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Warehouse Management with SAP® EWM

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Balaji R. Kannapan
Hari Shankar Tripathy
Vinay Krishna

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Balaji R. Kannapan, Hari Shankar Tripathy, Vinay Krishna

Warehouse Management with SAP® EWM

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Dear Reader,

Each warehouse is a hive of activity, with product and workers quickly flying from place to place. SAP Extended Warehouse Management allows you to keep track of all the moving parts within your warehouse, providing you with greater visibility into the status of inbound, outbound, and stored goods. But how can you make sense of the buzzing?

Whether you're looking to reduce costs through cross-docking or increase your responsiveness to customer demands through kitting, within these pages you'll find everything you need to be the queen bee of your warehouse. Authors Balaji Kannapan, Hari Tripathy, and Vinay Krishna have done a tremendous job, providing you with step-by-step instructions and screenshots for every step along the way. Beginning by sketching an overview of SAP's offerings, these experts show you how SAP EWM fits into the bigger supply chain picture, balancing careful configuration of master data with critical warehouse functionality like shipping and receiving.

As always, your comments and suggestions are the most useful tools to help us make our books the best they can be. Let us know what you thought about *Warehouse Management with SAP EWM*! Please feel free to contact me and share any praise or criticism you may have.

Thank you for purchasing a book from SAP PRESS!

Meagan White
Editor, SAP PRESS

Rheinwerk Publishing
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Contents

Preface

SAP offers hundreds of enterprise application software applications, and many of them are around the supply chain management space. While SAP ERP and its modules are at the core of the business processes run by organizations which have implemented SAP, specialized business processes are typically catered to by SAP offerings which run on top of SAP ERP. In simpler terms, while SAP ERP alone is sufficient to run most business processes, the need of specialized applications running in conjunction with SAP ERP becomes important with the increasing complexity of the business process. The specialized application around the supply chain management space is called SAP SCM, which in turn has various sub-products or solutions. One of these is SAP Extended Warehouse Management (SAP EWM), which caters to the specialized business requirements around the warehousing space. SAP Extended Warehouse Management leverages core functions of SAP ERP Warehouse Management module and brings in specialized functionalities which SAP ERP Warehouse Management cannot offer on its own. It is therefore safe to say that SAP Extended Warehouse Management is not a replacement for SAP ERP Warehouse Management. This book focuses on two key elements of SAP EWM: business processes and configuration. We also set up a dedicated SAP EWM system while writing this book. Numerous screenshots from this SAP EWM system will help you understand the configuration steps as you read, even if you don't have immediate access to an SAP EWM system. This book is based on the latest SAP EWM release, 9.3, which as of November was in the final stages of being made generally available.

Target Audience

This book expects the reader to be aware of concepts around SAP ERP Logistics, especially around Materials Management, Logistics Execution, and Warehouse Management. It is intended to be read by three main audiences—those SAP Logistics consultants wanting to learn SAP EWM, those SAP EWM consultants

wanting a book to help them during an SAP EWM implementation, and core team members involved in implementing SAP EWM in their organization.

Objective

The purpose of this book is to explain the need for SAP EWM, the business processes contained within SAP EWM and the way those business processes can be implemented. You can refer to screenshots from an SAP EWM system set up for this purpose and, even without having access to an SAP EWM system, understand the configuration process with ease.

After reading this book, you should be able to understand the business processes contained within SAP EWM, correlations between SAP EWM and SAP ERP, configuration steps, and new features which have been released with the latest EWM releases up to SAP EWM 9.3.

Structure of this Book

This book is organized into 23 chapters, 22 of which are a part of this book, with the remaining chapter available online. The chapters begin with an introduction to SAP EWM, and then move into master data and organization structure, and gradually dive into the business processes of SAP EWM.

The following walks through details of the chapters ahead:

- **Chapter 1: Introduction to SAP EWM**
  This chapter explains the evolution and positioning of SAP EWM within the large SAP solution portfolio. It also talks about the business benefits of SAP EWM and its correlation with SAP ERP WM. Towards the end it explains the relevance of ASAP implementation methodology with respect to an SAP EWM implementation
- **Chapter 2: Organization Structure**
  This chapter talks about the key elements of an organization structure in a SAP system and the steps required to set it up.
- **Chapter 3: Warehouse Structure**
  After explaining the concepts of how an organization structure is set up, we

move on to explain the warehouse structure and the units which form it. In this chapter, you will understand the relevance of those units, best practices around them, and the steps required to set them up within SAP EWM.

- **Chapter 4: Master Data**
  This chapter explains the relevance of various forms of master data which needs to be set up in SAP EWM and SAP ERP for various warehousing scenarios delivered with SAP EWM to work.
- **Chapter 5: Cross Process Definitions**
  This chapter explains various objects and processes like handling units, warehouse orders, storage control, batch management, resource management, serial number management, and the Post Processing Framework which are relevant to SAP EWM business processes which will be explained in the subsequent chapter.
- **Chapter 6: Integrating SAP ERP and SAP EWM**
  For most SAP EWM scenarios to run seamlessly, it is important for SAP EWM and SAP ERP to be integrated. This chapter talks about those integration concepts and systematically illustrates the steps needed to perform this integration.
- **Chapter 7: Inbound Processing**
  Activities start in a warehouse once the goods are received. This chapter focuses on various inbound activities like inbound delivery notifications, check in, unloading, putaway, etc.
- **Chapter 8: Advanced Production Integration**
  This chapter explains the integration of SAP EWM with respect to carrying out production activities in SAP ERP and SAP SCM. Concepts and set-up procedures around associated activities like component staging, batch management, catch weight management, receipts from production, etc. are explained in detail.
- **Chapter 9: Outbound Processing**
  Once you have understood how incoming materials are handled in a warehouse and how they are used in production, this chapter explains the outbound processes. Concepts around outbound deliveries, stock removal strategies, wave management, check out, picking, loading execution, etc. are explained in detail.
- **Chapter 10: Shipping and Receiving**
  This chapter talks about concepts and set-up procedures around shipping and receiving goods. Concepts around yard management, transportation units,

vehicles, shipments, freight documents, door determination, etc., are explained in detail.

- **Chapter 11: Physical Inventory**
  This chapter explains various physical inventory procedures, settings required to perform these procedures, and best practices around them.
- **Chapter 12: Internal Movements**
  In addition to the inbound and outbound movement of goods, a warehouse involves several movements within itself. This chapter explains the concepts and configuration steps around activities like replenishment, rearrangement, stock transfers, etc.
- **Chapter 13: Warehouse Monitoring**
  Monitoring a warehouse effectively is as important as setting up an efficient warehouse. One of the key features delivered with SAP EWM is the Warehouse Management Monitor. This chapters explains the usage of the Warehouse Management Monitor along with the Easy Graphics Framework and graphical warehouse layout.
- **Chapter 14: RF Framework**
  This chapter explains in details the radio frequency framework with respect to SAP EWM and the steps required to set it up for various business processes.
- **Chapter 15: Labor Management**
  In this chapter we talk about end-to-end processes around managing the warehouse workforce. Starting with activating the functionality through managing workforce performance, we explain it all.
- **Chapter 16: Quality Management**
  No warehouses want to hold inventory items that have manufacturing defects, delivery defects, returns defects, supplier defects, etc. In this chapter we will explain the entire spectrum of quality management procedures which can be performed in SAP EWM.
- **Chapter 17: Value Added Services**
  This chapter explains the value-added services which are designed to be performed along with inbound, outbound, and internal processes. After understanding the inbound and outbound processes which occur in SAP EWM, you can relate them to additional procedures which make those processes more meaningful and flexible.

- **Chapter 18: Cross Docking**
  In this chapter we explain the concept of cross docking, its various forms, exceptions around them, and the steps required to set it up.
- **Chapter 19: Material Flow System**
  Many modern warehouses use automatic storage and retrieval systems (ASRS) for the transfer of goods within the warehouse, wherein manual intervention isn't required, or is very limited. This chapter explains the concepts and steps which are required to set up a classic Material Flow System in SAP EWM.
- **Chapter 20: Kitting**
  Here we explain the concept of kitting and its forms like kit to order, kit to stock, and reverse kitting.
- **Chapter 21: Dock Appointment Scheduling**
  This chapter explains the concepts and configuration steps for Dock Appointment Scheduling with focus around key concepts like docking locations, loading points, appointment management, etc.
- **Chapter 22: User Maintenance and Archiving**
  For any SAP system to run seamlessly and to be fail safe, it is important to have a very robust user management and archiving framework. This chapter explains in detail the steps needed to archive a perfect user, role, and archiving state for your SAP EWM environment.
- **Integrating SAP EWM with Other Applications (online bonus chapter)**
  This chapter is freely available online, and explains the integration fundamentals of SAP EWM with other SAP systems like SAP TM, SAP GTS, SAP APO, etc.

We hope this book serves as a one-stop-shop for you to carry out successful SAP EWM Implementations.

References and Resources

The following resources and information contained within were used as references by the authors in the course of writing of this book and should be referred to for continued learning:

- **Concepts, Definitions and Industry Terminologies**
  http://www.supplychainmusings.com
  http://www.apics.org
  http://www.softwareadvice.com/scm/

- **SAP EWM Release and feature information**
  https://service.sap.com/rkt
  http://help.sap.com/ewm
  https://support.sap.com/release-upgrade-maintenance.html
  http://support.sap.com/releasestrategy
  https://solutionexplorer.sap.com/
- **SAP EWM Implementation methodology**
  https://service.sap.com/asap

Throughout the book, icons will alert you to special tips, warnings, and additional information:

Caution
This icon alerts you to information that will help prevent errors or confusion.

Tips
This icon highlights tips that will make your work easier.

Notes, Examples, and Takeaways
This icon provides you with examples, additional information on a topic, and, at the end of each chapter, indicates the key takeaways from that chapter.

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—Balaji Kannapan

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—Hari Tripathy

Special thanks to my wife **Soni** and friends **Saurabh** and **Vandana** for their patience & for compromising the amount of time which I could spend with them outside of work.
—Vinay Krishna

Before we get into the crux of SAP Extended Warehouse Management, this introductory chapter spends some time explaining what SAP is, what SAP Supply Chain Management is, and how SAP Extended Warehouse Management fits into the overall scheme.

1 Introduction to SAP Extended Warehouse Management

Instead of just another configuration guide, we want this book to be a one-stop reference for customers exploring SAP Extended Warehouse Management (SAP EWM) as their warehouse management software, for consultants practicing SAP EWM, for consultants aspiring to learn SAP EWM, and for end users getting ready to use SAP EWM. To that end, spending some time understanding how SAP EWM fits into the SAP scheme of things is worthwhile.

1.1 The SAP Product Pyramid

SAP has created hundreds of enterprise application software applications, which are mostly related to each other in one way or the other. Although volumes have been written on each of them, we'll use a simple pyramid to explain the concepts relevant to the scope of this book.

Caution

The SAP product pyramid concept has been created by authors of this book for readers to understand the SAP product portfolio in a simpler way. It's not the standard way SAP represents its product portfolio.

The pyramid shown in Figure 1.1 shows how SAP products relate to one another. As you can see, the pyramid is divided into four parts, called tiers. The bottom-most layer of the pyramid (Tier 1) has the largest base and area without which the tiers above it would have no platform to be based on. Tier 2 sits on top of Tier 1,

Tier 3 sits on top of Tier 2, and so on. Also, as we progress from Tier 1 through Tier 4, the base and the area of the tier decrease proportionally.

Now let's relate this pyramid to the SAP software portfolio. The bottommost layer relates to SAP Enterprise Core Component (ECC), better known as SAP ERP and historically as SAP R/3. Similar to the largest base of Tier 1 of our product pyramid, SAP ERP has the largest adoption within the SAP market. In other words, most of the customers who use SAP software have SAP ERP in their landscape and most SAP consultants around the globe are SAP ERP consultants. SAP ERP consists of various modules, including Sales and Distribution (SD), Materials Management (MM), Production Planning (PP), Warehouse Management (WM), Financials (FI), Controlling (CO), Logistics Execution (LE), and Human Capital Management (HCM). SAP ERP is self-sustained from an enterprise point of view, which means that its modules are generally sufficient to run the functions an enterprise wants from an SAP ERP package.

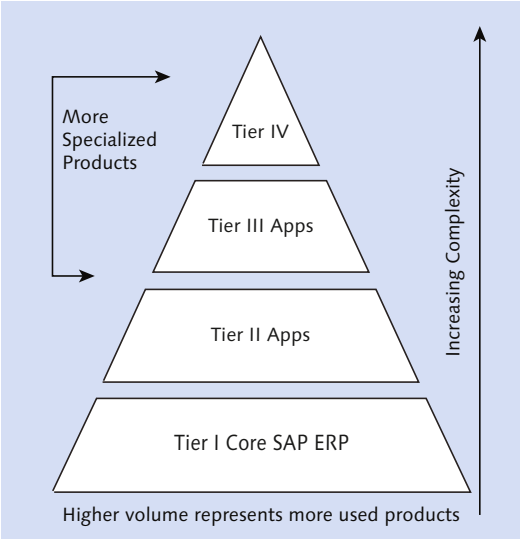


Figure 1.1 SAP Product Pyramid

So if Tier 1 SAP ERP can do pretty much everything that an enterprise needs, you may be wondering what the other tiers are for? Well, the logic is similar to that of upgrading a car after a few years. Although the customer can still buy new accessories and upgrade his old car with them, most people generally tend to buy a new car with those same features. Similarly, after customers use a specific module

of SAP ERP for some time and become stable with it, they start looking for newer features to cater to the business processes that they think need more advanced features than SAP ERP offers. This is where Tier 2 in our SAP product pyramid comes into picture.

For instance, a customer using the MM module within SAP ERP for 10 years may realize the need to have advanced contract management functionalities that aren't contained within SAP ERP. Such customers opt for advanced solutions that fall under our Tier 2 and importantly are related to one or more SAP ERP modules contained in Tier 1. For example, the customers using the MM module within SAP ERP and looking for a legal contract management solution may opt for SAP Contract Lifecycle Management (SAP CLM) as a top up to MM, and the ones looking for advanced auctioning functionalities may opt for SAP Supplier Relationship Management (SAP SRM). Similarly, most SAP ERP modules under Tier 1 have a Tier 2 counterpart that can augment their features when implemented in conjunction with each other. It's also important to note that one SAP ERP module may have more than one Tier 2 counterpart, and a Tier 2 solution may be a counterpart to more than one SAP ERP module. Just as Tier 2 of our pyramid sits on top of Tier 1, Tier 2 solutions work in conjunction with a module. It's important to note that, while many Tier 2 solutions can run independently of a module, their full potential is realized only when the corresponding module is implemented as well.

Example

The Tier 2 solutions SAP SRM, SAP CLM, SAP Sourcing, and SAP Supplier Lifecycle Management (SLC) each can run independently of the MM module and of course independent of one another. However, their full functionality is realized when they run in conjunction with MM.

Two or more Tier 2 solutions can also work in conjunction with each other. We've deliberately given an example outside of SAP EWM to drive home the point that a Tier 1 SAP ERP module can have multiple Tier 2 solutions.

Although we could write an entire book detailing this concept, in the context of this book, we'll limit it to stating that MM, SD, LE, and WM are the SAP ERP modules for which the Tier 2 solution is SAP EWM. This implies the following:

- If you are a consultant for one or more of MM, SD, LE, or WM, SAP EWM is a logical progression for you.

- A consultant running any of these four SAP ERP modules may start looking at SAP EWM as a Tier 2 solution for respective business processes.
- You can still learn SAP EWM without being an expert on these SAP ERP modules, but it's wise to have an overview of them.
- SAP EWM isn't a replacement of any of these modules; instead, it's meant to augment what they do within SAP ERP.

In the context of the pyramid, we define Tier 3 solutions as SAP industry solutions, such as SAP for Retail, SAP for Oil & Gas, and so on. SAP industry solutions are derived from various Tier 1 and Tier 2 applications with some additions to make them specific to a particular industry.

Tier 4 solutions are visibility solutions such as SAP Spend Performance Management (SAP SPM). Although Tier 3 solutions have a bit of Tier 1 and Tier 2 as relevant for that specific industry, Tier 4 solutions are specifically meant to run on Tier 1 through Tier 3 solutions and generate reports for top-level executives. The scope of this book will revolve around Tier 1 and Tier 2 solutions.

Now that you have an understanding of the concept of structuring SAP solutions by tiers, let's take a slightly closer look at the SAP solutions relevant for the scope of this book and see where they fit into the product pyramid.

1.2 Introducing SAP Business Suite

SAP bundles a set of fast-moving products together in a package called the SAP Business Suite, which includes the following:

- SAP ERP
- SAP Product Lifecycle Management (SAP PLM)
- SAP Customer Relationship Management (SAP CRM)
- SAP Supply Chain Management (SAP SCM)
- SAP Supplier Relationship Management (SAP SRM)

Other than SAP ERP, which is our Tier 1 solution, the rest of them fall into the Tier 2 of our product pyramid. They, along with the modules they are comprised of, are meant to perform specific business processes in conjunction with their

respective SAP ERP counterpart module, for example, MM and SAP SRM. We'll focus this section on SAP SCM because that is where SAP EWM resides.

The Association for Operations Management (APICS) defines supply chain management as the following:

> *... the design, planning, execution, control, and monitoring of supply chain activities with the objective of creating net value, building a competitive infrastructure, leveraging worldwide logistics, synchronizing supply with demand, and measuring performance globally.*

It goes on to state that interconnected or interlinked networks, channels, and node businesses are involved in the provision of products and services required by end customers in a supply chain.

SAP SCM builds upon this and provides a set of software that brings this definition to work in an enterprise. SAP SCM is made up of a set of modules (when you buy SAP SCM, you technically buy all the applications and then choose to implement one or more of them):

- SAP Event Management (SAP EM)
- SAP Supply Network Collaboration (SAP SNC)
- SAP Demand Planning (SAP APO-DP)
- SAP Supply Network Planning (SAP APO-SNP)
- SAP Production Planning and Detailed Scheduling (SAP APO-PP/DS)
- SAP Service Parts Planning (SAP SPP)
- SAP Transportation Management (SAP TM)
- SAP Auto ID Enterprise (SAP AIE)
- SAP Extended Warehouse Management (SAP EWM)

Hint

DP, SNP, and PP/DS are a part of SAP Advanced Planning and Optimization (SAP APO), which is a constituent of SAP SCM.

By now, you may have realized that you could really spend your life trying to master SAP SCM. In fact, we haven't come across a single SAP SCM subject matter expert!

Hint

Each of these Tier 2 solutions run in conjunction with a Tier 1 SAP ERP module; for example, PP/DS runs in conjunction with PP!

Figure 1.2 shows various components of the SAP SCM system. Let's quickly discuss what each one does before we move on to SAP EWM.

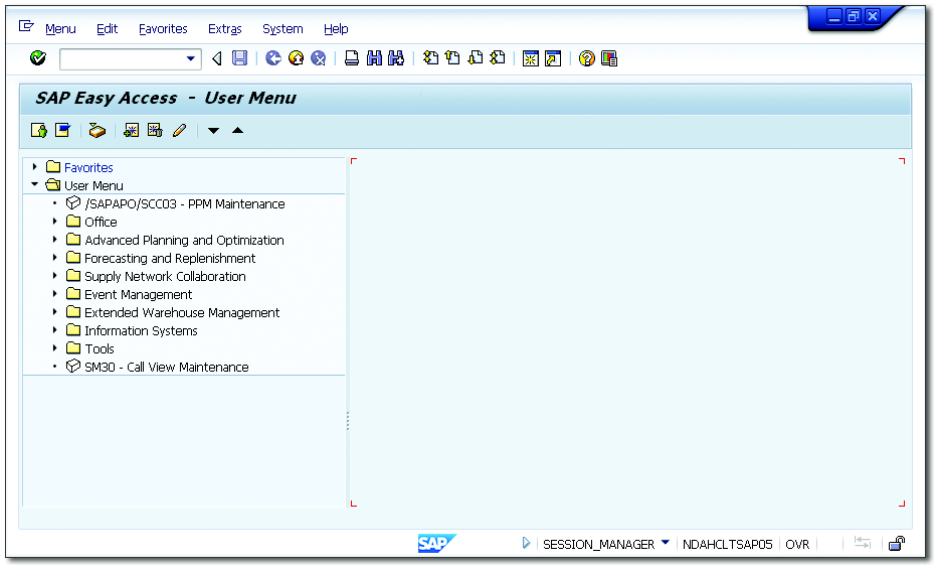


Figure 1.2 Typical SAP SCM Login Screen

1.2.1 SAP Event Management

SAP Event Management (EM) is the central application for tracking and controlling all kinds of business processes. Although designed and developed over many years to monitor logistical processes in the supply chain, EM can provide visibility of any kind of business process due to its generic design. EM provides a wide range of functions to monitor milestones (known as expected events), log unexpected events, and trigger alerts, notifications, and any kind of automated follow-up activities. It's designed to monitor a given business process across applications, systems, and business organizations, both internally and externally. EM can integrate with any SAP and non-SAP system and has preconfigured interfaces to other applications. It also has related preconfigured visibility processes for SAP ERP, TM, SAP SCM server, SAP Auto-ID Infrastructure (AII), and others.

1.2.2 SAP Supply Network Collaboration

SAP Supply Network Collaboration (SNC), which was previously known as SAP Inventory Collaboration Hub, is meant to connect and collaborate with suppliers, outsourced manufacturers, and customers. SNC improves visibility into supply and demand to reduce inventory buffers, accelerate the movement of materials through the pipeline, improve customer service, and increase revenues. The following are SNC's key objectives:

- Streamline collaboration with suppliers, contract manufacturers, and customers.
- Decrease procurement, sales, and inventory costs.
- Enhance supply chain visibility and increase overall speed, accuracy, and adaptability of the supply network.
- Reduce inventory levels while managing variations in supply and demand.
- Improve communications, and reduce errors and processing costs.

Caution

Consultants commonly refer to SNC as Supplier Network Collaboration, even though it's actually Supply Network Collaboration.

1.2.3 SAP Transportation Management

SAP Transportation Management (TM) supports you in all activities connected with the physical transportation of goods from one location to another. You can use TM to perform the following activities, for example:

- Create forwarding orders for your ordering parties.
- Transfer orders and deliveries from an SAP ERP system.
- Create freight bookings.
- Plan the transportation and select carriers.
- Tender transportation services.
- Dispatch and monitor the transportation.
- Calculate the transportation charges for both the ordering party and the supplier side.
- Consider foreign trade and dangerous goods regulations.

You can use TM to create and monitor an efficient transportation plan that fulfills the relevant constraints (e.g., service level, costs, and resource availability). You can determine options to save costs and to optimize the use of available resources, and you can react to transportation events and find solutions to possible deviations from the original transportation plan. TM is a Tier 2 solution for SD, LE, and so on.

1.2.4 SAP Demand Planning

Demand Planning (DP) in SAP APO is used to create a forecast of market demand for your company's products. This component allows you to take into consideration the many different causal factors that affect demand. The result of DP in APO is the demand plan.

DP is a powerful and flexible tool that supports the demand planning process in your company. User-specific planning layouts and interactive planning books enable you to integrate people from different departments and even different companies into the forecasting process. Using the DP library of statistical forecasting and advanced macro techniques, you can create forecasts based on demand history as well as any number of causal factors, carry out predefined and self-defined tests on forecast models and forecast results, and adopt a consensus-based approach to reconcile the demand plans of different departments. To add marketing intelligence and make management adjustments, you use promotions and forecast overrides. The seamless integration with SNP in SAP APO supports an efficient sales and operations planning (S&OP) process.

1.2.5 SAP Supply Network Planning

SAP Supply Network Planning (SNP) is a set of functionalities around distribution requirement planning, deployment, demand and supply matching, and optimization. Along with DP, it's an integral part of any organization's S&OP process.

1.2.6 SAP Production Planning and Detailed Scheduling

You use the SAP APO Production Planning and Detailed Scheduling (PP/DS) component, which is a Tier 2 solution corresponding to the PP module of SAP ERP to do the following:

- Create procurement proposals for in-house production or external procurement to cover product requirements.
- Optimize and plan the resource schedule and the order dates/times in detail.
- Reduce lead times.
- Increase on-time delivery performance.
- Increase the throughput of products and reduce the stock costs through better coordination of resources, production, and procurement.

You can take the resource and component availability into account here. Above all, PP/DS is used to plan critical products, such as products with long replenishment lead times or products that are produced on bottleneck resources. You can use PP/DS to create executable production plans and schedule them for manufacturing.

1.2.7 SAP Service Parts Planning

SAP Service Parts Planning (SPP) provides planning functions specific to service parts and transparency throughout the supply chain, right from the moment demand occurs through to the delivery of the product. Planning for your service parts takes place in distribution structures (i.e., the bill of distribution [BOD]), which contain all of your locations. Locations can be, for example, distribution centers, contract packagers, or your customers and dealers. Alongside the current BOD, you can also work with future BODs. This means that you can define a specific time in the future when a BOD will replace a different BOD. The system takes this future BOD into account, for example, as part of forecasting and distribution requirements planning (DRP).

1.2.8 SAP Auto ID Enterprise

SAP Auto ID Enterprise (AIE) helps enterprises in managing inventory and shipping of goods from inventories as well as goods receipt on the recipient's side using radio-frequency identification (RFID) devices together with the backend functionality of enterprise software applications such as SAP SCM and SAP ERP. Basically, AIE is RFID-based software, which, in conjunction with EM, automatically reads and posts the status of goods within a supply chain. This is a Tier 4 solution within our pyramid.

1.2.9 SAP Extended Warehouse Management

Finally, we reach SAP Extended Warehouse Management (SAP EWM). We'll explain the various introductory facets of this solution from SAP in this chapter. Before we get into explaining what SAP EWM is, let's spend some time understanding what warehouse management is in general and the various warehouse management solutions that SAP offers.

1.3 Warehouse Management in General

A warehouse management system (WMS) is a key part of the supply chain and primarily aims to control the movement and storage of materials within a warehouse and process the associated transactions, including shipping, receiving, put away, and picking. The systems also direct and optimize stock putaway based on real-time information about the status of bin utilization. A WMS monitors the progress of products through the warehouse. It involves the physical warehouse infrastructure, tracking systems, and communication between product stations.

Note

The objective of a warehouse management system is to provide a set of computerized procedures for management of warehouse inventory, space, equipment, and people with the goal of minimizing cost and fulfillment times.

More precisely, warehouse management involves the receipt, storage, and movement of goods—normally finished goods—to intermediate storage locations or to a final customer. In the multi-echelon model for distribution, there may be multiple levels of warehouses, including a central warehouse, a regional warehouse (serviced by the central warehouse), and potentially retail warehouses (serviced by the regional warehouses).

Warehouse management systems often use automatic identification and data capture technology, such as barcode scanners, mobile computers, wireless LANs, and potentially RFID to efficiently monitor the flow of products. After data collection, there is either a batch synchronization with the data or a real-time wireless transmission to a central database. The database can then provide useful reports about the status of goods in the warehouse.

Warehouse design and process design within the warehouse (e.g., wave picking) are also part of warehouse management. Warehouse management is an aspect of logistics and supply chain management.

1.4 Warehouse Management Solutions from SAP

If we look back two generations of SAP solutions, even SAP R/2 had warehouse logistics functions, which were partly integrated into the next generation SAP R/3. This came to be known as SAP R/3 WM, and then as SAP ERP WM, which is how it's known today.

With the release of R/3 2.0 in 1993, SAP introduced storage unit management and parallel processing in the solution and coined the term SAP Warehouse Management (WM). Here onward, SAP kept on adding capabilities per contemporary business needs of customers.

Within the SAP solutions portfolio, if we refer to Tier 1 of our product pyramid, SAP ERP contains a module called Warehouse Management (WM), which forms the base level of warehousing solutions within the SAP solutions portfolio. This works closely in conjunction with related SAP ERP modules such as SD, MM, and so on to perform the activities that a WMS solution should offer. Over time, customer warehousing requirements have transformed and so have the SAP warehouse offerings. Thus, like any other Tier 2 solution, the Tier 2 solution for warehouse management has also evolved within the SAP solutions portfolio. To be precise, SAP EWM is the logical evolution or the Tier 2 solution related to WM.

With the launch of SAP EWM in 2006, SAP delivered a generational shift in the way a WMS supports the core and cross processes of a warehouse. SAP EWM offers unmatched capability to fit into the warehousing requirements of business. Figure 1.3 illustrates this journey and lists the functionalities added over the years.

SAP's flagship solution, WM, is among the reputed WMSs available in the market and remains a fitting option for many customers using small- to medium-size warehouses, with lower volume warehouse operations and less complex process automation requirements. WM is focused on supporting enterprise-centric processes.

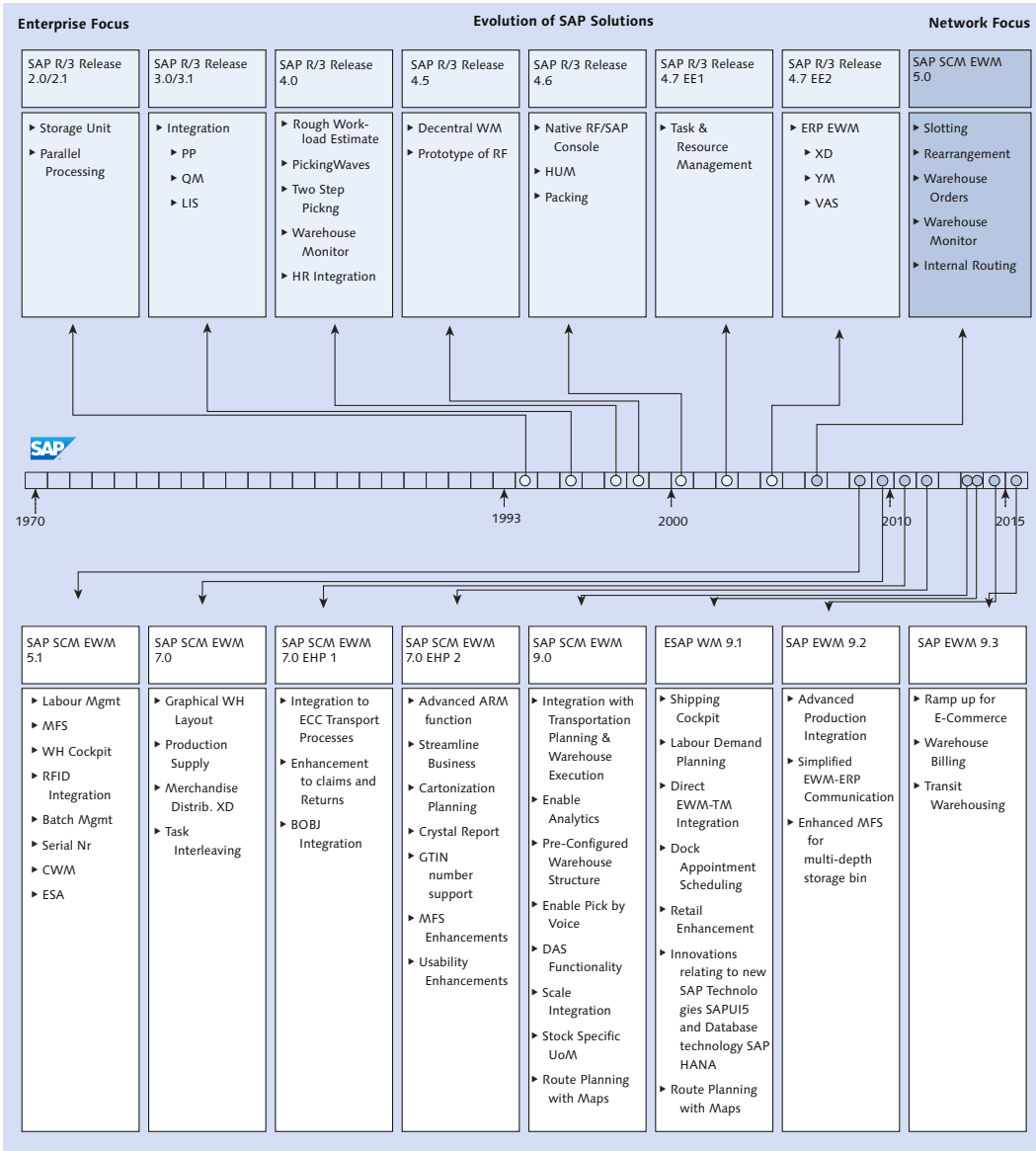


Figure 1.3 Evolution of SAP's Warehouse Management Solutions

SAP EWM represents a new-generation WMS based on supply chain management. With an architectural shift in design, SAP EWM is targeted to handle complex

processes with high-volume warehouse operations in medium- to large-size warehouses. SAP EWM provides connections to external processes such as TM as well.

Hint

SAP has built new capabilities into recent versions of SAP EWM that are based on innovative technologies such as SAPUI5 and SAP HANA, and it's all set to achieve even greater heights.

1.5 Comparing SAP Extended Warehouse Management and SAP ERP Warehouse Management

The following subsections provide a brief comparison of what WM can do and what SAP EWM can do in the following key areas:

- Mapping a warehouse complex in a WMS
- Functionalities
- Planning capabilities
- Monitoring capabilities
- Reporting and analytics
- Output management capabilities
- Supporting warehouse technologies
- User interaction

1.5.1 Mapping a Warehouse Complex in a Warehouse Management System

Mapping an accurate warehouse complex in any WMS is the key to accurate modeling of its warehouse processes. One of the key abilities of SAP EWM is that it replicates the warehouse complex with meticulous details.

While both SAP EWM and WM structure the warehouse using storage types, storage sections, and storage bins, SAP EWM further categorizes storage types with the roles they play in the warehouse, such as work center, staging area group, door, identification point, and so on. The work center role maps a physical unit of

the warehouse in SAP EWM, which is used to perform activities such as packing, deconsolidation, performing value-added services, weighing, counting, quality inspections, and so on.

SAP EWM also maps users and equipment (e.g., forklifts) as resources in the system. In SAP EWM, traceability of stock goes beyond final bins and stock lying in intermediate storage bins at work centers. Resources can also be tracked and analyzed.

SAP EWM groups the bins with respect to activities in an activity area to optimize the warehouse operations, and then it creates warehouse orders (WOs), which are work execution lists assigned to a resource per activity area.

Storage types, role classifications, resources, and activity areas are differentiators in SAP EWM.

1.5.2 Functionalities

SAP EWM functionalities provide greater automation support for both simple and complex business processes, as shown in Table 1.1. Whereas WM works with one-step and two-step movements, SAP EWM is capable of supporting n-step movements. It's important to note that while *warehouse movement type* controls the movement of product from source to destination bin, *warehouse process type* maintains parameters for both single- and multistep movements.

SAP EWM uses a concept called *storage control* for multistep movements. A parameter called *storage process* groups the steps to facilitate these movements through one or more *interim storage types* wherein activities such as deconsolidation, counting, and so on can be performed. These movements and activities can take place before final *putaway* in the inbound process and after *picking* in the outbound process. Storage control is further categorized into Process-Oriented Storage Control (POSC) and Layout-Oriented Storage Control (LOSC). SAP EWM is also capable of mixing POSC and LOSC for movements.

The *built-in slotting and rearrangement* optimization feature within SAP EWM calculates optimal parameters such as the *putaway control indicator*, *stock removal control indicator,* and *bin type* for a product. These planning values are stored in the product master and needs to be activated. Based on slotting, rearrangement optimizes space in the warehouse by moving stocks to optimal locations.

The *expected goods receipt* functionality enables users to create inbound deliveries from purchase orders (not all vendors send advanced shipping notices [ASNs]) and production orders and plan further activities based on these inbound deliveries.

Labor management is another built-in functionality in SAP EWM, whereas WM needs *Task and Resource Management (TRM)* as an add-on to provide similar functionalities.

The *Catch Weight Management* functionality of SAP EWM enables you to record weight while performing activities. This functionality is useful when there are weight variations in a product.

The *Yard Management* functionality of SAP EWM allows you to load/unload a transportation unit in the warehouse; this functionality isn't available in WM.

The *Task Interleaving* functionality of SAP EWM reduces deadheading (movement of resources without product/handling unit) in the warehouse and brings efficiency in the warehouse.

Functionality	SAP ERP WM	SAP EWM
Stock and bin management	Yes	Yes
Storage unit management	Yes	Yes
Placement and removal strategies	Yes	Yes
Replenishment	Yes	Yes
Pick logic	Yes	Yes
HU management	Yes	Yes
Yard management	Yes	Yes
Expected goods receipt	No	Yes
Value added services	No	Yes
Opportunistic cross docking	No	Yes
Dynamic cycle counting	No	Yes
Loading/unloading of TU	No	Yes
Deconsolidation	No	Yes
Slotting and rearrangement	No	Yes
Labor management	No	Yes

Table 1.1 Comparison of SAP EWM and SAP ERP WM Functionalities

Functionality	SAP ERP WM	SAP EWM
Task interleaving	No	Yes
Task and resource management	No	Yes

Table 1.1 Comparison of SAP EWM and SAP ERP WM Functionalities (Cont.)

1.5.3 Planning Capabilities

The *Wave functionality* in WM helps in planning and execution of picking activities. WM's planning capability depends on SAP ERP LE-SHP (Logistics Execution—Shipping) and SAP ERP LE-TRA (Logistics Execution—Transportation) to create and plan for deliveries and shipments.

The Wave functionality in SAP EWM is much broader and capable of automatically releasing waves per predesigned *wave templates*, which leads to creation of tasks in the warehouse. The *warehouse order* (WO), mentioned earlier, further bundles these *warehouse tasks* (WTs) based on rules and filters that suit warehouse operations. Also, shipment can be created and deliveries can be assigned to them within SAP EWM.

As a differentiator, SAP EWM's planning view of the shipping cockpit enables user to view and plan for deliveries and shipment in one screen. It has both planning and execution functionalities. Additionally, *Labor Demand Planning* can forecast workload and help plan for resources to avoid workforce shortages. *Dock Appointment Scheduling* is a collaborative planning tool for loading/unloading appointments at a warehouse between the warehouse operator and its carriers.

1.5.4 Monitoring Capabilities

Both WM and SAP EWM contain a *warehouse monitor* that helps supervisors monitor warehouse activities and maximize efficiency. The warehouse monitor has the capability to monitor *open deliveries*, *unconfirmed transfer orders,* and *stock situations* in the final and intermediate bins. WM also has separate monitors for *cross-dock* and *wave pick*.

The SAP EWM warehouse monitor is a comprehensive tool that lets users view documents, processes, and alerts. In SAP EWM, the Warehouse Management Monitor screen is well structured and is divided into three parts as shown in Figure 1.4:

- Hierarchical tree structures and navigation nodes in the left side of the screen
- Parent data (per selected node) in the right top of the screen
- Child data details per parent node in the right bottom of the screen

It's important to note that in SAP EWM, a supervisor can assign work through the warehouse monitor to a resource. The SAP EWM warehouse monitor is capable of performing some warehouse activities as well.

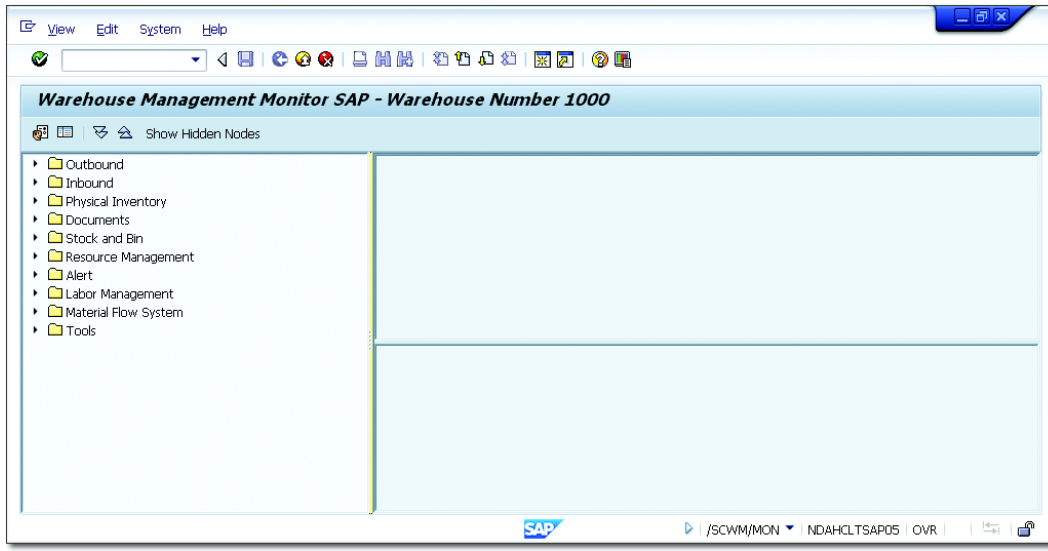


Figure 1.4 SAP EWM Warehouse Management Monitor

Although it's not possible to personalize the monitor in WM, which can be accessed only through SAP Easy Access, the SAP EWM warehouse monitor can be personalized per the need. The SAP EWM warehouse monitor provides system access options from both the GUI as well as the browser-based SAP NetWeaver Business Client (NWBC).

The SAP EWM shipping cockpit's execution view allows you to check the progress in activities such as picking, packing, and staging for transportation units.

Additionally, SAP EWM's warehouse cockpit and graphical warehouse layout (GWL) also provide monitoring capabilities through visualization of key warehouse figures and two-dimensional graphics of the warehouse complex.

1.5.5 Reporting and Analytics

WM provides several transaction codes (Transaction LX**) that can be run to fetch predefined standard reports. You need to customize the programs behind the transaction codes and design the report per the requirements. The WM warehouse monitor also holds reporting capabilities and assists in decision making.

In SAP EWM, a well-designed monitor provides wide reporting functionality through a single screen equipped with SAP List Viewer (ALV) features and functionalities. The SAP EWM warehouse monitor provides selection screens and detailed criterion for report generation as well.

Easy Graphics Framework (EGF) and *graphical warehouse layout* (GWL) tools available with SAP EWM also have reporting and analytical capabilities. EGF is used to develop the warehouse cockpit. The warehouse cockpit can display key figures, for example, pending picks in an activity area of the warehouse, in an easy to understand graphical format. Predefined chart types such as pie charts, Gantt charts, traffic lights, and so on can be used to display the key figures.

The GWL displays the warehouse as a two-dimensional graphic that provides a visual overview of the warehouse to verify location configurations. Conveyer segments, walls, offices, and so on can be defined as GWL objects. This allows monitoring of conveyer systems in the warehouse as well.

SAP EWM also includes predefined content integrated with SAP BusinessObjects BI for analytical reporting.

1.5.6 Output Management Capabilities

WM's *print control functionality* provides flexible control printing activities for the warehouse. Using print control, chosen documents can be printed for goods movement. Selection of form and number of copies can also be automated. Print control also provides automatic printer selection.

The *Post Processing Framework* (PPF) in SAP EWM provides an interface for actions such as printing delivery notes, mailing, faxing, creating subsequent documents, triggering workflow processes, and so on based on conditions. PPF tools are used for scheduling, starting, and monitoring actions. Determination and processing of actions can take place both automatically and with user interaction.

1.5.7 Connect with Supporting Warehouse Technologies

Although WM has standard RF technology, SAP EWM has enhanced and configurable RF technology. SAP EWM also has standard *Material Flow System* (MFS) and *voice picking integration*.

1.5.8 User Interfaces

User interaction with the WMS is the key to the warehouse's productivity.

Both WM and SAP EWM provide interactive support though graphical user interfaces (GUIs) and radio frequency (RF) devices. Additionally, SAP EWM provides user-friendly and easy-to-personalize tools such as *warehouse monitor*, *shipping cockpit,* and *labor demand planning,* which can be accessed using browsers and are based on NWBC. The labor demand planning application can also be accessed by mobile devices and uses SAPUI5.

Caution

WM remains a viable option for many customers, and SAP will continue to support it. However, developments of new functionalities may not be seen very often.

1.6 Business Benefits of SAP EWM

With fierce competition globally in the warehouse management space to minimize the inventory holding costs, procure inventory just in time, increase operating efficiency, decrease operating cost, deliver products on time in full, and react faster to demanding situations, organizations are constantly looking for innovations to augment their warehouse operations. Along with focusing on the primary businesses, robust warehouse management solutions are becoming essential for changing business needs. Because SAP has always provided cutting-edge solutions in the warehouse management space—from its initial WM solutions with SAP R/2 to its subsequent evolution to SAP EWM—it is often the first choice for customers looking at deploying a WMS solution.

In line with organizations looking at sustainability as a major business driver, SAP EWM aids warehouses to become fully paperless environments and to be driven by system-guided RF functionality. Seamless integration of automation using RF, RFID, pick-by-voice, interface to external systems (warehouse control units), and

automation further help organizations meet changing business needs. Dock appointment scheduling for carriers via user interface (UI) allows the carriers to maintain the appointments, plan and manage the vehicle arrivals effectively, and help being on time. This helps you balance the workload throughout the day effectively and plan based on resource availability within the warehouse.

Quality Management (QM) enables you to control the movement of products within the warehouse based on the quality inspection criteria, and the Quality Inspection Engine (QIE) is used to map the QM processes.

A robust and comprehensive monitoring tool is provided to keep the warehouse supervisors updated on the warehouse activities. This, unlike any other tool, is a one-stop shop for critical information on warehouse activity progress. In addition, the easy graphic framework provides the warehouse key figures in a graphical manner. Analytics for SAP EWM include BI Content, BI Content Extensions, and BI Content Extractors, which help to measure and evaluate business performance. The BI Content and BI Content Extensions contains data such as executed workload, exceptions, measurement services, WOs, WTs, volume analysis, and so on. Value-added services (VAS) in SAP EWM aid in designing complex warehouse scenarios and execution. VAS is an important feature in SAP EWM and provides an edge over other customary warehouse management solutions.

Labor Management (LM) in SAP EWM helps in handling resources optimally and effectively. You can use LM for evaluating performance against labor standards, operational planning, and calculating labor incentives. Labor Demand Planning (LDP) helps in forecasting the future workload and workload aggregation. The cross-docking functionality helps reduce storage costs, transportation costs, and material movements costs. It also reduces the unnecessary activities of product movements and augments potential elimination of stock holding costs. SAP EWM cross-docking helps with planned cross-docking and opportunistic cross-docking methods.

The shipping and receiving functionality in SAP EWM helps manage the inbound and outbound transports using vehicles and transportation units, specifically, check-in, check-out, loading, unloading, printing, goods issue, managing the yard, dock appointment scheduling, and so on. Yard Management (YM) is an integral part of shipping and receiving functionality wherein you manage the yard movements within the warehouse. YM is used to supervise the movements of

vehicles and transportation units within the premises, provide real-time visibility on the yard, and perform effective handling from check in till check out.

Resource Management (RM) supports effective use, monitoring, and governing of warehouse resources. RM prohibits manual allocation of work and instead operates via queue managed with RF and non-RF environments to effectively monitor resources.

SAP EWM for the retail rapid-deployment solution (RDS) offers a flexible preconfigured solution for critical fixed-scope warehousing processes. This solution can be delivered within a fixed time frame for predefined processes. It caters to the following business processes: simple inbound, complex inbound, simple outbound, complex outbound, physical inventory, cycle count, automatic replenishment, simple scrapping, and customer returns.

Wave Management in SAP EWM helps control items within and across deliveries, helps group delivery items or split items based on the required criteria, helps execute delivery in a timely manner, and helps improve the productivity in outbound processes. SAP EWM facilitates advanced integration of production processes from production supplies up to the production receipt. Production processes are integrated with in-process inspections to enable sample checks. Slotting and rearrangement help arrange the products in the warehouse based on the movement history and product categorization (A, B, and C) so they are stored for optimal movement within the warehouse.

SAP EWM supports and integrates with the RF framework and supports a wide variety of devices. The RF framework supports GUI-based, character-based, and browser-based devices. Character-based devices are connected via SAP Console, and browser-based devices are connected via ITSmobile. SAP EWM allows you to use RFID technology by integrating with AII as well. RFID technology allows you to automate the control of goods movement in real time and improves both operational efficiency and warehouse productivity.

The Material Flow System (MFS) in SAP EWM facilitates setting up an automatic warehouse, and the warehouse processes are processed automatically. MFS is integrated with SAP EWM and is connected via programmable logic controllers (PLCs) to retrieve the information on warehouse processes. SAP EWM supports environmental health and safety functions, helps in handling the hazardous substances safely, and assists in complying with environmental statutory regulations

when these goods are transported. Cartonization planning can be used to ship less-than-truckload quantities of different products to several customers using a single route and grouping multiple small deliveries to provide optimum usage of truck space.

SAP EWM provides an opportunity to handle the exception situations in the nick of the time through exception handling. This process is necessitated when the actual situation differs, and it allows you to execute freely definable follow-up actions based on the exceptional situation in the warehouse. SAP HANA enables analysis of very large, nonaggregated data at unprecedented speeds in local memory. SAP HANA Live for SAP EWM provides SAP-delivered content for real-time operational reporting and analytics without any latency in reporting. The deployment options are fairly easy to get the most out of your return on investment (ROI).

1.7 Deployment Options of SAP EWM

Decision on deployment of SAP EWM plays a crucial judgment on how you've decided to install SAP EWM for your organization. Various IT infrastructure and application elements within the organization are involved in assessing, evaluating, and deciding on deployment options. Influencing decision factors include transaction volume, integrity and compatibility of other WMS-related applications, criticality of the system landscape, hardware resources, and so on. Figure 1.5 illustrates the deployment options for SAP EWM.

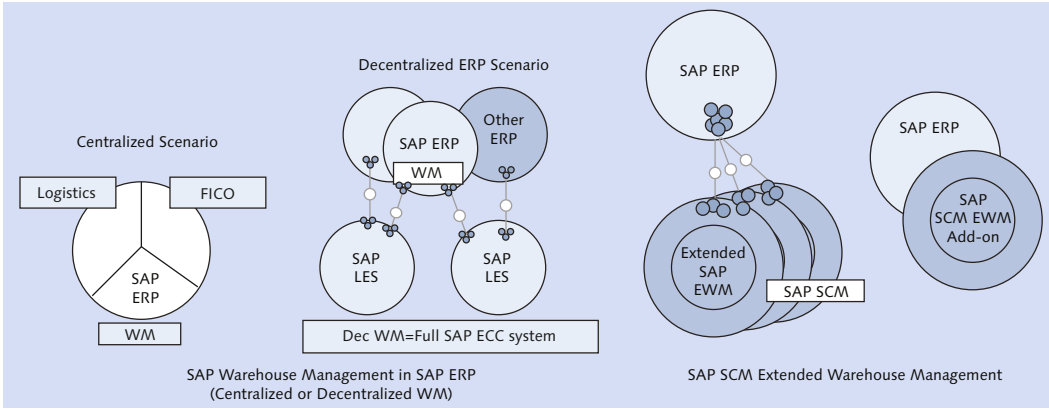


Figure 1.5 SAP EWM Deployment Options

1.7.1 Deploying SAP EWM on SAP ERP

SAP introduced the capability of implementing SAP EWM as an add-on to SAP ERP in 2007 to address the needs of customers who were already on SAP ERP and were looking at SAP EWM as a close-fitting integration across SAP ERP functionalities on the same server. This integration opportunity allowed many customers to move on from their custom WMSs into one single platform.

The two deployment options for SAP EWM on an SAP ERP system are listed here:

- **Centralized**
  The SAP EWM add-on is installed on a server on which SAP ERP runs.
- **Decentralized**
  The SAP EWM add-on is installed in SAP ERP, which positions itself as decentralized warehouse management even though it's a full SAP ERP system.

1.7.2 Deploying SAP EWM on SAP Supply Chain Management

The most widely used option of deploying SAP EWM is alongside SAP SCM. There are varied options within SAP SCM deployment based on keeping or not keeping other SAP SCM applications such as SAP APO, SPP, SNC, and SAP Global Available-to-Promise (GATP). SAP's general recommendation is to deploy SAP EWM on a separate instance from other SAP SCM applications. This option enables you to decouple warehousing business from the rest of the businesses, which allows the entity to stay focused on the core businesses while being flexible at the same time. Newer technologies such as cloud computing give the flexibility to run SAP EWM on one box along with other applications.

A dedicated system in a large-scale environment can continually provide better performance, and flexibility and dependability are compelling reasons to build SAP EWM on a separate instance. Sizing is also key to a successful SAP EWM implementation and has to be taken care of in detail. Factors that influence the sizing of an SAP EWM system include transaction volume, number of users, applications, interfaces, and traffic across applications.

1.8 ASAP 8 Implementation Methodology and SAP EWM

The ASAP methodology provides a comprehensive way to streamline the implementation, upgrade, and enhancement of SAP software via the following benefits:

- Reduced total cost of implementation by embedding the principles of SAP Advanced Delivery Management (ADM) into a streamlined and modular implementation road map for ASAP
- Choice of Agile or Standard ASAP implementation approach of your SAP solution (see Figure 1.6)
- Content-rich implementation accelerators, templates, and guides for implementation projects from strategy to operations
- Transparent value delivery through consistent reflection of the business case
- Efficient project governance, QM, and guidance for Agile implementation projects, SAP Business Process Management (BPM), and traditional implementation projects
- Approach that combines user-centric design, business processes, and IT architecture
- Coverage of the entire project lifecycle from evaluation through delivery to post-project solution management and operations

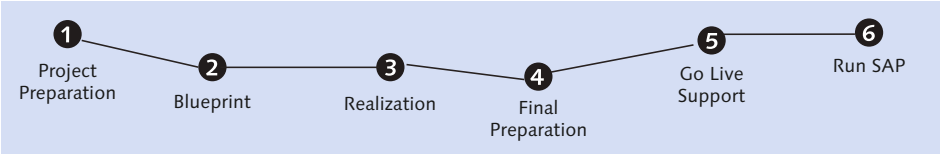


Figure 1.6 ASAP Implementation Methodology

It's important to understand how an ASAP methodology is relevant to an SAP EWM project. In the following subsections, we'll describe the most commonly used standard ASAP 8 methodology and explain some key aspects relevant to carry out a successful SAP EWM project.

1.8.1 Project Preparation

During this phase, the team goes through initial planning and preparation for the SAP project. Some of the activities that you'll undertake during an SAP EWM implementation include the following:

- **Project initiation**
  The purpose of the project initiation deliverable is to formally recognize that a new project exists. It supports the decision to accept the project, align stakeholders around a project and its scope, provide updated information for planning, and obtain a commitment to proceed. In an SAP EWM project, it's of utmost importance to ensure alignment between the IT teams and the end users of the warehouse at the user level. It's thus critical to have SAP EWM end user representation on the project team.
- **Project charter**
  The purpose of this deliverable is to clearly and explicitly define the objectives of the proposed project, analyze all possible benefits, and quantify benefits in financial terms. This information and supporting documents align key stakeholders around the strategic intent of the project. The SAP EWM project charter should essentially define the outcomes that will result from the project.
- **Kick-off workshop**
  The purpose of this deliverable is to kick off the project/phase and ensure that all needed information is shared with the resources for a successful project execution. You need to ensure that everyone who impacts the outcome of the project is a part of the workshop. The idea is to avoid situations in which the system is built per IT requirements, but the warehouse users shy away from using it. It's very important to have a representative from the warehouse management group in these workshops.
- **Project schedule and budget**
  The purpose of the project schedule deliverable is to define the work schedule to be followed, the resources and associated time commitments required for the project, and the phases of the project. The work breakdown structure (WBS) serves as the foundation for the schedule, the deliverables to be produced, and tasks to be performed as part of the project. The project budget, including monitoring and control, outlines all costs associated with the project, such as labor, hardware, software, contracting fees, and facilities. Along with

SAP EWM scope considerations, firming up a deployment option plays a critical role in defining this precisely.

- **Project and operational standards**
  The purpose of the project and operational standards deliverable is to provide consistent means of executing and governing project work in an efficient and effective manner. The key objective of project standards is to identify, define, approve, and communicate standards related to project execution. In an SAP EWM project, where and when applicable, the current customer processes and procedures related to the warehousing standards should be taken into account when defining the most suitable standards for the project.
- **Execution, monitoring, and controlling results**
  The purpose of this deliverable is to execute the project management plan and control and monitor the work defined in the project scope statement. It's very important that someone responsible for the warehousing division of the business is involved in this activity as well.
- **Business scenario design**
  While most of the project managers would put this under the business blueprint phase, we recommend that the SAP EWM project team explains and documents the essential processes at the scenario level (process level 1–2) during the project preparation phase itself. It builds the foundation for the business blueprint phase where process levels 3–5 are defined in detail.
- **Data migration approach and strategy**
  The purpose of the data migration approach and strategy deliverable is to capture and communicate the approach and strategy for the legacy data migration. In addition, the scope and requirement for warehouse management data migration should also be determined during this activity. SAP EWM offers standard master data upload transaction and migration tools from LE–WM, such as warehouse product migration, storage bin migration, stock migration, physical inventory completeness migration, and so on. You can access these transactions via the menu path, Extended Warehouse Management • Interfaces • Data Upload or via Transactions /SCWM/ISU, /SCWM/IPU, /SCWM/SBUP, /SCWM/SRTUP, /SCWM/MIG_PRODUCT, /SCWM/MIG_BIN, /SCWM/MIG_STOCK, /SCWM/MIG_PI_COMPL, /SCWM/MIG_MAP_SUT, and /SCWM/MIG_MAP_ALTUOM.

- **Technical requirements and design and solution landscape deployment plan**
  The purpose of the technical requirements and design deliverable is to provide the project with a specification of the target solution from a software component standpoint. This document is intended to serve as a reference for the rest of the project team during the business blueprint phase. Included in this deliverable is the solution landscape deployment plan, which is a high-level description of the overall system landscape approach to be used for the implementation project.
- **Interface inventory**
  The purpose of the interface inventory deliverable is to primarily identify the external systems, applications, and business objects or transactions that must be integrated with the SAP EWM solution to realize the objectives of the project.
- **Initial hardware sizing proposal**
  The purpose of the initial hardware sizing proposal is to begin the process of assessing the hardware infrastructure requirements. The hardware sizing proposal includes assessing and deriving the right hardware infrastructure requirement. From an SAP EWM perspective, key factors to be considered are the legacy landscape, SAP EWM deployment options, number of facilities (e.g., warehouse facility, production facility, distribution center, cross-docking facility, etc.), square footage of the facility, and SAP EWM interface with other applications/technologies (RF framework, MFS, PLC, etc.).

1.8.2 Business Blueprint

The purpose of this phase is to create/update the business blueprint, which is a detailed process-oriented and technical documentation of the results gathered during the requirements and design workshops or based on validation of a predefined solution or service description. The business blueprint includes the following deliverables:

- **Change impact analysis**
  The purpose of the change impact analysis deliverable is to ensure that the organizational and technical changes in business processes have been identified and documented by comparing the as-is and the to-be business processes.

- **Communication plan**
  The purpose of the communication plan deliverable is to summarize all planned communication measures and identify the dependencies among various activities. The communication plan is aligned to the overall organizational change management (OCM) road map and addresses mainly external communication to stakeholders, key users, SAP EWM end users, and suppliers.
- **End user training content**
  The purpose of the end user training content deliverable is to create a curriculum plan that covers the skills that end users will need to possess to use the SAP EWM system. This document will be refined throughout the project.
- **Scope validation/fit-gap analysis**
  The purpose of the scope validation/fit-gap analysis deliverable is to validate the predefined scenarios, processes, and enhancements; and identify potential gaps between delivered products and customer requirements. The deliverable only captures requirements for gaps. It follows an iterative approach. With respect to an SAP EWM project, we identify the organizational structure, warehouse structure, warehouse management pertinent master data, user authorization concepts, data integration across the application and solution, and business objects within SAP EWM for cross-process integration.
- **Defining roles and authorization (R&A)**
  R&A is used to offer access to SAP transactions based on job functions. Access required to perform certain functions are grouped based on job roles. The task for this phase is to identify and document the authorization requirement for the business process at the employee category level. SAP EWM delivers a standard set of roles in particular for each warehouse cadre, and these need to be identified during this phase. Following are a few examples of role names:
  - EWM: Warehouse Manager
  - EWM: Warehouse Expert
  - EWM: Warehouse Specialist for Goods Receipt
  - EWM: Warehouse Specialist for Goods Issue
  - EWM: Warehouse Specialist for Yard Management
  - EWM: Warehouse Worker
  - EWM: Physical Inventory Planner
  - EWM: Physical Inventory Counter

- EWM: Displaying Warehouse Information
- EWM: Labor Planner
- EWM: Warehouse Analyst
- EWM: Warehouse Specialist for Labor Management

- **Detailed design: business process #1–n**
  The purpose of this deliverable is to design, in detail, the to-be business process down to activity level (PL 3–5) and to describe gaps where the standard solution doesn't cover all required functionalities.
- **Detailed design: configuration and enhancements**
  The purpose of this deliverable is to specify and detail how to realize the solution, both core configuration and identified gaps, and core enhancements needed to complement standard functionality to fulfill business requirements. These RICEFW objects (reports, interface, conversion, enhancements, forms, and workflow) are based on process requirements and are specified in business process and solution design documents.
- **Legacy data migration**
  The purpose of the legacy data migration deliverables is to develop the designs, plans, and procedures to support the migration of legacy data during the implementation of the SAP EWM applications.
- **Legacy data archive**
  The purpose of the legacy data archive is to make legacy master data not considered currently active available for reference in a format compatible with the master data formats of the SAP EWM solution.
- **Technical solution design**
  The purpose of the technical solution design deliverable is to provide a detailed technical and integrated design of the solution to be implemented, accounting for all decisions made during the business blueprint phase, including business process definitions, integration with external systems, and physical server deployment.
- **User access and security**
  The purpose of this deliverable is to ensure proper set up of a R&A procedure and approach for the project.
- **Development environment (DEV)**
  The purpose of the development environment deliverable is to install a viable,

correctly configured technical development environment that is available for use by the project team to begin the realization phase.

- **Testing strategy**
  The purpose of this deliverable is to create a project-related test framework that gets content input from the existing test policy to build a central foundation around the taken approach (e.g., test approach and methodology, test standards and guidelines, test case development, defect management, reporting and analysis, roles and responsibilities) on functional testing (unit testing, string testing, integration testing, scenario testing, user acceptance testing, regression testing, etc.) and performance testing. The actual test strategy documentation for functional testing and performance testing has to be separated.

1.8.3 Realization

Realization is the longest phase in the ASAP methodology consuming around 75% of the budgeted project time in a typical SAP EWM project. The purpose of this phase is to implement all the business process requirements based on the business blueprint. The system configuration in standard ASAP is done in two work packages: baseline configuration (major scope) and final configuration (remaining scope). In an Agile ASAP project, the team splits the realization phase into multiple releases with a number of time-boxed iterations focused on building up the functionality. We'll focus on the Standard ASAP methodology and relate an SAP EWM implementation with the intent of meeting the following objectives in this phase:

- Establishment of the solution landscape
- Implementation of the final solution in the development environment
- Overall testing of the solution within the quality environment
- Release of the solution for production (live) operations
- Delivery of training materials
- Preparation for data migration and data archiving
- Identification of value delivery concepts
- Performance testing

The following deliverables are part of the realization phase:

- **Knowledge transfer**
  The purpose of the knowledge transfer deliverable is to ensure that key SAP EWM users get a good understanding of the solution being implemented.
- **Configured general settings and organizational structure**
  The purpose of the configured general settings and organizational structure deliverable is to complete and document the initial SAP EWM configuration of the system on the basis of the decisions made in the business blueprint phase.
- **Configured master data objects #1–n**
  The purpose of the configured master data objects 1–n deliverable is to configure the SAP EWM master data in the SAP software system according to the business process requirements specified in the business blueprint phase.
- **Core configuration and documentation: process #1–n**
  The purpose of the core configuration and documentation deliverable is to ensure that the SAP EWM configuration is implemented, tested, and documented.
- **Delta configuration: process #1–n**
  The purpose of the delta configuration deliverable is to ensure that the additional SAP EWM configurations are implemented, tested, and documented.
- **Enhancement development: RICEFW object #1–n**
  The purpose of this deliverable is to develop and test the SAP EWM RICEFW objects.
- **Business process procedures**
  The purpose of the business process procedures deliverable is to provide the basis for end-user training, end-user training documentation, and test case creation for SAP EWM. The procedures may also be used by security to develop roles and authorizations.
- **Value audits**
  The purpose of the value audit deliverable during the realization phase is to monitor and control the implementation of key process changes and value enablers, as well as to ensure the design and implementation of the value dashboard for key performance indicator (KPI) tracking purposes.

- **Scenario test #1–n**
  The purpose of this deliverable is to provide evidence that the scenarios designed can be supported by the solution implemented.
- **Quality assurance environment (QAS)**
  The purpose of the quality assurance infrastructure and environment design and setup deliverable is to install a viable, correctly configured technical SAP EWM QAS environment that is available for use by the project team to perform QA testing in the subsequent phases.
- **Preliminary cutover plan**
  The purpose of the preliminary cutover plan deliverable is to document the strategy, scope, and time lines for moving from the as-is solution to the to-be solution and the hyper care period immediately following go-live.
- **Legacy data migration**
  The purpose of the legacy data migration deliverable is to develop, implement, and test the data migration programs and processes defined in the business blueprint phase. This activity consists of iterative development and testing cycles focused on analysis of data, refinement of business rules, and deployment of migration programs and processes designed to move, cleanse, transform, and enrich legacy data required to support the various test cycles and ultimately the production cutover. The test cycles enable the migration team to improve data quality to an acceptable production level, develop a detailed cutover sequencing plan, and exercise data reconciliation and validation processes required to support the production cutover.
- **Approved user acceptance test**
  The purpose of this deliverable is to execute the user acceptance test (UAT). This is the last test cycle of an SAP EWM solution implementation and is an essential part of gaining end-user acceptance of the software system.
- **Warehouse data archiving**
  The purpose of the SAP EWM data archiving deliverable is to provide a method to check, remove, and store data that has completed its lifecycle within the solution. Data that meet the check criteria of data retention rules and are no longer actively used in the system can be archived and deleted. Storage of the data is a secondary process to enable data that has been archived and deleted to still be viewed and reported on even though the data are no longer stored on the transactional system.

- **Production environment (PRD)**
  The purpose of the production infrastructure and environment design and setup deliverable is to install a viable, correctly configured technical production environment to support productive operations of the delivered solution.
- **Failover environment**
  The purpose of this deliverable is to execute the setup of Availability and Continuity Management (ACM).
- **System and performance test**
  The purpose of the planned performance and system test is to check the entire system consisting of databases, application servers, frontends, printers, and so on. The performance test measures the throughput and response times of the system.
- **System user roles and authorization administration**
  The purpose of the system user roles and authorization administration deliverable is to establish effective operation processes for security.
- **Technical operations and handover plan**
  The purpose of the technical operations and handover strategy deliverable is to update and refine two prior deliverables from the business blueprint phase, and prepare a strategy to hand off operations of the solution landscape to the post-production support organization.
- **Technical integration check**
  The primary goal of the SAP EWM technical integration check is to identify technical integration issues related to the core business processes, the solution landscape, and the interfaces to SAP and non-SAP software systems.

1.8.4 Final Preparation

The purpose of the final preparation phase is to finalize readiness of the SAP EWM solution and its supporting tools and processes for production go-live. This includes, but isn't limited to, system tests, end-user training, system management, and cutover activities (including data migration). The phase deliverables also serve to enable the resolution of all crucial open issues. On successful completion of this phase, the business is ready to run the live SAP EWM system.

1.8.5 Go-Live and Support

The purpose of this phase is to provide support for the solution during the period immediately following production cutover. Exceptional items such as additional production support, exceptional business monitoring processes, and extraordinary technical support are planned and executed in this phase. At the end of the designated extra-care period, sustaining production support processes planned in final preparation and executed as part of go-live support become the core support for continuous improvement in the ongoing SAP EWM solution.

1.8.6 Run SAP EWM

Solution operations are initially set up during the implementation project. The primary goal of this phase is to further optimize and automate the operability of the SAP EWM solution. Operability is the ability to maintain SAP EWM systems in a functioning and operating condition, guaranteeing systems availability and required performance levels to support the execution of the enterprise's business operations.

1.9 Key Reference Points

Before we move on to the crux of this book, it's important to have a quick check of the must-know references that subsequent sections will refer to:

- **SAP Service Marketplace**
  SAP Service Marketplace provides support for business applications, analytics solutions and platform support, including software download, license key requests, customer messages, SAP Notes database, and so on. SAP Service Marketplace at *http://service.sap.com* is the master site that leads to the following subsites.
- **Release Notes**
  SAP release notes (*https://service.sap.com/releasenotes*) describe the new functions and changes in each SAP release. It's important for you to know what each release has to offer and whether a solution changed with a new release. For instance, if you're working on SAP EWM 9.2, and your organization intends to upgrade to SAP EWM 9.3, SAP release notes for SAP EWM will explain what's new.

- **Product Availability Matrix**
  Through the Product Availability Matrix (PAM) at *https://support.sap.com/release-upgrade-maintenance/pam.html*, SAP regularly publishes the following information about SAP software releases:
  - Release type (e.g., standard release, early adoption release, or custom development project release)
  - Planned availability
  - Maintenance durations
  - Upgrade paths
  - Platform availability, including database platforms and operating systems
- **Master Guides**
  This is probably the most important document for a consultant. The links to all the standard solution documentation provided by SAP are available at *https://service.sap.com/instguides*.
- **SAP Solution Explorer**
  The one-stop shop to explore SAP solutions by industry, line of business, or technology is available at *https://solutionexplorer.sap.com*.

1.10 SAP EWM on SAP HANA

SAP EWM is now released to run on an SAP HANA database. To run on SAP HANA, SAP EWM must be upgraded to at least version 9.1, and for database migration to SAP HANA, SAP advises that SAP EWM should be upgraded to 9.2. It's important to understand, however, that the release on the SAP HANA database doesn't imply any functional changes or functional enhancement to SAP EWM. All scenarios and all functions in SAP EWM can be used on SAP HANA in the same way as on any other supported database.

1.11 Summary

In this chapter we explained to you the SAP product pyramid, specifically designed for our readers. You should now be able to understand how SAP ERP is linked to other SAP solutions. You should also be able to understand the SAP SCM solution and its components and their first-level SAP ERP modules.

Takeaways

- SAP EWM is the latest among the various WMS solutions offered by SAP.
- With reference to our product pyramid, it's a Tier 2 solution, corresponding to SD, MM, LE, WM, and PP as the first level SAP ERP modules.
- SAP EWM isn't a replacement for WM; instead, it's an advanced solution meant to augment WM functionalities.
- SAP EWM isn't a part of SAP ERP but a separate solution offered under SAP SCM, which in turn is a part of the SAP Business Suite.
- SAP EWM can be deployed in multiple ways; the most common is in conjunction with SAP SCM.
- ASAP implementation methodology is the recommended methodology to implement SAP EWM.
- The release on the SAP HANA database doesn't imply any functional changes or functional enhancement to SAP EWM.

An organization structure is perhaps the most important form of master data within any SAP system because it's created once and perhaps never changed. Therefore, the design of an organization structure should correctly represent the present way of running a business process as well as factor in future plans of business process expansion.

2 Organizational Structure and Definition

SAP Extended Warehouse Management (SAP EWM) offers flexible, automated support for processing various goods movements and for managing stocks in the warehouse complex. It supports planned and efficient processing of all logistics activities in the warehouse. SAP EWM is the most advanced and flexible of the warehouse solutions offered by SAP and works in conjunction with SAP ERP. Referring to the SAP product pyramid discussed in Chapter 1, SAP ERP Warehouse Management (WM) forms the first level solution to SAP EWM. In other words, quite a bit is shared between SAP EWM and WM. A significant bit of organization structure is also shared between SAP ERP and SAP EWM. Thus, when we describe the organization structure components needed for an SAP EWM system to work, it will span across the components residing in SAP EWM as well as those in WM.

Let's now look at a bit of history around SAP ERP and understand how this impacts the organization structure. As Figure 2.1 illustrates, within SAP ERP, Logistics Execution (LE) is the bundling of system functions for the core logistics execution processes. It's connected to Production Planning (PP), Controlling (CO), Materials Management (MM), and Sales and Distribution (SD).

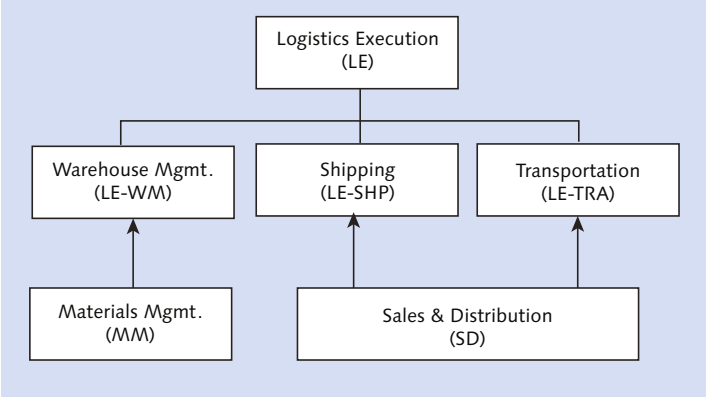


Figure 2.1 History of SAP ERP Warehouse Management

While LE was being created with SAP release R/3 4.5A, WM branched out from MM, whereas Shipping (SHP) and Transportation (TRA) branched out from SD. As the second level for WM and LE, SAP EWM is closely related to MM and SD as well. Therefore, some part of the organizational structure is common for all of them.

The organizational structure is the hierarchy within the system for the modus operandi of the organization. This structure describes the branches within the organization and establishes how the organization works within the structure and its function. This definition is exclusively dependent on the statutory requirement of the organization and is based on its geographical presence and the various laws governing the organization.

In an SAP implementation, the first demarcation of entity is the organization definition. With varied options available for SAP EWM implementation, the organization definition still exists in the SAP ERP system. Determining an organizational structure and its creation in the SAP system kick-starts the customization in SAP ERP. Appropriate formulation of the organizational structure is crucial to the success of the warehouse management system (WMS).

☑ **Note**

The discussions presented in the following sections of the book are based on the assumption that SAP EWM is deployed in a decentralized scenario with SAP ERP as the master system, unless otherwise expressly noted.

SAP EWM's organizational structure is set up in the master system, which is an SAP ERP system. We'll follow the sample organization structure illustrated in Figure 2.2 for explaining this concept.

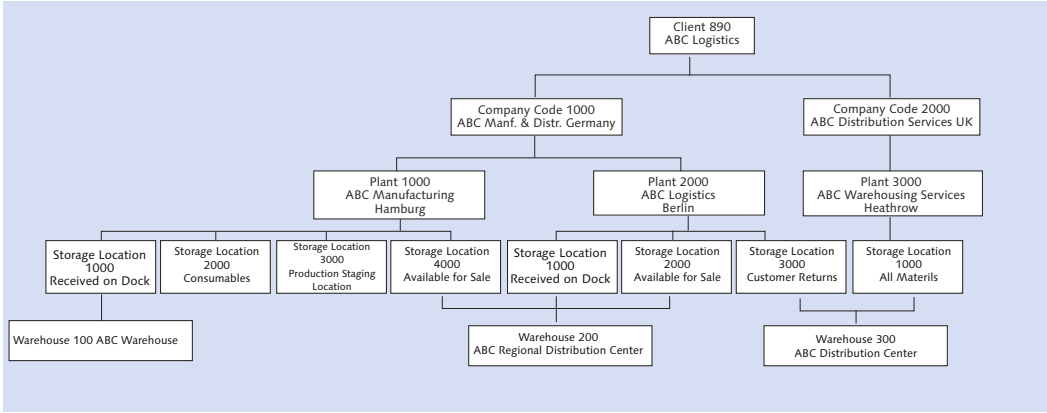


Figure 2.2 Organization of Enterprise in the SAP ERP System

The organization structure is in a pyramid shape, with the client at the top and the warehouse at the bottom of the hierarchy. Each organization has a varied composition of organizational elements in the structure.

In the subsequent sections of this chapter, we'll explore elements of the organizational structure (for example: client, company code, etc.) which form the backbone of a functional SAP system.

2.1 Client

A client is a combination of legal, organizational, business, and administrative units that form a group for a common objective. In this example, a corporate group can be called the client, which groups the legal entities of an organization, business, or administrative unit within the group for a common objective defined by corporate. The client forms the basis for consolidation of financial reports representing the entire entity. Each client can have one or more company codes assigned to it. Figure 2.2 shows ABC Logistics as client (890).

2.2 Company Code

Next in the organizational structure hierarchy is the company code. A company code represents a subsidiary unit of the corporate; it's an independent accounting unit within a client that maintains a separate balance sheet and profit and loss statement for external reporting. There should be at least one company code for a client. Each business is obligated to prepare its financial statement in the prescribed format for its geographic location. This leads to a demarcation of the company code within an SAP organizational structure. In Figure 2.2, there are two company names—ABC Manufacturing & Distribution Co. in Germany and ABC Distribution Services in UK—representing company codes 1000 and 2000, respectively. Figure 2.3 illustrates the company code definition in an SAP system.

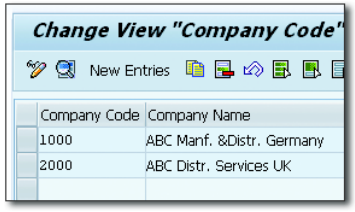


Figure 2.3 Company Code Definition in SAP ERP

The company code decision is made based on divisions within the business, locations of business units, and various fiscal factors such as the financial calendar, currency, and so on. Company code data are generally set up in the system by SAP FI/CO consultants after detailed consultation and agreement with the finance department of the business. Company codes have a one-to-many relationship with plants.

To create a company code, you need to navigate via Transaction SPRO to the SAP ERP Implementation Guide (IMG). Use the menu path, Enterprise Structure • Definition • Financial Accounting • Copy, Delete, Check & Edit Company Code.

SAP provides the copy functionality to copy data from the default existing company code. It facilitates copying all the tables and dependent entries to the new company code. This helps in speeding up the basic essential framework setup within the objects copied.

2.3 Plant

Next in the organizational structure is the plant. The plant is an operating unit within the company code where an entity further subdivides the enterprise based on the services it provides. The plant can be a manufacturing facility, distribution center, warehouse, co-pack (contract packer) facility, third-party facility, branch office, and so on. A company code can have multiple plants assigned to it. A single plant to multiple company codes relationship isn't practical. Various factors influence the decision on plant. The predominant factor is the plant used as an inventory valuation level. Stocks lying at each unit necessitate a separate plant code in SAP. These valuations roll up to the company code for financial reporting. Other influencing factors that dictate plant creation are the geographical presence of various units, type of business functions, third-party facility operated within the organization, representation of a logical plant, and so on. In Figure 2.2, shown earlier, there are two plants in SAP, 1000 ABC Manufacturing and 2000 ABC Logistics under company code 1000. Plant 3000 ABC Warehousing Services Heathrow appears under company code 2000.

To create a plant in an SAP ERP system, go to the IMG using Transaction SPRO. From there, navigate to the menu path, Enterprise Structure • Definition • Logistics – General • Define, Copy, Delete, Check Plant • Define Plant.

In an SAP system, plants are four-character alphanumeric texts as illustrated in Figure 2.4. The description can accommodate up to 25 characters.

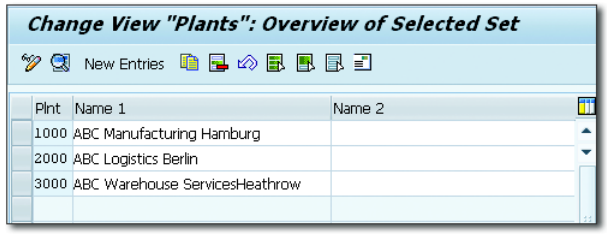


Figure 2.4 Plant Definition in SAP ERP

To assign the plants to the relevant company codes, in the IMG, follow the menu path, Enterprise Structure • Assignment • Logistics – General • Assign Plant to Company Code.

In this process, you link a plant to a company code, which it needs to roll up the valuation for financial reporting.

2.4 Storage Location

The next organizational structure element under plant is the storage location, which is an organizational unit that allows for stock differentiation for the product stocks in the plant. Each plant represents at least one storage location in an organizational structure if the services provided are related to physical or logical inventory. Although the inventories are valued at the plant level, they are stored at the storage location level. The plant needs different storage locations for mapping the physical segregation accurately in the SAP ERP system. This segregation might be based on the type of stock, different buildings in the same compound, and so on. Figure 2.2, shown previously, represents four storage locations 1000, 2000, 3000, and 4000 under plant 1000; three storage locations 1000, 2000, and 3000 under plant 2000, and one storage location 1000 under plant 3000.

Business processes may enforce the need of having separate storage locations for each activity. For example, when a material is received from the vendor, there might be a mandatory inspection in a place as part of the business operating procedure. In this case, without a quality check and subsequent approval, stock can't be utilized for manufacturing. Therefore, stock needs to be posted to a location for quality inspection (QI). Once found satisfactory, material must be posted to the available-to-promise (ATP) location where stock can be promised as available.

Transfer of material between storage locations belonging to the same plant requires less documentation than when transferring material across plants. Transferring the material across plants requires a stock transfer order (STO) and valid statutory documentation per the governing law of the land.

To define storage locations in a plant as shown in Figure 2.5, navigate to ERP IMG • Enterprise Structure • Definition • Materials Management • Maintain Storage Location.

In an SAP system, storage locations (SLoc) are 4-character-long alphanumeric texts. The storage location Description field can accommodate up to 16 characters.

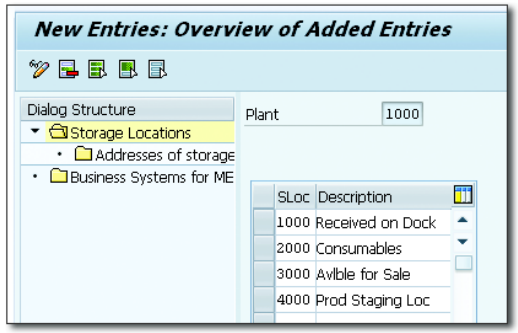


Figure 2.5 Storage Locations Definitions within the Plant

No separate step is required for assigning the storage location to the plant because the system forces you to input the plant number before the definition screen appears. A plant can have one or more storage locations, whereas the same storage location can't be shared among plants.

2.5 Warehouse

In this section, we will explain what it means for something to be a warehouse, how one is structured in an SAP system, and various configuration settings required to set up a functional warehouse.

2.5.1 Overview of Warehouse

A warehouse is a large commercial building where goods are stored before they are exported or distributed for sale. The process begins with the decision on which storage locations the customer wants to be warehouse managed. A business may want only a few storage locations to be warehouse managed and the rest of the storage locations to be inventory managed using MM.

Consider a business situation in which staging of raw materials is done at the inventory-managed level location, so that back flush can take place automatically at the time of goods receipt without any delay. In this situation, most likely, a business would not want to have a warehouse-managed location for raw material posting because this would become an arduous production process. Similarly, in certain industries, customer returns need to be scrapped, which doesn't obligate

the business to have a goods receipt in warehouse managed location. Thus, for simpler discarding of the product, returns can be received into an inventory-managed storage location.

It's important to understand the relationship between plant and storage location combinations with the warehouse and its benefits. Some key features to consider include the following:

- Multiple storage location of a plant can be assigned to a single warehouse.
- Multiple storage locations across various plants (plants belonging to one company code) can be assigned to a single warehouse.
- Multiple storage locations across various company codes can be assigned to a single warehouse.

A business might want to use a warehouse for multiple plants within the same company code or across company codes. When it's not obligatory to own an independent warehouse by plant, for better utilization of space and resource and other associated cost benefits, plants might share the same warehouse for its warehousing needs. This arrangement may lead to a better return on investment (ROI). A single high-volume warehouse helps achieve low storage costs per product, high inventory turnaround, and higher stock availability—all of which accrue huge benefits. Smaller shipments or less than a truckload can be tied together with other shipments on the same route to enable saving on transportation, as well.

When using WM as the WMS, we structure the warehouse within SAP ERP. So, we have the warehouse structure elements such as storage types, storage sections, and storage bins defined within the SAP ERP Customizing. Whereas in the decentralized SAP EWM scenario, the SAP ERP warehouse works as a replica and is linked to the SAP EWM warehouse, which is four-character warehouse existing in SAP EWM system. We'll discuss these settings later in Chapter 6. SAP EWM warehouses are structured in Customizing in the SAP EWM system, which we'll detail in Chapter 3.

2.5.2 Definition and Assignment of Warehouse-Specific Settings in SAP ERP

As a reader, you must be anticipating all along to start the warehouse management configuration, which initiates the integration between inventory management and warehouse management. We'll cover these in various sections of this chapter.

Let's start with the warehouse complex. A warehouse complex is represented in SAP ERP as a warehouse number, and all the warehouse processes such as picking and putaway are executed using this warehouse number. The warehouse number acts as a linking channel between SAP ERP and SAP EWM. The warehouse number doesn't have an address but a short descriptive text. This is unlike a storage location, which holds an address.

The warehouse number is a 3-character-long alphanumeric code in the SAP ERP system, and its description contains up to 25 characters.

Note

Plants belonging to different company codes may like to use the same warehouse for its storage and material flow needs. It's possible to map such a scenario in the SAP ERP/SAP EWM.

To define a warehouse as illustrated in Figure 2.6, navigate to ERP IMG • Enterprise Structure • Definition • Logistics Execution • Define, Copy, Check Warehouse Number • Define Warehouse Number.

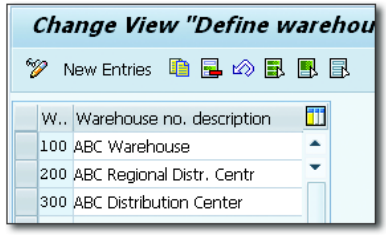


Figure 2.6 Warehouse Definition in SAP ERP

Within the system, assignment of warehouse number to plant and storage location combination in SAP ERP identifies which storage location is controlled by the WMS.

To assign the warehouse to the plant and storage location combination as shown in Figure 2.7, navigate to ERP IMG • Enterprise Structure • Assignment • Logistics Execution • Assign Warehouse Number to Plant/Storage Location.

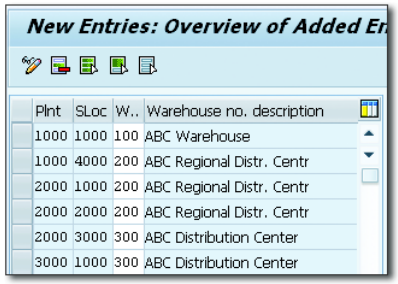


Figure 2.7 Assignment of Warehouse to Plant and Storage Location Combinations

2.5.3 Maintaining SAP EWM Parameters in SAP ERP

Let's now discuss the SAP EWM parameters that need to be set for an SAP ERP warehouse. These parameters influence the way communication takes place between SAP ERP and SAP EWM systems. As illustrated in Figure 2.8, to set the parameters, navigate to ERP IMG • Logistics Execution • Extended Warehouse Management Integration • Basic Setup for EWM Connectivity • Maintain Extended WM-Specific Parameters.

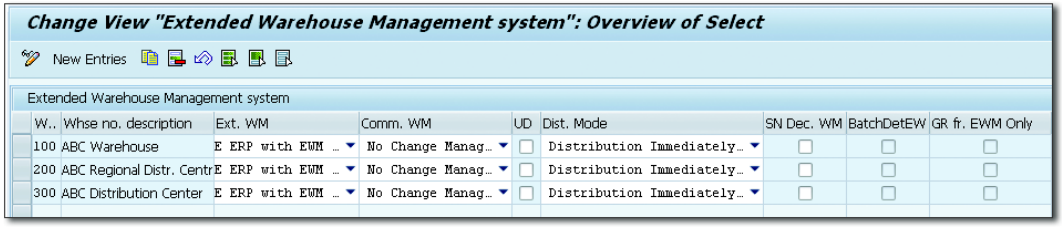


Figure 2.8 Maintaining SAP EWM Parameters

After you assign the SAP ERP warehouse to a plant and storage location using the parameter Ext. WM, you can specify that the SAP ERP warehouse is actually SAP EWM managed. For this, you need to select ERP with EWM from the dropdown for this parameter. By this setting, you ensure that the system manages the warehouse stock with an SAP EWM system.

You can choose the communication method with which the SAP ERP system should converse with the SAP EWM system. In most cases, it's Queued and Serialized Asynchronous RFC (these recommendations are just that; situations vary for each individual organization).

Activating the distribution of unchecked deliveries (UD) to the SAP EWM managed warehouse would help in planning for the warehouse. Only SAP EWM can handle the unchecked deliveries.

Distribution mode (Dist. mode) helps you control the timing of distribution of transactional data or deliveries of documents to SAP EWM system. These deliveries are later processed in SAP EWM. You have the option of immediate distribution of documents to the SAP EWM system as soon as they are saved in SAP ERP. You also have the option of stopping the automatic distribution, in which case, distribution of deliveries will be taken care of separately.

The batch determination in SAP EWM indicator (BatchDetEW) helps in replication of batch search in SAP EWM because a batch search isn't optimal in SAP ERP. The GR fr. EWM Only indicator helps control whether the process of goods receipt from production or process order into an SAP EWM-managed warehouse can be started from both SAP ERP and SAP EWM or from SAP EWM only.

2.5.4 Distribution Model Generation

A distribution model facilitates the transfer of transactional data between central SAP ERP systems to one or more SAP EWM systems via queued remote function call (qRFC).

Note

The qRFC is an enhancement of the transactional RFC (tRFC) that also allows you to send and receive data in a fixed call order across systems.

Unless the model is created, no transactional data can flow through qRFC. Generating a distribution model is a one-time activity. The object/method combinations listed in Table 2.1 are generated between sender and receiver. These Business Application Programming Interfaces (BAPIs) are replicable business object types; they assist in copying the instance of an object type to one or more system.

Object	Method	Description
/SPE/LIKP	SAVEREPLICA	Duplication of deliveries
/SPE/LIKP	DELIVERYCHANGE	BAPI for change to outbound delivery

Table 2.1 Objects and Their Methods

Object	Method	Description
/SPE/LIKP	REQUESTCHANGES	Change request for delivery quantity reduction
BUS2015	SAVEREPLICA	Duplication of inbound deliveries
BUS2015	DELIVERYCHANGE	BAPI for change to inbound delivery

Table 2.1 Objects and Their Methods (Cont.)

Note

Whenever the QA system is refreshed, you need to delete the distribution model and create a new one.

To generate a distribution model as shown in Figure 2.9, navigate to ERP IMG • Integration with Other SAP Components • Extended Warehouse Management • Basic Setting for EWM Linkage • Generate Distribution Model ERP => EWM.

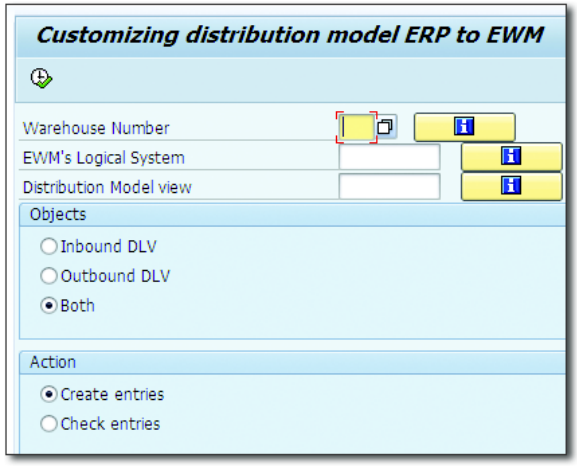


Figure 2.9 Distribution Model from SAP ERP to SAP EWM

Use the Create entries radio button to generate the distribution model. Use the Check entries radio button to check the existence of a distribution model that is already present.

2.5.5 Define Queue for Transfer to SAP EWM

Queues are used for temporary storage of data between the SAP ERP and SAP EWM systems. The queue type, inbound or outbound, determines whether queue processing is controlled by the sending or receiving system. Data transfer between SAP ERP and SAP EWM using qRFC necessitates this activity to be completed.

As shown in Figure 2.10, you can set the queue type for the specified target system by navigating to ERP IMG • Integration with Other SAP Components • Extended Warehouse Management • Basic Setting for EWM Linkage • Define Queue for Transfer to Extended WM.

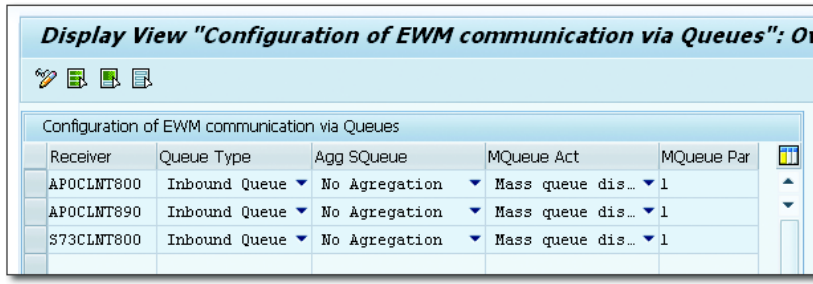


Figure 2.10 SAP EWM Communication via Queues

2.5.6 Decentralized Warehouse Management System Integration

Decentralized WMS, as a standalone in SAP ERP system that is independent of a central SAP ERP system, is another option for decentralization. Multinational organizations that are spread across geographies with very high volume of data tend to opt for decentralized WMSs. When the transaction volume is phenomenally high, companies need to isolate the critical business functions via decentralized options to mitigate the risks associated with running on a single instance.

Decentralized WMS integration in the SAP ERP IMG is structured in such a way to configure and connect the decentralized WMS with the centralized SAP ERP system. These settings aren't required when you're setting up an SAP EWM warehouse.

As shown in Figure 2.11, decentralized WMS integration configurations can be performed in ECC IMG • Logistics Execution • Decentralized WMS Integration.

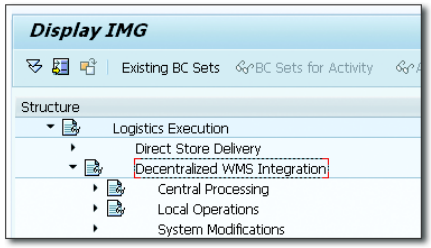


Figure 2.11 Decentralized WMS Integration Configuration

2.5.7 Assignment of a Decentralized SAP Supply Chain Management System

This important step shown in Figure 2.12 shows how to link the warehouse numbers defined in the central SAP ERP system to the warehouse number of the decentralized SAP SCM system.

For assignment, navigate to ERP IMG • Integration with Other SAP Components • Extended Warehouse Management • Assign Warehouse Number to Warehouse Number of Decentralized SCM System.

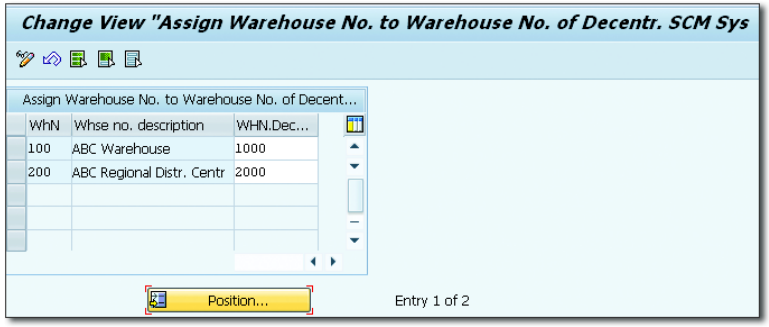


Figure 2.12 Assignment of SAP ERP Central System Warehouse Number to the Decentralized SAP SCM Warehouse Number

2.5.8 Delivery Split

Sometimes, a business needs to create deliveries in SAP ERP with more than one line item, for which goods issue should take place from warehouses on different systems. In such cases, it's critical that deliveries with appropriate line items reach their intended destination SAP EWM system. This is achieved by delivery split configurations.

The SAP ERP System allows delivery split at two levels:

- **Delivery split per delivery type**
  To set the Delivery Split - WhNo indicator at the delivery type level as shown in Figure 2.13, navigate to ECC IMG • Logistic Execution • Shipping • Deliveries • Define Split Criteria for Deliveries • Delivery Split by Warehouse Number • Define Delivery Split per Delivery Type.

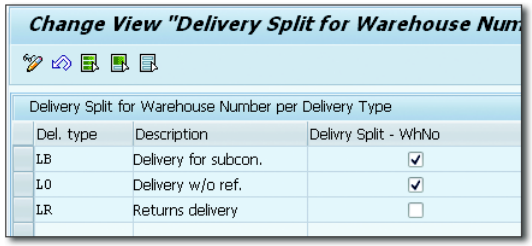


Figure 2.13 Delivery Split by Delivery Type

- **Delivery split per warehouse**
  To set the Deliv.Split by Whse number indicator at warehouse number as shown in Figure 2.14, navigate to ECC IMG Logistic Execution • Shipping • Deliveries • Define Split Criteria for Deliveries • Delivery Split by Warehouse Number.

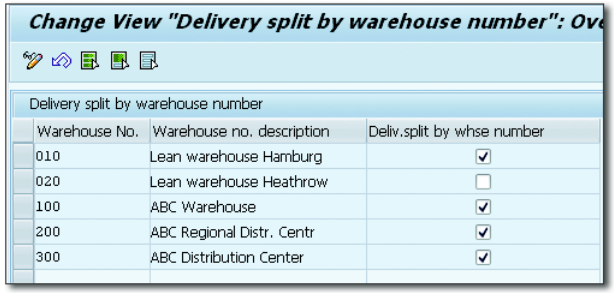


Figure 2.14 Delivery Split by Warehouse Number

When SAP EWM warehouses are on the same central instance of your SAP ERP system, you must ensure that no deliveries are created containing centrally managed items and SAP EWM-managed items in the same document. It's not recommended to do so. In the eventuality of such deliveries, they are neither distributed to SAP EWM nor completed in SAP ERP.

When delivery is split by warehouse number, deliveries within one warehouse are created automatically for specific warehouse numbers and delivery types. In the case of a delivery within one warehouse, either all storage locations of the delivery items must belong to one warehouse number, or they should have no warehouse number assigned to them. If this doesn't apply to the items of an order, then several deliveries are created automatically.

2.5.9 Warehouse Number Customizing

When customizing warehouse numbering, it's advisable to copy the warehouse numbering, especially because all the dependent table entries will be copied automatically. For certain objects, SAP provides copy functionality, and in such instances, it's wise to use it.

To copy the warehouse numbering as shown in Figure 2.15, navigate to the SAP EWM IMG menu path, Extended Warehouse Management • Cross-Process Settings • Copy Warehouse Number Customizing.

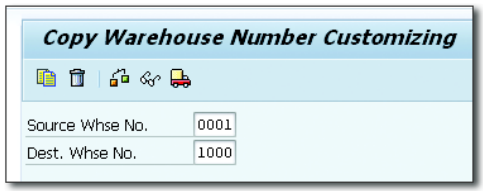


Figure 2.15 Copying Warehouse Number Customizing

2.5.10 Define and Assign the SAP EWM Warehouse Number

A warehouse complex is mapped as a warehouse number in SAP EWM. This is similar to the definition of a warehouse number in SAP ERP. In SAP EWM, the number of characters for the warehouse number is four, unlike in SAP ERP where it's three. A warehouse number in SAP EWM encapsulates the warehouse structure and executes all operations (e.g., stock removal and putaway) referencing the warehouse number.

You define and assign the SAP EWM warehouse number in the SAP EWM Customizing menu, Extended Warehouse Management • Master Data • Define Warehouse Numbers and Assign Warehouse Numbers (see Figure 2.16).

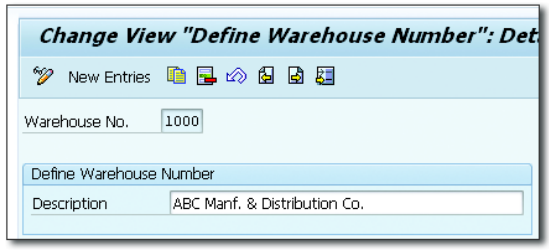


Figure 2.16 Define the Warehouse Number

2.5.11 SAP ERP and SAP EWM Warehouse Integration

For any two SAP logical systems to interact with each other and be able to communicate seamlessly, certain settings are required on both sides. This section explains the key settings required for an SAP ERP and an SAP EWM system to communicate with each other.

Mapping a Warehouse Number from SAP ERP to SAP EWM

After you've set up the SAP ERP warehouse and maintained the SAP EWM parameters, the next step is to link the SAP ERP warehouse code to the SAP EWM warehouse code. For this setting, navigate to EWM IMG • Extended Warehouse Management • Interfaces • ERP Integration • General Settings • Map Warehouse Numbers from ERP System to EWM.

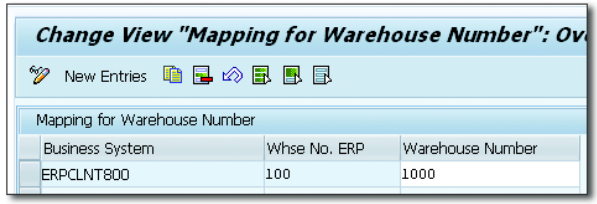


Figure 2.17 Mapping an SAP ERP Warehouse Number to an SAP EWM Warehouse Number

Control for RFC Queue

Communication between applications of different systems in the SAP environment includes connections between SAP systems as well as between SAP systems and non-SAP systems. RFC is the standard SAP interface for communication between SAP systems. RFC calls a function to be executed in a remote system. In

essence, RFC is one of the mechanisms by which the SAP ERP and SAP EWM systems communicate to each other. There is now a whole series of different RFC variants, and each has different properties and is used for a specific purpose. The one relevant here is qRFC, as mentioned earlier. To guarantee that multiple logical units of work (LUWs) are processed in the order specified by the application, tRFC can be serialized using queues (inbound and outbound queues), which is why this type is called queued RFC, or qRFC.

In the configuration menu shown in Figure 2.18 , you define the queue types to be used for communication between SAP ERP and SAP EWM. You can define the aggregation level for individual queues because this will have an impact on the performance. Selecting the correct option here plays a part in the success of your system environment.

You can navigate via the SAP EWM IMG menu path, Extended Warehouse Management • Interfaces • ERP Integration • General Settings • Control for RFC Queue.

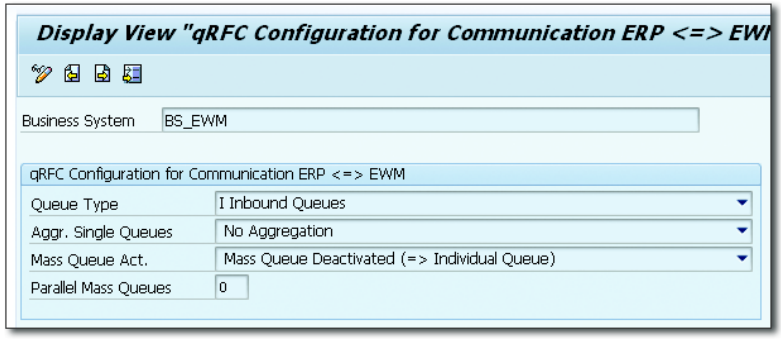


Figure 2.18 qRFC Configuration

Setting Control Parameters for SAP ERP Version Control

In the configuration menu shown in Figure 2.19 , you can influence the behavior of certain general functions with the connected SAP ERP system. Certain options aren't relevant for SAP ERP because not all SAP ERP versions have the interfaces that provide SAP EWM. You can access this via the SAP EWM IMG menu path, Extended Warehouse Management • Interfaces • ERP Integration • General Settings • Set Control Parameters for ERP Version Control.

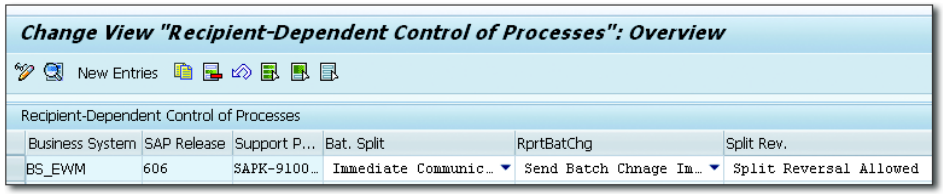


Figure 2.19 Setting Control Parameters for SAP ERP Version Control

Assignment of Business Partners and Supply Chain Units to a Warehouse

The default settings maintained in this assignment are proposed during the course of warehouse processes, for example, the manual creation of a warehouse request. This is a one-time activity for each warehouse.

You maintain this setting in the SAP EWM IMG menu path, Extended Warehouse Management • Master Data • Assign Warehouse Numbers (see Figure 2.20).

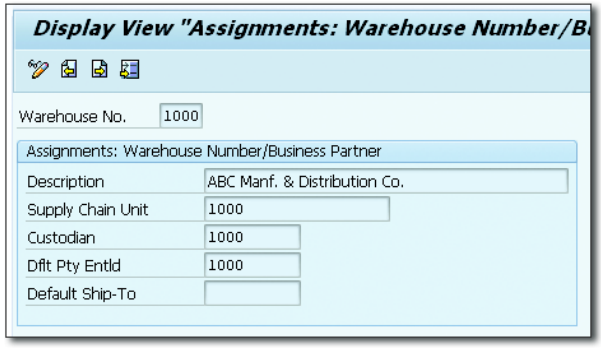


Figure 2.20 Assignment of Business Partners and Supply Chain Units to a Warehouse

2.6 Summary

In this chapter, we discussed setting up the organizational structure in SAP ERP and SAP EWM systems. We also discussed linking these SAP ERP and SAP EWM warehouses, other important integration settings, and their hierarchical connection down the structure. While these form the basics to set up an organization structure relevant to SAP EWM, a very detailed analysis of the customer organization and warehouse structure should be carried out during the business blueprint exercise. It's not uncommon for an organization structure signoff during the

business blueprint, taking the maximum amount of time. After the organizational structure is in place, you can proceed with the warehouse structure setup in SAP EWM, which we'll discuss in the next chapter.

Takeaways

The three major takeaways from this chapter are the following:

- SAP Logistics Execution (LE), which is comprised of Warehouse Management (WM), Shipping (SHP), and Transportation (TRP), form the first level SAP ERP modules to the second-level solution of SAP EWM.
- Organization structure set up for an SAP EWM system to work is done both in SAP EWM as well and the SAP ERP system, and they work in conjunction for various processes to work.
- Design of an organization structure is critical and should be done meticulously during a business blueprint exercise. It's very important that various business and IT stakeholders understand and sign off on the structure before an SAP consultant starts modeling it in the system.

Caution

There are several other steps which need to be performed for SAP EWM and SAP ERP systems to communicate. We don't intend this book to be another configuration guide, so we've focused only on those that we think are specific to SAP EWM. Some common settings that need to be done by a Basis consultant include but are not limited to the following:

- Creating an RFC user
- Creating an RFC destination to SAP ERP
- Naming a logical system for SAP EWM and SAP ERP
- Assigning a logical system to client
- Determining RFC destinations for method calls
- Defining business systems
- Maintaining a business system group
- Assigning logical system and queue types
- Defining controls for the RFC queue
- Performing queuing registration for qRFCs
- Activating message logging

Warehouse structure is the foundation for depicting the physical layout of the warehouse in SAP EWM. A warehouse complex will likely have many physical subdivisions. These must be mapped and accurately presented in the system to map the movements and processes, relating to these subdivisions of the warehouse. This layout, created in the system, forms the basis for modeling the warehouse operations in the system.

3 Warehouse Structure

Warehouse structure varies based on the industry. Also, within the same industry, each warehouse has its own unique structural requirements. Therefore, you'll come across processes that vary based on layout details of the warehouse and not only due to specific industry and business requirements. As businesses have evolved, the logistics processes have evolved as well and led to the evolution of complex warehouses. This in turn has resulted in the evolution of warehousing solutions such as SAP EWM (see Figure 3.1).

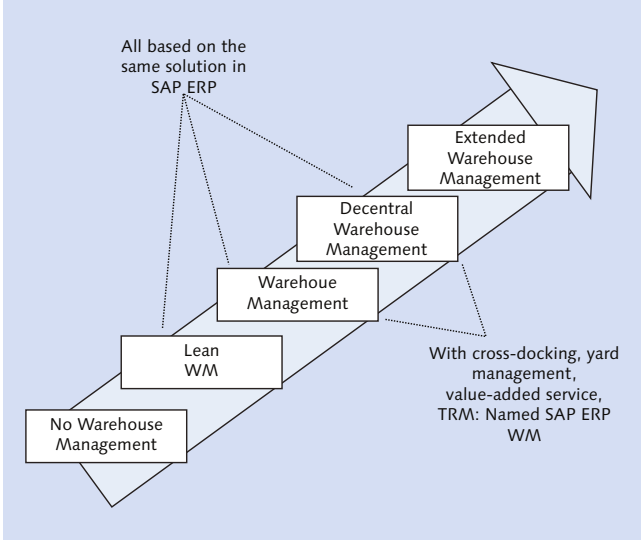


Figure 3.1 Evolution of SAP's Warehousing Solutions

The definition of warehouse structure elements helps in designing a warehouse with effective handling of materials, the best usage of warehouse handling equipment, and optimal space utilization. An organization, prior to implementing SAP EWM may try to reorganize the physical layout. Although substantial reorganization of a physical layout might not be possible and even might not be required, still it can improve operations due to better mapping in the warehouse management system (WMS). Businesses may seek the help of industrial engineers or warehouse design experts to arrive at the design and layout of the warehouse. It offers a huge cost saving potential in the medium to long run.

Warehouse structure must aim at high operational productivity and efficient space utilization. Diverse needs of the customer, in terms of warehouse structure, demand a detailed and flexible mapping from a WMS.

In the SAP solution blueprinting workshop with a customer, an SAP EWM consultant must discuss and analyze the feasibility of more accurate and effective mapping structures in the SAP EWM system.

In the following sections of this chapter, we'll discuss how to model and map the physical layout of a warehouse into SAP EWM by using layout structure definitions such as warehouse numbers, storage types, storage sections, storage bins, staging areas, doors, and so on. Figure 3.2 shows the warehouse structure elements and their hierarchy.

You'll find the definitions of warehouse structure elements in the SAP EWM Implementation Guide (IMG). Use the menu path, EWM IMG • Extended Warehouse Management • Master Data.

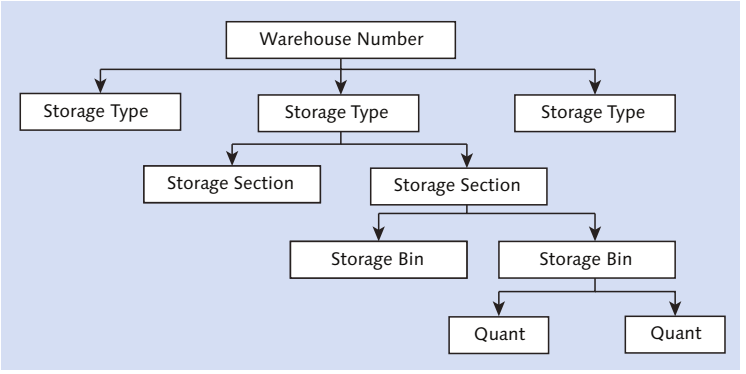


Figure 3.2 Warehouse Structure

Caution

We set up a dedicated SAP EWM system for this book and have used multiple screenshots throughout the book and especially this chapter. Because this chapter is very specifically about setting up a warehouse structure, you may need to refer to a specific screenshot to understand what a field does.

3.1 SAP EWM and SAP ERP Linkage

As discussed briefly in the previous chapter, the usage of SAP EWM is determined by the settings in the warehouse number in SAP ERP. The setup of this warehouse number shows the SAP ERP system what solution is being used—SAP ERP Warehouse Management (WM) in the central system, WM in a decentralized system, or SAP EWM.

As shown in Figure 3.3, SAP EWM requires an assignment of SAP ERP warehouse numbers to SAP EWM warehouse numbers because the names in SAP EWM can be longer and don't have to correspond to the names in SAP ERP.

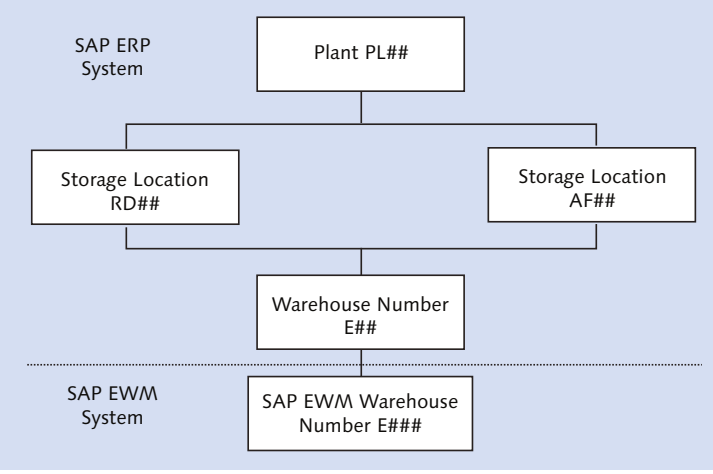


Figure 3.3 SAP ERP and SAP EWM Linkage via the Warehouse Number

The communication between SAP ERP and SAP EWM happens in two different ways. Figure 3.4 illustrates this in detail.

- For master data, the core interface (CIF) is used. CIF is the technology generally used for communication between SAP ERP and SAP Supply Chain Management (SAP SCM). For SAP EWM, the master data is only transferred from SAP ERP to SAP EWM; there is no communication back via CIF.
- For communicating delivery information between the systems, a separate distribution model, which uses queued remote function calls (qRFCs), is set up. This distribution model already exists in SAP EWM. You have to create it in Customizing in SAP ERP for every warehouse number you activate as administrated by SAP EWM.

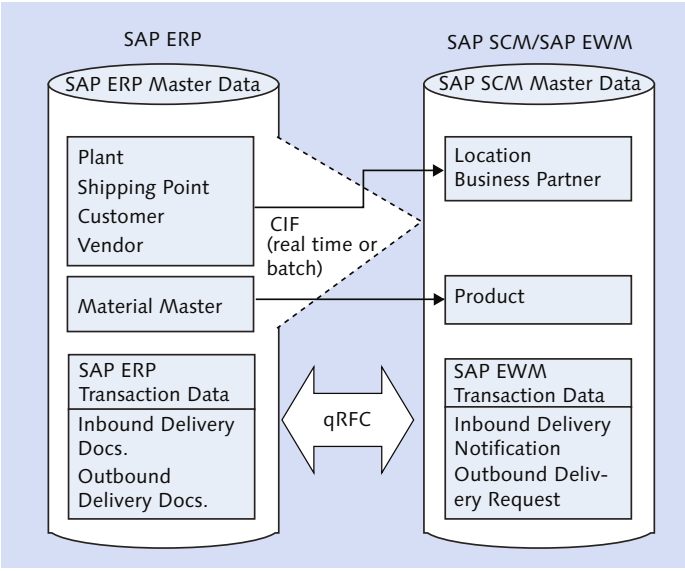


Figure 3.4 Communication between SAP ERP and SAP EWM

3.2 Storage Type

Storage type is the uppermost element and the very first in the hierarchy of the warehouse structure after the warehouse number. The storage type is the first subdivision within the warehouse. This subdivision is aimed at grouping the bins with a specific set of characteristics. These characteristics can represent various

categories, for example, nature of storage, type of storage, handling equipment usage, and so on.

A warehouse consists of thousands of bins. There might be bins at the door, bins in the goods issue area, bins in various storage areas such as high rack storage, bins in various work centers, and so on. These storage types group the bins of the same category and use. Following are some of the commonly used storage type examples:

- General Storage Area
- Rack Storage
- Bulk Storage
- Fixed Bin Storage
- Hazardous Substance Storage
- Production Supply
- Open Storage
  - Picking Area
  - Shelf Storage
  - Pallet Storage

All the storage types are tied under one warehouse number. These storage types help sort products based on similar characteristics for effective movement of pick and placement in the warehouse. In addition to these storage types, there are interim storage types, such as staging areas where the goods are stored temporarily before the final picking or putaway takes place.

In the following section, we'll discuss the parameters to be maintained within the storage type definition to control the behavior of storage types. These parameters are grouped under General, Putaway Control, Stock Removal Control, and Goods Movement Control areas of the screen.

3.2.1 General

This section of the screen provides generic parameters that control the storage type (Figure 3.5).

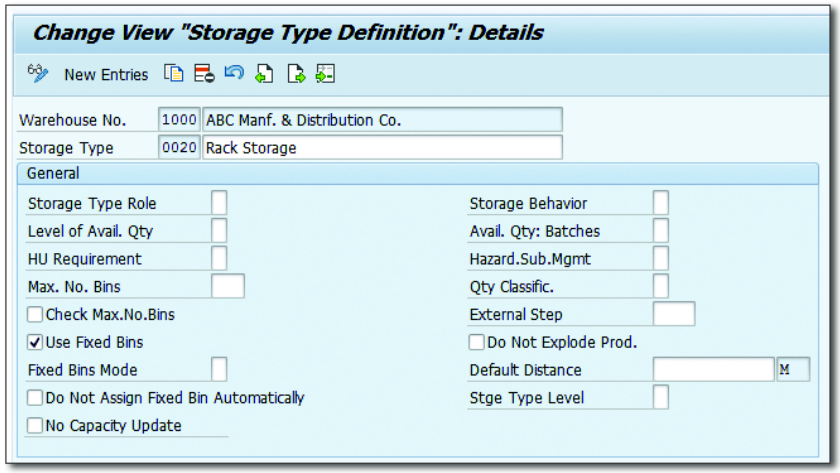


Figure 3.5 General Section in the Storage Type Definition

Storage Type Role

Storage Type Role suggests the behavior of the storage type. A storage type may act as a storage area, work center, door, identification point, and so on. A blank value in this field represents a standard storage type that is used for final storage in the warehouse. When a door is defined as a storage type, it must have door (F) as a Storage Type Role. All the interim storage types for a staging area are defined with role D. Table 3.1 lists the various roles available in SAP EWM.

Role Value	Description
(blank)	Standard Storage Type
A	Identification Point
B	Pick Point
C	Identification and Pick Point
D	Staging Area Group
E	Work Center
F	Doors
G	Yard
H	Automatic Storage Retrieval (Material Flow Control)

Table 3.1 Storage Type Roles List

Role Value	Description
I	Work Center in Staging Areas Group
J	Automatic Warehouse (Controlled by Material Flow System [MFS])
K	Production Supply

Table 3.1 Storage Type Roles List (Cont.)

Level of Available Quantity

Stock removal strategies use the LEVEL OF AVAIL. QTY field, which has two available options:

- Storage bin level
- Highest level handling unit (HU)

When the storage bin level option is chosen, the warehouse task (WT) for the stock removal is created without a source HU, and the warehouse operator can scan any HU that is available from the bin. When the highest level HU option is chosen, the WT is created with source HU in it. These WTs require the operators to scan the appropriate HU, even though it might not be feasible for them to locate the HU against every WT.

HU Requirement

This setting governs whether HU is mandatory or not for this storage type. Following are the options:

- **HU allowed but not a requirement**
  HUs aren't mandatory. Stock placement is allowed, with or without HUs, in the bins of this storage type.
- **HU requirement**
  HUs are mandatory, and stock must be kept in HUs only.
- **HU not allowed**
  Stock can't be stored in HUs. If you create an HU WT in a storage type where HUs aren't allowed, only the stock in the HU is moved. The empty HU remains in the source bin after WT confirmation.

Note

There are two types of WTs in SAP EWM: product WTs and handling unit WTs. We'll cover this in detail in later chapters.

Maximum Number of Bins

This parameter is used while creating the WT in the destination storage type when you select the Check Max.No.Bins checkbox and check Use Fixed Bins. This setting controls the maximum number of bins that are allowed per storage type for a product. The same setting can also be specified in the product-specific basis in the product master. This value in the product master precedes the priority value entered in the storage type level. With this control, more products can be stored in a well-adjusted way within the same area if this is required for subdivision in a warehouse.

Use Fixed Bins

If this indicator is flagged, the products are stored only in those bins (called fixed bins) associated with the product as fixed for storage. When you use fixed bins in a storage type, each product can be assigned with one or more such fixed bins. If fixed bins are full, then the system dynamically assigns another bin as fixed. Even if the stocks are emptied out, the fixed bins association with the product remains intact. The restriction here is that you can't use both fixed storage bins and dynamic storage bins in one storage type. Following are the dependent settings for fixed bin assignment:

- Maximum Number of Storage Bins
- Check Maximum Number of Bins
- Putaway Mode Fixed Storage Bins
- Do Not Assign Fixed Bins Automatically

Fixed Bins Mode

Two options are available with the Fixed Bins Mode setting. Either you can do a placement to a single optimum fixed storage bin or to multiple optimum fixed storage bins. This parameter is only applicable when you use slotting. With slotting, to determine the optimal bins, this indicator decides whether to place the

product in optimal bins or non-optimal bins (we'll cover more about slotting and rearrangement in Chapter 12). The results of slotting functions are stored in the fixed bin assignment in the Storage Bin Improvable column, as shown in Figure 3.6.

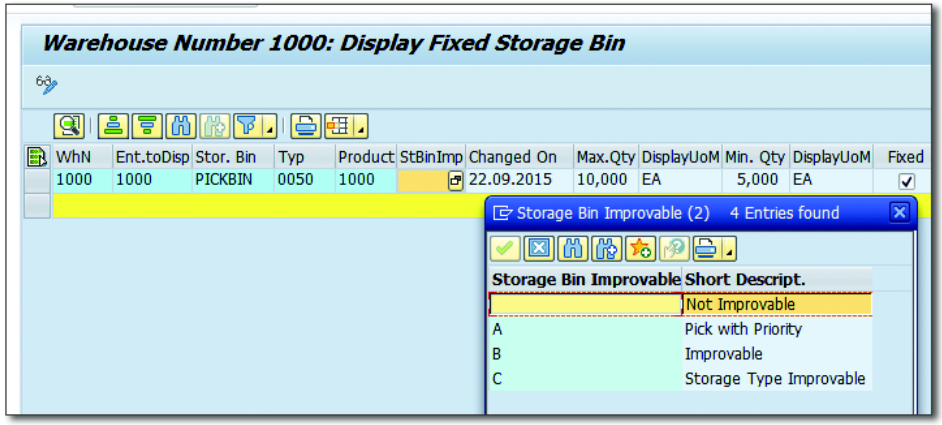


Figure 3.6 Storage Bin Improvable Field for Maintaining Fixed Storage Bins

If the Putaway to Optimum Fixed Storage Bins Only option is chosen, then stocks will be placed, only if the field on Storage Bin Improvable has the value Not Improvable. If the Putaway to Optimum Fixed Storage Bins Preferred option is chosen, fixed bins will be sorted against the Storage Bin Improvable field as one among the following:

- Not Improvable (blank)
- Pick with Priority (A)
- Improvable (B)
- Storage Type Improvable (C)

Do Not Assign Fixed Bin Automatically

With this option, you can control if fixed bin assignment to the product has to be discarded during the putaway or not. If the product doesn't have a fixed bin assignment, and all the fixed bins aren't full, the system will create a fixed bin assignment automatically during the putaway bin determination. If you don't want this to happen on the fly, choose this indicator.

No Capacity Update

The capacity and empty bin status are updated during WT creation and confirmation. When this update takes place for a bin for which more than one WT is scheduled, the database is locked while one WT is being performed. So there will be a wait time for other WTs to perform activity on this bin. By flagging this checkbox, you can prevent this capacity update, for example, when the putaway rule is EMPTY BIN for the storage type. By preventing this check, you help the system reduce the processing time.

Don't use this option if a capacity check is required for the bins of this storage type.

Storage Behavior

This has an influence on the general structure of the storage type. Let's take a look at the three available options to choose from:

- **Standard warehouse**
  This represents the general area for storage, and there are no special attributes for the bins in this storage type. Generally, in final storage and production supply area storage types, the standard warehouse behavior is used.
- **Pallet warehouse**
  High-rack storage areas use the pallet warehouse option. Normally, a high-rack storage shelf can accommodate different HU types. Shelf sections are mapped as the main section. When you perform the first putaway, the system creates the sub-bins for each pallet, for example:
  - Name of the main bin: 0010-01-01
  - Defined suffixes in section: 1 2 3
  - Name of sub-bins:
    - 0010-01-01/1
    - 0010-01-01/2
    - 0010-01-01/3
- **Bulk storage**
  This behavior is used most widely. When pallets are handled in high volumes and placed in one area (a bin), then this is the appropriate option to use. These bulk areas are structured in row, stack, and height. Bulk storage provides higher storage volume and is easily accessible by warehouse workers. You've

likely seen a warehouse where the bulk storage bins are marked on the floor representing the row, depth, and height stacked per the definition in bulk structure. They are sometimes stacked one on top of another, forming a pyramid-like structure.

Available Quantity: Batches

There are two options available to control the batches: batch-specifically or batch-neutrally. If you want to handle the stocks irrespective of the batch, enter "1". With this option, operators have the flexibility to choose any batch available in the bin when they scan the HU. But if you want the quantity to be batch specific, then leave the field blank. In this event, the stocks available in the bins are batch managed, and WTs, once created, will be batch specific.

Hazardous Substance Management

You can use this indicator to control the hazardous substance check. During the putaway of product, you can control whether you need to perform the check at the storage type level, perform the check at the storage type and storage section level, or perform no check at all.

Quantity Classification

Products are generally stored in different packaging units in the warehouse. Packaging units can be pallets, boxes, cartons, cases, bags, and so on. When one product has multiple possible packaging units based on the quantity, the Qty Classific. setting helps determine which packaging unit is to be used for storage.

The quantity classification is used in conjunction with the packaging specifications (Figure 3.7). The packaging specification holds the quantity classification details maintained at each level; this forms the basis for derivation of quantity classification for the requested quantity.

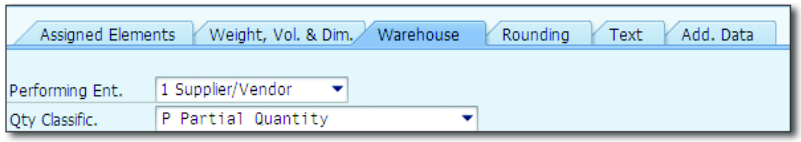
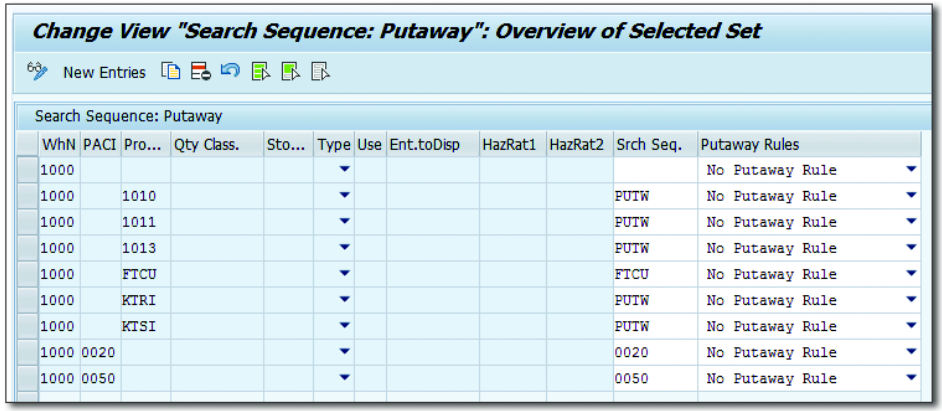


Figure 3.7 Quantity Classification in the Packaging Specifications

Quantity classification is also a criteria for determination of storage type search sequence (Figure 3.8). The storage type search sequence for both putaway and stock removal has quantity classification in it.



Change View "Search Sequence: Putaway": Overview of Selected Set

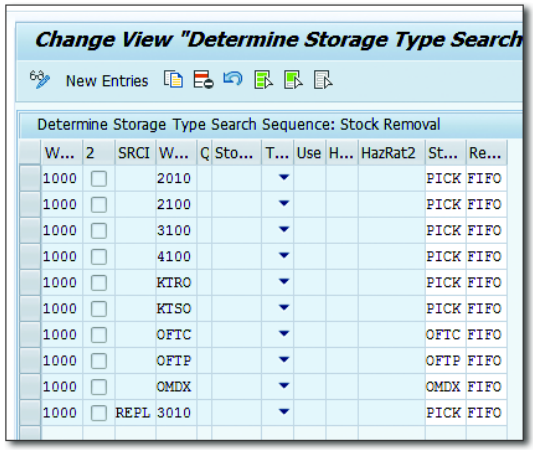
New Entries

Search Sequence: Putaway

WhN	PACI	Pro...	Qty Class.	Sto...	Type	Use	Ent.toDisp	HazRat1	HazRat2	Srch Seq.	Putaway Rules
1000											No Putaway Rule
1000		1010								PUTW	No Putaway Rule
1000		1011								PUTW	No Putaway Rule
1000		1013								PUTW	No Putaway Rule
1000		FTCU								FTCU	No Putaway Rule
1000		KTRI								PUTW	No Putaway Rule
1000		KTSI								PUTW	No Putaway Rule
1000	0020									0020	No Putaway Rule
1000	0050									0050	No Putaway Rule

Figure 3.8 Quantity Classification in Storage Type Search Sequence for Putaway

The operative unit of measure is derived from the same packaging specification level identified. Rounding data at the storage type level rounds the stock removal quantity based on the operative unit of measure (Figure 3.9).



Change View "Determine Storage Type Search

New Entries

Determine Storage Type Search Sequence: Stock Removal

W...	2	SRCI	W...	Q	Sto...	T...	Use	H...	HazRat2	St...	Re...
1000			2010							PICK	FIFO
1000			2100							PICK	FIFO
1000			3100							PICK	FIFO
1000			4100							PICK	FIFO
1000			KTRO							PICK	FIFO
1000			KTSO							PICK	FIFO
1000			OFTC							OFTC	FIFO
1000			OFTP							OFTP	FIFO
1000			OMDX							OMDX	FIFO
1000		REPL	3010							PICK	FIFO

Figure 3.9 Quantity Classification in Storage Type Search Sequence for Stock Removal

External Step

This setting refers to the process steps performed in the warehouse. These process steps are linked to a predefined internal process step, which is useful when you're using the storage control functionality of SAP EWM. Using this functionality, you can define a destination location for a storage process step in relation to the source location.

Do Not Explode Product

This indicator influences the update of HU content on a separate tracking table while WT confirmation happens. You might need the tracking table update for a storage type where you handle the inventory differences so you can track the differences.

You can display all the movements of a product, including all HU WTs, via the monitor by choosing Documents • All Movements for Product • Display All Movements for a Product in the warehouse management monitor. Pay attention to the inclusion/exclusion for the appropriate storage types because these updates are additional system overheads that can impact the performance of WT creation. If you're using SAP BusinessObjects BI for reporting, you might need these details from the tracking table.

Default Distance

Whenever the warehouse operator performs an activity using radio frequency (RF) devices, the distance he travels between the last bin confirmed and the first bin in the warehouse order (WO) is calculated. Sometimes, for a paper-driven warehouse facility, the WT confirmation is done on the desktop user interface (UI). In such a situation, where you don't have the processor information, calculation of travel distance takes place by using the value maintained in the Default Distance field. This default value represents the average distance one has to cover to reach the bin of this storage type.

Storage Type Level

The graphical warehouse layout (GWL) uses this parameter (Figure 3.10). The storage type level depicts the multiple storage levels in the warehouse based on the level maintained. If the level is the same across certain storage types, GWL

presents these storage types on the same level. If no levels are maintained, the system considers all storage types at the same level.

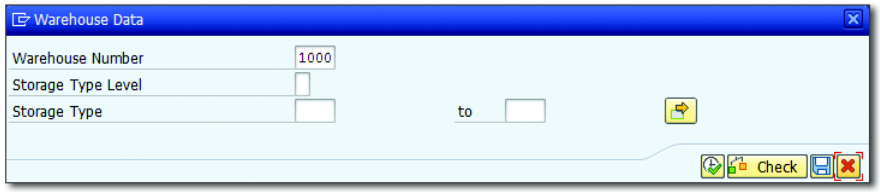


Figure 3.10 Storage Type Level in the Default Graphical Warehouse Layout

We'll discuss GWL in detail in Chapter 13.

3.2.2 Putaway Control

This section of the storage type definition controls the way in which the stock placement happens for a product into the bin (Figure 3.11). The putaway can be against inbound delivery or internal movements from one bin to another within or across the storage type. We'll walk through the putaway function parameters and their attributes.

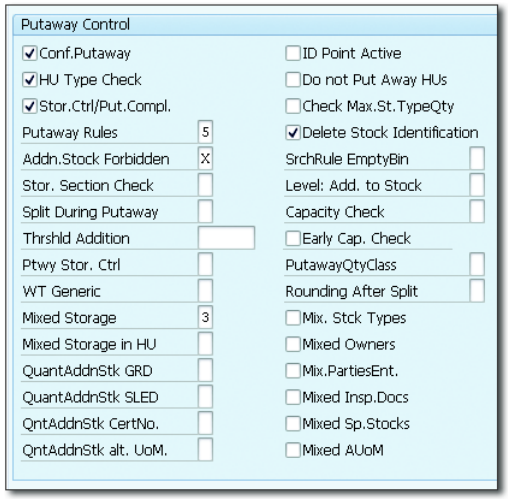


Figure 3.11 Putaway Control Parameters in the Storage Type Definition

Confirm Putaway

When the putaway is done into this storage type, the WTs have options of either automatic confirmation by system or manual confirmation by the user. If the Conf.Putaway flag is set in the storage type, the WTs are supposed to be confirmed automatically for the stock movement. Only when the WTs are confirmed does the associated stock become available. If this flag isn't checked, the stock becomes available upon WT creation.

HU Type Check

This parameter checks, whether an HU type is allowed for the destination storage type or not. When a WT is created with an HU assignment and destination as this storage type, the HU type check occurs.

When the HU Type Check flag is checked, the storage bin type becomes mandatory while creating the storage bin for this storage type.

The allowed HU type for the storage type is maintained in the IMG; navigate via Transaction SPRO to the SAP EWM IMG. Use the menu path, Extended Warehouse Management • Cross-Process Settings • Handling Units • Basics • Define HU Types for Each Storage Type.

Storage Control/Putaway Completed

This indicator controls the final putaway process against the Process-Oriented Storage Control (POSC). This indicator is checked for the bins with storage types representing the physical warehouse. The interim bins don't use this indicator.

Putaway Rules

The Putaway Rules setting determines the logic in which destination bins are determined during the putaway process. The options for this setting are the following:

- **Addition to existing stock/empty bin**
  During the bin determination, the system will try to find a bin in which stock exists, and capacity isn't exhausted. If it doesn't find any such bin, the system will go for an empty bin for stock placement.

- **Consolidation group**
  When a storage type is used as a work center for packaging, there might be a need to store the HUs of the same consolidation group in one bin. This option ensures assignation of the consolidation group to the bin after the first HU is moved to that bin.
- **General storage area**
  The general storage area consists of one large bin that can accommodate products for interim storage. From general storage, products later move to their final destination bin. For example, general storage can be a clearance area. Once deconsolidated, products are moved to the final bins or toward the dispatch area for loading onto the transportation unit. It can also be a clearance area where the damaged products or products approaching shelf life are stored for speedy clearance or sale. The general storage area bin allows addition to existing stock and to mixed storage of all types.
- **Empty bin**
  Every time stock placement happens, only the empty bins are considered, and bins with existing stocks are ignored.

Addition to Existing Stock Forbidden

This parameter allows or prohibits addition to the existing stock to the bin. There are three possible options:

- **Addition to existing stock permitted**
  System allows additions if the product and attributes are the same as compared to that of the existing quant in the bin.
- **Addition to existing stock generally not permitted**
  System prohibits addition to the existing quant in the bin.
- **Product putaway profile decides**
  The product putaway profile controls the addition to the existing stock (Figure 3.12).

To define the product putaway profile, go to the SAP EWM IMG, and follow the menu path, Extended Warehouse Management • Goods Receipt Process • Strategies • Define Product Putaway Profile.

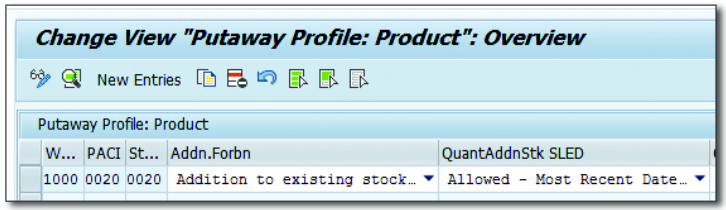


Figure 3.12 Product Putaway Profile

Storage Section Check

This indicator allows you to enable the storage section search and check functionality during the automatic bin determination for putaway in accordance with the strategies defined for the section search. The possible options are listed here:

- No storage section determination or check
- Storage section determination and check
- Storage section determination; no check

Split during Putaway

The SPLIT DURING PUTAWAY setting allows the products to be either allowed for placement without split or to be split if the quantity exceeds the bin capacity at the first bin. It also allows the decision to be made based on the split indicator in the product master (Figure 3.13), which is maintained in the storage type data view of product master. The following options are available:

- Do not split during putaway
- Split during putaway
- Product master decides

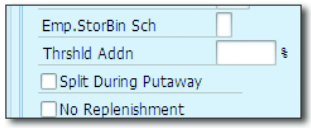


Figure 3.13 Split Indicator in the Storage Type View of the Product Master

Threshold Addition

This setting works in conjunction with the Split During Putaway indicator. When the Split During Putaway indicator is set, the available bin capacity is checked with the threshold value, and only if the available capacity is greater than the threshold value does the split occur.

Putaway Storage Control

This parameter controls the characteristic of the created WT. The WT can either be an HU WT or a product WT. The following options are available:

- Storage control: Putaway with HU WT
- Storage control: Putaway with product WT
- Storage control: Dynamically evaluated

If you enter the option as dynamically evaluated, POSC settings determine this characteristic per the assignment in the storage process step under the storage process definition, as shown in Figure 3.14.

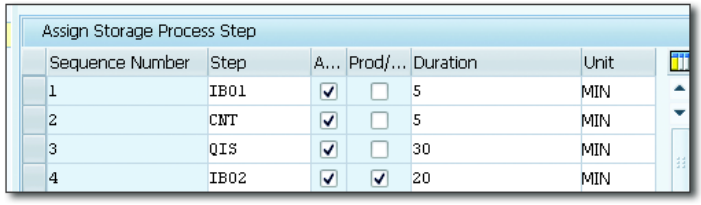


Figure 3.14 Dynamically Controlled Production/Handling Unit Warehouse Task in the Storage Process Step

WT Generic

The WT Generic field controls the determination of destination storage data. With this parameter, you can control which part of the destination data needs to be determined at the time of WT creation. When putaway is done in the packing station, you shouldn't determine the destination storage bin because at the point of WT creation, it isn't known. Instead, the destination storage bin only needs to be identified during the WT confirmation. The options for this field are the following:

- Not generic (storage type, storage section, and storage bin)
- Storage type and storage section
- Only storage type

Mixed Storage

The Mixed Storage field allows placing different quants of various products in one single storage bin. The following options are available:

- **Mixed storage without limitations**
  More than one product is allowed to be stored in a bin without any limitation on product and batch. Any product and any batch can be stored in a single bin.
- **Several non-mixed HUs with the same product/batch**
  Different HUs can be placed but with the same product and same batch in the bin.
- **Several HUs with different batches of the same product**
  HUs belonging to the same product can be placed from different batches in a single bin.
- **One HU allowed per bin**
  Only a single HU, containing multiple products, is allowed in one bin. This depends on the Mixed storage in HU indicator, as described in the next subsection.

Mixed Storage in HU

This parameter controls mixing different products and batches within an HU in a storage bin of this storage type. The potential options are the following:

- **Mixed storage not allowed**
  If this indicator is set, mixing of product isn't allowed in an HU.
- **Several batches of the same product per HU**
  If this is set, only one product is allowed in an HU, but several batches can be accommodated in it.
- **Mixed storage without limitations in HU**
  With this option, more than one product and multiple batches within the product are allowed in a single HU.

Quant Addition to Stock Goods Receipt Date

When different stocks are allowed to be placed in a storage bin or HU, there can be only one stock goods receipt date because a quant can accommodate only one date. This indicator influences the control of goods receipt date update in the quant when there is an addition of stock with a different goods receipt date. The following are the possible options to influence the goods receipt date:

- **Allowed—most recent date dominant**
  The latest goods receipt date is taken for consideration in quant update over that of old stock.
- **Allowed—earliest date dominant**
  The oldest date of goods receipt is updated in the quant.
- **Not allowed**
  Doesn't allow adding if the goods receipt date is different from that in the quant.
- **Product putaway profile decides**
  The product putaway profile determines one out of the preceding three possibilities.

Quant Addition to Stock Shelf Life Expiration Date (SLED)

This indicator also works in a similar way as the QuantAddnStk GRD. When stocks are added to the existing stock, the SLED date of the quant is also updated. You can control this by using the following options:

- Allowed—most recent date dominant
- Allowed—earliest date dominant
- Not allowed
- Product putaway profile decides

Quant Addition to Stock Certificate Number in Storage Bin/Handling Unit

This indicator is used to control the way in which the certificate numbers are stored during quant addition to stock. Following are the three options:

- Allowed—delete
- Not allowed
- Product putaway profile decides

Quant Addition to Stock Alternative UoM

This parameter controls the way in which the alternative unit of measure (UoM) is handled in the quant. The potential options are as follows:

- **Allowed—first alternative UoM dominant**
  Retain the first alternative UoM in the quant. For all subsequent movements, it's maintained in the base UoM (BUoM) and converted to the first alternative UoM (AUoM).
- **Allowed—manage stock in BUoM only**
  The AUoM is ignored, and all stocks are maintained in BUoM.
- **Not allowed**
  The UoM is not allowed.
- **Partly allowed—manage stock in AUoM**
  Only one AUoM is allowed; you can't add stock with different AUoMs into the existing stock.
- **Product putaway profile decides**
  Product putaway profile setting decides from the preceding alternatives.

ID Point Active

This indicator controls the storage of product in the intermediate location, before it's finally put away. An ID point is used in association with Layout-Oriented Storage Control (LOSC). In certain situations, for example, if the product has to be placed in a high rack storage area, before moving it to the final destination, you might move it to an interim place. This movement is controlled via the ID Point Active setting.

Note

We'll discuss LOSC in detail in Chapter 5.

Do Not Putaway HUs

If you flag this indicator, the putaway of HUs isn't allowed in this storage type. When a product is removed and placed in a pick HU on a resource, the stock removal WT gets confirmed, and the system automatically creates a WT for moving the product from a resource to the destination bin. Therefore, if you don't flag this indicator, an HU WT is created for the final putaway. Otherwise, a product WT is created for the final putaway.

Check Maximum Stock Type Quantity

This parameter influences the putaway of the product when it exceeds the maximum quantity specified in the storage type view of the product master. If this indicator is set, the system doesn't allow the maximum quantity to be exceeded in the storage type.

Delete Stock Identification

This is a unique number used for identifying the stock with its stock attributes. This indicator influences the retention of stock identification in the storage type and works in combination with the STOR.CTRL/PUT. COMPL indicator. When you do a final putaway of a product and don't want stock identification, then you can flag this indicator for deletion of stock ID. We'll cover stock identification in detail in Chapter 5, Section 5.6.

Search Rule Empty Bin

When the PUTAWAY RULES setting is 2 (addition to existing stock/empty bin) or 5 (empty bin), the sorting of bins is based on the following options:

- **Sorting according to definition**
  The standard sort definition is used to identify the empty bin. Whenever you implement, roll out, or add/delete the bin, sorting has to be performed to reinitiate the sort sequence per the new definition. To sort, use Transaction /SCWM/SBST (Sort Storage Bins) or navigate via the path, SAP EASY ACCESS screen UNDER EXTENDED WAREHOUSE MANAGEMENT • MASTER DATA • STORAGE BIN • SORT STORAGE BINS.

- **Near to fixed bin**
  When you use this option, the system searches for the fixed bin. If it doesn't find the fixed bin empty, it searches for the nearest fixed bin using reserve storage types. The assignment of reserve storage types can be done in Customizing by navigating the path, Extended Warehouse Management Under Goods Receipt Process • Strategies • Putaway Rules • Sorting Near To Picking Bin • Storage Type Control: Near to Picking Fixed Bin or Define Search Scope for Each Level.
- **Product decides**
  You have an option to decide on the preceding parameters based on settings in the product master. For this, you need to maintain the Emp.StorBin Sch (empty storage bin search) field on the Storage Type Data view of the product master.

Level of Addition to Stock

This indicator controls the level at which the stock is added to the existing stock during the stock placement. The following options are available:

- **Addition to stock at bin level**
  Stocks are added to the bin level. You need not enter the destination HU while confirming the WT.
- **Addition to stock at highest HU level**
  When you add the stocks to the highest level of HU, you need to enter the destination HU. When the WT is created, the system proposes the destination HU.

Capacity Check

This parameter helps control the bin capacity. When you're using dimensionless capacity, you need to specify the capacity data in a storage bin or storage bin type. Capacity check is performed against the dimensionless capacity data maintained in the Unit of Measure tab against the product master, packaging material, or both.

These are the possible options:

- No check according to key figure
- Check acc. to key figure product
- Check acc. to key figure packaging material

- Check acc. to key figures product and packaging material
- No check against key figure, weight, and volume

Early Capacity Check for Bin Types

This check enables you to activate the early capacity check (while creating a putaway task for the storage type) for the storage bin type. If you activate this check, and the capacity of storage bin type is exceeded, such storage bin types are excluded from the search. This helps improve the performance by avoiding the capacity check for all the bins individually.

Putaway Quantity Classification

This setting controls the packaging unit in which a product is stored in the warehouse.

Rounding after Split

If the split rule is used during putaway task creation, this parameter controls the rounding off of the quantity after the split. The possible options are the following:

- No rounding
- Round down WT quantity to a multiple of a unit

These factors round off the quantity based on the quantity classification defined in the putaway control (previous section) of the storage type.

Mixed Stock Types for the Same Product

This indicator controls whether different stock types of the same product are allowed to be stored in a storage bin or HU. If this field isn't checked, the system allows you to mix the different stock types; otherwise, the system doesn't allow mixing of different stock types.

Mixed Owners for the Same Product

This indicator controls whether products from more than one owner are allowed in the same bin or HU. Owner in SAP EWM is a business partner, that is, a

representative of the organization that owns the stock. You'll need to select this if you need to store the products from different owners in the same bin or HU in this storage type.

Mixed Parties Entitled to Dispose the Same Product

The party entitled to dispose is generally a plant or organization that has authorization for disposing of the stock. This indicator controls whether a bin or an HU in this storage type is allowed to contain products from more than one party entitled to dispose.

Mixed Inspection Documents for the Same Product

When a product is received for quality inspection (QI), the same is stored as QI stock in the bin or HU. The quant representing the stock has a quality inspection document associated with it. This indicator controls whether multiple inspection documents are allowed for the same product in a bin or HU when you receive a QI stock. If you don't check the indicator, it allows multiple inspection documents for the same product in a bin or HU.

Mixed Special Stocks for the Same Product

This indicator controls whether more than one special stock can exist in a storage bin or HU. If the field is blank, different special stocks are allowed to be maintained in a bin or HU; if selected, only one special stock can be maintained.

Mixed AUoM for the Same Product (Stock Level Dependent)

This indicator controls whether different AUoM in a bin or HU are allowed. If this field is blank, different AUoM are allowed; if selected, the product or batch can exist in one AUoM only.

3.2.3 Stock Removal Control

The stock removal control parameters of a storage type influence the stock removal processes (Figure 3.15). Whenever stock is removed from a bin, these parameter act as influencing factors. Let's go through these parameters one by one.

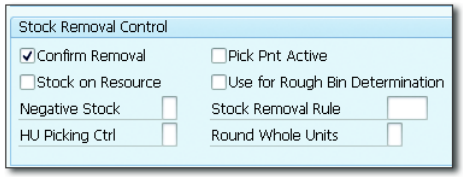


Figure 3.15 Stock Removal Control Parameters

Confirm Removal

If this indicator is flagged, then the WT confirmation is mandatory for stock removal from a bin in a storage type. Only when the WT is confirmed does the stock become available in the bin.

Stock on Resource

Set this indicator if you want the stock on the resource to be available for stock removal. In certain instances, stock is picked from the shelf and loaded on to the warehouse handling equipment, for example, a forklift. Under this circumstance, the stock is available on the resource, and if you want to consider this stock during stock removal, you need to flag this indicator.

☑ **Example**

If a high rack storage area is connected with an ID point, when the stock moves from resource to ID point as depicted in Figure 3.16, the stock on resource is also considered for stock removal.

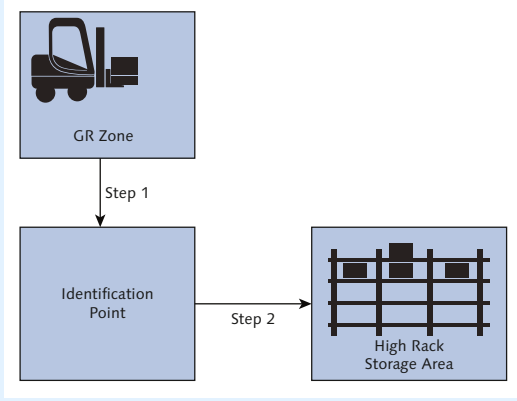


Figure 3.16 Stock on Resource While Moving to the ID Point

Negative Stock

If you allow negative stock at the storage type level, it allows a negative quant to be posted. Available options are the following:

- **Negative stocks not allowed**
  You cannot allow stock to be negative, meaning WT confirmation is not allowed without available stock.
- **Negative available quantity allowed (A)**
  The WTs are allowed to be created even if the stocks aren't available. However, confirmation of WTs isn't allowed. Prior to confirmation of WTs, you need to bring the stock in.
- **Negative stocks allowed**
  You can allow the stock to be negative, meaning WT confirmation is allowed without available stock.

Example

If you have a scenario of loose cases for deliveries in your warehouse, and the replenishment is ordered based on the actual warehouse request, you can choose indicator A (negative available quantity allowed). With this choice, you allow WTs to be created even without available stock and trigger an order-based replenishment for loose case picking. We'll discuss replenishment in detail in Chapter 12.

HU Picking Control

This indicator controls how the system should behave when you remove a homogeneous HU from a bin. The following are the available options:

- Adopt source HU with lower-level HUs into pick HU
  The first pick HU assigned to the WT is copied as the destination HU. While doing the confirmation, the HU copy indicator is set automatically.
- Propose source HU as destination HU
  The source HU is copied as the destination HU. The HU copy indicator is set automatically if you use this option.
- Warehouse process type controls proposal for destination HU
  The settings control for HU pick in the warehouse process type controls the behavior.
- Only adopt contents (prod. and lower-level HUs) into pick HU
  Only the contents of the source HU are adopted as the destination HU.

Pick Point Active

If you activate this indicator, all the withdrawal goods movement will be processed via pick point. Pick point acts as a work center and is used in the LOSC functionality. The withdrawals from the source HU are done using this work center, and the remaining quantities are repacked into a different HU. The leftover quantity is returned back through the return transfer storage type/bin entered in the work center.

Use for Rough Bin Determination

You use this indicator to set the source bin data in the delivery item even if there is no stock available. After you have the source bin information, you can trigger order-related replenishment for picking the product at a later point in time against this delivery item.

Stock Removal Rule

The stock removal rule is defined in the IMG via the menu path, Extended Warehouse Management • Goods Issue Process • Strategies • Specify Stock Removal Rule.

Commonly used rules are Last-In-First-Out (LIFO), First-In-First-Out (FIFO), Best-Before-Date (BBD), and so on. Based on this rule definition, the quants are sorted for stock removal. Firstly, the storage type search sequence is checked for stock removal. If no definition is found, the system checks for the storage type group and storage type for stock removal.

Round Whole Units

Depending on the situation and business necessity, you can round off the quantity in terms of whole units. This may save time and effort of workers at the picking location. When pallets are rounded up or down, you need not break the pallets for partial picking or in terms of case/loose picking. The following options are available:

- No rounding
- Round down WT quantity to single unit
- Round down WT quantity to a multiple of a unit

- Round up WT quantity to a multiple of a unit
- Round WT quantity to available quantity

3.2.4 Goods Movement Control

Now we'll discuss the various control parameters in the Goods Movement Control section of the storage type definition (Figure 3.17). These parameters influence the goods movement in a storage type.

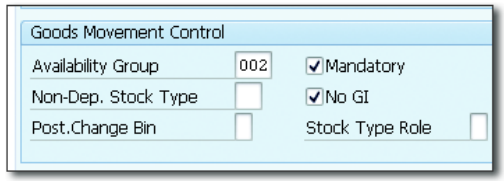


Figure 3.17 Goods Movement Control Indicators

Availability Group

The Availability Group parameter controls the availability of stock according to SAP Advanced Planning and Optimization (SAP APO) availability. The configuration of availability group and mapping of stock type with the SAP ERP storage location is done in the IMG by using the menu paths, Extended Warehouse Management • Goods Receipt Process • Configure Availability Group for Putaway and Extended Warehouse Management • Interfaces • ERP Integration • Goods Movements • Map Storage Locations from ERP System to EWM.

Defining the availability group at the storage type level makes the stock available at the mapped stock type in SAP EWM and storage location in the SAP ERP after the WT is confirmed.

Non-Dependent Stock Type

This parameter defines the quality of stock such as unrestricted, quality inspection, blocked, and so on, irrespective of an availability group of the storage type. The following options are available:

- Blocked stock (BB)
- Unrestricted-use stock (FF)

- Stock in quality inspection (QQ)
- Blocked stock returns (RR)

For example, if you want return stock to be blocked, kept as nonvaluated and not available to promise (ATP) in SAP APO till it's cleared, enter "RR" as the location-independent stock type.

Posting Change Bin

This indicator controls the posting change of product/HU from one stock type to another in a storage bin with or without creating a WT. The following options are available:

- **Posting change always in storage bin**
  Posting change is done within a bin without a WT. The stocks remain in the same storage bin as a result of the posting change.
- **Posting change according to mixed storage setting**
  Posting change is done in dependency with mixed storage settings. If the settings aren't permitted, and the stock is moved to a new storage bin, the system creates a WT for the posting change.
- **Posting change never in storage bin (create transfer order)**
  The WT is always created, and the stock is moved to a new storage bin.

Mandatory

Only stocks for this availability group (mentioned in the storage type settings) are allowed to be placed in the bin. If you have a stock quantity with a different stock type, the system automatically performs a posting change for the quantity in the relevant stock type of the mandatory availability group during WT confirmation.

No Goods Issue

This indicator controls the goods issue (GI) from the storage type. If the indicator is set, it doesn't allow posting GI directly from the storage bin of this storage type. This is flagged mostly for interim bins where the GI doesn't happen normally.

Stock Type Role

This parameter controls the automatic change in the stock type of the products that are moved into this storage type. The possible options are the following:

- Customs blocked stock
- Scrapping stock
- Normal stock

Hint

Under certain circumstances, businesses might need to hold the expired stock for scrapping. A particular stock type can be used for distinguishing the expired stock. You can use the STOCK TYPE ROLE parameter to control the holding of stock types with these attributes.

3.2.5 Replenishment

Replenishment parameters control the way in which the replenishment process works (Figure 3.18). We'll discuss this in detail in Chapter 12, Section 12.1.

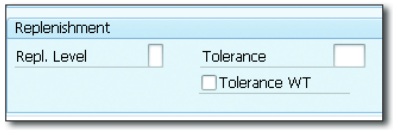


Figure 3.18 Replenishment Control Parameters

Replenishment Level

There are two levels at which you can do the replenishment, which you designate in the REPLENISHMENT LEVEL setting:

- **Storage bin level for fixed bins**
  This scenario is applicable when you have a fixed storage bin for a product. When replenishment is triggered, the stock data is read at the fixed bin level versus the required quantity. Replenishment proposals are then triggered based on this calculation.
- **Storage type level**
  If you opt for storage type level replenishment, the entire stock within the storage type is read. Based on this calculation between the existing stock and required stock, the replenishment proposals are triggered.

Tolerance

You define the tolerance level in a percentage. If the replenishment quantity is less than the requested quantity, and the difference is within the defined percentage limit, then the replenishment request is set to complete, and no further replenishment proposals are created. This field works in combination with the TOLERANCE WT indicator.

3.3 Storage Section

Storage sections are subdivisions or subsections of storage types. Storage sections obviously represent a group of bins with the same attribute (Figure 3.19).

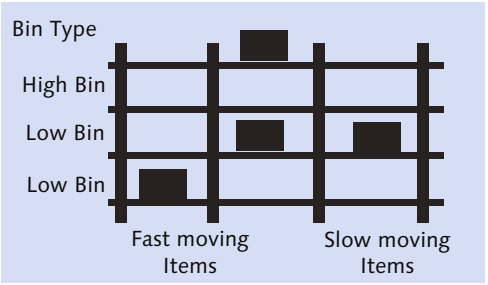


Figure 3.19 Storage Sections

For example, in finished goods storage types, a business might want to have different sections for fast-moving and slow-moving goods. Thus, all fast-moving items are stored in the bins classifying fast-moving section attributes.

In certain cases, a business might not need to subdivide the storage type in storage sections. In this situation, only one section will be created in the system because it's mandatory to do so. The one section will represent the entire storage type in this case.

Storage sections are four-digit alphanumeric codes in the SAP EWM system. Storage sections can be created by navigating to the menu path, EWM IMG • EXTENDED WAREHOUSE MANAGEMENT • MASTER DATA • DEFINE STORAGE TYPE.

3.4 Storage Bin

The storage bin is the smallest physical space in the warehouse. In fact, entire warehouse can be summed up as a set of storage bins. Standard storage types may have thousands of bins wherein the final storage takes place, whereas storage types such as door, staging area group, work center, and so on might have a smaller or a limited number of bins. The storage bin represents the exact position of space within the warehouse by means of a coordinates system. Coordinates are maintained in the storage bin master.

