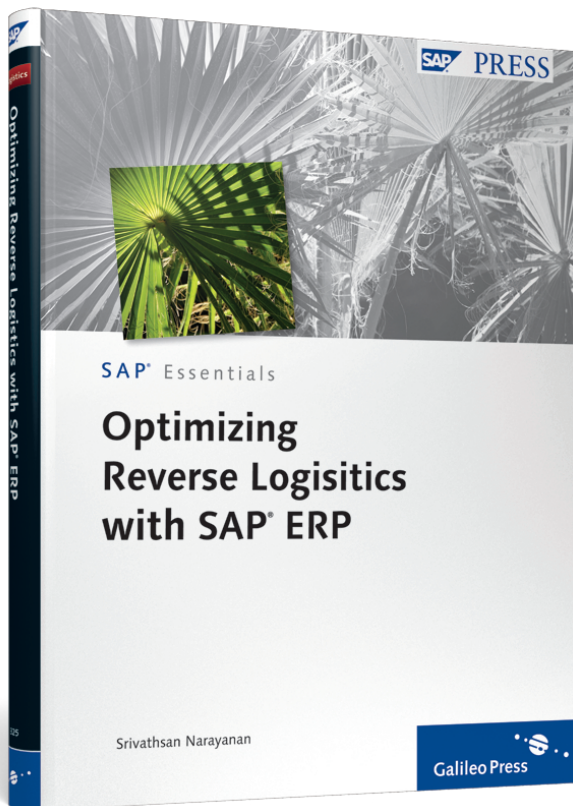


Srivathsan Narayanan

Optimizing Reverse Logistics with SAP® ERP



 Galileo Press®

Bonn • Boston

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Refurbishment is the process of receiving a failed or broken part returned by the customer, repairing it, and selling it back at full or discounted price. In this chapter, we'll discuss the different possibilities that enable rework or refurbishment, along with the SAP ERP functions and options to enable refurbishment.

3 Refurbishment

Refurbishment is the process where returned products are repaired and sold to customers. Typically, if the part is under warranty, the parts are returned by the customer, and the company accepts the failed part back into the network to either scrap or repair. The repaired part is generally sold at a less expensive price or the original price with additional warranty. There are a variety of types of refurbishment, including internal repair for refurbishment and external repair for refurbishment.

3.1 Internal Repair

For internal repair, the customer returns a part to the company, and the company repairs the product internally. The company procures the necessary components and supplies for the repair, performs the repair, and returns the product to the inventory as a refurbished product. The refurbished product is identified as such so that it can be sold at a different price or with an extended warranty. Figure 3.1 shows the simplified business process of receiving a failed part from the customer or engineer, repairing it, and adding it into the inventory. In some cases, the customer pays for the repair process if the product is owned by the customer, which is referred to as a paid repair or customer paid repair. We'll discuss this process further in Chapter 4, Customer Paid Repair Process in SAP ERP.

As you can see in Figure 3.1, different organizations in the company are involved in getting the returned product repaired and sold back to customers. Let's take a look at each of the roles played by these organizations in more detail.

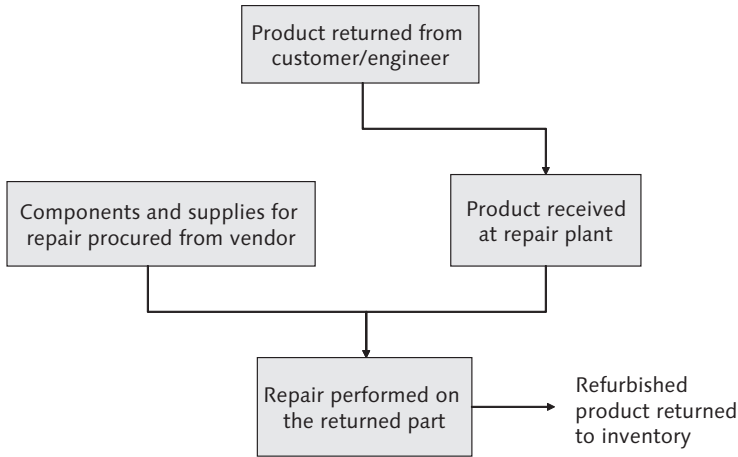


Figure 3.1 Internal Repair for Refurbishment Business Process

Example of Internal Repair

A toy manufacturing company makes toy wagons for sale in retail stores. On certain occasions due to bad handling of the product during transportation from the warehouse to the retail stores, the wheels of the wagon are broken and customers return the wagon to the store, which in turn returns it to the central returns processing center of the company. The company then inspects the wagon and determines that the wheels need to be replaced. Because the wheels for the wagon are produced in house, the repair center obtains a replacement wheel from the manufacturing warehouse of the company and packs the new wheels in the toy box with the wagon and sells the product as a refurbished toy wagon. The wagon is sold as refurbished because the product was already sold to the customer and was returned. So the company sells the product as a refurbished product at 50% of the original price but with the same warranty terms used at the sale of the original product.

The internal repair for refurbishment is accomplished in SAP ERP using various system processes and tools. The warranty check is done using a warranty claim document in SAP ERP. When checking for a warranty claim, the system uses the functions available in the warranty claim process in combination with the validation/substitution rules (VSR) checks to ensure that the product is under warranty and is acceptable for return based on the material condition. You can build custom requirements for checking the return in the VSR action checks, so that the product is allowed to be returned to the network for internal repair. After the warranty claim has been created and the product is accepted for return, a return order is cre-

ated in SAP ERP using Transaction VA01 with reference to the forward order. The details of the return order are discussed in detail in Chapter 2, Returns. After the creation of the return order, the return is processed into the network by creating a return delivery and receiving the product into the warehouse against the return delivery. The returns delivery processing contains a step to post the goods receipt in SAP ERP against a return delivery using Transaction VLO2N (LOGISTICS • LOGISTICS EXECUTION • OUTBOUND PROCESS • GOODS ISSUE FOR OUTBOUND DELIVERY • OUTBOUND DELIVERY • CHANGE • SINGLE DOCUMENT).

