Reading Sample

This book provides you with a detailed, comprehensive guide to the day-to-day use of the key SD functions. For this sample, you'll get a look at Shipping and Transportation. This sample will focus on the logistics aspects, including delivery processing, picking and packing, and transportation planning.

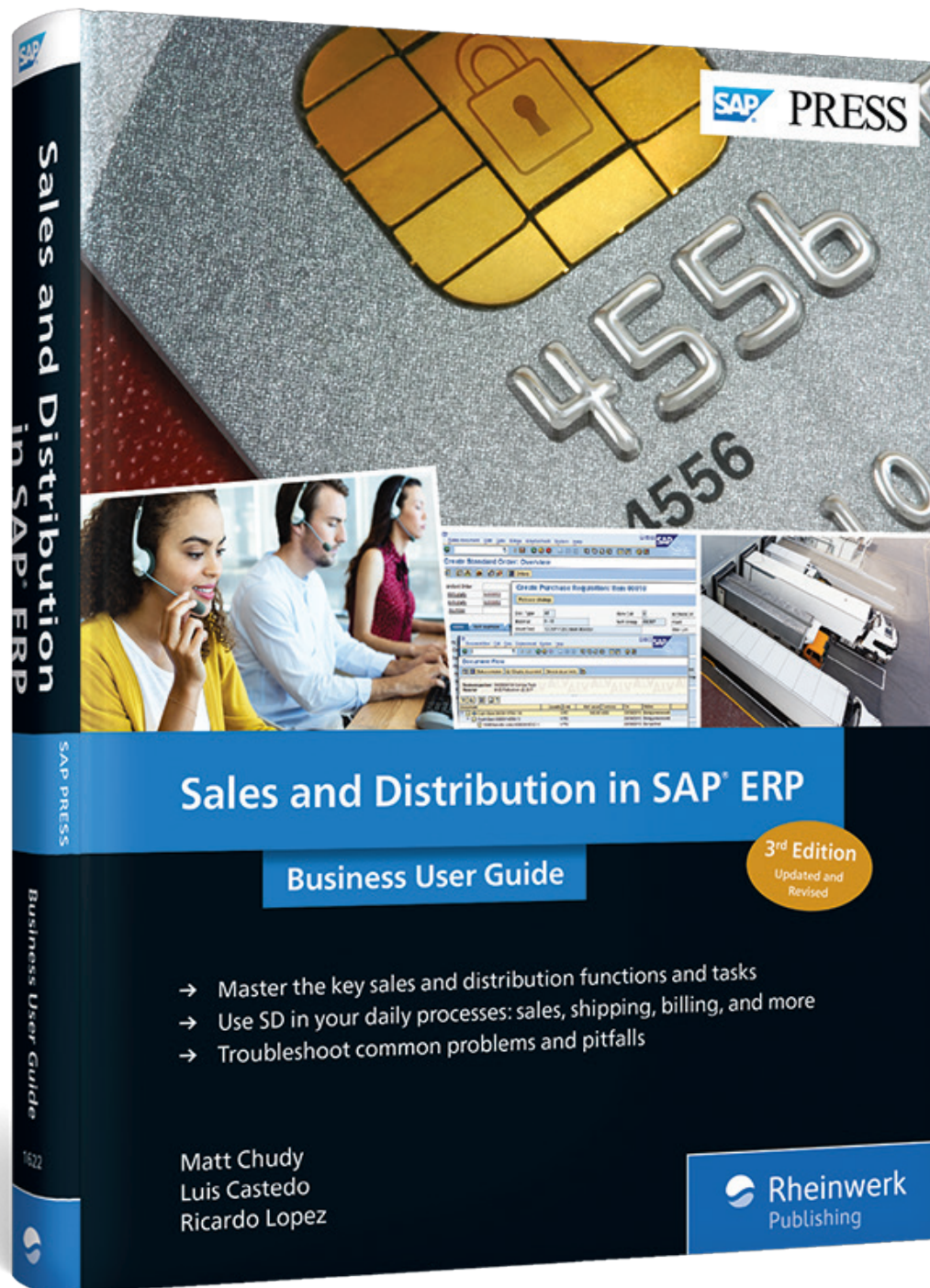**"Shipping and Transportation"**

Contents

Index

The Authors

Matt Chudy, Luis Castedo, Ricardo Lopez

Sales and Distribution in SAP ERP: Business User Guide

518 Pages, 2018, $79.95
ISBN 978-1-59229-881-5

www.sap-press.com/4526

Chapter 4
Shipping and Transportation

You've sold the goods. Now all you have to do is deliver them to the customer. How exactly do you do that?

So far, we've covered quite a lot of terrain on the sales side of SAP ERP Sales and Distribution (SAP ERP SD), so now it's time to start discussing the distribution side.

After the availability of the product has been confirmed in the sales order, and the customer has passed the credit checks, it's time to start preparing for the shipping of the goods. In SAP ERP, two main components help you execute the shipping of the goods to our customers: shipping and transportation, as illustrated in Figure 4.1.
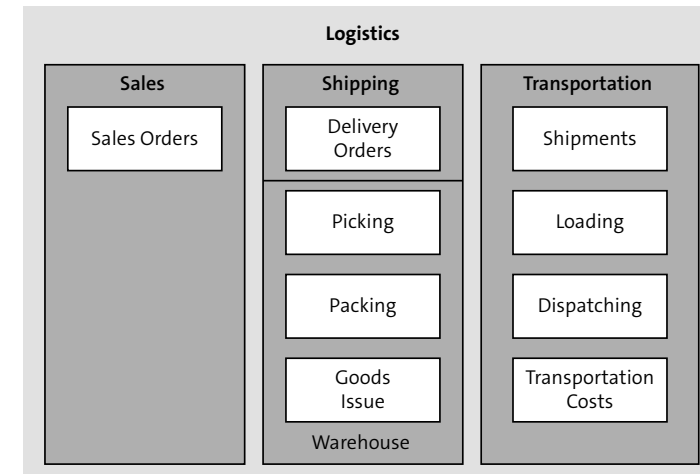

Figure 4.1 SAP ERP Logistics Processes

The shipping component consists of several tasks that, when put together, can pass the product needs to the warehouse and determine the shipping methods and routes that the product will follow after dispatch from your warehouse.

> **Note**
>
> Shipping can't be executed if the product isn't made available by the warehouse. In SAP ERP, shipping is also supported by the SAP ERP Warehouse Management (SAP ERP WM) functionality.

4.1   Shipping and Transportation Overview

Shipping monitors the shipping deadlines of preceding or reference documents, such as sales orders or return purchase orders. It uses these deadlines in conjunction with the material availability dates to schedule the delivery creation and execution of outbound deliveries. Shipping also ensures that the materials are picked and packed according to the scheduled dates. It allows you to print and transmit the shipping documentation to customers and freight partners, post the issue of the product from stock, and serve as the basis for creating the billing documents.

The transportation functionality in SAP ERP takes care of determining which is the best carrier to move the product from your company's warehouse to the customer's expected delivery point, handles all the truck scheduling by setting appointments for trucks to arrive at the loading dock, schedules when the loading of those trucks has to start and finish, and finally records when the truck has to be dispatched.

Transportation also outlines all the connection points in the transportation route and highlights the different modes of transportation that might take place. It keeps track of any customs clearing points and any loading and unloading points. And it does all this while tracking each cost involved in the process.

> **Note**
>
> Shipping and transportation don't have any new updates with SAP ERP 6.0, EHP 7. The reason for this is all the new developments for these two modules are now part of SAP Transportation Management (SAP TM) in SAP Supply Chain Management (SAP SCM). SAP ERP's shipping and transportation functionalities haven't received any updates since EHP 5. The EHP 5 enhancement allows you to connect with and take advantage of SAP TM's functionalities, connecting seamlessly and allowing the exchange of information. SAP TM is explained in more detail in Section 4.5.

Now that you have an overview of the shipping and transportation functionalities in SAP ERP SD, we'll go through all of the processes that you'll need to be aware of in your job: outbound delivery, picking, packing, shipment and shipment cost documents, goods issues, proof of deliver, customer returns, and output processing.

4.2   Outbound Delivery

The *outbound delivery* is the initial step in the logistics process and is created as the material becomes available and matches the various deadlines in the sales order approach. The system back-schedules based on this deadline and sets new deadlines in the delivery order to ensure that the items will be picked, packed, and shipped on time, so that the customer will receive the ordered items on the requested delivery date.

Delivery orders are linked to a shipping point, which is the responsible unit within the SAP system to monitor and process deliveries. This link can be automatic, based on the plant and storage location entered in the sales order, or it can be assigned manually. Figure 4.2 shows an outbound delivery screen, which you can get to by choosing **Logistics • Sales and Distribution • Shipping and Transportation • Outbound Delivery • Display**. The outbound delivery outlines the materials to be picked, quantities, picking dates, warehouse status, transportation status, and much more.
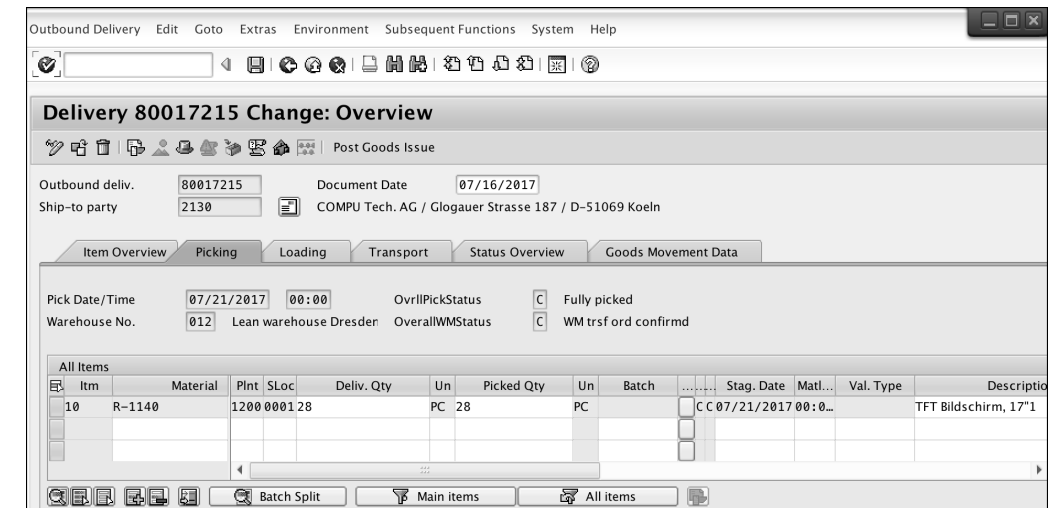

Figure 4.2 Outbound Delivery

4.2.1 Checks on Delivery Creation

To create a delivery, the system performs the following checks to make sure the information is complete and the delivery can be created:

- Possible delivery blocks (sales order blocks due to credit or other manual blocks set by the sales and finance areas)
- Sales orders incompleteness
- Material availability
- Picking date

If these checks are passed, the delivery order is created. At that time, the system will recalculate the deadlines, execute the batch determination (if applicable), calculate the shipping route, assign a picking location, calculate volumes and weights, and update the sales order by reducing the confirmed quantity, updating the document flow, and changing the delivery status.