Bins are 18-character-long alphanumeric codes. Naming of bins requires special attention because it can represent the position of the bin in the warehouse. Careful naming of bins can help workers identify the bins easily.

3.4.1 Storage Bin Types

Storage bin types are used to group the storage bins based on the size or physical attributes of the storage bin. To create the storage bin types in the IMG, follow the menu path, Extended Warehouse Management • Master Data • Storage Bins • Define Storage Bin Types.

Example

A storage bin type includes the physical attributes such as size and dimensions representing a group of bins with similar attributes. For example, a bin type can be created for dimensions 2W × 1D × 5 H (W represents the bin width, D represents the bin depth, and H represents the bin height in the pallet unit).

3.4.2 Bin Access Type

Bin access types are used in resource management to let certain resource types access the only allowed bin access types (Figure 3.20). In this way, they can control the access to certain areas within the warehouse for certain resource types who have special skills to handle those bins.

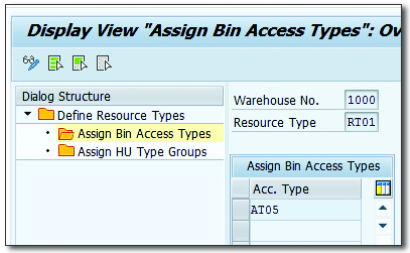


Figure 3.20 Bin Access Type Assignment against Resource Types

3.4.3 Storage Bin Structure

As a warehouse might have thousands of bins, it's unwise to create the bins one by one. With the help of a storage bin structure, you can expedite the storage bin creation activity. This is useful in creating a huge number of bins in one go. Bin definition can be provided using a template and structure (Figure 3.21).

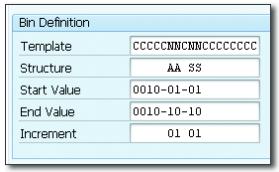


Figure 3.21 Storage Bin Definition

In the TEMPLATE field, "C" represents constant, "N" represents numeric character, and "A" represents alphabetic character (see Figure 3.21). The STRUCTURE field suggests the division of aisles, stacks, layers, and so on in the warehouse. For example, if you have aisles numbered 1 to 10 in the warehouse, you'll need to reserve two characters for them in the bin number so that it accommodates from 01 to 10.

Values used in STRUCTURE definition, such as A, S, L, and so on are called storage bin identifiers. These identifiers can be created by navigating to EWM IMG • EXTENDED WAREHOUSE MANAGEMENT • MASTER DATA • STORAGE BINS • DEFINE STORAGE BIN IDENTIFIERS FOR STORAGE BIN STRUCTURES.

The START VALUE (first bin name) to END VALUE (last bin name) fields help the system understand the first and last bin name it has to generate. Increments in each of the characters can be set appropriately based on requirements. Generation of bins using a bin structure will be discussed in the next section.

3.4.4 Storage Bin Master

The storage bin is the smallest spatial unit in a warehouse. Therefore, the storage bin represents the exact position in the warehouse where products are or can be stored.

Creating Storage Bins

Bins can be created manually by navigating to the menu path, SAP Easy Access Menu • Extended Warehouse Management • Master Data • Storage Bin • Create Storage Bin. Alternatively, you can use Transaction /SCWM/LS01 for bin creation. Transactions /SCWM/LS02 and /SCWM/LS03 can be used for change and display of bin, respectively. Note that a storage bin name is unique across the entire warehouse.

When storage bins are created, three fields are mandatory: Warehouse No., Storage Bin, and Storage Type. Let's now discuss the importance of other fields on the bin master (Figure 3.22).

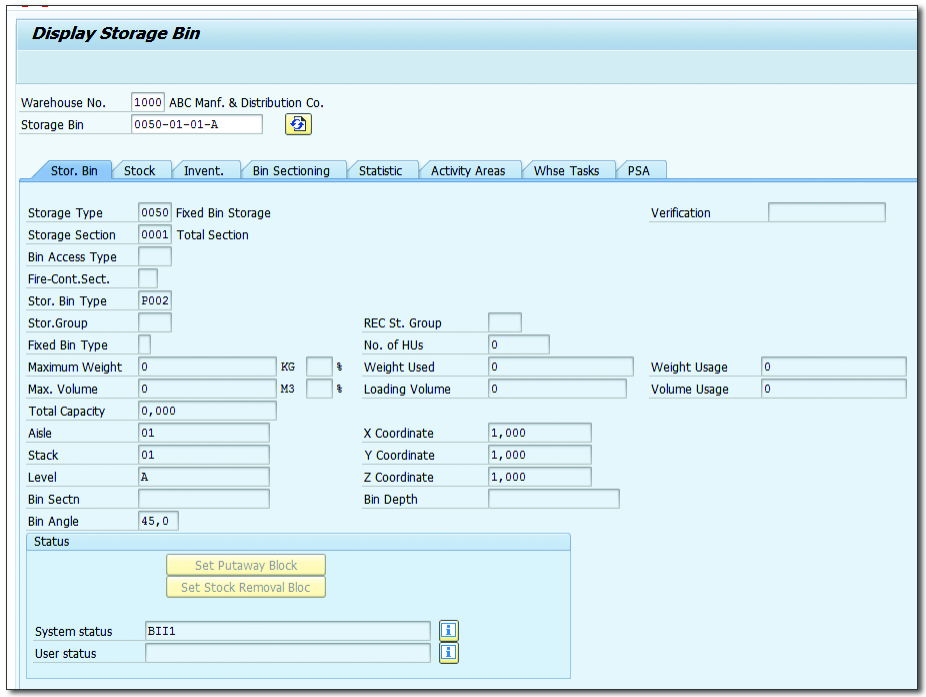


Figure 3.22 Creation of a Storage Bin Master

Fire Containment Section

This indicator helps to classify the storage bin to a fire containment section in the warehouse, thereby listing the hazardous substances within the fire containment section.

Storage Group

Storage groups are used in LOSC to determine the intermediate storage type. To create the storage group, follow the menu path, Extended Warehouse Management • Cross-Process Settings • Warehouse Task • Define Storage Groups for Layout-Oriented Storage Control.

Fixed Bin Type

This field isn't editable. The system doesn't allow you to maintain a value here. The same data from the fixed bin assignment of the product master are used at runtime.

Total Capacity

Capacity usage is maintained in this field, and it corresponds to the capacity usage defined in the product master and storage unit type.

Bin Section and Bin Angle

These parameters are used in GWL and provide additional information.

Verification

This setting is used during execution of warehouse processes using RF devices to confirm the correctness of bins. Verification fields can be set as the bin name if you want to keep the process of verification simpler. If you want to ensure the operational accuracy on every warehouse activity by verifying the bin verification, you can maintain the complex by keeping the readable verification different from the actual verification.

Resource Execution Constraint Storage Group

This parameter helps group the storage bins and control the space within the warehouse without any crowding of operators who execute the task in a certain area.

You can do the assignment in menu path, Extended Warehouse Management • Cross-Process Settings • Resource Management • Control Data • Assign Resource Execution Constraints to REC Storage Group. You can activate the resource execution constraint (REC) per REC storage group in the following menu path: SAP Easy Access Menu • Extended Warehouse Management • Master Data • Resource Management • Activate Resource Execution Control for Storage Groups. We'll be discussing this in detail in Chapter 5, Section 5.7.

3.4.5 Loading Storage Bins

At the time of implementation or rollout of a project, you need to create thousands of bins. Creating these bins manually is an error-prone and time-consuming task. If your business has the bin data in a third-party system, it can be uploaded using Transaction /SCWM/SBUP.

Follow the menu path, SAP Easy Access Menu • Extended Warehouse Management • Master Data • Storage Bin • Load Storage Bins. Upon successful upload, bins get created automatically. You may use the Successful Changes and Failed Changes tabs to see the report on bin creation (Figure 3.23).

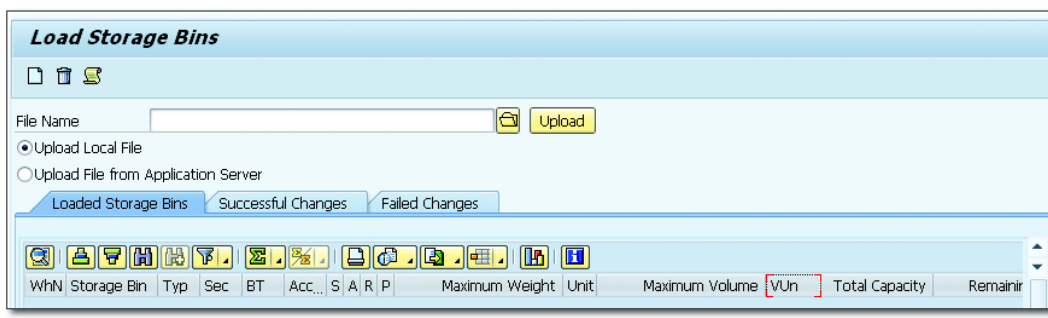


Figure 3.23 Loading Storage Bins

3.4.6 Mass Changes to Storage Bins

Businesses sometimes need to make changes in thousands of bins, which would be extremely time consuming to make in each of the bins manually. SAP has provided a tool to enable mass changes to be made instead (Figure 3.24).

Example

If you change the rack section within a warehouse from four stack height to five stack height to accommodate more products and for optimum utilization of space, you may want to classify this under a new section. By using mass change, you can reset all the bins to a new storage section at the same time.

To make a mass change to storage bins, use Transaction /SCWM/LS11. Alternatively, use the navigation path, SAP Easy Access Menu • Extended Warehouse Management • Master Data • Storage Bin • Mass Change to Storage Bins.

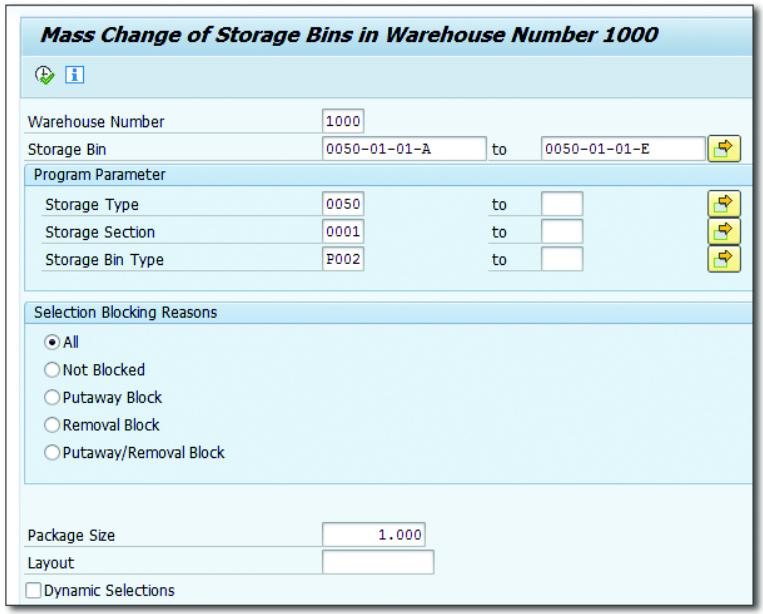


Figure 3.24 Selection Screen for Mass Change of Storage Bins

3.4.7 Generating Storage Bins

Bins can also be collectively generated using structures. Names for bins are automatically derived from the values provided in the Structure, Start Value, End

Value, and Increment fields (Figure 3.25). Use Transaction /SCWM/LS10 or the navigation path, SAP Easy Access Menu • Extended Warehouse Management • Master Data • Storage Bin • Generate Storage Bins.

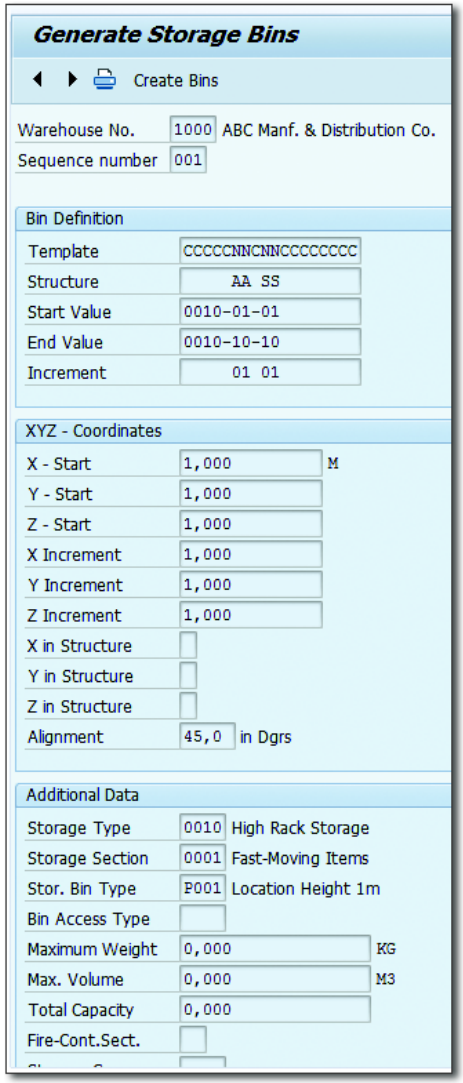


Figure 3.25 Generate Storage Bins Using a Storage Bin Structure

3.4.8 Loading Storage Bins Sorting

An automated tool for sorting the bins is required to rearrange the sort for bins in certain warehouses (Figure 3.26). You can load the bin sorting via Transaction /SCWM/SRTUP or the navigation path, SAP Easy Access Menu • Extended Warehouse Management • Master Data • Storage Bin • Load Storage Bin Sorting.

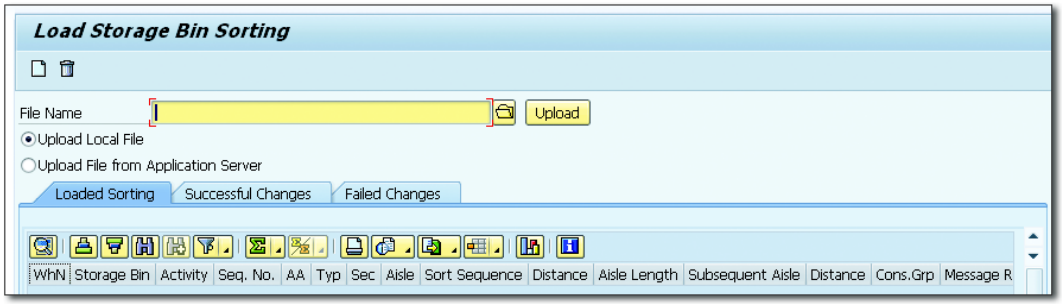


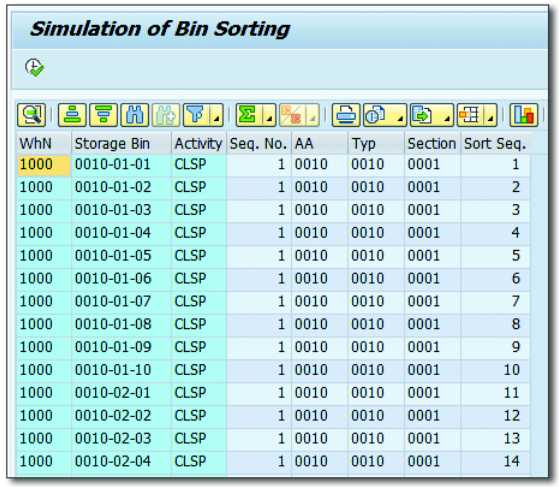
Figure 3.26 Load Storage Bin Sorting

3.4.9 Sorting Storage Bins

Sorting is a must before SAP EWM allows you to perform an activity on the bin. You need to sort the bins for the activity you want to perform on it. Sorting is performed at the activity area level (Figure 3.27). But you can't perform the sorting unless activity area has been created for this bin, that is, until the bin belongs to an activity area. Use Transaction /SCWM/SBST or the navigation path, SAP Easy Access Menu • Extended Warehouse Management • Master Data • Storage Bin • Sort Storage Bins.

Figure 3.27 Bin Sorting Selection Screen

Use the execute button to sort the bins for the entered values (Figure 3.28). The system confirms that the sorting was completed successfully.



WhN	Storage Bin	Activity	Seq. No.	AA	Typ	Section	Sort Seq.
1000	0010-01-01	CLSP	1	0010	0010	0001	1
1000	0010-01-02	CLSP	1	0010	0010	0001	2
1000	0010-01-03	CLSP	1	0010	0010	0001	3
1000	0010-01-04	CLSP	1	0010	0010	0001	4
1000	0010-01-05	CLSP	1	0010	0010	0001	5
1000	0010-01-06	CLSP	1	0010	0010	0001	6
1000	0010-01-07	CLSP	1	0010	0010	0001	7
1000	0010-01-08	CLSP	1	0010	0010	0001	8
1000	0010-01-09	CLSP	1	0010	0010	0001	9
1000	0010-01-10	CLSP	1	0010	0010	0001	10
1000	0010-02-01	CLSP	1	0010	0010	0001	11
1000	0010-02-02	CLSP	1	0010	0010	0001	12
1000	0010-02-03	CLSP	1	0010	0010	0001	13
1000	0010-02-04	CLSP	1	0010	0010	0001	14

Figure 3.28 Simulation of Bin Sorting

3.4.10 Fixed Bin Assignments

When you need a fixed bin—for example, if you're handling loose cases for certain products, and you replenish from bulk bins to these fixed bins—you may need fixed bin assignments for the product (Figure 3.29). Transaction /SCWM/BINMAT is used to maintain fixed bins, and the navigation path is SAP Easy Access Menu • Extended Warehouse Management • Master Data • Storage Bin • Maintain Fixed Storage Bin.

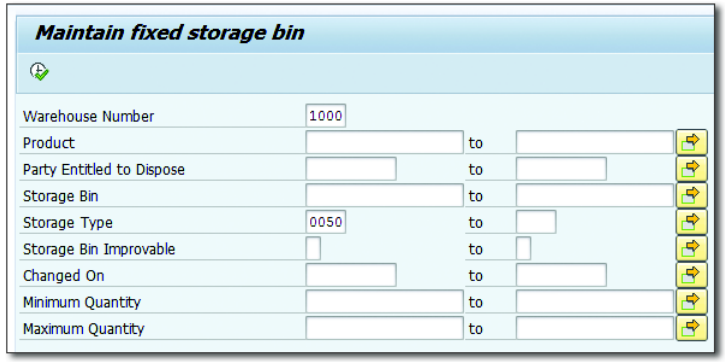


Figure 3.29 Maintain Fixed Storage Bin

You can also use Assign Fixed Storage Bins to Products for automatic assignment of storage bins to products. Use Transaction /SCWM/FBINASN or the menu path, SAP Easy Access Menu • Extended Warehouse Management • Master Data • Storage Bin • Assign Fixed Storage Bins to Products.

3.4.11 Maintaining Verification Field

You have a provision of creating the bin verification automatically using the utility provided in SAP EWM via Transaction /SCWM/LX45 (Figure 3.30). Using this transaction, the verification can be created in a uniform array. The navigation path is SAP Easy Access Menu • Extended Warehouse Management • Master Data • Storage Bin • Maintain Verification Field. There are three options for creating the bin verification:

- Adopt bin completely
  With this option, the bin name is written as the bin verification.
- Adopt bin partially
  With the coordinate input options provided in this transaction, you can remove any prefix, suffix, hyphens, and so on from the bin name. You can also realign characters or digits in the bin name per the desired sequence using these coordinate options.
- BAdI
  Using the Business Add-In (BAdI), you can define your own pattern in which you want to add the bin verification.

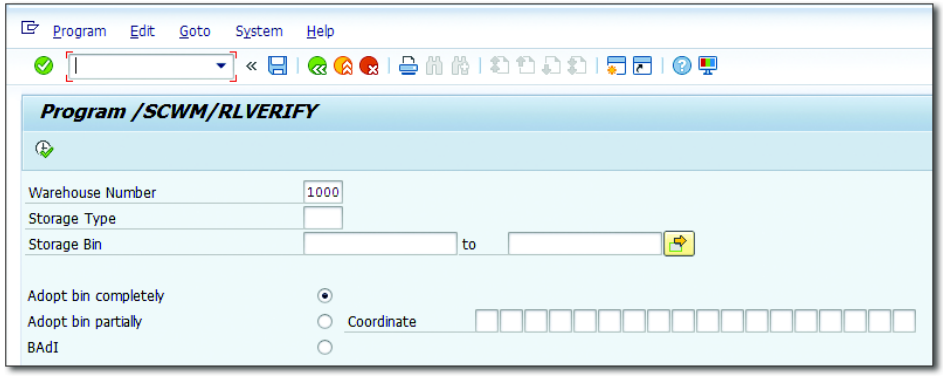


Figure 3.30 Program to Maintain Verification Field for Bins

3.4.12 Printing Labels for Storage Bins

Labels are used by workers for verification of bins in the warehouse. The label contains the ID or bin number of the bin. To print a bin label, you can use Transaction /SCWM/PRBIN or navigate via path, SAP EASY ACCESS MENU • EXTENDED WAREHOUSE MANAGEMENT • MASTER DATA • STORAGE BIN • PRINT STORAGE BIN LABEL.

3.5 Staging Area

Staging areas represent the space near the warehouse door for temporary storage of products, either before they are transferred to final storage bins within the warehouse or before loading onto the transportation units (e.g., a truck) headed toward the ship-to parties. This is important for the immediate discharge of the transportation unit and the availability of free doors.

For inbound delivery, a staging area stores goods temporarily after being unloaded from the truck/trailer at the warehouse door. For outbound delivery, goods are staged at the staging area for immediate loading to the transportation unit after it arrives at the door.

Staging areas can be defined via the IMG by following the menu path, EXTENDED WAREHOUSE MANAGEMENT • MASTER DATA • STAGING AREAS • DEFINE STAGING AREAS.

Staging area group corresponds to the storage type with storage type role D. A staging area represents a storage section. While defining the staging area, you assign the staging area group (STGAREAGRP), staging area (STGAREA), GR/GI checkbox indicating the purpose of goods receipt or goods issue or both, and the LOAD.RULE (Figure 3.31). LOAD.RULE has three options:

- LOADING CAN START WHEN THE FIRST HU HAS ARRIVED
- LOADING CANNOT START UNTIL STAGING HAS BEEN COMPLETED
- LOADING CANNOT START UNTIL 24 HOURS WAIT TIME HAVE PASSED

The capacity of the staging bin in the staging area allows you to limit the maximum number of deliveries that can be staged at a time.

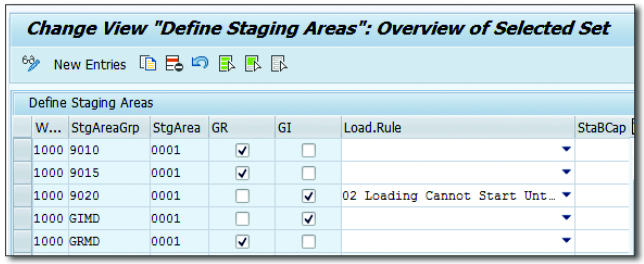


Figure 3.31 Define Staging Areas

3.6 Warehouse Door

Warehouse door is an organizational unit in the warehouse that represents the location within the proximity of the warehouse where the goods arrive and depart from the facility. All loading and unloading of goods occurs via the door to/from the staging area. Each warehouse might have multiple doors. Door numbers are used for easy identification of the door. You'll notice that related documents will have door numbers assigned.

Doors are defined via the IMG and the menu path, Extended Warehouse Management • Master Data • Warehouse Door • Define Warehouse Door. Whse Door is defined for a warehouse number. Load.Dir. represents Inbound, Outbound, or Inbound and Outbound (Figure 3.32) for which the door can be utilized. Doors are mapped to staging areas.

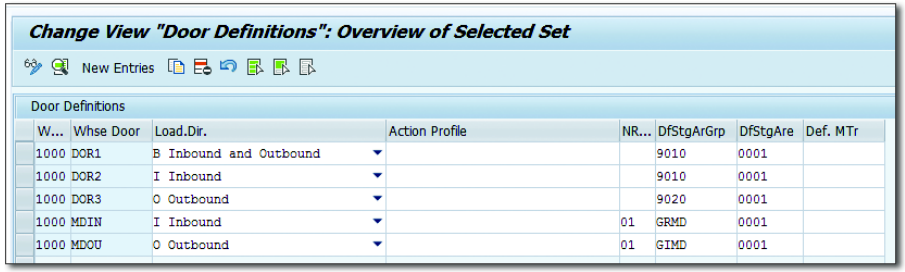


Figure 3.32 Door Definitions

The Action Profile, which is associated with scheduling the defined action, number range, default staging area group, default staging area, and default means of transport, is assigned to each door definition.

3.7 Activity Area

Activity area is a logical grouping of warehouse bins that focuses on activities to be performed on these bins. Activities might be putaway, picking, physical inventory, replenishment, and so on. An activity area may consist of a single bin or multiple bins spread across multiple storage types. Activity area is a concept introduced in SAP EWM, so it isn't a part of WM. The use of activity areas in SAP EWM facilitates efficient picking and putaway. This is related to the bin sorting functionality, which has been discussed earlier in this chapter.

Activity area is used to determine the Warehouse Order Creation Rule (WOCR), which we'll discuss in detail in Chapter 5, Section 5.2. WOCR plays a key role in creating the warehouse order (WO) document, mentioned previously, which is basically a to-do list for workers in the warehouse.

Activity area also plays a role in queue determination. Warehouse resources receive the assignments from these very queues. To define an activity area in the warehouse, navigate to EWM IMG • Extended Warehouse Management • Master Data • Activity Areas • Define Activity Area as shown in Figure 3.33.

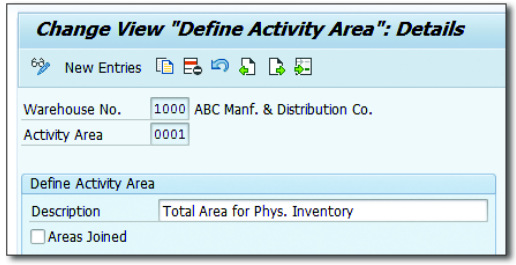


Figure 3.33 Define Activity Area

After an activity area is defined, you need to assign the bins to this activity area. To do so, navigate to EWM IMG • Extended Warehouse Management • Master Data • Activity Areas • Assign Storage Bins to Activity Areas.

The Sequence No. field facilitates the appropriate selection of bins within a single storage type at a time. If an activity area consists of bins from other storage types as well, you may use the next sequence number to include bins from another storage type. You may also use the bin attributes such as aisle, stack, level, bin subdivision, depth, assigned deconsolidation groups, and so on to group the bins in an activity area.

As discussed earlier, bins must be sorted for activities before you actually perform any activity on the bins. You can use the sorting sequence of the activity area to perform sorting of all the bins belonging to that area. To define the sort sequence, navigate to EWM IMG • Extended Warehouse Management • Master Data • Activity Areas • Define Sort Sequence for Activity Area.

Sometimes, a warehouse might be structured in such a way that a storage type represents an activity area. In such a case, SAP EWM provides a configuration node in which an activity area can be generated and sorted for an activity in a single step.

3.8 Work Center

Work centers are physical spaces in the warehouse where specific activities are performed. These activities may include packing, deconsolidation, quality inspection, counting, various value-added services, and so on. Activities performed may be part of inbound, outbound, or internal processes. Because any location in a warehouse is a bin (other than walkways and spaces used for physical separation of materials), a work center where activities are performed is also a bin.

SAP EWM provides a customizable UI for the worker performing the documentation in the SAP EWM system with the help of the work center layout. We'll discuss the layout in detail in this section.

From a consulting point of view, you must understand the determination procedure of the work center, which has the capability to automatically suggest the work center where the material needs to be moved during inbound, outbound, or Internal processes. We'll discuss it in detail in Section 3.8.3.

3.8.1 Specify Work Center Layout

Generally, a work center is specialized for particular activities, which means that only a particular type of activity can be performed in each work center. Let's consider an example of packing. While packing, a system user performing the activity in the warehouse should be able to generate an HU by selecting a particular material. After the product is placed on the packing material, that is, the HU is formed, he should be able to pack it. So, on the work center UI, he should have associated

fields and buttons available. These views and functionalities are collectively considered the layout.

Standard layouts are available in Customizing. However, you can copy these layouts and change them per your requirements by selecting certain tabs from a list. Later, these layouts are assigned to the work centers based on the activities that will be performed. After you log in to the work center, the tabs will be available per its layout. This layout is assigned to the work center while defining work center, which we'll discuss in the next section.

Here, transaction types such as deconsolidation, execution VAS, and so on are maintained at the layout level. Following are the available transaction types:

- **Packing**
  Facilitates packing-related transactions.
- **Deconsolidation**
  Provides transactions related to separating products from a mixed HU.
- **Quality inspection and count**
  Provides transactions for inspection results and count entry.
- **Packing in inbound delivery**
  Facilitates packing with respect to inbound delivery
- **Execution VAS**
  Relevant to value-added services

The layout configuration navigation path is EWM IMG • EWM • Master Data • Work Center • Specify Work Center Layout.

3.8.2 Definition of Work Center

A work center belongs to a storage type, and you can have more than one work center in the same storage type. These storage types will have one of these storage type roles: work center (E), pick point (B), identification and pick point (C), or work center in staging area group (I).

The navigation path for configuring the work center is EWM IMG • EWM • Master Data • Work Center • Define Work Center. Let's have a look at the fields you need to maintain while defining a work center:

- External Step
  Planned steps in the storage process can be placed here.
- Storage Type
  Enter the storage type to which this work center belongs.
- Inbound Section
  Products may need to wait before operations can be performed and can be stored in a bin of this inbound section temporarily before processing.
- Outbound Section
  Products that are already processed can be stored in a bin belonging to this outbound section.
- Repack WPT
  Specify the warehouse process type for performing activity within the work center.
- Work Center Layout
  Specify the work center layout designed in the previous section of this chapter.

After the work center is defined, it isn't sufficient to perform any activity here because you don't have a physical space (bin) to perform the activity yet. A bin must be assigned to this work center first.

3.8.3 Optimize Work Center Determination

For optimization settings (Figure 3.34), navigate to the path, EWM IMG • EWM • Master Data • Work Center • Optimize Work Center Determination In Goods Issue.

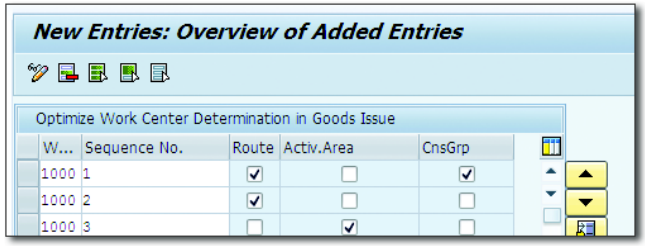


Figure 3.34 Optimize Work Center Determination in Goods Issue

3.8.4 Definition of Master Data Attributes

Users can assign the work center bin to a work center by navigating to SAP Easy Access Menu • Extended Warehouse Management • Master Data • Work Center • Define Master Data Attributes. The attributes are shown in Figure 3.35.

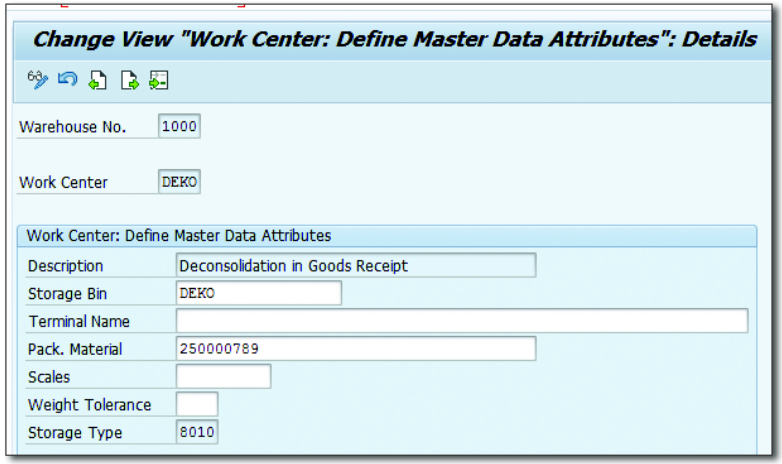


Figure 3.35 Work Center Attributes

3.8.5 Determination of Work Center

For determination of a work center for GI, you may use the combination of route, activity area, and consolidation group. To set up the determination, use Transaction /SCWM/PACKSTDT or navigate to SAP Easy Access Menu • Extended Warehouse Management • Master Data • Work Center • Determine Work center in Goods Issue.

For determination of a work center for cross-docking, use the combination of source storage type and HU type group. To set up the determination, use Transaction /SCWM/CDSTDET or navigate to SAP Easy Access Menu • Extended Warehouse Management • Master Data • Work Center • Determine Work center for Cross-Docking.

3.8.6 Work Center Print Control

Work center system users frequently need to print labels, packaging specifications or delivery notes, and so on to be pasted on the HU. The output device may

be different for label, packaging specifications, and delivery notes. Through work center print control, SAP EWM allows users to map the output device based on the work center and document.

To set up the print control, use Transaction /SCWM/TWCPRINT or navigate to SAP Easy Access Menu • Extended Warehouse Management • Master Data • Work Center • Printer Control.

3.9 Summary

In this chapter, you've seen how to define and configure the warehouse structure and its associated elements. Now you're familiar with storage types, storage sections, storage bins, staging areas, warehouse doors, activity areas, and work centers. After you've defined the warehouse structure, you're all set to pursue the next chapter on master data.

Takeaways

- Similarities exist between certain objects in the SAP ERP and the SAP EWM systems. It's important that you understand the similarities and the reasons behind them.
- Objects such as warehouse structural elements, strategy definitions, and storage bin structure definitions are especially homologous.
- The predominant object within a warehouse element is the storage type. You should understand each component of the storage type very well.
- Keep this chapter handy while setting up a warehouse structure. We've explained each field in depth along with the screenshots to ensure that this remains a handy reference guide for setting up the system.

Master data represents certain set of business objects that are common across various business functions. This forms a part of the essential data required in a SAP system to perform business process within and across systems and represents the unique identity of the business object within the enterprise.

4 Master Data

When working with decentralized SAP Extended Warehouse Management (SAP EWM), master data has linkages to both SAP ERP and SAP EWM systems. Certain master data originate from SAP ERP, such as material master, vendor, customer master, plant, and so on, and are transferred (via the core interface) to the SAP EWM system. In this chapter, we'll discuss the master data transfer from SAP ERP via CIF in detail. Other master data are maintained directly in SAP EWM, for example, warehouse view of product master, supply chain unit (SCU), and so on.

For master data transfers between SAP ERP and SAP EWM, the CIF is used. CIF is the technology generally used for communication between SAP ERP and SAP Supply Chain Management (SAP SCM). For SAP EWM, the master data are only transferred from SAP ERP to SAP EWM; there is no communication back via CIF.

As shown in Figure 4.1 and Figure 4.2, SAP EWM is fully integrated with SAP ERP, SAP Transportation Management (TM), and other products and components of the SAP Business Suite. It's thus important to understand what form of master data is native to SAP EWM and what is transferred in from elsewhere.

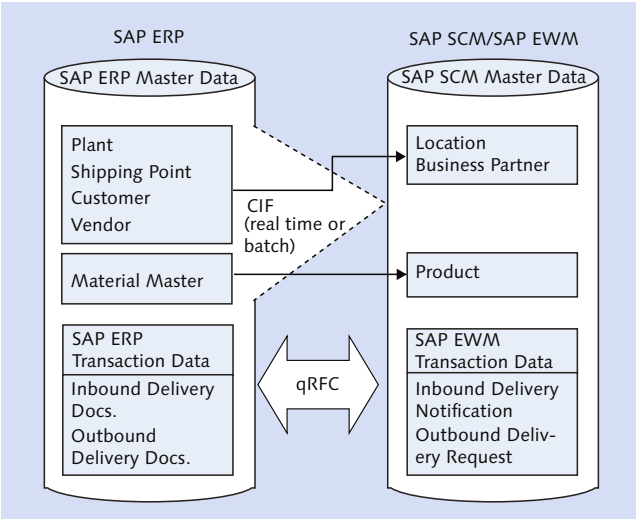


Figure 4.1 Data Communication between SAP ERP and SAP EWM

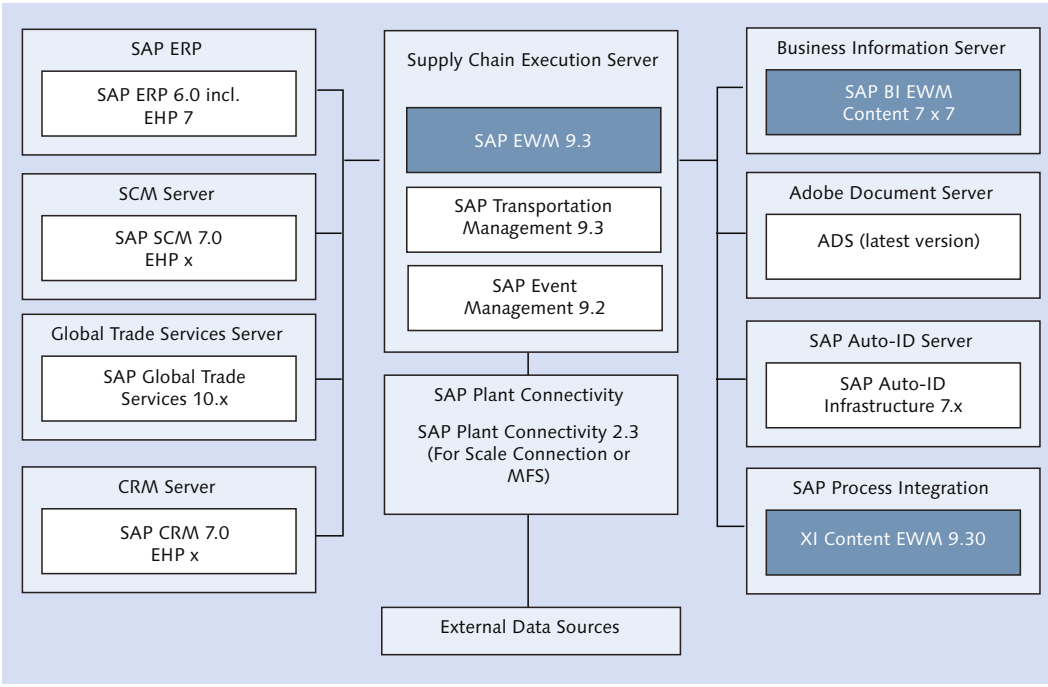


Figure 4.2 A Possible SAP EWM System Landscape

4.1 Supply Chain Unit

Supply chain units (SCUs) are elements that SAP EWM uses to model the organization's supply chain functions. These are physical or organizational units used with one or more business characters within a logistical process. SAP predefines these business characters from which you can choose. For example, an organizational unit may be a goods receiving office or a shipping office.

SCUs are used in transactions where geographical reference is required such as creation of routes. Also, while creating master data for transportation as part of the shipping and receiving function of SAP EWM, SCUs are referenced.

After a location is created in SAP EWM, either manually or transferred from the SAP ERP system, SAP EWM creates an SCU automatically in the background. SCU data is stored in table `/SCMB/TOENTITY` in the database. These SCUs possess one or more business characters and are maintained through attributes within the SAP EWM system. Attributes can be warehouses, doors, shipping offices, receiving offices, ship-to locations, zones, and so on. So after SCUs are created, either automatically (as a result of location creation) or manually, you need to set the business attributes based on the roles they play in the supply chain. Let's now discuss the data maintained within SCUs.

4.1.1 Maintaining a Supply Chain Unit

To maintain a SCU (Figure 4.3), use Transaction /SCMB/SCUMAIN, or navigate to SAP Easy Access Menu • Extended Warehouse Management • Master Data • Maintain Supply Chain Unit.

Data for an SCU is maintained through three tabs on the transaction screen:

- General
  Geographical location details and business partner information.
- Address
  Address and contact details.
- Alternative
  Roles this SCU plays in the supply chain model of the organization.

If an SCU is created automatically after creation of a location, general data and address data are pulled from it. You may want to maintain additional attributes based on the roles the SCU plays in the supply chain.

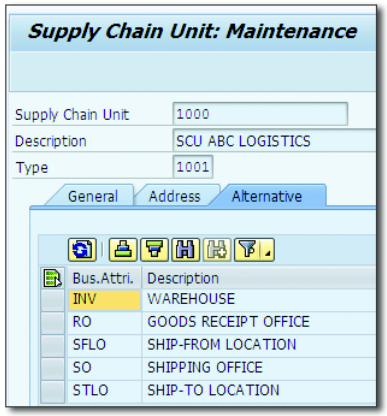


Figure 4.3 Supply Chain Unit Business Attributes

4.1.2 Assignment of Supply Chain Units

Plant is the SCU that plays the role of warehouse. Plant is linked to warehouse through storage locations. After a plant is transferred using CIF from SAP ERP to SAP EWM, location and SCU are created automatically in SAP EWM. You need to ensure that this SCU contains warehouse as a business attribute. You assign this SCU to the warehouse, which is an organization element in SAP EWM, and this is how you link the supply chain element to the SAP EWM organizational element.

To assign SCU to the warehouse (Figure 4.4), use Transaction /SCWM/LGNBP, or use the navigation path, SAP Easy Access Menu • Extended Warehouse Management • Settings • Assignments: Warehouse Numbers/Business Partners. You also maintain the Custodian, Dflt Pty Entld (default party entitled), and Default Ship-To fields in this screen, as required.

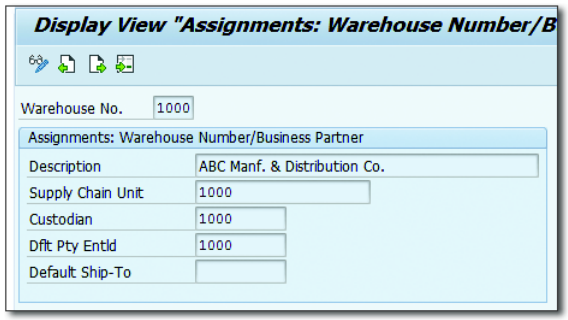


Figure 4.4 Supply Chain Unit Business Attributes

4.1.3 Supply Chain Unit Calendar Assignment

The operating hours of an SCU/plant play a vital role in accurate planning of activities and calculation of delivery dates to the customer. This requires creation and assignment of the appropriate departure calendar to each SCU.

You can use Transaction /SCTM/DEPCAL or navigate to SAP Easy Access Menu • Extended Warehouse Management • Master Data • Shipping and Receiving • Route Determination • Assign Calendar to Supply Chain Unit. This transaction also provides you an option to create the calendar from the screen. You can assign one or more existing calendar to this SCU by using the Append Row button on the screen.

4.2 Business Partners

Business processes in a warehouse involve persons, groups, or organizations, both inside and outside your own organization. Even when transactions happen within an organization, they may mandate financial settlements with internal parties later. To facilitate this within the SAP EWM system, you need to create business partners (BPs), which contain the necessary data that various transactions demand at different stages of the process.

BPs include vendors, customers, other plants of your own organisation, third-party suppliers, freight forwarders, and carriers, to name a few. These entities might already exist in the SAP ERP system, and they can be tranferred to SAP EWM or created within SAP EWM itself.

Caution

Source systems from where master data originates can be systems such as SAP Master Data Management (MDM), SAP Customer Relationship Management (SAP CRM), SAP Supplier Relationship Management (SAP SRM), SAP ERP, or some other legacy system. However, our discussion is limited to SAP ERP only as a source system because it's the most common scenario.

The nature of the relationship within these entities demands a different set of data to be maintained against them. In SAP EWM, this nature of relationship is defined by means of BP roles. Each BP can have one or many BP roles in the system. For example, you may have customers with the same billing (sold-to party) and ship to (ship-to party) address.

Various standard BP roles are available in the SAP EWM system. We've listed a few of them in Table 4.1.

BP Role	Description
000000	Business partner (general)
CRM000	Sold-to party
CRM002	Ship-to party
CRM010	Carrier
CRM012	Consolidator
BBP000	Vendor
BBP003	Plant
BUP003	Employee
SFPRT	Ship-from party
LUM001	Processor

Table 4.1 Business Partner Roles

Roles for a BP are chosen and maintained on the basis of the business process. Assignment of appropriate attributes is ensured through BP roles. BP role 000000 business partner (general) is a common role assigned across all BPs. One interesting role, which deserves a mention from the SAP EWM point of view, is that of processor (LUM001). This is used in the Labor Management (LM) application of SAP EWM and will be elaborated on in Chapter 15.

To create or maintain a BP (Figure 4.5), you can use Transaction BP or navigate to SAP Easy Access Menu • Extended Warehouse Management • Master Data • Maintain Business Partner.

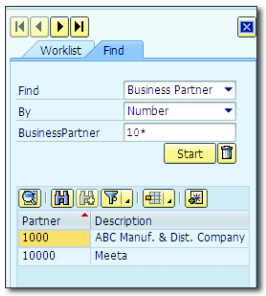


Figure 4.5 Maintain Business Partner Screen

We'll begin this section by discussing the functions available on the MAINTAIN BUSINESS PARTNER screen and then explain the functions available in other relevant screens.

4.2.1 Maintain Business Partner Screen

The FIND tab in Figure 4.5 allows you to search for an existing BP in the system. You can search (using the START button) for a BP, person, organization, or group by their name, number, external number, addresses, or search terms that have already been maintained for them. Search results appear in the lower left part of the screen.

Caution

The DELETE button shown here is for deleting the search criterion and not for deleting the BPs from the system.

After you select the appropriate item from the search result by double-clicking on it, the data is shown in the right side pane of the screen (Figure 4.6).

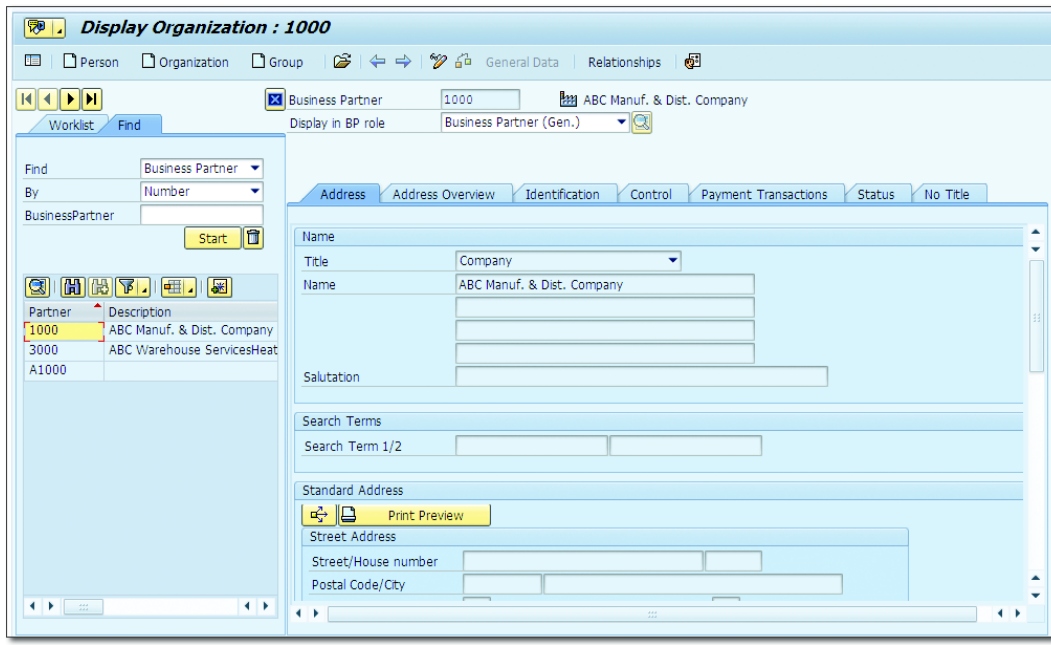


Figure 4.6 Tools for Maintaining Business Partners

If you want to see the roles that are already maintained for a BP, an easy way is to just click on the CHANGE IN BP ROLE dropdown to see the list. You'll notice that MAINTAINED (Figure 4.7) will be appended to the roles that are already maintained for the BP.

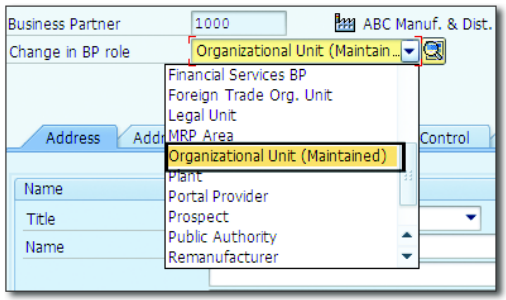


Figure 4.7 Maintained Indicator for a Business Partner Role

You can select the EDIT button to add another role and maintain the relevant data. You may also select an already maintained role to enhance the existing data if needed. The EDIT button can be used for toggling between edit and display mode as well.

When vendors, customers, and so on are transferred from SAP ERP (master system) to SAP EWM, SAP EWM automatically creates the BP using relevant BP roles that you can further enhance if required. Typically, not many changes are made to the BP data in an SAP EWM system because this data is primarily maintained in the SAP ERP system.

To create a new BP in the SAP EWM system, you use one of these three buttons: Person Organization Group. The system will allow you to maintain selected roles, which are based on the BP type person, organization, or group. After filling in the data, use the SAVE option to create the BP. Some of the data is common to all the roles, whereas some data is specific to a certain role.

The IDENTIFICATION tab in Figure 4.8 contains information that details the individual behavior of the partner. For example, if the BP is created as a person, it records the individual's data such as marital status, nationality, date of birth, user ID, external BP number, and so on. The IDENTIFICATION tab also contains information such as identification types for the BP. Each ID type defined has an ID category associated with it and also other relevant parameters such as relevance of BP

categories and proposed ID types. The identification category influences the ID uniqueness, for example, whether it's allowed for processing or only for display purposes. If you want to maintain a unique standard carrier alpha code (SCAC) for your carriers, you can achieve this using the ID UNIQUE indicator within the ID CATEGORY definition.

A BP may assume various roles within the system and processes. This tab maintains data that differentiates the users based on the activity they perform within the system.

A plant may act as a vendor or a customer in stock transfer scenarios. If the BP is also a user of the system, its user ID can be mapped. For example, BPs with the role of employee might have their user IDs mapped here. The EXTERNAL BP NUMBER field can be used to reflect the changes made in the legacy system in which this BP is maintained.

After BPs are transferred to SAP EWM, they are assigned the ID TYPE, IDENTIFICATION NUMBER, and RESPONSIBLE INSTITUTION (i.e., master system they originate from). ID types are built-in to the SAP EWM system.

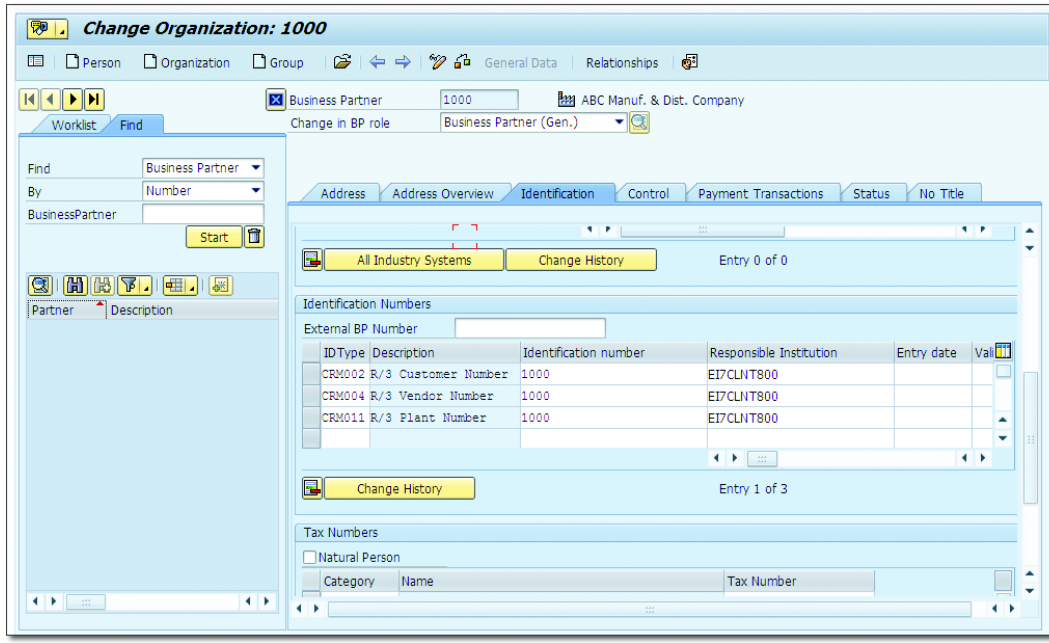


Figure 4.8 Identification Tab of Business Partner

Table 4.2 illustrates the standard identification types available in the SAP EWM system and their descriptions.

Identification Type	Description
CRM001	External system identifier
CRM002	SAP R/3 customer number
CRM004	SAP R/3 vendor number
CRM011	Plant number
BUP005	Global location number
BUP006	Standard carrier alpha code
SLLIAT	IATA code airline carriers

Table 4.2 Identification Types in the SAP EWM System

All configuration related to BPs, such as BP roles, ID numbers, tax numbers, status management, and so on, are made in the SAP EWM IMG, which you can access via menu path, Cross-Application Components • SAP Business Partner • Business Partner.

4.2.2 Plant

Plants need to be maintained like BPs because they are required in the stock transfer processes, where a plant may act either as a customer or a vendor. To do so in SAP ERP, you need to maintain the plant as vendor/customer, which then needs to be transferred to SAP EWM as BP using CIF. Apart from ID type CRM011 (SAP R/3 plant number), plant may also have ID type CRM002 (SAP R/3 customer number) or CRM004 (SAP R/3 vendor number) depending on the requirements.

4.2.3 Customer

Customers from the SAP ERP system are also mapped as BPs in SAP EWM. When a customer and a vendor exist with the same numbers in SAP ERP, it's not possible to create two BPs with the same number in SAP EWM. However, if the entity is the same for both the customer and the vendor, it can be integrated and created

as one BP in SAP EWM. BP ID in SAP EWM enables you to have one BP that can function as customer and vendor.

While creating the customer as a BP either via CIF or manually, certain BP roles are created automatically. Any additional BP roles can be created within SAP EWM. While maintaining the customer in change mode, you'll need to select the required role such as sold-to party CRM000, ship-to party CRM002, and so on, from the dropdown and maintain the data for the role. For any BP, if you want to know the existing BP roles, click on the DETAILS button next to the CHANGE IN BP ROLE dropdown. The system opens a popup window with a list of already maintained BP roles for the chosen BP, apart from the default roles.

The ADDRESS USAGES section in the ADDRESS OVERVIEW tab in Figure 4.9 allows you to maintain different texts within the BP. This may be required when you use different addresses for the ship-to party and the sold-to party, for example, while printing the bill of lading or any other statutory documents.

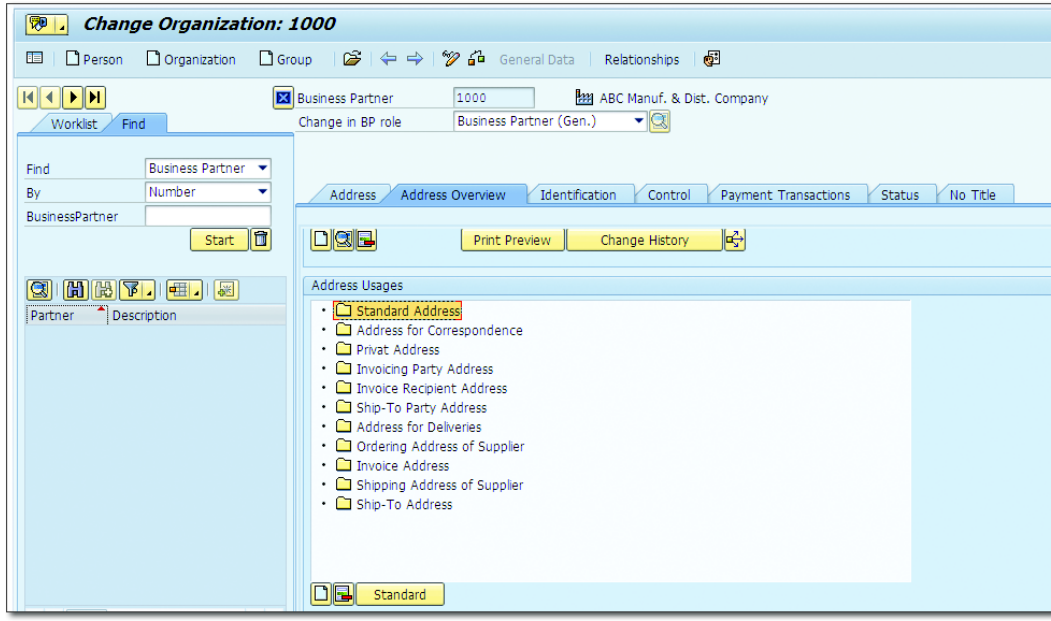


Figure 4.9 Address Usage for the Business Partner

4.2.4 Vendor

The vendor master from the SAP ERP system is mapped into SAP EWM as a BP too. If a carrier is maintained as a BP in SAP EWM, the relevant BP roles are CRM010 (carrier) and BBP000 (vendor).

If you wanted to block the BP centrally, you can use the checkboxes in the Lock section of the Status tab (see Figure 4.10). You can also control the release of a BP.

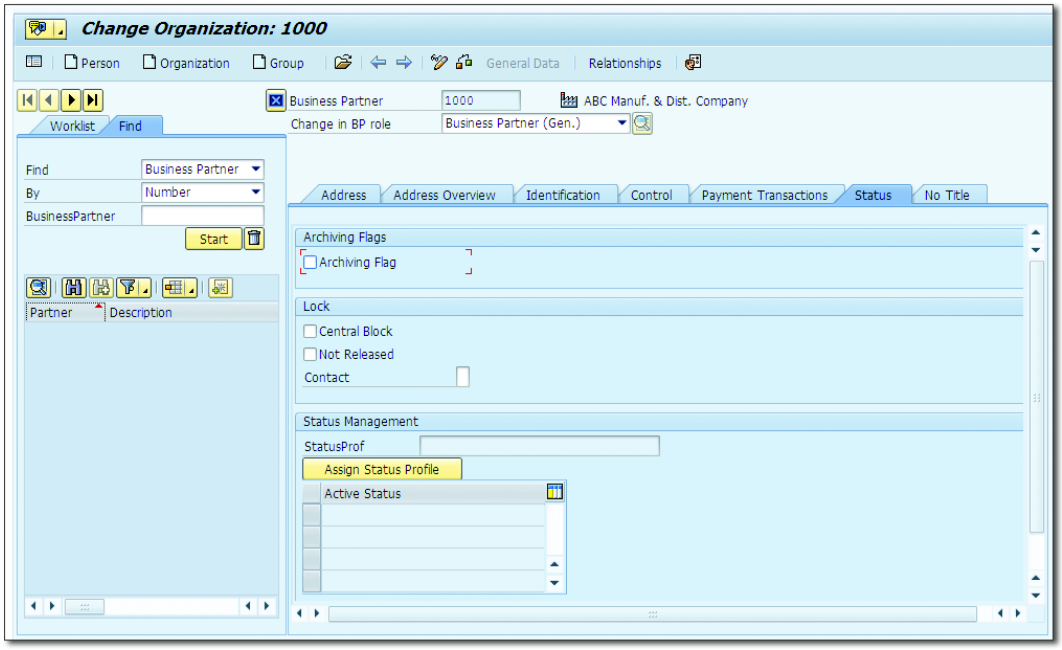


Figure 4.10 Blocking and Release Control of a Business Partner

You can maintain the business hours in the Control tab, which includes buttons for Calling Hours, Goods Receiving Hours, and Visiting Hours. If the hours are maintained, you'll notice the text Goods Receiving Hours is maintained in the Business Hours section of Figure 4.11. Within this maintenance, you can specify the general Rule in which you maintain the time period for the appointment. You have exceptions where you're allowed to handle the nonworking days along with Factory Calendar or Holiday Calendar. When you use Exceptions, you can move the activity (e.g., goods receiving hours) to the next day or the previous day.

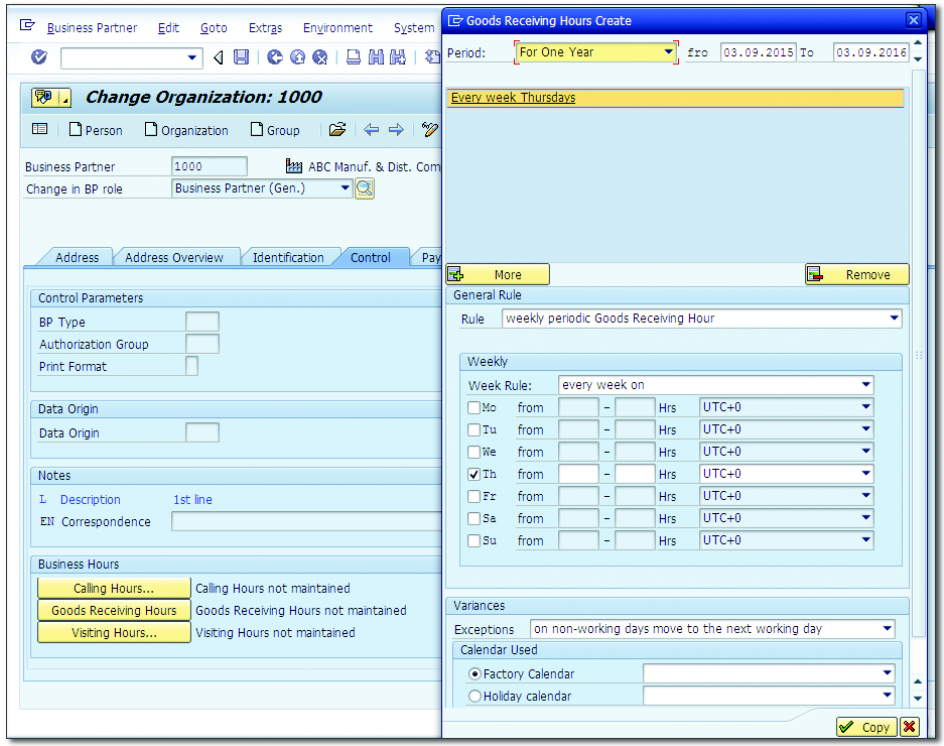


Figure 4.11 Business Hours in Business Partner Master Data

4.2.5 Party Entitled to Dispose

Warehouse stocks must be assigned to a party entitled to dispose in SAP EWM, that is, the party who is responsible and empowered to part with the stock.

Note

Most information within the BP sections are applicable against all the roles, so we won't repeat them in each BP description. For example, CENTRAL BLOCK in the STATUS tab and ADDRESS USAGES in the ADDRESS OVERVIEW tab are applicable across the roles.

4.2.6 Carrier

Because carriers provide transportation services, they are created as vendors in SAP ERP. After they are transferred to SAP EWM, they are maintained with the role of carrier. The BP roles for carriers CRM010 (carrier) and BBP000 (vendor)

need to be maintained in addition to the default roles of business partner (general) and financial services. The SCAC is maintained under the ID type BUP006 in the IDENTIFICATION NUMBER field.

4.2.7 Employee

Employees are created as BPs in SAP EWM as well. SAP ERP data is transferred to SAP EWM using CIF. The BP role of employee (BUP003) is maintained apart from the default roles of business partner (general) and financial services. Figure 4.12 shows the fields that can be maintained under PERSONAL DATA and EMPLOYEE DATA sections of the IDENTIFICATION tab on the BP screen for an employee.

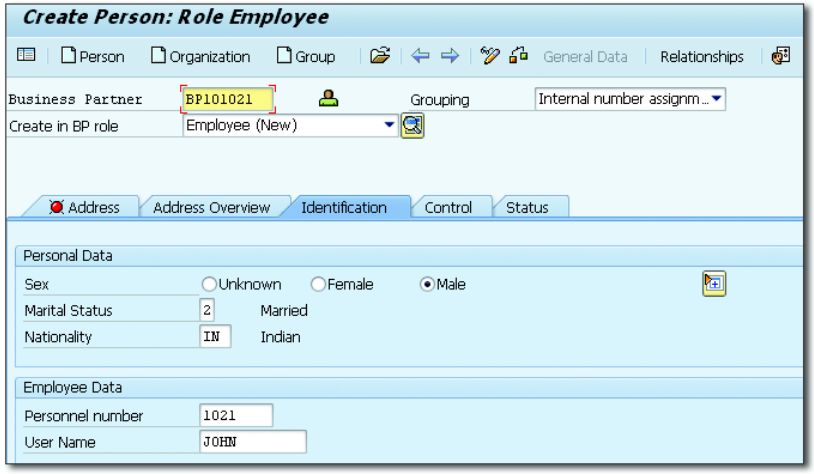


Figure 4.12 Employee Business Partner Personal and Employee Data

Employee details, including PERSONNEL NUMBER and USER NAME, are used to interface with the Labor Management (LM) module and HR system.

4.2.8 Miscellaneous Roles

Other than the mainstream roles already discussed, various other roles may be used in SAP EWM:

- BBP001—Bidder
- BBP002—Portal provider
- BUP002—Prospect

- CRM012—Consolidator
- CRM013—Remanufacturer
- CRM014—MRP area
- SLLAUT—Public authority
- SLLCOF—Customs office
- SLLDAP—Data provider

If you want to define a new role for a business need, you can add it in SAP EWM Customizing using menu path, Cross-Application Components • SAP Business Partner • Business Partner • Basic Settings • Business Partner Roles • Define BP Roles.

Within the definition (Figure 4.13), you can influence the business transaction's authority to BPs using the Modification indicator options. This indicator allows the following values:

- Transaction allowed
- Transaction allowed, warning message is issued
- Transaction not allowed

Figure 4.13 Define Business Partner Roles Screen

4.3 Warehouse Product Master

The product master is one of the most important and significant forms of master data. It contains numerous views and fields that decide or influence the way a product behaves. Perfect product master data setup is most critical to the success of any implementation or rollout project and the subsequent performance of the business process. Accurate warehouse product master maintenance is mandatory for seamless execution of warehouse business processes and integration across all business functions.

Note

The material master of SAP ERP is the same as the product master of SAP EWM.

4.3.1 Material Master in SAP ERP

Material master data in SAP ERP (Figure 4.14) contains hundreds of fields distributed over various views. It contains fields and parameters relating to each of the departments that need it. These departments may be purchasing, sales, finance, production, quality, warehouse, and so on. Based on what business process a material is being used for, the respective view is maintained.

You use the Transactions MM01, MM02, and MM03 for creation, change, and display, respectively, of the material master in SAP ERP. Go to the SAP ERP Easy Access Menu, and choose Logistics • Materials Management • Material Master • Material • Create/Change/Display.

Material Master Views

Views such as Basic Data, Sales: General/Plant, Plant Data/Storage1, and Unit of Measure contain data that are required in SAP EWM for various processes (Figure 4.14). Many of the fields present on these views get automatically mapped to various views of the product master. We'll discuss this in detail in this section.

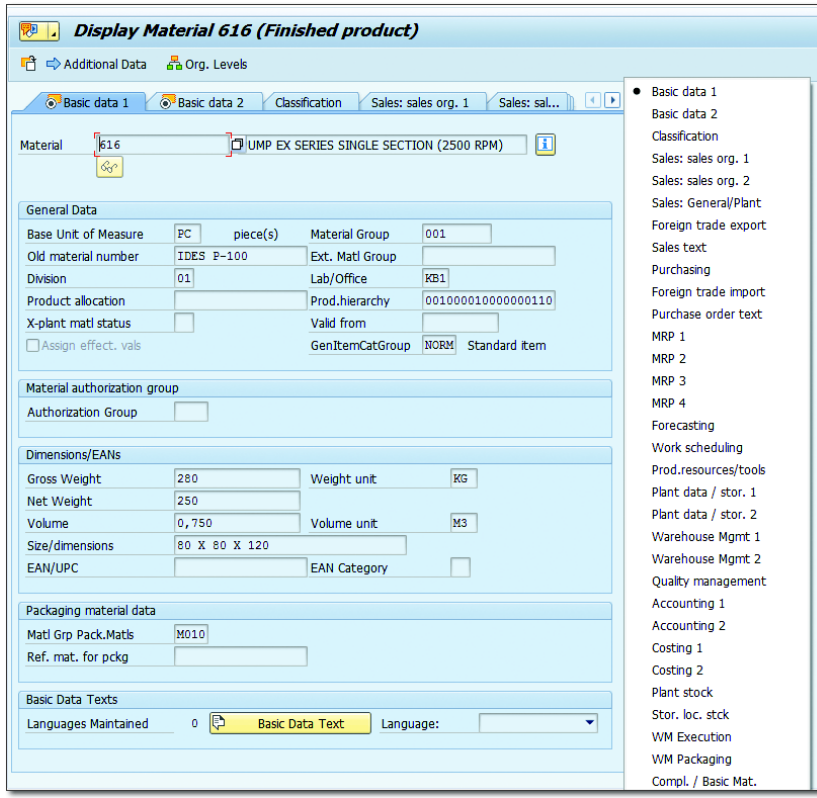


Figure 4.14 Material Master View of SAP ERP

You'll notice that there are four views of the material master that are specific to the warehouse department:

- Warehouse Mgmt 1 (Figure 4.15)
- Warehouse Mgmt 2 (Figure 4.16)
- WM Execution (Figure 4.17)
- WM Packaging (Figure 4.18)

When you use Logistics Execution—Warehouse Management (LE-WM), Warehouse Mgmt 1 and Warehouse Mgmt 2 views need to be maintained for various warehouse process-related parameters. The Warehouse Execution and Warehouse Packaging views for the material master had been created especially for SAP EWM purposes. These views have no usage when you're using LE-WM as a

warehousing solution. There are a few fields, for example, SERIAL NO. PROFILE, which only get transferred using CIF to the SAP EWM system from these two views. They aren't transferred to SAP EWM even when they might be present on other views of the material master.

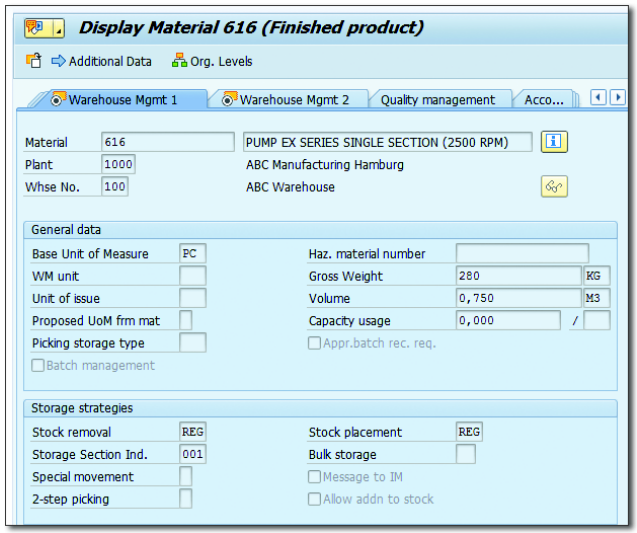


Figure 4.15 Warehouse Mgmt. 1 View

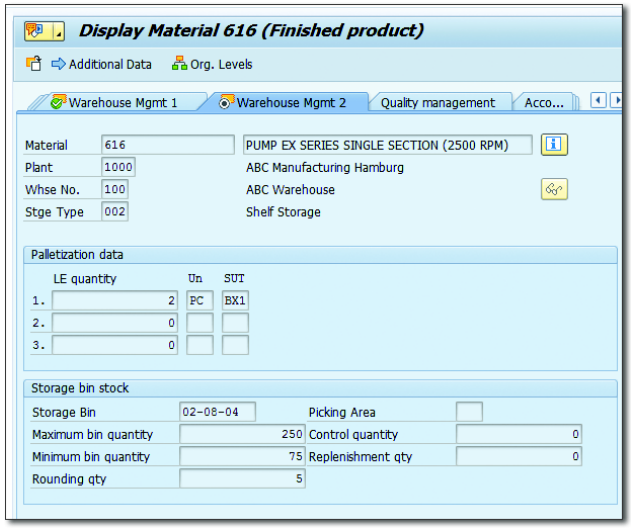


Figure 4.16 Warehouse Mgmt. 2 View

SAP EWM-Specific Views in SAP ERP: WM Execution View

This view contains SAP EWM-specific data within it (Figure 4.17). Let's discuss the fields maintained on this view.

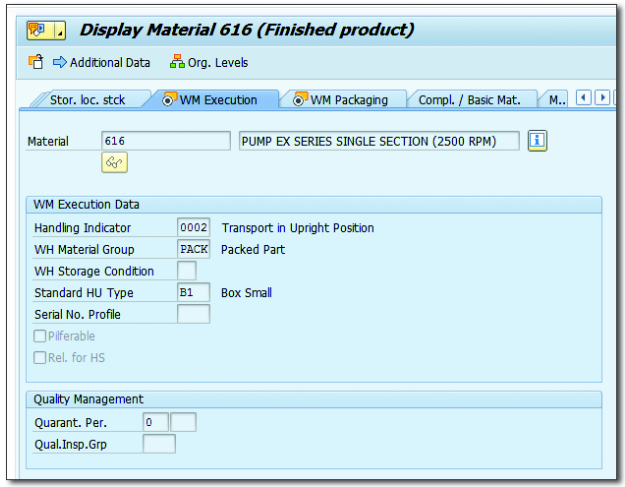


Figure 4.17 WM Execution View

Handling Indicator

Indicates how the handling unit (HU) should be handled in the warehouse. For example, if the material is to be handled in an upright position, it indicates that the warehouse operators need to maintain it in upright orientation during the HU's movements in the warehouse.

The navigation path to define the handling indicators is SAP ERP IMG • Integration with Other Components • Extended Warehouse Management • Additional Material Attributes • Attribute Values for Additional Material Master Fields • Define Handling Indicator.

Warehouse Material Group

By specifying the warehouse material group, you can distinguish the way in which the materials need to be stored in the warehouse.

The navigation path for creating the warehouse material groups is SAP ERP IMG • Integration with Other Components • Extended Warehouse Management • Additional Material Attributes • Attribute Values for Additional Material Master Fields • Define Warehouse Material Group.

Warehouse Storage Condition

Certain sets of products need to be stored in specific storage conditions such as cold storage, freezers, and so on. This indicator helps in classifying the products for these storage conditions. Storage conditions can be created using the navigation path, SAP ERP IMG • Integration with Other Components • Extended Warehouse Management • Additional Material Attributes • Attribute Values for Additional Material Master Fields • Define Warehouse Storage Condition.

Standard HU Type

There are various HU types in which the products are packed based on their physical attributes. HU types can be created using the navigation path, SAP ERP IMG • Integration with Other Components • Extended Warehouse Management • Additional Material Attributes • Attribute Values for Additional Material Master Fields • Define Handling Unit Type.

Serial Number Profile

If a business needs serialization of a product, whether at the warehouse level, inventory level, or document level, you need to create the serial number profile and assign it to the product master. The navigation path for defining serial number profiles is SAP ERP IMG • Integration with Other Components • Extended Warehouse Management • Additional Material Attributes • Attribute Values for Additional Material Master Fields • Define Serial Number Profile.

Pilferable

Certain products are prone to theft. These products need to be stored in a secured place within the warehouse from a safety perspective. This indicator helps to classify those pilferable products and helps in storing them appropriately.

Relevant for Hazardous Substances

When material is hazardous in nature, it needs special attention while handling in the warehouse. This indicator helps you classify the products for special handling and supports reading hazardous substance master data for this material.

Quarantine Period

This reflects the period for which the product is stored in the warehouse after production and before being made available for use.

Quality Inspection Group

This field is used to group materials from a quality inspection perspective. Quality inspection groups can be assigned to the materials to avoid setting up quality inspection rules for each material. To maintain the quality inspection group, navigate to SAP ERP IMG, and choose Integration with Other Components • Extended Warehouse Management • Additional Material Attributes • Attribute Values for Additional Material Master Fields • Define Quality Inspection Group.

Logistics Unit of Measure

This is a physical unit of an item in the warehouse representing the movements in physical measure for warehouse operations. The movements in warehouse include picking, packing, receiving, and so on. Each movement is denoted in a logistics unit of measure (LU) containing certain attributes such as weight, volume, proportional alternative unit of measure (AUoM), and so on relating to it. LU is generally associated with different SKUs of a product. For example, soda of different flavors such as regular and diet represent the same carton LU. The same soda in different bottles sized 1.5 liter and 2 liter represents a case LU. Certain restrictions might apply in some cases such as no mixed products allowed for an LU. For a variety pack, mixed products might be allowed for a LU. Likewise, working with LU might facilitate different ways of working within warehouse processes.

Catch Weight Relevant

This allows you to maintain two UoMs, LU and catch weight UoM. When Catch Weight Relevant is activated, the LU remains as well, whereas the actual weight varies against each LU.

Catch Weight Profile for Catch Weight Quantity

A catch weight profile is required in the material master for catch weight relevance. Using the catch weight profile, you can ensure that entering a catch weight value is mandatory when goods receipt/goods issue (GR/GI) is being done. To define the control, navigate to SAP ERP IMG, and choose Integration with Other Components • Extended Warehouse Management • Additional Material Attributes • Attribute Values for Additional Material Master Fields • Define Catch Weight Input Control.

Catch Weight Tolerance Group

You can define the global level checks for tolerances with the help of a tolerance group. The tolerance limit defined at the warehouse level gets highest priority. When the limit is exceeded, the system issues a warning or error message. The navigation path for this setting is SAP ERP IMG • Integration with Other Components • Extended Warehouse Management • Additional Material Attributes • Attribute Values for Additional Material Master Fields • Define Catch Weight Tolerance Groups.

SAP EWM-Specific Views in SAP ERP: WM Packaging View

The WM Packaging view was also added along with the WM Execution view in the SAP ERP material master explicitly for the purpose of SAP EWM (Figure 4.18). Following are the fields maintained on the WM Packaging view.

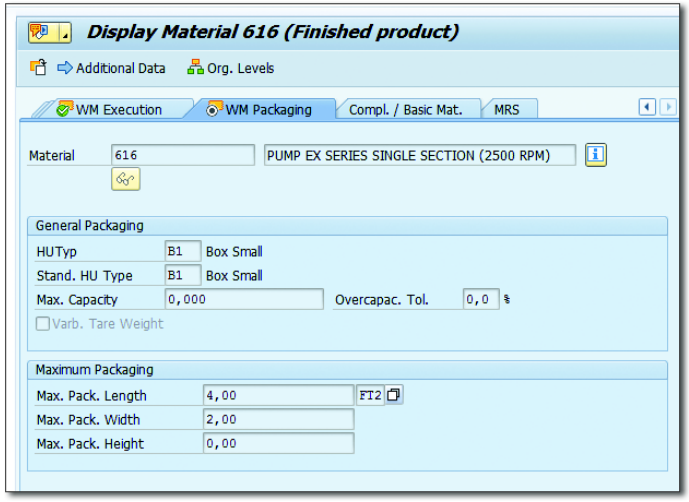


Figure 4.18 WM Packaging View

HU Type

If you expect a specific type of HU to be created when a product is used as packaging material in creation of the HU, you can set that HU type in this field. To create the HU types, the navigation path is SAP ERP IMG, Integration with Other Components • Extended Warehouse Management • Additional Material Attributes • Attribute Values for Additional Material Master Fields • Define Handling Unit Type.

Standard HU Type

When mixed HUs are used, and no packaging instruction is used, this parameter is considered for the HU type while creating the HU.

Maximum Capacity

You can define the maximum allowed capacity for the packaging material.

Overcapacity Tolerance

This is additional tolerance allowed to the maximum allowed capacity for the packaging materials.

Variable Tare Weight

If you flag this indicator, and there is a change in the total weight, the tare weight is adjusted instead of the loading weight. This might be applicable in custom-built packing material where there is no standard weight against it.

Maximum Packaging Length/Width/Height

These fields reflect the dimensions of packing material in terms of length, width, and height.

Unit of Measure for Maximum Packaging

This is the UoM for the maximum packing length/width/height.

4.3.2 Product Master in SAP EWM

After the SAP ERP material master is transferred to SAP EWM, it's referred to as the product master in the SAP EWM system. We've already explained the CIF, which facilitates the transfer in two steps—creation and activation of the integration model using Transactions CFM1 and CFM2. After the product master is created in SAP EWM, after Transaction CFM2, it can't be utilized in any warehouse process unless and until some of the warehouse-specific fields and parameters are maintained in SAP EWM. To maintain the product master in SAP EWM, use Transaction /SCWM/MAT1, or navigate to SAP Easy Access Menu • Extended Warehouse Management • Master Data • Product • Maintain Warehouse Product.

Figure 4.19 shows the screen for warehouse product maintenance. Note that while maintaining a product master, the input screen expects you to provide the

warehouse number where you want to maintain the product, so the parameters you maintain here will be warehouse specific. If you want to use the same product master for another warehouse, you must extend it separately for those warehouses. Similarly, the parameters you maintain for the product master may also vary based on the entry in the Party Entitled to Dispose field.

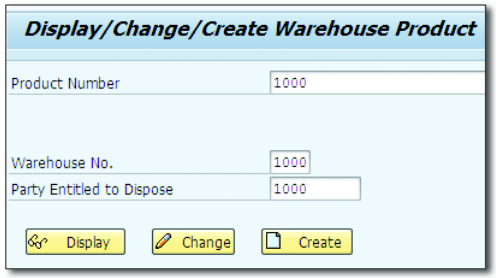


Figure 4.19 Maintain Warehouse Product Screen

The following views are displayed in this transaction:

- Properties
- Unit of Meas.
- Classification
- Packaging Data
- Storage
- Warehouse Data
- Slotting
- St. Type Data

You need to maintain parameters for Warehouse Data, Slotting, and St. Type Data views for each product master. Other tabs have various fields copied from the SAP ERP material master, which are used by SAP EWM and other components such as SAP APO. Let's now briefly discuss the parameters on the product master tabs.

Properties View

Figure 4.20 shows the Properties tab. The pertinent parameters are discussed in the following subsections.

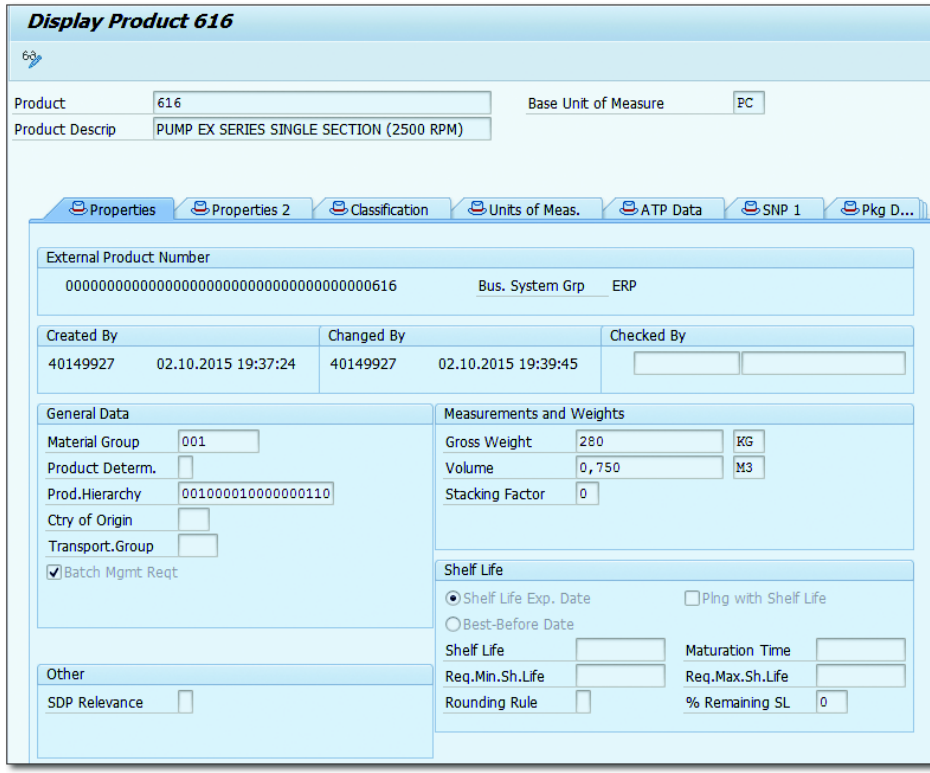


Figure 4.20 Properties View

External Product Number

This is the number of the material that is maintained in the managed system. The source system can be the SAP ERP system or any other third-party system, and the number may differ from the SAP EWM product number. In such situations, the system always refers to the source material number, which is maintained as External Product Number here.

Business System Group

You maintain the same business system group for the connected SAP ERP and SAP EWM systems before you start creating master data in the SAP EWM system. To create the business system group in SAP EWM, navigate to the SAP EWM IMG, and choose SCM Basis • Integration • Basic Settings for Creating the System Landscape • Maintain Business System Group.

To assign the logical system to the business system group, navigate to the SAP EWM IMG, and choose SCM Basis • Integration • Basic Settings for Creating the System Landscape • Assign Logical System and Queue Type.

Created By

The system maintains the user name that created the product in the system. If the product is created via CIF, you'll find the user as RFC User (the user for the interface) in this field. This is due to the fact that while setting up the RFC, the RFC user was created; therefore, when we CIF the material from SAP ERP to SAP EWM, the RFC connection facilitates the material data transfer.

Changed By

The system maintains the user name of the SAP EWM system that modified the product last. After being transferred using CIF, products must be modified and updated for warehouse views in SAP EWM.

Checked By

After a product is maintained suitably for appropriate warehouse operations, the business might want to get it checked by an expert. Once checked, he uses the Set to Checked button, which automatically populates the fields in the Checked By section. This is a one-time activity.

Material Group

Material Group (Figure 4.21) is an identifier that groups the materials based on their attributes for reporting purposes.

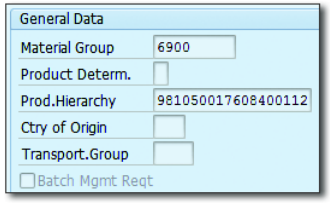


Figure 4.21 General Data

Product Determination

This isn't relevant to SAP EWM. This field is used by SAP Supply Network Collaboration (SNC) for determination of supplier backend products.

Product Hierarchy

In the SAP ERP system, this is used for grouping the materials based on different characteristics. Product hierarchy can be classified based on its characteristics at different levels. Products can be grouped based on these hierarchy levels. When this data is transferred into SAP EWM, this is for information purposes only.

Country of Origin

Various products require extensive documentation for importing or exporting, so mention of their country of origin (COO) is a must on these documents. You can maintain the place where the product was manufactured or sourced from.

Transportation Group

This field plays a role in route determination. You can group materials with similar transport requirement using TRANSPORT.GROUP.

Batch Management Requirement

If selected, this checkbox suggests the material is a batch-managed material in SAP EWM. Unlike SAP ERP, where the activation of batch uniqueness supports at the material, plant, or client level, SAP EWM supports batch uniqueness only at the material or client level and not at the plant level. This data flows from the SAP ERP material master while transferring through CIF.

Gross Weight

GROSS WEIGHT (Figure 4.22) signifies the total weight of the product and packaging material.

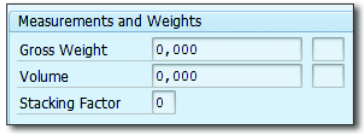


Figure 4.22 Measurement and Weights

Volume

This is the tare volume of the HU, which is made from this packaging material.

Stacking Factor

This field is required from a transportation perspective because it suggests how many pallets can be stacked on top of each other. If "1" is entered, it suggests that

no pallets can be placed on top of it. If you leave this field empty, the system assumes that pallets aren't stackable.

Shelf Life Expiration Date

This radio button specifies that the product is managed according to shelf life (Figure 4.23). There are certain products for which shelf life is extremely long and they don't need to be taken care of from the expiry date point of view. Beverages and pharmaceutical products are generally strictly monitored for their shelf life.

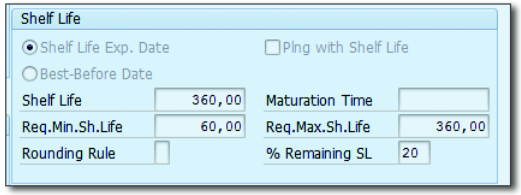


Figure 4.23 Shelf Life

Shelf Life

Shelf life is the total duration for which a material is available for sale or use.

Required Minimum Shelf Life

Businesses may want to make sure that products are fit for use when they reach the consumer. Therefore, they might want to make sure that a certain shelf life remains when the product leaves the warehouse. Through this field, you can maintain the required minimum shelf life.

Rounding Rule

This field works in combination with the SAP ERP period indicator with rounding rule of the shelf life expiration date (SLED). If the actual SLED is April 10th, 2002, and the rounding rule is start of the month, then the SLED is April 1st, 2002.

SDP Relevance

Using this field (Figure 4.24), you can exclude/include certain products from SAP APO Demand Planning (DP) and SAP Supply Network Planning (SNP).

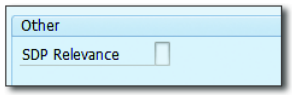


Figure 4.24 Other Tab Showing SDP Relevance

Maturation Time

In certain sectors, such as beverages or pharmaceuticals, products need to be mellowed in a specific condition before they can be shipped for consumption. This data is useful in planning.

Required Maximum Shelf Life

This refers to the maximum life of a product, which works as input for planning.

Percent Remaining Shelf Life

This field indicates the sufficient remaining shelf life for a product to be eligible for transfer to another plant/warehouse.

Table 4.3 illustrates the mapping of product properties view fields between the SAP EWM product master and SAP ERP material master.

SAP EWM Product View	Product Master Field	SAP ERP Material Master View	Material Master Field
Properties	Material Group	Units of Meas.	Material Group
	Product Hierarchy		Product Hierarchy
	Transportation Group	Sales: General/Plant	Transportation Group
	Batch Management Required	Plant Data/Storage 1	Batch Management
	Required Minimum Shelf Life		Minimum Remaining Shelf Life
	Shelf Life		Total Shelf Life
	Rounding Rule		Rounding Rule SLED
	% Remaining Shelf Life		Storage Percentage

Table 4.3 Mapping of Product Properties View Fields

Units of Measure View

Because measurement can take place using various AUoMs, you list the conversions of AUoMs to the base unit of measurement (BUoM). This is the same as how you manage UoMs in the SAP ERP material master (Figure 4.25).

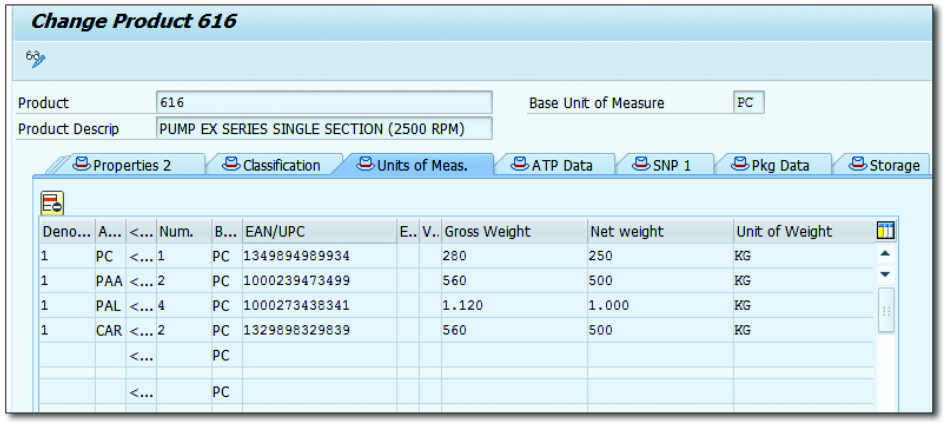


Figure 4.25 Unit of Meas. View

Denominator, Alternate Unit, Numerator, Base Unit

BUoM acts as the basis for inventory and financial calculations. A product may be transacted in other UoMs as well. You must maintain these AUoMs in the system. There may be more than one AUoM. Assume that a product's BUoM is EA (each) and AUoM is KG, for which 3 EA is equivalent to 2 KG. This implies that 1 KG (AUoM) = 3/2 EA (BUoM).

In this case, DENOMINATOR and NUMERATOR would be 2 and 3, respectively. You'll need to make an entry for each of these AUoMs you want to deal with.

EAN/UPC

EAN stands for European Article Number, now known as International Article Number. UPC stands for Universal Product Number.

EAN Category

This category of the International Article Number (EAN) allows you to maintain the attributes of the EAN, such as number range information, check-digit, fresh produce EAN, and so on. This is defined in the SAP ERP system and can be CIFed to the SAP EWM system.

Variant GTIN

This is maintained locally in the SAP EWM system and has no SAP ERP material master linkage. GTIN stands for Global Trade Item Number. This field value is utilized by radio frequency identification (RFID) technology.

Gross Weight

Once packed, the product plus packaging material weight reflects the Gross Weight of the product.

Net Weight

Net weight is the product weight only, which doesn't include packaging material weight.

Unit of Weight, Unit of Volume

These fields are mapped from the material master fields Weight Unit and Volume Unit, respectively.

Capacity Consumption

This field is used for the capacity check. The dimensionless capacity data is maintained here in the product master or packaging material.

Length/Width/Height

These are the dimensions of the container in which the product is stored using the specified UoM.

Unit of Dimension

This is the unit in which the dimensions are measured.

Maximum Stacking Factor

This is the maximum number of products or packing materials allowed to be stacked on top of another, which enables the efficient usage of storage space.

Remaining Volume after Nesting

When product A is nested into product B, the nested product B volume disappears into product A. Hence, the remaining volume is the volume of product A.

Unit of Measure Category

The UoM category enables you to use either the BUoM or parallel UoM (PUoM) if two UoMs are maintained. This happens especially with catch weight products.

Table 4.4 illustrates the mapping of UoM fields between SAP EWM product master and SAP ERP material master.

SAP EWM Product View	Product Master Field	SAP ERP Material Master View	Material Master Field
Units of Measure	Denominator	Units of Measure	Denominator
	Alternate Unit		Alternate Unit
	Numerator		Numerator
	Basic Unit		Basic Unit
	EAN/UPC		EAN/UPC
	EAN Category		EAN Category
	Length		Length
	Width		Width
	Height		Height
	Unit of Dimension		Unit of Dimension
	Volume		Volume
	Volume Unit		Volume Unit
	Gross Weight		Gross Weight
	Net Weight		Net Weight
	Unit of Weight		Weight Unit
	Remaining Volume after Nesting		Remaining Volume after Nesting
	Maximum Stacking Factor		Maximum Stacking Factor
	Capacity Consumption		Capacity
	UoM Category		Category of Unit of Measure

Table 4.4 Mapping of Unit of Measure View Fields

Classification View

The Classification tab (Figure 4.26) allows you to maintain the classification assignments for the product. When you have products of a similar kind but with minor differences in product characteristics, you can maintain those attributes with the help of a classification system. The characteristics are associated with the

class, and the class has a class type in it. The required class types are linked with the object. (We'll discuss batch classification in detail in Chapter 5.)

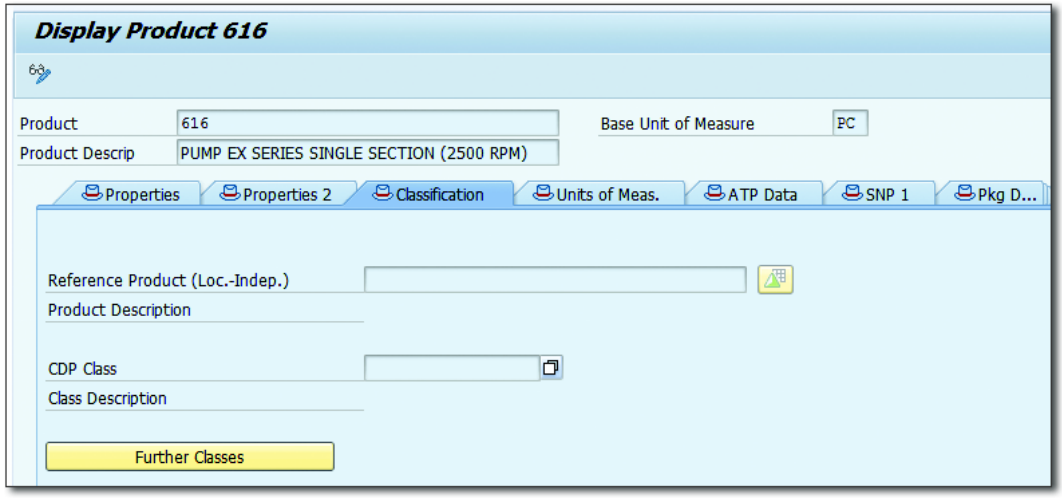


Figure 4.26 Classification View

Packaging Data View

The PKG DATA tab (Figure 4.27) consists of packaging information; this screen is divided into three sections:

- BASIC DATA: PACK
  Provides information regarding products that use packaging material for packing or HU formation.
- BASIC DATA: PACKAGING MATERIAL
  Requires maintenance only for packaging materials; this section need not be maintained for product masters.
- CAPACITIES
  Details the ability of a packaging material to accommodate the number of products based on its capacity.

The pertinent parameters from these three sections in Figure 4.27 are discussed in the following subsections.

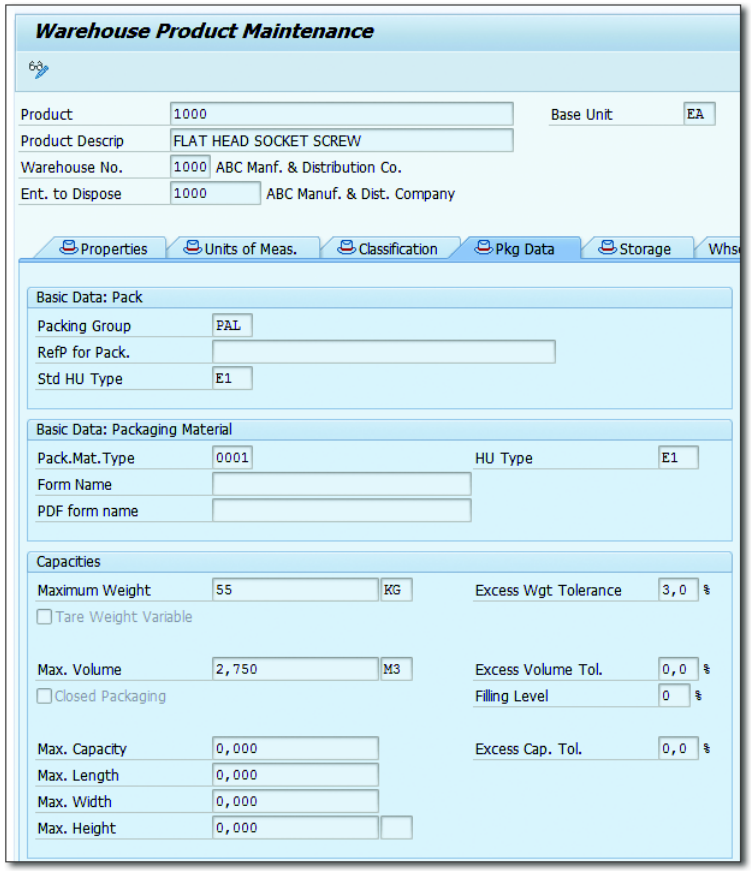


Figure 4.27 Pkg Data Tab

Packing Group

This is maintained for the product master only and not for packaging material. You might have various products that have similar packaging requirements. A packing group clusters these products. Entries in the SAP ERP material master Material Group field get transferred to SAP EWM and are automatically maintained as the Packing Group field in SAP EWM.

These packing groups must be maintained as customization data within the SAP EWM system. To maintain these packing groups, navigate to SAP EWM IMG, and choose Extended Warehouse Management • Cross-Process Settings • Handling Units • Basics • Define Packing Groups for Products.

Reference Product for Packing

If you have very similar packaging requirements for two products, you can simply maintain the other product number as the reference here. This simplifies the process of determining packaging specifications.

Standard HU Type

Packing instructions suggest the HU type for HUs created in the system. But if the packing instruction isn't applicable, this field decides the HU type for the mixed products. This field is mapped from the STANDARD HU TYPE field of the SAP ERP material master WM PACKAGING view. These HU types need to be maintained within SAP EWM by navigating to SAP EWM IMG and choosing EXTENDED WAREHOUSE MANAGEMENT • CROSS-PROCESS SETTINGS • HANDLING UNITS • BASICS • DEFINE HU TYPES.

Packaging Material Type

This is the type of packaging material used in determining the possible packaging materials used for packing a product. You need to maintain mapping of these material types with the packing group. Although this field flows from the SAP ERP material master BASIS DATA 1 view, still it needs to be maintained locally in the SAP EWM Customizing table.

To maintain the packaging material type values in SAP EWM, navigate to the SAP EWM IMG, and choose EXTENDED WAREHOUSE MANAGEMENT • CROSS-PROCESS SETTINGS • HANDLING UNITS • BASICS • DEFINE PACKAGING MATERIAL TYPES.

To maintain the mapping, navigate to the SAP EWM IMG, and choose EXTENDED WAREHOUSE MANAGEMENT • CROSS-PROCESS SETTINGS • HANDLING UNITS • BASICS • MAINTAIN ALLOWED PACKAGING MATERIAL TYPES FOR PACKING GROUP.

Handling Unit Type

This packaging material will be used in HU creation in the system. This field suggests the HU type for those HUs. This field is transferred from the HU TYPE field of the SAP ERP material master WM PACKAGING view. These HU types need to be maintained within SAP EWM by navigating to the SAP EWM IMG and choosing EXTENDED WAREHOUSE MANAGEMENT • CROSS-PROCESS SETTINGS • HANDLING UNITS • BASICS • DEFINE HU TYPES.

Form Name

This field suggests the form name to be used for label printing for the HUs created using this packaging material.

PDF Form Name

This is used if the smart form name isn't used. If the smart form is defined, then the smart form is taken into consideration for printing.

Maximum Weight

This is the maximum product weight allowed in the HU created using this packaging material. This field is transferred from the Allowed Package Weight field in the Sales General/Plant view of the material master.

Excess Weight Tolerance for the Handling Unit

This is the additional tolerance limit allowed against the maximum allowed weight. This field is transferred from the Excess Weight Tolerance field in the Sales General/Plant view of the material master.

Tare Weight Variable

Tare weight is the weight of packaging material. If the tare weight isn't fixed, you need to flag this checkbox. In this case, the system always calculates the tare weight by subtracting the gross weight from the weight of the HU. This flag is transferred from the Variable Tare Weight field of the WM Packaging view in the material master.

Maximum Volume

This is the maximum product volume in the HU created using this packaging material. This field is transferred from the Allowed Package Volume field in the Sales General/Plant view of the material master.

Excess Volume Tolerance for the Handling Unit

This is the tolerance limit allowed for maximum allowed volume. This field is transferred from the Excess Volume Tolerance field in the Sales General/Plant view of the material master.

Closed Packaging

If the HU is made out of a closed packaging material, this checkbox should be selected. If it's a pallet type of package material, it's never closed, and the volume of the HU may differ depending on the tare volume and loading volume. For a closed packaging material, the total volume is the same; this checkbox data gets

transferred from the CLOSED indicator in the SALES: GENERAL/PLANT view of the material master in SAP ERP.

Maximum Level (by Volume)

The maximum level is maintained in a percentage. This is for information purposes only.

Maximum Allowed Capacity for the Packaging Material

This is the maximum capacity of contents allowed to be packed within the packing material.

Excess Capacity Tolerance for the Handling Unit

This is the maximum allowed capacity inclusive of tolerance for the packing material.

Maximum Packing Length/Width/Height of a Packaging Material

This is the maximum allowed dimensions of packing material in terms of length, width, and height.

Table 4.5 illustrates the mapping of packaging data view fields between SAP ERP material master and SAP EWM product master.

SAP EWM Product View	Product Master Field	SAP ERP Material Master View	Material Master Field
Packaging Data	Packing Group	Basic Data	Material Group: Packing Materials
	Packaging Material Type	Sales: General/Plant	Packaging Material Type
	Maximum Weight		Allowed Package Weight
	Excess Weight Tolerance		Excess Weight Tolerance
	Maximum Volume		Allowed Package Volume
	Allowed Volume Tolerance		Allowed Volume Tolerance
	Closed Packaging		Closed

Table 4.5 Mapping of Packaging Data View Fields

Storage View

The STORAGE view (Figure 4.28) contains three sections: BASIC DATA, CATCH WEIGHT DATA, and HAZARD/DANGER DATA. These fields influence the storage behavior of the product.

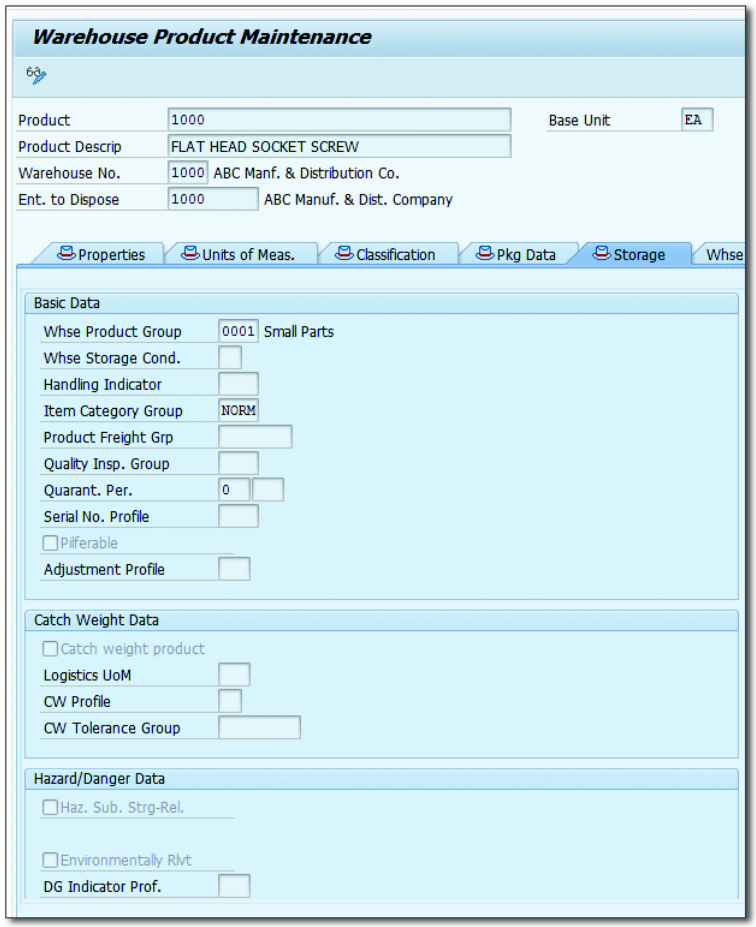


Figure 4.28 Storage View

Warehouse Product Group

This groups the products from the warehouse point of view and helps in determining that warehouse processes are similar for certain sets of products. You can

limit the existence check for packaging specifications and fixed bin assignment deletion using the warehouse product group for certain sets of products. To create the warehouse product group in Customizing, navigate to SAP EWM IMG, and choose Extended Warehouse Management • Master Data • Product • Define Warehouse Product Group.

Warehouse Storage Condition

The warehouse storage condition suggests the need for a storage environment where this product must be stored, for example, the freezer. To create the warehouse storage condition in Customizing, navigate to SAP EWM IMG, and choose Extended Warehouse Management • Master Data • Product • Define Warehouse Storage Condition.

Handling Indicator

Certain products need special care during transportation because they are fragile. To create the handling indicators in Customizing, navigate to SAP EWM IMG, and choose Extended Warehouse Management • Master Data • Product • Define Warehouse Handling Indicator.

Item Category Group

Only in SAP ERP, item category groups are used in determining the item categories. In SAP EWM, it's only for informational purposes.

Product Freight Group

This is used to determine the freight codes and freight classes for a freight code set. To create product freight groups in Customizing, navigate to SAP EWM IMG, and choose Extended Warehouse Management • Goods Issue Process • Transportation Management • Basics • Define Product Freight Group.

Quality Inspection Group

These groups help in classifying certain sets of products for inspection in a similar way. These groups can be assigned to the products instead of having separate quality inspection rules for each product. To create quality inspection groups in Customizing, navigate to SAP EWM IMG, and choose Extended Warehouse Management • Cross Process Setting • Quality Management • Settings for Inspection Rule • Define Quality Inspection Group.

Quarantine Period

This is the period in which the product is stored in the warehouse after production and before being made available for use. SAP EWM has no standard functionality using this period because it's industry specific.

Serial Number Profile

For products that require serialization, the serial number profile is used to help identify every single unit uniquely. To create a serial number profile in Customizing for warehouse-independent profiles, navigate to SAP EWM IMG, and choose Extended Warehouse Management • Master Data • Product • Define Serial Number Profiles • Define Warehouse Number-Independent Serial Number Profiles. To do the same for warehouse-dependent profiles, go to SAP EWM IMG, and choose Extended Warehouse Management • Master Data • Product • Define Serial Number Profiles • Define Warehouse Number-Dependent Serial Number Profiles.

Pilferable

Certain products are exposed for theft, and these products need to be stored in a secured place within the warehouse from a safety perspective. This indicator helps to classify those pilferable products and store them accordingly.

Adjustment Profile

This profile is used for adjustment when a deviation in the quantity occurs during the inbound process. To create adjustment profiles in Customizing, navigate to SAP EWM IMG, and choose Extended Warehouse Management • Cross Process Setting • Cross-Docking • Planned Cross Docking • Merchandise Distribution • Define Adjustment Profile.

Catch Weight Product

This indicator is used to activate the catch weight relevant product. When a product is catch weight relevant, it's maintained in dual independent UoMs, that is, the BUoM and the PUoM.

Logistics Unit of Measure

Catch weight products capture a dual UoM: BUoM and LUoM. The inventory valuation is done against the LUoM. LUoM are considered to be the primary UoM for the warehouse processes in SAP EWM.

Catch Weight Profile

These profiles are used to capture the catch weight quantity of a catch weight product. To create catch weight profiles in Customizing, navigate to SAP EWM IMG, and choose Extended Warehouse Management • Master Data • Product • Catch Weight • Define Catch Weight Profile.

Catch Weight Tolerance Group

You can perform a plausibility check using a tolerance group for a catch weight product. Per the limit defined in the tolerance group, the system will give a warning or error message during the process. To create a catch weight tolerance group in Customizing, navigate to SAP EWM IMG, and choose Extended Warehouse Management • Master Data • Product • Catch Weight • Define Catch Weight Tolerance Group.

Hazardous Substance Storage-Relevant

This indicator specifies that the product is relevant for hazardous substance storage. When you flag this indicator, the system reads additional data such as dangerous goods movement data, hazardous substance master data, and phrase management data.

Environmentally Relevant

This indicator indicates that the product is environmentally relevant. In the SAP ERP system, when the delivery is saved and if the product is checked for relevancy, reports are triggered based on the message type Material Safety Data Sheet (MSDS).

Dangerous Goods Indicator Profile

This indicator identifies the relevancy for dangerous goods, checks, and documents.

Table 4.6 illustrates the field mappings of storage view between SAP EWM product master and SAP ERP material master.

SAP EWM Product View	Product Master Field	SAP ERP Material Master View	Material Master Field
Storage	Item Category Group	Basic Data	General Item Category Group

Table 4.6 Mapping of Storage View Fields

Warehouse Data View

The Warehouse Data tab has three sections: General Data (Figure 4.29), Putaway, and Stock Removal. Putaway and Stock Removal sections include the strategy information that controls the product placement and picking in the warehouse. The General Data section consists of the Cycle Counting Indicator, Reqd Min. Shelf Life, Proc.Type Det. Ind. (process type determination indicator), and so on.

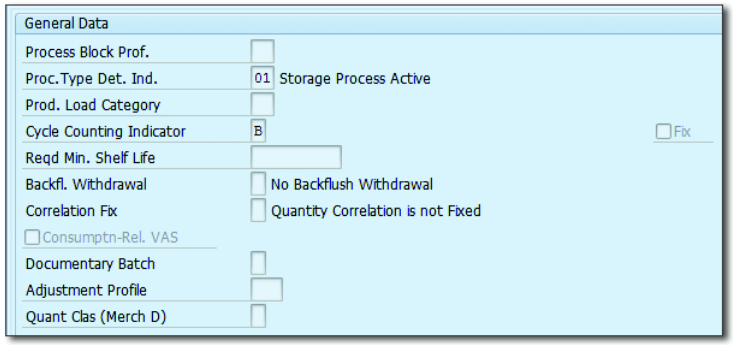


Figure 4.29 Warehouse Data Tab – General Data Section

Process Block Profile

This field enables the system to influence the execution of certain warehouse processes. For example, you might want to restrict movement of a product in the warehouse. To create the entries for Process Block Prof., navigate to the SAP EWM IMG, and choose Extended Warehouse Management • Master Data • Product • Define Process Block Profile.

Process Type Determination Indicator

This indicator plays a role in determining the warehouse process type for a process. Navigate to SAP EWM IMG, and choose Extended Warehouse Management • Cross-Process Settings • Warehouse Task • Define control indicators for determining Warehouse Process Types.

Product Load Category

You group the products from load points of view. LM uses this to determine the workload. Navigate to SAP EWM IMG, and choose Extended Warehouse Management • Cross-process Settings • Warehouse Task • Define Extract Time Determination • Define Product Load Categories.

Cycle Counting Indicator

This field relates to a physical inventory method known as cycle counting. It groups various products under specified categories; it's usually referred to as an ABC analysis of products. Navigate to SAP EWM IMG, and choose Extended Warehouse Management • Internal Warehouse Processes • Physical Inventory • Warehouse Number Specific Setting • Configure Cycle Counting. You can also automatically transfer this indicator from SAP APO using Transaction /SCWM/CCIND_MAINTAIN.

Required Minimum Shelf Life

The minimum remaining shelf life is checked when a goods receipt is performed. The system checks this only if Best before Date/Shelf Life Expiration Date is other than No Check. You can navigate to this setting in the SAP EWM IMG via Extended Warehouse Management • Cross-Process Settings • Batch Management • Make Setting for Delivery.

Backflush Withdrawal

When this indicator is checked, the components are back flushed in the kit-to-process scenario.

Correlation Fix

This check helps in adjusting the kit components to the quantity based on the kit header. If the correlation indicator is fixed in a kit, the components are adjusted automatically based on the kit header quantity. If it's not fixed, the auto adjustment doesn't happen.

Consumption-Related Value-Added Services

If you want the VAS auxiliary consumption to be posted, you need to check this indicator. You need to assign a storage bin to the work center at your warehouse so that the auxiliary products can be consumed. To assign this, you can use Transaction /SCWM/73000001 (Assign Storage Bins for VAS Consumption Posting) or access via SAP EWM Easy Access • Extended Warehouse Management • Master Data • Assign Storage Bins for VAS Consumption Posting.

Documentary Batch

When you want the traceability without batch activation at the material level, you can use the documentary batches. Documentary batches are specifically used in

automotive and consumer industries where you need reduced complexity, effort, and cost.

Quant Class (Merchandise D)

You can define the quantity classification for merchandise distribution.

Putaway Control Indicator

This indicator controls the putaway of product to reach its preferred storage type. To define putaway control indicators, navigate to SAP EWM IMG, and choose Extended Warehouse Management • Goods Receipt Process • Slotting • Master Data • Define Putaway Control Indicator.

Planned Putaway Control Indicator

This indicator is used during the slotting process. When slotting is activated, the planned results are saved in this field, and the Planned Putaway Control Indicator is moved to the actual Putaway Control Indicator field, which is above this.

Storage Section Indicator

This indicator controls that during putaway, product reaches its preferred storage section. To define the Storage Section Indicator, navigate to SAP EWM IMG, and choose Extended Warehouse Management • Goods Receipt Process • Strategies • Storage Type Search • Create Storage Section Indicators.

Storage Bin Type

This groups the bins such as big bins, medium bins, small bins, and so on. The entry here is for the optimum bin type. To define Storage Bin Type, navigate to SAP EWM IMG, and choose Extended Warehouse Management • Goods Receipt Process • Strategies • Storage Bin Determination • Define Storage Bin Types. If you've defined the optimum bin type, and no bin is found during putaway bin determination, then the system goes for the alternative storage bin type search sequence based on the optimum bin defined in the product master. To define the alternative storage bin type sequence, navigate to SAP EWM IMG, and choose Extended Warehouse Management • Goods Receipt Process • Strategies • Storage Bin Determination • Alternative Storage Bin Type Sequence.

Bulk Storage Indicator

Different products may be stored in different ways in the bulk storage area. Some may be stackable, but some may not be. The bulk storage indicator classifies

products by taking into account the way they are stored. To define bulk storage indicators, navigate to SAP EWM IMG, and choose Extended Warehouse Management • Goods Receipt Process • Strategies • Putaway Rules • Storage Behavior: Bulk Storage • Define Bulk Storage Indicators.

Stock Removal Control Indicator

This field enables the system to map the preferred storage type for removal of a product in the goods issue process. To define the stock removal control indicators, navigate to SAP EWM IMG, and choose Extended Warehouse Management • Goods Issue Process • Strategies • Define Stock removal Control Indicators.

Planned Stock Removal ID

This indicator is used during the slotting process. When slotting is activated, the planned results are saved in this field, and the Planned Stock Removal Control Indicator is moved to the actual Stock Removal Control Indicator field, which is above this.

Stock Determination Group

This groups the products based on rules during stock determination. To define stock determination groups, navigate to SAP EWM IMG, and choose Extended Warehouse Management • Cross Process Settings • Stock Determination • Maintain Stock Determination Groups.

Two-Step Picking

In two-step picking, you collectively remove stock from the bin for multiple outbound deliveries in the first step, and you confirm only to the relevant outbound deliveries in the second step. You maintain the appropriate entry in this field to suggest whether this product is relevant to two-step picking or not.

Staging Area/Door Determination Group

Before the loading/unloading process begins, the system must determine the appropriate staging area and door. You can use this definition to differentiate the appropriate staging area and door determination. To create the possible entries for staging area and door determination groups, navigate to SAP EWM IMG, and choose Extended Warehouse Management • Master Data • Staging Areas • Define Staging Area and Door Determination Groups. To assign a stage area/door determination group to doors, navigate to SAP EWM IMG, and choose

Extended Warehouse Management • Master Data • Warehouse Door • Assign Staging Area and Door Determination Group to Door.

In addition to the preceding, define the staging area and door determination (inbound) via Transaction /SCWM/STADET_IN (Staging Area and Door Determination [Inbound]) or access via SAP EWM Easy Access • Extended Warehouse Management • Settings • Shipping and Receiving • Staging Area and Door Determination (Inbound). Define the staging area and door determination (outbound) via Transaction /SCWM/STADET_OUT (Staging Area and Door Determination [Outbound]) or access via SAP EWM Easy Access menu • Extended Warehouse Management • Settings • Shipping and Receiving • Staging Area and Door Determination (Outbound).

Define the preferred access sequence to staging areas and door determination for inbound and outbound in Transaction /SCWM/STADET_ASS (Access Sequence to Staging Areas and Door Determination) or access via SAP EWM Easy Access menu • Extended Warehouse Management • Settings • Shipping and Receiving • Access Sequence to Staging Areas and Door Determination.

Slotting View

The Slotting tab in Figure 4.30 holds the information related to the slotting process in three sections: General Data, Requirement/Demand Data, and Dimension Data.

Status Slotting

This field has the following possible values:

- Product not yet slotted/slotting allowed
- Product not yet slotted/slotting not allowed
- Product already slotted/re-slotting allowed
- Product already slotted/re-slotting not allowed

Time of Last Slotting Run

This field stores the time stamp of the last slotting run.

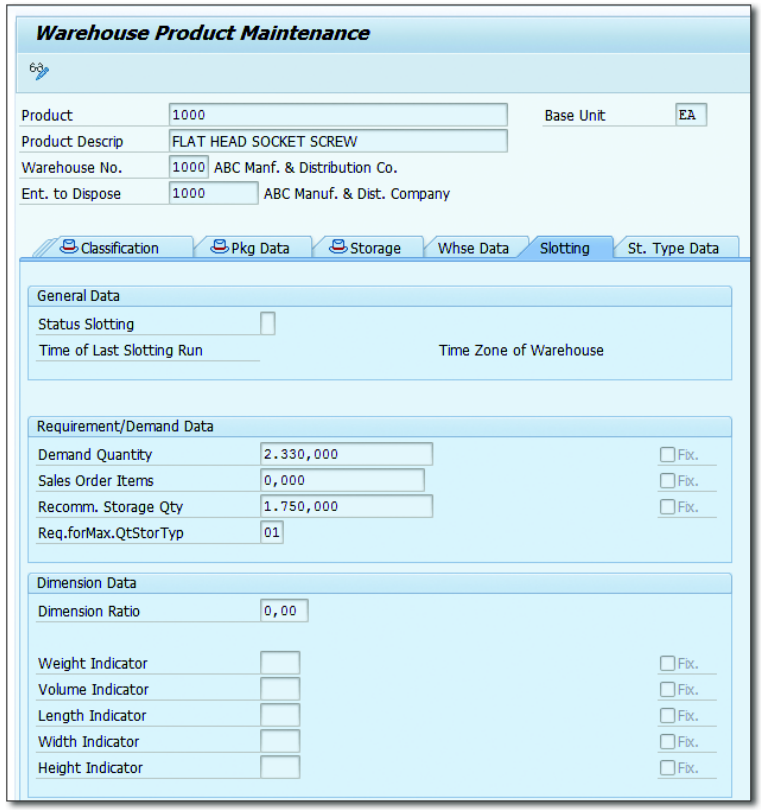


Figure 4.30 Slotting View

Demand Quantity/Sales Order Items/Recommended Storage Quantity

The requirement data (i.e., demand quantity, sales order item, and recommended storage quantity) can be read from SAP APO and gets stored in the SAP EWM product master. It's also possible to extract this data from other sources, and even a manual input option in the SAP EWM product master is feasible. The slotting process requires this demand data to calculate the maximum quantity required, number of sales order items, and recommended storage quantity for a time period. You can update this field during the slotting run if the option to update is chosen during the run. You can access Transaction /SCWM/SLOT (Slot Products for Warehouse), or you can navigate via SAP EWM Easy Access • Extended Warehouse Management • Master Data • Slotting • Slot Products for Warehouse. The Fix. indicator represents that the data maintained is fixed and doesn't get updated during the slotting run.

Note

The Fix. indicator applies to all the fix checkboxes in this tab.

Request for Maximum Quantity in Storage Type

You have three options to choose for the calculation of maximum quantity in the storage type during slotting process:

- Demand quantity
- Number of order items
- Recommended warehouse stock

Dimension Ratio

The system uses the dimension ratio in the storage bin type determination rules. The ratio among length, width, and height is calculated, and the orientations aren't allowed to exceed the defined ratio against the product master.

Indicators for Weight/Volume/Length/Width/Height

These indicators are used during slotting and in determination of storage type and bin type rule parameters for slotting. If the rule is used in the storage bin type, it overrides the rule defined at the storage type level.

Storage Type Data View

The parameters in this view determine how a product might be stored in multiple storage types. Handling of these materials can be done differently. Storage type specific parameters can be stored here and are described in the following subsections.

Storage Type

This is the storage type for which you want to maintain the fields. Click on the Create button to create and maintain the storage type parameters. Upon entering all the relevant parameters required for the storage type, click on Adopt button. After the storage type is created, it appears on the left side of the screen. For any correction or modification, click on the desired storage type on the left, and modify as required.

Storage Section Indicator

To create the entries for the storage section indicator, navigate to SAP EWM IMG, and choose Extended Warehouse Management • Goods Receipt Process • Strategies • Storage Section search • Create Storage Section Indicators. The Fix indicator represents that the data maintained is fixed and doesn't get updated during the slotting run.

Note

The Fix. indicator applies to all the fix checkboxes in this tab.

Planned Storage Section Indicator

Slotting proposed values will be updated in this field.

Storage Bin Type

To define the entries for Storage Bin Type, navigate to Extended Warehouse Management • Goods Receipt Process • Strategies • Storage Bin Determination • Create Storage Bin Types.

Planned Storage Bin Type

Slotting proposed values will be updated in this field.

Maximum Number of Bins

Specifies the maximum number of fixed bins allowed. This field can be updated from slotting as well.

Planned Maximum Bins

Slotting proposed values will be updated in this field.

Empty Storage Bin Search

This indicator influences the empty bin search with the following possible options:

- Sorting according to definition
- Near to fixed bin
- Product decides

Threshold Addition

This is used when split during putaway is active. When the putaway proposes a bin where it can't fit the entire quantity due to the limited free space in the destination bin, if split isn't active, operators might need to travel to multiple bins for the small portions of putaway. With the threshold value system check, if the free space is greater than the threshold value, it allows for putaway. Otherwise, the split occurs to the next appropriate bin.

Split during Putaway

Select this checkbox to account for situations in the warehouse when it's not possible to fit the entire quantity of stock into one single destination bin.

No Replenishment

If the material isn't applicable for replenishment, you can turn off this indicator. For some products, you may want to turn this off only for a certain storage type, which you can do within this view or in the warehouse product master.

Minimum Replenishment Quantity

This field specifies the minimum quantity to be replenished in the storage type. Even when the requested replenishment quantity is less than the minimum quantity, the system proposes the minimum quantity defined.

Planned Minimum Replenishment Quantity

The slotting proposed value will be updated in this field.

Minimum Quantity

This field is used for specifying the minimum quantity for the planned replenishment. When planned replenishment is used, the system determines the quantity for replenishment within this storage type.

Planned Minimum Quantity

The slotting proposed value will be updated in this field.

Maximum Quantity

This field is used for specifying the maximum quantity for the planned replenishment. When planned replenishment is used, the system determines the quantity for replenishment within this storage type.

Planned Maximum Quantity

The slotting proposed value will be updated in this field.

Minimum Quantity (Percent of Maximum Quantity)

This is the minimum quantity specified in percentage terms against the maximum quantity.

Quantity Classification

If the quantity classification isn't defined in the storage type, you can maintain this at the product master level. Quantity classification defines in which packing unit the product is stored.

Putaway Quantity Class

This suggests the packaging unit, such as pallets, cartons, lots, and so on, in which a product is stored in the warehouse.

Putaway Sequence

This sequence is used to sort the storage type within the storage type group for putaway bin determination.

Planned Putaway Sequence

The slotting proposed value will be updated in this field.

Skip During Putaway

This indicator is set automatically during slotting. If this is set, the storage type is skipped automatically during putaway.

Planned Skip during Putaway

The slotting proposed value will be updated in this field.

4.3.3 SAP EWM-Specific Master Data Settings

These settings are SAP EWM specific, so they aren't sourced from the SAP ERP system. These details have to be maintained directly in the SAP EWM system:

- **Additional GTINs (EANs/UPCs) for product**
  You can maintain additional GTINs in the warehouse product for a UoM. If the same product and same UoM are used by different vendors, these can be

distinguished with the help of additional GTINs. You can maintain these on the Additional GTINs/EANs tab of the warehouse product.

- **Business partner ID mapping**
  When you have a customer and vendor belonging to the same entity, both the BPs exist with the same number in the SAP ERP system. In SAP EWM, when either the vendor or the customer belongs to the same SAP ERP system or different SAP ERP system, BP ID mapping helps.

4.4 Transportation Data

To support route determination in SAP EWM, transportation-related master data are used. Proper setup of transportation-specific master data helps in identifying the appropriate route from many available route options.

4.4.1 Prerequisite Configuration

There are certain prerequisites in SAP EWM for proper route determination. You need to ensure that these conditions are met prior to proceeding with route determination in the outbound delivery process:

- **Activate/deactivate the route determination**
  To enable the route determination, you must first activate it. Activation occurs against the warehouse number, document type, and document category level. By default, it's inactive. Upon activation, it performs route determination. You can also specify whether it's to be determined manually or by an external system. Activate in the SAP EWM IMG and navigate to Extended Warehouse Management • Goods Issue Process • Outbound Delivery • Route Determination • Activate or Deactivate Route Determination.
- **Maintain the transportation mode in SAP EWM**
  To do so, go to SAP EWM IMG, and choose Extended Warehouse Management • Master Data • Shipping and Receiving • Maintain Transportation Mode.
- **Maintain the mode of transport categories**
  To define in SAP EWM IMG, go to SCM Basis • EH&S Services • Dangerous Goods Management • Dangerous Goods Master • Specify Mode-of-Transport Categories.

- **Maintain the transportation group**
  To define in SAP EWM IMG, go to SCM Basis • Master Data • Product • Maintain Transportation Group.
- **Define compatibility of means of transport and transportation group**
  To define in SAP EWM IMG, go to Extended Warehouse Management • Cross-Process Settings • Shipping and Receiving • General Settings • Define Compatibility of Means of Transport and Transportation Group.
- **Define modes of transport for foreign trade in SAP EWM IMG**
  To access, go to SCM Basis • Routing Guide • Define Modes of Transport for Foreign Trade.
- **Define general settings for route determination in SAP EWM IMG**
  To access, go to SCM Basis • Routing Guide • General Settings for Route Determination.
- **Define master data**
  Ensure that you've defined the following master data in SAP EWM:
  - General transportation cost profile
  - Location
  - Transportation lane
  - Maintain means of transport
  - Maintain routes
  - Maintain zones for routes
  - Carrier profile for routing guide

  You can navigate in SAP EWM Easy Access via menu path, Extended Warehouse Management • Master Data • Shipping and Receiving • Route Determination.

4.4.2 Transportation Hierarchy

Create a transportation hierarchy in SAP EWM Easy Access via Transaction /SAPAPO/RELHSHOW, or navigate via the menu path, Extended Warehouse Management • Master Data • Hierarchy • Maintain Hierarchy.

4.4.3 Transportation Lanes

After locations have been created in the system, you must set up lanes. Transportation lanes are required for outbound distribution and inbound procurement planning. Lanes link one location to the other, and they contain the allowed means of transport between these locations specific to products. In SAP EWM, it's used for determination of routes.

To set up a lane (Figure 4.31), use Transaction /SAPAPO/SCC_TL1, or navigate to SAP EWM Easy Access • Extended Warehouse Management • Master Data • Shipping and Receiving • Route Determination • Transportation Lane.

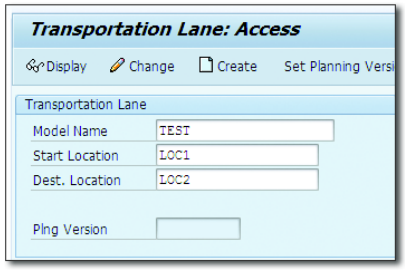


Figure 4.31 Transportation Lane Setup

4.4.4 Transportation Zones

Locations are grouped together using transportation zones. This reduces the effort in maintenance and storage of data because it partially transfers the properties from transportation zone. Different types of zones are direct zone, postal code zone, region zone, and mixed zone. You can maintain these zones via Transaction /SCTM/ZONE or via menu path SAP EWM Easy Access • Extended Warehouse Management • Master Data • Shipping and Receiving • Route Determination • Maintain Zones for Routes.

4.4.5 Transportation Routes

A route enables transportation between two locations with a certain set of influencing parameters and restrictions. You can connect the start supplying location and the destination location with a means of transport. A route has a header section and an item section. The header section includes restrictions data such as weight and volume, dangerous goods check, export data, cross-docking location, and so on. The item section includes attributes such as transportation leg,

cross-dock routes, request type, shipping conditions, and transportation group. You can access these using Transaction /SCTM/ROUTE or via menu path, SAP Easy Access • Extended Warehouse Management • Master Data • Shipping and Receiving • Route Determination • Maintain Routes (Figure 4.32).

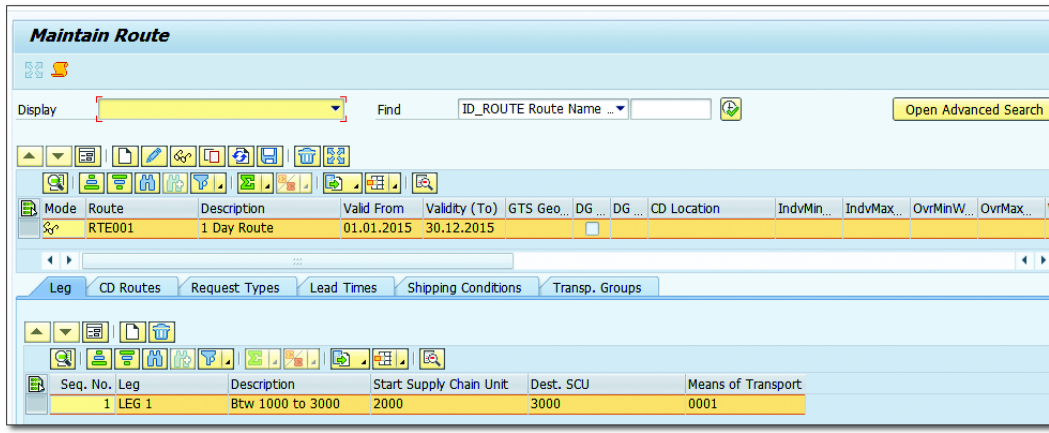


Figure 4.32 Route Maintenance

4.4.6 Carrier Profiles

Carrier-related information is stored in the carrier profile (Figure 4.33). The route determination considers the carrier profile data while determining the route. A carrier profile has a header and an item section as well. The header section includes communication details, contact details, and transportation service provider (TSP) performance attributes. TSP helps in evaluating the selection based on the strategies used in the transportation lane. The cost is directly proportional to the TSP performance.

The item section details include the following tabs: Transportation Information, Freight Code Set, Product Freight, Transp. Group, Fixed Transport, and Dimension Costs. The Transportation tab includes leg, means of transport, and dangerous goods transportation information. This information influences route determination for a suitable profile based on the route. Freight code sets are used to associate freight codes and product freight groups. You use freight codes for communication with the carriers. Assignment of freight code sets, product freight groups, and transportation groups to carrier profiles ensures the relevancy against the allowed values to the carriers.

You can define the freight code sets, freight codes, and determination in SAP EWM IMG via menu path, Extended Warehouse Management • Goods Issue Process • Transportation Management in EWM • Basics • Define Freight Code Sets, Freight Codes, and Determination.

You can define the product freight groups in SAP EWM IMG via menu path, Extended Warehouse Management • Goods Issue Process • Transportation Management in EWM • Basics • Define Product Freight Groups.

Transportation costs include fixed costs and variable costs. Fixed costs are defined for the means of transport, and variable costs are against the following given dimensions:

- Distance
- Transportation duration
- Quantity
- Stop-offs (although not considered for evaluation)

You can maintain the carrier profile using Transaction /SCTM/TSPP or via SAP EWM Easy Access • Extended Warehouse Management • Master Data • Shipping and Receiving • Route Determination • Carrier Profile for Routing.

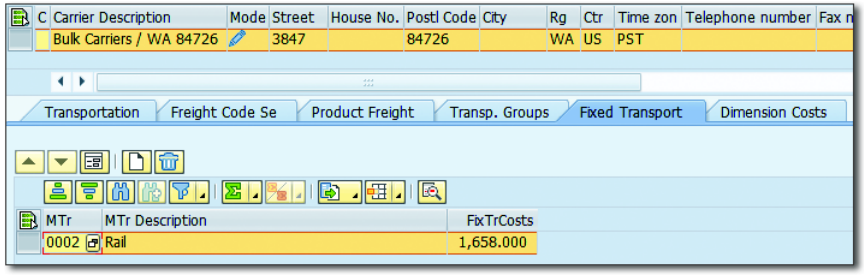


Figure 4.33 Carrier Profile for Routing

4.5 Packaging Materials

Any movement that takes place within or from the warehouse is either of a product or a handling unit (HU) (Figure 4.34). Let's discuss exactly what HUs are and how packaging materials come into the picture.

HUs are a combination of products and packaging material. However, you may have an empty HU as well in SAP EWM! During packing, you always provide packaging material to the system, so that it can create the HU. Packing material mostly holds the products into or onto it, making the HU a storable or transportable unit. A packaging material can be a pallet, simple box, wire box, crate, or container, for example.

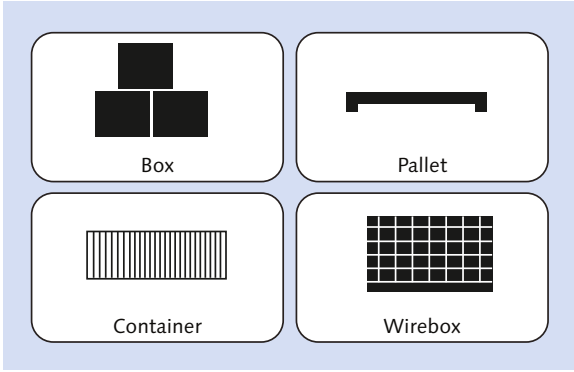


Figure 4.34 Packaging Materials for Creation of HUs

Similar to products, HUs also have various attributes whose details need to be stored as a product master. As a result, you need to maintain these packaging materials as a product master, but with some additional specific fields. Because the leading system is SAP ERP, packaging materials are created with type VERP in SAP ERP and transferred to SAP EWM as a product. Within SAP EWM, you'll need to maintain the material as required. The PKG DATA tab of the product master contains information regarding HU creation.

4.6 Packaging Specifications

Generally, products coming out of production never get shipped directly to customers. They are packaged for either temporary storage in the warehouse or right before being shipped to the customer. Various products need to be packed in different ways using different packaging materials. The same applies for warehouses catering to the retail industry.

Here comes the importance of another set of master data in SAP EWM—packaging specification. Packaging specification data is created within the SAP EWM

system. A packaging specification details the quantities at each level, the number of levels, the steps to be performed at each level and their sequence, the packaging material to be used at each level, and so on. That way, the system is able to give clear instructions to the worker handling the product.

4.6.1 Structure of Packaging Specification

Packaging specification (Figure 4.35) master data is well-structured with each packaging specification capturing the details in one header, one content, and various levels.

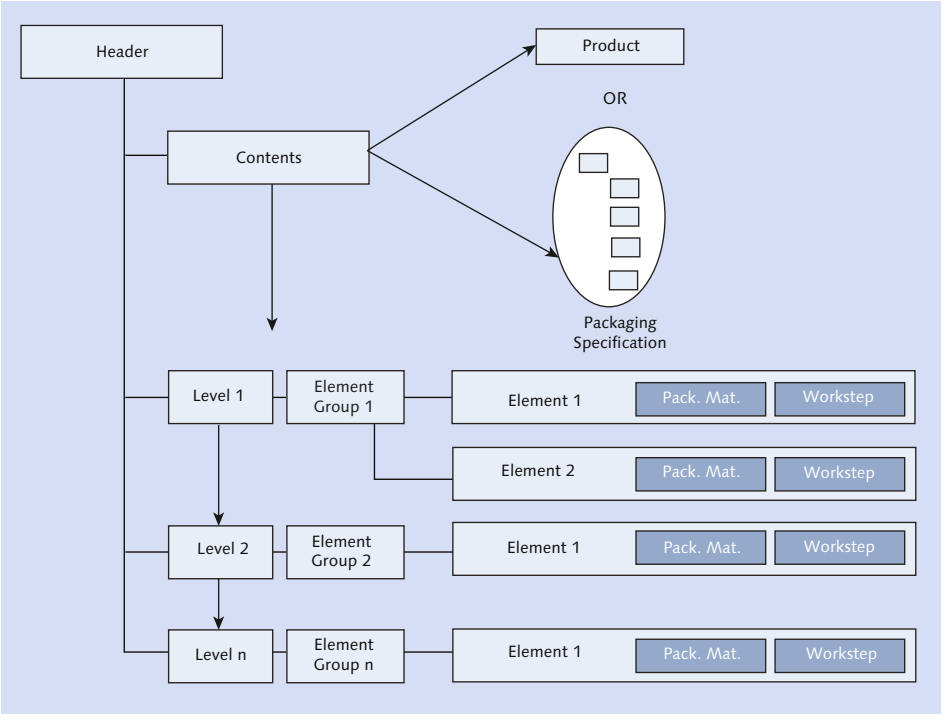


Figure 4.35 Packaging Specification Structure

Header

The header contains information such as the name, description, and status of the packaging specification. It maintains administration data such as who created, changed, and activated the packaging specification and its time. The header also

contains packaging specification group and level set assignments (Figure 4.36). These data must be available in Customizing tables before you start creating a packaging specification.

You can also set the determination procedure of the packaging specification in the header.

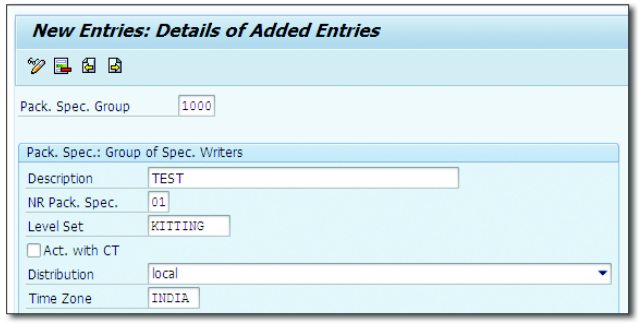


Figure 4.36 Packaging Specification Group Definition

The Transaction SPRO path for maintaining the packaging specification group is SAP EWM IMG • Extended Warehouse Management • Master Data • Packaging Specification • Define Packaging Specification Group. You'll find the Level Set field to be maintained within the packaging specification group. Note that the packaging specification group isn't warehouse specific. Within this setting, you must flag the Act. with CT checkbox to ensure that the condition technique is used in determining the packaging specification. No ranges for the packaging specification are mentioned in this setting.

To define the number ranges, navigate to SAP EWM IMG, and choose SCM Basis • Pack • Packaging Specification • DEFINE Number Ranges for Packaging Specification.

Contents

Contents specify the product that will be packaged and its quantity and UoM. Sometimes, in place of a product, it may contain another packaging specification. This is required when the package needs to contain more than one product. You'll also find a field named Content Sequence No, where you have to define the sequence of the content. The Base-Qty field suggests the quantity with respect to the BUoM.

Level

Level contains level type, minimum quantity, target quantity, and quantity per layer. The target quantity specified at each level suggests what number of previous level should be used to create this level.

To maintain the level type, navigate to SAP EWM IMG, and choose SCM Basis • Pack • Packaging Specification • Maintain Structure of Packaging Specification • Define Level Type.

Element Group

Element groups are created in Customizing and are reusable across packaging specifications. You can use the same element group against multiple packaging specifications if the elements are similar. Each level has a single element group association. When you create an element group, you need to manually create the element and maintain the associated values in it. Alternatively, you can use Assign button to assign an element group to a packaging specification. After the element group is assigned to a packaging specification, it assigns the element automatically. The Transaction SPRO path for assigning a number to an element group is SAP EWM IMG • SCM Basis • Pack • Packaging Specification • Define General Packaging Specification Parameters.

Element Details

Element details include the packaging material and quantity to be used for each step to be performed while the packaging operation is being carried out. The HU-Relevance field guides the system to consider this packaging material as Main Packaging Material, Auxiliary Packaging Material, and NonRelevant But Consider Weight/Volume. Based on the settings here, the HU data may not detail this packaging material in the HU details. You can also maintain the work step that you want to perform while packaging each of the elements. While maintaining a work step, you can use the long text as instructions for workers.

Work steps can be assigned to elements by choosing SAP EWM Easy Access • Extended Warehouse Management • Master Data • Packaging Specification • Maintain Packaging Work Step. You can also use Transaction /SCWM/PSWORKSTEP.

To define the element type, choose SAP EWM IMG • SCM Basis • Pack • Packaging Specification • Maintain Structure of Packaging Specification • Define Element Type.

The Warehouse tab holds information in fields such as Performing Entity, Qty Classification, HU Type, Operative UoM, and External Step.

Note

The level set is defined in Transaction SPRO. Element types are assigned to level types, which in turn are assigned to level sets. Based on your requirements, you can assign one or many level types to each level set and maintain their sequence. The association between element type and level type is similar. These level sets are finally assigned to packaging specification groups.

Now that you understand what details a packaging specification captures and the customization data required for it, let's see how these are created in an SAP EWM system.

4.6.2 Maintain Packaging Specification

You can use Transaction /SCWM/PACKSPEC or navigate to SAP EWM Easy Access • Extended Warehouse Management • Master Data • Packaging Specification • Maintain Packaging Specification. This screen can be used for both creating a new packaging specification and maintaining an existing one (Figure 4.37).

Use the Create button to create a new packaging specification. The first field entry that goes in is PS Group. The system generates the number (either internal or external) for the packaging specification. In the next screen, the system pulls the Customizing information automatically, including level set, element types, a few admin data fields, and the fields to be maintained for the condition record. You need to provide the specific details for the header (includes condition record), content, and levels. Note that Product is maintained in the Content section, whereas Packaging Materials and its Quantity needed are maintained at the element level. The quantity of product that goes into HU is available in level data.

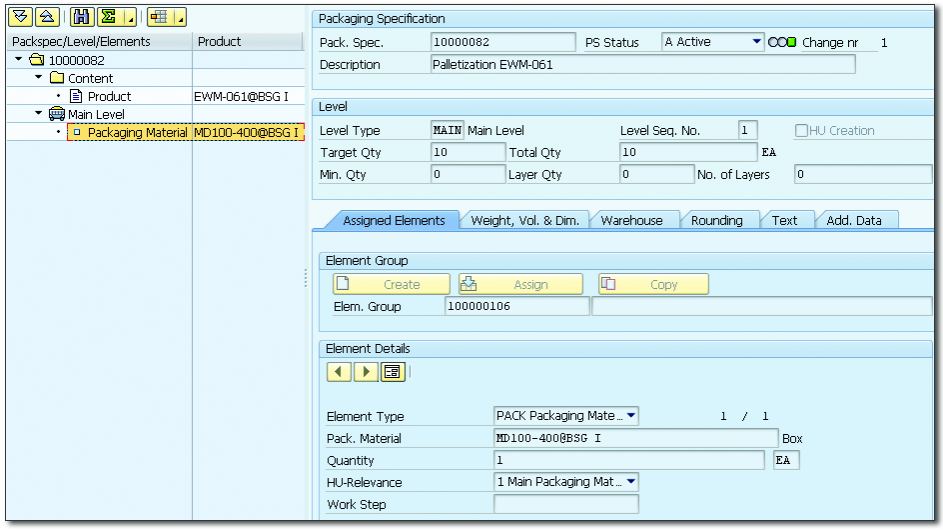


Figure 4.37 Maintain Packaging Specification Screen

4.6.3 Initial Data Transfer of Packaging Specification

Initial data transfer of packaging specifications is specifically used during the data migration. It helps to do a mass upload (Figure 4.38) of packaging specifications. You can navigate using Transaction /SCWM/IPU or go to SAP EWM Easy Access menu path, and choose Extended Warehouse Management • Master Data • Packaging Specification • Initial Data Transfer of Packaging Specifications.

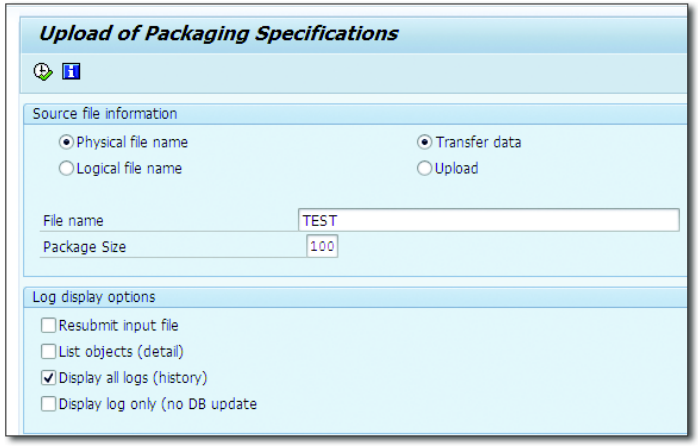


Figure 4.38 Initial Data Transfer of Packaging Specifications

4.6.4 Determination of Packaging Specification

Packaging specifications are utilized across various processes in the warehouse. They may be used for automatic packing in the system for inbound deliveries, palletization for putaway warehouse tasks, and pick HU proposals for warehouse orders and internal processes. Packaging specification requires accurate determination, which is critical for the smooth completion of the process. SAP EWM uses condition techniques to determine the right packaging specification.

To set up the following condition techniques, navigate to the Transaction SPRO node at the SAP EWM IMG, and choose Extended Warehouse Management • Master Data • Packaging Specification • Determination of Packaging Specification:

- Create Field Catalog
- Define Condition Tables
- Define access sequences
- Define Condition Types
- Define Determination Procedure
- Create Condition Maintenance Group

Procedures for determining packaging specifications can be created separately for palletization, VAS, automatic packing, deconsolidation, and so on. These procedures are linked to condition types in Transaction SPRO using navigation path SAP EWM IMG • Extended Warehouse Management • Master Data • Packaging Specification • Determination of Packaging Specification • Define Determination Procedure (Figure 4.39).

Procedures based on requirements may be placed in definitions of the document types. For example, for inbound delivery, navigate to SAP EWM IMG • Extended Warehouse Management • Goods Receipt Process • Inbound Delivery • Manual Settings • Define Document Types for Inbound Delivery Process to place the appropriate procedure in the PackMatPropProc field. So, basically you'll have the processes identify the determination procedure, which in turn are linked to condition types.

Figure 4.39 Condition Types Mapping to Determination Procedure

How exactly do condition types help identify a packaging specification? This identification happens based on the condition records maintained using the condition type. Condition records can be maintained in the header data of a packaging specification as shown in Figure 4.40.

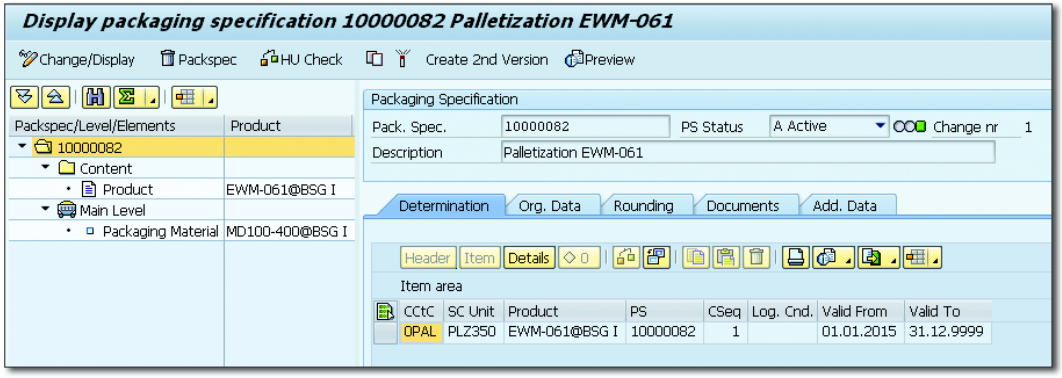


Figure 4.40 Determination Tab in Packaging Specification

You can use Transaction /SCWM/PSCT6 to do so The SAP EWM Easy Access menu path for this is Extended Warehouse Management • Master Data • Packaging Specification • Condition Maintenance.

Note

The condition types with which you can maintain these records must be maintained in the level set configuration.

4.6.5 Activating the Packaging Specification

The system provides you the option to activate or deactivate a packaging specification, as the need might arise in the course of business.

After a packaging specification is created, the system can't use it in any process without activating it. You may use the tool for activating a packaging specification. If successfully activated, the PS Status field in the header data becomes active. You may deactivate a packaging specification if required by using the Deactivate option in the Activate button of Transaction /SCWM/PACKSPEC.

Sometimes, when you want to do some changes in an existing packaging specification, it's recommended to use the Create 2nd Version button, which creates a second version of the packaging specification while the first version remains in use. After the second version is maintained per your requirements, you simply need to activate this second version, which automatically deactivates the first version of the packaging specification. This way, the system ensures only one version of a packaging specification remains active at a time.

4.6.6 Distribution of Packaging Specifications

Because packaging specification data is created in SAP SCM Basis layer, you don't want to re-create the same packaging specifications in different systems because this might lead to inconsistency in the packaging specification data. It's possible to distribute the packaging specification data to maintain consistency across systems.

To faciliate the transfer, systems must be connected via RFC. You're required to specify the connection in the source system for distribution. For the setting, navigate to SAP EWM IMG • SCM Basis • Pack • Packaging Specification • Define RFC Connection for Packaging Specification Distribution.

4.7 Route Determination

A suitable route needs to be determined out of a large set of available routes. The route determination is executed in a routing guide. SAP EWM provides a report for route simulation. You can access this via Transaction /SCTM/RGINT or via SAP EWM Easy Access • Extended Warehouse Management • Master Data • Shipping and Receiving • Route Determination • Simulate Route Determination. Route determination runs in the background, which is executed based on the following:

- Static route determination
- Scheduling
- Dangerous goods movement check
- Transportation cost calculation

Map routing is a necessary element and part of route determination. In SAP EWM IMG, you have this setting to map the route and route schedule while deliveries are transferred from SAP ERP to SAP EWM (Figure 4.41). With this option, you can control which route information has to be transferred from SAP ERP to SAP EWM. For this setting, navigate to SAP EWM IMG • Extended Warehouse Management • Interfaces • ERP Integration • Delivery Processing • Map Routes and Route Schedule from ERP System to EWM.

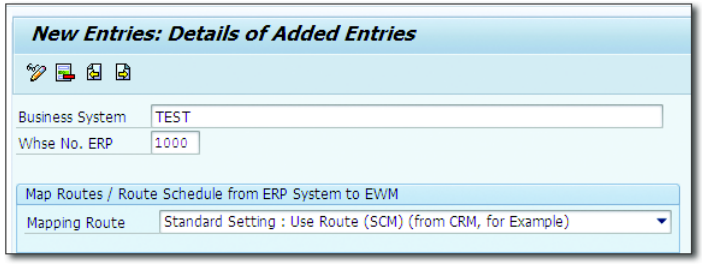


Figure 4.41 Mapping of Route from SAP ERP to SAP EWM

Three options exist for route mapping:

- Use Route (SCM)
  This is the standard setting; the route is from the SAP SCM system.

- Use Route (SD) if Route (SCM) is initial
  When the route from the SAP SCM system isn't filled, the SD route is used.
- Use Route (SD) if Route (SD) and Route Schedule are filled
  When the SD route and route schedule are transferred, the SD route is used.

4.8 Summary

In this chapter, we've discussed all the master data that is essential for core business process setup within SAP EWM. Now you should be familiar with SCU, BP, warehouse product master, transportation data, route determination, and packaging specifications. We've provided ample screenshots and diagrams in this chapter to enable you to understand the screens even if you aren't accessing an SAP EWM system while learning SAP EWM.

Takeaways

- In a decentralized SAP Extended Warehouse Management (SAP EWM) deployment, master data connects with both SAP ERP and SAP EWM systems.
- Certain types of master data originate from SAP ERP, such as material master, vendor, customer master, plant, and so on, and are transferred (using the core interface) to the SAP EWM system.
- For master data transfers between SAP ERP and SAP EWM, the CIF is used.
- Supply chain units (SCUs) are elements that SAP EWM uses to model the organization's supply chain functions.
- Business processes in a warehouse involve individuals, groups, or organizations, both inside and outside your own organization.
- Product master in SAP EWM corresponds to material master in SAP ERP.
- Carrier-related information is stored in the carrier.
- Handling units are a combination of products and packaging material.

Cross-process elements cut across various functions of the warehouse. These are basic essential components of warehouse activity that are necessary for the warehouse to function.

5 Cross-Process Definitions

Cross-process elements—or elements that are used in various processes in the warehouse—touch inbound, outbound, and internal movements. These definitions must be in place to successfully execute warehouse activities in SAP Extended Warehouse Management. For example, the warehouse order (WO) is one of the crucial and essential process data elements in SAP EWM. Most of the warehouse operations take place in relation to a WO.

5.1 Handling Units

Products packed inside or above packaging materials are referred to together as handling units (HUs) (see Figure 5.1).

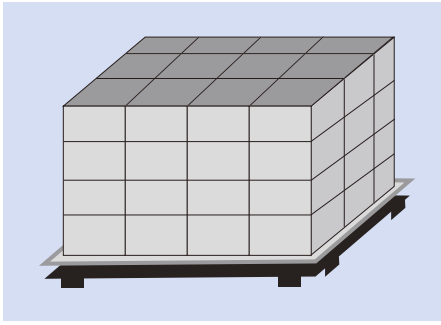


Figure 5.1 Simple Handling Unit

It's the HUs and not the products that you'll see frequently moving in and out of warehouses. HUs have unique numbers for identification. SAP EWM allows automatic deletion of the HU identification number from the system after the HU is

emptied. If you still want to track the vacant HU, it's possible to set up the system accordingly. Packaging materials such as containers or wire boxes from which products are emptied are referred to as empty HUs.

An HU sometimes can be a combination of several HUs packed inside or above a packaging material, as shown in Figure 5.2. Also, products may need various layers of packing using different packing materials one above or around the other. SAP EWM allows nesting of HUs by facilitating unique identification for each of the nested HUs, thus forming a hierarchy.

Another common situation occurs when nested HUs are used, wherein HUs to be delivered to customers are shipped in a special container, also referred to as load carriers.

On the whole, the point to note here is that an HU may contain products, packaging materials, and other HUs.

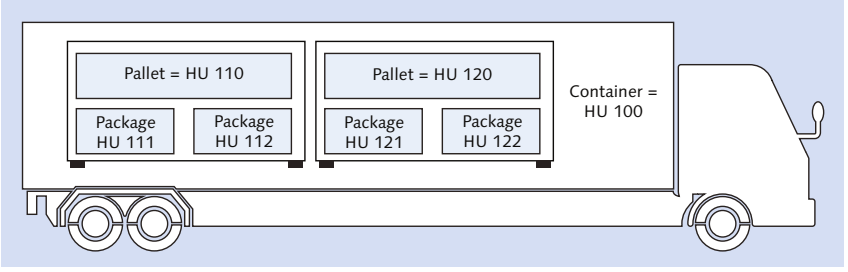


Figure 5.2 Nested Handling Units

Similar to products, SAP EWM supports tracking and handling of HUs in various processes in the warehouse. Some of the functionality of SAP EWM, such as storage control processes, requires mandatory HUs.