After the product is received, quality inspection on the product is completed using a combination of quality notifications and inspection lots in SAP ERP. The result of the inspection determines the product to be repairable. Sometimes, at this point, if the product is deemed nonrepairable, the product is scrapped locally in the repair plant or sent to the scrap plant. The receiving warehouse isn't always the repair facility, so if the product is repairable, it's sent to the repair facility by using a stock transport order (STO) if the repair plant is in the same company code as the receiving warehouse. If the repairing plant is in a different company code, then the product is transferred using an intercompany transport order (ICTO). Figure 3.2 shows the process of accepting a return and returning the product into the network and into the repair facility in SAP ERP.

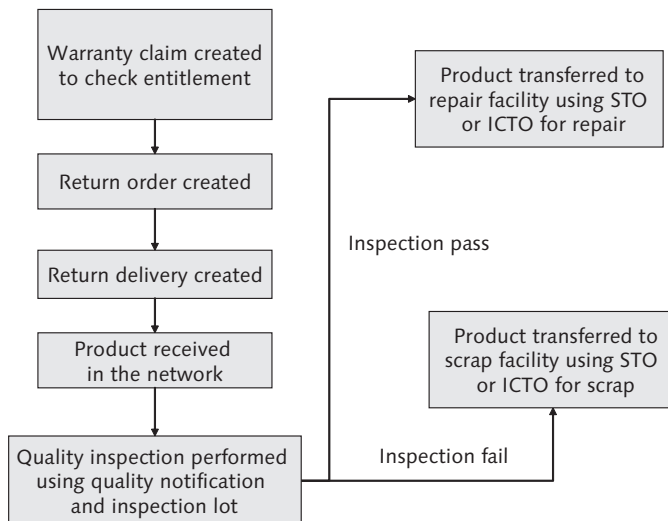


Figure 3.2 SAP ERP Process to Receive the Returned Product and Transfer It to the Repair Location

After the product is received in the repair location, the repair location uses a SAP ERP production order to repair the product by disassembling it to remove the broken component and replacing the product with new components. When the repair is just cleaning the product, a production order can be used to capture the materials and labor used to clean the product.

The repair process can be broken down into subprocesses, such as cleaning, disassembly, and repair as shown in Figure 3.3.

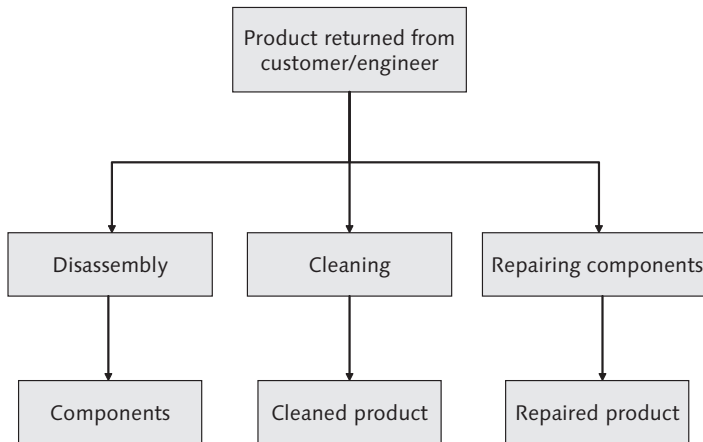


Figure 3.3 Subprocesses of the Repair Process

3.1.1 Cleaning a Product

Certain repairs actually involve cleaning the product. For example, a customer returns the dirty product that has been used and can't be used further without cleaning. The company provides a replacement product that is already cleaned, and the customer pays for the service and not for the product itself. This process is handled in SAP ERP by creating contracts for providing clean products in exchange for dirty products for a fixed price to the customer.

Example of Cleaning

In the semiconductor industry, kits are cleaned after continuous use to remove residues and chemical deposits before they can be reused again. The cleaning consists of sand-blasting or some other form of cleaning to remove the residue and deposits. This cleaning is considered a form of repair and can be performed in SAP ERP using a production order to indicate consumption of consumables, labor, and machine time if the company completes the cleaning process in house.

In SAP ERP, you can create a production order using Transaction CO01 (LOGISTICS • PRODUCTION • SHOP FLOOR CONTROL • ORDER • CREATE • WITH MATERIAL). Figure 3.4 shows a production order created for cleaning a wafer in the semiconductor industry. This production order is displayed using SAP ERP Transaction C003 (LOGISTICS • PRODUCTION • SHOP FLOOR CONTROL • ORDER • DISPLAY). The figure displays the different repair operations, such as Film Stripping, Visual Inspection, Polishing, Pre-Cleaning, and Final Clean.

Op.	SCOp	Start	Start	Work Ce	Plant	Co	StdText	Operation short text	Text	SysStatus	User Stat	CO	PRT	TP	D	Finish	Open
0010		27.07.2007	00:00:00	1710	1000	QM04		Incoming Inspection & Sorting		REL						27.07.2007	
0020		27.07.2007	07:00:00	1720	1000	PP01		Film Stripping		REL						27.07.2007	
0030		27.07.2007	07:30:00	1721	1000	PP99		Visual Inspection		REL						27.07.2007	
0040		27.07.2007	12:04:50	1904	1000	PP01	P000002	P/N Sorting & Thickness Grouping		REL						27.07.2007	
0050		27.07.2007	13:25:15	1330	1000	PP03	P000002	Polishing		REL						27.07.2007	
0060		27.07.2007	13:25:15	AS-00	1000	PP01		Pre-Cleaning		REL						27.07.2007	
0100		27.07.2007	14:05:15	AS-10	1000	PP01		Geometry Sorter		REL						30.07.2007	
0110		30.07.2007	07:23:15	AM-210	1000	PP01		Final Clean		REL						30.07.2007	
0120		30.07.2007	07:29:33	1721	1000	PP99	P000003	Surface & Particle Inspection		REL						30.07.2007	
0130		30.07.2007	08:00:00	1914	1000	PP01		Wafer Grade Sorter		REL						30.07.2007	
0140		30.07.2007	08:05:00	1802	1000	PP01		Packaging		REL						30.07.2007	
0150		30.07.2007	09:14:00	2050	1000	PP01	P000001	Ship		REL						30.07.2007	

Figure 3.4 Production Order Operations in SAP ERP Used for Cleaning a Wafer

The types of operations performed are defined in the control key displayed in the operations of the production order. For example, in the production order displayed in Figure 3.4, the first operation is Incoming Inspection & Sorting. To display the details of this operation, you can use the pull-down menu of the control key, and select the control key QM04 as shown in Figure 3.5.