The information in the delivery order includes the following:

- Ship-to address
- Picking location (the warehouse from which the goods are to be picked)
- Shipping point (the place the truck departs)
- Route (the path the truck will follow along with the total volume and weight of the shipment)

The delivery order also contains foreign trade information so that all necessary documentation that must travel with the goods can be put together. This information can be printed on the bills of lading and invoices screen, as shown in Figure 4.3.

All of this data comes from a collection of sources, mainly the material master, customer master, sales agreements, sales order data, and route information. They determine the customer defaults for processing deliveries.

If the customer requires complete delivery, the order should be delivered in a single delivery—all items should be delivered at the same time. When you create an outbound delivery, if all of the order items can't be shipped with the full order quantity, you'll receive a warning that the customer requires complete delivery.

If the customer doesn't require complete delivery, you can define a partial delivery agreement with the customer.
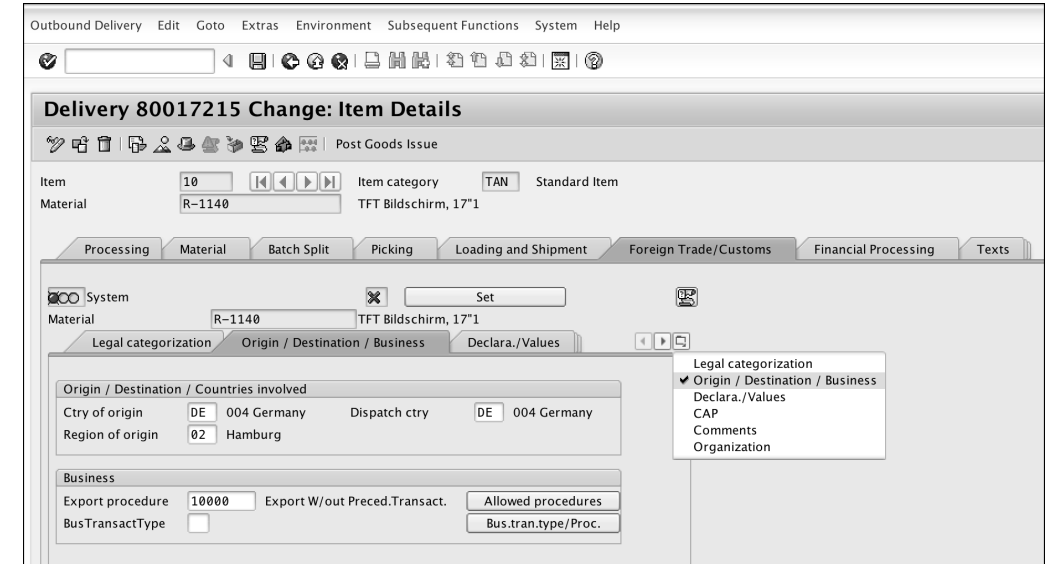
Figure 4.3 Delivery Orders Include Foreign Trade Information

Combining Items

If the customer allows orders to be combined, orders are combined in the outbound deliveries when using the delivery list. Combining items from different sales orders is possible only if the items have several common characteristics, such as the following:

- **Shipping point**
  Goods issue from the same place in your enterprise.
- **Date that delivery is due**
  Date on which shipping processing should begin, either the material availability date or the transportation planning date, must be within the selection dates on the delivery list initial screen.
- **Ship-to party**
  Outbound deliveries have the same destination.
- **Route**
  Same method of transport and route.
- **Incoterms**
  Incoterms of liability for freight in-transit.

- **Shipping conditions**
  Communicates the customer's shipping requirements.
- **Customizing**
  The list of common characteristics is maintained in Customizing.

Figure 4.4 illustrates the various options for outbound delivery creation: delivery complete, partial delivery, and order combination.
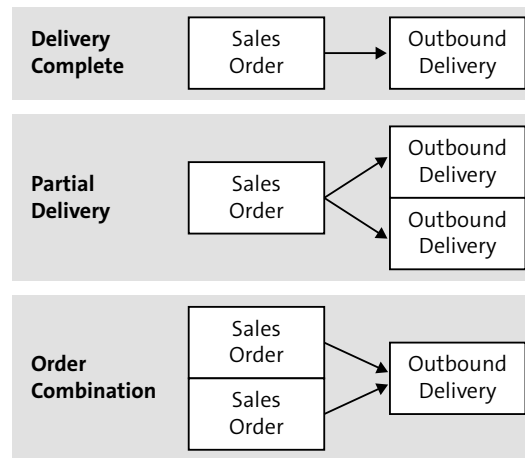

Figure 4.4 Customer Requirements Dictate How Deliveries Need to Be Created

These data also includes information that helps confirm the delivery date to the customer, which is known as the *confirmed delivery date*.

Confirmed Delivery Date

To calculate this confirmed delivery date, the system takes into account different lead times such as the material availability date, pick/pack time, loading time, transportation planning time, and transit time.

The following dates play a role in delivery and transportation scheduling:

- **Order date**
  Date on which the order was placed.
- **Material availability date**
  Date on which sufficient goods should be available to begin picking and packing.

- **Transportation planning date**
  Date on which the means of transportation planning must begin (e.g., call the trucking company so a truck is available on the loading date).
- **Loading date**
  Date on which picking and packing should be completed (and the mode of transport should be there) for loading to begin.
- **Goods issue date**
  The date on which the goods must leave the delivering plant to arrive at the customer's location on time.
- **Delivery date**
  Date at which the goods arrive at the customer location. A difference is made between the following:
  - **Required delivery date:** Date on which the customer wants to receive his goods.
  - **Confirmed delivery date:** Date on which the arrival of the goods at the customers can be confirmed by the system.

To calculate the confirmed delivery date, the system has the option of performing either backward scheduling or forward scheduling. In backward scheduling, the material availability date and transportation planning date are calculated from the required customer delivery date by subtracting the various lead times. The outbound delivery must be created on the earlier of the two dates (selection date of the outbound delivery).

If both dates are after the order date, and the material is available on the materials availability date, the required delivery date is confirmed to the customer. One schedule line is created for a sales line item. The schedule line date matches the confirmed delivery date, which corresponds to the required customer delivery.

If one of the two dates is before the order date, the required delivery date can't be confirmed. Therefore, the system tries to determine the next possible date (forward scheduling).

If the result of backward scheduling is that the delivery date required by the customer can't be confirmed, the system executes forward scheduling. Forward scheduling takes into consideration the time parallels of the workflows for transportation planning and picking/packing of materials. The longer of the two periods is relevant for scheduling. The selection date for the outbound delivery is the earlier of the material availability date or the transportation planning date.

The earliest time at which the material is available in the warehouse is the new material availability date. This is the outgoing point for new delivery scheduling.

Two schedule lines are generated for the sales line item:

- The date of the first schedule line corresponds to the customer's required delivery date and has no confirmed quantity.
- The date of the second schedule line shows the confirmed delivery date and the confirmed amount.

4.2.2 Create an Outbound Delivery

To create an outbound delivery, go to the menu path, **Logistics • Sales and Distribution • Shipping and Transportation • Outbound Delivery • Create • Single Document • With Reference to Sales Orders**.

In the initial screen, enter the shipping point, delivery date as confirmed by the sales order, and the sales order number, as shown in Figure 4.5.

Figure 4.5 Outbound Delivery with Order Reference

This will bring you to the delivery screen, as shown in Figure 4.6. The delivery items have data organized into various tabs. Figure 4.6 shows the **Item Overview** tab, which lists the materials and quantities to be delivered. The second tab, **Picking**, is shown in Figure 4.7.

Figure 4.6 Delivery Create: Overview

Figure 4.7 Picking Tab for Deliveries

This tab shows the delivery quantity, picked quantity, and the picking date (**Stag. Date**). In this instance, the picked quantity is grayed out so that it can't be manually updated. This is dictated by the **OverallWMStatus**. In this case, the value of this status is **A**, which makes it relevant for SAP ERP WM transfer orders. The picked quantity is updated by these transfer orders.

