

**SAP Manufacturing Execution
How-To Guide**



How To Set Up and Use Production Lines in SAP ME

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SAP ME How-To-Guide for Setting up Production Lines

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1 Introduction

1.1 Purpose

The SAP ME How-To-Guide for Setting up Production Lines is intended to provide sufficient information to enable production lines to be easily configured and readily utilized to meet business needs, making use of available best practices.

1.2 Scope

This document covers all aspects of setting up production lines in SAP ME.

1.3 Glossary

Activity	An executable software unit in SAP ME
Activity Hook	See Hook Activity and Hook Point
Custom Data	SAP ME data fields defined and populated by a user of a maintenance activity for use or display in a POD
Discrete Resource	A discrete resource requires that each SFC processed at the resource be started and completed by the same user
ECO	Engineering Change Order
Executive Dashboard	A configurable screen which can display the output of one or more reports
Hook Activity	An SAP ME activity that can be executed automatically at a hook point
Hook Point	A processing point in SAP ME where the execution of an activity can be configured to occur automatically (e.g. at Pre-Complete for an operation)
Item	Previous terminology for a material
Material	A unique manufactured or purchased part that is processed or consumed on the shop floor
NC	Nonconformance
Operation	A procedure performed at a resource; an element of a routing
POD	Production Operator Dashboard - configurable SAP ME module designed for use by factory floor operators
Process Resource	A process resource allows an SFC to be started by one user and completed by a different user
Resource	A machine, workstation or other piece of equipment used to perform an operation

Resource Type	A category of equipment, such as saw, hammer, mill, workbench or hand tool, used to group resources
Routing	A series of operations, or routing steps
SFC	Shop Floor Control unit - a single item or a batch of items (lot) being processed on the shop floor, and associated with a unique identifier
Time-Based Resource	A resource where identification of the assembled components is determined based upon the time at which the parent SFC was processed at the resource
Work Center	A representation of a portion of the shop floor containing one or more resources and/or one or more other work centers

2 Overview of Setting up Production Lines

2.1 Description and Applicability

2.1.1 Why Set Up Production Lines?

Keep in mind that when you release demand to the shop floor, the system creates SFCs to represent each unit you want to track. As the floor produces these units, SFC numbers allow you to track them. In the system, routings represent your manufacturing processes. Once an SFC is released to the floor, it travels down a routing as production operators work on the unit.

When you set up your production lines, you tell the system about the details of your shop floor so that the system can track information about SFCs, such as:

- Where the SFC is on the routing.
- Where or with what machinery an SFC was worked.
- What operations production operators performed on the SFC.

2.1.2 Decisions to Make

When you set up your production lines, you must decide:

- Which resources you want to track, how you will group them, and what operations your production operators or machines perform at these resources.
- How you will set up your routings.
- Whether to use scripting and how you will use it.
- Whether you will use work centers to organize your shop floor.
- How you will set up production operator dashboards.
- Whether and how you will use the Pack/Unpack feature.
- How you will use other production-related features.

2.1.3 Setting Up Production Lines

Setting up production lines in SAP ME includes the following tasks:

1. Set up your resources, resource types, and operations.
2. Create routings.
3. Set up the activity hooks you need.
4. Create the work centers your shop floor requires.
5. Create the production operator dashboards you need for your operators.
6. Set up Packing (optional).
7. Set all production-related system rules as needed.
8. If needed, set up work instructions, printing, engineering change order, shop floor scheduling, and custom data.
9. If needed, set up executive dashboards for specific users.

2.2 Business Purposes / Functions

The following are the functions, for setting up production lines, which are described in section 3:

- Setting Up Resources
- Setting Up Operations
- Setting Up Routings
- Organizing the Shop Floor with Work Centers
- Setting Up Production Operator Dashboards
- Setting Up Packing and Unpacking
- Setting Up Other Production-Related Features
- Engineering Change Orders
- Shop Floor Standards
- Executive Dashboards
- Custom Data

2.3 Prerequisites

Before setting up production lines, you must create at least one site, user accounts and assign user group permissions.

2.3.1 Creating a Site

A site can be created either in the CTC process in MEINT or manually in Site Maintenance (SY010). For more information on the CTC process, see the SAP ME Installation Guide.

1. On the Main tab in Site Maintenance, enter the name of your site in the **Site** field and a description for the site in the **Description** field.
2. Make sure:
 - The **Production** type is selected in the **Type** drop-down list.
 - The **Site is Local** check box is selected.
3. Save the site record.

Result: The system saves the site record in the database and creates all default values that come with the system. This process is called loading initial data (IDAT). Default values include statuses, next number patterns, and many other standard values that come with the system.

In System Rule Maintenance, you can change system rules for the site.

4. When you have decided how you want to use site-level activity hooks, retrieve the site record in Site Maintenance, enter values on the Activity Hooks tab, and save the record.

2.3.2 Creating User Accounts

User accounts are created in SAP NetWeaver. For more information, see the SAP ME How-To-Guide – User Management.

2.3.3 Assigning User Group Permissions

In User Group Maintenance, retrieve the user group and select the activities, you want users in the group to be able to access, on the Permissions tab.

Note: For more information about creating a site and user group permissions, see the SAP ME online help for Site Maintenance and User Group Maintenance.

Once you have created a site and user accounts for the implementation team, you can start setting up production lines. In the system, production lines are made up of resources, operations, routers, work centers, and other elements.

3 Functions for Setting up Production Lines

3.1 Setting Up Resources

The first step in setting up your production lines is to create resources in the system that reflect what equipment operators use.

3.1.1 What Are Resources?

A resource is a machine or other piece of equipment used to perform an operation. A resource may be something as simple as a drill, or as complex as an automatic component feeder. If no machinery is used to perform an operation, you can use a name that describes the work area, for example, BENCH.

You create a record for each resource you want to track in Resource Maintenance.

3.1.2 What Are Resource Types?

In the system you can group resources by resource type. A resource type is a category of equipment, such as saw, hammer, or hand tool. For example, in the system you can group the individual resources BANDSAW1, BANDSAW2, and TABLESAW1 under the resource type SAWS. You also could group miscellaneous hand tools under the resource type HANDTOOLS.

You create resource types in Resource Type Maintenance.

3.1.3 Associating Resources with Resource Types

You can associate resources with resource types in either Resource Maintenance or in Resource Type Maintenance. If necessary, you can associate a single resource with more than one resource type. For example, if your floor has a 5-axis milling machine primarily used for milling, but that can also be used as a drill, assign the MILL5WAY resource record to both the MILL and the DRILL resource types.

3.1.4 Process Flow Versus Discrete Flow

With the **Process Resource** check box in Resource Maintenance, you specify whether a resource is a discrete flow resource (cleared) or a process flow resource (selected).

When a resource is a discrete flow resource, the same operator must start and complete SFCs at the resource. When a resource is a process flow resource, the system allows different operators to start and complete the same SFC at the resource. For example, you may want to classify the resource OVEN as a process flow resource so that one operator can put boards into the oven near the end of first shift, and another operator can remove the boards after the start of second shift.

3.1.5 Tracking Resource Time

The system has the capability to accumulate totals for the number of hours that a machine (resource) is used for work. The Track Resource Time system rule in the Production Tracking section in System Rule Maintenance controls how the system tracks resource time. For more information, see the SAP ME online help for System Rule Maintenance, the SAP ME How-To-Guide – OEE Reporting and the SAP ME How-To-Guide – Production Tracking.

Note: To optimize performance, it is highly recommended to make this setting ‘No’ unless there is a requirement to track individual resource time.

When you set the status of a resource to Productive in Resource Maintenance, the system logs the time for the resource, in minutes, as utilized machine time. The system uses this value to determine the utilization percent for a resource.

3.1.6 Setting Up Resources for Time-Based Component Traceability

If you interface one or more production assembly machines with the system, you may want to define a resource for use in time-based component traceability. For more information, see the SAP ME How-To-Guide – Setting up Products.

3.1.7 Using Activity Hooks with Resources

You can use activity hooks in the system to automatically perform repetitious routine tasks. For example, you can use an activity hook to automatically create SFCs at the first machine on an assembly line. For more information about resource-level activity hooks, see the SAP ME How-To-Guide – Setting up Activity Hooks.

3.1.8 System Rules

You can override several system rules at the resource level. For more information, see the SAP ME online help for the System Rules tab in Resource Maintenance.

3.2 Setting Up Operations

The next step in setting up your production lines is to create operations in the system that reflect what operators need to do.

3.2.1 What Are Operations?

An operation is what a production operator or machine does with an SFC at a resource. Examples of operations are PAINT, DRY, ASSEMBLE, TEST, and PACK.

You create a record for each operation you want to track in Operation Maintenance. You also associate each operation with a resource type in Operation Maintenance.

3.2.2 Operations and Routings

You use a series of operations in Routing Maintenance to create routings that represent workflow on your floor. For example, you can create one routing with a set of operations you use to produce or assemble units. You can create another routing with a set of operations for reworking units that fail tests.

3.2.3 Operations and Resource Types

When you release demand for a product, the system creates an SFC for each unit demanded and places the SFCs in queue at the first operation on the routing. The operator who will perform the operation logs onto the system, opens the production operator dashboard (POD), and enters the operation he or she will perform in the **Operation** field and the resource he or she is using in the **Resource** field:

Production Operator Dashboard: Site - BOBJ, User - CHET

POD Selection

* Operation: * Resource:
SFC:

Completed: 0
Nonconformed: 0

In Operation Maintenance, you can associate an operation with a default resource. But, you must associate it with a resource type. This allows the operator to enter any resource in the POD that belongs to the resource type associated with the operation.

For example, if the resource type of the ASSEMBLE operation is BENCH, and the BENCH resource type includes BENCH1, BENCH2, and BENCH3, an operator who enters ASSEMBLE as the operation in the PODs can enter BENCH1, BENCH2, or BENCH3 as the resource. This feature allows you to reuse operations on various routings. If one machine fails or has to go down for scheduled maintenance, the operator can select another machine to continue working on the SFC. Also, this flexibility allows you to use the same operation on more than one routing.