An HU consists of a header and items. It's identified by a unique number that is used for identification purposes.

HU header data includes the following:

- Weight/volume/dimension
- General data
- Storage-specific data

HU item data includes the following:

- Product
- Auxiliary packaging material
- Other HUs

5.1.1 Handling Unit Configuration Settings in SAP Extended Warehouse Management

Let's take a look at the important configuration settings related to HU management in SAP EWM. We'll refer to these settings and terms in further sections on HUs in this chapter.

These configuration settings are available under the Transaction SPRO menu path, SAP EWM IMG • Extended Warehouse Management • Cross-Process Settings • Handling Units. They are then divided into two further nodes, Basics and External Identification, as shown in Figure 5.3.

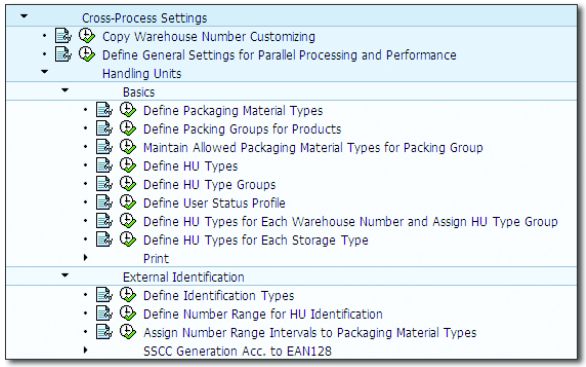


Figure 5.3 Handling Units Configuration Settings

Let's discuss the usage of these configurations in the following subsections.

Basic Settings

The following basic settings are used for HUs:

- **Define packaging material type**
  The packaging material type helps to group the packaging materials with similar characteristics, for example, crates, pallets, and so on. This allows you to

control the main characteristics that are relevant for packaging material, as shown in Figure 5.4.

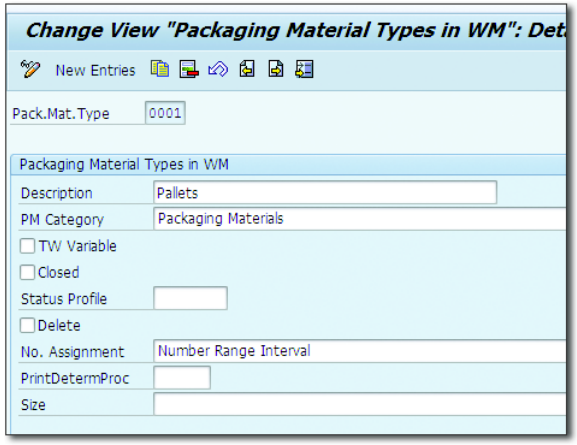


Figure 5.4 Packaging Material Type Definition Screen

- **Define packing groups for products**
  In Figure 5.5, you define the packing groups for products. Packing groups are used to group products that must be packed in the same way. For example, a packing group can be defined for all products that must be packed in bottles.

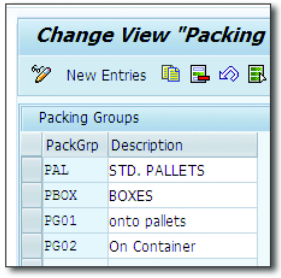


Figure 5.5 Packing Groups

- **Maintain allowed packaging material type for packing group**
  In Figure 5.6, you define the allowed packaging material for the individual packing groups. At the time of packing, the system checks whether the selected packaging material is permitted for the packing group of the materials being packed.

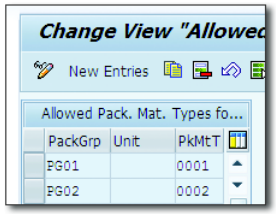


Figure 5.6 Allowed Packaging Material Type for Packing Group

- **Define HU types**
  In the node shown in Figure 5.7, you define the HU types that are used to describe the spatial characteristics of an HU. By doing so, the system can check whether an HU can be stored in a storage bin. It also helps the system in identifying the optimum storage bins.

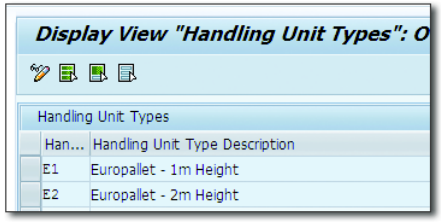


Figure 5.7 Handling Unit Type Definition

- **Define HU type groups**
  HU type groups are used to group HU types of similar characteristics, as shown in Figure 5.8.

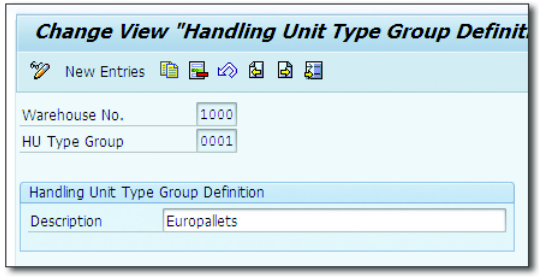
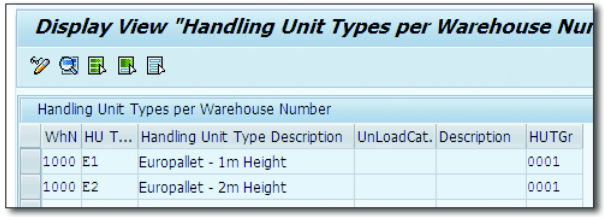


Figure 5.8 Handling Unit Type Group Definition

- **Define user status profile**
  Here, you define the status profile for HUs. The status profile is used to control the activities a user can undertake in the system.
- **Define HU types for each warehouse number and assign HU type groups**
  Using this node (see Figure 5.9), you can specify which HU types you want to permit in the warehouse. You can assign a unit of measure (UoM) load category to HU for workload evaluation. HU type can also be assigned to the HU type group defined previously.

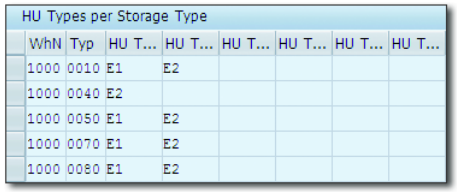

Display View "Handling Unit Types per Warehouse Nu

Handling Unit Types per Warehouse Number

WhN	HU T...	Handling Unit Type Description	UnLoadCat.	Description	HUTGr
1000	E1	Europallet - 1m Height			0001
1000	E2	Europallet - 2m Height			0001

Figure 5.9 HU Type and Group per Warehouse

- **Define HU types for each storage type**
  In Figure 5.10, you define the permitted HU types for each storage type that are used by the HU type check.


HU Types per Storage Type

WhN	Typ	HU T...	HU T...	HU T...	HU T...	HU T...	HU T...
1000	0010	E1	E2				
1000	0040	E2					
1000	0050	E1	E2				
1000	0070	E1	E2				
1000	0080	E1	E2				

Figure 5.10 HU Types Allowed per Storage Type

External Identification Settings

As with the basic settings, there are a few external identification settings for HUs:

- **Define identification types**
  The identification type is used to identify the type of identification you're dealing with. For the HU, you can store both an HU identification (number) and other identifications, as shown in Figure 5.11.

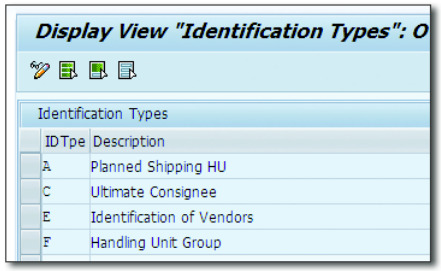


Figure 5.11 Identification Types

- **Define number range for HU identification**
  Here you maintain the number range for HU identification.
- **Define number range intervals to packaging material types**
  In the node shown in Figure 5.12, you define the number range intervals from which an HU identification must be obtained.

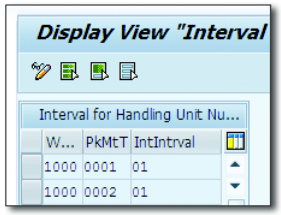


Figure 5.12 Define Interval Range for HU Identification

- **SSCC generation**
  Tracking an HU when it's transported is very important. An HU passes from manufacturer to transporter to dealers/distributors and finally reaches the consumer. To track an HU in this supply chain, a unique internationally recognized numbering standard is used called the Serialized Shipping Container Code (SSCC). It's used to identify the HUs being transported.

When an HU is constructed, the SSCC can be automatically assigned. For this, you need to define and maintain the SSCC number range for each warehouse. The SSCC number has a total of 18 characters and consists of the International Location Number (ILN) and a check digit from a sequential number, whose area you can define. The ILN, which is the basic number of SSCC, usually has 7 characters and uses up the second through eighth characters. With the check digit, there are 10 remaining characters that you must specify for your company. You can access

this configuration in SAP EWM IMG via menu path, Extended Warehouse Management • Cross-Process Settings • Handling Units • External Identification • SSCC Generation Acc. to EAN128 • Define Number Range Object for SSCC and Maintain SSCC Generation for Each Warehouse Number.

5.1.2 Packing Materials and Specifications

Packing material is also a product for a specialized use of holding/protecting other products. Some of the popular packing materials are pallets, wire boxes, cartons, and so on, which generally are available in various capacities. Based on their suitability and need, a manufacturer of certain products may or may not manufacture packaging materials themselves. These packaging materials are maintained as product masters in the system. These packing materials may have substantial weight that must be taken into account from the transportation perspective. While maintaining these materials in SAP EWM as product master, the associated parameters such as tare weight, volume, length, width, and height can be maintained and used for the HU's weight and volume calculation perspective, so that shipping HUs fit the transportation unit (TU)/vehicle.

SAP EWM allows you to classify these packaging materials into packaging material types, which helps group similar packing materials. To specify the settings, use SAP EWM IMG the menu path, Extended Warehouse Management • Cross-Process Settings • Handling Units • Basics • Define Packaging Material Type.

Packaging specifications, a master data item, contain necessary information such as number of levels, the quantity that goes into each level, packaging material used in each level, and so on for formation of HU. (Packaging specifications were discussed in detail in Chapter 4.)

To create and maintain packaging specifications, use Transaction /SCWM/PACKSPEC or the SAP Easy Access menu path, Extended Warehouse Management • Master Data • Packaging Specifications • Maintain Packaging Specification shown in Figure 5.13.

Customers may demand HUs to be formed in a specific way and with specific packaging materials. Thus, during HU creation in the system, the right packaging specification must be referred to. To facilitate this, you need to set up the determination procedure in Transaction SPRO in the SAP EWM IMG menu path, Extended Warehouse Management • Master Data • Packaging Specifications • Determination of Packaging Specification.

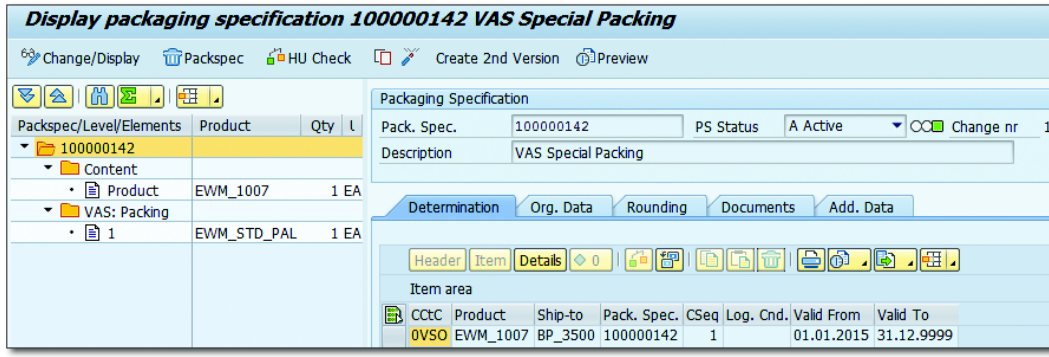


Figure 5.13 Packaging Specification Master Data

During the formation of the HU, personnel performing the packing should know how to follow the packing procedure while packing. Work steps detail the exact procedure to be carried out at each level of the HU formation. To define work steps that can be assigned to element types, use the SAP Easy Access menu path, Extended Warehouse Management • Master Data • Packaging Specifications • Maintain Packaging Work Step, or use Transaction /SCWM/PSWORKSTEP.

5.1.3 Post Processing Framework Customizing for Handling Unit Printing

HU labels generally contain information such as products contained, packaging materials used, quantity, total weight, other HUs packed inside, and so on. Based on its requirements, a business may want to trigger its printing with the help of the SAP EWM system. HU label automatic printing can be set up with the help of Post Processing Framework (PPF). Printing of HU labels in SAP EWM is highly flexible. You can set up the system to print the HU labels at a desired step of an inbound/outbound/internal movement process. For example, for an inbound process, the business may want to print the HU when goods are unloaded at the dock, so that direct putaway can be performed uninterrupted after pasting the HU label on them.

Possible points where you may want to trigger HU printing include the following:

- Creating an HU at the work center
- Saving an HU in a delivery document
- After unloading of inbound goods at the staging area

- If any damaged label exists against the stock received from another location either via intercompany or intracompany Stock Transfer Orders (STOs)
- Relabeling for varied reasons

SAP EWM provides standard smart forms for HU labels. For specific needs of customers for layout and content, these smart forms can be copied to create a new smart form. With the PPF setting, these smart forms can be utilized for label printing. SAP EWM provides a PPF action definition for HU label printing. Table 5.1 provides list of smart forms and PPF action definitions. For printing HU documents, these action definitions are supported in the PPF in the application `/SCWM/WME` in the action profile `/SCWM/HU`.

Smart Form Name	Description	Action Definition
HU_CONTENT	Print HU contents document with serial numbers	/SCWM/HU_CONTENT
HU_EXPRESS	Print express shipping label	/SCWM/HU_EXPRESS
HU_HAZARD	Print hazardous goods label	/SCWM/HU_HAZARD
HU_LABEL	Print HU label	/SCWM/HU_LABEL
HU_SHPLABEL	Print shipping label	/SCWM/HU_SHPLABEL
HU_TO	Print HU WTs	/SCWM/HU_TO
HU_SERIAL	Print HU serial number label	/SCWM/HU_SERIAL

Table 5.1 Standard Smart Form and PPF Action Definitions for HU Label Printing

5.1.4 Automatic Packing in Inbound Delivery

When you're dealing with vendors/suppliers who don't include packing details in the inbound deliveries, that is, only product information is available in deliveries (suppliers considered as non-HU locations/vendors), you need to ensure that HUs are created in the system after goods are received at the warehouse. SAP EWM provides an automatic packing feature in the system. When an inbound delivery comes to the SAP EWM system from SAP ERP and an inbound delivery notification (IDN) is created and activated, the SAP EWM system checks for unpacked items in the delivery. If the system finds an unpacked item relevant for automatic packing, it uses a procedure to arrive at a packaging specification so that the system gets sufficient information to form an HU. After the system generates the HU,

and SAP EWM inbound delivery is updated with HU details, these HUs can participate in the storage control process established for them during putaway.

There are two key settings relating to automatic packing:

- Enabling automatic packing at document type level
- Maintaining packaging specification and their determination procedure

If you leave the No Automatic Packing checkbox shown in Figure 5.14 unchecked and provide no procedure, the system can't perform automatic packing. The Transaction SPRO menu path for Figure 5.14 is Extended Warehouse Management • Goods Receipt Process • Inbound Delivery • Manual Settings • Define Document Types for Inbound Delivery Process.

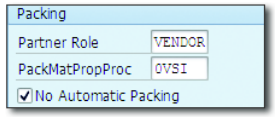


Figure 5.14 Automatic Packing Configurations

To enable automatic packing, packaging specifications must be created and activated in SAP EWM. The settings also need to be made for determination of packaging specifications. Use the SAP EWM Easy Access menu path, Extended Warehouse Management • Master Data • Packaging Specification • Maintain Packaging Specifications. You must maintain all HU-relevant data in the packaging specification so that the system finds out enough information such as packing material, target quantity, and so on to successfully construct the HU.

5.1.5 Packing during Warehouse Task Confirmation

During picking, a partial pallet may need to be picked; we call this partial pallet the pick HU. During the warehouse task (WT) confirmation, the product/HU task needs to be assigned with the pick HU. You can divide a product WT between several pick HUs. The system can assign the pick HU identification, or you can do this manually. For example, the WT is created for 75 pieces, but the palatalization quantity is 100 pc. Hence, there is a need for a partial pallet. For the partial pallet, creation of the pick HU and assignation to the WT is possible during manual confirmation of the WT.

The following process steps results in the product or HU being included in the pick HU:

1. Create a new entry for the pick HU in the system.
2. Enter a default packaging material.
3. If required, enter an HU identification.
4. Create an HU.
5. During confirmation of the WT, assign the pick HU as the destination HU.

5.1.6 Status Management

An HU can have different statuses such as BLOCKED, RELEASED, PLANES, REALIZED, and so on. SAP EWM allows a user to control the status of the HU through the status management functionality. Statuses can also be used to indicate other attributes of HUs such as loaded, weighed, posted for goods issue, and so on.

Two types of statuses can be defined in the SAP EWM system: system statuses and user statuses:

- The system status is the standard SAP-defined status, which can't be changed.
- The user status is defined by a user based on business requirements.

System statuses are identified when the appropriate business contexts arise. To define a user status, a user status profile needs to be created as shown in Figure 5.15. This can be done using the SAP EWM IMG menu path, EXTENDED WAREHOUSE MANAGEMENT • CROSS-PROCESS SETTINGS • HANDLING UNITS • BASICS • DEFINE USER STATUS PROFILE.

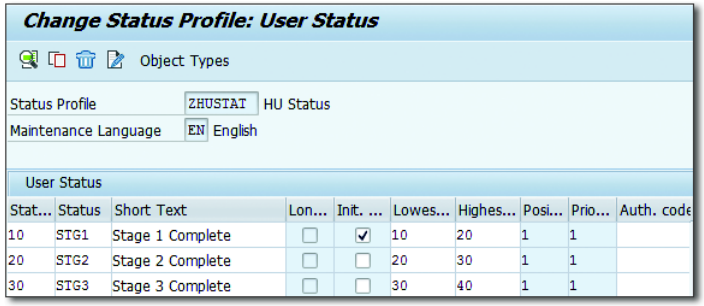


Figure 5.15 Status Profile Configuration

After the user status profile is created, you need to assign it to a packing material so that when the HU is created, the user status profile will be automatically assigned to the HU. To assign a user status profile to a packing material, use the SAP EWM IMG menu path, Extended Warehouse Management • Cross-Process Settings • Handling Units • Basics • Define Packaging Material Types.

5.1.7 Packing and Deconsolidation Using Radio Frequency

SAP EWM delivers the standard RF framework which includes packing and deconsolidation. You can perform all that is possible via the desktop in RF, provided you have the RF framework defined for the process required. You can navigate to packing in RF via RF MAIN MENU • 04 Outbound Processes • 02 Packing, as shown in Figure 5.16.

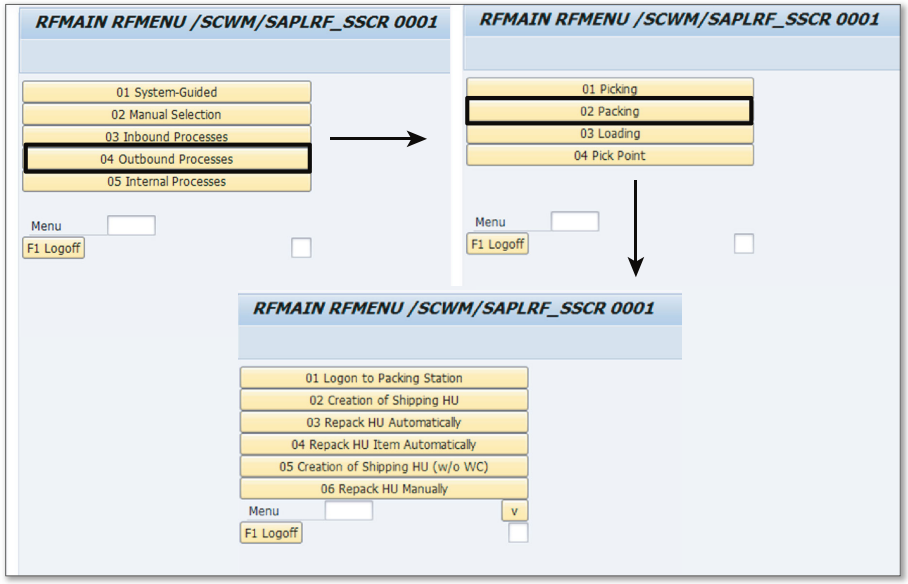


Figure 5.16 Packing Menu on RF

You can navigate to deconsolidation in RF via RF MAIN MENU • 03 Inbound Processes • 02 Deconsolidation, as shown in Figure 5.17.

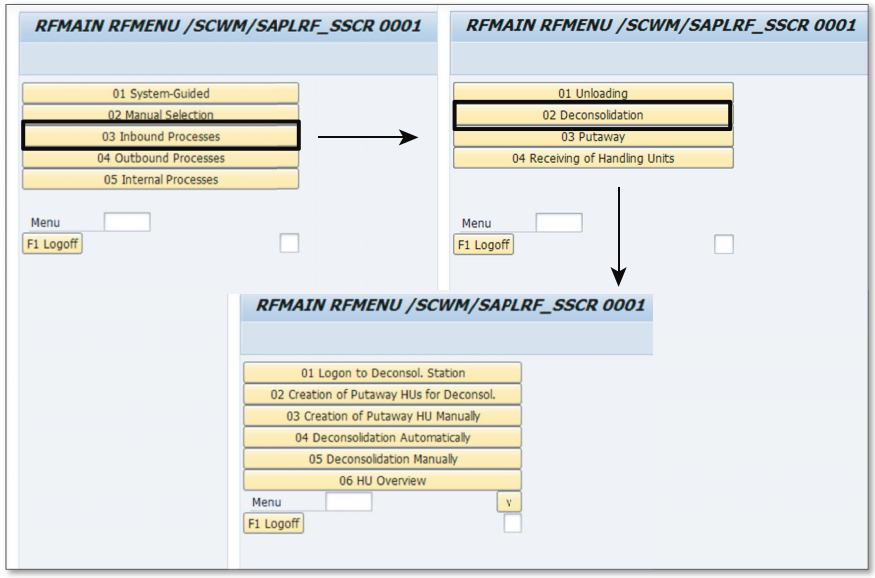


Figure 5.17 Deconsolidation Menu on RF

Packing can be executed using an RF device. The following features are available:

- Pack station logon
- Shipping HU creation
- Automatic repacking of HU
- Automatic repacking of HU items
- Shipping HU creation without logon to packing station
- Manual repacking of HU
- Manual repacking of HU item
- HU maintenance
- Manual repacking of all HU items

Deconsolidation at the work center can also be executed using an RF device. The following features are available:

- Logging on to a work center
- Creating multiple HUs
- Creating a single HU

- Deconsolidating HUs
- Deconsolidating HUs manually
- Viewing an HU overview
- Creating a single HU manually
- Changing HUs

5.2 Warehouse Order

In the following sections we will provide you with an overview of warehouse orders, how they work, what they do, and then describe the settings necessary for them.

5.2.1 Warehouse Order Overview

A warehouse order (WO) is a document and a placeholder of one or more WTs. A WO is assigned to a warehouse resource to provide the details of the work required to be completed by the resource. A resource, handling the WO, performs the WTs one by one. A WT contains the necessary information such as which product/HU needs to be moved, quantity to be moved, batch number, source and destination bins, and so on. Based on the WTs grouped in the WO, a resource can perform the warehouse activities such as picking, packing, putaway, consolidation, deconsolidation, value-added services (VAS), and so on.

Note

In the SAP EWM system, a WT isn't assigned to a resource directly. Any WT created in the system sits in a WO document, and later the WO is assigned to the resource.

WTs are created either manually or automatically (by wave release, which is discussed in Chapter 9) in the system. As soon as one or more WTs are created in the system, the WO creation begins immediately so that these WTs are accommodated into them.

So, how does the grouping of WTs take place in the system? The WTs are grouped per certain rules to create a WO. Whenever a wave is released, and the wave-specific WTs are created, the system creates and groups the WOs automatically based on the warehouse order creation rules (WOCR). However, the release of these

WOs can be controlled. The WO release can be automatic, that is, at the time the WOs are created, or they can be selectively released manually by removing the lock on the WO.

Before we discuss how a WO is created and what settings to make in the system, let's first take a look at the steps involved in WO creation:

1. The WO creation is triggered when WTs are created. A WT can be created either through the release of a wave or individually via PPF.
2. When the WTs are generated, the system initiates the process of creating a WO by checking if there are any user-defined rules set up in the system. The user can define the following types of rules:
   - Sorting rule: Sorting rule is used to sort WTs at the time a WOCR is applied.
   - Filter: Filters are used to check whether a WOCR can be applied to a WT or not. The purpose is to segregate the WTs into groups from which tasks can be picked to create a WO. You can define two types of filters (discussed in detail in Section 5.2.2):
     - Item filter
     - Subtotal filter
   - Limit value: The limit values are used to control the size of a WO. For example, you can define the minimum and maximum number of items in a WO or the maximum weight, volume, and so on of a WO depending on business requirements.
   - Parameters for packing: This rule defines the packing profile for a WO.
   - Consolidation group: This influences which WTs can be packed together to create a WO.
3. If there are no user-defined WOCRs, then the system picks the default (standard) rule to assign WTs to a WO. The standard rule groups deliveries based on the following parameters:
   - For each activity area
   - For each queue
   - For each delivery
4. If some WTs remain unassigned after applying all the rules, these tasks are assigned based on the remainder rule. The remainder rule assigns tasks on the basis of the following:

- Activity area
- Queue
- Consolidation group

Let's now take a closer look at the settings required in the system to implement WOCRs.

5.2.2 Warehouse Order Settings

The WO settings command the way WOs are formed in the system and have an impact on the efficiency of the warehouse. These settings also affect the way the operator sees the WT in the RF device. Right grouping of WTs to the WO is important for efficient and uninterrupted warehouse operations. For example, an overweight load on the forklift or conveyer may lead to accidents and interruptions in warehouse operations.

Sorting Rule for Warehouse Tasks

Sorting rules, as pointed out earlier, are used to sort WTs within a WO. These rules can be defined for one of the following three stages during processing:

- Sorting all WTs as soon as the WO creation processes a sort rule (inbound sorting), that is, at the start of WO creation
- Sorting all WTs that are part of a WO at the end of WO creation
- Sorting all WTs during packing for determination of pick HUs (e.g., by volume or weight)

To define the sorting rules for WTs in the SAP EWM IMG as shown in Figure 5.18, use the menu path, Extended Warehouse Management • Cross-Process Settings • Warehouse Order • Define Sort Rules for Warehouse Tasks.

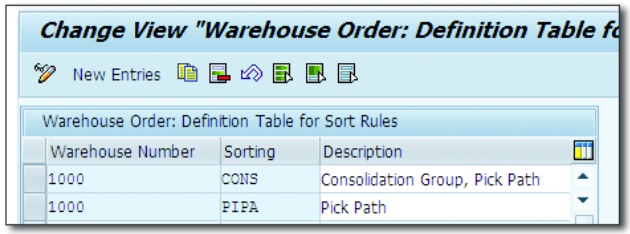


Figure 5.18 Define Sort Rules for Warehouse Tasks

If no sort rules have been defined by the user, then the system uses standard rules for sorting.

Filters for Warehouse Order Creation Rules

As pointed out earlier, filters are used to check the applicability of a WOCR to a WT. To specify the settings, use the menu path, SAP EWM IMG • Extended Warehouse Management • Cross-Process Settings • Warehouse Order • Define Filters for Warehouse Order Creation Rules.

Filters can be applied either at the item level or at the subtotal level. An item level filter means that the filtering rule is applied to each item. For example, if the business wants to create a separate WO for items heavier than say 100 kg, which are classified as heavy items, then an item level filter can be defined so that only those WTs that require moving items heavier than 100 kg are considered for the WO. On the other hand, a subtotal level filtering rule isn't used at the item level but at the subtotal level. For example, a business wants to have a maximum of five items from a consolidation group in a WO. In this case, the filtering rule checks the total number of items from a consolidation group when creating a WO. Such a filtering rule is at the subtotal level and not at the item level because only the total number of items is checked and not each item.

Figure 5.19 shows how an item level filtering rule is defined for the heavy items example we discussed earlier.

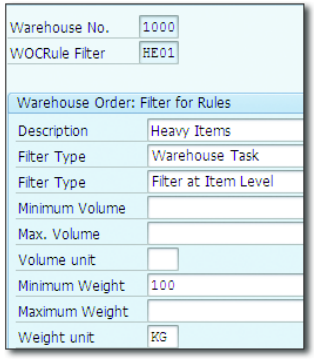


Figure 5.19 Define Filters for WOCR

As shown in the figure, the Minimum Weight is specified as 100 kg, and the Filter Type is selected as Filter at Item Level. Apart from this, you can also filter the

WTs based on the warehouse process type (WTP), priority, route, wave category, processing time, volume, and so on. You can also specify whether you want to handle a complete HU or put some restrictions on it.

Limit Values for Warehouse Order Creation Rules

To specify the limit values, use the menu path, SAP EWM IMG • Extended Warehouse Management • Cross-Process Settings • Warehouse Order • Define Limit Values for the Size of a Warehouse Order.

As shown in Figure 5.20, we've defined limit values for the processing time of a WO. By doing so, we can ensure that a WO is created only if the total processing time of the WTs is at least 30 minutes and a maximum of 150 minutes. In this way, we can control which tasks can be combined to create a WO.

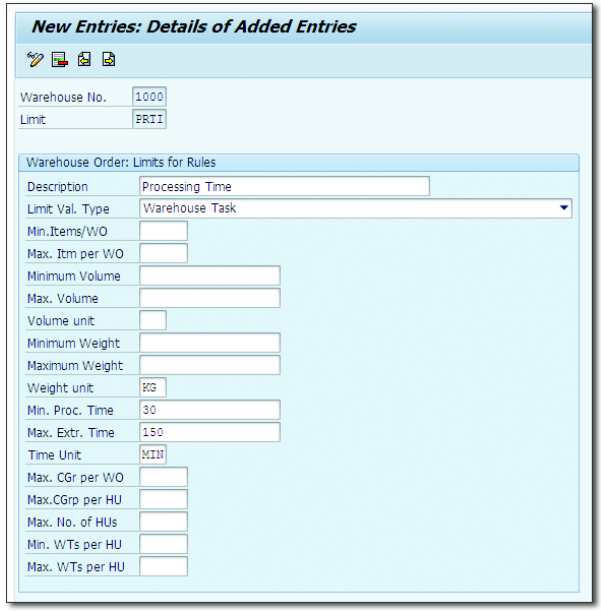


Figure 5.20 Define Limit Values for WOCR

Packing Profile for Warehouse Order Creation Rules

To define the packing profile, use the menu path, SAP EWM IMG • Extended Warehouse Management • Cross-Process Settings • Warehouse Order • Define Packing Profile for Warehouse Order Creation.

Here, you define the packing profiles for WO creation. This lets you control which pick HUs should be considered for creation of a WO. The system uses the data from the WTs (such as weight, volume, or dimensions) to perform this determination. The number and type of pick HUs are determined by comparing this data against the data available for possible packaging materials. Apart from this data, the system also considers the following additional values from the limit values defined earlier:

- Maximum number of different deconsolidation groups in a pick HU
- Maximum number of pick HUs
- Maximum number of items for each HU
- Minimum number of items for each HU

As you can see in Figure 5.21, the following modes are available for determining the pick HUs:

- Simple Algorithm
  This algorithm uses exactly one packaging material to determine the required pick HUs. For this, you define one packaging material in one packaging specification.
- Complex Algorithm
  This algorithm uses multiple possible packaging materials to determine the optimum pick HUs from the various packaging materials and their number. You can define multiple packaging materials in the packing specifications.
- BAdI
  The BAdI processes the determination of pick HUs according to your requirements.

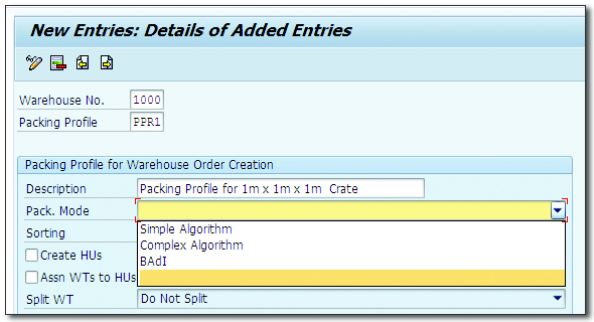


Figure 5.21 Define the Packing Profile for WOCR

You can also control whether you want the system to only propose HUs or to create HUs at the time of WO creation. This can be done by ticking the CREATE HUs indicator. By ticking the ASSIGN WTs TO HUs indicator, you can assign WTs to HUs according to the packing proposal.

Definition of Warehouse Order Creation Rules

After the filters, limit values, packing profile, and sort rules are defined, you can use various combinations of these parameters to define WOCRs. To do so, use the SAP EWM IMG menu path, EXTENDED WAREHOUSE MANAGEMENT • CROSS-PROCESS SETTINGS • WAREHOUSE ORDER • DEFINE CREATION RULE FOR WAREHOUSE ORDERS.

In the screen shown in Figure 5.22, apart from the parameters mentioned earlier, you can also define whether the work center should be determined during WO creation and whether the WO should be locked at the time of WO creation. All this can be done by ticking the appropriate indicators shown in the screen.

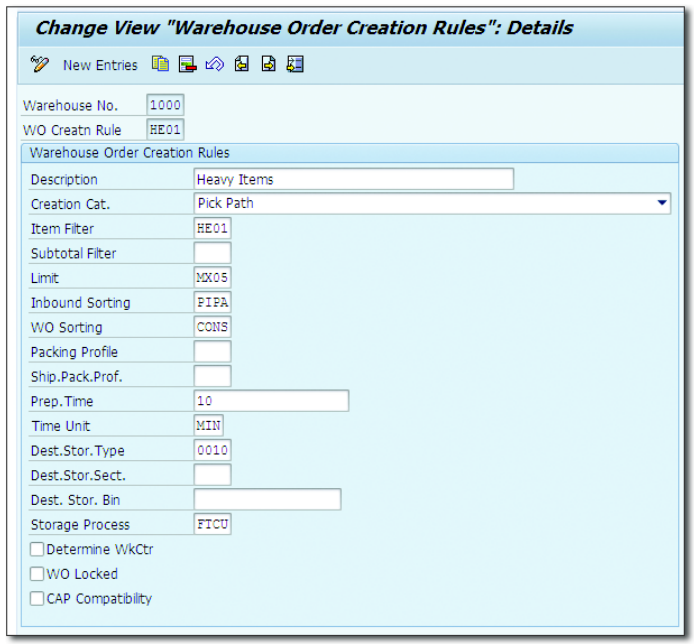


Figure 5.22 Define WOCR

Overview of Warehouse Order Creation Rules

To get a snapshot of all the WOCRs, use the SAP EWM IMG menu path, Extended Warehouse Management • Cross-Process Settings • Warehouse Order • Overview of creation rules for Warehouse Orders.

Through the screen shown in Figure 5.23, you can view all the WOCRs created in the system. The same screen also allows you to view all the parameters associated with a WOCR such as filters, limit values, packing profile, sort rules, and so on. The importance of this screen is that a user can view, change, and/or define WOCRs in a single screen. Hence, it functions like a warehouse monitor, which is used to monitor all warehouse activities through a single screen.

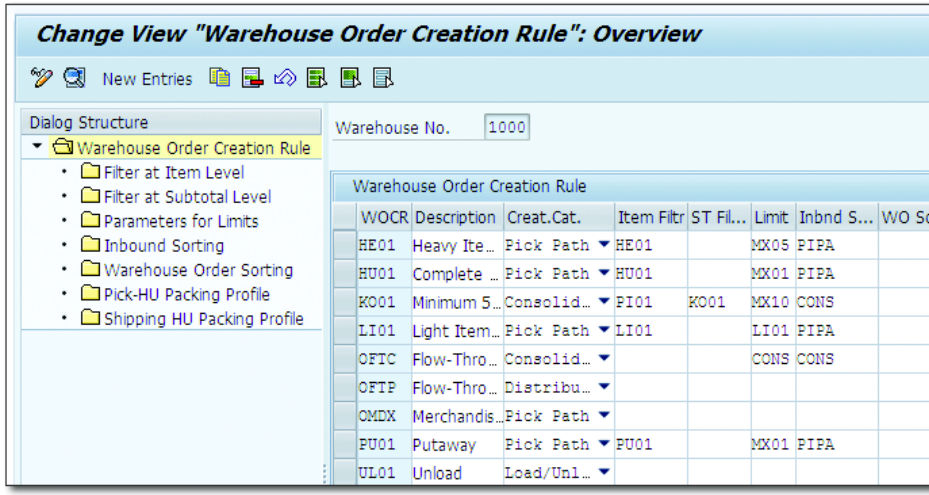


Figure 5.23 Overview of WOCR

Define Search Sequence of Warehouse Order Creation for Activity Area

So far we've seen how WOCRs can be created in the system and which parameters are required to be defined for a WOCR. Now we'll see how these rules are applied by the SAP EWM system to get things done on the ground. For this, the SAP EWM system uses a search sequence. The SAP EWM system browses through the already created WOCRs in a specified order (which is the search sequence) defined by a user and then applies the relevant WOCRs to group WTs to create a WO. Note that a search sequence is defined for an activity area.

To specify the settings, use the SAP EWM IMG menu path, Extended Warehouse Management • Cross-Process Settings • Warehouse Order • Define Search Sequence of Creation Rules for Activity Areas.

As shown in Figure 5.24, for activity area 0010, there are five WOCRs defined in the system. By specifying the sequence number, a user tells the system the order in which these rules must be applied. For example, a user wants the system to first group all those WTs that involve complete pallet withdrawal. To that rule, the user can assign sequence number 1 as shown in Figure 5.24.

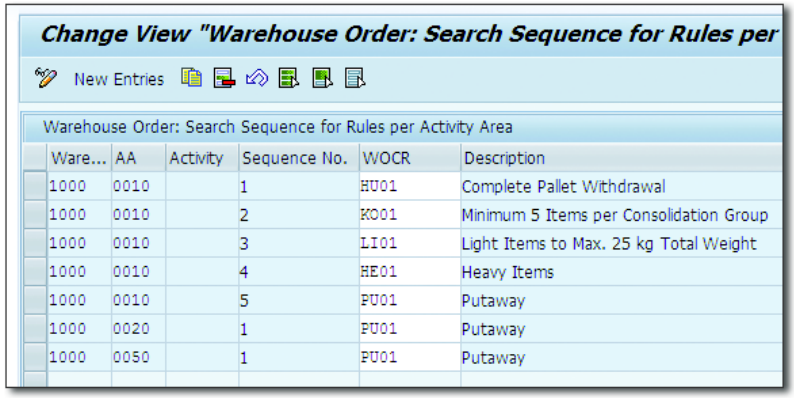


Figure 5.24 Define Search Sequence for an Activity Area

Printing Warehouse Orders

For printing WOs, the action definitions listed in Table 5.2 are supported in PPF in the application `/SCWM/WME` in the action profile `/SCWM/WO`.

Action Definition	Description	SAP Smart Forms Form
`WO_MULTIPLE`	Print list for WO with serial numbers.	`/SCWM/WO_MULTIPLE`
`WO_SINGLE`	Print single document for WO with serial numbers.	`/SCWM/WO_SINGLE`
`WO_HUSHIP`	Print shipping label.	`/SCWM/WO_HUSHIP`
`WO_LOAD`	Print loading instructions with WTs.	`/SCWM/WO_LOAD`
`WO_UNLOAD`	Print unloading instructions with WTs.	`/SCWM/WO_UNLOAD`

Table 5.2 Actions Supported in PPF for Printing WOs

Manual Assembly of Warehouse Orders

During the goods receipt process, a user may want to group certain HUs and ignore others so that the resource can put them away collectively. To do so, the manual assembly function can be used wherein you can delete WTs of different HUs from WOs and then group them together in a new WO. The SAP EWM system then determines the optimal putaway path.

To assemble the WO manually, use the SAP EWM Easy Access menu path, Extended Warehouse Management • Execution • Manually Assemble Warehouse Orders, or use Transaction /SCWM/RWOCR.

5.3 Storage Control

The storage control functionality helps in designing complex warehouse processes in SAP EWM. In the following sections we will give an overview of storage control and then drive into the two types of storage control: Process-Oriented Storage Control (POSC) and Layout-Oriented Storage Control (LOSC).

5.3.1 Storage Control Overview

In various business scenarios, certain activities, such as deconsolidation, storage control needs to be performed before received goods are putaway to the final bins after they are unloaded in the inbound process. Similarly, for the outbound process, certain activities, such as packing, consolidating, and so on, may be performed on goods to be sent to customers after they are picked from the source bin and before they are loaded to TUs. Storage control can also be used in internal movements in the warehouse. Sometimes the layout of the warehouse also forces you to use an intermediate identification and pick points within the warehouse while transferring the goods from storage bins to staging area. These multistep movements in the warehouse are mapped with the use of the storage control functionality of SAP EWM.

Storage control in SAP EWM can be classified into two groups: Process-Oriented Storage Control (POSC) and Layout-Oriented Storage Control (LOSC).

As the name suggest, POSC takes care of process activities that need to be performed, and LOSC takes care of physical warehouse layout-based constraints during the movement of goods within the warehouse. POSC and LOSC can be

mixed as well for goods movement per the business requirements. If mixed, as a rule, POSC is carried out first and then LOSC is executed.

Note

We'll discuss the details of the POSC and LOSC concepts in Chapter 7 and Chapter 9.

Storage Control in the Inbound Process

We'll discuss the setup of the storage process for multistep movements in the system in Section 5.3.2. The storage process, after it's set up, is placed in the WTP definition in the Settings for Storage Process section as shown in Figure 5.25.

When goods are received, a business may want to follow a defined set of procedures before material can be put away. These procedures can be defined by using the SAP EMW IMG menu path, Extended Warehouse Management • Cross-Process Settings • Warehouse Task • Define Warehouse Process Type.

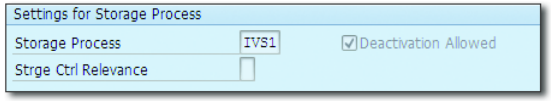


Figure 5.25 Storage Control for Putaway in Define Warehouse Process Type

Storage Control in the Outbound Process

For outbound, the storage process is assigned to the WOCR, as shown in Figure 5.26. To define this, follow the SAP EWM IMG menu path, SCM Extended Warehouse Management • Cross-Process Settings • Warehouse Order • Define Warehouse Order Creation Rule.

Warehouse Internal Movements

For warehouse internal movements, the storage control setting depends on the type of movement. For example, for replenishment, storage control is done through WOCR, whereas for picking, it's linked to the WTP.

So how exactly are these multistep movements mapped in the SAP EWM system? What are the important settings? Let's take a look at these setting with which you can map POSC and LOSC in the system.

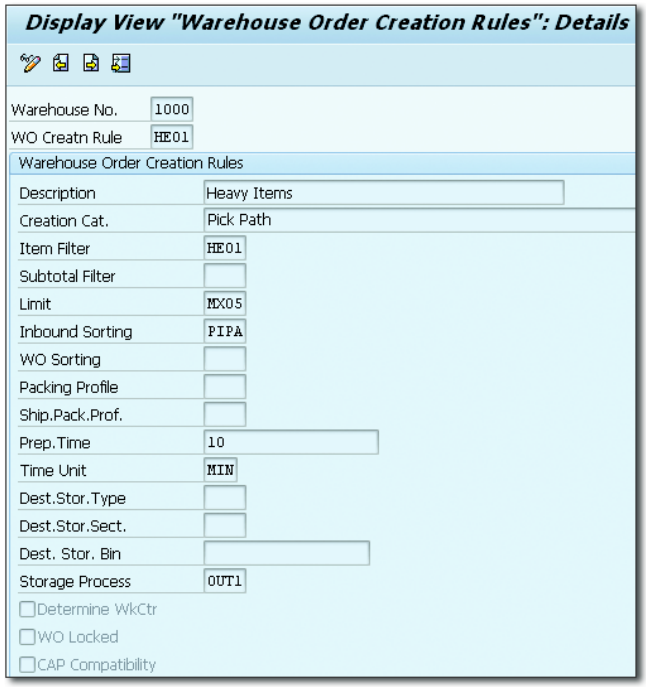


Figure 5.26 Storage Process Field for Outbound in WOCR

5.3.2 Process-Oriented Storage Control

POSC is used to define complex putaways, stock removal processes, or internal warehouse movements. Here you define storage process steps and combine them to form a single storage process. For example, a putaway storage process may involve storage process steps such as unloading, counting, deconsolidating, and so on. SAP EWM already has some predefined process steps. However, it also allows defining custom process steps, which can be based on the existing predefined process steps.

Process-Oriented Storage Control Configuration

To begin with, you first define the storage process for POSC by following the SAP EWM IMG menu path, Extended Warehouse Management • Cross-Process Settings • Warehouse Task • Define Process Oriented Storage Control. In the screen shown in Figure 5.27, you can define the storage process using the Storage Process - Definition node.

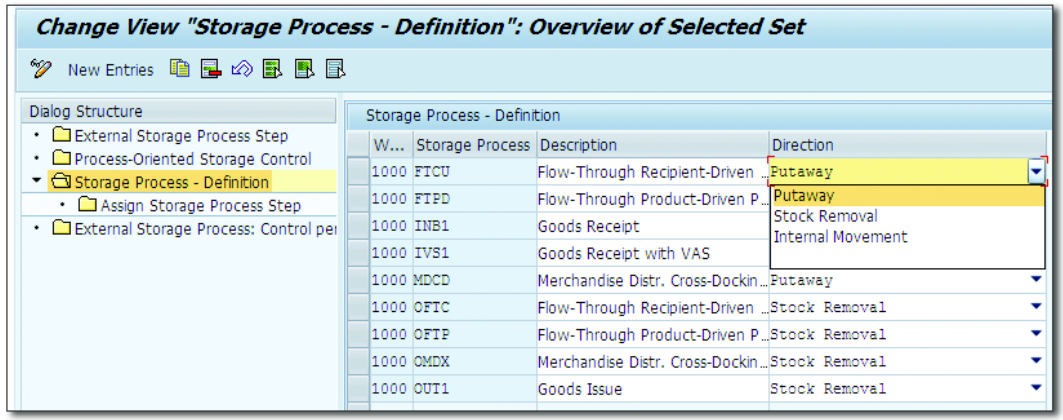


Figure 5.27 POSC Storage Process Definition

In the next step, you define the storage process steps involved in completing the storage process. For this, use the ASSIGN STORAGE PROCESS STEP node. In the screen shown in Figure 5.28, we've shown the process steps defined for storage process INB1 (i.e., goods receipt process).

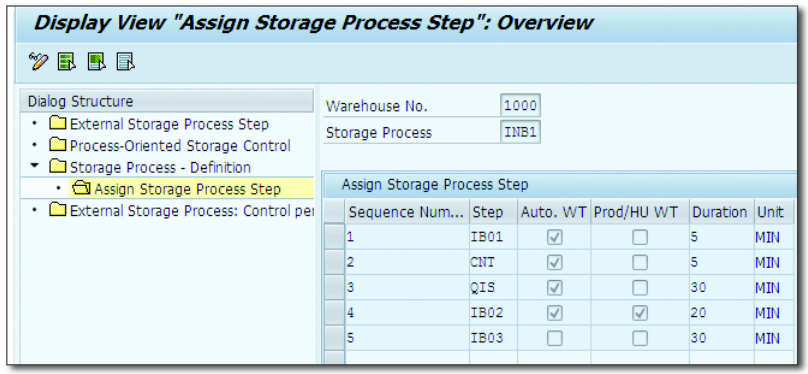


Figure 5.28 Assign Storage Process Step

The external storage process step can be defined using the EXTERNAL STORAGE PROCESS STEP node, as shown in Figure 5.29.

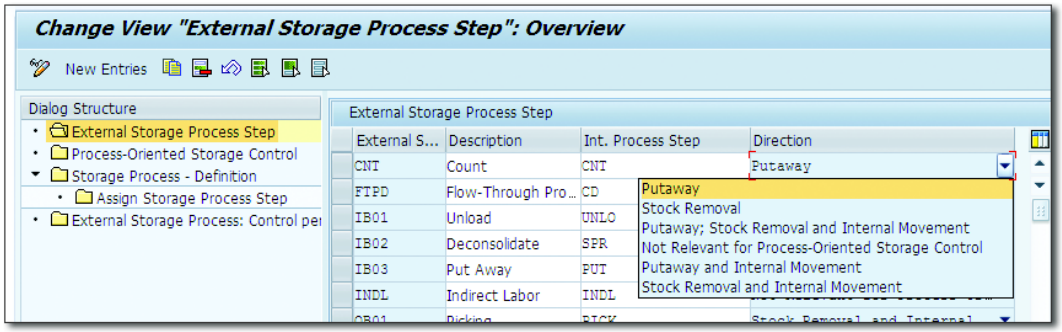


Figure 5.29 POSC—Define External Storage Process Step

5.3.3 Layout-Oriented Storage Control

LOSC is important when intermediate bin storage/transfer is required while moving goods from the source bin to the destination bin. Depending on settings, LOSC also suggests alternative storage options if storage in the currently defined destination bin isn't possible due to layout constraints.

It's worth noting at this point that LOSC works at the HU level only. The only exception is for process display with identification points or picking points.

Layout-Oriented Storage Control Configuration

To define LOSC-related parameters, use the SAP EWM IMG menu path, Extended Warehouse Management • Cross-Process Settings • Warehouse Task • Define Layout Oriented Storage Control.

As shown in Figure 5.30, the following parameters are to be defined for LOSC:

- Warehouse Number
  Warehouse number of the warehouse where the LOSC configuration is being done.
- Source Storage Type
  This is the storage type from where a product will be removed for movement.
- Source Storage Group
  In LOSC, a storage group is a logical or physical combination of storage types. A storage group can be a combination of storage bins. For example, all the bins

in the aisle can form a storage group so that the intermediate bin is always on the aisle, which makes it easier to fetch a product.

- WHOLE HU
  Using this indicator you can specify whether you want to work with a complete HU withdrawal, empty HUs, or a partial withdrawal.
- INTER. STORAGE TYPE/INTERM.STORAGE SECTION/INT. STORAGE BIN
  Describes the intermediate storage type or section or the bin.
- WHSE PROC. TYPE
  Specify the type of warehouse process such as putaway, deconsolidation, removal, and so on.
- ID POINT
  These points identify the goods arrived in an automated warehouse.
- PICK POINT
  This is the actual place in the warehouse where you pick items for a partial stock pick from an HU.
- SEGMENT
  This is used when conveyor segments are used in the Material Flow System (MFS).

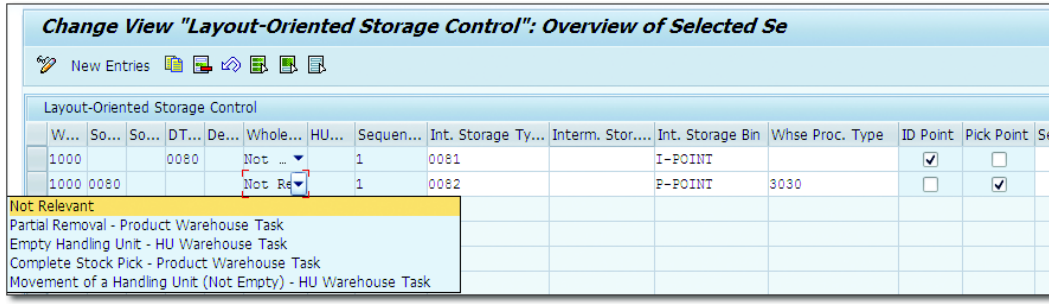


Figure 5.30 Layout-Oriented Storage Control

5.4 Exception Handling

In a warehouse, many unique situations arise that require special handling. For example, a supervisor goes to a bin for putaway but finds that the bin isn't empty or that the bin is broken. It's imperative to report such exceptional situations and

also configure the system to propose solutions for such situations so that the warehouse process isn't interrupted. In SAP EWM, you use exception codes to describe and handle such unforeseen situations in the warehouse.

You can define exception codes for different document types (e.g., for inbound deliveries or outbound deliveries), product shortages during goods receipt, product shortages during picking (pick denial), and other warehouse situations where processing abnormalities can exist.

Combined with the exception code processing is the exception handler service that can be configured to create corrective tasks, generate alerts, and/or record the exception for reporting purposes. Exception codes can be reported in the desktop user interface (UI) or in the RF UI.

5.4.1 Configuring Exception Codes

When you use exception codes to report an exceptional situation, the purpose is to ensure that the system guides the user in resolving that exceptional situation by executing follow-up actions. These follow-up or corrective actions are determined by the system based on certain settings maintained by configuring the system per the business need. Before we proceed to creating a new exception code, let's discuss some important terminology related to exception handling. The following terms are necessary both from the process as well as system configuration point of view:

- **Internal process code**
  Internal process codes like the ones shown in Table 5.3 are used to specify what action the system must take when an exception code is entered by the user. It has to be assigned to the exception code to make sure that SAP EWM understands what is to be done when that particular exception code is encountered.

Internal Process Code	Description
BIDF	Pick denial (full quantity)
BIDP	Pick denial (partial quantity)
CHBD	Change destination storage bin (location)
COCO	Confirmation correction
DIFF	Post with difference

Table 5.3 Examples of Internal Process Codes

- **Business context**
  Business context gives more clarity regarding the business process for which the exception code is defined. An internal process code can be used for one or more business contexts.
- **Execution step**
  The execution step further breaks down the business context and specifies the transactions through which the exception code will be entered for further processing by the system.
- **Exception code profile**
  Exception code profile is used to control which users can use which exception codes. There might be certain exceptions that a normal warehouse supervisor can't or shouldn't be allowed to handle. For such situations, the business might mandate that they be handled by a senior warehouse supervisor or employees with special skills. Such authority for using exception codes is defined using an exception code profile.

Now that you're familiar with the terminology related to exception codes, let's see this in action by defining a new exception code EXQR for a situation wherein an additional quantity of material has been received at the warehouse.

To define a new exception code, follow the SAP EWM IMG menu path, Extended Warehouse Management • Cross-Process Settings • Exception Handling • Define Exception Codes. The screen shown in Figure 5.31 appears showing the dialog structure at the left side.

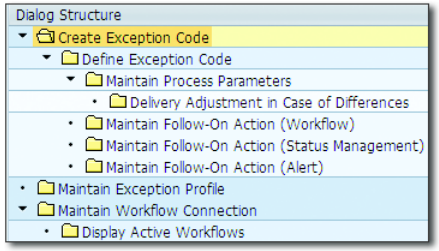


Figure 5.31 Dialog Structure for Exception Codes

Using these folders and subfolders, you'll create a new exception code and maintain parameters for the same. Follow these steps to create a new exception code:

1. In the Create Exception Code folder, click on the New Entries button to create a new code. The screen shown in Figure 5.32 appears. Here you specify the warehouse number for which the exception code is to be used. Then you define the exception code, which is a four-character code, and add a short text description. If you want to monitor the exception code in the warehouse monitor, then select the With Hist. indicator. You can also decide to block the exception code by using the Block indicator. You might want to block a code temporarily if you detect some flaw in the follow-up actions or some error in its configuration.

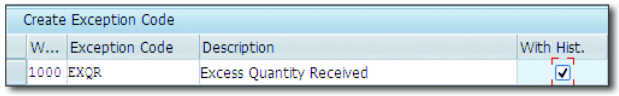


Figure 5.32 Create Exception Code

2. After the exception code is created, select that code, and click on the Define Exception Code folder. In this folder, you define the business context and the execution steps. Click on the New Entries button, and the screen shown in Figure 5.33 appears. For the exception code we're defining, we want the excess quantity to be checked and reported at the time of unloading. Thus, define the Business Context to be LPT Unloading of HUs (Putaway). Now at the time of unloading, the excess quantity can either be reported using a desktop transaction or by using an RF device. These are the execution steps you define in this screen. You can also specify the exception code profile (Excp.Code Prof.). For the sake of simplicity, we're not defining any exception code profile for this exception code.

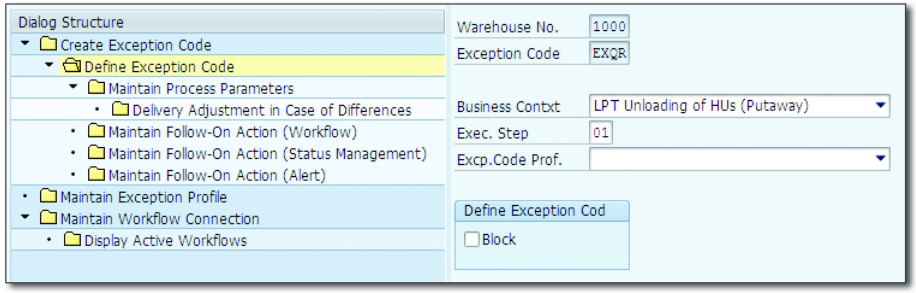


Figure 5.33 Define Business Context and Execution Steps

Note that one or more execution steps can be defined for a business context. However, you can define only one execution step at a time. All the execution steps defined for an exception code are displayed in the Define Exception Code folder as shown in Figure 5.34. Here, we've defined two execution steps: 01 for desktop transaction and 04 for RF device.

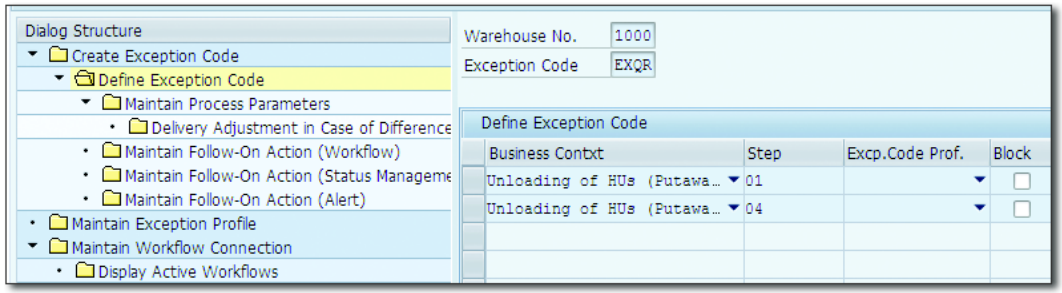


Figure 5.34 Business Context and Execution Steps for Exception Code EXQR

3. Now for each of the execution steps, you need to assign internal process codes. By doing so, the SAP EWM system will know what action to take when the exception code EXQR is entered through the desktop or RF device. To assign an internal process code, select the execution step in the Define Exception Code folder and then click on Maintain Process Parameters folder in the dialog structure. In our case, we want the system to create an additional HU for the excess quantity when the exception code EXQR is entered using a desktop transaction. Thus, enter the predefined internal process code "HUAD" in the Int. Proc. Code field to the relevant execution step as shown in Figure 5.35.

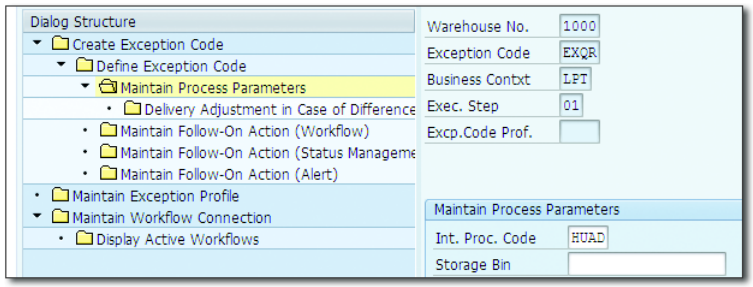


Figure 5.35 Asssign Internal Process Code to Execution Step

The completion of the preceding steps is sufficient to configure a new exception code. However, if you want to define some more follow-up actions, such as generating alerts for exceptions, then you can define the parameters for the same using the relevant Maintain Follow-on Action folders in the dialog structure.

5.4.2 Exception Code Profile Assignment

As described earlier, the exception code profile is used to control the authorization of users for using exception codes. To create exception code profiles and to assign user IDs to exception code profiles (see Figure 5.36), use the SAP EWM Easy Access menu path, Extended Warehouse Management • Settings • Assign User to Exception Code Profile or Transaction /SCWM/EXCUSERID.

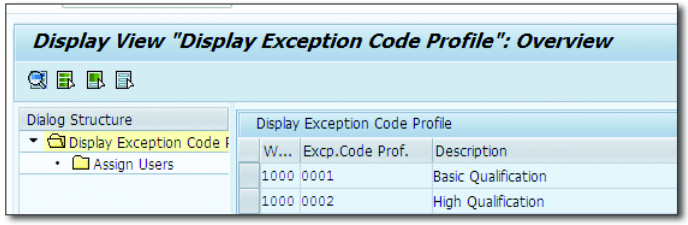


Figure 5.36 Exception Code Profile Assignment

5.4.3 Maintain Business Context

To maintain the business context and execution steps, follow the SAP EWM IMG menu path, Extended Warehouse Management • Cross-Process Settings • Exception Handling • Maintain Business Context for Exception Codes (see Figure 5.37).

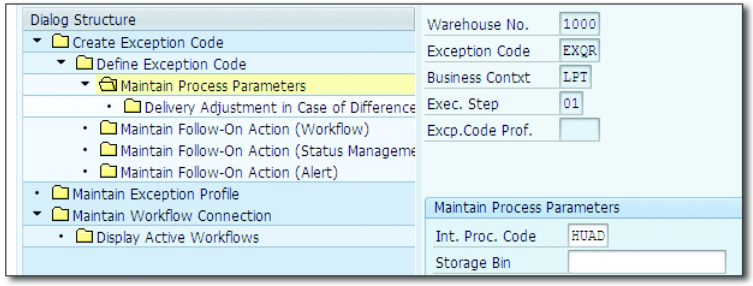


Figure 5.37 Maintain Business Context

5.5 Batch Management

Batch management is obligatory for several goods in various industries. Batches allow you to capture certain properties of the stock. These properties play a role in decision making in various warehouse processes. For example, based on the production date captured in a batch, at a later stage, the business can decide on whether the stock can be sent to the customer or whether it needs to be scrapped. For recalls of a product, the batch plays a critical role in identifying the exact products that need to be recalled.

SAP EWM is highly flexible in maintaining, using, and handling batch-related information in the system. SAP EWM allows setting up easy batch determinations in various warehouse processes. When used with SAP ERP as the master system, you need to enable batch management in SAP ERP as well as the SAP EWM system. Batches are managed centrally in the SAP ERP system as the master data system for batches. From SAP ERP, batches and classes/characteristics can be distributed to all connected SAP EWM systems via the core interface framework (CIF). SAP EWM allows creating or changing the batches locally in the system.

Because batch data is dependent on class and characteristics, before transferring any batch data to SAP EWM, you need to ensure that requisite classes and characteristic have already been transferred and exist in SAP EWM, as shown in Figure 5.38. Transaction CFM1 is used to transfer the batch data from SAP ERP to SAP EWM.

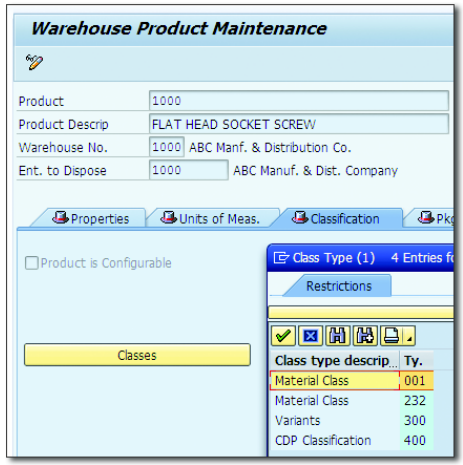


Figure 5.38 Classification View of the Product Master

The class for batch is 023. After the CIF model is created and activated, as soon as the batch master data is changed in the SAP ERP system, connected SAP EWM systems receive the changes automatically via the master data distribution. Batch-relevant fields are maintained on the product master Classification view in SAP EWM.

To edit and create batches in SAP EWM, use the SAP EWM Easy Access menu path, Extended Warehouse Management • Master Data • Product • Maintain Batches for Product, or use Transaction /SCWM/WM_BATCH_MAINT, as shown in Figure 5.39.

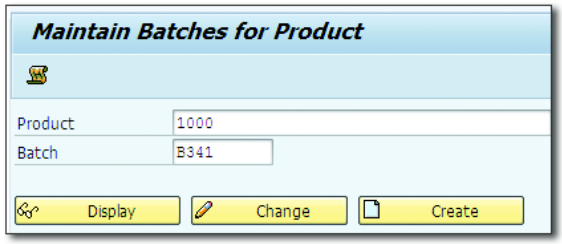


Figure 5.39 Batch Maintenance Input Screen

Next, let's discuss important settings relating to using batches in the SAP EWM system. Later, we'll discuss how batches are used in various processes in the warehouse and their status management, and finally we'll discuss documentary batches in SAP EWM.

5.5.1 Batch Management-Specific Configuration

First, you need to activate and specify the batch level at which the business needs to maintain the batches by navigating to the SAP ERP IMG menu path, Logistics - General • Batch Management • Specify Batch Level and Activate Status Management • Batch Level.

Let's start with a setting relating to batch determination in the outbound process, which needs to be done while setting up integration between SAP ERP and SAP EWM in the SAP ERP IMG menu path, Logistics Execution • Extended Warehouse Management Integration • Basic Setup of EWM Connectivity • Maintain Extended WM-Specific Parameters.

In this setting, if you flag the BatchDetEW checkbox shown in Figure 5.40, the system ensures that during outbound delivery creation, batch attributes are replicated to the SAP EWM system, and automatic batch determination is executed with these replicated attributes as selection criteria in SAP EWM. However, for this to work, you must activate batch determination in Sales and Distribution (SD) for sales order and delivery items.

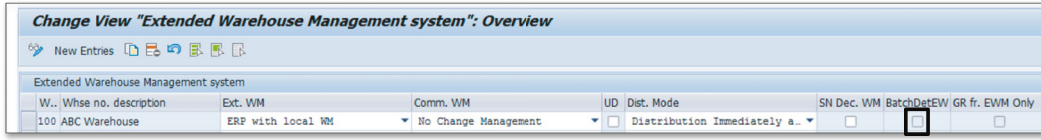


Figure 5.40 Maintain SAP EWM-Specific Parameters

To define the number ranges for a batch go to the SAP EWM IMG menu path, Extended Warehouse Management • Cross-Process Settings • Batch Management • Define Number Range for Batch.

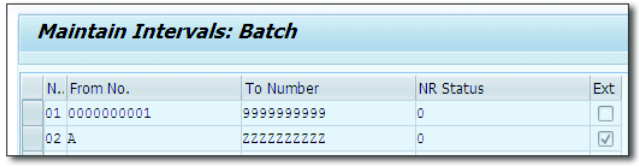


Figure 5.41 Maintain Intervals

You can maintain the batch management and shelf life expiration date (SLED) check against the document level for each warehouse in the SAP EWM IMG menu path, Extended Warehouse Management • Cross-Process Settings • Batch Management • Batch Status Management • Make Settings for Delivery (see Figure 5.42).

Activate the Sts Restr. checkbox shown in Figure 5.43 if you want to allow the WT creation with a restricted batch. You can do this in the SAP EWM IMG menu path, Extended Warehouse Management • Cross-Process Settings • Batch Management • Batch Status Management • Settings for Warehouse Task Creation.

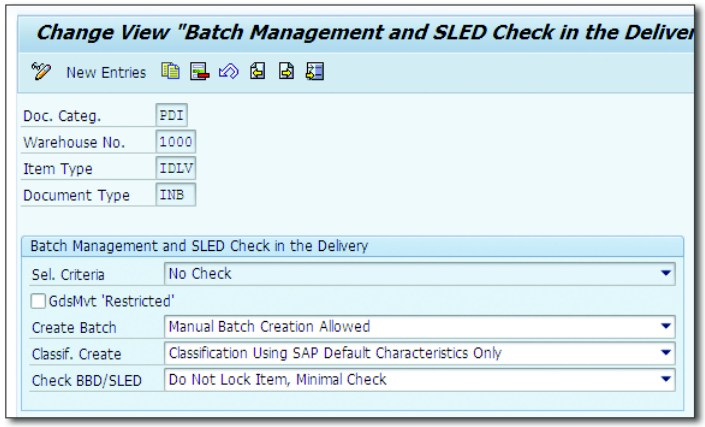


Figure 5.42 Maintain Settings for Delivery

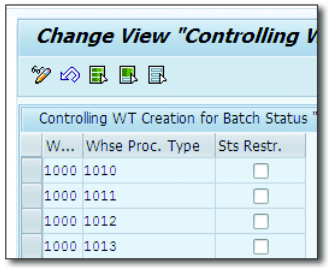


Figure 5.43 Settings for WT Creation

The use of documentary batches must be enabled in Customizing, as shown in Figure 5.44. The general configuration of batch management can be found in the SAP SCM IMG menu path, Extended Warehouse Management • Cross-Process Settings • Batch Management. The Set Documentary Batch node is used to enable documentary batches in the batch management Customizing. Documentary batch management is also enabled by setting the Documentary Batch indicator of the product master to "1" in SAP EWM.

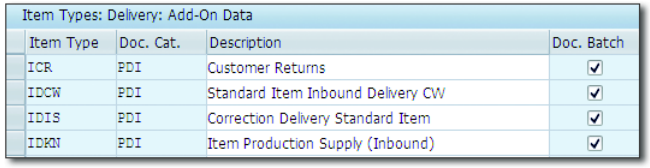


Figure 5.44 Set Documentary Batch

If the item type is configured to require documentary batches, the batch information has to be available at four key times:

- In goods receipt processing
- Before goods receipt posting is possible
- Before product WT confirmation is possible
- In goods issue processing before goods issue posting

In the goods issue process, you can enter the documentary batch either in the outbound delivery order (ODO) (creates a batch split item) or during the pick WT confirmation.

To set up the update control for batches, use the SAP EWM IMG menu path, Extended Warehouse Management • Cross-Process Settings • Batch Management • Set update control (Centralized, Decentralized), as shown in Figure 5.45.

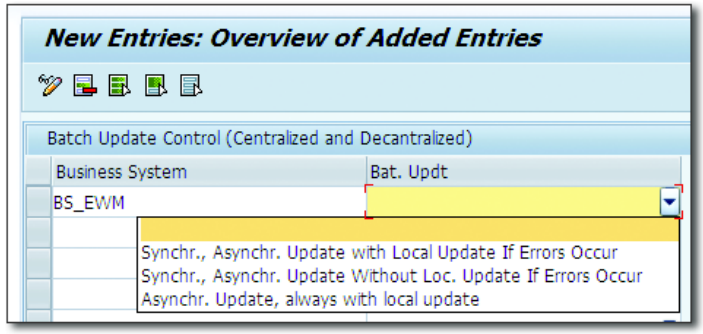


Figure 5.45 Set Update Control

5.5.2 Batch Management in Goods Receipt

When creating an inbound delivery in the SAP ERP system, the batch number is distributed as part of the delivery item to SAP EWM. If a batch is already available in SAP EWM with a master data record, you can utilize the batch to create the putaway task. If a batch isn't yet available in SAP EWM with a master data record, then you can create the batch either in the foreground via the inbound delivery or automatically during creation of the inbound delivery. If no batch number is available, the system determines a new number from the defined number range.

If SAP EWM creates the batch master, the system must be provided the characteristics values, for example, country of origin, expiration date, SLED, production date, and so on.

5.5.3 Batch Management in Goods Issue

Starting from the SAP ERP system, you can assign batch selection criteria for outbound and distribute them to SAP EWM together with the delivery. When creating the picking WT, the specified selection criteria are taken into consideration when searching for suitable batches. If the quantity of a batch is insufficient to fill the required quantity, the system determines multiple batches that fit the selection criteria.

To make the settings to check whether the batch entered meets the selection criteria, follow the SAP EWM IMG menu path, Extended Warehouse Management • Cross-Process Settings • Batch Management • Make Setting for Delivery. If you pick multiple batches for an ODO, SAP EWM will perform a batch split in the delivery item, and you can visualize the batch split within the delivery processing transaction by selecting the item and clicking the Batch Split button.

5.5.4 Batch Status Management

Batches in SAP EWM can have the characteristics unrestricted and restricted. When a batch is set to restricted, you can specify that no movements are allowed for this batch. You can also stop them from being posted for goods receipt or goods issue.

To control the batch status management, follow the SAP EWM IMG menu path, Extended Warehouse Management • Cross-Process Settings • Batch Management • Batch Status Management.

5.5.5 Documentary Batch Management

A documentary batch is a special kind of batch that isn't inventory managed. This means you can guarantee the traceability of a product with documentary batches, but you don't have to perform Inventory Management (IM) for the product. In Table 5.4, you can see the main differences between standard batch management and documentary batch management.

Functionality	Standard Batch Management	Documentary Batch Management
Batch master	Yes	No
Where-used list	Yes	Only in SAP ERP
Batch status management	Yes	No
Batch search	Yes	No
Batch stock	Yes	No
Class assignment	Yes	No

Table 5.4 Differences between Standard and Documentary Batch Management

The settings to synchronize SAP ERP/SAP EWM for documentary batches can be maintained by using Transaction /SCWM/DBATCHSYNC or by using the SAP EWM Easy Access menu path, Extended Warehouse Management • Master Data • Product • Synchronize ERP/EWM Settings for Documentation Batches.

5.6 Stock Identification

As you already know, a warehouse structure is defined in the SAP EWM system to monitor various warehouse areas. We've seen how defining storage areas, storage types, and storage bins helps in tracking the movement of goods in the warehouse. We'll now extend this understanding to the individual product level.

Stock identification is a concept in SAP EWM to track individual products in the warehouse. It's a unique number generated for a product when a WT is created. Stock identification defines product attributes such as quantity, batch, size, and so on. The stock ID is a 16-digit number in which the first 4 digits are the warehouse number, and the remaining 12 digits are the WT number. The purpose of stock identification is that this number remains unchanged even when the goods are moved frequently in the warehouse, so a product can be tracked across WTs and WOs.

To control stock identification creation in SAP EWM IMG, use the menu path, Extended Warehouse Management • Cross-Process Settings • Warehouse Task • Define Warehouse Process Type.

There are four options available for stock ID creation, as shown in Figure 5.46:

- Blank—No stock identification
  If this field is left blank, then stock identification won't be executed, which means a number won't be generated for products in a WT at the time of the WT creation. If a stock ID exists, SAP EWM won't use it.
- A—Stock Identification only if externally predetermined
  This option means that the stock ID will be generated only if the same is defined in the SAP ERP system. The stock ID will be used by SAP EWM when the communication comes for the SAP ERP system.
- B—Create stock identification if none exists
  In this case, the SAP EWM system will create a stock ID if it doesn't exist. If a stock ID already exists in the SAP ERP system, then the same will be used in SAP EWM.
- C—Always assign stock identification anew
  This option must be selected when a business wants to create a new stock ID in SAP EWM irrespective of whether it already exists or not. Thus, SAP EWM will create a new stock ID even if it already exists in the SAP ERP system.

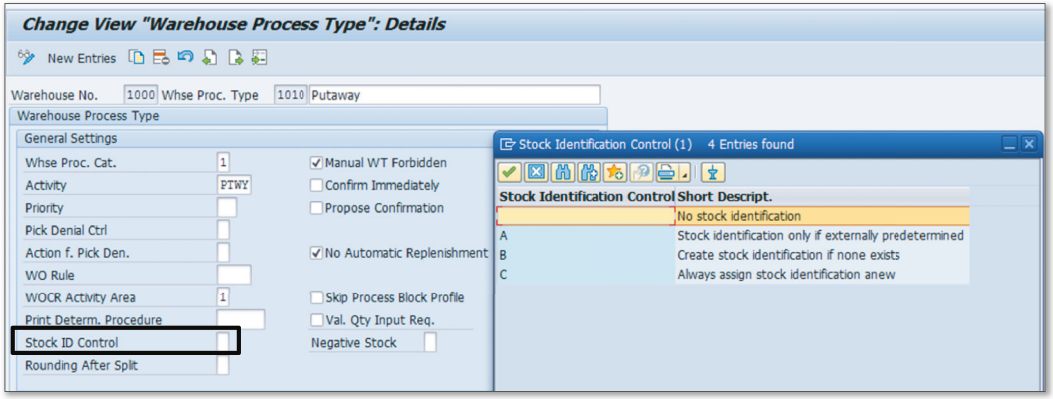


Figure 5.46 Stock Identification Control

5.6.1 Usage of Stock Identification

Stock identification allows you to work at the item level instead of the WT level in work centers. Stock identification can be done for the following warehouse processes:

- Deconsolidation
- Packing
- Putaway
- Counting
- Quality inspection

The same processes can use stock identification when carried out in an RF environment. These processes can be accessed using the relevant nodes in the SAP EWM Easy Access menu path, Extended Warehouse Management • Execution.

5.6.2 Splitting Warehouse Tasks

A WT split occurs when a WT is confirmed with partial quantity. The main advantage of stock identification is that when a WT is split while executing work, SAP EWM assigns a new stock identification to the split quantity, which helps track the split quantity. If stock identification isn't active, then the SAP EWM system only gives information about the HU, which isn't sufficient because the HU might be split when the partial WT is confirmed. SAP EWM also allows printing labels with the new stock ID.

5.6.3 Splitting Stock in Goods Receipt

SAP EWM allows splitting stocks in the goods receipt process. Suppose an HU with 10 items is received, but only 6 items can be put away in one bin, and the remaining 4 need to be put in another bin. Deconsolidation is done, and two separate WTs are created for the two bins. At this point, the SAP EWM system also creates a new stock ID for the split quantity.

5.6.4 Splitting Stock in Goods Issue

Similar to putaway, stock identification can be done even when stock is split during goods issue. For example, during packing, if someone realizes that instead of 10 pieces only 6 pieces can be packed in a single HU, then the stock needs to be split. As in the goods receipt case, a new stock ID is created for the split quantity.

It's worth noting that the stock ID, in all the preceding cases, remains the same for the original quantity. A new stock ID is created only for the split quantity. For example, in the goods receipt scenario explained earlier, the HU with 6 items has the same stock ID as that of the HU with 10 pieces. The new stock ID is generated for the split quantity, that is, the remaining 4 pieces only.

5.7 Resource Management

Workers or equipment engaged in performing WTs are referred to as resources in SAP EWM terms. Optimized use of resources is essential for warehouse productivity. Assigning WOs to the right resource at the correct time is crucial for an efficient warehouse. SAP EWM uses queues for assigning WOs to resources. WOs, which are just groups of one or more WTs, are assigned to queues either automatically by the SAP EWM system or manually by warehouse supervisors.

Queues and resources are critical master data in the SAP EWM system that are required for day-to-day functioning of the warehouse. While defining a resource, you assign a resource type or queue to it to enable this resource to perform any warehouse activity. The design of queues for the warehouse, for example, might depend on various processes being carried out in the warehouse. The business might want to have specific queues for the inbound and outbound processes of the warehouse.

Let's discuss definition, settings, and other details of queue and resource in detail in the following section.

5.7.1 Queue Definition

As the name implies, a queue is a logical file to which WTs/WOs are assigned for processing. Thus the management and distribution of work in the warehouse is accomplished by the assignment of resources and WOs to queues. Any resource can work on only those WTs or WOs that belong to one of its allowed queues. In addition, a resource working within a particular operating environment may execute only those WOs that belong to a queue in the same operating environment, unless the queue is changed for the resource. Here, the operating environment can be an RF environment, a non-RF environment, or an MFS environment.

Define Queues

To define queues, follow the SAP EWM IMG menu path, Extended Warehouse Management • Cross-Process Settings • Resource Management • Define Queues.

As shown in Figure 5.47, you define the queue and the operating environment for it. You can also specify whether you want to use semi-system guided processing (Semi-Sys) or not. Queue printing can also be specified.

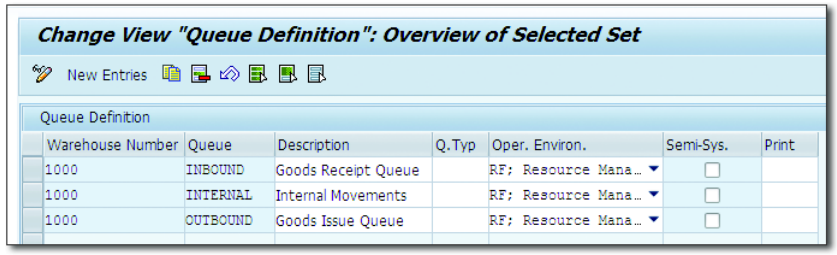


Figure 5.47 Define Queues

Define Queue Determination

After the queue is defined, you can define the queue determination criteria so that a queue can be automatically determined by the system. To determine queues as shown in Figure 5.48, use the SAP EWM IMG menu path, Extended Warehouse Management • Cross-Process Settings • Resource Management • Define Queues • Define Queue Determination Criteria.

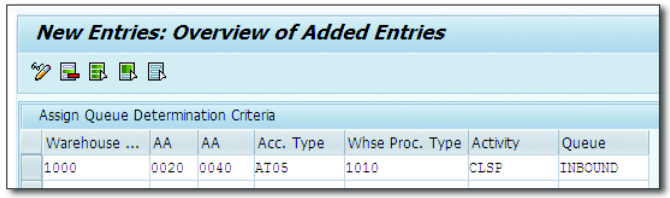


Figure 5.48 Queue Determination

There are a handful of parameters to be defined for queue determination:

- Source and destination activity area
- Bin access type

- WTP
- Activity type
- Queue name

Define Queue Access Sequences

To define the queue sequence as shown in Figure 5.49, use the SAP EWM Easy Access menu path, Extended Warehouse Management • Master Data • Resource Management • Maintain Queue Sequence for Resource Group, or use Transaction /SCWM/QSEQ.

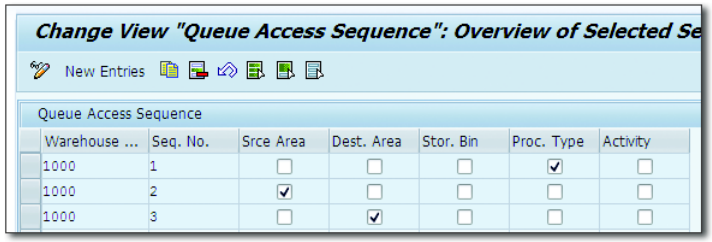


Figure 5.49 Define Queue Access Sequence

5.7.2 Resource

As stated earlier, a resource is any entity that performs work in a warehouse. It can be a person such as a warehouse supervisor or a piece of equipment such as a crane or forklift. For managing and assigning these resources, we classify the resources into resource types and then group the resources into resource groups. This is essential for managing resources in an efficient manner. In the subsequent sections, we'll discuss the definition and configuration settings required to be maintained for resource management.

Resource Type

A resource type is a group of resources with similar technical or physical specifications. For example, a forklift can be defined as a resource type containing all forklifts of different capacities. Such logical grouping helps in managing resources in a more simple and efficient manner.

To access the settings for resource type as shown in Figure 5.50, follow the SAP EWM IMG menu path, Extended Warehouse Management • Cross-Process Settings • Resource Management • Define Resource Types.

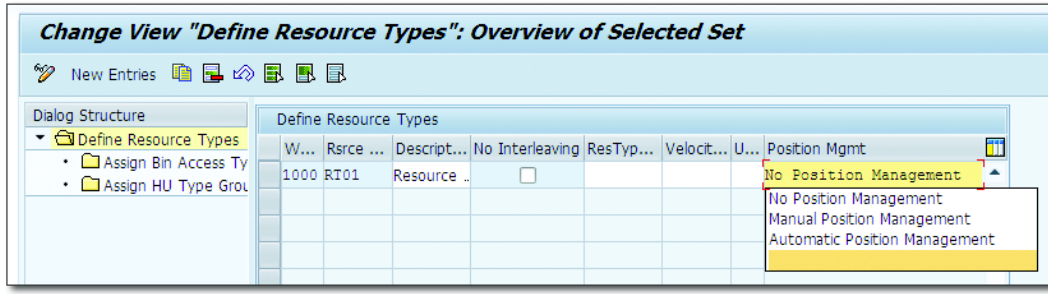


Figure 5.50 Define Resource Types

While defining the resource type, you can specify the following:

- Horizontal velocity of resource
- Interleaving in RF environment activated or deactivated
- Position management settings, that is, whether it should be done manually or automatically or not at all

Queue Types

Queue type is a determining factor when assigning WOs to resources during task interleaving in an RF environment. To create queue types, use the SAP EWM IMG menu path, Extended Warehouse Management • Cross-Process Settings • Resource Management • Define Queue Types. Two queue types are shown in Figure 5.51: Queue for Inbound and Queue for Outbound.

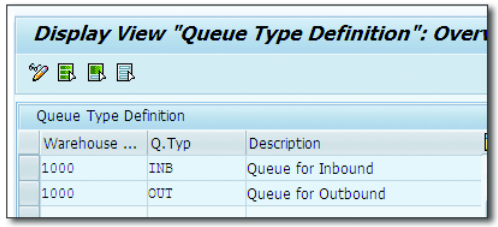


Figure 5.51 Define Queue Type

Queue Type Sequence

Queue type sequence specifies the order in which queue types are selected during interleaving in an RF environment. The settings for this can be accessed in the SAP EWM Easy Access menu path, Extended Warehouse Management • Master Data • Resource Management • Maintain Queue Type Sequence or by using Transaction /SCWM/QTSQ. Figure 5.52 shows that the queue for outbound is given the Sequence 1, and the queue for inbound is given the Sequence 2.

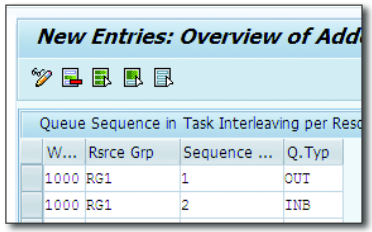


Figure 5.52 Maintain Queue Type Sequence

5.7.3 Definition and Execution of Resource Execution Constraints

In a warehouse, a situation may arise wherein a particular area becomes congested because a lot of activities are going on in that area simultaneously. This may impede work in that area and cause these constraints to be taken into consideration when scheduling more tasks in the area. Resource execution constraints (REC) is a concept in SAP EWM that deals with such situations.

When the system determines the resources to be assigned to a new WO, it takes into consideration the resources already working in the area related to this WO. If there are many resources already working in that area, then the system determines the next highest priority WO and assigns the resource to that WO in another area of warehouse.

A very important feature of REC in SAP EWM is that if travel distance and time calculations are maintained, then the system uses this information to estimate the amount of time a resource will take to finish a task in an area. This information is then utilized to calculate the time at which the existing resource will leave the area and thereby decide when a new resource can enter the same area.

For the system to determine how the resources must be assigned in such a situation, we form resource groups and storage bin groups, and then define how many

resources of each type can work at a time in the area of the storage bin group. The following steps are required to configure RECs in the system:

- **Define RECs**
  The first step is to define the resource groups, as shown in Figure 5.53. The resource groups are identified by an identification number called ID Grp. Res. Type. For each warehouse and resource type, one or more ID numbers can be assigned, and for each ID number, you define the number of resources that can be used for this group. For this setting, use the SAP EWM IMG menu path, Extended Warehouse Management • Cross-Process Settings • Resource Management • Control Data • Define Resource Execution Constraints.

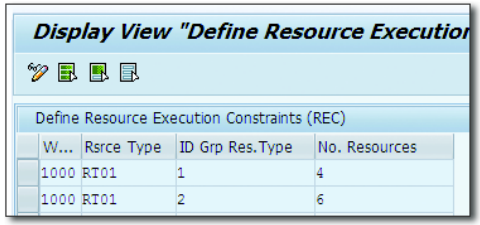


Figure 5.53 Define Resource Execution Constraints

- **Assign RECs to REC storage groups**
  After the ID groups are created, you define REC storage groups and then assign these ID groups to REC storage groups, as shown in Figure 5.54. To define and assign RECs to an REC storage group, use the SAP EWM IMG menu path, Extended Warehouse Management • Cross-Process Settings • Resource Management • Control Data • Assign Resource Execution Constraints to REC Storage Group.

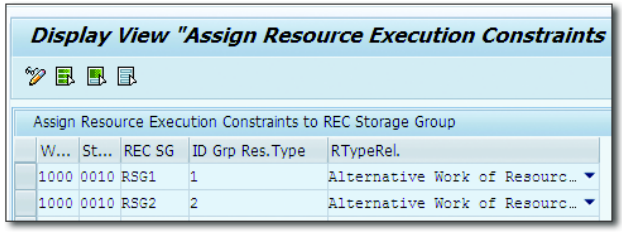
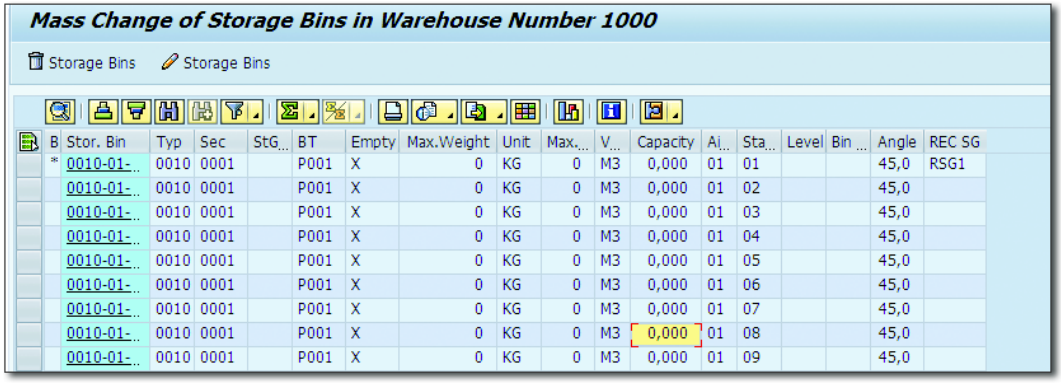


Figure 5.54 Assign RECs to REC Storage Groups

- **Assign REC storage groups to storage bins**
  After REC storage groups are created, the next step is to assign these groups to storage bins, as shown in Figure 5.55. To assign REC groups to already-created storage bins, use the SAP EWM Easy Access menu path, Extended Warehouse Management • Master Data • Storage Bin • Mass Change to Storage Bin, or use Transaction /SCWM/LS11.



B	Stor. Bin	Typ	Sec	StG...	BT	Empty	Max.Weight	Unit	Max....	V...	Capacity	Ai...	Sta...	Level	Bin ...	Angle	REC SG
*	0010-01-...	0010	0001		P001	X	0	KG	0	M3	0,000	01	01			45,0	RSG1
	0010-01-...	0010	0001		P001	X	0	KG	0	M3	0,000	01	02			45,0	
	0010-01-...	0010	0001		P001	X	0	KG	0	M3	0,000	01	03			45,0	
	0010-01-...	0010	0001		P001	X	0	KG	0	M3	0,000	01	04			45,0	
	0010-01-...	0010	0001		P001	X	0	KG	0	M3	0,000	01	05			45,0	
	0010-01-...	0010	0001		P001	X	0	KG	0	M3	0,000	01	06			45,0	
	0010-01-...	0010	0001		P001	X	0	KG	0	M3	0,000	01	07			45,0	
	0010-01-...	0010	0001		P001	X	0	KG	0	M3	0,000	01	08			45,0	
	0010-01-...	0010	0001		P001	X	0	KG	0	M3	0,000	01	09			45,0	

Figure 5.55 Assign REC Storage Groups to Storage Bins

- **Activating REC for REC storage groups**
  The final step is to activate checks for REC, as shown in Figure 5.56. Use the SAP EWM Easy Access menu path, Extended Warehouse Management • Master Data • Resource Management • Activate Resource Execution Control for Storage Groups, or use Transaction /SCWM/REC_ACTIVATE.

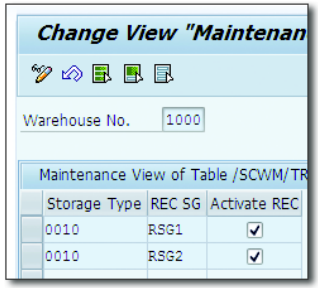


Figure 5.56 Activating RECs for REC Storage Groups

5.7.4 Maintain Resource Group

A resource group is a grouping of resources for queue assignment purposes. Resources with similar characteristics are grouped so that they can be interchangeably assigned to a WT. To maintain resource groups as shown in Figure 5.57, use the SAP EWM Easy Access menu path, Extended Warehouse Management • Master Data • Resource Management • Maintain Resource Group, or use Transaction /SCWM/RGRP.

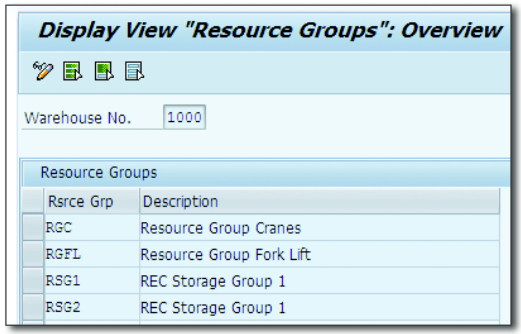


Figure 5.57 Maintain Resource Groups

5.7.5 Maintain the Queue Sequence for Resource Groups

To define the queue sequence for resource groups, use the SAP EWM Easy Access menu path, Extended Warehouse Management • Master Data • Resource Management • Maintain Queue Sequence for Resource Group, or use Transaction /SCWM/QSEQ (see Figure 5.58).

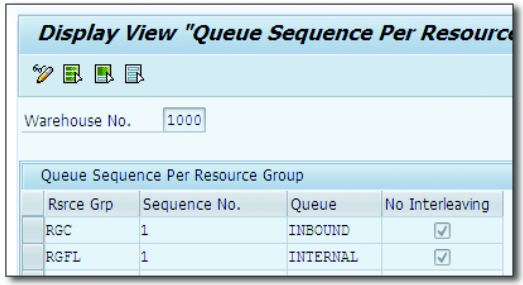


Figure 5.58 Maintain Queue Sequence for Resource Groups

5.7.6 Maintain Resource

Each resource is assigned to a resource type and resource group as stated previously. For example, a crane is a resource that could be assigned to the resource type material handling equipment; if this crane is used for putaway only, then it's part of the resource group PUTAWAY. This is just an example; the definition of resource, resource types, and resource groups depends on how the business wants to classify its resources.

To define and maintain resources, use the SAP EWM Easy Access menu path, EXTENDED WAREHOUSE MANAGEMENT • MASTER DATA • RESOURCE MANAGEMENT • MAINTAIN RESOURCE, or use Transaction /SCWM/RSRC (see Figure 5.59).

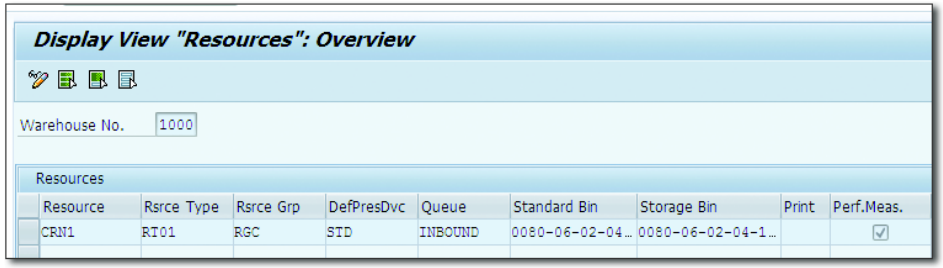


Figure 5.59 Maintain Resource

5.7.7 Maintain Execution Priorities

You can maintain the execution priorities for access types, as shown in Figure 5.60. To maintain execution priorities, use the SAP EWM Easy Access menu path, EXTENDED WAREHOUSE MANAGEMENT • MASTER DATA • RESOURCE MANAGEMENT • MAINTAIN EXECUTION PRIORITIES, or use Transaction /SCWM/EXECPR.

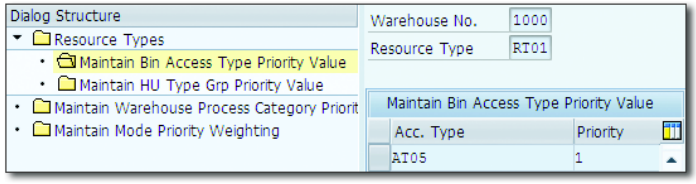


Figure 5.60 Maintain Access Type and Priority for Resource Types

5.7.8 Maintain Users

In an RF environment, you can maintain a user profile so that only certain presentation profiles are accessible in Transaction /SCWM/RFUI for the users. By doing so, you can restrict the user to access only the desired transaction within RF based on his profile. You can maintain auto logon for the user so that he doesn't have to log in manually every time he uses RF. To do so, click on the AUTO LOGON indicator in the screen shown in Figure 5.61. To access settings for maintaining users, use the SAP EWM Easy Access menu path, EXTENDED WAREHOUSE MANAGEMENT • MASTER DATA • RESOURCE MANAGEMENT • MAINTAIN USERS, or use Transaction /SCWM/USER.

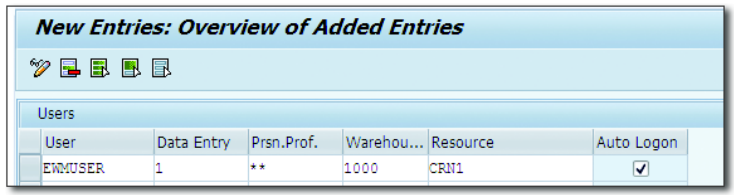


Figure 5.61 Maintain Users

5.7.9 Processor

Processors are business partners defined in the Logistics Management (LM) system to store data related to employees' labor activities, including data such as labor hours, labor factors, performance expectations per activity, and so on. To create a processor, use the SAP EWM Easy Access menu path, EXTENDED WAREHOUSE MANAGEMENT • MASTER DATA • RESOURCE MANAGEMENT • PROCESSOR • CREATE PROCESSOR, or use Transaction /SCMB/PRR1.

When creating a processor, apart from maintaining the general data in the ADDRESS and ADDRESS OVERVIEW tabs, you also need to link the processor to the SAP EWM user name in the IDENTIFICATION tab to make the user relevant for the SAP EWM system (see Figure 5.62). In the same way, you can assign a personnel number to the processor so that it gets linked with the SAP ERP Human Capital Management (SAP ERP HCM) system. An external business partner (BP) number can also be used to link the processor with any other external system.

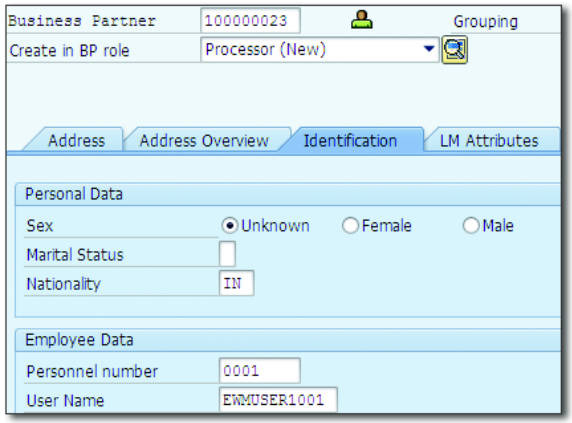


Figure 5.62 Maintain Processor

5.7.10 System-Guided Using Resource Management

If you've designed a system-guided activity in the RF framework, the system allows you to perform the activity via the SYSTEM-GUIDED option in the RF menu (see Figure 5.63). After you have the resource group or queue assigned, the system-guided feature allows you to perform activities based on the resource group or queue assigned.

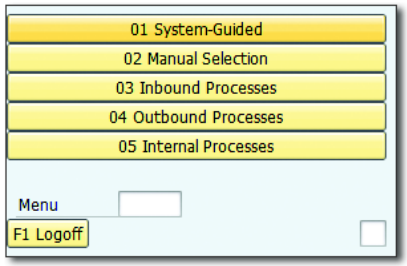


Figure 5.63 System-Guided Option in the RF Main Menu

5.7.11 Resource Monitoring

You can monitor resources and queues in the WAREHOUSE MANAGEMENT MONITOR screen using Transaction /SCWM/MON. The nodes shown in Figure 5.64 can be used to access all information about resources, processors, queues, users, and resource groups.

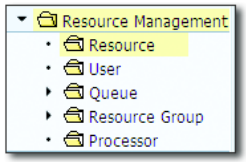


Figure 5.64 Warehouse Monitor for Resource Monitoring

5.8 Post Processing Framework

In various chapters of this book, you've seen how a process is executed in the system step by step. For example, the outbound process is triggered by an outbound delivery request (ODR) and ends with the posting of goods issue. During this process, a number of steps are involved, but not all steps are done manually. For example, a user takes a printout of the ODO every time it's confirmed. Such routine steps in a process can be automated with the help of PPF.

The PPF provides SAP applications with a uniform interface for the condition-dependent generation of actions (e.g., printing delivery notes, faxing order confirmations, or triggering approval procedures). These are shown in Figure 5.65.

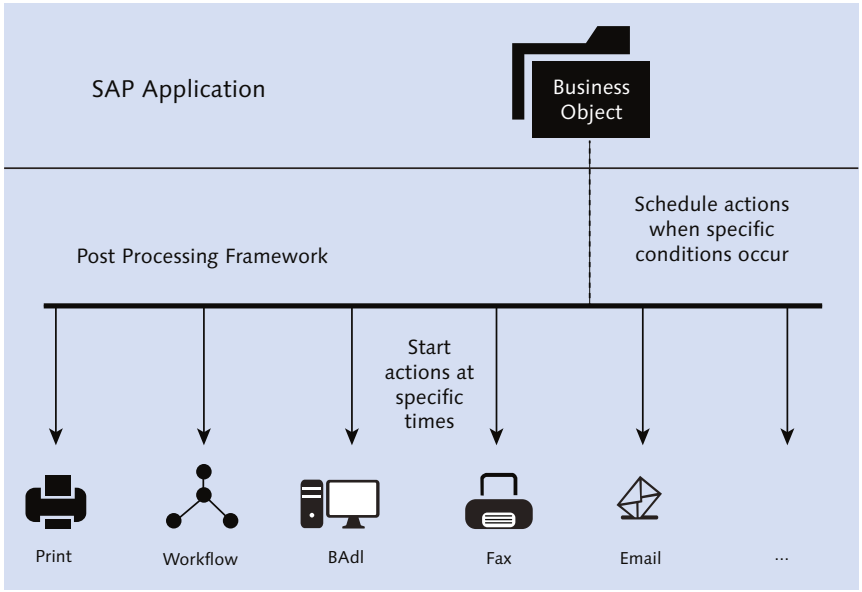


Figure 5.65 PPF Applications

Conditions for the actions can be set keeping in mind different events, times, and statuses. The actions are generated if specific conditions are fulfilled for an application document, for example, a specific status is set (approval by some person) or a specific date has been reached. The actions are then processed either directly or in a scheduled report later on.

PPF is a framework provided by SAP and is part of the SAP Application Platform. It replaces the output control used in SAP Warehouse Management (WM).

5.8.1 Purpose of the Post Processing Framework

The PPF is a framework for the generic execution of functions and processes, and it's used for the following purposes:

- Printing
- Sending SAP Process Integration (SAP PI) messages from one system to another
- Communicating with other systems such as SAP ERP or SAP Global Trade Services (GTS)
- Executing loosely coupled actions into the business process with the goal of having a separate application log
- Enabling customer extensions of SAP EWM processes, especially for workflow, asynchronous processes, and printing
- Performing asynchronous updates between business objects within SAP EWM

The PPF offers the following advantages:

- The PPF provides a UI that is easy to recognize and work with and can be implemented in different applications.
- Conditions act as a trigger for the actions, thus preventing things getting lost or having to be done twice.
- Actions can be defined as partner-dependent, which provides for an easy method to use contact information based on business partner data.

5.8.2 Structure of the Post Processing Framework

To understand the structure of the PPF, it's important to examine a few key elements.

Action Profile

The PPF contains many action definitions and their settings in the action profile. The action profile is used by the application, and it can be either embedded or determined via SAP EWM-owned Customizing. There are also profiles known as common profiles that contain reusable actions. So there is a choice if you want to use a customer-defined action profile, you can use SAP-provided common profiles.

Action Definition

The *action definition* tells us about the content of an action. An action can be performed in the background by the system or by a user. The execution can either be started directly after the scheduling of the action or later.

A function or a process is scheduled for an application document under specific conditions and is started either immediately or later.

A scheduled action is just a management record initially. The processing of the action generates the desired output, such as print or fax. The types with which the actions of this action definition can be processed, for example, print a smart form, are all also assigned to the action definition.

An action definition also comprises the valid processing times for an action.

Processing Time

The action can be processed at different times. It can be started as soon as an action is scheduled or at a later point in time. However, it's also possible for the action to be only scheduled initially. Processing can then be started later.

The PPF offers the following processing options:

- **Immediate processing**
  The action is executed just after scheduling. When you choose this option, the system executes the action before it continues with processing the current transaction. You need to choose this processing time to execute an action upon the deletion of a document because only at this time is all data still available.
- **Processing when saving the document**
  The action execution starts immediately after saving the document. From the technical point of view, this is after the `COMMIT` statement.

- **Processing using the selection report**
  The action isn't executed unless transaction process actions are started manually or the report is scheduled on a regular basis.

Locking issues can occur when actions change the delivery data under the following conditions:

- The action profile contains more than one action that changes the delivery document.
- Scheduling conditions for these actions are valid simultaneously.
- The actions are configured for the same processing time, which is any other processing time than immediate processing.

In these cases, actions start at the same time, and any one action will lock the document, causing the other actions to fail because the document is locked.

5.8.3 Configuring the Post Processing Framework

You can access the generic PPF Customizing using Transaction SPPFCADM. The first step to configure the PPF is to configure the scheduling of PPF actions in the PPF application such as `/SCDL/DELIVERY`. You have to first define schedule conditions that can be used in the condition technique. The condition technique works with condition records that control the scheduling of the PPF actions.

There are a few prerequisites to this configuration:

- Schedule condition for the PPF action is defined. This PPF action contains the call of method `/SCWM/CL_DLV_PPF_CONF=>EVALUATE`.
- The following settings have to be made for the condition technique in Customizing for SAP EWM:
  - Creation of field catalog
  - Creation of condition tables
  - Creation of access sequences
  - Creation of condition types
  - Maintenance of determination procedure
  - Assignment of determination procedure
  - Creation of condition maintenance group
  - Registration of condition maintenance group

Post Processing Framework Configuration Steps

Follow these steps to configure the PPF:

1. Perform the activities in the sequence specified under Prerequisites in the IMG via the following menu path Extended Warehouse Management • Cross-Process Settings • Delivery Processing • Actions • Configure Action Scheduling.
2. View or edit schedule conditions for PPF actions in the IMG via the menu path, Extended Warehouse Management • Cross-Process Settings • Delivery Processing • Actions • Change Actions and Conditions • Define Conditions or via Transaction /SCDL/ACTION_CONF.
3. Edit condition records for the schedule condition of a PPF action through the SAP Easy Access menu path, Extended Warehouse Management • Delivery Processing • Actions.
4. Maintain condition records for PPF schedule conditions or use Transaction /SCWM/DLVPPFC.
5. View and edit PPF actions through the SAP Easy Access menu path, Extended Warehouse Management • Delivery Processing • Actions • Process and Display PPF Actions.

Post Processing Framework Applications

The PPF communicates with various modules in your system. However, for each module, there are certain predefined applications. For example, for SAP EWM, Table 5.5 lists the SAP standard applications.

PPF Application	Description
/SCDL/DELIVERY	Used for all delivery-related actions such as configuration of ODO, inbound delivery, and so on
/SCWM/SHP_RCV	Used for TUs, vehicles, and doors
/SCWM/WME	Used for core processes such as WOs, physical inventory, HUs, or VAS
/SCTM/FOM	Used for SAP Transportation Management (TM)

Table 5.5 PPF Applications in SAP EWM

For each of these applications, there are application profiles and action definitions. One example of an action profile and action definition for each of these applications is given in Table 5.6.

PPF Application	Action Profile	Action Definition	Description
/SCDL/DELIVERY	/SCWM/PDI_RECEIVED	/SCWM/PDI_RECEIVED_POST_GR	Posts goods receipt automatically after physically receiving stock
/SCWM/SHP_RCV	/SCWM/TU	PRINT_LOADLISTTU	Prints loading list for TU
/SCWM/WME	/SCWM/WO	WO_SINGLE	Prints single document for WO with serial numbers
/SCTM/FOM	SHP	SEND_DELIVERY_INFO	Sends shipment update to the delivery

Table 5.6 Examples of Action Profile and Action Definition for PPF Applications

5.8.4 Printing via Post Processing Framework

Printing is initiated via PPF and to get more flexibility, the condition technique is used for determining the print relevance. Warehouse administrators will create the condition records. To configure the printing of a delivery note, you have to schedule the PPF action for printing and define the spool determination and the form determination. Basically these steps are identical for all printouts used for deliveries.

The following steps need to be followed for printing an outbound delivery:

1. Select the action profile for the document type for the outbound delivery.
2. Select the action to be used to print the delivery note.
3. Assign the determination procedure for the action definition.

In SAP, it's done through the Customizing path, Extended Warehouse Management • Cross-Process Settings • Delivery Processing • Actions • Configure Action Scheduling • Assign Determination Procedure (see Figure 5.66).

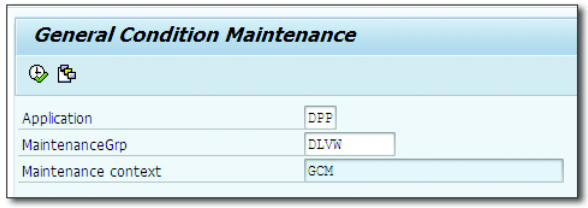


Figure 5.66 Determination Procedure Assignment

Condition records are created using the SAP EWM Easy Access menu path, Extended Warehouse Management • Delivery Processing • Actions • Maintain Condition Records for PPF Schedule Conditions or using Transaction /SCWM/DLVPPFC (see Figure 5.67).

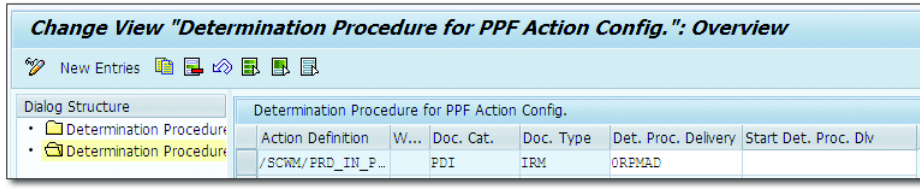


Figure 5.67 Condition Maintenance Selection Screen

Print Profiles

Defining print profiles is accomplished through the following Customizing path, Extended Warehouse Management • Goods Issue Process • Outbound Delivery • Print • Define Print Profiles for Delivery Processing, or via Transaction /SCWM/SPPF_PRPR (see Figure 5.68).

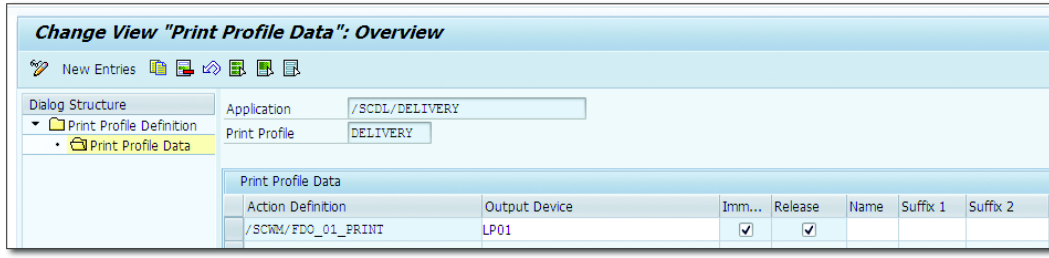


Figure 5.68 Print Profile Data

The spool device used in the preceding should be already defined with the printing parameters, such as point in time for printing, printer, handling of spool job after printing, text for cover page, and so on.

Print Profile Determination

In SAP, print profile determination is done through the Customizing menu path, Extended Warehouse Management • Goods Issue Process • Outbound Delivery • Print • Define Print Profile Determination for Goods Issue Process (see Figure 5.69).

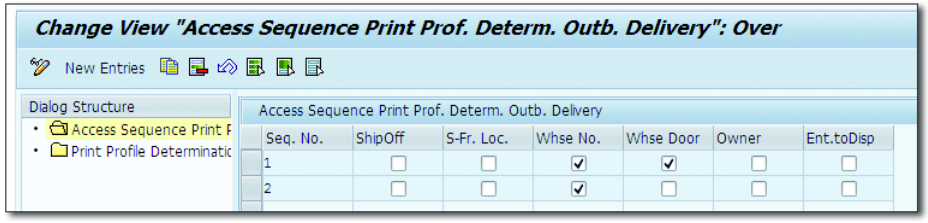


Figure 5.69 Access Sequence Print Profile Determination Outbound Delivery

In this case, the system will determine the print profile DELIVERY when delivery is assigned to door DOR1 in warehouse 1000 (Figure 5.70). And for all other profiles in warehouse 1000, the system will use the print profile PR_PROFILE. This print profile may or may not use the same spool used for the DELIVERY print profile.

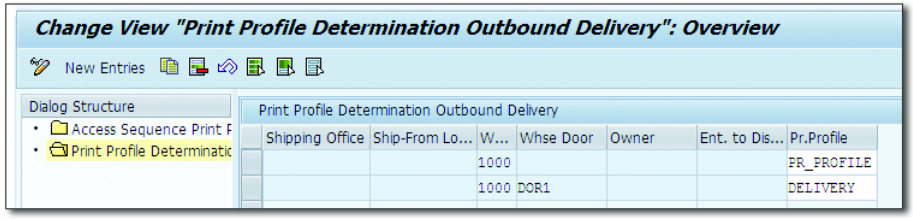


Figure 5.70 Print Profile Determination Outbound Delivery

Form Determination for Printing

In SAP, form determination is done through the following Customizing menu path, Extended Warehouse Management • Goods Issue Process • Outbound

Delivery • Print • Define Form Determination for Delivery Note Printing (see Figure 5.71).

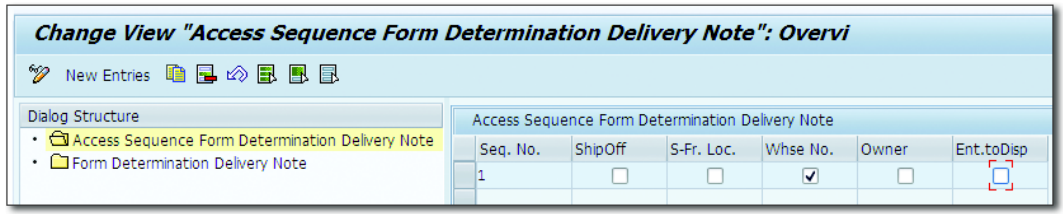


Figure 5.71 Access Sequence Form Determination Delivery Note

In SAP, the standard smart form `/SCWM/DLV_NOTE` (see Figure 5.72) will be used to print a delivery note, and different custom forms can be used for different types of output types.

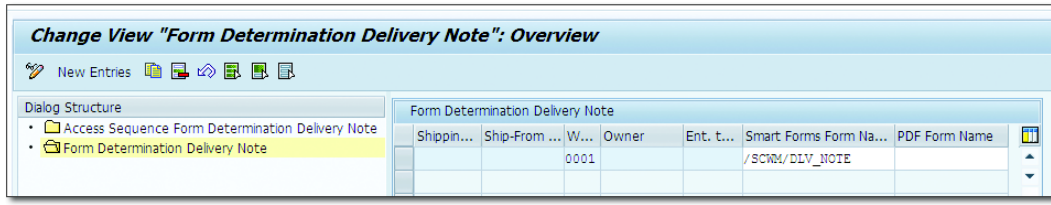


Figure 5.72 Form Determination Delivery Note

Interactive forms can be viewed from the menu path, SAP Extended Warehouse Management • Tools • Form Printout • Interactive Forms, or by using Transaction SFP.

Smart forms can be viewed using the menu path, Extended Warehouse Management • Tools • Form Printout • Smart Forms, or by using Transaction SMARTFORMS.

5.9 Travel Distance Calculation

The distance a worker needs to travel for executing an order can be calculated using the travel distance calculation feature of the SAP EWM system. A time estimate for executing the WO can also be done by using the travel distance and resource speed data. Such calculated data helps in calculating the latest start time

for a WO, and travel distance calculation results can be used for planning the number of workers needed and calculating the Engineered Labor Standards (ELS).

Networks are the backbones of the system, upon which it calculates the travel distances. They define the usable route in the warehouse. Networks are accumulation of edges (valid routes in the warehouse) and nodes (crossings). There are two types of networks that can be defined in SAP EWM: storage type-specific networks and global networks:

- Storage type networks are defined for storage type and consist of edges. Edges help to map the aisles of a storage type and the connection between aisles.
- Global networks are simply two or more interconnected storage type networks.

5.9.1 Settings for Travel Distance Calculation

Settings for travel distance calculations can be done using Transaction /SCWM/TDC_SETUP or navigating to SAP EWM Easy Access menu path, Extended Warehouse Management • Settings • Travel Distance Calculation • Settings for Travel Distance Calculation (see Figure 5.73).

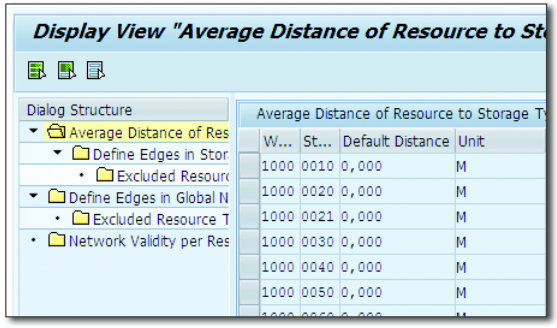


Figure 5.73 Travel Distance Calculation Settings

These settings allow you to define essential elements of edges and display the validity of the network for both storage type networks and global networks. Additionally, for storage type networks, you can also define the average distance for the warehouse number and storage type.

To access the BAdIs for travel distance calculation in SAP EWM IMG, follow the menu path, Extended Warehouse Management • Business Add-Ins for

Extended Warehouse Management • Cross-Process Settings • Travel Distance Calculation.

5.9.2 Examples of Travel Distance Calculation

The calculation of travel distance depends on the definition of networks in the warehouse. As stated earlier, a network is a combination of edges and nodes that define the valid routes in a warehouse. Think of a network like the streets in a city. The vehicles or pedestrians in a city can move only on well laid out streets. Similarly, the resources in a warehouse such as the picking/putaway worker, forklift, crane, conveyor, and so on can only move on edges. Just like there are crossings in streets, there are nodes in a network. With the help of these edges and nodes, you define a route that a warehouse resource can follow to access storage bins.

As described earlier, networks are of two types. The storage type network defines edges and nodes in a storage type. In other words, it defines routes for accessing storage bins within a storage type. The global network, on the other hand, connects different storage types. The travel distance calculation is completely based on the definition of these two types of networks in a warehouse. It's quite obvious that the objective of this calculation is to suggest the shortest possible route that a resource must follow to complete a WT.

Heuristics for the Travel Distance Calculation

Two heuristics are used within a network for the travel distance calculation. The system calls both by default. You can manage the heuristics using BAdIs for the travel distance calculation:

- **Depth-first search**
  This is an algorithm for traversing or searching a tree or graph. It starts at the root (selecting some arbitrary node as the root in the case of a graph) and explores as far as possible along each branch before backtracking. The search finishes when the first complete route is found.
- **Breadth-first search**
  This is also an algorithm for traversing or searching a tree or a graph. It starts at the tree root (or some arbitrary node of a graph, sometimes referred to as a "search key") and explores the neighbor nodes first, before moving to the next-

level neighbors. This heuristic is more performance intensive at runtime and is only appropriate for small networks.

- **Stopping criterion**
  The stopping criterion is a faster approach to the breadth-first search. This could have a negative impact on the solution quality, and the system may fail to find the shortest route. The parameter restricts the number of nodes that can be visited by a route in relation to the route found by the depth-first search.

5.9.3 Network Generation

SAP EWM allows you to generate the network for storage-type networks. To generate the network, you use Transaction /SCWM/TDC_NET or navigate via the SAP EWM Easy Access menu path, Extended Warehouse Management • Settings • Travel Distance Calculation • Generate Network.

If the Aisle Edges Only box shown in Figure 5.74 is checked, the system generates edges (aisles) for the storage type only. And if unchecked, the system also connects adjacent aisles with edges, thus forming the complete storage type network.

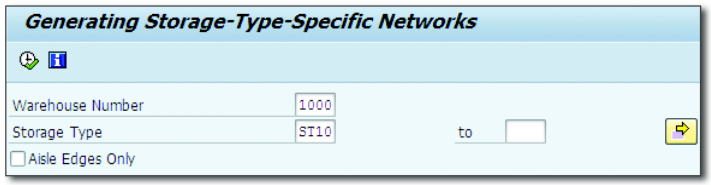


Figure 5.74 Selection Screen for Generating Storage-Type Networks

5.10 Serial Number Management

Tracking products and their movements in a warehouse are important to have real-time visibility of warehouse operations. However, tracking each and every item in a warehouse is a cumbersome task and is sometimes redundant as well. Thus, based on the business needs, you need to decide the level to which tracking is required. For example, tracking an expensive product is essential, whereas tracking an inexpensive consumable isn't that important. This concept of item-level tracking is incorporated in SAP EWM by the use of serial numbers. A serial number is a unique number assigned to each item/piece of a product so that its

complete movement can be tracked until it is delivered to the customer. The purpose is to have complete visibility of these items with respect to where this item is stored currently.

Serial number management works at four different levels in SAP EWM. It's important to understand these levels because serial number management serves different purposes at different levels, and choosing at which level serial number management is to be executed is a major decision for a business. The four levels are described in the following list:

- **Serial numbers for document items**
  Here, the serial number is required only at the document level when an inbound or outbound delivery takes place. This is used typically when you want to keep a record of when the product left your warehouse and which customer received it. This is useful in cases where a customer returns a product, and the business wants to confirm whether the product returned was the one that was delivered and intended for that customer or not.
- **Serial numbers at the warehouse level**
  Serial numbers are required for all goods receipt/issue and are maintained at the warehouse level. The system forces you to enter the serial number at the goods issue and receipt stage so that the system is always able to show which serial numbers are in the warehouse. However, the system doesn't show where the item is in the warehouse. As a result, you don't have stock visibility at the level of the storage bin. You only know whether the item is in the warehouse or not.
- **Serial numbers in IM**
  In this case, serial numbers are maintained at the bin level. Because the bin level is the last level, this serial number becomes a quant attribute. In this level, the serial number is entered for each transaction and not just in inbound or outbound delivery as in the previous two cases.
- **No serial number requirement**
  This setting is used primarily when some products are serialized in some warehouses but not in others.

Let's now take a detailed look at how serial numbers are used in delivery processing and other warehouse activities. Before that, we'll discuss how a serial number profile is generated and also other settings required for using serial number management.

5.10.1 Serial Number Profile

A serial number profile is a four-character code created in Customizing that determines the conditions and business transactions for issuing serial numbers to serialized products. You must assign a serial number profile in the product master records for products that require serial numbers.

In the system configuration in SAP ERP Customizing, you define a serial number profile that is valid for all warehouse numbers; in other words, it's warehouse-number independent. You can, however, define a warehouse-number-dependent serial number profile in Customizing for SAP EWM. SAP EWM will first search for the warehouse-number-dependent serial number profile. Only if it doesn't find one does it use the warehouse-number-independent serial number profile. In this way, you can make a product require a serial number in one warehouse and not require one in another warehouse.

Serial numbers are part of both SAP ERP and SAP EWM. If you work with serial numbers in conjunction with SAP ERP, you need to maintain two independent serial number profiles. One is the old profile on the Sales General/Plant view of the material master. We'll refer to this profile as the LES (Logistics Execution System) serial number profile.

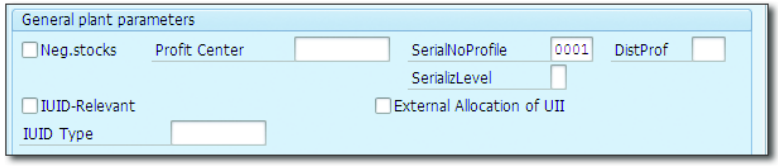


Figure 5.75 Serial Number Profile in the Sales General/Plant Tab

In addition, there is a new profile on the WM Execution view of the material master. This profile is only relevant in combination with SAP EWM. It needs to be maintained the same way in SAP ERP and SAP EWM. We'll refer to this profile as the SAP EWM serial number profile.

In SAP EWM, the warehouse-independent and warehouse-dependent serial number profiles are defined using the SAP EWM IMG menu path, Extended Warehouse Management • Master Data • Product • Define Serial Number Profiles • Define Warehouse Independent Serial Number Profiles/Define Warehouse Dependent Serial Number Profiles.

In the screen shown in Figure 5.76, you define a serial number profile SNP1. We can provide a short free-text DESCRIPTION for the same. You can also specify any prefix that you want to use for easier identification. For example, for all chocolate-flavored drinks, you could use CHOC as the prefix and specify the same here.

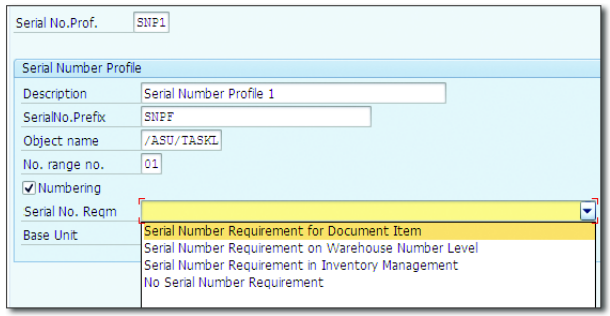


Figure 5.76 Define the Warehouse-Independent Serial Number Profile

Next, using the NUMBERING indicator, you can choose to activate automatic numbering. For automatic numbering, you need to specify the object name and number range so that the next serial number can be fetched for automatic numbering. In the SERIAL NO. REQM field, you specify the level at which you want to use serial number management. The four options available in this field are the same as explained earlier in this chapter. You can also specify the base unit of measure (BUoM) for serial numbers (BASE UNIT), which in most cases is EA or PC.

For the warehouse-dependent serial number profile, you must specify the WAREHOUSE NO. as shown in Figure 5.77. All the other fields are the same as the warehouse-independent serial number profile screen.

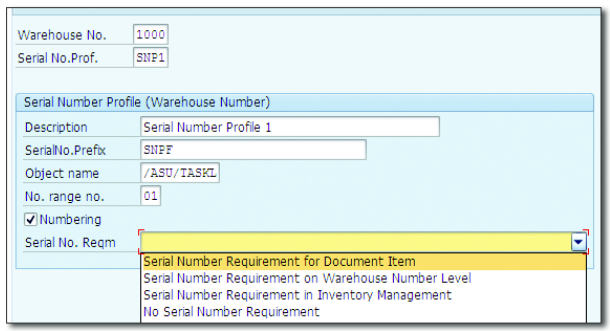


Figure 5.77 Define the Warehouse-Number-Dependent Serial Number Profile

5.10.2 Provisional Serial Number

A provisional serial number is a string that the system automatically assigns to products requiring serial numbers (serial numbers at the warehouse number level or in IM). The provisional serial number must be replaced before the execution of certain process steps in the goods receipt process by entering a valid serial number manually. It has a maximum of 30 characters and starts with a $ symbol.

When you specify serial number requirements at the warehouse level or IM level, SAP EWM always requires the serial numbers before the goods receipt posting. If you set the Prov. SNs indicator shown in Figure 5.78 in Customizing, SAP EWM automatically assigns a provisional serial number, if you haven't already entered a valid serial number. To enable provisional serial numbers in SAP EWM IMG follow the menu path, Extended Warehouse Management • Master Data • Product • Define Serial Number Profiles • Serial Numbers: Settings for Warehouse Number.

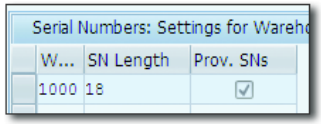


Figure 5.78 Provisional Serial Number Indicator

The provisional serial number is replaced with your own in a subsequent goods receipt process. The purpose of providing a provisional serial number is that, in many cases, it's not advisable to assign a serial number right at the point of goods receipt. For example, when you unload a truck and post the goods receipt, you don't want to specify any serial numbers. You want to wait until deconsolidation before entering the serial numbers.

5.10.3 Settings/Configuration

In SAP EWM, a serial number can be up to 30 characters in length. However, to remain compatible with the SAP ERP system, the serial number length must be restricted to 18 characters. There is a BAdI available, however, that can be used to map SAP EWM serial numbers to SAP ERP serial numbers.

To specify the serial number length, use the SAP EWM IMG menu path, Extended Warehouse Management • Master Data • Product • Define Serial Number Profiles • Serial Numbers: Settings for Warehouse Number.

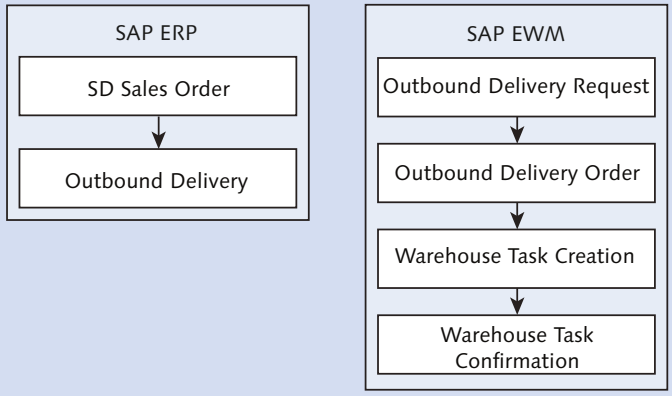
For serialization of delivery types, specify the settings in the SAP EWM IMG menu path, Extended Warehouse Management • Goods Receipt Process • Inbound Delivery • Manual Settings • Define item types for Inbound Delivery Process.

5.10.4 Serial Number in Deliveries

Let's discuss serial numbers in outbound delivery processing and inbound delivery processing. We'll also discuss serial numbers in WT documents and how serial numbers can be tracked in the warehouse monitor.

Serial Numbering in Outbound Delivery Processing

In the SAP ERP system, serial numbers can be entered in either the sales order or the delivery document. These specific serial numbers can be processed in SAP EWM as shown in Figure 5.79.



- Predetermined serial numbers are specified via sales order in SAP ERP system
- Predetermined serial numbers are forwarded via the SAP ERP outbound delivery to SAP EWM outbound delivery request and outbound delivery order
- Predetermined serial numbers are picked (Pick Denial Possible)

Figure 5.79 Serial Number in Deliveries

If the serial number from SAP ERP can't be located in the SAP EWM system, a pick denial will occur.

Serial Numbering in Inbound Delivery Processing

In an inbound delivery, the serial numbers can be specified within the notification from the supplier (via Electronic Data Interchange [EDI], SAP Supply Network Collaboration [SNC], or other integration method) specified in the inbound delivery in SAP ERP or specified in the inbound delivery in SAP EWM.

5.10.5 Serial Number in a Warehouse Task

When you use serial number management at the IM level, then the serial number is entered at the WT level because each movement of an item is to be tracked. Thus, during confirmation of a WT, a serial number has to be specified. Also, if at the time of WT confirmation you find a stock discrepancy, you need to specify which serial numbers are missing. Similarly, when you repack stock at the work center, you need to specify which serial numbers were repacked.

The serial number details need to be specified in the Serial Number tab in the WT confirmation screen. You can also post quantity differences and the corresponding serial numbers of missing products in the same screen.

While confirming a WT, if you have provisional serial numbers, then the same must be replaced with actual serial numbers. For picking WTs, you need to manually enter the serial numbers of products you've picked.

5.10.6 Serial Number in the Warehouse Monitor

In Warehouse Management Monitor screen, you can see serial numbers if the serial number requirement is at the warehouse level or the IM level. For IM-level serial numbers, all the relevant information can be accessed using the menu path, Stock And Bin • Physical Stock • Serial Number Node. The Warehouse Management Monitor screen shows information such as serial number movements, current location/HU of specified serial number, serial number query, and display of serial numbers for confirmed WTs (for RF). For warehouse-level serial numbers, use the menu path, Stock and Bin • Serial Numbers at Warehouse Level.

5.11 Summary

In this chapter, we explored how various functionalities of SAP EWM complement various warehouse processes. To fulfill this objective, extensive configuration settings must be maintained in the system. On one hand, functionalities related to HU, WO, storage control, exception handling, and PPF are directly visible when executing warehouse processes. On the other hand, some functionalities such as travel distance calculation, aren't visible; rather, they define the logic based on which system makes a lot of decisions for improving the efficiency of warehouse processes.

Takeaways

- HUs are a combination of product and packaging material. Creation of HUs can be automated by specifying relevant settings. This involves defining and maintaining product details and packaging specifications in the master record.
- WOCRs can be created by defining filters, limit values, packing profiles, and sort rules. Based on these rules, WOs can be created by grouping WTs, which can be carried out by the same employee in the most efficient manner.
- POSC and LOSC are used to determine storage control parameters before putaway or goods issue. Whereas POSC takes process constraints into consideration, LOSC is concerned with warehouse layout-related constraints for determining the optimum storage control process.
- Exceptional situations such as broken bins, excess/shortage of received/issued quantity, defects in received/issued material, and so on are common in any warehouse. However, reporting and acting upon such situations is of the utmost importance. The exception handling functionality allows you to maintain settings in the system so that the system proposes ways to handle such exceptional situations.
- Batch management, serial number management, and stock identification are functionalities that focus on monitoring products at various levels in a warehouse. Batch management tracks batches of products, stock identification is associated with assigning unique numbers to products, and serial number management assigns a unique serial number to very expensive or critical items that need to be monitored from the point they are received from a vendor to the time they reach the customer.
- Managing warehouse resources such as employees and equipment is a very important activity. In a warehouse, there may be a large number of WOs that need to be executed in a day, and assigning resources to these WOs is a huge task. Resource management deals with maintaining details of all resources working in a warehouse and also maintaining the queue from which resources can be selected and assigned to WOs.

- PPF is useful for communication between SAP EWM and other systems. It's also useful in defining print commands.
- In a large warehouse, a resource might have to travel long distances to reach a bin and do putaway/stock removal activities. The time taken to complete these activities is calculated by using the travel distance calculation functionality. The objective of having travel distance information is to estimate when a resource, currently occupied in an activity, will be available for the next activity.

In a typical customer landscape where SAP ERP is deployed in conjunction with any tier two system such as SAP EWM, some integration settings have to be configured for these systems to interact seamlessly. Some of these steps are common irrespective of the system being connected to SAP ERP, whereas some steps are specific to the system being connected.

6 Integrating SAP Extended Warehouse Management with SAP ERP

In any deployment scenario, whether decentralized SAP EWM or SAP EWM on SAP ERP, applications from both SAP ERP and SAP EWM need to interact with each other to ensure that end-to-end processes run with consistent data. To ensure this happens, both systems must be interconnected to enable the seamless exchange of information. As a consultant, you need to ensure that data from SAP ERP to SAP EWM and vice versa are available on time every time.

In this chapter, we will explain the various configuration and application settings required for SAP EWM and SAP ERP to communicate seamlessly.

6.1 Dependency of Systems on Business Scenarios

In situations where a business process needs more than two systems to be connected to each other, similar integration is necessary between all the systems. For example, with *Transit Warehousing* introduced with SAP EWM 9.3, SAP ERP, SAP EWM, and SAP Transportation Management (TM) systems have to be running in conjunction with each other. The scenario component matrix for Transit Warehousing is listed in Table 6.1, whereas for the business scenario *planning labor demand for outbound*, only SAP EWM and SAP ERP systems are required (see Table 6.2).

Component	Mandatory/Optional
EHP 7.0 for SAP ERP 6.0 +	Mandatory
SAP EWM 9.3	Mandatory
SAP TM 9.3	Mandatory

Table 6.1 Technical Landscape for Transit Warehousing

Component	Mandatory/Optional
EHP 3.0 for SAP ERP 6.0 +	Mandatory
SAP EWM 9.1+	Mandatory

Table 6.2 Planning Labor Demand for Outbound Business Scenario

It's also important to understand the dependency of a business scenario on a system version. For example, Transit Warehousing needs SAP EWM 9.3, whereas the planning labor demand for outbound scenario needs SAP EWM 9.1 or above. In other words, for a business scenario to run, the software components have to be on the minimum prescribed level or any level above it. As Figure 6.1, illustrates, for seamless business process flow, multiple systems have to be integrated and communicate effectively.

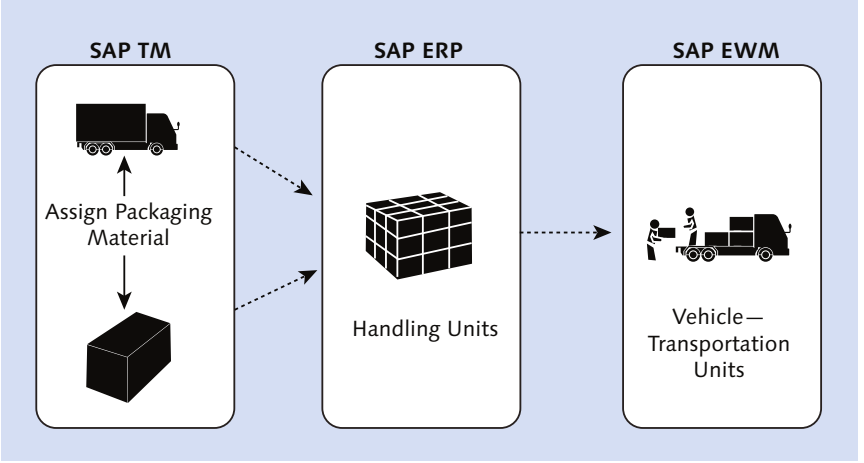


Figure 6.1 Business Process Running across Systems

There are certain required aspects of this integration. First, a connection must be established between SAP ERP and SAP EWM and any other system that a business process needs to complete the transaction. In this chapter, we'll focus on SAP ERP and SAP EWM integration as that is at the core of this book. Note that both of these systems work as senders and receivers of data. This connection will need a communication channel for transferring relevant data from one system to another. These communication channels function via remote function calls (RFCs) between these systems (Figure 6.2). Let's spend some time understanding the concept of communication between various SAP systems.

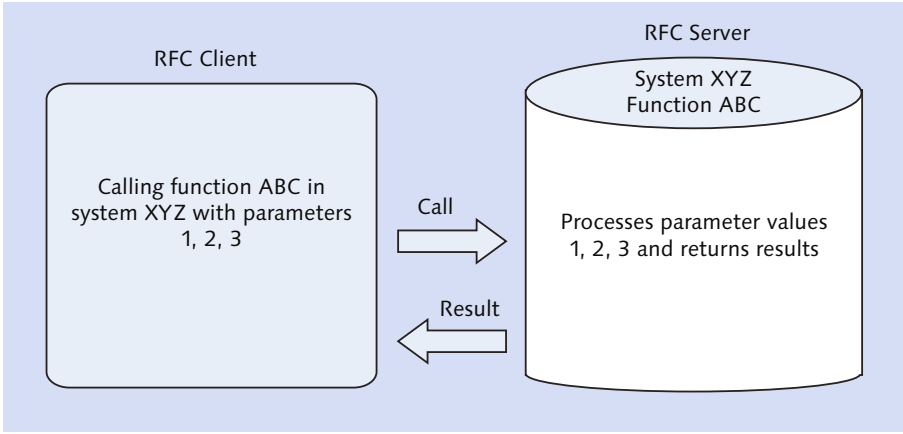


Figure 6.2 RFC Principles

6.1.1 Application Link Enabling

Application link enabling (ALE) is a communication between logical systems. Logical systems can be, for example, SAP ERP and SAP EWM. ALE distribution models are based on message types that indicate the appropriate Intermediate Document (IDoc) types. As an analogy, let's assume you have to travel from city A to city B by car, which requires roadway between these two cities. In our logical systems, ALE is the process of enabling this roadway between two or more logical systems.

6.1.2 Intermediate Document

As shown in Figure 6.3, the IDoc interface is used to exchange business data between two different systems. The IDoc interface consists of the data structure

definition and the processing logic for this data structure. Different message types (e.g., goods receipt or invoice) usually have specific formats, which are the SAP IDoc types. However, several related message types can be assigned to one IDoc type. Coming back to our roadway example, you need a car to travel on the roadway from city A to city B. In terms of our logical systems, the car is the IDoc. Data is transmitted between logical systems by means of this IDoc. The document is considered *intermediate* because until it reaches its intended system and posts itself, a final document isn't created—it just remains a carrier of data.

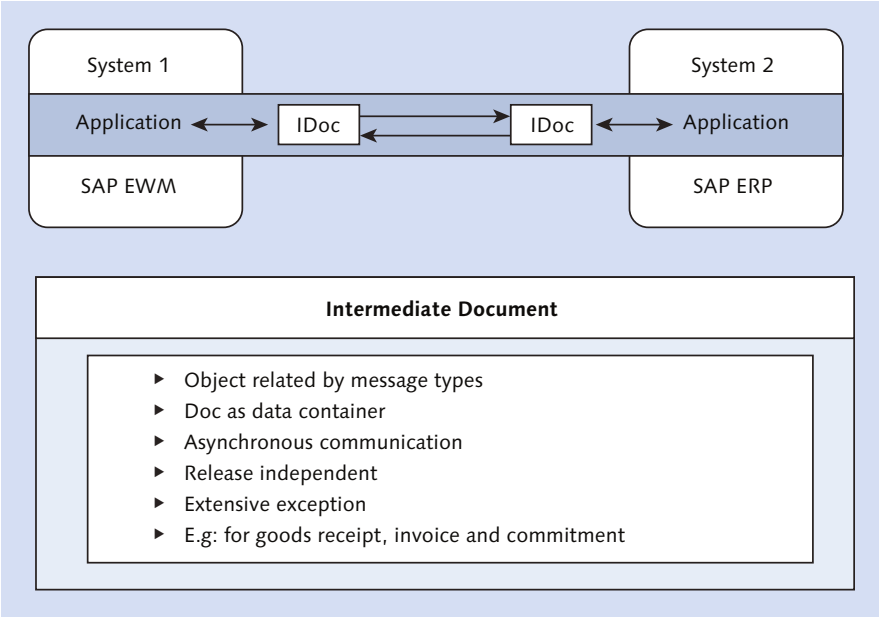


Figure 6.3 IDoc Principles

6.1.3 Remote Function Call

As shown in Figure 6.2, an RFC is a function module (routine) call in a partner system. The caller is the RFC client, and the called partner is the RFC server. In our example, it's the fuel that powers your car for you to travel between the two cities.

To put this all together, logical systems are connected to each other by means of ALE, data travels between the systems by means of an IDoc, and the IDoc in turn is powered by RFC.

RFC Types

There are four types of RFCs:

- **Synchronous RFC (sRFC)**
  Requires acknowledgements.
- **Asynchronous RFC (aRFC)**
  Doesn't require acknowledgements.
- **Transactional RFC (tRFC)**
  Calls the function module only once in the receiver system
- **Queued RFC (qRFC))**
  An extension of tRFC that allows you to send and receive data in a fixed sequence. We'll discuss qRFC in further detail later in this chapter.

So, what exactly is transferred between systems? To start with, for new implementations, a significant volume of master data has to be transported from SAP ERP to SAP EWM. This data may also include some organizational structure data. Because certain organizational structure elements in SAP EWM depend on organizational data replicated from SAP ERP, the sequencing is significant. For example, before setting up a warehouse in the SAP EWM system, you'll need SAP ERP plants to be transferred to SAP EWM as locations. You may also need some business partners (vendors and customers in SAP ERP) to be available in SAP EWM. The core interface (CIF), which facilitates this transfer, will be discussed in subsequent sections of this chapter. CIF is used mainly for transferring plants, shipping points, materials, vendors, and customer data from SAP ERP to SAP EWM.

First, the qRFC connection between systems is established, and organizational data is set up. Then, you need master data to be set up in the SAP EWM system. Among these master data, a few can be transferred from SAP ERP and enhanced within SAP EWM system (e.g., storage bins), whereas others need to be created in SAP EWM from scratch.

In an implementation, a significant volume of master data has to be transferred from SAP ERP to SAP EWM, so SAP has provided easy-to-use tools to facilitate this transfer.

These tools are divided into two categories:

- Indirect upload of master data to SAP EWM through third-party systems
- Direct upload of master data to SAP EWM through the SAP ERP system

After the system has been set up, transfer of transactional data (e.g., delivery document) is carried out. The main elements to this are the qRFC connection and distribution model.

Note

Integration with various applications such as SAP Customer Relationship Management (SAP CRM), SAP Supply Network Collaboration (SNC), available-to-promise (ATP), Global Trade Service (GTS), and so on will be covered in online material accompanying this book.

6.2 Settings

Various settings at the configuration and application levels have to be carried for SAP ERP and SAP EWM to be integrated. This section explains the relevance of each of these settings and the procedure to carry them out.

6.2.1 Basic Settings

When it comes to integrating the SAP ERP system (one or many) to the SAP EWM system, a certain set of steps must be performed in each of the involved systems in a specific sequence. In this section, we'll discuss these settings and their order of implementation.

Once operational, both SAP ERP and SAP EWM systems need to make RFCs to each other. Therefore, the SAP ERP system must be able to log in to SAP EWM system to execute a function in the distributed environment (SAP EWM system) and vice versa. This requires the creation of the RFC user (with a user type as SYSTEM) in SAP ERP as well as in the SAP EWM system.

To create the user, use Transaction SU01, or you may navigate using the following path (for both SAP ERP and SAP EWM): SAP Easy Access Menu: Tools • Administration • User Maintenance • Users.

You must name the logical systems for SAP ERP and SAP EWM. These logical system names are used in RFCs to SAP ERP and SAP EWM. You may want to use a name format, which clearly demarks the system ID and client number such as "ERPCLNT890," for example. Upon naming the logical system, you need to assign this logical system to the client.

The navigation path for this setting in SAP ERP is from the SAP ERP IMG menu, Integration with Other Components • Extended Warehouse Management • Basic Settings for Setting Up the System Landscape • Name Logical System/ Assign Logical System to a Client.

From the SAP SCM IMG menu, choose SCM Basis • Integration • Basic Settings for Creating the System Landscape • Name Logical Systems/Assign Logical Systems to a Client.

RFC destinations are used for the connection to the target system, for example, an SAP SCM (SAP EWM) system. You also need to provide the details of the host server and the RFC user, which you created in the first step to log in via the background to execute the function.

The navigation path for this setting in SAP ERP via the SAP ERP IMG menu is Integration with Other Components • Extended Warehouse Management • Basic Settings for Setting Up the System Landscape • Set Up RFC Destination.

From the SAP EWM IMG menu, choose SCM Basis • Integration • Basic Settings for Creating the System Landscape • Set Up RFC Destination.

Alternatively, you can use Transaction SM59 in both the systems as well.

In this SAP ERP IMG setting, you define the queue type (can be Inbound or Outbound) for the target system and the operating mode. Modes can be transactional events, initial data transfers, or no transfer. In the SAP SCM (SAP EWM) system, you'll then assign the logical system with the business system group.

From the SAP ERP IMG menu, choose Integration with Other Components • Extended Warehouse Management • Basic Settings for Setting Up the System Landscape • Set Target System and Queue Type.

From the SAP SCM IMG menu, choose SCM Basis • Integration • Basic Settings for Creating the System Landscape • Assign Logical System and Queue Type.

In this setting, you assign the standard RFC destination for Business Application Programming Interface (BAPI) calls, dialogs, or methods against the destination system.

This requires settings for both inbound and outbound queues. Settings for inbound queues can be done in the qRFC monitor (QIN Scheduler) and for outbound queues in the qRFC monitor (QOUT Scheduler) of the SAP ERP/SAP EWM

system. Transaction SMQR is used for QIN Scheduler, and Transaction SMQS is used for QOUT Scheduler.

When communication takes place between SAP ERP and SAP EWM, logs are generated. These logs enable the system administrators to analyze the reason for any issue or communication failure. To display these logs, specific programs can be registered. Use Transaction SMQE to maintain the settings.

The SAP APO CIF uses some user specific parameters for data transfer, such as RFC mode through which you can control the qRFC calls, setting application logs, and using on/off debugging.

In the SAP ERP IMG menu, choose Integration with Other Components • Extended Warehouse Management • Basic Settings for Data Transfer • Set User Parameters, or use Transaction CFC2.

6.2.2 General Settings

After the basic integration settings have been carried out, SAP EWM specific settings have to be done step by step. Figure 6.4 shows the required settings; each one is elaborated on further in this section.

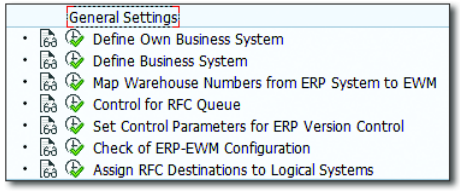


Figure 6.4 General Integration Settings

Define Own Business System

Here you name the business system on which SAP EWM is installed (Figure 6.5). This serves as a vital step in cross-system document flow. Cross-partner document flow is also maintained in the central information repository of the system landscape.

In the SAP SCM IMG menu, choose Extended Warehouse Management • Interfaces • ERP Integration • General Settings • Define Own Business System.

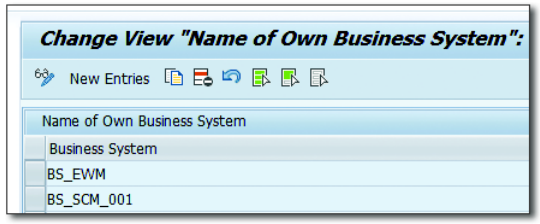


Figure 6.5 Own Business System Definition

Define Business System

In this setting (Figure 6.6), you assign the logical system to the business system. When the data is sent from SAP EWM to SAP ERP, it uses the logical system that contains the delivery and maps the business system related to the logical system. In the SAP EWM IMG menu, choose Extended Warehouse Management • Interfaces • ERP Integration • General Settings • Define Business System.

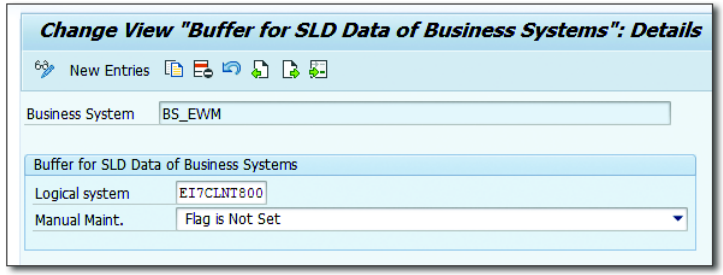


Figure 6.6 Connected Business System

Control for RFC Queue

You define the RFC queues for SAP ERP system in this setting (Figure 6.7). While defining, you also get to choose how you want to send the message from SAP EWM to SAP ERP. Options available are aggregations of queue, mass queue activation, and parallel processing for mass queues. There are two types of messages sent from SAP EWM to SAP ERP: messages with delivery reference and messages without delivery reference. Delivery reference messages are the goods movement against the delivery and its changes; messages without reference refer to posting changes, physical inventory, internal movement, and so on. In this configuration, you define the qRFC configuration of aggregation and serialization for both inbound and outbound queues. Because you're dealing with both delivery and

goods movement interfaces, strict serialization is of the utmost important under certain circumstances.

In the SAP EWM IMG menu, choose Extended Warehouse Management • Interfaces • ERP Integration • General Settings • Control for RFC Queue.

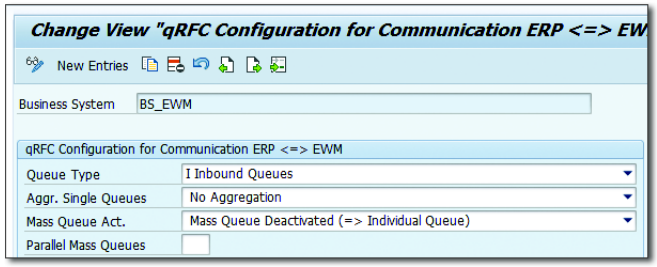


Figure 6.7 Control for the RFC Queue

Set Control Parameters for SAP ERP Version Control

Through this activity (Figure 6.8), you control the system behavior and confirmations of the recipient system (SAP ERP) for its expected compliance.

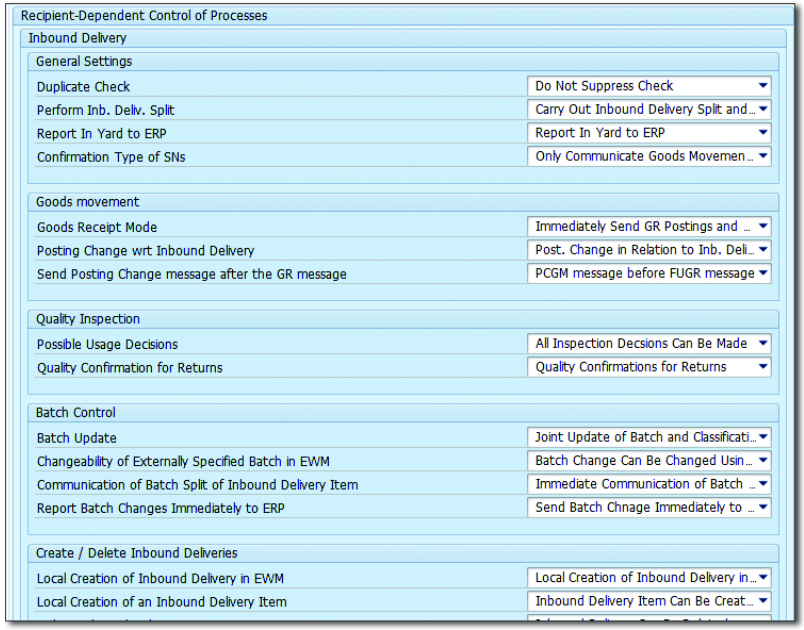


Figure 6.8 Recipient-Dependent Control Parameters

The influencing functions are inbound, goods movement, quality inspection, batch control, and nondelivery-related messages. These function checks happen when the respective document reaches the recipient system. Control options provided are relevant based on the SAP ERP version. These checks aren't specific to warehouses; instead, they have system-wide control.

To set these control parameters, navigate to the SAP EWM IMG, and choose Extended Warehouse Management • Interfaces • ERP Integration • General Settings • Set Control Parameters for SAP Version Control.

Map Warehouse Numbers from ERP System to EWM

After the business system for the SAP ERP system is defined, you define the mapping of the business system and SAP ERP warehouse number combination to the SAP EWM warehouse number (Figure 6.9). You can assign more than one SAP ERP warehouse number to an SAP EWM warehouse number.

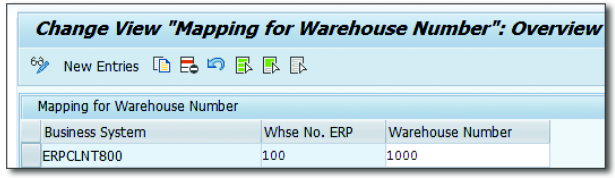


Figure 6.9 Mapping of Warehouse Numbers

6.2.3 Delivery Settings and Integration

In this series of steps, you define the document type mapping, item type, date type, partner role between SAP ERP and SAP EWM, recipient-dependent control of message processing, allowed account assignment category definition, route, and route schedule mapping. Figure 6.10 shows various configuration nodes related to delivery settings.

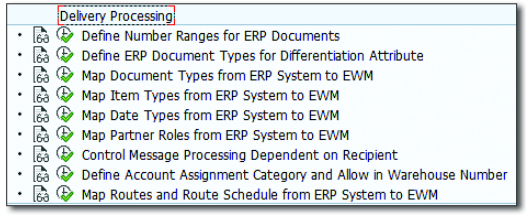


Figure 6.10 Configuration Related to Delivery Processing

In the SAP EWM IMG, choose Extended Warehouse Management • Interfaces • ERP Integration • Delivery Processing.

6.2.4 Goods Movement Mapping

In this setting, you relate goods movement between SAP ERP and SAP EWM. The integrating factor between these two is the SAP ERP organization structure mapping against the SAP EWM warehouse number. Unless and until this setting is done, the transactions related to goods movement won't happen.

Note

We'll discuss the availability group function and its stock type relation in the following section.

6.2.5 Map Storage Locations

You map the SAP ERP plant and storage location combination to the SAP EWM warehouse number, availability group, and party entitled to dispose (Figure 6.11). This availability group relates to the stock types in SAP EWM.

In the SAP EWM IMG, choose Extended Warehouse Management • Interfaces • ERP Integration • Goods Movement • Map Storage Locations from ERP System to EWM.

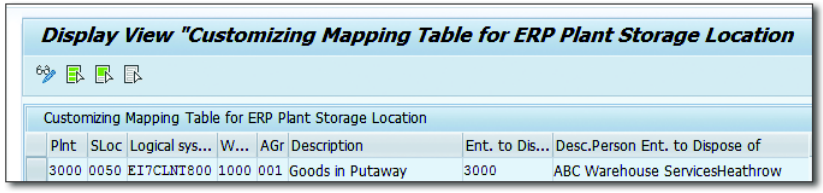


Figure 6.11 Mapping between SAP ERP Plant/Storage Location to SAP EWM

6.2.6 Customer-Specific Movement Types

The system allows you to have your own movement types for certain business necessities. For example, if the goods shrink, and you want to post them to a different movement type than the standard one, you define your custom movement type with posting string references used when communicating to SAP ERP using BAPI `BAPI_GOODSMVT_CREATE`.

To do so, go to the SAP EWM IMG, and choose Extended Warehouse Management • Interfaces • ERP Integration • Goods Movement • Define Customer-Specific Movement Types.