The **Transport** tab contains the estimated shipping date, shows the route of the truck, and shows the transportation planning status, as shown in Figure 4.8.
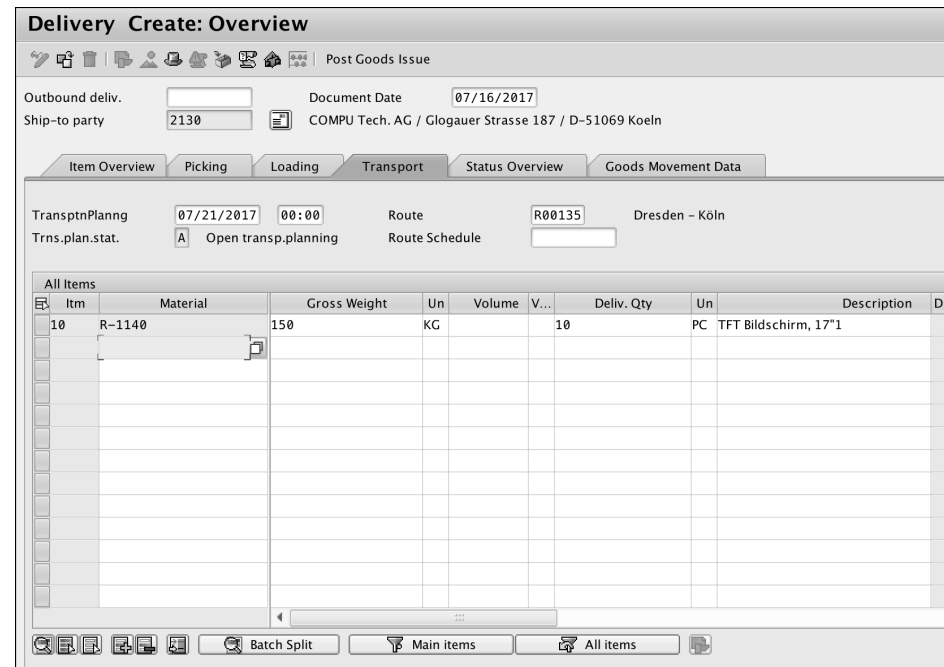
Figure 4.8 Transport Tab for Deliveries

When the transportation planning status (**TransptnPlanng**) field isn't blank, the delivery is also linked to the transportation functionality in SAP ERP. This status will be updated as the shipment is executed, as we'll discuss further in Section 4.5.

The **Goods Movement Data** tab shows you the planned good movement date, actual goods issue date, and the total goods movement status, as shown in Figure 4.9. These statuses allow you to monitor the progress of your delivery. The most important status might be the goods movement status because you can't create an invoice until all of the items in a delivery have been issued.
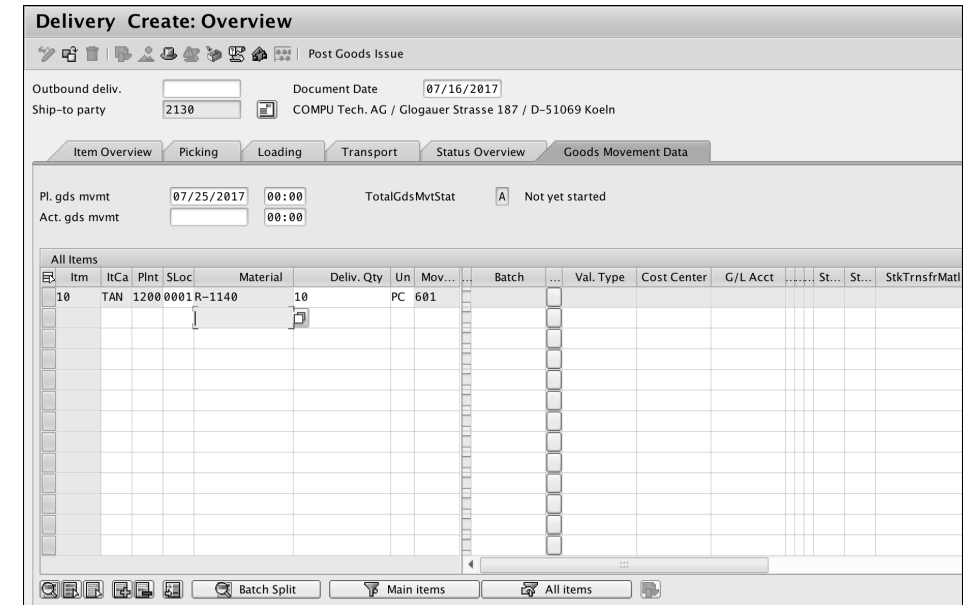
Figure 4.9 Goods Movement Data for Deliveries

When you save the delivery, the document flow in the sales document gets updated, as shown in Figure 4.10.
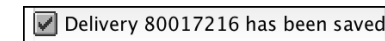
Figure 4.10 Delivery Number in the Status Bar

Table 4.1 lists the outbound delivery maintenance transactions and menu paths.

Transaction	Menu Path
VA01 – Create Delivery with Reference to Sales Orders	**Logistics • Sales and Distribution • Shipping and Transportation • Outbound Delivery • Create • Single Document • With Reference to Sales Orders**
VL10C – Collective Processing of Documents due for Delivery	**Logistics • Sales and Distribution • Shipping and Transportation • Outbound Delivery • Create • Collective Processing of Documents Due for Delivery • Sales Orders Items**

Table 4.1 Outbound Delivery Maintenance

Transaction	Menu Path
VL02N – Change	**Logistics • Sales and Distribution • Shipping and Transportation • Outbound Delivery • Change • Single Document**
VL03N – Display	**Logistics • Sales and Distribution • Shipping and Transportation • Outbound Delivery • Display**
VL06O – Outbound Delivery Monitor	**Logistics • Sales and Distribution • Shipping and Transportation • Outbound Delivery • Lists and Logs • Outbound Delivery Monitor**

Table 4.1 Outbound Delivery Maintenance (Cont.)

Now that you understand outbound deliveries, let's move on to the next process: picking.

4.3   Picking

Picking refers to the activities that are executed by the warehouse to collect and stage all of the items requested by the delivery order in the correct quantities and prepare them for shipping.

Depending on your system configuration, the delivery can interface with your warehouse in several ways:

- **No SAP ERP WM**
  When your system is configured to handle only inventory management, the outbound delivery requires only that the picking quantity is confirmed. In this case, the warehouse clerks would pick the items and update the delivery directly.

- **Lean SAP ERP WM**
  This allows the warehouse to create simple picking lists with quantities per material SKU. After all of the items have been picked, the warehouse clerks need to confirm the picking quantities in a separate document called a transfer order. This transfer order can update the delivery quantities in case the picked quantity is different from the original delivery quantity. The delivery can't have the picking quantity confirmed manually.

- **Full SAP ERP WM**
  This is a fully functional functionality in SAP ERP that links into the shipping process. It includes a full representation in the system of all the storage areas in the warehouse, including all racks and storage bins.

Like lean SAP ERP WM, full SAP ERP WM also produces transfer orders for picking, but, in this case, they contain the specific coordinates where each quantity of each product is stored in the warehouse. To confirm the delivery picking, the warehouse clerks have to confirm the transfer orders. The delivery picking can't be confirmed directly in the outbound delivery.

When a transfer order is created, its SAP ERP WM status changes from **Not Yet Processed** to **Partially Processed**.

We'll go over the different kinds of picking you can use in the following sections.

4.3.1   Wave Picks

Wave picks allow the warehouse to consolidate picking requirements. To do this, you first have to group deliveries together based on the time when they have to be processed.

> **Note**
>
> Wave picks aren't for everyone. Some companies' products allow for direct picking for each customer's orders; in other cases, consolidated picking is a very good option. If, for example, your company's products are packed in pallets or boxes that contain multiple items, and each of your customers orders large multiples of them, then you may want to execute consolidated picking. This is true when selling to distributors and not directly to end customers.

Prerequisites

To use wave picks, you need to have other functionalities of SAP ERP installed as prerequisites. The simplest configuration can be based on a lean SAP ERP WM implementation, but if you have a very complex warehouse, then your company can benefit from a full SAP ERP WM implementation.

Another prerequisite for wave picking is the use of time slots. *Time slots* help you plan wave picks according to the working calendar at your warehouse facility. These

time slots can be, for example, linked to routes so that all the deliveries for a certain shipping route are picked at the same time, and the trucks can be loaded and dispatched on schedule.

Because time slots have a predefined duration, and your picking capacity is just so much at a given time of the day, you can set limits on the number of articles that can be processed. You can set up these capacity restrictions in two ways:

- Maximum number of delivery items to be picked in a wave
- Maximum number of picking transactions per wave

These restrictions are set in configuration, and only the system analysts can change them. The simplest way to create a wave pick is to use the Outbound Delivery Monitor, which we'll describe next.

Creating a Wave Pick

To create a wave pick, follow these steps:

1. Choose **Logistics • Sales and Distribution • Shipping and Transportation • Picking • Wave Picks • Create • Via Outbound Delivery Monitor**. The Outbound Delivery Monitor is your single point of contact with all of the delivery order-related statuses (see Figure 4.11).

Figure 4.11 Outbound Delivery Monitor

2. Click on the **For Picking** button. In the **Picking Data** section (Figure 4.12), you'll be able to enter selection parameters so that the resulting worklist shows the deliveries that you're looking for.

Figure 4.12 Outbound Deliveries for Picking

3. The search screen allows you to enter several different parameters to narrow down your search results. The basic two parameters you have to enter in this search screen are the **Shipping Point** and **Picking Date Range**. Figure 4.13 shows the deliveries that matched our search. Here you see the global information that totals the item's data.

Figure 4.13 Day's Workload for Picking

4. Select the **Item View** button (Figure 4.14), which displays detailed information for each item.

Figure 4.14 Item View

5. Select all of the items, and choose **Subsequent Functions • Group • Create with WM Reference**, as shown in Figure 4.15. In this example, we're selecting a SAP ERP WM group because it's simple.

Figure 4.15 Create Delivery Group with SAP ERP WM Reference

6. Enter a description for the group and the warehouse number, as shown in Figure 4.16. After you've done this, the status bar will show you the group number after it's created, which is **Group 6139** in this example (see Figure 4.17).

Figure 4.16 Group Type and Description

Figure 4.17 Status Bar Showing the Group

Table 4.2 illustrates the various transactions and menu paths for wave picks maintenance.

Transaction	Menu Path
VL35 – Create According to Delivery Time	**Logistics • Sales and Distribution • Shipping and Transportation • Picking • Wave Picks • Create • According to Delivery Time**
VL35_S – Create According to Shipment	**Logistics • Sales and Distribution • Shipping and Transportation • Picking • Wave Picks • Create • According to Shipment**
VL35_ST – Create According to Shipment	**Logistics • Sales and Distribution • Shipping and Transportation • Picking • Wave Picks • Create • According to Shipment and Compare Time**
VL06P – Via Outbound Delivery Monitor	**Logistics • Sales and Distribution • Shipping and Transportation • Picking • Wave Picks • Create • Via Outbound Delivery Monitor**

Table 4.2 Wave Picks Maintenance

4.3.2   Two-Step Picking

After the wave picks are created, you can start two-step picking. Two-step picking is a way of separating the picking activities in the warehouse into two phases: collective picking of material and separation into individual customer orders.