3.2.4 Types of Operations

In Operation Maintenance you must specify the type of operation you are defining in the **Operation Type** field. Operations can be Normal, Test, or Special. Most operations are Normal. Test operations are where operators test units.

3.2.5 Special Operations

In the Operation PODs, operators can click the **Browse** button next to the **SFC** field to view the work selection list for the operation. The work selection list is a list of SFCs the operator can start work on at the specified resource.

A special operation is an operation that allows an operator to pull SFCs from another routing, in other words, SFCs that are not queued at the operation (not in the work selection list). Operators can enter SFC numbers in the operation type PODs by typing or scanning the value in the **SFC** field. Operators at Normal and Test operations can start only the SFCs that appear in their work selection lists.

For example, a special operation could be used as a first step on a quality assurance routing to pull work into the routing for random sampling and testing.

Note: To be able to pull SFCs from another routing, the special operation must be the first step on a routing. Only Special routings can contain special operations.

Note: Often, a special operation is the only step on a special routing. For example, a special operation called “Preliminary Material Review” is often the only step on a PMR routing. Therefore, the terms “special operation” and “special routing” are sometimes used interchangeably.

3.2.6 Operations and Nonconformance

Some operations on your floor may involve quality assurance tasks, such as testing and reworking units. At rework operations, operators analyze, inspect, and repair units. The part of the system that handles these processes is called Nonconformance.

In Operation Maintenance, you can specify a nonconformance client and a default NC code for operations you use for rework. Test operations are included in this group.

For more information about operations and Nonconformance, see the SAP ME How-To-Guide - NC.

3.2.7 Operations and Certifications

Certifications allow you to control, which of users can perform specific operations. This feature helps you prevent operators without the proper expertise from performing certain tasks on your floor. You must set up certifications in Certification Maintenance, Resource Maintenance, Material Maintenance, Customer Order Maintenance and Operation Maintenance. For more information, see the [Setting Up Production Lines](#) section in this guide.

3.2.8 Using Activity Hooks with Operations

You can use activity hooks to automatically perform repetitious routine tasks. For example, you can use an activity hook to check for open NC records and a hook that checks that the required components have been assembled. For more information about operation-level activity hooks, see the SAP ME How-To-Guide – Setting up Activity Hooks.

3.2.9 System Rules

You can override several system rules at the operation level. For more information, see the SAP ME online help for the System Rules tab in Operation Maintenance.

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For descriptions of these system rules, see the SAP ME online help for the System Rule Maintenance activity.

3.3 Setting Up Routings

After you set up your resource types, resources, and operations, you can set up your routings in the system.

Note: After you set up resource types, resources, operations, and routings, members of the Implementation Team can begin entering product-related information. For more information, see the SAP ME How-To-Guide – Setting up Products.

3.3.1 What Is a Routing?

A routing is a representation of how you process work on your floor. Typically, a routing is made up of a series of operations. However a routing may include other steps, such as Hold or Scrap, or even other routings.

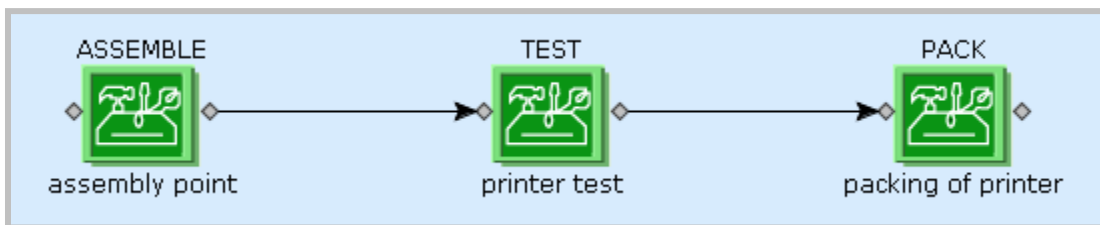
The system allows creating and maintaining routings both in graphical and tabular modes.

In tabular mode, the sequence of operations is displayed in the table. You create a routing by inserting the new table records representing the routing steps. You can further add new and remove the existing operations as well as change their order.

Step ID	Operation	Step Description	Work Center	Step Type	Details
ASSEMBLY1		ASSEMBLY1		Normal	
INSPECT		Inspect		Normal	
PACK1		Pack1		Normal	

In a graphical mode, all the operations you have created are displayed in a tree list on the left of the screen. You create a routing by first dragging the operations onto the drawing area, and then connecting them with lines that represent the flow of work.

For example, suppose your floor performs three steps to create one of your products: ASSEMBLE, TEST, and PACK. After you create these three operations and assign them a resource type, you can tie these operations together in Routing Maintenance:



3.3.2 How Routings Work

Continuing the above example, when you release demand for the product, the system creates an SFC for each unit demanded and places the SFCs in queue at the ASSEMBLE operation, the first step on the routing. Following is a simplified narrative of what happens next in the system.

Note: For more information about how the system generates SFCs, see “Creating PODs for SFC Processing” in the SAP ME How-To-Guide – Setting up Products.

An operator at the ASSEMBLE operation logs onto the system, opens operation type production operator dashboard (POD), and enters the operation to be performed and the resource to be used.

In the operation type PODs, the operator can view a work list. The work selection list is a list of all the SFCs the system has placed in queue at this operation. The operator can select one or more SFCs from the list and click a **Start** button to indicate that he or she has started work on these units. When the operator has finished working the unit, he or she clicks a **Complete** button in the POD to indicate that work is complete.

When the operator clicks the **Complete** button, the system places the SFC in queue at the next operation, in this case, TEST. The operator at the TEST operation opens the work selection list in his or her POD, selects the SFC and starts and completes it. The system then places the SFC in queue at the PACK operation. The operator at the PACK operation opens the work selection list in his or her POD, selects the SFC and starts and completes it.

When the operator at the last step on the routing completes an SFC, the system assigns the SFC the status of “Done”.

Note: Operators can also use the TAB key and scan information into the PODs. In addition, the PODs are configurable for each operator and have many other features built into it. For more information, see the SAP ME How-to-Guide – POD.

Note: The example above assumes human production operators. The PODs are for them. You can also send start and complete messages to the system from your machines through a machine interface. When you use machine interfaces, you do not use the POD.

3.3.3 How Can I Process Exceptions with Routings?

Most production lines on your floor are probably more complex than the previous example. In addition to the linear steps on a routing, you need to indicate where units go when exceptions occur, such as failing a test step on a routing.

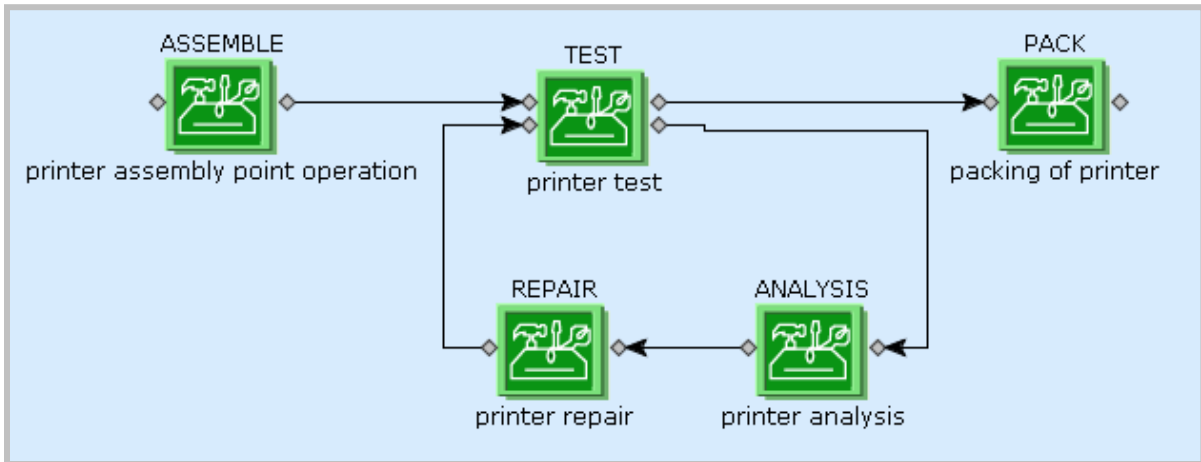
This situation creates the possibility of multiple next steps at a point on the routing. For example, at a TEST step, if a unit passes the test, it is sent to the PACK step. If the unit fails the test, it is sent to the ANALYSIS step to determine why it failed the test.

There are two ways to handle multiple next steps:

- Branching
- Nonconformance (NC) dispositioning

3.3.4 Working with Branching

Branching allows you to drag operations and draw lines in the same routing record in Routing Maintenance. Following is an example of a branched routing:



When an operator at the TEST operation completes an SFC, it can go to either the PACK step or the ANALYSIS step. Because there are two possible next steps, the system displays a window giving the operator the choice of the PACK step or the ANALYSIS step:

Step	Operation	Description
020	PRINTER_PACKING	PRINTER_PACKING
030	PRINTER_ANALYSIS	PRINTER_ANALYSIS

Complete Cancel

The operator selects the next operation, and the system places the SFC in queue there.

Note: You can also branch to another routing you previously defined.

3.3.4.1 Controlling Branching with Nonconformance (NC) Codes and Scripting

In certain situations, you may not want operators to select the next step for an SFC. When you use branching, you can use a combination of nonconformance (NC) codes and scripting to automatically control where the system sends SFCs.

3.3.4.2 Nonconformance (NC) Codes

Nonconformance (NC) codes are codes that operators can log against SFCs in the PODs. NC codes indicate what is wrong with the unit. As well as test failures, you can use NC codes to indicate any type of nonconformance of a unit, such as a scratch on a chassis.

In addition, operators at operations such as ANALYSIS and REPAIR can log NC codes to indicate the result of their work. You can use such NC codes to track units through a repair loop and verify defects.

For more information about NC codes and how to use them, see the SAP ME How-To-Guide - NC.