6.2.7 Transportation Settings

Shipment number of SAP ERP and transportation number of SAP EWM are equivalent objects. Businesses may want to use the same numbers for these objects across SAP ERP and SAP EWM systems. After the number is created in one of the systems, it needs to get replicated to the other to support the transportation process. Through the Customizing setting, it's possible to have consistent numbers across systems, irrespective of which system the numbers originated from.

For customizing these settings (Figure 6.12), go to the SAP EWM IMG, and choose Extended Warehouse Management • Interfaces • ERP Integration • Transportation • Map Shipment Number and TU Number.

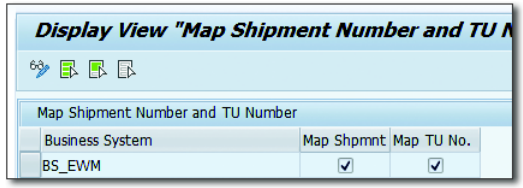


Figure 6.12 Transportation Settings for Mapping Shipment and TU Numbers

Selecting the Map Shpmnt checkbox ensures that once the shipment number of SAP ERP is replicated to SAP EWM, it will have the same document number. Selecting the Map TU No. checkbox ensures that any transportation unit (TU) created in SAP EWM will have the same number once replicated to SAP ERP.

You also maintain default values for the IDoc that originates from SAP EWM to SAP ERP transport integration. These values facilitate acceptance of the IDoc in SAP ERP and creation/deletion of the shipment that will follow. You can maintain values such as Mode of Transportation, Shipment Type, and Transportation Planning Point against the message type.

For setting the values, navigate to the SAP EWM IMG, and choose Extended Warehouse Management • Interfaces • ERP Integration • Transportation • Define Default Values for IDoc Outbound.

6.3 Data Load Systems

If a warehouse management system (WMS) is being migrated from legacy (non-SAP) to SAP EWM, transferring accurate data into the SAP EWM system becomes crucial to the success of the implementation and future rollouts. Because the source of the data is a third-party (non-SAP) system, it may need some modifications before it can be made compatible with the SAP EWM system. SAP provides tools for easy upload of various data to the SAP EWM system, after data is formatted and compatible with SAP EWM. These tools can be accessed via menu path, SAP EWM Easy Access • Extended Warehouse Management • Interfaces • Data Upload.

Like any other automation, these tools demand the data to be in a specific format. SAP provides structures for each of these data uploads. While preparing for the upload file template, you may refer to those structures to decide which column accommodates which field, and in what order. It's advisable that you put extra effort in cleaning the input data of the uploadable file for smooth transition into the SAP EWM system (remember, garbage in, garbage out). The system allows you to upload the data using a local file (e.g., CSV) or using a logical file on the server. Following are some examples of data that can be uploaded:

- Stock data transfer
- Initial data transfer of packaging specifications
- Load storage bins
- Load storage bins sorting

6.4 Migration from LE-WM

For various reasons, businesses running on SAP ERP Warehouse Management (WM) may also want to migrate to SAP EWM. It's important that this transition is smooth and without any system interruptions. Keeping this in mind, SAP has provided various tools to ensure a smooth and steady transition from WM to an SAP EWM environment.

Businesses expect to use the same data in SAP EWM that they were using in SAP ERP, with further enhancements later done within SAP EWM. This data can relate to the material masters, bins, stocks, and so on. Also, the packaging materials and physical inventory related data can be directly mapped to SAP EWM.

SAP provides built-in tools that facilitate businesses to quickly migrate from LE-WM (Logistics Execution—Warehouse Management) to SAP EWM. These transaction codes can be accessed using the following path: SAP EMW Easy Access • Extended Warehouse Management • Interfaces • Migration from LE-WM.

These tools effectively pull out the values of data objects from the relevant tables while downloading to a CSV on a local machine or to a logical file on a server and upload them to the respective SAP EWM tables from the intermediate files generated from the download step. Note that before you can use these tools, the RFC connection must already be in place, and the initial master data must be set up in SAP EWM.

6.4.1 Warehouse Product Migration

In any SAP EWM implementation, product data is the most voluminous data you'll deal with. Accurate product master creation is thus critical for the success of your implementation. These products, also called stock keeping units (SKUs), can number in the multiples of thousands.

The warehouse product migration function (Figure 6.13) is used for migrating the SAP ERP material master as a product master in SAP EWM. Apart from this, this tool is also used for migrating fixed bin assignments, palletization data (packaging specification in SAP EWM), and WM unit of measure (UoM).

To access the tool, use Transaction /SCWM/MIG_PRODUCT, or navigate to SAP EWM Easy Access • Extended Warehouse Management • Interfaces • Migration from LE-WM • Warehouse Product Migration.

This tool works in two steps. In the first step, it downloads the relevant material master fields from the relevant tables such as `MLGN`, `MLGT`, `MARA`, `MARC`, and so on from SAP ERP and creates an intermediate file either on your desktop or on the server. In the second step, it uploads the same intermediate file to the SAP EWM system and creates the data objects accordingly by updating the respective tables and fields in SAP EWM.

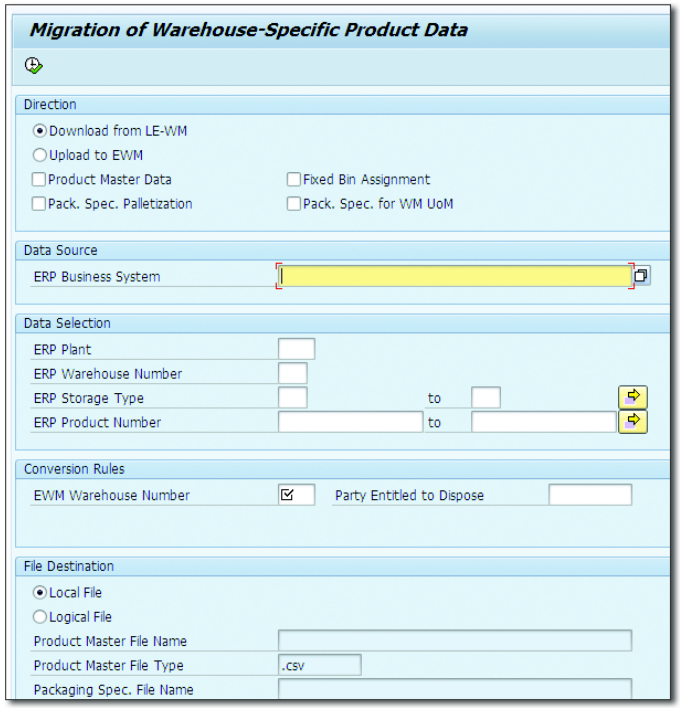


Figure 6.13 Warehouse-Specific Product Data Migration

The notion remains the same for transferring the other data using these tools for other forms of migration as well. Just the data source tables in SAP ERP and the target tables in SAP EWM change. For palletization and UoM data migration, an intermediate sequential text file is generated and passed on to Transaction /SCWM/IPU for upload. Keep in mind that the packaging specifications created out of these uploads will be inactive, and you need to activate it at a later point before you can use these packaging specifications in various processes. For a complete set of prerequisites and "table/field" names for SAP ERP and SAP EWM that are mapped to each other for this migration, refer to the SAP Help documentation.

6.4.2 Storage Bin Migration

This function (Figure 6.14) is used for migrating storage bin and bin sortation data from WM to SAP EWM. It works in two steps (as mentioned in the previous section). The second step is equivalent to data upload tools from Transaction /SCWM/SBUP and Transaction /SCWM/SRTUP.

To access this function, use Transaction /SCWM/MIG_BIN, or navigate to SAP EWM Easy Access • Extended Warehouse Management • Interfaces • Migration from LE-WM • Storage Bin Migration.

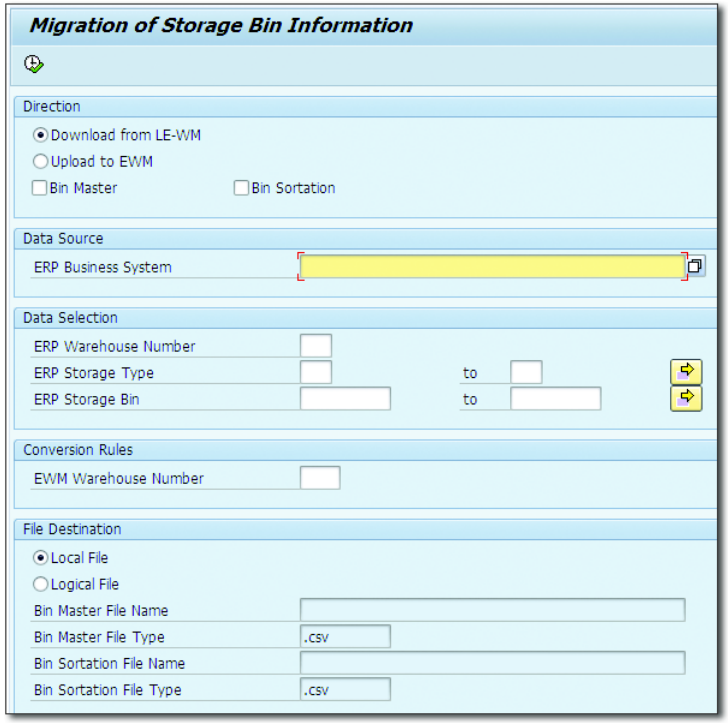


Figure 6.14 Storage Bin Migration

The selection screen allows you to choose the direction (Download from LE-SWM, Upload to EWM) and type of data (Bin Master, Bin Sortation). While downloading, you can specify the source ERP Business System and file destination and format. Using the Data Selection fields, you can filter the SAP ERP bins you want to download. The EWM Warehouse Number you enter in the selection screen replaces the SAP ERP warehouse number in the intermediate file.

While uploading, you need to specify the CSV or server file in the selection screen. For a CSV file, use fields from structures `/SCWM/S_LAGP_LSMW_MIG` and `/SCWM/S_LAGPS_LSMW` for column headers of storage bin data and the sortation data file, respectively.

6.4.3 Stock Migration

The stock migration function (Figure 6.15) is used for migrating existing stocks from LE-WM to SAP EWM. You can use this function only after you've migrated the products, bins, and packaging materials to SAP EWM. Apart from these, you must have already created the handling unit types in SAP EWM and mapped the storage unit types to packaging materials. There shouldn't be any open documents of the stock during download of this data. However, you can download the stock data, which have an open document, as an erroneous entry in the intermediate file by selecting the Include Entries with Error checkbox in the Display Control section of the selection screen for this migration.

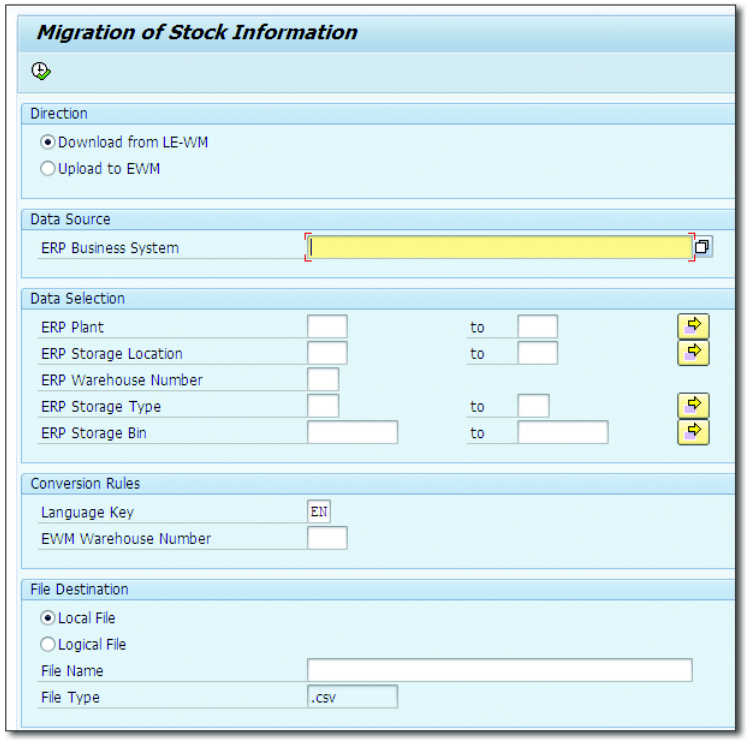


Figure 6.15 Stock Migration

To access the tool, use Transaction /SCWM/MIG_STOCK, or navigate to SAP EMW Easy Access • Extended Warehouse Management • Interfaces • Migration from LE-WM • Stock Migration.

Use the DIRECTION radio buttons to download the stock data from SAP ERP or upload the stock data to the SAP EWM system. In the DATA SOURCE area, the ERP BUSINESS SYSTEM specifies the source system while downloading the SAP ERP stock data. The EWM WAREHOUSE NUMBER specifies the warehouse to which this data should be uploaded. The upload step is equivalent to data upload tools in Transaction /SCWM/ISU discussed earlier.

6.4.4 Physical Inventory Completeness Migration

When stock is migrated from WM to SAP EWM, it doesn't migrate the data that suggests when a product was counted last, that is, the last inventory completeness of a product in WM. This leads to the SAP EWM system proposing all the stocks for counting. This migration requires material master migration. Also, you must ensure that physical inventory areas and inventory activity areas are already created and mapped using Customizing. Note that this migration (Figure 6.16) doesn't include data such as inventory documents and partially counted results.

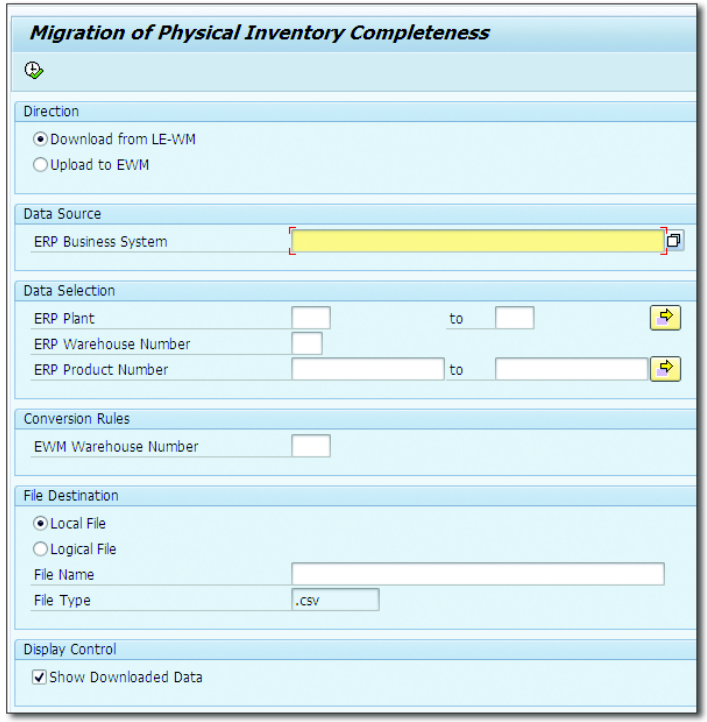


Figure 6.16 Migration of Physical Inventory Completeness

To access this tool, use Transaction /SCWM/MIG_PI_COMPL, or navigate to SAP EMW Easy Access • Extended Warehouse Management • Interfaces • Migration from LE-WM • Physical Inventory Completeness Migration.

6.4.5 Map Storage Unit Type to Packaging Material

You use this function to map the SAP ERP storage unit type to attributes of the packaging specification. These are later used when the system creates packaging specifications for the product, as part of the warehouse product migration. Following are the mapped packaging specification attributes:

- Packaging material
- Handling unit type
- Pack specification group
- Condition type
- Condition table

To access the mapping table, use Transaction /SCWM/MIG_MAP_SUT, or navigate to SAP EMW Easy Access • Extended Warehouse Management • Interfaces • Migration from LE-WM • Map Storage Unit Type to Packaging Material.

6.4.6 Map Warehouse Management Unit of Measure to Packaging Material

You use this function to map the UoM from SAP ERP to attributes of the packaging specification. These are later used when the system creates packaging specifications for the product, as part of the warehouse product migration. Mapped packaging specification attributes are the same as listed in Section 6.4.5.

To access this mapping table, use Transaction /SCWM/MIG_MAP_ALTUOM, or navigate to SAP EMW Easy Access • Extended Warehouse Management • Interfaces • Migration from LE-WM • Map Warehouse Management UoM to Packaging Material.

6.5 Master Data Integration between SAP ERP and SAP EWM

Let's now take a look at the master data integration and exchange data between SAP ERP and SAP EWM. This keeps both the systems in sync. In general, master data, especially material master, vendor, customer, and so on, are created in the SAP ERP system. These master data are transferred via the CIF, which is used for both the initial transfer and subsequent changes.

6.5.1 Basic Setup

Basic setup for the data transfer ensures the exchange across systems without any interruption. Settings need to be made on both the SAP ERP and SAP EWM systems.

Use the following navigation paths:

- SAP ERP IMG: Integration with Other mySAP.com Components • Advanced Planning and Optimization • Basic Settings for the Data Transfer
- SAP EWM IMG: Integration with SAP Components • Basic Settings for Data Transfer

The change transfer for master data is basic configuration that controls the way in which the change transfer occurs. Whenever there are changes to the existing master data such as basic data in the material master (e.g., gross weight and net weight), it reflects immediately in SAP EWM when the following are set accordingly:

- Configure Change Transfers of Master Data
- Activate ALE Change Pointers Generally
- Activate ALE Change Pointers for Message Types

6.5.2 Integration of Master Data via CIF

If you're using SAP ERP 6.0, CIF (Figure 6.17) is an integrated part of the SAP ERP system. Older versions of SAP R/3 up to SAP ECC 5.0 need the SAP R/3 plug-in to provide CIF functionality. To transfer the master data and further data changes, you can use manual CIF model creation and activation, automatic transfer through batch jobs, and change pointers.

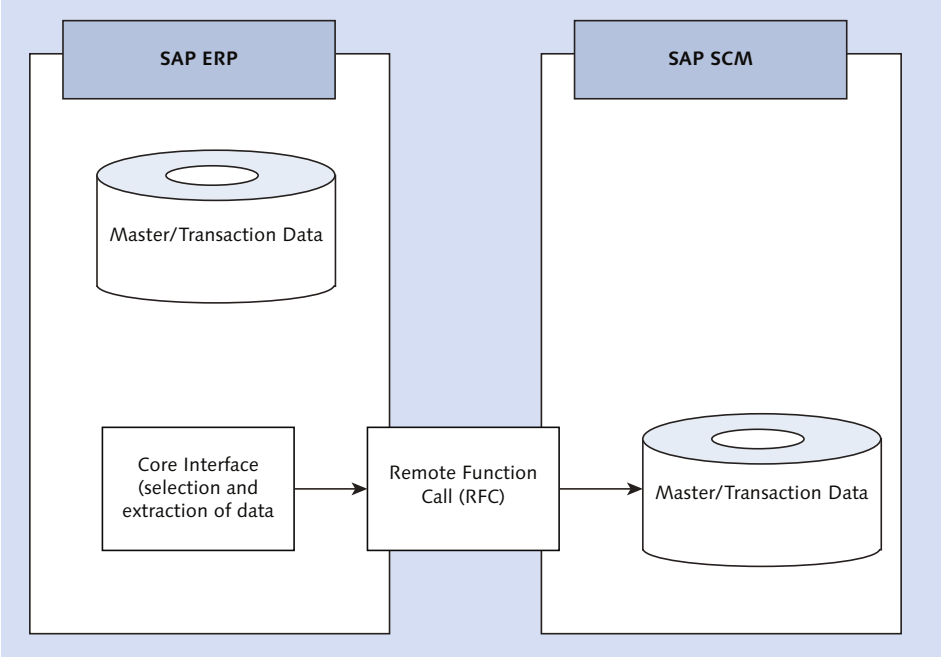


Figure 6.17 CIF Framework

Integration Model Creation

After the master data are created in the source system, you need to create an integration model that holds the data to be transferred. Figure 6.18 shows the initial Create Integration Model screen.

You can create an integration model via Transaction CFM1 or via SAP ERP Menu, Logistics • Central Functions • Supply Chain Planning Interface • Core Interface Advanced Planner and Optimizer • Integration Model • Create.

Model Name and APO Application fields define the integration model uniquely. You also need to specify the Logical System (SAP EWM target system) to which data needs to be transferred in this model. Further, from the Transaction CFM1 screen, you need to select the names of the master data objects you want to transfer. You'll find the selection criteria screen for each of these objects, which helps you restrict the data to be transferred.

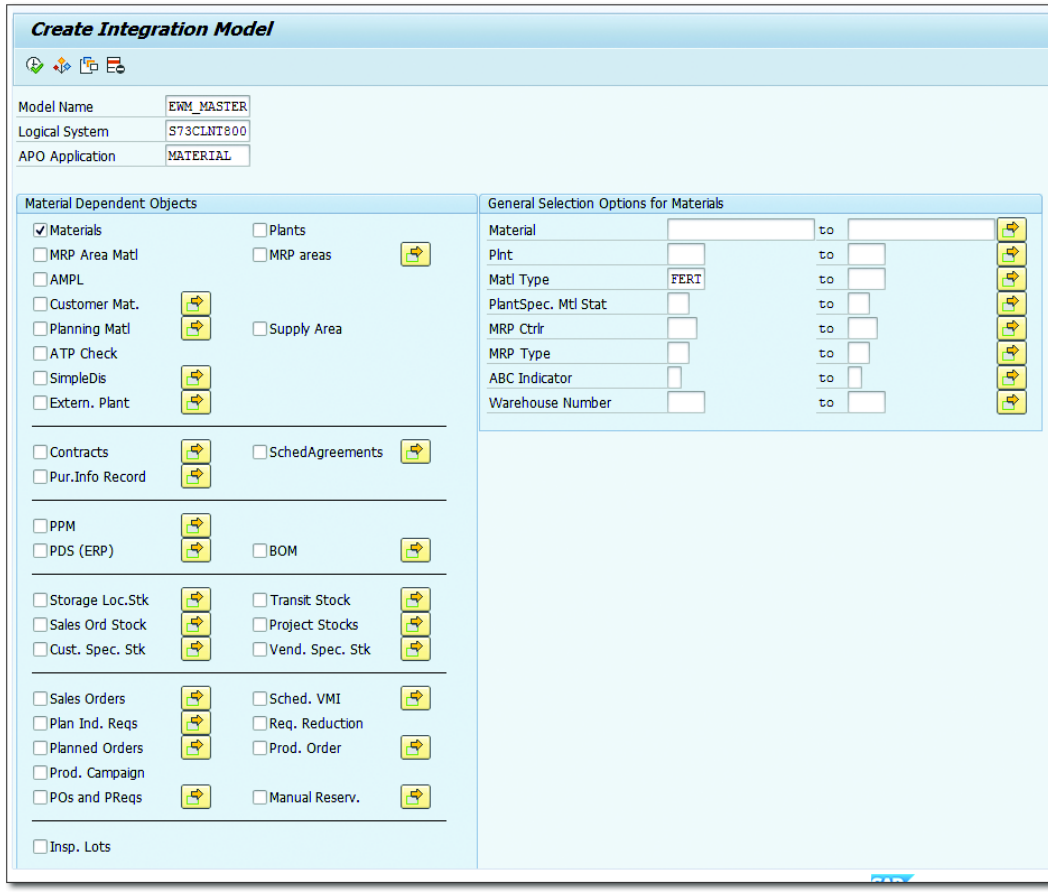


Figure 6.18 Create Integration Model

After all these fields are filled appropriately, use the execute button to navigate to the summary screen. In the summary screen, you can review the objects by selecting the DETAIL button. You can also perform consistency checks in the same screen. If all the data are consistent, use the GENERATE IM button in the summary screen to create the integration model.

Integration Model Activation

Integration model generation (Figure 6.19) generates the data to be transferred but holds the data in the SAP ERP system in the form of an IDoc. Transfer of data takes place only after activation of the model.

To activate the model, you can use Transaction CFM2 or navigate via the SAP ERP menu path, Logistics • Central Functions • Supply Chain Planning Interface • Core Interface Advanced Planner and Optimizer • Integration Model • Activate.

On the screen that appears, you need to enter the same Model Name, Logical System, and APO Application with which you created the integration model. After entering these three selection criteria, use the Execute/Start function.

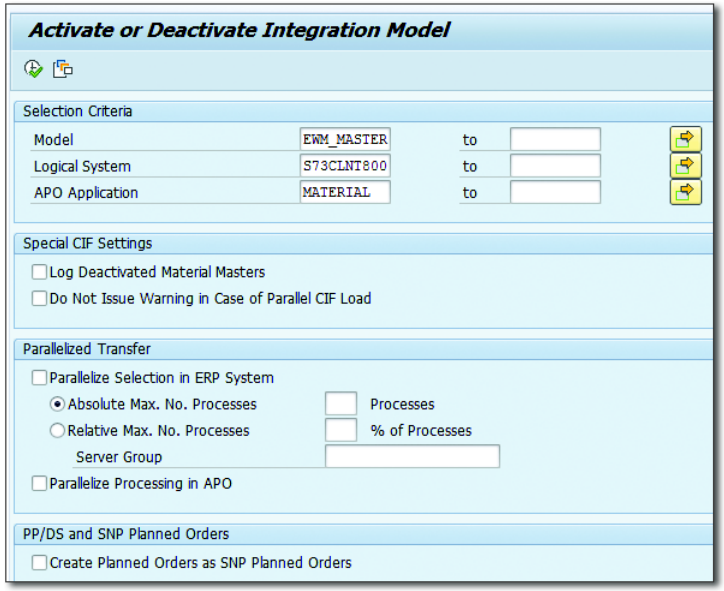


Figure 6.19 Integration Model Activation

Upon execution, the system shows the selection results in the next screen wherein you can use the Start button to activate the model for actual data transfer to take place. You can also review the details if needed in the selection results screen.

This data transfer takes place in real time. While sending the data, you need to be careful in selecting the correct integration model. Because there may be many active integration models present in the system, you may end up activating an unintended one. It's recommended to periodically run integration model generation, activation, and deletion of inactive IMs.

6.5.3 Integration of Master Data via IDoc

If you're integrating older versions of SAP ECC before SAP ECC 5.0 without the SAP R/3 add-in, you'll need to use IDocs for master data and transactional data transfers.

6.6 Logistics Inventory Management Engine

As the name suggests, Logistics Inventory Management Engine (LIME) is an engine—a modular set of codes with numerous function modules and tables—built by SAP to ensure availability of highly precise and real-time inventory data for other applications to consume. Because this is a separate engine, different applications can use it for inventory management purposes. Other applications can make a query to LIME to get the inventory information.

You can access LIME via the SAP SCM IMG menu path, SCM Basis • Logistics Inventory Management Engine (LIME).

6.7 Summary

In this chapter, we discussed basic settings to integrate SAP ERP and SAP EWM, data load options during cutover, and migration of data from SAP ERP to SAP EWM using standard tools provided by SAP. We also covered master data integration between SAP ERP and SAP EWM and automatic transfer via job schedule and change pointer activation for synchronous exchange of data. In the next chapter, you'll learn about inbound processing in SAP EWM and the business processes contained within.

Takeaways

- Business processes drive the software components required in a system landscape.
- If a business scenario has been enabled in a specific software version, either that software version or its higher releases are required for the process to run.
- All software components in a system landscape have to be integrated to each other for data exchange to happen seamlessly.
- Data communication between SAP ERP and SAP EWM happens by various means; for example, CIF is used for master data transfer.

- Once replicated from SAP ERP to SAP EWM, certain master data must be further modified in the SAP EWM system for business process to work in SAP EWM.
- SAP provides various tools to migrate data from legacy WMSs to SAP EWM as well as from WM to SAP EWM systems.
- Integration between systems must always be carried out in a specific sequence because each step is dependent on the output of the previous step.
- SAP EWM 9.3 is the latest release of SAP EWM, which at the time of this writing, is undergoing ramp-up. Features such as Transit Warehousing and Warehouse Billing are included with this version.

Every stock in the warehouse is received through the inbound process; hence, setting up the warehouse appropriately for optimal arrangement, space utilization, and high employee productivity are strategic success factors. SAP EWM enables warehouses to be configured to address complex inbound processes with wide range of advanced functions.

7 Inbound Processing

Goods receipts in warehouses originate from direct purchases by vendors/subcontractors, stock transfers from other facilities within or across company codes, and customer returns. This may necessitate various steps to be carried out, such as registering (also called check-in) the vehicle or transportation unit (TU) (e.g., detachable container from vehicle) in the yard, parking the TU in the yard, docking the TU to the door, unloading, counting, performing quality inspection (QI), deconsolidating, performing value-added services (VAS), putting away goods in the final bins, and so on. Based on specific needs, a combination of these steps forms the inbound process for the business. From the system's point of view, SAP Extended Warehouse Management (SAP EWM) is well equipped to handle all of these and many more steps of the inbound process. SAP EWM possesses a number of functionalities required to automate these steps in the system and is highly flexible. We'll discuss these functionalities and related configurations in various sections of this chapter.

Vehicles carrying inbound goods might need to be parked temporarily in the yard, which is an area outside the warehouse but within the plant facility, before they can be unloaded at the warehouse door. Parking may be required due to the lack of free doors or some administrative/documentation work relating to the vehicle/TU.

Goods arrive in the warehouse by various means of transport such as road, rail, ship, off-road transports, pipelines, and so on. Some of them need the process of check-in, and some don't. If the means of transportation is road, off-road, or rail, the trailers/rail may be checked in using the Yard Management (YM) functionality

of SAP EWM. SAP EWM provides built-in YM functionality to handle the yard-related steps in both inbound and outbound processes. YM provides easy tracking of parked vehicles in the yard waiting to be docked to a door for unloading. Pipelines, which are specifically used in oil and gas industries, don't require the check-in function in the inbound process. The shipping/receiving supervisor is tasked with finding the optimized door for docking. When the doors are fixed, for example, in case of rail as means of transport, the goods are always unloaded at the fixed door.

After vehicles/TUs are docked at the door, they are unloaded and goods are placed in the staging bins, which are near to the door in most cases. After they are unloaded, goods can be directly moved to the final storage bins or taken to interim bins for performing counting, QI, deconsolidation, packing, VAS, and so on before they can be put away in the final storage bins. These steps may vary per the uniqueness of the business/industries.

Note

We'll discuss receipts from production in Chapter 8. Process steps such as QIs and VAS will also be discussed in detail in Chapter 16 and Chapter 17, respectively.

We'll also discuss YM separately in Chapter 10 of the book. However, because the YM function is often tightly integrated with the warehouse, we'll continue to explain YM concepts in various topics within the current chapter.

7.1 Basic Setup for Inbound Delivery Processing

Before we get into details of basic setups related to inbound processing, to set things in perspective, let's discuss the inbound delivery notification (IDN) document in SAP EWM (Figure 7.1). Consider a scenario in which a user creates a purchase order (PO) in the SAP ERP system and sends this PO to a vendor. The vendor confirms the delivery of the goods, and inbound delivery is created in the SAP ERP system. If the storage location for which the PO was raised is warehouse managed, some information from the inbound delivery must be sent to the warehouse so that the warehouse supervisor can plan for receiving the goods and warehouse activities appropriately taking delivery date into consideration. For this information to be passed onto SAP EWM, queued RFC (qRFC) is used. On successful transfer of information from SAP ERP to SAP EWM, SAP EWM captures this information in an IDN document. If the SAP EWM system doesn't

understand this information due to missing settings, the information/documents get stuck in the inbound queue of the SAP EWM system. We'll discuss IDN in detail in the next section.

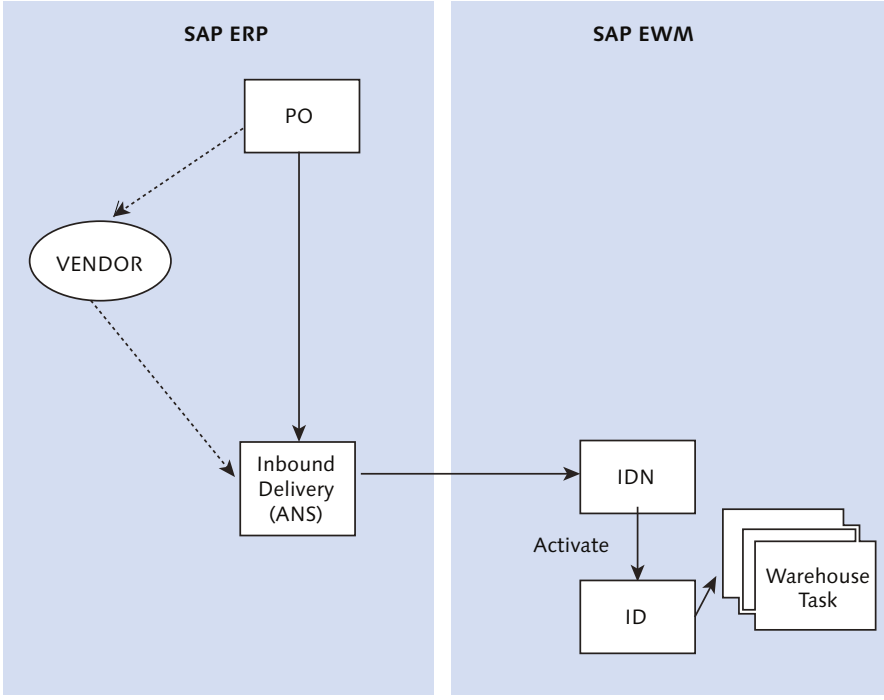


Figure 7.1 Document Flow for Inbound Process When the Vendor Sends an Advanced Shipping Notice

For successful transfer of information to SAP EWM from SAP ERP, there are a few prerequisites that need to be taken care of in SAP EWM. For example, the document type, item type, print profile, allowed item types for document type, and so on must be defined. After you're done with the SAP EWM side document type and item type definition, you need to map those with the SAP ERP document types and item types. We'll discuss the mapping of document types and item types from SAP ERP to SAP EWM in subsequent sections.

7.1.1 Introduction to Document and Item Categories

Another important attribute of SAP EWM documents is the document category. You'll come across categories fields at the header and item levels of a document.

Document categories are predefined codes in the SAP EWM system. While defining a document type, the SAP EWM system expects you to provide a document category. When the document type is defined, you assign different sets of profiles based on different document categories assigned to it. Document categories in the SAP EWM system are IDR (inbound delivery notification), PDI (inbound delivery), FDO (outbound delivery), EGR (expected goods receipt), and so on. These document types, in combination with various document categories, relate to one business process. Table 7.1 shows examples of standard SAP-provided document types and categories.

Document Type	Document Category	Document Category Description
INB	IDR	Inbound delivery notification
INB	PDI	Inbound delivery

Table 7.1 Examples of Document Types and Document Categories

Similarly, while defining the item type, a different set of profiles is assigned based on combinations of document and item categories assigned to it. Table 7.2 shows these specifics.

Item Type	Document Category	Item Category	Item Category Description
IDLV	IDR	DLV	Standard item (inbound delivery)
IDLV	PDI	DLV	Standard item (inbound delivery)

Table 7.2 Examples of Item Types and Item Categories

7.1.2 Defining Document Types

You can define document types in SAP EWM IMG via menu path, Extended Warehouse Management • Goods Receipt Process • Inbound Delivery • Manual Settings • Define Document Types for Inbound Delivery Process. While defining the document type, you assign the following:

- **Document category**
- **Internal number range**
- **Retention period for archiving purposes**
- **Change document**
  This is for recording changes in a document of this document type.

- **Profiles**
  Different profile types include:
  - Action profile: This is used for triggering subsequent actions such as document activation, printing, and so on using the Post Processing Framework (PPF).
  - Status profile: This is used for linking different statuses to the document type. For example, statuses such as Goods Receipt, Unloading, Putaway, and so on must be linked to inbound delivery documents so that supervisors can easily distinguish the deliveries for which putaway is yet to be completed.
  - Text profile: This helps in storing different text in the documents for work instructions, packing safety measures, printing information, special instructions, and so on. These texts can be transmitted to radio frequency (RF) devices used by warehouse operators to follow the notes/guidelines.
  - Field control profile: This profile controls the field selection for change or display based on these settings.
  - Partner profile: This is assigned in relation to the system profile. It uses the setting of assigned partner roles from the corresponding system profile. With this, you can define the required partner roles for the desired business functions.
  - Date profile: This is used to define the date types in the delivery document such as Putaway Start, End of Putaway, Goods Receipt Start, End of Goods Receipt, and so on.
  - Incompletion profile: This helps to maintain all the required fields in the document to process further.
  - Quantity offset: This is used to calculate the quantities such as Requested Quantity, Reduction Quantity, Open Quantity, and so on.
  - Reference document category profile: This allows maintaining the reference documents such as ASNs, SAP ERP original document, purchase order, outbound delivery, and so on when a document is processed.
  - Process profile: This is used for controlling the allowed process indicators for the business processes in this profile, such as Manual Creation, Preceding Documents, Invoice before GI, and so on. You have profiles both at the header level and item level.

- **Packing information**
  Settings maintained in this section help in packaging specification determinations. It also controls whether automatic packing is allowed for this document type.
- **Process controlling**
  These settings tell the system whether to allow manual creation of a document of this document type and whether a predecessor document can be referred to while creating a document of this document type. These settings also contain information related to processes such as scrapping, pickup, correction delivery, production, and invoice before goods issue for this document type.

7.1.3 Defining Item Type

Like document types, item types must also be defined. It's mandatory to assign the document category and item category in the definition of an item type. To create the item type in SAP EWM IMG, navigate via the menu path, Extended Warehouse Management • Goods Receipt Process • Inbound Delivery • Manual Settings • Define Item Types for Inbound Delivery Process. To define the item types you should consider the following information:

- The definition links the profiles and process management control parameters.
- While defining item types, all the profiles that we discussed for the document type definition can be maintained except action profile. Action profile is set only at the document type level. One additional profile that can also be maintained in the item type definition is the process code profile. The process code profile helps in handling the quantity differences at the item level. You can adjust the quantity at the item level based on the warehouse pick situation.
- Using process management control settings, you get to choose whether you want to allow item creation manually or not. A prerequisite for allowing manual item addition is definition of the document type and item type without the process profile. For example, when you do a transfer posting against a warehouse request (WR) in SAP EWM, you can add an item on the go, directly in the WR. By adding this item, you can create the warehouse task (WT) and post the transfer posting successfully.
- The Invoice before GI setting allows you to generate an invoice prior to goods issue through the SAP EWM system. This is an interesting and extremely useful

feature of SAP EWM. Consider a situation in which due to some stock discrepancy in the system, you're unable to dispatch a load systematically via SAP EWM. If you hold the load until differences are sorted out, it may incur substantial detention costs. By using this setting, the system will let you generate an invoice before goods issue in the system and dispatch the load. In the meantime, prior to the load reaching the customer site, you may resolve the issue in the system and do goods issue posting for the delivery.

Now that we've defined the document type and item type, let's see how their determination takes place in the SAP EWM system. While creating an inbound document, the system must be able to determine a document type and item type.

7.1.4 Document Type and Item Type Mapping from SAP ERP to SAP EWM

Inbound delivery documents originating from SAP ERP get replicated to the SAP EWM system before further processing on them begins in SAP EWM. When ASNs are received from the vendor, inbound delivery documents are created in SAP ERP and get replicated as IDNs in SAP EWM. IDNs contain all logistics data necessary from an SAP EWM perspective. For successful transfer of such deliveries or others to SAP EWM, mapping between document and item types of SAP ERP and SAP EWM documents must be done in the SAP EWM system. Prior to making these configurations in the system, you need to understand these documents and their relationships across SAP ERP and SAP EWM. In a way, these configurations achieve the integration between SAP ERP and SAP EWM from a document point of view.

For mapping the document type, navigate to the SAP EWM IMG menu path, Extended Warehouse Management • Interfaces • ERP Integration • Delivery Processing • Map Document Types from ERP System to EWM.

As shown in Figure 7.2, the document type of the SAP EWM document is determined based on the business system the SAP ERP document is originating from, the document type in SAP ERP, and the initiator of the communication chain code. The benefit of using the communication chain code is that you can assign one SAP ERP document type to various SAP EWM document types to have different control over the business processes in your warehouse. For example, if you want to distinguish the production receipt process with two different document

types in SAP EWM based on the type of production process, that is, discrete production process and repetitive manufacturing, you can use different codes for the initiator of communication chain for each of them.

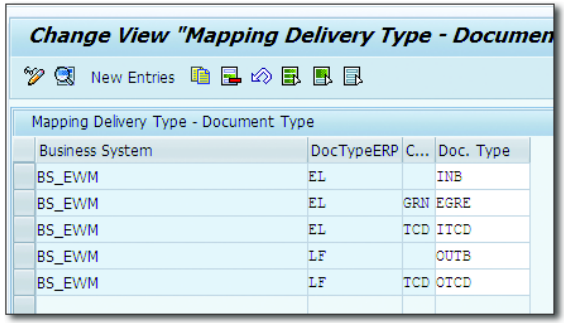


Figure 7.2 Document Type Mapping between SAP ERP and SAP EWM

In a similar way, you can define multiple SAP ERP document types to a single SAP EWM document type to keep your processes unique in SAP EWM. When the system approaches the determination of the SAP EWM document type, it first looks for all entire key definitions; if none are found, it next searches only for the document type in the access sequence.

Similar to SAP EWM document types, mapping for SAP EWM item types can be done via the SAP EWM IMG menu path, Extended Warehouse Management • Interfaces • ERP Integration • Delivery Processing • Map Item Types from ERP System to EWM.

As shown in Figure 7.3, the SAP EWM item type is determined based on the SAP ERP business system, SAP ERP document type, SAP ERP item type, SAP EWM document type, differentiation attribute, and catch weight product. While deciding, the system uses various combinations of fields in the following order to arrive on an SAP EWM item type:

1. Against all key parameters
2. Catch weight product, differentiation attribute, and SAP EWM document type
3. Catch weight product and differentiation attribute
4. Only the catch weight product
5. SAP ERP document type and SAP ERP item type

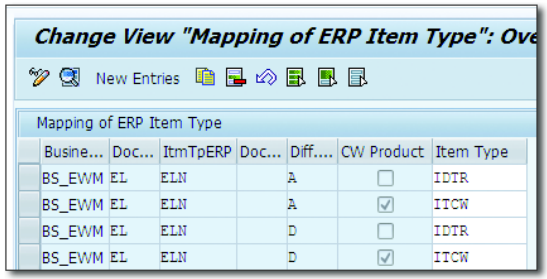


Figure 7.3 Item Category to Item Type Mapping in SAP ERP and SAP EWM

7.1.5 Determining Document Types and Item Types in SAP EWM

Document type determination (Figure 7.4) for an inbound delivery takes place based on the source document category, source document type, and target document category. These settings can be done via the SAP EWM IMG navigation path, Extended Warehouse Management • Goods Receipt Process • Inbound Delivery • Define Document Type Determination for Inbound Delivery Process.

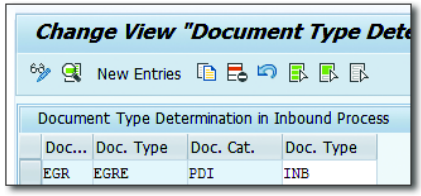


Figure 7.4 Document Type Determination in the Inbound Process

Note

In the document type determination setting, you'll find that the source document category (Doc. Cat.) and source document type (Doc. Type) fields aren't mandatory. This is due to the fact that a document can very well be created without reference to a predecessor document.

Similarly for the item type determination settings (Figure 7.5) can be done by navigating to the SAP EWM IMG menu path, Extended Warehouse Management • Goods Receipt Process • Inbound Delivery • Define Item Type Determination for Inbound Delivery Process. The target item type is determined based

on the source document category, source document type, hierarchy type, item type for higher-level item, item category, and item type predecessor parameters.

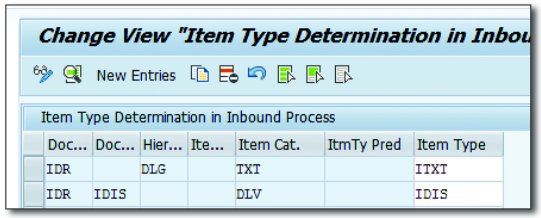


Figure 7.5 Item Type Determination in the Inbound Process

7.1.6 Existence Check of Packaging Specification

Specific incoming goods might be subject to VAS processing before they can be put away to final storage bins. Because necessary details are stored in packaging specifications, the system should be able to search and propose appropriate packaging specifications while processing. You can activate the packaging specifications check for relevant products in inbound by activating the packaging specifications check at the product group level for the warehouse.

Product groups, which help in the existence check of packaging specification, are created at the warehouse level and placed in the product master. To define a product group, navigate to the SAP EWM IMG menu path, Extended Warehouse Management • Goods Receipt Process • Inbound Delivery • Existence Check of Packaging Specification • Define Product Groups for Existence Check.

To activate the existence check for the packaging specification, navigate to the SAP EWM IMG menu path, Extended Warehouse Management • Goods Receipt Process • Inbound Delivery • Existence Check of Packaging Specification • Activate Existence Check of Packaging Specification.

As shown in Figure 7.6, the PS Exist. Check field can be activated using a combination of the following fields:

- Warehouse No.
- Doc. Cat
- Document Type
- Item Type
- Product Group

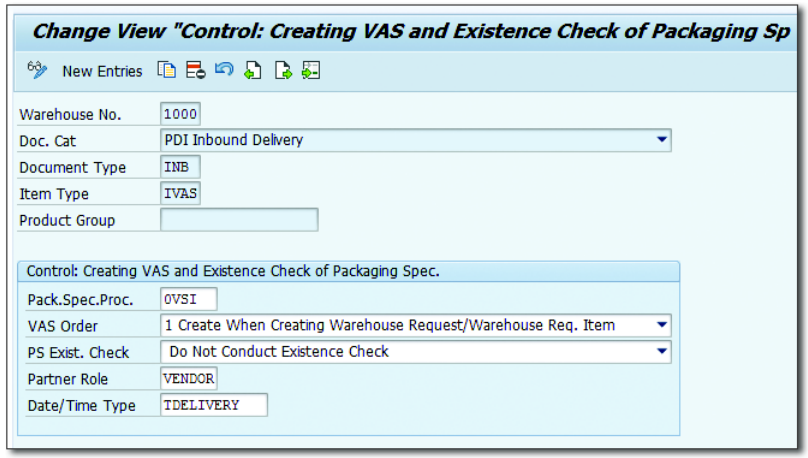


Figure 7.6 Packaging Specification Existence Check for Value-Added Services

Based on the requirement, you may opt for one of the following options for PS Exist. Check:

- Do Not Conduct Existence Check
- Perform Existence Check (Warning)
- Perform Existence Check (Error)

If you don't need to check for packaging specifications existence, use the Do Not Conduct Existence Check option. If you opt to check the packaging specifications existence, the system uses packaging specification procedure (Pack.Spec.Proc field) value to start searching for a relevant packaging specification. If the system isn't able to come across any relevant packaging specifications, you can control the system in two ways. Using the Perform Existence Check (Warning) option, the system writes a warning in the message log of the inbound delivery and allows further processing. Using the Perform Existence Check (Error) option, the system writes an error in the message log of the inbound delivery and doesn't allow further processing by setting the item of the delivery as inconsistent. You'll need to specify a valid packaging specification to proceed further in the process. Partner Role, which indicates the partner role of the supplier, is used in packaging specification determination. The Date/Time Type parameter is used to check the validity of the packaging specification.

7.1.7 Batch Management and Remaining Shelf Life Check in the Inbound Delivery

As shown in Figure 7.7, configuration settings related to the batch management and shelf life check can be done by navigating to the SAP EWM IMG menu path, Extended Warehouse Management • Goods Receipt Process • Inbound Delivery • Batch Management and Remaining Shelf Life Check in the Inbound Delivery.

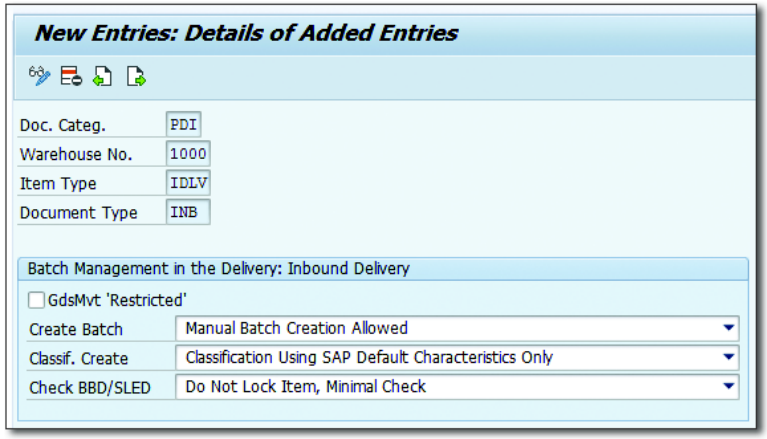


Figure 7.7 Batch Management and Shelf Life Expiration Date Check in the Inbound Delivery

Batch management control can be set up right from the creation of the IDN. Batches can be created manually by the user as well as automatically by the system. You can instruct the system to not create any batch at all. By flagging the GdsMvt 'Restricted' checkbox, you allow the system to put the batches in restricted stock.

The Check BBD/SLED setting controls the checking of remaining shelf life of the goods. You may also allow the system to inform the shortfalls in minimum remaining shelf life without locking the item in the document. There is also an option to lock the items with and without manual release allowed. If you choose Lock Item, Manual Release Allowed, and the system notices a shortfall in the minimum remaining shelf life, it locks the item and sets the status of Check Remaining Shelf Life as Checked, Not OK. Further, you won't be able to post the goods receipt or create the WT using this locked delivery. You first need to accept or reject the delivery in the system. If you opt to reject the delivery or the

delivery item, associated delivery items become zero in quantity. If shelf life isn't relevant to the goods, you may specify not to check the remaining shelf life altogether.

7.1.8 Defining Print Profiles

In the inbound process, from the warehouse perspective, the printing need mainly arises from the fact that you need to create a handling unit (HU) label and paste it on the pallet before putting the pallet into the final storage bin. This is a must especially when you're receiving the goods from locations that aren't HU managed. HU labels may even vary per vendor in terms of design and information contained on the print label.

Also, based on certain characteristics, many times goods need to be handled in a specialized manner while unloading. Thus, unloading instructions need to be printed and provided to the personnel handling the goods.

SAP EWM caters to the various printing needs of the warehouse using print profiles as shown in Figure 7.8. The settings for defining print profiles for goods receiving can be made via the SAP EWM IMG menu path, Extended Warehouse Management • Goods Receipt Process • Inbound Delivery • Print • Define Print Profiles for Delivery Processing.

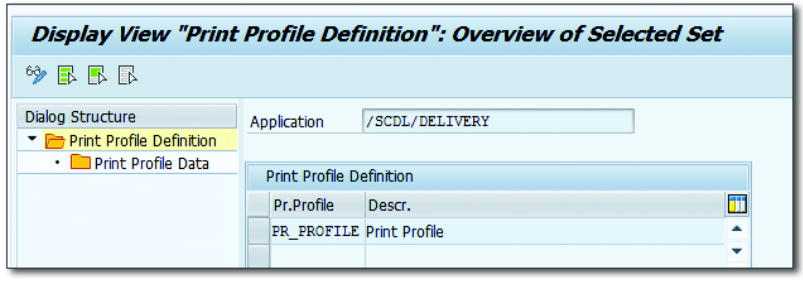


Figure 7.8 Print Profile Definition

While defining the print profile, you assign the PPF action definition, output device, spool name, and suffixes. You can also activate the switches for immediate printing and deletion of the spool.

After the print profile is defined, you can assign this profile in the determination procedure for inbound processes. For setting up determination of print profiles,

navigate to the SAP EWM IMG menu path, Extended Warehouse Management • Goods Receipt Process • Inbound Delivery • Print • Define Print Profiles Determination for Goods Receipt Process. This Customizing node allows you to set up the access sequence and determination of the print profile, based on goods receipt office, ship-to location, warehouse, and door. Using door as a determination criterion provides flexibility to utilize printers placed near a door out of numerous printers available in the warehouse.

7.2 General SAP EWM Delivery Document Structure

Let's discuss the structure of a delivery document. These documents are used across inbound, outbound, internal transfer, and posting change processes. These warehouse request (WR) documents contain necessary information to perform subsequent warehouse activities of a business process. An SAP EWM delivery document consists of two sections, the document header and the document item, as portrayed in Figure 7.9.

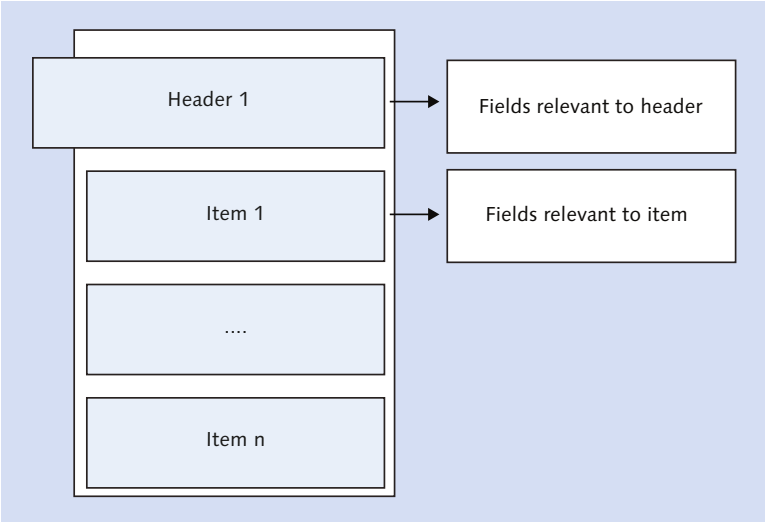


Figure 7.9 SAP EWM Delivery Document Structure

The document header contains the document category and document type. The document categories are predefined by SAP and help in classifying different

documents that can be processed by the system. Table 7.3 shows the predefined document categories in SAP EWM.

Document Category	Description
EGR	Expected goods receipt
FDO	Outbound delivery
GRN	Expected goods receipt notification
IDR	Inbound delivery notification
ODR	Outbound delivery request
PDI	Inbound delivery
PDO	Outbound delivery order
POR	Posting change request
SPC	Posting change
WMR	Stock transfer

Table 7.3 Predefined Document Categories in SAP EWM

Note

In these examples of standard document/item categories/types, we've also included documents from other processes such as outbound, internal transfers, and posting changes. From the document structure point of view, these are the same as that of inbound documents.

The document type in relation with various document categories represents a business process. A document type can be assigned to one or more document categories. The document type represents the primary business use and classifies the document to complete business processes relating to it. The structure of the WR is the same for all processes; only the document type enables you to differentiate the business process performed. If an inbound is created, the referring document type is INB; if an outbound is created and processed, the document type is OUTB. These document types help you in identifying the sort of business process performed in the system. Even for reporting purposes, this categorization helps in trimming down the list based on the business process for review at a time.

Table 7.4 shows the examples of SAP EWM document types.

Document Type	Description
EGRE	Expected goods receipt
INB	Inbound delivery
INBI	Inbound delivery goods receipt production
ODSH	Direct outbound delivery
OKTS	ODO for kit creation
OUTB	Outbound delivery
SRPL	Replenishment
TWPR	Posting change request

Table 7.4 Examples of Document Types in SAP EWM

Standard SAP delivers with various document categories and types relevant to warehouse documents covering core business processes. A few standard examples are given in Table 7.5.

Document Type	Document Category	Description
INB	IDR	Inbound delivery notification
INB	PDI	Inbound delivery
IPS	IDR	Production supply (inbound)
IPS	PDI	Production supply (inbound)
OUTB	ODR	Outbound delivery request
OUTB	PDO	Outbound delivery order
OUTB	FDO	Outbound delivery
SWHI	WMR	Stock transfer
SRPL	WMR	Replenishment
TWPR	POR	Posting change request
TWPR	SPC	Posting change

Table 7.5 Examples of Document Types and Document Categories in SAP EWM

However, based on business needs, you may create your own document type and link it to the predefined document category. Based on the configuration settings for the document type, you control the relevant business process.

The document header consists of general information such as goods receipt office, shipping office, scheduling date, weight, volume, ship-from-party, and so on. The document item consists of individual products information from the delivery. The information relating to products include the following:

- Product number
- Delivery quantity
- Batch number and shelf life expiration date (SLED) information
- Stock type
- Tolerance information
- Location-related information

Each delivery document item is associated with the item category and item type. The item category classifies based on basic usage of the delivery item. This defines the item by itself as finished goods or packing items. These are predefined by SAP. Table 7.6 shows the item categories delivered by SAP.

Item Category	Description
DLV	Standard delivery item
PAC	Packing item
RET	Returns item
TXT	Text item
VAL	Value item (used in outbound only)

Table 7.6 Item Categories Examples

An item type (Table 7.7) classifies the business characteristics of an item in the delivery. In conjunction with the document type, it defines the complete business process. Within each item category, you have subsets. The item type helps to distinguish these subsets. A standard item can belong to inbound delivery, production item, or outbound delivery. Thus, you can classify which specific process the item belongs to.

Item Type	Description
IDLV	Standard item (inbound delivery)
IDPP	Inbound delivery standard item goods receipt production
ODLV	Standard item (outbound delivery)
OVAS	Standard item with VAS

Table 7.7 Item Types Examples

Similar to document types, per the business need, you can define your own item types and link them to an item category to represent a business process. The following sections describe some of the standard item types delivered by SAP.

7.3 Inbound Delivery Notification

The first official document for the inbound process between the buyer and seller is the PO or scheduling agreement, which is created in the SAP ERP master system. The SAP ERP inbound delivery is created with reference to the PO or scheduling agreement, either manually or automatically via ASN. The inbound delivery of SAP ERP is distributed to SAP EWM either immediately or manually based on the decentralized warehouse setting in SAP ERP. This inbound delivery notification (IDN) document, which is distributed to SAP EWM, becomes the first document to trigger the inbound process in SAP EWM.

Figure 7.10 illustrates the document flow of the inbound process in SAP ERP and SAP EWM. You can access the IDN via Transaction /SCWM/IDN or via the SAP Easy Access menu path, Extended Warehouse Management • Delivery Processing • Inbound Delivery. IDN holds the necessary information that was carried forward to SAP EWM from SAP ERP. If any incorrect entries are made, such as an inadvertent quantity in the SAP ERP IDN, the IDN can be rejected in SAP EWM by using the Reject button. After you reject the IDN in SAP EWM, it sets the quantity to zero in the inbound delivery assignment to the PO. The system then allows you to create a new inbound delivery in SAP ERP again. The rejected IDN can't be used any further in the SAP EWM system to create the inbound document of SAP EWM.

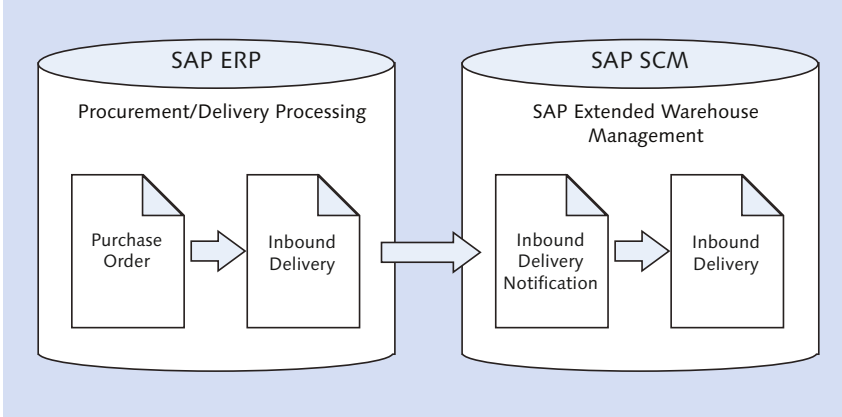
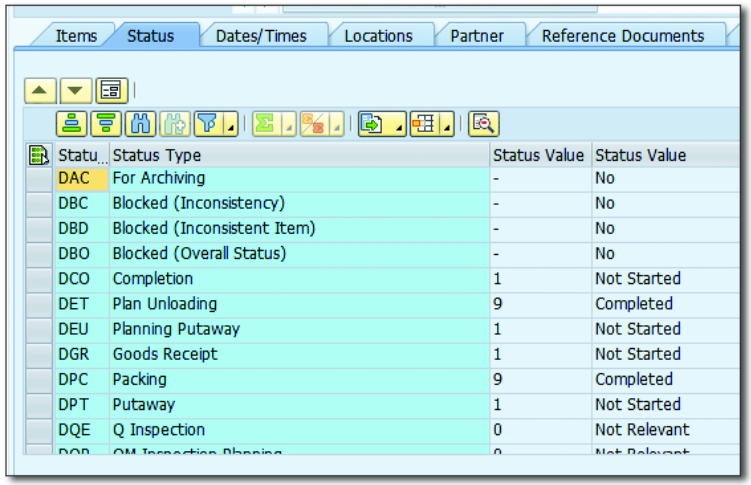


Figure 7.10 Documents Flow in the Inbound Process

The SAP ERP ID number is mapped as an IDN number in SAP EWM. While activating the IDN, the system conducts some preliminary checks in the background. These checks ensure that there is no inconsistency in the document or any reason to block the document to process further. The incompletion profile associated with the IDN document type and item type validates the incompletion check at the header and item level. The system checks if all the required fields defined in the profile are available or not. At the header level, you'll see fields such as Receiving Office: Location No., which relate to specifics of who is handling the receiving of all the items, whereas at the item level, you'll see fields such as Unloading Point: Location Number, Person Entitled to Dispose, Product, Production Date, Start, Shelf Life Expiration Start and End dates, and so on.

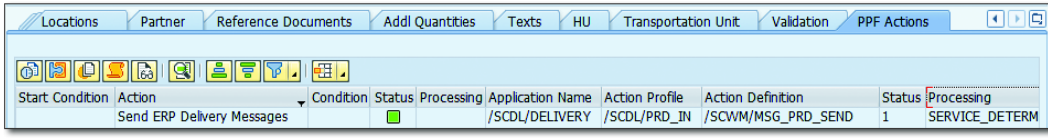
If this check fails, the system blocks the IDN. As shown in Figure 7.11, the Status tab in the Details Delivery section of the IDN reflects the reason for the block. In Transaction /SCWM/IDN, you can also perform a manual check using the Check button. After the inconsistencies are rectified either in SAP EWM or SAP ERP, use the Check indicator to validate once again and remove the block from the IDN.

IDN activation (Figure 7.12) can be done manually by clicking on the Activate button or automatically in the background by using PPF. While setting up the PPF for automatic activation of IDN, use the application `/SCDL/DELIVERY`, action profile `/SCDL/IDR`, and action definition `/SCDL/IDR_TRANSFER`. The PPF Actions tab in the item level data shows whether the IDN was activated successfully or not. If executed successfully, you'll see the status turned green.



Statu...	Status Type	Status Value	Status Value
DAC	For Archiving	-	No
DBC	Blocked (Inconsistency)	-	No
DBD	Blocked (Inconsistent Item)	-	No
DBO	Blocked (Overall Status)	-	No
DCO	Completion	1	Not Started
DET	Plan Unloading	9	Completed
DEU	Planning Putaway	1	Not Started
DGR	Goods Receipt	1	Not Started
DPC	Packing	9	Completed
DPT	Putaway	1	Not Started
DQE	Q Inspection	0	Not Relevant

Figure 7.11 Statuses on the Item Level



Start Condition	Action	Condition	Status	Processing	Application Name	Action Profile	Action Definition	Status	Processing
	Send ERP Delivery Messages				/SCDL/DELIVERY	/SCDL/PRD_IN	/SCWM/MSG_PRD_SEND	1	SERVICE_DETERM

Figure 7.12 IDN Activation Status

7.3.1 Inbound Delivery Notification against Advance Shipping Notice

When a PO is created in the SAP ERP system, you enter all the necessary information required for the supplier to identify and deliver the product. After the product is received, the inbound delivery in the SAP ERP system is required to post the goods receipt. Inbound delivery in SAP ERP can be created automatically by the SAP ERP system based on the response from the vendor regarding delivery dates of the goods. Using Electronics Data Exchange (EDI), the business may receive the shipping information from the vendor. By using an EDI 856 ASN, which comes from the supplier in an electronic version, the buyer gets to know that the goods have been shipped and also gets details of the arriving shipment. Use of ASNs is popular in various industries such as retail, manufacturing, and automotive. After the EDI document is received in the SAP ERP system, it triggers the creation of inbound delivery (Figure 7.13).

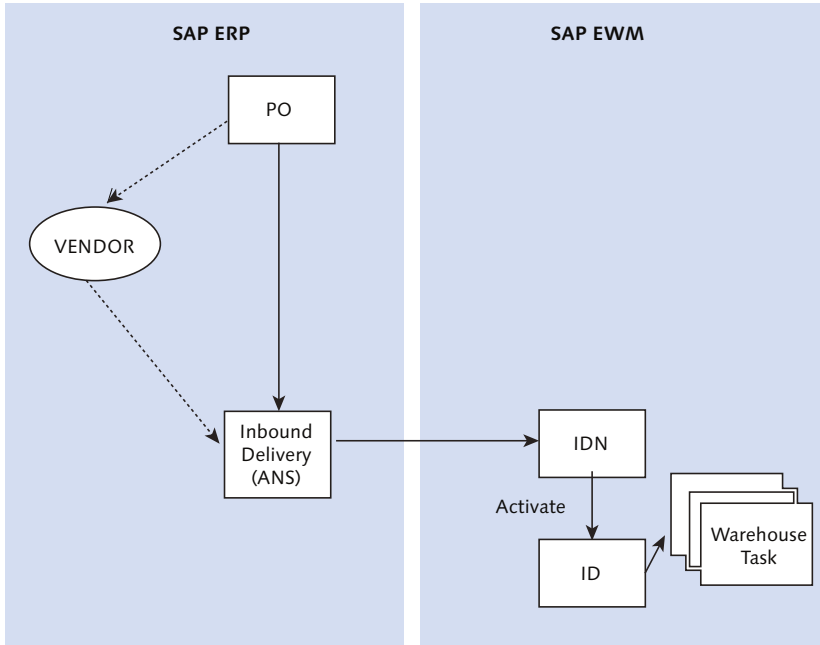


Figure 7.13 Purchase Order, ASN, and Inbound Relationship

Companies might need to transfer the stocks within or across company codes in SAP ERP via stock transport orders. SAP provides a standard output type SPED, which can be triggered at the time of good issue from the supplying plant. SPED calls processing routines to trigger an inbound delivery document creation for the receiving plant. When the stock transfer is across the company codes, then SPED isn't used. Instead, the SAP ERP inbound delivery is created manually or automatically via SAP Supply Network Collaboration (SNC).

If the vendor has no capability of sending an EDI 856 ASN, you can still generate the inbound delivery automatically by using the confirmation control key. The confirmation control key can be assigned to a plant and storage location combination by navigating to the SAP ERP IMG menu path, Logistics Execution • Shipping • Deliveries • Define Order Confirmations for Inbound Deliveries.

If the delivery is relevant to the SAP EWM warehouse, the system replicates the SAP ERP inbound delivery to SAP EWM as an IDN (see Figure 7.14). Replication from SAP ERP to SAP EWM happens via calling the qRFC. The function call takes place by calling the remote-enabled module `/SPE/INB_DELIVERY_SAVEREPLICA` to

create the SAP EWM IDN. While creating the IDN by replicating the SAP ERP inbound delivery, all pieces of delivery-related information are copied. This information from IDN is carried over after activation of IDN to create the inbound delivery in SAP EWM.

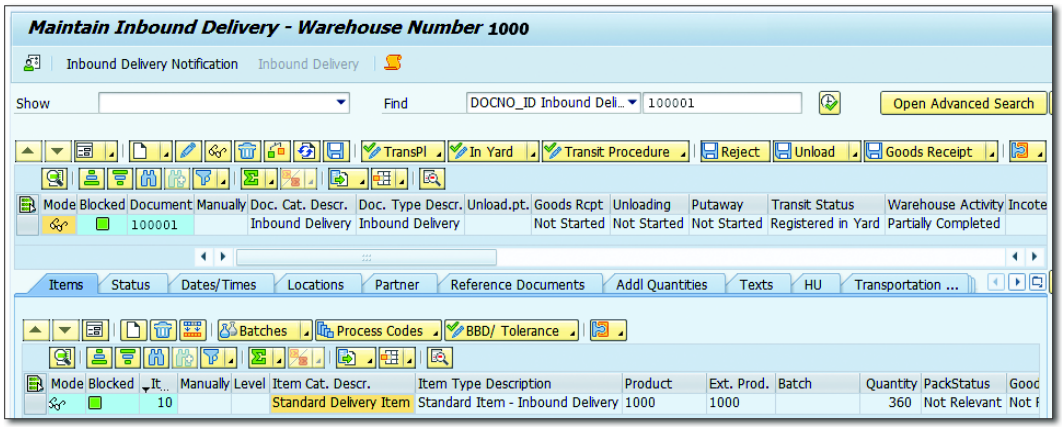


Figure 7.14 Inbound Delivery in SAP EWM

The communication from SAP EWM inbound delivery is sent back to SAP ERP delivery via PPF. PPF action definition `/SCWM/MSG_PRD_SEND` is used for this communication, which is part of application `/SCDL/DELIVERY` and action profile `/SCDL/PRD_IN`.

The IDN containing all the information from the SAP ERP inbound delivery in turn is converted to the SAP EWM inbound by activating the IDN manually or by PPF. IDN acts as an intermediate document between inbound deliveries of SAP EWM and SAP ERP. The system can't generate any WTs based on the IDN document. The SAP ERP delivery details are copied into SAP EWM inbound delivery header and item details. (We'll discuss in detail the activation and creation of the SAP EWM inbound delivery in subsequent sections of this chapter.)

If the transmitted document is stuck due to an error in the SAP ERP system or due to missing information in SAP EWM, the queue entry will show a failed status. After the error is fixed, the queue entry can be processed by resetting the status in the inbound qRFC monitor (Transaction SMQ2). After you see the IDN blocked status in green, the IDN document is ready for activation and conversion into the SAP EWM inbound delivery.

7.3.2 Notification Delivery in SAP EWM for the Purchase Order/ Production Order

The expected goods receipt (EGR) functionality of SAP EWM enables the system to handle the receiving of goods from the vendor and from production without prior notification.

Let's discuss the various documents involved in this process. Because POs and production orders are created in the SAP ERP system, as a first step, they must be pulled from SAP ERP to SAP EWM. This ensures the availability of sufficient data for further processing in the SAP EWM system. SAP EWM provides Transaction /SCWM/ERP_EGR_DELETE to pull the POs and production orders from the SAP ERP system.

Figure 7.15 illustrates the EGR flow and the associated documents in both SAP ERP and SAP EWM.

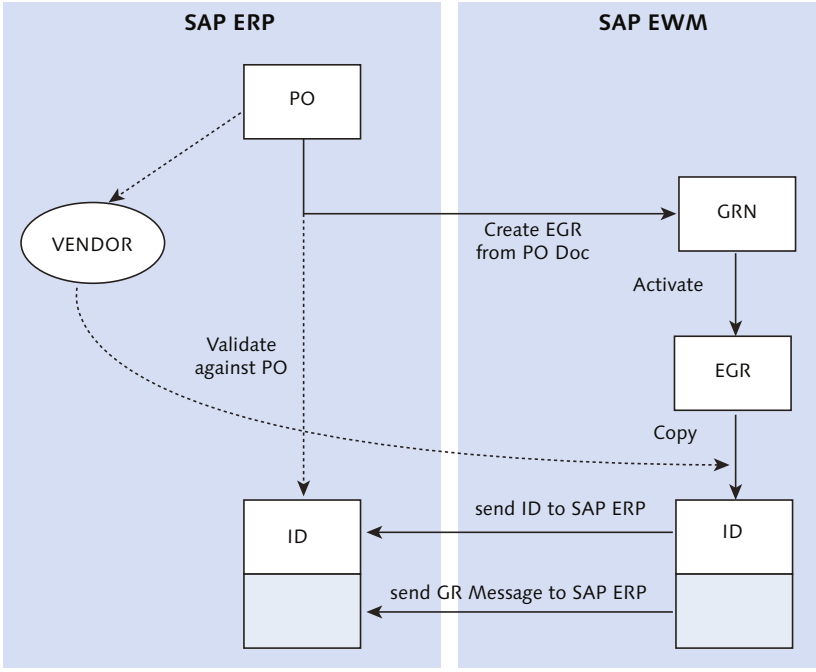


Figure 7.15 Expected Goods Receipt Process Flow

On the successful transfer of the production/purchase order to SAP EWM, goods receipt notification (GRN) is created as the first document in SAP EWM with

reference to the purchase/production order. You can view the created GRN using Transaction /SCWM/GRN and activate the GRN using the Activate button on the screen to create the EGR document. Activation can also be performed using PPF in the background. On successful activation, the EGR document gets created, which works as input for creation of the inbound delivery in SAP EWM.

7.4 Inbound Delivery in SAP EWM

Inbound delivery in SAP EWM, which is created upon activating the IDN either manually or automatically by PPF, forms the basis for creation of subsequent documents for carrying out various activities in the warehouse. Based on the data contained within the inbound delivery, activities such as packing, VAS, goods movement tasks, and so on can be performed. During the creation of the inbound delivery, various field values are determined. This determination takes place according to the configurations maintained in the IMG. Let's discuss a few such important field determinations and related configurations. We'll also discuss briefly the statuses, tolerance checks, batch, serialization, and PPF actions relating to inbound delivery.

We've discussed the determination of the document type and item type in general in previous sections of this chapter. Another important determination that takes place is the warehouse process type (WPT). Configuration related to WPT determination can be set up by navigating to the SAP EWM IMG menu path, Extended Warehouse Management • Cross-Process Settings • Warehouse Task • Determine Warehouse Process Type.

As shown in Figure 7.16, this determination is based on the warehouse number, inbound document type, item type, delivery priority (originates from the SAP ERP system), process type determination indicator, and process indicator. The process type determination indicator (ProTypeDet) is maintained in the product master. Note that if you're creating a warehouse by copying an existing warehouse via SAP EWM IMG menu path, Extended Warehouse Management • Cross-Process Settings • Copy Warehouse Number Customizing, WPTs for the source warehouse number get copied to the warehouse created.

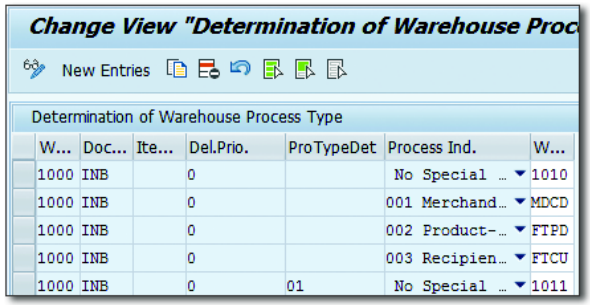


Figure 7.16 Determination of the Warehouse Process Type

Packaging specification can be determined automatically during inbound delivery creation. This requires activation of automatic packaging specification at the document type level, determination procedure setup, and existence of an active packaging specification in the system. Automatic packing can be disabled at the document type definition (discussed in Section 7.1.2) level. Packing is generally performed when goods are received from locations that aren't managed by HUs, external vendors, or production lines. Figure 7.17 is a portion of the document type definition screen, wherein you can choose the procedure for packaging specification determination. The PARTNER ROLE field helps in setting up condition records for packaging specification determination. Determination uses the popular condition technique for the packaging specification determination.

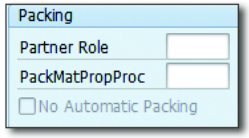


Figure 7.17 Deactivation Flag for Auto Packing in Document Type

Staging area and door, at which goods will be unloaded and staged before movement to final or interim storage bins, are also important determinations that take place during creation of the inbound delivery. Relevant settings can be done using the SAP Easy Access menu path, EXTENDED WAREHOUSE MANAGEMENT • SETTINGS • SHIPPING AND RECEIVING • STAGING AREA AND DOOR DETERMINATION (INBOUND) or via Transaction /SCWM/STADET_IN. Another option to determine the door during the TU check-in process will be discussed in Chapter 10, Section 10.2.

The SAP EWM system determines and maintains various statuses related to goods movement across three levels in the inbound delivery: Delivery, Details Delivery, and Details Delivery Item (Figure 7.18).

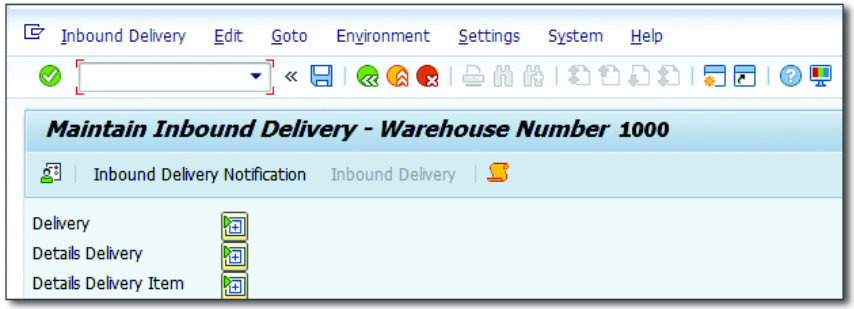


Figure 7.18 Inbound Delivery Document Sections

The Delivery section displays the values for goods receipt, unloading, putaway, transit, and warehouse activity statuses. For example, values for goods receipt status might be Not Started, Partially Completed, or Completed, based on the actual movement of goods. These statuses don't include all the statuses that the SAP EWM system maintains at the header level. To refer to all of the possible header statuses, you need to go to the Status tab of the Details Delivery section. Statuses included here relate to packing, quality, delivery block, archiving, and so on. To refer to the statues of items, you need to select the item in the Details Delivery section and go to the Status tab of the Details Delivery Item section.

Inbound receipt tolerance details are transferred from the SAP ERP system to IDN and copied until inbound delivery in SAP EWM. SAP EWM allows you to use the Tolerance Check Based on the Reference Document indicator at the time of the inbound delivery creation. This indicator allows you to control the tolerance at the inbound delivery item. When this indicator is set externally, it sums up all the inbound deliveries for this item and compares them with the PO or production order. Based on this check, SAP EWM sets the status for Tolerance Check to Checked, Not OK if it falls outside the tolerance limit. When the statuses aren't okay, the document can't be processed further until the statuses are fixed. If the indicator isn't influenced externally, then it validates against the IDN, and if any discrepancy is there, a message is sent to notify the differences.

The batch information is transferred from SAP ERP inbound delivery to the inbound delivery of SAP EWM through IDN. If the batch number doesn't exist, the system derives the batch number based on the defined number range for batches.

If the supplying location is on the SAP ERP system, the batch record might be CIF'd from SAP ERP to SAP EWM as soon as it's created in SAP ERP.

If the supplying location is on SAP EWM, the batch record would exist. If no record exists, there are two ways of creating the batch record: either manually from the inbound delivery document or automatically while inbound delivery is created.

You can control the batch valuation with SAP standard characteristics or user-defined characteristics. If you want user defined, this has to be regulated via `/SCWM/EX_DLV_BATCH_CHAR` of enhancement spot `/SCWM/ES_DLV_BATCH`.

By using the serial number, you can differentiate each item in the warehouse from the rest. Serializations are also used for business situations where a customer complains about a specific product, and you want to be sure that the same product was delivered to the customer. The SAP ERP serial number profile can be set up in SAP EWM for each warehouse. The Serial Number Requirement indicator is copied from IDN.

PPF actions are determined based on the start and schedule condition for the relevant action definition in the action profile for the application. There are certain predefined PPFs delivered by SAP that trigger appropriate actions such as sending SAP ERP delivery messages (action profile `/SCDL/PRD_IN` and application `/SCDL/DELIVERY`), which is triggered to send the updates to the SAP ERP system. You might have certain follow-up actions scheduled when the inbound delivery is created in SAP EWM, for example, printing unloading instructions. A business might want to pass on this information to the respective warehouse operators prior to the unload start, so that they can read it thoroughly to follow the guidelines for unloading. Printing of unloading instructions via PPF can be set up by using action definition `/SCWM/PRD_IN_UNLOAD_LIST_PRINT` and action profile `/SCDL/PRD_IN` in application `/SCDL/DELIVERY`.

7.5 Communication between SAP EWM and SAP ERP

Now that we've discussed the deliveries involved in the inbound relating to vendors, let's discuss the communication interfaces between both the SAP EWM and SAP ERP systems to keep the documents updated and in sync with each other regarding changes. Documents of importance here are SAP ERP inbound delivery and SAP EWM IDN and inbound delivery. This communication is asynchronous and uses qRFC technology. Table 7.8 lists the important communication interfaces relating to inbound processes and their purpose.

Inbound Delivery Interfaces	Purpose
/SCWM/INB_DLV_SAVEREPLICA	Inbound delivery reproduction from SAP ERP to SAP EWM.
/SPE/INB_DELIVERY_SAVEREPLICA	Inbound delivery reproduction from SAP EWM to SAP ERP.
/SCWM/INB_DELIVERY_REPLACE	Inbound delivery change replication from SAP ERP to SAP EWM.
/SPE/INB_DELIVERY_REPLACE	Inbound delivery change reproduction, prior to goods receipt in SAP EWM to SAP ERP. Inbound delivery deletion from SAP EWM to SAP ERP.
/SPE/INB_DELIVERY_SPLIT	Inbound deliveries split from SAP EWM to SAP ERP.
/SPE/INB_DELIVERY_RESPONSE	Accept or reject inbound delivery changes from SAP EWM to SAP ERP.
/SPE/INB_DELIVERY_CONFIRM_DECENTRAL	Confirmation, correction, or cancellation of the goods receipt in SAP EWM to SAP ERP.

Table 7.8 Inbound Delivery Interfaces

As Figure 7.19 illustrates, the interface functions are required for various reasons such as copying of deliveries on SAP ERP to SAP EWM and vice versa, changes in data in deliveries, split of a delivery, confirmations relating to goods receipt, and so on. Delivery replication from SAP EWM to SAP ERP is needed for the EGR scenario.

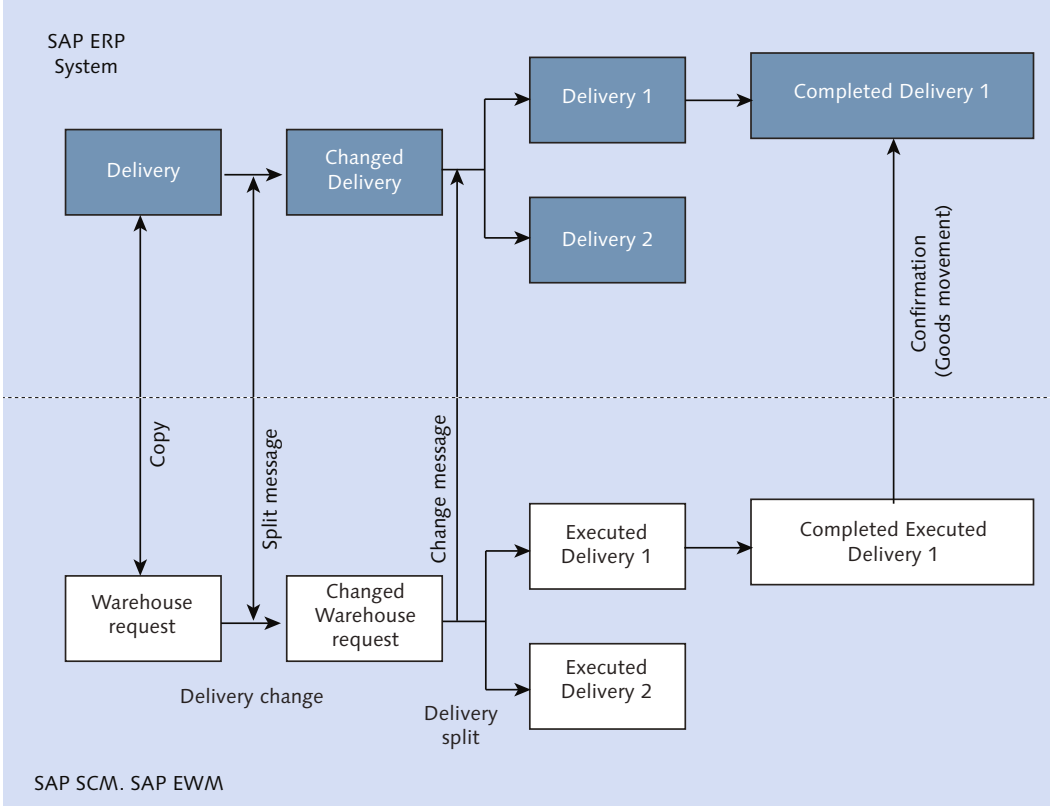


Figure 7.19 Communication Interfaces between SAP EWM and SAP ERP Systems

7.6 Check-In Process

The check-in process is about acknowledging that a vehicle carrying goods from the vendor has arrived at the warehouse premises and should be unloaded soon or as planned. The prerequisite for this is activation and setup of the YM functionality of SAP EWM. As introduced in the first section of this chapter, a yard is an area, generally adjacent to the warehouse, where temporary storage of vehicles and/or containers carrying goods takes place before they are unloaded using the free warehouse door. The yard has three types of spaces/bins called checkpoints, parking lots, and doors.

After the vehicles or TUs (e.g., containers on truck) carrying the inbound goods arrive at the facility, the yard administration office initiates the check-in process. The office validates the paperwork, for example, bill of lading, delivery note, and so on, that is sent along with the goods. At this stage, they must ensure that the relevant inbound delivery exists in the system. For an ASN by vendor, inbound delivery will already be available in the system. Otherwise, the clerk needs to create the inbound delivery manually using the PO number via the EGR process.

Sometimes, just after a vehicle arrives, the free door isn't available for immediate unloading of goods. Thus, vehicles need to wait in the yard before they are docked. Officials need to find the availability of a suitable door for unloading and allocate the door to this vehicle in the SAP EWM system. Managing the yard efficiently is a challenging task, especially when the warehouse uses land transports for movement of goods. These vehicles and containers are represented in the form of a vehicle or TU document in the SAP EWM system. Vehicles/TUs are linked to one or more inbound deliveries. Without TU and vehicle documents, you won't be able to perform any of the yard activities.

Note

It's important to know that deliveries can't be assigned manually to vehicles. Deliveries need to be assigned to TUs using Transaction /SCWM/TU, which can be assigned to the vehicle later using Transaction /SCWM/VEH. The check-in step can be performed for both vehicle and TU documents using Transaction /SCWM/CICO. We'll discuss these in detail in Chapter 10. Movement within the warehouse will also be detailed in Chapter 10.

You need vehicle or TU documents to record the check-in information and perform the check-in step. These documents can be created in advance using PPF. When the vendor sends the ASN, and inbound delivery is automatically created in SAP EWM, the PPF action can be triggered based on conditions. Action profile `/SCDL/PRD_IN` and action definition `/SCWM/PRD_CREATE_VEH` are used for this purpose. The system also links the delivery to these documents automatically.

The check-in process (Figure 7.20) is performed using Transaction /SCWM/CICO (Arrival at/Departure from Checkpoint), or you can access the same via the SAP EMW Easy Access menu path, Extended Warehouse Management • Shipping and Receiving • Yard Management • Arrival at/Departure from Checkpoint.

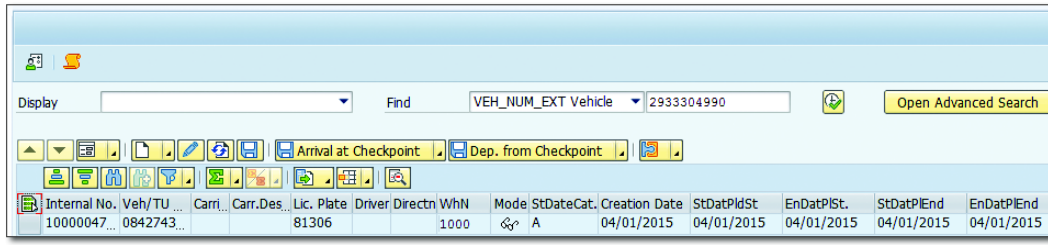


Figure 7.20 Check-In/Check-Out Screen

Information such as license plate number, SCAC code, seal number, driver name, and so on can be captured in the Vehicle/TU document, and then the check-in step can be performed using the ARRIVAL AT CHECKPOINT button in Transaction /SCWM/CICO screen. After you check in a vehicle, the status of the vehicle/TU is set to ARRIVAL AT CHECKPOINT automatically with the date and time stamp on it. Also the status of the vehicle/TU turns to ACTIVE, and the arrival time is captured in the header data of the vehicle document.

When PPF isn't set up, the vehicle and TU documents can be created manually using Transactions /SCWM/VEH and /SCWM/TU, respectively. TU documents can be assigned to the inbound deliveries manually.

Settings for warning and error messages relating to actual arrival outside the planned arrival period can be set up via the SAP EWM IMG menu path, EXTENDED WAREHOUSE MANAGEMENT • CROSS-PROCESS SETTINGS • SHIPPING AND RECEIVING • GENERAL SETTINGS • GENERAL SETTINGS FOR SHIPPING AND RECEIVING.

After the vehicle/TU is checked in, it might be docked to a door immediately by moving the vehicle to the door bin from the checkpoint bin or can be parked in the yard by moving the vehicle to the parking lot bin from the checkpoint bin if the doors aren't free. Both these movements can be performed using Transaction /SCWM/YMOVE via the SAP EWM GUI. You may navigate to this transaction via SAP Easy Access menu path, EXTENDED WAREHOUSE MANAGEMENT • SHIPPING AND RECEIVING • YARD MANAGEMENT • CREATE WAREHOUSE TASK IN YARD.

You can also execute the yard movement from the RF environment. SAP delivers a standard RF presentation profile, which includes yard movements. The presentation profile assignation to the warehouse is a prerequisite to work using RF in the warehouse. To make this assignment, navigate to the SAP EWM IMG menu

path, Extended Warehouse Management • Mobile Data Entry • Assign Presentation Profile to Warehouse. To log on to the RF environment, use Transaction /SCWM/RFUI, or navigate via the SAP EWM Easy Access menu path, Extended Warehouse Management • Execution • Log On to RF Environment. In the standard RF menu, you'll need to access 05 Internal Processes • 06 Yard Movements.

As shown in Figure 7.21, the system provides two options: first, 01 Create Adhoc Yard WT to create the WT, and second, 02 Create and Confirm Adhoc Yard WT to create and confirm the WT simultaneously. WTs created are HU WTs and use a special WTP *9999* called warehouse supervision. These yard movement WTs are created with the internal TU number as the source HU and destination HU, and bins involved as source and destination must belong to the yard.

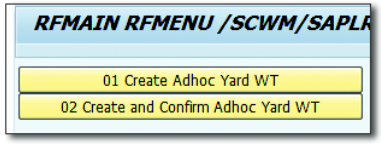


Figure 7.21 RF Menu for Yard Movements

Following are some important configuration points and other setups in the SAP Easy Access menu, which are required as prerequisites before you can create vehicles and TUs in the YM setup.

To define number ranges for vehicles, TUs, and shipping and receiving activities, navigate to the SAP EWM IMG menu path, Extended Warehouse Management • Cross-Process Settings • Shipping and Receiving • Number Ranges.

To maintain the means of transport, use Transaction S_AP9_75000130, or navigate via the SAP EWM Easy Access menu path, Extended Warehouse Management • Master Data • Shipping and Receiving • Route Determination • Maintain Means of Transport.

Define the control parameters (Figure 7.22) for forming vehicles and TUs via the SAP EWM IMG menu path, Extended Warehouse Management • Cross-Process Settings • Shipping and Receiving • General Settings • Define Control Parameters for Forming Vehicles/Transportation Units.

Next you need to activate the DTU status type. To activate the Assign Transportation Unit (DTU) status type for status profiles used by document and item

types, navigate to the SAP EWM IMG menu path, Extended Warehouse Management • Cross-Process Settings • Delivery Processing • Status Management • Define Status Profiles (see Figure 7.23).

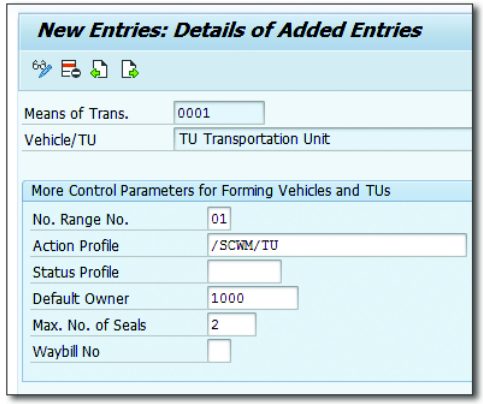


Figure 7.22 Control Parameters for Means of Transport

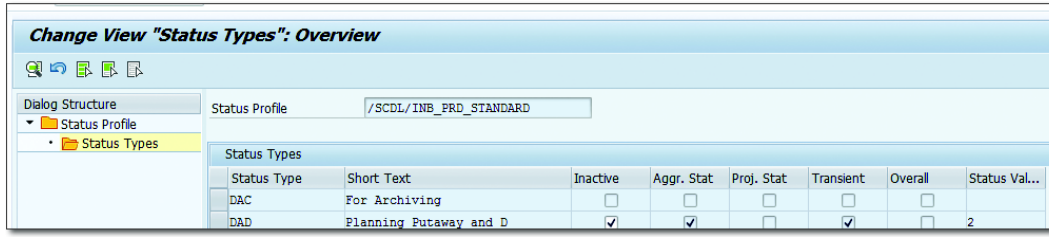


Figure 7.23 Status Profile Definition Screen

Means of transports must be linked to a packaging material, for example, a container, before the vehicle or TU document can be created in the SAP EWM system.

To define a packing material type, navigate to the SAP EWM IMG menu path, Extended Warehouse Management • Goods Receipt Process • Slotting • Influencing Parameters • Packaging Material Determination • Define Packaging Material Types.

To create a packaging material, you can use Transaction /SAPAPO/MAT1 or navigate to the SAP EWM Easy Access menu path, Extended Warehouse Management • Master Data • Product • Maintain Product.

To link the packing material to the means of transport, navigate to the SAP EWM Easy Access menu path, Extended Warehouse Management • Settings • Shipping and Receiving • Link between Packaging Material (TU) and Means of Transport, or use Transaction /SCWM/PM_MTR.

7.7 Unloading and Goods Receipt

After a vehicle carrying goods from the vendor is docked at the warehouse door, the next required steps are unloading the goods to the staging area and posting goods receipts in the system. Based on the business need, various combinations of these subsequent steps are possible in terms of actions to be carried out after docking the vehicle at the door. These steps might include creation of an unload WT, creation of a putaway WT, packing, returning the goods to vendor, printing unload instructions to be communicated to warehouse operators, and so on.

Verification of inbound delivery can be performed using Transaction /SCWM/PRDI or by navigating to SAP EWM Easy Access menu path, Extended Warehouse Management • Delivery Processing • Inbound Delivery • Maintain Inbound Delivery (see Figure 7.24). Search options include searching by inbound delivery number, ASN, and SAP ERP document (i.e., SAP ERP IDN, PO, or production order). There is also an advanced search available that can be used by clicking on the Open Advanced Search button and includes more options as search criteria.

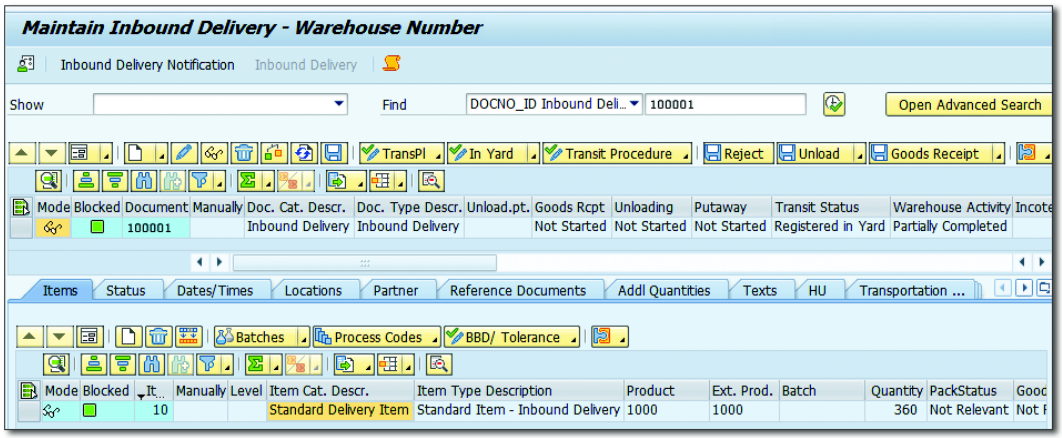


Figure 7.24 Inbound Delivery Document

Inbound deliveries can also be viewed using the warehouse monitor via Transaction /SCWM/MON or the SAP EWM Easy Access menu path, Extended Warehouse Management • Monitoring • Warehouse Management Monitor. In the navigation tree, use the node Inbound • Documents • Inbound Delivery for filtering the required inbound delivery document (Figure 7.25).

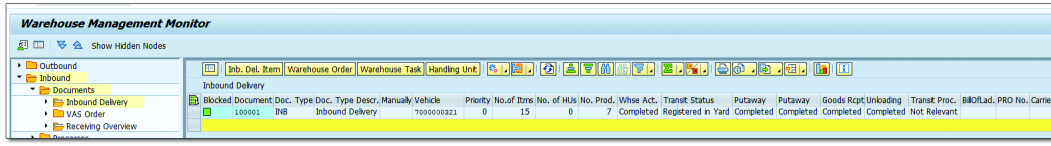


Figure 7.25 Inbound Delivery in the Warehouse Monitor

If YM is in use, verification of delivery takes place before the vehicle/TU check-in. If there are any discrepancies in the quantities in the inbound delivery, process codes may be used for adjustments in the delivery or for rejection of the item in the delivery (Figure 7.26).

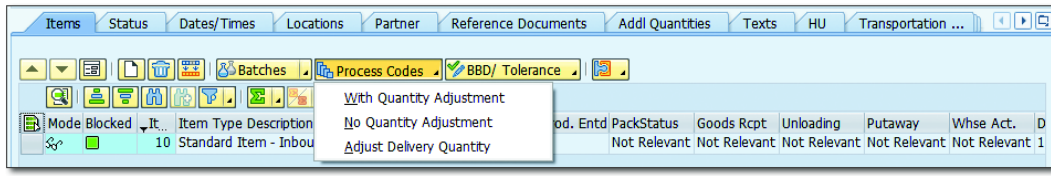


Figure 7.26 Process Code at the Inbound Delivery Item Level

It's advisable to complete all the steps in terms of document check, printing requirements, and so on before the unloading activity begins to avoid any interruption during unloading.

For the goods that need to be put away in an HU-managed storage type, SAP EWM provides the options of automatic creation of HUs in delivery or manually packing the goods for HU creation by choosing Inbound Delivery • Follow on Function • Pack from the menu bar in Transaction /SCWM/PRDI. We've discussed automatic packing in previous sections already. Figure 7.27 shows the manual packing screen where empty HUs can be created by providing relevant data in the screen and using the Execute button. Created HU numbers are immediately displayed in the left portion of the screen. After selecting the goods and HU, you can use the Pack button to pack the goods. After the HU is packed successfully, you can expand the HU to see the goods packed inside it.

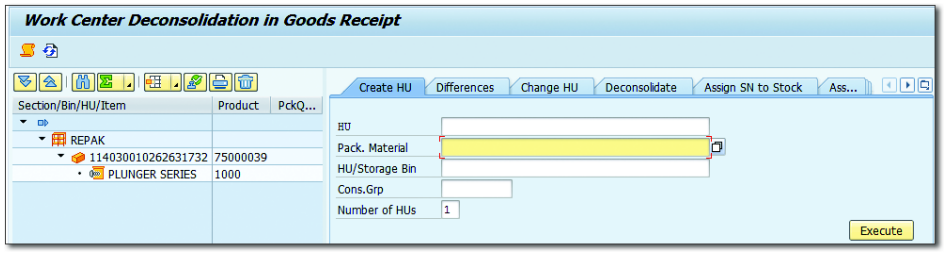


Figure 7.27 Packing Work Center for Inbound Delivery

7.7.1 Unloading

You can use Transaction /SCWM/UNLOAD or navigate to the SAP EWM SAP Easy Access menu path, Extended Warehouse Management • Delivery Processing • Inbound Delivery • Unload, for performing unloading in the system. HUs to be unloaded can be searched based on the inbound delivery document.

As shown in Figure 7.28, simple unloading can be performed using the Unload button against the HUs. Options available with the Unload button allow you to unload to a different destination bin with the use of an exception code and also to reverse a simple unload confirmation. After saving, the system updates the unload status of the HUs and also at the inbound delivery document item level.

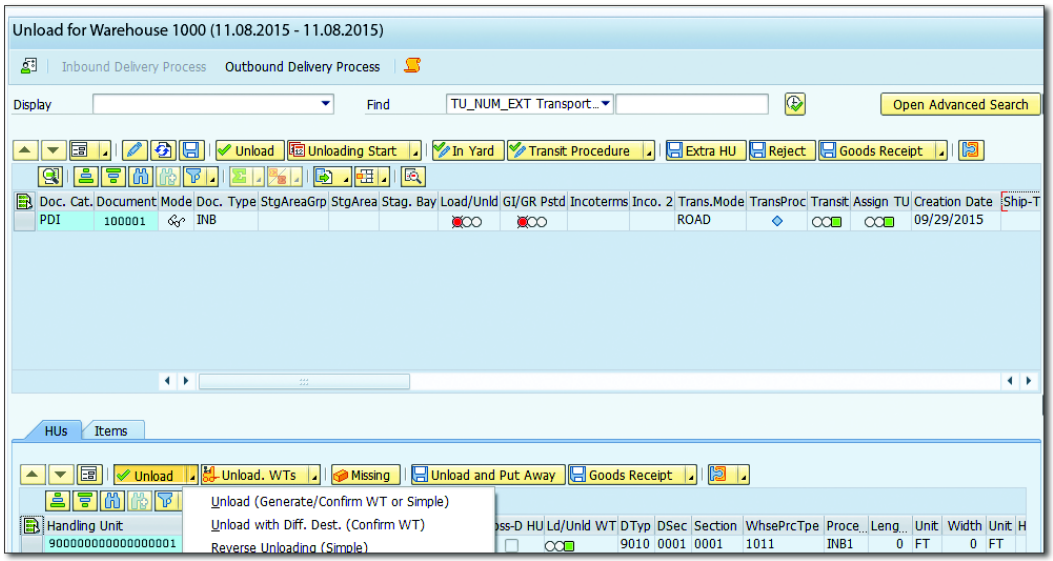


Figure 7.28 Simple Unloading

SAP EWM supports both simple and complex unloading processes. A complex unloading process uses WTs for unloading in the system. The unload process step is planned in the storage control configuration. The unloading WTs can be created either manually via the desktop using Transaction /SCWM/UNLOAD or in the background using PPF. This WT relates to transferring the goods from the door to the staging area. The unloading task must be confirmed before goods can be moved to final bins, unlike in simple unloading where unload WT doesn't get created.

Let's discuss the settings that must be carried out to enable the door assignment of the vehicle/TU carrying the goods and determination of the staging area.

To assign the supply chain unit and yard door bin to the warehouse door, use Transaction /SCWM/DOOR_SCU, or navigate via the SAP EWM Easy Access menu path, Extended Warehouse Management • Master Data • Shipping and Receiving • Assign Door Storage Bin and Supply Chain Unit.

When the storage process is used, the source and destination location for unloading the WT can be referred from the Process-Oriented Storage Control (POSC) steps. Otherwise, you can use Transaction /SCWM/STADET_IN for setting up the staging area information. The SAP EWM Easy Access menu path to navigate this setting is Extended Warehouse Management • Settings • Shipping and Receiving • Staging Area and Door Determination (Inbound). We will discuss POSC in detail in subsequent sections.

7.7.2 Goods Receipt

Posting of goods receipt (Figure 7.29) can be done manually or automatically by the system. You can post goods receipt manually against the inbound delivery document using Transaction /SCWM/PRDI, where you have an option for goods receipt both at the header level and the item level. You can also use Transaction /SCWM/GR to post the goods receipt manually. The SAP EWM Easy Access menu path for the same is Extended Warehouse Management • Delivery Processing • Inbound Delivery • Physical Goods Receipt. Goods receipts can also be posted automatically in the background, when storage control is in place, and after the unloading of the WT is confirmed.

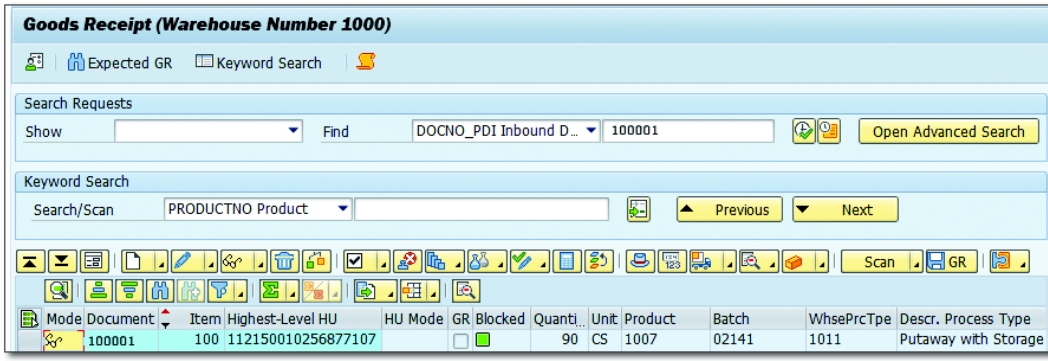


Figure 7.29 Physical Good Receipt

The system uses a WT in the background for posting the goods receipt. The WTP used by the system belongs to warehouse process category 5, that is, goods receipt posting. Until posting is done, HUs remain in PLANNED status. Upon posting of goods receipt in SAP EWM, the standard PPF is triggered for goods receipt posting in SAP ERP. SAP provides standard PPF action definition `/SCWM/MSG_PRD_SEND` for this, which can be found in application `/SCDL/DELIVERY` and action profile `/SCDL/PRD_IN`.

7.8 Putaway Processing

The putaway process moves the product from the staging area to the final storage bin in the warehouse. Based on the business need, this may be a simple putaway, that is, pick the unloaded goods from the staging area and put them away in the final bin (as shown in Figure 7.30), or it can be a complex putaway involving one or more activities to be performed before the final putaway to the storage bins. Sometimes, the layout of the warehouse also influences the putaway process because there might be a need for temporary storage of goods for identification or other reasons before the goods are put away in the final bins.

Simple putaway uses a single WT for transfer of the goods to the final storage bins. The WT can be created by using the follow-on function from the inbound delivery document maintenance screen. The WT suggests the details such as the product to be transferred, quantity, HU, source bin, destination bin, and so on. SAP EWM supports the handling of an unexpected situation such as breakage of

the destination bin, lesser quantity of goods available for the actual transfer, and so on by using exception codes that can be set up for the warehouse. Confirmation of the WT is possible from RF device or the SAP EWM monitor.

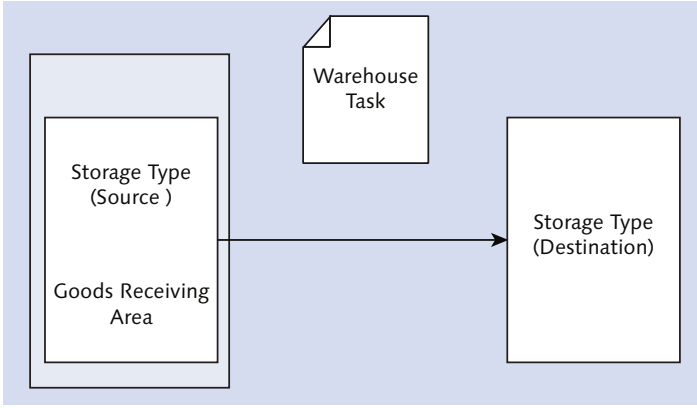


Figure 7.30 Simple Putaway Process

In the case of a complex putaway, activities to be performed before placement to the final bin may include VAS, QI, counting, deconsolidation, and so on. Thus, goods need to be brought to one or more intermediate bins in a sequence for performing these activities before they can be put away to their final bins in the warehouse. The SAP EWM system is highly flexible in setting up these movements of a complex putaway process. The system can be set up in such a way that it automatically proposes the intermediate bin the goods need to be moved to and the operation that needs to the performed on it in the designed sequence. Multiple WTs are used in the complex putaway process.

Multistep movements can be set up by using the storage control functionality of SAP EWM. There are two types of storage control: Process-Oriented Storage Control (POSC), mentioned earlier and discussed again in Section 7.8.4, and Layout-Oriented Storage Control (LOSC), discussed later in Section 7.8.5. It's mandatory to use HUs (packed goods) for using storage control in the warehouse.

7.8.1 Configuration Setup for Putaway

Let's discuss some of the important configuration settings that affect the putaway process in the warehouse. As shown in Figure 7.31, at the warehouse level, priority parameters for storage type, storage section, and storage bin, which regulate

the search sequence, can be set by navigating to the SAP EWM IMG menu path, Extended Warehouse Management • Goods Receipt Process • Strategies • Define Warehouse Number Parameters for Putaway. This search priority helps in regulating the sequence of priority within bin type, storage section, and storage type. For example, if the bin type priority is low, the alternatives within the bin type are searched first before moving to the storage section and storage type.

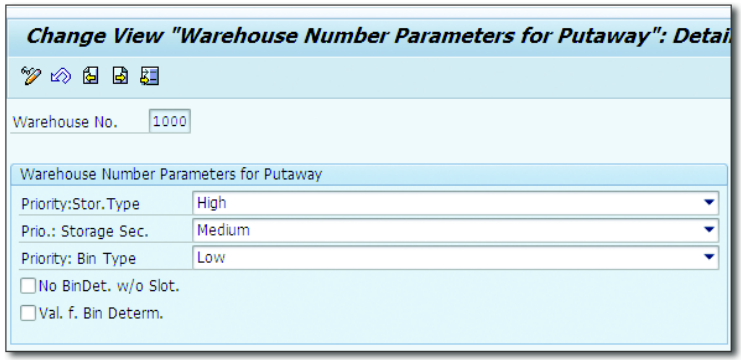


Figure 7.31 Putaway Control Parameters at the Warehouse Number Level

If the No BinDet. w/o Slot. is checked, it allows bin determination for only those products that are already slotted in the warehouse. The Val. f. Bin Determ. indicator allows the alternatives to be checked based on the bin evaluations of the search sequences for storage types, storage sections, and storage bin types.

7.8.2 Putaway Rules

After being unloaded at the staging area, goods must be put away to their appropriate bins, either directly or indirectly through intermediate bins. So how does determination of appropriate bins take place? SAP EWM identifies the appropriate storage type and storage section based on the putaway strategy set up in Customizing. Within the storage section of a storage type, multiple bins might exist. Decision on which bin to be used depends on the putaway rule maintained in the storage type. The following are the possible SAP EWM putaway rules that can be used:

- **Manual entry**
  The system doesn't propose the destination bin; instead, it's entered manually.

The warehouse operator chooses the destination bin based on his wisdom. Transactions that allow you to enter the destination data manually are Transaction /SCWM/TODLV_I (Putaway for Inbound Delivery), Transaction /SCWM/ADPROD (Move Product), and Transaction /SCWM/ADHU (Move Handling Unit). The RF framework also supports manual entry of the destination bin.

- **Fixed storage bin**
  This strategy is used when you want to put away the product to a fixed area (bin) in the warehouse. There are two ways in which fixed bin assignment can be set up:
  - Link a fixed bin to the product, either automatically by the system or manually by using Transaction /SCWM/FBINASN or Transaction /SCWM/BINMAT, respectively.
  - Determine the bin on the fly by defining the fixed storage bin strategy. The system determines the fixed bin on the fly and assigns it to the product as a fixed bin.
- **General storage**
  General storage is used especially for bulk storage. Most likely, these bins are used as mixed storage and, generally, have a single storage bin per storage section.
- **Addition to existing stock**
  This strategy allows the system to place the product in a storage bin where stock for the same already exists. It also checks for the free capacity to accommodate the additional stock. If it doesn't find enough space to accommodate additional quants, the system proposes the next empty bin. This strategy violates the first in, first out (FIFO) principle; for example, different SLEDs can go into the same bin. Hence, this should be used only if there is a space constraint in the warehouse.
- **Empty storage bin**
  When this strategy is chosen, the system proposes the empty storage bin for putaway. This strategy is suitable for products that are stored in high rack storage and shelf storage.
- **Near fixed picking bin**
  This strategy is used to put away the product nearer to the fixed bin. It checks the fixed storage bin first, and if it doesn't find the fixed bin empty, it uses this strategy to find the reserve bin nearest to the fixed storage bin.

- **Pallet storage (by HU type)**
  With this strategy, you can handle different HU types, for example, the 1 meter high and 2 meter high European pallet, to allocate them to the suitable storage bin section. You can only put away the same HU type in a storage bin. This strategy is especially used in high rack storage, where several HU types are generally accommodated. You can define the maximum number of pallets that can be accommodated for each combination of storage bin type and HU type. When the pallet is placed for the first time in the bin, the strategy determines the storage bin sectioning and assigns it to the storage bin.

  Performing bin sectioning (Figure 7.32) for bin type and HU type is defined in the SAP EWM IMG menu path, Extended Warehouse Management • Goods Receipt Process • Strategies • Putaway Rules • Storage Behavior: Pallets • Perform Bin Sectioning for Bin Type and HU Type.

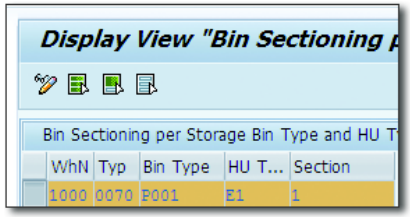


Figure 7.32 Bin Sectioning against Bin Type and HU Type Combination

- **Bulk storage**
  Use of bulk storage in the warehouse eases handling of warehouse operations due to the reduced number of bins. Certain products such as beverages, tires, and so on, are often stored in bulk. Bulk storage generally uses mixed storage. Due to frequent access, it can accommodate all HU types. There is just one bin per row for easy scanning. This method enables auto blocking per row and freely defined coordinate structures.

SAP EWM allows you to influence or change these strategies by using BAdI `/SCWM/ES_CORE_PTS`.

7.8.3 Availability Group Configuration for Putaway

As the name suggests, the availability group imitates the availability of the material for various purposes in the warehouse, such as goods in putaway, goods completely available, goods in production, and so on. Storage types in the warehouse

have a one-to-one association with these availability groups. In the storage type definition screen where the Availability Group field is available in the Goods Movement Control section. When goods are sent from the vendor and unloaded in the staging area storage type, they can be classified as Available in Putaway. Based on the business need, they can be further classified as Unrestricted in Putaway, Quality in Putaway, Blocked in Putaway, and so on. Similarly, goods stored in the finished goods storage type can be categorized as availability group Goods Completely Available. But still, they can further categorize stock types such as Unrestricted, Blocked, Scrapping, and so on. Stock types resemble the more current status of the stock such as Unrestricted, Quality, Blocked, and so on by assigning the availability group to the storage type. Stock types defined for the availability group become permissible for the goods stored in that storage type.

Related configuration can be done using the SAP EWM IMG menu path, Extended Warehouse Management • Goods Receipt Process • Configure Availability Group for Putaway. You can perform the following activities under this configuration node:

- **Define availability group**
  Here you can create the desired availability groups per the business need. Maintaining Date/Time Type in ERP System is required if you want to compare the time of transfer at which the stock was transferred into this availability group versus delivery (Figure 7.33).

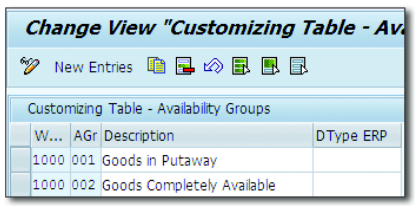


Figure 7.33 Availability Group Definition

Apart from being maintained as a parameter in the storage type definition (Figure 7.34), availability groups are also linked to SAP ERP plant and storage location combinations. You can access this setup in the SAP EWM IMG menu path, Extended Warehouse Management • Interfaces • ERP Integration • Goods Movements • Map Storage Locations from ERP System to EWM (Figure 7.35).

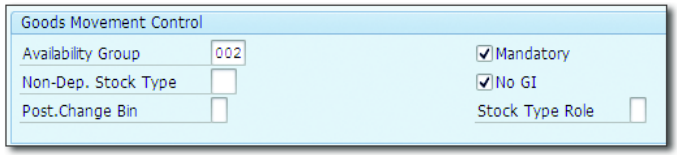


Figure 7.34 Goods Movement Control

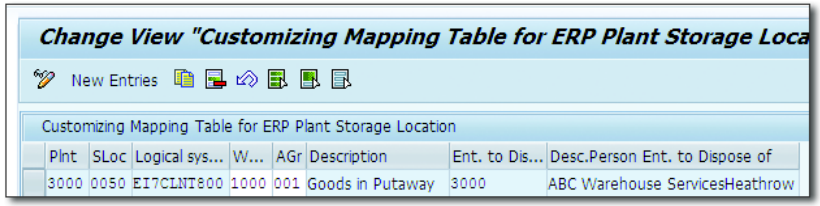


Figure 7.35 Define Non-Location-Dependent Stock Type

These stock types are equivalent to stock categories of SAP ERP and are also linked to SAP ERP stock categories internally by the system. If you've created a warehouse using copy from the default warehouse of predefined non-location dependent stock type for the new warehouse, the SAP ERP system only recognizes these predefined stock types. You need to define a new stock only if you want the non-location-dependent stock type not to be linked to SAP ERP (Figure 7.36).

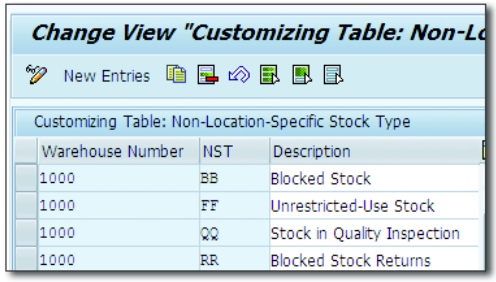


Figure 7.36 Non-Location-Dependent Stock Types in SAP EWM

- **Configure stock type**
  This activity allows you to define the SAP EWM stock type and map it to the availability group and non-location-dependent stock type. This setup determines the subsequent stock type for movement between two storage types.

This is another Customizing path for maintaining the availability group for storage types (Figure 7.37). The same can be maintained from the storage type definition from the master data node in the SAP EWM IMG. It's important to assign the availability group to the storage type. When you do a putaway from the staging bin to the final bin by confirming the WT, the system also does a stock type change in the background. This posting change is possible only if you maintain the availability group in both the source and destination storage types, and also different stock types should be maintained in these availability groups.

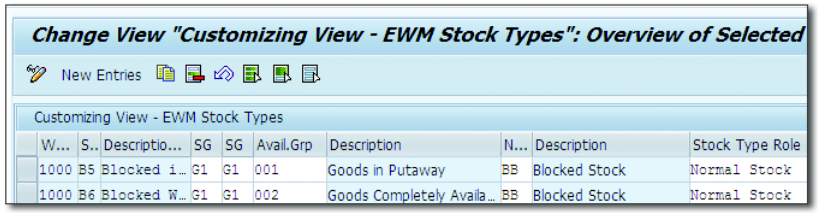


Figure 7.37 Assign Availability Group to Storage Type

7.8.4 Process-Oriented Storage Control for Inbound Processes

The storage process control feature facilitates the modeling of multistep movements in the warehouse in both inbound and outbound processes. As noted earlier, it has two variants: named Process-Oriented Storage Control (POSC) and Layout-Oriented Storage Control (LOSC). POSC is focused on modeling intermediate activities, whereas LOSC is focused on modeling the intermediate steps by taking account of the physical layout of the warehouse.

POSC is used to automate multistep movements in the warehouse, wherein various activities such as deconsolidation, packing, QI, VAS, and so on are performed before putaway to the final bin. These activities necessitate movements to interim bins of work centers to perform the required activities. Multistep processes are also popularly referred to as complex warehouse processes. HUs are mandatory in POSC.

Let's now discuss the related Customizing for setting up an inbound POSC with steps such as unloading, deconsolidation, and final putaway.

To model the POSC, we're using an inbound process with the deconsolidation scenario as depicted in Figure 7.38. Goods need to be unloaded from door bin to

staging area bin and then transferred to the deconsolidation work station where the larger HU is broken into two separate smaller HUs. And in the last step, they are put away to their final bins in the warehouse for storage.

Note

The example provided here is just for explaining the POSC concept and may not necessarily fit the requirement of a warehouse you're modeling the POSC for. We're also using standard steps defined in SAP EWM, which can be renamed and altered to accommodate the real process of the business.

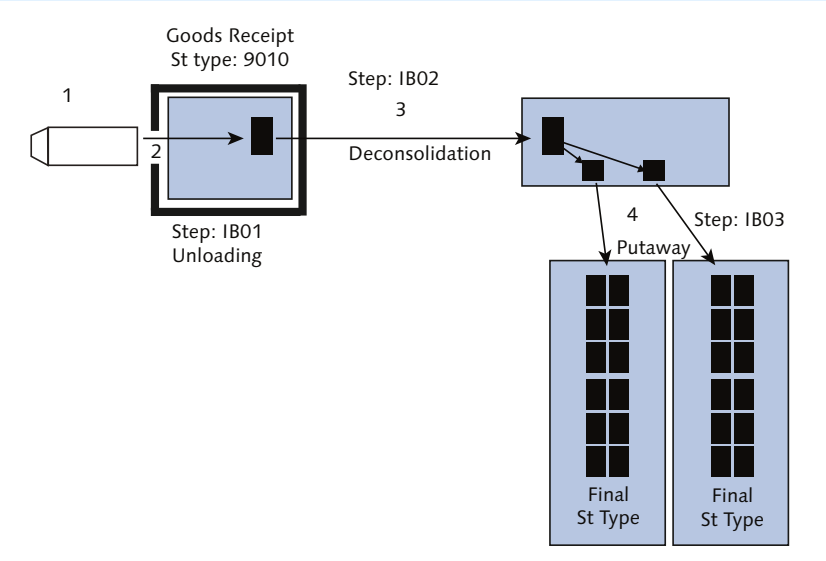


Figure 7.38 Inbound with Deconsolidation

So how does SAP EWM help model these? POSC rules are created at the warehouse level, which allows you to group the steps you want to perform. Definition of steps helps decide the source and destination bin, between which goods movement needs to take place. While grouping these steps, the system allows you to prescribe if you want the next step WT created automatically by the system or not. These steps in configuration are called external steps.

You may refer to these standard external steps in SAP IMG by accessing the menu path (Figure 7.39), Extended Warehouse Management • Cross-Process Settings • Warehouse Task • Define Process-Oriented Storage Control • Dialog structure (External Storage Process Step).

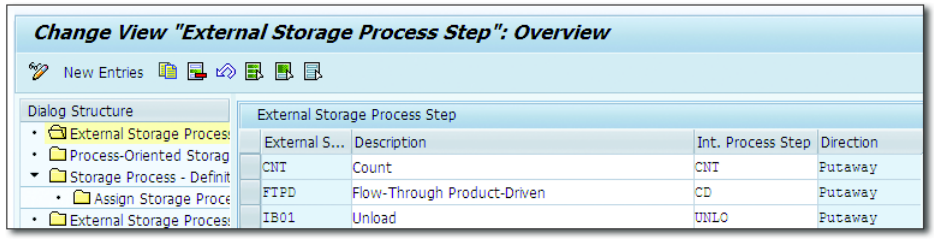


Figure 7.39 External Storage Process Steps Linked to Internal Process Steps

Note that external process steps aren't defined at the warehouse level and thus can be modeled differently per use by different warehouses (see Figure 7.40).

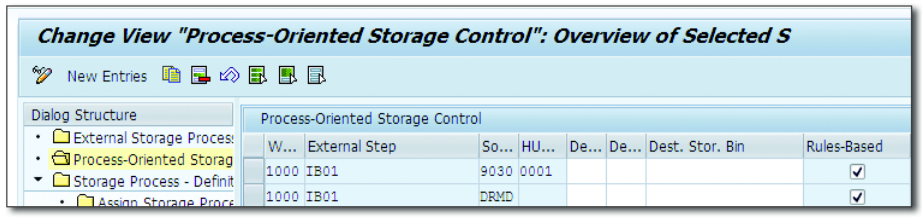


Figure 7.40 External Process Step with Destination Data for External Step

External steps are linked to internal steps, which are readily available codes in the system and can't be created manually. Steps used are IB01, IB02, and IB03 for unload, deconsolidate, and putaway, respectively. The storage process step IB01 denotes the receipt of product from the door to the staging area. A WT is created and confirmed against step IB01. The HU moved via step IB01 has two products in it and needs to be deconsolidated to create separate HUs for each product. Separating products and forming new HUs occurs in the deconsolidation work center. IB02 models the movement of the HU from the staging area to the deconsolidation work center. At the work center, the HU is unpacked and split into two separate HUs. After this activity is completed, the HUs are moved to the final putaway bin via step IB03. Destination data in step IB03 can be left blank for the system to use the putaway strategy to propose the destination bin in the putaway tasks. Instead of providing the destination bin data in the external step setup, you can use rule-based determination for the destination bin for WTs. For steps such as unload, stage, and load, destination data is determined using a warehouse order (WO). Note that the WO is another SAP EWM document that groups one or more WTs based on various defined criteria.

The deconsolidation work center will be determined based on the determination of the deconsolidation station (Figure 7.41) maintained in the SAP EWM IMG. You can access this via the menu path, Extended Warehouse Management • Goods Receipt Process • Deconsolidation • Specify Deconsolidation Station.

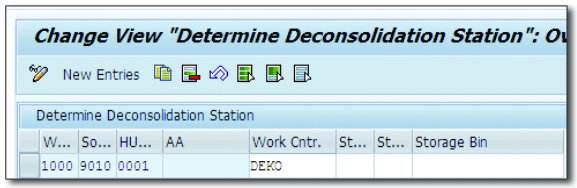


Figure 7.41 Determination of the Deconsolidation Station Bin

After the storage process is defined, the steps need to be assigned to it in the right sequence. As shown in Figure 7.42, the unloading step has been assigned first in the sequence, followed by the step to move the goods to the deconsolidation station and final putaway at the end.

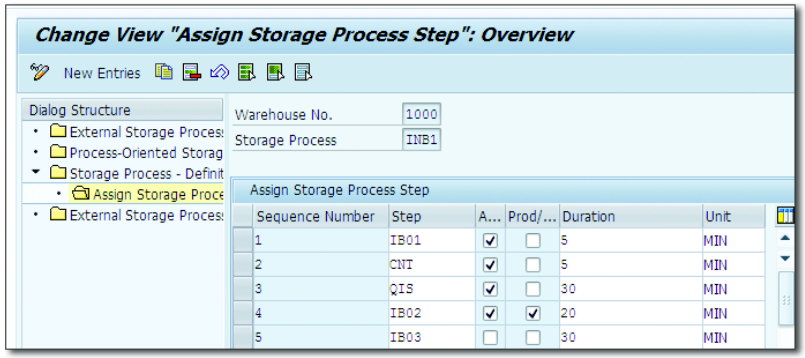


Figure 7.42 Storage Process with Various External Process Steps

While assigning steps to the storage process, you can control whether the WT for the next step can be created automatically by the system or not by using the Auto. WT checkbox. The Prod/HU WT indicator influences whether product WTs or HU WTs are to be created. The Duration fields in each step are used for estimation of the planned time for execution of the process steps in the warehouse.

After the POSC rule is set up, you need to place it in the Storage Process field in the definition of appropriate WTPs. We've already discussed WPT determination in SAP EWM inbound delivery in Section 7.4.

7.8.5 Layout-Oriented Storage Control for Inbound Processes

LOSC is used to map multistep movements of the warehouse to SAP EWM. These multistep movements may originate due to the physical layout of the warehouse or by use of the auto storage and retrieval system in the warehouse, which necessitates the transfer of goods to take place through intermediate bins. Goods from goods receipt or production may need to be stored in high rack storage, requiring temporary storage/identification using an intermediate bin. The SAP EWM system refers to these intermediate points in the warehouse as identification points, whereas outbound, intermediate bins are referred to as pick points in SAP EWM. LOSC works only with HUs with the only exceptions being picking points and identification points.

Figure 7.43 reflects an inbound warehouse process requiring an identification point as an intermediate bin for the transfer of goods from the goods receipt (GR) zone to the high rack storage area. Let's understand how this can be set up in the SAP EWM system by using standard storage types available in SAP EWM. Storage type 9010 is the staging area for goods receipt, 0081 is the identification point that might be a conveyor, and 0080 is the high rack storage at which goods need to be stored.

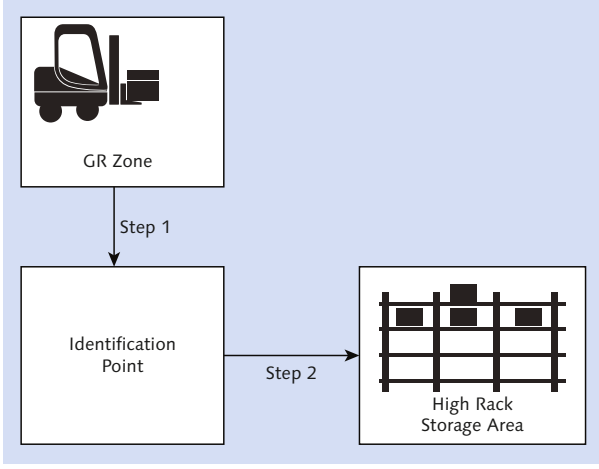


Figure 7.43 Transfer of Inbound Goods through Identification Point

LOSC settings can be done via the SAP EWM IMG menu path, Extended Warehouse Management • Cross-Process Settings • Warehouse Task • Define Layout-Oriented Storage Process Control.

Using the LOSC settings (Figure 7.44), you tell the system which intermediate bin to use as the identification point for the inbound process. Pick point, as intermediate bin, is used in the outbound scenarios. Appropriate storage role, which can be A-Identification Point, B-Pick Point, or C-Identification and Pick Point, must be assigned to these intermediate storage types. ID Point and Pick Point checkboxes are used as required.

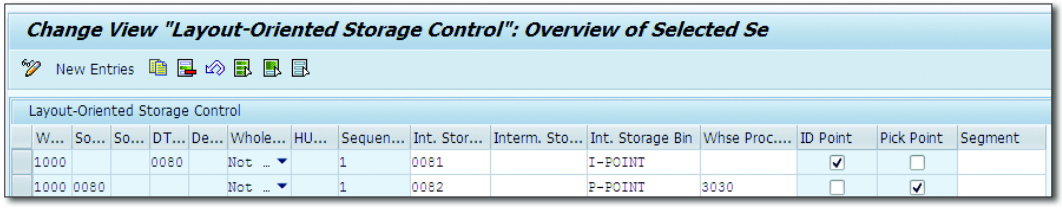


Figure 7.44 Layout-Oriented Storage Control Overview

As shown in Figure 7.45, the system creates two WTs for the overall movement. Initially, WT1 is in the active state, whereas WT2 is in the inactive state. After WT1 is confirmed, WT2 updates the source bin as the ID point and becomes an active WT, which can be confirmed subsequently.

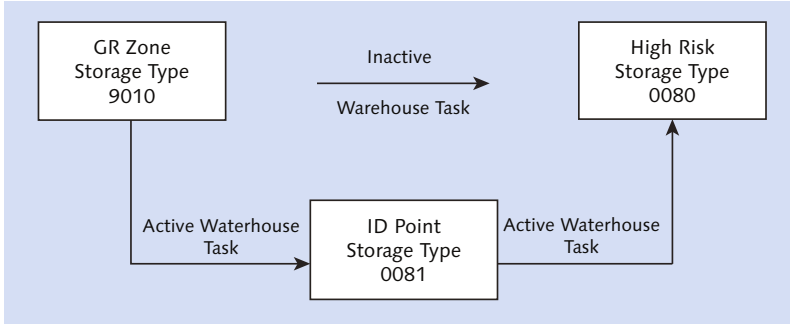


Figure 7.45 Warehouse Task Flow for LOSC

As shown in Figure 7.46, the pick point is an area in the warehouse in which you split the full HU to pick the partials. When products are stored in bulk storage, and if an order request is for partial products, you might need to withdraw from bulk before you can split the pallet or pick partials from it. In such a situation, you can move the bulk product to the pick point and withdraw partial HU by using LOSC. This pick point has to be an HU-managed pick point. After the withdrawal of the partial is complete, you can return the rest of the product back to the

putaway bin by using the HU WT. While making returns, you can determine the return process type, return storage type, and return storage section defined in the work center via the SAP EWM IMG.

You can navigate to this via menu path, Extended Warehouse Management • Master Data • Work Center • Define Work Center. If it's not defined in this IMG setting, the system determines the work center from the putaway strategies. When you define the pick point storage type, you need to check the Pick Point indicator.

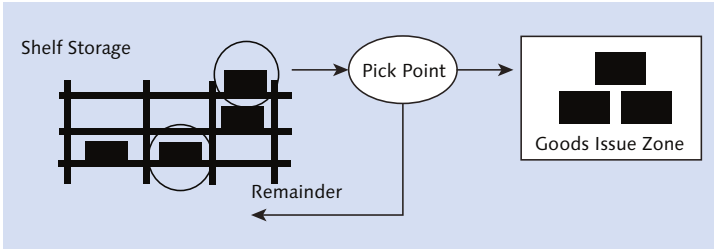


Figure 7.46 Partial Picking Using Pick Point

POSC and LOSC can be used together for the complex warehouse setup. When both storage controls are used, POSC is executed first, and then LOSC is executed. LOSC checks the process step sequence if possible in the layout view and executes. With both the storage control features available in SAP EWM, the system enables you to model the process based on both the activities to perform and the physical layout of the warehouse.

7.8.6 Deconsolidation Process

Deconsolidation is a process in which multiple HUs are created by separating products from a bigger HU, which may be sent by a vendor or a supplying plant. After it's received in the warehouse, you may want to separate the products and create smaller HUs before the final putaway.

SAP EWM provides the deconsolidation work center, which is specially used for this purpose. The deconsolidation work center provides a user interface for carrying out creation of the new HU, transferring products from bigger to smaller HUs, and so on. The deconsolidation work center can be accessed by the SAP EWM Easy Access menu path, Extended Warehouse Management • Execution • Deconsolidation in Goods Receipt, or by using Transaction /SCWM/DCONS.

After the goods are unloaded from the door to the staging area, they need to be brought to the deconsolidation work center. Smaller HUs are created by separating the products in the work center, and then the HUs are moved to their respective putaway locations.

Configuration of POSC helps in mapping the deconsolidation step in the SAP EWM system. The system looks for certain prerequisites for the relevance of deconsolidation. If the destination storage types for products inside HU belong to different activity areas, where each activity area is linked to a unique consolidation group, it becomes mandatory to deconsolidate the HU into smaller HUs. Otherwise, even when the activity area and the consolidation group are the same but the maximum number of WTs for the HU has been exceeded, these prerequisites are checked against the activity areas determined by the inactive product WTs for all the products within the deconsolidation HU. If any of the aforementioned prerequisites are met, the HU WT is created to the deconsolidation work center. Whenever deconsolidation is pertinent, the system creates the WTs for the deconsolidation of HU, for packing every product in the deconsolidation HU, and other WTs if applicable based on the configuration.

To maintain the consolidation group in the activity area (Figure 7.47), navigate to the SAP EWM IMG menu path, Extended Warehouse Management • Master Data • Activity Areas • Assign Storage Bins to Activity Areas.

Deconsolidation-related settings can be made in the SAP EWM IMG under the node, Extended Warehouse Management • Goods Receipt Process • Deconsolidation. Using Define attributes for Deconsolidation, you define the maximum number of allowed putaway and deconsolidation WTs for putaway and deconsolidation HUs, based on activity and activity area.

Let's consider this example, where the maximum allowed WTs for deconsolidation HU is 5 with POSC and receipt was made for a deconsolidation HU with 10 WTs. Exceeding the maximum permitted number for WTs in the deconsolidation HU, the system moves the deconsolidated HU to the deconsolidation work center. Under the same situation, if the maximum number of allowed WTs for putaway HU is 2, during deconsolidation, the putaway HUs are created. After repacking the two product WTs into the putaway HU, SAP EWM proposes closure of this HU. This initiates the release of HUs for subsequent process putaways if defined after deconsolidation in POSC.

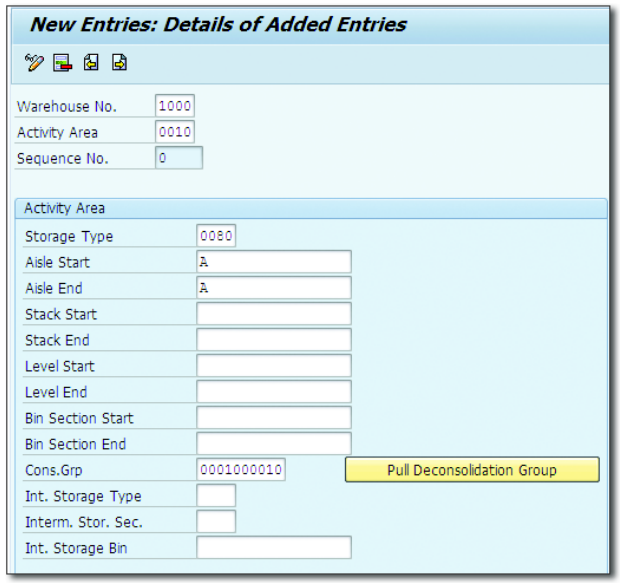


Figure 7.47 Maintaining the Consolidation Group in Activity Area

When deconsolidating in a cross-docking scenario, the contents of the deconsolidation HU are distributed in different ways for cross-dock relevant and nonrelevant products. The nonrelevant products in the deconsolidation HU are distributed to multiple putaway HUs as in the standard putaway process. When products are relevant for cross-docking, they are distributed across multiple pick HUs.

7.8.7 Value-Added Services for Inbound Processes

You can set up the relevance for VAS against a combination of document type, item type, and product group. For this setting, navigate to the SAP EWM IMG menu path, Extended Warehouse Management • Cross-Process Settings • Value-Added Services (VAS) • Define Relevance for VAS.

The system checks for the Customizing settings and necessary master data setup to initiate the VAS process. VAS requires a packaging specification for details of activities and packing/auxiliary materials required at the VAS work center. The packaging specification procedure helps in determining the right packing specification. Using the setting, you can also tell the system when to create the VAS order.

You include VAS as an external step, at the right sequence, in the POSC setup. If relevant, the system triggers the VAS step prior to the final putaway of the product. For example, if you need to do repacking before putaway, as desired from customers, VS02 (standard external step available) can be used in the POSC setup after unloading (step IB01) and prior to putaway (step IB03), as shown in Figure 7.48. (We'll discuss more about VAS in Chapter 17.)

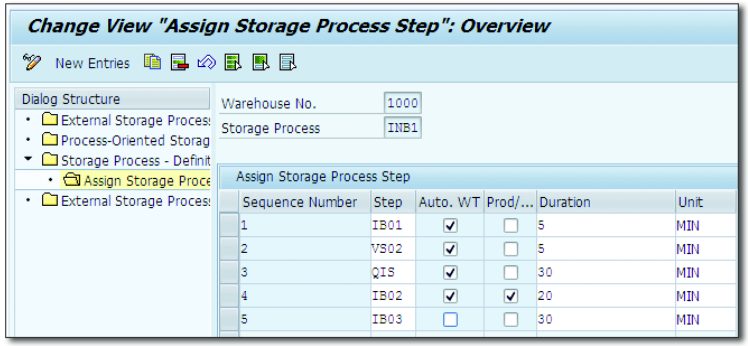


Figure 7.48 POSC with VAS (Repack) Before Putaway

7.8.8 Final Putaway

Per the requirement of the business, after deconsolidation, VAS, QI, counting, and so on, as the case may be, are performed, the final movement of products into their intended bins take place, and this last step is referred to as final putaway in a complex inbound process. The system determines the final destination bin and places it in the WT for the putaway based on the configuration settings in the SAP EWM IMG. WTs are created, manually or periodically by PPF, from the WR documents.

Related settings (Figure 7.49) are made under various SAP EWM IMG configuration nodes: Extended Warehouse Management • Goods Receipt Process • Strategies.

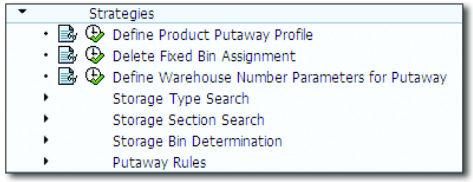


Figure 7.49 Strategy Configuration Nodes in SAP EWM

You define the Storage Type Search, Storage Section Search, Storage Bin Determination, and Putaway Rules based on the needs of your warehouse. With these strategies (putaway logic) in place, you enable the system to determine the appropriate bin for the warehouse processes.

So, how does the system identify which bin is suitable for the goods? You need to set up a strategy in the SAP EWM system for the identification of the appropriate putaway bin. This strategy, based on the setup, goes on in a sequence to search the storage types one by one. After it identifies a storage type where the system can look for an appropriate bin, based on the setup, it identifies a storage section in which it can search for the putaway bin. If this combination of storage type and section doesn't fetch an appropriate bin, per the sequence, the system picks the next section of this storage type for searching the putaway bin. After the correct storage type and sections are identified that have eligible bins, bin identification occurs based on putaway rules set up in the storage type.

This search is triggered with the help of the Putaway Control Ind. and Storage Section Ind. that are placed on the product. These indicators can be defined in the SAP EWM IMG menu path, Extended Warehouse Management • Goods Receipt Process • Strategies • Storage Type search • Define Putaway Control Indicator and Extended Warehouse Management • Goods Receipt Process • Strategies • Storage Type search • Create Storage Section Indicators, respectively. You maintain the putaway parameters in the Warehouse Data tab of the product master (Figure 7.50). You can access this via Transaction /SCWM/MAT1 or via the menu path, Extended Warehouse Management • Master Data • Product • Maintain Warehouse Product.

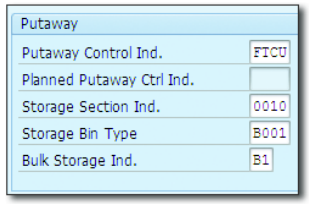
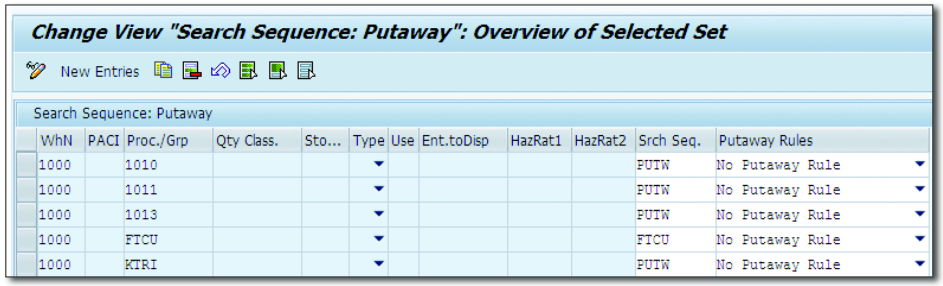


Figure 7.50 Warehouse Data Tab of the Warehouse Product Screen

Based on the Putaway Control Ind., the system determines the search sequence. Search sequence definition maintains the sequence of storage types in which the system should try searching for the putaway bin. As evident from Figure 7.51, other attributes that affect the decision on search sequence in the

warehouse are WTP, hazardous rating, putaway rules, quantity classification, and so on. The hazardous ratings assigned to the hazardous substance master are checked to store the product safely and in the appropriate place in the warehouse. Similarly, the Storage Section Ind. maintained in the warehouse product helps in determining the storage section of the bin for the final putaway.



WhN	PACI	Proc./Grp	Qty Class.	Sto...	Type	Use	Ent.toDisp	HazRat1	HazRat2	Srch Seq.	Putaway Rules
1000		1010								PUTW	No Putaway Rule
1000		1011								PUTW	No Putaway Rule
1000		1013								PUTW	No Putaway Rule
1000		FTCU								FTCU	No Putaway Rule
1000		KTRI								PUTW	No Putaway Rule

Figure 7.51 Putaway Search Sequence

In the storage bin determination settings, you can control the allowed storage bin types and HU type. The putaway rule definition helps in handling the storage behavior for pallet storage and bulk storage. The storage behavior for pallets strategy helps in accommodating different HU types and allocates the suitable storage bin section especially for high rack storage areas within the warehouse.

The bulk storage strategy (Figure 7.52) helps in accommodating certain bulk products that need a huge amount of space for high volume and frequent access. With this storage behavior, you can take advantage of defining a minimal number of storage bins and clear bulk structure definitions with ease of access to this storage.

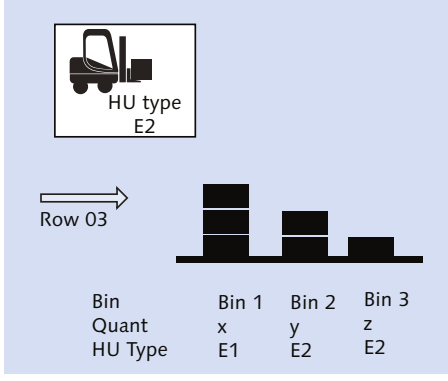


Figure 7.52 Bulk Storage

The created WTs are grouped into one or more WOs based on the configuration of the WO creation rule. These grouped WOs are assigned to a queue based on the queue determination (WOs and resource management/queue determination are discussed in Chapter 5). The WT and WO can be confirmed or executed via desktop or RF devices after the physical transfer of stock has taken place. You can use the warehouse monitor to confirm the WO in one go or confirm WTs individually. The functionality to confirm in the background and foreground mode are available and can be used by using the More Methods functionality in the warehouse monitor, as shown in Figure 7.53.

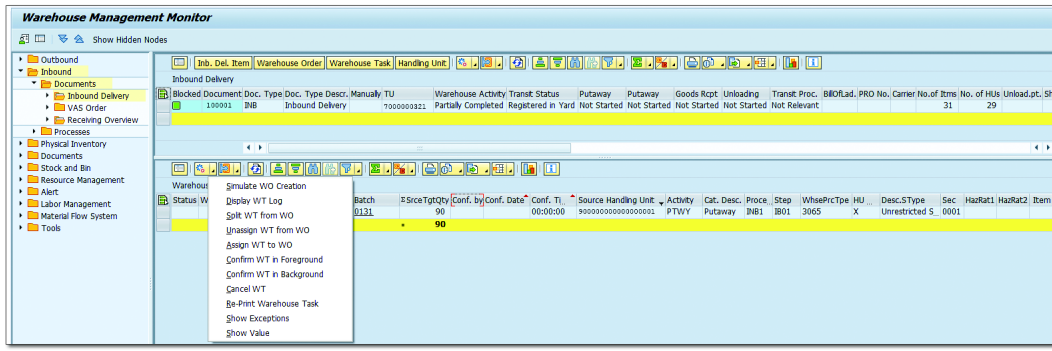


Figure 7.53 Warehouse Order Foreground/Background Confirmation Against Inbound Delivery Using the Warehouse Monitor

Confirmation is also possible by using Transaction /SCWM/TO_CONF. The navigation path for the same in the SAP Easy Access menu is Extended Warehouse Management • Execution • Confirm Warehouse Task.

The SAP standard delivered RF profile for putaway (Figure 7.54) provides options to confirm Putaway by HU, Putaway by HU (Clustered), and Putaway by WO.

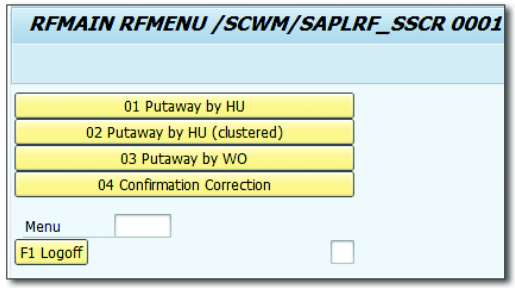


Figure 7.54 Putaway Confirmation via RF Transaction

7.9 Check-Out Process

After the inbound goods are unloaded and staged in the staging area, the vehicle/TU becomes free and can be checked out from the warehouse. The vehicle/TU needs to be brought back to the checkpoint bin from the door bin in the yard. A WT needs to be created for this purpose by using the YARD MOVEMENT option available with the YARD MOVEMENTS button on the vehicle/TU screen (Figure 7.55). The WTP used for this movement is 9999.

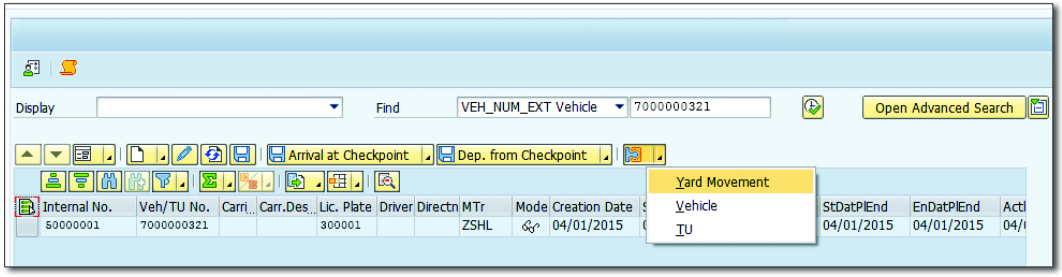


Figure 7.55 Yard Movement Using Vehicle Screen

After confirmation of the yard movement task, the vehicle/TU can be checked out from the yard by using the arrival/departure option (Figure 7.56). Otherwise, Transaction /SCWM/CICO can also be used for departure of the vehicle/TU.

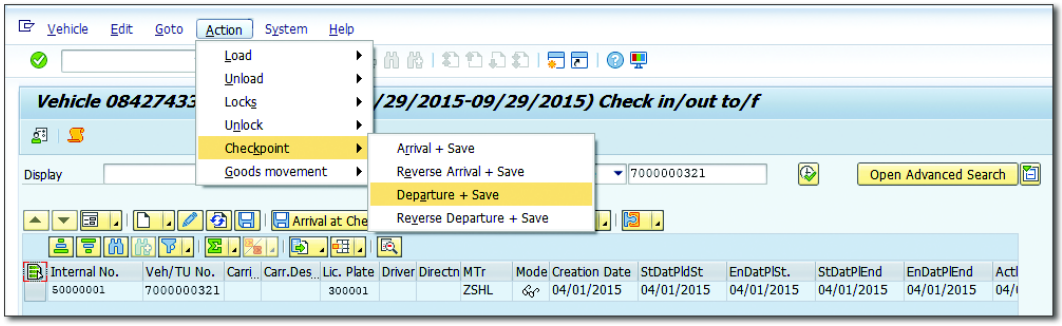


Figure 7.56 Departure from the Checkpoint of the Vehicle/TU

Alternatively, as shown in Figure 7.56, you can choose ACTION • CHECKPOINT • DEPARTURE + SAVE to complete the check-out process.

7.10 Expected Goods Receipt

The use of expected goods receipt (EGR) processes is widespread. When the warehouse receives additional pallets due to an unanticipated situation that wasn't on the original plan of receipts, it can be handled through EGR. Let's consider a couple examples. In SCENARIO 1, if the warehouse receives additional products sent by the vendor that weren't on the original ASN, SAP EWM empowers the warehouse to make receipt of these additional products without any returns. In SCENARIO 2, the production facility doesn't have room for storage so they shuttle products to a nearby warehouse. Until the supplies reach the warehouse for physical count/verification, the exact quantity isn't known. Under these circumstances, the business won't want to create the inbound delivery until the trailer reaches the warehouse. Upon receipt at the warehouse, the business can process the receipts via EGR processes. This allows the correct receipts to be posted when there is an ambiguity of quantity correctness until the product reaches the warehouse.

7.10.1 Push/Pull Expected Goods Receipt from SAP EWM

There are two ways of creating the EGR notification:

- **Push scenario**
  You initiate the process in SAP ERP using Report /SPE/INB_EGR_CREATE (Transaction /SPE/EGR—Maintenance of Expected Goods Receipt). To access this transaction, go to the SAP ERP Easy Access menu path, Logistics • Logistics Execution • Inbound Process • Goods Receipt for Inbound Delivery • Extended Inbound Delivery Processing • Subsequent Functions. This report helps you delete the existing EGR documents in SAP EWM and create new EGRs.
- **Pull scenario**
  You trigger the process in SAP EWM via Report /SCWM/ERP_DLV_DELETE or via Transaction /SCWM/ERP_EGR_DELETE (Generate or Delete Expected Goods Receipt). The menu path to access this transaction in SAP EWM is Extended Warehouse Management • Delivery Processing • Inbound Delivery • Expected Goods Receipt. By executing this report, you have four different options:

- Selecting possible EGRs in SAP EWM
- Deleting EGRs in SAP EWM
- Creating EGRs in SAP EWM
- Deleting and creating EGRs in SAP EWM

7.10.2 Maintaining the Expected Goods Receipt Notification

EGR notification documents are created using the initiator of inbound delivery processes in the SAP ERP system. Standard settings in SAP EWM create the EGR notification via a message. This message is received from the reference document with the required data in it. The document type and item type are defined in the SAP EWM IMG menu path, Extended Warehouse Management • Goods Receipt Process • Expected Goods Receipt • Manual Settings. EGR notifications are created with reference to the POs or production orders.

7.10.3 Maintaining the Expected Goods Receipt

To utilize the existing data of the EGR for creating the inbound delivery, it must be maintained using Transaction /SCWM/EGR or SAP EWM menu path, Extended Warehouse Management • Delivery Processing • Inbound Delivery • Expected Goods Receipt • Maintain Expected Goods Receipt.

After goods relating to the production/process become available for receipt at the plant, the supervisor can use this EGR document and additional data to create the inbound delivery document in SAP EWM. You can use Transaction /SCWM/GRPE and Transaction /SCWM/GRPI for creating SAP EWM inbound deliveries from the production and process order, respectively.

The EGR functionality of SAP EWM enables the warehouse to process the goods receipt even when there is a temporary outage of the SAP ERP system. The shipping office need not wait until the concerned department takes the initiative to process the document from the SAP ERP side; instead, the office can process with the EGR.

After the inbound delivery is created with reference to the EGR in the SAP EWM system, a message is sent to the SAP ERP system for inbound delivery creation within the SAP ERP system. The preceding document reference is being used while sending the message to the SAP ERP system. The inbound delivery number

in SAP EWM refers to the SAP EWM specific number range defined in the system. The IDN and inbound delivery are always created for one warehouse. The inbound delivery document is the WR in SAP EWM. This WR forms the basis for further warehousing activities. This inbound delivery is used to forecast the workload in the warehouse at difference stages such as putaway workload, deconsolidation workload, counting workload, and so on. You can access the workloads in the warehouse monitor via Transaction /SCWM/MON (see Figure 7.57).

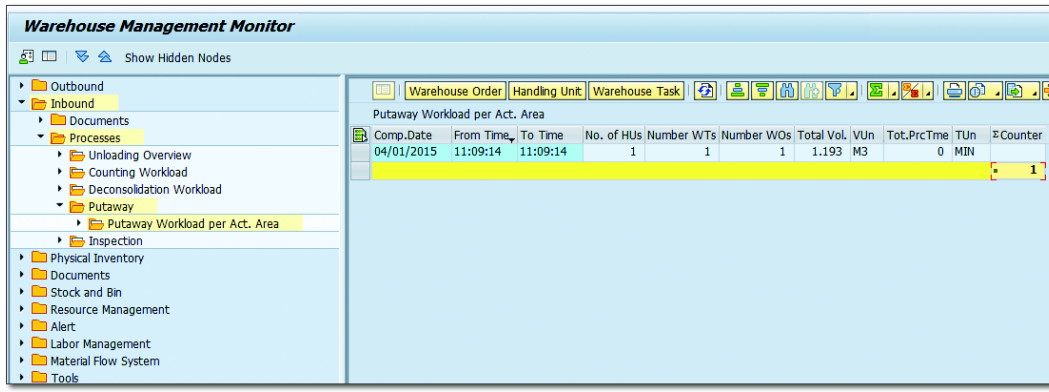


Figure 7.57 SAP EWM Monitor Showing the Workload

You can create the inbound delivery from the EGR using Transaction /SCWM/GRPE (GR Preparation—External Procurement) or via the SAP EWM Easy Access menu path, Extended Warehouse Management • Delivery Processing • Inbound Delivery. You can't modify or amend any data onto the EGR, but after the inbound delivery is created referring to the EGR, you can amend it.

7.11 Stock-Specific Unit of Measure in the Inbound Process

In general, the delivery items are always created in SAP EWM as base unit of measure (BUoM). When you want this to be influenced, you can work with the stock unit of measure (SUoM) in the SAP EWM side. With the SUoM in SAP EWM, it takes the alternative UoM from the SAP ERP delivery item as SUoM. For activating the SUoM, you need to activate the Define Item Types for Inbound Delivery Process flag for applying the alternative SAP ERP UoM (AUoM) as SUoM. You

can navigate via the SAP EWM IMG menu path, Extended Warehouse Management • Goods Receipt Process • Inbound Delivery • Manual Settings • Define Item Types for Inbound Delivery Process.

With this flag set (Figure 7.58), you can work with the preferred UoM in SAP EWM. When the preferred UoM is used in the product master data, and the SAP ERP quantity doesn't have any decimals, the SAP EWM delivery item is set as the preferred UoM. The prerequisites for working with SUoM are definition of UoM attributes at the warehouse level (Figure 7.59).

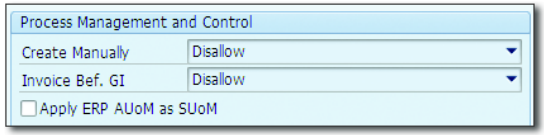


Figure 7.58 Process Management and Control

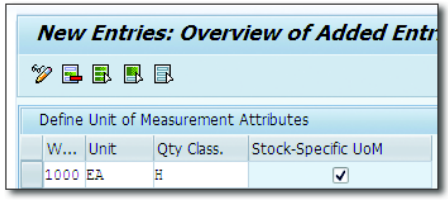


Figure 7.59 Define Unit of Measurement Attributes

You can maintain this in the SAP EWM IMG via menu path, Extended Warehouse Management • Master Data • Product • Define Unit of Measure Attributes.

