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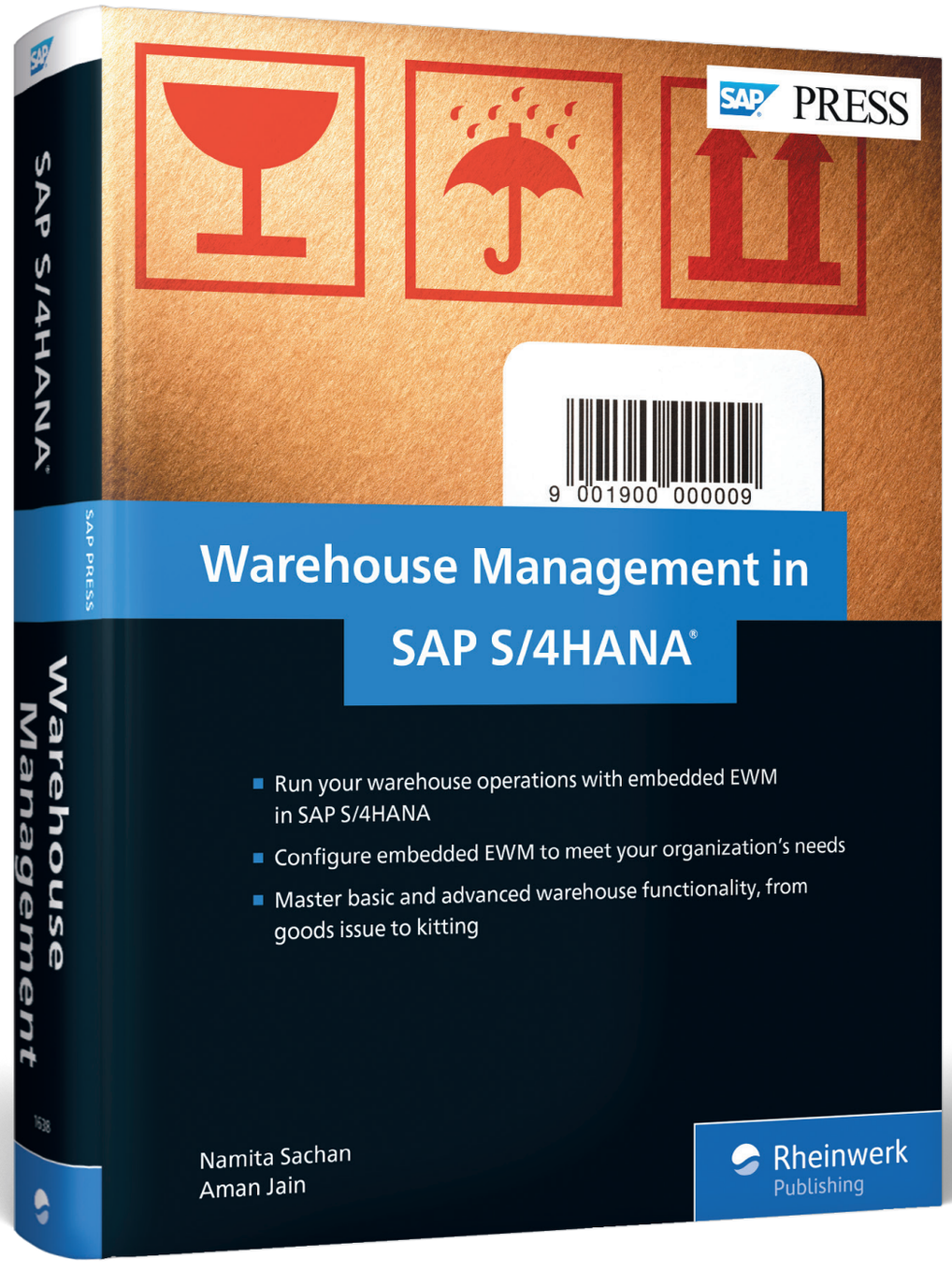

Reading Sample

This sample chapter covers the outbound process in embedded EWM. It covers various stock removal processes, including activities like picking, staging, and loading goods into transportation units or vehicles.

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Chapter 8
Outbound Processing

The outbound process in embedded EWM caters to various processes of stock removal from the warehouse, including activities like picking, staging, and loading goods into transportation units or vehicles. We'll discuss these activities in detail in this chapter.

Using embedded EWM in SAP S/4HANA, organizations can make use of the integrated landscape provided by SAP to manage their outbound warehousing operations to issue stock to customers or other locations. The outbound operations can be simple or complex: In a *simple* outbound process, the goods are picked from storage bins and moved to a goods issue area, and goods issue is completed. In a *complex* outbound process, the goods move through various stages like picking, packing, staging, and loading before goods issue can be initiated. This involves integration with process-oriented storage control and layout-oriented storage control, which we discussed in the previous chapter.

An outbound operation initiates with the creation of a *logistics execution delivery* in SAP S/4HANA, which creates an outbound warehouse request in embedded EWM. This delivery can be created for a customer sales order, stock transport order, or posting change in SAP S/4HANA. The process can work with or without integration with other application modules, such as SAP APO for availability checks. You can also create a direct warehouse request without a delivery in SAP S/4HANA by creating a direct outbound delivery in embedded EWM. Direct goods issue can be posted for processes like scrapping and unplanned goods issue from embedded EWM. You can create warehouse tasks for each warehouse request to complete the outbound process or schedule the creation of multiple warehouse requests simultaneously using waves to further optimize the picking process. We'll talk more about waves in Chapter 13.

Section 8.1 begins this chapter by explaining the outbound process flow in embedded EWM. Section 8.2 explains the configuration settings that need to be made for the

outbound process in embedded EWM. Section 8.3 explains the outbound delivery. Section 8.4 explains the stock removal process. Section 8.5 explains picking and packing, as well as handling exceptions. Section 8.6 covers the loading process, and we end the chapter in Section 8.7 by discussing goods issue posting.

8.1 What Happens During Outbound Processing?

Figure 8.1 shows the sequence of creation of documents in embedded EWM during the outbound process.

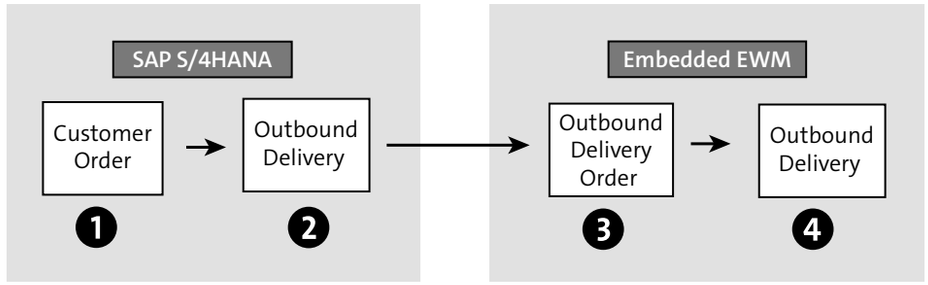

Figure 8.1 Document Flow in Outbound Process

Briefly, each step in the outbound process is as follows:

1. The outbound process starts with creation of an outbound delivery in SAP S/4HANA. The outbound delivery can be created from various business processes:
   - Sales: A customer sales order is created in SAP S/4HANA that requires picking of goods from an embedded EWM-managed warehouse.
   - Stock transfers: A stock transfer order can be created in SAP S/4HANA that requires picking of goods from an embedded EWM-managed source plant to be sent to another location.
   - Production staging: A manufacturing order is created for staging of raw materials for production in the production staging area. These goods are consumed based on requirements in the manufacturing order and goods issue is posted.
2. An outbound delivery is created in SAP S/4HANA for picking from the embedded EWM warehouse. The outbound delivery can be created for any of the scenarios described in the previous step. The outbound delivery contains all relevant data required for stock picking: product, quantity, batch, and so on.

3. The outbound delivery is replicated to embedded EWM and an outbound delivery order is created in embedded EWM. This document serves as the requirement document in embedded EWM and is called the warehouse request. Further processing in embedded EWM such as picking, packing, and staging is done based on the outbound delivery order via creation of warehouse tasks.
4. Once the picking and staging of stock is completed by the warehouse worker and all associated warehouse tasks are confirmed, the warehouse operator posts the goods issue in embedded EWM, resulting in creation of an outbound delivery in embedded EWM. The goods issue is also updated in the outbound delivery in SAP S/4HANA.
5. The use of a transportation unit (TU) is optional in embedded EWM. However, organizations can activate shipping and receiving functions in embedded EWM and make use of TU and vehicle activities to execute loading of goods and carrying them out of the warehouse. The stock is moved to a staging area after picking and loaded on a TU. Goods issue can be posted after loading is complete, which results in posting of goods issue in the outbound delivery in SAP S/4HANA.

Note

Readers familiar with decentralized SAP EWM will notice that an outbound delivery request is no longer created in embedded EWM. The system directly creates an outbound delivery order in embedded EWM based on the outbound delivery in SAP S/4HANA. This reflects a simplification strategy in SAP S/4HANA.

The outbound process can include either simple or complex movement of the stock from the source to destination bin. In complex movements, product is moved using multiple steps, which includes picking, packing, staging, and loading before it reaches the destination bin. A detailed explanation of the configuration and usage of the storage process using process-oriented storage control and layout-oriented storage control was provided in Chapter 6.

Figure 8.2 shows a complex movement scenario in an outbound process using only process-oriented storage control. Configure each of these steps as process steps and provide them in a sequence to let system know the next step that needs to be executed after the previous step is completed. Each step is mapped with logic to identify the source and destination so that the system will know where to pick the step from

and move it to after the required process step is completed. Storage control consists of the following steps:

❶ **Picking**
A picking warehouse task is created to move product from the source bin to the packing work center. You confirm the warehouse task and, depending on settings in process-oriented storage control, the next warehouse task can be created automatically or manually. For more about the steps required to set up process-oriented storage control, see Chapter 6.

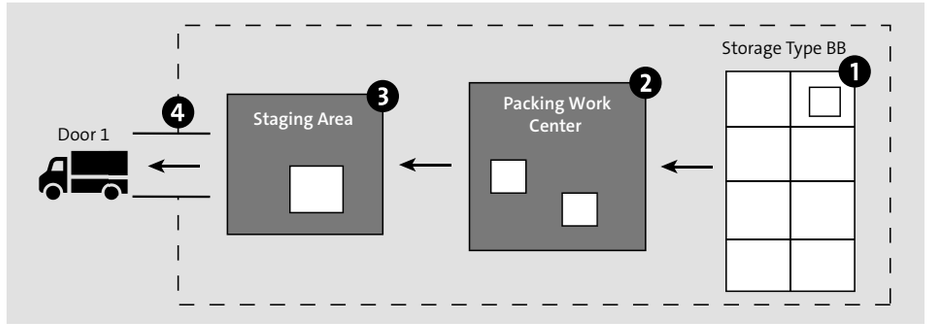

Figure 8.2 Storage Control in Outbound Process

❷ **Packing**
The products are packed or repacked in the packing work center. A warehouse task is created to move pallets to the staging area.

❸ **Staging**
Products are taken to the staging area, where they wait for the transportation vehicle to arrive. The staging warehouse task is confirmed.

❹ **Loading**
After the truck docks at the warehouse door, HU warehouse tasks are created for loading the goods onto the vehicle. The tasks are confirmed when loading is complete.

The picking process can also involve a combination of process-oriented storage control and layout-oriented storage control to execute specific processes based on the warehouse layout. For example, pallets picked from the source storage bin might need to be moved to a pick point, where required goods will be packed into a pick HU. This is done by activating the pick point for the source storage type. The pick HU can then be moved for other outbound operations, such as packing, staging and loading.

8.2 Configuring Outbound Delivery Processing

To carry out warehouse activities for outbound processing in embedded EWM, it's important to perform some initial settings in both SAP S/4HANA and embedded EWM so that the delivery documents are sent to embedded EWM along with all attributes such as stock type, serial number, batch requirements, and so on. We'll cover each of these basic settings in this section.

8.2.1 Document Type and Item Type in Outbound Process

We discussed document categories, item categories, document types, and item types in the previous chapter. Some of the document types available in embedded EWM for the outbound process are shown in Table 8.1.

Document Category	Document Type	Document Type Description
PDO	OUTB	Outbound delivery order
PMR	PWR	Production material request
FDO	OUTB	Outbound delivery

Table 8.1 Document Types for Outbound Process

New document types are created manually via IMG path **SCM Extended Warehouse Management • Extended Warehouse Management • Goods Issue Process • Outbound Delivery • Use the Wizard to Define Document Types for Outbound Delivery Process**; they also can be created manually without wizard assistance via IMG path **SCM Extended Warehouse Management • Extended Warehouse Management • Goods Issue Process • Outbound Delivery • Manual Settings • Define Document Types for Outbound Delivery Process**.

Click on **New Entries** and add a document type with its document category, number range, and control profile, as shown in Figure 8.3.

The item types available in embedded EWM for the outbound process are shown in Table 8.2.