For example, you could have 30 different customers that ordered the same product for a total of 1,500 pieces. In this scenario, a wave pick would consolidate the customers' requirements, and the forklifts would go out and bring all 1,500 pieces. Then, in the picking area, individual orders would be sorted and trucks loaded and dispatched. This allows for a more efficient use of the warehouse resources. As you can see in Figure 4.18, two-step picking moves large quantities of products that need to be sorted.
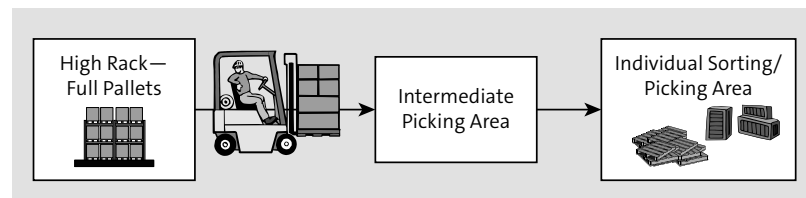
Figure 4.18 Two-Step Picking

The first step creates the consolidated transfer orders so that the pickers can start moving multi-unit packages (i.e., boxes, cases, pallets, sacks, etc.) for each material number that is included in the delivery items that form the wave pick. These transfer orders don't update the SAP ERP WM status in the delivery (see Figure 4.18). The second step starts after the consolidated quantities have been moved from the warehouse into the picking area. At this point, we have to break out and pick the individual delivery item quantities by creating picking lists by delivery. In the SAP system, two-step picking lists are defined as *transfer orders*. The creation of transfer orders updates the SAP ERP WM status from **Not Yet Processed** to **Partially Processed**. Two-step picking (see Figure 4.19) also requires that the functionality is enabled in SAP ERP WM configuration. Ask your IT analyst whether this functionality is active in your system.
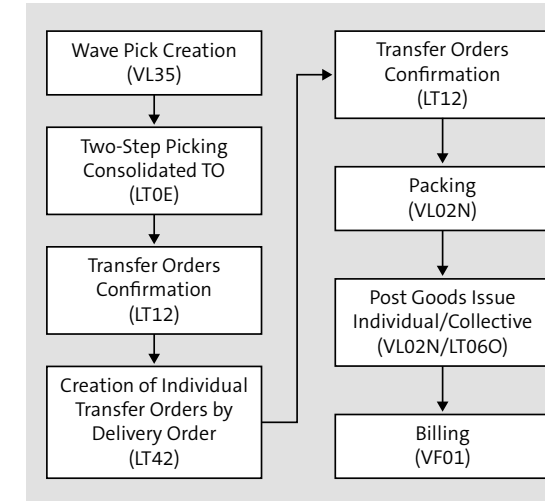
Figure 4.19 Two-Step Picking Flow with Transaction Codes

Two-Step Picking Example

Let's walk through an example so you can visualize this process in the SAP system.

> **Note**
>
> In the previous section, you learned how to create a delivery group, so here we'll use that delivery group to create two-step picking transfer orders.

1. Choose **Logistics • Sales and Distribution • Shipping and Transportation • Picking • Create Transfer Order • Via 2-Step Picking** to get to the **Create Removal TO for 2-Step Picking: Initial Screen**, as shown in Figure 4.20.
2. For this transaction, enter the **Warehouse Number** and the **Group** number, and press ⌈Enter⌉; in our example, we created group **6139** earlier in Figure 4.17. This will take you to the screen shown in Figure 4.21. The quantities displayed are the consolidated quantities for all of the deliveries that require each material.

Create Removal TO for 2–Step Picking: Initial Screen

Generate TO Item   Stor. Type Srch Seq.

Warehouse Number   101
Group   6139

Movement data

Movement Type   ▢   Goods recipient   ▢
Requirement Number   ▢   Unloading Point   ▢

Quantity proposal
⦿ Total quantity
◯ Full SUs
◯ Part.qty

Control
Foreground/Backgrnd   H Foreground ▾

Figure 4.20 Create Removal TO for 2-Step Picking: Initial Screen

Create Removal TO for 2–Step Picking: Item Overview

Generate TO Item   Stor. Type Srch Seq.

Warehouse Number   101
Group   6139   Warehouse Picking Wave
Movement Type   850   Requirement Number   ▢

| Active Worklist | Inactive items | Items created |

	Material	Plnt	Batch	S	S	Requested qty AUn	A...	Reqmnt qty AUn	Qty picked in AUn	S...	LE quantity	Gross weight	
	T–BW02–01	1000				51	PC	51	0	E1	100.000	153	107

Active   Inactive

Figure 4.21 All Materials and Total Quantities for Each

3. Click on the **Save** button. The system will let you know how many transfer orders were created, as shown in Figure 4.22. It's important to know that this consolidated transfer order doesn't update the delivery statuses.

☑ Transfer order 0000000021 created

Figure 4.22 Status Showing the Number of Tranfer Orders Created

4. Go to the two-step picking monitor by choosing **Logistics • Sales and Distribution • Shipping and Transportation • Picking • Wave Pick • Two-step Picking • Analysis**, which brings you to the screen shown in Figure 4.23.

Evaluation of Groups for 2–Step Picking and Update Status

Warehouse Number   101
Group   6139   to   ▢
Reference Document Category   ▢

Creation date   07/16/2017   to   07/16/2017

Display Log   ▢
Display Result of Evaluation   X

Figure 4.23 Evaluation Groups for 2-Step Picking and Update Status Screen

5. The two-step monitor shows you the status for the pick or consolidated picking, and also for the allocation or individual picking, as shown in Figure 4.24.

6. Click on the **Display 2-Step Relevance** button, which brings you to the screen shown in Figure 4.25. By doing so, you can see how each delivery and each material qualifies for consolidation in two-step picking, along with the consolidated quantities.

View of Group for 2–Step Picking

Display   Data   Line   Subtree   Determine 2–Step Relevance   Display 2–Step Relevance   Display TOs   Create TOs   Confirm TOs   Rel.Mult.Processing

Group: 0000006139   Group Name: Warehouse Picking Wave
  Pick
    Sequence Number: 001 Date: 20170716   Time: 171615
      Transfer Orders Created
      (All) Transfer Orders Not Yet Confirmed
  Allocation
    Procedure Not Yet Started or no Current Evaluation

Figure 4.24 View of Group for 2-Step Picking Screen

Display 2–Step Picking Relevance for Group

Choose   Save

Display 2–Step Picking Relevance for Group

Warehouse Number 101
Group: 0000006139

2st	Material	Plnt	Batch	S	S	Requested qty AUn	Reqmt qty AltUn	Qty picked in AUn	AUn	No. Items	SUT	LE quantity
2	T–BW02–01	1000				0	51	51	PC	4	E1	100.000

Figure 4.25 Display 2-Step Picking Relevance for Group Screen

Create Individual Transfer Orders for Individual Deliveries

Let's now create the individual transfer orders for the individual deliveries. In two-step picking, this is referred to as an *allocation*. Follow these steps:

1. To create the individual transfer order, go to **Logistics • Sales and Distribution • Shipping and Transportation • Picking • Create Transfer Order • Collective Processing**, as shown in Figure 4.26, or go to Transaction LT42 and enter the group number. It's a prerequisite that all transfer orders for consolidated picking are confirmed at this time.
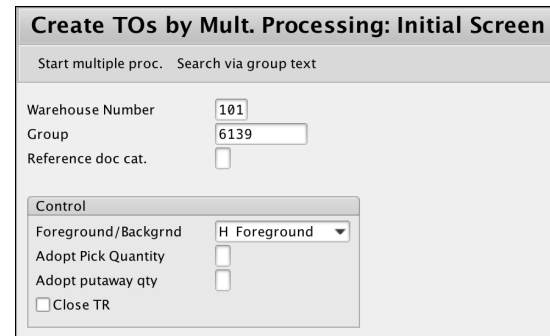
Figure 4.26 Create TOs by Mult. Processing: Initial Screen

2. If you choose to run this transaction in the foreground, you'll be prompted to create a transfer order for each delivery, as shown in Figure 4.27. Because we normally process hundreds or thousands of deliveries, it's a good idea to run it in the background.
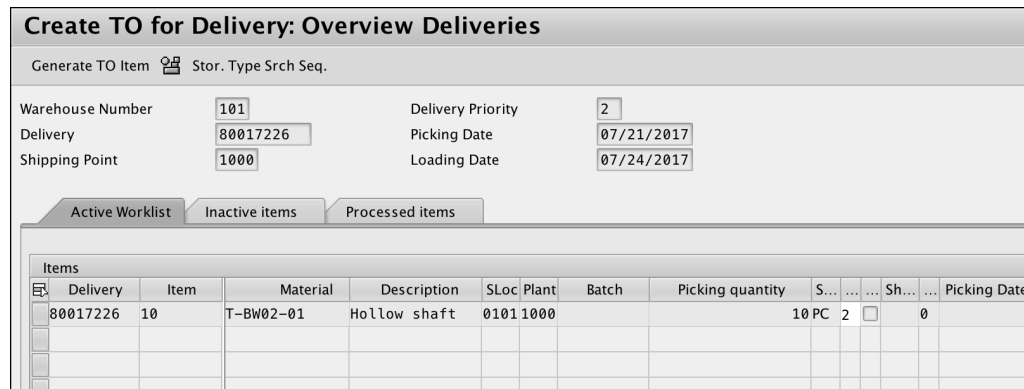
Figure 4.27 Create TO for Delivery: Overview Deliveries Screen

3. At the end of the background processing, you'll see the summary information, as shown in Figure 4.28. You can also display the list of transfer orders by clicking on the **Disp. details** button.
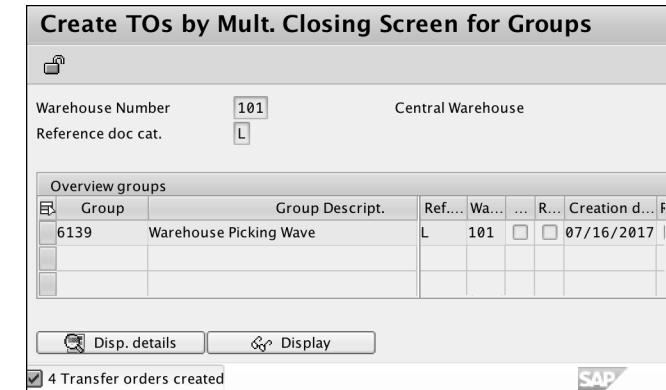
Figure 4.28 Create TOs by Mult. Closing Screen for Groups Screen