7.12 Summary

You should now understand and be able to set up various process steps within the inbound process (e.g., unloading, deconsolidation, and putaway). You should also now understand the concepts of document mapping, storage control in the inbound process, VAS, document structure, EGR processes, and master data, and you should be able to perform the necessary configuration setup required to process the inbound delivery in SAP EWM.

Takeaways

- SAP EWM provides built-in YM functionality to handle the yard-related steps in both inbound and outbound processes.
- It's mandatory to assign the document category and item category in the definition of an item type.
- Using process management control settings, you get to choose whether you want to allow item creation manually or not.
- Inbound delivery documents originating from SAP ERP get replicated to the SAP EWM system before further processing on them begins in SAP EWM.
- Product groups, which help in the existence check of packaging specification, are created at the warehouse level and placed in the product master.
- Batch management control can be set up right from the creation of the IDN
- Each delivery document item is associated with the item category and item type.
- The check-in process is about acknowledging that a vehicle carrying goods from the vendor has arrived at the warehouse premises and should be unloaded soon or as planned.
- Posting of goods receipt can be done manually or automatically by the system.
- The putaway process moves the product from the staging area to the final storage bin in the warehouse.
- POSC is used to automate multistep movements in the warehouse, wherein various activities such as deconsolidation, packing, QI, VAS, and so on are performed before putaway to the final bin
- LOSC is used to map multistep movements of the warehouse to SAP EWM.

When two systems have to communicate for a production process to be executed, the synchronization between them is of utmost importance. A breakdown in communication can halt the entire production process. SAP EWM's advanced production integration feature provides the best traits of production process integration and ensures that production never stops.

8 Advanced Production Integration

The various methods of production each involve a series of stages or processes to transform raw material into semi-finished or finished goods. Any production process starts with the supply of production supplies (raw materials or components) to the production supply area (PSA). In SAP Extended Warehouse Management (SAP EWM), the integration of production process starts with SAP ERP to support the production execution right from the staging components and goods issue (back flushing of raw materials), receipt of by-product, and receipt of co-product until receipt of finished/semi-finished goods.

Advanced production integration supports the integration with SAP ERP for the manufacturing processes such as discrete manufacturing and process manufacturing and also for quality inspection process integration for in-process inspection during the production execution, and so on.

Figure 8.1 depicts the production process flow right from creation of the manufacturing order to the placement of the produced stock in the final bin. Let's take an example of manufacturing chocolates. You create and release the manufacturing order in SAP ERP for chocolate production. After you release the order, expected goods receipts (EGRs) get created in SAP EWM for release order parts. Upon release, you perform the staging for the manufacturing orders in SAP ERP with the system creating production material requests (PMRs) in SAP EWM for the ingredients. The PMR carries all the information about the ingredients for staging. The next step is to create the warehouse tasks (WTs) for staging the ingredients against the PMR. By confirming these WTs, you move the ingredients to the production supply area. Based on the actual consumption of the ingredients, goods issue is posted in SAP EWM and updated in SAP ERP.

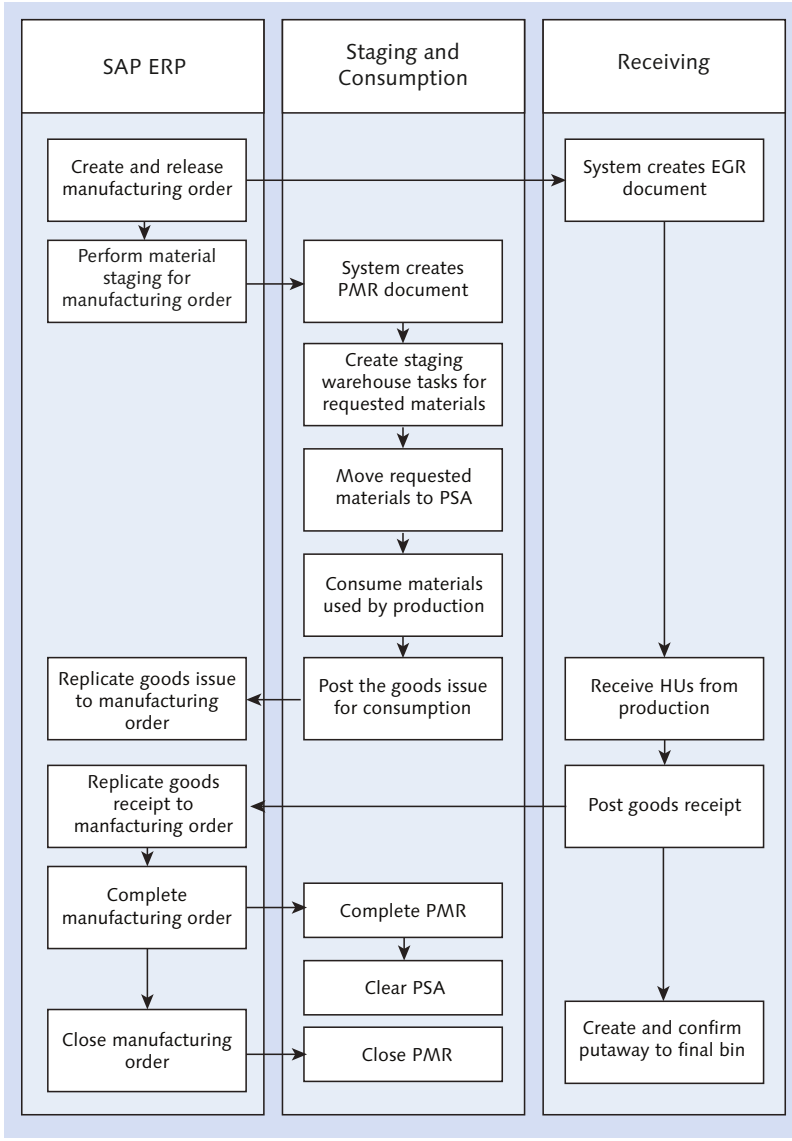


Figure 8.1 Production Supply and Receipt Process

As the production progresses, chocolates are produced and flow through the production lines for final packing before goods receipt. Once packed, the finished goods (chocolates) are receipted and put away into the warehouse in SAP EWM, and the system communicates back to SAP ERP for necessary updates.

Putaway WTs are created and confirmed in SAP EWM for placing the product into the final bin. After the entire manufacturing order is completed, technically complete (TECO) is set in the manufacturing order, and PMR is set to complete automatically based on TECO. Additional ingredients lying on the PSA are brought back to the respective locations in the warehouse. After the manufacturing order is set to complete in SAP ERP, the system automatically closes the PMR in SAP EWM.

8.1 Master Data and Settings for Advanced Production Integration

To work in conjunction with SAP ERP and SAP EWM, there are certain prerequisites for both that are mandatory for the production process:

- Activate the business function `LOG_PP_EWM_MAN` in Transaction SFW5.
- Maintain the delivery type determination in SAP EWM manufacturing integration. In this configuration setting, you assign the delivery type and the movement type for the process against the plant/storage location. You can maintain this setting in SAP ERP IMG via menu path, Logistics Execution • Extended Warehouse Management Integration • Production Planning and Control • Define Delivery Type Determination. The recommended delivery types for the staging process are shown in Table 8.1.

Material Staging Processes	Recommended Delivery Type
Release order parts with one-step stock transfer	HOD or DOG (outbound delivery)
Release order parts with two-step stock transfer, goods receipt from stock in transit	HID or DIG (inbound delivery)
Release order parts with two-step stock transfer, goods issue to stock in transit	HOD or DOG (outbound delivery)
Pick parts with one-step stock transfer	HOD or DOG (outbound delivery)
Pick parts with two-step stock transfer, goods receipt from stock in transit	HID or DIG (inbound delivery)
Pick parts with two-step stock transfer, goods issue to stock in transit	HOD or DOG (outbound delivery)

Table 8.1 Delivery Types in the Staging Process

- Create the PSA in SAP ERP Easy Access via menu path, Logistics Execution • Master Data • Warehouse • Production Supply • Production Supply Area • Create/Change, or use Transaction PK05.
- Create a control cycle for the PSA in SAP ERP Easy Access via menu path, Logistics Execution • Master Data • Warehouse • Production Supply • Control Cycle Production Supply • Create, or use Transaction LPK1. The control cycle supports several types of staging, especially the following:
  - Pick parts: Ensures the material staged from the warehouse to PSA is absolutely against the production order.
  - Crate parts: The materials stored in other standard containers are requested from the warehouse-managed location for production, irrespective of the production order.
  - Release order parts: It's primarily used for repetitive manufacturing. You request a quantity for staging against multiple release orders.
    - Manual Material Staging (Figure 8.2)
    - No Material Staging

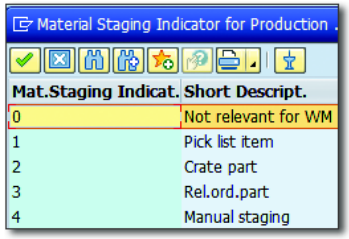


Figure 8.2 Material Staging Indicators

- Maintain the PSA in the bill of material (BOM), in the material master, or in the production version.
- Maintain the Storage Type Role in the storage type as "K" for the production supply (Figure 8.3). You can access the definition of storage type in SAP EWM IMG via menu path, Extended Warehouse Management • Master Data • Define Storage Type.

Figure 8.3 Storage Type Role

- Define and assign the warehouse process type and its determination for production supplies in SAP EWM (Figure 8.4). The navigation path for the definition is SAP EWM IMG • Extended Warehouse Management • Cross-Process Settings • Warehouse Task • Define Warehouse Process Type and Determine Warehouse Process Type.

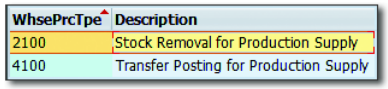


Figure 8.4 Warehouse Process Type for Production Supply

- If you want automatic posting of goods issue for production supply, maintain the relevant settings (Figure 8.5) in SAP EWM IMG via menu path, Extended Warehouse Management • Goods Issue Process • Outbound Delivery • Production Supply • Maintain Settings for Auto. Goods Issue for Production Supply and Post Goods Issue for Consumption Posting.

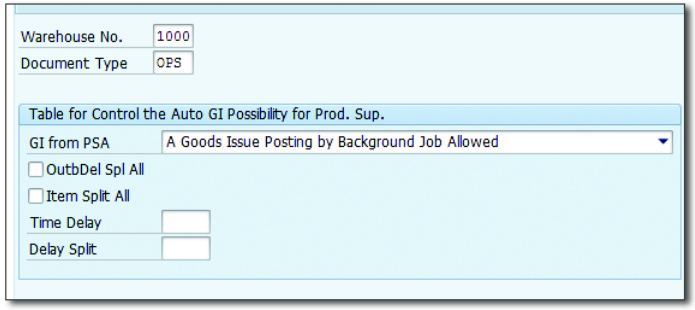


Figure 8.5 Maintain Settings for Auto Goods Issue for Supply

Similarly, goods issue for consumption posting can be configured by selecting (Figure 8.6).

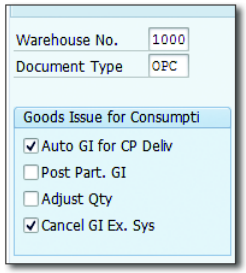


Figure 8.6 Post Goods Issue for Consumption Posting

8.1.1 Define Production Supply Areas

There are two ways of creating the PSAs in SAP EWM. You can manually define a PSA in SAP EWM by following the SAP Easy Access menu path, Extended Warehouse Management • Master Data • Production Supply Area (PSA) • Define PSA.

If you create the PSA manually in SAP EWM, ensure that you map the SAP EWM PSA with the SAP ERP PSA (Figure 8.7). You can achieve this by mapping in SAP EWM via the menu path, Extended Warehouse Management • Interfaces • ERP Integration • Map Production Supply Area (PSA), or use Transaction /SCWM/PSAMAP.

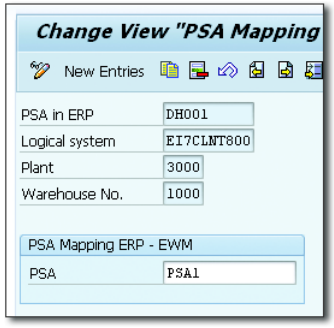


Figure 8.7 Production Supply Area Mapping between SAP ERP and SAP EWM

8.1.2 Mapping and Replication of Production Supply Areas

You can also replicate the PSAs (Figure 8.8) from SAP ERP via the SAP EWM Easy Access menu by choosing Extended Warehouse Management • Interfaces •

ERP Integration • Replicate Production Supply Area (PSA). You can also use Transaction /SCWM/PSA_REPLICATE to create and delete the PSAs.

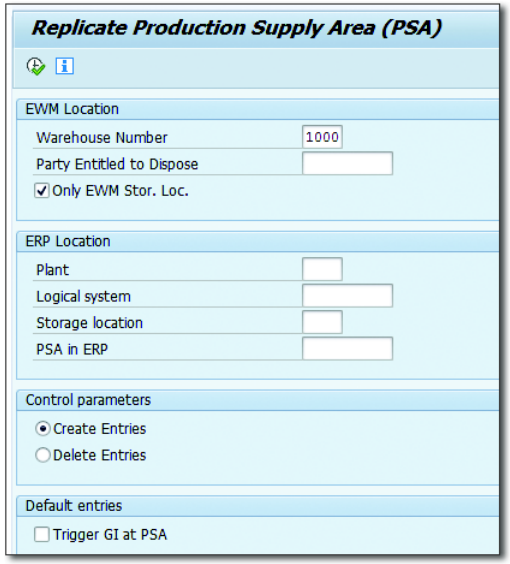


Figure 8.8 Replicate Production Supply Area Selection Screen

8.1.3 Assignment of Bin to Production Supply Area

To assign a bin to the PSA/product which are entitled to a warehouse, go to the SAP EWM Easy Access menu, and choose Extended Warehouse Management • Master Data • Production Supply Area (PSA) • Assign Bin to PSA/Product/Entitled in Warehouse Number, or use Transaction /SCWM/PSASTAGE.

You can also maintain a bin to product/entitled in PSA via SAP EWM Easy Access menu path, Extended Warehouse Management • Master Data • Production Supply Area (PSA) • Assign Bin to Product/Entitled in PSA or via Transaction /SCWM/PSASTAGE2.

You can also maintain PSA as a product group specific at the warehouse level by maintaining the entry in the SAP EWM IMG via menu path, Extended Warehouse Management • Master Data • Production Supply • Maintain Product Group Type for PSA Assignment (see Figure 8.9).

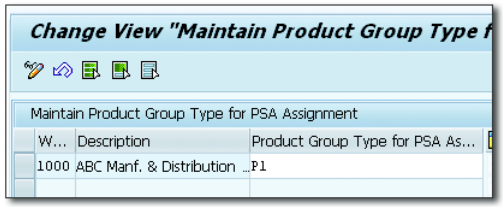


Figure 8.9 Product Group Type for Production Supply Area Assignment

8.2 Integration of Production Supply in SAP EWM

We've already seen master data and other integration-related settings in Section 8.1. Close-fitting integration at the document level is a prime factor for carrying forward the production supply request from SAP ERP to SAP EWM. To do so, the following settings are required:

- Map SAP ERP delivery types to the SAP EWM document types, and maintain this mapping in the SAP EWM IMG node via menu path, Extended Warehouse Management • Interfaces • ERP Integration • Delivery Processing • Map Document Types from ERP System to EWM.
- Map item types of SAP ERP deliveries to the SAP EWM item types, and maintain this in the SAP EWM IMG node via menu path, Extended Warehouse Management • Interfaces • ERP Integration • Delivery Processing • Map Item Types from ERP System to EWM.
- Define the document type determination for outbound deliveries in SAP EWM, and maintain this via the IMG menu path, Extended Warehouse Management • Goods Issue Process • Outbound Delivery • Define Document Type Determination for Outbound Delivery Process.
- Define the item type determination for outbound deliveries in SAP EWM, and maintain this via the IMG menu path, Extended Warehouse Management • Goods Issue Process • Outbound Delivery • Define Item Type Determination for Outbound Delivery Process.
- Define document type determination for inbound deliveries in SAP EWM, and maintain this via the IMG menu path, Extended Warehouse Management • Goods Receipt Process • Inbound Delivery • Define Document Type Determination for Inbound Delivery Process.

- Define item type determination for inbound deliveries in SAP EWM, and maintain this via the IMG menu path, Extended Warehouse Management • Goods Receipt Process • Inbound Delivery • Define Item Type Determination for Inbound Delivery Process.
- Define document type determination for posting changes in SAP EWM, and maintain this via the IMG menu path, Extended Warehouse Management • Internal Warehouse Processes • Delivery Processing • Define Document Type Determination for the Posting Change Process.
- Define item type determination for posting changes in SAP EWM, and maintain this via the IMG menu path, Extended Warehouse Management • Internal Warehouse Processes • Delivery Processing • Define Item Type Determination for the Posting Change Process.
- Configure the stock type for the production supplies in SAP EWM via the IMG menu path, Extended Warehouse Management • Goods Receipt Process • Configure Availability Group for Putaway.

8.3 Component Staging for Production

Staging of components at the right time enables optimum utilization of space within the warehouse. It avoids unnecessary holding of components in the PSA when there is no need for immediate consumption. SAP EWM allows you to stage the products at the right time and when there is a need. You can stage the entire quantity at once, or you can do it partially over a period of time. Upon consumption of the product (components) for production, the leftover products are brought back to the warehouse. You can stage the products to PSA in the following ways:

- **Single-order staging**
  In this scenario, you stage for every single PMR item. For every PMR item, you create a WT to move the product to the PSA, and the WT has a reference to the PMR item in it. The stock is consumed only against this PMR; this ensures that no item other than that needed for this particular order is being consumed. This scenario is necessary if a special ingredient is required only for a particular production order. For the previously mentioned chocolate example, a particular flavor might be required for only a limited amount of chocolates, so it's a special ingredient specific to a production order.

- **Cross-order staging**
  In this scenario, you cumulate multiple PMRs together and stage them at once. The WT is created for the cumulative quantity and staged to the PSA. Unlike the single-order staging, you don't have the PMR reference in the WT, for example, if you're manufacturing chocolates of the same variety in three different pack sizes. The ingredients, for example, cocoa beans, are the same for all three except the packing material. You can stage in total for all three orders.

8.4 Batches in Staging and Consumption

In SAP EWM, you can work with batch-managed products for production staging and consumption. PMR is used for staging and consumption in SAP EWM. When a product is batch activated, the batch information is maintained in the manufacturing order (in SAP ERP). The batch information can be entered in SAP ERP either manually or through batch determination, which you can configure. You enter the batch selection criteria in the manufacturing order in SAP ERP.

For the PMRs that contain batches or batch selection criteria, the system uses the single-order staging method. The single-order staging method ensures that the manufacturing process gets the same batch that is required for manufacturing. When the WT is created for the PMR, the system ensures that the batch is determined per the required selection for each PMR item when using single-order staging.

In SAP EWM, you can stage and consume a restricted batch via Customizing (Figure 8.10). You can access the setting in SAP EWM IMG via menu path, Extended Warehouse Management • Cross-Process Settings • Batch Management • Batch Status Management • Settings for Warehouse Task Creation.

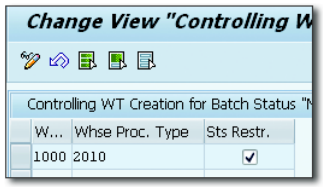


Figure 8.10 Control Warehouse Task Creation for Batch Status Restricted

You can also control the consumption of batches that don't meet the batch selection criteria in SAP ERP. For such control, you deactivate the check for the batch selection criteria in Customizing via menu path, Extended Warehouse Management • Goods Issue Process • Production Material Request • Batch Management for Production.

8.5 Catch Weight in Staging and Consumption

In a catch weight scenario, the PMR contains the estimated catch weight quantity, which is fetched from the product master in the outbound delivery item. When goods are issued, the actual quantity is recorded, and the delivery is updated with the actual allocated catch weight quantity.

There are certain prerequisites for activating the catch weight for staging and consumption. Ensure that you've defined the item types that contain a status profile and a quantity offsetting profile for catch weight in Customizing via menu path, Extended Warehouse Management • Goods Issue Process • Production Material Request • Define Item Types for Production.

You need to activate the status type DVQ in the catch weight status profile used for the PMR. You can access this in Customizing via menu path, Extended Warehouse Management • Cross-Process Settings • Delivery Processing • Status Management • Define Status Profile.

Also activate the quantity roles VALQ (valuation quantity) and VALQR (valuation quantity assignment) in the quantity offsetting profile used in PMR. You can access this in Customizing via menu path, Extended Warehouse Management • Cross-Process Settings • Delivery Processing • Quantity Offsetting • Define Quantity Offsetting Profile.

8.6 Staging and Consumption

As of SAP EWM 9.2, you can stage products that are needed by production and consume the products using functions based on SAP EWM. Staging and consumption is fully integrated with SAP ERP, but it allows you to work in a decentralized manner, based on the warehouse. The application offers the following features:

- Automatic quantity proposals for staging
- Distribution of staging over time
- Full access to existing SAP EWM functionality
- Triggering of consumption in SAP EWM
- Confirmation of more than the planned quantity
- User-friendly user interfaces (UIs)

With staging and consumption, SAP EWM updates SAP ERP on goods issue via material documents only.

To perform staging and consumption in SAP EWM, you need to create the WT for staging in SAP EWM against the PMR. You post the consumption of products in SAP EWM; this in turn posts the goods issue, and updates are sent to SAP ERP from the SAP EWM system. After the PMR is available in SAP EWM, you can keep staging and consumption going irrespective of SAP ERP system availability. Even when the SAP ERP system is taken down for maintenance, you can still keep continuing the staging and consumption process.

There are also situations wherein you want to continue staging over a period of time. You can maintain the quantity for staging in Transaction /SCWM/PSASTAGE (Assign Bin to PSA/Product/Entitled in Warehouse Number).

Automatic proposal of quantities for staging is possible in SAP EWM. The system checks for the current stock in the PSA, existing open WTs, and the requirements. Based on all this, the system calculates and proposes the quantity for staging the product. However, it's your discretion to accept or change the proposed quantity. You can even stage more than the planned quantity.

8.7 Receipt from Production

As of SAP EWM 9.2, you can receive packed goods from production in a warehouse managed by SAP EWM via the receipt from production feature. When large quantities are produced, and the execution of a manufacturing order stretches for several hours, you receive the products pallet-wise (handling unit after handling unit) from a conveyor line in the warehouse.

An expected goods receipt (EGR) document in SAP EWM contains information about the manufacturing order from SAP ERP. When you identify an incoming pallet in the inbound staging area, SAP EWM automatically creates a handling unit (HU) and an inbound delivery based on the EGR document. If necessary, you attach an HU label to the pallet. You perform the putaway of the HUs into the warehouse. You post the goods receipt and create a putaway warehouse order, either during the receipt or during the putaway of the HUs. The goods receipt quantities are communicated from SAP EWM to SAP ERP.

The following enhancements have been made in SAP EWM 9.2 to support the process of receiving goods from production:

- Enhanced expected goods receipt document to support by-products and store additional reference information, such as SAP ERP reservations
- New radio frequency (RF) transactions to process receipts from production in mobile devices
- New node in the warehouse management monitor provides an overview of the goods to be received for each manufacturing order
- New configuration options allow communication with SAP ERP using material documents instead of inbound deliveries
- New report to monitor and close pending inbound deliveries
- Enhanced configuration options to control follow-on actions such as putaway and goods receipt posting after declaration of receipt from production
- New internal application programming interface (API) to support implementation projects, building interfaces to manufacturing execution systems, or building customer-specific UIs

8.8 Consumption Posting/Back Flushing for Production Supply

Consumption posting is a process of consuming the products for production both physically and systematically in your system. When you post for consumption, the goods issue happens for the relevant product in SAP EWM, and a communication is sent to the SAP ERP system for necessary updates. The excess leftover on the floor/PSA can be brought back to the warehouse by means of reversal of

consumption posting. For example, if you've issued 25 GAL of ingredient to the PSA and if 3 GAL is left over at the PSA at end of the production run, you can bring back this 3 GAL quantity to the warehouse by means of a reversal of consumption posting.

SAP EWM enables you to post the consumption through either a desktop or RF environment. In RF, you have the following options in SAP EWM:

- **Consumption by manufacturing order**
  This transaction is used to post consumption for packed goods and unpacked goods.
- **Reversal of consumption by manufacturing order (HU)**
  This transaction is used to reverse consumption for packed goods.
- **Reversal of consumption by manufacturing order (bin)**
  This transaction is used to reverse consumption for unpacked goods.

Consumption can be posted only for the item that isn't marked for back flush. You can consume products that are staging relevant or nonstaging relevant. For example, when you have products such as crude oil as a raw material for your finished products, these products can be stored in silos and be consumed without the need of a staging.

Reversal is possible for both full and partial quantities. When you handle with HU-managed reversals, the partial HUs are only reversed to the same HU. While consumption posting happens, the HUs are deleted. You can possibly set your system so that when you reverse an HU-managed product, the same HU is re-created with the same attributes. For an HU inside an HU (nested HU), on reversal, the lower level HUs aren't created by the system.

You can't post a restricted batch for consumption. Only the batch, which isn't in restricted status, is allowed to be posted for consumption. The stock-relevant attributes are read while posting for consumption. SAP EWM allows you to post the serial-numbered stock for consumption and reversal.

8.9 Goods Issue for Production Supply

There are possible scenarios for issuing production supplies from the PSA either from the inventory-managed managed location or warehouse-managed location (SAP EWM). You can stage the products to both the locations depending on the

level on which you want to maintain the production supplies. If maintained in the inventory-managed location (non-SAP EWM), you can auto back flush the production supplies at the goods receipt of the produced material (finished goods). If the production supplies are maintained in the SAP EWM location, an outbound delivery is created. You need to process the outbound delivery and process for goods issuance of production supplies in SAP EWM. After the goods issue is posted in SAP EWM, the communication is transferred to SAP ERP for goods issue posting.

8.10 Goods Receipt from Production

SAP EWM supports multiple options for production goods receipt, such as production receipts using advanced production integration, production receipts triggered by SAP ERP, and production receipts triggered by SAP EWM.

8.10.1 Receipt from Production in Advanced Production Integration

Before proceeding with goods receipt, ensure that you have the EGR from SAP ERP in the SAP EWM system. When you receipt HU by HU in the warehouse upon production output, the system creates an inbound delivery and posts the goods receipt for each HU. You can make a receipt of production using RF. There are a few options available for the receipt:

- If you make a production receipt for a single order of the same product, you can keep receiving one after the other without a need to enter the HU information every time.
- You can make a receipt of production for co-product and by-product for the same order by scanning the HUs.
- For receiving different HUs against different orders, scan the individual HUs.
- If the batch number isn't the same across the manufacturing order, you can receive different batches for one single-manufacturing order.

Goods receipt and WT creation can be influenced in different ways. Goods receipt creation can be automatic at the time of inbound delivery creation or at the time of WT confirmation. Similarly, the WT creation can be automatic at the time of inbound delivery creation or when you scan the HU. You can reverse the product receipt via RF for the full handling unit or partial handling unit. You can

do it both via RF and via the Warehouse Management Monitor screen in the production overview. After the production is complete, you can set the inbound deliveries to complete using Report /SCWM/R_MFG_PDI_COMPLETE if there is no further production against the inbound delivery.

8.10.2 Receipt of Handling Units from Production

The prerequisites for receiving HUs against manufacturing orders are as follows:

- EGR should be available in SAP EWM prior to making receipt of production receipts.
- You can influence the goods receipt posting at delivery creation when receiving the goods receipt at a work center or by maintaining the condition record for Post Processing Framework (PPF) action `/SCWM/PDI_02_GR_POST`. You can access the transaction for maintenance of condition records for PPF schedule conditions in SAP EWM Easy Access menu path, Extended Warehouse Management • Delivery Processing • Actions • Maintain Condition Records for PPF Schedule Conditions, or you can access it via Transaction /SCWM/DLVPPFC. Similarly, you can also influence the WT creation when receiving the goods receipt at the work center by maintaining the condition records for PPF action `/SCWM/PDI_02_WT_CREATE`. You can maintain the condition records for PPF schedule conditions for maintenance group DLVIMFG.

When a pallet comes out of a production line ready for goods receipt, you can make a receipt of HU via RF transaction. To do so, follow these steps:

1. Navigate to Inbound Processes • Receiving of Handling Units • Rec. HU by Manufacturing Order.
2. Start the transaction (Rec. HU by HU), and start receiving the first HU.
3. Create an HU in the system; print the label to apply on the pallet.
4. Receive the subsequent HUs. If the subsequent HU has the same material, batch, and other identical attributes, the system proposes the same data.

   Goods receipt is posted immediately when HU is received or at the time of putaway, depending on the configuration settings as discussed previously. Once receipted, the communication is sent to SAP ERP.

5. Based on the configuration, you can create the putaway WT immediately when the HU is receipted or when you scan the HU from the source bin to put it away.
6. After the putaway exists, confirm the putaway task to place the HU into the final bin in the warehouse.

8.11 Summary

You should now be able to perform the settings and configurations between SAP ERP and SAP EWM from a production process standpoint. You should also now understand the relevant master data and configuration settings required in both SAP ERP and SAP EWM systems for this process to run seamlessly. We also discussed the option for receipt of every single HU into the warehouse after production, how the PSA is set up, and how PMR is used in the production process. Additionally, we covered production execution from staging components and goods issue to back flushing raw materials.

Takeaways

- In SAP Extended Warehouse Management (SAP EWM), the integration of the production process starts with SAP ERP to support the production execution from the staging components and goods issue (back flushing of raw materials), receipt of by-product, and receipt of co-product to the receipt of finished/semi-finished goods.
- Staging of components with the correct timing enables optimum utilization of space within the warehouse.
- In SAP EWM you can work with batch-managed products for production staging and consumption.
- As of EWM 9.2, staging and consumption is fully integrated with SAP ERP but allows you to work in a decentralized manner, based on the warehouse.

SAP EWM offers solutions to complex outbound processes such as Wave Management, exception handling, cartonization, and stock-specific units of measure empower businesses to make decisions systematically on the fly. System-guided radio frequency operations in outbound processes enable operators to complete assigned tasks without any manual interference from supervisors.

9 Outbound Processing

SAP Extended Warehouse Management (SAP EWM) empowers a business to effectively manage its outbound processes even in the most complex warehouse management scenarios. SAP EWM comes with functionalities such as Wave Management, which is a combination of various aspects of outbound processes. Further, it can consolidate requests in Wave Management and perform a simplified outbound activity for a complex unification of orders.

The outbound process can be initiated either by a customer or by any associated companies. The outbound orders can be created in SAP ERP or can flow from the originating systems such as SAP Customer Relationship Management (SAP CRM) to SAP ERP. Sales order, stock transport order (inter/intra), return order, and so on are the source documents used to pick, pack, and deliver the stock out of the warehouse locations.

SAP EWM interfaces with other systems such as SAP CRM, SAP ERP, SAP Advanced Planning and Optimization (SAP APO), and SAP Global Trade Services (GTS) as shown in Figure 9.1:

- SAP CRM drives the sales order/customer order creation.
- Scheduling, routing, and available-to-promise (ATP) checks are carried out in SAP APO.
- Unchecked deliveries are created in SAP ERP, and conversion of unchecked deliveries to checked deliveries are processed in SAP ERP.
- SAP EWM uses the unchecked data for forecasting purposes.

- Warehouse processes are executed against the checked deliveries in SAP EWM.
- Compliance check (e.g., sanction party list screening), customs shipment, and export document are done in GTS.
- Invoices are created based on the confirmation of the checked deliveries.

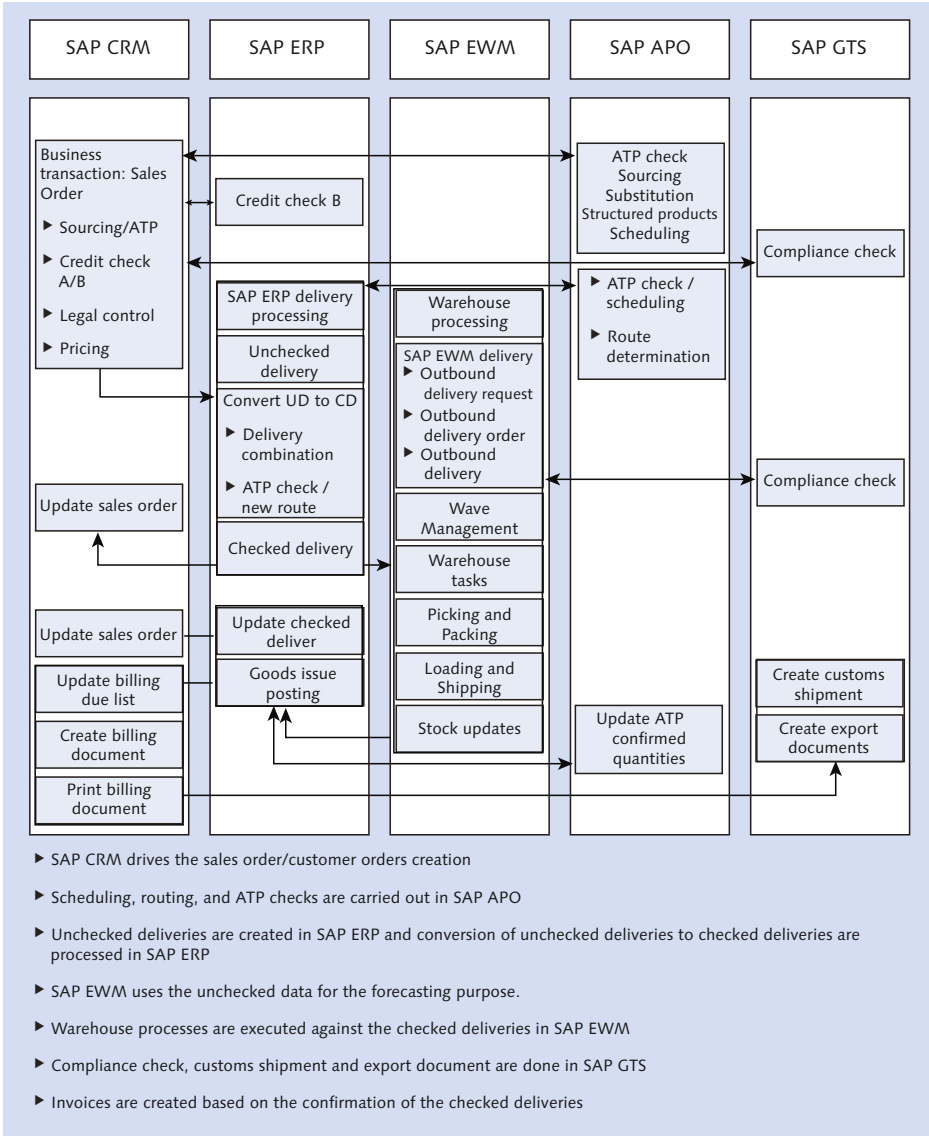


Figure 9.1 Outbound Process Flow Across Systems

9.1 Basic Setup for Outbound Delivery Processing

To execute an outbound process in SAP EWM, you need some basic configuration settings relating to document flow from SAP ERP to SAP EWM, strategy definitions, and others, as discussed in the following subsections

9.1.1 Document Type and Item Type Mapping

Document type and item type mapping are necessary for the document to flow from one system to another with the appropriate charting of the relationship between the document and the items in it. Each product/SKU in the document is mapped referring to an item type. Item type definition distinguishes the attributes of each line item in the document such as batch subitem, consumption item, and so on.

You can create the document type (Figure 9.2) in the SAP EWM IMG menu path, Extended Warehouse Management • Goods Issue Process • Outbound Delivery. You can define document types for outbound delivery process with the help of wizard assistance. Otherwise, you can create them manually without wizard assistance in the SAP EWM IMG menu path, Extended Warehouse Management • Goods Issue Process • Outbound Delivery • Manual Settings • Define Document Types for Outbound Delivery Process.

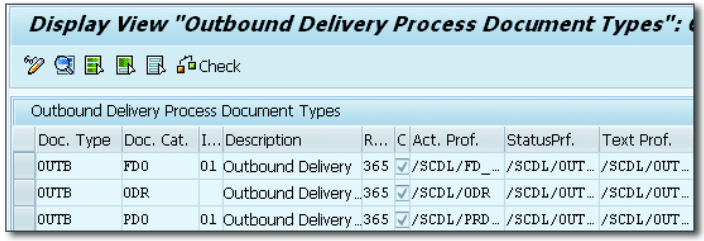


Figure 9.2 Outbound Delivery Process Document Types

Similarly, you can create the item type (Figure 9.3) in the SAP EWM IMG menu path, Extended Warehouse Management • Goods Issue Process • Outbound Delivery • Use the Wizard to Define Item Types for Outbound Delivery Process, or create them manually in the SAP EWM IMG menu path, Extended Warehouse Management • Goods Issue Process • Outbound Delivery • Manual Settings • Define Item Types for Outbound Delivery Process.

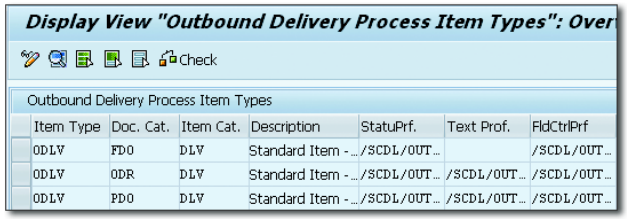


Figure 9.3 Outbound Delivery Process Item Types

After you create the document type and item type, you need to maintain the relation between these across the SAP ERP and SAP EWM systems (Figure 9.4 and Figure 9.5). You can do this mapping for document type and item type in the SAP EWM IMG menu path, Extended Warehouse Management • Interfaces • ERP integration • Delivery Processing • Map Document Types from ERP system to EWM and Map Item Types from ERP system to EWM.

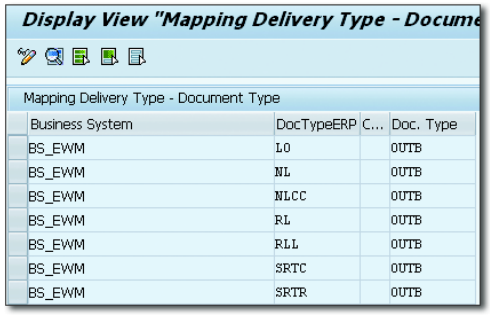


Figure 9.4 Mapping the Document Type between SAP ERP and SAP EWM

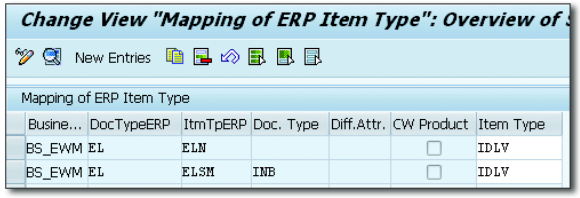


Figure 9.5 Mapping the Item Type between SAP ERP and SAP EWM

Note

Refer to Chapter 7, Section 7.2, to understand the structure of the outbound delivery document in detail.

9.1.2 Route Determination

Route determination includes identification of the appropriate route/path, means of transport, and legs based on shipping data to transport the products. In SAP EWM, the route determination can be done against document type, document category, or warehouse. Route determination (Figure 9.6) can be controlled in SAP ERP at a certain document level if need be by activating it. To activate/deactivate route determination in SAP EWM IMG, follow the menu path, Extended Warehouse Management • Goods Issue Process • Outbound Delivery • Route Determination • Activate or Deactivate Route Determination.

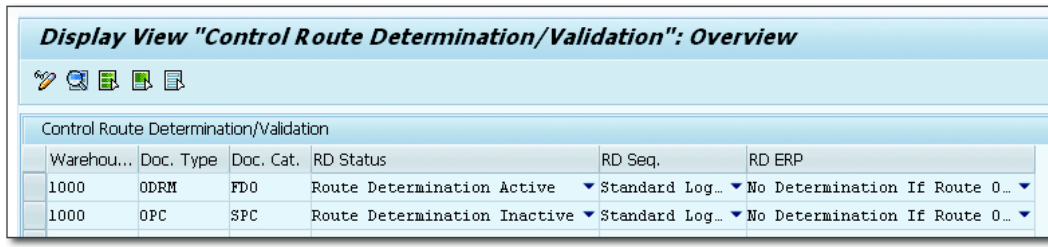


Figure 9.6 Activate/Deactivate Route Determination

You can choose the scheduling direction either forward or backward within the route determination via the SAP EWM IMG menu path, Extended Warehouse Management • Goods Issue Process • Outbound Delivery • Route Determination • Define Scheduling within Route Determination.

In SAP EWM, the route can be determined at various stages: outbound delivery request (ODR), outbound delivery order (ODO), and outbound delivery. This helps the business plan the carrier efficiently by grouping deliveries on the same route to achieve a full truckload. In certain cases, it might be important to validate the delivery document against the route assigned based on parameters such as fragile goods. Safe transportation is more important than costs in such cases. Products that are fragile can be separately shipped, and other products can be grouped with another delivery on the same route to achieve the full load.

9.1.3 Batch Management in the Outbound Delivery

To access batch management configuration (Figure 9.7) in SAP EWM IMG, follow the menu path, Extended Warehouse Management • Goods Issue Process • Outbound Delivery • Batch Management in Outbound Delivery.

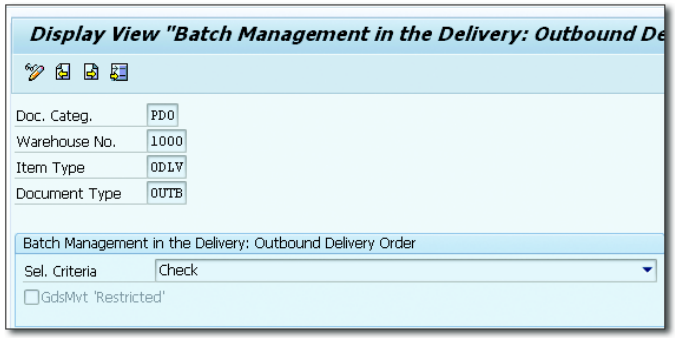


Figure 9.7 Batch Management in Outbound Delivery

There are a few Business Add-Ins (BAdIs) where you can influence the batch selection in the deliveries. You can find these in the SAP EWM IMG menu path, Extended Warehouse Management • Business Add-Ins (BAdIs) for Extended Warehouse Management • Cross-Process Settings • Batch Management • Batches in Delivery Processing.

9.1.4 Warehouse Process Type Determination

All the activities performed in a warehouse are classified into various process types in SAP EWM. Every activity in the warehouse has to fall under one of these process types without which a process can't be performed in a warehouse movement. As shown in Figure 9.8, there are predefined warehouse process types (WPTs): 1010 for putaway, 1011 for putaway with storage process, and so on.

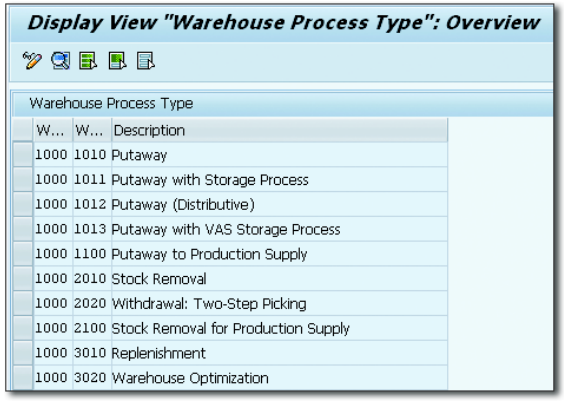


Figure 9.8 Predefined Warehouse Process Type Examples

To define your own WPT, use the SAP EWM IMG menu path, Extended Warehouse Management • Cross Process Settings • Warehouse Task • Define Warehouse Process Type.

After you have the WPT in place, defining their determination procedure across the business processes is a must. You can maintain this assignment (Figure 9.9) via the SAP EWM IMG menu path, Extended Warehouse Management • Cross-Process Settings • Warehouse Task • Determine Warehouse Process Type. With the delivery priority and control indicator for the process type determination, you can influence certain products to determine a different WPT than the regular one. For example, you can influence a delivery with high priority to determine a distinguished WPT from the regular one.

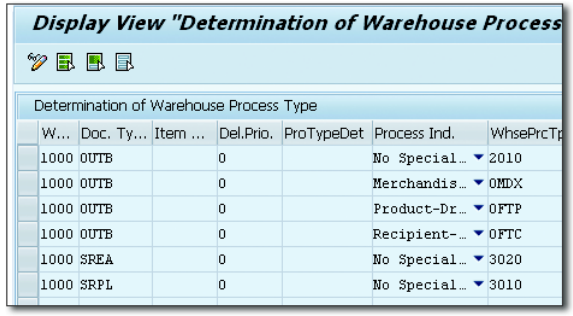


Figure 9.9 Warehouse Process Type Determination Settings

You can maintain the control indicator (Figure 9.10) for process type determination in the SAP EWM IMG menu path, Extended Warehouse Management • Cross-Process Settings • Warehouse Task • Define Control Indicators for Determining Warehouse Process Types.

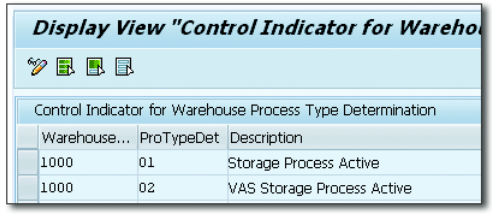


Figure 9.10 Control Indicator for Warehouse Process Type Determination

9.1.5 Warehouse Order Creation for Outbound Delivery

After the transportation unit (TU)/vehicle is checked in, the warehouse task (WT) and warehouse order (WO) are created with the help of the Post Processing Framework (PPF) or wave (in case of a staged load) in which the wave release creates the WT/WO for the associated ODO. These WOs act as a viaduct between the ODO and WTs. All warehouse operations are performed using the WTs, but resource management (i.e., resource planning and execution) utilizes the WOs.

9.1.6 Storage Control in Outbound Processes

Here we'll further discuss what has already been discussed in Chapter 7. The techniques are similar to what is described in Chapter 7, but here the process differs. When it comes to configuring a complex warehouse stock removal process, the storage control technique helps to perform the composite function for stock removal in the warehouse by using two forms of storage control: Process-Oriented Storage Control (POSC) and Layout-Oriented Storage Control (LOSC). You can use POSC, LOSC, or both combined for a complex outbound process. When both POSC and LOSC are used, SAP EWM always executes POSC first.

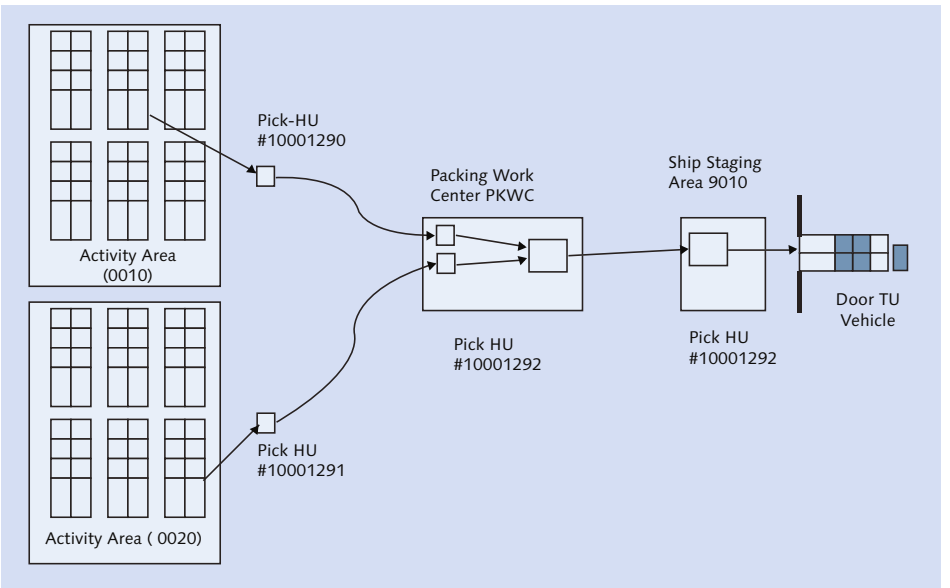
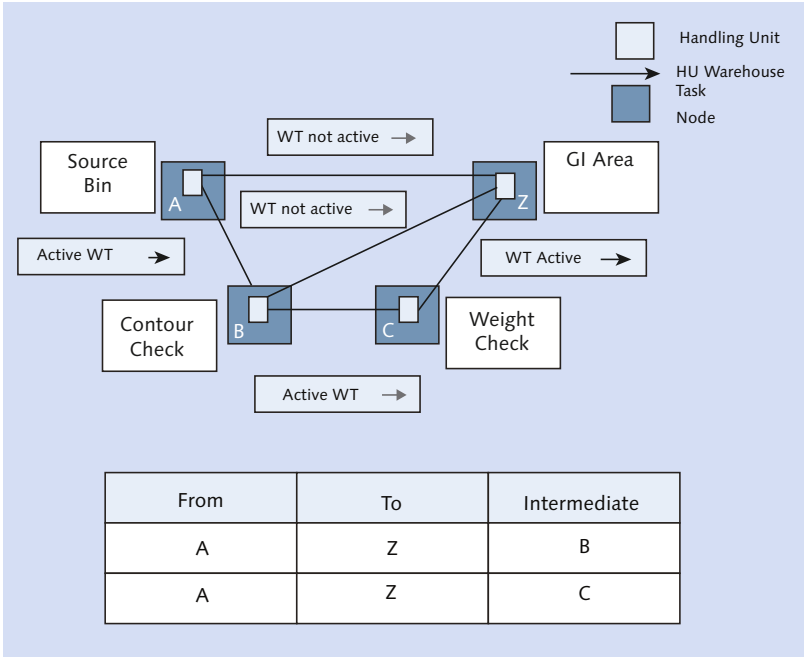


Figure 9.11 Process-Oriented Storage Control with Packing for Outbound

As shown in Figure 9.11, when products are in different storage bins under different activity areas 0010 and 0020, they are moved to the packing work center (PKWC) using a pick HU (handling unit). After these products are moved to the packing work center, they are consolidated under a single HU. The consolidated HU is then moved to the shipping staging area 9010. From the staging area, HU is loaded onto the vehicle.

LOSC is used when the stock doesn't move directly from the source bin to the destination bin (see Figure 9.12). There is an intermittent movement like automated storage/retrieval system through which it travels before it can reach the final destination. Especially in the Material Flow System (MFS), the LOSC is used to oblige the needs of the storage/retrieval system.



From	To	Intermediate
A	Z	B
A	Z	C

Figure 9.12 Layout-Oriented Storage Control for Outbound with Contour/Weight Check

The preceding example depicts an outbound process with LOSC. The product needs to move from source bin (A) to goods issue (GI) area (Z). But prior to moving to Z, the HU needs to move via the automated storage/retrieval system to B, which is the contour check and C for the weight check. (LOSC works only with HU). In such a scenario, the WO is split into three WTs. First, the WT is to move

the product from the source bin to the identification point B, where you do the contour check. Second, the WT is to move the product from identification point B to identification point C, where the weight check is performed. Finally, the third WT is to move the product from identification point C to goods issue area Z.

9.2 Stock Removal Strategy Definition

The stock removal strategy defines how the system must search for the stock when goods issue is initiated. It basically defines the sort rules that the system must follow to determine which stock needs to be removed. The stock removal rule (Figure 9.13) is defined per your organization policy. Each industry differs in the picking logic; some prefer first in, first out (FIFO), some last in, first out (LIFO), and so on. In this setting, you can define the Stock Removal Rule you want and assign the Sort Field against it. This field dictates how the system should sort the quant of a stock found for picking. You can maintain the stock removal rule via the SAP EWM IMG menu path, Extended Warehouse Management • Goods Issue Process • Strategies • Specify Stock Removal Rule.

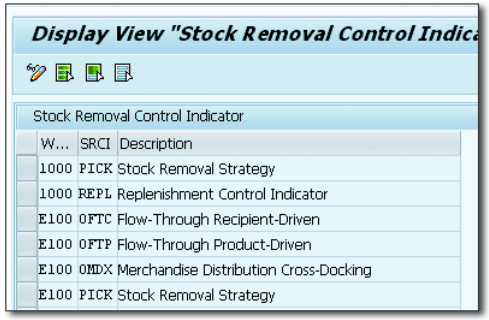


Figure 9.13 Definition of the Stock Removal Rule

Stock removal control indicators (Figure 9.14) influence the search sequence at the product level. These indicators are assigned to the product master. Based on this stock removal indicator in the product, the system determines an appropriate storage type from the search sequence. You can maintain the stock removal control indicators in the SAP EWM IMG menu path, Extended Warehouse Management • Goods Issue Process • Strategies • Define Stock Removal Control Indicator.

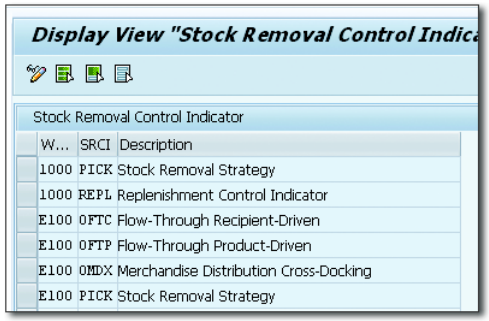


Figure 9.14 Stock Removal Control Indicators

9.2.1 Storage Type Determination

The first step to determine prior to the pick bin determination is the storage type determination. When a warehouse has the products scattered across different storage types within a facility, thoughtful consideration has to be given on picking the product. High-volume complex warehouses need a well-thought-through and efficient product picking process. Figure 9.15 depicts a scenario wherein products are placed across different high rack storages. The storage type determination sequence points the sequence in which the business wants to pick.

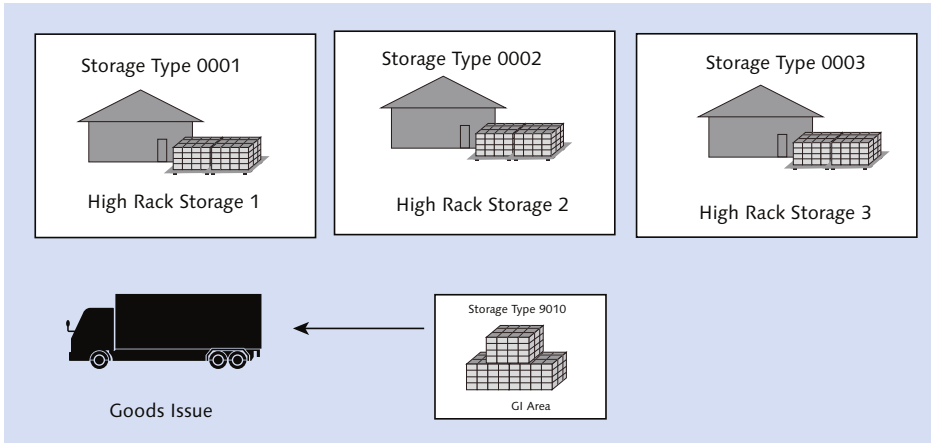


Figure 9.15 Storage Type Determination During Outbound Pick

The storage type search sequence indicator (Figure 9.16) contains the list of storage types with sequence. When the system identifies the storage type search

sequence, then it goes by the sequence for the storage type. For each storage type determined, it examines the stock removal rule for the given storage type. You can define and assign the storage type search sequence in the SAP EWM IMG menu path, Extended Warehouse Management • Goods Issue Process • Strategies • Specify Storage Type Search Sequence.

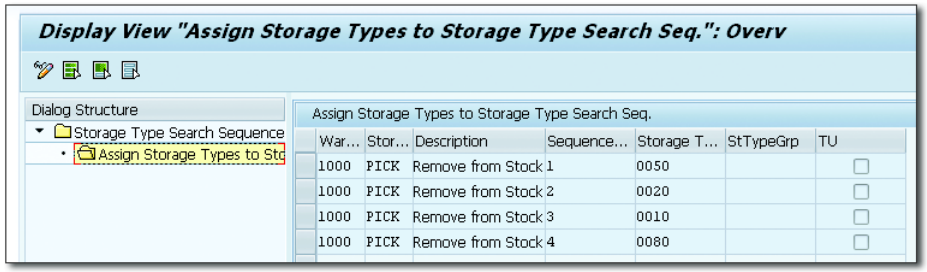


Figure 9.16 Storage Type Search Sequence

9.2.2 Storage Type Search Sequence Determination

The storage type search sequence determination (Figure 9.17) is influenced by the following:

- Two-step picking, only when you're using the two-step processes
- Stock removal control indicator, which is maintained in the warehouse data of product master
- WPT
- Quantity classification, for example, for full or partial pallets
- Storage type group to influence the entire set of stock types
- Project stock or sales order stock type indicator
- Stock usage
- Hazardous rating

Based on this list, you assign the storage type search sequence and stock removal rule (Figure 9.17).

You can maintain the storage type search sequence determination in SAP EWM IMG via the menu path, Extended Warehouse Management • Goods Issue Process • Strategies • Determine Storage Type Search Sequence for Stock Removal.

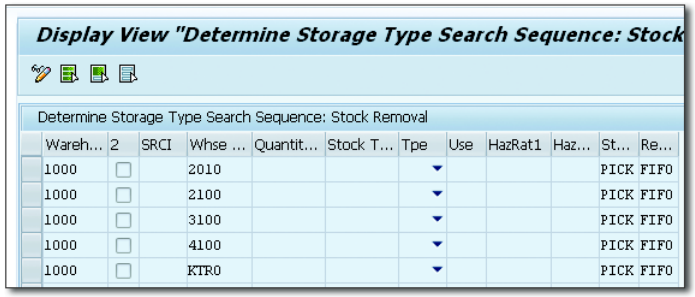


Figure 9.17 Determination of Storage Type Search Sequence for Stock Removal

You can optimize the search sequence (Figure 9.18) for storage type determination to limit the search in the defined sequence. This improves the performance of reading and quickly identifying the storage type. You can define this in SAP EWM IMG via menu path, Extended Warehouse Management • Goods Issue Process • Strategies • Optimization of Access Strategies for Stor. Type Determination in Stck Rmvl.

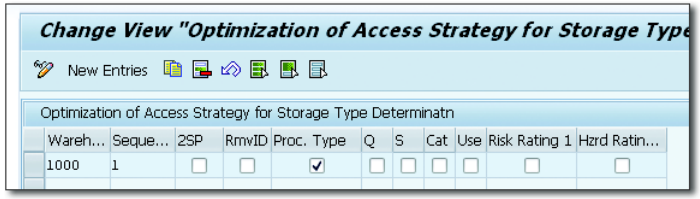


Figure 9.18 Optimization of the Access Sequence for the Storage Type

9.3 Stock Determination and Valuation

Stock determination is used to control the way in which the stock is determined while picking or during stock transfer based on the predefined configuration. Table 9.1 represents how you can influence company-owned stock and a co-sourced stock from the vendor using stock determination. If you have company-owned stock, that is, of ABC Co., as well as co-sourced stock from vendor A, you may want to pick the company-owned stock first, and if doesn't exist, then pick co-sourced stock from vendor A. Stock determination group G1 is assigned to ABC Co. as the first sequence with a valuation of 100. Co-sourced vendor A is assigned to sequence 2 with a valuation of 10.

Warehouse Number	Party Entitled to Dispose	Activity	Stock Determination Group	Sequence	Stock Characteristic	Inbound Value	Permitted Value	Valuation
1000	ABC Co.	PICK	G1	1	Owner	ABC Co.	ABC Co.	100
1000	ABC Co.	PICK	G1	2	Owner	ABC Co.	Co-Sourced Vendor 'A'	10

Table 9.1 Configuration of Stock Determination

9.3.1 Stock Determination

Stock determination is executed while creating the WT. The stock determination group (Figure 9.19) is maintained in the product master.

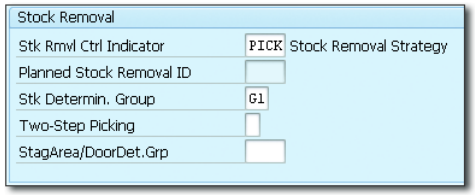


Figure 9.19 Stock Determination Group Field in the Warehouse Data of the Product Master

When the stock determination is executed, there are two strategies—either stock determination dominates or SAP EWM dominates. If it's stock determination, it goes by stock characteristics and valuation defined by you in the configuration of stock determination (referred to in the preceding table).

You can maintain the stock determination groups in SAP EWM IMG via menu path, Extended Warehouse Management • Cross-Process Settings • Stock Determination • Maintain Stock Determination Groups.

You can specify settings for stock determination in SAP EWM IMG via menu path, Extended Warehouse Management • Cross-Process Settings • Stock Determination • Configure Stock Determination.

If the strategy used is SAP EWM dominating stock determination, it considers all stock types irrespective of stock characteristics. This strategy considers only the

stock removal rule defined, for example, FIFO, LIFO, and so on. It also considers stock from the oldest quants, irrespective of stock types.

9.3.2 Stock Valuation

You need stock valuation in SAP EWM especially when doing physical inventory processes. When you perform the tolerance check and posting for the physical inventory, value-based tolerance (in Physical Inventory under Define Tolerance Group for Posting Differences) is based on the values defined here.

You can set the valuation by running the report in SAP EWM Easy Access via menu path, Extended Warehouse Management • Physical Inventory • Periodic Processing • Determine and Set prices from ERP, or you can use Transaction /SCWM/VALUATION_SET.

9.4 Wave Management

When discussing the need for Wave Management, you must consider a few scenarios in the warehouse that need to be proactively visualized and planned well ahead before the TU/vehicle arrives. For example, there may be export scenarios in which you want to group the WT for the international route and send few loads across different customers under one shipment for cost optimization. It becomes monotonous if you need to group these orders manually on various factors such as staging the complex pick products for subsequent day shipment, planning on combining less than truckloads into one shipment, and so on. You need a solution to ease all these situations, which is possible via Wave Management.

Ultimately, Wave Management enables you to split or merge the warehouse request (WR) for outbound deliveries based on activity area, route, product, and so on.

Waves can be created automatically or manually. Figure 9.20 is an example of grouping the WR item across different WRs into one wave. You can see that WR item 10 and WR item 20 from WR 100 and WR item 10 from WR 200 are grouped into Wave 1. The condition for grouping can be based on the route and material group.

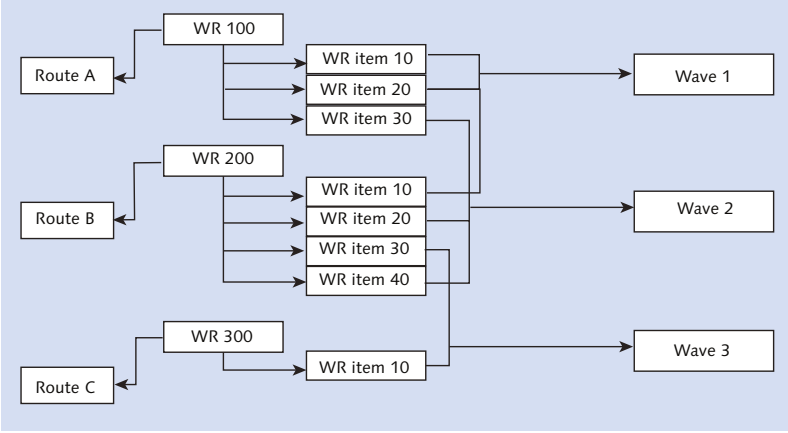


Figure 9.20 Grouping of Warehouse Item into Waves

Figure 9.21 illustrates splitting WRs based on quantity. WR 100 has product A with 111 units in it. When the rough picking location determination assigns three different picking areas, KB1, KB2, and KB3, there might be a situation in which you have 100 units as a full pallet, 10 units as a partial build pallet, and 1 loose box. You group all the full pallets into wave 1, partials into wave 2, and loose boxes into wave 3. By doing so, the operator working on bulk or full pallets will move around those areas for picking and staging the products.

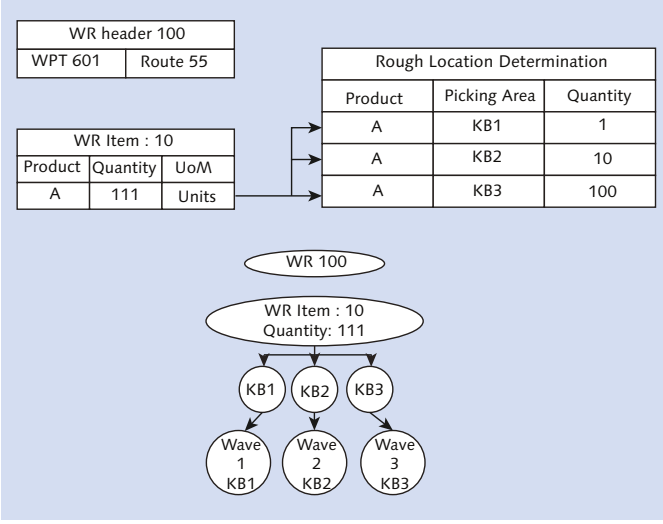


Figure 9.21 Quantity-Based Splitting of Warehouse Requests into Different Waves

9.4.1 Wave Templates

A wave template's attributes are master data in SAP EWM that serves as a framework to combine the WR items. The wave template can be reused multiple times across different WRs that meet the predefined conditions. For example, you might want to group all the request items where you need to pick loose cases for next-day delivery. Because this picking is time-consuming in your warehouse, you might want to pick and stage before the vehicle/TU arrives; you can use the wave template to group all those WRs into one.

You can maintain the wave template in the SAP EWM Easy Access Menu via menu path, Extended Warehouse Management • Work Scheduling • Wave Management • Maintain Wave Templates, or you can use Transaction /SCWM/WAVETMP to create it. Figure 9.22 depicts the cutoff time, release time, and so on.

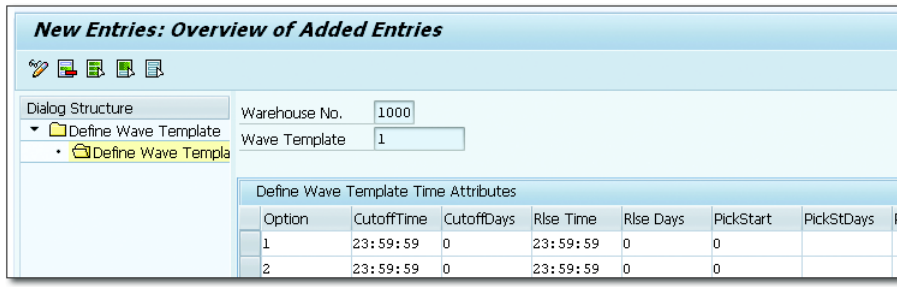


Figure 9.22 Wave Template

9.4.2 Wave Template Attributes

The wave template attributes consist of the following:

- Release Method
  The possible values are Automatic, Immediate, and Manual.
- Wave Type
  This enables specific monitoring in the Warehouse Management Monitor screen, especially for business processes such as standard orders, rush orders, and so on.
- Wave Assignment Also Possible After Wave Release
  You may want to assign additional WR items to a wave that has already been released if the shipping office wants to fill up to the vehicle capacity for optimum utilization of space in the TU.

- Control for Bin Denial
  The following choices are available:
  - You can leave an item in a wave, in other words, release it again later.
  - You can remove an item from a wave, in other words, reassign the item.
  - You can have the system immediately create a WT with an alternative source bin.

You can maintain waves manually via Transaction /SCWM/WAVE, or you can use the SAP EWM Easy Access menu path, Extended Warehouse Management • Work Scheduling • Wave Management • Maintain Waves.

SAP EWM provides an opportunity to create automatic waves by activating at the WPT level (Figure 9.23). You can do this in the SAP EWM IMG menu path, Extended Warehouse Management • Goods Issue Process • Wave Management • General Settings • Set Automatic Wave Generation for Warehouse Process Type.

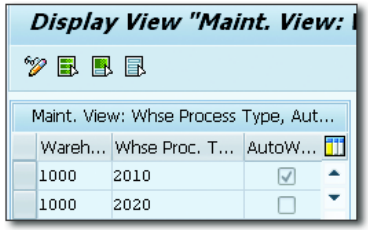


Figure 9.23 Automatic Wave Creation Indicator at the Warehouse Process Type Level

SAP EWM delivers standard PPF profiles for Wave Management, such as application `/SCDL/DELIVERY`, action profile `/SCDL/PRD_OUT`, and profile definition `/SCWM/PRD_OUT_WAVE_NEW` (Assign Warehouse Request to Wave), which can be used in the delivery for assignment of WRs to a wave. Condition record tables (Figure 9.24) are checked to determine the WR item's relevancy against the suitable warehouse template maintained. You can maintain the conditions records for wave template determination in SAP EWM Easy Access menu path, Extended Warehouse Management • Work Scheduling • Wave Management • Maintain Conditions for Determining Wave Template Generation, or you can access Transaction /SCWM/WDGCM.

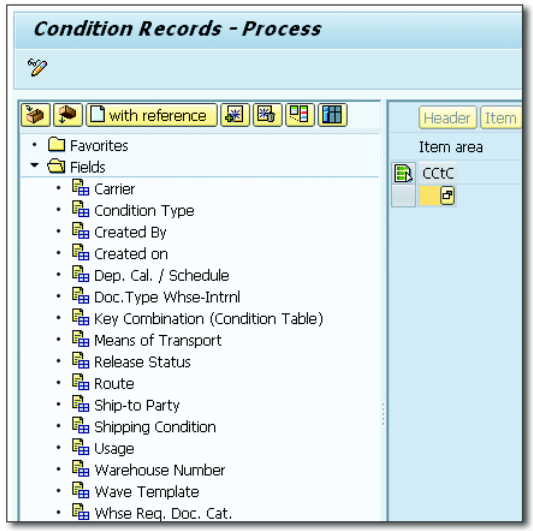


Figure 9.24 Condition Record Maintenance for Wave Template Determination

You can monitor and execute certain functions via the warehouse monitor, such as wave release, block, unblock, split, delete wave, merge waves, and so on. You can access these in Transaction /SCWM/MON under node OUTBOUND • DOCUMENTS • WAVE.

9.5 Door and Staging Area Determination

The door and staging area determination are necessary for an outbound process if it's inherent in your storage control. After the products are picked, they are ready for staging prior to loading to the TU. The POSC might have a step before check-out and loading the products/SKUs/HUs to the staging area. For this, you need to set up the determination rule for staging areas, staging area groups, and staging bays for the storage control. Make sure that you maintain the following:

- Define the staging area/door determination groups in SAP EWM IMG via menu path, EXTENDED WAREHOUSE MANAGEMENT • MASTER DATA • STAGING AREAS.
- Define doors and assigned staging areas and staging area/door determination groups to these doors in SAP EWM IMG via menu path, EXTENDED WAREHOUSE MANAGEMENT • MASTER DATA • WAREHOUSE DOOR.

- Don't specify the staging area/door as the destination storage type/destination storage bin in the WPT definition. You can check this in SAP EWM IMG via menu path (Figure 9.25) Extended Warehouse Management • Cross-Process Settings • Warehouse Task • Define Warehouse Process Type.

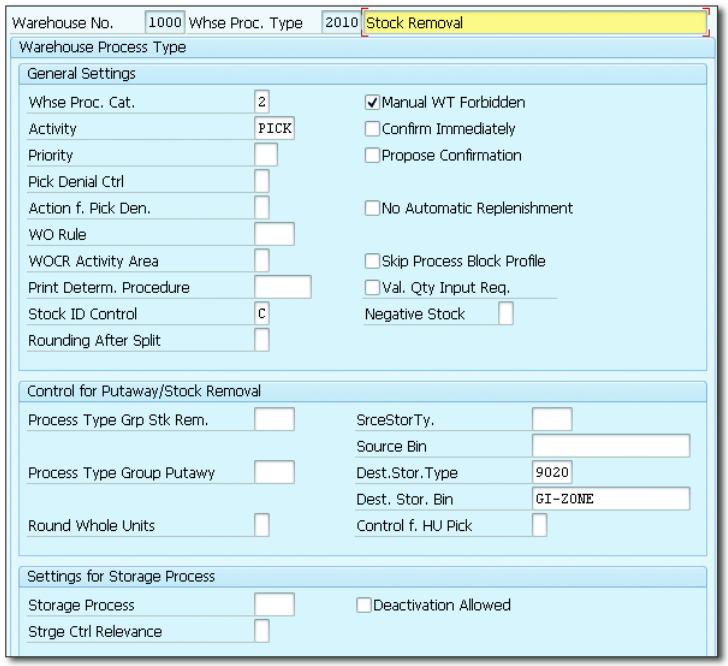


Figure 9.25 Defaults Maintained in the Warehouse Process Type Definition

You can maintain the staging area and door determination (Figure 9.26) for outbound in SAP EWM Easy Access via menu path, Extended Warehouse Management • Settings • Shipping and Receiving • Staging Area and Door determination (Outbound), or you can access this via Transaction /SCWM/STADET_OUT. This is based on the route and WPT; for example, process wise, you can demarcate the staging area in your warehouse.

By maintaining the access sequence for the staging area and doors determination, you can improve the performance of the search. You can maintain this via Transaction /SCWM/STADET_ASS, or you can navigate via in SAP EWM Easy Access menu path, Extended Warehouse Management • Settings • Shipping and Receiving • Access Sequence to Staging Area and Door determination.

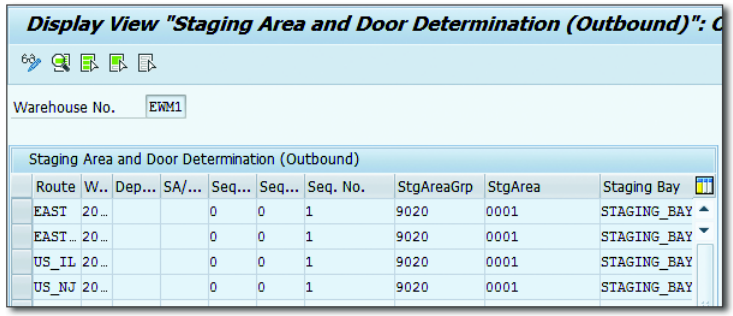


Figure 9.26 Staging Area and Door Determination Outbound

After the determination rules and data are maintained, you can see the staging area/door data to the ODO, which you can access in Transaction /SCWM/PRDO or via the SAP EWM IMG menu path, Extended Warehouse Management • Delivery Processing • Outbound Delivery • Maintain Outbound Delivery Order. Figure 9.27 depicts the staging bay info in the ODO. In an RF environment, when you confirm the first pallet/HU to a staging area, it applies to all subsequent pallet/HUs.

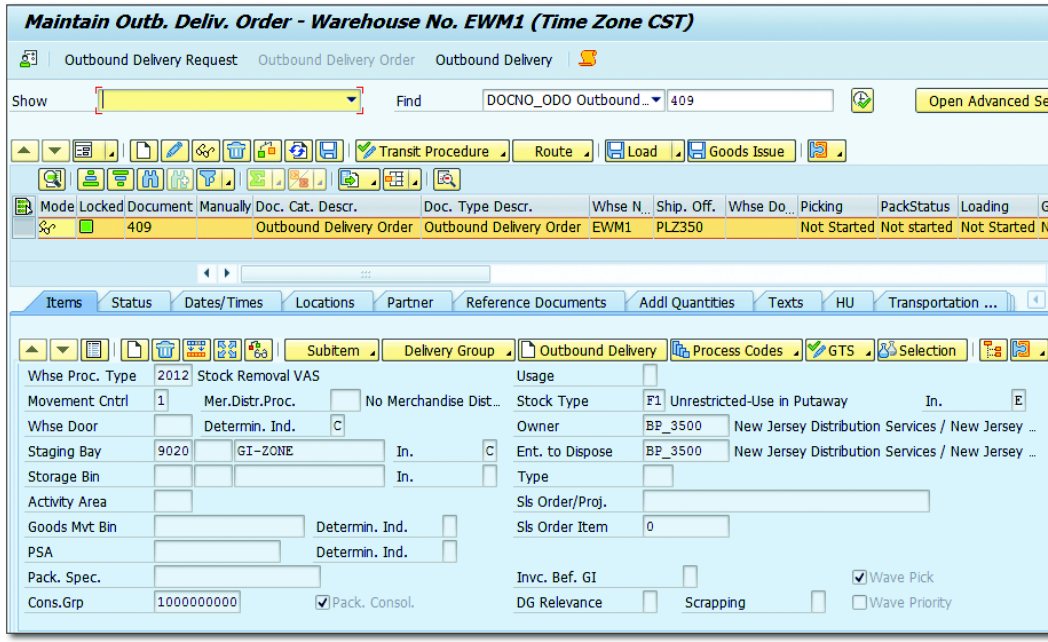


Figure 9.27 ODO Item with Staging Bay Information

9.6 Outbound Delivery Creation

Figure 9.28 illustrates the document flow of a sales order until the time the outbound delivery is created in SAP EWM. Let's take an example of a sales order created in SAP CRM, which flows to the SAP ERP system. All functions of the sales document are performed, such as pricing determination, availability check, shipping point and route determination, credit check, and so on. After the sales order is ready/due for subsequent processing, the outbound delivery is created. Outbound delivery in SAP ERP serves as a prime document for warehouse operation for outbound shipments. If the products in the outbound delivery are SAP EWM warehouse managed, the outbound delivery is distributed to SAP EWM for further processing.

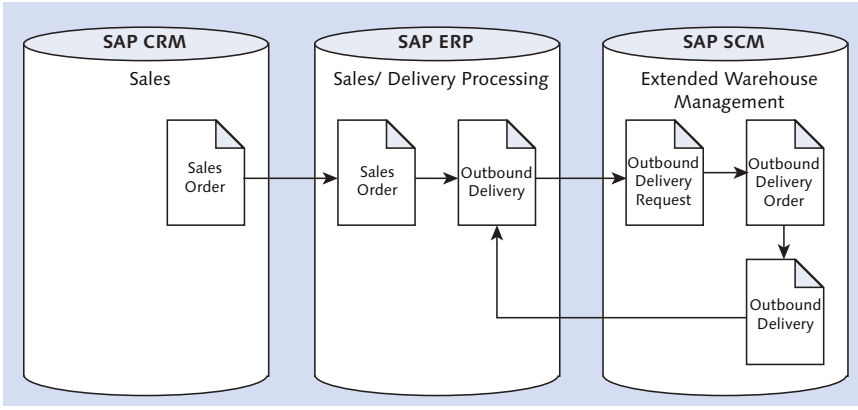


Figure 9.28 Outbound Delivery Document Creation Flow

9.6.1 Overview of the Outbound Delivery Process

When outbound delivery from the SAP ERP system is replicated into SAP EWM, the system creates the ODR in SAP EWM, as shown in Figure 9.29. This is where the system looks for mapping between the SAP ERP document type and the item type in SAP EWM and determines the relevant document type and item type while creating the ODR in SAP EWM. After the ODR is created, the follow-up actions can be triggered in SAP EWM, such as PPF for activation of ODR. You can manually activate the ODR in the SAP EWM Easy Access menu path, Extended Warehouse Management • Delivery Processing • Outbound Delivery • Maintain Outbound Delivery Request, or you can use Transaction /SCWM/ODR. Upon activation of ODR, the system creates the ODO. All the warehouse activity

can be performed only against the ODO. In SAP EWM, the ODO is the document that begins the warehouse processes, including printing pick lists, picking, packing, performing value-added services (VAS), staging, and loading.

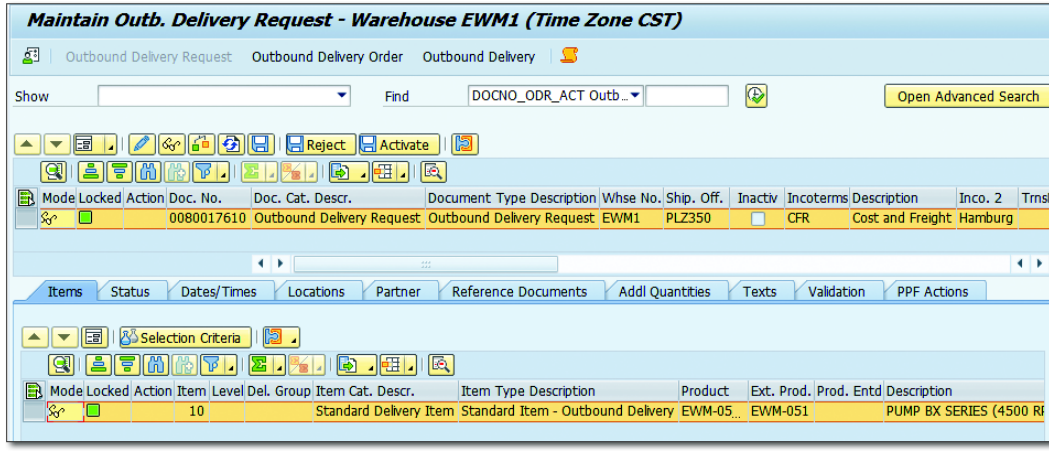


Figure 9.29 Outbound Delivery Request Document

You can maintain the ODO in the SAP EWM Easy Access menu path, Extended Warehouse Management • Delivery Processing • Outbound Delivery • Maintain Outbound Delivery Order, or you can use Transaction /SCWM/PRDO (see Figure 9.30).

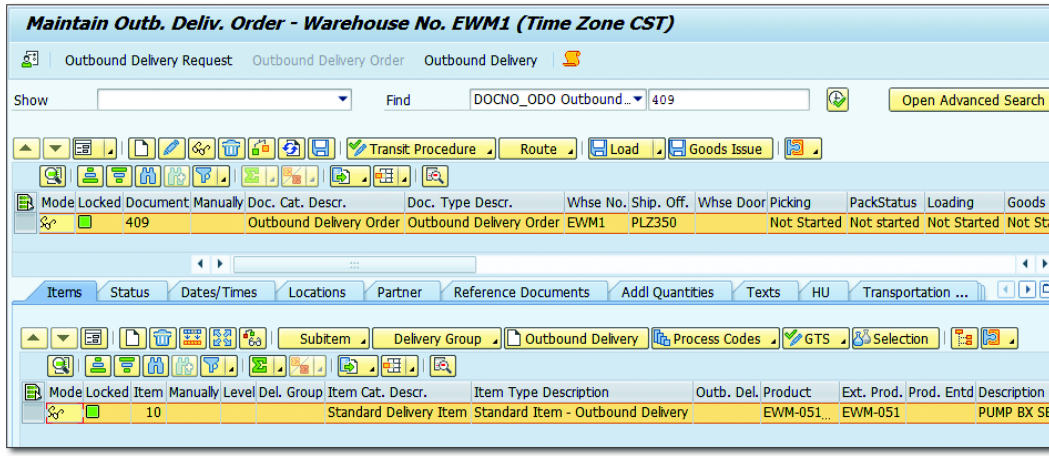


Figure 9.30 Outbound Delivery Order

You create the WT and WO against the ODO. To create WTs for picking from the ODO, navigate via the SAP EWM Easy Access menu path, Extended Warehouse Management • Work Scheduling • Create Warehouse Task for Warehouse Request • Stock Removal for Outbound Delivery Order, or use Transaction /SCWM/TODLV_O. After you perform all the warehouse activity against the ODO, you perform check-out/goods issue. When you perform goods issue, another document called outbound delivery is created. This document communicates back to SAP ERP, and the goods issue, billing, and so on is performed against it to complete the SAP ERP outbound delivery.

This process isn't only for sales orders, but it also includes stock transport orders or deliveries in SAP ERP without any reference as well. For example, when you perform goods issue from one storage location to the other storage location, the outbound delivery created in SAP ERP replicates in the same way mentioned previously for ODR and ODO for further processing in SAP EWM.

The following functions are performed automatically for the ODO when a WR is generated:

- Determination of route
- Determination of which products can be packed together for a shipment
- Determination of staging area
- Determination of door assignment
- Determination of WPT
- Determination of staging area group
- Addition of packaging items

You can control processes for ODO as part of the configuration. For example, you can create an invoice before goods issue in the outbound delivery process.

9.6.2 Direct Outbound Delivery Process

As illustrated in Figure 9.31, there can be varied scenarios demanding direct outbound delivery process. You may need this if you have situations like the following in your warehouse:

- Direct sales from the warehouse with customer pick up
- Scrap sales particularly when product crosses its shelf life

- Donation orders
- Rush order for emergency delivery from the warehouse
- Delivering against account assignment without any transportation, customer pick-up, or internal transfer to another facility belonging to the same corporate group

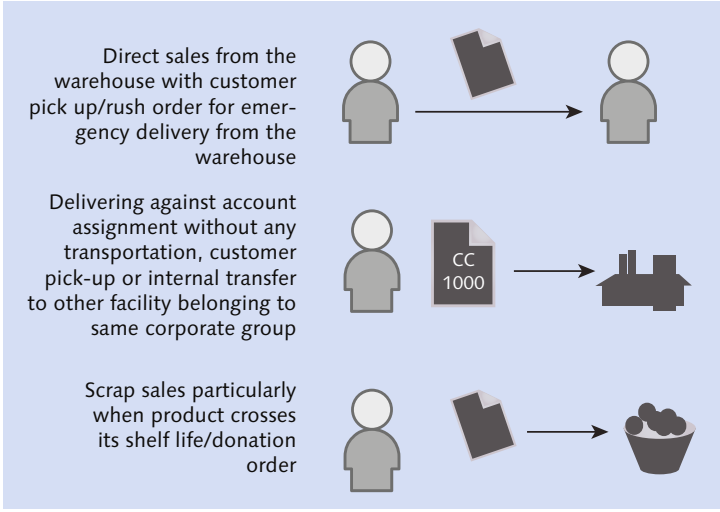


Figure 9.31 Direct Outbound Delivery Process

There is always a situation in the warehouse where customers come for a pick up for certain emergencies or where your business wants to sell directly from the warehouse to certain customers. If the product is approaching its shelf life, you want to discard it by certain means per your company policy or scrap it at the end. These states of the product are only known to the warehouse personnel who are examining the warehouse activity day in and day out. Hence, there are always context-based situations that demand direct outbound delivery in the warehouse.

In the pull procedure (Figure 9.32) certain customers might demand to fill the TU if space is available for accommodating additional products. In the push procedure, the warehouse might push some products when space is available on the TU to make effective space usage on the TU and for cost benefits as well.

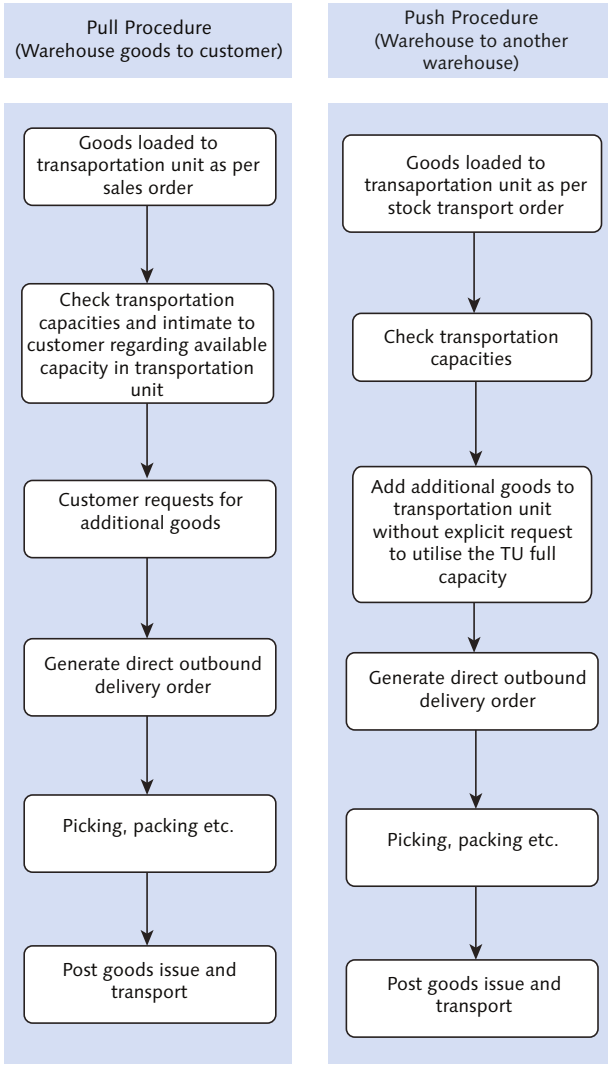


Figure 9.32 Push/Pull Procedural Situations Demanding a Direct Outbound Delivery Order

There are certain actions that differ in direct ODOs from regular ODOs created from SAP ERP:

- The availability check is usually performed in SAP ERP. Because direct ODO is created directly in SAP EWM based on the configuration, you can control the ATP check either in SAP ERP or SAP APO (Figure 9.33).

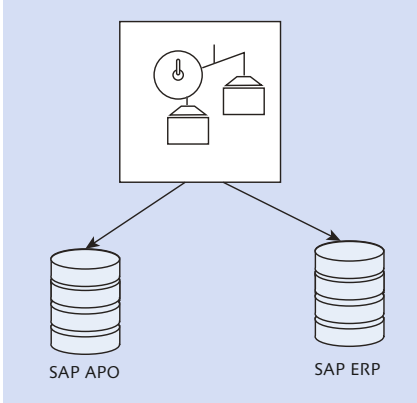


Figure 9.33 ATP Check in SAP EWM for Direct Outbound Delivery Order

- SAP Global Trade Services (GTS) are optional checks. If required, they can be performed for direct ODOs. Because this process doesn't have sales orders involved, while creating direct ODO, the system can't copy data from the predecessor document. SAP EWM requires sales organizations to carry out the GTS check. Hence, you can assign the party entitled to dispose in Customizing with its sales organization to a warehouse number. You can do this in SAP EWM IMG via menu path, Extended Warehouse Management • Interfaces • GTS Integration • Assign Sales Organization to Warehouse Number.
- When you create delivery using predecessor document ODR, all required information items such as product, quantity, and so on are carried forward from SAP ERP delivery to ODR and from ODR to ODO. But when it comes to direct ODO, there is no reference to copy, so either you need to enter the information manually such as product and quantity, or you can determine data such as the goods movement bin from the configuration. You can maintain this in the SAP EWM Easy Access menu path, Extended Warehouse Management • Settings • Maintain Goods Movement Bin Determination or via Transaction /SCWM/GMBIN_DET.
- Direct outbound delivery can't be split because there is no delivery ODR relating to the SAP ERP delivery.
- Nonpick-relevant items are supported in direct ODO.
- You should use the corresponding enhancement package in the SAP ERP system; otherwise, the goods movement posted in the SAP ERP system delivery isn't replicated.

After all the checks are performed and direct ODO is created in SAP EWM, it's replicated in SAP ERP as an outbound delivery document. The outbound delivery scenario that originated from SAP ERP had a preceding ODR document, whereas in the direct outbound scenario, the ODR isn't involved. This process has only two documents: ODO and outbound delivery. As shown in Figure 9.34, you can create the direct ODO in the SAP EWM Easy Access menu path, Extended Warehouse Management • Delivery Processing • Outbound Delivery • Maintain Outbound Delivery Order.

Figure 9.34 Direct Outbound Delivery Order Creation

9.6.3 Outbound Process with Cartonization Planning

Cartonization planning helps to improve the creation of shipping HUs based on product master data and quantity, weight, volume information from the ODO. Cartonization planning creates planned shipping HU (PSHUs) and serves as template for creating the actual shipping HUs during picking and packing. PSHUs don't physically exist because these are *planned* HUs only.

Cartonization planning, which is shown in Figure 9.35, gives a better visibility for better load planning, labor planning, and efficient packaging at a low cost. PSHUs can be created manually and automatically in cartonization planning. Automatic cartonization planning uses algorithms to create PSHUs. SAP EWM provides default algorithms for cartonization planning. You can see this in SAP EWM IMG via menu path, Extended Warehouse Management • Business Add-Ins (BAdIs) for Extended Warehouse Management • Goods Issue Process • Cartonization Planning • BAdI: Cartonization Planning Algorithm. The default algorithms use minimization of HUs and a heuristic approach. If you wanted to

change the cartonization planning process before or after the algorithms run, you can implement the BAdI `Pre- and Post-processing of CAP Algorithms`. You must activate the business function `SCM_EWM_FND` in SAP EWM Essential Foundation Functions for using this feature.

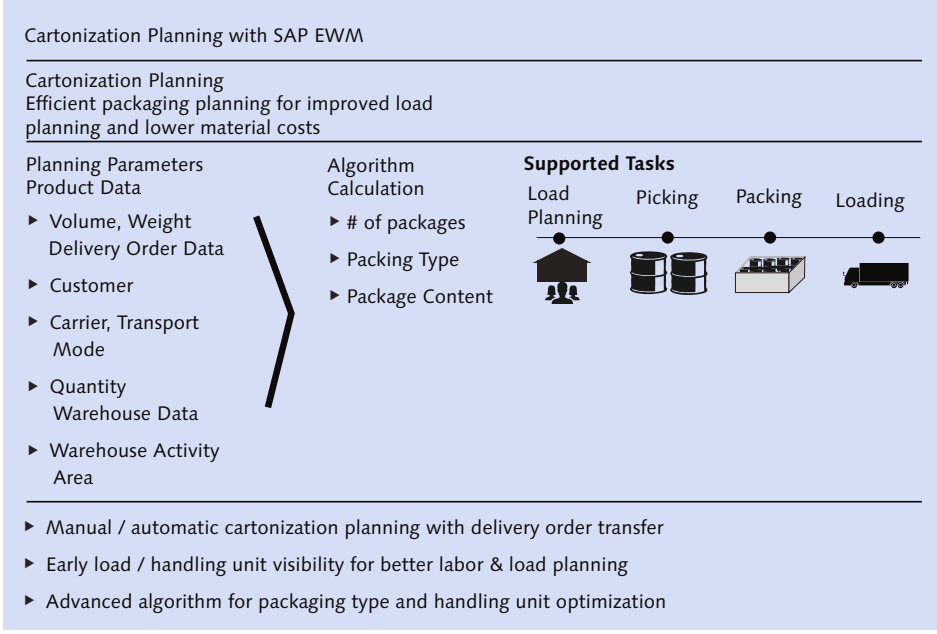


Figure 9.35 Cartonization Planning in SAP EWM

9.7 Check-In/Check-Out Process

Until now, we've been discussing the delivery creation, types of ODO, and so on. After the delivery is in place, the warehouse is ready for execution upon arrival of the vehicle or even for a customer pick up. When the vehicle arrives at the facility, it's checked in first. If the free doors are available and the arrival was at the right time, the vehicle can be checked in. If the arrival is early or late, the vehicle is checked in and parked in the yard or door based on its availability.

Upon checking it in to the door, you can maintain settings to create the WT automatically via PPF. SAP EWM delivers standard PPF for WT creation, printing of loading instructions, and so on. You can customize the PPF to be triggered at TU level or at the ODO level.

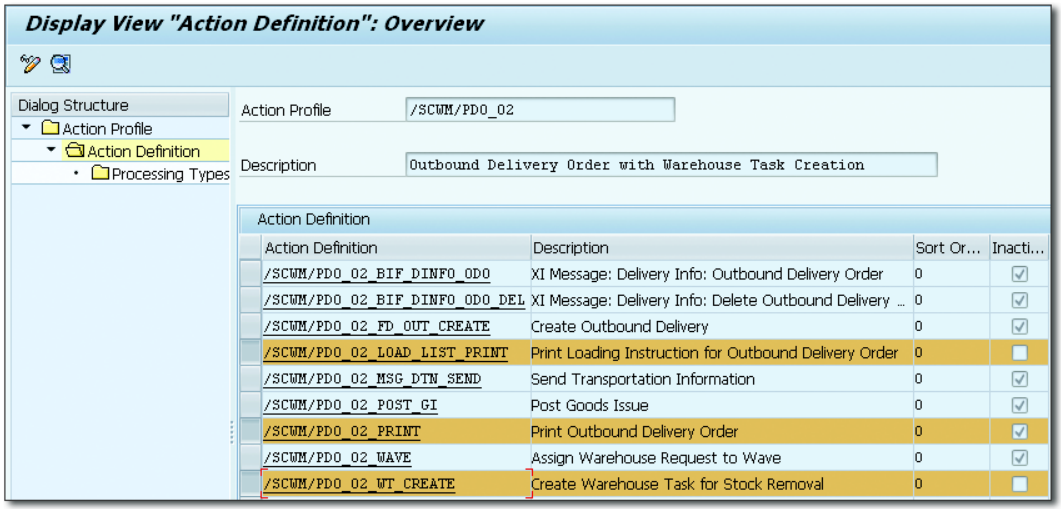


Figure 9.36 Action Profile and Action Definition in Application /SCDL/DELIVERY

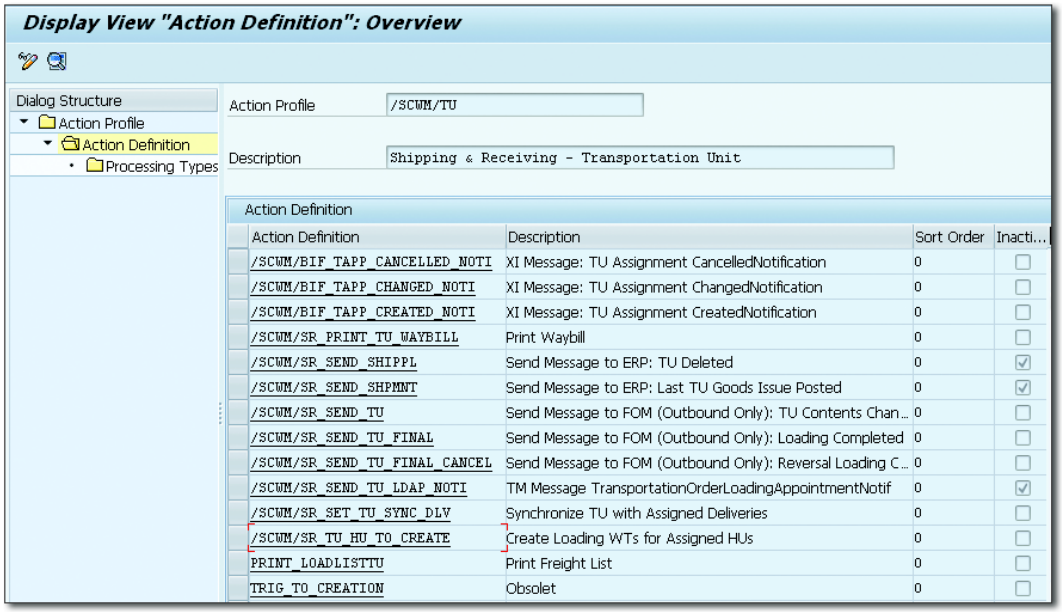


Figure 9.37 Action Profile and Action Definition in Application /SCWM/SHP_RCV

You can access the PPF via Transaction SPPFCADM to see the action profile and action definitions (Figure 9.36 and Figure 9.37). You can also navigate via the SAP EWM IMG menu path, Cross-Application Components • Processes and Tools for Enterprise Applications • Reusable Objects and Functions for BOPF Environment • PPF Adapter for Output Management • Maintain PPF Settings. Choose the profiles/definitions for implementation for your organization as appropriate to your business process.

Check-in and check-out are done via Transaction /SCWM/CICO, or you can navigate via the menu path, Extended Warehouse Management • Shipping and Receiving • Yard Management • Arrival at/Departure from Checkpoint.

Note

For further information on check-in and check-out (inbound and outbound), please refer to Chapter 7.

The only difference between inbound and outbound is that the checkpoints may differ if you have separate checkpoints for inbound and outbound. Similarly, the yards may differ if you have a separate demarcation for inbound vehicles and outbound vehicles. In outbound, you may like to print the pick list to give an overview for the warehouse operators before they start. SAP EWM delivers some standard smart forms for printing the WO list, WO individual documents, and loading instructions:

- `/SCWM/WO_LOAD`: Loading instructions WT
- `/SCWM/WO_SINGLE`: WO individual document
- `/SCWM/WO_MULTIPLE`: WO list

9.8 Picking and Loading Execution

After the check-in and docking to the door is completed, the WTs/WOs are ready to execute the warehouse activity. If you haven't designed the PPF for auto creation of WTs/WOs, you can use the manual option. Upon docking the TU to the door, you can use the Follow-On Functions in the ODO to create the WTs manually. You can navigate as shown in Figure 9.38 within the ODO for WT creation.

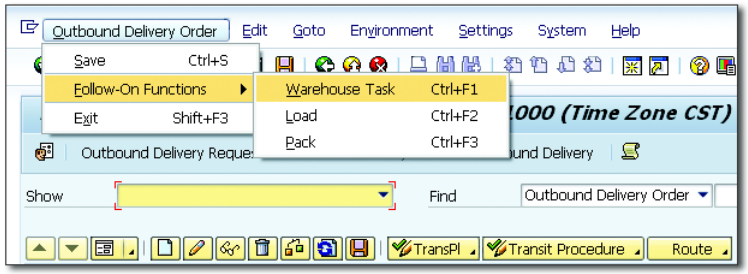


Figure 9.38 Manual Creation of Warehouse Task via Follow-On Functions

This allows you to create the pick WTs/WOs for the ODO. All the picking and loading execution are performed against the ODO. Figure 9.39 shows the WTs created for an ODO in the warehouse monitor.

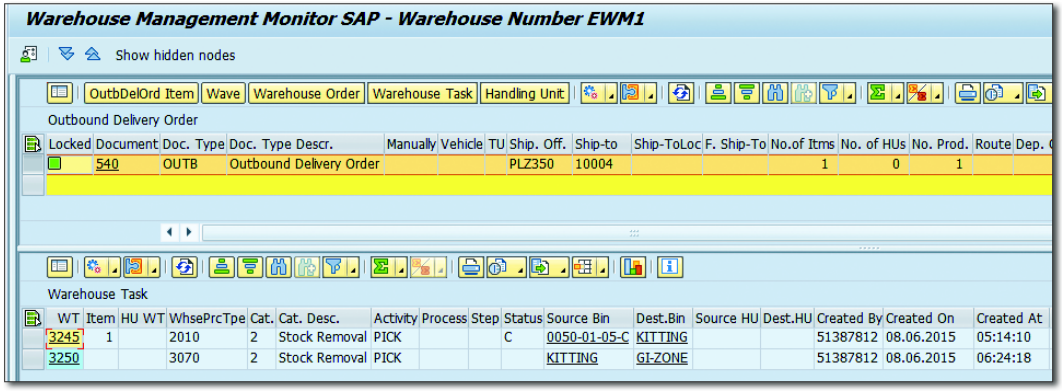


Figure 9.39 ODO Document with WTs

9.8.1 Execution with the Pick List

You can execute the picking function in your warehouse with two options, using the desktop graphical user interface (GUI) or via an RF device. As detailed in Section 9.8.1 for printing the pick list via PPF, you can perform the picking execution with the aid of this pick list, execute the physical picking in your warehouse, and record the results in the pick list. You can confirm the WO/WT in the desktop GUI, as shown in Figure 9.40.

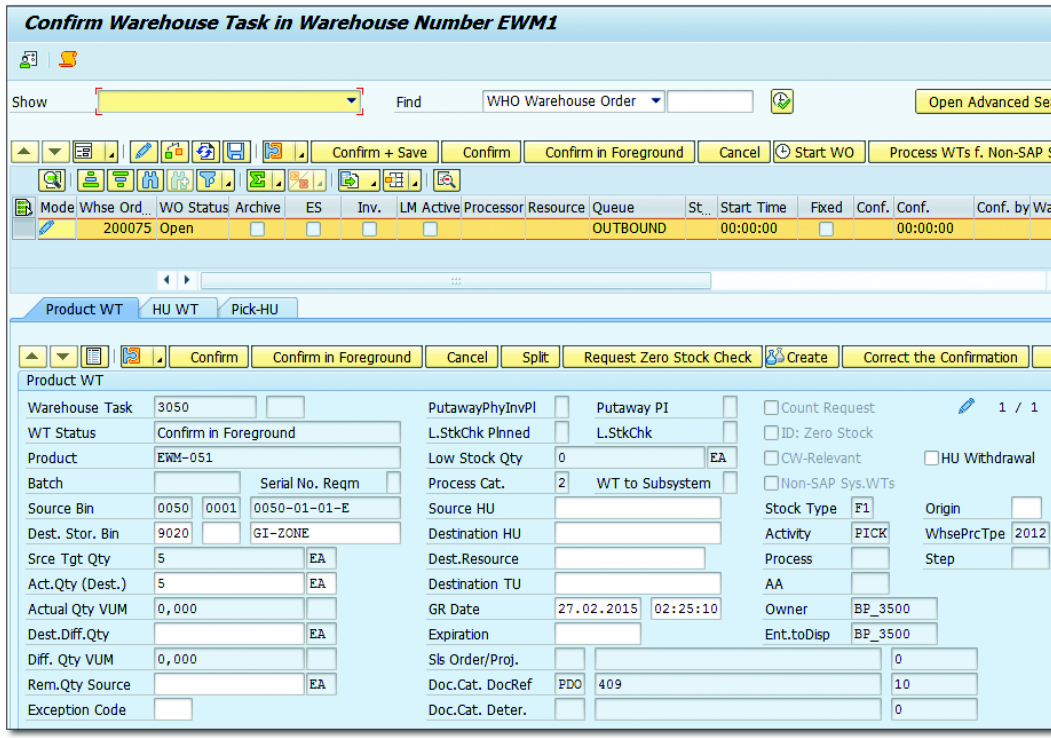


Figure 9.40 Confirmation of the Warehouse Task

Let's discuss the simple outbound process with an example to understand it better. Say, for example, you've configured the outbound process with POSC and the following two steps:

- Step 1: Picking, which is 2010 WT
- Step 2: Loading, which is 3070 WT

After you have the picking information, you confirm the pick WT via the desktop GUI using Transaction /SCWM/TO_CONF. You can navigate to the SAP EWM Easy Access menu path, Extended Warehouse Management • Execution • Confirm Warehouse Task, or you can confirm it via the Warehouse Management Monitor shown in Figure 9.41 as well.

After the pick WT is confirmed, based on your configuration, the WT for the second step, which is (from the example) loading, is created automatically or manually. Similarly, the loading WT can be confirmed either way.

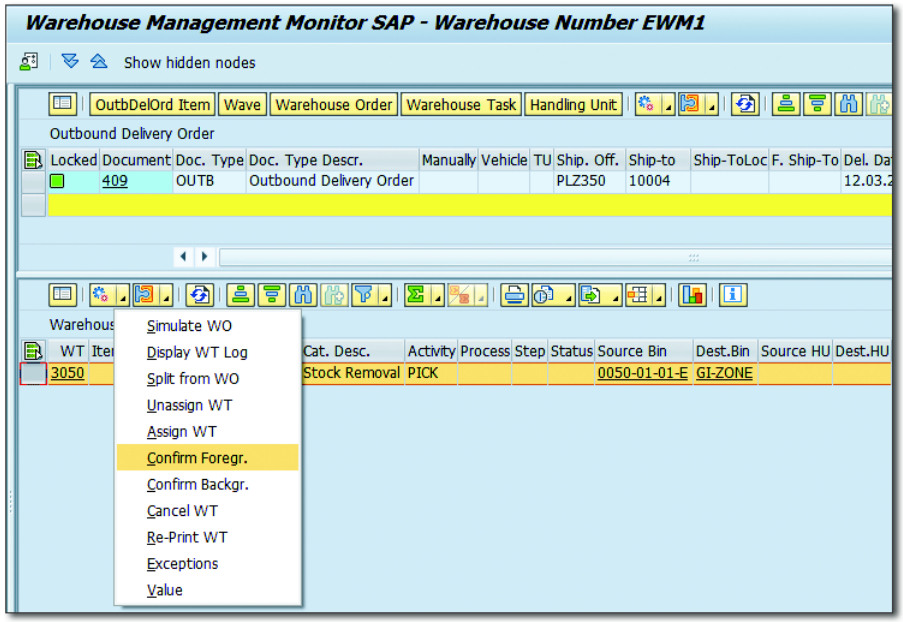


Figure 9.41 Confirmation of WT via the Warehouse Monitor

9.8.2 Execution with Mobile Devices

SAP EWM delivers a standard RF framework for execution of warehouse activity, which includes outbound processes as well. Mobile transactions are accessible through Transaction /SCWM/RFUI or via the SAP ERP Easy Access menu path, Extended Warehouse Management • Execution • Log on to RF Environment. You can access the outbound RF menu as shown in Figure 9.42, Figure 9.43, and Figure 9.44.

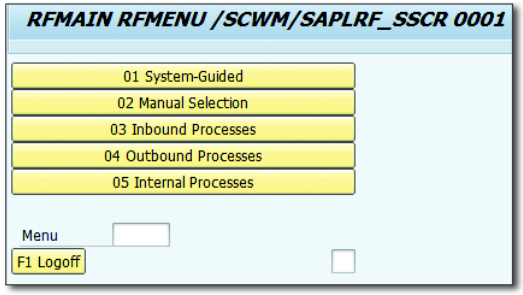


Figure 9.42 Standard RF Main Menu

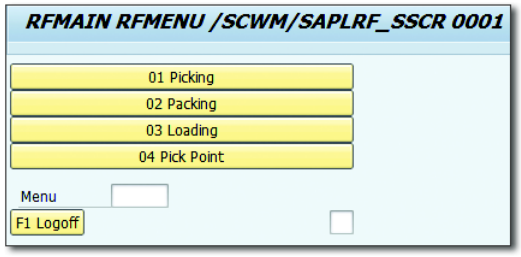


Figure 9.43 RF Main Menu—04 Outbound Processes

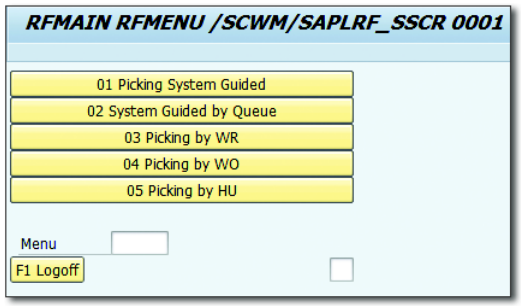


Figure 9.44 Outbound Processes—01 Picking

You have multiple options to confirm the pick WT as follows:

- Picking System Guided
  Use this if you want the system to guide you per the resource type for outbound within the picking processes.
- System Guided by Queue
  Use this if you want to confirm the pick WT by the queue name; specifically, you would have multiple picking scenarios within the organization for which different queues might have been configured. In such cases, when you want to go by queue, you can use this option.
- Picking by WR
- Picking by WO
  Use this if you want to pick against certain WOs first.
- Picking by HU

9.8.3 Pick Denial/Handling Differences in Picking

Warehouses often have to deal with the situation in which there is a shortage of quantity for picking. Sometimes, the stock exists but isn't allowed to be picked due to bin blockage, product quarantine, and so on. In these cases, the system allows the WT to be created, but when it comes to picking, the operator is unable to do so. When there is a shortage of quantity that doesn't allow fulfilling the WR items, the WT isn't created. SAP EWM allows you to handle such situations via the pick denial process.

Certain prerequisites for activating the pick denial process are as follows:

- The BAdI for the outbound delivery (`/SCWM/TO_CREATE`) doesn't use the method `ABORT` to cancel WT creation, meaning you're not canceling such tasks directly.
- You've activated pick denial at the warehouse number level in SAP EWM IMG via menu path. Extended Warehouse Management • Goods Issue Process • Pick Denial • Activate Pick Denial at Warehouse Number Level.
- You've activated pick denial at the WPT level (Figure 9.45) in the SAP EWM IMG menu path, Extended Warehouse Management • Goods Issue Process • Pick Denial • Activate Pick Denial at Warehouse Process Type Level.

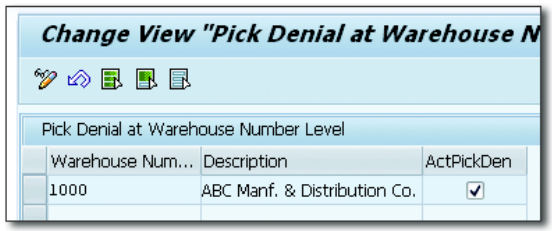


Figure 9.45 Pick Denial at the Warehouse Process Type Level

- You can define your own exception codes for calling exception handling and have them assigned to the internal exception codes defined by SAP. Define this in the SAP EWM IMG menu path, Extended Warehouse Management • Goods Issue Process • Pick Denial • Assign Internal Exception Codes to Exception Codes.

There are a few possible options in SAP EWM to handle the pick denial process. If you want to deny picking when the stock deficit situation exists, you can

achieve this with the relevant configuration setting. If you want to adjust the quantity to the available quantity, for example, if you need 20 pallets of product A but the available stock is 18 pallets, you may want to pick those and adjust the WR item to the picked quantity. This situation can be handled in SAP EWM.

9.8.4 Packing

In SAP EWM, packing is performed in the work center (Figure 9.46). You can execute the packing in the desktop GUI or via the RF transaction. You can access packing via Transaction /SCWM/PACK or via the SAP EWM Easy Access menu path, Extended Warehouse Management • Execution • Packing – General.

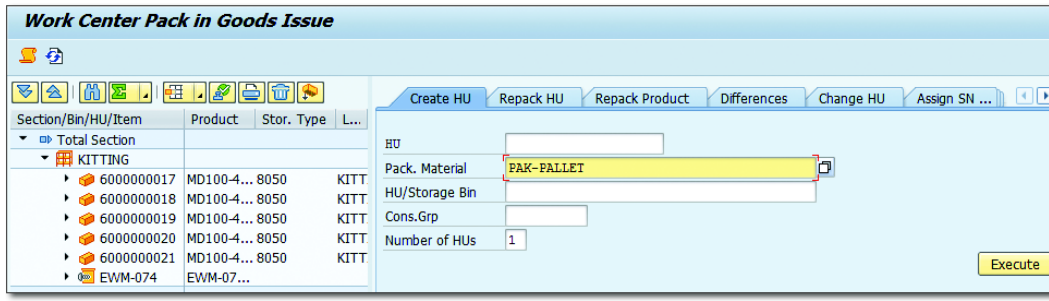


Figure 9.46 Packing in the Work Center

You can use RF Transaction /SCWM/RFUI to do packing by accessing the RF menu as shown in Figure 9.47, Figure 9.48, and Figure 9.49.

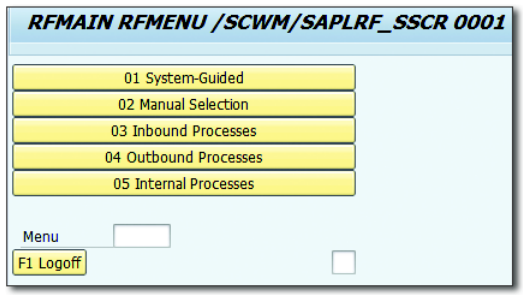


Figure 9.47 RF Main Menu

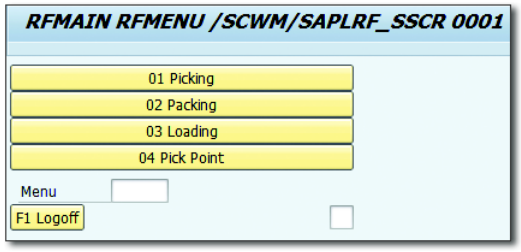


Figure 9.48 RF Main Menu—04 Outbound Processes

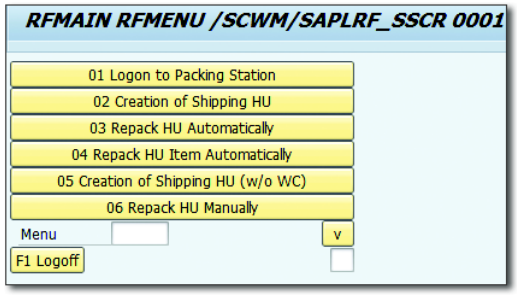


Figure 9.49 04 Outbound Processes—02 Packing

You can log on to the packing station via RF, create the shipping HU, and then pack automatically and manually as well. You should have the step assigned in POSC for moving the HU to the packing work center. As shown in Figure 9.50, the determination of the work center for packing can be defined via Transaction /SCWM/PACKSTDT, or you can access it via the SAP EWM Easy Access menu path, Extended Warehouse Management • Master Data • Work Center • Determine Work Center in Goods Issue. You can also maintain the same in the WO creation rule (WOCR).

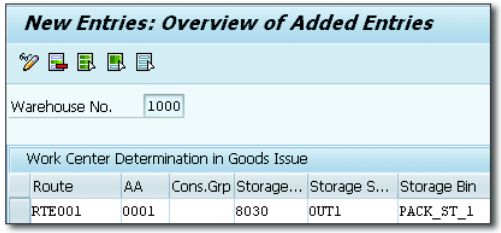


Figure 9.50 Determination of the Work Center for Packing

The packing work center helps if you want to bundle all the loose cases into a pallet or if you want to bundle the entire pick HU into one consolidated HU. Depending on the needs of your organization, this packing can help in optimizing the space utilization effectively in the TU/vehicle by packing the products appropriately. In SAP EWM, the consolidation group helps to determine which products can be consolidated or not (Figure 9.51). Ensure that you've activated the consolidation group for your warehouse in the SAP EWM IMG via the menu path, Extended Warehouse Management • Goods Issue Process • Define Consolidation Group.

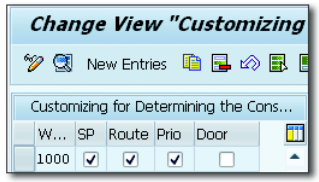


Figure 9.51 Attributes Influencing the Determination of the Consolidation Group

Define the level at which you want to check the consolidation group during packing (Figure 9.52) in the SAP EWM IMG via menu path, Extended Warehouse Management • Master Data • Work Center • Define Work Center.

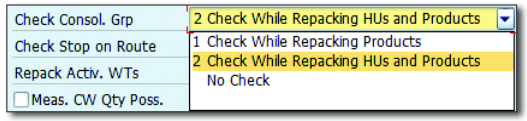


Figure 9.52 Consolidated Group Check in the Work Center Definition

Packing offers wide range of function in SAP EWM such as the following:

- Creation of HUs
- Repacking of HUs
- Repacking of products
- Posting differences
- Changing HUs
- Consolidating/deconsolidating HUs

9.8.5 Pick, Pack, and Pass

These are business scenarios where you need to pick different products for an order, for example, kit assembly, variety pack, and so on. These scenarios necessitate that you pick products from across different activity areas in your warehouse, pack them, and pass them to the goods issue zone. Let's consider Figure 9.53 where a conveyor passes through the activity areas A001, A002, and A003. Each activity area denotes an aisle physically located in the warehouse A, B, and C. When the conveyor passes through, each warehouse operator who is responsible for each aisle needs to pick the product and place it on the pick HU. After the first picking is done in aisle A, he passes on to the next aisle, that is, from activity area A001 (aisle A) to A002 (aisle B). Similarly, the next operator picks the product from activity area A002 (aisle B) and places the pick HU that arrived on the conveyor belt from activity area A001 (aisle A). The operator at activity area A002 passes the pick HU to the next activity area A003 (aisle C). When the operator completes his activity in aisle C, the pick HU passes to the goods issue zone for loading on to the TU/vehicle, goods issue, and check-out.

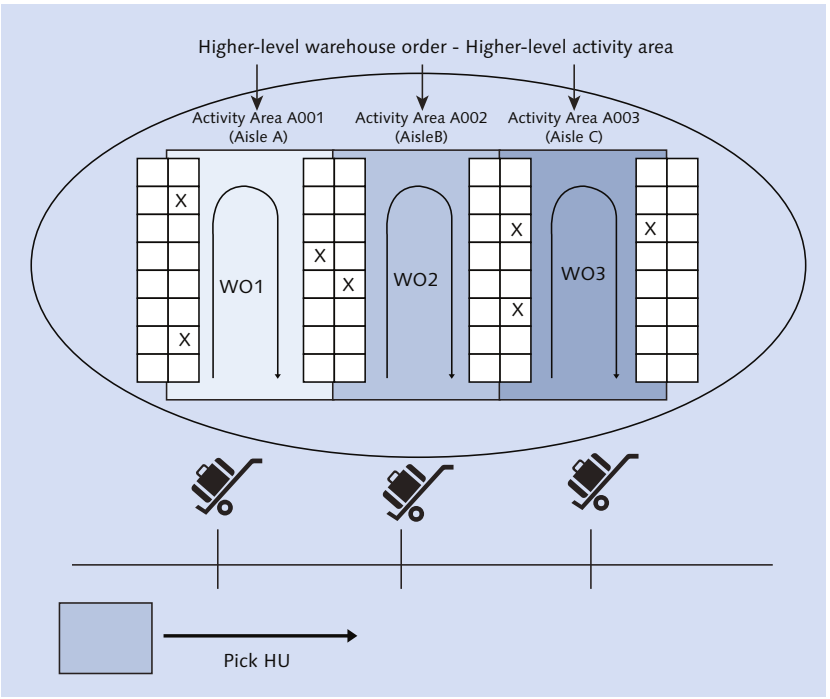


Figure 9.53 Pick, Pack, and Pass Scenario

One WO is created for picking the product in each aisle; hence, you see three WOs: WO1, WO2, and WO3. The higher-level WO connects all three lower-level WOs: WO1, WO2, and WO3. The pick HU is attached to the higher-level WO. After all three operators pick and pass, this pick HU passes to the goods issue zone and is shipped to the customer.

There are certain prerequisites for performing this scenario; you need to define a WO creation with the creation category for pick, pack, and pass. You can choose between system-driven or user-driven creation categories in the SAP EWM IMG menu path, Extended Warehouse Management • Cross-Process Settings • Warehouse Order • Define Creation Rule for Warehouse Orders.

Each picking aisle should be defined as an activity area in the SAP EWM IMG via menu path, Extended Warehouse Management • Master Data • Activity Areas • Define Activity Area. For higher-level activity areas, you need to define and flag the Joined indicator in the definition (Figure 9.54).

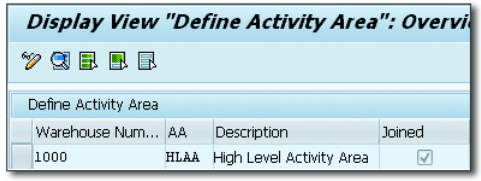


Figure 9.54 Higher-Level Activity Area with the Joined Indicator Set

Next, you must join individual activity areas with the higher-level activity area in SAP EWM IMG via menu path, Extended Warehouse Management • Cross-Process Settings • Warehouse Orders • Join Activity Areas Together.

If you work with the system-controlled method, you have to define the source and destination storage bins for each activity area, as shown in Figure 9.55.

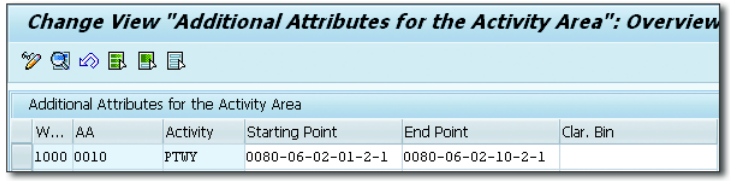


Figure 9.55 Starting and End Point for Activity Area/Activity

You can assign this in the SAP EWM Easy Access menu path, Extended Warehouse Management • Master Data • Storage • Assign Start/End Storage Bin for Activity Area, or you can use Transaction /SCWM/SEBA.

9.9 Invoice before Goods Issue

The standard process is to print the invoice after the goods issue against the delivery in both SAP CRM and SAP ERP. However, there are always certain business scenarios which demand that printing of invoices be done before goods issue, such as the following:

- International shipments where you don't want to issue goods until the goods leave your facility
- System stock discrepancies between the physical stock and the system stock, where you want to dispatch the TU/vehicle before you sort your system differences later for rush orders/urgent orders
- To save detention charges by dispatching the TU/vehicle

Unlike the standard process, invoice before goods issue (IBGI) allows you to print the invoice in SAP CRM or SAP ERP before goods issue. You could print the invoice along with the bill of lading to dispatch these orders. The IBGI is printed after the outbound delivery is created against the ODO in SAP EWM (Figure 9.56). You can trigger the invoice in SAP EWM Easy Access via Transaction /SCWM/FD or via the menu path, Extended Warehouse Management • Delivery Processing • Outbound Delivery • Maintain Outbound Delivery.

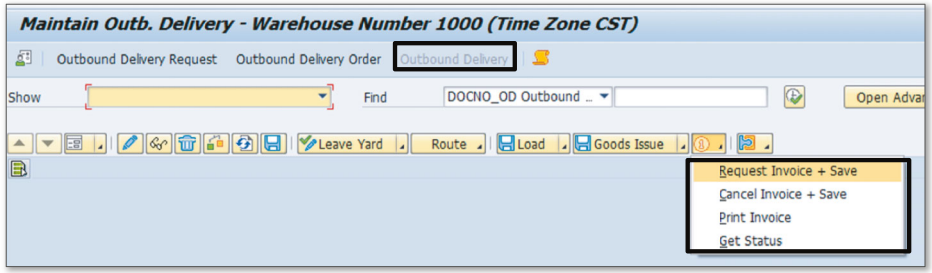


Figure 9.56 Invoice Request and Printing Options from Outbound Delivery

You can also print invoices via TU (Figure 9.57). You can access TUs via Transaction /SCWM/TU or via the SAP EWM Easy Access menu path, Extended Warehouse Management • Shipping and Receiving • Process Transportation Unit. After the invoice is created, you can't modify the pick quantity. If any quantity adjustment is required, you need to reverse the invoice first, which SAP EWM communicates to SAP CRM or SAP ERP. You then need to cancel the outbound delivery before you can make a pick quantity adjustment.

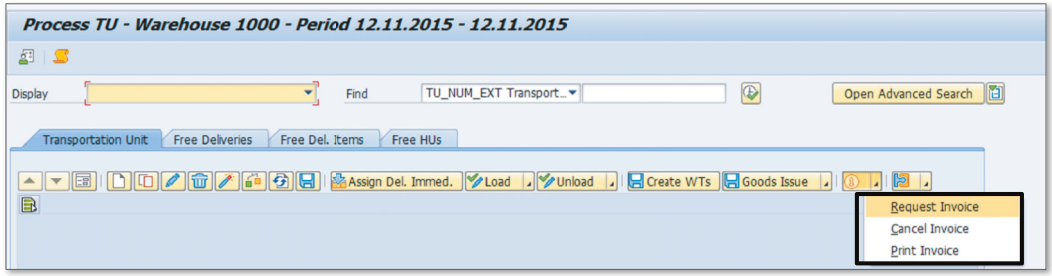


Figure 9.57 Invoice Request and Printing Options from Transportation Unit

For printing invoices, SAP EWM finds the print profile and sends it to SAP ERP or SAP CRM accordingly. For printing single invoices, the system uses the print profile found. For printing multiple invoices, the system uses the print profile identified for the first delivery. The print profile is maintained, defined, and accessed in the following sequence:

- Maintain the default print profile in Transaction /SCWM/SGI or access it via the SAP EWM Easy Access menu path, Extended Warehouse Management • Delivery Processing • Outbound Delivery • Pickup.
- Implement your own print profile determination in BAdI `/SCWM/EX_DLV_PRINT_PROFILE`.
- Define print profiles for delivery processing and determination for goods issue process in SAP EWM IMG via menu path, Extended Warehouse Management • Goods Issue Process • Outbound Delivery • Print • Define Print Profiles for Delivery Processing and Define Print Profile Determination for Goods Issue Process.

9.10 Post Goods Issue

Goods issue posting in SAP EWM represents the physical departure of goods from your warehouse. It also depletes the stock from your SAP EWM warehouse stock and communicates back to the SAP ERP system for posting against the originating outbound delivery document. After it's posted in SAP ERP, it makes a relevant account posting for the inventory ledger via the material document. Goods issue posting against the delivery makes the delivery document ready for billing and subsequent accounts receivables (AR) postings.

You can post goods issue manually from ODO (Figure 9.58) using Transaction /SCWM/PRDO, or you can use the SAP EWM Easy Access menu path, Extended Warehouse Management • Delivery Processing • Outbound Delivery • Maintain Outbound Delivery Order.

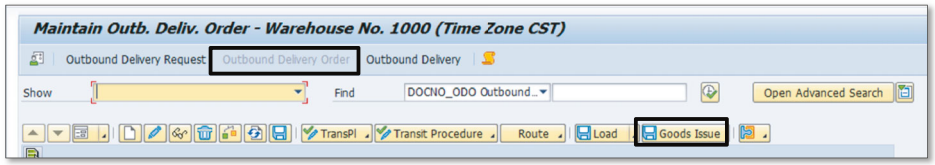


Figure 9.58 Goods Issue Posting via the Outbound Delivery Order

You can also post goods issue manually from outbound delivery (Figure 9.59) using Transaction /SCWM/FD or using the SAP EWM Easy Access menu path, Extended Warehouse Management • Delivery Processing • Outbound Delivery • Maintain Outbound Delivery.

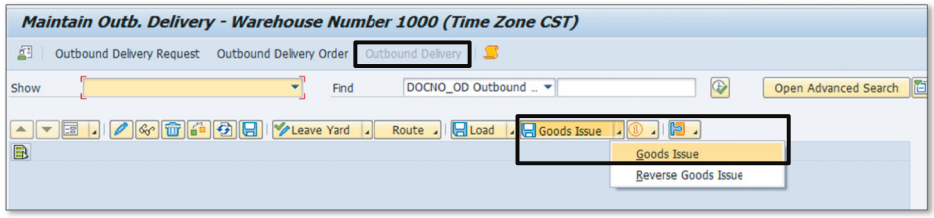


Figure 9.59 Goods Issue Posting via Outbound Delivery

You can also post via PPF. SAP delivers standard PPF (application `-/SCDL/DELIVERY /`, action profile `/SCDL/PRD_OUT`) out of the box for posting goods issue (Figure

9.60). You can activate, start, and schedule for the appropriate action per your requirements.

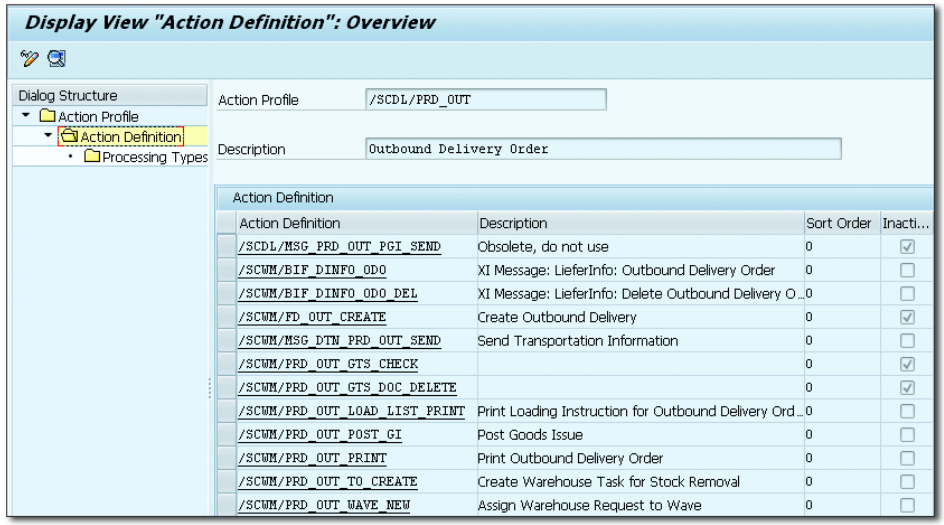


Figure 9.60 Standard PPF Action Definition for Posting Goods Issue

9.11 Stock-Specific Unit of Measure in the Outbound Process

With this selection, you can use multiple stock-specific UoMs (SUoMs) for the delivery item. It's common today that customer orders have varying stock units. Although you have conversions maintained in the system, you end up handling fractional units at times. With the SUoM functionality, the system determines what should be picked for fulfilling the order. The UI displays the alternative UoM (AUoM) to enable the pick and pack process to reflect the physical reality. Update to SAP ERP can be against SUoM to reflect the actual updation.

9.12 Canceling Outbound Delivery

At times, you may need to cancel the pick that was already completed in SAP EWM due to a wrong product in the delivery or a customer request to substitute the product. Under these circumstances, you need to reverse the outbound

document/process in SAP EWM. By the time the warehouse is notified about the cancellation, the ODO might be at the following various stages:

- No picking performed
- Picking complete but subsequent process pending such as loading
- From picking to loading completed, but post goods issue pending
- Check-out pending (pick, pack, and loading complete), that is, post goods issue pending
- TU/vehicle checked out

For these stages within the outbound process, you might need to start the cancellation at different stages.

When no picking is performed, you can cut the quantity using a process code in the ODO. There are predelivered process codes that can be used to adjust the quantity in the ODO (Figure 9.61). If you want to define your own, you can do so in the SAP EWM IMG menu path, Extended Warehouse Management • Cross-Process Settings • Delivery Processing • Process Codes • Define Process Codes.

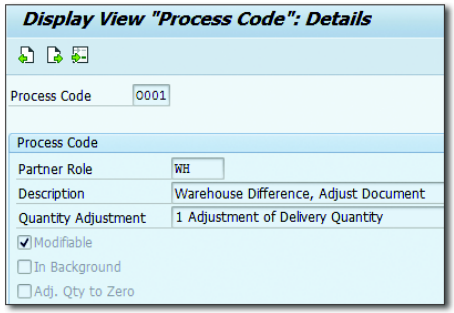


Figure 9.61 Process Codes for Quantity Adjustments

You can assign these codes to your own process code profiles in Customizing (Figure 9.62). You can do this in the SAP EWM IMG via menu path, Extended Warehouse Management • Cross-Process Settings • Delivery Processing • Process Codes • Maintain Process Code Profiles.

You can assign these process code profiles to the relevant document types and item types in Customizing in SAP EWM IMG via menu path, Extended Warehouse Management • Goods Issue Process • Outbound Delivery • Manual

Settings • Define Document Types for Outbound Delivery Process and Define Item Types for Outbound Delivery Process.

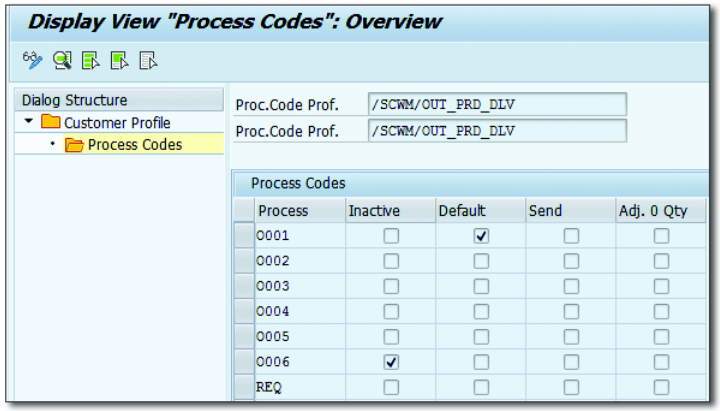


Figure 9.62 Process Code Profiles

For situations where picking is complete, you need to cancel the picking process (Figure 9.63) via Transaction /SCWM/CANCPICK or via the SAP EWM Easy Access menu path, Extended Warehouse Management • Execution • Cancel Picking. This transaction allows you to release the stock and create WTs so that you can move to the respective source bin or any staging bin.

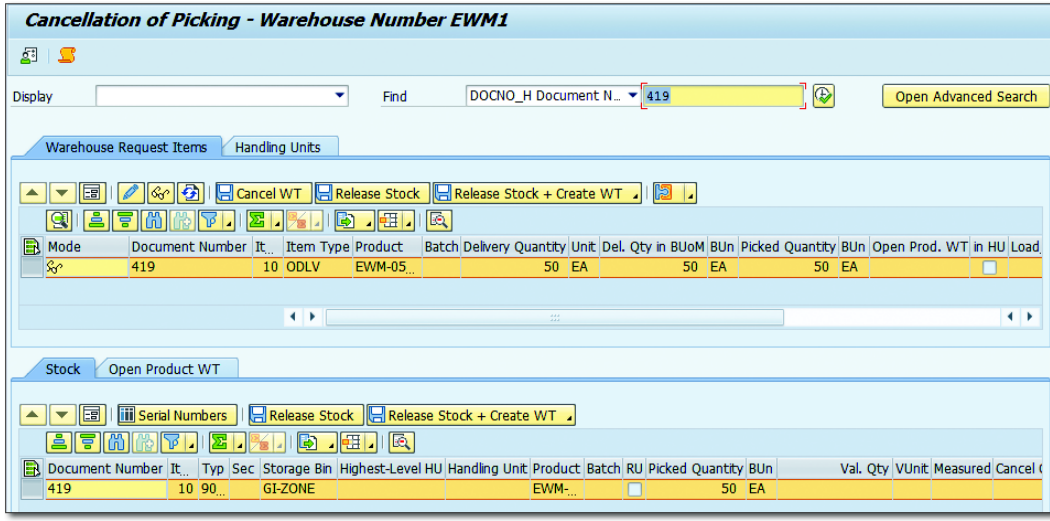


Figure 9.63 Cancel Picking

For the documents that are processed until post goods issue, you need to reverse the goods issue via the outbound delivery document in SAP EWM. In Figure 9.59, you can see the option for reversing the goods issue. If the TU/vehicle is checked out, you need to reverse the checkout and proceed.

9.13 Summary

In this chapter, you saw how the outbound process works in SAP EWM, the basic settings required for the outbound process, the document flow, and the relationship between SAP ERP and SAP EWM. We also discussed Wave Management and its use in processing outbound deliveries. We discussed wave templates, door and staging area determination, check-in/check-out processes, and their subsequent functions via PPF. We also explained the standard RF framework for outbound processes. You've seen how IBGI works in SAP EWM in conjunction with SAP CRM and SAP ERP, how SUoM helps in handling different suitable AUoMs in warehouse processing in SAP EWM, and how to handle pick denial, which is an important aspect in outbound picking because this ensures the right way to handle shortages.

Takeaways

- SAP EWM interfaces with other systems such as SAP CRM, SAP ERP, SAP Advanced Planning and Optimization (SAP APO), and SAP Global Trade Services (GTS)
- The outbound orders can be created in SAP ERP or can flow from the originating systems such as SAP Customer Relationship Management (SAP CRM) to SAP ERP
- In SAP EWM, the route can be determined at various stages: outbound delivery request (ODR), outbound delivery order (ODO), and outbound delivery
- You can use POSC, LOSC, or both combined for a complex outbound process. When both POSC and LOSC are used, SAP EWM always executes POSC first.
- The stock removal strategy defines how the system must search for the stock when goods issue is initiated
- The first step to determine prior to the pick bin determination is the storage type determination.
- Stock determination is used to control the way in which the stock is determined while picking or during stock transfer based on the predefined configuration.
- SAP EWM delivers standard PPF profiles for Wave Management as well
- Cartonization planning helps to improve the creation of shipping HUs based on product master data and quantity, weight, volume information from the ODO.

A warehouse is that link of a supply chain that stores the goods before being shipped to the ultimate or the next consumption point. Shipping and receiving processes are key to an efficient supply chain and determine how well the supply chain performs with respect to the defined standards.

10 Shipping and Receiving

One of the most challenging tasks in managing a warehouse is controlling the movement of vehicles that carry the goods into or out of the warehouse. Efficiently handling the flow of vehicles is important for shipping and receiving operations of a warehouse, and the warehouse yard plays a key role in shipping and receiving activities being carried out in the warehouse. We'll discuss Yard Management (YM) in detail in this chapter.

With SAP EWM 9.3, a new functionality called Transit Warehousing has been introduced. This feature enables you to integrate warehouse execution with freight forwarding operations using SAP Extended Warehouse Management (SAP EWM) and SAP Transportation Management (TM). We'll discuss this in detail in this chapter as well.

SAP Dock Appointment Scheduling (DAS) is another application aimed at better collaboration between warehouses, thus reducing the idle time of vehicles in the yard. DAS can be integrated with SAP EWM. We'll talk expressly about DAS in Chapter 21.

10.1 Yard Management

A yard can be defined as a location outside or near the warehouse where vehicles bringing inbound and outbound deliveries are maintained after arrival until their departure. The Yard Management (YM) functionality helps you in managing the yard in the SAP EWM system.

In SAP EWM, the YM function is built-in and is closely linked with warehouse operations to exploit the benefits of integrating yard operations with warehouse operations. By virtue of being built-in to the SAP EWM system, YM shares the same structure as the warehouse and thus supports the end-to-end inbound and outbound processes. YM also helps businesses make more accurate decisions by providing stock data contained in the yard to the users.

In this section, we'll discuss various elements of YM. We'll also discuss various activities performed within the yard and the documents involved in carrying out those activities.

Note

The YM functionality of SAP EWM is optional to use and may be left deactivated (by default) based on the needs of the business.

10.1.1 Yard Management Activities

Figure 10.1 illustrates the sequence of activities performed within a yard. After the vehicle that will carry the goods arrives at the arrival gate of the facility, it must be registered in the system by performing check-in activities. Based on the warehouse door availability, the vehicle can be mapped directly to a free door and moved for loading/unloading activities to be performed. Or the vehicle can be made to wait in the yard's parking area, before being mapped to a free door. After the loading/unloading activity is completed, the vehicle may be parked temporarily in the yard's parking area or directly taken to the departure gate of the facility. The check-out activity is carried out after the vehicle leaves the facility.

The smallest loadable unit of a vehicle that is used to transport goods is called a transportation unit (TU). The TU can be a fixed part of the vehicle or units contained within. We'll discuss TUs in detail in subsequent sections of this chapter. At the moment, note that delivery items are linked to vehicle or TU documents using which yard activities are carried out. It's also possible to link one or more TUs to a vehicle document.

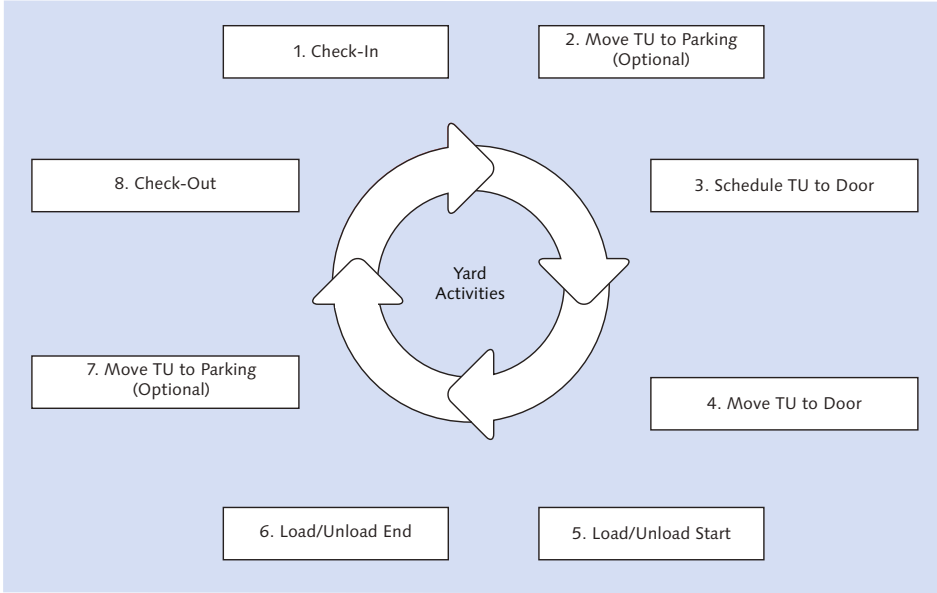


Figure 10.1 Activities Performed in the Yard

10.1.2 Activation of Yard Management

SAP recommends using the YM functionality of SAP EWM to realize the full potential of the software. Activation of YM (Figure 10.2) for a warehouse can be done using the navigation path, SAP EWM IMG • Extended Warehouse Management • Cross-Process Settings • Shipping and Receiving • Yard Management • Activate Yard Management for Warehouse. By selecting the YM Actv. indicator for a warehouse number, YM functionality can be enabled for the warehouse.

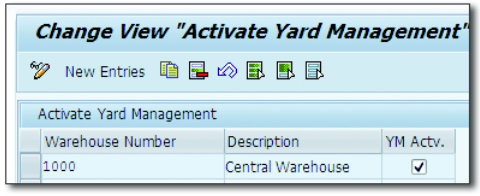


Figure 10.2 Yard Management Activation

Note

The discussions in the following sections of the book are based on yard as a storage type. However, when a common yard is used by multiple warehouses, a yard can also be structured as a warehouse.

10.1.3 Yard Structure

Similar to other storage types in the warehouse, the yard storage type is comprised of yard sections and yard bins. Figure 10.3 illustrates the hierarchy of these components within the yard. The highest level in this hierarchy is the yard, which is mapped to the SAP Extended Warehouse Management (EWM) structure as a storage type. Unless, you have a YM structure and definitions, it's not possible to configure a process flow involving the yard.

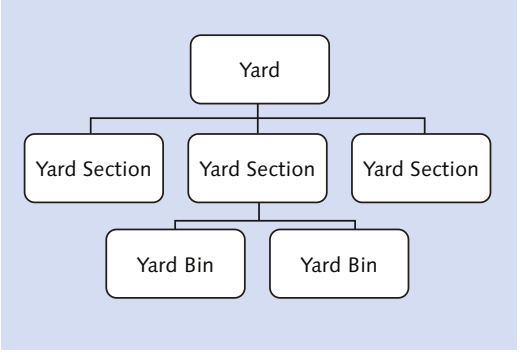


Figure 10.3 Hierarchy of Yard Structure Components

Define Yard Using Storage Type

With the definition of the yard storage type with the role *Yard*, you also need to maintain some important parameters (Figure 10.4) that control the behavior of the yard. The navigation path for defining the yard using the storage type and setting up the parameters is SAP EWM IMG • Extended Warehouse Management • Master Data • Shipping and Receiving • Yard Management • Define Yard Using Storage Type.

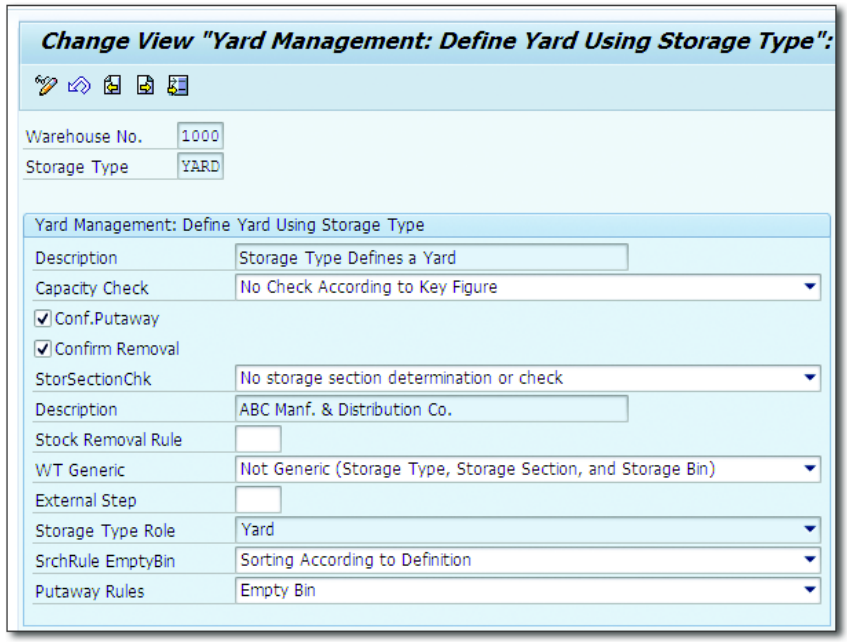


Figure 10.4 Define Yard Using Storage Type Parameters

Structure Yard Using Storage Areas

Yard constitutes the following three storage areas:

- **Checkpoint**
  Vehicles temporarily stay here for some paper verification and so on, after they arrive at the facility or before they leave the facility. Usually there are multiple checkpoints in the warehouse for entry/exit. These checkpoints naturally act as a guard shack for arrival and departure of vehicles/TUs for the YM activity.
- **Parking space**
  Waiting area for the vehicles before they are assigned and moved to a free door for loading/unloading. After loading/unloading is completed, they can again be brought to the parking area so that some paper verification can be performed before they leave the premises.
- **Group of warehouse doors/single door**
  Used for loading or unloading of the goods from the vehicles or TUs.

To maintain these areas of the yard in SAP EWM as shown in Figure 10.5, navigate to the IMG, and choose Extended Warehouse Management • Master Data • Shipping and Receiving • Yard Management • Structure Yard Using Storage Areas.

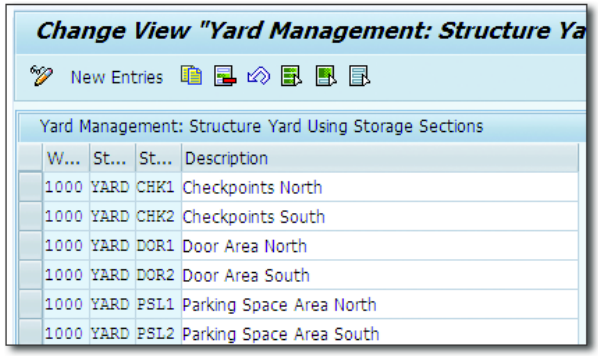


Figure 10.5 Storage Areas in the Yard

This customization allows the yard areas to be structured and mapped to the SAP EWM system. Storage sections are used to clearly mark and segregate areas in a yard. Apart from simplifying the identification of various areas in a yard, this segregation is also important from the warehouse monitoring point of view because appropriate reports can be generated for each storage section of the yard.

Yard Bins

Each of the yard areas (storage sections) is further divided into smaller physical spaces (i.e., a *bin* in SAP EWM terminology) that is the exact position (parking slot) where the vehicles or TUs are parked for check-in/check-out, waiting to be loaded/unloaded for the actual loading/unloading process. The yard bin is the lowest level in the hierarchical YM structure. Figure 10.6 illustrates the various areas within the yard.

You can define these yard bins using Transaction /SCWM/LS01 or by navigating to SAP EWM SAP Easy Access Menu and choosing Extended Warehouse Management • Master Data • Shipping and Receiving • Yard Management • Create Storage Bin.

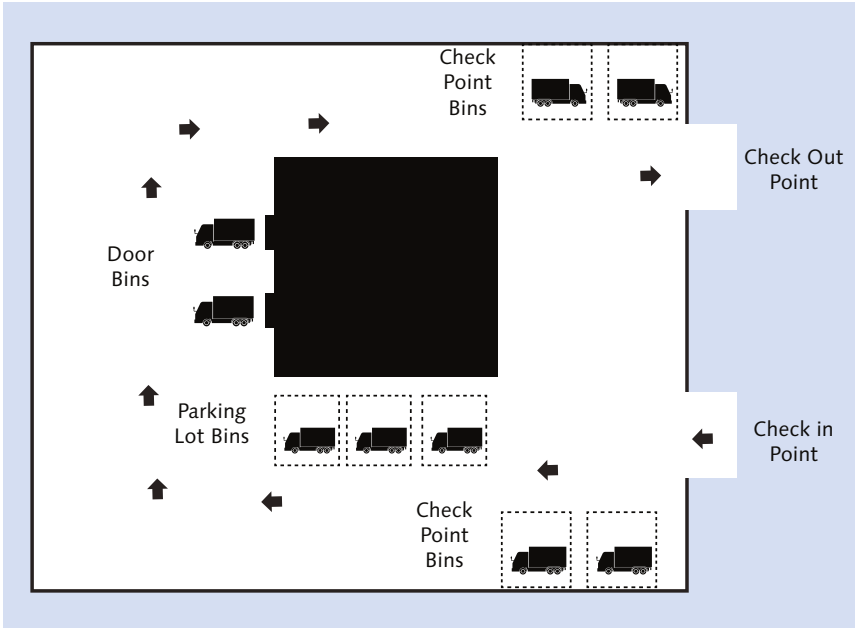


Figure 10.6 Yard with Various Bins

10.1.4 Yard Organizational Units Definition and Bin Assignments

Checkpoint and door are the organizational units used in the YM functions. These organizational units must be linked to the appropriate bin of the yard.

Checkpoint

A checkpoint is a location from where vehicles enter or exit the yard. It can either be a physical gate or a virtual gate from where the date is transmitted electronically or a goods issue or goods receipt office at the yard entrance. At the checkpoint, all the important information about the vehicle and TUs is collected. Defining checkpoints is essential for YM because these checkpoints are used to control the entry/exit from the yard and movement within the yard.

To define a checkpoint as shown in Figure 10.7, navigate to SAP EWM IMG, and choose Extended Warehouse Management • Master Data • Shipping and Receiving • Yard Management • Define Checkpoints.

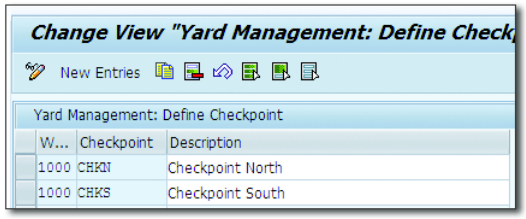


Figure 10.7 Checkpoint Definition

As shown in Figure 10.8, checkpoints can be assigned to yard bins or supply chain units (SCUs) by using Transaction /SCWM/YM_CHKPT_BIN or by navigating to SAP EWM Easy Access Menu and choosing Extended Warehouse Management • Master Data • Shipping and Receiving • Yard Management • Assign Checkpoint to Yard Bin and SCU.

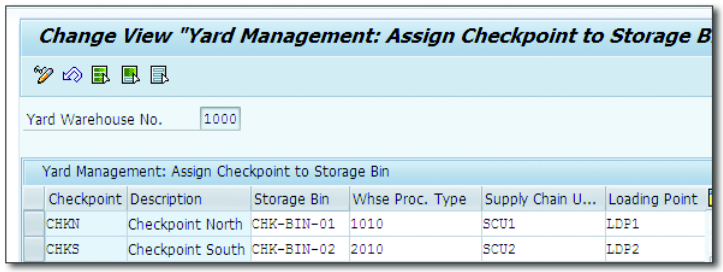


Figure 10.8 Yard Bin Assignment to Checkpoints

Door

A door connects the yard to the warehouse. Goods are issued from or received in a warehouse through a door. Loading and/or unloading of vehicles and TUs takes place at the doors. A door is an organizational unit assigned to a warehouse.

To define a door as shown in Figure 10.9, navigate to SAP EWM IMG, and choose Extended Warehouse Management • Master Data • Warehouse Door • Define Warehouse Door.

While defining a warehouse door, the loading direction can be assigned to it. The loading direction specifies the purpose for which the door is used, that is, whether it's used for unloading (inbound), loading (outbound), or both.

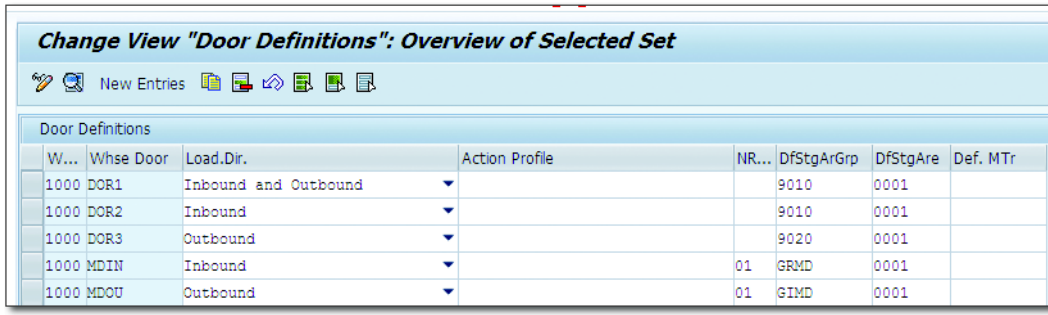


Figure 10.9 Door Definition Screen

As shown in Figure 10.10, the warehouse door can be assigned to a yard bin using Transaction /SCWM/YM_DOOR_BIN or by navigating to in the SAP EWM Easy Access menu and using the path, Extended Warehouse Management • Master Data • Shipping and receiving • Yard Management • Assign Warehouse Door to Yard Bin.

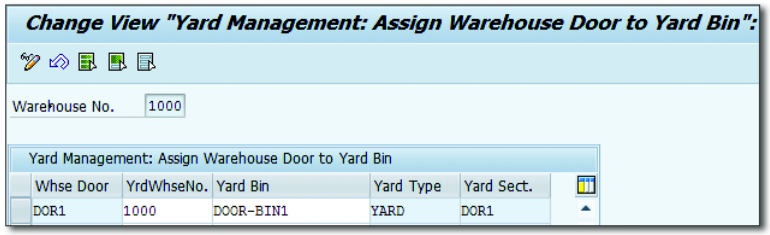


Figure 10.10 Assigning a Door to a Yard Bin

10.1.5 Transportation Unit

As mentioned earlier in the chapter, the TU is the smallest loadable unit of a vehicle that is used to transport goods. For example, a train with four wagons is said to have four TUs. The TU can be a fixed part of the vehicle. To create a TU, use Transaction /SCWM/TU, or go to SAP EWM Easy Access menu and follow the path, Extended Warehouse Management • Shipping and Receiving • Process Transportation Unit.

The same transaction is used to assign deliveries, assign handling units (HUs) or vehicles to TUs, assign doors to TUs, or read or process other information related to TUs.