Item Category	Item Type	Item Type Description
DLV	ODLV	Standard item—outbound delivery
DLV	ODPS	Item production supply (outbound)

Table 8.2 Item Types in Embedded EWM for Outbound Process

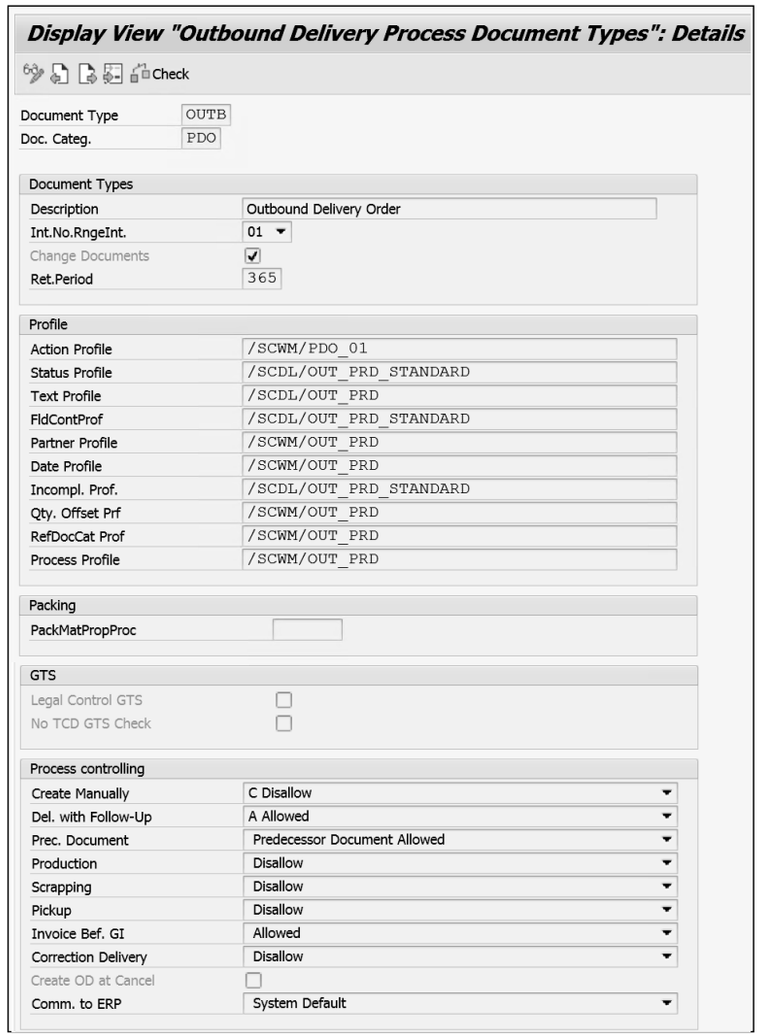

Figure 8.3 Define Document Type for Outbound Process

You create item types using a wizard via IMG path **SCM Extended Warehouse Management • Extended Warehouse Management • Goods Issue Process • Outbound Delivery • Use the Wizard to Define Item Types for Outbound Delivery Process** or manually via IMG path **SCM Extended Warehouse Management • Extended Warehouse Management • Goods Issue Process • Outbound Delivery • Manual Settings • Define Item Types for Outbound Delivery Process**, as shown in Figure 8.4.

Click on **New Entries**, add the item type and item category, and define control profiles and other process management controls.

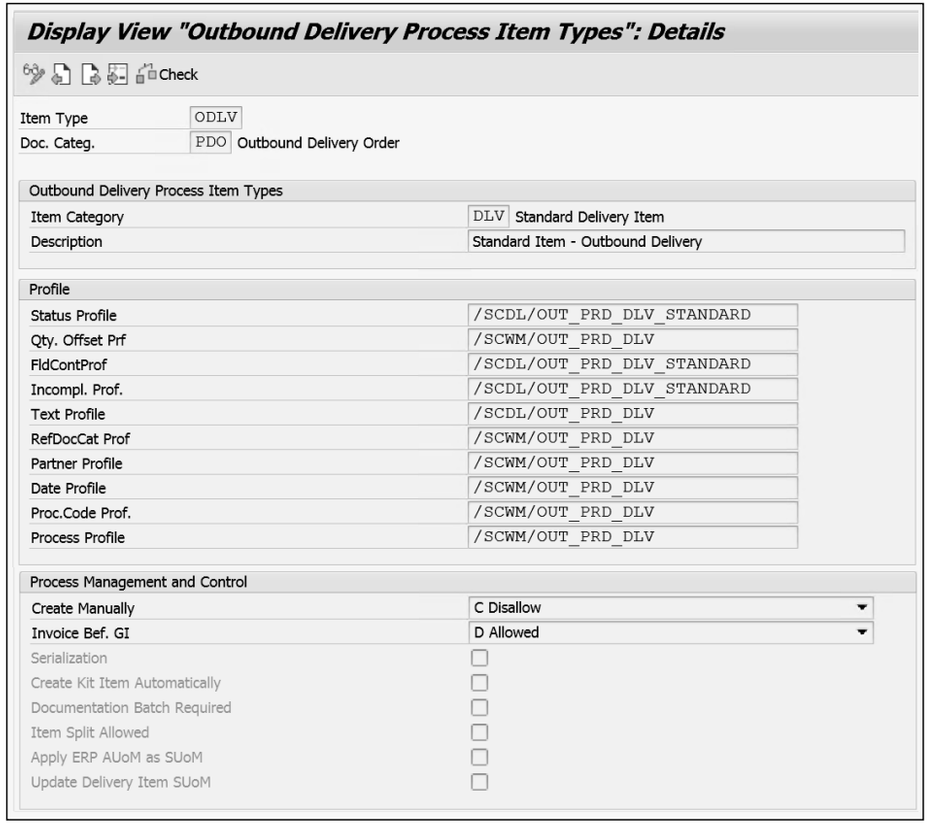

Figure 8.4 Define Item Type for Outbound Process

8.2.2 Mapping Outbound Deliveries

It's important to map the delivery document type from SAP S/4HANA with the corresponding document type of the warehouse request. This helps the system to know which embedded EWM document type to create based on the document type of the SAP S/4HANA system. Document type mapping is done in embedded EWM from IMG path **SCM Extended Warehouse Management • Extended Warehouse Management • Interfaces • ERP Integration • Delivery Processing • Map Document Types from ERP**

System to EWM. Click on **New Entries** and map the document type in SAP S/4HANA and the target embedded EWM document type.

Similarly, you also need to map item types in the deliveries in SAP S/4HANA with the item types in warehouse request in embedded EWM. To do so, navigate to IMG path **SCM Extended Warehouse Management • Extended Warehouse Management • Interfaces • ERP Integration • Delivery Processing • Map Item Types from ERP System to EWM.** Click on **New Entries** and map the SAP S/4HANA document and item type and the embedded EWM document type with the item type in embedded EWM.

8.2.3 Assigning Item Type to Document Type

The item types defined previously are assigned to document types to restrict the allowed item types for a delivery type for the outbound process. The assignment of item types to delivery types is done via IMG path **SCM Extended Warehouse Management • Extended Warehouse Management • Goods Issue Process • Outbound Delivery • Manual Settings • Define Allowed Item Types for in Outbound Delivery Process**, as shown in Figure 8.5. Click on **New Entries** and add combination of embedded EWM document and item types.

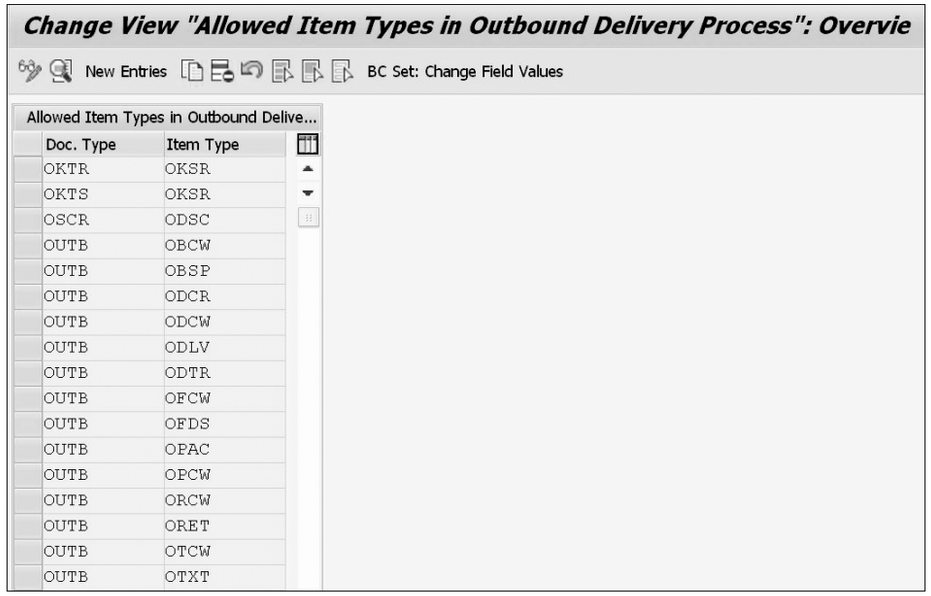

Figure 8.5 Assign Item Types to Document Types for Outbound Process

8.2.4 Configuring and Using Consolidation Groups

Consolidation groups are used to identify the outbound delivery items that can be picked or packed together in a handling unit. Consolidation groups are used if the **Packing Consolidation** checkbox is flagged for an outbound delivery item.

To consolidate delivery items with similar requirements for picking or packing, consolidation groups are assigned to the delivery items either manually or automatically by embedded EWM. To ensure a consolidation group is assigned to the delivery item, make the following settings:

- **Define consolidation group**
  In this setting, define the delivery values via which the consolidation group is assigned to the delivery item via IMG path **SCM Extended Warehouse Management • Extended Warehouse Management • Goods Issue Process • Define Consolidation Group**. Select checkboxes for parameters used for determination of the consolidation group, as shown in Figure 8.6.

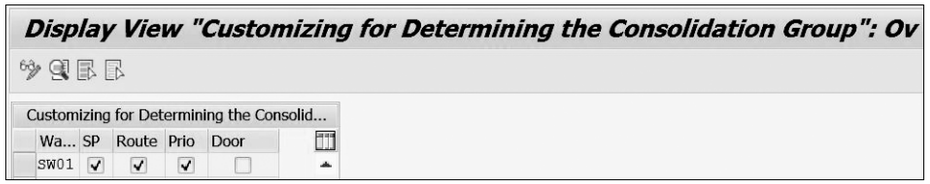

Figure 8.6 Define Consolidation Group for Grouping Delivery Items

- **Assign number range interval to consolidation group**
  In this setting, define warehouse-dependent settings for the consolidation group assignment to a delivery item via IMG path **SCM Extended Warehouse Management • Extended Warehouse Management • Goods Issue Process • Assign Number Range Intervals to Consolidation Group**. Click on **New Entries** and provide the consolidation group number range identifier and type. As shown in Figure 8.7, you can configure automatic or manual consolidation group assignment for the stock removal and putaway process. It's also possible to direct the system to always assign a unique consolidation group to a delivery item if products are required never to be consolidated together in a handling unit.

Note

A consolidation group can be added manually in a delivery item. Manually added consolidation groups must have the external number range assigned to warehouse.

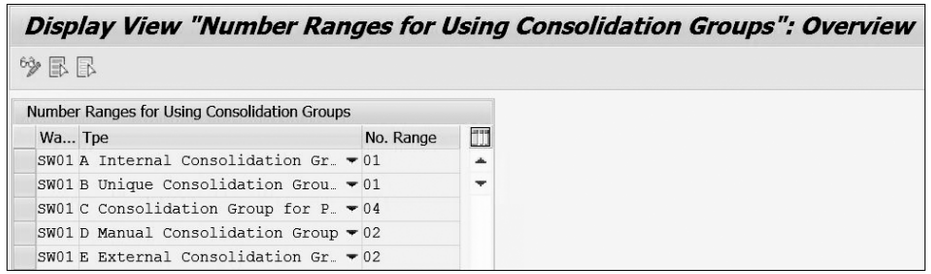

Figure 8.7 Assign Consolidation Group Number Range to Warehouse

8.3 Outbound Delivery

In this section, we'll explain the structure and some important features of outbound delivery orders and outbound delivery documents used in the outbound process in embedded EWM. We'll explain the outbound process from the perspective of the order-to-cash cycle, but the same warehouse processes also can be performed for other business processes that involve issuing stock out of the warehouse, such as stock transfer orders or goods issue to production orders.

8.3.1 Outbound Delivery Order

As discussed in Section 8.1, the outbound delivery order is the warehouse request in embedded EWM, based on which the picking process is carried out. The outbound delivery order consists of a header section and an item section. As shown in Figure 8.8, the outbound delivery order header contains general information such as shipping office, various statuses for picking, packing, loading, and issue, routes received from delivery in SAP S/4HANA, and any shipping and receiving process–related data like means of transport, vehicle, and so on.

In addition to general information, there are buttons used to perform processes at the header level, such as the **Load** button, which is used for loading/reverse loading, and the **Goods Issue** button, which is used to perform goods issue for the outbound deliver order. The order header also provides an option to navigate to associated documents and data. You can click on the icon and open documents such as warehouse tasks, view the change log for the order, display VAS orders and physical inventory documents created for the outbound delivery order, and more.

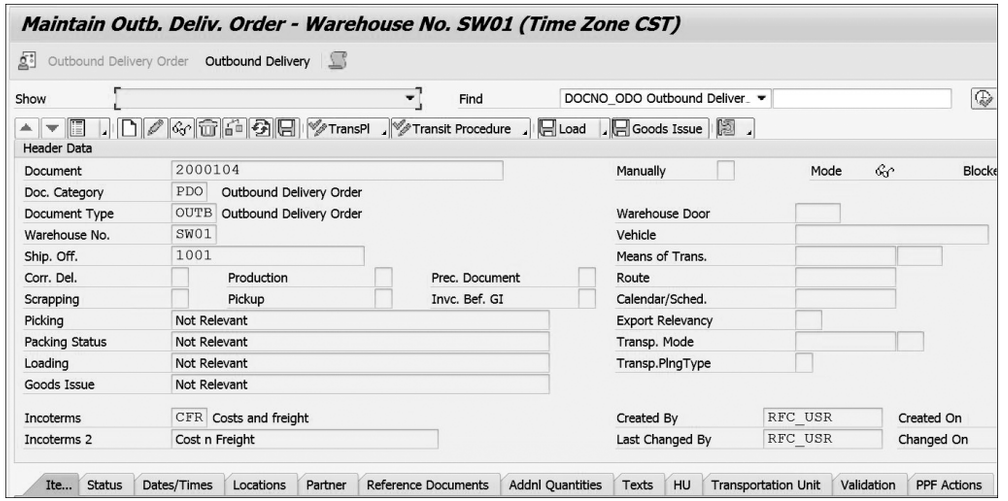

Figure 8.8 Outbound Delivery Order Header

The outbound delivery order document also contains tabs holding further data about the order and its processing status at the header level. These tabs are as follows:

- The **Status** tab contains all applicable statuses for the outbound delivery order document at the header level. The statuses come from the status profile assigned to the combination of document category and document type for the outbound delivery order. For example, once an operation such as picking is completed for all outbound delivery order items, the relevant status value is set from **Not Started** to **Complete** for status type **DPI** for picking.
- The **Dates/Time** tab contains all applicable statuses for the outbound delivery order document at the header level. The dates/times come from the date/time profile assigned to the combination of document category and document type for the outbound delivery order. Once an operation such as goods issue is completed for all items in the outbound delivery order, the actual date and time values are set for the **EGOODSISSUE** date/time type. Planned and actual values for new dates and time can be manually added in this tab for an outbound delivery order.
- The **Location** tab contains all applicable locations for the outbound delivery order document, like a warehouse number. New locations can also be manually added in this node.
- The **Partner** tab contains all applicable business partners for the outbound delivery order header. The business partner roles come from the partner profile

assigned to the combination of document category and document type for the outbound delivery order header. New business partners with applicable business partner roles can be manually added in this tab.