The control key also indicates if the operation is costing relevant, if inspection characteristics are to be maintained for the operation, and if the operation is a rework. The control keys are configured in the IMG in SAP ERP that is accessed using Transaction SPRO. In the IMG, you can go to PRODUCTION • SHOP FLOOR CONTROL • MASTER DATA • ROUTING DATA • DEFINE CONTROL KEY to configure control keys.

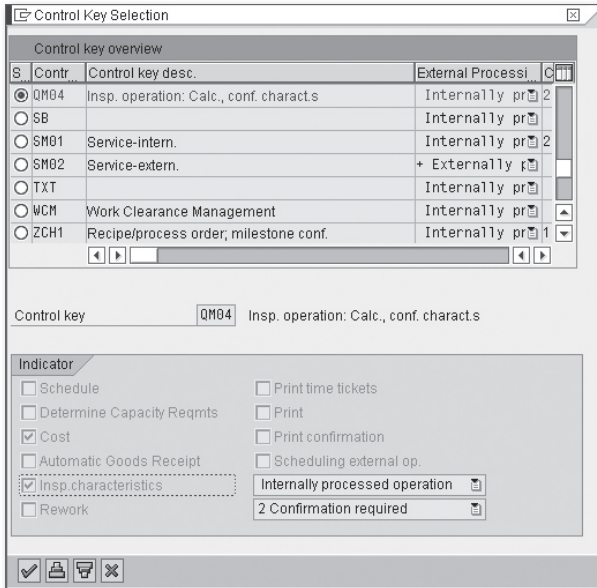


Figure 3.5 Details of the Control Key of the Incoming Inspection Operation of a Production Order

Here you can define the characteristics of the control key shown in Figure 3.5. In addition to the control key, the work center where the operation is performed is also specified in the operations of a production order. The work center is the organization unit where the operations are performed. Work centers also have a limited capacity that is defined during their creation. A work center can refer to machines or people. In Figure 3.4, shown earlier, the work center for operation 0010 is 1710, which is defined for goods receipt inspection for plant 1000 where the operation 0010 will be performed.

To perform every operation, some components or materials are used. The components used for the production order displayed in Figure 3.4 can be displayed by choosing the **GOTO • OVERVIEWS • COMPONENTS** option in the menu of the production order.

Figure 3.6 shows the components of the production order used in the example shown earlier in Figure 3.4. Component 0010-RW0014 is used in operation 0010 to perform an incoming inspection.

Order: 60003302, Type: PP01
Material: WAFER-01, Wafer Grade 01, Plant: 1000

Filter: NO_FIL No filter, Sort Order: ST_STA Standard sort

Item	Component	Description	Reqmts qty	U	It	Operation	Seq	Plant	Stor	Batch	A	Bu	Ba	S	D	C	Ph	D	B	It
0000	WAFER-01	Wafer Grade 01		10	PC	L 0010	0	1000	0002											
0140	0010-RW0014	AI BAG	20	PC	L	0010	0	1000	0001											
0150	0010-RW0015	PE BAG	20	PC	L	0010	0	1000	0001											
0160	0010-RW0016	Empty 8\"/>																		

Figure 3.6 Components of a Production Order

The production order captures the cost of cleaning based on the costing information provided in the control data of the production order. The control data can be accessed from the production order display by choosing the Control Data tab in the production order header. The control data of the production order displayed in Figure 3.4 is shown in Figure 3.7.

Order: 60003302, Type: PP01
Material: WAFER-01, Wafer Grade 01, Plant: 1000
Status: REL PRC CSER GMPS MANC SETC, Multiple items

General | Assignment | Goods receipt | **Control data** | Dates/qtls | Master data | Long text | Administration | SAP Event Mgmt

Order Reference order: [] Deletion flag:
Reserv/Preq: Immediately

Costing
CstgVariantPlan: PPP1, CstgVariantActl: PPP2
Costing Sheet: C06M, Overhead key: SAP10
RA Key: FERT, Variance Key: 000001
PlannedCostCalc: 2 Determine Planned Costs When Savir
Prod. Process: 100084740, Rest(Production)

Scheduling
 Calculate Capacity Reqs, Exact breaks, Automatically

Production Scheduling Profile
Profile: 000001, PP-PROD.SCHEDULING PROFILE 001 (MANUAL)

Figure 3.7 Control Data Containing Costing Information for Production Orders

Costing information includes the costing variant for planned costs and the costing variant for actual costs as shown in Figure 3.7. To display the costs itemized for the production order, you can choose GOTO • COSTS • ITEMIZATION from the production order display menu. The itemized costs of the production order displayed in Figure 3.4 are shown in Figure 3.8.