When creating a TU, the following fields need to be specified:

- TU
  Each TU is assigned an external number that is used to track the TU within the yard. The number must be such that it can be traced to the physical TU.
- Carrier
  A carrier is the logistics service provider and must be defined in SAP EWM as a business partner with the carrier role.
- Standard Carrier Alpha Code (SCAC)
  This is a unique code used to identify carriers on the basis of geography.
- Means of Transport
  This is the class of vehicle used to transport a TU. Truck, for example, is a means of transport in the road mode of transport.
- Packaging Material
  For ease of handling and transportation, a certain quantity of packaged goods are held together to form a pallet, box, crate, and so on. The material used for holding together packaged goods is called packaging material. The most frequently used packaging materials are pallets, boxes, crates, wire baskets, and containers. From the TU point of view, it's necessary to define the packaging material because the capacity of the TU is determined from the packaging material it can carry.
- Route
  Route is the path that a TU will take from the start location to reach the destination location with some stops (called transshipment locations) in between.
- Shipping and Receiving (S&R) Activity direction
  For every TU, it's necessary to define whether it's for inbound or outbound delivery. The direction of transport gets assigned automatically when a TU is assigned to inbound or outbound delivery. This is important because, in some cases, it's not known whether the TU is inbound or outbound at the time of creation, hence the S&R activity direction is left undefined at the time of TU creation.

Apart from the preceding fields, the S&R activity start and end dates and times can also be specified.

It's worth noting that for TUs that regularly take goods in and out of a yard, there is no need to create a new TU every time it's used. The TUs created earlier can be

reused; in this situation, the S&R Activity number creates the unique identity along with the TU number.

10.1.6 Vehicles

A vehicle is a specialized means of transport that is made up of one or more TUs. To create a vehicle, use Transaction /SCWM/VEH, or navigate to SAP EWM Easy Access, and follow the path, Extended Warehouse Management • Shipping and Receiving • Process Vehicle.

For creating a vehicle, the following details need to be specified:

- Vehicle number
- Means of transport
- Carrier
- SCAC
- S&R activity start and end date and time

10.1.7 Check-In and Check-Out

This transaction is used to record the entry and exit of vehicles/TUs at checkpoints. To record check-in/check-out, use Transaction /SCWM/CICO, or navigate to SAP EWM Easy Access menu, and follow the path, Extended Warehouse Management • Shipping and Receiving • Yard Management • Arrival at/Departure from Checkpoint.

During check-in and check-out, if certain additional functions have to be triggered, you can use the post-processing framework. This functionality enables you to schedule certain actions and process them against the document. For example, if you want to trigger the bill of lading (BOL) at the time of check-out, you can configure the Post Processing Framework (PPF) for BOL printing.

For defining the action profile and condition in SAP EWM IMG, navigate to Extended Warehouse Management • Cross-Process Settings • Shipping and Receiving • Message Processing.

In this configuration setting, you can define the action profiles for vehicle (Transaction /SCWM/VEH), TU (Transaction /SCWM/TU), and doors (Transaction /SCWM/DOOR).

10.1.8 Functions of Yard Management

The entire yard process from the entry of a vehicle into the yard to the exit is managed using YM. In a yard, a vehicle or a TU moves from a yard bin to another for either actual loading/unloading or simply to wait for its turn for loading/unloading. Each of these movements of a vehicle or a TU in a yard, called a yard movement, is a warehouse task (WT) in SAP EWM. Thus a vehicle or a TU moving from checkpoint to parking space during entry, from parking space to door for loading/unloading, from door to parking space after loading/unloading, and from parking space to checkpoint for exit, are all called yard movements. A WT is created in the system each time a yard movement takes place.

To create a WT, use Transaction /SCWM/YMOVE, or navigate to SAP EWM Easy Access menu, and follow the path, Extended Warehouse Management • Shipping and Receiving • Yard Management • Create Warehouse Task in Yard.

10.1.9 Yard Monitoring

The activities of a yard can be monitored using the Warehouse Management Monitor screen (Figure 10.11). This is possible because a yard is assigned as a storage type to a warehouse, as described initially in this chapter, and hence it's linked to the warehouse. The monitor allows you to monitor stock in the yard, stock on TUs, availability of parking spaces, status of doors, and so on.

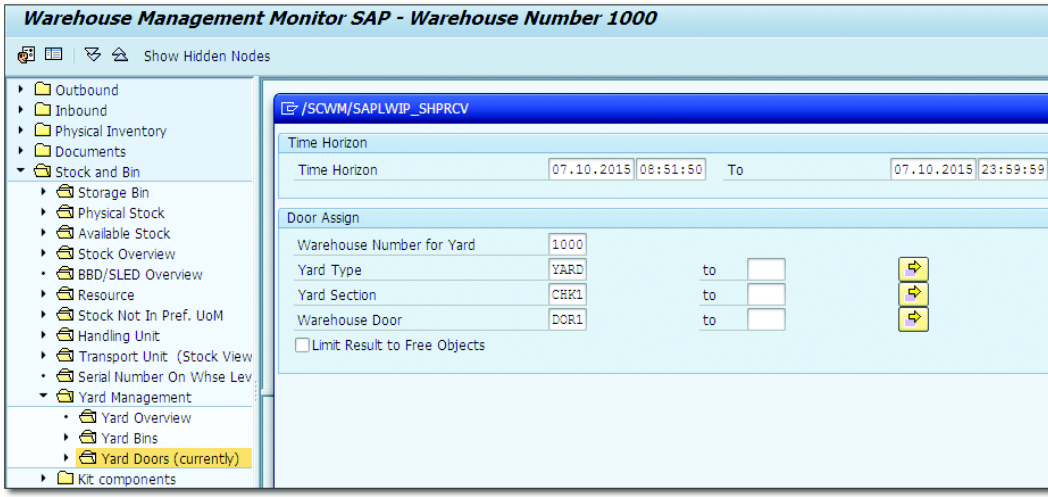


Figure 10.11 Monitoring Yard Bins from Warehouse Monitor

To monitor the yard, use Transaction /SCWM/MON, or go to SAP EWM Easy Access menu, and choose Extended Warehouse Management • Monitoring • Warehouse Management Monitor.

In the Warehouse Management Monitor screen, you can see the yard monitoring under menu path, Stock and Bin • Yard Management. Within Yard Management, it provides visibility on Yard Overview, Yard Bins, and Yard Doors. Yard Doors can give you the distinguishability on occupied doors and free doors available for docking. You can filter the selection for the required time horizon, yard warehouse, yard type, yard section, and door. You can also limit the results against the free object for quick output.

10.1.10 Yard Activity Updates in SAP ERP

SAP EWM is closely integrated with other modules of SAP ERP such as Materials Management (MM), Production Planning (PP), Sales and Distribution (SD), and so on. Any document related to goods movement that is generated in these SAP ERP modules triggers a process in SAP EWM. For example, when an inbound delivery document is generated for a purchase order in MM, a corresponding inbound delivery notification (IDN) specifying details of incoming material is generated in YM. These delivery items are then assigned to a vehicle/TU to complete the process.

This integration of SAP EWM with SAP ERP is important from an organizational perspective because information is readily available to all the concerned stakeholders. It also ensures end-to-end integration of the entire business process of an organization.

10.2 Transportation Units and Vehicles

When performing the YM functions, shipping and receiving uses TU and vehicle documents to perform the YM activities. Without these documents, you can't perform, track, and trace the YM functions.

As the smallest transportable unit of goods, the TU can be handled as a part of a vehicle or independently in the SAP EWM system. A vehicle may be comprised of one or more TUs, as shown in Figure 10.12.

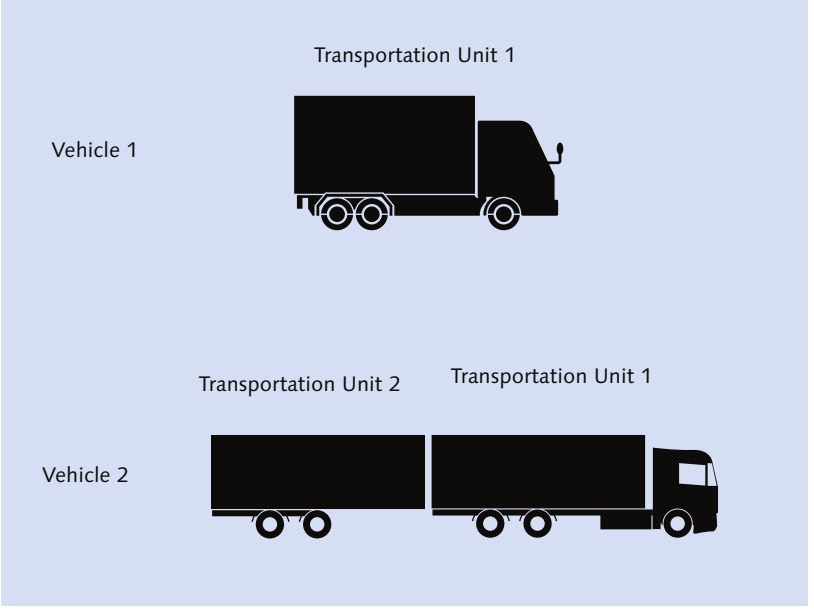


Figure 10.12 Vehicle and TU Relationship

In SAP EWM, you can work without a vehicle if the TU is sufficient for the business need. Packaging material is used to construct a TU in SAP EWM. By linking the packing material with the means of transport, you can define the construction rule in SAP EWM. For this setting, navigate to the menu path in SAP EWM Easy Access menu, and choose Extended Warehouse Management • Settings • Shipping and Receiving • Link between Packaging Material (TU) and Means of Transport. You can define the number of permitted packing materials for the means of transport (Figure 10.13).

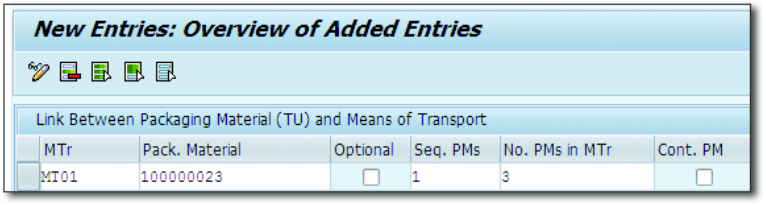


Figure 10.13 Packaging Material for Constructing a TU

When you check-in/check-out using Transaction /SCWM/CICO, you have the option of Arrival at Checkpoint or Dep. from Checkpoint. You can enter a

license plate number and driver information upon check-in. You can do the yard movement as shown in Figure 10.14 after check-in.

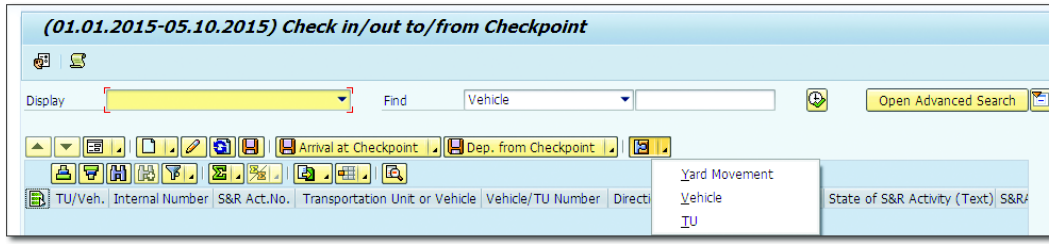


Figure 10.14 Vehicle Check-In/Check-Out

Via yard movements, you can dock to the respective door after check-in/check-out for further processing of the load. Whenever there is a yard movement, the system creates WTs for these movements. Every single yard movement is posted via WTs. BOLs are generated via vehicles in SAP EWM.

Vehicles can be created automatically via PPF, which is especially used for advanced shipping notifications (ASNs) and shipments if coming via the SAP ERP system to SAP EWM. Creation of a vehicle in SAP EWM can initiate shipment creation in the SAP ERP system as well. Creation of a vehicle from a TM freight order is also a possibility. You can specify whether the TU will be optional or obligatory. If it's obligatory, the TUs are fixed assignments to vehicles; you can't assign the obligatory TU to another vehicle.

It's important to understand the distinction between a vehicle and a TU in SAP EWM. So before we proceed to the next section, let's take a quick look at Table 10.1 to see the activities that can be performed at the vehicle level and the TU level to emphasize how they are differentiated in the system.

Functions	Vehicle	Transportation Unit
Assign deliveries	N	Y
View the assigned deliveries	Y	Y
Assign HUs, doors	N	Y
Arrive/depart from door/checkpoint	Y	Y
Create WTs for complex loading/unloading	N	Y

Table 10.1 Comparison of Functions of Vehicle and TU

Functions	Vehicle	Transportation Unit
Perform/reverse simple loading/unloading	Y	Y
Perform/reverse goods issue/receipt for assigned TUs/deliveries	Y	Y
Generate BOL	Y	N

Table 10.1 Comparison of Functions of Vehicle and TU (Cont.)

10.3 Transportation Management Linkage with SAP EWM

SAP Transportation Management (TM) aids all transportation functions in moving the product from the source to the destination location. TM is used to perform an effective transportation planning and execution, to optimize the transportation cost, and to react any eventuality and plan for alternatives. TM helps in performing the following:

- Handling forwarding orders
- Creating freight bookings
- Planning transportation
- Selecting carriers
- Tendering services
- Dispatching and monitoring the transportation
- Calculating transportation charges
- Considering foreign trade
- Regulating dangerous goods

Note

TM is a huge topic in itself. Here we're just referring to TM-specific points that are relevant for your understanding of SAP EWM.

TM provides a comprehensive solution and integrates with SAP ERP, SAP EWM, SAP Event Management (EM), SAP Global Trade Services (GTS), and SAP Customer Relationship Management (SAP CRM). In this chapter, we're providing a glimpse of integration with SAP EWM, which can happen in three ways:

- Integration based on SAP ERP shipments
- Direct integration
- Warehouse billing

Shipment-Based Integration between SAP TM and SAP EWM via SAP ERP

Outbound deliveries form the communication between TM and SAP EWM. The planning results from TM appear as shipments in SAP ERP, and this shipment document is sent to SAP EWM. The SAP ERP shipments are represented in SAP EWM as TUs. These TUs form the basis for warehouse planning and execution in SAP EWM with the associated deliveries. TU in SAP EWM sends the message back to SAP ERP and updates the shipment document. This in turn sends the respective shipment updates to TM.

Direct Integration between SAP TM and SAP EWM

The communication is based on the delivery from SAP ERP to SAP EWM and TM. In contrast to the preceding SAP ERP shipment integration, the planning results from TM are sent directly to SAP EWM. In an identical way, the execution results from SAP EWM TUs are sent directly to TM.

Warehouse Billing

This feature, introduced with SAP EWM 9.3, enables you to do the following:

- Sell warehouse services to customers and bill the customers periodically based the services used for a time period.
- Purchase warehouse services from external service providers and self-bill periodically to pay the service provider based on the warehouse services used for a time period.

You can render services to the customer and bill periodically; similarly, you can take services from the vendor for the warehouse activity and pay periodically. For this, you use agreements, charge calculations, and settlements in TM.

10.3.1 Basics

There are certain prerequisites for using TM, like maintaining the transportation mode, means of transport, and transportation group. Other basic configuration and definitions in SAP EWM are given in the following list. For these settings, go to SAP EWM IMG, and choose Extended Warehouse Management • Goods Issue Process • Transportation Management in EWM • Basics.

- **Activate Transportation Management**
  This is used to activate TM in SAP EWM.
- **Define freight code sets, freight codes, and determination**
  Freight codes are used together with freight code sets of freight forwarders and rail carriers to classify the goods that are to be transported. Freight codes are used for communication with freight forwarders and are specified in the shipping papers. Freight code sets and freight codes are used to classify the goods that are to be transported. Freight codes are used to communicate with freight forwarders. A freight code is determined in two steps. First, the freight code sets are determined based on the following criteria:
  - Transportation service provider
  - Forwarding country
  - Means of transport

  Next, a freight code is determined. Each freight code is defined for a particular freight code set. A freight code can be based on the following criteria:
  - Product freight group
  - Freight code set
- **Define product freight groups**
  Product freight group is used to classify product freight codes and freight classes. These are then used for communication with service providers.

10.3.2 SAP TM Interfaces

Interface-related configurations for TM and SAP EWM communication are defined under the interfaces in SAP EWM IMG. The Navigation Path is Extended Warehouse Management • Goods Issue Process • Transportation Management in EWM • Interfaces. The following definitions are maintained under it.

Define Transportation Planning Point

The transportation planning point is used for planning and processing transportation activities. It's an organizational unit in Logistics Execution (LE). The responsibility of planning shipments and handling freight documents rests with the transportation planning point. Consequently, one and only one transportation planning point is responsible for each shipment and freight document.

Shipment type, mode of transport, regional departments and so on are different types of transportation planning points. For example, a company has two separate groups of shipping employees who plan shipments by rail and shipment by ship. Thus, two transportation planning points are required to be defined in the system.

Assign an External Transportation Planning System to a Transportation Planning Point

When an external transportation planning system (TPS) is already in use, it can be linked to a transportation planning point using this IMG activity. By doing so, shipments planned by a transportation planning point can be sent to the external TPS where they are optimized, and a freight document is generated. This freight document is sent to the transportation planning point for further processing.

The assignment between an external TPS and a transportation planning point is unique; that is, a transportation planning point can be assigned to only one external TPS. However, an external TPS can be assigned to multiple transportation planning points.

Maintain Settings for Determining Transportation Planning Points

By maintaining settings for transportation planning points, the system can automate the process of assigning a transportation planning point on the basis of shipment data. Determination of Planning Point is based on Location ID, Mode of Transportation, Shipping Condition, and Transportation Priority.

10.3.3 Maintain Shipments

In this IMG activity, you define the shipment-related configurations. Go to the SAP EWM IMG, and choose Extended Warehouse Management • Goods Issue Process • Transportation Management in EWM • Shipments.

Define Shipment Type

All the important control parameters for a shipment document are contained in the shipment type:

- Planned shipment/final shipment
- Number ranges
- Document data, for example, status profile, transportation mode, means of transport, transit direction, and an indicator for specifying whether the user interface (UI) changes to the document are allowed
- Archiving settings
- Indicator for change documents

Define Number Range for Shipments

Whenever a shipment is created in the system, a unique number is assigned to it. This number can either be system generated or can be manually assigned. In this IMG activity, the number range for this unique number can be defined.

Define Number Range for External Bill of Lading Numbers

When a BOL is created, a unique number is assigned to it. An external number can be generated in addition to the internal number. The number range for this unique number can be defined in this IMG activity.

Maintain Settings for Determination of Shipment Types

This activity is used to link various shipment documents by defining predecessor shipment types and successor shipment types. By doing so, when a shipment or a BOL is created automatically, the shipment type gets determined automatically.

10.3.4 Maintain Freight Documents

In this IMG activity, you maintain the freight document-related settings. Go to SAP EWM IMG, and choose Extended Warehouse Management • Goods Issue Process • Transportation Management in EWM • Freight Documents.

Define Freight Document Type

Similar to a shipment type, the freight document type contains all the important control parameters for a freight document. The number range and archiving settings need to be defined here (Figure 10.15).

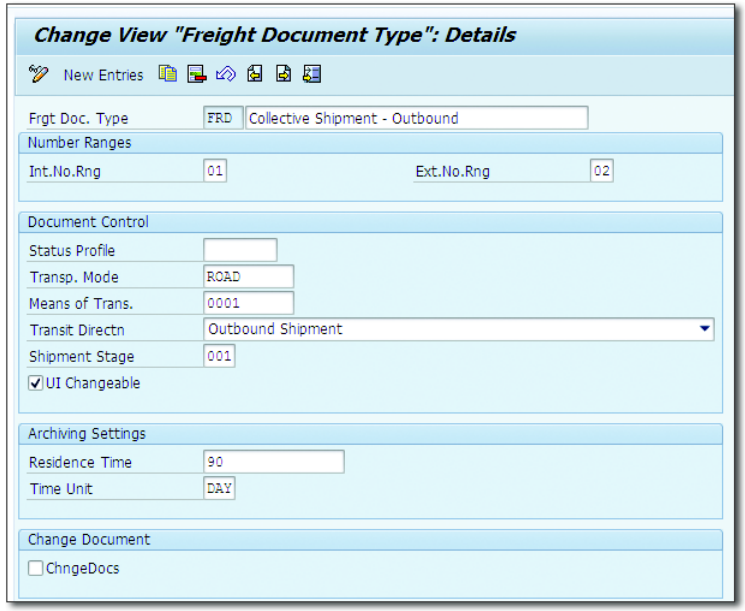


Figure 10.15 Freight Document Type Definition

The other important control parameters are listed here:

- Status Profile
  This is part of a cross-application component with which the user statuses can be defined. In the context of a freight document, defining the status profile means defining the authorization rules for processing a freight document.
- Transp. Mode
  This indicates how a product is transported—by air, rail, or road.

- Means of Trans.
  This indicates the class of vehicle used to transport a product. For example, a truck is a class of vehicle for road as a mode of transport.
- Transit Directn
  This specifies whether the movement of goods is inbound or outbound.
- Shipment Stage
  This is used to specify whether a shipment or freight document is linked to other shipments or freight documents. For example, preliminary leg, main leg, and inland transportation are shipment stages.
- UI Changeable
  By checking this indicator, manual changes are permitted for certain documents.

Define Number Range for Freight Documents

Just as a unique number is generated for a shipment document, a unique number is also generated for a freight document. The number range for this unique number can be defined in this IMG activity.

Maintain Settings for Determining Freight Document Type

By maintaining settings for freight document type, when a freight document is automatically generated, a freight document type is automatically determined by the system based on transportation mode, means of transport, stage code, and transit direction.

10.4 Staging Area and Door Determination (Inbound/Outbound)

In a warehouse, for various reasons, goods need to be stored in an intermediate place before they go to the destination. A staging area is used for such interim storage of goods. For example, in a goods issue process, goods might be required to be kept in a staging area before they are picked for delivery. A staging area is an organizational unit assigned to a warehouse number in a defined hierarchy. A door, on the other hand, is a point where goods enter or leave the warehouse. A door is also an organizational unit assigned to a warehouse. In

staging area and door determination, rules are used to determine the following values:

- Staging area groups (storage type)
- Staging areas (storage section)
- Staging bays (storage bin)
- Doors

These values are required for storage control. This process runs automatically in the background when a delivery is created or changed. This transaction is used to define the determination rules for the listed values. You may use Transaction /SCWM/STADET_IN, or go to SAP EWM Easy Access, and choose Extended Warehouse Management • Settings • Shipping and Receiving • Staging Area and Door Determination (Inbound) (Figure 10.16).

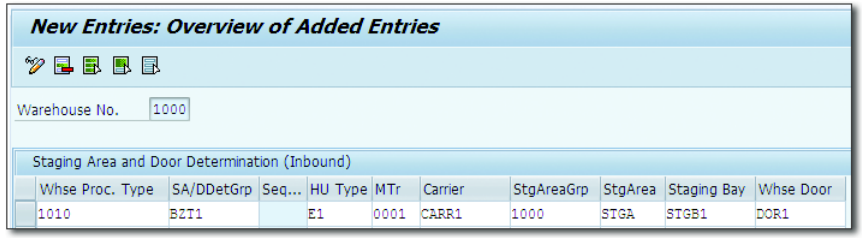


Figure 10.16 Staging Area and Door Determination Table in Inbound

The key fields which need to be populated in screen seen in Figure 10.16 are as follows:

- **Warehouse process type**
  In this field (Whse Proc. Type), you need to define the type of warehouse processes such as goods issue, goods receipt, repacking, and so on. This information is useful during creation of a WT.
- **Staging area/door determination group**
  To differentiate between requirements during loading and unloading at a door or staging area, the staging area/door determination groups are used.
- **Sequence**
  This is a numerical value indicating the order of an object in a specific context. For example, a product may have multiple stops in between the source and the destination in a transportation process.

- **Handling unit type**
  Each type of HU has different requirements for handling during the transportation process, so it's necessary to define the type of HU, such as 1m height pallet, 2m height pallet, and so on.
- **Means of transport**
  The class of vehicle is specified here as truck, rail, airplane, and so on.
- **Carrier**
  Carrier is the logistics service provider defined as a business partner with the carrier role.
- **Staging area group**
  Multiple staging areas can be grouped into a staging area group. A staging area group corresponds to a storage type, whereas a staging area corresponds to a storage section.
- **Staging bay**
  Part of the staging area that allows a correct loading or unloading sequence.

Similarly, for Staging Area and Door Determination (Outbound) as shown in Figure 10.17, use Transaction /SCWM/STADET_OUT, or go to SAP EWM Easy Access, and choose Extended Warehouse Management • Settings • Shipping and Receiving • Staging Area and Door Determination (Outbound).

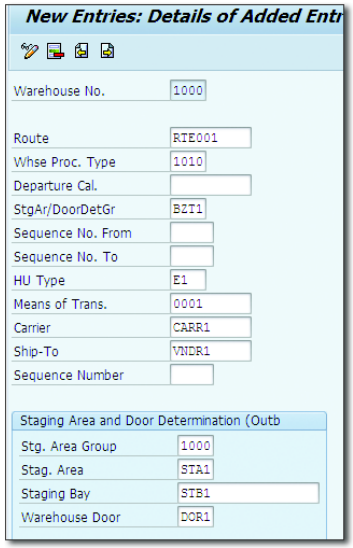


Figure 10.17 Staging Area and Door Determination Table (Outbound)

For the Staging Area and Door Determination (Outbound) section, in addition to the fields described in the preceding list, route, ship-to party details, and departure calendar can also be specified. Routes, which are maintained in TM, can be specified here. The ship-to-party details are fetched from the parties maintained as partners in the system. The departure calendar provides the scheduled departure date for shipment.

10.5 Transit Warehousing

This feature, released with SAP EWM 9.3, enables you to integrate warehouse execution with freight forwarding operations using SAP EWM and TM.

In Transit Warehousing, you receive cargo from shippers based on inbound planning performed in TM. You consolidate cargo with the same destination in your transit warehouse. Then you ship it to the next location in the transportation chain or to the final consignee, based on outbound planning performed in TM.

As cargo received from numerous shippers in a transit warehouse is variable, you don't manage product master data for it. Instead, you manage cargo as HUs and keep cargo information directly in the documents used in the warehouse.

The transit warehouse is structured so that you put away HUs with the same destination country or region in the same storage bin. This means that they are available for shipment to the next location or to the consignee.

HUs with special attributes, such as dangerous goods or high-value cargo, are put away separately.

With the next outbound plan sent by TM, you either load the HUs directly from the staging area used for putaway, or you stage the HUs before loading them onto a vehicle.

During these processes, SAP EWM keeps TM informed about the major steps performed in the transit warehouse, such as arrival at checkpoint, departure from checkpoint, and receiving or loading completion.

The following are the main processes involved in transit warehousing:

- Receive cargo from shippers
- Ship cargo to transit warehouse or consignee

- Receive cargo from the transit warehouse
- Load cargo onto a unit load device (ULD), ready for air freight
- Ship the ULD to the airport
- Receive and unload cargo from the ULD
- Load cargo into a shipping container, ready for ocean freight
- Ship the shipping container to the seaport
- Receive and unload cargo from a shipping container

The following are the main exceptions that Transit Warehousing can handle during the processes:

- Receive unexpected package or HU
- Receive damaged package or HU
- Missing package or HU
- Perform floor check and process found HUs
- Perform floor check for lost HUs
- Load fewer HUs than planned by TM

You can use an HU stock list to perform floor checks, monitor clarification zones, and query specific HUs.

Note

To implement Transit Warehousing, the mandatory components are SAP ERP 6.0 EHP 7, SAP EWM 9.3, and SAP TM 9.3.

10.6 Summary

In this chapter, we detailed the YM and TM functionalities available in SAP EWM and described the organizational elements and structure of a yard. Vehicle and TU documents and their functions were also discussed, which is important for smooth functioning of a warehouse in coordination with the yard.

Takeaways

- YM forms an important function in shipping and receiving material in SAP EWM.
- By default, YM isn't active in SAP EWM and has to be activated manually.
- Smallest transportable unit of goods is called a TU.
- The Transit Warehousing functionality, released with SAP EWM 9.3, enables you to integrate warehouse execution with freight forwarding operations using SAP EWM and TM.

Physical inventory is a process in which a business physically counts its entire inventory. A physical inventory may be mandated by financial accounting rules or the tax regulations to place an accurate value on the inventory, or the business may need to count inventory so component parts or raw materials can be restocked.

11 Physical Inventory

The terms inventory and stock refer to the goods that a business holds to fulfill its ultimate objective of serving customers, external or internal to the organization. At any given point in time, the stock data on record may or may not match the stock available physically. Some of the reasons for the mismatch could be wrong entry in the system, damages, misplacement and pilferage, and so on. To avoid such surprises of stock mismatch, organizations have a policy of stocktaking at frequencies suitable to them.

Stocktaking (also called physical inventory or inventory taking) is the physical verification of inventory available in the stores or warehouse against SAP Extended Warehouse Management (SAP EWM) system records. The quantities obtained in physical inventory counting are presumed to be correct, and differences, if any, should result in adjustments to the records. Much easier said than done, physical inventory may not be possible or may not be cost effective all the time. In such cases, estimates or sampling can be used.

Physical inventory and adjusting the records is one thing, but understanding why it happened and working toward reducing the mismatch is another. In some countries, physical inventory is also mandated by law wherein state authorities want to know the stock situation of specific goods residing in the warehouse. Businesses may also want to carry out regular physical inventory for products that are important in some aspect, for example, inventory evaluation for stocks on hand, external reporting purposes, and so on.

Thus, updating the system with accurate stock data becomes critical for uninterrupted warehouse operations. This is also important for accurate inventory estimations that go into the firm's financial books. Physical inventory is an important activity conducted on a regular basis in the warehouse to ensure that SAP ERP and SAP EWM systems are updated with the accurate physical stock situation of the warehouse. In this chapter, we'll discuss how the SAP EWM solution supports physical inventory in an organization.

The business decision on frequency or periodicity (annually, every six months, etc.) of the physical inventory activity depends on various factors. Inventory may also be carried out randomly. Physical inventory functions in SAP EWM are used to carry out the inventorying process.

Following are the two ways in which physical inventory is generally carried out:

- **Product-specific physical inventory**
  The entire warehouse is searched for a specific product.
- **Location-specific physical inventory**
  An area of the warehouse is searched where multiple products or handling units (HUs) might be present. This is also referred to as bin-specific physical inventory.

The various business inventory procedures to choose from while performing the physical inventory will be discussed in the following sections.

11.1 Physical Inventory Types

SAP EWM is a highly flexible solution in terms of supporting the varied needs of the physical inventory process of businesses. SAP EWM provides several methods for physical inventory, so customers may choose to set up one or more methods for their warehouse, as applicable. Inventory methods relate to specific time lines and trigger points with particular guidelines or procedures to be followed in the physical inventory process. Before we start our discussion on SAP EWM-specific physical inventory procedures, let's have a quick discussion on the physical inventory types such as periodic, cycle counting, continuous, and sampling (Figure 11.1).

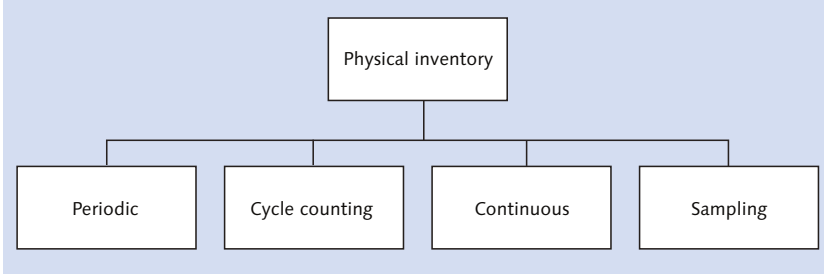


Figure 11.1 Physical Inventory Types

11.1.1 Periodic Inventory

All the goods are physically counted on a predetermined day, usually on balance sheet key dates. There are generally no exceptions, and all the goods are counted on this day. Warehouse activities may be stopped on this day, and all the goods movements are blocked until the counting is over.

This is one of the most followed physical inventory methods. Most often, it's done once a year and referred to as the annual physical inventory (storage bin specific and product specific). Because material is counted once a year, it's done at the end of the year or after the season ends for seasonal industries.

11.1.2 Cycle Counting

In this procedure, goods are classified into various groups, for example, A, B, C classification, and each group has specific predefined date for physical inventory. This procedure is based on the premise that not all goods in an organization are fast moving, of the same importance, and of the same value. This gives an organization the flexibility to count fast-moving goods more frequently than those goods that aren't fast moving. Compared to periodic inventory, which usually happens once a year, cycle counting occurs a few times within a fiscal year. An important point to be remembered here is that not all the goods are counted in cycle counting; only those goods or group of goods that have been scheduled are counted.

11.1.3 Continuous Inventory

In continuous inventory, different parts of the warehouse are counted at different times in a year and as many times as required. Compared to periodic inventory,

which is done once a year, continuous inventory is undertaken when required and as many times as required throughout the year. It's important to ensure that all the goods are at least counted once in a year.

In continuous inventory, the accounts are adjusted as and when the goods are counted throughout the year, unlike periodic inventory where the accounts are adjusted once in a year, typically at the end of the financial year.

11.1.4 Sampling

Complete counting, that is counting of each and every good, can be a very costly task. Sampling provides a way to save on the resources in which actual counting is performed on a small number (sample) of goods, and later results from samples are extrapolated to all the goods in the store to arrive at inventory estimates. Any stock from the store is randomly selected, counted, and extrapolated for the entire stock. If the difference between the book and extrapolated value is small, then the sampling is considered a success. If the difference isn't negligible, then physical inventory of all the stocks has to be done.

11.2 Physical Inventory Procedures

SAP EWM supports various physical inventory methods to cater to the possible inventory needs of businesses. When you create a physical inventory document in SAP EWM to kick-start the physical inventory process, the system expects you to provide the warehouse number for which you're conducting the physical inventory and the physical inventory procedure you want to use. Table 11.1 shows the physical inventory procedures that SAP EWM supports.

Physical Inventory Procedure	Specific To	Procedure Code in SAP EWM
Ad hoc	Product	HS
	Bin	HL
External	Product	ES
	Bin	EL
Annual	Product	AS
	Bin	AL

Table 11.1 SAP EWM Physical Inventory Procedures

Physical Inventory Procedure	Specific To	Procedure Code in SAP EWM
Cycle counting	Product	CC
Low stock	Bin	NL
Putaway	Bin	PL
Storage bin check	Bin	ML

Table 11.1 SAP EWM Physical Inventory Procedures (Cont.)

Let's briefly look at the specific details of these procedures.

11.2.1 Ad Hoc Physical Inventory

As the name suggests, these are done on an ad hoc basis at any point of time. Both product and storage bin physical inventory is possible. The trigger (physical inventory document creation) for this procedure is possible manually as well as through an exception code that the user enters in unforeseen circumstances.

11.2.2 Annual Physical Inventory

Certain inventory control norms and organization accountability obligates the physical inventory count at least once a year. The products/HUs of all the bins are counted once a year.

11.2.3 Cycle Counting

This procedure is product specific and is widely used by businesses. It provides the flexibility to the business to decide on the interval at which to perform the physical inventory for a product or a set of products. SAP EWM enables such grouping of products using the Cycle Count Indicator. This indicator, which classifies the products in various groups based on inventory periodicity, is maintained on the product master data in the Whse Data tab, as shown in Figure 11.2.

Based on the time interval settings of the physical inventory, you can also schedule the background job in Transaction /SCWM/PI_CC_CREATE (Create Physical Inventory Document [Cycle Counting]) for automatic generation of physical inventory documents for eligible products. This reduces the administrative overhead for the warehouse managers (Figure 11.3).

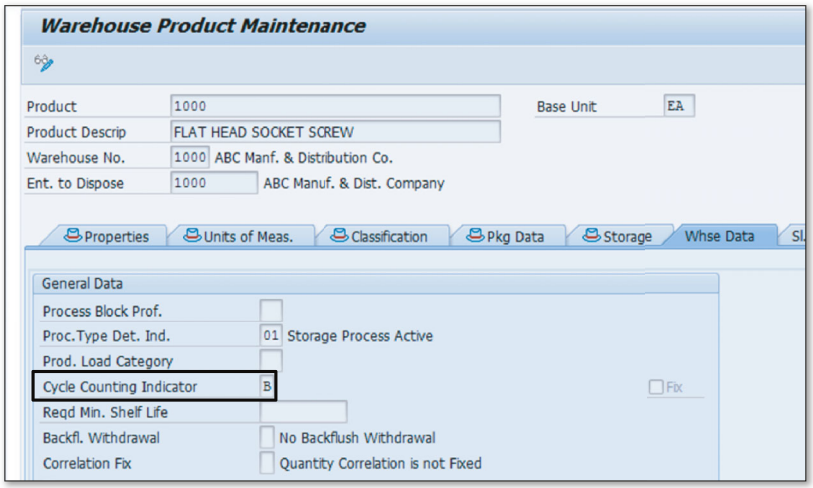


Figure 11.2 Cycle Counting Indicator in the Product Master

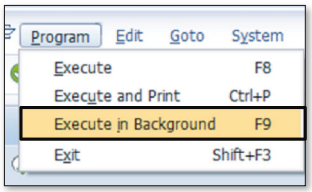


Figure 11.3 Execution of the Physical Inventory Document (Cycle Counting) Creation in the Background

11.2.4 Storage Bin Check

Using the storage bin check procedure, correctness of product position in the warehouse can be verified, which may trigger physical inventory for bins. The quantity verification is ignored; hence, it's not truly a physical inventory procedure.

11.2.5 Low Stock Check

This procedure is location specific and triggers the physical inventory when stock quantity in the bin goes below a threshold quantity (Figure 11.4). For example, after a picker confirms a pick warehouse task (WT) and the quantity in

the bin goes below the specified value, the system automatically triggers a physical inventory.

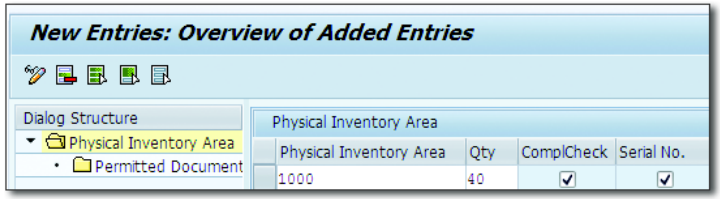


Figure 11.4 Threshold Quantity for Low Stock Check

11.2.6 Zero Stock Check

A special case for the low stock check procedure is the zero stock check, in which a threshold quantity is set up as zero. For example, this is often done for expensive raw materials that aren't used frequently.

11.2.7 Putaway Physical Inventory

By using this procedure, SAP EWM triggers a physical inventory at the time of the first putaway activity being carried out on a bin in a fiscal year. This is a one-time activity, which ensures that bin inventory data in the system are corrected at the first opportunity in the year.

11.2.8 External Procedure

The storage bin-specific external procedure (production code EL) and product-specific external procedure (production code ES) are used when you create sample-based physical inventory using the physical inventory sampling interface. Report /SCWM/PI_SAMP_CR is used to upload the sample to create physical inventory documents. You can access this report via the SAP EWM Easy Access menu, Extended Warehouse Management • Physical Inventory • Interfaces for Sample-Based Physical Inventory • Upload Sample to Create PI Documents.

11.3 Physical Inventory Settings

In this section, we'll discuss various physical inventory settings required to set up physical inventory in SAP EWM. Physical inventory settings can be done in

various nodes via the SAP EWM IMG menu path, Extended Warehouse Management • Internal Warehouse Process • Physical Inventory.

11.3.1 Physical Inventory Area-Specific Settings

Settings relating to physical inventory area can be carried out under the nodes in the SAP EWM IMG menu path, Extended Warehouse Management • Internal Warehouse Processes • Physical Inventory • Physical-Inventory-Area-Specific Settings.

Defining Physical Inventory Area

Using this setting (Figure 11.5 and Figure 11.6), you define Physical Inventory Area and specify various settings relating to physical inventory within this physical inventory area. Subsequently, allowed physical inventory procedures are mapped to this physical inventory area. Note that the definition of physical inventory area isn't specific to a warehouse number. The following settings are made while defining a physical inventory area:

- Putaway physical inventory
- Allow low-stock/zero-stock physical inventory
- Allow a low-stock/zero-stock check after WT confirmation
- Automatic posting carried out after the count
- Book inventory proposed at the time of the count and at the time of printout
- Product data proposed for the storage-bin-specific physical inventory
- Counting an HU as complete
- Product data included in printouts
- Threshold value for the low-stock/zero-stock physical inventory

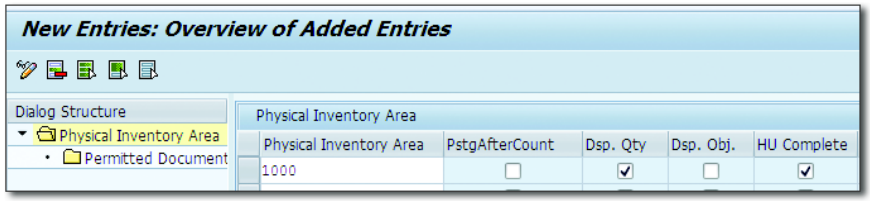


Figure 11.5 Physical Inventory Area Definition

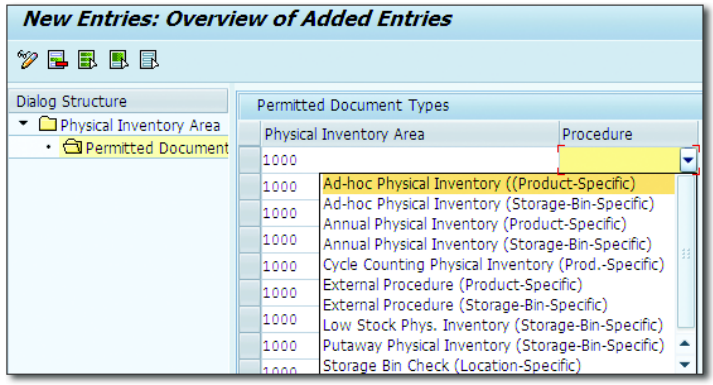


Figure 11.6 Procedures Allowed for the Physical Inventory Area

Periodicity of Storage Bin Check

You can set the periodicity and buffer time in number of days for STORAGE BIN CHECK (Figure 11.7). Interval provides you the periodicity in working days against which you need to execute the physical inventory count for the warehouse and activity area combination. Buffer time in working days is used in the WAREHOUSE MANAGEMENT MONITOR screen. When you monitor the physical inventory progress report for cycle counting in the warehouse monitor, the system considers the buffer time while calculating for physical inventory count completeness. The products are displayed as complete until the cycle count period plus the buffer period have expired.

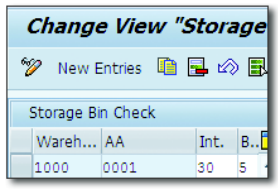


Figure 11.7 Storage Bin Check Interval Settings

11.3.2 Warehouse-Specific Settings

Some of the configurations for physical inventory need to be done at the warehouse number level. The configuration nodes are available in the SAP EWM IMG menu path, EXTENDED WAREHOUSE MANAGEMENT • INTERNAL WAREHOUSE PROCESSES • PHYSICAL INVENTORY • WAREHOUSE-NUMBER-SPECIFIC-SETTINGS.

Assign Physical Inventory Area to Activity Area

For bins to be eligible for any physical inventory procedure, they must belong to a physical inventory area. This assignment is done by mapping an activity area (AA), to which the bins belong, to a Physical Inventory Area (Figure 11.8).

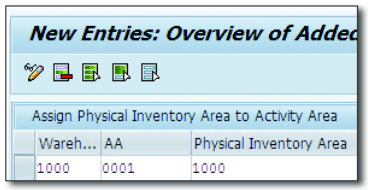


Figure 11.8 Mapping Physical Inventory Area to Activity Area

Define Number Range for Physical Inventory Document

The number range for the physical inventory is specific to the year.

Specify Physical-Inventory-Specific Settings in the Warehouse

Warehouse-specific physical inventory settings include the following:

- Currency unit, factory calendar, and period (fiscal year) to be used
- Determination procedure for printing physical inventory documents
- Date/month of physical inventory period, if different from fiscal year
- Owner, person authorized to draw, proposed in inventory count
- Allow adjustment postings in the difference analyzer
- Percentage deviation checked for the physical inventory count
- Physical inventory completeness determined at the warehouse level only

Configure Cycle Counting

In this setting (Figure 11.9), you can define the cycle count indicators, which later need to be maintained in the warehouse product master data. These indicators are defined at the warehouse level. The definition also holds the values of the intervals after which physical inventory needs to be carried out again and the buffer time for the physical inventory.

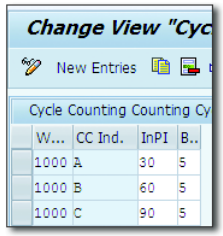


Figure 11.9 Defining Cycle Counting Indicators

Tolerance Group Definitions

Tolerance, in general, is the deviation, upward or downward, from the desired value. Tolerance groups are defined at the warehouse level and then assigned to users based on the qualification and responsibility dispensed to them. Tolerance group definition setting allows you to define the tolerance groups and set up the tolerance values for the following:

- Difference analyzer
- Posting for the differences SAP EWM
- Recounting

In the difference analyzer (Figure 11.10) tolerance group setting, you can maintain VALUE-BASED TOLERANCE and CURRENCY. You may also restrict the system from performing tolerance checks using the NO TOL. checkbox. WAIT TIME is used by system for automatic posting of the differences from SAP EWM to SAP ERP. Wait time is maintained in number of days.

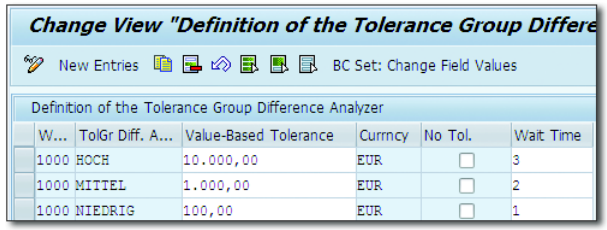


Figure 11.10 Tolerance Group Definition for the Difference Analyzer

The tolerance group definition for posting differences in SAP EWM and for recounting allows you to maintain both value-based and quantity-based (in percentage) tolerances. For tolerance groups relating to posting differences in SAP

EWM, you can control whether the system should send an alert if the quantity tolerance or value tolerance is exceeded.

Assignment of Tolerance Group to User

As shown in Figure 11.11, you can use Transaction /SCWM/PI_USER_DIFF or navigate to the SAP EWM Easy Access menu and choose Extended Warehouse Management • Settings • Physical Inventory • Assign User to Tolerance Group for Difference Analyzer.

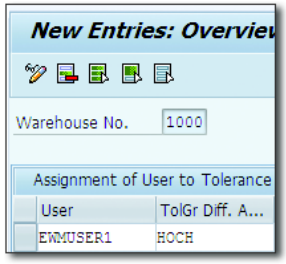


Figure 11.11 Tolerance Group Assignation to User for Difference Analyzer

Use Transaction /SCWM/PI_USER, or navigate to the SAP EWM Easy Access menu and choose Extended Warehouse Management • Settings • Physical Inventory • Assign User to Tolerance Group for Recount/Clearing (Figure 11.12).

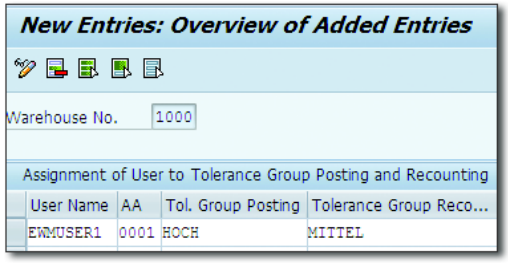


Figure 11.12 Posting and Recounting Tolerance Group User Assignation

Reason and Priority Definitions

Priority reflects the urgency of the physical inventory document. For example, the business may like to assign highest priority to the physical inventory followed

by a pick denial (Figure 11.13). In the physical inventory transactions, the priorities are sorted in ascending order. Priorities are defined at the warehouse level. You can define up to nine (1 to 9) priorities for a warehouse.

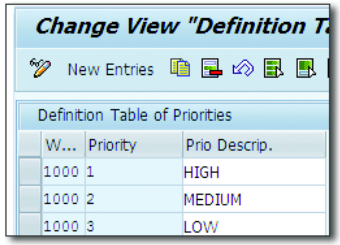


Figure 11.13 Priority Definition

Reason codes are defined for physical inventory and differences (Figure 11.14). When a physical inventory document is created, the system expects you to provide a reason code. Reasons can also be linked to priorities. With the use of the AUTOM. indicator, you can ensure that differences occurring through these physical inventories are to be posted immediately as a background job, so that stock in SAP ERP is updated instantly. Using the ACTIVE indicator, you can direct the system as to whether the physical inventory document created with this reason code should be in an active or inactive state.

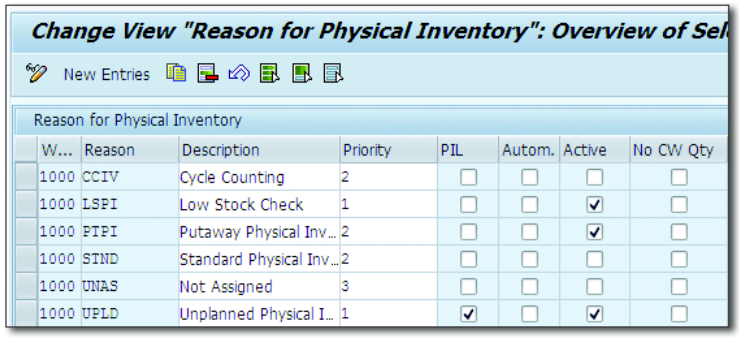


Figure 11.14 Defining Reasons for Physical Inventory

Separate reason codes (Figure 11.15) are used while processing the differences in the difference analyzer, displaying differences and reporting.

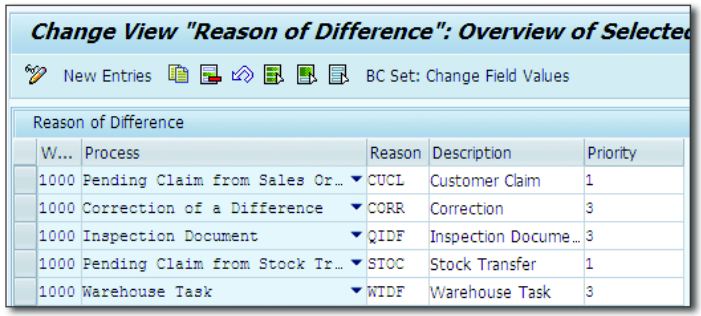


Figure 11.15 Reason Codes for Differences

These reason codes can be created in the SAP EWM system for the following processes:

- Difference for a WT
- Difference for a pending correction due to physical inventory
- Difference for a receivable from a sales order
- Difference for a receivable from a stock transfer
- Difference for an inspection document

Define the Standard Reason for Each Physical Inventory Procedure

Using this setting (Figure 11.16), you map the reason codes for physical inventory procedures.

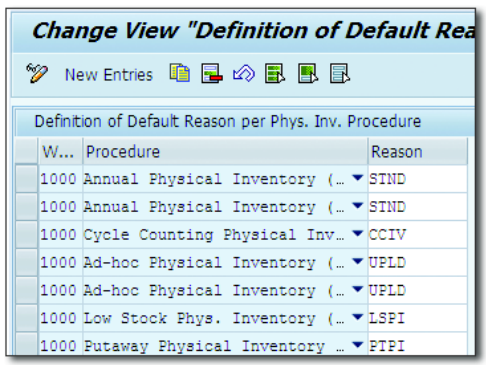


Figure 11.16 Reason Code Mapping to the Physical Inventory Procedure

11.3.3 Printing Physical Inventory Documents

Print-related settings can be done in the SAP EWM IMG menu path, Extended Warehouse Management • Internal Warehouse Processes • Physical Inventory • Print.

The condition technique methodology is used in SAP EWM for printing the physical inventory functionality. This technique is widely used across various processes in SAP, such as pricing determination, output determination, and so on. The same methodology is used in SAP EWM for printing the physical inventory document. The condition technique uses the following elements:

- Field catalog
- Condition table
- Access sequence
- Determination procedure
- Condition maintenance group
- Post Processing Framework (PPF) action profile and action condition
- Condition maintenance group

For using additional parameters in the printer determination, you must fill and evaluate the parameters in customer-specific BAdI `EVAL_SCHEDCOND_PPF`. Additional fields can be added in the field catalog if required; you need to add the fields in the structure `/SCWM/PPI_COM_I`.

Specify Action Profiles for Printing Physical Inventory Documents

To print the physical inventory documents, first the action profiles have to be defined. The action profile displays the interface between the application and the PPF. The view shows object types that are of interest to the PPF. Based on settings, the conditions are evaluated, and the actions are scheduled.

PPF is a SAP application that provides communication services such as print, fax, mail, and SMS.

Specify Action Conditions for Printing Physical Inventory Documents

Action conditions are defined in this section.

Register Condition Maintenance Group

Condition maintenance groups are specified for a context in this setting. For general condition maintenance (Transaction /SAPCND/GCM), the context GCM is used.

In the advanced search, the fields available are defined by the condition maintenance group. Here too, the condition maintenance groups are used, which you've assigned to the context GCM.

11.4 Physical Inventory Process

The physical inventory process triggers with automatic or manual generation of physical inventory documents. Products/bins are then counted, and the count value is entered in the system. Recounting, if needed, can be initiated for a counted document. Recount leads to generation of a new active document, and the status of the previous physical inventory document becomes recounted. After the products/bins are recounted, new count values are entered again in the physical inventory document. Counted physical inventory documents are then posted to update the SAP EWM system data. Differences, if any, are then moved to the difference analyzer. After they are posted in the difference analyzer, the SAP ERP system gets updated with the counted data, and inventory is adjusted at the inventory management level. Figure 11.17 shows the flow of the physical inventory process.

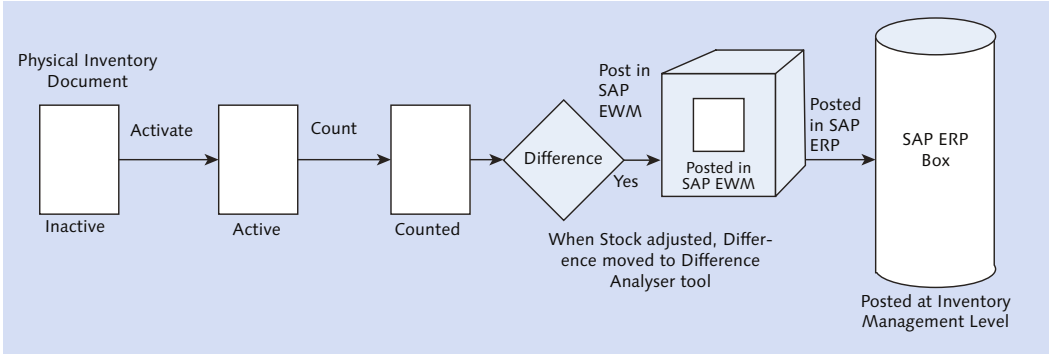


Figure 11.17 Example Physical Inventory Posting Using the Difference Analyzer

Before we discuss each step of the physical inventory process, let's look at the various states a physical inventory document goes through.

Figure 11.18 captures the various states of a physical inventory document. The user can enter a count value to an active physical inventory document only, and it's not possible to enter a count value for an inactive physical inventory document. A counted physical inventory document status changes to POSTED or RECOUNT.

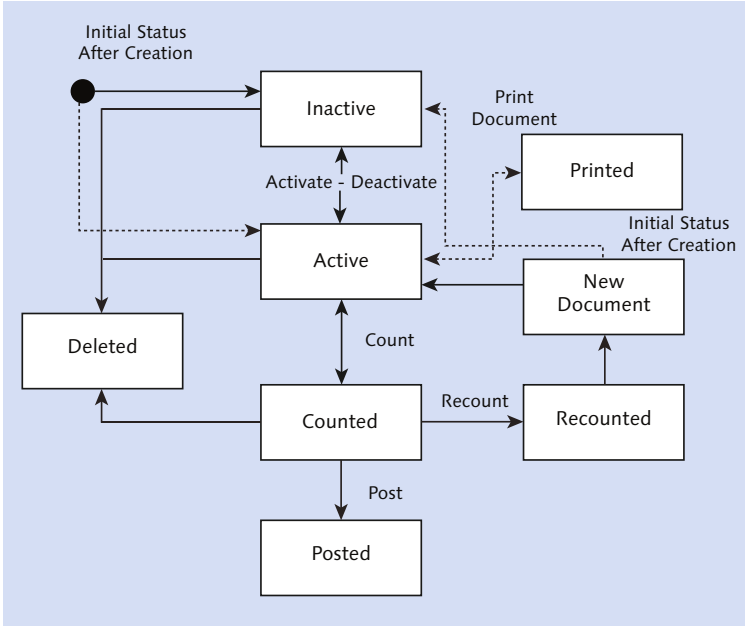


Figure 11.18 Status Flow of Physical Inventory Document

11.4.1 Create a Physical Inventory Document

To initiate a counting process, a physical inventory document needs to be created. This becomes the guiding document that has all the relevant information required to carry out the counting process through final posting of the results to SAP ERP.

Use the Transaction /SCWM/PI_CREATE or navigate to the SAP EWM Easy Access menu, EXTENDED WAREHOUSE MANAGEMENT • PHYSICAL INVENTORY • CREATE PHYSICAL INVENTORY DOCUMENT.

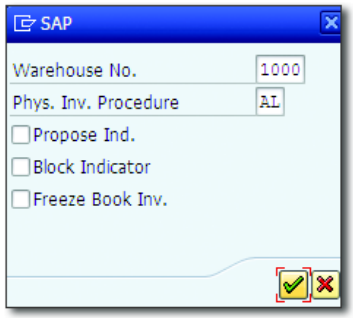


Figure 11.19 Initial Pop-up Screen During Physical Inventory Document Creation

The system expects you to provide the warehouse number and the physical inventory procedure you want to carry out (Figure 11.19). Indicators involved are the following:

- The PROPOSE IND. influences all items selected for the physical inventory document creation. If you don't want to create a physical inventory document for all items, then don't choose this indicator.
- The BLOCK INDICATOR is checked if you want the movement of goods to be blocked for the entire bin (for a bin-specific search) or product in the storage bin (in a product-specific search) against which the physical inventory document was created. There should be no open WTs if you want to use the BLOCK INDICATOR.
- To ensure that the book value referred to when actual counting took place and while entering the count results is the same as the prevailing book value, the FREEZE BOOK VALUE box has to be checked. By default, when FREEZE BOOK VALUE isn't checked, the count results are compared with the book value at the moment when you enter the results.

There are two options in the method of selecting the SET FLAG: SET BLOCK INDICATOR, and FREEZE BOOK INVENTORY. You can select either as the default for the entire list of items. To maintain the default for the entire selection, choose default values button or press F5 in Transaction /SCWM/PI_CREATE.

To choose only certain lines for set indicators, you need to highlight the line (as shown in Figure 11.20) and choose the relevant indicator, such as Set Flag or Set Block Indicator, or Freeze Book Inventory.

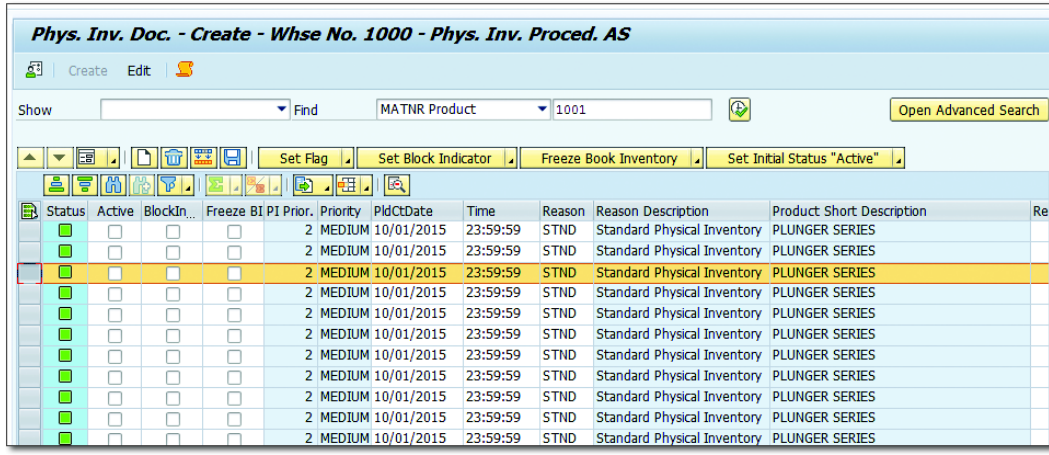


Figure 11.20 Selection of Set Indicators for Certain Line Items Only

Figure 11.21 shows the structure of a physical inventory document header:

- Plnd Count Date
  This field is used to indicate the date and time for the counting activity that is to be undertaken for a better planning.
- Reason
  This field is used to mention any of the following reasons for the search activity being carried out.
- Product Data
  - In the Product field, the part codes of the specific goods to be counted are to be entered.
  - Other product-related generic fields to be entered include Batch, Stock Type, Ent. to Dispose, Usage, and Owner.
  - The Ent. To Dispose field is the party entitled to dispose the inventory. This is usually a partner or an organization that is authorized to dispose of goods.

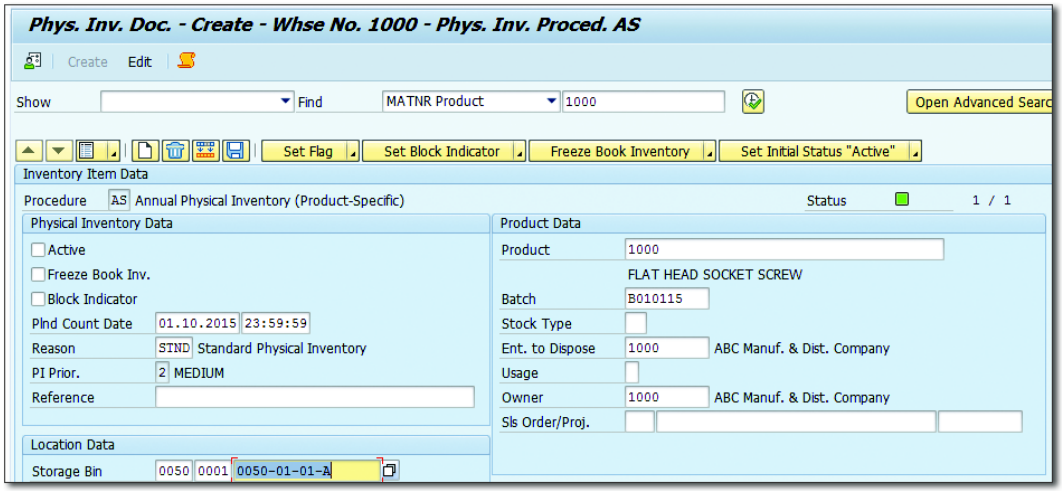


Figure 11.21 Physical Inventory Document Header Data

11.4.2 Process Physical Inventory

By using Transaction /SCWM/PI_PROCESS or navigating to the SAP EWM Easy Access menu path, Extended Warehouse Management • Physical Inventory • Process Physical Inventory Document, the system user can activate/deactivate a physical inventory document, capture the count result, delete a physical inventory document, and post the difference at the warehouse level. You'll notice the relevant buttons Activate | Count | Delete | Post on this transaction screen. Upon entering the transaction, users can find the physical inventory documents using the Find dropdown option of the physical inventory or warehouse order.

The Activate button provides the options for activating and deactivating a physical inventory document. The Count button provides the options of Count, Change Count, and Recount. The document header reflects the current status of the physical inventory process, which can assume one among the Inactive, Active, Counted, Recount, Posted, and Deleted. Only an active document can be counted. Similarly, a counted document can be recounted or posted.

Transaction /SCWM/PI_COUNT (via the SAP EWM Easy Access menu path, Extended Warehouse Management • Physical Inventory • Enter Count Results) also allows you to enter the counting result but is limited to Count and Change Count options only.

No matter which transaction you use to enter the count result, the system shows you error or warning messages for any tolerance limit violations.

After entering the count data via the transaction, the document status changes to Counted, and the Action field changes to Post Difference. The Posting button can be used to post the difference. After the document is posted, the status of the document changes from Counted to Posted, and the Action field changes from Post Difference to blank. Posting done in Transaction PI_process is restricted to updating the data in the SAP EWM system only. After the document is posted and the differences are cleared, the document is no more shown in the list of documents in Transaction /SCWM/PI_PROCESS.

Use Transaction /SCWM/PI_COUNTLIST or navigate to the SAP EWM Easy Access menu path, Extended Warehouse Management • Physical Inventory • Create Phys. Inventory Count in the List. This transaction enables you to enter the count for all line items or HUs in the physical inventory document. If you're processing the physical inventory over the desktop, this transaction makes entering the count results at one go easier.

11.4.3 Difference Analyzer

To access the difference analyzer, use Transaction /SCWM/DIFF_ANALYZER or navigate to the SAP EWM Easy Access menu path, Extended Warehouse Management • Physical Inventory • Difference Analyzer. Default values to be maintained are Warehouse No. and the appropriate checkboxes as shown in Figure 11.22.

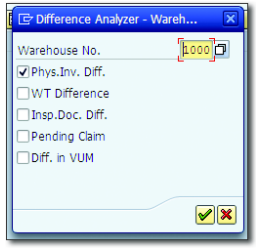


Figure 11.22 Eligible Documents for the Difference Analyzer

These checks indicate the preference against which you want to use the difference analyzer. Some of the indicators represent physical inventory differences, WT differences, inspection document difference, and so on.

The difference analyzer shows the differences between the book value and counted value. The transaction screen allows you to search the relevant documents by priority or product in the FIND dropdown option. The POST, BLOCK, and CREATE NOTE buttons are available for users to clear the difference, blocking the posting of the difference if any discrepancy is noted by the supervisor when the counted value doesn't match the physical count.

The count result can be corrected within the difference analyzer. Once posted successfully, the system confirms a warehouse material document number created as a result. All the cleared differences are logged in and are reflected in SAP ERP and can be checked using Transaction MB51 (Material Document List) in the SAP ERP system. The navigation path for Transaction MB51 in the SAP ERP Easy Access menu is LOGISTICS • MATERIALS MANAGEMENT • PHYSICAL INVENTORY • ENVIRONMENT • MATERIAL DOCUMENT FOR MATERIAL.

11.4.4 Stock Comparison with SAP ERP

As shown in Figure 11.23, SAP provides an additional report for stock comparison between SAP EWM and SAP ERP. This tool enables you to clear the difference at one go with ease. SAP ERP stock and SAP EWM stock can be compared and cleared (posted) by using Transaction /SCWM/ERP_STOCKCHECK. The navigation path via the SAP EWM Easy Access menu is EXTENDED WAREHOUSE MANAGEMENT • PHYSICAL INVENTORY • PERIODIC PROCESSING • STOCK COMPARISON ERP. If you do this, the WTs are created in SAP EWM to post +ve (positive) and –ve (negative) posting, and 711 and 712 movements are posted in SAP ERP.

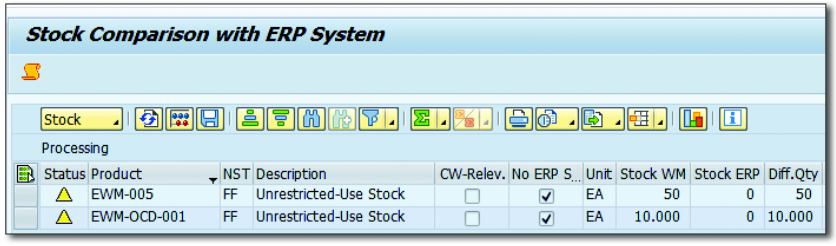


Figure 11.23 Stock Comparison with SAP ERP

11.4.5 Post Differences Automatically to SAP ERP System

Certain business reasons necessitate auto clearing of differences without any further manual intervention, for example, for low-value differences where it's not

worth spending additional efforts for any further interrogation. These checks happen, and the forklift operators or the inventory clerks are the ones who notice the fact; therefore, the business would want to post automatically up to a certain value. In such a situation, this transaction can be used to auto clear. To manually update the differences in the SAP ERP system, use Transaction /SCWM/WM_ADJUST or navigate to the SAP EWM Easy Access menu, Extended Warehouse Management • Physical Inventory • Periodic Processing • Post Differences to ERP System. To reduce the administrative work of posting differences manually (Figure 11.24), a report can be generated based on this transaction.

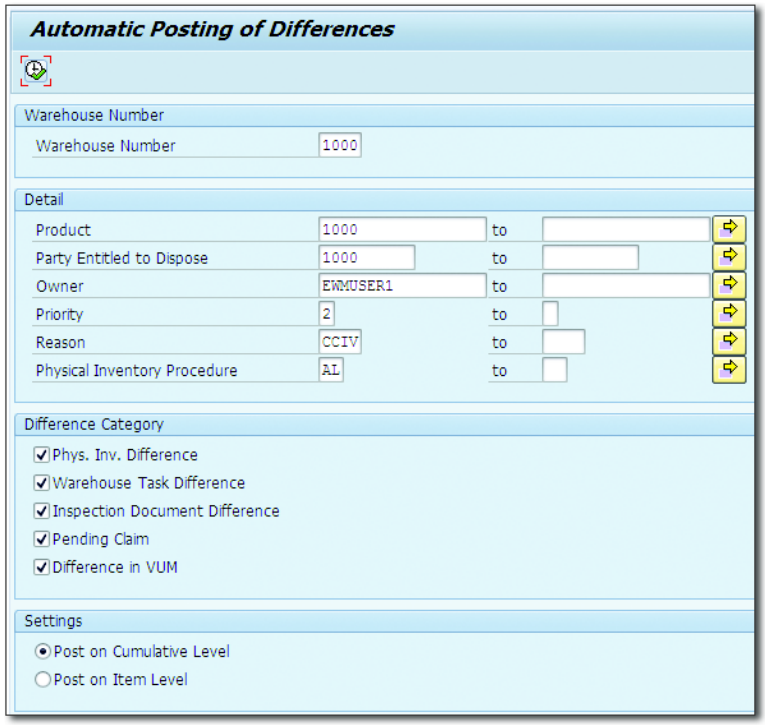


Figure 11.24 Post Difference Selection Screen

11.5 Stock-Specific Unit of Measure in Physical Inventory

You can customize the stock-specific unit of measure (SUoM) in SAP EWM IMG via menu path, Extended Warehouse Management • Interfaces • ERP Integration • General Settings • Set Control Parameters for ERP Version Control.

As shown in Figure 11.25 and Figure 11.26 you can control the behavior of different alternative units of measure (AUoMs) during the quant addition to the stock through storage type settings. You can manage this in SAP EWM IMG via menu path, Extended Warehouse Management • Master Data • Define Storage Type.

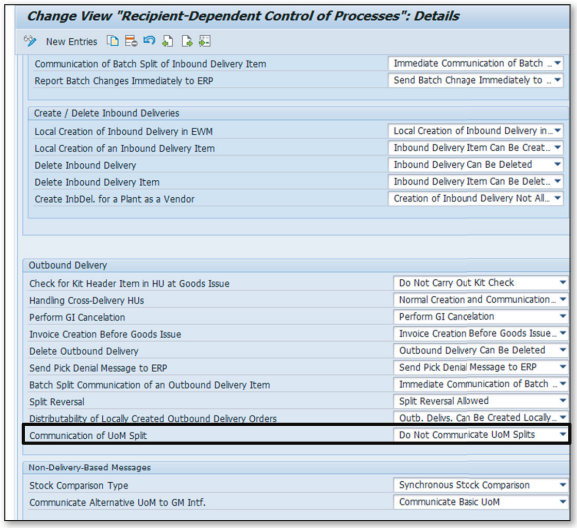


Figure 11.25 Communication of UoM Split Option

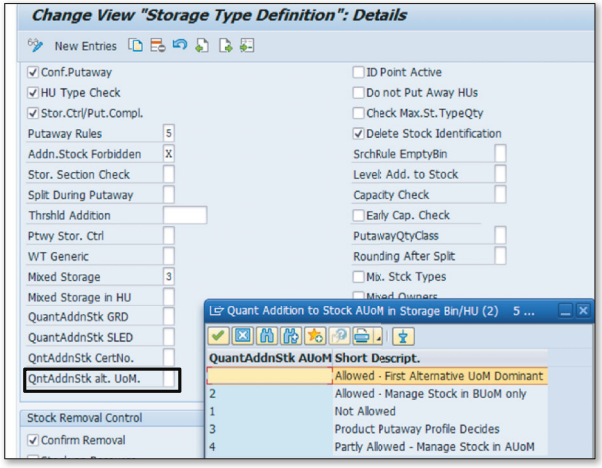


Figure 11.26 Quant Addition Control for Alternative Unit of Measure

Note

Counting can be done only with the SUoM. While the counting system can't accept identical stock attributes with only differences in UoM, that is, SUoM and BUoM, because quant can't be differentiated with UoM.

11.6 Physical Inventory Counting via Radio Frequency

SAP EWM supports physical inventory processes via the radio frequency framework (RF framework). Physical inventory counting can be performed through Transaction /SCWM/RFUI or via the RF menu in the SAP EWM Easy Access menu path, Extended Warehouse Management • Execution • Log On to RF Environment. The standard RF framework provides the counting options shown in Figure 11.27 either via a system-guided process or manually.

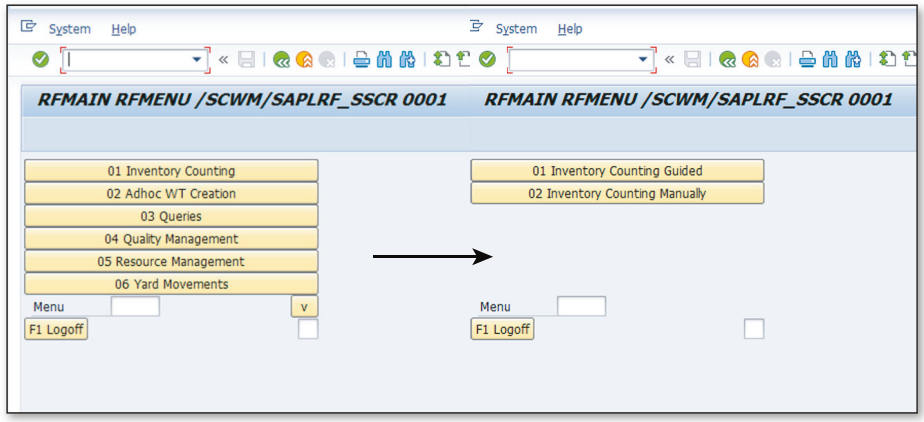


Figure 11.27 Physical Inventory Counting via Radio Frequency

With the system-guided process, the physical inventory document warehouse orders are read in sequence by the LST (latest start time) and process one by one. If you want certain documents to be processed at your choice, you can use the Inventory Counting Manually option. Here you provide the warehouse order number that you want to perform counting. With these options, you can enter the count results in the RF device, and it records with time and counter. The subsequent steps are the same without the RF device.

11.7 Reporting

The objective of physical counting is to ensure that a warehouse is accurately inventoried, which is essential not only for financial reporting at the end of the fiscal year but equally important for management reporting and operational control.

SAP EWM provides reports for the following:

- Work scheduling (reports for work scheduling)
- Performing physical inventory (operational reports)
- Correcting errors (check reports)

Reports can be generated in SAP EWM warehouse monitor. The warehouse monitor can be accessed using Transaction /SCWM/MON or by going to the SAP Easy Access menu and choosing Extended Warehouse Management • Monitoring • Warehouse Management Monitor. In the warehouse monitor, using the appropriate nodes as shown in Figure 11.28, reports can be generated for the following:

- Product-related reports
- Physical inventory area reports
- Cycle counting reports

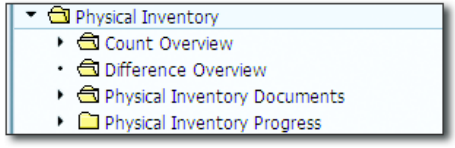


Figure 11.28 Physical Inventory Nodes in Warehouse Monitor

Let's first look at the reports that are available in the physical inventory functionality of SAP EWM, and then we'll discuss the monitoring of physical inventory using the warehouse monitor functionality.

11.7.1 Reports in Physical Inventory

Physical inventory reports can be categorized into work scheduling, operational, and check reports, which we'll discuss in the following subsections.

Reports for Work Scheduling

When differences are to be posted in SAP EWM, the price of the product is taken into account. Price is considered because tolerance checks are defined based on the price of the product. The price data is taken from the SAP ERP system wherein it's maintained in the material master data. Thus, this report is used to fetch product prices from the SAP ERP system.

If split-valuated products without batches are used in SAP ERP, the report must be executed to download the valuation types from the SAP ERP system first. The valuation types are handled as batches in SAP EWM.

Operational Reports

These reports are used to carry out the following tasks as a background job:

- Create physical inventory documents.
- Print physical inventory count document.
- Post differences to the SAP ERP system.
- Carry out a completeness check.
- Upload storage bins and count data.
- Download storage bins and stock data (from external systems).

Check Reports

These reports are used to check errors between two systems such as SAP ERP and SAP EWM, and also within a system. The following reports are possible:

- **Stock comparison SAP ERP**
  This report is used to check and correct the mismatch in stock levels between SAP ERP and SAP EWM systems. This report is important because these two systems operate in different ways. On one hand, the SAP EWM system performs inventory management at the storage bin level, whereas the SAP ERP system performs inventory management at the storage location level. Thus the system, unless this report is run, always assumes that you need to correct stocks in SAP ERP systems whenever necessary. For stock comparison, use Transaction /SCWM/ERP_STOCKCHECK or navigate to the SAP EWM Easy Access menu path, Extended Warehouse Management • Physical Inventory • Periodic Processing • Stock Comparison ERP.

- **Adjust serial numbers at warehouse number level**
  When differences are posted in difference analyzer, the system doesn't automatically delete the serial numbers. Because the system saves the serial numbers in a global table, it's advisable to reconcile the data in this table with those recorded in the physical inventory. For this purpose, this report is important because it suggests serial numbers for deletion that haven't been recorded by physical inventory documents in the period for which counting has been done. The serial numbers shown by this report can then be deleted.

11.7.2 Physical Inventory Progress Report

The warehouse monitor is useful to get an aggregate as well as a detailed view of physical inventory progress (Figure 11.29). The aggregate view gives the status of counting in a warehouse area, that is, the positions that have been counted and the positions pending for counting. On the other hand, a detailed view contains information at the storage bin level, such as the storage bins that have been counted, open bins, and started bins, which are in progress as well.

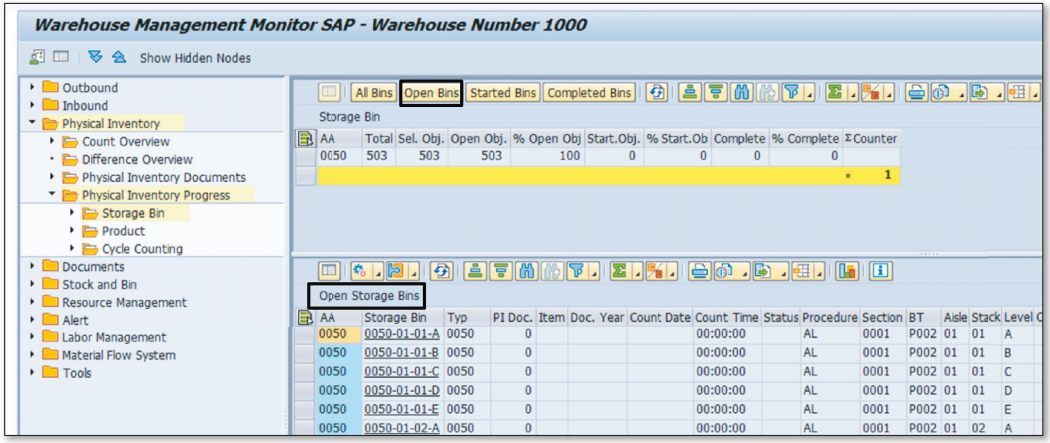


Figure 11.29 Physical Inventory Progress Reports

11.7.3 Physical Inventory Count Overview

The warehouse monitor allows you to have a count overview as well as a difference overview. By running queries in the monitor, a summary of counting and differences can be viewed for a specific time horizon. You can access the report

using the COUNT OVERVIEW subnode in the PHYSICAL INVENTORY node in the warehouse monitor.

11.7.4 Physical Inventory Document Overview

Physical inventory documents are generated when physical inventory procedures are carried out. These documents provide useful information about physical inventory activities. The warehouse monitor allows users to access all these documents from a single screen. Not only can a user access these documents, but he can also carry out the following activities from a single screen (Figure 11.30):

- Display physical inventory document
- Activate physical inventory document
- Deactivate physical inventory document
- Reassign physical inventory document
- Recount physical inventory document
- Print physical inventory document
- Delete physical inventory document
- Change priority

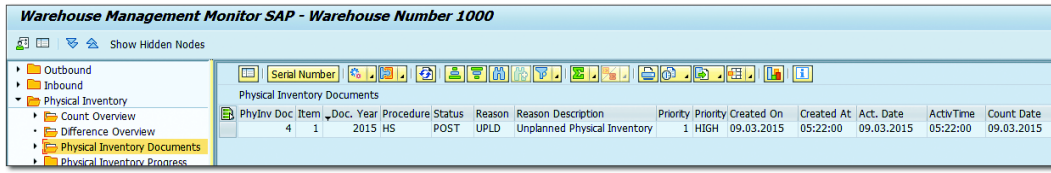


Figure 11.30 Physical Inventory Documents Overview

As described in Chapter 13, a user can also view the child documents attached to a parent document.

11.8 Summary

In this chapter, we covered the physical inventory procedures which SAP EWM supports. We discussed warehouse dependent and independent settings required for setting up the customer-specific physical inventory in system. We

also discussed how physical inventory is carried out in the SAP EWM system. You should now be comfortable to set up and run a physical inventory process using SAP EWM.

Takeaways

- Physical inventory is the process used to ensure that the stock levels physically present in the warehouse are appropriately reflected in the SAP EWM system.
- Physical inventory can be either product specific or location/bin specific; product-specific physical inventory involves searching the entire warehouse for a product, whereas location-specific physical inventory is done for a specific area of a warehouse only.
- SAP EWM supports the following physical inventory procedures:
  - Ad hoc inventory
  - Annual physical inventory
  - Cycle counting
  - Storage bin check
  - Low stock check
  - Putaway physical inventory
  - External procedures

Internal movements refer to processes that occur "within the walls" of the warehouse. This chapter walks through the configuration and general use of the replenishment process, slotting and rearrangement, stock transfer, ad hoc movements, and posting changes that constitute internal movements.

12 Internal Movements

In a warehouse, not all goods movement are related to inbound or outbound deliveries. Internal movements are processes that occur "within the walls" of the warehouse, for example, bin-to-bin moves, replenishment, stock transfer, and so on. Depending on the situation, movement of goods might be required from, say, one bin to another if a bin is damaged or if a product has mistakenly been put in a wrong bin.

One of the important activities carried out in internal movements is replenishment. In this chapter, we'll look closely at this process and the various means to execute it in the system. The chapter will also walk through the configuration and general use of the replenishment process, slotting and rearrangement, stock transfer, ad hoc movements, and posting changes.

12.1 Replenishment

Replenishment is the process of refilling the stock in any area of a warehouse to ensure that optimum stock levels are maintained to meet the demand for a product at any point of time. Thus, by maintaining proper settings and by defining the replenishment procedure, the system proposes replenishment when the stock goes below the safety stock level.

The primary reason for initiating replenishment is demand data, which can come from varied sources in SAP Extended Warehouse Management (SAP EWM), such as slotting data, min max data maintained at the storage type level or at the fixed

bin level, existing open warehouse tasks (WTs) in accordance with demand or by manual entry of min max data, and minimum replenishment quantity.

12.1.1 Replenishment Configuration

There are certain prerequisites in SAP EWM before you can start working on the replenishment processes. First, ensure that you've activated the required replenishment strategy for your organization against the storage type. You can navigate to this setting via the SAP EWM IMG menu path, Extended Warehouse Management • Internal Warehouse Processes • Replenishment Control • Activate Replenishment Strategies in Storage Types.

The following replenishment strategies can be activated for a warehouse number and storage type combination (Figure 12.1):

- Planned Replenishment, which is carried out when the replenishment is on plan
- Automatic Replenishment, which is carried out during confirmation of a WT
- Order-Related Replenishment, which is done using open warehouse requests
- Direct Replenishment, which is a reaction to stock shortfalls during confirmation of WTs
- Crate Part Replenishment

We'll take a closer look at all these strategies in this chapter.

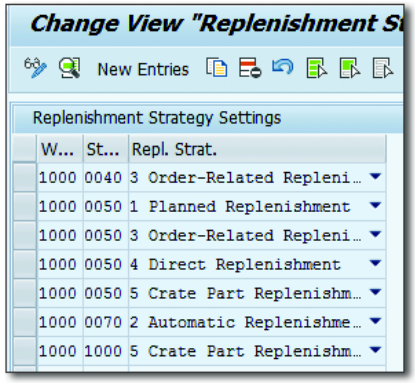


Figure 12.1 Activation of Replenishment Strategy

When you set up the replenishment strategy in the system, you need to define the following as illustrated in Figure 12.2:

- Whse Proc. Type
  This is the warehouse process type to be used in replenishment WT.
- Qty Type Used
  This is either the physical or available stock quantity type to be used.
- Ind. Exec. Time
  This is the execution time indicator to determine the replenishment planning time, which is used in calculating the planned completion time for the replenishment WT.
- Pckr-Drvn Repl.
  This is the picker-driven replenishment, if you want to work with direct replenishment.
- WT Immed.
  This immediate WT creation indicator is set if you want automatic WT creation on execution of replenishment.

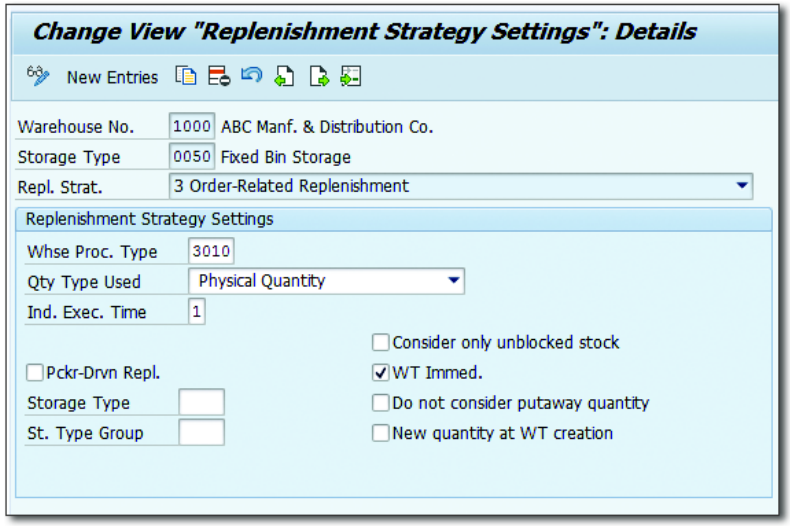


Figure 12.2 Replenishment Strategy Settings

You also define the SCRI (stock removal control indicator) in Figure 12.3 and assign it to the appropriate storage type search sequence and the stock removal rule, which is required for the replenishment process.

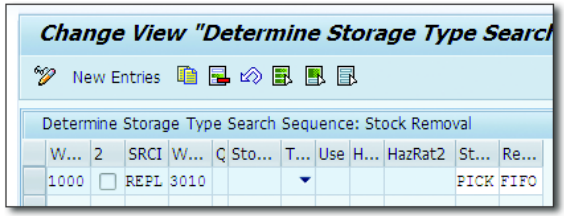


Figure 12.3 Stock Removal Control Indicator

If you want to work with min max data at the storage bin type level or for fixed bins, define the replenishment level and tolerances in the storage type setting. To do this, navigate to the SAP EWM IMG menu path, Extended Warehouse Management • Master Data • Define Storage Type, and then define the minimum quantity and maximum quantity in the warehouse product master (Figure 12.4 and Figure 12.5).

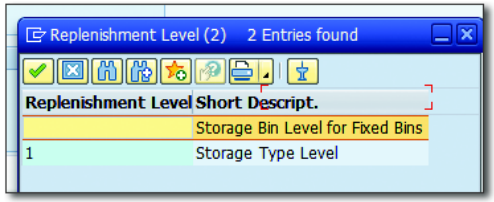


Figure 12.4 Replenishment Setting in the Storage Type

If you're willing to work with replenishment at the fixed storage bin level, maintain the minimum quantity and maximum quantity for each bin in the Maintain Fixed Storage Bin setting (Figure 12.6). To do this, use Transaction /SCWM/BINMAT, or navigate via menu path, Extended Warehouse Management • Master Data • Storage Bin • Maintain Fixed Storage Bin.

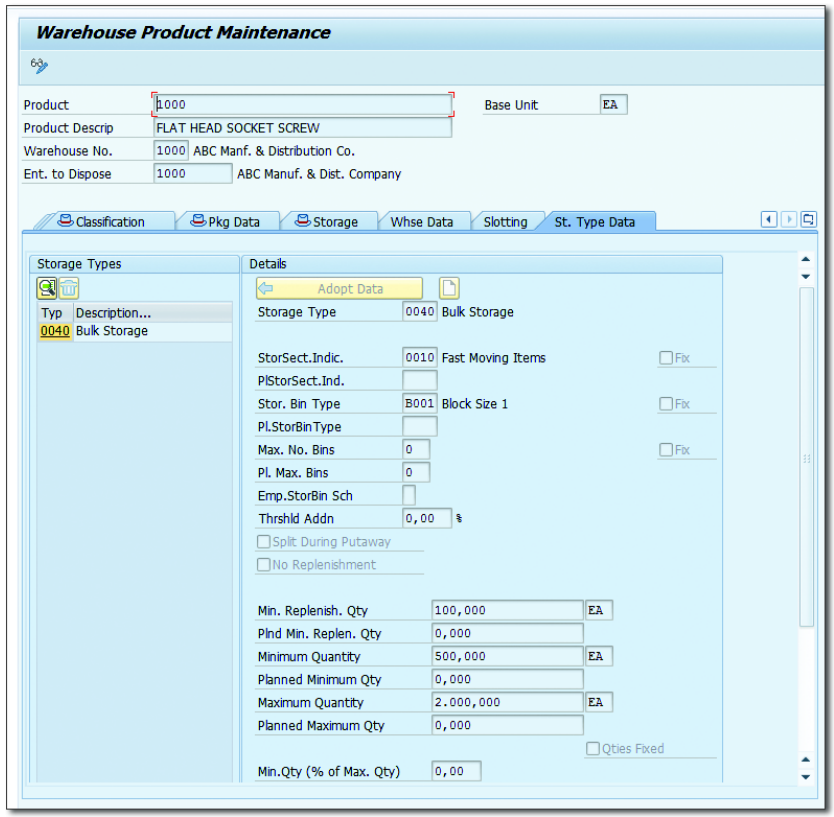


Figure 12.5 Replenishment Quantity in the Storage Type View of the Product Master

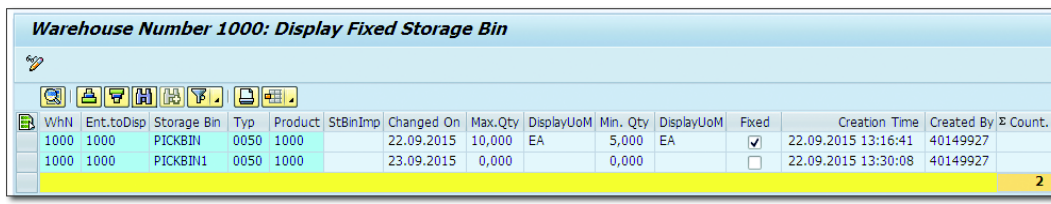


Figure 12.6 Maintain Fixed Storage Bin

You need to manually maintain the fixed storage bin using this transaction. Using the Append Row button, you can add an entry manually (Figure 12.7). The details to be entered include party entitled to dispose, storage bin, storage type, product, minimum quantity, maximum quantity, fixed indicator, and so on. Click on Save after all the relevant parameters are maintained.

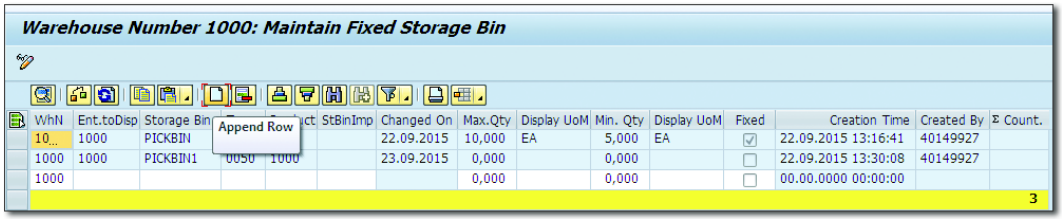


Figure 12.7 Appending a New Row to Add an Entry in the Maintain Fixed Storage Bin Screen

SAP EWM provides automatic assignment of fixed bins to products. You can do this using Transaction /SCWM/FBINASN or the SAP EWM Easy Access menu path, Extended Warehouse Management • Master Data • Storage Bin • Assign Fixed Storage Bins to Products.

In Customizing, to define the default stock type for replenishment (Figure 12.8), you can navigate via the SAP EWM IMG menu path, Extended Warehouse Management • Master Data • Define Warehouse Number Control.

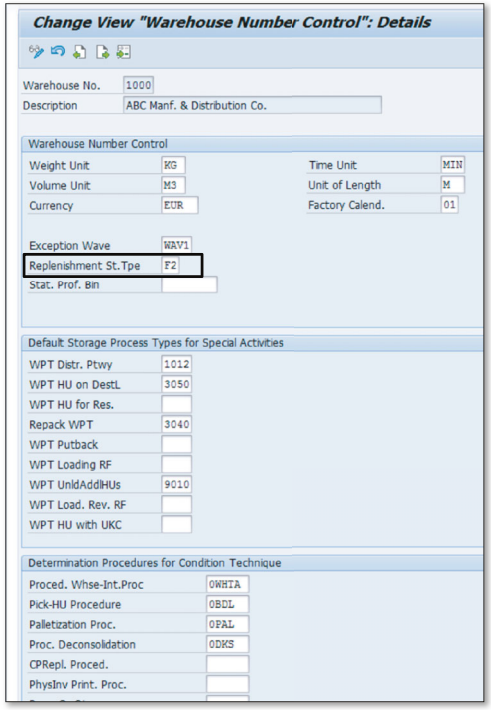


Figure 12.8 Default Replenishment Stock Type at the Warehouse Level

To maintain the document type and item type for replenishment warehouse request creation (Figure 12.9), navigate to the SAP EWM IMG menu path, Extended Warehouse Management • Internal Warehouse Processes • Replenishment Control • Maintain Document/Item Categories for Replenishment Warehouse Request.

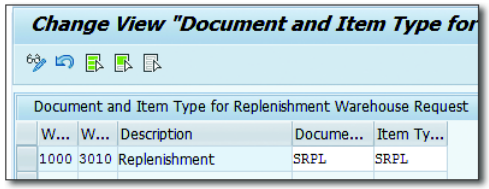


Figure 12.9 Maintain the Document Type and Item Type for the Replenishment Warehouse Request

12.1.2 Replenishment Strategies

SAP EWM supports the following replenishment strategies:

- **Planned replenishment**
  This strategy works on the basis of minimum and maximum quantity (Figure 12.10). When the stock level falls below the minimum quantity, replenishment is triggered. The replenishment quantity is in multiples of minimum replenishment quantity if it's defined; otherwise, replenishment would be done on the actual deficit.

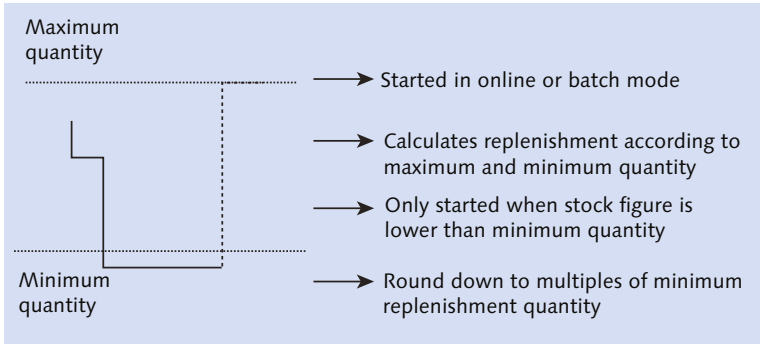


Figure 12.10 Planned Replenishment

Planned replenishment (Figure 12.11 and Figure 12.12) can be executed interactively or in the background. To execute, you can use Transaction /SCWM/REPL

or follow the SAP EWM Easy Access menu path, Extended Warehouse Management • Work Scheduling • Schedule Replenishment.

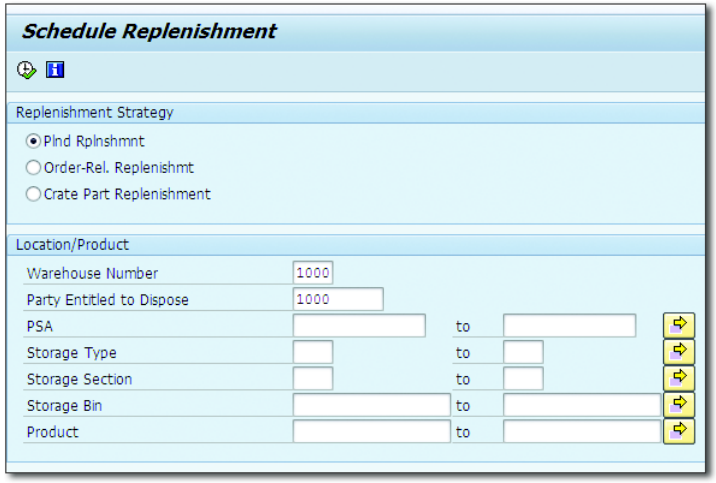


Figure 12.11 Schedule Planned Replenishment

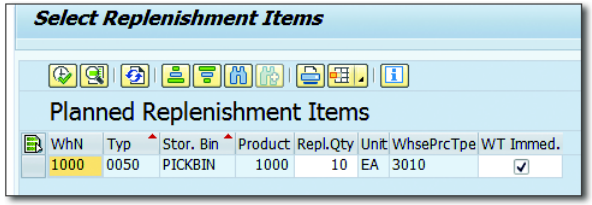


Figure 12.12 Planned Replenishment Based on Fixed Bin Min/Max Data

If you want to execute the replenishment in the background, use the Execute in Background option in Figure 12.13, and schedule periodically or for an ad hoc request.

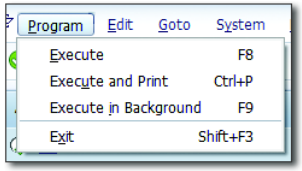


Figure 12.13 Option to Execute the Report in the Background

- **Automatic replenishment**

  You use this business process to fill up a picking area in accordance with the demand for products that you pick in this area. In this automatic replenishment process, you use warehouse orders (WOs) to carry out replenishment. The system creates replenishment WOs in the background when you confirm a pick-WO, and the stock in the source bin falls below a predefined threshold. The system calculates the replenishment quantity in accordance with the maximum and minimum quantity maintained for the product in the product master.

  This process is enabled when you activate the storage type for automatic replenishment (Figure 12.14). You can enable this via the SAP EWM IMG menu path, Extended Warehouse Management • Internal Warehouse Processes • Replenishment Control • Activate Replenishment Strategies in Storage Types. This strategy works with minimum quantity and maximum quantity. When the stock falls below the minimum stock level, the system automatically triggers replenishment in the background.

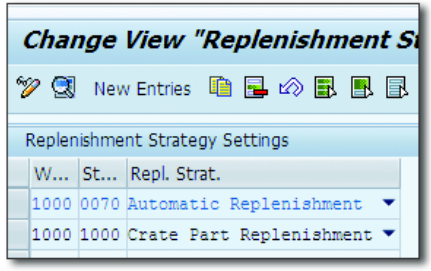


Figure 12.14 Automatic Replenishment

- **Order-related replenishment**

  As shown in Figure 12.15 and Figure 12.16, the replenishment calculation is based on the open items against the outbound delivery order. You should have activated the order-related replenishment strategy for the relevant storage type for this to work.

  Activation of rough bin determination in the warehouse process type is necessary. After the rough bin is activated, when the outbound delivery orders are created, the system initiates rough bin determination and determines the storage bin information. When the system determines two or more bins, the rough bin is blank.

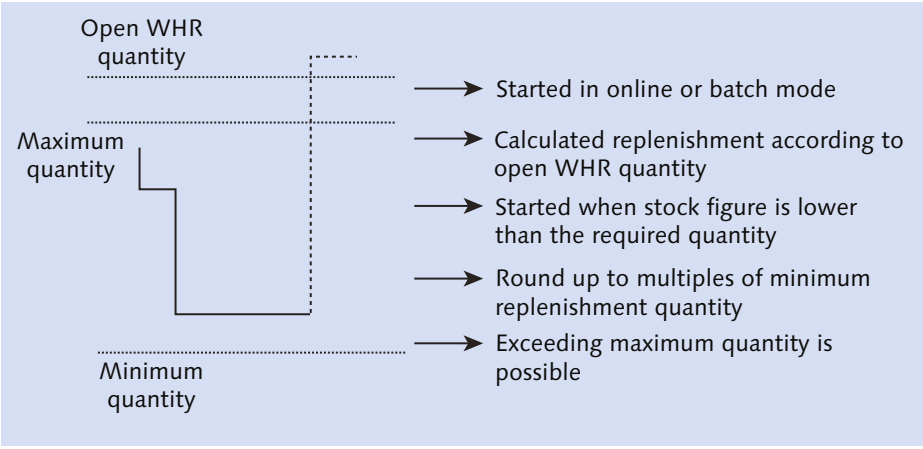


Figure 12.15 Order-Related Replenishment Process

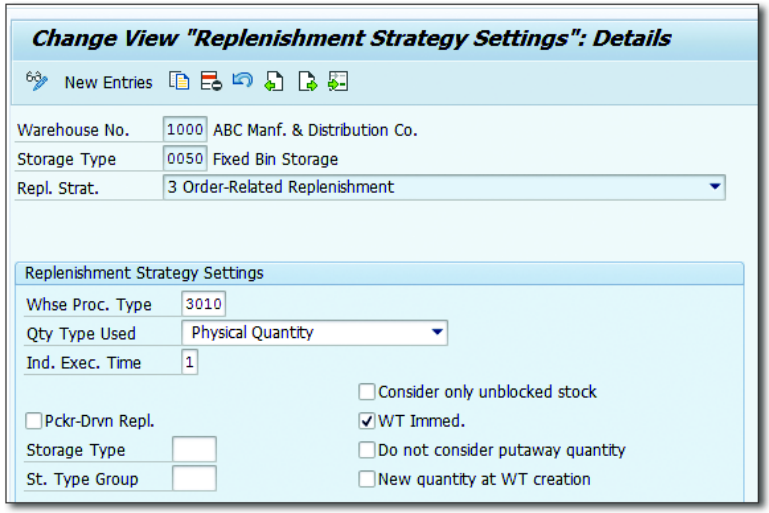


Figure 12.16 Order-Related Replenishment Strategy Settings

Use Transaction /SCWM/REPL (Schedule Replenishment) to execute the order-based replenishment and select the strategy as ORDER-REL. REPLENISHMENT (Figure 12.17).

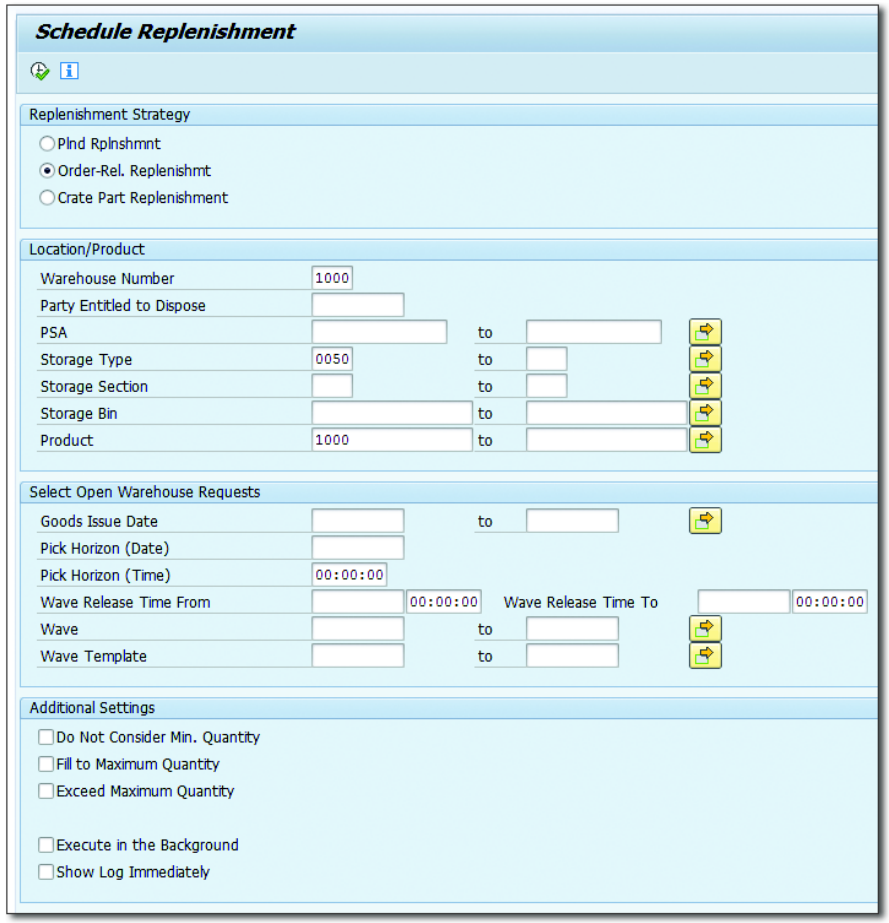


Figure 12.17 Order-Related Replenishment

In this replenishment strategy, the system calculates the replenishment level based on the open warehouse requests.

- **Direct replenishment**
  Direct replenishment starts when pick denial is done with exception code REPL (Figure 12.18). Standard exception functionality REPL (Figure 12.19) is delivered for direct replenishment in case of pick denial. Direct replenishment is only possible in the fixed bin scenario.

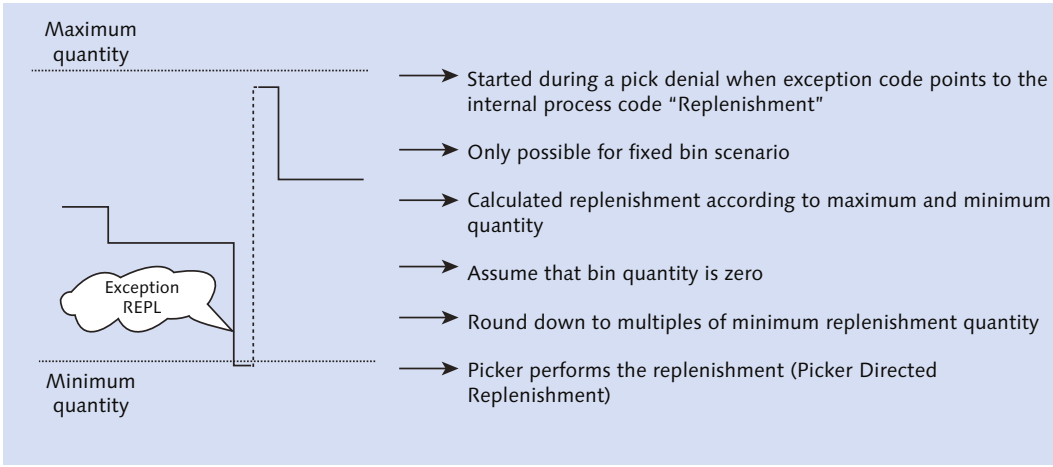


Figure 12.18 Direct Replenishment Process

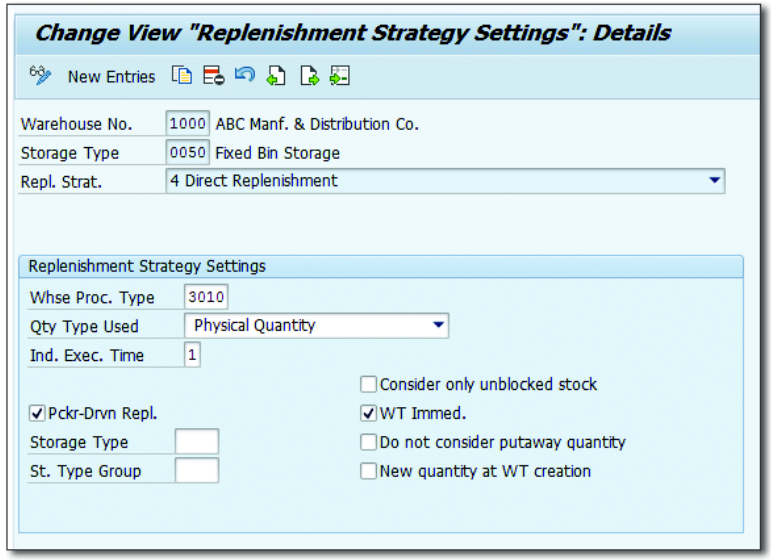


Figure 12.19 Exception Code REPL for Direct Replenishment When Pick Denial Is Performed

The REPL scenario works with min max quantity data, with the system assuming that the stock in the storage bin is zero. The system rounds the demand in multiples of minimum replenishment quantity. Because this process is triggered by the picker, it's called picker-driven replenishment.

When the picker goes to the bin and finds that it's empty, he can trigger replenishment via radio frequency (RF) by using exception code REPL. The system then creates a replenishment task and WO. This WT is displayed in the RF as a next item to process for the picker. The only prerequisite is to have the available stock in the bin for replenishment (Figure 12.20). This scenario is only possible in the RF environment.

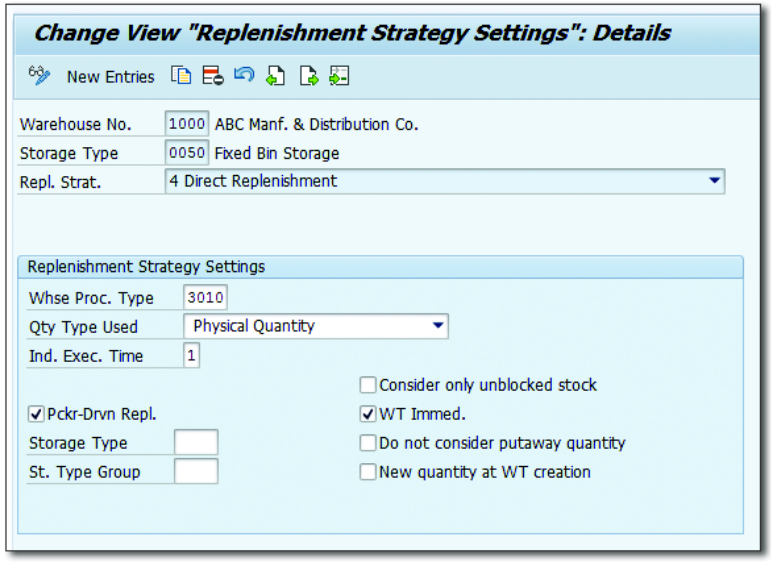


Figure 12.20 Direct Replenishment with the Picker-Driven Indicator Set

There is also a possibility of creating the WT and WO in the background and assigning it to a different group so that replenishment can be taken care of while the picker is processing the other pick tasks.

- **Crate part replenishment**
  Crate parts are the parts stored in crates, rather than in standard containers. These are planned independently of production orders. With this scenario, you can replenish the crate parts for the production supply working against minimum quantity and maximum quantity data. The prerequisite for activating and executing the crate part replenishment is activating the replenishment strategy for the storage type (PRODUCTION SUPPLY, as shown in Figure 12.21).

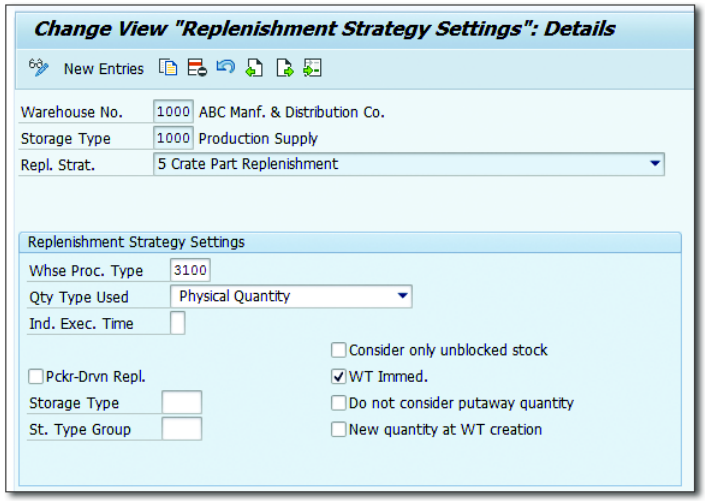


Figure 12.21 Crate Part Replenishment Strategy Settings

As shown in Figure 12.22, the first step is to create the production supply area (PSA) in SAP EWM Easy Access; you can access this via Transaction /SCWM/PSA or menu path, Extended Warehouse Management • Master Data • Production Supply Area (PSA) • Define PSA.

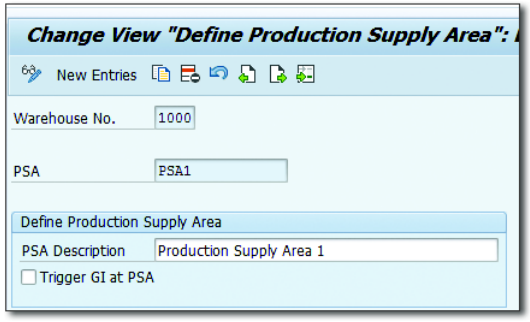


Figure 12.22 Production Supply Area

The next step is to make an assignment of bin to PSA/product/entitled in the Warehouse No. field or product/entitled in the PSA field (Figure 12.23). You can use Transaction /SCWM/PSASTAGE or Transaction /SCWM/PSASTAGE2. You can also go to the SAP EWM Easy Access menu path, Extended Warehouse Management • Master Data • Production Supply Area (PSA) • Assign

Bin to PSA/Product/Entitled in Warehouse Number or Assign Bin to Product/Entitled in PSA.

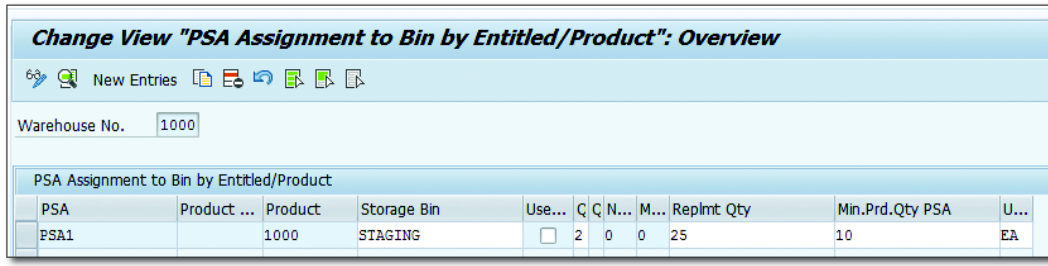


Figure 12.23 Assign the Bin to PSA/Product/Entitled in the Warehouse Number Field

Here you can specify the stage bin, type of quantity calculation, quantity classification, replenishment quantity, minimum production quantity in PSA, and so on. When the current quantity in the staging bin (in the preceding example) falls below the minimum production quantity level in PSA, the crate part replenishment is triggered. Replenishment quantity is in multiples of this quantity.

12.2 Rearrangement

The rearrangement process helps in repositioning the products in the warehouse at the best optimized location for picking and putaway as compared to their current location. For the purpose of evaluation between current optimal parameters and the proposed optimal location, the system uses the slotting index. Slotting indexes are based on the entries maintained in the search sequence in the Evaluate Warehouse Item field in Customizing.

12.2.1 Rearrangement Configuration

To accomplish this, you need to define the default warehouse process type for rearrangement in the SAP EWM IMG menu path, Extended Warehouse Management • Internal Warehouse Processes • Warehouse Optimization • Specify Default Warehouse Process Type for Rearrangement and Specify Document Type and Item Type for Rearrangement as shown in Figure 12.24 and Figure 12.25.

Figure 12.24 Default Values for Rearrangement

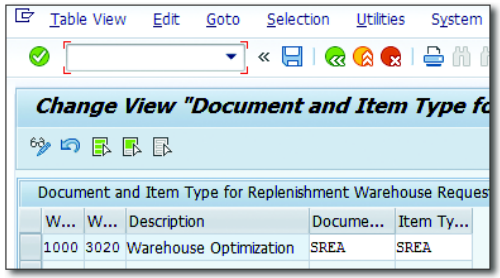


Figure 12.25 Document Type and Item Type for Rearrangement

If you work with slotting indexes (i.e., evaluation and offering of optimal location based on the evaluation points maintained in the following configuration) you need to enter a value in the Evaluate Warehouse Item field in the search sequence in Customizing. When using a slotting index, the system first tries to propose an optimum storage bin (with a slotting index of zero). If this isn't possible, the system proposes an alternative storage bin with the next lowest slotting index. The system only proposes an alternative storage bin if its slotting index is lower than that of the current storage bin.

You can access these settings in the following SAP EWM IMG menu paths:

- Extended Warehouse Management • Goods Receipt Process • Strategies • Storage Type Search • Assign Storage Types to Storage Type Search Sequence
- Extended Warehouse Management • Goods Receipt Process • Strategies • Storage Section Search • Maintain Storage Section Search Sequence
- Extended Warehouse Management • Goods Receipt Process • Strategies • Storage Bin Determination • Alternative Storage Bin Type Sequence

- Extended Warehouse Management • Goods Receipt Process • Strategies • Storage Bin Determination • HU Types • Define HU Types for Each Storage Bin Type

12.2.2 Slotting Data

For slotting, the system uses rearrangement-related data prerequisites from the product master. During slotting, a storage concept is automatically determined for a product from the underlying storage parameters that are relevant for putaway. These storage parameters are determined on the basis of master data, that is, product data, requirement data, and packaging data. The objective is to describe the storage section in which the product is to be stored, the storage bin properties, and the putaway strategy. For optimal storage type, storage section, and storage bin type determination, the product should have the putaway-related settings.

Slotting takes into account master data that isn't dependent on the execution process. If the putaway process for a product is dependent on execution parameters, this dependency is taken into account later on during storage bin determination for putaway. This doesn't, however, have an effect on the results of slotting.

12.2.3 Performing Slotting and Rearrangement

As described earlier, rearrangement is the process of finding the optimal bin as compared to the current bin of a product. Slotting forms the basis of rearrangement. During slotting, the system determines the following storage parameters and stores them in the product master as shown in Figure 1.26:

1. Putaway control indicator (and, optionally, stock removal control indicator)
2. Maximum quantity in storage type
3. Storage section indicator
4. Storage bin types

Note that the system always performs step 1 but steps 2 to 4 are optional.

Because we've already described the process of slotting earlier, here we'll only highlight how to perform slotting. You can use Transaction /SCWM/SLOT or navigate to the SAP EWM Easy Access menu path, Extended Warehouse Management • Master Data • Slotting • Slot Products for Warehouse. In this

transaction, you specify the product for which slotting is to be done, the date of the slotting run, and the slotting steps to be followed.

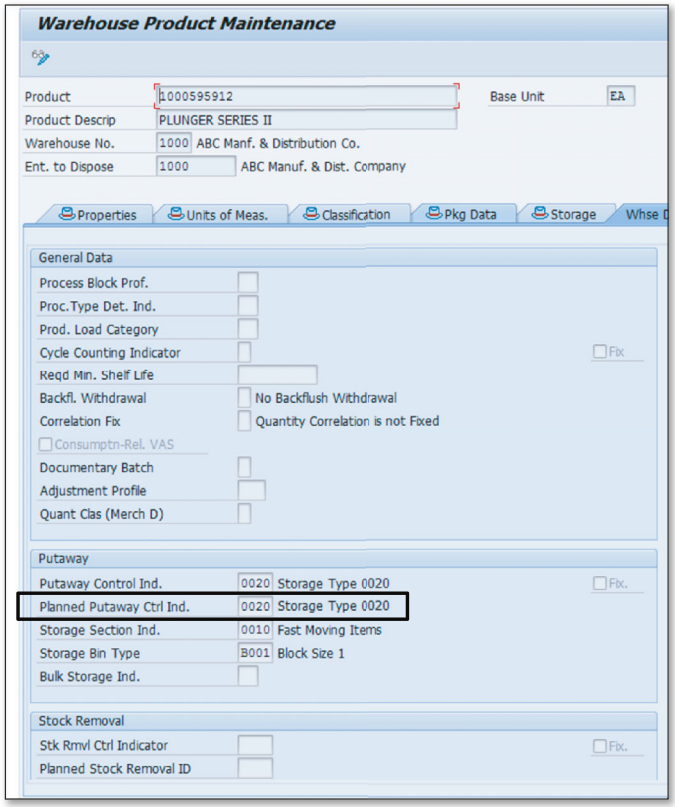


Figure 12.26 Planned Putaway Control Indicator

Similarly, to perform rearrangement, use the SAP EWM Easy Access menu path, Extended Warehouse Management • Work Scheduling • Rearrangement, or use Transaction /SCWM/REAR.

12.2.4 Alerts for Rearrangement

Rearrangement becomes relevant when the capacity utilization of a particular area is higher than other areas. Thus, rearrangement can be triggered when the capacity utilization of a bin exceeds a certain predefined value. Alerts can be generated for areas where capacity utilization is high. To make the settings related

to threshold values for creating alerts as shown in Figure 12.27, navigate to Extended Warehouse Management • Internal Warehouse Processes • Warehouse Optimization • Define Threshold Values for Stock Situation.

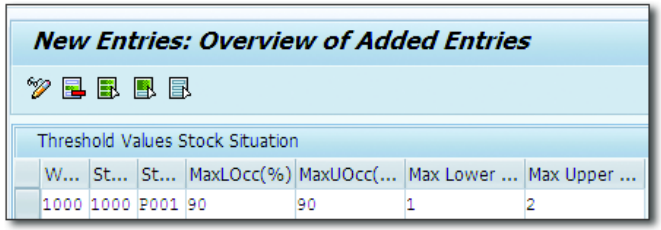


Figure 12.27 Threshold Values

As shown in Figure 12.27, you define the threshold values in terms of the maximum upper and lower threshold occupancy in percentage for a storage bin. You also define the maximum upper and lower threshold occupancy in numbers of a product.

After the threshold values are maintained, use Transaction /SCWM/WM_ANA or go to Extended Warehouse Management • Work Scheduling • Analyze Stock Situation in EWM Easy Access to evaluate the stock situation and to trigger alerts.

12.3 Stock Transfer

The stock transfer process in SAP EWM helps in internal goods movement for production supply, replenishment, warehouse reorganization, and so on. Because these activities are confined to the warehouse, they don't have any delivery reference such as inbound and outbound delivery. After the process is completed in SAP EWM, communication is sent to the SAP ERP system. SAP EWM sends the posting change information for internal stock transfer as a goods movement to SAP ERP.

12.3.1 Document Type and Item Type Mapping

The document structure for stock transfer is similar to the delivery document structure. In its header and item details, the header contains document category, warehouse, and so on, and the item details contain item type, product, batch, stock type, quantity, source and destination bin details, and so on. Primarily, you

need to define the document type and item type, and map the determination process for the stock transfer.

You can do this in SAP EWM IMG menu path, Extended Warehouse Management • Internal Warehouse Processes • Delivery Processing • Stock Transfers • Define Document Types for the Stock Transfer Process and Define Item Types for the Stock Transfer Process.

You can maintain the determination process for the stock transfer in SAP EWM IMG via menu path, Extended Warehouse Management • Internal Warehouse Processes • Delivery Processing • Stock Transfers • Define Document Type Determination for the Stock Transfer Process and Define Item Type Determination for the Stock Transfer Process.

You can also use the wizard assistance (Figure 12.28) in creating the document type and item type via the SAP EWM IMG menu path, Extended Warehouse Management • Internal Warehouse Processes • Delivery Processing • Stock Transfers • Use Wizard to Define Document Types for the Stock Transfer Process and Use Wizard to Define Item Types for the Stock Transfer Process.

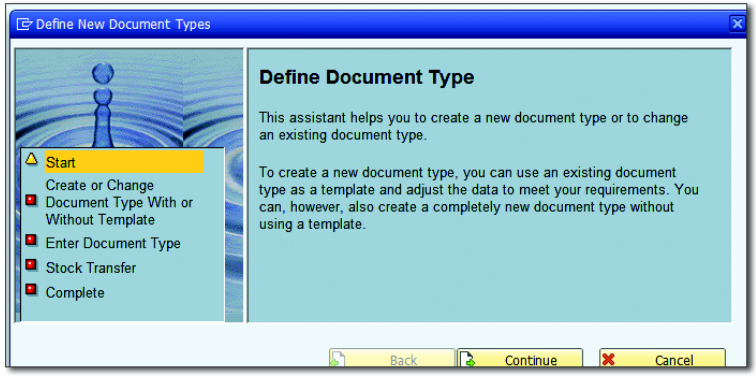


Figure 12.28 Wizard Assistance in Creating the Document Type

12.3.2 Internal Stock Transfer Process

Warehouse requests are created in SAP EWM either manually through user interfaces (Figure 12.29) or automatically (e.g., via schedule replenishment). Manual creation of the internal stock transfer document is done using Transaction /SCWM/IM_ST or via the SAP EWM Easy Access menu path, Extended Warehouse Management • Work Scheduling • Maintain Internal Stock Transfer.

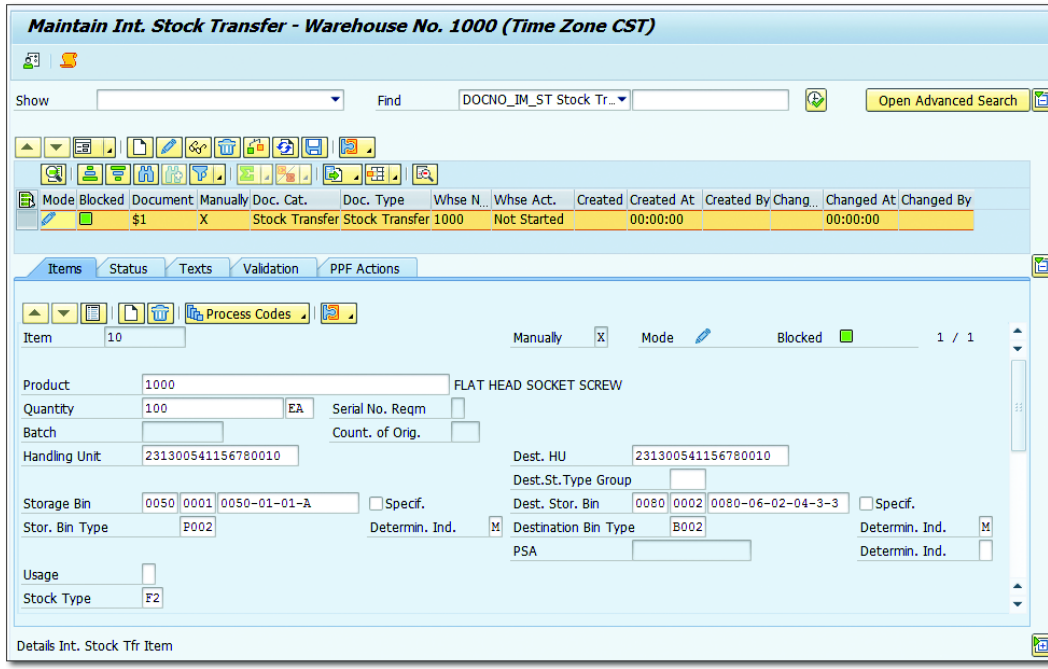


Figure 12.29 Creation of the Internal Stock Transfer Document from One Bin to Another

Enter the document type, item type, product, source and destination information, stock type, and so on at the item level for appropriate internal stock transfers you've decided to undertake. After the internal stock transfer document is created, the WTs are created based on the Post Processing Framework (PPF) settings. It can be done automatically, or if you intend to create it manually, use Follow-On Functions (Figure 12.30) in the menu bar to create WTs.

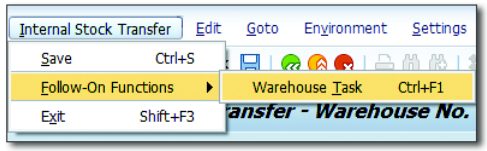


Figure 12.30 Warehouse Task Creation via Follow-On Functions

Upon confirmation of the WT, the stock moves to the desired destination. Because this process moves product from one bin to the other in one step, the process contains the putaway and picking step at the same time.

Internal stock transfers can be used along with wave planning to create WTs for internal movements. This feature enables you to do mass release of warehouse requests for internal movements, thereby blocking the stock as late as possible for internal movement.

12.4 Ad Hoc Movements

Ad hoc movements are the unplanned movement of stocks within the warehouse. Reasons for such movements include the following:

- Wrong placement of product in the bin
- Damage of product in the bin
- Removal of product for scrapping due to shelf life expiry
- Removal of dead stock
- Unplanned rearrangement movement

In such a situation, you don't have any preceding document to process the ad hoc move. SAP EWM provides an option to create WTs without reference.

12.4.1 Creation of Ad Hoc Warehouse Tasks

SAP EWM provides two transactions for ad hoc WT creation: Transaction /SCWM/ADPROD (Move Product) and Transaction /SCWM/ADHU (Move Handling Unit). You can access these transactions via the SAP EWM Easy Access menu path, Extended Warehouse Management • Work Scheduling • Create Warehouse Task without Reference.

12.4.2 Execution of Ad Hoc Warehouse Tasks

Here, you maintain the default parameters (warehouse number and warehouse process type) as shown in Figure 12.31, so that you need not enter this information every time you process an ad hoc movement.

Use either product WT or HU WT based on the need, and set up the ad hoc move from one bin to another for the product. You can manually create the task using the preceding transactions. You enter the product, warehouse process type for the ad hoc movements, and destination data in the highlighted sections

shown in Figure 12.32. After all relevant parameters are entered, click on CREATE and then SAVE.

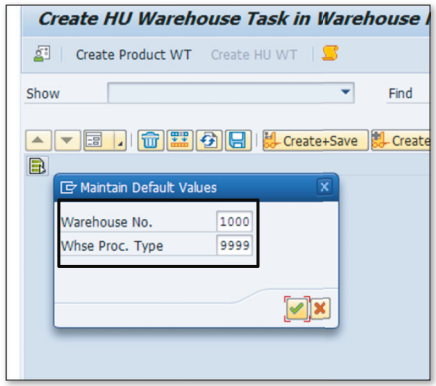


Figure 12.31 Maintain Default Parameters

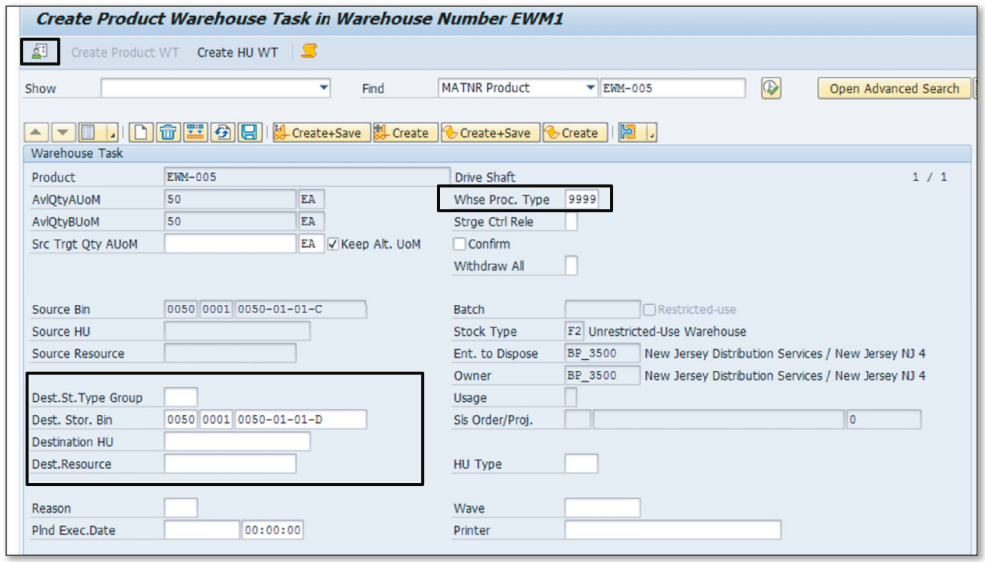


Figure 12.32 Create Product Warehouse Task

If you want to confirm the WT immediately, click the CONFIRM button; otherwise, you can confirm via the warehouse monitor or RF environment if enabled in your RF framework.

12.5 Posting Changes

A posting change is a stock attribute alteration from one to another in SAP EWM. For example, you can flip from one stock type to other, change storage bin or batch, and so on. This activity is always recorded via a document and goes with the WT in SAP EWM.

Table 12.1 illustrates the different type of posting changes applicable in SAP EWM.

Procedure	Transaction at Start of Procedure	Outbound Delivery Exists in SAP ERP	Posting Change Delivery Exists in SAP EWM	Immediate Goods Movement Allowed	Goods Movement after WT Allowed	Goods Movement before WT Allowed
Planned posting change triggered in SAP ERP	Transaction MIGO or Transaction VL_MOVE	X	X	X	X	X
Planned posting change triggered in SAP EWM	Transaction /SCWM/IM_PC or Transaction /SCWM/POST	No	X	X	X	X
Direct posting change or WT	Transaction /SCWM/POST	No	No	X	No	X
Automatic posting change upon WT confirmation	Transaction /SCWM/TO_CONF or Transaction RF	No	No	No	X	No

Table 12.1 Types of Posting Changes in SAP EWM

12.5.1 Planned Posting Change from SAP ERP

Planned posting changes can be initiated via SAP ERP and SAP EWM. In SAP ERP, posting changes are triggered via a posting change request and posting change delivery document. You enter the source and destination stock type in SAP ERP.

Posting change options when triggered from SAP ERP are shown in Table 12.2.

Process Type Settings	Procedure
Immediate goods movement	▸ If the system can find the stock, it posts the posting change immediately. ▸ The system sets the warehouse activity status of the posting change delivery to COMPLETED.
Goods movement before WT	▸ If the system can find the stock, it posts the posting change immediately. ▸ The system sets the warehouse activity status of the posting change delivery to PARTIALLY COMPLETED. ▸ You create the WTs. ▸ You execute the WTs and confirm them.
Goods movement after WT	▸ The system sets the warehouse activity status of the posting change delivery to NOT STARTED. ▸ You create the WTs. ▸ You execute the WTs and confirm them. ▸ The system posts the posting change automatically with the WT confirmation.

Table 12.2 Posting Change Options from SAP ERP

12.5.2 Basic Settings

You can post the posting change immediately if the stock is found in SAP EWM, or you can also post the posting changes by creating the WT first and then posting the change. Alternatively, you can do the posting change first and then create the WTs. As shown in Figure 12.33, you can use the warehouse process type with warehouse process category 7 (Posting Change) in Process-Oriented Storage Control (POSC) in SAP EWM. The standard out-of-the-box process type is 4010 for transfer posting. When you copy and create a new warehouse, you should be able to see all the out-of-the-box process types that were delivered by SAP as default.

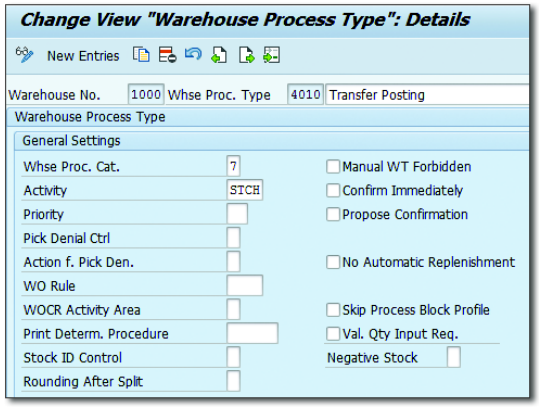


Figure 12.33 Warehouse Process Type 4010 with Warehouse Process Category 7

You can trigger a posting change document (Figure 12.34) in SAP EWM. For this, create a posting change document in SAP EWM using Transaction /SCWM/IM_PC. Click on the CREATE button on both the header and item level, choose the appropriate document type and item type, and enter the stock attributes for the source and destination at the item level. Based on the settings of the warehouse process type, you can control whether the WT should be created before or after the posting change.

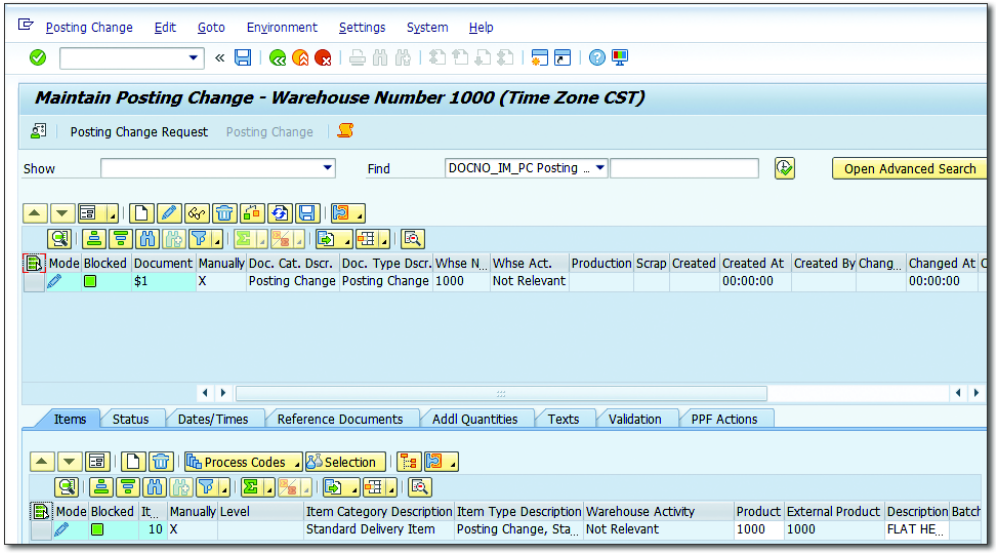


Figure 12.34 Create the Posting Change Document

You can maintain the default target stock data for each process type used while performing the posting change for the product in Transaction /SCWM/POST. You can navigate to this settings in the SAP EWM IMG menu path, Extended Warehouse Management • Internal Warehouse Processes • Default Values for Posting Changes (see Figure 12.35).

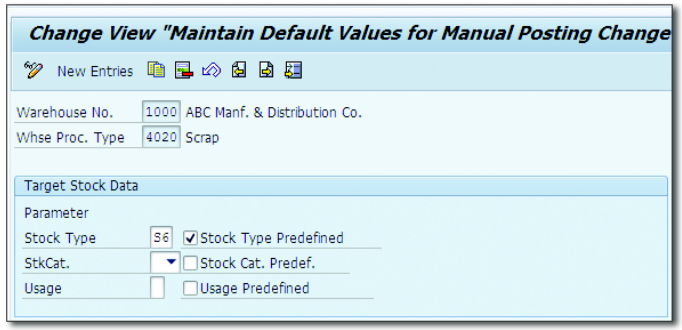


Figure 12.35 Default Values for Posting Changes

Table 12.3 lists the procedural options for posting changes as allowed by SAP EWM.

Process Type Settings	Procedure
Immediate goods movement	▸ If the system can find the stock, it posts the posting change immediately. ▸ The system sets the warehouse activity status of the posting change delivery to Completed.
Goods movement before WT	▸ If the system can find the stock, it posts the posting change immediately. ▸ The system sets the warehouse activity status of the posting change delivery to Partially Completed. ▸ You create the WTs. ▸ You execute the WTs and confirm them.
Goods movement after WT	▸ The system sets the warehouse activity status of the posting change delivery to Not Started. ▸ You create the WTs. ▸ You execute the WTs and confirm them. ▸ The system posts the posting change automatically with the WT confirmation.

Table 12.3 Procedural Options for Posting Changes in SAP EWM

As shown in Figure 12.36, you can even create WTs manually using the Follow-On Function via the Posting Change document.

Figure 12.36 Follow-On Functions to Create Warehouse Tasks Manually

12.5.3 Direct Posting Change

You can do an immediate posting change in SAP EWM by using Transaction /SCWM/POST or by navigating to the SAP EWM Easy Access menu path, Extended Warehouse Management • Work Scheduling • Make Posting Change for Product. As shown in Figure 12.37, you have various options to search the data required for posting change by Product, Handling Unit, Storage Bin, and so on.

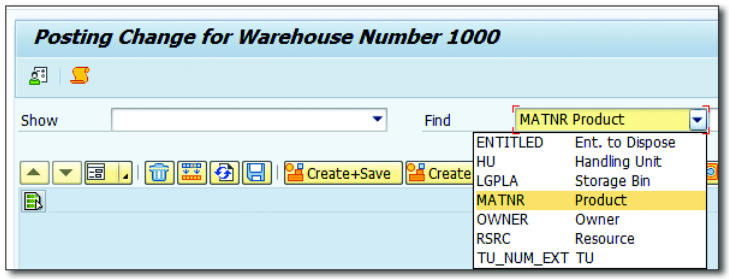


Figure 12.37 Posting Change Search Selection

12.5.4 Processing Posting Changes

After you have the list (as shown in Figure 12.38), you can do posting changes for an individual item or a mass change for multiple items. For an individual item, click on the form view to enter the destination data; for mass changes, enter the destination data in the pop-up window. By doing this, it posts the stock per the destination stock parameters entered.

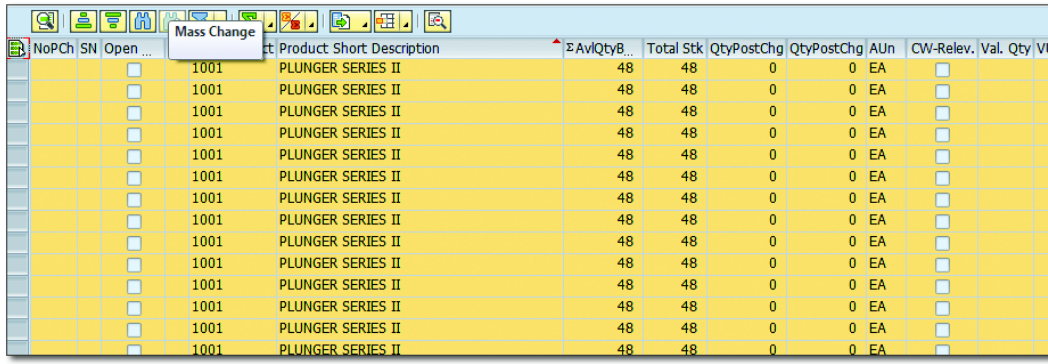


Figure 12.38 Mass Change Option in Posting Change Document

If it's only the stock type change, you can do it via the warehouse monitor. Access the CHANGE STOCK TYPE option (Figure 12.39) in the WAREHOUSE MANAGEMENT MONITOR screen via node STOCK AND BIN • BBD/SLED OVERVIEW • MORE METHODS.

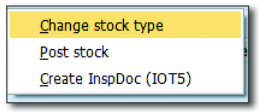


Figure 12.39 Option to Change Stock Type via More Methods in the Warehouse Monitor

12.5.5 Automatic Posting Change

In this case, the system posts the posting change when the WT is confirmed. For example, when the stocks are received at the dock, they are under stock type 01 (stock at dock) and when you confirm the final putaway WT, the stock type moves to 02 (stock at warehouse).

Settings related to this automatic posting are maintained at the storage type level and warehouse process type level via availability group settings in both the storage type and warehouse process type. You can access this via the SAP EWM IMG menu path, EXTENDED WAREHOUSE MANAGEMENT • MASTER DATA • DEFINE STORAGE TYPE AND EXTENDED WAREHOUSE MANAGEMENT • CROSS-PROCESS SETTINGS • WAREHOUSE TASK • DEFINE WAREHOUSE PROCESS TYPE. When deliveries are used and a warehouse process type is assigned to it, then the availability group from the warehouse process type is considered. The availability group (Figure 12.40) has an assignment of stock type associated to it and as well as SAP ERP storage

location. When you confirm the final task, the stock is posted to the stock type associated with its availability group.

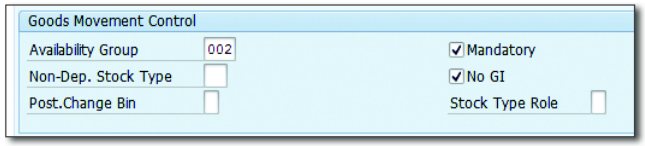


Figure 12.40 Destination Storage Data (Availability Group) in the Storage Type

12.6 Summary

In this chapter, we discussed the replenishment options and strategies, internal stock transfer settings and processes, ad hoc movements within the warehouse, posting changes initiated in SAP ERP and SAP EWM, and slotting and rearrangement. You should now understand the concepts regarding movement of stock within a warehouse and the mechanisms by which they can be realized in a SAP EWM system.

Takeaways

- You need to first understand the type of replenishment strategies required for your business process. The intent should be not to have any deficit stock at any point in time.
- Maintaining a replenishment quantity at the PSA level and setting the appropriate PSA bin are the keys to timely replenishment for the production process.
- You should set the slotting data as needed for your organization and then perform rearrangement as and when necessary. Using the rearrangement alerts you can optimize rearrangements within the warehouse.
- You can process various WTs via the system-guided RF functionality. This will help you perform auto assignment of WOs to the operators based on the queue assignments.

SAP EWM provides a central tool for monitoring the warehouse activities encompassing all warehouse processes. It provides complete visibility on the warehouse situation and its operations. Warehouse management monitor in SAP EWM is a paramount tool to assist warehouse managers, supervisors, experts, specialists, and others in their day-to-day activities.

13 Warehouse Monitoring

In today's dynamic supply chain scenarios, the warehouse supervisor has to make instant decisions based on the current situation in the warehouse. This chapter covers the robust monitoring features available in SAP Extended Warehouse Management (SAP EWM) that allows warehouse managers to "see" the current status of warehouse processes and respond to a given warehouse situation. Inconsistency in the warehouse processes and activities can be reduced to a large extent with the help of warehouse monitoring in SAP EWM.

Let's consider a typical warehouse situation to understand how a monitoring capability is useful. Assume a supervisor in the outbound area logs in to the system in the morning when his shift starts. The first thing he is concerned with is the deliveries scheduled to be completed that day. The supervisor can simply use the available warehouse monitoring tools to easily get information on warehouse tasks (WTs) to be completed for the outbound area during that day. Similarly, the same supervisor needs to know which tasks could not be completed on the previous day and hence need to be completed today on priority. For such cases, alerts are generated from the Alert Monitor. This and many more such features are explained in detail in this chapter.

In SAP EWM, the capabilities required for monitoring a warehouse are covered under three tools as shown in Figure 13.1:

- Warehouse management monitor
- Easy Graphics Framework or warehouse cockpit
- Graphical warehouse layout (GWL)

These tools can be accessed in SAP Easy Access Menu, by choosing Extended Warehouse Management • Monitoring.

Figure 13.1 Warehouse Management Monitor Easy Access Menu

In this chapter, we'll take a detailed look at how the various functionalities of the three tools just mentioned can be leveraged for efficiently monitoring a warehouse. Also, we'll see how these tools can be customized to meet your business requirements. The main objective is to ensure that all the warehouse activities are monitored to ensure smooth execution of business processes.

13.1 Warehouse Management Monitor

The *warehouse management monitor*, or simply *warehouse monitor*, is a tool that provides a means of monitoring all the warehouse activities using a single screen. The warehouse monitor is a powerful tool to easily get information on all activities that are essential to run a warehouse. Apart from accessing information, warehouse management monitor also contains alert monitoring capabilities, which highlight actual and potential problematic situations in the warehouse, and provides exception-handling tools.

The monitor can be accessed using Transaction /SCWM/MON or by going to SAP EWM Easy Access Menu and choosing Extended Warehouse Management • Monitoring • Warehouse Management Monitor. The first screen that appears is shown in Figure 13.2.

This screen asks for the details about the warehouse for which the monitor is to be accessed. It also requires details of the Monitor type (which will be explained in detail in subsequent sections) and the Demo Data Set. The use of Demo Mode is to display demo data instead of real system data. You can create demo data, import demo data from one system into another system, and reuse demo data to give better demos of the warehouse management monitor and

warehouse cockpit. If the DEMO MODE field is left empty, then the system displays real-time data by default.

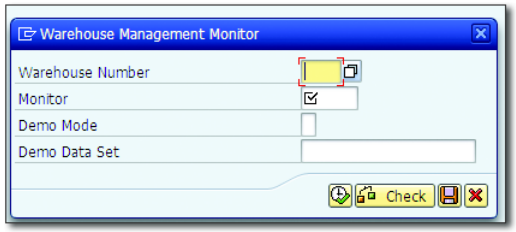


Figure 13.2 Warehouse Management Monitor Selection Screen

13.1.1 Understanding the Warehouse Management Monitor

Understanding the WAREHOUSE MANAGEMENT MONITOR screen (Figure 13.3) is important to make the best use of available functions. From this single screen, you'll not only be able to monitor the entire warehouse but also perform activities for the warehouse.

The WAREHOUSE MANAGEMENT MONITOR screen is divided into three sections: the node hierarchy tree, the parent data section, and the child data section.

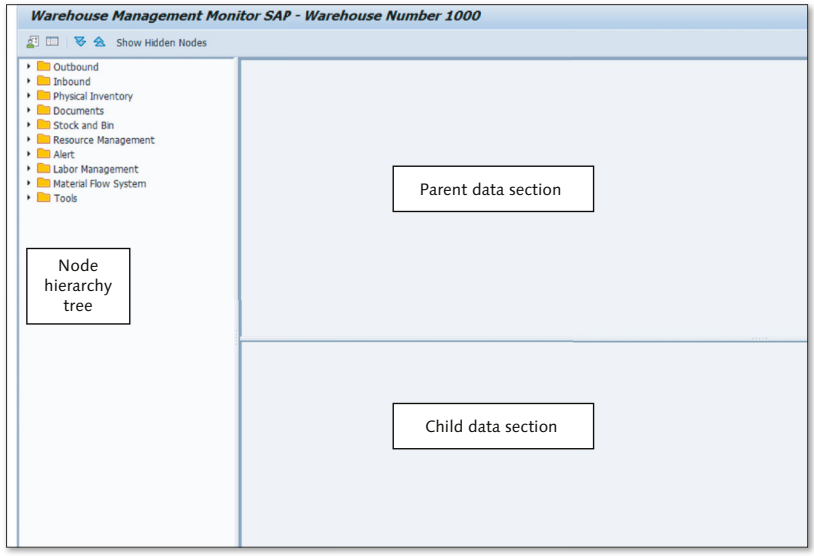


Figure 13.3 Warehouse Management Monitor Screen Layout

Node Hierarchy Tree

The left pane in the screen is the node hierarchy tree, which contains all the relevant predefined object classes. The tree is used to access information for a specific node depending on the user requirements. The warehouse management monitor contains nodes for object classes related to the following:

- Documents such as warehouse requests (WRs), warehouse orders (WOs), warehouse tasks (WTs), and physical inventory documents
- Processes such as stock and bin, and resource management
- Alerts such as overdue waves or overdue deliveries without goods issue/goods receipt

Let's take a brief look at the predefined nodes displayed in the node hierarchy tree:

- Outbound
  This node shows all the processes related to outbound delivery such as packing, kitting, picking, loading, and so on. It can also be used to access documents related to outbound delivery such as outbound delivery order (ODO), value-added services (VAS) order, route, shipping documents, and so on (Figure 13.4). All these nodes give a better visibility on the outbound processes. For example, under Transportation Unit Overview, you can see the transportation units (TUs) for a given time horizon. It gives a varied amount of selection for TUs based on the Status of shipping and receiving (S&R) activity, attributes of TU, status of assigned deliveries, vehicle, yard, and user references.
- Inbound
  This node can be used to monitor all the inbound delivery-related activities such as unloading, inspection, deconsolidation, putaway, VAS, and so on. The documents related to these activities can also be accessed. For example, if you want to see the putaway workload per the activity area, access the monitor via node Inbound • Processes • Putaway • Putaway Workload per Act. Area (Figure 13.5). Upon selecting this, you have an option to choose by Activity Area, Planned Closing Date/Time, and by Time Slot Duration. Time Slot Duration helps in automatically assigning the workload data to the time slot.

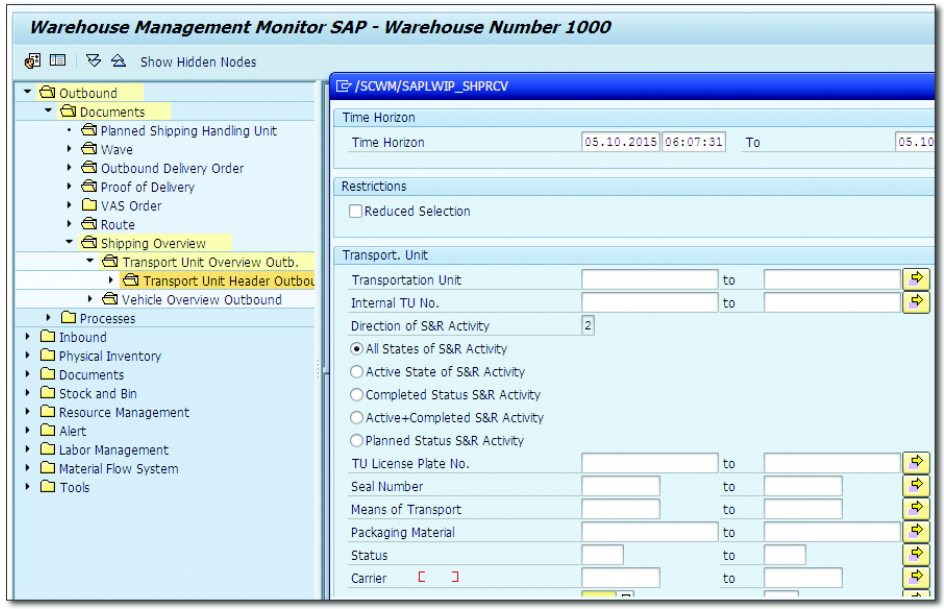


Figure 13.4 Outbound Transportation Unit Header in the Warehouse Monitor

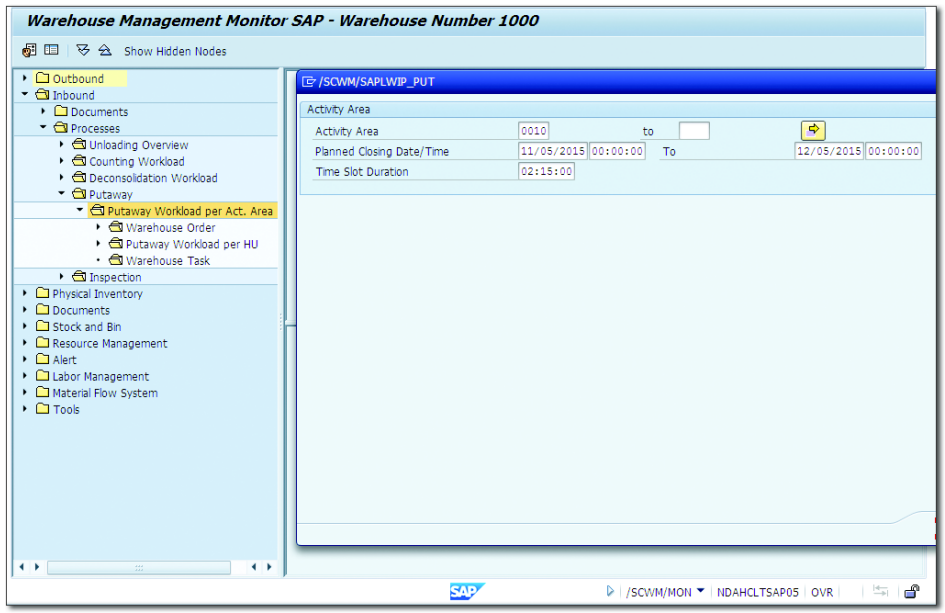


Figure 13.5 Putaway Workload in Warehouse Management Monitor

- **Physical Inventory**
  Physical inventory is the procedure in which physical counting of products in the warehouse is done to ensure that the stock as shown in the system matches the actual stock in the warehouse. This is an important activity because over a period of time, it's possible that the stock physically present in the warehouse might be more or less than the stock shown in the SAP EWM system. It's necessary to account for such a mismatch. By accessing this node, a user can check the documents related to physical inventory counting and take corrective steps. Apart from documents, another important feature is to monitor physical inventory progress. The objective of the physical inventory check is to ensure that the warehouse is completely inventoried by the end of the physical inventory year. You can display the status of this completeness at Storage Bin, Product, and Cycle Counting levels in the warehouse monitor through the Physical Inventory Progress node (Figure 13.6).

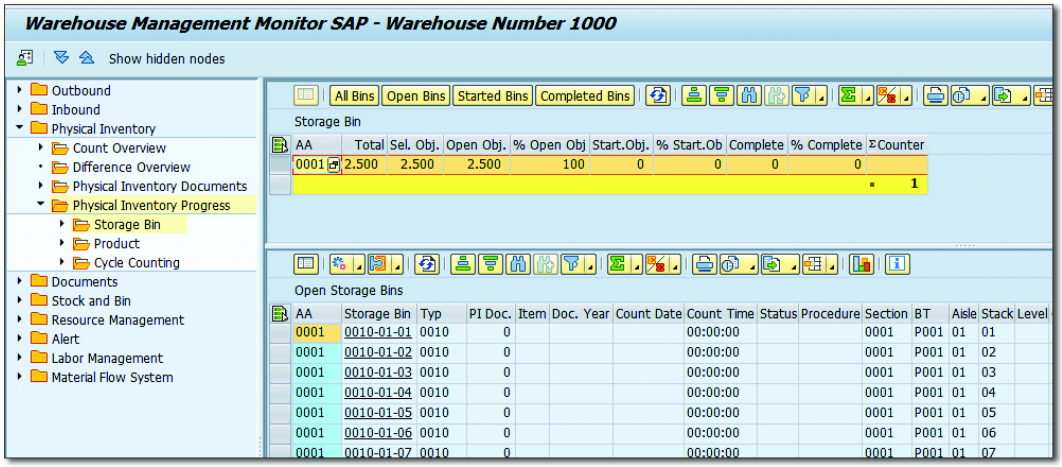


Figure 13.6 Physical Inventory Progress Report in the Warehouse Management Monitor

- **Documents**
  Using this node, a user can access all documents related to all the warehouse activities such as inbound, outbound, inspection, physical inventory counting, waves, and so on. Thus, if a user wants to access all WOs, instead of separately going to the respective node for accessing WOs, this node shows all the documents related to a warehouse in a single screen. These documents include inbound order, outbound order, physical inventory document, and so on.