The detailed information, shown in Figure 4.29, shows you which transfer orders were create for each delivery.
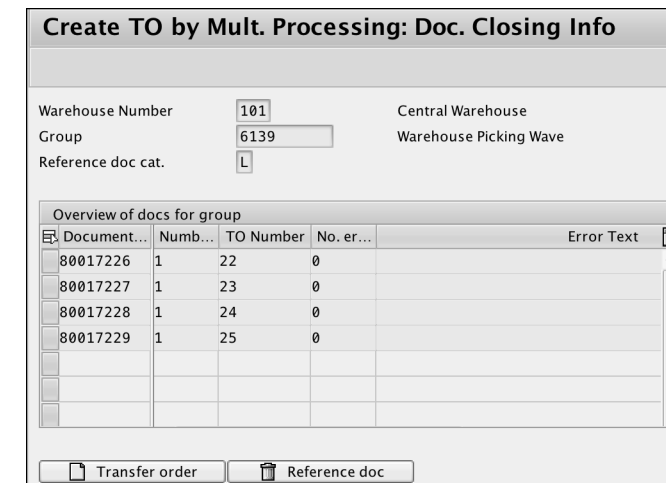
Figure 4.29 Create TO by Mult. Processing: Doc. Closing Info Screen

Table 4.3 lists the two-step picking maintenance transactions and menu paths for your easy reference.

Transaction	Menu Path
LT72 – Redefine Two-Step Picking	**Logistics • Sales and Distribution • Shipping and Transportation • Picking • Two-Step Picking • Redefine 2-Step Picking**
LX39 – Two-Step Picking Analysis	**Logistics • Sales and Distribution • Shipping and Transportation • Picking • Two-Step Picking • Analysis**
LT0E – Create Consolidated Transfer Orders (two-step first step)	**Logistics • Sales and Distribution • Shipping and Transportation • Picking • Create Transfer Order • Via 2-Step Picking**
LT42 – Create Individual Transfer Orders for Group (two-step second step)	**Logistics • Sales and Distribution • Shipping and Transportation • Picking • Create Transfer Order • Collective Processing**

Table 4.3 Two-Step Picking

4.3.3   Planning Replenishments

Some companies need to supply odd quantities to their customers, which means they don't supply full pallet or full box quantities. In these situations, the SAP system provides what is known as *large/small quantities* picking.

The *large* part refers to the full pallet or box quantity, and the *small* part refers to a partial quantity of that larger container. The system indicates two different sections of the warehouse as dependent on each other. The small quantity area has to be replenished from the large quantity area when the stock level reaches a certain threshold. The system will guide the picking into these sections or storage types by creating separate transfer orders for the large quantity containers and for the partial container quantities, respectively.

Let's walk through an example to help explain this better. You sell a product in cases of 12, there are 32 cases in a pallet, and your client ordered 300 cases. To fulfill this quantity, the system will create 1 transfer order in the large quantities storage type for 9 pallets for a subtotal of 288 cases. Then, it will create a second transfer order for the small quantities area for the remaining 12 boxes. This way, you don't have to break a new pallet and return the remaining partial pallet to the pallet storage area, as illustrated in Figure 4.30.
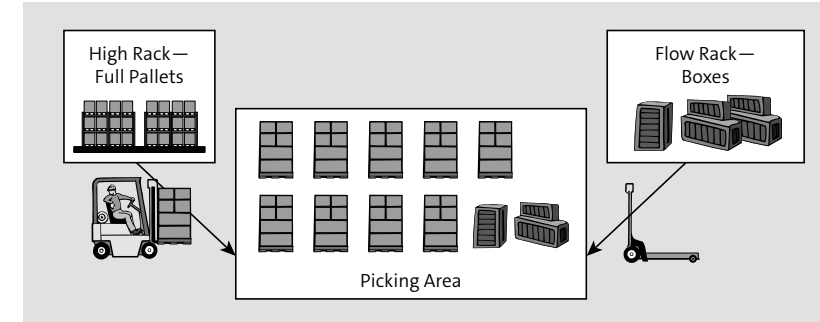
Figure 4.30 Picking Small/Large Quantities from the Full Pallet and Box Storage Areas

This all sounds nice and neat, but how does the small quantity area get those 12 cases? Well, you have to replenish this area. Normally, you'd wait until the stock here goes below a minimum threshold and then request that at least 1 full pallet be moved from the pallet storage area.

In the SAP system, you need to indicate these parameters in the **Warehouse 2** view of the material master (**Logistics • Materials Management • Material Master • Material • Change • Immediately**), as shown in Figure 4.31, for each of the products you want to pick in this manner.

Figure 4.31 Storage Bin Stock from the Warehouse Management 2 View

First, you need to create a new view for the specific small quantities storage type and then enter the values that will guide both the replenishment and the split picking.

The fields you need to update are as follows:

- **Maximum bin quantity**
  The maximum quantity that this storage type can hold for this material.

- **Minimum bin quantity**
  Threshold quantity to trigger the replenishment.

- **Control quantity**
  The quantity that will dictate when to split the picking. Normally, it's a full pallet

quantity minus one. From the example, if a pallet is 32 cases, then the control quantity would be 31 cases.

- **Replenishment qty**
  The quantity of this material that will be moved from the pallet storage type to the box storage type.

Now that you understand picking, let's move on to packing.

4.4 Packing

Although you might think all your products have to be packed before you ship them out to your customer, this isn't necessarily the case in SAP. Packing in SAP ERP helps you keep track of individual shipping units. A shipping unit is also known as a *handling unit* (see Figure 4.32), and it can refer to a box, a pallet, a container, or any other packaging that you serialize and keep track of for your client.

Figure 4.32 Sample Content of a Handling Unit

4.4.1 Handling Unit Characteristics

Each of these containers maintains the following characteristics about the products that are packed inside of it:

- **Material number**
  Refers to the SKU number that uniquely identifies a product within the SAP system.

- **Quantity**
  Refers to the partial quantity of the material that is contained in that specific package.
- **Batch**
  If your company sells materials that require batch management, then the batch number will be included in the handling unit data.

Packing takes place either in SAP-defined packing stations, which are defined in configuration, or directly in the delivery order. There is also the option to have the system automatically pack each delivery upon creation. You should ask your functional analyst whether this is activated in your system.

Packaging materials are also defined in the material master; they have a predefined capacity in weight and volume, as shown in Figure 4.33.

Figure 4.33 Packaging Material Data from the Sales/Plant Data View in the Material Master

4.4.2 Packing Steps

To pack your product before shipping to your customer, you first have to go to the packing screen in the delivery order. Follow these steps:

1. From the item overview, click on the **Packing** button (see Figure 4.34). When you're on the packing screen, choose a packaging material, which is typically a pallet or case, depending on your company's needs.
2. After you've selected a packaging material, you need to select the materials and quantities that are to be packed in each handling unit. After packing your materials, the weight of the handling unit is updated with the weight of the packed materials (see Figure 4.35).
3. Save the delivery.
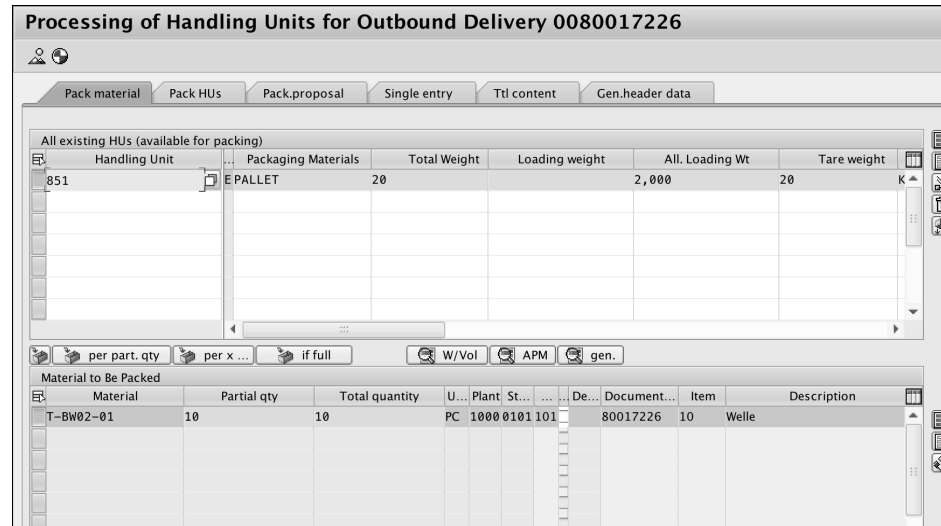
Figure 4.34 Packing Screen in a Change Delivery Transaction
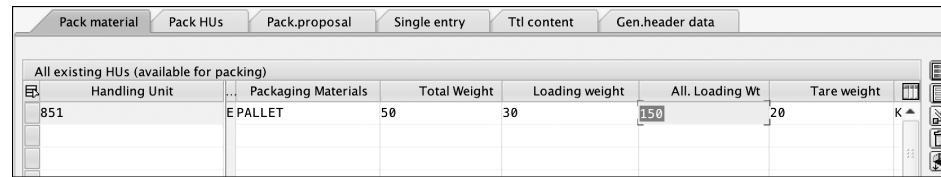
Figure 4.35 Weight of the Packed Handling Unit Updated after Packing

Table 4.4 lists the packing transactions and menu paths.