ItemNo	CstElement and Txt	Resource	Resource (Text)	∑	Total Value	Curr..	Quantity	Un	L
37	400000 Consumption, raw material 1	1000 0010-RW0002	HCL(G3)		3,412,80	EUR	30	L	M
38		1000 0010-RW0004	H2O2(G4)		7,963,20	EUR	70	L	M
39		1000 0010-RW0005	IPA(G4)		3,412,80	EUR	30	L	M
40		1000 0010-RW0006	NH4OH(G4)		2,275,20	EUR	20	L	M
	400000 Consumption, raw material 1			∑	70,531,20	EUR			
1	619000 Dir. Int. Act. Alloc. Production	4280 1710 1421	Incoming Inspection & Sor		3,74	EUR	0,533	15M	E
3		4280 1710 1421	Incoming Inspection & Sor		93,67	EUR	3,333	H	E
15		4280 1720 1421	Film Stripping		70,26	EUR	2,500	H	E
22		4280 1721 1421	Visual Inspection		107,72	EUR	3,833	H	E
25		4220 1904 1421	P/N Sorting & Thickness C		106,06	EUR	2	H	E
26		4230 1330 1421	Polishing		2,69	EUR	0,091	H	E
28		4230 1330 1421	Polishing		53,71	EUR	1,818	H	E
34		4220 AS-00 1421	Pre-Cleaning		0,00	EUR	0	H	E
36		4220 AS-00 1421	Pre-Cleaning		0,00	EUR	0	H	E
41		4220 AS-10 1421	Geometry Sorter		3,55	EUR	4	MIN	E
43		4220 AS-10 1421	Geometry Sorter		0,00	EUR	0	H	E
46		4216 AM-210 1421	Final Clean		30,27	EUR	1	H	E
49		4280 1721 1421	Surface & Particle Inspecti		0,00	EUR	0	H	E
52		4220 1914 1421	Wafer Grade Sorter		0,00	EUR	0	H	E
55		4220 1802 1421	Packaging		265,14	EUR	5	H	E
58		4230 2050 1421	Ship		196,98	EUR	6,667	H	E
	619000 Dir. Int. Act. Alloc. Production			∑	933,79	EUR			
2	620000 Dir. Int. Act. Alloc. Machine Cos	4280 1710 1420	Incoming Inspection & Sor		70,26	EUR	1,333	H	E
14		4280 1720 1420	Film Stripping		17,55	EUR	0,333	H	E
21		4280 1721 1420	Visual Inspection		52,71	EUR	1	H	E
24		4220 1904 1420	P/N Sorting & Thickness C		67,71	EUR	1	H	E
27		4230 1330 1420	Polishing		29,08	EUR	1,111	H	E
35		4220 AS-00 1420	Pre-Cleaning		45,16	EUR	0,667	H	E
42		4220 AS-10 1420	Geometry Sorter		79,02	EUR	1,167	H	E
45		4216 AM-210 1420	Final Clean		0,00	EUR	0	H	E

Figure 3.8 Itemized Costs for a Production Order

The costs for different cost elements are allocated based on the consumption of materials and use of the resources in the production order as displayed in Figure 3.8.

3.1.2 Disassembly

Disassembly is another process where a component in a kit can be removed and sold again even though the kit itself has to be scrapped. The disassembly process can be done in SAP ERP using a production order. In the production order, the kit is entered as a component, and the kit's components that can be removed and sold are classified as by-products or co-products. When the production order is confirmed, the components that were classified as co-products and by-products are received into inventory against the production order.

If you don't want to use a production order, you can create a custom movement type to consume the kit against a general ledger account or a cost center and a reversal custom movement type that references the same general ledger account or costs center that you can to receive the components. This will ensure that the kit value is consumed, and the component value is deducted from the same general ledger account or cost center, resulting in the difference of the kit value and the component value being left out in the general ledger account or the cost center.

The advantage of using a production order for disassembly is that the production order can automatically determine components that can be disassembled based on a BOM (bill of material), whereas the custom movement type solution requires the user to enter the component manually in the SAP ERP system.

Co-products and by-products can be specified in the BOM of the kit. For co-products, the material master needs to be set up to indicate that the material can be produced as a co-product. Co-products provide additional flexibility because the actual costs of the co-products can be displayed at the co-product level, which isn't possible with by-products. In SAP ERP, co-products are indicated by the co-product indicator in the production order line item. By-products are indicated by the negative quantity of the component in the production order without the co-product indicator. Figure 3.9 shows a list of by-products in a production order.

As described earlier, by-products are items that are present in the components of the production order with negative quantity without the co-product indicator. Figure 3.10 shows a production order with components that include co-products.

Order Functions Edit Goto Component Environment System Help

Production Order Create: Component Overview

Material: R-3007 Maxitec-R 3007 Professional PC Plant: 3200 Type: PP01

Filter: NO_FIL.No filter Sort Order: ST_STA Standard sort

Item	Component	Description	Reqmts qty	U	It	Op	Seq	Plant	Stor	Batch	A	Bu	Ba	S	D	C	Ph	D	B	Text	Fl	TT
0010	3007-01	2 GB Dual Channel DDR2 SDRAM	2-PC	L	0010	0		3200	0001		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
0020	3007-02	Intel Pentium 4 Processor	2-PC	L	0010	0		3200	0001		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
0030	3007-03	21 Inch Digital Flat Panel	2-PC	L	0010	0		3200	0001		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
0040	3007-04	48X CD-RW/DVD Combo Drive	2-PC	L	0010	0		3200	0001		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
0050	3007-05	Hard Drive 800GB RAID	2-PC	L	0010	0		3200	0001		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
0060	3007-06	Slimline PC CASE	2-PC	L	0010	0		3200	0001		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
0070	R-3007	Maxitec-R 3007 Professional PC	2	PC	L	0010	0	3200	0001		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
0080											<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
0090											<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
0100											<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Entry 1 / 7