- The **Reference Document** tab contains all reference documents for the outbound delivery order. The applicable reference document categories come from the reference document profile assigned to the combination of document category and document type for the outbound delivery order. Reference documents can include documents like the number of the logistics execution delivery in SAP S/4HANA, VAS orders, and more. A new reference document for the applicable reference document category can be added manually in this node.
- The additional quantities (**Addnl Quantities**) tab contains all quantities and their units of measure applicable to the outbound delivery order document.
- The **Text** tab contains all text types applicable to the outbound delivery order document header. The applicable text types come from the text profile assigned to the combination of document category and document type for an outbound delivery order. New text against a text type can be added manually in this node.
- The **Handling Unit** tab contains details of any handling units created for the outbound delivery order items after packing goods in the order. You also can create new handling units for an item type manually in this node. The delivery can be split against a selected handling unit, which can be used to create an outbound delivery or directly post goods issue.
- The **Transportation Unit** data tab contains details of the transportation unit assigned to the outbound delivery order. The transportation unit represents the vehicle on which stock is loaded during the outbound process.
- The **PPF Actions** tab contains details of any postprocessing framework action being carried out in the outbound deliver order to create any follow-up document or execute an action. For example, you can schedule a postprocessing framework action for creation of warehouse tasks for picking or creation of a wave for the warehouse request. You can also execute an unprocessed postprocessing framework action from this tab or manually retrigger a postprocessing framework action.

As shown in Figure 8.9, the **Item** tab in the outbound delivery order contains general information such as product number, quantity, batch, country of origin, and expiration date, defined by the item category and item type. This level also contains important information that guides the movement of the product inside the embedded EWM warehouse. Some of these include warehouse process type, stock type, staging bay, door, goods movement bin, and consolidation group.

There are various processes that can be performed from this screen using different buttons—for example, creation of batch subitems using the **Subitem** button. A delivery group also can be added to the item manually, which adds a text item to the main product using the **Delivery Group** button. If selection criteria for the batch have been passed on to embedded EWM, then batches can be selected using the **Selection** button. If required, the delivery quantity can be adjusted using appropriate process codes, and the same information is relayed back to SAP S/4HANA for updating the outbound delivery.

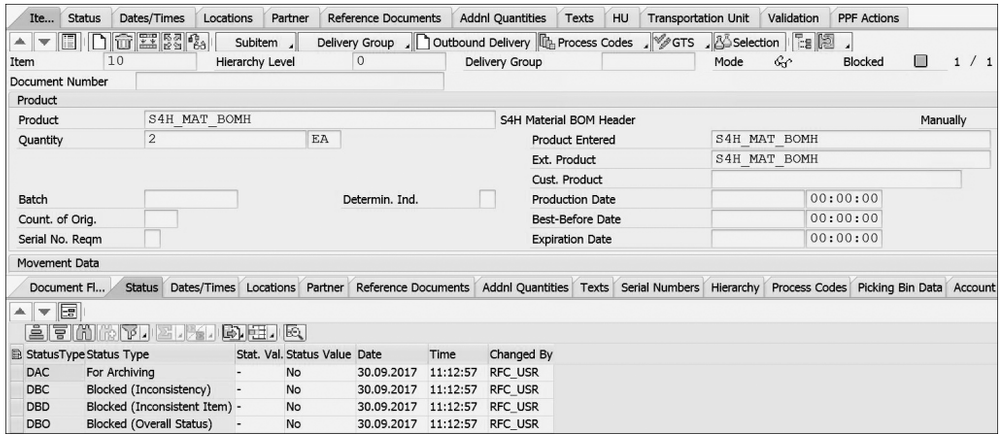

Figure 8.9 Outbound Delivery Order Item

The outbound delivery order item contains a detailed item-level view with various tabs to show the processing status of the individual document items. Some of these tabs at the item level are similar to the tabs available for the outbound delivery order at the header level. The data in tabs at the item level is determined based on the profiles assigned to the combination of item categories and item types. There are some data tabs which are applicable only to outbound delivery order items, such as the following:

- The **Serial Number** tab is used to provide the serial numbers for the items picked in the outbound delivery if the item is relevant for serialization.
- The **Process Codes** tab contains information about all process codes applied on the outbound delivery order item. This node also contains information about the delivery quantity, which is adjusted by applying process codes.

- If an item transferred to embedded EWM from SAP S/4HANA has an account assignment linked to it, such as a cost center, WBS element, or order, this is shown in the **Account Assignments** tab. This data acts as a filter in the embedded EWM warehouse monitor to filter out the delivery for a specific account assignment.
- If the product in the line item of the outbound delivery order is a dangerous good, then the dangerous goods indicator is populated in the **Dangerous Goods** tab. All information such as the dangerous goods class, hazard ID, and so on is captured in this node.

8.3.2 Outbound Delivery Creation

The final outbound delivery is created automatically in embedded EWM once the goods issue is posted from the outbound delivery order or when you click on **Outbound Delivery** from the outbound delivery order. This document triggers the update of goods issue in the outbound delivery in SAP S/4HANA. With the goods issue complete in SAP S/4HANA, you can take subsequent actions such as creation of an invoice, account postings, and so on. You can perform partial goods issue based on goods available for picking in the outbound delivery, which creates an outbound delivery for a partial quantity. You also can trigger a goods issue for the partial quantity from the outbound delivery in embedded EWM.

Figure 8.10 shows an outbound delivery created in embedded EWM.

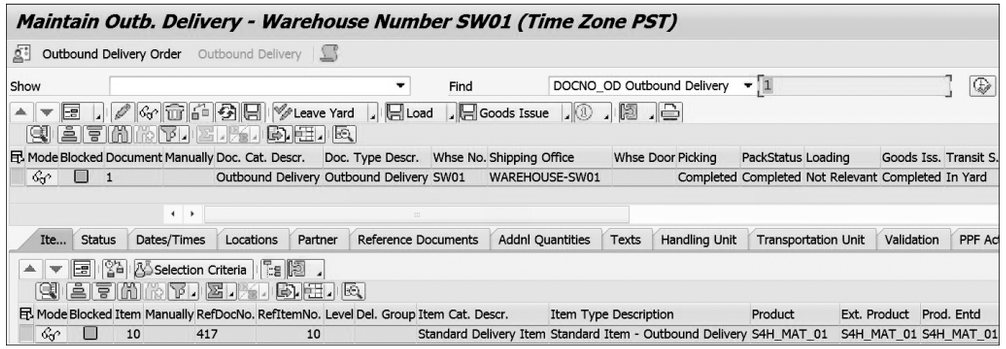

Figure 8.10 Outbound Delivery in Embedded EWM

The outbound delivery is used as the basis to print delivery documents such as delivery notifications, bills of lading, and so on. Some of the functions available in the outbound delivery are as follows:

- Setting and resetting yard status
- Setting and resetting loading status
- Posting and canceling a goods movement
- Requesting and canceling an invoice if the document supports invoicing before goods issue

8.3.3 Delivery Creation Using References

The order-to-cash process starts with a sales order being created once the customer enquiry is converted into a quotation. Usually, organizations have an active availability check to find out if they have sufficient stock in their inventory. After the sales order schedule line is confirmed, a delivery is created as per the delivery schedule line and distributed to embedded EWM for carrying out warehouse activities.

Once the delivery is replicated to embedded EWM, a warehouse request or an outbound delivery order document is created. The outbound delivery order forms the basis for all warehousing activities in embedded EWM. As explained in Chapter 6, picking warehouse tasks are created and grouped into warehouse orders to be assigned to a resource for execution. The resource completes picking, packing, staging, and loading for the available stock and posts goods issue for the outbound delivery order. If the shipping and receiving function is activated in the warehouse, then goods issue can also be posted from TU display Transaction /SCWM/TU, thus creating an outbound delivery in embedded EWM. As a follow-up step, goods issue is posted in the outbound delivery in SAP S/4HANA. After this process, the billing and financial posting is carried out in SAP S/4HANA by relevant departments.

The outbound delivery also can be created without reference to a sales order, such as during issue of stock to a network order using movement type 281. This creates an outbound delivery in SAP S/4HANA and the same is replicated to embedded EWM and processed in the same way as explained for the order-to-cash process. In effect, you can say embedded EWM isn't concerned about whether the delivery is created with or without reference to an order so long as the right delivery document determination configuration is maintained as mentioned in Section 8.2.

8.3.4 Direct Outbound Delivery Process

An outbound delivery order also can be created directly in embedded EWM, which in turn creates an outbound delivery in SAP S/4HANA. There are many business

scenarios in which the outbound delivery is required to be created directly in embedded EWM—such as the following:

- There's some extra space left in the truck after loading all customer deliveries and you want to push some additional products (e.g., perishable items) to the customer.
- There may be an urgent request from a customer to send over products that weren't included in the original delivery.
- Returnable packaging material (e.g., reusable empties, containers) is sent back to a supplier or another location that needs it urgently.
- A sale is made to an internal customer, such as a project system team, for internal consumption. In this case, the internal customers may pick up the products from the warehouse itself, and during goods issue the stock is posted to the cost center of the account assignment category.
- During the process of scrapping, once the scrapping stock is placed in the scrapping work center, when completing the scrapping process goods issue is posted using the direct outbound delivery order for the quantity to be scrapped.

It may be required to involve the SAP Global Trade Services (SAP GTS) system and the gATP system to check the global inventory availability or carry out customs and clearance checks. The availability check in embedded EWM is configured as per business requirements to be made in embedded EWM, SAP APO, or in SAP S/4HANA. If the delivery is designated for product exports, an integration with SAP GTM is performed for custom and compliance checks. Once all the mandatory and optional steps are performed for the delivery, the outbound delivery order created in embedded EWM is replicated to SAP S/4HANA. The warehouse activities are performed in the same way as for the outbound delivery order created from sales orders. For direct outbound delivery orders, invoicing before goods issue can also be done. Once the goods issue is posted for the outbound delivery order in embedded EWM, it's replicated to the outbound delivery in SAP S/4HANA to facilitate delivery-related billing.

To enable creation of an outbound delivery in SAP S/4HANA for a direct outbound delivery order created in embedded EWM, map a delivery type from embedded EWM to a delivery type in SAP S/4HANA. You can optionally assign the embedded EWM delivery type to a cross-company delivery type in SAP S/4HANA if the direct outbound delivery in embedded EWM is for a stock transfer order. To do so, navigate to IMG path **Logistics Execution • EWM Integration • Outbound Process • Direct Outbound Deliveries • Determine Document Types for Direct Outbound Deliveries**. Click

on **New Entries** and enter the SAP S/4HANA outbound delivery type to be determined for the direct outbound delivery type created in embedded EWM, as shown in Figure 8.11.

Figure 8.11 Mapping SAP S/4HANA Delivery Type

In a similar way, map the SAP S/4HANA delivery item type with the embedded EWM document type, item category of SAP S/4HANA, and item type of the embedded EWM outbound delivery order via IMG path **Logistics Execution • EWM Integration • Outbound Process • Direct Outbound Deliveries • Determine Item Categories for Direct Outbound Deliveries**. Click on **New Entries** and enter the SAP S/4HANA outbound delivery item type to be determined against the embedded EWM direct outbound delivery item type.

8.3.5 Changing Order Quantity

SAP has provided a functionality in embedded EWM in SAP S/4 HANA via which order quantity changes in a sales order are communicated to embedded EWM and automatically updated in the outbound delivery order. Quantity changes in a sales order are communicated to embedded EWM by flagging the checkbox for **Delv.Chg** at IMG path **Logistics Execution • Extended Warehouse Management • Basic Setup of Connectivity • Configure EWM Specific Parameters**, as shown in Figure 8.12.

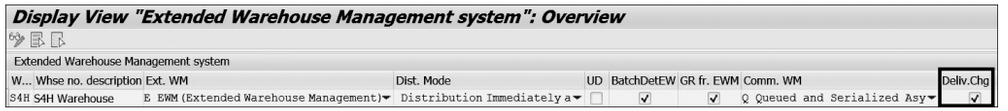

Figure 8.12 Order Reduction

Embedded EWM performs the following follow-up actions in the warehouse request once the quantity is changed:

- **Order reduction with warehouse task for outbound delivery order created but not confirmed**

The warehouse task for the outbound delivery order item is canceled and the new warehouse task is created, which is confirmed by the warehouse worker.

- **Order reduction with warehouse task for outbound delivery order confirmed**
  If the picking warehouse task is confirmed and the stock is reduced in SAP S/4HANA, then the stock is marked as reduced in embedded EWM, which can be seen in the work center. This allows warehouse workers to be aware of the stock reduction and thus avoid packing reduced quantities.

> **Note**
>
> Order reduction allows you to modify order quantities in SAP S/4HANA after warehouse tasks have been created in embedded EWM; this is a new feature in embedded EWM in SAP S/4HANA 1709.