Transaction	Menu Path
VL02N – Outbound Delivery	**Logistics • Sales and Distribution • Shipping and Transportation • Packing • Outbound Delivery**
VT02N – Shipment	**Logistics • Sales and Distribution • Shipping and Transportation • Packing • Shipment**
HUPAST – Packing Station	**Logistics • Sales and Distribution • Shipping and Transportation • Packing • Packing Station**

Table 4.4 Packing Transactions and Menu Paths

In Section 4.5, we'll discuss the transportation functionality in SAP ERP. At that point, you'll learn about shipments and how they represent trucks carrying your company's products to your customers. For now, we'll only mention that those trucks are also handling units, and you'll need a packaging material for each truck type you use. In them, you'll pack multiple deliveries.

> **Note**
>
> If you're using batch management in your company, you can't pack a delivery until the batch determination has taken place.

Now that you understand packing, let's move on to shipments.

4.5   Shipment

Another very important component of the logistic chain in the SAP system is the transportation functionality. You don't need to have this functionality active in your system to be able to ship goods to your customers, but it's very helpful when you consolidate shipments and must print collective bills of lading. It's also a great tool to keep track of transportation costs and charge them back to the customer, if necessary.

With transportation, you create shipments that represent trucks for sending multiple delivery orders for your customers. Shipments can inherit the route in the delivery orders if all the deliveries have the same shipping route. The shipment will then have a set of stops based on the customers' addresses.

The transportation functionality in SAP ERP allows your company to plan and execute transportation activities to ensure that shipments timely dispatch and arrival to your customer.

To use the transportation functionality, you need to make specific configurations for your company in your system. Ask your systems analysts whether this functionality is activated and configured in your company.

> **EHP 7 Updates: SAP Transportation Management (SAP TM)**
>
> As mentioned earlier, SAP won't enhance the transportation functions in SAP ERP any longer. Instead, SAP recommends clients with complicated transportation needs to move to SAP TM. SAP TM is an advanced logistics system that supports you in all

activities connected with the physical transportation of goods from one location to another. Efficient deliveries depend on informed route planning, freight consolidation, and enhanced visibility. By providing managers with appropriate tools such as route optimization, load building, and track and trace, SAP TM can improve fleet performance and reduce supply chain expenditures. Along with warehouse management solutions and truck routing solutions, SAP TM solutions constitute the logistics side of an overall supply chain management system.

You can use SAP TM to perform the following activities, for example:

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

You can use SAP TM to create and monitor an efficient transportation plan that fulfills the relevant constraints (e.g., service level, costs, and resource availability). You can determine options to save costs and to optimize the use of available resources, react to transportation events, and find solutions to possible deviations from the original transportation plan.

4.5.1   Transportation Planning Point

The first important point in transportation planning in SAP ERP is the *transportation planning point*, which represents the place where trucks are loaded and dispatched from the warehouse. It's essentially the place where you'll create shipments.

4.5.2   Shipments

Shipments are documents that hold the information about the movement of goods to the customer; this includes carrier information, truck type, truck license plates, and the name of the truck driver. It also contains all of the information about the shipping route, including mode of transportation, connection points, loading and unloading points, and total weight, along with the list of all of the deliveries loaded in the truck, which themselves contain the lists of materials and handling units shipped to each customer.

There are three different types of shipments:

- **Individual shipments**
  Can contain one or more deliveries that go from one point of departure to one point of destination with one mode of transportation.
- **Collective shipments**
  Can perform several drop stops to several points of destination with one mode of transportation.
- **Transportation chain**
  Can be very useful when shipping of deliveries has to deal with several modes of transportation, which is very common in exports.

The transportation chain normally has different legs, one for each loading and unloading point. For example, if you have to ship goods to Europe, then you'll have to use a truck to move the goods to the port, and then use a ship carrier to move the goods to Europe, and most likely then you'll need to load the shipment onto a train so it gets to the final destination.

4.5.3   Shipment Example

In this example, three modes of transportation are involved: truck, ship, and train. There are also three legs of the trip, one for each mode of transportation, and at least two loading and unloading points, which represent the ports. The route stages are illustrated in Figure 4.36.

Figure 4.36 Overview of the Route Stages

As part of the logistics chain, the shipments are linked to the deliveries, so each time that a delivery is made part of a shipment, its transportation planning status changes from **Not Started** to **Partially Processed**. The main screen in Transaction VT01N prompts you for the transportation planning point and the shipment type, as shown in Figure 4.37.
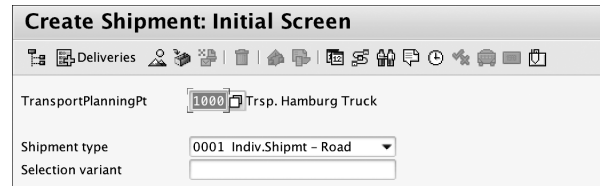
Figure 4.37 Create Shipment: Initial Screen

When you create a shipment, you have to select the shipment type and the transportation planning point. From there, SAP provides you with a selection screen for selecting the deliveries you want to include in it. You can filter deliveries using several parameters, for example, by route, delivery date, customer (ship-to), planned goods issue date, and several others, as shown in Figure 4.38.
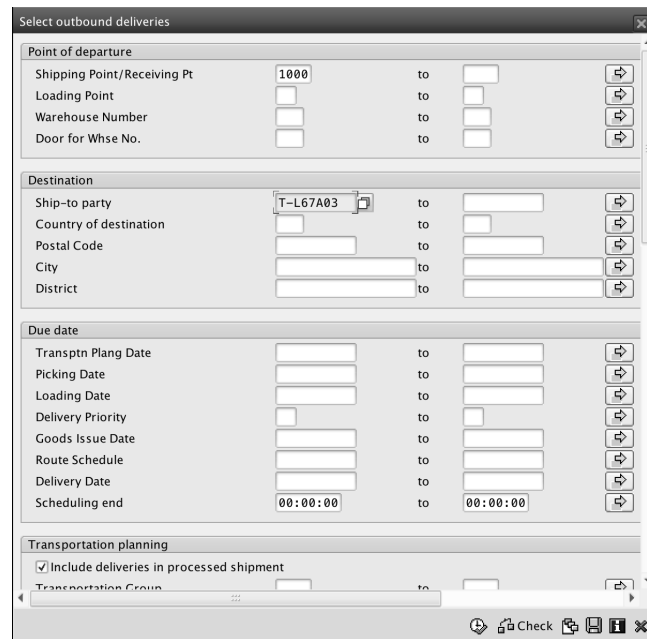
Figure 4.38 Delivery Selection Screen for Shipments

After the selection, you'll find a list of the deliveries provided based on your search parameters, and from there you can manually add or remove deliveries. This screen (Figure 4.39) is very important because it will show you the total weight and volume occupied by each delivery so you know whether they will all fit in a single truck or other shipping container.
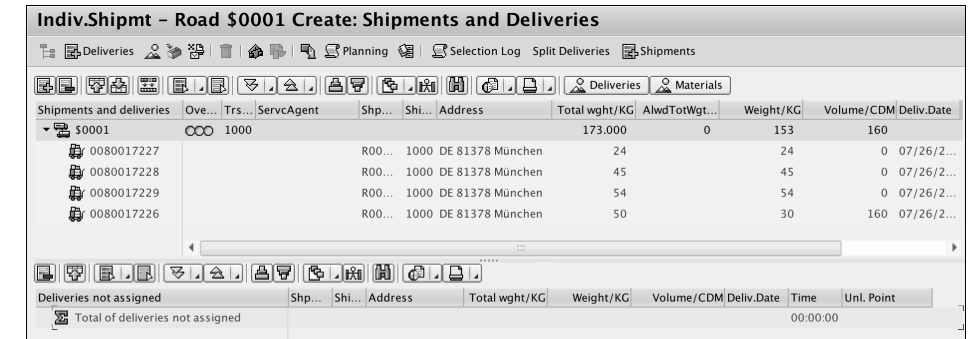
Figure 4.39 Search Result with List of Deliveries in a Shipment

After you're satisfied with the list of deliveries in the shipment, then you can use the planning screen to set the shipment deadlines shown in Figure 4.40.
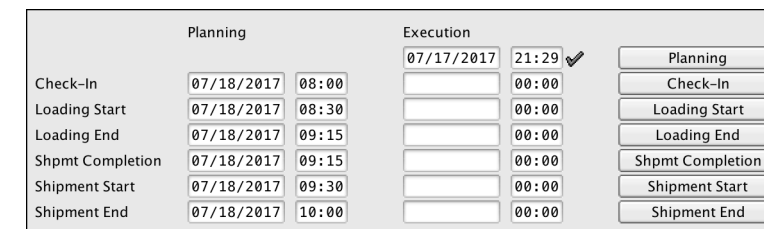
Figure 4.40 Shipment Deadlines from the Shipment Overview Screen

These deadlines can later be used to communicate with the shipping carriers to schedule the right trucks at the right time. With deadline planning, you can schedule the following:

- **Check-In**
  The truck appointment.
- **Loading Start**
  The time the loading activities must start.

- **Loading End**
  The time the loading activities must finish.
- **Shpmt Completion**
  The truck closing time.
- **Shipment Start**
  The truck dispatch time.
- **Shipment End**
  Related to the shipment cost functionality, which isn't a mandatory setting for using transportation.

Later, when the shipment is executed, the shipment has to be updated by the transportation clerks at the warehouse. Each button in the shipment overview (Figure 4.41) updates the actual dates and times for each of the deadlines. Additionally, you can ask your system analyst to link tasks to these buttons.

Figure 4.41 Complete Overview of the Shipment Status

The types of tasks that can be linked range from printing different formats such as the individual packing lists, the consolidated packing lists, and the list of dangerous materials included in the shipment, to posting the actual goods issue for all of the

deliveries in the shipment, executing the billing, and printing the invoices and other documents that must travel with the goods.

Shipments, like other SAP documents, can be treated either individually or collectively.

> **Note**
>
> The **Shipment Start** button updates the transportation planning status from **Partially Processed** to **Complete**.

Table 4.5 lists some transactions for creating, updating, and listing shipments.