Note: Machine interfaces can also send nonconformance messages to the system.

3.3.4.3 Scripting

The system allows you to associate a coded script with any branch in a routing. You create a script for a branch by double-clicking the line between two routing steps and entering the code.

In the above example, you can create a PASS script for the line between the TEST step and the PACK step, and a FAIL script for the line between the TEST step and the ANALYSIS step.

Following is the PASS script:

```
if (NC_CODE==null)exit(true);
```

Following is the FAIL script:

```
if (NC_CODE!=null) exit(true);
```

When an operator at the TEST step completes an SFC, because the SFC has no NC code, the system executes the PASS script and places the SFC in queue at the PACK step. When an operator at the TEST step logs an NC code against the SFC, the system executes the FAIL script and places the SFC in queue at the ANALYSIS step.

Note: The system provides both of these scripts in Routing Maintenance. You can change them as needed. For more information about scripting in the system, see [Appendix A](#) in this guide.

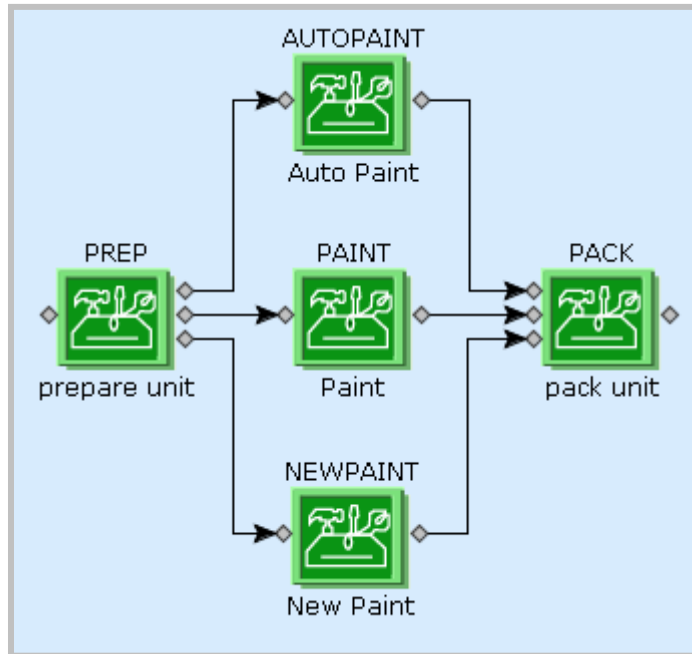
3.3.5 Other Types of Multiple Next Steps

3.3.5.1 Next Operator Decision

In some situations, you may want operators to decide where an SFC goes next. For example, to avoid bottlenecks, you may use several operations that do essentially the same task at a point on your routing.

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In the routing below, the middle step can be performed by the AUTOPAINT, PAINT, or NEWPAINT operation:



When the operator at the PREP operation completes an SFC, the system displays a list with the possible next steps:

Step	Operation	Description
020	NEW_PAINT	NEW_PAINT
030	PAINT	PAINT
040	AUTO_PAINT	AUTO_PAINT

The operator can select the step that is least busy at the moment to process work in the most efficient way.

3.3.5.2 Any Order Groups

In addition to operations, the system allows you to use an operation called Any Order Group. You first drag an Any Order Group operation onto the drawing area in Routing Maintenance, and then drag the operations you want to include in the group onto the Any Order Group.

You use an Any Order Group when you want a set of operations to be completed one at a time, but you do not want to impose a particular order on the operations. When you use an

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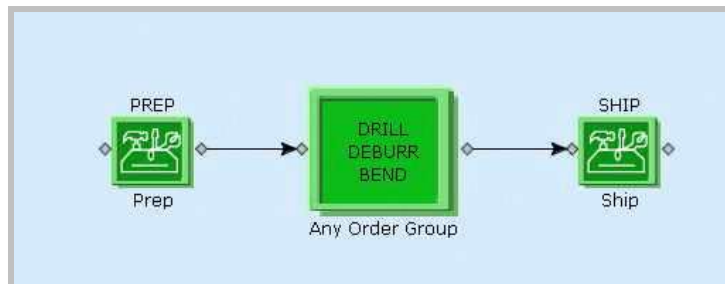
Any Order Group, the system places SFCs in queue at all the operations in the group. Operators start and complete each operation one at a time.

When the operator at one of the operations in the group starts the SFC, the system takes the SFC out of queue at the other operations. When the operator completes the SFC, the system places it back in queue at the other operations that have not been completed. After the SFC has completed the last of the operations, the system places the SFC in queue at the next operation on the routing.

The middle step in the following routing is an example of an Any Order Group. When the operator at the PREP operation completes an SFC, the system places the SFC in queue at the DRILL, DEBURR, and BEND operations. However, when the operator at the DEBURR operation starts the SFC, the system removes the SFC from the Task lists at the DRILL and BEND operations.

When the operator at the DEBURR operation completes the SFC, the system places the SFC back in queue at the DRILL and BEND operations. When the operator at the BEND operation starts the SFC, the system removes the SFC from the Task list at the DRILL operation.

When the operator at the BEND operation completes the SFC, the system places the SFC back in queue at the DRILL operation. Finally, when the operator at the DRILL operation starts and completes the SFC, the system places the SFC in queue at the SHIP operation.



3.3.5.3 Simultaneous Groups

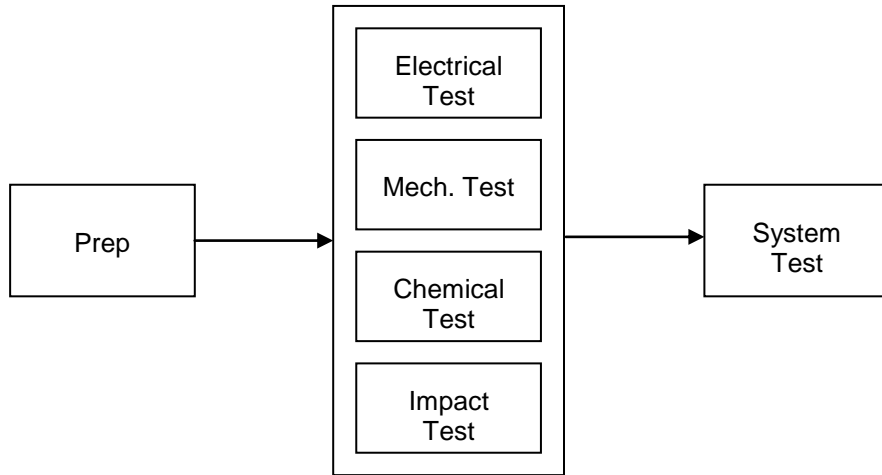
The system also allows you to use an operation called Simultaneous Group. You first drag a Simultaneous Group operation onto the drawing area in Routing Maintenance, and then drag the operations you want to include in the group onto the Simultaneous Group.

You use a Simultaneous Group when you want a set of operations to be completed simultaneously (either independently or dependently of one another) on an SFC.

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3.3.5.3.1 What Are Independent Steps?

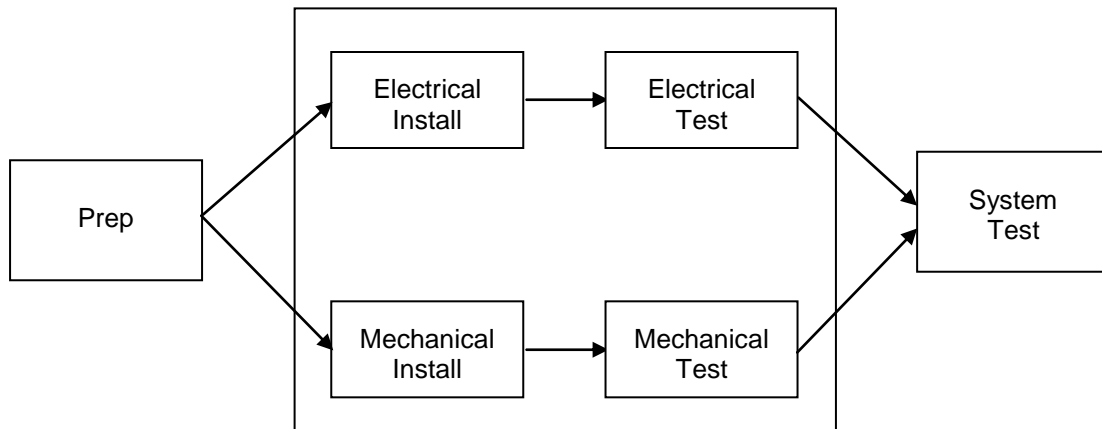
Independent steps allow work to be done simultaneously against an SFC in any order. The middle step in the following routing is an example of a Simultaneous Group containing independent steps.



In the above example, after the operator completes the Prep step, the system places the SFC in queue at each of the steps in the Simultaneous Group. In this case, the Electrical Test, Mechanical Test, Chemical Test, and Impact Test operations. Operators performing these operations can start and sign off the SFC. The SFC cannot move to the System Test operation until all four operations within the Simultaneous Group have been completed.

3.3.5.3.2 What Are Dependent Steps?

Dependent steps allow work to be done simultaneously against an SFC but only in a particular sequence. The middle step in the following routing is an example of a Simultaneous Group containing dependent steps.



In the above example, after the operator completes the Prep step, the system places the SFC in queue at the Electrical Install and Mechanical Install operations of the

Simultaneous Group. The SFC moves to the Electrical Test operation only when the Electrical Install operation is completed, which is independent of the Mechanical Install and Mechanical Test operations. The SFC moves to the Mechanical Test operation only when the Mechanical Install operation is completed, which is independent of the Electrical Install and Electrical Test operations. The SFC moves to the System Test operation only when the Electrical Test and Mechanical Test operations are completed.