8.4 Stock Removal

In this section, we'll explain the independent objects and configurations required for the stock removal process in the warehouse. First, we'll explain the process for creating warehouse tasks for different outbound processes such as picking, packing, loading, and so on. Then, we'll talk about the process of source storage type determination during the stock removal process to identify the source bin for the requested stock. Finally, we'll explain standard stock removal strategies that can be used during the stock removal process and explain the process if a custom stock removal strategy needs to be configured.

Before we jump into those topics, however, there are two facts to note:

- **Waves for outbound process**
  In embedded EWM, warehouse requests for outbound and internal warehouse processes can be grouped into waves to further optimize picking of stock. Waves are created for products sharing similarities such as being picked from same source area or picked together because they need to be shipped at the same time. Items within the wave are processed together, and picking warehouse tasks are created for all assigned warehouse requests at a scheduled time. This enables completion of multiple picking requests from the warehouse simultaneously, which reduces the number of roundtrips in the warehouse. A detailed explanation of waves is provided in Chapter 13.

- **Warehouse order creation for outbound requests**
  In embedded EWM, warehouse orders are created mandatorily whenever warehouse tasks are created. Warehouse orders are containers that hold warehouse tasks, which are grouped together using warehouse order creation rules to create executable work packages assigned to a worker using resource management. A warehouse operator prints the warehouse order and confirms the tasks assigned to it.

  Alternatively, if an operator is using RF, then the system displays the warehouse tasks assigned to the warehouse order in a sequence on RF screens. The warehouse order is confirmed when the last task assigned to the warehouse order is confirmed and its status is changed to **Complete**. These work packages are created based on settings configured in warehouse order creation rule, such as how many items can be in one warehouse order, maximum weight/volume, and so on. A detailed explanation of the warehouse order creation process is provided in Chapter 6.

8.4.1 Warehouse Tasks

We will pick the flow from where we left off. You've created a warehouse request in embedded EWM to work with in the form of an outbound delivery order. When the outbound delivery order is created, there are certain determinations that take place in the delivery, such as warehouse process type, consolidation group determination, dates, partner, batch, and so on.

The next step in processing the outbound delivery order is creation of warehouse tasks for stock removal. You can create warehouse tasks for individual warehouse requests or group them into waves to allow simultaneous creation of warehouse tasks for multiple warehouse requests. To create a warehouse task for the outbound delivery order, access the outbound delivery order from the embedded EWM warehouse monitor using Transaction /SCWM/MON. Expanding the **Outbound • Document • Outbound Delivery Order** nodes. Select the outbound delivery order displayed after providing selection criteria, click on  , and select the **Create WT in Background** option, as shown in Figure 8.13.

Another way of accessing the outbound delivery order for maintenance is via SAP Easy Access path **Logistics • SCM Extended Warehouse Management • Extended Warehouse Management • Delivery Processing • Outbound Delivery • Maintain Outbound Delivery Order** or using Transaction /SCWM/PRDO.

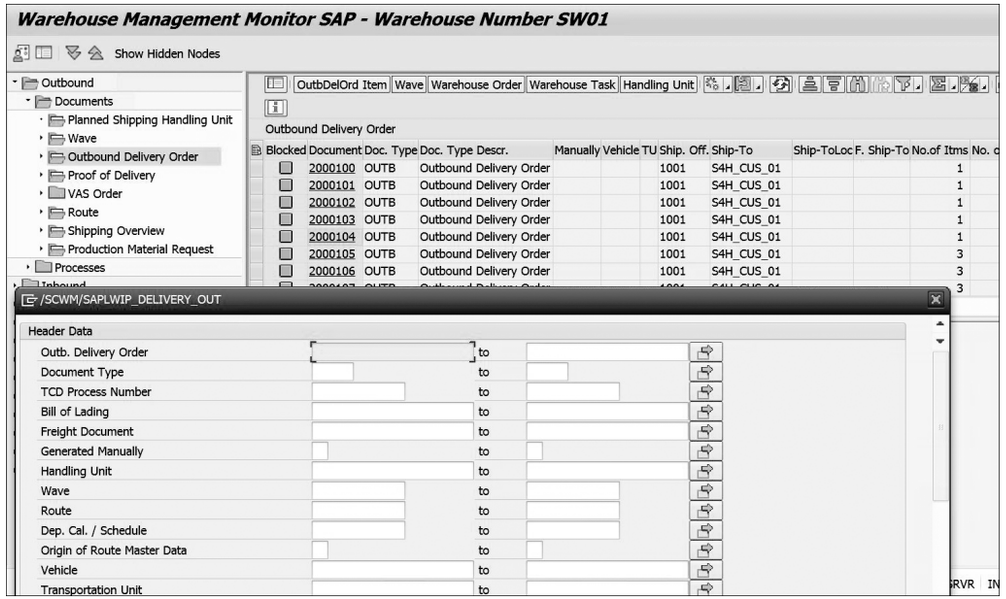

Figure 8.13 Warehouse Monitor to Search Outbound Delivery Order

As shown in Figure 8.14, once the outbound delivery order is opened, follow the path **Outbound Delivery Order • Follow-On Functions • Warehouse Task** and click on the Create + Save button to create the warehouse task directly from the delivery.

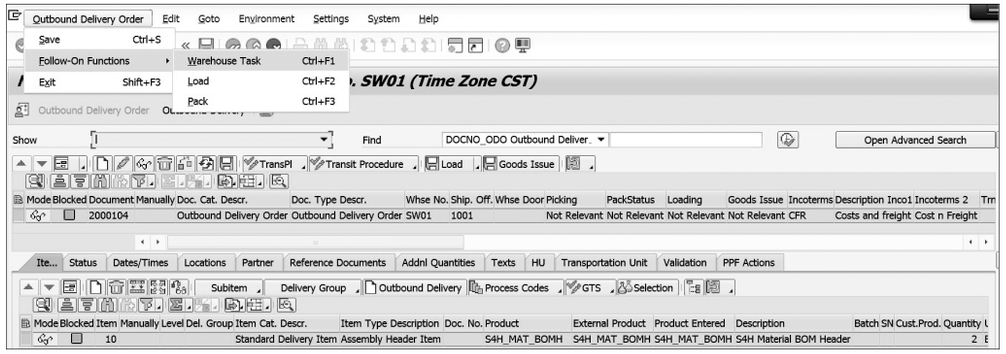

Figure 8.14 Creating Warehouse Task for Outbound Delivery Order

Another way of creating the warehouse task for an outbound delivery order is via SAP Easy Access path **Logistics • SCM Extended Warehouse Management • EWM Work**

Scheduling • Create Warehouse Task for Warehouse Request • Stock Removal for Outbound Delivery Order or by using Transaction /SCWM/TODLV_O and selecting the option for **Stock Removal**. Embedded EWM finds the source bin for the stock to be picked. It considers the storage type search sequence and stock removal strategy to determine the source bin.

Once warehouse tasks are created, the system determines the warehouse order creation rule for creating a warehouse order and assigns the warehouse order to a queue from which it will be picked up by a resource. We'll discuss resource management further in Chapter 11.

Note

To create a warehouse task for stock removal for the outbound delivery order, embedded EWM requires a warehouse process type, which enables it to create warehouse tasks that guide warehouse workers about the source bin of the stock, what operations are to be performed, and other parameters that affect stock placements in embedded EWM.

The warehouse process type is determined at the item level of the outbound delivery order. It's then used in the creation of warehouse tasks for stock removal. As a follow-up document, the warehouse order is created as a container consolidating one or more warehouse tasks. Because the warehouse order contains warehouse tasks, the system uses the warehouse process type to determine the queues to allocate work to the warehouse workers. The details of how the warehouse process type is determined in delivery items are explained in Chapter 6.

8.4.2 Storage Type Determination

The first step in execution of the outbound process is the identification of source bins for creation of warehouse tasks for picking. The system won't create a picking warehouse task if it can't find a source storage bin. Picking bin determination is done by the system using the storage type determination process.

The storage types determined in embedded EWM begins by determination of storage type. A group of storage types are grouped together into a storage type search sequence. The system looks for products in the storage types in the sequence in which they're added in the storage type search sequence. The storage type search sequence is defined via IMG path **SCM Extended Warehouse Management • Extended Warehouse Management • Goods Issue Process • Strategies • Specify Storage Type**

Search Sequence, as shown in Figure 8.15. Click on **New Entries** and enter the storage type search sequence against the embedded EWM warehouse. Select the search sequence, click on **Assign Storage Type to Storage Type Search Sequence**, and enter the storage types the system should search.

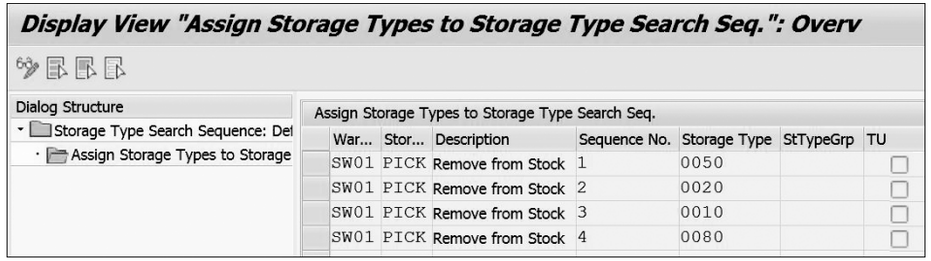

Figure 8.15 Defining Outbound Search Strategy in Embedded EWM

In the next step, define the criteria to determine the storage type search sequence. This setting is made via IMG path **SCM Extended Warehouse Management • Extended Warehouse Management • Goods Issue Process • Strategies • Define Storage Type Search Sequence for Stock Removal**. Click on **New Entries**, define a stock removal control indicator against the embedded EWM warehouse, and save.

Once the search sequence determination identifier is defined, configure the setting used by the system to determine the source storage type while creating the stock removal warehouse task. This is configured via IMG path **SCM Extended Warehouse Management • Extended Warehouse Management • Goods Issue Process • Strategies • Determine Storage Type Search Sequence For Stock Removal**, as shown in Figure 8.16. Click on **New Entries** and set the determination of the search sequence based on the following parameters for your embedded EWM warehouse:

- The stock removal control indicator (**SRCI**) is assigned to the **Warehouse Data** tab in the product master and is used to group products that can be picked from bins in the same storage type search sequence.
- **HazRat1** and **HazRat2** are used if the material is hazardous.
- **Quantity Classif.** is for quantity classification and is determined from the packaging specification. It's used to determine the storage type—for a product stored in cases, pallets, and so on.
- **Whse Process Type** is for the warehouse process type determined at the outbound delivery order item level.
- **Tpe** and **Use** are used for classifying stocks based on special stock and usage.

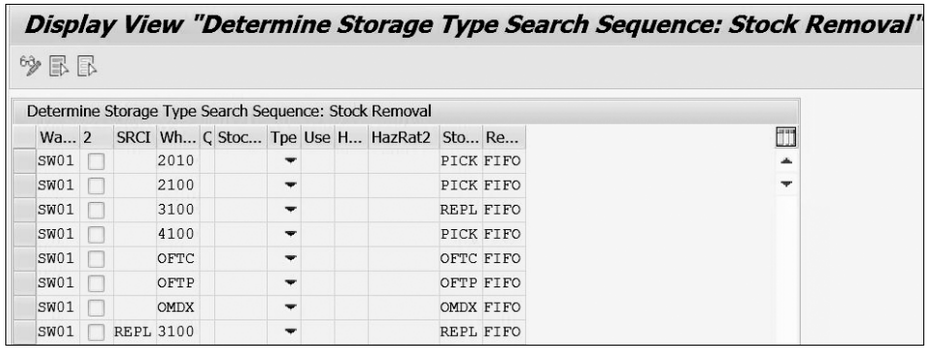

Figure 8.16 Settings to Determine Storage Type Search Sequence

Once the storage type determination is configured, you can provide an access sequence optimization, based on which the system determines the storage type search sequence using the set parameters. The access sequence is set via IMG path **SCM Extended Warehouse Management • Extended Warehouse Management • Goods Issue Process • Strategies • Optimization of Access Strategies for Storage Type Determination in Stock Removal**, as shown in Figure 8.17. Click on **New Entries**, select the parameters for determining the storage type search sequence in the descending sequence, and save.

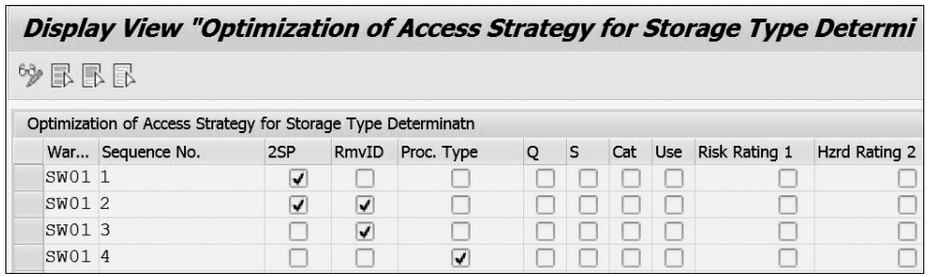

Figure 8.17 Settings to Optimize Stock Removal Search Seqence

8.4.3 Stock Removal Strategies

Stock removal strategies are used by the system to determine the bin in the storage type from which picking will be carried out. These strategies can be used to identify which stock the system must pick up based on goods receipt date, shelf-life expiration date, and so on.

Stock removal strategies are assigned to a storage type search sequence determination under **Storage Rule**, as shown in Figure 8.18. Thus, they're used to identify which quant should be picked up by the system for a storage type or storage type group. To specify a stock removal rule, navigate to IMG path **SCM Extended Warehouse Management • Extended Warehouse Management • Goods Issue Process • Strategies • Specify Stock Removal Rule**. Click on **New Entries** and define a stock removal identifier rule for the embedded EWM warehouse.

Next, select the newly created stock removal rule and click on **Stock Removal Rule** in left-hand menu to add sort fields for the stock. Stock removal strategies are means of sorting the stock in the source bin based on quant characteristics (which become the sort fields in this case), like goods receipt date, shelf-life expiration date, and so on, either in ascending or descending order. As shown in Figure 8.18, one or more sort fields can be assigned to a stock removal rule via a predefined list of fields available in standard embedded EWM that can be used in defining the sort rule.