Transaction	Menu Path
VT01N – Create Shipment Single Document	**Logistics • Sales and Distribution • Shipping and Transportation • Shipment • Create • Single Document**
VT02N – Change Shipment Single Document	**Logistics • Sales and Distribution • Shipping and Transportation • Shipment • Change • Single Documents**
VT06 – Mass Change	**Logistics • Sales and Distribution • Shipping and Transportation • Shipment • Change • Mass Changes**
VT03N – Display Shipment Single Document	**Logistics • Sales and Distribution • Shipping and Transportation • Shipment • Display**
VT70 – Print	**Logistics • Sales and Distribution • Shipping and Transportation • Shipment • Print**
VT11 – Transportation Planning List	**Logistics • Sales and Distribution • Shipping and Transportation • Shipment • Lists and Logs • Transportation Planning List**
VT14 – Utilization List	**Logistics • Sales and Distribution • Shipping and Transportation • Shipment • Lists and Logs • Utilization List**
VT15 – List of Free Capacity	**Logistics • Sales and Distribution • Shipping and Transportation • Shipment • Lists and Logs • List of Free Capacity**

Table 4.5 Shipment Transactions

Transaction	Menu Path
VT16 – Check-In List	**Logistics • Sales and Distribution • Shipping and Transportation • Shipment • Lists and Logs • Check-in List**
VT11 – Shipment Completion List	**Logistics • Sales and Distribution • Shipping and Transportation • Shipment • Lists and Logs • Shipment Completion List**

Table 4.5 Shipment Transactions (Cont.)

4.6   Shipment Cost Document

Costing transportation shipments is an optional function in the SAP system. If your company chooses to use it, then you'll be able to track each invoice from each of your transportation partners and relate it to individual shipments. This, like many of the steps described before, also requires the system to be configured to handle shipping costs.

Shipping costs are tracked in a separate SAP document called a *shipping cost document*. This cost document collects all of the costs involved in a specific shipment, including freight, insurance, and customs. These costs are calculated based on previously negotiated prices with your transportation partners for each route and transportation mode.

When the shipment cost document is created, it will look up all the conditions included in the shipment document and use the data available, such as shipping partner, route, stages, distance, weight, volume, and so on, to determine the value for each of those conditions, which include prices, surcharges, and discounts, and are stored in condition records.

Shipment pricing takes those condition records, determines prices and surcharges/discounts, and allows the user to influence these conditions manually. You can define conditions at any level. A level corresponds to the fields in the condition table in which a condition record is stored. Therefore, the level represents the key fields for the access to a condition. Common levels at which price agreements are made are predefined in the standard system.

Through Customizing, you can add any levels that you may need. You can make conditions dependent on any fields of the shipment document. You'll need the assistance of your IT systems analyst to make any of these changes to the field catalogs. By specifying a validity period, you can restrict a condition to a specific period.

You can maintain the values within a condition record (e.g., price, surcharge, and discount) depending on a scale (weight-based, volume-based, or value-based). You can also use multidimensional scales. There is no limit to the number of scale levels.

For each condition record, you can define an upper and lower limit that will allow you to manually change a pricing element within the limits specified.

All condition types supported for pricing are determined in the pricing procedure (set in Customizing), which is decided automatically based on different criteria:

- Transportation planning point of the shipment
- Shipping type (grouped in a shipping type procedure group)
- Forwarding agent (grouped in a service agent procedure group)
- Shipment cost item category (grouped in an item procedure group)

Shipment cost documents can be created one at a time or collectively. In either case, one cost document will be created for each shipment document in a one-to-one relationship.

4.6.1   Setting Up a Shipment Cost Document

To create a shipment cost document for a shipment, the shipment must be relevant for shipment costs (at the header and/or stage level). The shipment must also have the required **Overall** status set in the definition of the shipment cost type. As a minimum, it must have **Planned** status.

The shipment cost document consists of the following sections:

- **Shipment cost header**
  This contains general information on the entire document. Status, reference, and administrative information are provided. As far as the status information is concerned, the statuses are cumulated statuses that are derived from the individual items.
- **Shipment cost item**
  This contains general data for shipment cost calculation and settlement, such as service agent, pricing and settlement date, tax amount and tax base amount, and

organizational data (e.g., company code, plant, and purchasing organization). Each item has its own status for the shipment cost calculation, account assignment, and transfer functions.

- **Shipment cost subitem**
  Shipment costs are calculated at the shipment cost subitem level. The calculation result is also recorded at this level.

After the document is complete, it can be settled against the transportation partners (also known as service agents) and accounts, and the cost is passed either to an internal transportation costs account or billed to the customer.

If you choose to bill your customer for the shipping and handling charges, then you need to also have the system configured to carry those costs included in the *shipping cost document* to the customer's invoice. These can either be totaled up or itemized, depending on your company's policies.

> **Note**
>
> Another very interesting functionality in transportation costs is the creation of a purchase order issued to the transportation partner for the services described in the shipment document. When the invoice for these services is presented, it has to reference either the shipment number or the purchase order number so that it can be approved by the transportation department. To execute this approval, the transportation department creates a service entry sheet, which is the equivalent of a goods receipt for services, and allows the accounts payable area to process the payment.

Each service agents that will receive payment through this functionality must be created as a vendor in the SAP system. These vendors are maintained either by the purchasing or the accounts payable departments.

4.6.2 Creating a Shipment Cost Document

To create the shipment cost document, the shipment must have a status of **Shipment Complete**. Follow these steps:

1. First follow the path, **Logistics • Logistics Execution • Transportation • Shipment Costs • Create • Single Documents**.

2. When prompted, enter the shipment for which you want to create the cost document and the shipment cost type, as shown in Figure 4.42.

Figure 4.42 Create Shipping Costs

3. The shipment cost document receives the value of the conditions that were previously established for the route/partner, and you'll get the screen shown in Figure 4.43.

Figure 4.43 Shipment Cost Document after Calculation of the Price Conditions

4. To settle the costs, you first need to transfer them, as shown in Figure 4.44.

Figure 4.44 Transferring Costs

5. After the document is saved, the costs are transferred, and the status is updated, as shown in Figure 4.45.
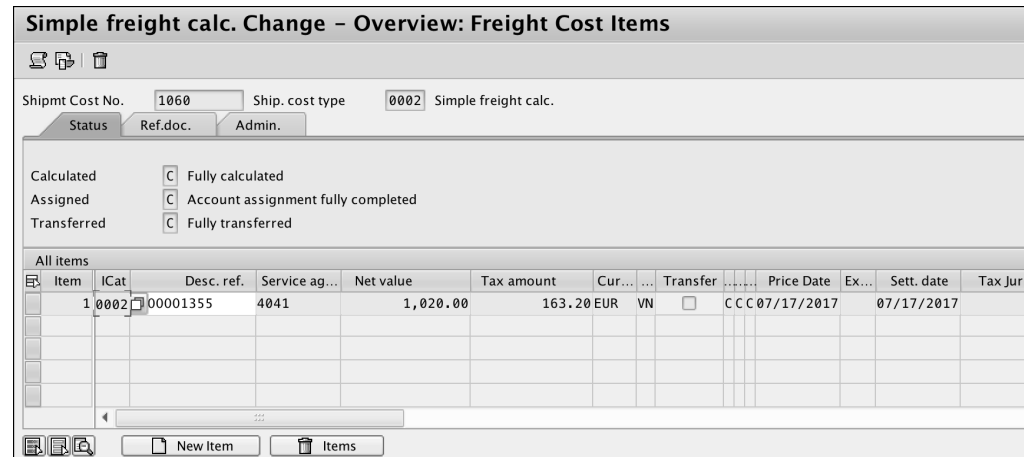
Figure 4.45 Overview: Freight Cost Items

In the shipment costs settlement list (Transaction VI12) shown in Figure 4.46, you can see how the document was updated with the purchase order that was created automatically when the cost was transferred.
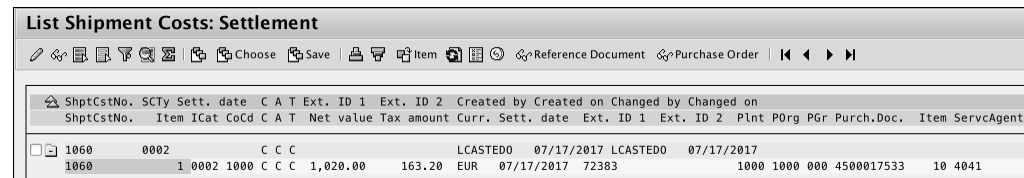
Figure 4.46 Shipment Costs Settlement List

By displaying the purchase order history in Transaction ME23N (see Figure 4.47), you can see how a goods receipt for the services was posted. Now the vendor can submit an invoice for payment, and it can be posted in the SAP system.
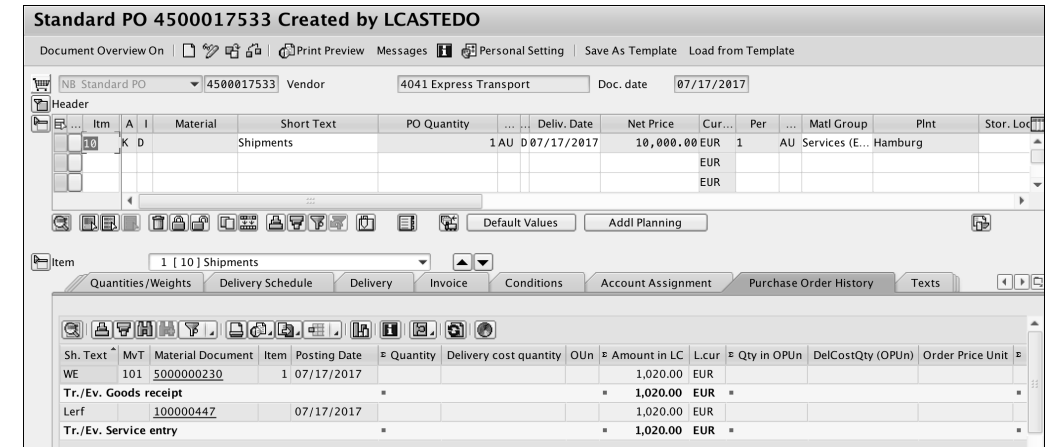
Figure 4.47 Purchase Order History

Table 4.6 lists some transactions for creating, updating, and listing shipment cost documents.