3.3.5.3.3 Creating a Simultaneous Group Containing Dependent Steps

When creating a Simultaneous Group containing dependent steps, you must:

1. Complete the fields on the Main tab to describe the routing and specify its characteristics.
2. Click the Routing tab.
3. Do one of the following:
 - If you cleared the **Tabular Routing** check box on the Main tab, drag a Simultaneous Group operation onto the drawing area and then drag the operations you want to include in the group onto the Simultaneous Group. Double-click the step to open its Properties window, and assign successors to the appropriate routing step(s). Click **OK**.
 - If you selected the **Tabular Routing** check box on the Main tab, click **Insert New** as required for creating table rows representing the operation you want to include in the Simultaneous Group. For each operation in the group, select **Simultaneous** in the **Step Type** field.
4. Complete any remaining necessary fields. For more information, see the “Creating a Routing” topic in the SAP ME online help.
5. Save the routing record.

3.3.6 Working with Nonconformance (NC) Dispositioning

When you use nonconformance (NC) dispositioning, you create separate routing records in Routing Maintenance. These separate records are called disposition routings. Disposition routings are classified as Special or NC routings. Instead of branching, you control the flow of SFCs primarily with NC codes.

3.3.6.1 Why Use Nonconformance (NC) Dispositioning?

You may choose to use nonconformance (NC) dispositioning instead of branching because:

- You have upgraded the system from an older version and have too much data to convert to branching.
- The configuration of your routings changes frequently.
- You import routing records that do not include branching.
- Your routing is too detailed for a single routing record.
- You want to reuse a Special or NC routing, such as an NC routing for rework.

3.3.7 Other Routing Features

In addition to operations and Any Order Groups, Routing Maintenance provides the following elements you can add to your Special and NC routings:

- Hold steps
- Scrapped steps
- Return steps
- Done steps

Return steps include returning to:

- The step on the routing where the SFC originally came from.
- Any other step.
- The previous step.
- Any other previous step.
- The next step on the routing where the SFC originally came from.

These tools are helpful when you create Special and NC routings.

3.3.7.1 Nested Routings

You may use a nested routing as a step on your Production routing.

Returning from a nested routing is somewhat different than returning from a pulled special routing or from a disposition routing.

The following table describes the differences from the standard return.

Return to	Special Routing and Disposition Routing	Nested Routing
Original Step	Returns to original operation step.	Treated as Return to Next Step.
Next Step	Returns to step(s) after the original step.	Returns to step(s) after the original step.
Previous Step	Returns to step(s) immediately before the original step where the SFC has already been processed. Under rare conditions, this may be multiple steps (e.g. when the routing has 2 or more paths to the original step and the SFC has been processed on both of those paths).	Same.
Any Previous Step	Returns to any step(s) before the original step where the SFC as already been processed.	Same.
Any Step	Returns to any step on the routing.	Same.

3.3.7.2 What Is a Routing Type?

On the Main tab in Routing Maintenance, you use the **Routing Type** field to classify each routing you create as a Production Routing, an NC Routing, a Special Routing, a Disposition Function Routing, or an SFC-Specific Routing. (See the SAP ME online help for Routing Maintenance for more information.)

Note: In NC Code Maintenance, the Disposition Routing tab includes all routings defined with the NC Routing and Special Routing type.

Note: The Disposition Function Routing type in Routing Maintenance is used by the system to define disposition functions. See the [Types of NC Dispositioning](#) topic in this section of this guide.

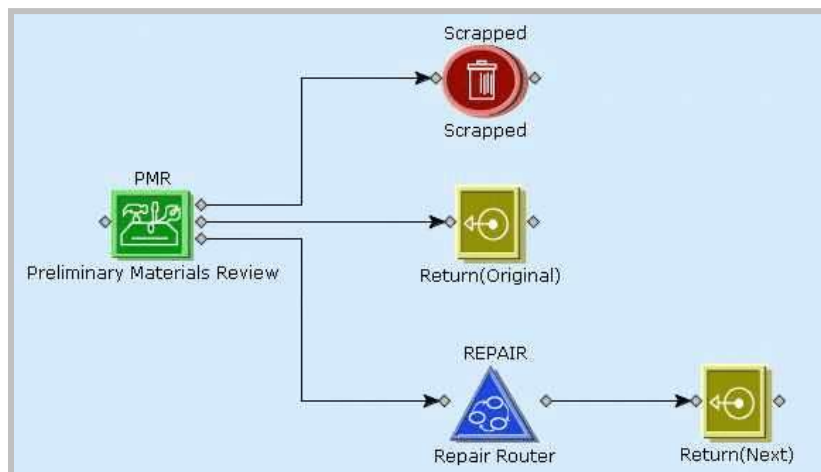
While Production routings represent your manufacturing processes, such as building a printer, Special and NC routings represent how you handle exceptions, such as a printer's failure of a functional test. The purpose of a Special and NC routings is to process nonconformed SFCs sent to the routing from a step on another routing.

Note: You cannot send SFCs from one Production routing to another Production routing.

For example, an operator at the TEST step on RTR1 logs an NC code against an SFC. This action causes the system to automatically send the SFC to the first step on the NC Routing, RTR2. When the SFC completes the last step on RTR2, the system sends the SFC back to the TEST step on RTR1.

Following is a Special routing named PMR. PMR is also the name of the first step on the routing. Because PMR is a Special routing, SFCs are never released to its first step. SFCs are never released to the first step on Special routings or NC routings. Instead, the system sends an SFC to PMR only when an operator or machine on another routing logs an NC against the SFC.

Because the nonconformance indicates something is wrong with the SFC, the operator at the PMR step is to determine the condition of the SFC. When this operator completes the SFC, the system displays a list of the possible next steps for the SFC. The operator determines whether to scrap the SFC, send it back to the original step it came from for retesting, or send it to a repair routing. In this case, the repair routing includes a retest of the SFC, so when the SFC completes the repair routing, the system sends the SFC back to the next step on its original routing.



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Note: If a Special or NC routing has a Done step and the Track Inventory system rule is set to **True** (the default), the SFC goes into inventory when it reaches the Done step. If there is no Done step, the SFC automatically returns to its original production routing.

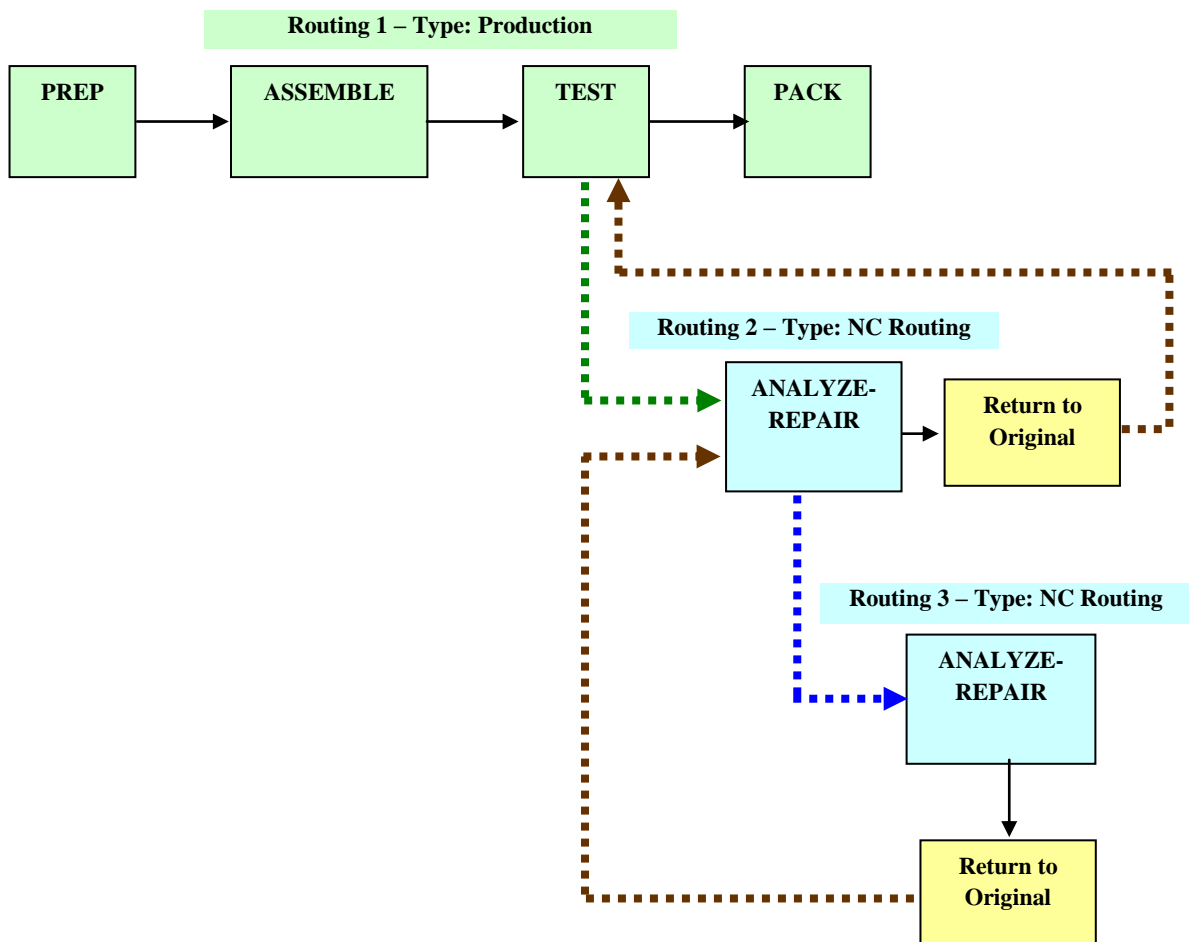
3.3.7.3 Layering Routings

The system allows you to disposition SFCs from a production routing to either a special or NC routing. You can also disposition SFCs from a special or NC routing to another special or NC routing. In other words, you can create several layers of Special and NC routings.

To return SFCs to the step they came from, you can use return steps on your Special and NC routings. When you use return steps with these routings, the step returns the SFC to the **production** or **NC routing** it last came from. All return steps *skip* special routings.