Figure 8.18 Assigning Sort Field to Stock Removal Rule

Some of the stock removal strategies that can be defined in the system and used for stock removal are as follows:

- **First in, first out (FIFO)**
  FIFO is the stock removal strategy in which the goods receipt date is used as the sort field and quants are sorted in ascending order of goods receipt date. Thus,

based on this strategy, the quant with the earliest goods receipt date is proposed for picking from a storage type. This strategy is mostly used for products that are perishable in nature.

- **Stringent FIFO**
  Stringent FIFO is a removal strategy in which the oldest quant is picked not from a single storage type, but from a group of storage types. This strategy is useful if you want the system to look for quants with the oldest goods receipt dates across multiple storage types in the warehouse. Storage type groups are defined via SAP Easy Access path **SCM Extended Warehouse Management • Extended Warehouse Management • Master Data • Define Storage Type Groups**, as shown in Figure 8.19. Click on **New Entries** and set the **Stock Removal Rule** as first in-first out while defining the storage type group.

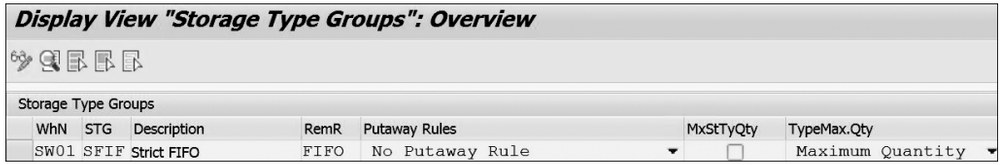

Figure 8.19 Defining Storage Type Group

After defining the storage type group, storage types to be assigned to the storage type group are assigned via IMG path **SCM Extended Warehouse Management • Extended Warehouse Management • Master Data • Assign Storage Type to Storage Type Group**, as shown in Figure 8.20. Click on **New Entries**, enter the storage type group, and assign it to a sequence of storage types.

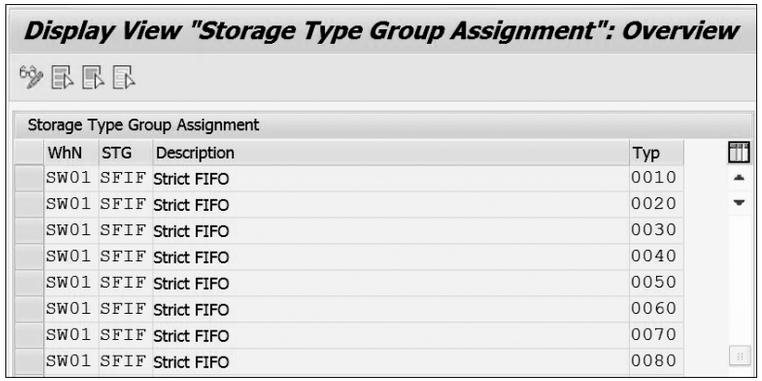

Figure 8.20 Assinging Storage Types to Storage Type Group

While configuring the search strategy for product removal in a warehouse, apply the stock removal rule to all the storage types assigned to the storage group. This is done by assigning the storage type group search sequence to a storage group in the **StTypeGrp** field rather than to individual storage types via IMG path **SCM Extended Warehouse Management • Extended Warehouse Management • Goods Issue Process • Strategies • Specify Storage Type Search Sequence**, as shown in Figure 8.21.

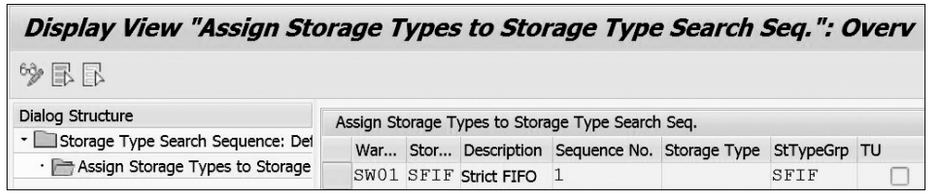

Figure 8.21 Assign Storage Types to Storage Types Search Sequence

This storage type search sequence then can be used in storage type search sequence determination. In this way, during the picking warehouse task creation, embedded EWM will scan all the bins in all the storage types assigned to the storage type search sequence and choose the source bin that holds the stock with the oldest goods receipt date.

- **Last in, first out (LIFO)**
  In the LIFO search strategy, the stock removal rule is defined with the goods receipt date being used as sorting criteria for the stock in the storage type, but in descending order. Thus, embedded EWM always picks up the quant last placed in stock. This strategy is specifically used in processes in which products don't have shelf-lives—for example, pallets of mobile phone boxes. In these cases, rather than removing all the stock from the top and then removing the one at the bottom, the warehouse operator picks the stock placed at the top, which is the quant last received in stock in embedded EWM.
- **Partial quantities first**
  Partial quantities first is the stock removal strategy in which the system overrides FIFO principles for stock removal and optimizes the number of HUs in the warehouse. This strategy aims to keep the number of partial HUs in the warehouse as low as possible. As discussed in the previous chapter, during putaway the stock for products are stored in the following:
  - Full pallets as specified in the packaging specification

  - Partial pallets in which the quantity is less than that of a standard HU

  While setting up this strategy, two stock removal rules are defined, one for ascending quantity (pieces) and the other for descending quantity (full HUs). A packaging specification is defined with two levels—one with the quantity classification as a pallet and other with pieces, for example. Next, the stock removal rules are assigned to the storage type search sequence so that stock is picked up based on the quantity classification as a filtering parameter.

  During the search for the source bin to remove the stock, the system proceeds as follows:

  - If the quantity of the warehouse request is the same or greater than that of the standard HU, the system sorts the pallets in descending order and removes full pallets from the source bin.
  - If quantity of the warehouse request is less than that of the standard HU, the system sorts the pieces in ascending order and picks up one or more partial pallets that equals the picking quantity.
- **Large/small quantities**
  This strategy is used if picking of the stock is to be done based on quantity. For example, when small quantities (cartons) are requested, the system can search for them in one storage type in which cartons are stocked; when large quantities (pallets) are requested, the system can search the stock in another storage type used for stocking pallets. This strategy is implemented using quantity classification. Alternatively, rather than using packaging specifications, a stock-specific unit of measure can be used. Alternate units of measure must be defined in the product master and should be assigned to the quantity classification in embedded EWM.

Example

Two quantity classifications are defined: C for carton and P for pallet. Now, a packaging specification is defined for the products to be picked and the picking relevance is set in packaging specifications using the quantity classification. The packaging specification contains two levels, one level with quantity classification P, containing the full quantity for a pallet (e.g., 140 EA) and the other for quantity classification C, containing the full quantity for carton (e.g., 70 EA). The pallets are stored in storage type A, and cartons are stored in storage type B. While configuring the search strategy for quantity classification P, the search sequence with storage type A will be determined by the system; for quantity classification C, the search sequence for storage type B will be determined.

- **Fixed bins**
  Using a fixed bin strategy, embedded EWM picks stock from fixed bins assigned to the product master. If a fixed bin strategy is used for picking, then the system allows the determination of empty storage bins for picking that don't contain any stock and creates picking warehouse tasks even when no stock exists in the bin. This scenario triggers the replenishment process for the source bins. This can also be handled using pick denial and picker-based replenishment. We'll cover picker-based replenishment in Chapter 9.
- **Shelf-life expiration date**
  This strategy is implemented by using a stock removal rule that contains the shelf-life date as the sorting field, sorted in ascending order. This strategy sorts all the quants in the source storage type in ascending order of shelf-life expiration date (sort field **VFDAT**) and proposes the bin containing stock with the oldest such date.
- **Customer-specific strategy**
  If the standard characteristics fields of a quant don't provide an effective way of sorting and selecting the quant from a source bin, organizations can implement their own stock removal rules to identify a storage bin for picking by implementing a BAdI via IMG path **SCM Extended Warehouse Management • Extended Warehouse Management • Goods Issue Process • Strategies • Stock Removal • Strategies • BAdI: Deletion of Quant Buffer and BADI: Filtering and/or Sorting of Quants**. A new implementation code for the BAdI method is written and activated for the system to follow the custom stock removal process.

8.5 Picking and Packing

The picking process is performed manually based on a printed warehouse order that contains picking-related information or via RF. The warehouse operator confirms the picking task after physically carrying the stock from the source bin to destination bin. This can involve moving the stock directly to the goods issue area or moving it via multiple intermediate locations, as shown in Figure 8.22, using process-oriented storage control.

Once the picking of stock is confirmed using process-oriented storage control, a new warehouse task is created manually or automatically for packing the product in a packing station. The picking of the stock can also use a pick HU if it's configured in the warehouse order creation rule settings. If the pick HU needs further packing, it can be moved to a packing work center by creating a separate process step to move the pick

HU to the packing work center. Packing is done in a packing work center in the goods issue process using desktop Transaction /SCWM/PACK (if there's access to a desktop in the work center) or using RF (for smaller work centers equipped with RF devices).

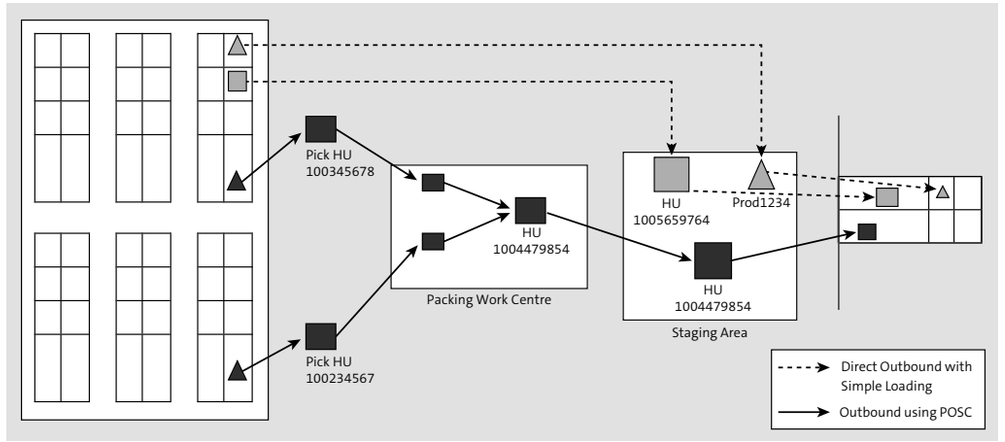

Figure 8.22 Picking Process in Embedded EWM

After completing the packing step, the handling unit is closed using the icon, which creates a new warehouse task for staging of stock and moving the stock from the packing station to the staging bin. In addition, ad hoc warehouse tasks also can be created manually to move the stock from a packing station to a staging bin if you're not using the postprocessing framework for automatic creation of follow-up warehouse tasks in process-oriented storage control. Once the warehouse task is created, the stock is physically moved to the staging area by the worker and the warehouse task is confirmed. After the stock is moved to the staging area, a new warehouse task is created for loading the stock on the truck. A loading task can be created manually or automatically using the postprocessing framework when the truck arrives at the loading door and the product is ready for loading. A loading warehouse task is needed if you're performing complex loading. For simple loading, the loading status can be set to **Complete** manually from the outbound delivery order by clicking on the **Load** button.

Once the loading is completed, the outbound delivery is created, and goods issue is performed for the outbound delivery order or for the complete TU in one go for all outbound delivery orders assigned to the TU. As soon as goods issue is performed for the outbound delivery order, an outbound delivery is created in embedded EWM.

This in turn sends the goods issue message to SAP S/4HANA and posts the goods issue in the outbound delivery in the same. After you trigger billing for the issued delivery, a financial document is posted.

The following sections talk about the different actions that can be performed on the warehouse stock during picking and packing processes. Section 8.5.1 talks about various ways stock removal can be executed, such as paper-based or RF-based picking. Section 8.5.2 explains the process of pick denial during picking and the follow-up actions for the same. Section 8.5.3 and Section 8.5.4 talk about the process of canceling successfully picked products, putting them back in their bins, and handling differences during the picking process. Finally, Section 8.5.5 and Section 8.5.6 talk about the standard packing and use of pick HUs for packing stock during the outbound process execution.

8.5.1 Stock Removal Execution

Once the warehouse tasks are created, the stock removal from the source bin of the warehouse is performed via various methods. The process starts with the creation of warehouse tasks and warehouse orders; then, warehouse workers can perform picking using a manual pick list, mobile data entry, or SAP Fiori apps. Let's discuss each of these execution methods in detail:

- **Pick list-based execution**
  In this method, the picking in the warehouse is performed via a pick list. The pick list is printed from the warehouse orders created for the outbound delivery order. This process is executed as follows:
  - Warehouse orders are created for the outbound delivery order.
  - These orders are printed to create a pick list for the warehouse operator.
  - The warehouse worker executes physical picking and updates the results in the picking sheet.
  - The worker confirms the warehouse order using SAP GUI at a workstation.
  - In case of exceptions, appropriate exception codes are applied in SAP to trigger follow-up actions, such as replenishment.

  Printing warehouse orders in embedded EWM is done using the postprocessing framework and condition techniques. Warehouse orders can be printed by scheduling the action execution of printing or can be printed manually from the embedded EWM warehouse monitor. The warehouse orders are printed on SAP Script Texts or Smart forms as templates. Users can customize the form layout depending

on business requirements. SAP provides various action definitions for printing warehouse orders via the postprocessing framework in the /SCWM/WME application and the /SCWM/WO action profile. The action definitions and corresponding smart forms for printing single and multiple warehouse orders are given in Table 8.3. You can print both if required simultaneously.