Figure 3.9 By-Products Listed in a Production Order

Order Functions Edit Goto Component Environment System Help

Production Order Display: Component Overview

Material: WAFER-01 Wafer Grade 01 Plant: 1000 Type: PP01

Filter: NO_FIL.No filter Sort Order: ST_STA Standard sort

Item	Component	Description	Reqmts qty	U	It	Op	Seq	Plant	Stor	Batch	A	Bu	Ba	S	D	C	Ph	D	B	Text	Fl	TT
0000	WAFER-01	Wafer Grade 01	10-PC	L	0010	0		1000	0002		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
0140	0010-RW0014	Al BAG	20	PC	L	0010	0	1000	0001		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
0150	0010-RW0015	PE BAG	20	PC	L	0010	0	1000	0001		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
0160	0010-RW0016	Empty 8" wafer boxes	10	BOXL	0010	0		1000	0001		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
0170	0010-RW0017	Top and Bottom Plastic Insert (12	10	PC	L	0010	0	1000	0001		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
0180	0010-RW0018	Carton (190*164*152)	10	BOXL	0010	0		1000	0001		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
0190	WAFER-02	Wafer Grade 02 (Co-Products)	10-PC	L	0010	0		1000	0002		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
0200	WAFER-03	Wafer Grade 03 (Co-Products)	10-PC	L	0010	0		1000	0002		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
0210	WAFER-04	Wafer Grade 04 (Co-Products)	10-PC	L	0010	0		1000	0002		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
0010	0010-RW0001	HCL(G1)	200	L	L	0020	0	1000	0001		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
0030	0010-RW0003	HF(G1)	50	L	L	0020	0	1000	0001		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
0070	0010-RW0007	MAE(G1)	20	L	L	0020	0	1000	0001		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
0080	0010-RW0008	KOH(EL)	20	L	L	0020	0	1000	0001		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
0090	0010-RW0009	Pads-SUBA850 46.375", PSAlI	20	PC	L	0050	0	1000	0001		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
0100	0010-RW0010	Pads-Insets-550um	10	PC	L	0050	0	1000	0001		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
0110	0010-RW0011	Pads-Shim-125um(5mil)	30	PC	L	0050	0	1000	0001		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
0120	0010-RW0012	Slurry-Bindzil	20	L	L	0050	0	1000	0001		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
0130	0010-RW0013	Slurry-Glanzox 3900	30	L	L	0050	0	1000	0001		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
0020	0010-RW0002	HCL(G3)	30	L	L	0060	0	1000	0001		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
0040	0010-RW0004	H2O2(G4)	70	L	L	0060	0	1000	0001		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
0050	0010-RW0005	IPA(G4)	30	L	L	0060	0	1000	0001		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
0060	0010-RW0006	NH4OH(G4)	20	L	L	0060	0	1000	0001		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Entry 1 / 22

Figure 3.10 Co-Products in a Production Order

To consume the kit against the custom movement type, you use the SAP ERP Transaction MIGO, choose the Goods Issue – Other option, enter the custom movement type (XXX in Figure 3.11) in the GI for Cost Center field, and enter either the G/L Account or Cost Center information in the Account Assignment tab of the line item as shown in Figure 3.11. Transaction MIGO can be accessed by going to LOGISTICS • MATERIALS MANAGEMENT • INVENTORY MANAGEMENT • GOODS MOVEMENT • GOODS MOVEMENT (MIGO).

The screenshot shows the SAP MIGO transaction interface. The title bar reads "Goods Issue Other - Srivathsan Narayanan Srivathsan Nar". The main area is divided into several sections:

- General:** Document Date: 20.01.2010, Posting Date: 20.01.2010, GI for cost center: XXX.
- Table:** A table with columns: Line, Mat, Short Text, OK, Qty in UnE, E, SLoc, Cost Center, Bus, G/L Account, Batch, Valuation T, M, D, Stock Type. One row is visible: Line 1, Mat 48X CD-RW/DVD Combo Drive, Qty 0,000, Stock Type Unrestricted.
- Account Assignment:** Fields for G/L account, Business Area, and Cost Center.

Figure 3.11 Goods Issue to Using a Custom Movement Type for Disassembly

After the kit or the parent material is consumed then using the reversal movement type or another custom movement type, the components can be received back into inventory. To create the receipt, you can use the same Transaction MIGO, choose the Goods Receipt – Other option, and then use the custom movement type and the general ledger account to complete the transaction.

3.1.3 Repair

In certain assemblies that are returned, only one component of the assembly is defective, and the rest of the assembly is good. In this case, the assembly is disassembled, and the defective component is removed and replaced. This whole process is done

in SAP ERP using a production order to disassemble and then another production order to assemble the product with good components. The defective component is then scrapped using Transaction MIGO with the Goods Issue – Other option and movement type 551. The scrap movement can also be allocated to a general ledger account or a cost center using the Account Assignment tab in Transaction MIGO.

Now that you have a solid understanding of internal repair, let's move on to discuss external repair.

3.2 External Repair

For external repair, the returned product is received into the network, an external vendor is contacted, and a quote is obtained for performing the repair. If the quote is accepted, then the product is sent to the vendor who performs the repair and returns the product to the company. The company then sells the product as a refurbished product.

Example of External Repair

A computer manufacturing company receives a laptop that has failed from a customer. Upon return and inspection, the problem is identified to be the motherboard. The manufacturer then contacts a vendor who is qualified to repair motherboards to obtain a quote. Upon approval, the product is sent for repair, and afterwards, the product is returned to the company. The company then advertises the product as a refurbished laptop with a selling price that is 50% off the original price with the original manufacturer's warranty of 1 year from the sale.

The difference between internal and external repair is that for internal repair, the activities for repairing the product happen within the company, so the financial impact is within the company. For external repairs, where a vendor invoices for the service, the cost needs to be considered for external repair reporting. Sometimes, there are opportunities to repair products inside the company, and the product is still repaired by the vendor because of the lower cost of repairing externally. In addition, for OEM products, the vendor has equipment qualified to do certain kinds of repair that the company can't perform in house. Also, most companies today prefer to have a contract with a third-party logistics (3PL) provider that handles the repairs for the company. The 3PL in turn either repairs the product or subcontracts the repair to another vendor. The 3PL bills the company on a periodic basis for the repairs instead of billing for every repair activity. Figure 3.12 provides the overview of the external repair business process.