For example, you may allow operators to be able to send SFCs to an NC routing from a step on a production routing. Then you may want to allow operators on the NC routing to send SFCs to another NC routing. If you use a Return to Original step on your NC routings, the system returns SFCs to the NC or production routing they came from.

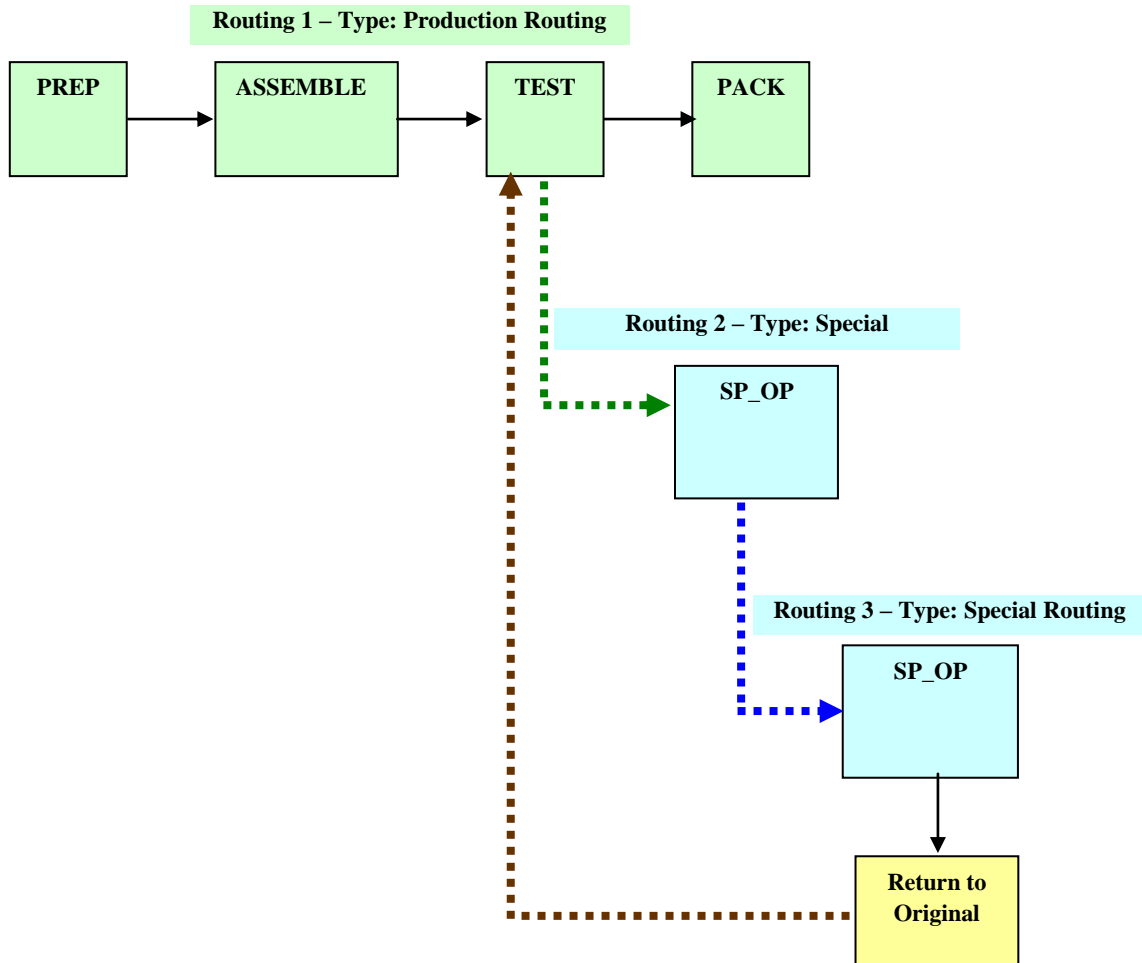
The following diagram illustrates this process.



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As another example, you may allow operators to be able to send SFCs to a special routing from a step on a production routing. Then you may want to allow operators on the special routing to send SFCs to another special routing. If you use a Return to Original step on your special routings, the system returns SFCs to the NC or production routing they came from, but skips any special routings along the path.

The following diagram illustrates this process.



3.3.8 Types of NC Dispositioning

With NC dispositioning, whenever there is more than one place the system can send an SFC, the system displays a window to the operator listing the possibilities. The system sends the SFC to the place the operator selects in the list.

You can use two types of NC dispositioning in the system to control both the flow of SFCs and the lists your operators see:

- Routing-based dispositioning.
- Function-based dispositioning.

3.3.8.1 What Is a Routing-Based Dispositioning?

When you use routing-based dispositioning, you assign Special and NC routings to NC codes to control the flow of SFCs. When an operator logs an NC in the POD, the system sends the nonconformed SFC to the associated Special and NC routing. If you associate more than one Special and NC routing with an NC code, the system displays a list, similar to the one shown previously, displaying all options. The operator clicks an option in the list to send the SFC to that Special and NC routing.

For more information about routing-based dispositioning, see the [Setting Up Routing-Based Dispositioning](#) section of this guide. For more information about nonconformance, see the SAP ME How-To-Guide - NC.

3.3.8.2 What Is a Function-Based Dispositioning?

When you use function-based dispositioning, you assign a group of one or more disposition functions to NC codes to control the flow of SFCs. When an operator logs an NC in the POD, the system displays a list of disposition functions to select from. The set of functions the operator sees in the list is the set of functions defined in the assigned disposition group.

You can also assign disposition groups to steps on a Special and NC routing, so that those operators can select where the system should send SFCs when they complete them.

Function-based dispositioning more closely duplicates the functionality of SFDM and allows you to give your operators more disposition choices than routing-based dispositioning.

3.3.8.3 What Is a Disposition Function?

A disposition function is a choice on a list the system displays to the operator in the POD. Each choice is one of a set of the possible places the operator can send an SFC. For some disposition functions, operators can indicate the current condition of the SFC, such as *Useable as is*.

Note: If there is only one possible place for the system to send the SFC(s), no list is displayed.

Function-based dispositioning allows you to disposition one or more SFCs using disposition functions to control the flow of the SFCs. You can assign one or more disposition functions to a disposition group. Each disposition function you add to a disposition group controls a specific disposition behavior.

A disposition function can represent:

- A choice in the list that disposes the SFC in a specific way.
- A choice in the list that opens another window with another set of disposition choices.

3.3.8.4 Types of Disposition Functions

There several types of disposition functions that correspond to the general way they work:

- The system can send the SFC(s) to a Special and NC routing. That is, a special or NC routing. You can specify a specific special or NC routing or allow the operator to select it from a list of special or NC routings.
- In a step on a Special and NC routing, the system can send the SFC back to any step on the routing it came from.

- The system can send the SFC(s) to a previously defined dynamic routing (a routing defined specially for this SFC).
- The operator can create a new dynamic routing (a routing defined specially for this SFC) and send this SFC to this routing.
- The operator can scrap an SFC.
- The system leaves the SFC at the current step, but adds information to it that indicates there was no defect found with the SFC, the SFC is useable as is, or the operator will repair the SFC at the current step (local rework).

See the SAP ME online help for Disposition Group Maintenance for a complete description of disposition functions.

3.3.8.5 Applying Disposition Functions

Operators using the Nonconformance clients in the POD can work with SFCs in multi mode, that is, one at a time, or batch mode, that is as a group. When an operator selects a disposition function for an SFC, the system applies it to a single SFC when the operator is in batch mode, and to the entire set of SFCs if the operator is in multi mode. In batch mode, the system displays the window listing disposition functions in the POD for each SFC.

For more information about Nonconformance, see the SAP ME How-To-Guide - NC.

3.3.8.6 What Is a Disposition Group?

A disposition group is a set of disposition functions. In other words, a disposition group is set of the possible places an operator can send an SFC.

You create groups of disposition functions in Disposition Group Maintenance. You can then assign one or more disposition groups to either one or more NC codes in NC Code Maintenance. In general, you assign a disposition group to an NC code that you want operators to use at a testing operation to send the SFC off the production routing. You assign a disposition group to an operation used on an NC routing or a special operation to return the SFC back to the production routing.

Note: If routings are nested more than one level, the system returns SFCs to the previous NC routing.

Disposition Groups decrease the level of maintenance required for sites with large numbers of special or NC routings. This makes it easier to maintain a set of standard dispositions without modifying all NC Codes.

3.3.8.7 Creating Disposition Groups

You create disposition groups in Disposition Group Maintenance by assigning one or more disposition functions to a disposition group.

For more information, see the [Setting Up Function-Based Positioning](#) section of this guide.

3.4 Organizing Shop Floor with Work Centers

Work centers are not required for setting up your production lines. However, you can use work centers to organize your shop floor so that you can:

- Enhance your reporting capabilities with finer granularity.
- Identify work center categories for ODS reporting.
- Control release of product to be worked at a variety of levels.

3.4.1 What Is a Work Center?

A work center represents a segment of your shop floor that you want to run reports on or release demand to.

You create a work center in Work Center Maintenance by assigning one of the following to it:

- One or more resources.
- One or more work centers.

A specific resource can belong to only one work center. You must also assign sequence values to the elements in a work center.

3.4.2 Categorizing Work Centers

For use with ODS reporting, you can categorize each work center according to the level it represents on the shop floor. Work center categories range from Building to Cell level. For more information, see the example in this section and online help in Work Center Maintenance.

3.4.3 Nesting Work Centers

Nesting work centers inside other work centers produces a hierarchical structure with resources as the bottom nodes. Following are some tips for nesting work centers:

- Assign only resources to work centers at the bottom-most level in the hierarchy.
- You can assign one or more work centers to another work center.
- You must create a work center before you can assign it to another work center.
- You can assign work centers to only one parent work center.
- You cannot assign a work center to itself.

3.4.4 Queue SFCs at a Resource / Work Center or Operation

The System Rule, *Queue SFC at Resource*, controls whether SFCs are queued at a resource / work center or at an operation. To queue SFCs at a resource, work centers must be used. SFCs can be started at a resource (or work center) only if the *Allow SFC Pull from Other Work Centers* system rule is set to *False*.