Action Definition	Description	SAP Smart Form
WO_MULTIPLE	Print list for warehouse order with serial numbers	/SCWM/WO_MULTIPLE
WO_SINGLE	Print single document for warehouse order with serial numbers	/SCWM/WO_SINGLE

Table 8.3 Postprocessing Framework

Once the physical picking of stock is completed by the warehouse worker based on the provided pick list, the worker must confirm the warehouse order in SAP GUI to complete the picking process in embedded EWM. This is done via SAP Easy Access path **Logistics • SCM Extended Warehouse Management • Extended Warehouse Management • Execution • Confirm Warehouse Task** or using Transaction /SCWM/TO_CONF, as shown in Figure 8.23.

To confirm all the items in the warehouse task, click on the **Confirm + Save** button in the header. Alternatively, to confirm the individual warehouse tasks, click on the **Confirm** button after selecting individual warehouse tasks at the item level. A warehouse order is set to **Confirmed** only when all the warehouse tasks in the order are confirmed.

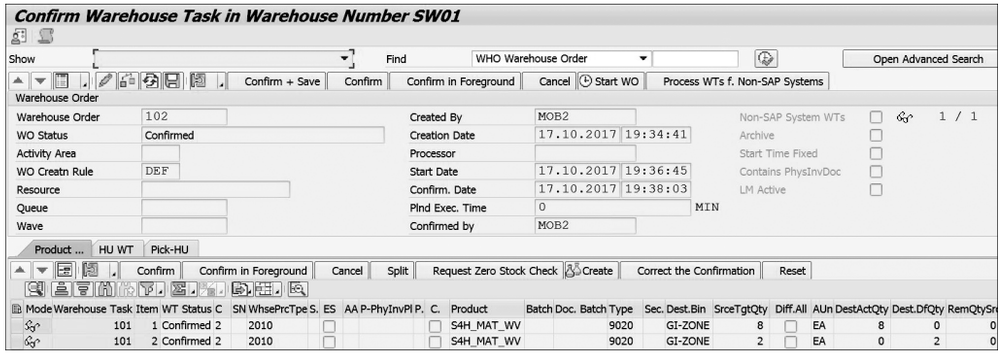

Figure 8.23 Confirming Warehouse Task for Picking

- **RF-based execution**
  Warehouse orders created for the outbound delivery order can also be confirmed from mobile devices via RF, which is used extensively in organizations. This provides an easy and paper-free way of confirming stock removal and movement from source to destination. Any exceptions encountered during the picking process can be directly handled from RF and updated in SAP. You can also trigger follow-up actions based on the exception triggered.

  To confirm warehouse orders using RF, logon to RF via SAP Easy Access path **Logistics • SCM Extended Warehouse Management • Extended Warehouse Management • Execution • Log on to RF Environment** or use Transaction /SCWM/RFUI.

  You can manually select the warehouse order, HU, or warehouse request that needs to be picked or let the system determine the next warehouse order for picking if system-guided processing is active. There are two options available in the system-guided process:

  – System-guided picking: With this option, the system assigns the warehouse order based on the queue assigned to the resource group to which the resource belongs. The user is already logged on to a resource and picks the warehouse order assigned to the resource. This is a fully automated option.
  – System-guided by queue: With this option, you can choose a queue and the system will display the details for the first open warehouse order in that queue.

    When a warehouse order is selected for confirmation using RF, the system displays the warehouse tasks in the warehouse order in the sequence in which they're assigned to the warehouse order. You confirm the first warehouse task, and the system will automatically display the next warehouse task included in the warehouse order. The warehouse order is only confirmed in the system after all warehouse tasks included in the warehouse order are confirmed.

> **Note**
> We will discuss using RF for completing warehouse processes in Chapter 14.

- **SAP Fiori-based execution**
  In SAP S/4HANA, SAP offers the option to use SAP Fiori apps to confirm warehouse tasks using mobile devices. The apps provide an easy way for you to scan a product using barcodes to confirm which product is being picked for the outbound delivery order. The SAP Fiori app available for picking is called Outbound Delivery Orders (Pickup). If you need to pick multiple outbound delivery orders in a single

cart trip across the warehouse, you can use the Pick by Cart SAP Fiori app. In the latter app, the pick step allows you to pick multiple HUs from the same bin in one step in the cart, and HUs can be taken to a destination bin using a single warehouse task. We'll discuss SAP Fiori apps more towards the end of the book.

8.5.2 Handling Denials During Picking

During the creation of a warehouse task for picking stock for an outbound delivery order, it may happen that sufficient stock isn't found in the bin, thus leading to a short pick or complete pick denial. There may be multiple reasons for which pick denial can occur. There may be issues with the counting of inventory of a product in a storage bin, or the stock may be misplaced in the warehouse. It may also happen that due to physical inventory in progress, the goods issue from the bin is blocked or there may have been physical damage in the bin.

Pick denial can happen at various points in the outbound process. For example, there may not be enough stock of a product in the warehouse and picking warehouse tasks might not be created. It's also possible that picking warehouse tasks are created, but there's no stock in the source bin when a warehouse worker goes to the bin to execute picking. Embedded EWM offers a way to execute pick denial in both cases. In the first case, the system can be configured to execute pick denial immediately if there's a shortage of stock in the warehouse. In the latter case, a warehouse worker can enter an exception code for bin denial and look for stock in another bin. If stock isn't found in any other bin in the warehouse, the system executes a pick denial.

Pick denial occurs if the system can't create the warehouse task at all or is only able to create a warehouse task for a partial quantity. The configuration required to set up pick denial involves activating pick denial at the warehouse number level via IMG path **SAP Extended Warehouse Management • Extended Warehouse Management • Goods Issue Process • Pick Denial • Activate Pick Denial at Warehouse Number Level**. Set the **ActPickDen** indicator for your embedded EWM warehouse.

After pick denial is active at the warehouse level, activate pick denial for a warehouse process type via IMG path **SAP Extended Warehouse Management • Extended Warehouse Management • Goods Issue Process • Pick Denial • Activate Pick Denial at Warehouse Process Type Level**. Click on **New Entries** and assign the pick denial control and action against the warehouse process type. Here, you can also configure what should happen in case of a pick denial scenario in terms of passing information to the user and what action the system should take to adjust the warehouse request quantity. For example, as shown in Figure 8.24, as part of pick denial control the system can issue a warning to the user and trigger an automatic follow-up action in the

background that (a) adjusts the quantity in the outbound delivery order to the available quantity in the warehouse and (b) updates the delivery quantity in SAP S/4HANA.

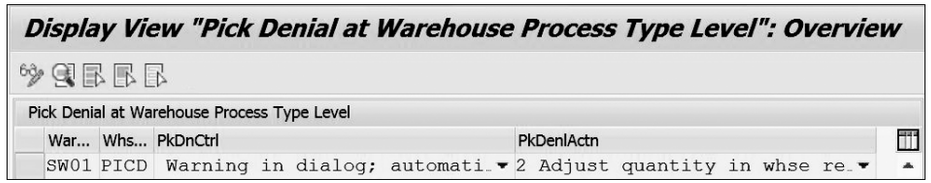

Figure 8.24 Setting Pick Denial Control and Action for Warehouse

To enable execution of a follow-up action, define the workflow which is triggered when the exception code is entered. The settings for managing exception codes are made via IMG path **SAP Extended Warehouse Management • Extended Warehouse Management • Goods Issue Process • Pick Denial • Assign Internal Exception Codes to Exception Codes**. Click on **New Entries** and map the user-defined exception code to an internal exception code, as shown in Figure 8.25. In standard SAP, the exception code PD02 is used. We covered exception handling in detail in Chapter 6.

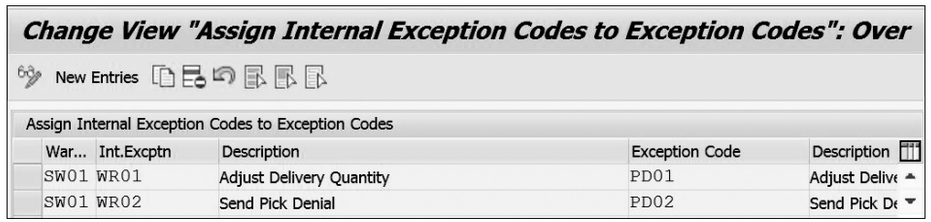

Figure 8.25 Assigning External Exception Code to Internal Exception Code

Using the exception code configuration, the workflow for activating pick denial using an exception code is configured via IMG path **SAP Extended Warehouse Management • Extended Warehouse Management • Cross-Process Setting • Exception Handling • Define Exception Code**, as shown in Figure 8.26. Select **Maintain Follow-On Action (Workflow)** and assign the exception code with a workflow ID. This workflow is triggered when a pick denial scenario occurs in the warehouse.

For example, in Figure 8.27, an outbound delivery order is created with a requested quantity of 10 EA. However, at the time of picking warehouse task creation, only 5 EA is available in the warehouse. This triggers pick denial in embedded EWM, which leads to triggering the workflow to adjust the quantity in the outbound delivery order and send the revised quantity to the outbound delivery in SAP S/4HANA.

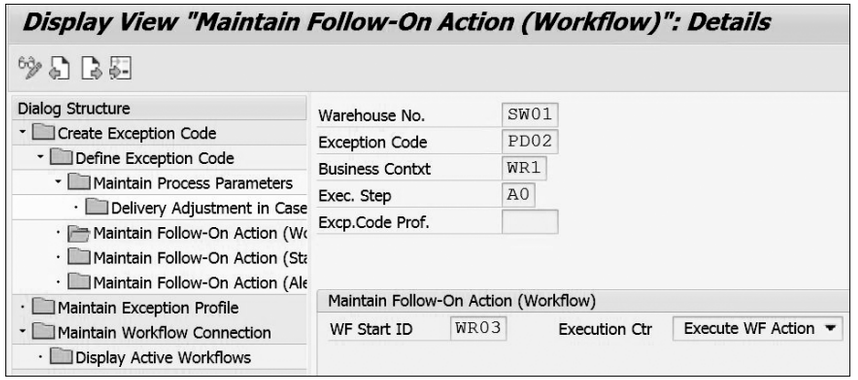

Figure 8.26 Assigning Workflow to Pick Denial Exception Code

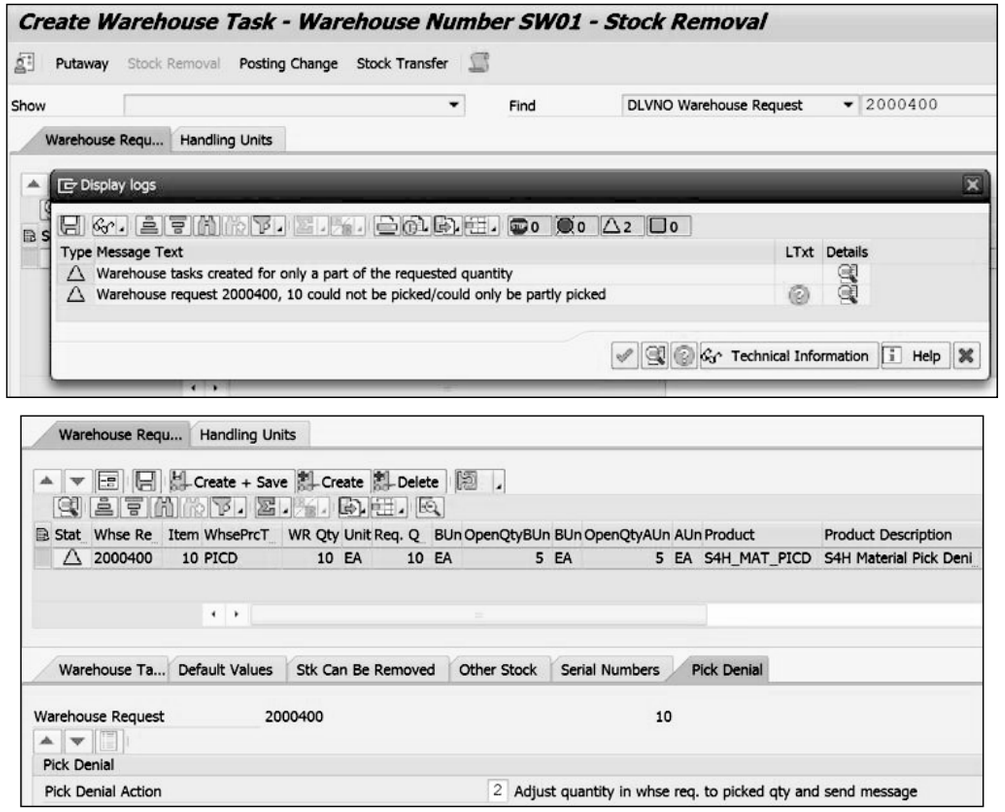

Figure 8.27 Pick Denial in Outbound Delivery Order

8.5.3 Picking Cancellations

During the outbound process in embedded EWM, it's often necessary to cancel the picked quantity and send it to suitable storage bins. This may be the case if more than the required quantity has been picked or the stock needs to be made available for another urgent outbound delivery. Embedded EWM provides a process to enable such cancellations and send the picked stock back to suitable bins. The picking cancellation happens for warehouse request items, handling units, and reserved stock of warehouse tasks. Embedded EWM releases the stock assigned to the warehouse request item, handling unit, or warehouse task and makes it available to be used again. For stock in handling units, stock is made available at the highest-level HU. Embedded EWM can only release stock for a complete HU.

As explained earlier, stock can be not only released but also putaway in suitable bins by creation of a transfer warehouse task. The system follows a set series of steps:

1. Embedded EWM releases the stock.
2. If the stock isn't packed in HUs, the system calls the screen for moving the products. If the stock is packed, the system calls the screen for moving the HU.
3. You supply the destination bin where the stock is to be putaway, and the system creates a transfer warehouse task.

There are two important settings to be made for canceling picks in embedded EWM. First, define the warehouse process type to be used for transferring the stock back after picking in embedded EWM via IMG path **SAP Extended Warehouse Management • Extended Warehouse Management • Goods Issue Process • Cancel Picking • Define Warehouse Process Type for Put-back**. Click on **New Entries** to define a new return warehouse process type. This warehouse process type has the warehouse process category of **3 Internal Warehouse Movement**. SAP provides warehouse process type 3030 for transferring the stock from the source bin (where the stock is released) to the destination bin. You also need to configure warehouse number control for pick cancellation; you can assign the warehouse process type defined previously to the warehouse and allow the system to create a stock ID for the stock quantities to be putaway. This is configured via IMG path **SAP Extended Warehouse Management • Extended Warehouse Management • Goods Issue Process • Cancel Picking • Define Warehouse Number Control for Put-back**, as shown in Figure 8.28. Click on **New Entries**, enter the put-back warehouse process type, and set the control for stock ID creation if required for the embedded EWM warehouse.