- Stock and Bin
  This node is used to monitor the stock lying at any location and at any level in the warehouse. Stock at bin level, TU level, handling unit (HU) level, physical stock, available stock, kit components, and so on can be monitored.
- Resource Management
  Any user or equipment that does work in the warehouse is considered a resource. Using this node, a user can monitor all the resources and their assigned workloads (Figure 13.7). Queues, which define the logical flow of WTs assigned to a resource, can also be monitored using this node. You can also monitor resource groups, which are just groupings of resources for queue assignment purposes. The Processor subnode is linked to the Labor Management (LM) functionality of SAP EWM and allows entering details of an employee who has completed predefined tasks.

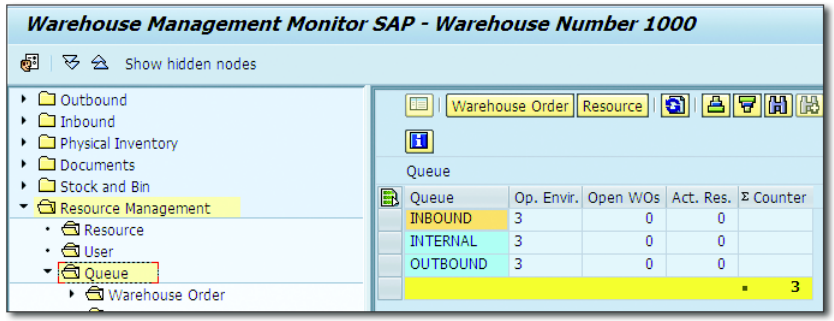


Figure 13.7 Report for Active Resources per Queue

- Alert
  This node can be used to monitor all types of alerts on overdue WOs, overdue WTs, overdue waves, overdue delivery orders, and so on. Apart from these, alerts for inbound and outbound deliveries, which are processed without goods receipt (for inbound) or goods issue (for outbound) or without WTs, can also be monitored. This is a very important functionality of the warehouse monitor because it highlights all those areas of warehouse where work isn't progressing smoothly and as planned. A user, with the help of alerts, can quickly identify bottlenecks in warehouse functioning. Alerts will be described in detail in later sections.

- Labor Management
  With this node, a user can monitor workload and utilization of labor in the warehouse.
- Material Flow System
  MFS is used to set up an automatic warehouse in SAP EWM. An automatic warehouse is one in which all the activities are carried out automatically. Programmable logic controllers (PLCs), communication channels, and so on are used for this purpose. All of this can be monitored using this node.
- Tools
  This node is used to monitor the logs raised due to errors in using SAP EWM. Also the status of message queues, that is, queued remote function (qRFCs) and so on, can be monitored. In the Tools folder, the Message Queue node is a very handy tool to analyze the messages stuck in RFC queues.

  You can use the Message Queue node to monitor the status of qRFC messages in message queues in SAP EWM (Figure 13.8). You can also monitor the status of qRFC messages in message queues between SAP EWM and SAP ERP. This allows you to see messages that haven't been processed as expected, so you can perform any steps necessary to resolve the problem. After you've done this, you can activate message queues from the warehouse management monitor. Overall, you can do the following with the Message Queue node:

  - Select message queues using the SAP EWM warehouse number.
  - View message queues from different warehouse numbers.
  - View message queues where no warehouse is determined for the message queue, for example, cross-warehouse messages such as messages related to packaging specification.
  - Select message queues by business-related selection criteria.
  - View information such as the warehouse number and business key of messages that haven't been processed yet and are still in the message queues.
  - Display the number of entries in one message queue.
  - Display existing SAP EWM application logs.
  - View inbound message queues relevant to SAP EWM on a connected SAP ERP system.
  - Execute message queues.
  - Reset the status of message queues.

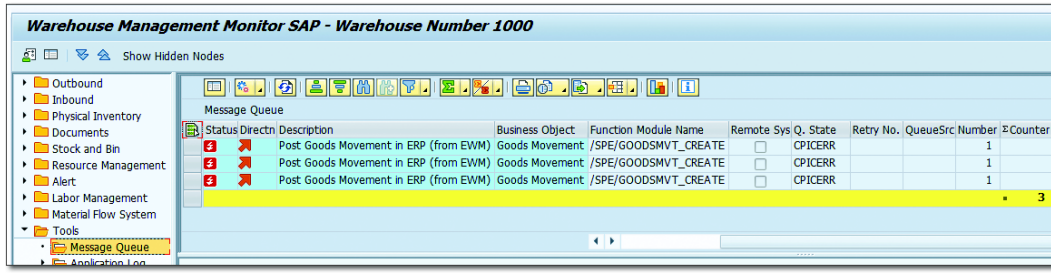


Figure 13.8 Message Queues in Warehouse Management Monitor

Parent and Child Data

As stated previously, the right side of the screen is divided into two sections. The upper view area displays parent data, and based on the selection criteria, the child node is displayed below the parent subscreen. The parent screen shows the main documents for the selected node, and the child screen shows the finer details of the parent document. For example, a WO can be a parent document, and WTs included in that WO are the child data.

The parent and child section contains an SAP List Viewer (ALV) grid. The object information is displayed in the ALV grid and consists of all the standard functionalities such as sorting, filtering, and printing. There is an option to toggle to the form view, which provides a much more detailed view than the ALV. Understanding the ALV grid buttons is very important because users can easily perform activities in just one click instead of navigating to that transaction through the SAP EWM Easy Access menu.

Let's consider an example to understand the layout of the Warehouse Management Monitor screen and the use of the ALV grid. Suppose you want to get information on open warehouse orders. To get this information, you navigate to the warehouse monitor, select the Documents node, and then select the Warehouse Orders subnode. The screen shown in Figure 13.9 opens when you double-click on the Warehouse Orders subnode. Select Open WOs and other search criteria as required and then press F8 to execute.

On pressing F8, the Warehouse Manager Monitor screen will display all open WOs in the parent data section. To get details on the WTs associated with a WO, select the row containing the WO, and click on the Warehouse Task

button. The WTs will appear in the child data section. Figure 13.10 shows the WT for a specific WO.

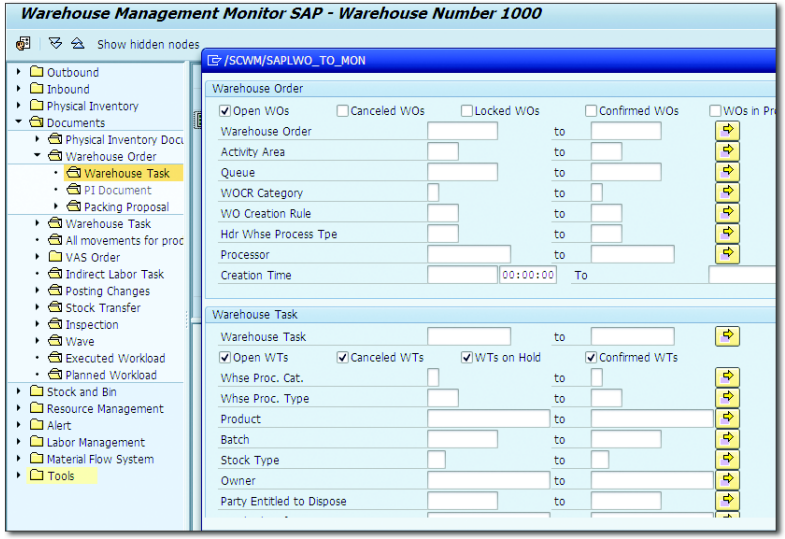


Figure 13.9 Search Screen for Open Warehouse Orders

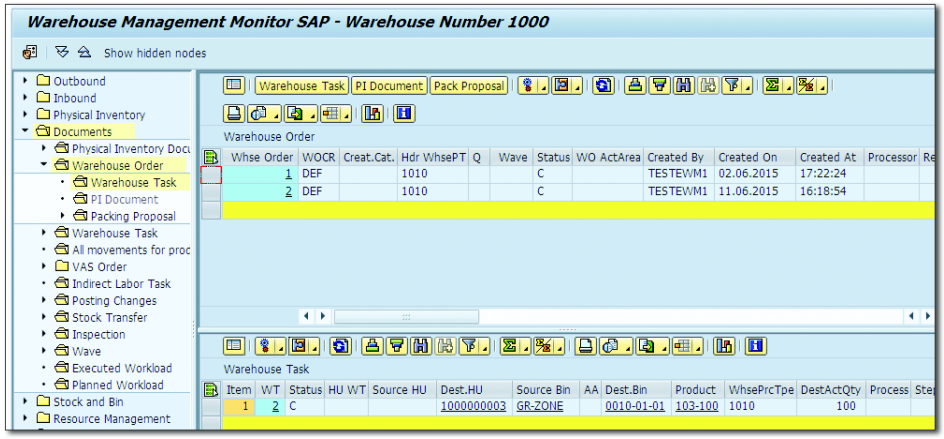


Figure 13.10 Parent and Child Data for a Warehouse Order

Similarly, you can also navigate to PI Document and Packing Proposal by clicking on the respective buttons. Apart from such monitoring work, you can also use

the warehouse monitor to perform activities. For example, for the selected WO number, you can perform the activities shown in Figure 13.11 by clicking on the More Methods button in the ALV grid.

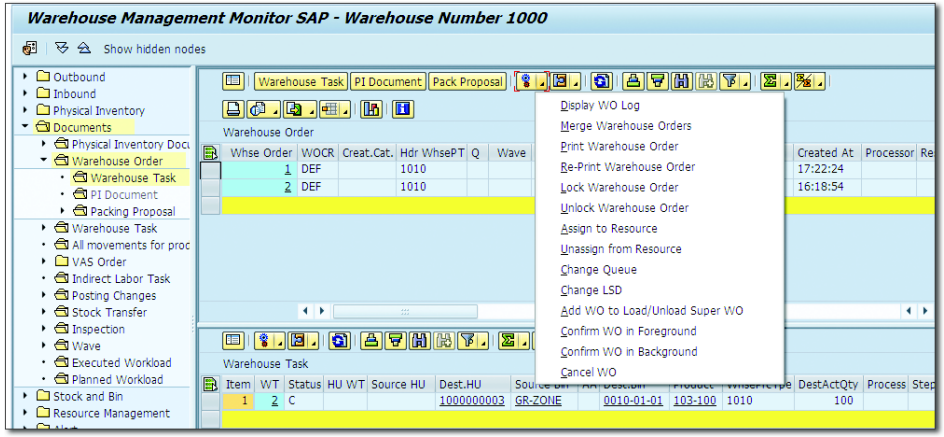


Figure 13.11 Performing Activities in the Warehouse Management Monitor

Similarly, activities such as assignment, deassignment, confirm, print, and so on can also be performed for WTs by clicking on the More Methods button in the child data section. You can also navigate to the main document associated with a WO or WT using the Navigate To button as shown in Figure 13.12. You can toggle between list view and form view using the button.

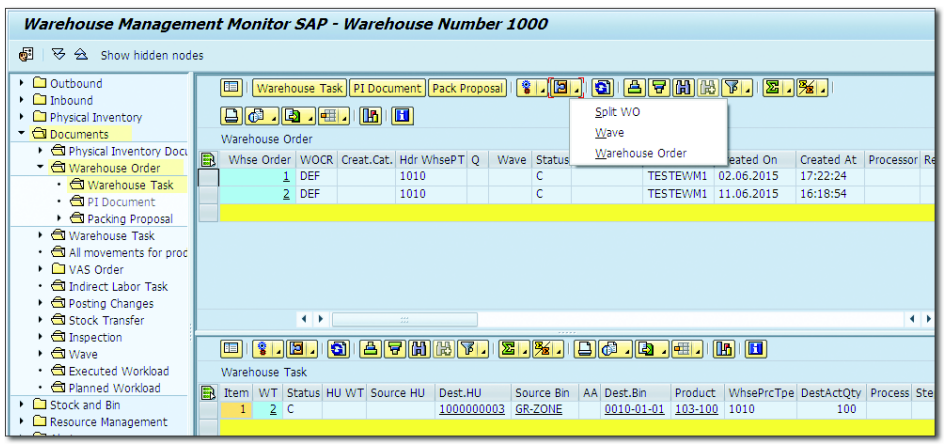


Figure 13.12 Navigation to Main Document Using Warehouse Management Monitor

13.1.2 Configuring the Monitoring Tree

The Warehouse Management Monitor screen allows users to create their own monitor and node hierarchy tree. A user may want to customize the monitor and hierarchy tree to display only the nodes that he used frequently. A user can also create custom nodes, which we'll discuss in the next section.

To create a monitor, use the path, SAP EWM IMG • Extended Warehouse Management • Monitoring • Warehouse Management Monitor • Define Monitor. Figure 13.13 shows the screen for defining the warehouse monitor.

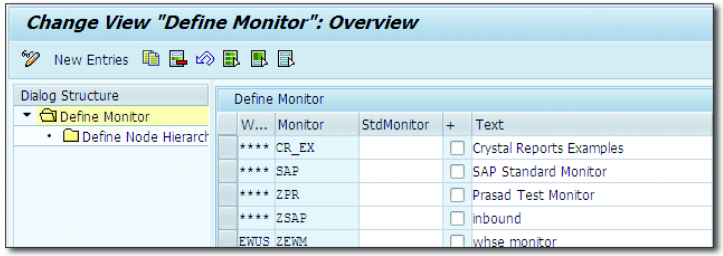


Figure 13.13 Monitor Definition

To create a new monitor, click on the New Entries button. If you want to create a new node hierarchy in the existing monitor, then select the row containing that monitor, and click on the Define Node Hierarchy folder in the dialog structure. The screen shown in Figure 13.14 will appear, in which you can click on the New Entries button to define a new node hierarchy. To do so, you need to specify the Higher Node, Lower Node, and Sequence. Sequence is the order in which the lower node will appear in the node hierarchy tree.

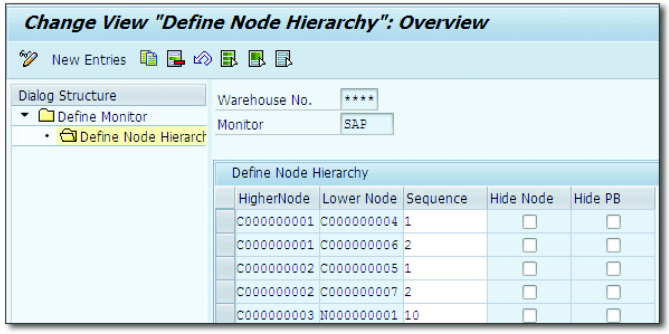


Figure 13.14 Node Hierarchy Definition

13.1.3 Customizing Warehouse Monitor Nodes

The nodes in the main screen of the warehouse monitor can be customized because users might frequently access only a few nodes. Following are the different types of customizations that can be made:

- **Hide nodes**
  The nodes that aren't used frequently can be hidden from the main screen by right-clicking on the folder/node and clicking on HIDE NODE. To unhide the node, click on SHOW HIDDEN NODES above the node hierarchy tree.
- **Set selection criteria for nodes**
  Users who regularly use the warehouse monitor might be interested only in getting very specific information relevant for their day-to-day work. Thus, they can set search criteria for a node so that when the user clicks on that node, the required information is readily available. For example, a supervisor in a picking area might only be interested in knowing which WTs are pending for his area.

  To set the selection criteria for a node, right-click on that node, and click on SET SELECTION CRITERIA. You can then define the conditions for the selection criteria.
- **Creating nodes for selection criteria**
  You can also create nodes for the selection criteria you defined earlier, which are called variant nodes. To do so, right-click on the node for which you defined a selection criteria, and click on CREATE VARIANT NODE. This automatically fetches the selection criteria from the node and creates a variant node specifically for the defined selection criteria.
- **Creating nodes**
  The warehouse monitor allows the creation of custom nodes. You can also create a custom monitor and node hierarchy containing only the nodes that you want to use. Now let's go over, step-by-step, the procedure of creating a new node. To create a node, follow the path, SAP EWM IMG • EXTENDED WAREHOUSE MANAGEMENT • MONITORING • WAREHOUSE MANAGEMENT MONITOR • DEFINE NODES, and then follow these steps:
  - Step 1: Define an object class for a node (Figure 13.15). Every node is a part of an object class. An object class categorizes a node for management and control purposes. SAP has some predefined object classes into which the custom

node can be categorized. However, you can create your own object class if the need arises. To define a new object class, click on the New Entries button.

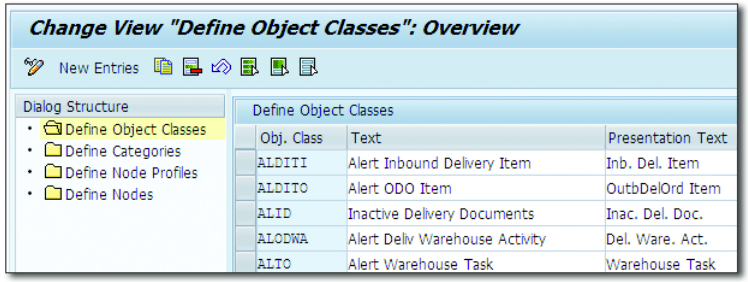


Figure 13.15 Object Class Definition

- Step 2: Define the node category (Figure 13.16). Category is the grouping of nodes based on their similarities. Thus if a user is responsible for all loading activities in the warehouse, whether it's for inbound or outbound, he can create a category called "Loading", which will have subnodes for inbound, outbound, returns, and so on. Click on the New Entries button to create a new category.

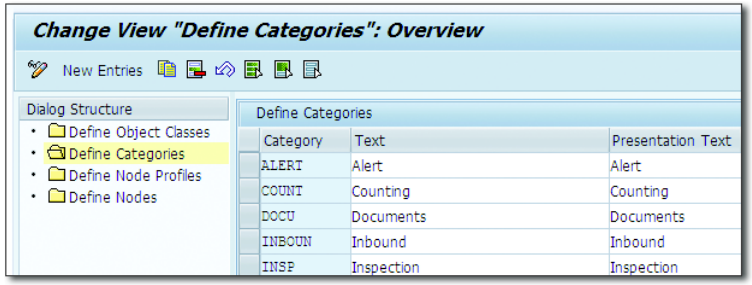


Figure 13.16 Categories Definition

- Step 3: Define the node profile as shown in Figure 13.17. A node profile is used to define parameters such as the structure of a node in list and form view, the object class a node is associated with, and so on. Standard node profiles are already available that can be used for custom nodes. New node profiles can also be created if the standard node profiles don't meet user requirements. A new node profile can be created by clicking on the New Entries button.

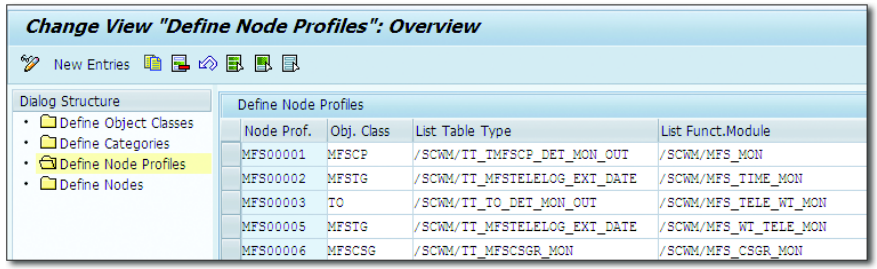


Figure 13.17 Node Profile Definition

- Step 4: Define the node either as a subnode to an existing node or as a completely new node, also called a category node. To make a new node, click on the NEW ENTRIES button. As shown in Figure 13.18, NODE PROF., CATEGORY, and VARIANT details need to be entered. You can also enter in the PRESENTATION TEXT field the name of node that you want to be displayed in the hierarchy tree.

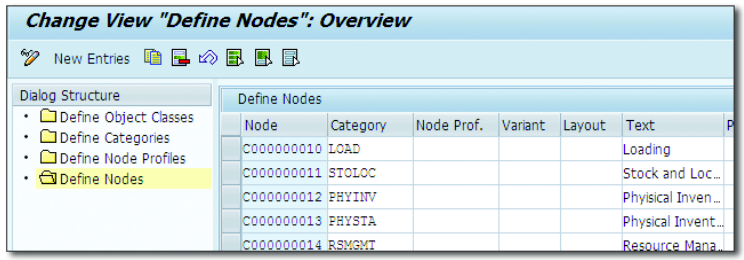


Figure 13.18 Node Definition

13.2 Easy Graphics Framework

The Easy Graphics Framework (EGF) is a tool that can be used for configuration of cockpits. Using EGF, new cockpits can be developed as required by the business. The cockpits are graphic formats that provide users with vital information in an easily viewed format. It enhances text-based SAP solutions and was developed to be implemented in a strategically oriented warehouse. EGF supports new processes, such as working with analytical functions when managing a warehouse using SAP EWM. Multiple users can access the EGF cockpit simultaneously, and authorizations can be set for users to view only information relevant to them. Figure 13.19 illustrates how EGF works.

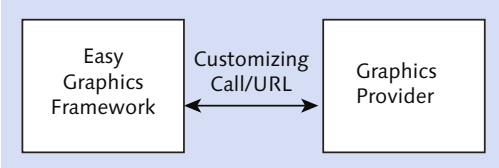


Figure 13.19 Working of Easy Graphics Framework

The EGF receives the data from the service provider. This data is sent to the Internet Graphics Server (IGS). The IGS then returns the relevant graphic and sends the URL for the generated graphic to the EGF. This can be displayed in the cockpit.

One of the important features of EGF is refresh rate, which is the rate at which the EGF graphic gets updated automatically. By default, the refresh rate is one minute. The refresh rate is located at the EGF object level. Refresh rate can also be deactivated. Usually, refresh rate is preferred to be deactivated when the business requires only the trend over a period of time for forecasting and not real-time data.

13.2.1 Warehouse Cockpit

The warehouse cockpit is a standard predefined cockpit provided by SAP that can be used to display key warehouse figures graphically by implementing the EGF objects (Figure 13.20). It can be accessed by via Transaction /SCWM/EGF or by navigating to SAP EWM Easy Access Menu • Extended Warehouse Management • Monitoring • Warehouse Cockpit.

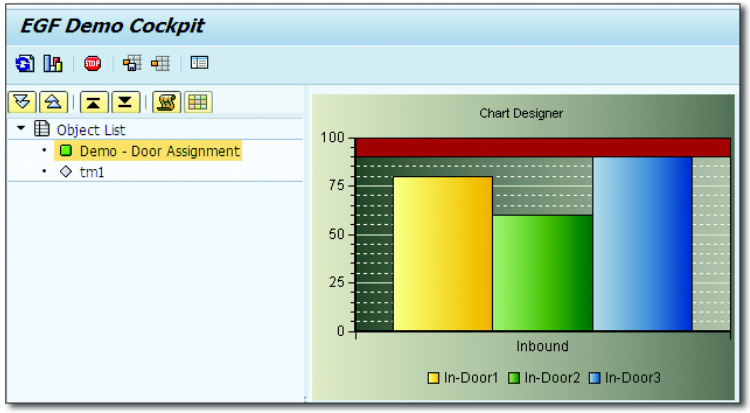


Figure 13.20 Warehouse Assignment for Sample Data

The standard warehouse cockpit contains the following EGF objects:

- **Measurement services**
- **Material flow system (MFS)**
  - Status of communication channel
  - Status of communication layer
  - Status of process for telegram repetition
  - Status of MFS resource
- **Overdue objects**
  - Overdue WTs
  - Overdue WOs
  - Overdue waves
  - WT time series
  - WO time series

The following are the default chart types available in the warehouse cockpit for various objects:

- **Chart types are available for the measurement services:**
  - Bars
  - Stacks
  - Time
  - Speedometer
  - Table
- **Chart types are available for the objects of the MFS:**
  - Traffic light
  - Table
- **Chart types are available for overdue objects:**
  - Bars
  - Stacks
  - Time
  - Table

Although the standard warehouse cockpit has quite a few EGF objects and chart types, the warehouse cockpit can accommodate changes as required by the business. The following modifications can be made to the warehouse cockpit:

- The warehouse cockpit provides a graphical display of some standard measurements such as overdue WTs, overdue WOs, overdue warehouse waves, and so on. However, it also allows creating a new measurement for display in the cockpit. Such a tailored measurement can be created using Transaction /SCWM/TLR_WIZARD or by navigating to SAP EWM IMG • Extended Warehouse Management • Monitoring • Measurement Services • Tailored Measurement Service with Wizard.

  A Tailored Measurement Service (TMS) is based on a Basic Measurement Service (BMS). A BMS is predefined in SAP, and using combinations of available BMSs, a TMS can be defined. BMSs are the building blocks of warehouse key figures. Number of inbound deliveries, number of WTs, and so on are examples of BMS.
- The layout of warehouse cockpit can be customized for a user or a specific set of users. The possible modifications are defining the number of rows and columns in the display grid, modifying the layout of the navigation tree, grouping objects in the navigation tree, and so on.
- The chart types can be modified using the path, SAP EWM IMG • Extended Warehouse Management • Monitoring • Easy Graphics Framework • Define Chart Types. Chart types, once created, are assigned to EGF objects.
- Apart from the standard objects provided by SAP, you can create EGF objects for the warehouse cockpit. For example, you can integrate a web page to the warehouse cockpit.

13.3 Graphical Warehouse Layout

The *graphical warehouse layout* (GWL), as illustrated in Figure 13.21, displays the interior and exterior of the warehouse as a two-dimensional graphic. It shows all the areas of the warehouse such as bins, picking area, staging area, doors, and so on. Further, GWL also graphically shows stocked and empty bins, resources working in the warehouse, location of HUs, and so on. GWL can be accessed via Transaction /SCWM/GWL or via SAP EWM Easy Access • Extended Warehouse

Management • Monitoring • Graphical Warehouse Layout • Display Graphical Warehouse Layout.

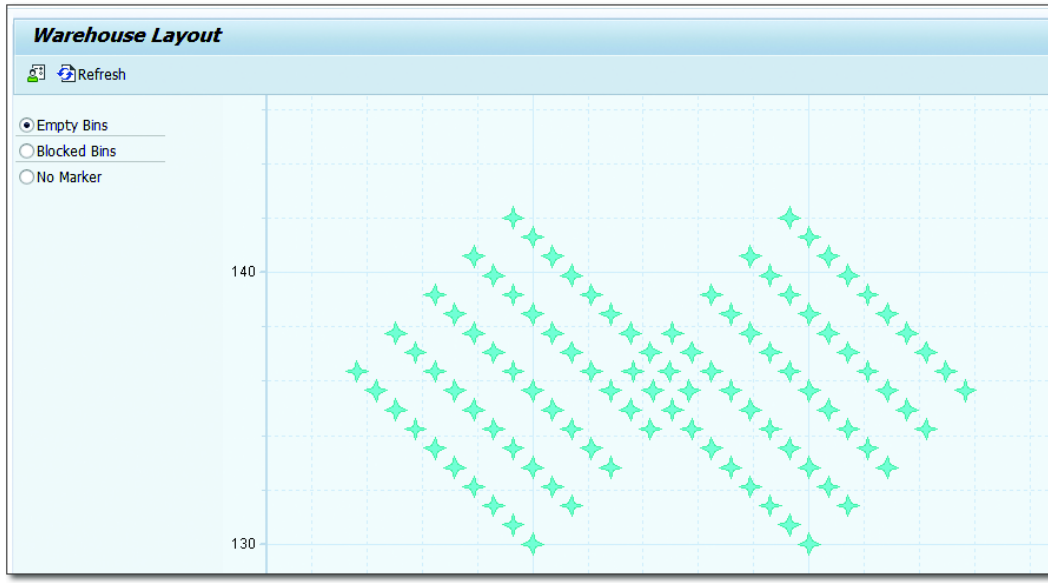


Figure 13.21 Graphical Warehouse Layout

The key features of this tool are the following:

- One of the advantages of GWL is that the graphical display quickly allows you to identify whether data in Customizing is incorrect. For example, the shelf number can be incorrect due to an incorrect entry in Customizing.
- Various warehouse objects, such as bins, walls, racks and so on, can be displayed in different colors for easy identification.
- At the bin level, GWL shows the status of the bin, that is, whether it's empty or stocked. SAP provides four standard statuses: empty, stocked, blocked, and no marker. The bin dimensions are determined from bin type definition, and bin coordinates are fetched from bin master data.
- The GWL is also useful to make travel time calculations using the coordinates of the warehouse. Travel time calculation is useful to determine the nearest bin for a product or to assign the nearest resource to a WT such as loading or unloading.

- If you want to use your own GWL objects such as conveyors, walls, offices, and so on, you have to define these in Customizing for SAP EWM under SAP EWM IMG • Monitoring • Graphical Warehouse Layout • Define GWL Objects, and then you assign them to a GWL object category under SAP EWM IMG • Monitoring • Graphical Warehouse Layout • Define GWL Object Categories.
- The Zoom In and Zoom Out pushbuttons can be used to display either the entire warehouse or individual objects. If the display size doesn't allow you to display the entire warehouse, you can choose the corresponding pushbutton to navigate upwards or to the right, for example.

Note

You can only refresh the display of the GWL for objects that change in the warehouse as part of your daily work, such as HUs or resources. However, if you display a warehouse, create new storage bins, and refresh the display, SAP EWM doesn't show the new storage bins.

13.4 Alerts

SAP provides a standard tool called Alert Monitor for managing alerts. As the name suggests, Alert Monitor is used to monitor whether the application is running without problems. Alerts are generated when the system detects any sort of deviation from standard or defined values so that the users can take corrective action. For this purpose, first, an alert profile needs to be created to specify the conditions when a system must generate and alert. The Alert Monitor window allows you to monitor all the alerts that have occurred and also to navigate directly to the relevant application function to resolve the problem.

Like the previous tools, Alert Monitor also allows customization. In the user-specific display hierarchy, the user can customize the views to be displayed on the initial screen of the Alert Monitor. Also, if you want to view all alerts for individual objects, such as for a particular location product, irrespective of which application the alerts were generated, you can use the Alert Overview by Objects function.

It's worth noting that Alert Monitor is a tool that functions only with SAP APO, SAP Forecasting and Replenishment (SAP F&R), and SAP EWM. Thus, when it's

called from an application, only those alerts will be displayed that are specific to the objects in that application and that are part of a relevant application-specific alert profile.

It isn't always possible for all planners involved to actively monitor alerts in the Alert Monitor. You can use the following notification functions to ensure that each planner is informed of alerts in his area of responsibility:

- Interactive sending of documents for alerts from the Alert Monitor window
- Automatic messaging when alerts occur, or at regular intervals.

Alert notifications can be sent by the following:

- **Interactive sending of notifications**
  In the Alert Monitor window, you can choose the SEND NOTIFICATION function in the context menu of an alert to create a notification and to send it to a recipient of your choice. The system automatically copies the description and the corresponding alert parameters.
- **Automatic sending of notifications**
  This can be achieved in the following ways:
  - Alert Monitor: You can automatically send notifications to system users, to an email address, or to the inbox in the SAP Business Workplace.
  - Alert Notification Engine: The system can use the Alert Notification Engine in SAP Supply Chain Management (SAP SCM) Basis to automatically send alert notifications, using all message channels supported by Alert Management in the SAP Web Application Server.

13.5 Summary

In this chapter, we discussed one of the most important capabilities of SAP EWM—warehouse monitoring. The three monitoring tools—warehouse management monitor, Easy Graphics Framework, and graphical warehouse layout—constitute an extremely user-friendly, customizable functionality that has a huge impact on the functioning of a warehouse. We took a comprehensive look at how these three tools can be customized to meet user requirements. We also discussed the Alert Monitor functionality, which helps in managing exceptions. It also plays

a major role in highlighting and communicating, to the right person, the problems faced in various areas of a warehouse.

Takeaways

- You can customize your own monitor tree as required for your organization by using the drag-and-drop options.
- The message queue tool allows you to manage the failed queues, navigate to qRFC, and access application logs all through the warehouse monitor. You can also set an alert for the overdue items via the alert mechanism.
- Resource allocation can be handled via the warehouse monitor through node resource management. This is an excellent feature, especially for the managers/supervisors in handling warehouse resources.
- Variant node allows you to create your own variant pulling the information with one click rather than choosing on the selection screen.
- With the Easy Graphic Framework (EGF), you can provide real-time data with a graphical display.

Accessing data at every point in your warehouse empowers you to work as effectively as possible. To serve this purpose, radio frequency devices have attracted attention in the supply chain arena because they provide fast, reliable, and seamless communication.

14 Radio Frequency Framework

Mobile data entry by the warehouse operator has become a necessity in today's challenging environment for recording warehouse data on the fly. Use of wireless radio frequency (RF) devices/terminals in a warehouse aids day-to-day operations to increase efficiency. To leverage the benefits of RF technology, SAP Extended Warehouse Management (SAP EWM) works with RF devices for managing warehouse operations. Thus, understanding the radio frequency (RF) framework becomes essential for a successful implementation of SAP EWM.

SAP EWM contains its own set of configurations for implementation of the RF framework. The RF framework helps in decoupling the business logic from the presentation layer of application data on a selected presentation device and supports a wide variety of RF devices. These devices (handheld and others) enable error-free data communication. SAP EWM supports and integrates with GUI-based, character-based, and browser-based RF devices for greater efficiency. The GUI-based system is connected to SAP EWM like a client-dependent PC. Character-based devices are linked to SAP EWM via SAPConsole; RF devices interact with SAPConsole. Browser-based devices are connected to SAP EWM via ITSmobile. The RF framework is user friendly and provides warehouse operators with effortless interaction with the SAP EWM system.

Note

The RF framework by itself is a vast topic. Refer to the RF Cookbook in the SAP Service Marketplace for detailed information. Our attempt here is to highlight all the important aspects of the RF framework and to provide a basic understanding of how it works with SAP EWM.

The RF framework provides better flexibility to meet customer needs. It supports bar codes, and the display profile enables you to perform customer-specific adjustments, and define different device sizes and device types. RF screens can be touch screens, predefined pushbuttons, or keyboard operated. These and many more such features make the RF framework highly flexible and adaptable to any warehouse environment.

14.1 Basic Settings

Before we discuss the navigation and processing using RF, let's discuss the basic settings related to the RF framework in SAP EWM.

14.1.1 Logical Transactions

Similar to the SAP ERP system, where Transaction LM00 is the starting point for the RF menu, in SAP EWM Easy Access, Transaction /SCWM/RFUI is the starting point. From this point, you call every logical transaction in SAP EWM. Logical transactions are actions defined within the modules where actions are performed from beginning to end. Logical transactions contain various screen changes within the RF menu, as well as business transaction processing and posting. Logical transactions can't be processed directly from SAP Easy Access or from a transaction equivalent to Transaction SE93.

In simple terms, a logical transaction is a complete process that you perform via the RF user interface (UI). Parts of the process include loading, unloading, and so on. The user logs in to the RF UI using Transaction /SCWM/RFUI and selects the relevant process from the initial menu path. There is a logical transaction assigned to each process, which is a combination of steps, screens, function codes, and function modules (logic part) required to complete that process. A logical transaction can also be called using method `SCWM/CL_RF_BLL_SRVC => START_LTRANS` (e.g., from another logical transaction).

Table 14.1 lists the various processes or activities performed in the warehouse and their acronyms.

ACRONYM	PROCESS
AH	Ad hoc movements
IN	Inquiries
IV	Physical inventory
PA	Packing
PI	Picking
PT	Putaway
QM	Quality management
RF	RF framework
RS	Resource management
SH	Shipping/loading
SP	Spreading
UL	Unloading
WK	Work process independent

Table 14.1 Various Processes

You can define steps in a logical transaction as shown in Figure 14.1 via SAP EWM IMG menu, Extended Warehouse Management • Mobile Data Entry • Radio Frequency (RF) Framework • Define Steps in Logical Transactions.

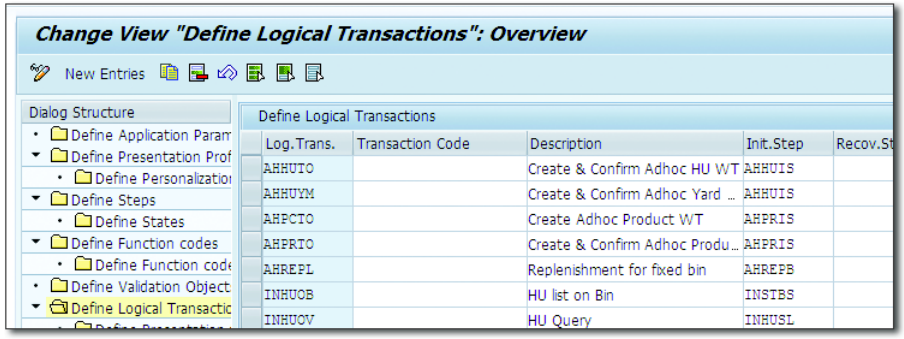


Figure 14.1 Define Logical Transaction

Define Application Parameter

Application parameters are used for the assignment of a structure or table type to change the defined parameters in the application function modules for business data processing.

Define Presentation Profile

The presentation profile, along with the personalization profile in RF, is used to support different menu structures for use within the warehouse. The default presentation profile for the standard transaction is ****, which is assigned to the application.

Define Personalization Profile

The personalization profile is used in conjunction with the presentation profile. The personalization profile supports different user groups within the warehouse for different business processes. For example, different business units might have a different set of transactions within RF. In such situations, you might want to provide access to only relevant transactions under one combination of the presentation and personalization profile. For such cases, you can define different profiles for different business units within the organization. For example, a warehouse may have different units that serve its various divisions such as retail, trade, wholesale, vending business, and so on. In that case, you might want to design a different menu for each division to provide an appropriate menu structure. The personalization profile for standard transaction is **.

Define Steps

Steps are a series of actions to be performed by the user or system to complete a process. Steps can be executed in the foreground or background. For foreground mode, there will be a screen assigned that is a physical representation of data to the user. In background mode, you can combine multiple steps to perform an activity. While defining a logical transaction, you need to mention the initial step from where the logical transaction will start or the starting point of the logical transaction. You can't define a logical transaction without a step; that is, there should be at least one step defined for each logical transaction.

Define Function Code Catalog

For ease of use, RF devices carry pushbuttons. These buttons are mapped in the screens and configured in the logical transaction where, to define actions, a user can perform, for example, ENTER, SAVE, BACK, UNLOAD, PUTAWAY, and so on. Each pushbutton has a function code defined for it. This function code executes the action when a user clicks the button. There can be multiple buttons on a screen, so multiple function codes are defined for one step.

Predefined Function Codes in the RF Framework

SAP delivers a few essential predefined function codes for a standard warehouse as listed in Table 14.2.

Function Code	Description of the Triggered Function
INIT	Initiates the logical transaction. Defining an entry for initial step and function code INIT in table /SCWM/TSTEP_FLOW represents the process before output (PBO) for the first dynpro. If no entry is defined, the initial step is displayed in the foreground.
CLEAR	Clears actual input field with the cursor in it. Clicking CLEAR twice without changing the cursor's position clears all input fields, but this behavior can be customized in the FLG_CLEAR_ALL field in table /SCWM/TPRDV_CAT. In the standard system, the feature is switched on. With CLEAR, the flow logic doesn't return from the screen. This means that CLEAR doesn't trigger a step flow.
BACK	Navigates flow logic to the previous foreground step. If you've defined some PBO steps in table /SCWM/TSTEP_FLOW, such as the INIT step, these PBO steps aren't processed again.
ENTER	Defines or sets the next step to be performed.
LIST	Displays a screen presenting a list of possible entries of the current input field. Corresponds to a list box display.
UPDBCK	Updates data in a stack and navigates back to the previous foreground step. This is required if you need to perform some steps in addition to the main operation step, for example, exception handling to determine a new storage bin that changes the data of the main operation. If you leave the exception with UPDBCK, the stack data is updated with the new data.

Table 14.2 Predefined Function Codes

Function Code	Description of the Triggered Function
NEXTSC	Moves to next screen when a screen is split.
BUILD_MENU	Used in the standard service step MENU.
PGUP	Used for automatic page up implementation.
PGDN	Used for automatic page down implementation.
YES	Used in the standard service step MESSAGE/QUERY.
NO	Used in the standard service step MESSAGE/QUERY.
MORE	Used for navigation for grouped pushbuttons. The next push-button group is displayed using MORE. From the last group, you change to the first group.
FULLMS	Displays error message on a separate screen. Used to see the full text of an error message if the bottom line isn't sufficient.
UNKNOW	Used internally to handle unmapped function codes coming from the screen without definition in table /SCWM/TSTEP_FLOW.
UPDPST	Used for light synchronous posting.
CLSEMS	Clears message line and displays screen in usual way.
CMPTRS	Ends a logical transaction. This function code must be set at the end of each logical transaction via method SET_FCODE of class /SCWM/CL_RF_BLL_SRVC to continue in the defined way.

Table 14.2 Predefined Function Codes (Cont.)

Define Validation Objects

Validation objects represent the application object (e.g., product, handling unit [HU], bin, etc.) that must be validated or verified via an RF transaction. This enables the user to evade any incorrect processing while scanning for the warehouse operation. For example, if you want to ensure that the correct door has been used while loading the pallet, you can enable this option to scan the door bin so that the user doesn't misplace the pallet in some other door while loading it to the transportation unit.

Define Presentation Texts

Presentation text is for defining the text for objects to make them understandable. It's the text for processes or menu items. By reading this text, the user can

understand what process he is going to do via this menu item. For example, the presentation text for menu item 02 DECONSOLIDATION is 02 Deconsolidation.

Define Logical Transaction Step Flow

The step flows (Figure 14.2) are used for determining the business process flow when moving from one step to the other based on the process requirement. It's advisable to use only one function module (FM) for the process before output (PBO) and one FM for the process after input (PAI). By doing this, you can make customization easier.

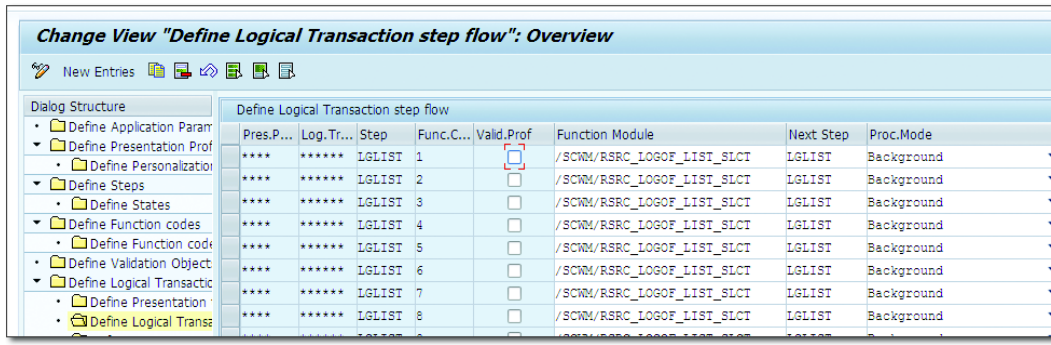


Figure 14.2 Logical Transaction Step Flow

Define Inter-Transaction Flow

This configuration piece helps in navigating to different screen after the completion of the logical transaction. There are five different options for default navigation (DEF.NAVIG.), as shown in Figure 14.3:

- USER CHOICE
- MAIN MENU
- LAST MENU
- SAME TRANSACTION
- LOG OFF RF USER FROM SAP SYSTEM

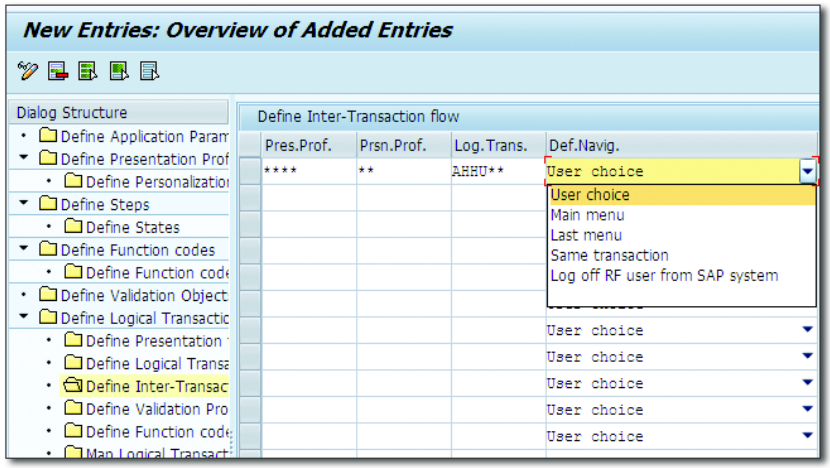


Figure 14.3 Define Inter-Transaction Flow

Define Validation Profile

In the validation profile, you define the fields for which you need to validate the values (e.g., HANDLING UNIT, MATERIAL, BIN, etc.). The validation profile is specific to the step, and the field should be defined on the screen associated with that step with the same structure used in defining the fields on screen.

Define Function Code Profile

Function code profiles are used to define the function keys available on the screen. You can disable the function code, if required. Standard function codes need to be defined if you want to use them (e.g., BACK, CLEAR, etc.). Table 14.3 shows the function codes used in the standard SAP EWM system.

Function Code	Function Key	Shortcut	Action
NEXT	F4	04	Jump to next screen.
MORE	F5	05	Display next pushbutton sequence.
CLEAR	F6	06	Clear input field.
BACK	F7		Return to previous screen without saving.
UPDBCK	F7		Return to previous screen with saving.

Table 14.3 Standard Function Codes with Shortcuts and Function Keys

Function Code	Function Key	Shortcut	Action
LIST	F8	08	Display possible option list.
FULLMS	F9	09	Display message on separate screen.
ENT	Enter		Use default navigation.

Table 14.3 Standard Function Codes with Shortcuts and Function Keys (Cont.)

Map Logical Transaction Step to Subscreen

As explained earlier, a step defines the flow of a process sequence. A step in the foreground is a screen (physical display), which is associated with the step to display the values carried forward from the last step or the result of the action performed in the last step with the provided values. You can define it in configuration via Define Steps in Logical Transactions • Define Logical Transactions • Map Logical Transactions to Screen (see Figure 14.4).

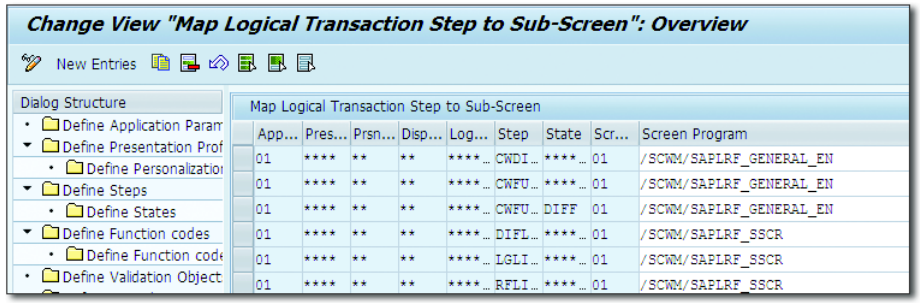


Figure 14.4 Mapping Logical Transaction Step to Subscreen

14.1.2 RF Menu and Screen Manager

You can create, modify, and delete the RF menu via the Menu Manager. Menu Manager can be accessed in SAP EWM IMG using the path, Extended Warehouse Management • Mobile Data Entry • Radio Frequency (RF) Framework • RF Menu Manager. As shown in Figure 14.5, the Menu Manager screen is configured against the key combinations of Application , Presentation Profile, and Personal.Profile, and Object Size. By copying an existing menu hierarchy, you can create your own menu with custom presentation texts and desired submenus.

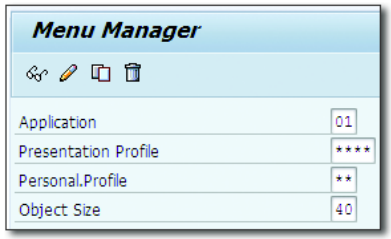


Figure 14.5 Menu Manager Selection Screen

After you have the logical transaction "building blocks" defined, it's easy to configure the desired Menu Manager. The MENU HIERARCHY shown on the right side of Figure 14.6 would be displayed in your RF menu. Using drag-and-drop features, you can choose whether the object has to be on the same level or a lower level (Figure 14.7). In this way, you can design the RF menu hierarchy for the desired presentation profile and personal profile. Thus, this tool helps the user manage the RF menu catalog.

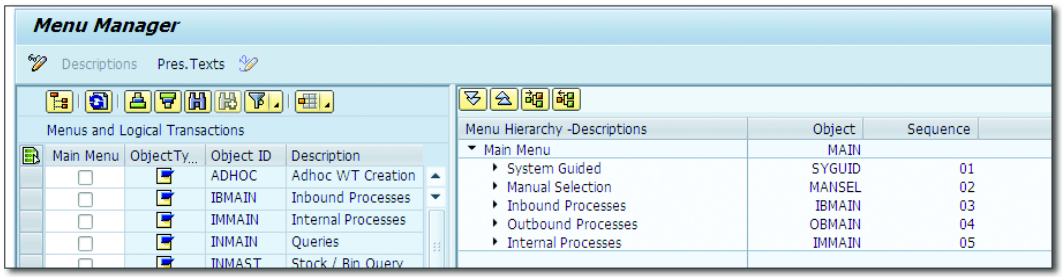


Figure 14.6 Menu Manager

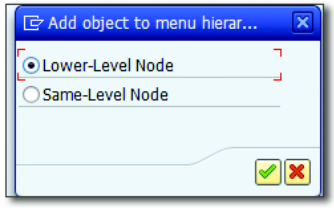


Figure 14.7 Menu Hierarchy

The SCREEN MANAGER (Figure 14.8) screen permits you to customize the appearance of the RF presentation screen. It aids you in defining the attributes that are consistent with the presentation device. You can access the SCREEN MANAGER

screen via SAP EWM IMG menu, by choosing Extended Warehouse Management • Mobile Data Entry • Radio Frequency (RF) Framework • RF Screen Manager.

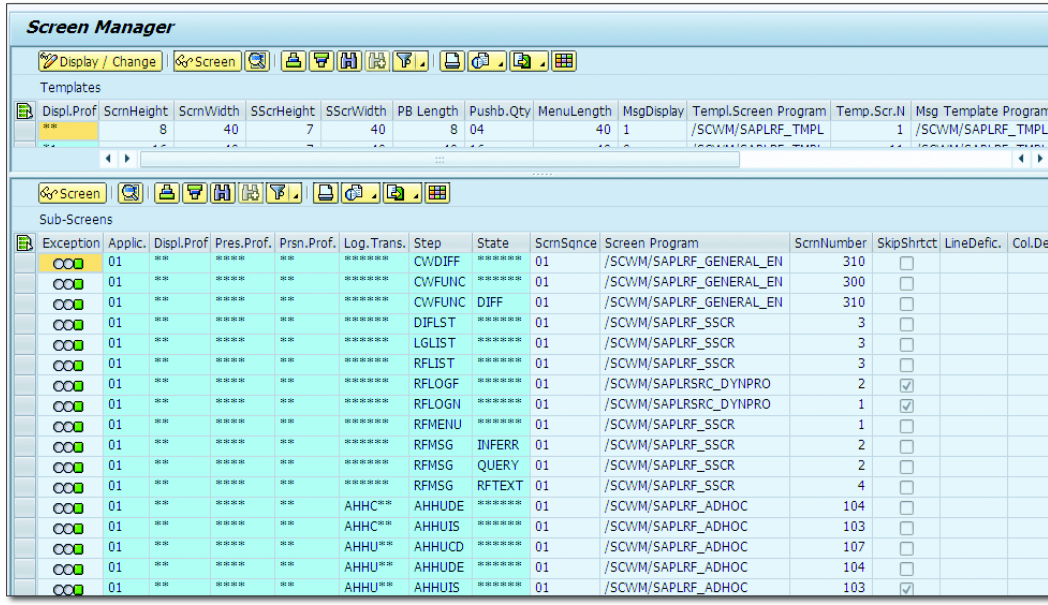


Figure 14.8 Screen Manager

With this Customizing feature, you can define the screen size; screen attributes, such as number of pushbuttons, text length of pushbuttons, and message templates; screen programs; and screen numbers.

14.1.3 Verification Control

Verification control enables you to verify whether the operators are scanning the right object during processing. For example, if the HU is to be verified to ensure the warehouse operator is picking the correct HU, this verification control ensures the right HU is scanned; otherwise, it alerts the user for the correct HU picking. Here you can maintain the warehouse-specific verification profile and its determination. If the verification profile is maintained, the system gives priority to it rather than to any defined verification field in the RF transaction. The verification field can't be activated if it's not supported for a particular screen. You can do this configuration in SAP EWM IMG via menu path, Extended Warehouse

Management • Mobile Data Entry • Verification Control • Define Warehouse-Specific Verification.

You can define the Warehouse-Specific Verification Determination and Warehouse-Specific Verification Determination Sequence in the same IMG node (Figure 14.9). You can define the determination against the key combination of warehouse, warehouse process type, process category, activity, and activity area. You can also control the sequence determination to be either of four combinations, that is, process type, process category, activity, and activity area.

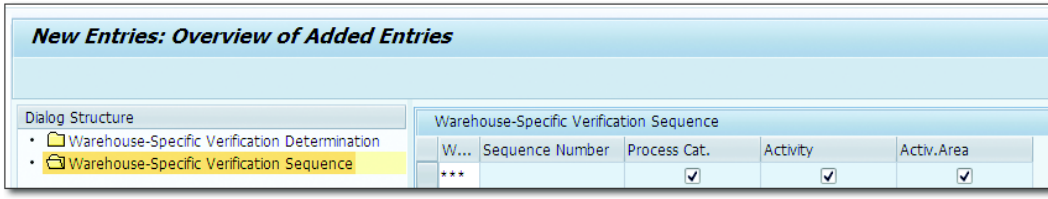


Figure 14.9 Warehouse-Specific Verification Sequence

14.1.4 Assign Presentation Profile to Warehouse

In this definition, you assign the presentation profile to the warehouse number (Figure 14.10). SAP delivers default profile ****; you can use the default or define per the needs of your business.

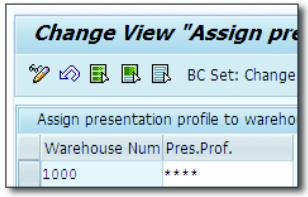


Figure 14.10 Assignment of Presentation Profile to Warehouse

Access this in SAP EWM IMG via menu path, Extended Warehouse Management • Mobile Data Entry • Assign Presentation Profile to Warehouse.

14.1.5 RF Function Keys

Here you can define the function keys for the standard function (Figure 14.11). When you use the Split Screen Wizard (the Split Screen Wizard guides you

through the steps to be carried out for splitting the RF screen into several screens), it inserts these function codes for proper navigation between the screens.

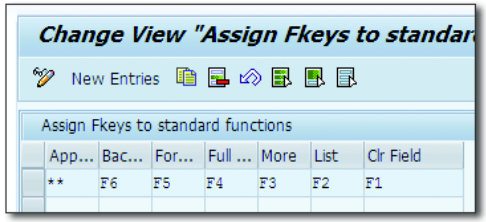


Figure 14.11 Assignment of Function Keys to Standard Functions

14.2 RF Navigation

After the RF framework is designed and configured, you can check the RF menu access for various business processes. Each menu has its hierarchy based on business needs and is configured accordingly. There are three different possible ways to navigate to the menu. Let us have a look at them in the following subsections.

14.2.1 Standard Navigation

Standard navigation allows you to choose from among the menu items configured in the RF menu (Figure 14.12). The RF menu is divided into menu items and menu fields.

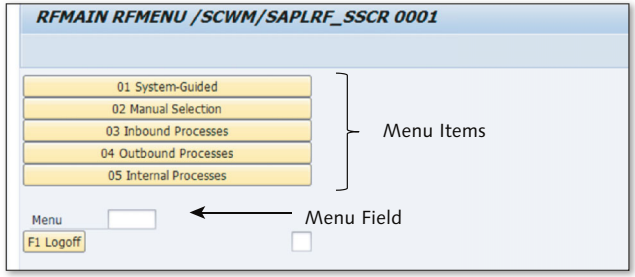


Figure 14.12 RF Menu

The basic screen layout is shown in Figure 14.13.

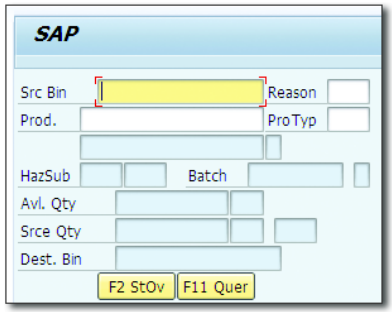


Figure 14.13 Basic Screen Layout

From the RF menu, you can navigate to the desired process and its associated menu items. For example, if you wanted to navigate to INBOUND PUTAWAY, choose menu item 03 INBOUND PROCESSES.

Upon choosing 03 INBOUND PROCESSES, you are taken to the screen (Figure 14.14) where you see the options for 01 UNLOADING, 02 DECONSOLIDATION, 03 PUTAWAY, and 04 RECEIVING OF HANDLING UNITS. From this menu item, you can choose 03 PUTAWAY if you wanted to do the putaway of pallets.

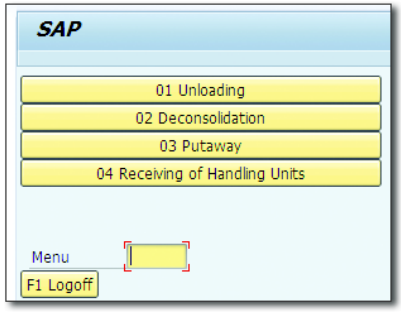


Figure 14.14 03 Inbound Process

14.2.2 Direct Navigation

You can access the required menu by entering the number of the menu item in the MENU field. For example, when you want to access internal processes enter "05" in the MENU field (Figure 14.15), and press Enter.

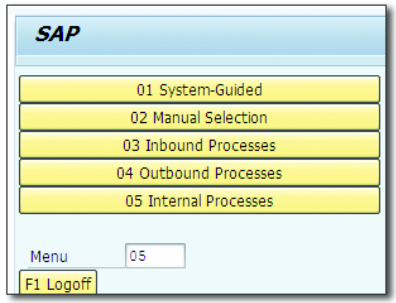


Figure 14.15 05 Internal Processes

14.2.3 Virtual Navigation

In certain cases, due to screen size constraints, you won't be able to see or display all the menu items in the RF framework. In such situations, you can do virtual navigation between the menus. For example, to do a bin query, you can navigate to bin query by entering "5321" in the MENU field and pressing Enter (Figure 14.16).

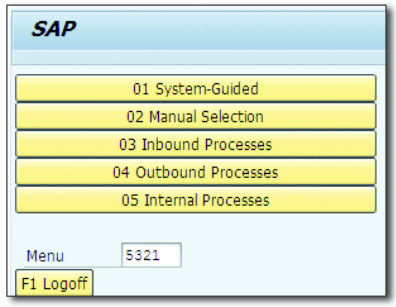


Figure 14.16 Entering "5321" for Bin Querry

On pressing Enter, it takes you directly to the bin query shown in Figure 14.17.

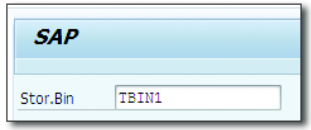


Figure 14.17 Bin Query

14.3 Processing Using RF

You can process all functionality of putaway and stock removal activities via RF. The standard RF menu delivers the following functionality; however, you can include/exclude the functions per your needs:

- **The goods receipt process:**
  - Unloading
  - Deconsolidation
  - Putaway
  - Receipt of HUs
  - Receipts of HUs from production
  - Confirmation correction
- **The goods issue process:**
  - Picking
  - Packing
  - Loading
  - Consumption for production
- **The internal warehouse processes:**
  - Physical inventory
  - Ad hoc movement
  - Yard movements
  - Queries
  - Resource management
  - HU differences
- **The transit warehouse processes:**
  - Receipt of HU
  - Unloading of HU containers
  - Loading of HU containers
  - Loading of transportation unit
  - Floor check
  - HU maintenance

14.4 SAP Solutions for Auto-ID and Item Serialization

SAP solutions for auto-ID and item serialization enable the use of radio frequency identification (RFID) and other means of automatic identification such as bar codes to provide accurate, real-time information about items as they move through your supply chain and to automate your business processes. SAP solutions for RFID consist of the following offerings:

- **SAP Auto-ID Infrastructure (AII)**
  AII is a flexible and customizable infrastructure that integrates RFID technology with existing SAP logistics systems. It provides standard content that enables you to automate and RFID-enable basic logistics processes, but it also provides extensible capabilities that allow you to easily adapt the standard content to implement your own customer-specific processes.
- **SAP Auto-ID Enterprise (AIE)**
  You can install multiple local instances of AII and implement an SAP object event repository to collect data centrally from across your enterprise and from your business partners. You can use the repository to query, manage, and monitor your processes centrally.
- **SAP Object Event Repository**
  You can use the SAP Object Event Repository (the repository) to capture, store, and query data about uniquely identified objects centrally in a disparate system landscape. You can automatically capture information about object-level events that occur across your supply chain, from both within your enterprise and from your business partners. You can access the data in the repository, and your business partner can use XML messages to query it. By enabling disparate applications to exchange information about uniquely identified objects, the repository provides visibility and traceability of the objects throughout their respective lifecycles. Furthermore, you can use the repository to monitor business documents related to the objects.
- **SAP Event Management (EM)**
  EM allows you to track and query events across your supply chain and thereby provides or improves visibility within your logistics processes, both in planning and in execution. The flexibility of the application allows you to map, control, and check all required business processes. EM is an optional component in AII processes. If you install the repository, it's also possible to use the standalone functionality of EM.

14.5 Summary

In this chapter, we discussed how the RF framework works, its basic configuration, logical transaction building blocks and their importance. We also discussed the RF navigation and processes delivered as part of the standard solution by SAP. You should now be familiar with working with presentation and personalization menus for your RF devices. In the next chapter, we will discuss Labor Management within SAP EWM and its various functionalities.

Takeaways

- Don't confuse RF with RFID; they are different topics.
- Try not to personalize the logical transaction definition and its step to be warehouse-specific so that one set of configurations can cater to all your warehouses. Make it warehouse specific only when necessary.
- Plan to have only one function module for PBO and one FM for PAI to make future modifications and maintenance easier to handle.
- Utilize the RF Screen Manager screen to ensure that the attributes defined for the presentation devices are consistent.
- Utilize the presentation profile and personalization profile to configure the required RF menu for your business needs.

SAP EWM Labor Management offerings include service-oriented planning functions as well as various analytical functions. SAP EWM also offers an interface with the human resources system in SAP ERP for tighter process integration, such as triggering bonus/incentive payouts to employees.

15 Labor Management

Labor management is an extremely important aspect of a warehouse. Efficient use of labor time and the right compensation/reward for work performed are business responsibilities and necessities. Harmonious employer–employee relations are linked to high productivity and minimum staff turnover, and those relations are essential to the effective operation of any enterprise.

The Labor Management (LM) functionality in SAP Extended Warehouse Management (SAP EWM) provides a series of features and tools that help manage workers in an efficient manner. These tools help you plan labor times and resources in your warehouse more effectively in order to make the warehouse more productive. These functions can be used to measure, plan, simulate, and visualize the activities in the warehouse. They help in tracking and reporting employee productivity compared to devised standards in Engineered Labor Standards (ELS) and industry best practices. SAP EWM provides means to calculate, monitor, and compare the hours of productive versus unproductive work performed by each worker. LM also provides an integration with the human resources (HR) system to complete the cycle for an employee.

The LM module in SAP EWM provides the following functions:

- LM-specific master data:
  - Processor
  - Formula and condition
- Defining ELS
- Creating planned and executed workload
- Capturing indirect labor for additional work

- Labor Management node in the warehouse monitor
- Performing operational planning
- Employee performance reporting
- Labor Demand Planning (LDP)

Note

As of SAP EWM 9.1, you can use LDP as part of LM to view a graphical display of planned workload records based on the picking and packing outbound processes. This enables you to plan resources and workloads more efficiently.

15.1 Labor Management Activation

As shown in Figure 15.1 and Figure 15.2, LM can be activated for an entire warehouse or internal process steps and external process steps as relevant for the warehouse. By default, LM isn't activated either at the warehouse level or at the activity level. At first, you need to activate LM for the warehouse, and then LM activation is done at the internal and external process step levels. For activation, go to SAP EWM IMG, and choose Extended Warehouse Management • Labor Management • Activate Labor Management.

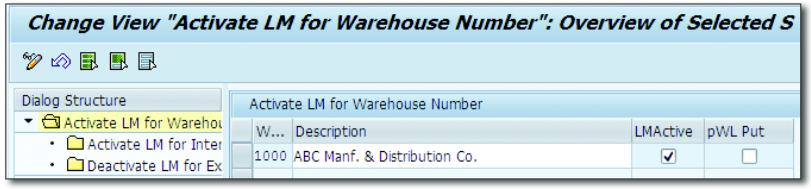


Figure 15.1 Activation of Labor Management for Warehouse Number

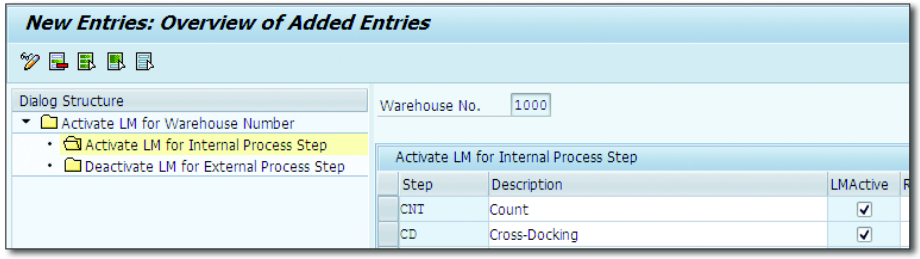


Figure 15.2 Activation of Labor Management for Internal Process Steps

If the business doesn't want to activate LM for all the internal and external steps carried out in the warehouse, you can select the Activate LM for Internal Process Step node.

Note that when you define an external process step, you always assign an internal process step to it. For this setting, go to SAP EWM IMG, and choose Extended Warehouse Management • Labor Management • Define External Process Steps. There can be one or more external process steps for each internal process step. These are the external process steps of a warehouse number for which you want to create a planned and executed workload.

After you activate an internal process step, all the external process steps by default get activated for LM. As shown in Figure 15.3, to deactivate the external process steps, you need to select the Deactivate LM for External Process Step node and make the appropriate selections. Any external process inside an activated internal process step can be explicitly deactivated. But an external process step remains implicitly activated as long it's assigned internal process step is active for LM.

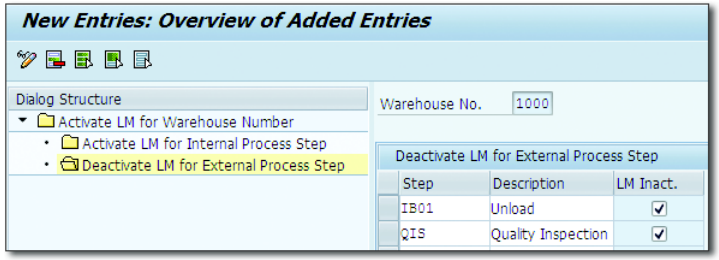


Figure 15.3 Deactivation of an External Process Step inside an Activated Internal Process Step

Let's now look at the master data, which is specifically important from a LM perspective. In addition to the other master data used by SAP EWM, LM requires creation of additional master data, called processor, which helps in tracking the activity performed by this processor. Another important data set includes formulas and conditions, which are required for time calculations for workload planning and reporting purposes.

15.1.1 Employee Master

Processor is the role that maps employees carrying out floor activities of the warehouse to the system and is defined as a business partner person with the processor role. The processor constitutes the responsibilities of an employee who performs warehouse activities and operates a vehicle or other resources.

To create the processor, use Transaction /SCMB/PRR1 (Figure 15.4) or navigate via the SAP EWM Easy Access menu, and choose Extended Warehouse Management • Master Data • Resource Management • Processor • Create Processor.

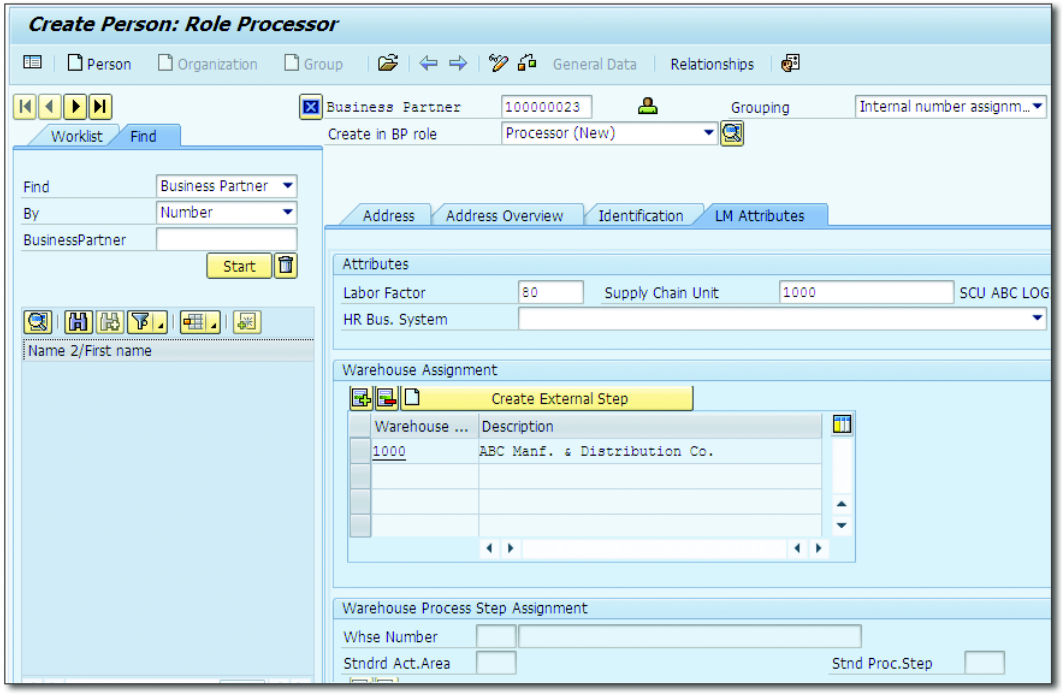


Figure 15.4 Processor Business Partner Creation Screen

Apart from maintaining details such as address, you use the Identification tab to map the personnel number and system user name of the employee to the processor. The LM Attributes tab (Figure 15.5) allows you to create the association of the processor with one or more warehouses where he performs the activities. The Labor Factor field is used to rate the work of a processor, which can be a

standard or an actual value. As shown in Figure 15.5, you can also maintain the external steps, which are performed by the processor in each warehouse.

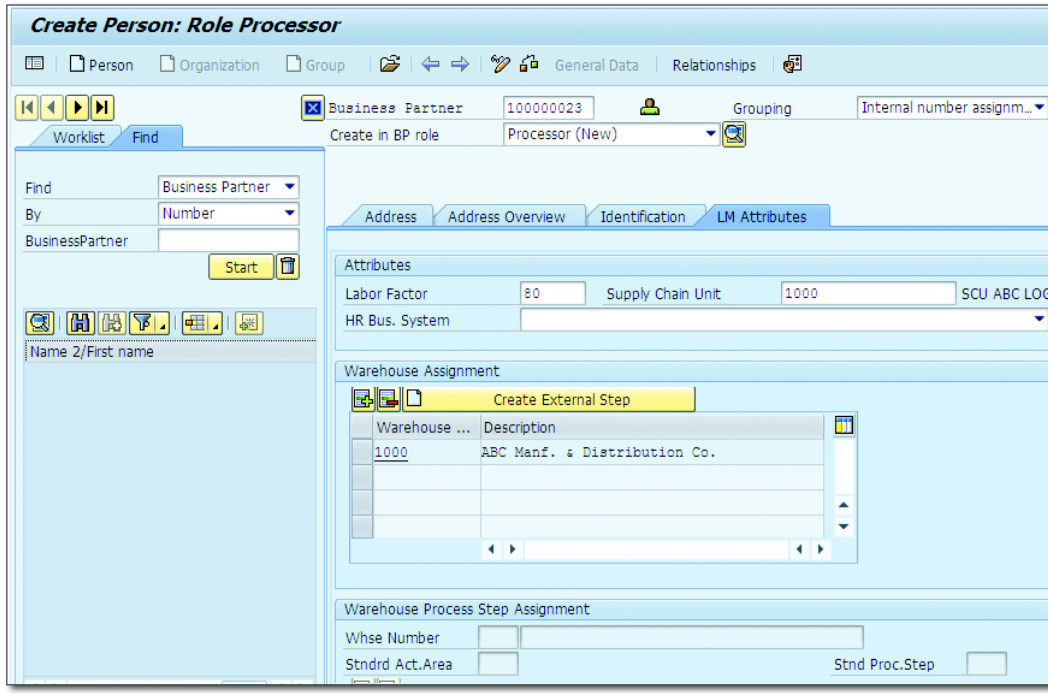


Figure 15.5 Assignment of Warehouse and External Steps to Processor Data

15.1.2 Formulas and Conditions

An activity in a warehouse may consist of one or more work steps. The standard time it takes to perform a work step can be a constant value or a variable. If it's a variable, using a formula helps in the calculation of time. Based on the variation—for example, picking each item individually or picking many items collectively—with which a work step may be performed, the time required will vary. To cater to these situations, a condition-based determination of the formula can be set up. Formulas and conditions are transportable master data.

Formulas and conditions are used in LM for calculating and comparing actual work and planned work, as well as in calculations of workload planning. Conditions are directly realized as algorithmic if-else loops, in a way that if a condition

is met, then standard time is equal to the formula. Formulas are directly used to devise the standard time for each step of work if the condition is met.

Both formulas and conditions need to be activated in LM. Only activated formulas and conditions will be used for planning, preprocessing, and engineering labor standards. They are both connected to the transport system and transported as Customizing objects. Any formula or condition with incorrect syntax is automatically converted into an inactive state.

Formulas

To create a formula, you can use Transaction /SCWM/LM_FE or navigate via the SAP EWM Easy Access menu to Extended Warehouse Management • Settings • Labor Management • Formula Editor.

You define a formula or condition using the following:

- A four-digit number and a description
- Formula or condition type details
- Assigned unit of measure (UoM): weight, volume, length, and time

Complex formulas also can be created by reusing existing formulas as operands; however, recursive formulas aren't allowed by the system. The calculation of standard time by the formula can make use of fixed as well as variable times. For example, the total time required to pick from one activity area could be calculated as the travel time plus a fixed 20 seconds for each unit for packing and arriving at the destination.

On the Formula Display maintenance screen, you can add new fields by clicking on the bottom left pane. You can search for fields and sort them to get to the required logic. And from the bottom right pane, you can select different functions and insert them into the formula for more clarity and meaningfulness.

As shown in Figure 15.6, available fields, such as Weight, Volume, Travel Time, Quantity, and so on, and functions such as concatenate, addition, multiplication, greater than, equals, and so on, can be used while creating formulas.

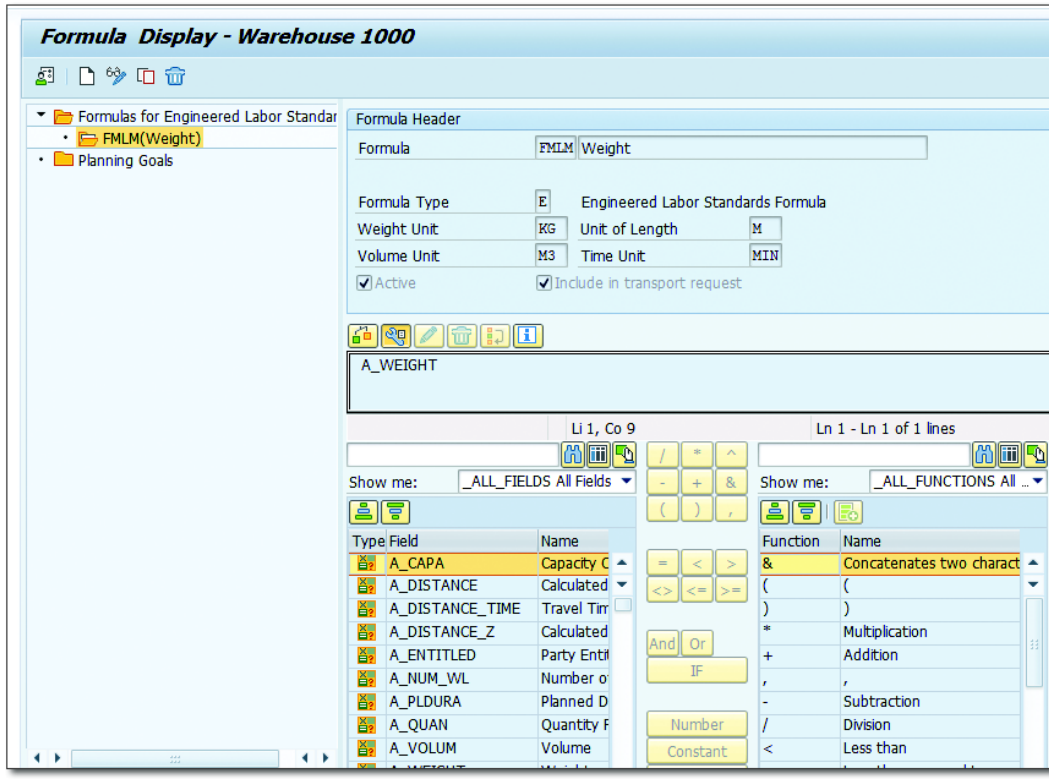


Figure 15.6 Formula Maintenance for Labor Management

Conditions

As shown in Figure 15.7, to create a condition, you can use Transaction /SCWM/LM_CE or navigate via the SAP EWM Easy Access menu, and choose Extended Warehouse Management • Settings • Labor Management • Condition Editor.

The process of creating, maintaining, and transporting the conditions are similar to formulas. Because they are evaluated as conditions, they are bound to have a conditional operator within them.

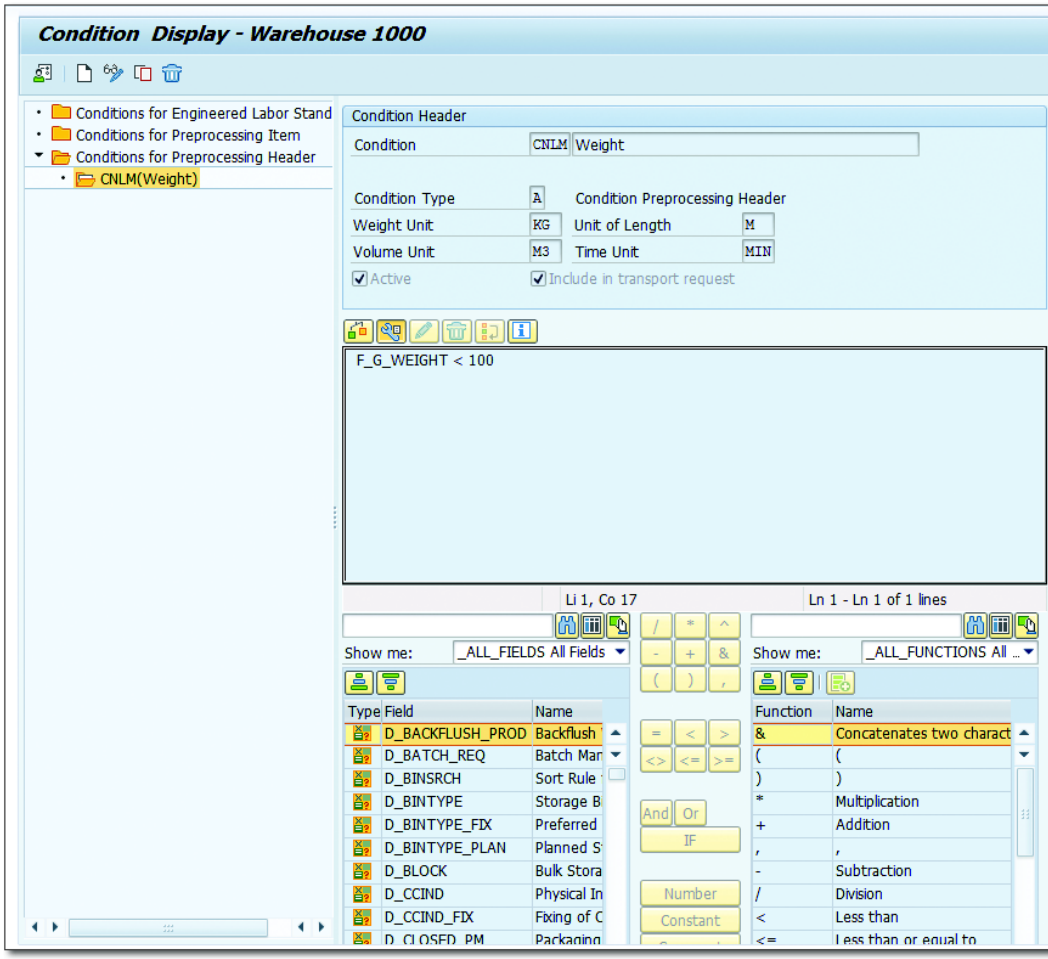


Figure 15.7 Condition Maintenance

15.2 Engineered Labor Standards

Engineered Labor Standards (ELS) are used to determine the standard time to execute an activity in a warehouse. It's calculated by adding standards for all the components/work steps of the activity. When the system generates a *planned* workload, an ELS document is *generated*, and when the system generates an *executed* workload, an ELS document is *confirmed*.

The system saves the labor standards in the planned workload as planned duration and in the executed workload as an adjusted planned duration. To calculate the activity time through ELS, the activity is generally divided into the number of work steps executed sequentially to make a work step procedure. The total time is hence the addition of the planned times of each work step in the work step procedure. Formulas and conditions are used to determine the planned time of a work step. We'll discuss the creation and upload of ELS data to the system in the following sections.

15.2.1 Determining Engineered Labor Standards

SAP EWM allows for the creation of ELS, which can be made up of many steps, each composed of different formulas and conditions to calculate the total labor standard for the activity. To maintain ELS data in the SAP EWM system, you can use Transaction /SCWM/ELS or navigate to SAP EWM IMG, and choose Extended Warehouse Management • Labor Management • Determine Engineered Labor Standards.

You can perform the following steps in this transaction:

- Defining work step (Figure 15.8)
- Defining standard times for work step (Figure 15.9)
- Defining the work step sequence (Figure 15.10)
- Assigning the work step sequence (Figure 15.11)
- Defining ELS directly (Figure 15.12)

Direct ELS definition can be used when there is only one work step and one active assignment. The system generates the required work step and work step sequence automatically. The following figures show the tables you may need to maintain.

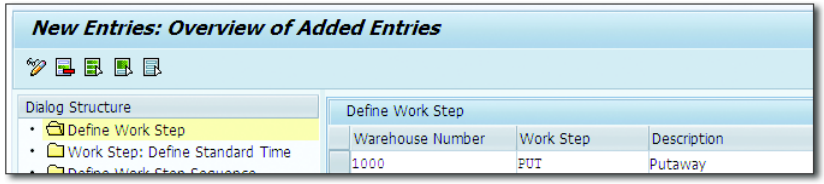


Figure 15.8 Define Work Step

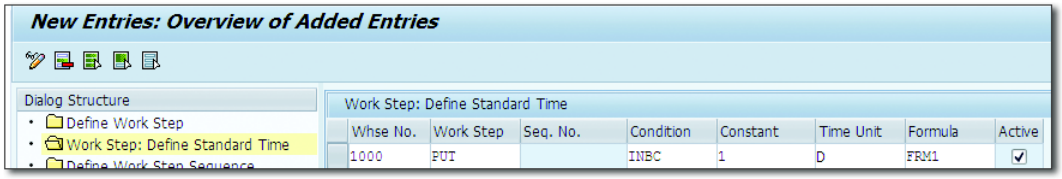


Figure 15.9 Define Standard Time for Each Work Step

You can create standard time for each work step in two ways: by assigning a constant time, or by assigning a formula that has been already created in the system. All the work steps have to be activated to be made part of the work sequence.

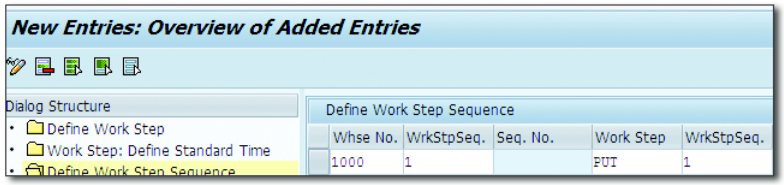


Figure 15.10 Define Work Step Sequence

All the steps under the ELS are followed according to the sequence specified. The planned time for the ELS is the total time each work step takes for execution. The work step sequence is assigned to the following in the assign work step sequence process:

- Warehouse number
- Object type
- External process type
- Activity area

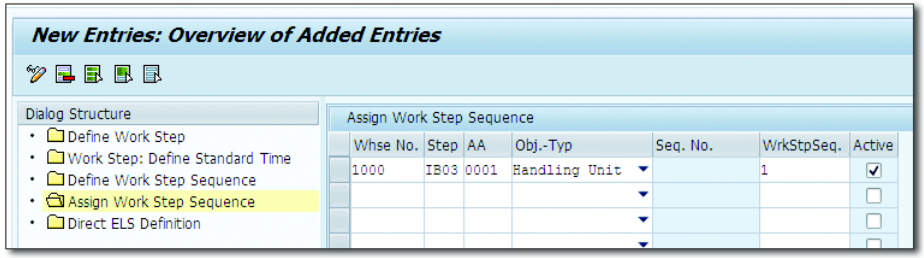


Figure 15.11 Assign Work Step Sequence

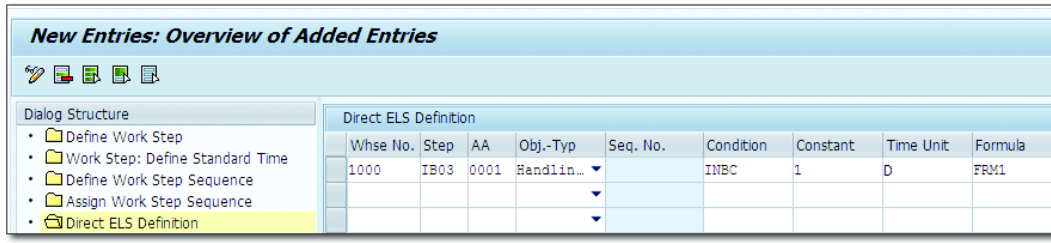


Figure 15.12 Direct ELS Definition

The benefit of using DIRECT ELS DEFINITION is that the work step and work step sequence are created automatically. This may be preferable when only one work step is applicable.

15.2.2 Uploading Engineered Labor Standards

As shown in Figure 15.13, this function is used to upload ELS from external systems. Many times, external agencies create standards that can be used directly in the SAP system without having to create them all over again. External systems also often keep a strict track of changes happening in the organization vis-à-vis the processes and procedures, product-mix, standard labor rates and skills, and so on and correspondingly make ELS to accommodate these changes. So it's better for the system to get those ELS directly from the outside instead of creating them again.

Use Transaction /SCWM/ELS_UPLOAD or navigate to SAP EWM Easy Access menu, and choose EXTENDED WAREHOUSE MANAGEMENT • SETTINGS • LABOR MANAGEMENT • UPLOAD ENGINEERED LABOR STANDARDS. You may use a local comma-separated value file or a file from the application server to upload the data.

As shown in Figure 15.13, various objects can be uploaded using this transaction. SAP EWM uses a connection to the *Legacy System Migration Workbench (LSMW)*. Following are the structures LSMW uses:

- `/SCWM/S_ELS_LSMW_FRML` (formula or condition)
- `/SCWM/S_ELS_LSMW_ST` (work step)
- `/SCWM/S_ELS_LSMW_STE` (labor standards of the work step)
- `/SCWM/S_ELS_LSMW_SEQ` (work step sequence)
- `/SCWM/S_ELS_LSMW_ASS` (assignment of work step sequence)

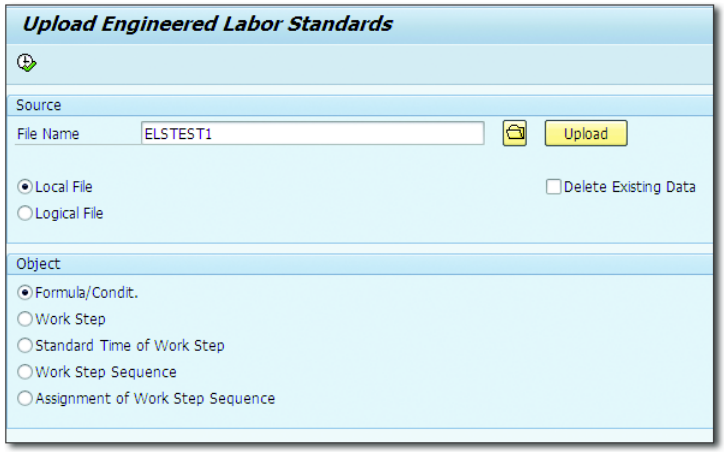


Figure 15.13 Upload Engineered Labor Standards

15.3 Direct Labor Activities

Activities such as picking, packing, counting, performing value-added services (VAS), loading, unloading, making yard movements, and so on are called direct labor activities in the warehouse. Direct labor activities directly contribute to warehouse processes. These activities are different from other activities carried out in the warehouse such as cleaning, other administrative work, and maintenance work, which indirectly support the functioning of the warehouse. Warehouse supervisors may be interested in monitoring these activities from a time perspective because it's important for the efficiency of the warehouse.

Warehouse personnel performing these direct labor activities use radio frequency (RF) devices and SAP Graphical User Interface (SAP GUI) to capture the details of the activity. When the operator performs the activity through a mobile RF-enabled device, the start and end times are automatically captured by the system. But when the operator performs activities using SAP GUI, the operator needs to enter the details in the system to capture the start and end times. If you look at the header data of a warehouse order, you'll find certain fields are important from the LM perspective. Applicable documents will have the LM Active checkbox flagged. The LM Active flag indicates that entering the start and end times is mandatory. Assigning the processor and the execution times are also compulsory; if these aren't assigned, an error will be thrown and data won't be stored.

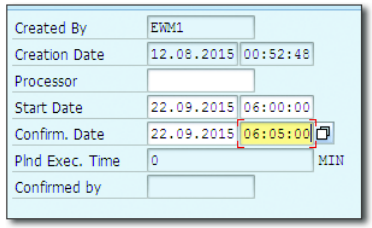


Figure 15.14 Manual Entry for the Start and End Times in the System

After the system captures the start and end time of an activity (Figure 15.14), it generates an executed workload document with a reference document number, which details the captured time stamps for the direct labor. As shown in Figure 15.15, you can view the executed workload documents in the SAP EWM Warehouse Management Monitor screen by using Transaction /SCWM/MON and navigating to Labor Management • Executed Workload.

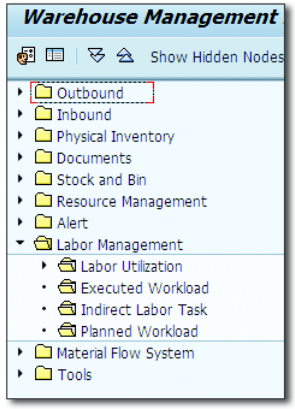


Figure 15.15 Executed Workload Document in Warehouse Management Monitor Screen

Certain movements in the warehouse are required before, during, or after the direct labor activity, such as moving a forklift to pick bin, movement to other bins, and so on. These movements may take a sizeable amount of time for big warehouses or activity areas, and thus they can't be ignored when calculating planned and executed workloads.

So, how does SAP EWM makes these calculations? How are distances calculated? Which objects contain the necessary information for distance calculation? To

facilitate these calculations, there are XYZ coordinates fields that must be maintained as shown in Figure 15.16.

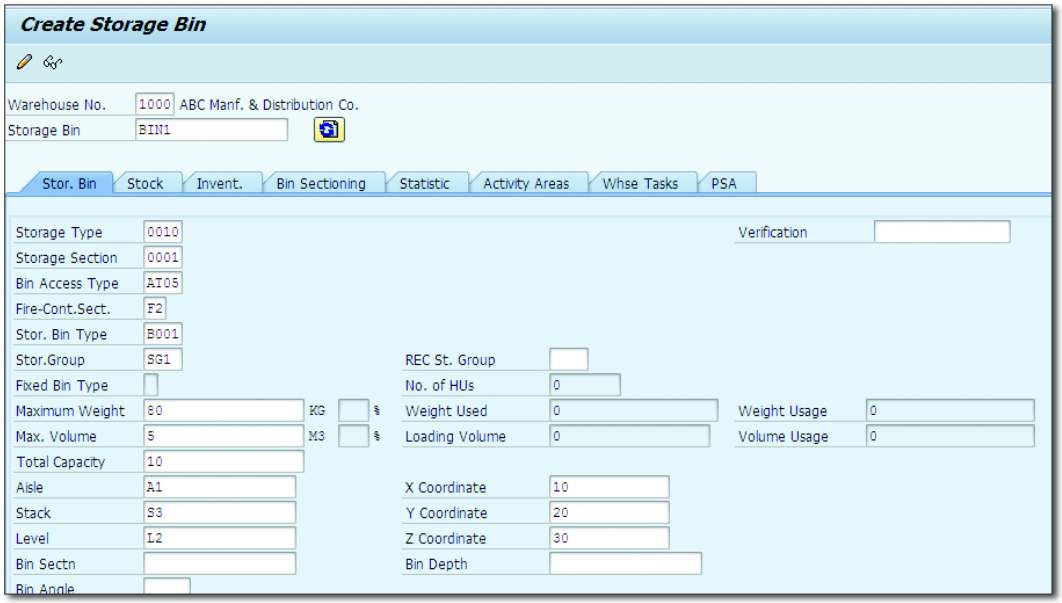


Figure 15.16 XYZ Coordinates on the Bin Master Data

For settings related to travel distance calculation (Figure 15.17), use Transaction /SCWM/TDC_SETUP or navigate to SAP EWM Easy Access Menu, and choose Extended Warehouse Management • Settings • Travel Distance Calculation • Settings for the Travel Distance Calculation.

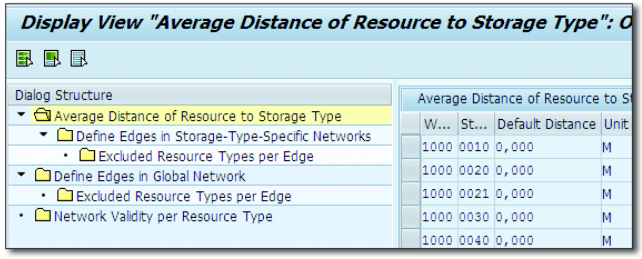


Figure 15.17 Travel Distance Calculation Settings

Here, you can maintain the distance of the resource from storage types. The system can calculate the time by dividing the distance by the speed of the resource.

15.4 Indirect Labor Activities

Indirect labor generally includes administrative and maintenance activities required for the functioning of the warehouse, such as, cleaning, managing workers, creating warehouse documents, inspecting loads, performing forklift maintenance, and so on. It's possible to track and record these indirect activities in SAP EWM via both desktop and mobile transactions. Even for indirect activities, an executed workload document is created in the system, which helps you create performance documents.

15.4.1 Create External Storage Process Steps for Indirect Labor

SAP EWM allows you to create external storage process steps for indirect labor activities (Figure 15.18) by going to SAP EWM IMG and choosing Extended Warehouse Management • Labor Management • Define External Process Steps. Indirect labor external process steps must be linked specifically to the INDL Internal Process Step. The direction of these external steps gets automatically updated to Not Relevant for Process Oriented Storage Control upon saving the data. These process steps are independent of warehouse number, which means they can be used across different warehouses.

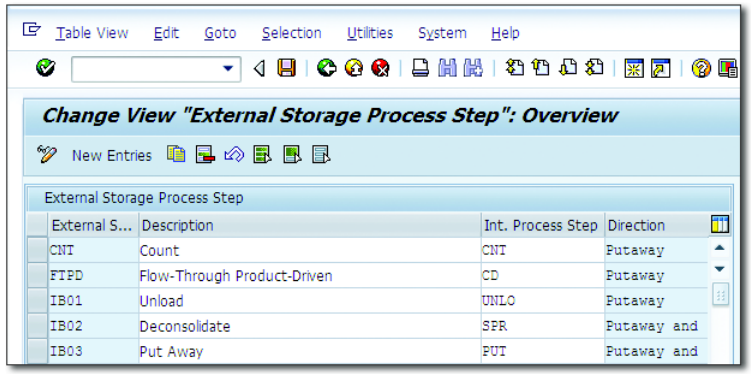


Figure 15.18 External Storage Process Step for Indirect Labor

15.4.2 Capturing Indirect Labor efforts

You can capture indirect labor efforts using both SAP GUI and RF devices. While both achieve the same result, you may decide which option to go with based on how your system is configured.

Using SAP GUI

You can capture the indirect labor using Transaction /SCWM/ILT. Go to SAP EWM Easy Access Menu, and choose Extended Warehouse Management • Labor Management • Maintain Indirect Labor Task. You can search for relevant records using Indirect Task No, Processor, and Assignment Key. After you select the record, use the Set Start Time and Set End Time buttons to capture the start and end time for the activity. The administrator can use the SAP GUI screen to enter indirect tasks of other users.

Using Radio Frequency Devices

You can also record the start and end times of indirect activities via RF-enabled mobile devices. The Set Start Time and Set Stop Time fields are used for capturing the time. Note that by using RF, the operator can enter indirect tasks for his own processor only and not for others. To enter indirect labor tasks through standard RF, use Transaction /SCWM/RFUI, and follow the path, 05 Internal Processes • 08 Labor Management• 01 Indirect Labor Task Reporting (Figure 15.19).

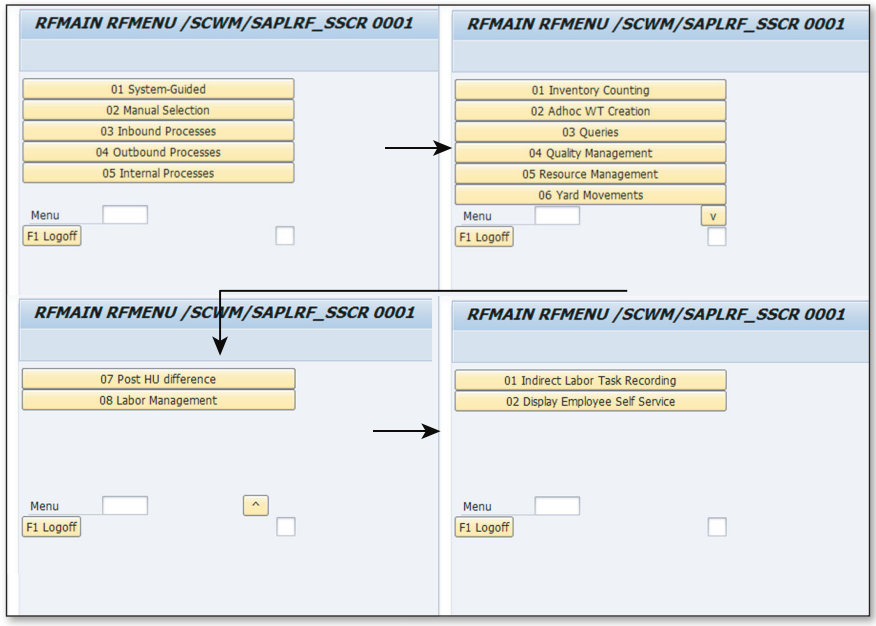


Figure 15.19 Using Radio Frequency Devices in Labor Management

15.5 Planning and Simulation

Consider a situation in which a warehouse manager suddenly realizes that there aren't sufficient workers available to complete the pending warehouse tasks scheduled for the day. This situation may compromise on delivery promises given to customers, as immediate arrangement of sufficient workers might not be possible. Thus, it's clearly important to take a calculation of future workloads of the warehouse, so that sufficient workers can be planned in advance for smooth and timely accomplishment of warehouse activities.

SAP EWM provides the necessary tools to estimate and plan for the future workload of the warehouse via the Load Planning function through calculation of the planned workload. We'll also discuss the concept of preprocessing, in which based on available deliveries (for which warehouse orders aren't yet created), the system helps to decide manpower needed for future.

The first step in this process is setting up workload planning by assigning the planning activity area and then moving towards calculating the workload. To enable the system for this, certain settings must be in place. The appropriate planning activity area has to be assigned to work centers, storage sections, or storage types in the order. If it's not assigned, then the planned workload calculation happens without any planning activity area.

As shown in Figure 15.20, to carry out these settings, navigate to SAP EWM IMG, and choose Extended Warehouse Management • Labor Management • Assign Planning Activity Areas. This setting allows you to assign the planning activity area for storage types, storage sections, and the work center.

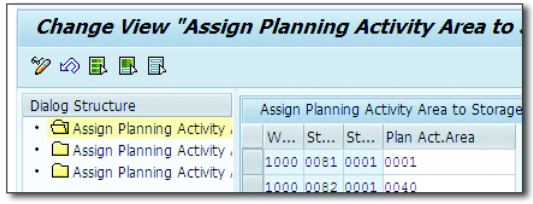


Figure 15.20 Assignment of Planning Activity Area to Storage Section

15.5.1 Workload Planning for Active Documents

To generate the planning workload, use Transaction /SCWM/PL, or navigate to the SAP EWM Easy Access menu, and choose Extended Warehouse Management • Labor Management • Planning • Planning and Simulation.

Appropriate records for planning can be fetched using simple search with external step and activity area as the search criteria. After you select a record from the results in the top pane, you can display or change the formula using the button (Figure 15.21). The Evaluate Planning Formula button is used for planning. Planning for results can be triggered automatically by using the Automatic Planning checkbox in the Advanced Search options.

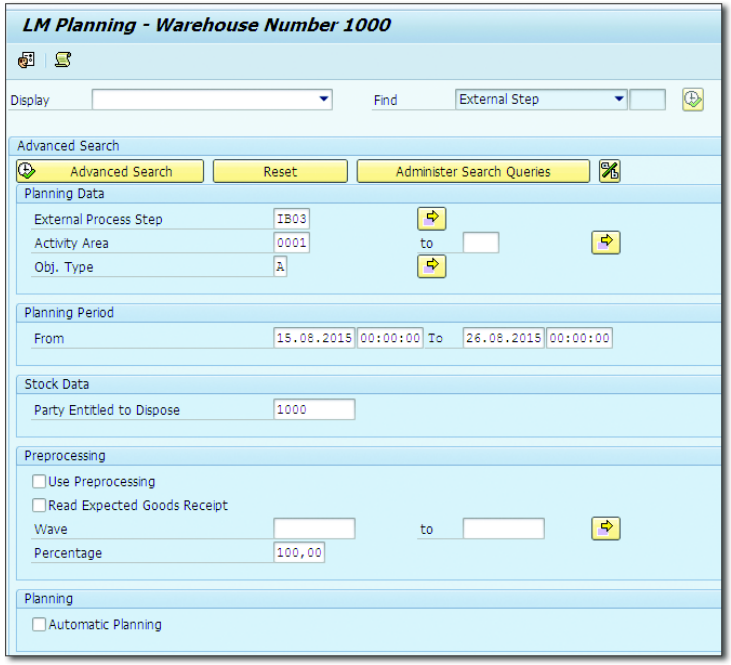


Figure 15.21 Advanced Search Options for Workload Planning

15.5.2 Preprocessing

Planning and simulation, as discussed previously, assume that warehouse orders are already created in the system. But how about planning for deliveries for which warehouse orders haven't been created yet? SAP EWM provides the preprocessing feature for workload planning of inbound and outbound deliveries for

which the warehouse orders aren't yet created. To use this function, select the Use Preprocessing checkbox in the Advanced Search options to trigger the system for evaluation of unprocessed items. The results of preprocessing only affect the planning process and not the actual execution.

To use the preprocessing feature of SAP EWM, assign the Date/Time Type to document categories Inbound Delivery and Outbound Delivery (Figure 15.22) in Customizing. The system then uses these for preprocessing. In the SAP EWM IMG, the navigation path for this setting is Extended Warehouse Management • Labor Management • Define Delivery date/Time for Preprocessing.

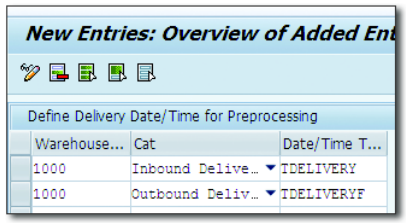


Figure 15.22 Defining Date and Time for Preprocessing

Before you can start preprocessing in LM, you need to configure the Preprocessing Header settings and generate dependent settings for preprocessing (Figure 15.23). To do so, navigate to SAP EWM IMG, and choose Extended Warehouse Management • Labor Management • Set Preprocessing, or use Transaction /SCWM/PPR. This setting can also be done using the assistant wizard, which you can access in the SAP EWM IMG by choosing Extended Warehouse Management • Labor Management • Preprocessing with Assistant.

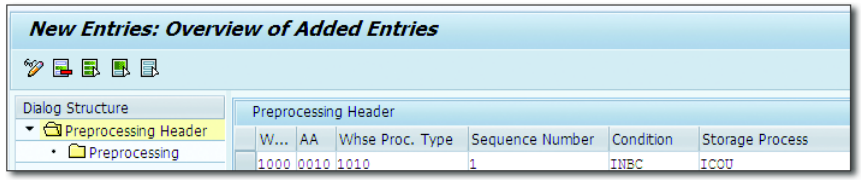


Figure 15.23 Configuration for Preprocessing Header

15.5.3 View Planned Workload Data

After the planned workloads are created (Figure 15.24), the data is saved for future references. The Warehouse Management Monitor screen is used to

view those later. Use Transaction /SCWM/MON, and navigate via node Documents • Planned Workload.

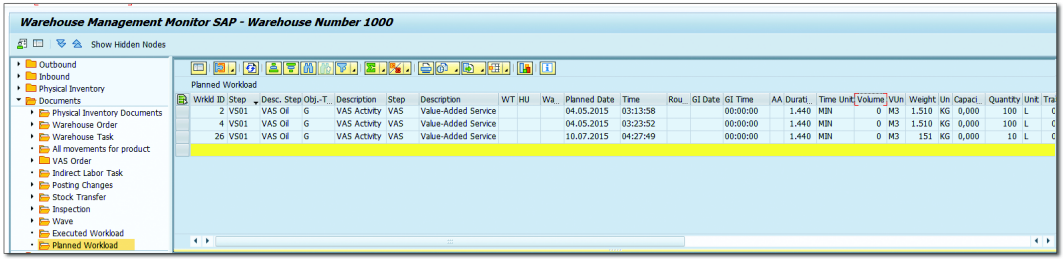


Figure 15.24 Planned Workload in the Warehouse Management Monitor Screen

15.5.4 Simulation

After the warehouse supervisor has the data, such as planned workload for active documents, planned workload from preprocessing of deliveries without warehouse order, list of available processors, and calculated measurement services, he can simulate various expected scenarios by changing the parameters (e.g., number of processors, etc.) to get the total workload in various possible situations. Simulation is done using the same screen (Transaction /SCWM/PL), and the following buttons provide for simulation options:

- Generate Simulation Lines
- Add Processor
- Discard Changes
- Delete Simulation Lines
- Save Result

15.6 Employee Performance

LM is implemented by many companies with a major view on evaluating and rewarding employee performance. SAP EWM gives managers an option to keep track of efficiency and utilization of warehouse workers and their activities by maintaining employee performance documents. Performance documents can be compared with executed workload, and the result can be handed over to HR department for initiating rewards for the workers.

15.6.1 Employee Performance Documents

Employee performance documents can be created by using Transaction /SCWM/EPERF. Navigate to the SAP EWM Easy Access menu, and choose Extended Warehouse Management • Labor Management • Employee Performance • Employee Performance Overview.

Employee performance documents can be created against a particular processor. The search criteria for processor records includes Processor, Group, Team Lead, Personnel Number, User Name, and Performance Document Number. The status of the document can also be seen through the transaction by checking the Perf.Doc.Status field. Once approved by the warehouse supervisor, these documents can be transferred to the HR department.

15.6.2 Transfer Performance Documents to Human Resources

To transfer the approved employee performance documents to SAP HR, use Transaction /SCWM/EPD_TRANSFER or navigate to the SAP EWM Easy Access menu, and choose Extended Warehouse Management • Labor Management • Employee Performance • Send Performance Document. Figure 15.25 shows the search criteria for searching the employee performance document.

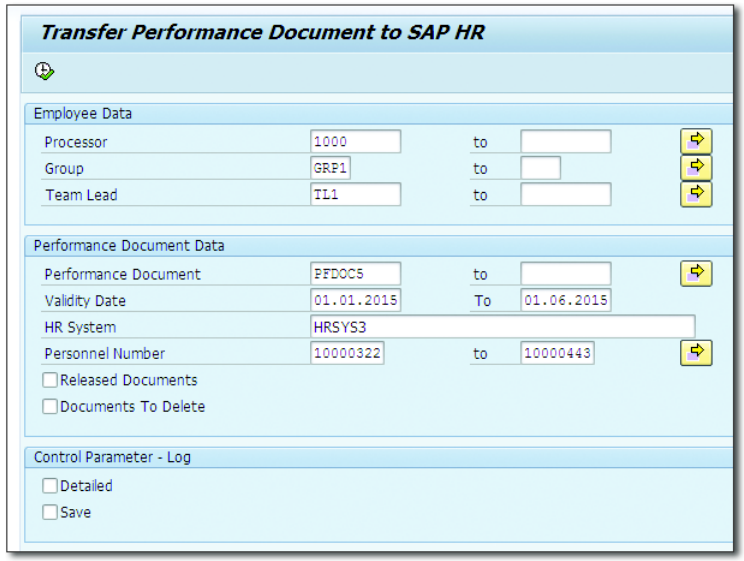


Figure 15.25 Transferring Performance Documents to SAP Human Resources

15.7 Labor Demand Planning

As of SAP EWM 9.1, you can use Labor Demand Planning (LDP) as part of LM to view a graphical display of planned workload records based on the picking and packing outbound processes. This enables you to plan resources and workloads more efficiently. You can also run LDP on a mobile tablet device.

You can use LDP to carry out the following tasks:

- Display planned workload records for a selection based on a given time horizon, activity areas, and external process steps.
- Display details of the selected planned workload records, for example, how the records are distributed to activity areas and external process steps.
- Define views for selecting data relevant to a certain area of responsibility. These predefined views are then used to easily access data relevant for planning, for example, a team of workers. You can define these views by selecting external process steps and activity areas.
- Calculate a planned duration of the planned workload record. The planned duration relevant for the planned workloads for picking and packing can now be calculated based on historical data. This feature is an alternative to using ELS and carrying out Customizing activities. To use this feature, you must have RF enabled for picking and packing.
- Create and store planned workload records for outbound deliveries, based on historical data. If a rough bin determination is enabled in your SAP EWM system, it's used in this process. This feature is an alternative to using LM preprocessing and carrying out Customizing activities. To use this feature, you must have RF enabled for picking and packing.

The following features have been included in LDP in SAP EWM 9.2:

- **Forecasting**
  You can forecast future workload based on historical workload records. The forecast calculation uses an advanced time-series algorithm from the SAP HANA predictive analysis library (PAL).
- **Workload aggregation**
  The system aggregates overdue workloads at the current time slot, that is, the current hour, day, or week depending on the selected time slot size.

- **Personalization**
  All personalization settings for LDP are now stored in the backend. You now also have further personalization options.
- **Warehouse management monitoring**
  Monitoring of planned workload has been enhanced with further selection criteria and fields from the planned start time and the outbound delivery order reference of the workload. You can also monitor historical workload records.

No new enhancements have been made to LM in SAP EWM 9.3

15.8 Summary

We explained the functionalities of the LM module of SAP EWM in this chapter. We talked about the creation of LM resources and the usage of planned and executed workload items. After reading this chapter, you should be capable of implementing your own LM program and also understand the new features released with SAP EWM 9.1 and 9.2 with respect to LM. There is no enhancement to LM in SAP EWM 9.3.

Takeaways

- By default, LM isn't activated either at the warehouse level or at the activity level.
- When you define an external process step, you always assign an internal process step to it.
- In addition to the other master data used by SAP EWM, LM requires creation of additional master data.
- Definition of Engineering Labor Standards (ELS) is influential for the evaluation and subsequent transfer to the HR system for the bonus/incentive payouts.
- The preprocessing functionality enables you to plan well before the vehicles are checked in and provides visibility to the warehouse manager/supervisor and enables planning for the workforce arrangement.

Warehouse management processes alone don't provide significant benefits to the business, unless the processes incorporate quality checks at various levels. SAP EWM completely integrates with the Quality Management (QM) module in SAP ERP to check the products moving in and out of warehouse for their quality compliance as defined in the organization's quality policies and procedures,

16 Quality Management

No warehouses want to hold inventory items that have manufacturing defects, delivery defects, returns defects, supplier defects, and so on. Holding such inventory can cause an inadvertent supply of defective material to the buyer. By integrating warehouse processes of SAP Extended Warehouse Management (SAP EWM) with the Quality Management (QM) processes shown in Figure 16.1, this risk is brought down, and this preventive measure helps in holding only faultless inventory.

Figure 16.1 Components of Quality Management

This chapter covers the mapping of QM processes, from incoming processes to returns inspections, using the Quality Inspection Engine (QIE). QM processes can be either automated as a defined set of policies and procedures in the system for all products movement within the warehouse to check the QM qualifying criteria or can be manually triggered as and when required for quality inspection.

You can perform the following inspections in SAP EWM:

- Goods receipts inspection, such as the following:
  - Inbound delivery inspection (for complete delivery)
  - Inspection of the delivered handling units (HUs)
  - Count of the delivered products
  - Raw material, trading goods, or supplier inbound delivery inspection
  - Delivered products inspection for customer returns
- In-house inspection
- Returns inspection

When it comes to returns processes in QM, SAP Customer Relationship Management (SAP CRM) plays a crucial role. Integration between SAP EWM and SAP CRM goes a long way in giving a holistic view of QM. Realizing the importance of such integration, there is a provision for communication between these two systems. The influencing parameter for QM is defined in SAP CRM, and upon completion of the quality inspection process in SAP EWM, the results are sent back to SAP CRM for further evaluation. Evaluation can trigger further follow-on actions against the stock such as stock transfer, blocking, scrapping, and so on.

16.1 Quality Inspection Engine Architecture

The Quality Inspection Engine (QIE) allows you to integrate the quality inspection processes across various SAP and non-SAP applications. QIE is based on service-oriented architecture, through which it supports quality processes in decentralized warehouse environments such as SAP Supply Chain Management (SAP SCM) or across other application areas. QIE comes as an add-on component and sits on a SAP SCM environment. The SAP ERP system communicates with QIE via a queued remote function call (qRFC), and it's also possible to input data to QIE using SAP Web Application Server.

The consumer system shown in Figure 16.2, (e.g., depicting SAP SCM in SAP EWM) uses the QIE (which is part of SAP SCM) to run all the quality processes. The consumer system can customize, create, and process QM master data; it can also create, process, archive, and print the inspection documents.

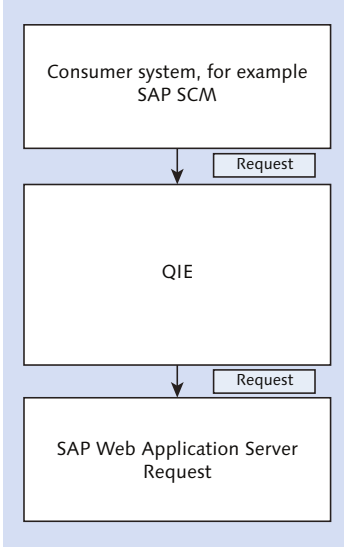


Figure 16.2 Quality Inspection Engine Architecture

16.2 Quality Inspection Engine Data

The consumer system supplies the data to the QIE. The Inspection Object Types (IOTs) in SAP EWM are predefined. These IOTs define the software component, the processes, and the object for which the inspection document has to be created. These IOTs are constructed in QIE from the consumer system. The IOT helps in determining the inspection rules based on the properties defined. The following predefined IOTs are delivered by SAP:

- Preliminary Inspection Inbound Delivery (IOT1)
- Counting Inbound Delivery (IOT2)
- Q-Inspection Returns Delivery (IOT3)
- Q-Inspection Product/Batch Inbound Del. (IOT4)
- Q-Inspection Product/Batch Warehouse-Internal (IOT5)

- Preliminary Inspection Handling Unit (IOT6)

16.3 Customizing Quality Management

Follow these basic configuration steps in SAP EWM to enable the quality inspection process:

1. **Generate the IOT version.**
   The IOT defines the software component, process, and object for which the inspection document is created in QIE. To generate a version, navigate via SAP EWM IMG menu path, Extended Warehouse Management • Cross-Process Settings • Quality Management • Basics • Generate Inspection Object Types Version.

2. **Activate the generated version.**
   You can activate the object type (Figure 16.3) generated in the previous step by navigating to SAP EWM IMG menu path, Extended Warehouse Management • Cross-Process Settings • Quality Management • Basics • Maintain Inspection Object Types Version. You maintain the properties for the activated IOT here. The version and warehouse number are mandatory for most of the objects.

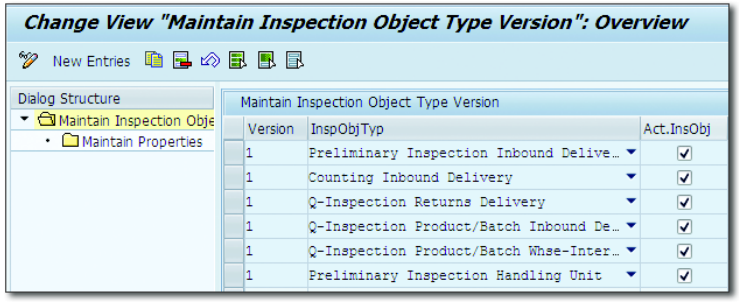


Figure 16.3 Activation of Inspection Object Type

3. **Define the item types.**
   While defining the item type, you define the properties against the software component and the action profile. This is in turn assigned to the parameters in the warehouse-dependent IOT. You define this in SAP EWM IMG via menu

path, Extended Warehouse Management • Cross-Process Settings • Quality Management • Settings for Inspection Rules • Define Item Types.

4. **Activate the IOT at the warehouse.**
   To activate the IOT at the warehouse level in SAP EWM (Figure 16.4), follow the IMG menu path, Extended Warehouse Management • Cross-Process Settings • Quality Management • Basics • Warehouse-Dependent Activation of Inspection Object Type.

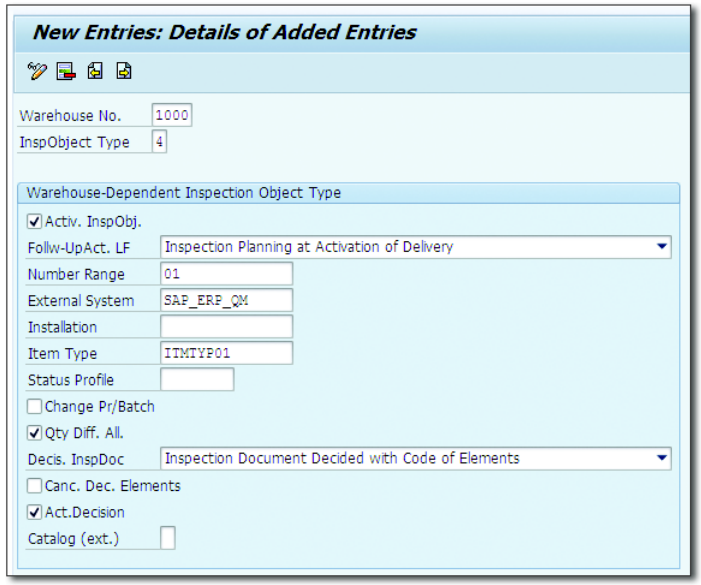


Figure 16.4 Warehouse-Dependent Activation of Inspection Object Type

5. **Define the decision code and follow-up action.**
   To define the decision code and follow-up action in SAP EWM IMG, navigate via menu path, Extended Warehouse Management • Cross-Process Settings • Quality Management • Result • Define Decision Codes and Maintain Follow-Up Action.

6. **Define indexes for QIE.**
   Define the search indexes for inspection documents, samples, and items against the properties. You can navigate to the configuration in SAP EWM IMG via menu path, Extended Warehouse Management • Cross-Process Settings • Quality Management • Basics • Define Indexes for QIE Objects.

7. **Assign RFC destinations.**
   Assign RFC destinations to logical systems via SAP EWM IMG menu path, Extended Warehouse Management • Cross-Process Settings • Quality Management • Basics • Assign RFC Destinations to Logical Systems. This assignment is only used by the QM function for synchronous Business Application Programming Interface (BAPI) calls. If the definition isn't done here, it reads from the standard RFC destination.
8. **Specify settings for inspection rules.**
   You can specify the required setting for inspection rules based on the needs of your QM process in SAP EWM IMG under menu path, Extended Warehouse Management • Cross-Process Settings • Quality Management • Settings for Inspection Rules.

As is true for integration between multiple SAP systems, some settings have to be carried out in SAP ERP as well:

1. Maintain the catalogs (3) for usage decisions in SAP ERP IMG via menu path, Quality Management • Quality Inspection • Inspection Lot Completion • Maintain Catalogs for Usage Decisions.
2. Maintain inspection types in SAP ERP IMG via menu path, Quality Management • Quality Inspection • Inspection Lot Creation • Maintain Inspection Types.
3. Maintain catalog 3, which was defined in the previous step, and set the Selected Set in Same Plant flag. This enables you to use the catalog pertaining to the same plant only.
4. Maintain Inspection Lot Origins and Assign Inspection Types in SAP ERP IMG via menu path, Quality Management • Quality Inspection • Inspection Lot Creation • Maintain Inspection Lot Origins and Assign Inspection Types.
5. Define default values for the inspection type in SAP ERP IMG via menu path, Quality Management • Quality Inspection • Inspection Lot Creation • Define Default Values for Inspection Type.
6. Activate event type linkage for confirmations in SAP ERP IMG via menu path, Quality Management • Environment • Tools • Communication with Quality Inspection Engines • Activate Event Type Linkage for Confirmations for

object type BUS2045 and events CREATED, CHANGED, CANCELLED, and RESULTSRECORDINGSTARTED. By activating the event type linkage, the SAP ERP system sends communication to the QIE system (i.e., SAP SCM).

7. You need to implement the Define Communication Technology Business Add-In (BAdI) for using qRFC as the communication technology. (Refer to SAP Note 1278425 for details.)
8. Activate application event QBEXTP in Transaction BF11, and perform the other basic essential settings for QM in SAP under the Quality Management in the SAP ERP IMG menu.

16.4 Quality Management Master Data

Certain essential quality-related master data must be maintained in SAP EWM. QM data is available to the SAP EWM user interface from SAP EWM as well as from QIE.

16.4.1 Warehouse-Specific Quality Management Data

If you have a recurring inspection process, you need to maintain the field inspection interval (Figure 16.5) either in the SAP ERP material master in the Quality management view or in the SAP EWM product master's Warehouse Data tab under Warehouse Product Maintenance.

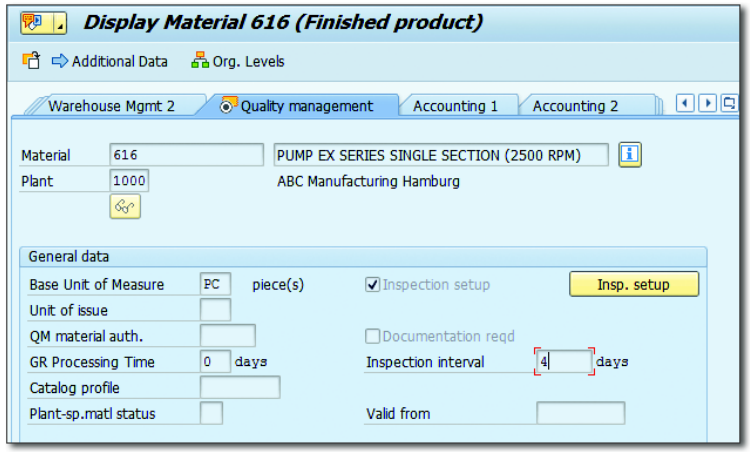


Figure 16.5 Inspection Interval

If you find any defect for quality reasons, you can block the product from being received into the warehouse. Goods receipt blocking can be done using the QM control key. In SAP ERP, it's maintained in the Procurement Data tab of the QM view in the material master. The QM control key is maintained in SAP ERP Customizing under menu path, Quality Management • QM in Logistics • QM in Procurement • Define Control Keys.

You can block the goods receipt for certain vendors using the vendor block functionality. You can block the vendor in both the SAP ERP vendor master and the SAP EWM business partner master.

16.4.2 Maintain Inspection Rule

Inspection rules are required for the creation of inspection document in SAP EWM.

Inspection rules have parameters that help determine the particulars for inspection execution. Determining factors such as product and vendor for which inspection has to take place, as well as other parameters, such as inspection procedure, catalogs, findings, sampling, and so on, are maintained in the rule. You can maintain this in SAP EWM Easy Access menu, Extended Warehouse Management • Master Data • Quality Management • Maintain Inspection Rule, or you can use Transaction /SCWM/QRSETUP.

16.4.3 Sample-Drawing Procedure

Sample-drawing procedures (Figure 16.6) help you in drawing conclusions on sample sizes that have to be taken for inspection.

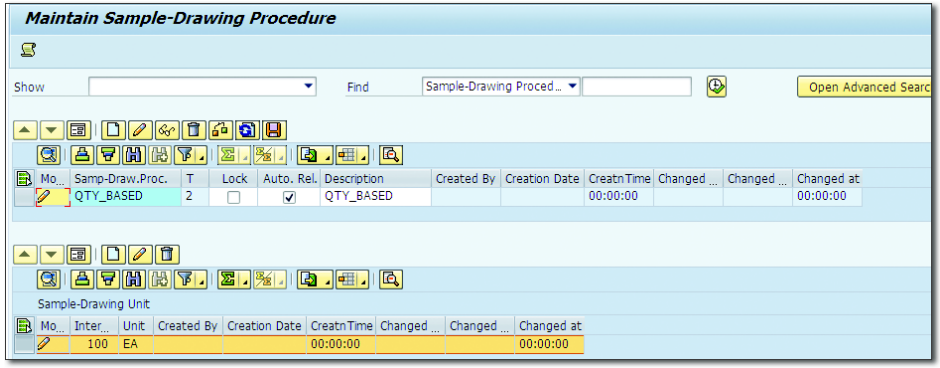


Figure 16.6 Sample-Drawing Procedure—Quantity Based

A sample-drawing procedure contains a sample-drawing unit, and for each sample-drawing unit, you define sample-drawing instructions. Sample-drawing units specify the time or quantity intervals for drawing samples from the lot. You can maintain this in SAP EWM Easy Access menu, Extended Warehouse Management • Master Data • Quality Management • Maintain Sample-Drawing Procedure, or you can use Transaction /SCWM/QSDRWP.

16.4.4 Maintain Quality Level

The quality level is updated based on the dynamic modification, either at the creation of the inspection document or at the time of usage decision. The information in the quality level helps in determining which inspection stage will be used in sampling against the next inspection document. When the quality level deteriorates based on the expectation set against the vendor, it helps in examining more aggressively than before based on the quality level. You can maintain this in SAP EWM Easy Access menu, Extended Warehouse Management • Master Data • Quality Management • Maintain Quality Level, or you can use Transaction /SCWM/QLEVEL.

16.4.5 Dynamic Modification

This helps in influencing the inspection frequency; for example, you can use previous inspection data to determine the inspection frequency. It allows you to react based on the current situation and determine the inspection scope using sampling procedures and dynamic modification rules. With the help of dynamic modification, you can achieve a high level of quality. In SAP SCM, QIE helps to perform the dynamic modification at the inspection document level.

16.5 Inspection Object Type

IOTs define the quality inspection process and allow you to create the inspection document in SAP EWM (Figure 16.7). The first step is to generate the new version for the IOT. You can do this in the SAP EWM Customizing menu, Extended Warehouse Management • Cross-Process Settings • Quality Management • Basics • Generate Inspection Object Types Version.

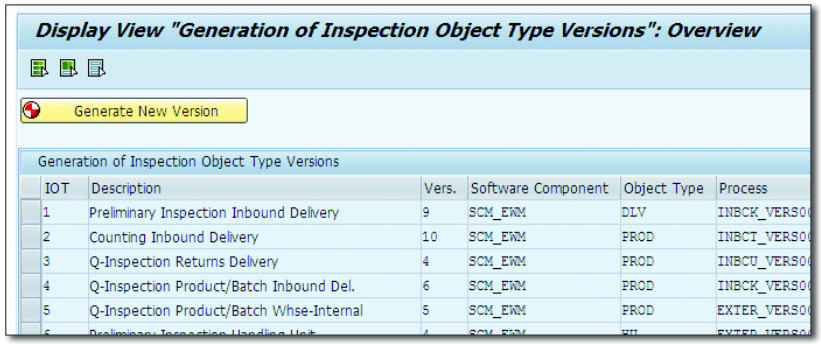


Figure 16.7 Generation of Inspection Object Type Versions

These IOTs are predefined by SAP. After the versions are generated, you need to activate these IOTs and maintain the properties against each IOT.

These properties are used to search the appropriate inspection rule with its sequence, which is relevant for the inspection rule determination (Figure 16.8). You can do this in the SAP EWM Customizing menu, Extended Warehouse Management • Cross-Process Settings • Quality Management • Basics • Maintain Inspection Object Types Version. After this is done, you need to activate the IOT at the warehouse level and define the required parameters such as follow-up actions for the inspection planning stage at which you wanted the inspection document to be created, number range, status profile, decision, and so on.

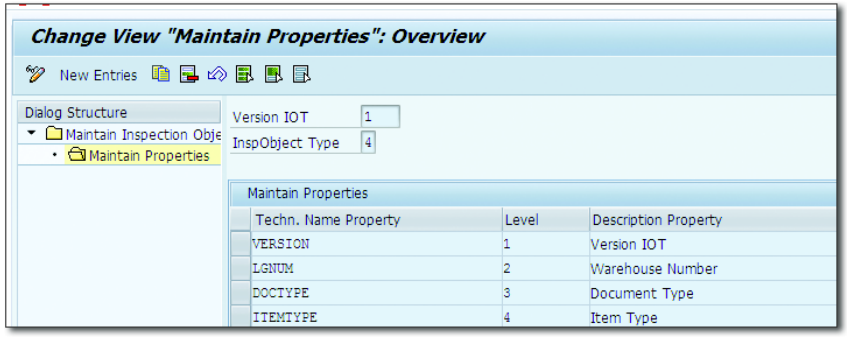


Figure 16.8 Maintain Properties

You can do this in the SAP EWM Customizing menu, Extended Warehouse Management • Cross-Process Settings • Quality Management • Basics • Warehouse-Dependent Activation of Inspection Object Type.

16.6 Quality Inspection Groups

Maintaining the quality inspection group to a certain set of materials simplifies the process of maintaining the quality inspection criteria. Rather than maintaining the quality inspection criteria individually for each product, you can assign the quality inspection group across the materials that need to go through the same set of quality checks. Quality inspection groups are defined in both SAP ERP and SAP EWM; ensure that both the settings are aligned. In SAP ERP IMG, the quality inspection group is defined under menu path, Integration with Other SAP Components • Extended Warehouse Management • Additional Material Attributes • Attribute Values for Additional Material Master Fields • Define Quality Inspection Group.

In SAP EWM IMG, it can be defined under menu path, Extended Warehouse Management • Cross-Process Settings • Quality Management • Settings for Inspection Rules • Define Quality Inspection Group.

16.7 Quality Inspection Process

Goods receipt inspection for inbound delivery and warehouse internal inspection are the foremost inspection processes in SAP EWM. Within goods receipt inspection, the following options are available:

- **Preliminary inspection inbound delivery**
  In this inspection, a simple check is performed; for example, a kind of visual breakage check can be performed after the inbound is receipted.
- **Preliminary inspection HU (RF environment only)**
  A simple check of OK/not OK is performed for each HU in the radio frequency (RF) environment only.
- **Presampling in production**
  Sample inspection is done against the production orders before the stocks are received from production. This result impacts all the receipts of stock into the warehouse against this production order.
- **Acceptance sampling**
  This inspection process is used for external procurement; it can be started before the goods receipt is done against the external procurement. Goods

receipt is blocked till the acceptance sampling is found OK. The goods receipt is posted only after the decision is successful against the sampling acceptance.

- **Inbound delivery after goods receipt**
  When goods receipts is posted for a stock transfer order (STO) or production order, quality inspection takes place for each delivery item or cumulative by product or batch. Quality inspection can also depend on a dynamic modification rule for this scenario.
- **Counting**
  An explicit inspection is done after receipt of the products but before placing them on the final bin in the warehouse to ensure the products receipted have no quantity differences against the order.
- **Customer returns**
  If you have SAP CRM in place, you can allow customer returns. Based on the inspection results against the returns in the warehouse, SAP CRM decides how much customer credit is given for the return receipts.
- **Planned/unplanned**
  You can also perform planned and unplanned inspections for the warehouse internal stock that isn't related to any inbound or outbound documents.

16.7.1 Recurring Inspections

The process of recurring inspection is used for the batch-managed products that need inspection on a periodic interval. There are certain prerequisites for activating recurring inspection: IOT 5 should be active, you should have assigned a valuation class containing standard characteristic `LOBM_QNDAT` to the batch, and inspection interval must be maintained in the product master.

When the new batch is created, the system calculates the next inspection date based on production date plus inspection interval and assigns it to characteristic `LOBM_QNDAT`. If the production date isn't provided, the next inspection date is calculated on the basis of batch creation date + inspection interval.

SAP standard Report /SCWM/R_STOCK_TYPE_CHANGE (Figure 16.9) is available in SAP EWM for retrieving the stock with the next inspection date in the past and posting it to the quality inspection stock. You can run this report in both foreground and background mode. When the inspection document is accepted for this stock, the system recalculates the next inspection data as the decision date plus the

inspection interval. If the inspection decision is rejected, the system doesn't calculate the next inspection date; instead, it executes the follow-up action.

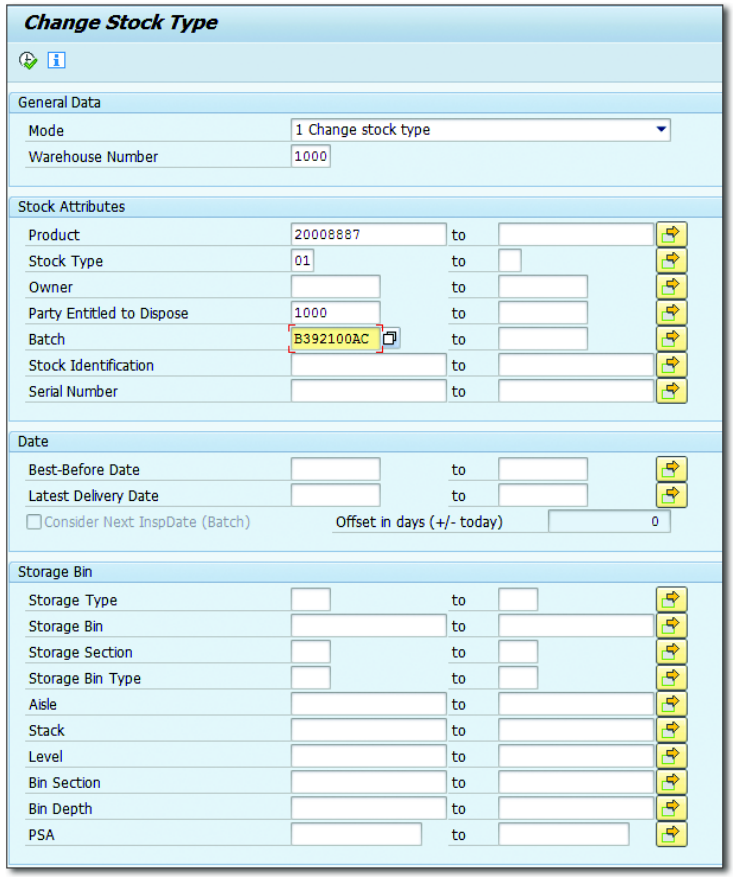


Figure 16.9 Report /SCWM/R_STOCK_TYPE_CHANGE

16.7.2 Acceptance Sampling

The acceptance sampling procedure is used for external procurements, and it can start before or after goods receipt. If sampling starts before the goods receipt, the goods receipt is blocked until a usage decision is made. The usage decision controls the goods receipt for external procurement. Goods receipt can be allowed with or without restriction or can be forbidden. If you want to allow it with restricted posting, you can allow making a receipt to blocked stock using a follow-up action.

With this procedure, it's possible to combine acceptance sampling with inspection control after goods receipt. You can post to the blocked stock based on the acceptance sampling results; once received, you can do a detailed inspection. To do this, you need to maintain an inspection rule for acceptance sampling and for inspection after goods receipt.

16.7.3 Presampling in Production

This process (shown in Figure 16.10 and Figure 16.11) is used in in-house production. When the manufacturing order is released, the inspection document is created. The inspection process is initiated well before the goods receipt against production.

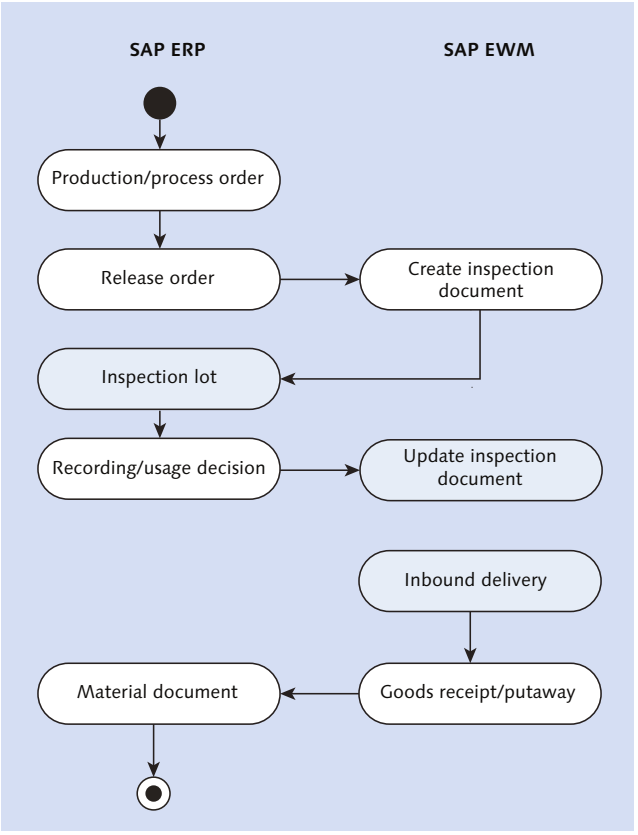


Figure 16.10 Presampling in Production Process

Based on the presampling, the results are recorded in SAP ERP and passed on to SAP EWM to update the inspection document.

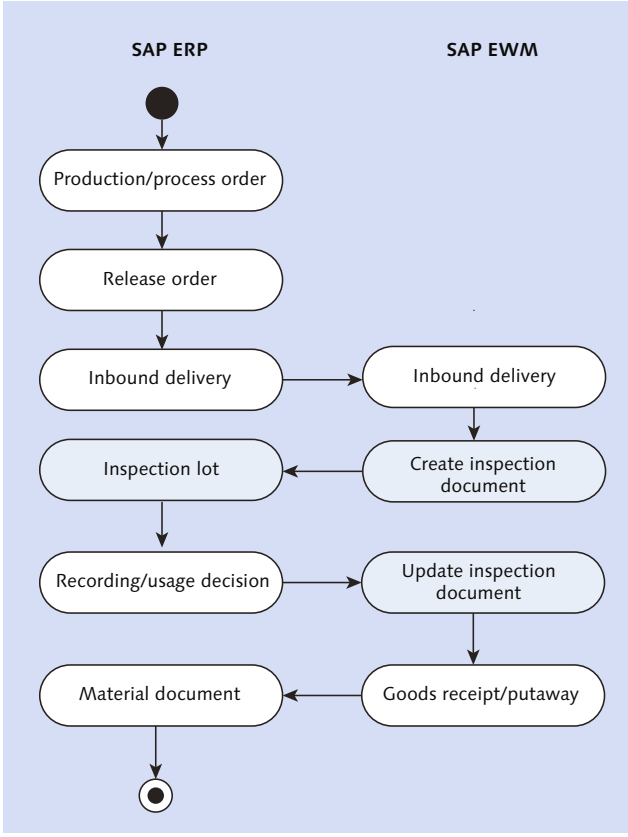


Figure 16.11 Presampling in Production Process Inspection Document with Inbound Activation

You can also create an inspection document in SAP EWM along with inbound delivery activation. The usage decision is posted prior to goods receipt against production order.

16.7.4 Goods Receipt Control

You can control the goods receipt by blocking the vendor or certain products from a vendor due to quality reasons. You can also decide, at the product master level, to ignore a vendor block or to get a warning or error message for a blocked vendor and material.

16.8 Quality Inspection Document Creation

In SAP EWM, you use inspection documents for processing the quality checks and recording them. Inspection documents can be created automatically or manually. For example, if you've set up the in-process inspection for the production process, then the system will create the inspection document when you release the production order. The system first identifies the inspection rule, and if it finds the inspection rule for the determined properties, the system will create an inspection document automatically. You can process all quality inspection processes using the inspection document, perform checks, record findings, and record results.

16.9 Inspection Decision Recording

After the quality checks are performed by the quality personnel, based on the inspection result, you now need to post the usage decision for the inspected object against the inspection document. Based on the findings and recorded results, you now decide whether the stock should be released for sale, should be blocked or scrapped, or should be returned to vendor. After the decision is made, the system posts the quality score for the inspection lot, updates the quality level, and triggers an automatic follow-up action.

16.10 Follow-Up Actions

Logistical follow-up actions trigger follow-up processes (Figure 16.12) such as the following:

- Putaway
- Scrapping
- Stock transfer
- Returns

This is achieved through warehouse document and warehouse task (WT) creation based on the follow-up action. Follow-up postings are done with warehouse documents and WTs. You define the follow-up actions in SAP EWM Customizing

using menu path, Extended Warehouse Management • Cross-Process Settings • Quality Management • Result • Maintain Follow-Up Action.

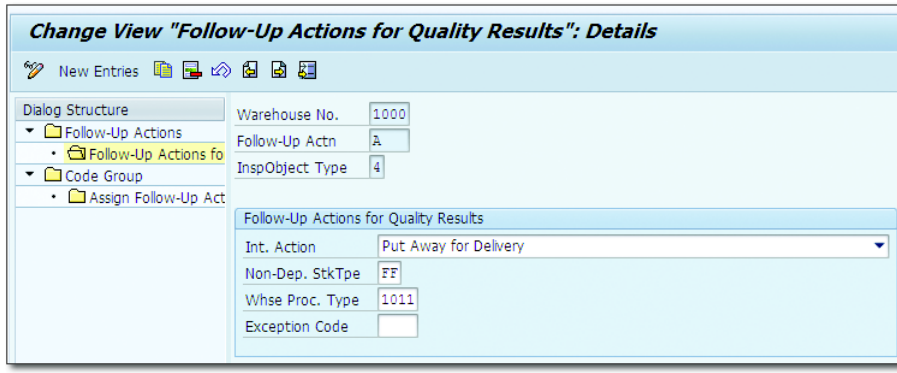


Figure 16.12 Follow-Up Actions

16.11 Warehouse Inspection Monitoring

The Warehouse Management Monitor screen (Figure 16.13) gives you an overview of the inspection document statuses and allows you to trigger internal warehouse inspections. You can access the warehouse monitor via node Documents • Inspection.

You also can create the inspection document via the warehouse monitor. To create the inspection document, navigate via node Stock and Bin • Physical Stock or via Stock and Bin • BBD/SLED Overview, and go to the More Methods option where you'll find the Create InspDoc (IOT5) button. Options available under More Methods button are listed here:

- Change Stock Type
- Post Stock
- Create Inspection Doc (IOT5)

When you create an inspection document, the system searches for the inspection rule. If found, then the system creates the inspection document, and the stock is moved to quality inspection stock.

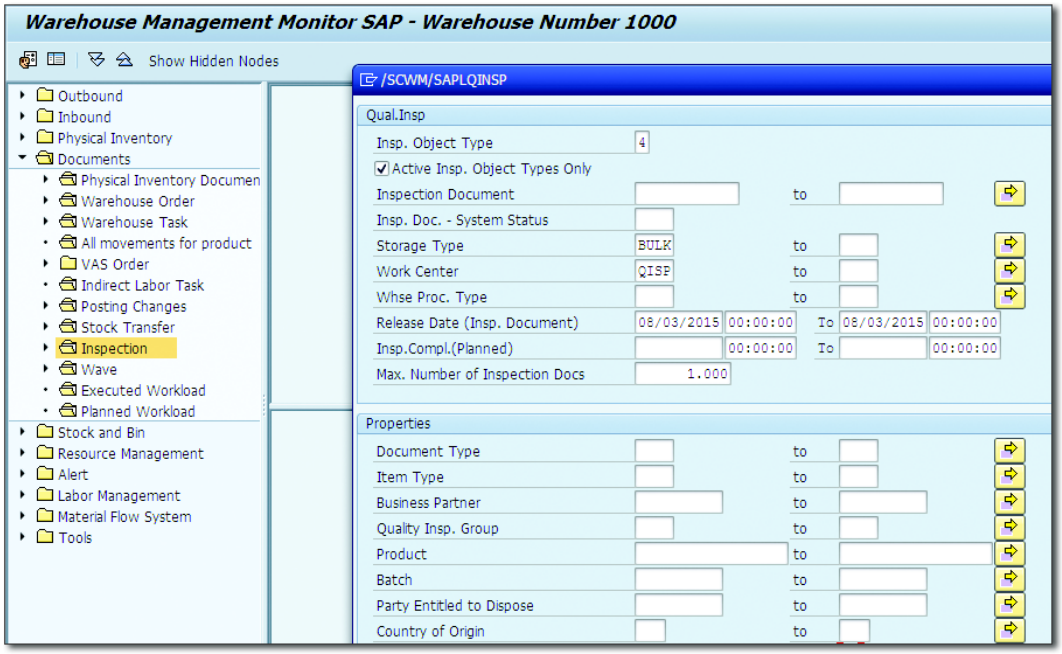


Figure 16.13 Warehouse Document Selection in the Warehouse Management Monitor Screen

16.12 Quality Inspection Using Radio Frequency

With the RF functionality, you can execute the preliminary quality inspection for inbound deliveries and also inspect HUs or bins in the warehouse. SAP EWM delivers standard logical transaction (Figure 16.14) and step flows for QM process execution in the RF environment.

Navigation to Product Inspection Decision on the standard RF menu is 05 Internal Process • 04 Quality Management • 04 Product Inspection Decision.

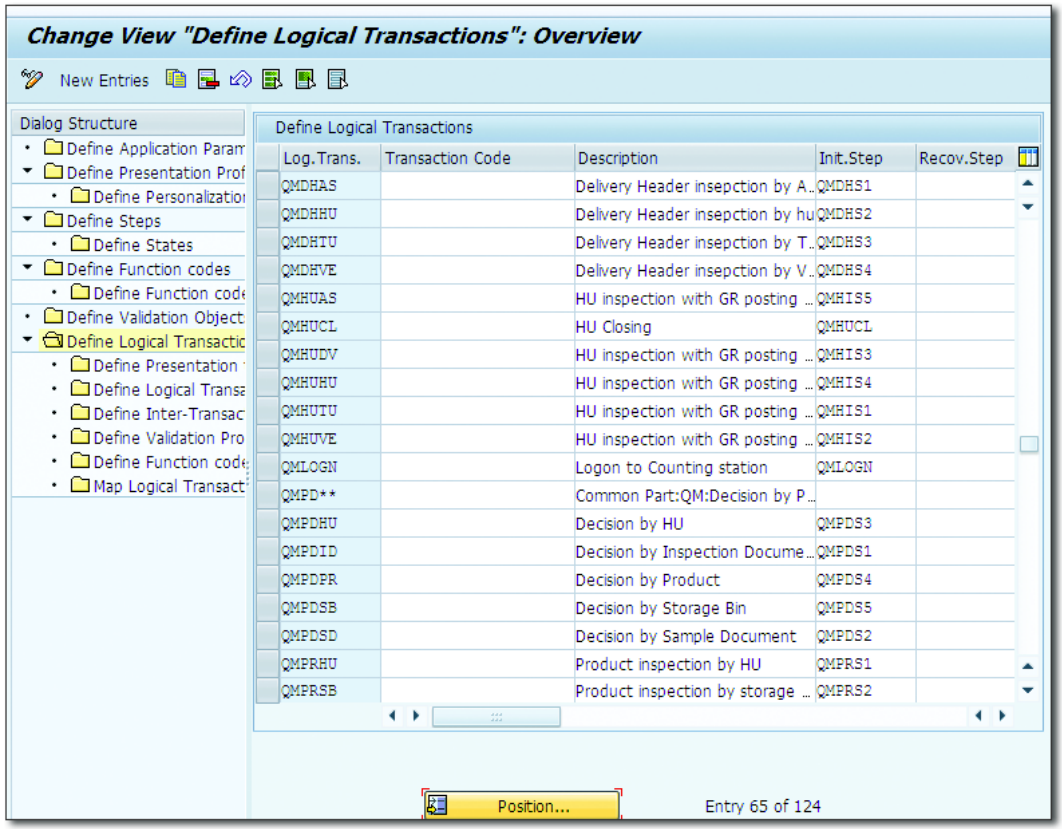


Figure 16.14 Standard QM Logical Transaction (Out-of-the-Box)

16.13 Quality Inspection in Returns Management

There are various reasons that lead to the returns process; for example, the supplying location dispatched the wrong item, an additional item was sent without a request, an item with bad quality was sent, and so on. When such a situation arises at the receiving point, you need to react and comply with the defined returns management functions to address this per the organization's policies.

16.13.1 Returns in the Distribution Network

When STOs are received, there may be a need to return the product due to an exceptional situation. When such situations are identified, the return STO process is triggered by the follow-on functions. By following the returns process appropriately, you ensure the inventory and the financial adjustments are done without any differences. During the returns process, you need to act at both the receiving site and supplying site. For example, the receiving plant can create the inbound delivery if additional items are received, trigger quality inspection for them, and return the goods, if required, with appropriate follow-up action. The supplying site can create quality inspection at the return delivery item level, accept the return receipt, and close the return process by recording the results with the appropriate follow-up action. Finally, financial settlement is done across the company for cross-company scenarios.

16.13.2 Advance Returns Management

SAP EWM fully supports the return inspection process; it can be used along with the SAP ERP advance return process for better efficiency and transparency. When a return order or a return STO is created in the Advanced Returns Management of SAP ERP, the following two options become available:

- **Before goods receipt in SAP ERP using Advance Returns Management**
  In this process, all the processes—from inspection, finding, usage decision, and follow-on actions—are handled in SAP ERP and sent to SAP EWM via qRFC. SAP EWM receives the external inspection ID with the delivery document, which is stored on the corresponding stock item. Later, this information is used for determining the stock item for the follow-on document, which is replicated from SAP ERP.
- **During goods receipt using SAP EWM/QIE functions**
  The returns that arrive in the goods receipt area are inspected in SAP EWM. Simple logistical follow-up action can be performed in SAP EWM. For complex logistical follow-up actions, responsibilities are transferred to SAP ERP. The processing of follow-on document in SAP EWM that are created in SAP ERP finalizes the inspection.

16.14 Summary

In this chapter, we described the processes involved in QM. We discussed the QIE architecture, QIE data, QM master data, QM process, and QM in the warehouse monitor. Standard RF functionality for the QM process, which comes out-of-the-box for immediate use in the RF environment, was also discussed. We also looked at handling returns in the SAP EWM system, which is an exceptional situation.

Takeaways

- The Quality Inspection Engine (QIE) is the key in implementing the QM process.
- Among many steps, you need to maintain and activate the Inspection Object Types (IOTs) for quality assurance against the required processes.
- In addition to the already existing master data, you need to set up inspection rules, sampling procedures, quality inspection groups, dynamic modification rules, and so on for the QM process to work.

Value-added services occur when the warehouse makes an additional service or a particular contribution to a product to increase its value, such as adding a new element, repackaging, reworking, labeling, oiling, and so on. This chapter covers value-added services in the complex putaway and stock removal processes.

17 Value-Added Services

As the name suggests, value-added services (VAS) are performed to add value to the product. Examples of VAS activities include packaging, labeling, oiling, kitting, assembling, and so on. VAS processes are performed at the work center within the warehouse by using VAS order documents. The time spent and materials consumed in the VAS activities can be captured in SAP EWM, which supports billing the customers accurately. The system also keeps track of auxiliary products used in VAS activities and their consumption posting. VAS in SAP EWM can be plugged into both inbound and outbound processes before warehouse operators perform the final putaway or loading into the goods issue area.

Figure 17.1 illustrates a VAS activity in which oiling and labeling are being performed. We'll discuss the master data required for VAS, processes in the warehouse where VAS is used, VAS order documents and important transactional data, execution of VAS in the work center, and consumption postings for VAS in detail in this chapter.

A VAS order document details the needs of VAS and can be created either manually or automatically in the SAP EWM system. You can include the VAS process steps using Process-Oriented Storage Control (POSC) to be part of other processes. For example, if you want to do the VAS activity of oiling and labeling before putting away in the final storage bin, it can be defined as a process step in POSC. Figure 17.2, illustrates a POSC for inbound process, in which Step VS01 (VAS Oil) and Step VS02 (Vas Pack) are performed before the final Step IB03 (Put Away).

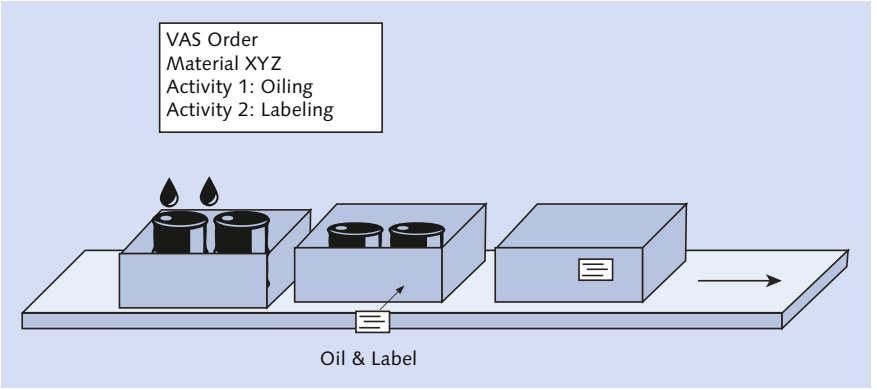


Figure 17.1 Oiling and Labeling

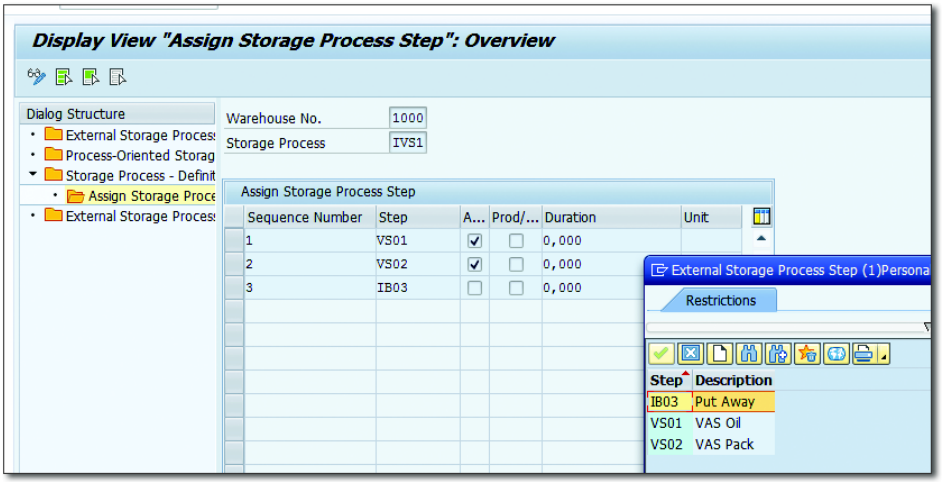


Figure 17.2 Inbound Process with VAS Oiling and Packing before Putaway

Packaging specifications of master data can be used for the details of auxiliary materials to be used and the activities to be carried out on a product in the work center. SAP EWM allows you to flexibly set up the determinations of packaging specifications for a product based on appropriate criteria, for example, product number, business partner, and so on. VAS is performed in a work center, which is a storage type with role E. A work center might consist of various bins, such as inbound bins where products can wait for VAS activities to be performed on them, and outbound bins where products wait for further movement after VAS activities are completed.

In the next section, we'll discuss the important configuration settings required to support VAS in SAP EWM.

17.1 Configuration

Following are the important configurations that support VAS in various processes in the warehouse. Most of these configuration steps are mandatory and, once done, set up the specific value-added service they are relevant for. It should be noted, however, that a typical customer environment will warrant some custom developments as well.