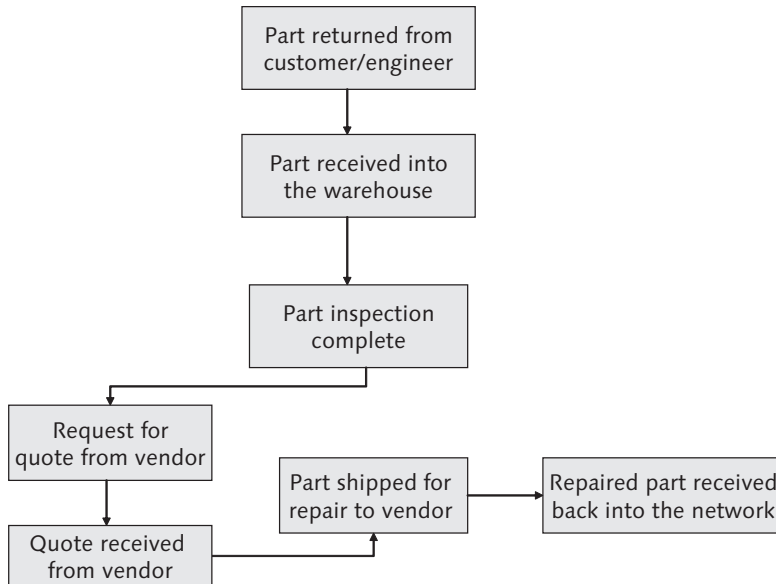


Figure 3.12 External Repair Business Process Overview

In SAP ERP, the external repair process is accomplished using the following tools and process flows. The starting point for both external and internal repairs is the same. The order entry team obtains the information from the customer or the engineer and creates a return sales order. But after the product has been returned to the warehouse and the inspection is complete, if the product is deemed repairable, the procurement team identifies a vendor that can repair the material and contacts the vendor to get a quote. The request is done in the SAP system by using the request for quote (RFQ) transaction. An RFQ can be created in SAP ERP using Transaction ME41. This transaction can also be accessed by going to LOGISTICS • MATERIALS MANAGEMENT • PURCHASING • RFQ/QUOTATION • REQUEST FOR QUOTATION • CREATE.

After the quote is obtained and accepted by the company, then a subcontracting purchase order or an expense purchase order is created to send the part for service. The difference between a subcontracting purchase order and an expense purchase order lies in the tracking and the cost. For a subcontracting purchase order, the material movement to and from the vendor is tracked in SAP ERP; for the expense purchase order, the material movement isn't tracked, and only the cost associated with the service provided by the vendor is captured in SAP ERP. Because the subcontracting purchase order provides the option to track both the materials and the cost of service from the vendor, it's the preferred solution to handle external

repairs. In the subcontracting purchase order, if the company is providing any components for the service, the components are listed in the purchase order. If the part alone is shipped to the vendor and received back, then the part is listed both as the received part or the main part as well as the component. SAP ERP standard serialization doesn't allow for the same material number/serial number to be both sent as a component and received as a repaired part. To overcome this issue, serialization can be turned off for certain movement types, as discussed in Chapter 6, Serial Number Management in Reverse Logistics.

After the purchase order has been approved based on the release strategy, the part is then shipped from the warehouse by using a delivery against the subcontracting purchase order. After this delivery is processed and the post goods issued, the stock shows up in a stock category called stock with vendor. The stock stays in this category until the repair is complete and the repaired part is returned to the company. Upon receipt of the repaired part, the component stock is consumed from the stock with vendor category, and the repaired material is stored in the warehouse. If additional material was used by the vendor, then another transaction for subsequent adjustment can be created to provide the additional material to the vendor. To do subsequent adjustments, you use Transaction MIGO, and choose the Subsequent Adjustment option. Figure 3.13 shows the process of external repair in SAP ERP.

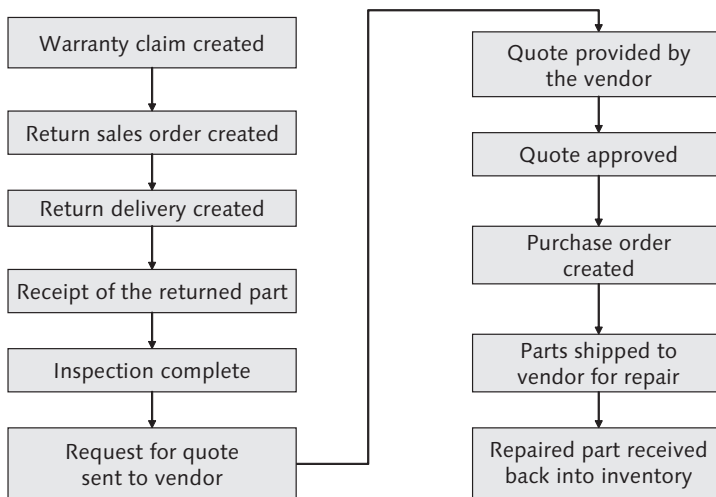


Figure 3.13 External Repair Process in SAP ERP

3.2.1 Products Returned from Service Engineers

In many industries, products are stored on the customer's premises to provide support to the service engineers who provide support and are responsible for maintaining equipment. These products are used by the service engineers to fix issues in the machines and return the broken machine parts back to the network if they are repairable. If they are repairable, then the product follows the same process of the internal and external repair described previously. The service engineer returns the product to the closest repair location that is capable of performing quality inspection.

The service engineer return process starts with the product being removed from the machine that has stopped due to a defective part. The removal of the product from the machine is shown in SAP ERP by performing Transaction MIGO, using movement type 262 in the transaction to reverse the goods issue, or performing a goods receipt against a service order. In some companies, because the stock was consumed against a forward sales order against a service order, the removal of the product from the machine is done in SAP ERP by creating a returns sales order and performing the goods receipt against the returns delivery. For contracts provided to the customers where the company is responsible for maintaining the machine and ensuring problems are fixed in the machine ASAP, the company owns and is responsible for all of the components in the machine. The inventory of all spare parts that are owned by the company and are stored in the customer's location shows in the stock report of the company in the maintenance plant. The maintenance plant is the location where the machine and the parts used for services are stored in SAP ERP. This is the plant against which service order operations are created and performed against.

For returns from the service engineer, the parts are returned to the maintenance plant first by performing a goods movement transaction with movement type 262 with reference to a service order or by using the return sales order process. After this return, the part is either returned to the local warehouse or a repair facility using a STO or an ICTO. From that point on, the process is the same as internal or external repair. Figure 3.14 shows service order header details in SAP ERP. The service order can be displayed using Transaction IW33 or by going to LOGISTICS • CUSTOMER SERVICE • SERVICE PROCESSING • ORDER • SERVICE ORDER • DISPLAY.

Order Edit Goto Extras Environment System Help

Display Contract Based Service 60047930: Central Header

Order: ZM01 60047930 PM usage
 Sys. Status: CLSD PCNF ADVS GMPS MANC PRC SETC OPEN

HeaderData Operations Components Costs Partner Objects Addit. Data Location Planning Control

Cust. address Order address Obj. address

Name
 Street
 Location
 Telephone Fax

Service
 Pur. order Service go thru 01/21/2009 Sales Document 35002747 30

Person responsible
 PlannerGrp / 8157
 Mn.wk.ctr E83791 / 8157 RCE L3 6614 Jack I
 Person resp 0
 Notifctn 300049378
 Costs 0 NTD
 PMActType 001 Contract Repair
 SystCond.