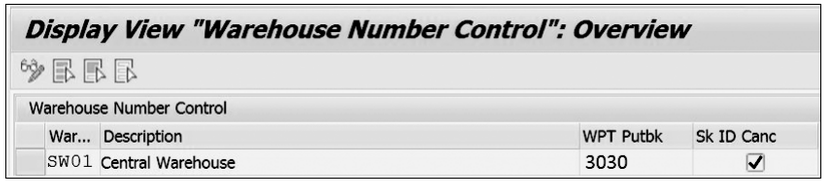

Figure 8.28 Setting Up Picking Cancellation

Note

Stock ID creation is allowed during picking cancellation because it allows the quants of split picks for a delivery item not to be mixed up when they're being putaway to a destination bin; the reference to the original delivery item is lost during pick cancellation.

For example: Suppose a delivery of Item 10 requires 15 EA to be picked. The warehouse worker picks 1 carton (10 EA) from storage bin A and 1 carton (5 EA) from storage bin B. A split pick is done based on available quants picked from different bins, and two split line items, 20 and 30, are created in the delivery for each alternate unit of measure—for example, C10 and C05. Each of these quants have reference to the delivery items. During pick cancellation, this reference to the delivery is lost. If the **Stock ID** flag is set in configuration, the system creates stock identification for the two alternate units of measure as follows: 10 EA with alternate unit of measure C10, stock ID 1234; and 5 EA with alternate unit of measure C05, stock ID 5467.

The following processes can be carried out in the warehouse to execute pick cancellation in embedded EWM:

- **Releasing stock for warehouse request items**
  Once the picking task for an outbound delivery order item has been confirmed by the warehouse worker, the picking can be canceled via SAP Easy Access path **Logistics • SCM Extended Warehouse Management • Extended Warehouse Management • Execution • Cancel Picking** or using Transaction /SCWM/CANCPICK. From this screen, search for the outbound delivery order item for which picking has to be canceled, as shown in Figure 8.29.

  You can release the complete picked delivery quantity for a warehouse request item by selecting the warehouse request item on the **Warehouse Request Item** tab and clicking on **Release Stock**.

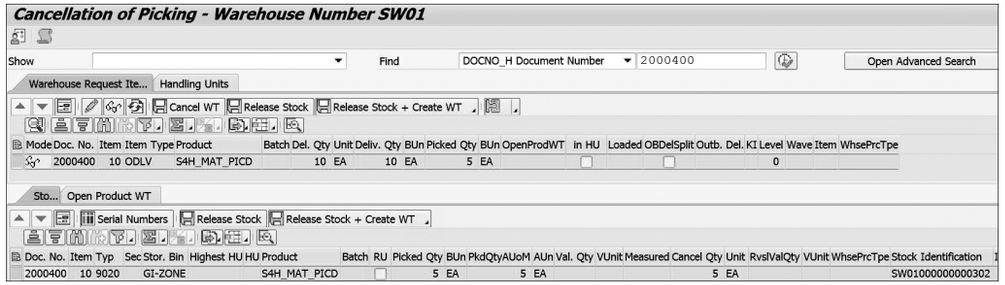

Figure 8.29 Canceling Picking for Outbound Delivery Order

Partial stock for picked warehouse request items can also be released by selecting the warehouse request item as described previously and going to the **Stock** tab, entering the quantity to be released, and then clicking on **Release Stock**.

- **Releasing stock for handling units**
  If instead of canceling items by selecting a warehouse request you want to cancel picking of handling units, go to the **Handling Units** tab on the transaction screen for pick cancellation. On this screen, search for HUs for which cancelation must be executed and take one of the following actions based on your requirements:
  - Release the completely picked delivery quantity for an HU. This is done by selecting the HU and clicking on **Release Stock**.
  - To cancel picking for a partial HU, repack the HU. To do this, select the HU on the transaction screen and click on **Re-Pack HU**.
- **Cancel reserved stock in warehouse task**
  You can cancel stock reserved for warehouse tasks for an outbound delivery order or handling unit. In this case, the same process is followed as for stock release, but rather than using the **Release Stock** button, use the **Cancel WT** button for canceling the warehouse tasks for a warehouse request item or handling unit.

  If partial cancellation is being made for select warehouse tasks for a warehouse request, select the warehouse request item in the pick cancellation screen and go to the **Product WT** tab at the bottom. In this tab, select the warehouse task to be canceled and click on **Cancel WT** to complete the process.

Note

For HUs, all the warehouse tasks are canceled; hence selective pick warehouse task cancellation isn't applicable for HUs in embedded EWM.

- **Release stock and create warehouse task**
  In addition to just releasing the stock for the warehouse request item or for an HU, the system also lets you create a stock transfer warehouse task. To release stock and create warehouse tasks simultaneously, click on the **Release Stock + Create WT** button in the transaction screen. This can be done in both the foreground and background.

8.5.4 Handling Differences while Picking

After picking of stock is carried out for an outbound warehouse request, it's confirmed in the system by confirmation of a warehouse task. While confirming the warehouse task in the system, we can get a difference between the requested and available quantity. If the picked quantity is smaller than the requested quantity in the warehouse task, then the following steps can be taken:

- The difference is recorded in the warehouse task by entering the actual picked quantity in the warehouse task.
- A warehouse task with the difference is confirmed.
- You can either repick the remaining amount in the warehouse request document by creating a warehouse task for the difference quantity, or choose not to pick the difference quantity by using **Adjust Delivery Quantity** option in the **Process Codes** button at the item level in the outbound delivery order to equate the delivery quantity with the picked quantity. This changes the status of picking from **Partially Completed** to **Completed** and allows you to post goods issue for the outbound delivery order. This process is shown in Figure 8.30.

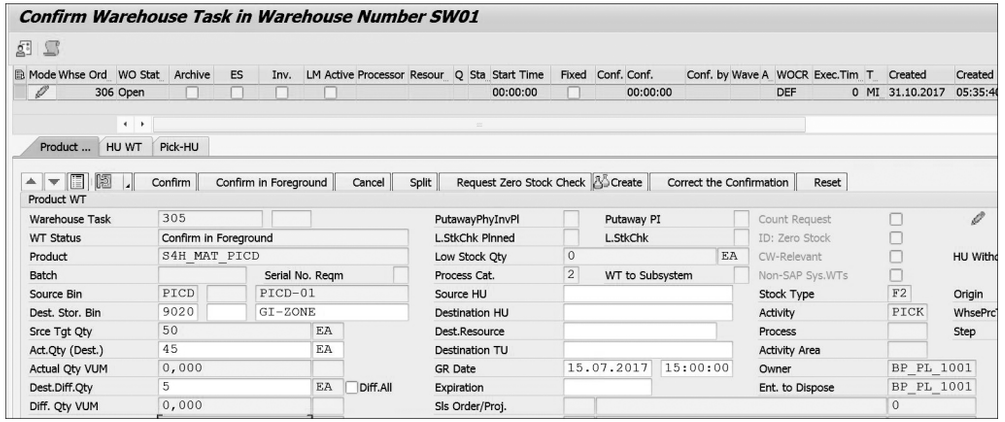

Figure 8.30 Confirming Outbound Delivery Order with Difference

Example

An outbound warehouse request is created to pick 50 EA from a bin, but only 45 EA are available; the worker will confirm the warehouse task with a difference of 5 EA.

8.5.5 Use of Pick HUs in Picking

If you're picking a partial quantity from a pallet or picking multiple products, you can create pick HUs to carry out the picking process. The pick HU can then be packed and labeled in a packing work center. The pick HU can be created manually while picking the product. Alternatively, you can have the pick HUs created automatically at the time of warehouse order creation. The system-generated pick HUs can be seen in the **HU** tab of the outbound delivery order. If you don't define a packing profile, the system doesn't propose a pick HU. However, you can still create a pick HU manually and assign it to a warehouse task for picking.

To create a pick HU, a packing profile needs to be defined and assigned to the warehouse order creation rule. The packing profile is configured via IMG path **SAP Extended Warehouse Management • Extended Warehouse Management • Cross-Process Settings • Warehouse Order • Define Packing Profile**, as shown in Figure 8.31. Click on **New Entries** to define a packing profile for the warehouse and set the control parameters as described ahead.

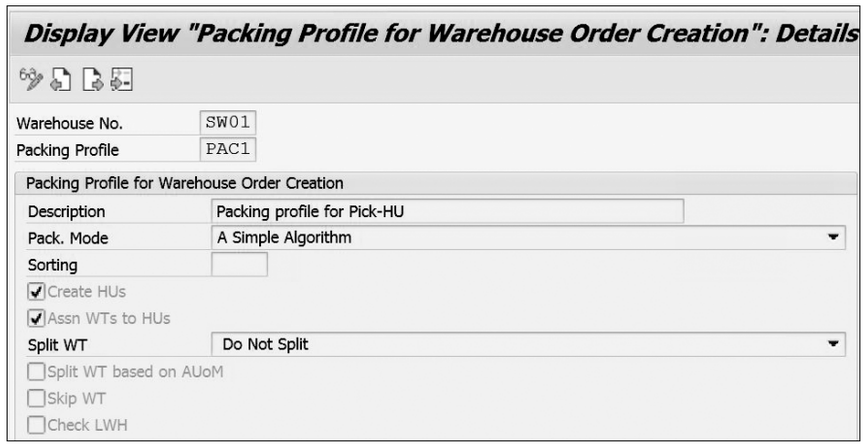

Figure 8.31 Define Packing Profile for Warehouse Order

If you select the **Create HUs Indicator**, the pick HU is created automatically by embedded EWM. If the **Assign WTs to HUs** indicator is set, the pick HU is automatically assigned to the warehouse task. When you're confirming the warehouse task, you can manually change the pick HU and its assignment to a warehouse task. Figure 8.32 shows a pick HU created for an outbound delivery and assigned to the warehouse task.

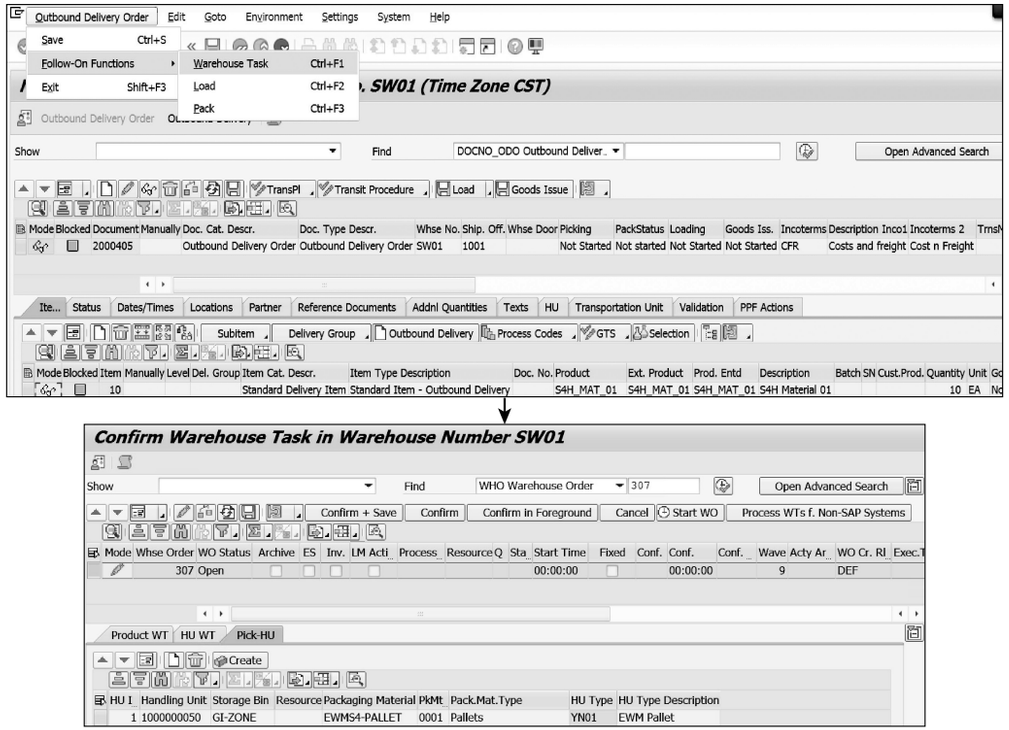

Figure 8.32 Creation of Pick HU for Picking Outbound Delivery Order Products

If you haven't selected **Create HUs** and **Assign WTs to HUs** settings in the packing profile definition, the system only proposes the packaging material and number of pick HUs required for the task at the time of warehouse order creation. You can create the pick HUs by confirming the proposal of the packaging material at the time of warehouse task confirmation. The value in the **Split WT** field controls if the warehouse task should be split if the pick HU is too small to pack the entire quantity in the warehouse task.

8.5.6 Packing in Outbound Process

Embedded EWM offers detailed sets of packing-related functionalities that can be carried out at a packing work center after stock has been moved to the packing work center for packing. The first step for executing packing in the outbound process in embedded EWM is to set up the packing work center and its determination. The packing work center determination is made from settings in the warehouse order creation rule. While defining a warehouse order creation rule for picking via IMG path **SAP Extended Warehouse Management • Extended Warehouse Management • Cross-Process Settings • Warehouse Order • Define Creation Rule for Warehouse Order**, flag the **Determine WkCtr** checkbox, which will enable embedded EWM to determine the packing work center. This is the case if you're not using process-oriented storage control.