17.1.1 Product Group Type and Product Group

Product group type and product group configurations help in grouping products of the same nature from the VAS point of view. For example, a manufacturer of screw jacks uses a process of oiling for specific varieties of screw jacks before packing and putaway. These screw jacks that go for oiling are then packed and placed in the final bin of the warehouse. To classify only these certain varieties for VAS such as oiling and packing, product group types and product types can be used.

As shown in Figure 17.3, to create product group types, navigate to the SAP EWM IMG menu path, SCM Basis • Master Data • Product • Product Groups • Define Product Group Types.

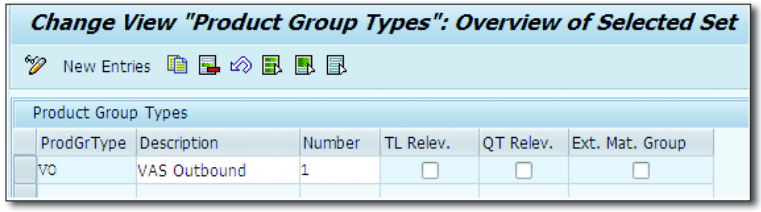


Figure 17.3 Product Group Type for Value-Added Services

The Number field for the product group type is used by the SAP Business Warehouse (SAP BW) extractor to define the Group field for the product group type in the extractor structure. While defining the product group type, you can also make

the product group type transportation lane relevant; that is, transportation lanes will be defined for product group types instead of products, by setting the TL Relev. indicator.

The product group type is assigned to a product in the product master on the Properties 2 tab. When you create a product group, you always create it for a product group type. Based on your business need, you might want to create multiple product groups for a product group type. To create a product group, navigate to the SAP EWM IMG, and choose SCM Basis • Master Data • Product • Product Groups • Define Product Groups (Figure 17.4).

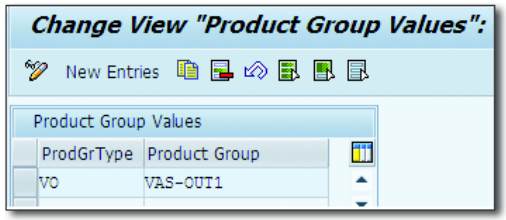


Figure 17.4 Product Group Definition

Note that these definitions are maintained independently of the warehouse number and are also used by SAP Advanced Planning and Optimization (SAP APO).

17.1.2 Setting Up Value-Added Service Relevance

To maintain the VAS relevance, navigate to the SAP EWM IMG, and choose Extended Warehouse Management • Cross Process Settings • Value Added Services (VAS) • Define relevance for VAS.

You use these settings for further assignation of parameters to control the product group behavior. At the product group level, in combination with the warehouse number, document category, document type, and item type, you may set up the following parameters (Figure 17.5):

- Pack.Spec.Proc.
  The packaging specification procedure helps in determining the packaging specification for the VAS order creation.
- VAS Order
  By selecting an option from the dropdown, you control the way the VAS order is created in the SAP EWM system. The following options appear in the dropdown:

- Do Not Create Automatically (Manual Creation of VAS Needed)
- Create When Creating Warehouse Request/Warehouse Request Item (Automatic)
- Create at First Goods Receipt Posting (Auto Creation)

- PS Exist. Check

  You use this setting to ensure that packaging specification is available during the VAS activity. If you use this setting, then a check will be performed during the creation of the VAS order to determine whether a packaging specification exists or not. There are three options to choose from:

  - Perform Existence Check (Warning)
  - Perform Existence Check (Error)
  - Do Not Conduct Existence Check

  When Perform Existence Check (Warning) is chosen, only the message log is written in the warehouse request. If Perform Existence Check (Error) is chosen, the message log is written in the warehouse request, and the system sets the inconsistency in the warehouse request item. No check is conducted when the Do Not Conduct Existence Check option is chosen.

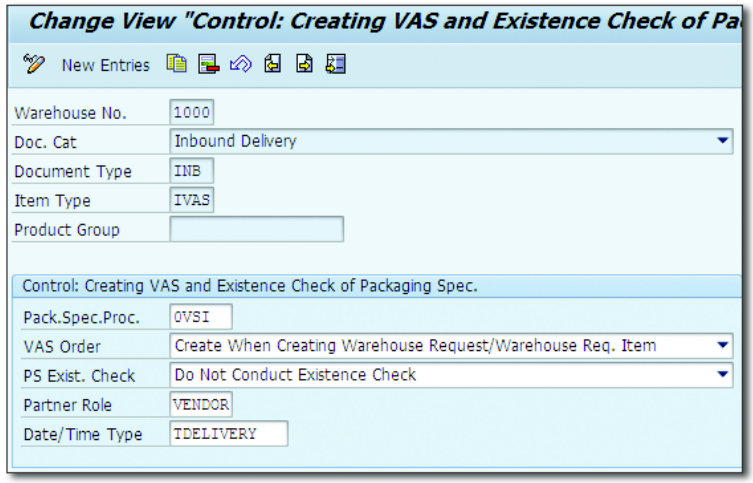


Figure 17.5 Setting Up Value-Added Service Relevance for a Document Type and Item Type Combination

- Partner Role
  The partner role is used to determine the packaging specification. For example, for an outbound delivery, the partner role SHIP-TO-PARTY is used to determine the packaging specification.
- Date/Time Type
  The date/time type defined here, for example, transport start or delivery date/time or transportation planning start, and so on, can be used in determining the packaging specification validation.

17.1.3 Maintaining Value-Added Service Settings for a Warehouse

There are other VAS settings that need to be maintained at the warehouse level. These settings are applicable to all the VAS activities conducted in a warehouse. To maintain these settings as shown in Figure 17.6, go to the SAP EWM IMG menu path, Extended Warehouse Management • Cross Process Settings • Value Added Services (VAS) • Warehouse Number Dependent VAS Settings.

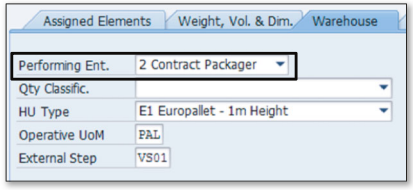


Figure 17.6 VAS Settings at the Warehouse Level

Here you need to specify the following details in Figure 17.7:

- VAS No. Range
  This is the number range for VAS orders.
- Performing Ent.
  Certain levels in the packaging specification are responsible for execution by vendor, contract packager, warehouse, and so on. These entities are maintained here. Levels in the packaging specifications are used in the creation of VAS orders. When the executing entity matches the executing entity of the warehouse in the levels, the VAS order is created.
- PS Prod. Group Type
  This is used to determine the packaging specification based on the product group type.

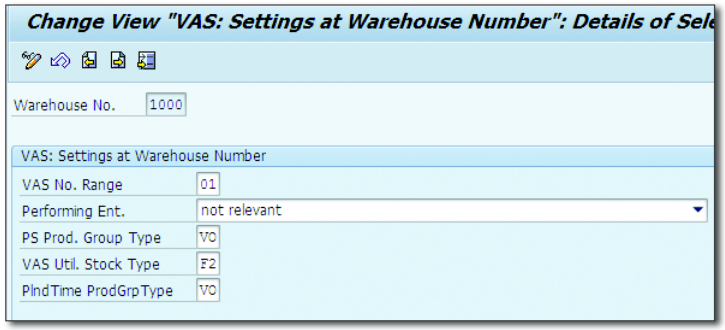


Figure 17.7 Performing Entity in the Package Specifications

- VAS Util. Stock Type
  Here you can define the default stock type for consumption posting. This is needed for the components or auxiliary units that are used for the VAS activity to be posted for consumption in the system. When posting for consumption, the system proposes the stock type from which the stock has to be consumed.
- PlndTime ProdGrp Type
  Here you maintain the product group type for which the planned execution time for VAS needs to be calculated. The fixed time and the process step duration are maintained in plan times in the SAP EWM IMG via the menu path, Extended Warehouse Management • Cross-Process Settings • Value-Added Services (VAS) • Plan Times • Define VAS Fixed Times and Define Duration of Process Steps.

17.2 Master Data

Before we jump in to discuss the VAS activity in warehouse processes, let's take a look at the important master data settings and determine which settings are required and which settings affect the VAS process in the warehouse. These master data relate to products, bins, and packaging specifications.

17.2.1 Maintaining the Material Master

Assigning the product group to the product master is essential for VAS relevance. Product group is assigned in the Properties 2 tab of the product master. This can be done using Transaction /SAPAPO/MAT1 or by navigating to the SAP EWM

Easy Access menu path, Extended Warehouse Management • Master Data • Product • Maintain Product.

As shown in Figure 17.8, to maintain the product master in SAP EWM, use Transaction /SCWM/MAT1, or navigate via the SAP Easy Access menu path, Extended Warehouse Management • Master Data • Product • Maintain Warehouse Product.

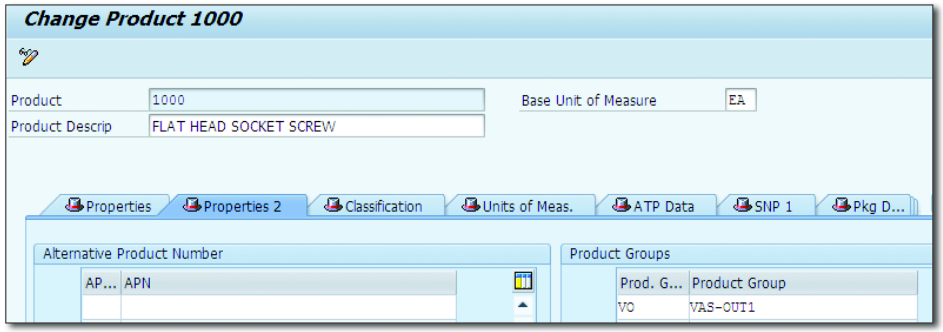


Figure 17.8 Product Group Maintained in the Product Master

A product on which VAS needs to be performed can be modeled for multistep movements using the storage control feature of SAP EWM. These storage processes contain or plan all the steps, including VAS. In the inbound process, storage control is picked from the warehouse process type. Thus, the Proc.Type Det. Ind. for a VAS-relevant product is used to influence the determination of the warehouse process type. The Proc.Type Det. Ind. (Figure 17.9) is maintained in the Warehouse Data view of the product master.

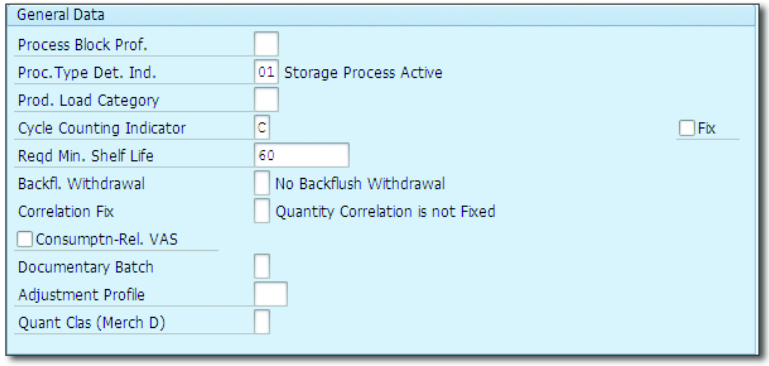


Figure 17.9 Type Determination Indicator Influencing the Value-Added Services Process

Auxiliary materials, for example, oil, shrink-wrap, labels, and so on, are used while VAS activities are performed. These materials are generally available in abundance near the work center and are used continuously without being counted for a period of time. Then, they are posted for consumption at an aggregate level. For an auxiliary packaging material to be made eligible for consumption posting, you must flag the CONSUMPTION-REL. VAS checkbox on the WHSE DATA view of the product master, as shown in Figure 17.10.

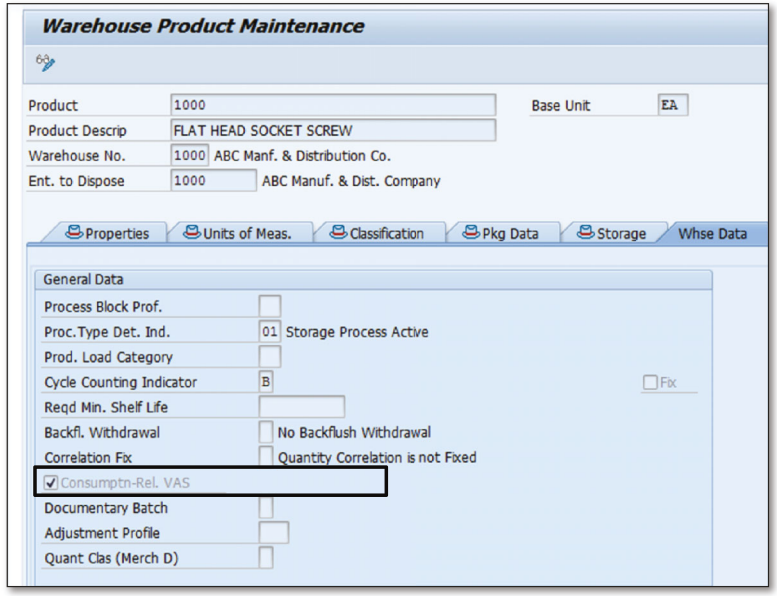


Figure 17.10 Consumption Relevance of Auxiliary Packaging Material

Auxiliary materials are kept in an area (bin) in the work center, and a bin must be set up for the work center to post its consumption. This enables the goods issue to be posted for the auxiliary materials used. These bins are referred to as consumption bins for the work center. Auxiliary materials required for VAS must be available in this bin in the system, so that post usage a goods issue can be posted. To set up the consumption bin, use Transaction /SCWM/73000001, or navigate to the SAP Easy Access menu path, EXTENDED WAREHOUSE MANAGEMENT • MASTER DATA • ASSIGN STORAGE BIN FOR VAS CONSUMPTION POSTING (Figure 17.11).

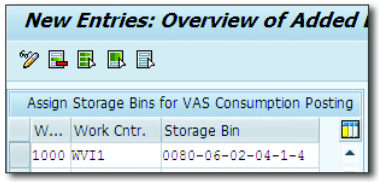


Figure 17.11 Bin Assignment to Work Center for Value-Added Services Consumption Posting

17.2.2 Creation of Packaging Specification for Value-Added Services

Businesses might need to perform VAS based on the specific needs of products. Even for the same product, labeling might be completely different for different customers. This may pose challenges to ensure that the right VAS activities are performed on the product with the right auxiliary materials. SAP EWM allows a very flexible way to handle the situation by using the packaging specification master data. Automatic determination of correct packaging specifications can be set up in the SAP EWM system.

To create and maintain packaging specifications, you can use Transaction /SCWM/PACKSPEC, or you can navigate via the SAP EWM Easy Access menu path, Extended Warehouse Management • Master Data • Packaging Specification • Maintain Packaging Specification (Figure 17.12).

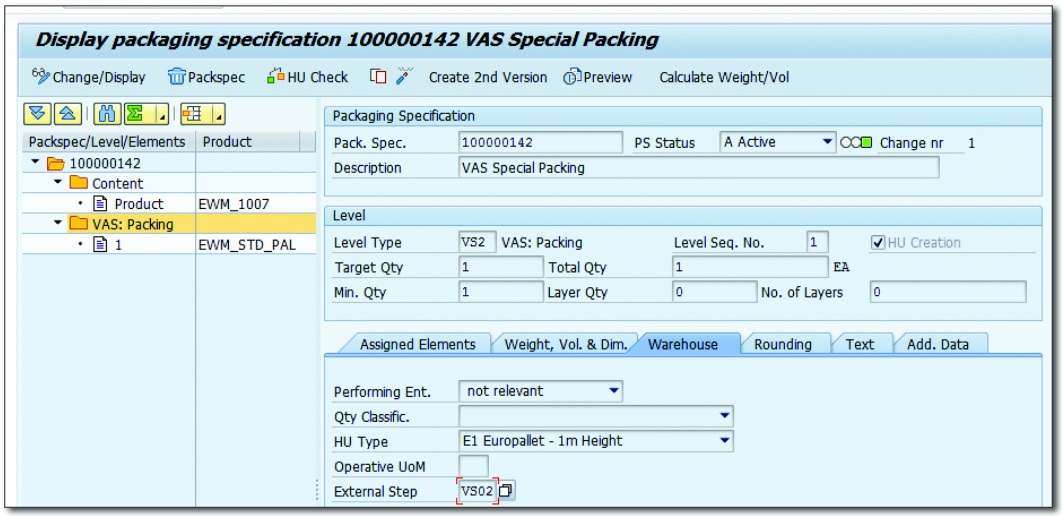


Figure 17.12 Packaging Specification Showing Oiling and Labeling

We've discussed packaging specification in detail in Chapter 4, Section 4.6. From the VAS point of view, the parameters in the WAREHOUSE tab page are important. Condition records for packaging specifications determination can also be set up and viewed in Transaction /SCWM/PACKSPEC as shown in Figure 17.13 and Figure 17.14.

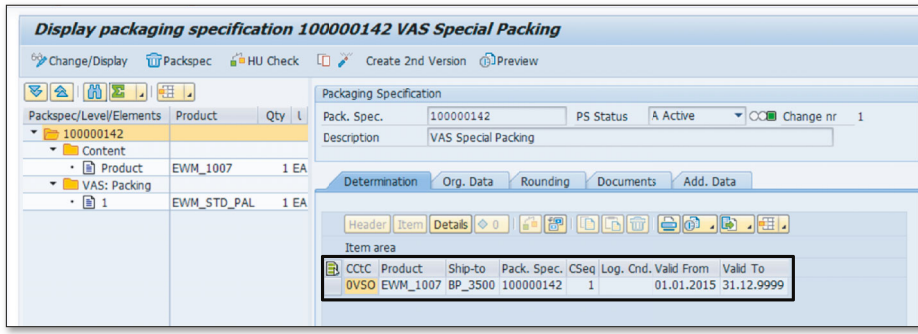


Figure 17.13 Condition Record Maintenance in the Packaging Specification

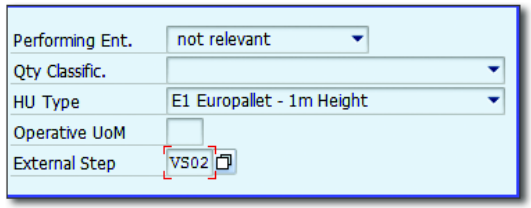


Figure 17.14 Warehouse Tab in the Packaging Specification

Let's have a quick glance at what each of the fields available in this tab refer to:

- PERFORMING ENT.
  This information in the packaging specification states the entity/organization that is responsible for performing the steps in each level.
- QTY CLASSIFIC.
  The quantity classification drives in which packaging unit the product is stored in the warehouse. For example, you might have different unit of measure (UoM) for a product, such as each (EA), boxes (BOX), cartons (CAR), pallets (PAL), and so on.

- HU Type
  This key portrays the HUs with their dimensional attributes; in other words, it classifies the type of HU. Examples are shown in Table 17.1.

Dimensions (W × L)	Handling Unit Type
40" × 48"	T1
42" × 42"	T2
48" × 48"	T3
48" × 40"	T4

Table 17.1 Example of Handling Unit Type Attributes

- Operative UoM
  This is the UoM used in the warehouse. The operative UoM is captured in the warehouse task (WT) and is displayed while confirming the WT.
- External Step
  The external step (i.e., VAS) that has to be performed for each packaging specification level is maintained here. This step determines the work center associated with it for performing the VAS activity.

17.3 Warehouse Processes

VAS are designed to be performed along with inbound, outbound, and internal process. For example, a vendor supplies spare parts that aren't in appropriate packaging condition for spare parts sale. The process necessitates a repack if it's for a direct spare parts sale, prior to final putaway on the bin. This process can be called a VAS part of inbound process before final putaway.

There have been numerous changes to the traditional approach of warehousing operations. Being a customer-driven market, there is a huge demand on the way the SKUs are shelved by meeting the customer-desired specification. Moreover, companies are focusing on core businesses rather than other ventures (noncore functions), which means that outsourcing warehouse operations have become indispensable. When operations are outsourced, the traditional approach of simple putaway and picking are outdated, and additional warehouse activity becomes essential to shelve the products to be ready for sale. All of these VAS activities are possible in the following scenarios:

- Goods receipt process
- Goods issue process
- Kitting as in goods issue
- Auxiliary product consumption posting
- Kit to order
- Kit to stock
- Reverse kitting

17.3.1 Goods Receipts Process

A VAS process may be linked to the standard goods receipts if the product has to go through a value-adding activity, such as packing, before putaway (Figure 17.15). The details of packing are picked from the packaging specification determined from the determination procedure assigned to the document type and item type in the VAS relevance settings.

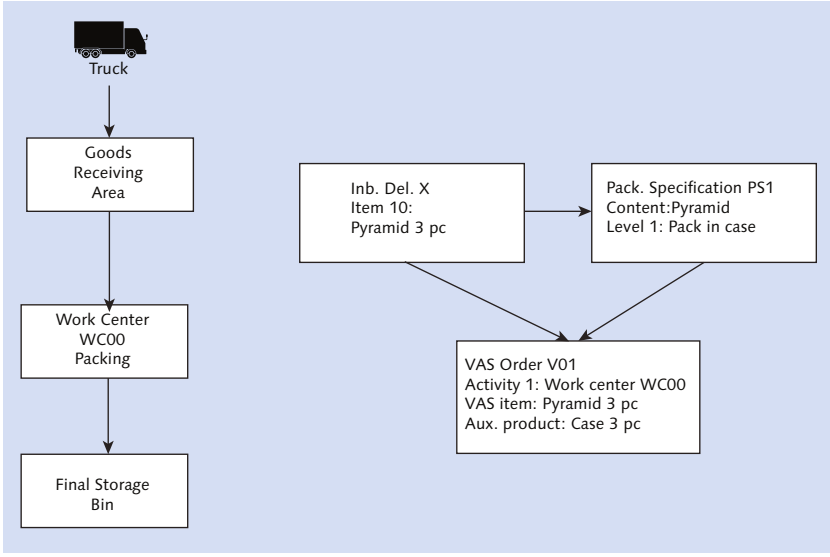


Figure 17.15 Value-Added Services Activity in the Inbound Process

In the goods receipt process with VAS, the product may be routed to the VAS work center if a VAS order exists in the inbound delivery. If no VAS order is found in the inbound delivery, then the HU is directed to the putaway location

rather than the VAS work center. If you want an automatic WT creation for the interim VAS step, you must configure this VAS step in the POSC (Figure 17.16).

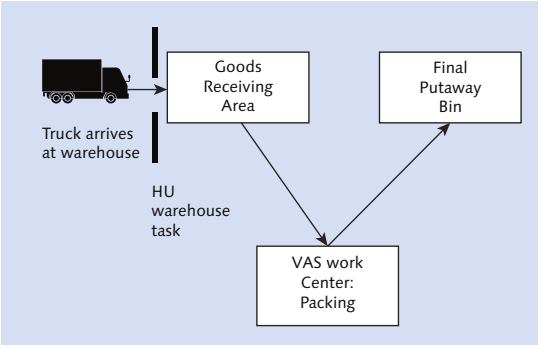


Figure 17.16 Value-Added Services Process Flow in the Inbound Process with Process-Oriented Storage Control

You have three different options in processing the preceding scenario in the system: VAS with POSC, VAS without POSC but with the internal process step, and VAS without POSC and no internal process step. The flow of the business process in all three scenarios is as follows:

- **VAS with POSC and internal process step**
  - First, the system creates a VAS order against the inbound delivery.
  - Packaging specifications are determined against the inbound delivery item.
  - The HU WT is created with the destination storage location as a work center. The system creates as many WTs for the VAS as you configured in the interim step for the VAS.
  - After the VAS activity is completed and the WT is confirmed, the putaway WT is created for shelving the product into the final storage bin.
- **VAS without POSC but with the internal process step**
  - First, the system creates a VAS order against the inbound delivery.
  - Packaging specifications are determined against the inbound delivery item.
  - Product WT is created with the destination storage location as a work center. The system creates as many WTs for the VAS as you configured in the interim step for the VAS. The only difference is the product WT; otherwise, the rest of the steps are the same.

- After the VAS activity is completed and the WT is confirmed, the putaway WT is created for shelving the product into the final storage bin.

- **VAS without POSC and without the internal process step**
  - First, the system creates a VAS order against the inbound delivery.
  - Packaging specifications are determined against the inbound delivery item.
  - VAS order is printed, and a designated warehouse employee performs the VAS activity.
  - After the VAS activity is completed, instead of the WT being created as in the preceding two methods, the confirmation is done for VAS completion here. The system puts the product into the final storage bin.

17.3.2 Goods Issue Process

As shown in Figure 17.17, VAS can be used in the outbound process when a customer may want the good to be packed in a specific way (for example, on a special pallet and packing material specifically used for that customer). VAS in the outbound process can be used with POSC or without POSC. While planning the multistep complex outbound movement for the product, you may include the VAS steps in the POSC definition if you want an automatic WT creation, or you can work without POSC and without the interim process step as well.

Let's consider the example stated in the preceding paragraph where you wanted to do an additional packing for the specific customer order.

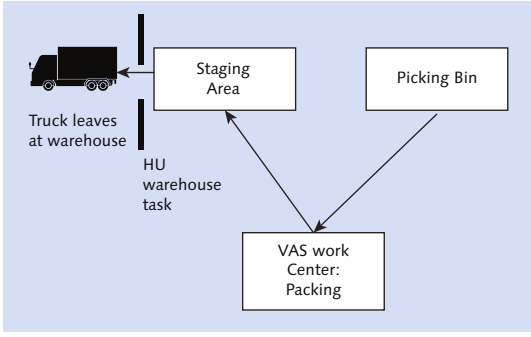


Figure 17.17 Value-Added Services in the Outbound Process with Process-Oriented Storage Control

Similarly, as stated in the inbound VAS, you have three different options for the outbound process with VAS. You can perform VAS with POSC, VAS without POSC but with the interim process step, and VAS without POSC and without any process step. The business flows for all three options are given here:

- **VAS with POSC and the internal process step**
  - First, the system creates a VAS order against the outbound delivery.
  - Packaging specifications are determined against the outbound delivery item.
  - An HU WT is created with the destination storage location as a work center. The system creates as many WTs for the VAS as you configured in the interim step for the VAS.
  - After the VAS activity is completed and the WT is confirmed, the product is placed in the goods issue area.
- **VAS without POSC but with the internal process step**
  - First, the system creates a VAS order against the outbound delivery.
  - Packaging specifications are determined against the outbound delivery item.
  - A product WT is created with the destination storage location as a work center. The system creates as many WTs for the VAS as you configured in the interim step for the VAS. The only difference from the first method is that the product WT is created here.
  - After the VAS activity is completed and WT is confirmed, the product is placed in the goods issue area.
- **VAS without POSC and without the internal process step**
  - First, the system creates a VAS order against the outbound delivery.
  - Packaging specifications are determined against the outbound delivery item.
  - You print the VAS order for the assignment of this VAS activity to the warehouse employee who has been designated for this activity.
  - After the VAS activity is completed and entered in the system, the product is placed in the goods issue area.

17.3.3 Internal Warehouse Processes

Situations might arise in the warehouse that demand some additional VAS activity on a situational basis. There might not be any goods movement, but the

activity has to be performed within a warehouse without any goods movement. Under this condition, you can use internal warehouse processes with VAS, and the system only checks if the packaging specification exists.

The process steps are as follows:

- The VAS order is created manually.
- One or more WTs are created with a destination storage bin as your first work center for VAS.
- Products are withdrawn for VAS, and VAS is executed. Upon completion, the product is shelved.

The VAS order can be created from Transaction /SCWM/VAS_INT or via the SAP EWM Easy Access menu path, Extended Warehouse Management • Work Scheduling • Value Added Services (VAS) • VAS for Internal Warehouse Operations. When you create the VAS order using the transaction, the warehouse request is created in the background.

Upon creating the internal process VAS order, an internal warehouse request gets created in the background that can be accessed by Transaction /SCWM/IM_ST. the SAP EWM Easy Access menu path for this transaction is Extended Warehouse Management • Maintain Internal Stock Transfer .

17.4 Orders

One of the most important documents related to VAS is the VAS order (Figure 17.18). A VAS order is used to inform the employees in the warehouse of which VAS activities needed to be performed on the product. A VAS order links delivery items to a packing instruction and contains details from within the delivery and packaging specification.

The VAS order is created automatically during inbound and outbound delivery creation with storage control, if the packaging specification is found. The VAS order can be seen in the inbound and outbound delivery in the Document Flow tab at the item level. The document category of the VAS order is VAS.

To define the VAS order type (Figure 17.19), follow the menu path, EWM IMG • Cross-Process Settings • VAS • Define Order Types for VAS. For the document type and item type, you define which warehouse process type should be used for

creation of the warehouse request and the VAS packaging determination procedure for creation of the VAS order.

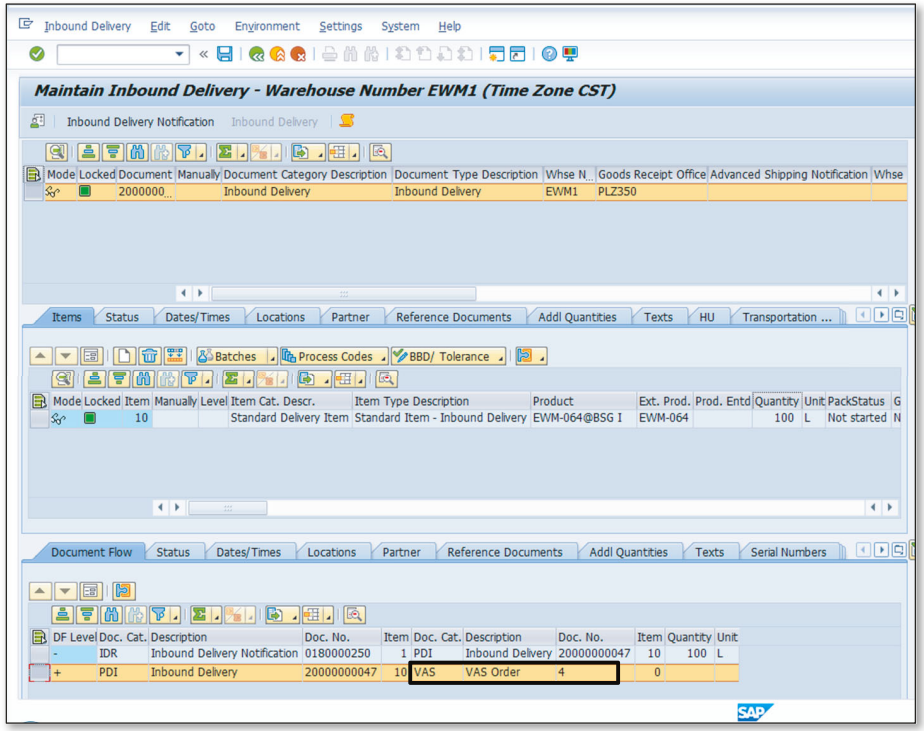


Figure 17.18 VAS Order in Inbound Delivery

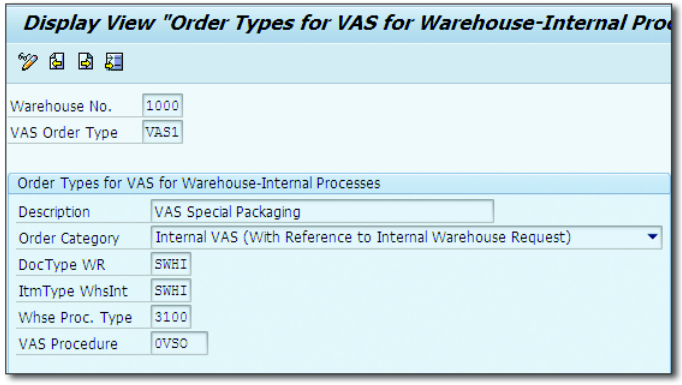


Figure 17.19 Order Type Definitions for Value-Added Services for the Internal Warehouse Process

17.5 Value-Added Services Execution Using the Work Center

The VAS activity is executed using Transaction /SCWM/VASEXEC. To access the transaction, follow the SAP EWM Easy Access menu path, Extended Warehouse Management • Execution • Create Confirmation for VAS. The transaction opens the VAS work center UI where the VAS activities can be captured. To start the VAS order, click on the Start button (Figure 17.20) to capture the start date and time, system date and time is captured.

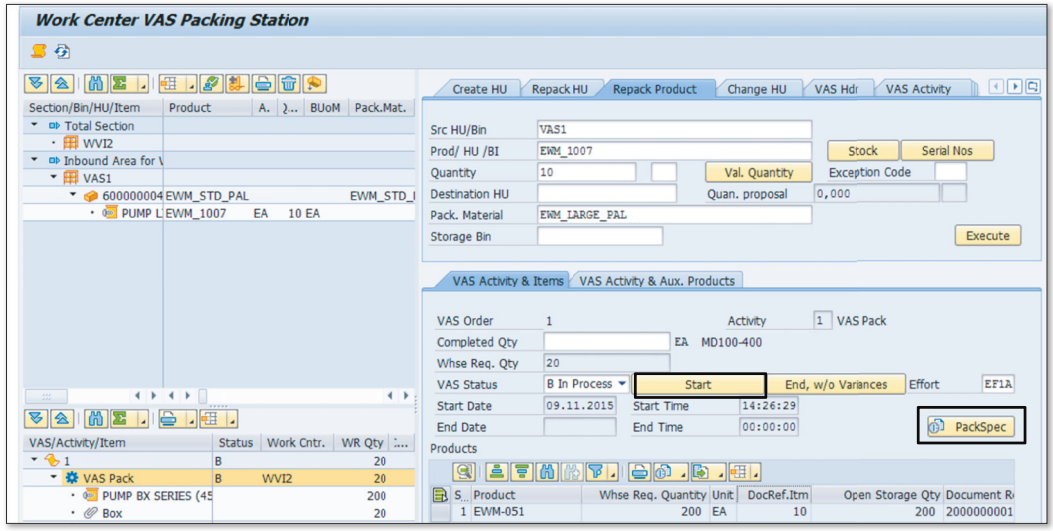


Figure 17.20 Work Center VAS Packing Station Screen

Table 17.2 lists some buttons found on the Work Center VAS Packing Station screen.

Button	Denotes
	VAS Order Header
	VAS Item
	VAS Activity
	VAS Auxiliary Product

Table 17.2 Buttons on the Work Center VAS Packing Station Screen

You should click the PackSpec button and follow the instructions for performing the VAS activity mentioned in the packaging specification. As stated in the previous example, if the VAS activity includes a special packing for specific customers on the box, repack in the work center into box pack material. Go to the Repack Product tab as shown in Figure 17.20, and repack 10 each in the Quantity field of product EWM_1007 into Pack. Material Box. In the Completed Qty field, enter the quantity for which you wanted to confirm.

After the VAS activity is completed, use the End, w/o Variances button to update the end date and time, without variances and to complete the VAS order. You can record with variances as well. Confirmation of the VAS order is possible in the following ways:

- If you confirm at the VAS order header, the system automatically adjusts the quantity of the VAS activity, VAS item, and VAS auxiliary product.
- If you confirm at the VAS activity level, the system automatically adjusts the quantity of the VAS item and the VAS auxiliary product.
- If you set the status of the VAS order to complete without variances, the system automatically sets the status of all activities to complete without variances.
- If you set the status of the VAS activity to complete without variances, the system automatically sets all previous activities to complete without variances.

17.6 Auxiliary Product Consumption Posting

Users can set the quantity of auxiliary packaging material consumed in the VAS order. If the relevance for consumption posting is set in the material master, then the goods issued quantity is automatically posted upon completion of the VAS order. You can document the consumption of the auxiliary item for the VAS at the work center. The following are required to record this process, which is shown in Figure 17.21:

- Set the consumption relevant for VAS in the product master under storage data.
- Assign a storage bin for VAS consumption posting.
- Maintain packaging specifications.
- Define customer-specific movement types in SAP EWM Customizing via the menu path, Extended Warehouse Management • Interfaces • ERP Integration • Goods Movements • Define Customer-Specific Movement Types.

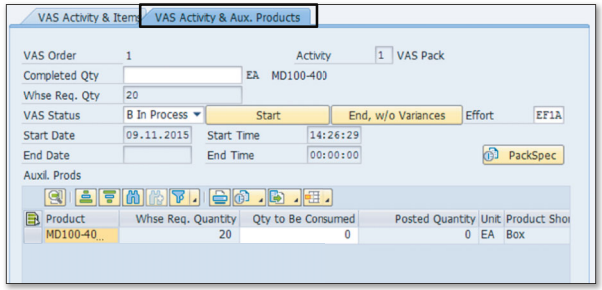


Figure 17.21 Auxiliary Product Consumption via the Work Center

The quantity of consumption posting is determined based on the ratio from the packaging specification. When the VAS activity is confirmed by the warehouse employee, the system performs the auxiliary consumption posting. The system determines the respective quantities by using the quantity ratios in the packaging specification of the products being processed. However, you can also manually overwrite the quantity determined (such as for unplanned overconsumption or underconsumption).

17.7 Summary

This chapter showcased the VAS processes in inbound, outbound, internal processes, and so on. We also discussed master data and configuration settings required to set up and run VAS processes. We also covered how VAS orders are created and executed via the VAS work center. Toward the end, this chapter covered the auxiliary product consumption and how the POSC is used in VAS activities and the VAS steps that are defined in POSC.

Takeaway

- Value-added services are designed to be performed along with inbound, outbound, and internal process.
- A VAS order document details the needs of a VAS and can be created either manually or automatically in the SAP EWM system.
- Product group type and product group configurations help in grouping products of the same nature.
- Value-added services settings that are maintained at the warehouse level are applicable to all the VAS activities conducted in a warehouse.

Within a supply network's distribution centers, production plants, and storage depots, there is a constant transfer of goods. Cross-docking deals with transporting and handling of goods among such multiple locations with the objective of efficiently managing goods movement to reduce time and cost.

18 Cross-Docking

Cross-docking involves receiving the merchandise at the inbound docks and then shipping it out shortly after without the need to stock it at the warehouse. If planned and executed properly, it saves the intermediate disposition, storage, and order fulfillment tasks in the warehouse. By simplifying the process, well-planned cross-docking operations save resources across the board, including warehouse resources (e.g., labor, space, and equipment) and technology resources (e.g. RF devices or computers).

Because cross-docking doesn't require the inventory to be stored at the warehouse, it provides the following dual advantages:

- **Operational efficiency**
  Because the material doesn't have to be stored at the warehouse and directly moves from the receiving docks to the shipping docks or staging areas, the warehouse operations are more efficient.
- **Inventory efficiency**
  Because the inventory moves directly from the receiving to shipping docks, there is no storage at the warehouses for the cross-docked items, which reduces the total system inventory in the supply chain.

There are two variants of cross-docking that can be leveraged. Both of these address different situations and need specific process/system capabilities, but both are founded in the cross-docking concept and provide the same advantages:

- Planned cross-docking
- Opportunistic cross-docking

SAP EWM supports planned cross-docking and opportunistic cross-docking and its subforms as illustrated in Figure 18.1.

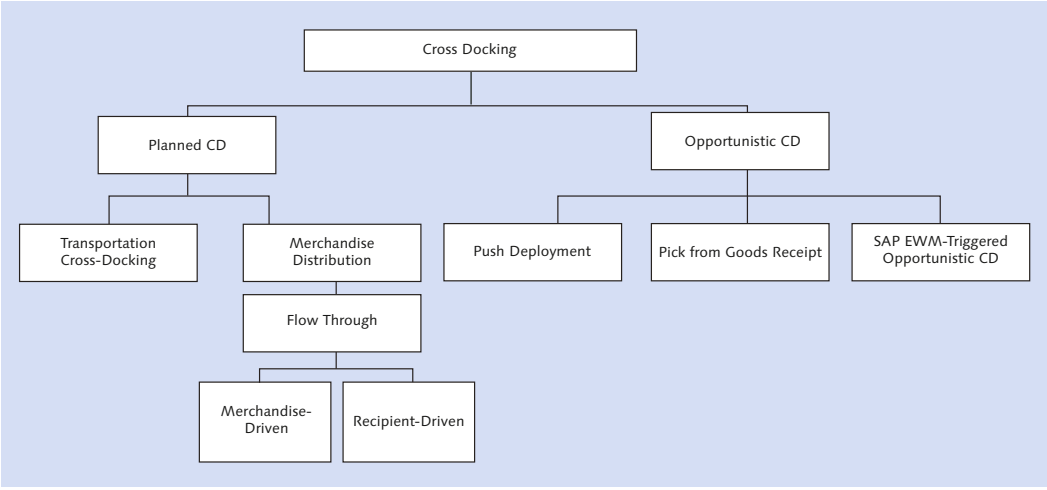


Figure 18.1 Cross-Docking Scenarios in SAP EWM

SAP EWM supports the following cross-docking options:

- Transportation cross-docking (TCD)
- Merchandise distribution
- Push deployment (PD)
- Pick from goods receipt (PFGR)
- SAP EWM-triggered opportunistic cross-docking

18.1 Planned Cross-Docking

Planned cross-docking is a deliberate strategy for the supply chain. It consists of determining the products that will be the best candidates for cross-docking/flow-through operations, and then deploying a complete demand and supply management process that leverages the flow-through strategy at the warehouse. These products typically show the following characteristics:

- They normally have consistent demand that isn't too high or too low. They can be seasonal as long as the seasonal demand has the same stable characteristics and the processes can handle data specific procedures.
- They have good handling characteristics.

After the target products have been determined, the implementation of the strategy requires that the supporting business processes are adjusted for making the shift. Like any other SAP ERP process, these shifts are enabled by SAP EWM.

As shown in Figure 18.2, the planned cross-docking process in SAP EWM allows you to design the cross-docking process the way you want to. In planned cross-docking, you determine the relevance for cross-docking before the stock arrives and before you post the goods receipt or release the outbound delivery.

The SAP ERP system gets the TCD operations number containing both inbound delivery and outbound delivery, which in turn executes the TCD in SAP EWM.

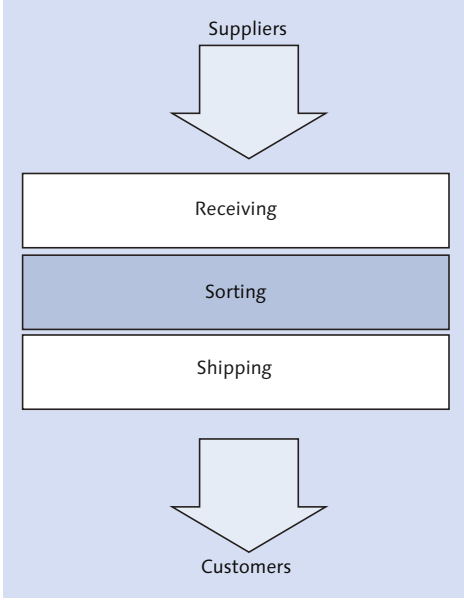


Figure 18.2 Planned Cross-Docking in Warehouse or Distribution Center

There are two types of planned cross-docking—TCD and merchandise cross-docking—described next.

18.1.1 Transportation Cross-Docking

Transportation cross-docking (TCD) helps in reducing the transportation cost by transferring the incoming products to the outgoing load in the TCD location (Figure 18.3). It also reduces the transportation cost, reduces the effort wasted on in-house activity of putaway and picking for the same load, saves storage space, and reduces the time to fulfill orders. TCD can help in fulfilling multiple orders that flow through the same cross-dock location.

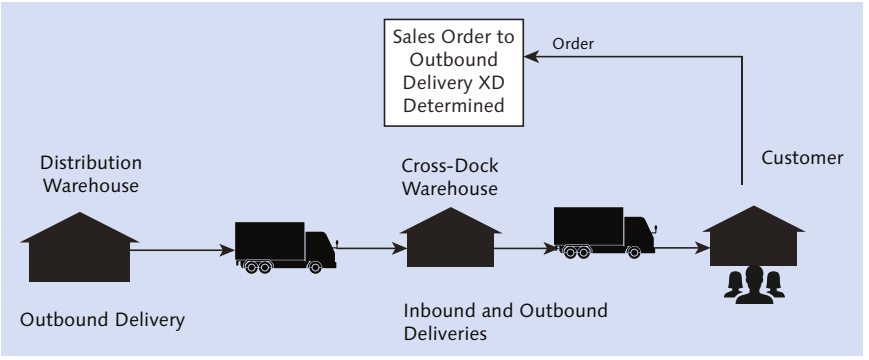


Figure 18.3 Transportation Cross-Docking

With TCD, the products aren't delivered directly to the customer; instead, they are moved to the cross-docking location. As represented in Figure 18.4, the product moves from the source location to cross-docking location 1 and cross-docking location 2 before it reaches the final destination. If the transportation is standard transport or company owned, it's typical to move the product close to the customer using the standard routes before the final dispatch.

At the cross-dock locations, handling units (HUs) can be consolidated or deconsolidated as required. If the HUs are to be consolidated while moving to the cross-docking locations, then they are moved to deconsolidation area using Process-Oriented Storage Control (POSC). Using the deconsolidation work center, the HUs are unpacked and repacked accordingly. After the deconsolidation is done, the HUs relevant for cross-docking move to the goods issue zone, and the rest moves for putaway. One of the prerequisites for using TCD is that products are packed as HUs and transported.

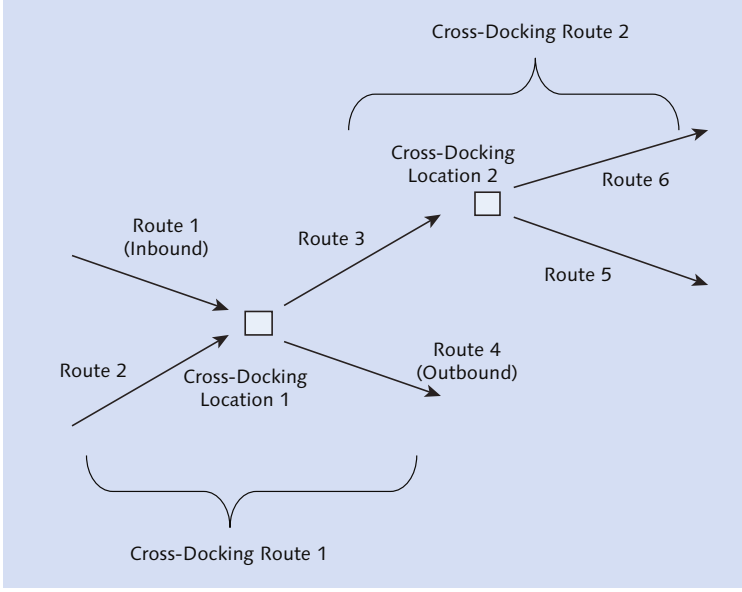


Figure 18.4 Transportation Cross-Docking Routes

TCD is initiated during the SAP EWM route determination of the outbound delivery order (ODO). Cross-docking routes are required for cross-docking, and two linear routes—an incoming route and an outgoing route—are assigned to it.

In a stock transport scenario, depending on how the system is configured, either SAP Advanced Planning and Optimization (SAP APO) or SAP ERP generates the stock transport order.

Replenishment delivery is created based on this stock transport order. While creating the delivery it calls the routing guide, and an available-to-promise (ATP) check is performed in SAP APO. If the system determines the cross-docking route between the shipping and receiving location, SAP ERP copies the cross-docking route into the outbound delivery. The outbound delivery is then distributed to SAP EWM, and an outbound delivery request (ODR) is created. The ODR is converted to an ODO either manually or automatically. When the ODO is created, SAP EWM considers the route proposal from SAP ERP. However, the routing guide is called again to determine if it's supposed to be transported to cross-docking location 1 or to the final destination. Warehouse activity is executed in cross-docking location 1, such as pick, pack, and post goods issue against the standard ODO, and communication is sent back to SAP ERP against the outbound delivery.

Now in SAP ERP, inbound and outbound deliveries are generated for cross-docking location 2. For these newly created documents in SAP ERP, corresponding documents in SAP EWM are created as well. When the ODO document is created, it calls for a routing guide in SAP APO again to check if any other cross-docking warehouse exists or if it needs to be shipped directly to the final destination. When goods receipt is posted against the inbound delivery, communication is sent to SAP ERP to update the inbound delivery. Against the ODO, you execute the warehouse activities such as creating an active pick HU warehouse task (WT) for the ODO. While creating the pick HU WT, the system determines the staging area for the goods issue. After you confirm the pick HU task, the HU is moved to the goods issue area to load the trailer with the HU.

After the loading of the trailer/truck is complete, the goods issue is posted against the ODO. SAP EWM sends the communication to the SAP ERP system to update the outbound delivery. If no relevant TCD steps are found, the SAP ERP system generates an inbound delivery at the receiving location. After the product is received at the receiving location, a goods receipt is posted, and pallets are put away in the bins. After the warehouse activity is completed, communication is sent to SAP APO to update the stock information.

Work Center Determination in Cross-Docking

As shown in Figure 18.5, you can determine the work center using Transaction /SCWM/CDSTDET, or you can go to SAP EWM Easy Access menu, and choose Extended Warehouse Management • Master Data • Work Center • Determine Work Center for Cross-Docking. You can also use rule-based determination of destination storage data via POSC. You need to set the Rule-Based indicator for the external storage process step.

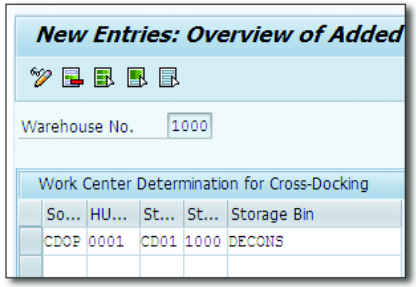


Figure 18.5 Work Center Determination for Cross-Docking

A variant of TCD is called *supplier cross-docking*. In this scenario, the supplier sends the product to the cross-docking location—not to the receiving warehouse. From the cross-docking location, it's grouped with other deliveries and transported to the receiving location in the most cost-effective manner.

18.1.2 Merchandise Cross-Docking

Merchandise cross-docking (Figure 18.6) is a subset of merchandise distribution in SAP Retail and is quite frequently used in the retail industry. Merchandise distribution helps control the flow of goods from vendor to the recipient, which can be either stores or customers. Before moving it to the customer, the merchandise can be stored in distribution centers or moved through multiple warehouses/distribution centers before reaching the final recipient. Merchandise distribution is planned either using a push scenario or pull scenario in SAP ERP; the push scenario involves allocation tables, and the pull scenario involves collective purchase orders. For processing merchandise distribution, cross-docking or flow-through methods are used.

Following are the basic configuration prerequisites for merchandise distribution in SAP ERP and SAP EWM:

- Basic prerequisite to use merchandise in the SAP ERP system is to configure SAP Retail, and the system should be SAP ERP 6.0 EHP 4 with business function Retail, CD/FT_EWM Integration.
- You have to make the necessary Customizing settings in the SAP ERP IMG menu, under Logistics - General • Merchandise Distribution • Integration with Other mySAP.com Components • Extended Warehouse Management • Additional Material Attributes • Attribute Values for Additional Material Master Fields • Define Adjustment Profile.
- On the SAP EWM side, ensure that the necessary configurations are made in the SAP EWM IMG Customizing menu, Extended Warehouse Management • Cross-Process Settings • Cross-Docking (CD) • Planned Cross-Docking • Merchandise Distribution.

In merchandise cross-docking, if it's a pull scenario, then SAP ERP creates a collective order due for the customer order or stock transfer order and updates the merchandise distribution data (pull).

If it's a push scenario, SAP ERP creates the vendor order and stock transport order using the allocation table and updates the merchandise distribution data.

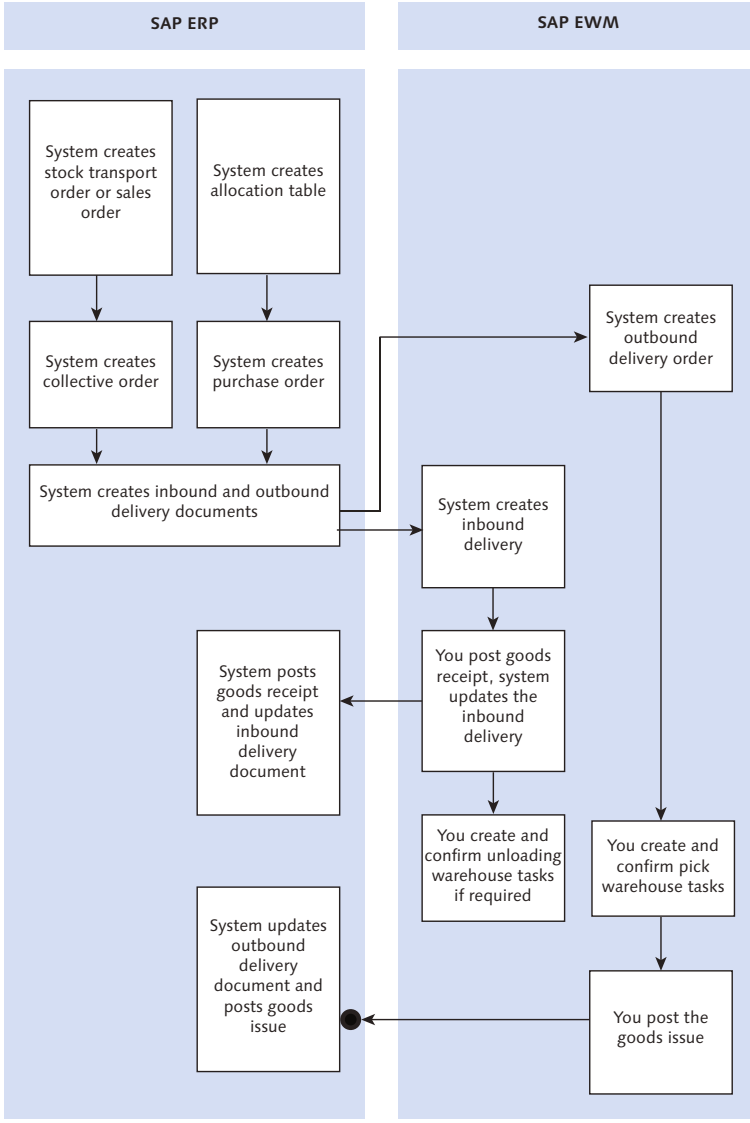


Figure 18.6 Merchandise Distribution

The SAP ERP system then generates inbound and outbound deliveries and distributes them to SAP EWM. When the inbound and outbound deliveries are created

in SAP EWM, it receives the process method and purchase order item as reference. In SAP EWM, according to the merchandise distribution process configuration, the process type determination and cross-docking are executed. When goods are received, depending on whether the goods are packed or unpacked the following options are available:

- If unpacked, the POSC can't be used.
- If packed in HU when received, the POSC can be used. When customer information is received in SAP EWM, it checks for final ship-to party details of the HU and then matches it with the ship-to party of the outbound delivery. Unload WTs are created according to settings in POSC, and pick-relevant WTs are generated.

Upon goods receipt, the product moves directly to goods issue and post goods issue. Communication is sent back to the SAP ERP system for outbound delivery update and goods issue.

Merchandise Distribution: Recipient-Driven Flow-Through Process

In the recipient-driven flow-through process (Figure 18.7) when you receive the products, there could be a situation where you can't send the goods to the final ship-to party due to their condition. In such situations, you might need to move the product to the cross-docking repack area. In this process, one pick HU is used for each customer. The warehouse operator picks the pick HU, pulls out the entire product from the bin to this pick HU, packs this pick HU, and takes the entire HU to goods issue.

If you receive HUs with different products and post goods receipt in SAP EWM, then the inbound delivery is updated in goods receipt in SAP ERP. You can use the Merchandise Distribution Quantity Adjustment—Flow Through report to adjust the ODO item quantities when there is a difference between goods receipt quantity and purchase order item quantity. You can access this report in SAP EWM Easy Access via Transaction /SCWM/MEDI_AQTY or choosing Extended Warehouse Management • Delivery Processing • Inbound Delivery • Merchandise Distribution: Maintain Quantity Adjustment (Flow-Through).

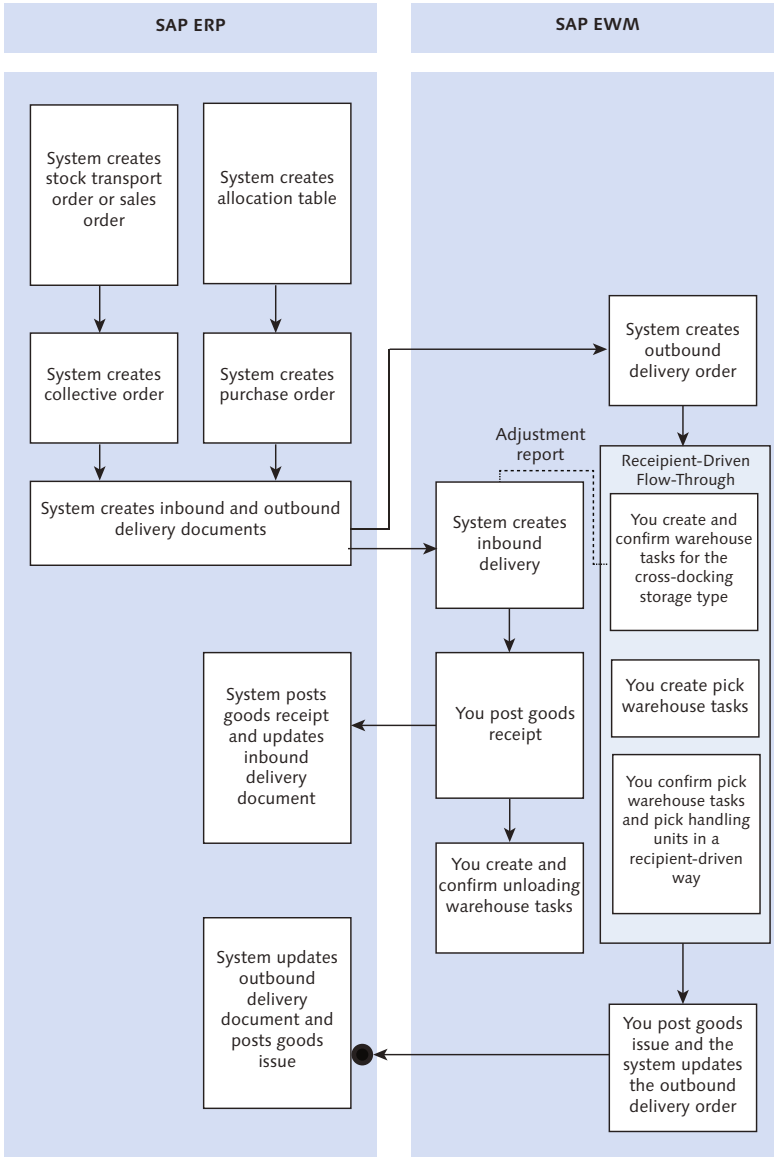


Figure 18.7 Recipient-Driven Flow-Through

Merchandise Distribution: Product-Driven Flow-Through Process

The product-driven flow-through process (Figure 18.8) disassembles the products from the incoming HU into customer-specific HUs.

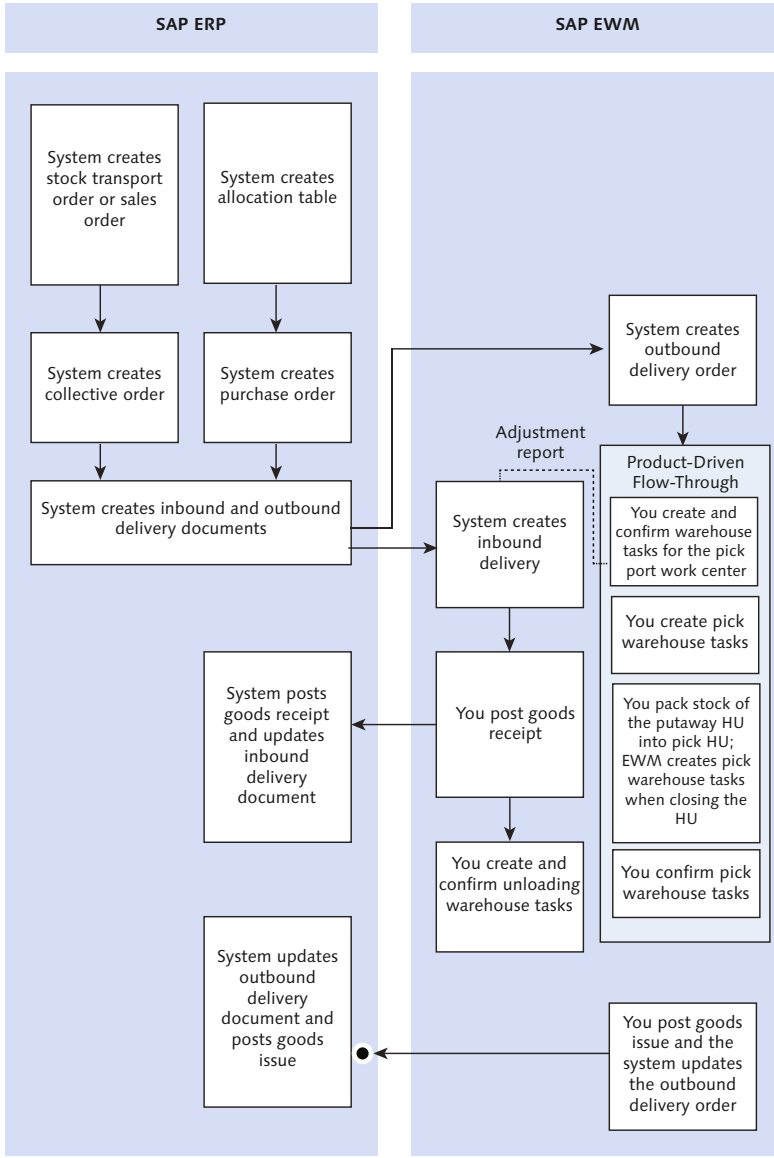


Figure 18.8 Product-Driven Flow-Through

Ultimately, the warehouse operator deconsolidates by unpacking the incoming HU and packs the products into customer-specific pick HUs. After the pick HU is completed, a new WT is created to move this HU to the goods issue staging area.

When you confirm the WT that moves the pick HU into the goods issue area, the loading WT is created. Then you load the HU and confirm the loading WT. After this is done, SAP EWM posts the goods issue and updates the ODO. Communication is sent from SAP EWM to the SAP ERP system to update the outbound delivery.

18.2 Opportunistic Cross-Docking

This is an ad hoc cross-docking process that takes advantage of real-time information exchanges among various distribution and fulfillment systems. Opportunistic cross-docking identifies when an inbound shipment or part of shipment can be used to fulfill an outstanding order by directly routing the inbound merchandise to the staging or shipping docks for an outbound order.

This type of cross-docking may also not provide any significant inventory reduction benefits, but this is broadly applicable across most products and provides the warehouse operation efficiencies without major changes in the business planning and execution processes.

In opportunistic cross-docking, you initially work with the standard inbound and outbound process. The decision for cross-dock relevance is made after goods arrive at the warehouse and before they leave the premises. The following methods are used in opportunistic cross-docking:

- Push deployment (PD) and pick from goods receipt (PFGR)
- SAP EWM-triggered opportunistic cross-docking

18.2.1 Push Deployment and Pick from Goods Receipt

The push deployment is feasible only when SAP APO, SAP Customer Relationship Management (SAP CRM), SAP ERP, and SAP EWM are used. As shown in Figure 18.9, the process starts with standard inbound and standard goods receipt. When the relevance of putaway delay is identified against warehouse process type and stock type, the WT creation is delayed for the specified time.

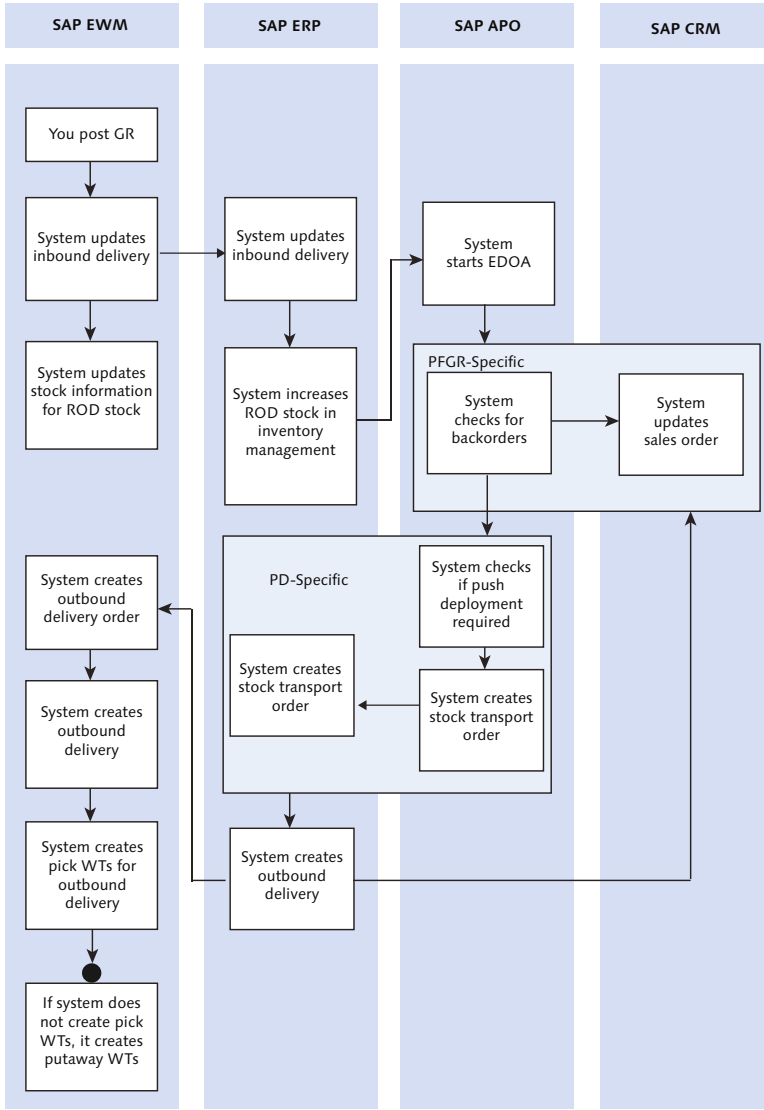


Figure 18.9 Push Deployment and Pick from Goods Receipt Opportunistic Cross-Docking

You specify the putaway delay (Figure 18.10) in SAP EWM IMG under menu path, Extended Warehouse Management • Cross-Process Settings • Warehouse Task • Define Putaway Delay.

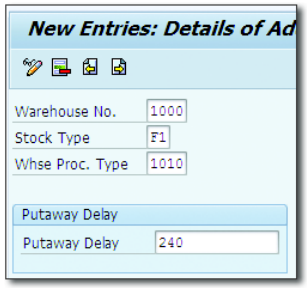


Figure 18.10 Definition of Putaway Delay

During this period, SAP APO checks if there is a forecast demand from other locations, overdue customer orders, or overdue stock transfer orders. If forecast demand is there, SAP APO initiates the outbound delivery creation in SAP ERP. When the putaway delay time is over, the system creates putaway WTs, and as the cross-docking outbound delivery takes place, the goods are directly transferred to the goods issue zone. If you create the putaway WTs manually, the system issues a warning message. If you ignore this message, the system bypasses the opportunity cross-docking.

18.2.2 SAP EWM-Triggered Opportunistic Cross-Docking

Unlike other variants of cross-docking, SAP EWM-triggered opportunistic cross-docking works within the SAP EWM system and doesn't involve any other system such as SAP ERP, SAP APO, or SAP CRM. For the SAP EWM-triggered opportunistic cross-dock process, when the system generates the putaway or the pick WTs, it determines the relevance for SAP EWM-triggered opportunistic cross-docking. You can activate the relevance at the warehouse level or at the product level.

A prerequisite for working with SAP EWM-triggered opportunistic cross-docking is to implement the Business Add-Ins (BAdIs) Activate and Adjust Inbound-Triggered Cross Docking Process and Activate and Adjust Outbound-Triggered Cross Docking Process for both inbound and outbound processes. You can activate the BAdIs in SAP EWM IMG using the menu path, Extended Warehouse Management • Business Add-Ins (BAdIs) for Extended Warehouse Management • Cross-Process Settings • Cross-Docking (CD) • Opportunistic Cross-Docking • EWM-Triggered Opportunistic Cross-Docking • EWM-Triggered Opportunistic Cross Docking Inbound and EWM-Triggered Opportunistic Cross Docking Outbound.

As shown in Figure 18.11, the activation for the SAP EWM-triggered opportunistic cross-docking at the warehouse level is done in SAP EWM Customizing for the inbound process or the outbound process. You can access the menu path via SAP EWM IMG by choosing Extended Warehouse Management • Cross-Process Settings • Cross-Docking (CD) • Opportunistic Cross-Docking • EWM-Triggered Opportunistic Cross-Docking • Activate EWM-Triggered Opportunistic Cross-Docking.

Figure 18.11 SAP EWM-Triggered Opportunistic Cross-Docking Activation at the Warehouse Level

Here you assign the product group type for opportunistic cross-docking for inbound and outbound. To create the product group type, you need to navigate to the SAP EWM IMG menu path, Advanced Planning and Optimization • Master Data • Product • Product Groups • Define Product Group Types.

After the product group type is defined, you need to create the product group to assign the product group against the product group type. By grouping the product group with the product group type, it helps in grouping the products of the same kind for opportunistic cross-docking. You define the product group in the SAP EWM IMG menu path, Advanced Planning and Optimization • Master Data • Product • Product Groups • Define Product Groups.

Product group is assigned to the product master in the Properties 2 tab. You can maintain this via Transaction /SAPAPO/MAT1 (Maintain Product) or via the SAP EWM Easy Access menu path, Extended Warehouse Management • Master Data • Product • Maintain Product.

There are two variants in SAP EWM-triggered opportunistic cross-docking—one for the inbound process and one for the outbound process—as we'll discuss next.

SAP EWM-Triggered Opportunistic Cross-Docking in Inbound Process

As shown in Figure 18.12, when the inbound delivery is relevant for opportunistic cross-docking and while creating the putaway task, the system checks for any existing ODO item against product, batch, and quantity characteristics based on the active BAdI implementation. In such situations, instead of creating a putaway task, the system creates a cross-docking WT referring to the ODO item. If the system is unable to find the suitable ODO item, the standard process continues with goods receipt and putaway task creation.

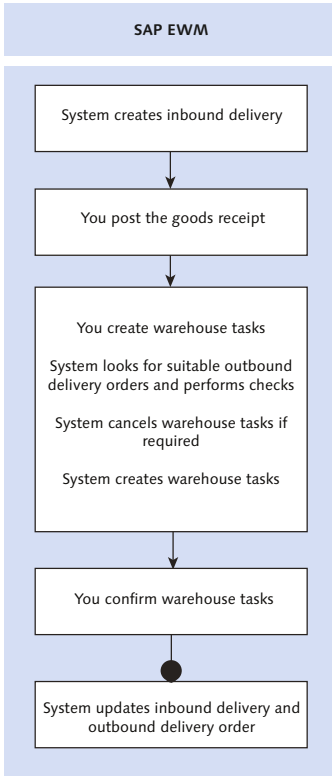


Figure 18.12 SAP EWM-Triggered Opportunistic Cross-Docking in Inbound Process

If the system does find an existing pick task for the same item, batch, and quantity, SAP EWM cancels the existing WT without violating the first in, first out (FIFO) principle and creates a new pick task against the product, batch, and quantity that you want to put away. By doing this, it eases out the putaway as well as picking from the bin for the ODO item.

If the stock required in the ODO item is less than the putaway quantity, the system creates the putaway task for the remaining quantity after the cross-docking quantity. You can use this process with and without POSC.

Note

For opportunistic cross-docking, SAP EWM considers only inbound delivery items for which goods receipt has been posted. If items are relevant for quality inspection, they are ignored for cross-docking. Only homogenous types of HUs are considered. When the HU isn't split and has multiple products in it, the quantity should be less or identical to the requested quantity.

SAP EWM-Triggered Opportunistic Cross-Docking in Outbound Process

As shown in Figure 18.13, this is triggered when SAP EWM identifies that the ODO is relevant for opportunistic cross-docking based on the active BAdI implementation.

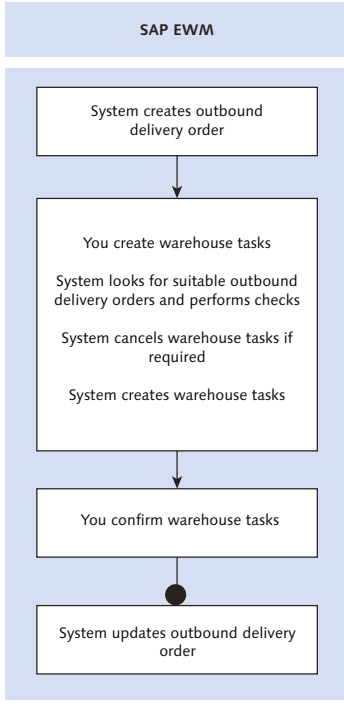


Figure 18.13 SAP EWM Triggered Opportunistic Cross-Docking in Outbound Process

During the course of the pick task creation against the ODO item, the system checks if any stock exists in the goods receipt area that is suitable for fulfilling the ODO item. If stock exists, SAP EWM checks for open putaway tasks. If open putaway tasks are found, the system cancels the putaway task without violating the FIFO principle and creates a new pick task with the stock that you wanted to put away. If SAP EWM doesn't find any goods receipt item, it proceeds with the standard process for picking based on the stock removal strategies.

18.3 Exceptions in Cross-Docking

In SAP EWM, exception codes are used to handle the exceptional situations during the course of the business process. Exception codes in cross-docking update both inbound delivery and outbound delivery in certain processes, which in turn update the quantity in both the documents at the same time.

You can define this setting in Customizing for cross-docking via the SAP EWM IMG menu path, Extended Warehouse Management • Cross-Process Settings • Exception Handling • Define Exception Codes. Define the Delivery Adjustment in Case of Differences in the dialog structure for the process code against the inbound and outbound delivery type for adjusting the delivery quantity for cross-dock. If you configure without a business context but with the cross-dock indicator against the item type, even then SAP EWM adjusts the delivery quantity of this item type.

18.4 Summary

In this chapter, we discussed the various methods of cross-docking. We covered how the cross-docking process works in planned cross-docking and opportunistic cross-docking, along with variants within these methods. We also discussed how to use them and exceptions available in cross-docking.

Takeaways

- At a broad level, there are two kinds of cross-docking mechanisms: planned and opportunistic.
- Planned cross-docking is typically used in the following:

- Engineer to order, procure to order, or make to order environments, where you create a supply source to satisfy a particular demand. In this situation, a one-to-one relationship exists between the supply source and the demand source.
- High-volume retail distribution center environments where you receive items from vendors with preallocation to a demand source. Sometimes the containers the vendors send have the store marking and identification label. This functionality applies to retail and 3PL industry verticals.

- Opportunistic cross-docking is typically used in the following:
  - Just in Time (JIT) manufacturing environments, where material received from vendors through inbound trailers is cross-docked directly to manufacturing.
  - Flow-through shipping environments, where material from inbound trailers is cross-docked directly to waiting outbound trailers. This process works well when a small number of incoming orders are used to fulfill a small number of outbound orders.

Material Flow Systems enable SAP EWM to take advantage of automatic storage retrieval systems that automate conveyor systems and control the transportation of handling units. No additional warehouse control units are needed for linking SAP EWM with the automated retrieval system.

19 Material Flow System

Many modern warehouses use automatic storage and retrieval systems (ASRS) for the transfer of goods within the warehouse, wherein manual intervention isn't required or is very limited. ASRS is a combination of components such as the storage rack, the input/output system, the storage and retrieval equipment (e.g., conveyer belts, automatic forklifts, transfer cars, etc.), and the computer management system.

In SAP Extended Warehouse Management (SAP EWM), such physical movements of products in the warehouse are managed and controlled by the Material Flow System (MFS). SAP EWM communicates directly with the automated system control levels, and no additional warehouse control unit is required between SAP EWM and the automated system control levels.

The programmable logic controller (PLC) is widely used in automation for electromechanical process, for example, a conveyer system in a warehouse or manufacturing facility. The PLC is used for communication between SAP EWM and the MFS. Figure 19.1 depicts a material flow conveyor system in the warehouse transporting products in and out of a high rack storage area. In this example, an automated transfer car (T-car) system is used to move the pallet/handling unit (HU) right from production receipts until goods issue for the customer order or stock transport order (STO)/purchase order (PO). When the pallet/HU is received from the production line, it moves to the identification point (ID point). Upon receipt, the HU is scanned, and the telegram message is sent to SAP EWM from the PLC. This message is processed in SAP EWM, for example, for determining the putaway bin for the HU, and this information is again sent back to the PLC

through a telegram message. After the PLC receives and processes the telegram, it communicates to the MFS to HU to the respective destination.

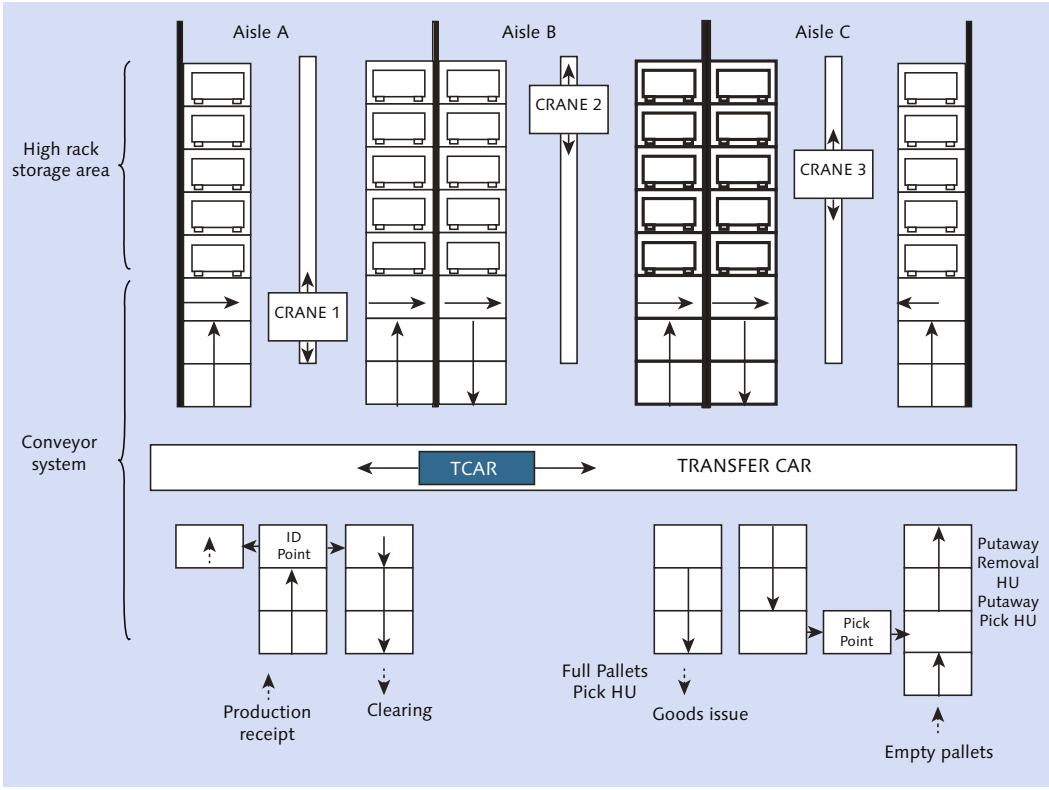


Figure 19.1 Material Flow System with High Rack Storage Area

19.1 Structure of MFS

The structure of MFS consists of the following components:

- PLC
- Communication channel
- Communication point
- Conveyor segment
- Resources

Configuring the correct structure of MFS is critical. Also sending the telegram back and forth at the right time and in the correct sequence is critical for successful execution of the automated transportation of products/pallets/HUs within the facility.

19.1.1 Programmable Logic Controller

The PLC controls the physical movement of HUs on the conveyor system. The PLC enables the controlling and handling of the MFS via SAP EWM through warehouse tasks (WTs) to PLCs. When the telegram is received from the PLC, it evaluates the signal from the connected ASRS. Based on this evaluation, it activates or deactivates the motor, appliances, sensors, readers, and so on. Every single communication control between SAP EWM must be defined in the PLC. In a complex environment of ASRS, there could be head control and local control pertaining to it. SAP EWM only interacts with the head controls.

19.1.2 Communication Channel

A communication channel is required to connect the MFS and the PLC for transmission of telegrams between them. Each PLC should have at least one communication channel. The communication channel controls properties such as length of the message, time, and number of recurrences in a handshake mode, which acknowledges the receipt of the telegram/signal. Unless a communication channel is defined, the signal/telegram can't facilitate the transfer of messages between MFS and the PLC. The connection is defined by the IP address and a port. One PLC can have many channels of communication using separate ports. Based on the business requirements, you can communicate the telegrams via different ports.

Messages of telegram/signal are communicated in sequence. The second signal is sent only upon the acknowledgement of receipt for the first one. However, sending parallel signals is also possible, but you need to take a precautionary approach so that signals aren't superimposed on one another. You can define, assign, and rank the order of communication channels in the SAP EWM IMG menu path, Extended Warehouse Management • Material Flow System (MFS) • Master Data • Communication Channel.

Let's take an example from the Figure 19.1. You have the ASRS in your warehouse using T-cars and cranes for moving the products from production line to the bin.

Because the traffic is heavy at the staging area, you can have two separate channels (Port 1 and Port 2) of communication to the PLCs. Channel 1 for product/HU attributes-related communication and Channel 2 for status communication.

19.1.3 Communication Point

SAP EWM and the PLC communicate via communication points. The communication points are assigned to the PLC. The common communication points are identification points (ID points) or scanner points. When the product arrives at the identification points, it's scanned and the signal/message is sent from the PLC to SAP EWM. This message is called a telegram. SAP EWM processes this telegram, for example, when the message is received after arriving at one I-point, SAP EWM can determine the destination bin information and send back the message to the PLC for further processing of the product (HU) for moving it to the final putaway bin. This message back to the PLC initiates the conveyor system to move further for product placement.

19.1.4 Conveyor Segment

The portion between the two communication points is called a conveyor segment (Figure 19.2). The HUs move physically between these legs (from ID Point 1 to ID Point 2). You can control the traffic between these conveyor segments by defining the capacity. The capacity relates to the number of HUs allowed for commuting within the conveyor segment. When the system finds the number of HUs exceeding the allowed limit, SAP EWM holds action for any further HU transportation in the segment.

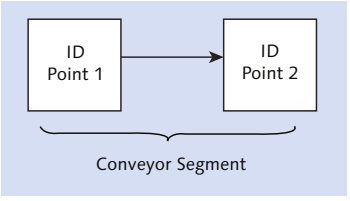


Figure 19.2 Conveyor Segment

You can define the conveyor segment in the SAP EWM IMG menu path, Extended Warehouse Management • Material Flow System (MFS) • Master Data • Define Conveyor Segment.

19.1.5 Resources

A resource is an object that performs the task; it can be either a T-car or crane moving the HU from one communication point to the other. A resource travels to the pick point in an empty state, takes the HU, and commutes to the required destination. You define the MFS resource type in the SAP EWM Customizing menu path, Extended Warehouse Management • Material Flow System (MFS) • Master Data • Define MFS Resource Type.

You can maintain the MFS resource in the SAP EWM Easy Access menu, Extended Warehouse Management • Master Data • Material Flow System (MFS) • Maintain MFS Resource or via Transaction /SCWM/MFS_RSRC as shown in Figure 19.3

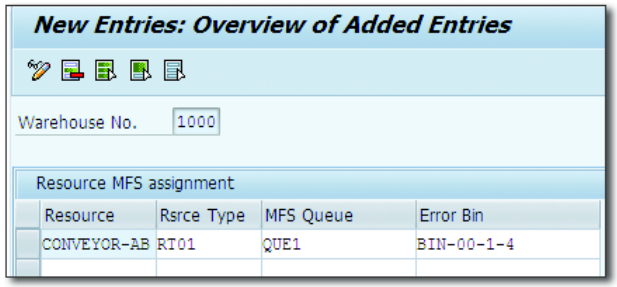


Figure 19.3 MFS Resource Assignment

Task interleaving is a well-established industry best practice. It uses the warehouse management system (WMS) to assign tasks to workers in ways that make the best use of each trip that they and their associated equipment make during their work shifts. When you use interleaving, you might need different resource types because you move from one queue to the other against different resource types (see Table 19.1).

Resource Type	Queue
INB	PUTAWAY
OUTB	PICKING

Table 19.1 Resource Type Example for Flipping for Interleaving

In the previous example, the queue keeps flipping between putaway and picking for the resource when interleaving is active. When the putaway is done, the

resource moves to the OUTB resource type for the picking activity because interleaving was active. After picking is completed, it moves back to putaway. The warehouse orders (WOs) are considered based on the latest start date/time (LSD/T) for interleaving when the LSD/T has reached or is about to reach the rounding time period, which is defined in modes. These modes are defined in the system (Figure 19.4), and the determination criteria are maintained against the activity level in the SAP EWM Customizing menu path, Extended Warehouse Management • Cross-Process Settings • Resource Management • Define Modes and Define Mode Determination Criteria.

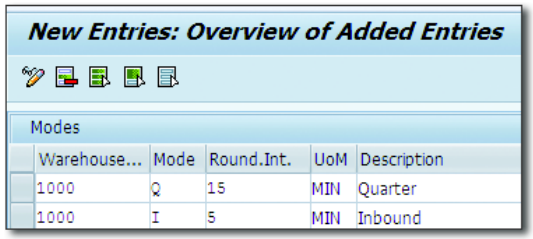


Figure 19.4 Definition of Modes

19.2 Setting Up the Material Flow System

To enable the SAP EWM system connection with PLC, you need to make the following settings in Customizing:

- Define the PLC interface types in the SAP EWM IMG menu path, Extended Warehouse Management • Material Flow System (MFS) • Master Data • Define PLC Interface Type.
- Define a PLC in the SAP EWM IMG menu path, EWM • Material Flow System (MFS) • Master Data • Define Programmable Logic Controller (PLC).
- Define communication channels for each PLC in the SAP EWM IMG menu path, EWM • Material Flow System (MFS) • Master Data • Communication Channel • Define Communication Channel.
- Define communication point types in the SAP EWM IMG menu path, EWM • Material Flow System (MFS) • Master Data • Define Communication Point Types.

- Define communication points in the SAP EWM IMG menu path, EWM • Material Flow System (MFS) • Master Data • Define Communication Point.
- Define communication point dependencies in the SAP EWM IMG menu path, EWM • Material Flow System (MFS) • Storage Control • Define Communication Point Dependencies.
- Define conveyor segments in the SAP EWM IMG menu path, EWM • Material Flow System (MFS) • Master Data • Define Conveyor Segment.
- Define conveyor segment group types in the SAP EWM IMG menu path, EWM • Material Flow System (MFS) • Master Data • Define Conveyor Segment Group Type.
- Define conveyor segment groups in the SAP EWM IMG menu path, EWM • Material Flow System (MFS) • Master Data • Define Conveyor Segment Groups.
- Assign the conveyor segments to the conveyor segment groups in the SAP EWM IMG menu path, EWM • Material Flow System (MFS) • Master Data • Assign Conveyor Segments for Conveyor Segment Groups.
- Assign an MFS-relevant storage type role to the storage types for the MFS process in the SAP EWM IMG menu path, EWM • Master Data • Define Storage Type.
- Define storage groups for Layout-Oriented Storage Control (LOSC) in the SAP EWM IMG menu path, EWM • Material Flow System (MFS) • Storage Control • Define Storage Groups for Layout-Oriented Storage Control.
- Define LOSC in the SAP EWM IMG menu path, EWM • Material Flow System (MFS) • Storage Control • Define Layout-Oriented Storage Process Control.
- Define an MFS queue for each PLC in the SAP EWM IMG menu path, EWM • Material Flow System (MFS) • Master Data • Define MFS Queue.
- Define the MFS resource type PLC in the SAP EWM IMG menu path, EWM • Material Flow System (MFS) • Master Data • Define MFS Resource Type.
- Define MFS actions in the SAP EWM IMG menu path, EWM • Material Flow System (MFS) • Telegram Processing • Define MFS Actions.
- Define the telegram structure in the SAP EWM IMG menu path, EWM • Interfaces • Material Flow System (MFS) • Telegram Processing • Define Telegram Structure.

- Specify the MFS action that is triggered depending on the communication point type and the telegram type in the SAP EWM IMG menu path, EWM • Material Flow System (MFS) • Telegram Processing • Find MFS Actions.
- Define exceptions in the SAP EWM IMG menu path, EWM • Material Flow System (MFS) • Exception Handling • EWM Exceptions.
- Assign telegram errors to PLC errors in the SAP EWM IMG menu path, EWM • Material Flow System (MFS) • Exception Handling • Assign Telegram Errors to PLC Errors.

Note

In addition to the preceding list, there are system settings to be made in SAP Easy Access. Go to *http://help.sap.com* for information on these settings.

19.3 Repeating or Resending an Acknowledgment Telegram

SAP EWM provides an option for resending the acknowledged telegram. A telegram might get stuck due to inadvertent error, so you may want to resend the telegram so that it can be reprocessed successfully. In this event, you can use the warehouse monitor to resend the telegram. In the warehouse monitor, you navigate via the Material Flow System • Telegram node and then use the More Methods option to simulate or resend the telegram.

19.3.1 Telegram Repetition and Channel Check

At times, there can be a disjuncture in the communication channel. When the communication channel is synced up after the disjuncture, the PLC resends all the messages that were accumulated during the disjuncture to SAP EWM. This in turn updates in SAP EWM that the message is sent. When there is no acknowledgement, SAP EWM repeats the telegram based on the setting maintained in the communication channel. You can maintain this in the SAP EWM IMG menu path, Extended Warehouse Management • Material Flow System (MFS) • Master Data • Communication Channel • Define Communication Channel. When there is no communication, SAP EWM sends a channel check by sending a life telegram. This life time interval is maintained in the communication channel as well.

19.3.2 Reprocessing Incoming Telegrams

Some of the incoming telegrams are set to retry in status due to momentary issues. These telegrams can be reprocessed at a regular interval of time based on the retry interval maintained in the communication channel. This reprocessing is done in batches; that is, reprocessing is done after every specified interval of time.

Note

Not all error messages are set for retry; some messages might have failed for a different reason. Those telegrams have to be processed manually.

19.3.3 Periodic Custom Logic

SAP EWM provides BAdI `/SCWM/EX_MFS_PERIOD_ACT` to add your own custom logic for period execution reasoning.

19.4 Material Flow System in the Warehouse Management Monitor

The warehouse monitor has robust attributes for MFS from a monitoring viewpoint. The following are the key nodes within the warehouse monitor and its subset for MFS:

- Communication Channel
  This node allows you to start, stop, and restart the channel.
- Communication Point
  This note allows you to send a request for the status, set exceptions, and track all the communication points.
- Telegram
  This node subset allows you to follow up the telegrams. You can sort based on the dispatch time and type of error in the telegram. From the list, you can resend and simulate the telegram. You can also branch to the WT from here.

- Conveyor Segment Group and Conveyor Segment
  This node allows you to lock the individual segment or segment group.
- Resource
  This node allows you to send status requests, trigger telegram processes, and set exceptions via this report.
- Telegram Buffer
  This node allows you to monitor both incoming and outgoing telegram buffers. The inbound telegram received with error stays in this incoming telegram. All the outgoing telegrams that haven't been acknowledged by the PLC stay in the outgoing telegram buffer. You can edit, delete, and process the logs for both incoming and outgoing from here.

19.5 Exception Handling in the Material Flow System

The exceptions handling process allows you to handle the system errors during the PLC reports in the telegram. Exceptions in the PLC can be handled in two different ways. You can either map the exception codes to the PLC error code, or you can use internal exception codes defined in the system. In the first case, the PLC telegram reports the exception on the telegram. For internal exceptions, you can map them to your own customized exception codes to make them self-explanatory for the business user. This can be done in the SAP EWM IMG menu path, Extended Warehouse Management • Cross Process Settings • Exception Handling • Assign Internal Exception Codes to Exception Codes.

19.6 Material Flow System in the Easy Graphics Framework

SAP EWM delivers the following Easy Graphics Framework (EGF) objects. You can read the status of these objects in the EGF.

- **Communication channel status**
  Red status indicates that the communication channel has been stopped, green status indicates that the communication channel is running, and yellow status indicates that synchronization is going on.

- **Communication layer status**
  Red status indicates that it can't be reached, green status states indicates that it can be reached, and gray status indicates that the communication layer can't be checked (status unknown).
- **Outbound telegram status**
  Red status indicates that at least one outgoing telegram hasn't been acknowledged on time, and green status indicates that all telegrams have been sent in a timely manner.
- **Inbound telegram status**
  Red status indicates that the telegram has run into an error upon receipt, and green status indicates that all telegrams have been received without errors.
- **Process for telegram repetition status**
  Red status indicates that it's not running, and green status indicates that it's running.
- **MFS resource status**
  Red status indicates that there is an exception, and green status indicates that there is no exception.

19.7 Material Flow System for Case Conveyor Systems

SAP EWM enables you to connect with PLCs that control fast-moving automatic case conveyor systems. The case conveyor systems are used in industries such as cool drinks, beverages, chocolate, and so on. With this option, the routing decision of the HU is based on the current location of the HU and the context information. The context information refers to the general information such as putaway- or picking-relevant data. The system accesses the context data and current communication point for the incoming telegrams. It evaluates the routing decision and communicates the telegram back to the PLCs.

19.7.1 Setting Up Material Flow Systems for Case Conveyor Systems

For setting up the Customizing and system settings for a case conveyor system, go to *http://help.sap.com* and choose Extended Warehouse Management • 9.3 • Material Flow System • Setting Up MFS for Case Conveyor Systems.

Figure 19.5 illustrates the responsibilities in the MFS.

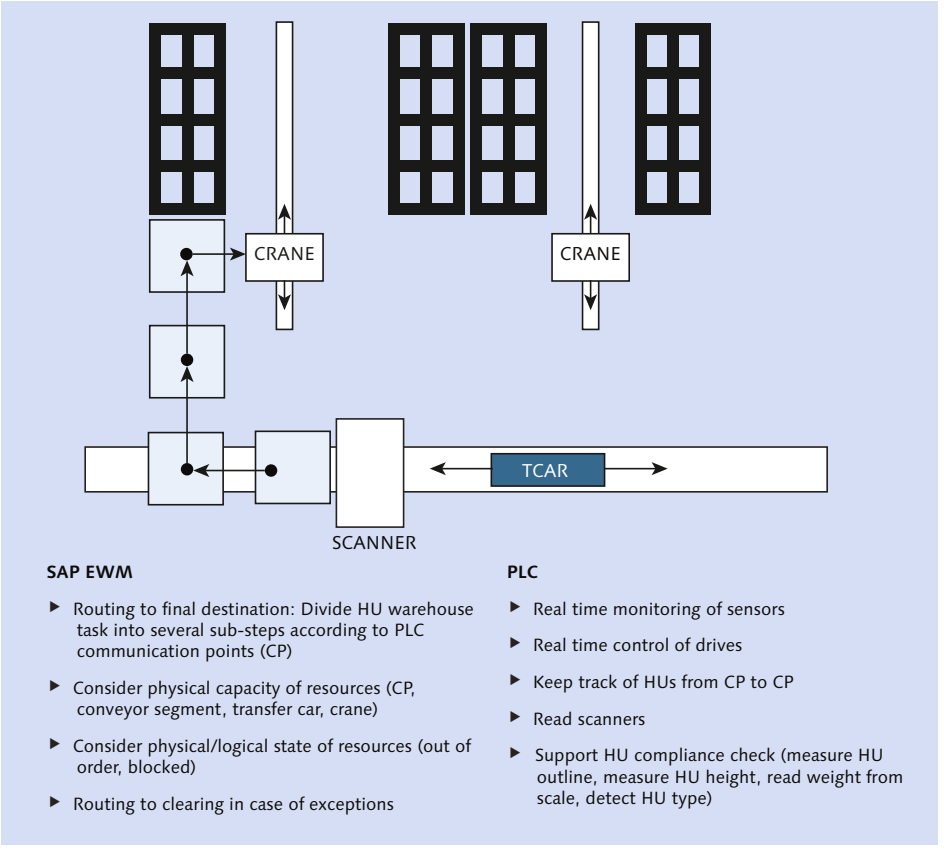


Figure 19.5 Responsibilities in the Material Flow System

19.7.2 Putaway and Stock Removal Strategy

The putaway strategy in the case conveyor system is different from the manual storage process in the warehouse. It works in a completely different way considering the physics of the ASRS and the current state of equipment being used. The putaway strategy for the conveyor works in an absolutely dynamic way in that it only takes routing decisions into consideration and doesn't create the WT until the final putaway. This provides high flexibility because the stock situation and the equipment state are considered just before the final putaway. For more details on the prerequisites and features, go to *http://help.sap.com* and choose

Extended Warehouse Management • 9.3 • Material Flow System • Putaway Strategy.

Stock removal strategy takes two factors into consideration. First, the equipment status is considered, and second, the system sorts the quants to distribute picking across different aisles to improve productivity and efficiency. Sorting can be done in the following ways:

- Considering the load across aisles based on open pick WTs
- Using the logical position to first pick the HUs next to aisles
- Using the cross-line stock putaway sorting to spread the load across aisles
- Using the goods receipts date instead of the exact goods receipt date and time

Consider a situation in which an HU is blocked in a bin where it's placed in front (bin coordinates 1 × 2 × 4 single row, 2 stack, and 4 high). If an HU is to be picked for an order, then first the blocked HU in the front bin must be transferred to another bin in the same aisle so the HUs behind it can be removed; otherwise, it will keep interfering with all the HUs behind it. If a particular HU is moved very often, the HU is sent to a resource error bin. These movements help in improving the operating efficiency in the warehouse. You can control this by maintaining the maximum number of stock transfers allowed for an HU in the SAP EWM IMG menu path, Extended Warehouse Management • Material Flow System (MFS) • Master Data • Define MFS Resource Type. Under certain circumstances, when the stocks aren't considered, especially when the communication channel isn't synced up, then the resource and drop-off point have an exception.

19.7.3 Handling Unit Movements

The HU movement doesn't create the WT immediately. In this case, the routing decision is made, and a telegram is sent to the PLC. The WT for the case conveyor system can be done in the following way: the PLC creates the WT based on the routing information received and sends back the telegram to SAP EWM with the actual routing information. SAP EWM then creates the WT and confirms it. If the PLC is unable to send the routing information to SAP EWM, it can trigger an asynchronous posting to the location of the routing decision.

19.7.4 Routing for Case Conveyor Systems

For the conveyor functionality, the routing depends on making the right decision at the right time. When the automatic conveyor system reaches the decision point, it needs to provide the subsequent decision to aid the HU for moving it to the next destination. The routing criteria are determined and the routing evaluation is done. Based on this evaluation, the routing decision is obtained and sent via outbound telegram to the respective system.

19.7.5 Material Flow System Actions for Case Conveyor Systems

SAP EWM delivers certain predefined logical actions for the case conveyor system. On top of these, you can also customize your own actions. You can define MFS actions in the SAP EWM IMG menu path, Extended Warehouse Management • Material Flow System (MFS) • Telegram Processing • Define MFS Actions. The following are the predefined MFS logical actions:

- HU check
- Destination determination
- Destination redetermination
- Routing decision
- Movement posting
- Aisle decision points
- MFS resource pick-up points
- WT confirmation for MFS resources

These logical actions can be triggered synchronously or asynchronously. Synchronous actions can take place at the receipt of the telegram. For example, let's consider the logical action for the HU check. In this case, the HU check is performed when it passes through the automatic conveyor system. The system checks if this is a valid HU with its affiliation with the WO/WT. If this isn't a valid HU passing through the conveyor, you might want to discard it and take it to the next desired location.

19.7.6 Process Examples

Let's consider an example of the MFS for a conveyor system for the inbound process with automatic rack process.

From the example shown in Figure 19.6, the inbound pallet is moving from ID point staging to the rack storage via the case conveyor system. An HU WT is created for the inbound HU, and this HU is the start point of the case conveyor system from the ID point (staging). As soon as the HU arrives at this ID point, the WT is confirmed with the ID point bin as the destination. If the HU check action fails, the HU would be directed to an error-classified location where it would be sorted for discrepancy at a later point in time. If the HU passes the check, it will be transferred from the ID point staging to the ID point automatic rack before it gets on to the final rack bin. At this point, the HU WT is created from the ID point staging to the automatic rack bin. Because the HU has to travel a long distance to reach the automatic rack, only the rough bin determination is done because the situation might change before it reaches the final destination bin. At a later point, the final destination bin is determined through another PLC telegram, which triggers WT creation. SAP EWM routes the HU in this direction. From the automatic rack point, the HU is moved to the final rack bin via forklift.

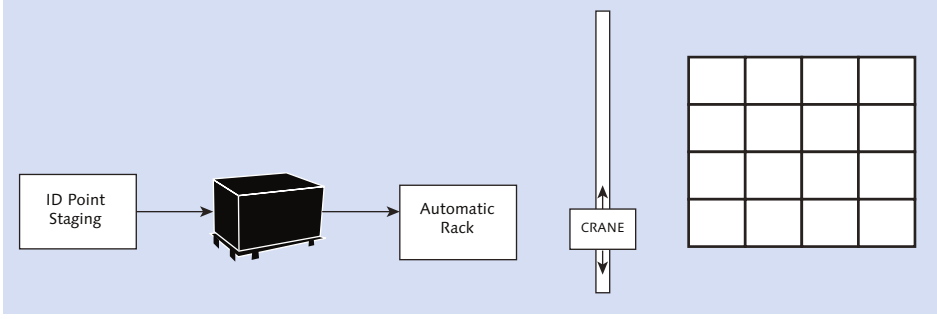


Figure 19.6 HU Moving from Staging to Rack

19.8 Summary

In this chapter, we've seen how the SAP EWM and the PLC are integrated for ASRS, and we've discussed the system configuration settings necessary for MFS. You've seen how the telegram works as well as how the warehouse monitor helps

in monitoring and executing certain functions within this. You've also seen how to set up the case conveyor system and how the business process works. Now you're able to understand how SAP EWM and the PLC work without any additional warehouse control unit.

Takeaways

- Automation in material handling helps in managing the movement of goods in an efficient and error-free manner. The MFS in SAP EWM works with the PLC, communication channel, communication points, and so on for automated storage and retrieval of goods in a warehouse.
- The communication between SAP EWM and the PLC takes place through messages or signals known as telegrams. The processes of bin determination, HU checking, WT creation, and so on are initiated in SAP EWM upon receipt of telegrams from the PLC.

A kit is a set of products that are always delivered in an assortment, such as a group of materials used to repair a piece of machinery or add-on products for other products. This chapter describes the process of building or assembling kits.

20 Kitting

Kitting is the process of packaging outgoing products per the bill of material (BOM) of the kit or the recipient's specifications for the kit. Kitting can also refer to the dissembling of already packaged items to repackage them. Kits are generally prepared in two ways, both of which will be discussed at length in this chapter:

- Kit to stock
- Kit to order

Kit to stock is based on your forecast planning; it's manufactured prior to any customer requirement and placed in stock. Kit to stock is typically carried out as a part of the manufacturing process with reference to an SAP ERP production order or through an SAP EWM value-added service (VAS) order, and the kit is put away in the warehouse.

Kit to order assembly is initiated after the customer order is placed. The process for kit manufacturing starts after the receipt of the customer order.

A kit, as shown in Figure 20.1 and Figure 20.2, consists of a structure with two levels: *kit header* and *kit component*. Kit components are used to manufacture/assemble the kit header product. The kit is represented by its header product. A customer places an order for the header product and the header product is billed—not the components.

Kit structure by itself isn't saved in SAP EWM as master data but is obtained from the items of an outbound delivery from SAP ERP.

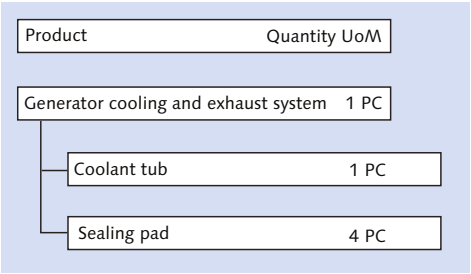


Figure 20.1 Representation of a Simple Kit

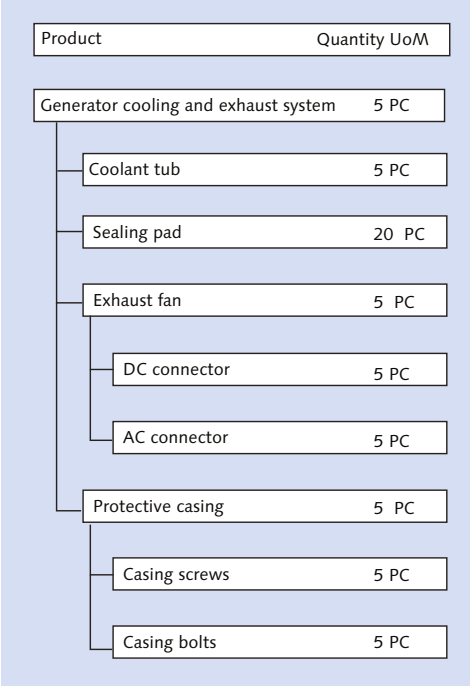


Figure 20.2 Representation of a Complex Kit

Caution

As of SAP EWM 9.3, nested kitting, that is, a kit within a kit, isn't supported by SAP EWM. However, complex kit structures can be used in combination with the SAP Supply Chain Management (SAP SCM) integrated Product and Process Engineering (iPPE) when, for example, a sales order is created from SAP Customer Relationship Management (SAP CRM).

20.1 Kit to Order Using Sales Orders

Kit to orders using sales orders can occur in two ways:

- Kit to order using a sales order generated from SAP CRM (complex scenario)
- Kit to order using a sales order generated from SAP ERP (simple scenario)

Further, there can be variants with or without availability-to-promise (ATP) checks in the SAP Advanced Planning and Optimization (SAP APO) system, if SAP APO is a part of the landscape.

With the kit to order process, the system can automatically create the tasks and data necessary to assemble kits for a specific outbound delivery order (ODO), if the kit isn't in stock. Not all kits can be stocked for availability. Because of cost and inventory considerations, certain kits are assembled only when an order is placed. The kit order requests are taken from the SAP ERP system or from SAP CRM.

Hint

While you can run kitting with SAP EWM and SAP ERP 6.0 EHP 3 only in your landscape, the complete functionality is realized when you have SAP CRM and SAP SCM-SAP APO in your landscape as well. Generally, customers using SAP CRM as their sales order management system and SAP APO as their ATP system, use the functionality fully.

The following points are relevant for kitting:

- Delivery with kitting is always in full quantity; no partial deliveries are allowed.
- The kit header and components can't be scheduled on different dates.
- All kit components have to be issued from the same warehouse for kitting.
- Kit prices are calculated at the header level; components aren't priced separately.
- There is a quantity ratio between the kit header and kit component. The ratio is defined in the kit structure. Whenever there is a change in the quantity at the header or component level, the revised quantity is calculated based on the ratio between the header and component. For example, if you need one fan and one coolant tub to repair a generator cooling and exhaust system, kitting won't permit you to get one coolant tub and two fans.

20.1.1 Kit to Order Using Sales Orders in SAP CRM

SAP EWM supports kit to order both from SAP CRM and from SAP ERP directly. In other words, if your landscape doesn't have SAP CRM, and your sales order management system is SAP ERP, you can still perform the kit to order process in SAP EWM.

To cover all the process steps involved, we've used a detailed scenario with SAP CRM and SAP APO for explaining this process. Figure 20.3 depicts the kit-to-order flow from SAP CRM.

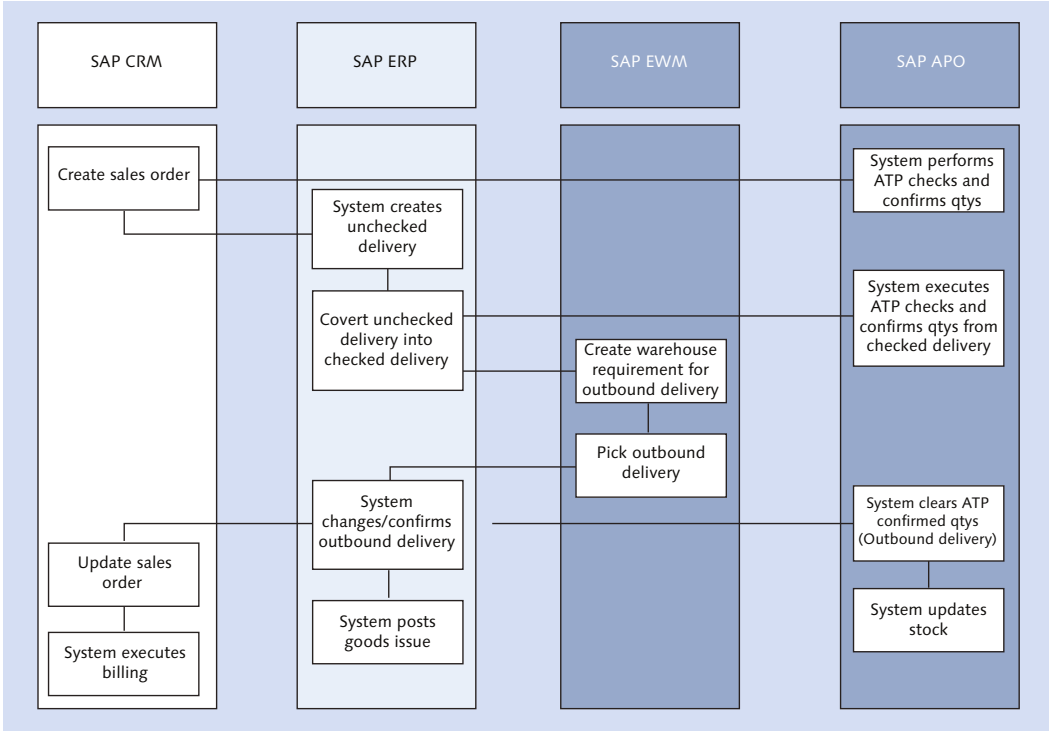


Figure 20.3 Kit to Order Using Sales Orders in SAP CRM

The following lists the steps in the kit to order process:

1. A sales order is created in SAP CRM.
2. The system determines substitution rules and whether it's a kit.

3. Upon completion of all checks across SAP SCM and SAP ERP, such as ATP, credit, price, foreign trade, and so on, the system transfers the sales order from SAP CRM to SAP ERP.
4. The system performs the ATP check (SAP APO), and if stock isn't on hand, the validation rule creates a kit structure that contains the kit components required to assemble the kit. Then the ATP check is performed for the components of the kit BOM, and the sales order is confirmed.
5. An unchecked delivery is created in SAP ERP. An unchecked delivery is only created when the document to which it refers represents a shipping requirement. In this case, we have a shipping requirement, thus an unchecked delivery is created.
6. Convert the unchecked delivery into a checked delivery in SAP ERP. When the system converts a delivery from unchecked to checked, the SAP ERP system sends a message to SAP CRM that updates the delivered quantity of the sales order and notifies the SAP CRM sales order of the status.
7. Against the checked delivery, the system performs an ATP check in SAP APO. Because our example illustrates a scenario with SAP CRM and SAP APO in place, we're considering the possibility of an ATP check.
8. After checked deliveries are distributed to SAP EWM, an outbound delivery order (ODO) is automatically created for checked deliveries (i.e., a warehouse request).
9. Picking for the ODO is carried out in SAP EWM.
10. Based on the exact delivery fulfillment in SAP EWM or with quantity shortages reported in SAP EWM, the outbound delivery in SAP ERP is confirmed.
11. Goods issue for the kits is posted in SAP ERP.
12. The system clears the ATP confirmed quantities, and stocks are updated in SAP APO.
13. Sales order information is updated in SAP CRM.
14. Billing is executed in SAP CRM.

20.1.2 Kit to Order Using Sales Orders in SAP ERP

In a simpler scenario without SAP CRM and SAP APO in your landscape, the sales order is created in SAP ERP. If the sales order material consists of a sales BOM, it

explodes and creates BOM components as line items in the sales order. Outbound delivery is created against the sales order and distributed to SAP EWM. The ODO in SAP EWM carries both the kit header and kit components. Only the kit components are relevant for picking, however, not the kit header material. Therefore, the warehouse tasks (WTs) are only created for the kit components not for the kit header material. Kitting can be done in three ways:

- At a work center using VAS orders
- At a work center without VAS orders
- During picking

Kit to Order at a Work Center Using VAS

After the delivery is distributed from SAP ERP to SAP EWM, it creates an outbound delivery request (ODR) and an ODO. The kit header and kit components are transferred from outbound delivery in SAP ERP to ODR and ODO in SAP EWM. VAS related configurations (Figure 20.4) are done using the EWM IMG menu path, Extended Warehouse Management • Cross-Process Settings • Value-Added Services (VAS). Options include Define the Number Range for VAS Order, Define Relevance for VAS, Warehouse Number-Dependent VAS Settings, Define Order Types for VAS, and so on.

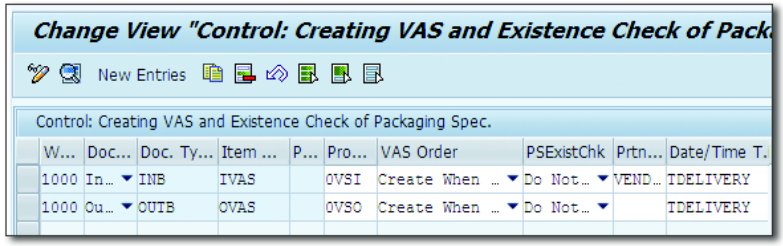


Figure 20.4 VAS Relevance Definition and Packaging Specifications Check

The goods receipt movement type needs to be maintained in the SAP ERP IMG via menu path, Logistics Execution • Service Parts Management (SPM) • Outbound Process (SPM) • Kit to Order • Set Goods Receipt Movement Type for Kit Headers.

In a standard system, movement type 521 is maintained against item category KIT (Figure 20.5).

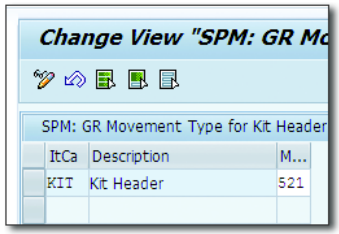


Figure 20.5 Good Receipt Movement Type for Kit Header

After the ODO is created in SAP EWM, the VAS order is created automatically based on your Customizing settings. The VAS order gives an overview of the kitting activity to be performed in the work center. Picking WTs are generated for the kit components, and the components are confirmed into a pick HU. Upon confirmation, the pick HU is moved to the kitting work center. After the components are in the kitting work center, the kitting is performed per the kitting instructions. You can perform the VAS execution in Transaction /SCWM/VASEXEC (Create Confirmation for VAS), or you use the SAP EWM Easy Access menu path, Extended Warehouse Management • Execution • Create Confirmation for VAS.

After the kit is assembled, you can click on the Complete Process button to create the WT to move the handling unit (HU) to the goods issue zone. Goods receipt for the kit header is posted based on the movement type assigned to the kit header item category.

Kit to Order at a Work Center without VAS

Kitting without a VAS order is processed under certain circumstances:

- No detailed documentation is required against the VAS order.
- No special work center is used for kitting; instead, the general packing area is also used for kitting.
- Kitting instructions are maintained as free text in SAP CRM sales orders, and this text is used in the delivery. It can flow from the SAP ERP sales order to delivery as well. Free text flows from the SAP ERP delivery, or it can be maintained in the SAP EWM warehouse request directly.

This process is similar to the previously described processes with only a few differences in kitting the product in the packing work center.

Kit to Order during Picking

Kit to order without VAS is done during picking. This process is used when there is no need for detailed documents for kitting, and you want to assemble the kit during the picking process rather than doing it in special work center. Kit instructions are maintained as free text in the following:

- In the SAP CRM sales order or in SAP ERP and transferred to outbound delivery
- Created in the warehouse request in SAP EWM

The process of kit to order during picking is as follows:

1. Outbound delivery is distributed to SAP EWM with kit component items from SAP ERP.
2. WTs are generated for the kit component items.
3. Kit components are picked and kitted per the kit instructions.
4. The WTs are confirmed; if Create Kit Item is set in Customizing, the system generates the pick HU item for the kit header. You can repack these into other HUs in the work center.
5. Goods issue is posted for the warehouse request.

20.2 Kit to Stock

Kit to stock, as described earlier, is a kitting process in which kits are assembled in advance, before the customer order is placed. These kits are prepared in anticipation of future orders based on sales forecasts. Unlike kit to order, which is triggered by a sales order, the kits to stock are triggered by a production order created manually or automatically in the SAP ERP system or through a VAS order in the SAP EWM system.

20.2.1 Kit to Stock Using Production Orders

When a production order is created in SAP ERP, an inbound delivery is generated for the kit header, and an outbound delivery is created for the kit components. These deliveries are sent to SAP EWM where an inbound delivery notification (IDN) and inbound delivery is generated for the kit header and an ODR and ODO is created for kit components. For the inbound delivery that is created for the kit

header, a VAS order is automatically generated in SAP EWM, which is used for kitting. For kitting, a goods issue is generated for kit components, and a goods receipt is generated for kit header. These goods issue and receipt documents are then transferred to the SAP ERP system. The production order will be updated accordingly in the SAP ERP system.

20.2.2 Kit to Stock Initiated from VAS in SAP EWM

A kit to stock process can be initiated directly in SAP EWM by manually creating a VAS order. This can be done by navigating to the SAP EWM Easy Access Menu, and choosing Extended Warehouse Management • Work Scheduling • Value-Added Services (VAS) • VAS for Kit Creation on Stock or by using Transaction /SCWM/VAS_KTS. VAS can be created with or without a BOM.

20.3 Reverse Kitting

Reverse kitting is a process of disassembling the kit into components when a kit isn't required, and the kit components are needed instead. Reverse kitting is done using a VAS order (Figure 20.6). The VAS order type for reverse kitting is defined in the SAP EWM IMG menu path, Extended Warehouse Management • Cross-Process Settings • Value-Added Services (VAS) • Define Order Types for VAS for Reverse Kitting.

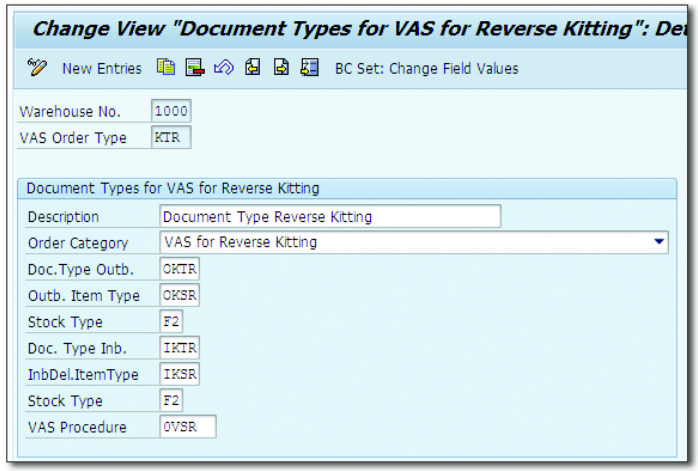


Figure 20.6 VAS Document Type Definition for Reverse Kitting

Reverse kitting is initiated in SAP EWM by creating the VAS order manually via Transaction /SCWM/VAS_KTR or via the SAP Easy Access Menu path, Extended Warehouse Management • Work Scheduling • Value-Added Services (VAS) • VAS for Reverse Kitting.

You have two options in creating the VAS order: with and without BOM (Figure 20.7). When you create the VAS order with BOM, the system explodes the BOM from the SAP ERP system and determines the BOM components. When you create the VAS order without BOM, you need to enter the kit header and kit components manually. In reverse kitting, packaging specifications are required, and it can only have one activity. Only the kitting level is considered; all others are ignored. When the VAS order is created, an ODO for the kit header and an inbound delivery for the kit component are created, transferred, and posted in SAP ERP.

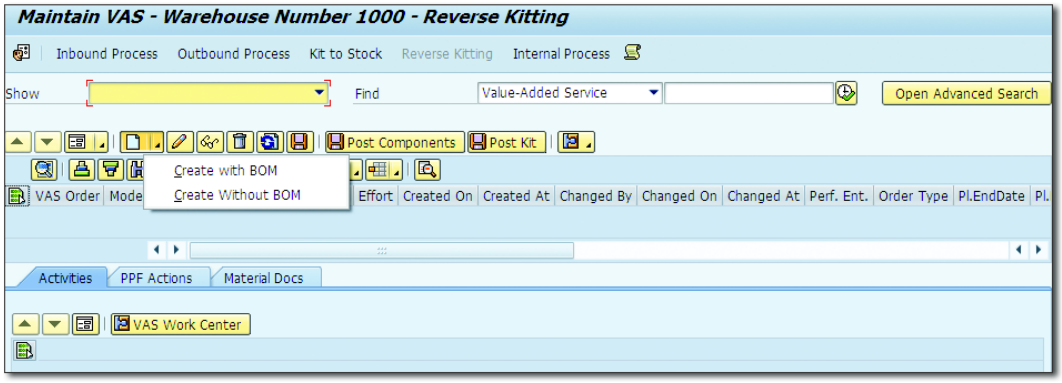


Figure 20.7 VAS Creation for Reverse Kitting

20.4 Summary

This chapter focused on two types of kits: kit to stock and kit to order. You saw how kitting can be initiated either in the SAP ERP system or directly in SAP EWM. If the SAP ERP system is used to initiate kitting, the deliveries and VAS order can be automatically created in SAP EWM. At the end of the kitting process, the SAP ERP system gets updated automatically. Whereas when kitting is directly done in the SAP EWM system, a VAS order is manually created, and kitting is

controlled through the same document. In the next chapter, we will discuss Dock Appointment Scheduling functions and the associated settings required to run this functionality.

Takeaways

- There are three primary types of kitting:
  - Kit to order
  - Kit to stock
  - Reverse kitting
- Kit to stock is typically used for scenarios arising out of a forecasting process, whereas kit to order is typically used for scenarios arising out of a customer order.
- Reverse kitting is the process of disassembling a kit, typically when a component within a kit is required individually.
- Kit to order is primarily a result of orders arising out of the SAP CRM or SAP ERP system.
- Kit to stock is primarily initiated from a VAS in SAP EWM or a production order from SAP ERP.

Shuttling between applications or interfaces to carry out various transactions related to a business process isn't generally desirable. SAP Dock Appointment Scheduling in SAP EWM is one place where you can manage and operate vehicle appointments and collaborate with concerned parties.

21 Dock Appointment Scheduling

On the one hand, businesses need to achieve efficient loading/unloading operations with greater use of doors in the warehouse. On the other hand, carriers want to minimize, if not eliminate, the unproductive time (waiting in the yard) of their vehicle resources. This not only demands planning from warehousing and carrier perspectives but also requires collaboration between the business and its carriers. The SAP Dock Appointment Scheduling (DAS) solution caters to this situation. Browser-based access to DAS enables carriers to collaborate with the business for planning the arrival of vehicles.

DAS can be deployed as an integrated solution with SAP EWM or as a standalone solution supporting a third-party warehouse management solution (WMS). If you want to use it with SAP EWM, you'll need to activate the business function `SCM_EWM_FND` using Transaction SFW5.

Note

Since the release of SAP EWM 9.2, you have a new user interface (UI) for external carriers to access DAS.

Typically, carriers want to be able to maintain their own appointments for unloading or loading processes in the warehouse. Prior to SAP EWM 9.2, there was a specific UI available in DAS that allowed the appointment planner for the carrier to maintain appointments. This UI was based on Web Dynpro for ABAP technology.

Since SAP EWM 9.2, the new UI functions in the same way, allowing appointment planners for carriers to maintain their own appointments, but it uses SAPUI5 instead of Web Dynpro for ABAP. SAPUI5 is based on HTML 5 and offers additional deployment and security options. Access to the DAS database is controlled via a gateway server. This

server is normally located between two firewalls, delivering a higher level of security by running the UI and the backend on two different servers with a firewall in between. This feature enhances the security aspect of the system landscape.

21.1 SAP Dock Appointment Scheduling Settings

The settings related to transportation units (TUs) and vehicles, discussed in Chapter 10, are required as prerequisites to use this functionality.

You'll need to create the number range for the appointment numbers in Customizing using the navigation path, Extended Warehouse Management • Cross Process Settings • Shipping and Receiving • Dock Appointment Scheduling • Define Number Range Intervals for Appointment Numbers.

To create the Means of Transport as shown in Figure 21.1, navigate to Customizing using the path, Extended Warehouse Management • Cross Process Settings • Shipping and Receiving • Dock Appointment Scheduling • Define Means of Transport.

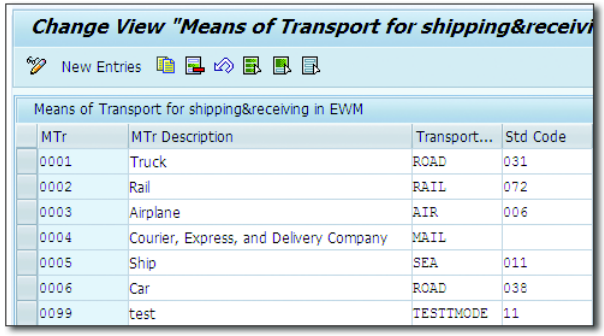


Figure 21.1 Means of Transport Definition

While loading, users refer to various documents. You can add these document categories in the Customizing table, so that the system can take actions based on these document categories. To define reference document categories as shown in Figure 21.2, navigate to Customizing using the path, Extended Warehouse Management • Cross Process Settings • Shipping and Receiving • Dock Appointment Scheduling • Define Reference Document Categories.

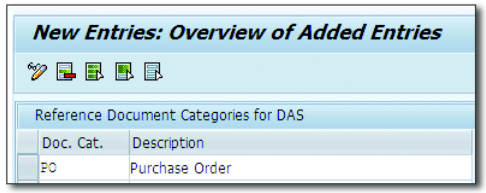


Figure 21.2 Reference Document Categories for DAS

Users can control the loading appointment creation by the system using Transaction /SCWM/SR_INTDAS or by navigating to the SAP EWM Easy Access Menu, and choosing Extended Warehouse Management • Interfaces • Dock Appointment Scheduling • Integration Settings for SAP EWM.

Based on the checkboxes flagged in Figure 21.3, the system creates loading appointments for the relevant inbound and outbound TUs as soon as deliveries are assigned to them.

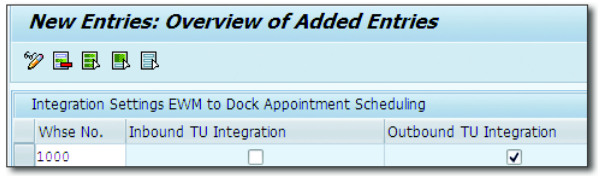


Figure 21.3 DAS—SAP EWM Integration Settings

21.2 Docking Locations and Loading Points

Although it's possible to work only with loading points, SAP suggests using the docking location to group the loading points of a warehouse. Both methods are discussed in the following subsections.

21.2.1 Docking Location

The docking location consists of loading points and may represent a warehouse or a distribution center. These loading points are situated in the same geographical location and have a fixed address. If you have many loading/unloading points in one location, it makes sense to gather them in a docking location for easier overview and monitoring. These warehouse docks where loading/unloading takes place in the warehouse are grouped from the perspective of identical processing.

One loading point can't be assigned to multiple docking locations. Also, you can't assign more than one docking location to a warehouse. It's possible to group existing loading points in a docking location. However, if you define your docking point first, you may simply keep specifying this docking point in all loading points definitions, which you intend to group. If you define your docking point first, then while specifying this docking point in the definition of a loading point, the system uses time zone, country, number range, and integration with SAP EWM of the docking point in the loading point definition. If you want to group the existing loading point in the docking location, each of the loading points must have the same time zone, country, number range, and integration with SAP EWM. SAP recommends defining the docking location first. There are other attributes such as time slots, arrival lead time, restricted planning period, and so on inherited from the docking location to the loading point, but they can be changed as needed.

For using DAS with SAP EWM, it's mandatory to use docking locations. Docking locations are assigned to a supply chain unit (SCU), which in turn is assigned to the warehouse. This SCU must have a business attribute docking location.

21.2.2 Loading Points

Loading appointments are planned at a loading point level. Appointment number ranges can be mapped to loading points. A loading point holds time slots, which are used for planning the times of loading appointments. Each time slot possesses the same fixed duration. Businesses need to decide whether they want many slots with small fixed durations or fewer slots with higher fixed durations. If you change the time slots for a location, it will influence only new appointments.

Warehouses won't expect carrier planners to change the appointment details just before loading/unloading. For this reason, loading points hold restricted planning periods, that is, how long before the appointment-restricted period begins for the loading point concerned. During this time, carrier planners must not be able to change the appointment details. Only a few attribute values will be open to change in this time, which aren't that important as far as impact on warehouse operations are concerned. Ideally, carrier planners must contact the warehouse for changes in appointment during the restricted planning period. You can also maintain arrival lead times for vehicles in a loading point. This is required for paperwork, and so on at the checkpoint, which might be required before the appointment.

You can use the time slot management functionality to create, change, or delete the time slots and capacity (number of vehicles loaded/unloaded in parallel during the time slot) of the loading point. Change in capacity may arise from various reasons such as lunch hour, limited number of handling equipment, and so on.

Loading points are linked to a SCU that must have the business attribute set as loading point (LP).

21.3 Appointment Management

Loading appointments for vehicles are planned on loading points. This may need collaboration with the carrier. The system allows you to add reference documents such as purchase orders to the appointment.

Selected carriers can log in to the system and plan loading/unloading appointments for their vehicle. Loading appointments are closely linked to TU/vehicle activity in the SAP EWM system. The loading appointment of a vehicle takes place in reference to loading points. When you use DAS with SAP EWM, it uses queued remote function calls (qRFCs) for status exchanges of loading appointments between SAP EWM and DAS. Loading points group the docks of the warehouse that have similar loading or unloading requirements. These docks can, for example, have similar parking requirements, and so on.

21.3.1 Alliance with Carriers

Carriers want to minimize the unproductive time (waiting time in the yard) of their vehicle because it negatively affects their profitability. To take care of this, the carrier must collaborate with the warehouse regarding timing of the vehicles scheduled in the yard. DAS enables carrier participation.

Carriers can plan their loading appointments in DAS. While planning, carriers can just choose a docking location. The system, based on configuration, will automatically assign this appointment to a loading point.

21.3.2 Integration with SAP EWM

To work with SAP EWM, you must link the warehouse deliveries with the DAS loading appointments. Integration enables the processing of various shipping and

receiving steps in SAP EWM and ensures that SAP EWM and DAS remain in sync with respect to statuses of loading appointments. Integration also enhances the search criteria for TU by including loading points and appointment numbers.

An important aspect of integration is to decide which system the business wants to plan for shipping and receiving activities. The business may have a preference in using DAS or the SAP EWM system for planning:

- For planning in DAS, the business creates the appointment in DAS, and a TU gets created in SAP EWM.
- For planning in SAP EWM, after the TU is created in SAP EWM, DAS automatically creates an appointment.

These alternatives require setting up the integration in different ways. Figure 21.4 illustrates the flow of activities and information exchanges between DAS and the SAP EWM system when you create a loading appointment in DAS.

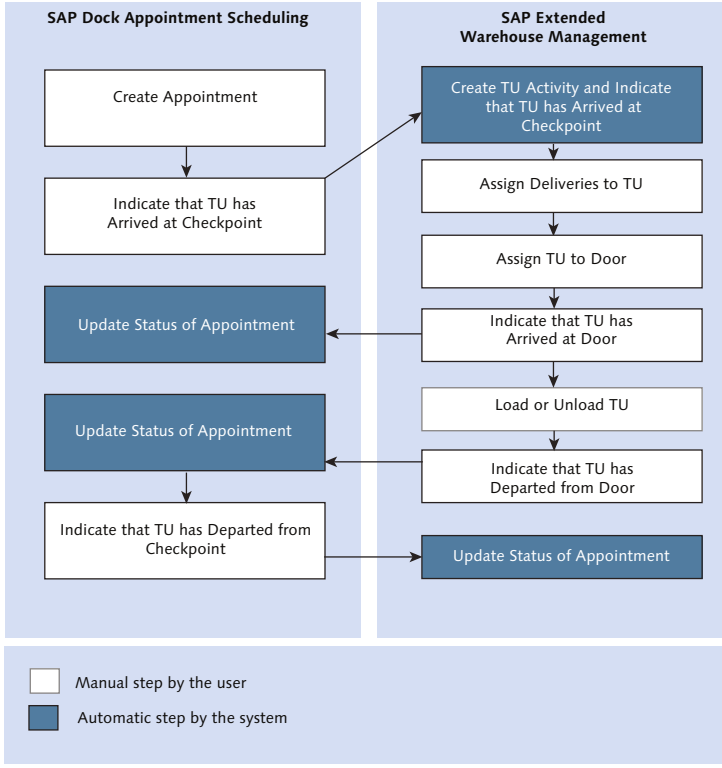


Figure 21.4 Activity and Information Flow

When DAS is integrated with SAP EWM, the business process gets completed in such a way that some tasks are performed in DAS, and some are performed in SAP EWM. Thus, the two systems communicate to complete the business process. For example, let's consider an outbound delivery process for which a loading appointment is to be created. As shown in Figure 21.5, this process is initiated in SAP EWM when an outbound delivery order (ODO) is generated. After the TU is generated in SAP EWM, and delivery gets assigned to this TU, DAS comes into picture when a provisional appointment gets created. Refer to Figure 21.5 and Figure 21.6 to understand how the two systems interact to complete the outbound delivery process.

Figure 21.5 illustrates the process for an outbound loading appointment where you need to plan the staging area in advance of the arrival of the TU.

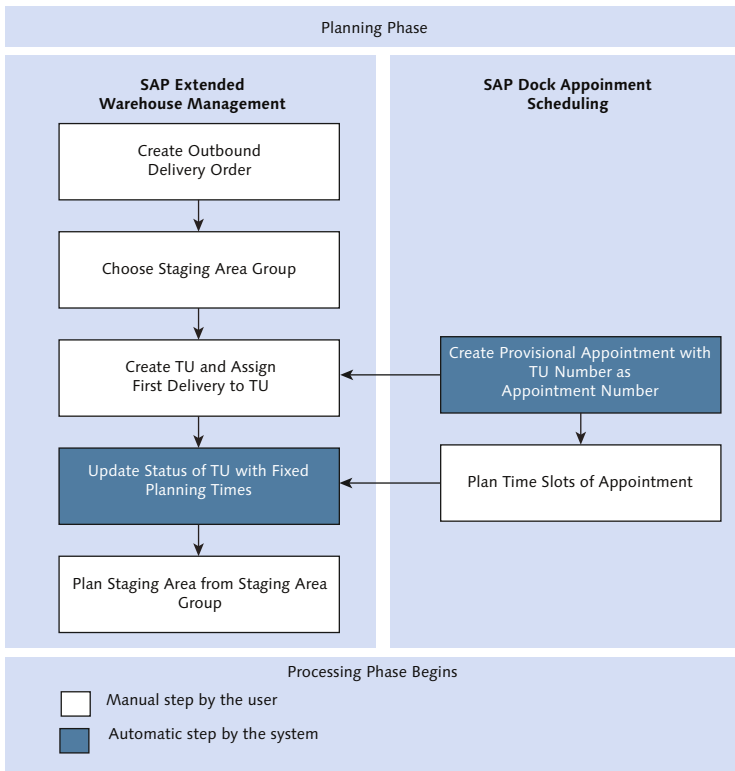


Figure 21.5 Planning Phase for Outbound Loading Appointment

Figure 21.6 shows how the appointment is processed in DAS, which involves updating the status of check-in/check-out at the checkpoint.

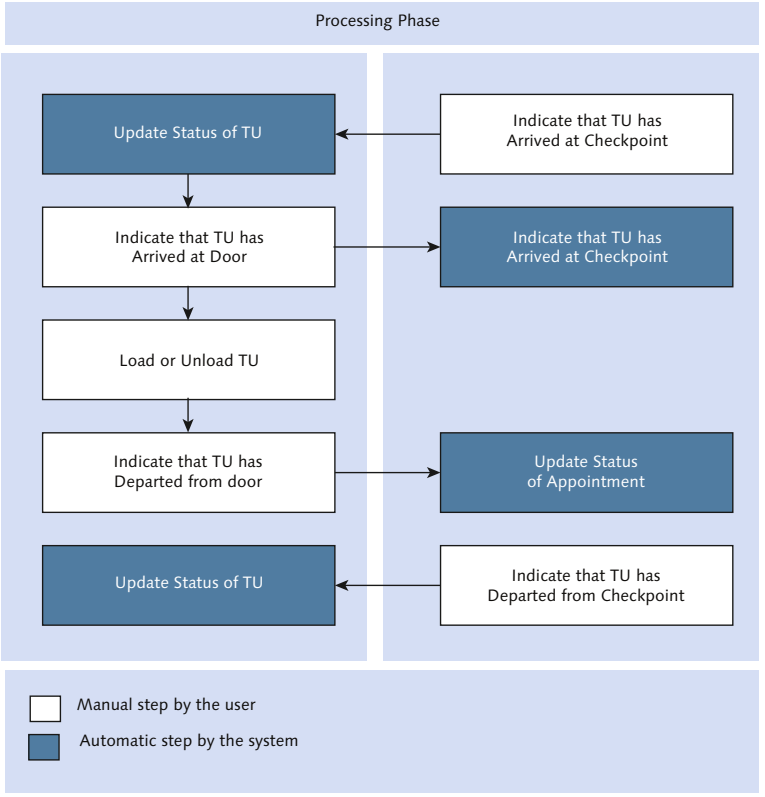


Figure 21.6 Processing Phase for Outbound Loading Appointment

21.4 Summary

In this chapter, we emphasized the importance of managing appointments for loading/unloading vehicles/TUs. We looked at how SAP Dock Appointment Scheduling (DAS) can be integrated with SAP EWM and the associated settings required for docking locations and loading points. It was also pointed out that DAS can be used as a standalone solution. You now know how managing appointments for vehicles/TUs enables efficient management of a yard. In the next chapter, we will discuss user management and archiving, which are key functions for breach-free and safe functioning of an SAP system.

Takeaways

- DAS relates to planning the loading/unloading appointments for carriers.
- DAS can either be integrated with SAP EWM or can be implemented as a standalone solution, which can work with any WMS.
- In addition to appointments scheduled by a warehouse user, DAS also allows third-party carriers to schedule an appointment for their vehicles.
- Since the release of SAP EWM 9.2, you have the new SAPUI5 for external carriers to access DAS

Identifying and establishing the right credentials for users and preventing unauthorized access are critical for any successful implementation. Data archiving becomes a necessity over a period of time to maintain the usability of system resources, improve system performance, and comply with the organization's legal data retention policy.

22 User Maintenance and Archiving

User maintenance relates to securing the system and its data by restricting the activities that can be performed by system users. Users of the warehouse generally need to run one or more specific transactions in the SAP EWM system, depending on the responsibilities he is assigned in the warehouse. Sometimes, a specific transaction, such as handling hazardous goods, can only be assigned to an expert user of the warehouse.

Over time, users generate numerous documents (data) in the system. The system itself may also generate data. Organizations typically want to retain some of these documents for a few years so that they can be used as historical data for planning or other analytical purposes. Sometimes, state regulations also mandate the preservation of specific documents by businesses for a certain number of years. State authorities may demand this data to be presented to them. However, retaining a large number of documents in the running system may impact system performance. Data archiving provides a suitable way to handle this situation.

Note

User maintenance and archiving are concepts that are applicable not only to SAP EWM but also to other SAP applications.

22.1 Roles for SAP EWM

Businesses require different activities to be carried out under different roles. In the everyday course of business, users get assigned to some activities with

restricted access to other activities to ensure data security within the organization. To complete those activities, users need to access different transactions, reports, and applications in SAP. Hence, to meet these requirements, SAP provides roles that are assigned to users. Roles are like containers that contain authorization objects. These roles can be standard roles defined by SAP, or they can be created on the basis of a client's specific requirements.

Let's discuss the concept of authorization and roles with the help of some standard terms used in SAP:

- **User master record**
  An SAP system provides all its defined users with a unique user ID that forms the user master record. The users then set their passwords for login. The users do have freedom in making certain custom settings such as storing favorite transactions, changing the layout of an SAP screen and so on. However the system administrator controls the assignment of roles and authorizations in the user master record. Security roles are assigned to the users to control their authorizations to create, change, or display data in the system. The authorizations can be provided at transaction level, organizational level or execution-level security objects such as warehouse numbers, and against other organizational elements.
- **Single and composite roles**
  The access a user gets to SAP transactions, reports, web-based applications, and so on in the logon menu is controlled using roles. A single role is created for users who share similar job profiles, whereas a composite role can be created by combining several single roles. For example, a user working in the warehousing department requires the authorization of creating a warehouse order (WO) but doesn't need access to giving quality clearance because that will be done by a user in the quality department. Thus, two single roles can be created, one for warehousing and one for quality. A composite role can also be created if the same user handles both warehousing and quality. The roles are the connection between the user and the corresponding authorizations.
- **Authorizations**
  After the roles have been created, authorizations can be assigned to users. Authorizations allow a user to perform activities in SAP. For the example from the previous section, the permission a user gets to create a WO is the authorization assigned to that role. For each role, an authorization profile is generated that consists of authorization objects and authorization fields. Authorization

objects are a collection of authorization fields used to create complex authorization conditions. Authorization fields are individual values that are checked for the conditions that define authorization objects. The actual authorizations and profiles are stored in the SAP system as objects.

SAP recommends using the role maintenance functions and the profile generator (Transaction PFCG) to maintain the roles, authorizations, and profiles. Although you can continue to create profiles manually, you still need detailed knowledge of all SAP authorization components. The role maintenance functions support the task by automating various processes and allowing more flexibility in the authorization plan. You can also use the Central User Administration (CUA) function to centrally maintain the roles delivered by SAP or your own, new roles, and to assign the roles to any number of users. The roles based on the organizational plan of your company form the structure for the profile generator.

22.1.1 Standard Roles

SAP provides many standard roles for SAP EWM that can be used out of the box; even new roles can be created to cater to an organization's specific requirements. The roles can be mixed and matched to create composite goals for attaining higher usability. Separate roles can be created if the process steps are performed by different users, for example, a warehouse clerk working exclusively in SAP EWM and a transportation planner working exclusively in SAP Transportation Management (TM). The list of roles delivered with SAP EWM and their technical names are illustrated in Table 22.1.

Role	Technical Name
Warehouse Manager	/SCWM/SUPERVISOR
Warehouse Expert	/SCWM/EXPERT
Warehouse Expert for EHP 2	/SCWM/EXPERT_2
Warehouse Specialist for Goods Receipt	/SCWM/INBD_SPECIALIST
SAP EWM: Warehouse Specialist for Goods Issue	/SCWM/OUTBD_SPECIALIST
Warehouse Specialist for Yard Management	/SCWM/YARD_SPECIALIST
Warehouse Worker	/SCWM/WORKER

Table 22.1 Standard Roles in SAP EWM

Role	Technical Name
Physical Inventory Planner	/SCWM/INVENTORY_PLANNER
Physical Inventory Counter	/SCWM/COUNTER
Shipping Office Clerk	/SCWM/SO_CLERK
Displaying Warehouse Information	/SCWM/INFORMATION
SAP ERP Integration	/SCWM/ERP_EWM_INTEGRATION
Labor Planner	/SCWM/LM_PLANNER
Warehouse Analyst	/SCWM/ANALYST
Warehouse Specialist for Labor Management	/SCWM/LM_SPECIALIST
IDM Integration	/SCWM/IDM_EWM_INTEGRATION
Technical Role for Using the Business Context Viewer	/SCWM/BCV_USER
Warehouse Billing Administrator	/SCWM/WB_ADMINISTRATOR
Warehouse Billing Specialist	/SCWM/WB_SPECIALIST

Table 22.1 Standard Roles in SAP EWM (Cont.)

You can also check the authorizations provided under each role using Transaction PFCG (Figure 22.1) or by choosing SAP EWM Easy Access Menu • Tools • Administration • User Maintenance • Role Administration • Roles.

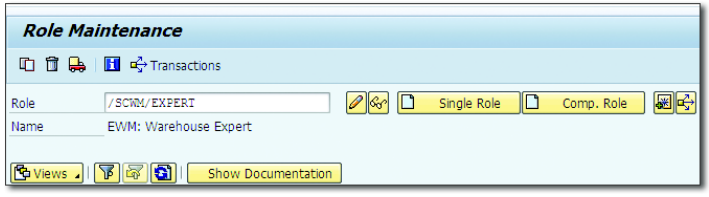


Figure 22.1 Role Maintenance Screen

Through this transaction (Figure 22.2), you can check which transactions are allowed for a specific role.

Detailed authorization objects can also be checked under the role selected by going to the Authorizations tab. There will be no assignments for the organizational elements within the standard roles, but you can see them by copying the standard roles to the new role by using the Display Authorization Data button (Figure 22.3).

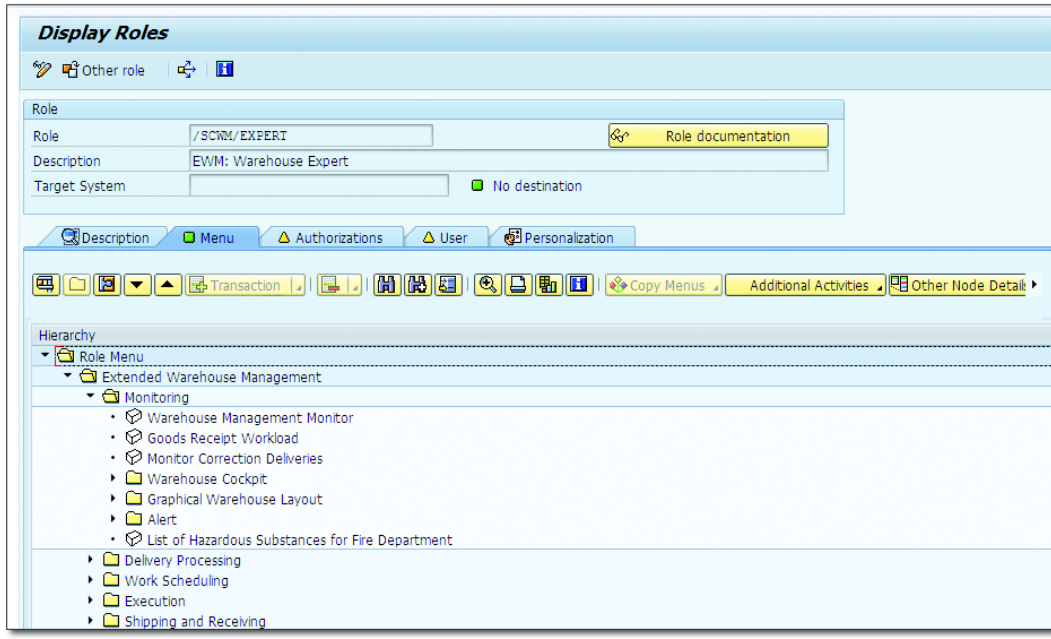


Figure 22.2 Transactions Assigned to a Role

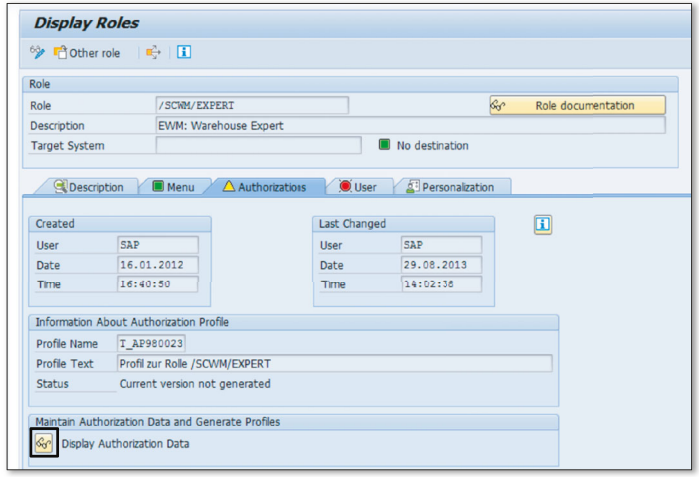


Figure 22.3 Display Authorization Data

The USER tab specifies all the user IDs that are assigned to that particular role and gets the defined authorizations.

22.1.2 Identity Management Integration

SAP has provided this function with the aim of enforcing security and authorization requirements across diverse system landscapes. It allows management of employees across varied SAP systems such as SAP EWM and SAP ERP Human Capital Management (HCM).

SAP ERP HCM may or may not be a part of the system landscape depending on whether SAP Labor Management (LM) in SAP EWM is activated or not. When SAP ERP HCM isn't a part of the system landscape and LM isn't activated, the role SAP_BC_SEC_IDM_COMMUNICATION can be used to enable communication between systems using a background user. For systems with SAP ERP HCM and LM activated, the role /SCWM/IDM_EWM_INTEGRATION can be used directly.

When LM is activated in SAP EWM, the SAP EWM roles used for LM should be aligned with the business roles in Identity Management (IdM) by the system administrator. Here, only the roles with assigned warehouse numbers at the organizational level are relevant for LM. The system automatically creates a user and a business partner (BP), assigns the respective SAP EWM role to the user, and assigns the processor BP role, the user ID, and the personnel number to the BP.

When LM isn't activated in SAP EWM, SAP EWM roles used for LM should be aligned with business roles in IdM by the system administrator. Here, any SAP EWM roles can be used. The system creates a user and assigns the respective SAP EWM role to the user without creating a BP for the user.

22.1.3 Roles for Dock Appointment Scheduling

SAP Dock Appointment Scheduling (DAS) is a special function provided by SAP to do a lot of activities involved in vehicle planning and collaboration between parties involved. The following summarizes the responsibilities of different roles under DAS:

- Maintain the loading points and time slots, and monitor the time slots.
- Create and maintain appointments.
- Maintain the status of appointments for transportation units arriving at the warehouse or leaving the warehouse.
- Create, change, and display loading appointments for the carrier.
- Execute the activities for integrating SAP EWM to DAS systems.

- Plan for efficient running of the warehouse.
- Plan for the efficient usage of the carrier.

DAS can be deployed as either a standalone solution or as an integrated solution. The standalone solution allows the business to manage the loading and unloading activities of the warehouse without reference to SAP EWM. The integrated solution uses an integrated local SAP EWM system. The transportation unit (TU) for the loading appointments can be automatically created after the integration happens. The status changes of the loading appointment and its TU activity are exchanged between SAP EWM and DAS by queued remote function calls (qRFCs).

Table 22.2 lists the different roles in DAS along with their technical names.

Role	Technical Name
Administrator for Dock Appointment Scheduling	/SCWM/DAS_ADMINISTRATOR
Specialist for Dock Appointment Scheduling	/SCWM/DAS_SPECIALIST
Checkpoint Clerk for Dock Appointment Scheduling	/SCWM/DAS_CP_CLERK
Appointment Planner for Carrier in Dock Appointment Scheduling	/SCWM/DAS_EXT_CARR_PLANNER
Dock Appointment Scheduling for Carriers Using UI5 and Gateway	/SCWU/DAS_CARRIER_ACCESS
Technical Role for Dock Appointment Scheduling Integration to SAP EWM	/SCWM/DAS_TO_EWM_INTEGRATION
Technical Role for SAP EWM Integration to Dock Appointment Scheduling	/SCWM/EWM_TO_DAS_INTEGRATION

Table 22.2 Standard Roles in Dock Appointment Scheduling

Caution

With the release of new features in the new version of SAP EWM, SAP includes a new set of roles required to realize those features. For example, with SAP EWM 9.2, roles related to staging and consumption were delivered, and with SAP EWM 9.3, roles related to warehouse billing and Transit Warehousing are being delivered. Thus, the roles available in the standard SAP EWM system are a factor of the system version as well.

22.2 Data Archiving

Data archiving is the process of recognizing and moving inactive data out of current systems and into separate long-term storage systems for long-term retention. Moving older data out of production systems improves the performance of resources. The specialized archival systems store information more economically, use fewer resources, and provide for retrieval when needed. Recovery of data is less costly, and systems are easier to manage. Data archival systems are indexed and have search capabilities so that files can be easily located and retrieved. Data archiving is important for organizations that amass a lot of information but still need to retain older information. Automated data archiving helps organizations achieve these capabilities at lower costs. Organizations have their own policies for qualifying data to be selected as old and to be moved into archives. These policy settings automate the process of identifying and creating the archive system. Once in the archive system, information remains online and accessible.

SAP EWM has provided some standard archive objects for the archiving functionality. SAP provides objects in delivery processing, quality management, shipping and receiving, value-added services (VAS), TM, Wave Management, warehouse order processing, and LM. The implementation teams can decide on the expected lifeline definitions for the data in their active systems. SAP has provided a complete list of archiving objects for all the functionalities just mentioned at *https://help.sap.com*. SAP EWM has classified the archiving functionalities into different heads with document categories under each head. Table 22.3 lists some of those objects.

Head	Document Category	Archiving Object
Archiving in Delivery Processing	Internal Warehouse Requests (Inbound Delivery)	DLV_INB
	Internal Warehouse Requests	DLV_OUT
	Warehouse Requests from External Systems	DLV_REQ
Archiving in Quality Management	QIE Inspection Documents	QIE_INSP
Archiving in Shipping and Receiving	Door Activities	WME_DOOR
	Vehicle Activities	WME_VEH
	TU Activities	WME_TU

Table 22.3 Archiving Objects for Document Categories

Head	Document Category	Archiving Object
Archiving for Value-Added Services	Value-Added Service Orders (VAS Orders)	WME_VAS
Archiving in Transportation Management	Shipments	TM_SHP
	Freight Documents	TM_FRD
Archiving in Wave Management	Waves	WME_WAVE
Archiving in Warehouse Order Processing	Telegram Flows	WME_MFS
	Relevant Resource Data	WME_RSRC
	Warehouse Tasks	WME_TO
	Warehouse Orders	WME_WO
Archiving in Labor Management (LM)	Performance Documents	WME_EPD
	Executed Workload	WME_EWL
	Indirect Labor Tasks	WME_ILT

Table 22.3 Archiving Objects for Document Categories (Cont.)

22.3 Summary

User management, authorizations and archiving are key to a hassle-free operation of a SAP system. In this chapter, you learned about user management and roles and the linkage between them. You also learned about archiving and its importance in the operations of a SAP system. While these are typically the responsibilities of an S&A (security and authorization) consultant, it is important for an SAP EWM consultant to have a high-level understanding of them as well.

Takeaways

- Roles are the primary objects in the roles and authorization concept.
- Roles can be composite (role within a role) or single.
- Roles contain a set of transactions that an individual is authorized to perform.
- When a role is assigned to a user, he gets the authorization to carry out specific transactions contained within that role.
- Roles also simplify user management by avoiding the process of assigning transactions to users directly.

Conclusion

SAP Extended Warehouse Management (SAP EWM) is an advanced warehouse management solution that helps you gain more control over your warehousing processes and provides you with the tools needed to improve your warehouse efficiency, transform your operations, and increase your competitiveness. Typically SAP EWM works in conjunction with SAP ERP and, depending upon the business scenarios being run, can fully integrate with one or more of the following SAP applications:

- SAP Global Trade Services
- SAP Transportation Management
- SAP Plant Connectivity
- SAP Supply Chain Management Server (SCM Server)
- SAP Solutions for Auto-ID and Item Serialization (including SAP Event Management)
- SAP CRM

By now, you have grasped the features offered by SAP EWM, the best practices around them, and the configuration steps required to set them up. As explained in this book, various new features are released with each SAP EWM Enhancement Pack. For example, the latest Enhancement Pack, EHP 3, brings in new features around transit warehousing and warehouse billing. It is thus very important for an SAP EWM consultant to stay up to date with the following three offerings from SAP:

- SAP's release strategy for SAP EWM: This describes the release schedule of each enhancement pack.
- Release Notes around an Enhancement Pack: This describes in detail the new features which are getting released with a specific enhancement pack
- Master Guide around an Enhancement Pack: This describes the requirements around the software components which are required for various business scenarios contained within a release to work. It also describes if a business scenario has been extended, limited or withdrawn in a release.

Once you have gone through this book and understood the contents, we recommend that you follow the above three points to keep yourself up to date with new features of SAP EWM. While this book covers new functionalities released up to SAP EWM 9.3, you can keep up with subsequent additions to SAP EWM using those three offerings.

Since many customers are now upgrading their databases to SAP HANA, and since the release SAP EWM 9.1, SAP EWM is able to run on the SAP HANA database as well. It is important to note that the release on the SAP HANA database does not imply any functional changes or functional enhancement to SAP EWM. All scenarios and all functions in SAP EWM can be used on SAP HANA in the same way as on any other supported database.

We hope you enjoyed reading our book, and we wish you a great career in SAP EWM.

The Authors

Balaji R. Kannapan is a solution architect with HCL Technologies and has more than 13 years of experience with SAP Supply Chain Management solutions. He has designed and implemented several projects for SAP Extended Warehouse Management and is considered an authority in this space. Balaji lives in Texas, USA with his wife, Sangeetha, and two children, Sudharsan and Smitha.

Hari Shankar Tripathy heads the SAP SCM, CRM, and Industry Solutions practices at HCL Technologies. With six SAP certifications in various supply chain areas, Hari has worked on more than 50 SAP supply chain projects in over 20 countries, and has been working with SAP EWM since 2005. Hari is based out of Bangalore, India.

Vinay Krishna is an SAP EWM solution consultant with HCL Technologies with expertise in warehousing for the CPG industry. He is an engineer with an MBA in supply chains and an SAP EWM certification from SAP. He is based out of Bangalore, India.

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