3.4.5 Sequencing Resources within a Work Center

You must supply a sequence value for each resource and work center you add to a work center in Work Center Maintenance. Assigning resources with sequence numbers to a work center eliminates the flexibility to choose any resource assigned to a resource type associated with the operation.

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Sequence values assigned to resources are especially important when you create work centers for machine interfaces. Sequence values allow you to control the order the system works SFCs at the machines on your line.

3.4.6 Releasing SFCs to Work Centers

To release SFCs to work centers:

1. In Work Center Maintenance, select the **SFC Can Be Released To This Work Center** check box for each work center you want to release SFCs to.
2. In System Rule Maintenance:
 - Set the Force Release to Work Center system rule to **true**.
 - Enter the default work center value in the Site Value column field of the Default Work Center for Release system rule.
 - If you want to allow operators to pull SFCs from another work center, set the Allow SFC Pull From Other Work Centers rule to **true**.

Note: There are no overrides for system rules at the work center level.

3.4.7 Result

When you release demand to the floor, the system places SFCs in queue at the first operation(s) on the routing(s) in the default work center.

In Shop Order Maintenance, users can override the default work center. Additionally, in Shop Order Release, users on the floor can override both the default work center and the work center specified in Shop Order Maintenance. Your shop may allow senior level shop floor personnel to make this decision to balance workload among lines.

3.4.8 System Rules

As explained previously, the following site/global-level system rules affect work center processing:

Rule	Description
Default Work Center for Release	The name of the default work center You create work centers in <i>Work Center Maintenance</i> . You must also select the <i>SFC Can Be Released to This Work Center</i> checkbox in the default work center record in <i>Work Center Maintenance</i> and set the <i>Force Release to Work Center</i> rule to True . Default: blank; this value is required only when you set the <i>Force Release to Work Center</i> rule to True . Can override at: site, material Related rule: <i>Force Release to Work Center</i>
Force Release to Work Center	True : Releases the shop order and SFCs to the work center specified in the <i>Default Work Center for Release</i> rule False : (default): Releases the shop order demand to the routing specified either in <i>Material Maintenance</i> , <i>Shop Order Maintenance</i> , or <i>Shop Order Release</i> Can override at: site, user Related rule: <i>Default Work Center for Release</i>

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Allow SFC Pull From Other Work Centers	If set to True (default), allows an SFC in queue at a work center to be processed at a different work center
Queue SFC at Resource	True: Places SFC numbers in queue at the next resource or work center when the operator completes each SFC False: (default): Places SFCs in queue at the next operation when the operator completes each SFC Can override at: site, operation To queue SFC at a resource, work centers must be used. SFCs can be started at a resource (or work center) only if the <i>Allow SFC Pull from Other Work Centers</i> rule is set to False

For more information about system rules, see the SAP ME online help for System Rule Maintenance.

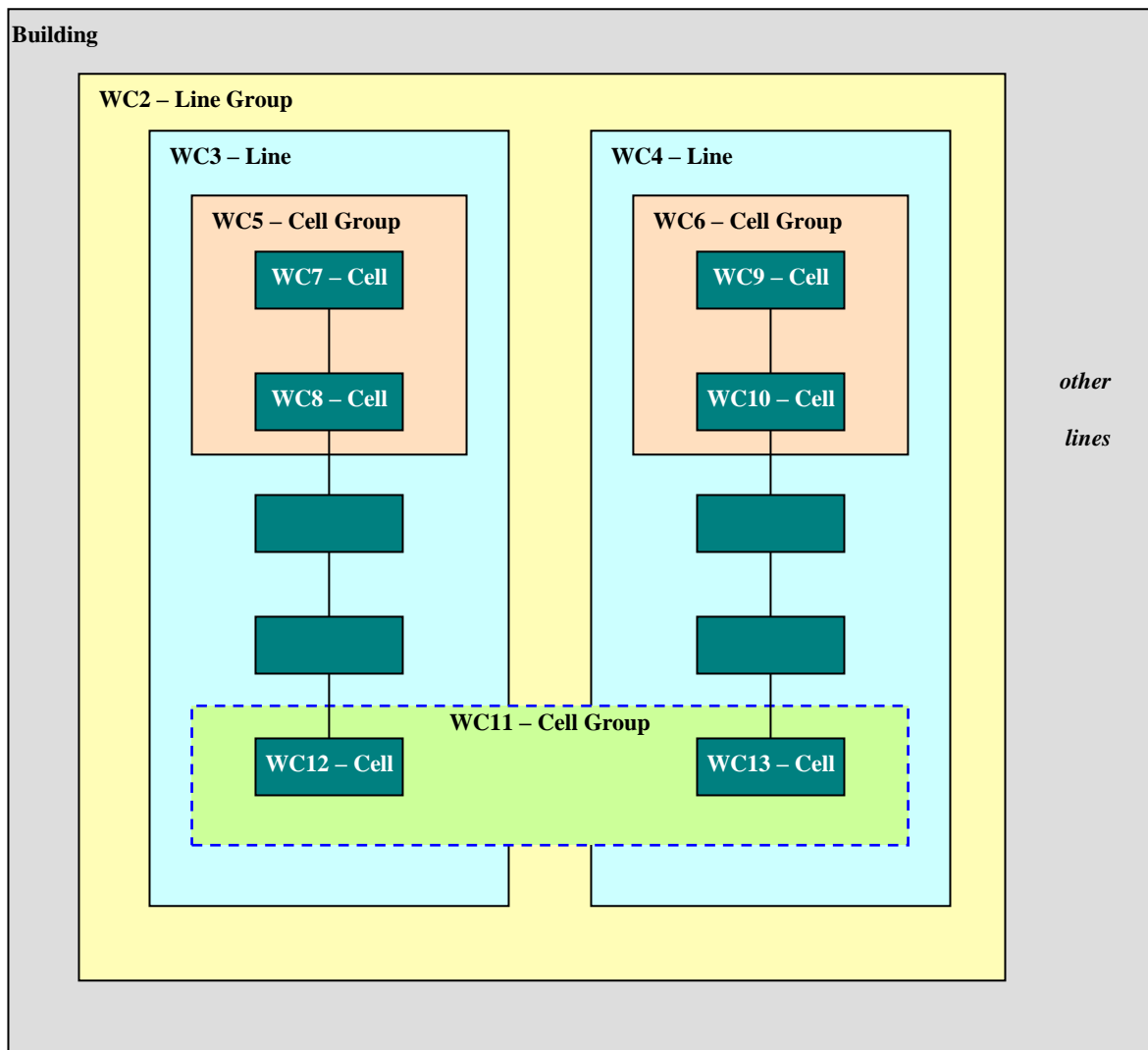
3.4.9 Example

The following illustration shows a commonly used approach with several nested work centers and their various categories. The smallest boxes in the illustration represent resources. Some resources are also work centers. For example, WC7 is a work center that contains a single resource. Therefore, WC7 has category Cell.

WC3 and WC4 are Line category work centers. Each of these work centers categorizes an entire routing. These routings have identical routing steps (operations), but different resources. For example, if the first step on Routing 1 is ASSY, the first step on Routing 2 is also ASSY. However, the operator on Routing 1 enters BENCH1 as the resource in the production operator dashboard, while the operator on Routing 2 enters BENCH2. This approach allows you to track information about each resource separately.

The **SFCs Can Be Released To This Work Center** check box in Work Center Maintenance controls where users can release SFCs. In the example, the **SFCs Can Be Released To This Work Center** check box is selected only for WC3 and WC4. All other work centers are used only for reporting purposes.

WC11 is an optional work center that allows you to track the resources on the last routing step together. In this case, you must create WC12 and WC13 as separate work centers for each resource so that the system does not send SFCs across routings after the last step.



Note: For more information, see tips for nesting work centers earlier in this section and online help in Work Center Maintenance.

3.5 Setting Up Production Operator Dashboards

The Production Operator Dashboards (PODs) are the user interfaces your production operators use to record the work they do. For complete information about the PODs, see the SAP ME How-To-Guide – POD.

3.6 Setting Up Packing and Unpacking

You can use the Pack/Unpack feature to track the work of operators who pack or unpack your manufactured goods into or from containers. In the system, operators record the SFCs and containers that they pack into or unpack from a parent container. For complete information about packing and unpacking, see the SAP ME How-To-Guide – Setting up Packing and Unpacking.

3.7 Setting Up Other Production-Related Features

This topic covers other production-related features. These are:

- Work instructions
- Printing
- Engineering change order
- Shop floor scheduling
- Executive dashboards
- Custom data and data collection

3.7.1 Work Instructions

The Work Instructions feature allows you to display electronic documents containing written or graphical instructions about how to perform a task, to operators on your floor. The system displays these work instructions in the PODs.

For each operator group, you can have the work instructions display:

- At the same time the operator clicks any button in the PODs, such as **Start**.
- When the operator clicks on a work instruction button you have created in POD Maintenance.

Note: For more information about work instructions and the PODs, see the SAP ME How-To-Guide - POD.

You can associate work instructions with a specific material, operation, routing, resource, or any combination of these elements. If you use the Nonconformance feature, you can also associate work instructions with a specific nonconformance client. For example, you may want to display instructions about how to build the PRINTER material at every ASSEMBLE operation, whenever the operator starts an SFC representing a printer.

Note: For more information about the Nonconformance feature, see the SAP ME How-To-Guide - NC.

Work instructions can take two forms:

- Text messages you enter directly into Work Instruction Maintenance.
- A web page. This page can contain links to HTML, PDF, Word files, or any other files your browser can display.

You can require operators to view work instructions in the PODs by checking the **Required** check box in Work Instruction Maintenance. When a work instruction is required, the operator must open the work instruction before closing the viewer. If you associate a required work instruction with the **Start** button in the PODs, the system automatically displays it when the operator clicks the button.

For more information, see the [Setting Up Work Instructions](#) section of this guide and the SAP ME How-To-Guide – Work Instructions.