As shown in Figure 8.33, embedded EWM uses the route, activity area, and consolidation group as filters to determine the work center in the goods issue via **Logistics • SCM Extended Warehouse Management • Extended Warehouse Management • Master Data • Work Center • Determine Work Center in Goods Issue** or using Transaction /SCWM/PACKSTDT. Click on **New Entries** and enter a combination of route, activity area, and consolidation group that may be used to determine the corresponding work center storage type/section/bin for your embedded EWM warehouse. You can optimize work center determination in goods issue via IMG path **SAP Extended Warehouse Management • Extended Warehouse Management • Master Data • Work Center • Optimize Work Center Determination in Goods Issue**. In the transaction screen, create the access sequence that the system can use to determine the work center based on the filter values determined from the warehouse task.

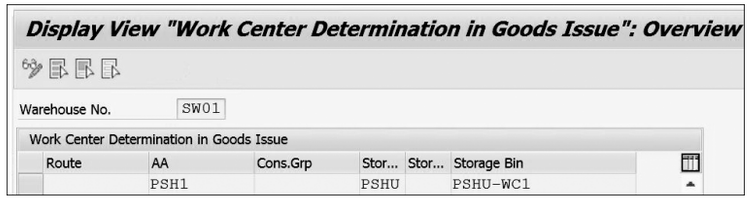

Figure 8.33 Determination of Work Center in Goods Issue

If you're using process-oriented storage control, then the packing work center is defined in the storage process step for packing. For more details on setting up process-oriented storage control, see Chapter 6.

The packing work center for the goods issue process can be accessed using Transaction /SCWM/PACK or via SAP Easy Access path **Logistics • SCM Extended Warehouse Management • Extended Warehouse Management • Execution • Packing—General or Deconsolidation in Goods Receipt**. Provide the embedded EWM warehouse number and packing work center and click on **Execute**. The next screen displays the packing work center, as shown in Figure 8.34.

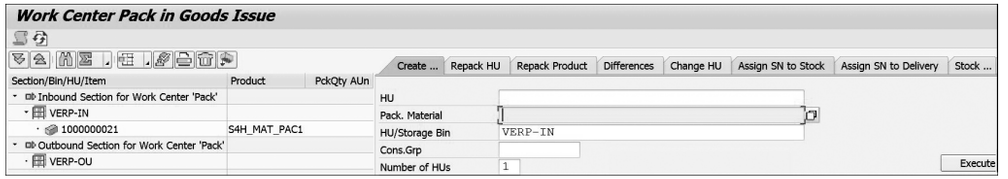

Figure 8.34 Packing Products during Outbound Process

A packing work center can be used for performing the following tasks:

- Create HUs
- Repack HUs
- Repack products
- Post differences
- Change HUs
- Assign serial numbers to stock
- Display stock details

If order reduction functionality (see Section 8.3.5) is activated for the product being packed, the system issues a message that the product is excluded from outbound processes. In addition to basic configuration for the work center (discussed in Chapter 5), perform settings for assigning a work center to the terminal so the system always identifies the correct warehouse number and work center. You can also assign scales connected to the work center to transmit the exact weight to the SAP system, as well as a local printer to print HU labels. This is done via SAP Easy Access path **Logistics • SCM Extended Warehouse Management • Extended Warehouse Management • Master Data • Work Center • Define Master Data Attributes**. Click on **New Entries** and enter the work center storage bin, work center terminal, and scales for the packing work center.

8.6 Loading

In this section, we'll explain the loading subprocess for completing the outbound process in embedded EWM. Section 8.6.1 talks about the configuration and usage of doors and staging area determination in embedded EWM for outbound deliveries. Then, Section 8.6.2 builds on these topics and explains the different actions and movements of transportation units in the yard, which can support the loading subprocess to complete the overall outbound process.

8.6.1 Door and Staging Area Determination

Once the materials are packed, the next set of processes are staging and shipping of products. If storage control is active for the end-to-end outbound process, a warehouse task is created automatically or manually to move the HU to a staging area when the HU is closed in the packing work center. After defining a door, staging area, and staging area door determination group, assign a staging area to the door via IMG path **SAP Extended Warehouse Management • Extended Warehouse Management • Master Data • Assign Staging Area/Door Determination Group to Door** and **Assign Staging Area to Warehouse Door**.

You can enable the system to determine the staging area based on route, warehouse process type, departure calendar, staging area/door determination group, HU type, means of transport, carrier, and ship-to party. This is done via SAP Easy Access path **Logistics • SCM Extended Warehouse Management • Extended Warehouse Management • Settings • Shipping & Receiving • Staging Area and Door Determination (Outbound)** or using Transaction /SCWM/STADET_OUT, as shown in Figure 8.35. Click on **New Entries** and enter the values for the route, warehouse process type, staging area/door determination group, means of transport, carrier, and ship-to party that will be used for determination of destination staging area.

To limit the table size and improve system performance, specify an access sequence for determining the staging area and door via SAP Easy Access path **Logistics • SCM Extended Warehouse Management • Extended Warehouse Management • Settings • Shipping & Receiving • Access Sequence to Staging Area and Door Determination**.

When these settings are complete, staging area determination is executed during the creation of the outbound delivery, and the system populates the staging area at the item level, with the value determined from these settings. The corresponding door is also assigned at the outbound delivery order header level.

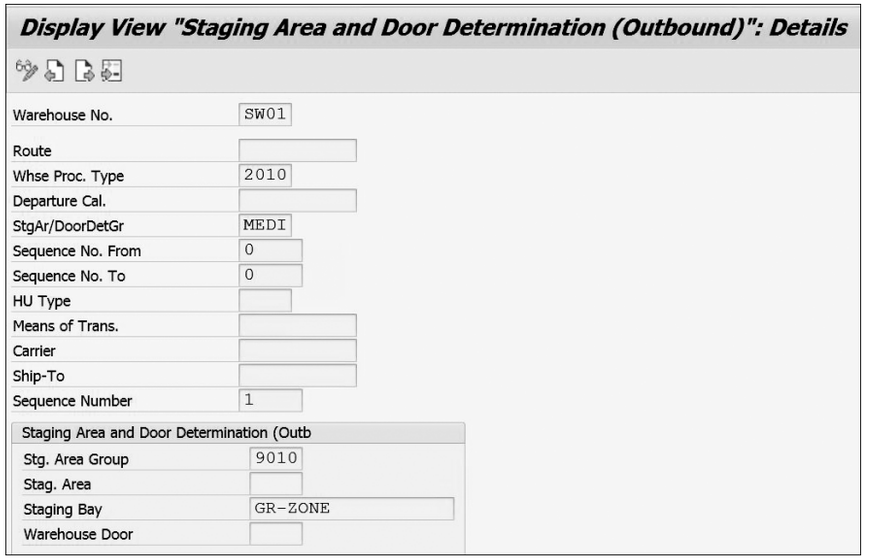

Figure 8.35 Staging Area and Door Determination in Outbound Delivery Order

8.6.2 Integration with Yard Management

It's possible to activate shipping and receiving in the embedded EWM warehouse to enable use of vehicles and TUs for managing transports in the warehouse, carry out loading and unloading activities from the warehouse door, and integrate with yard management. Organizations often use a vehicle to load multiple deliveries for a customer or for multiple customers on a single route. The process starts with creation of a transportation unit (TU) in embedded EWM and a planned shipping and receiving activity. A TU in embedded EWM represents a truck, trailer, container, or other such element used for carrying items from warehouse to the customer. They're created via SAP Easy Access path **Logistics • SCM Extended Warehouse Management • Extended Warehouse Management • Shipping & Receiving • Create Transportation Unit** or using Transaction /SCWM/TU. For more details on the shipping and receiving process, see Chapter 18. Organizations often print a loading list that displays the deliveries to be loaded onto the TU. A TU is used for displaying the deliveries to be loaded on the truck/trailers and shows the shipping and receiving activities that represent TU movements in the warehouse.

After the picking and packing process is complete, goods are moved to a staging area in the warehouse. When a TU arrives in the warehouse, click on the **Activate** button in

the TU transaction screen, which changes the status of the shipping and receiving activity from **Planned** to **Active**. The TU is assigned to a door. If you're using yard management, then a yard warehouse task is created to move the TU to the door. Otherwise, the user can execute the **Arrival at Door** action via menu option **Action • Door • Arrival** at the door from the vehicle or TU transaction by selecting the relevant vehicle or TU. Because the staging area is assigned to a unique door, once the TU is docked to the door, goods staged in the staging area are loaded in the TU. Loading is done using a simple or complex loading process. Simple loading doesn't involve actual movement of goods from the staging bay to the TU but only a change of loading status once the Load button is clicked on for the TU or outbound delivery order. Alternatively, you can also perform loading via SAP Easy Access path **Logistics • SCM Extended Warehouse Management • Extended Warehouse Management • Shipping & Receiving • Load** or using Transaction /SCWM/LOAD by selecting the TU and clicking on the **Load** button.

Perform complex loading to track the loading process for each pallet on the TU using warehouse tasks. In this process, warehouse tasks are created for loading, and once loading is completed the warehouse tasks are confirmed. You can configure goods issue posting from a TU when it's checked out from the yard by flagging the checkbox for **Post Goods Issue at Departure** via IMG path **SCM Extended Warehouse Management • Extended Warehouse Management • Cross-Process Settings • Shipping and Receiving • General Settings for Shipping and Receiving**, as shown in Figure 8.36.

Figure 8.36 Activate Goods Issue during Check Out

8.7 Goods Issue Posting

The goods issue posting confirms the physical departure of products from the warehouse. Once goods issue is complete, a notification can be sent to customers to let them know of the upcoming arrival of goods and the billing process can be initiated in SAP S/4HANA. Goods issue for the outbound delivery order is posted using various options in embedded EWM.

It can be posted manually at the header level in the outbound delivery order using Transaction /SCWM/PRDO, as shown in Figure 8.37. Click on the **Goods Issue** button to post the goods issue for the selected outbound delivery order.

If you're using integration with shipping and receiving, it can also be posted from the TU via Transaction /SCWM/TU. In addition to complete goods issue, partial issue can also be posted. This is done only for stock loaded on the TU or items picked in an outbound delivery order. On posting the goods issue for select warehouse request items, the information for goods issue is replicated for the deliveries in SAP S/4HANA and partial goods issue is posted in the deliveries in SAP S/4HANA.

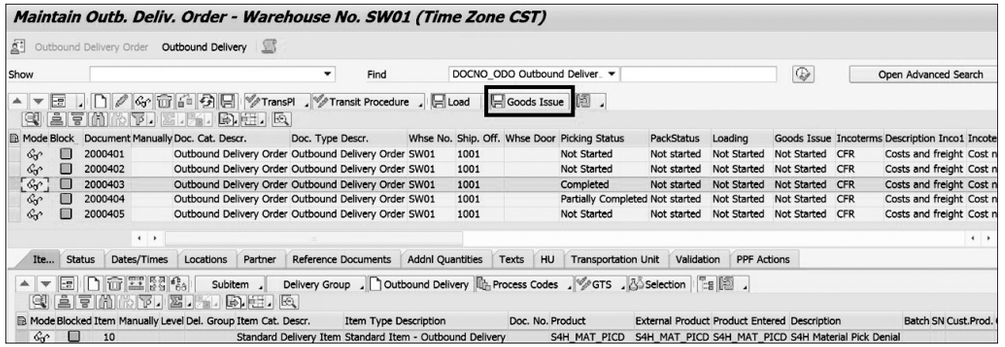

Figure 8.37 Posting Goods Issue for Outbound Delivery Order

If required, you can reverse goods issue posted for items in a delivery or on a TU by choosing the **Reverse Goods Issue** option from the **Goods Issue** button, as shown in Figure 8.38.

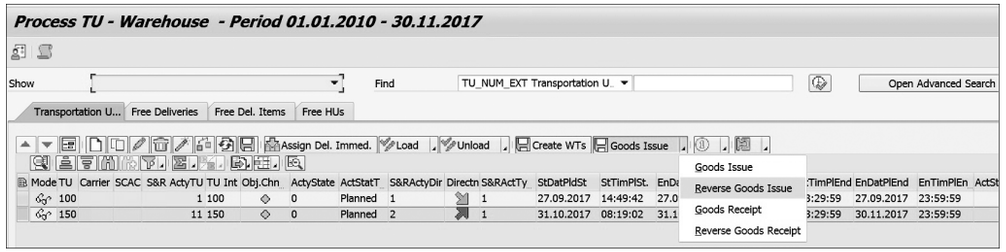

Figure 8.38 Reversing Goods Issue for Outbound Delivery Order

In a normal outbound process, the invoice is created and printed after the goods issue in SAP S/4HANA. However, you may require the invoice to be created before you post the goods issue, as is often the case for international shipments and the direct outbound delivery process. An invoice can be printed for outbound deliveries created in embedded EWM using Transaction /SCWM/FD or Transaction /SCWM/TU. You select the outbound delivery or TU containing the outbound delivery requests, click on , and select **Request Invoice**.

To enable this functionality, activate invoice before goods issue for the process profile assigned to the document type and item type for the outbound delivery. You have to maintain the **IBGI** indicator for both the sales order types and sales organization in SAP S/4HANA via IMG path **Logistics Execution • Extended Warehouse Management Integration • Billing Settings • Determine Invoicing Before Goods Issue (IBGI) Indicator**. Click on **New Entries**, enter the **Sales Order Type** and **Sales Organization** and set the **IBGI** control to **D Allowed But not Mandatory**, and save.

8.8 Summary

This chapter introduced outbound processes and documents supporting outbound processes in embedded EWM. We discussed the settings required to distribute outbound deliveries from SAP S/4HANA to embedded EWM. We covered the warehouse request created to execute the picking process in embedded EWM. We reviewed all subprocesses used in outbound operations, such as picking cancellation, pick denial, and handling differences to manage exceptional scenarios in the warehouse. We also discussed how packing is carried out using pick HUs and in work centers. Toward the end of the chapter, we discussed the integration of yard management with outbound processes in embedded EWM using trailers and trucks. We also discussed goods issue posting for outbound delivery documents in embedded EWM and the use of invoice creation before goods issue in embedded EWM.

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