Dates
 Bsc start 02/08/2009 Priority 3 Medium
 Basic fin. 02/08/2009 Revision

Reference object
 Func. Loc. 6753 FAB 6
 Equipment 28430 COMPASS 300
 Assembly

Malfnctn data Damage Notif. dates

Figure 3.14 Service Order Display in SAP ERP Using Transaction IW33

The service order has components that are entered by the service engineer that will be used to perform the maintenance on the machine. Every material in the line item that is used for maintenance may have a corresponding material that can be returned because the material being installed on a machine means the failed or defective material with the same material number is removed from the machine. Figure 3.15 shows the service order header displaying the maintenance plant.

The maintenance plant stores the spare parts that will be used for servicing the machines in that location.

The screenshot displays the SAP Service Order Display interface for a contract-based service. The main title is "Display Contract Based Service 60047930: Central Header". The interface is organized into several sections:

- Header Information:** Includes "Pur. order" (Service go thru: 01/21/2009), "Sales Document" (35002747), and "30".
- Person responsible:** Shows "PlannerGrp" (8157), "Mn.wk.ctr" (E83791 / 8157), and "RCE L3 6614 Jack I".
- Notification Data:** Includes "Notifctn" (300049378), "Costs" (0), "NTD", "PMActType" (001), and "Contract Repair".
- Dates:** Shows "Bsc start" (02/08/2009), "Basic fin." (02/08/2009), "Priority" (3 Medium), and "Revision".
- Reference object:** Lists "Func. Loc." (6753), "Equipment" (28430), and "Assembly".
- Malfnctn data:** Includes "Malfnctn start" (02/08/2009 18:39:09), "Malfnctn end" (02/12/2009 17:51:43), and "Breakdown dur." (0.00).
- First operation:** Shows "Operation" (PM usage), "WkCtr/Plnt" (E83791 / 8157), "Ctrl key" (SM01), "Acty Type" (CESTD), "Work durtn" (1 H), "Number" (0), "Oprtn dur." (0 H), and "Person. no" (0).

Figure 3.15 Service Order Display Showing the Maintenance Plant

All of the parts ordered in the service order are displayed in the components screen of the service order. These are the parts ordered by the service engineer to perform maintenance. Figure 3.16 shows the component screen with a list of all of the materials ordered against a service order. The plant and storage location listed in the component screen typically refer to the maintenance plant where the material is stored until the service engineer uses it to perform the service.

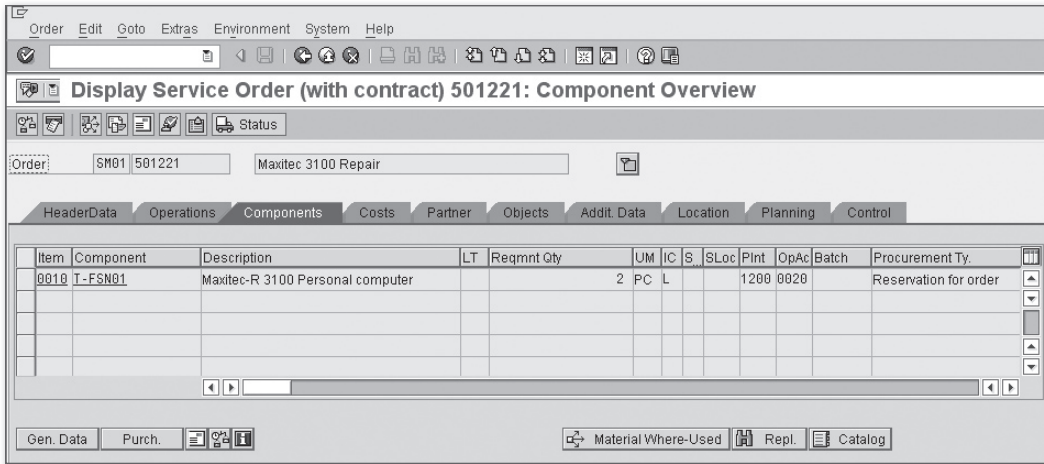


Figure 3.16 Component Listed in the Service Order

The costs associated with the service order are listed in the Costs tab and the costs subscreen that shows costs associated with labor, material, and services. Figure 3.17 shows the Costs tab and costs subscreen with the costs breakdown of External Services, Internal Labor, Overhead, and Spares (Own Production).

Figure 3.18 shows Transaction MIGO used with movement type 262 to receive the returned part. You can see the material document that was posted for the 262 movement type.

As you can see, the service order is referenced in the material document under the Account Assignment tab. The Profit Center and Functional Area are also specified to ensure proper valuation and accounting. Figure 3.19 shows the material document display with the Plant, Storage Location, and the Movement Type in the Where tab at the item level.