Transaction	Menu Path
VI01 – Create Single Document	**Logistics • Logistics Execution • Transportation • Shipment Costs • Create • Single Documents**
VI04 – Create Multiple Processing	**Logistics • Logistics Execution • Transportation • Shipment Costs • Create • Collective Processing**
VI02 – Change Single Document	**Logistics • Logistics Execution • Transportation • Shipment Costs • Change • Single Documents**
VI05 – Change Multiple Processing	**Logistics • Logistics Execution • Transportation • Shipment Costs • Change • Collective Processing**
VI03 – Display Single Document	**Logistics • Logistics Execution • Transportation • Shipment Costs • Display**
VI11 – Calculation List	**Logistics • Logistics Execution • Transportation • Shipment Costs • Lists and Logs • Calculation List**
VI12 – Settlement List	**Logistics • Logistics Execution • Transportation • Shipment Costs • Lists and Logs • Settlement List**

Table 4.6 Shipment Cost Document Transactions

4.7   Goods Issue

Goods issue occurs when inventory is taken off from the SAP General Ledger (G/L). The inventory is no longer part of the company's assets at this time. Therefore, it's very important that this activity matches the actual physical exit of the goods from the warehouse. From the shipping and transportation point of view, the goods issue is posted normally right before the truck is dispatched. This activity also precedes one other very important activity: billing. Billing can't be executed until the goods issue is posted.

When you're sending out one single delivery, it's very easy to pick, pack, goods issue, bill, and dispatch. But in large distribution environments, it can become complicated to follow up each of these activities for hundreds or thousands of deliveries.

4.7.1   Outbound Delivery Monitor

SAP ERP provides several ways to execute them, one of which is the Outbound Delivery Monitor. This allows you to search and select several deliveries at once and change the status for them all. From here, you can create transfer orders for picking, confirm those transfer orders, and post the goods issue (see Figure 4.48 and Figure 4.49).
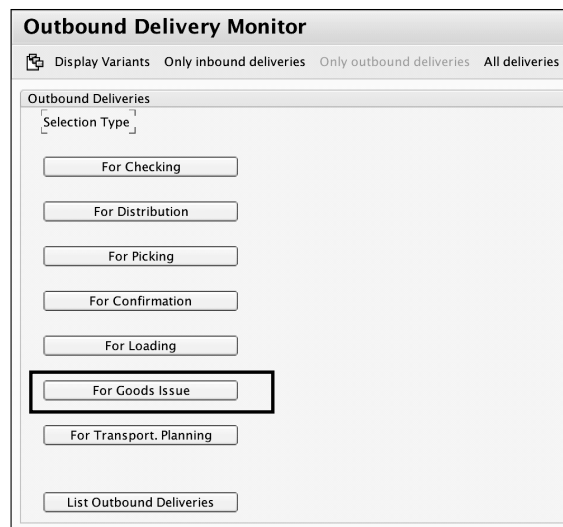
Figure 4.48 Posting the Goods Issue via the Outbound Delivery Monitor

Figure 4.49 Deliveries Ready for Goods Issue Listed in the Outbound Delivery Monitor

Another way of handling deliveries collectively is, as discussed earlier in this chapter, the use of shipments in the transportation functionality.

As part of the SAP ERP Inventory Management (SAP ERP IM) component, SAP ERP creates a material document for each goods issue that is posted. This material document outlines the change in stock that just happened and details the material that was affected, the movement type that affected it, the quantity for which the movement took place, the plant and storage location where the material was issued from, and the reference document (in this case, the delivery).

Along with this material document, the system also creates an accounting document, which shows the effects to the G/L. Normally, the value of the goods is taken out from the stock account and at the same time affects the Cost Of Goods Sold (COGS) account. For each entry in the journal, the document shows whether it was a credit or a debit, as well as the amount in local currency for the total quantity issued.

4.7.2   Document Flow

You can review the document flow in a delivery document in Transaction VLO2N and select **Extras • Document Flow,** as shown in Figure 4.50.

The document flow is consistent across all logistics documents and shows the relationships among them, from the sales order to the invoice, with the delivery and goods issue in the middle. As you can see in Figure 4.51, the material document shows the details of the goods issue. You can see the material that was issued, plant, storage location, quantity, movement type, and delivery number that created it.
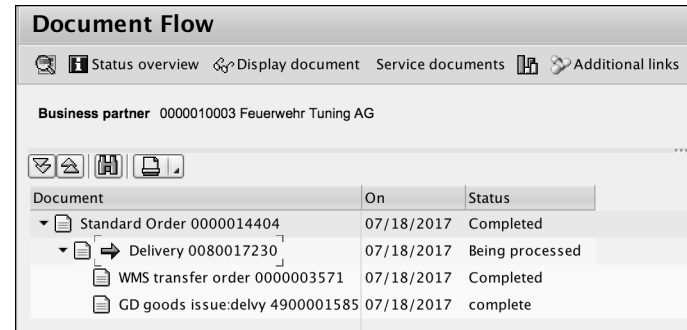
Figure 4.50 Document Flow
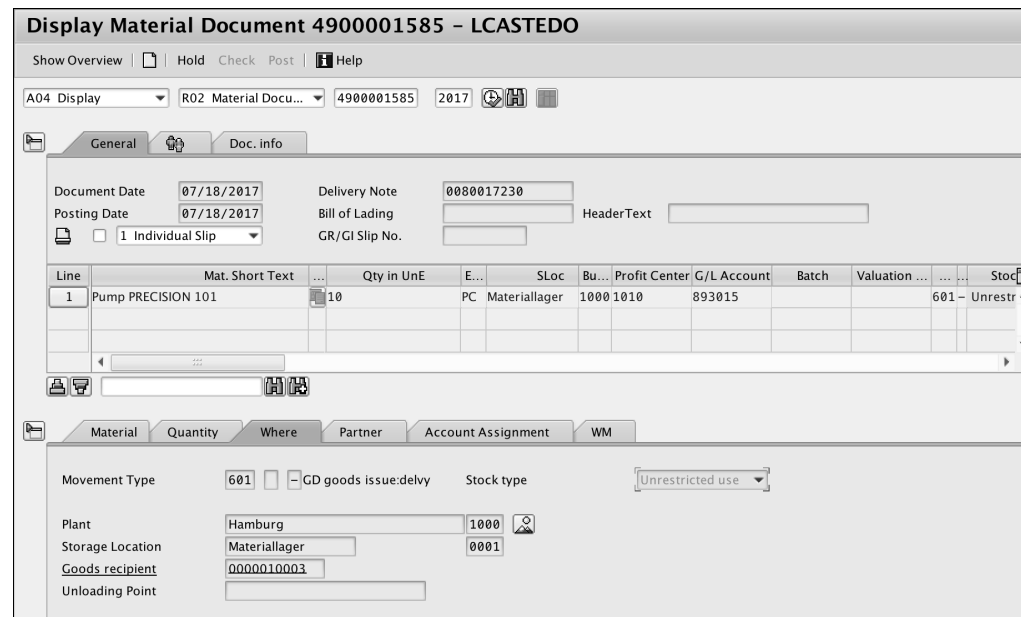
Figure 4.51 Material Document

The accounting document (Figure 4.52), on the other hand, is linked to the material document and shows the G/L accounts that were debited and credited along with other financial details.
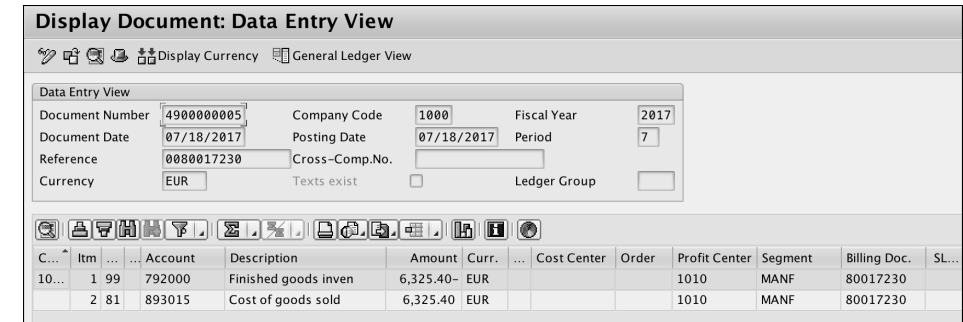
Figure 4.52 Accounting Document

Table 4.7 lists the important transactions to process goods issue.

Transaction	Menu Path
VL02N – Change Delivery Single Document	Logistics • Sales and Distribution • Shipping and Transportation • Post Goods Issue • Outbound Delivery Single Document
VL06G – Collective Processing via Outbound Delivery Monitor	Logistics • Sales and Distribution • Shipping and Transportation • Post Goods Issue • Collective Processing via Outbound Delivery Monitor
VL09 – Cancellation/Reversal	Logistics • Sales and Distribution • Shipping and Transportation • Post Goods Issue • Cancellation/Reversal

Table 4.7 Goods Issue Transactions

> **Note**
> In those cases in which you reverse a goods issue, if you want to reverse the picking for that delivery as well, you use Transaction LT0G.

4.8   Proof of Delivery

Some companies apply the guidelines suggested by the Generally Approved Accounting Principles (GAAP), which require that a company can't issue an invoice to its customers until the customer has confirmed the receipt of goods or services.

Contents

6   Reporting   337

Index

Matt Chudy, Luis Castedo, Ricardo Lopez

Sales and Distribution in SAP ERP: Business User Guide

518 Pages, 2018, $79.95
ISBN 978-1-59229-881-5

www.sap-press.com/4526

Matt Chudy is an independent SAP Logistics consulting lead. He has more than 13 years of experience in Sales and Distribution, Materials Management, and other logistics applications, spanning project administration, design, gap analysis, testing, implementation, and support and training.

Luis Castedo is an independent systems and business consultant with more than 20 years of experience. For the past 15 years, he has been focused on SAP implementations, spanning Sales and Distribution, Materials Management, Inventory Management, Warehouse Management, and Transportation Management.

Ricardo Lopez is an SAP veteran of 20 years. He is a PMP project manager with an SD certification from SAP America. As a senior manager with a solid background coordinating and managing major OTC projects and devising plans and schedules, Ricardo has two decades of consulting experience directing implementations of SAP applications such as Sales and Distribution, SAP FSCM/Biller Direct, Credit and Dispute Management, and SAP Fiori.