3.7.2 Printing

There are two methods of printing with SAP ME. One is using Software and the other is using Adobe Document Services. For more information, see the SAP ME How-To-Guide - Printing.

3.8 Engineering Change Order

The Engineering Change Order feature allows you to associate SFCs with specific ECOs, allowing product that is active on the shop floor to be changed according to defined specifications. Included in the Engineering Change Order feature is the Shop Floor Change Request activity, which allows users to submit engineering change requests to product on the manufacturing shop floor. For more information, see the SAP ME online help for Engineering Change Order and Shop Floor Change Request and the SAP ME How-To-Guide - POD.

3.9 Shop Floor Scheduling

The Shop Floor Scheduling feature allows you to set planned production standards, such as production rates, yields, and machine setup and wait times. This feature allows you to compare your planned rates, yields, and times with actual values on the shop floor. This helps you determine gaps between planned and actual results more precisely, gives you feedback on your processes, and allows you to improve your yields and your time-to-market.

For more information, see the SAP ME online help for Scheduling Standards Maintenance.

3.10 Executive Dashboards

The Executive Dashboard feature allows users to view one or more reports at the same time with the user's preferred settings. For information about setting up this feature, see the [Setting Up and Viewing an Executive Dashboard](#) section of this guide.

3.10.1 What Is a Portlet?

A portlet is a region on the Executive Dashboard Viewer portal screen. A portlet can be thought of as a web component displaying a single report. Portlets are designed to be grouped together, providing several different reports on a single dashboard.

3.10.2 Working with Executive Dashboard Portlets

The Executive Dashboard Portlet Maintenance activity is used to do the following:

- Create a new portlet.
- Define or edit the list of parameters for a portlet.
- Define or edit the list of sizes for a portlet.

The portlets defined in this activity are assigned to Executive Dashboards. For more information about assigning portlets to Executive Dashboards, see the SAP ME online help for Executive Dashboard Maintenance.

3.10.3 Working with Executive Dashboards

The Executive Dashboard Maintenance activity is used to define the following attributes for the SAP Manufacturing Execution Executive Dashboard Viewer:

- Overall page layout for a set of portlets.
- Available portlets for each frame of the portal.
- Size of each portlet.
- Refresh rate of each portlet.
- Common parameters that will be passed to every portlet in the portal.

3.10.4 Using the Executive Dashboard Viewer

Use the Executive Dashboard Viewer to display information from several sources on one screen. The information that is being displayed is determined by the portlet value selected using the Executive Dashboard Maintenance activity. Also, portlet parameters are used to control the specifics of the frames, and fields displayed on the Executive Dashboard Viewer screen.

When you access the Executive Dashboard Viewer, default values for the defined fields are displayed automatically in the screen.

Executive Dashboard Viewer has the following screens:

Screen	Purpose
Executive Dashboard Viewer Launcher	Use this screen to select, which Dashboard you want displayed in the Executive Dashboard Viewer.
Executive Dashboard Viewer	Use this screen to display information from several sources on one screen.

3.11 Custom Data and Data Collection

The Custom Data feature allows you to add additional fields to maintenance activities as needed for your shop floor. For more information, see the SAP ME online help for Custom Data Maintenance.

You can also collect additional information from production operators in the PODs with SFC Data Entry (SFC_DATA_ENTRY) and Data Collection (DC500).

Note: Data Field Assignment Maintenance (SY130), allows you to collect information while performing other actions.

For more information data collection, see the SAP ME online help for SFC Data Entry and Data Field Assignment Maintenance and the SAP ME How-To-Guide – Data Collection.

4 Integration

SAP ME integration with SAP ERP enables objects to be created in SAP ERP and downloaded to SAP ME. Actions taken in SAP ME can be communicated back to SAP ERP. For more information, see the SAP ME ERP Integration section in the SAP ME online help.

5 Setting up Production Lines

To set up your production lines:

1. Set up your resources in Resource Maintenance, resource types in Resource Type Maintenance, and operations in Operation Maintenance.
2. In Routing Maintenance:
 - Create the routings that reflect the processes on your shop floor.
 - Write any necessary scripting for branched routings.
 - Create any Special and NC routings you need.

3. Set up the activity hooks you want.
4. Create the work centers your shop floor requires in Work Center Maintenance and, if necessary, set the related system rules.
5. Create the production operator dashboards you need for your operators.
Note: Also create any machine interfaces you need.
6. Set up Packing (optional).
7. Set all production-related system rules as needed.
8. If desired, set up work instructions, printing, engineering change order, shop floor scheduling, and custom data.
9. If desired, set up executive dashboards for specific users.

5.1 Setting Up Resources, Resource Types, and Operations

To set up resources, resource types, and operations:

1. In Resource Maintenance, create resources.
2. In Resource Type Maintenance, create resource types.
3. Assign resources to resource types in either Resource Maintenance or Resource Type Maintenance.
4. In Operation Maintenance, create operations. If desired, also set up certifications.
5. Assign a resource type to each operation in Operation Maintenance.

5.2 Setting Up Certifications

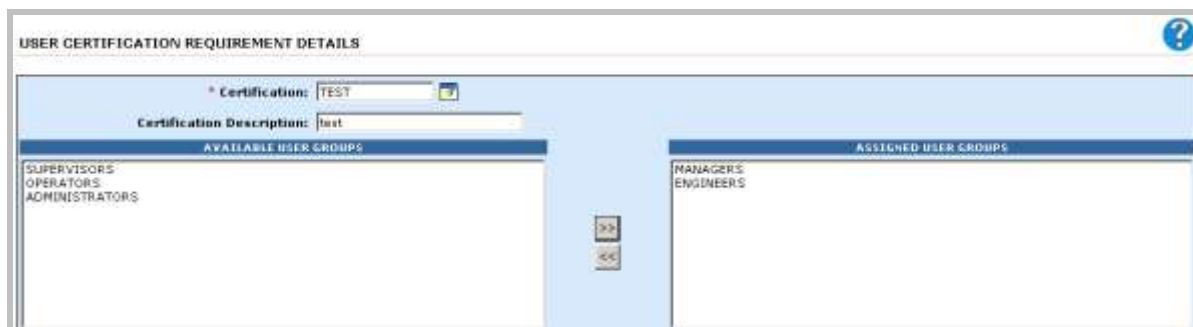
To set up certifications:

1. In Certification Maintenance, create the certifications you want to use.
2. In Certification Types Maintenance, create the certification types to group the individual certifications for reporting purposes.
3. You can associate the created certification(s) with an operation, material, resource, or customer order.
 - In Operation Maintenance, create or retrieve a record for the operation you want to certify. On the Certifications tab, click **Insert New**. Enter or browse for the certification you want to associate with the selected operation in the User Certification Requirement Details window. Click **OK**.
 - In Material Maintenance, create or retrieve a record for the material you want to certify. On the Certifications tab, click **Insert New**. Enter or browse for the certification you want to associate with the selected material in the User Certification Requirement Details window. Click **OK**.
 - In Resource Maintenance, create or retrieve a record for the resource you want to certify. On the Certifications tab, click **Insert New**. Enter or browse for the certification you want to associate with the selected resource in the User Certification Requirement Details window. Click **OK**.

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- In Customer Order Maintenance, create or retrieve a record for the customer order you want to certify. On the Certifications tab, click **Insert New**. Enter or browse for the certification you want to associate with the selected customer order in the User Certification Requirement Details window. Click **OK**.

Important: If you want the certification to be enforced against specific user groups, select user groups from the **Available User Groups** list and place them to the **Assigned User Groups** list. This limits the certification enforcement to only those user groups defined on the right hand side of the window and all other user groups are exempt from enforcement of the defined certification on this specific object. Only users in the **Assigned User Groups** list will have the certification. Any users outside of the group will not have the certification.



4. In User Certification Assignment Maintenance, assign the user certification(s) to the user. Click **Insert New**, enter or browse for the certification you want to assign to the user in the User Certification Assignment Details window. Click **Apply**.
5. If you want to run and schedule Certification Expiration Check process, in Background Process Execution, select the **Enable** check box, specify the frequency and interval to run the process.

Extra: If you want to warn users or supervisors (for example, by an e-mail message) about nearing expiration of their certifications, use Message Maintenance to define those messages. For more information, see the SAP ME online help for Message Maintenance.

5.3 Setting Up Routing-Based Dispositioning

Preliminary step: Make sure the operations you want to include on your Special and NC routings exist. Also make sure the operation from which you want to send the SFC to the Special or NC routing, for example TEST or INSPECT, exists.

To set up a routing-based dispositioning:

1. In Routing Maintenance, create a Special or NC routing. In the **Routing Type** drop-down list, select either **Special** or **NC Routing**.
2. In NC Code Maintenance, create NC codes and associate them with the Special or NC routing on the Disposition Routings tab.

Note: If you associate more than one routing on the Disposition Routings tab, the system displays a window to the operator. The operator must select the routing the system is to send the SFC to.

Note: For more information about creating NC codes, see the SAP ME How-To-Guide - NC.

3. In NC Code Maintenance, associate the NC codes with the operation that you want to give the ability to send the SFC to the Special or NC routing.

When an operator logs an NC against an SFC, the system removes the SFC from its original routing and places it in queue at the entry step of the Special or NC routing.

5.4 Setting Up Function-Based Dispositioning

Preliminary step: Make sure any special operations and Special and NC routings you want to use exist. Also make sure the operation on the production routing from which you want to send the SFC, for example TEST or INSPECT, exists.

To set up function -based dispositioning:

1. In Operation Maintenance, create any additional special operations you need.
2. In Routing Maintenance, create the needed Special and NC routings. In the **Routing Type** drop-down list, select either **Special** or **NC Routing**.
3. If needed, create routings for individual SFCs using Dynamic Routing.
4. If needed, in Activity Code Maintenance, modify or create the activity codes you will need to use.

Note: This may require custom development as well as additional setup steps. See your Professional Services Organization (PSO) representative for more information.