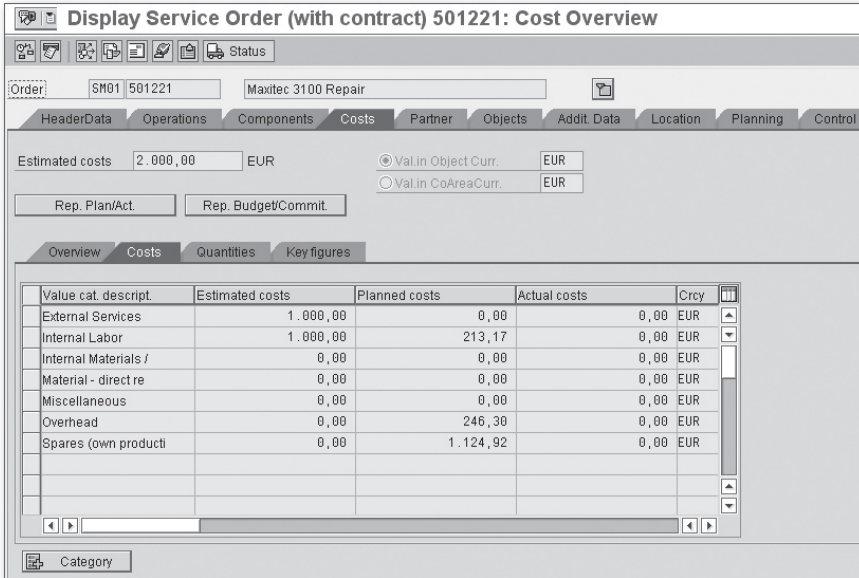


Figure 3.17 Costs Displayed in the Service Order

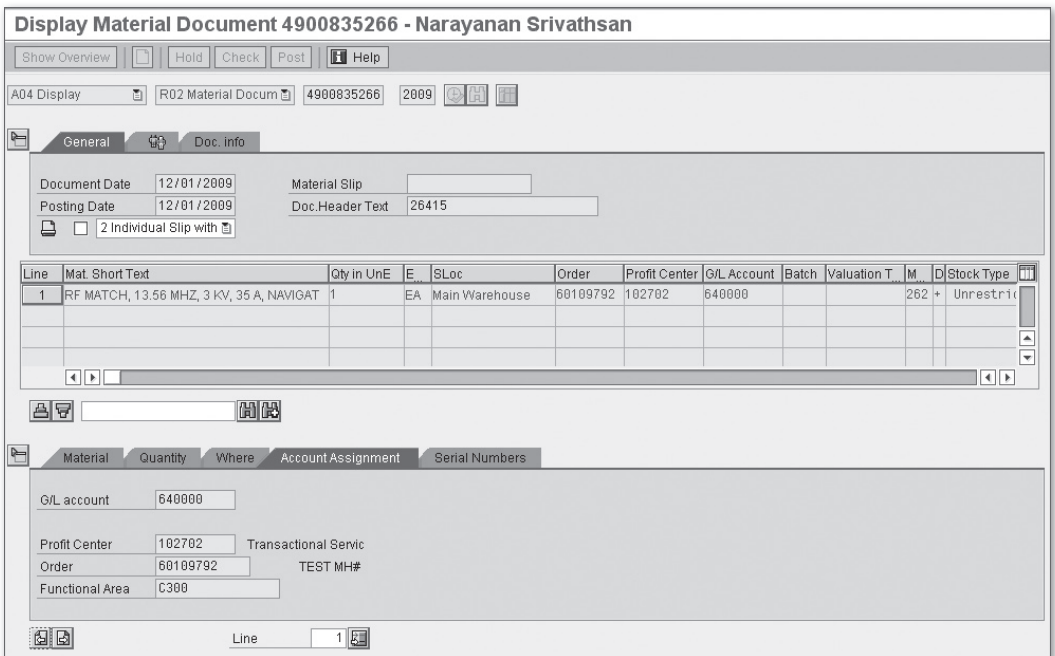


Figure 3.18 Material Document Display of a 262 Goods Movement with Reference to a Service Order

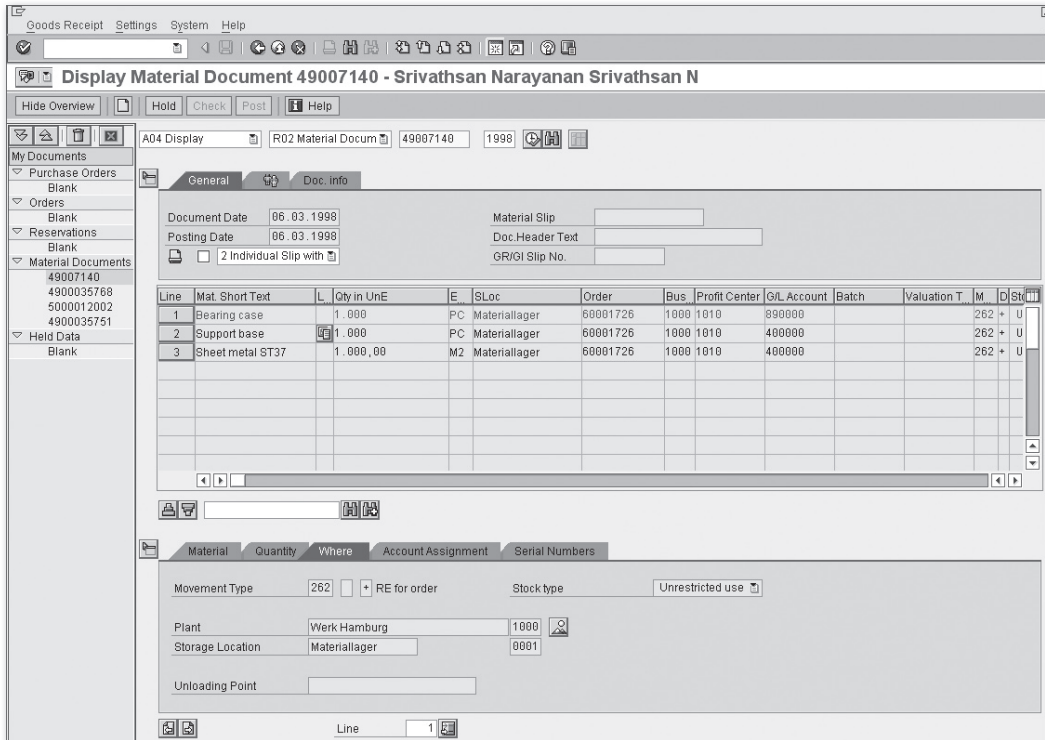


Figure 3.19 Material Document Display with Plant, Storage Location, and Movement Type Displayed

In certain situations, the stock for the service order is received using a sales order. This process is based on stock being issued for a sales order that has a reference to the service order and ensures the value of the material is accounted against a service order and isn't billed directly to the customer. In this scenario, the return from a service engineer is done using a return sales order, and the receipt of the return sales order is done by goods receipt against a returns delivery. After the receipt is completed, a quality inspection follows, which is then followed by contacting the vendor for a quote, and so on.

3.3 Organization Impact on Refurbishment Processes

Different organizations are involved in enabling the refurbishment process to perform smoothly. In this section, we'll discuss the impact of these organizations.

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