5. In Disposition Group Maintenance, create the disposition groups you want.
6. In NC Code Maintenance, assign a disposition group to one or more NC codes, and associate the NC code with the operation that you want to give the ability to send the SFC to the Special or NC routings.
7. In Routing Maintenance, assign a disposition group to the routing steps where operators will use the NC code associated with the disposition group.

When an operator logs an NC against an SFC, the system displays a window to the operator. The window displays all possible choices. The operator must select where the system is to send the SFC. Some selections may open another window with a set of choices.

Note: If the operator logs more than one NC code to the SFC(s), the system uses the priority of the NC code to determine which list of options to display. If the NC priorities are the same, the system displays all the options.

5.5 Setting Up Work Instructions

To set up work instructions:

1. In Work Instruction Maintenance, define a work instruction record for each document you want to display to operators on the floor.
2. In Attachment Maintenance, specify which element(s) you want the system to associate a particular work instruction with. This association determines when and where the system displays the work instruction in the PODs.

Note: If you want to display work instructions in a nonconformance client, specify them on the Work Instructions tab of Nonconformance Client Maintenance instead. For more

information, see the SAP ME online help for Nonconformance Client Maintenance and the SAP ME How-To-Guide - NC.

3. In POD Maintenance, set up one or more PODs to run the Work Instruction Viewer (WI500). This step further defines when the system displays the work instruction in the PODs.

5.6 Setting Up Printing

The printing feature allows you to print production-related documents, such as barcode labels, BOMs, travelers (routing documents), and packing lists. You can print these documents on either labels or standard size paper or forms. For example, you can print labels to be placed on circuit boards for tracking or packing slips to be packed into boxes ready for shipping.

Together with the Document Print (SY520) or ADS Document Print (SY521) activity set up as an activity hook, you can print documents automatically anywhere on your lines.

5.6.1.1 How the System Prints

The system uses SAP NetWeaver ADS component or third-party software for printing.

If you decide to use the ADS component available in your SAP NetWeaver, configure and set up the system as described in the SAP ME How-To-Guide – Printing.

The system also has a built-in interface with Software Print Server software. If you decide to use the Software Print Server, you must purchase Software separately. For more information, see <http://www.loftware.com>.

Note: If you use other third-party printing software, see your Professional Service Organization (PSO) representative for using it with the system.

5.6.1.2 The Monitoring Directory

Print Server polls for the file on the server in the designated folder where the system has placed the file. It uses the information you set up in the system to know what template and printer to use, as well as, what information to print.

For more information, see the [Setting Up Printing](#) section of this guide and the SAP ME How-To-Guide - Printing.

5.7 Setting Up Engineering Change Order (ECO)

To set up ECO:

1. In Next Number Maintenance, use the default numbering pattern for ECO *or* create a new ECO numbering pattern.
2. If you want shop floor personnel to submit shop floor change requests, you must set up the Collaboration feature to integrate with the Shop Floor Change Request activity. This step includes the following:
 - First, in Collaboration Directive Maintenance, create a directive for Shop Floor Change Request.
 - Then, in Collaboration Link Maintenance, link the directive you created to the COLLABORATION_CHANGE_REQUEST Trigger Action.

3. In POD Maintenance, do the following:

- Set up one or more PODs to execute Engineering Change Order (SU610) from the **Start** button.

Note: You may use an existing POD and add a row that executes the ECO activity from the **Start** button. See the SAP ME How-To-Guide - POD for more information.

- On the Buttons tab, on the row containing the **Start** button associated with the ECO activity (SU610), enter a lower sequence number than the row containing the **Start** button associated with the **Start** activity.

When an operator clicks **Start** in the PODs, the ECO executes and tags SFCs for an ECO *before* the Start activity occurs.

5.8 Setting Up and Viewing an Executive Dashboard

To set up an executive dashboard:

1. In Executive Dashboard Portlet Maintenance, if necessary, create a portlet by specifying the report you want to display in the Executive Dashboard Viewer and the attributes of the area of the screen you want to display it in.

Note: The system comes with many predefined portlets. Retrieve the portlet you want by its report name. If desired, change its attributes and save the portlet under a new, similar name.

2. In Executive Dashboard Maintenance, create and define attributes for one or more dashboards that the Executive Dashboard Viewer can display. For more information, see the “Creating a New Executive Dashboard View” topic in the SAP ME online help for Executive Dashboard Maintenance.
3. In the Executive Dashboard Viewer, select a dashboard by clicking its link. The system displays the dashboard.

6 Usage Scenario Examples

None provided.

7 Links to Additional Information

[SAP ME online Help](#)

8 Other Reference Material

SAP ME How-To-Guide – Setting up Activity Hooks

SAP ME How-To-Guide – Data Collection

SAP ME How-To-Guide – NC

SAP ME How-To-Guide – OEE Report

SAP ME How-To-Guide – POD

SAP ME How-To-Guide – Printing

SAP ME How-To-Guide – Production Tracking

SAP ME How-To-Guide – Setting up Packing and Unpacking

SAP ME How-To-Guide – Setting up Products

SAP ME How-To-Guide – User Management

SAP ME How-To-Guide – Work Instructions

9 Overview of Changes

Not applicable.

Appendix A

A.1 Scripting

The system supports scripting for routing next-step selection.

The scripting language is interpreted JavaScript. The scripts can make Enterprise Java Beans (EJB) calls or Structured Query Language (SQL) queries if needed.

There are a number of convenience methods (callEJB() and getEJBProperties(), getItemProperties(), getCustomItemProperties()) that make direct calls to EJBs. A large amount of data is also available to these scripts to help make next step decisions.

Note: The actual syntax of the scripting language may change from the examples shown in this document. Refer to www.mozilla.org/rhino for more information about the scripting language reference.

To use routing scripts, the ME user needs to have permission to Manage and Execute scripts. For more information, see the [Scripting Permissions](#) section below.

Double clicking the link between operations will open the 'Link Properties' box which gives the option to choose from 4 scripts already created and shipped with the product described briefly below or just use help from ME documentation if further details are required:-

- *None* (default): Scripting is not used.
- *Failure*: Sends the SFC number down this path when the SFC number has had a nonconformance logged against it at this operation
- *Open Nonconformance*: Sends the SFC number down this path when the SFC number has an associated NC code that is open
- *Pass*: Sends the SFC number down this path when the SFC number did not have a nonconformance logged against it at this operation
- *Custom Script*: Allows you to write your own scripting code in the *Script Text Area*

'Custom Script' can be used if you wish to base decision making on other factors besides just Nonconformance.

The following example illustrates returning a value of true only if the number of sites present in database is equal to 2. Using the same syntax, you can modify the script to fetch other data from the database, based on your requirements.

```
stmt="select count(site) as SITE_CT from site";
res=executeQuery(stmt);
total = res.get("SITE_CT");
res1 = parseInt(total,10);
if(res1 == 2) exit(true);
    else
        exit(false);
```

The executeQuery(stmt) will return an object of type 'Data' and not the actual result. 'Data' is a vector class having name value pairs of fetched data. The fetched parameters can be retrieved using 'get()' which will be of type 'Object', so you need to parse it to appropriate data type for further usage. In the case above, it just returns 'true' if the total number of sites in the database is 2.

A.1.1 Scripting for Next-Step Selection

Certain points on a routing may have multiple next steps in handling the way defects are processed at your installation. This process may vary from one installation to another, and even on the same routing. The system allows you this flexibility through custom scripting logic. After one step at an operation is completed, custom logic makes the step selection when multiple next steps are possible.

When a step has multiple next steps, there are multiple connectors exiting from the step. Each of the connectors (lines) can have a decision script associated with it. These scripts are evaluated when an SFC completes the step. The return values from all of these next steps are used to determine the next step for the SFC.

Each script is associated with the paths between steps. In Routing Maintenance, to display the scripting dialog box for the next step, display the Routing panel and double-click the label on the line that represents the path to the next step.

A.1.2 Scripting for Decision Logic

A.1.2.1 Step Selection Logic

The routing shown in Figure 1 includes rework logic. This includes a simple set of logic for determining the next step after the TEST operation.

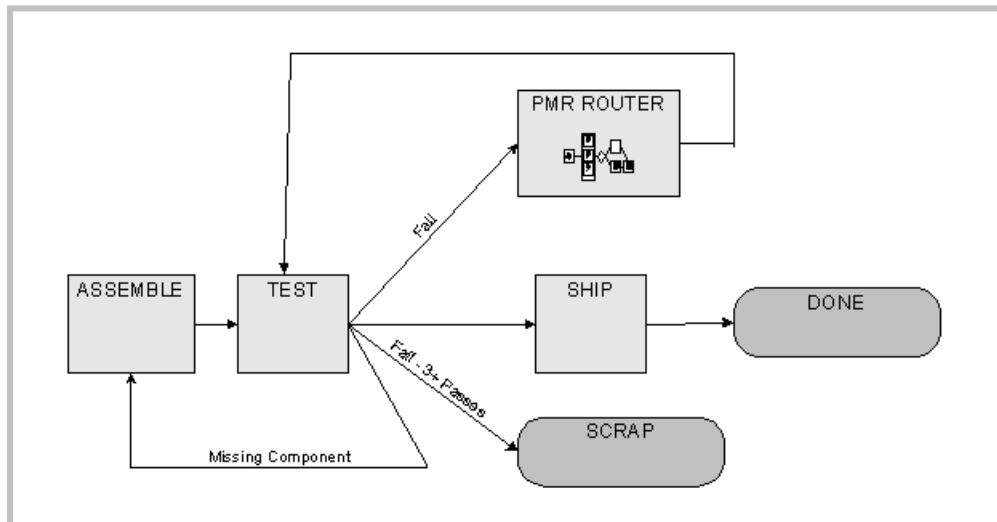


Figure 1: Step Selection Example

In this example, when an SFC exits the TEST step, it can exit one of four different ways.

Assume that the production engineer has included the following scripting for the next-step possibilities.

- For the TEST-to-SCRAP next step, the SFC should be scrapped if it fails and has been re-tested too many times (3 times). Therefore, the next-step definition between TEST and SCRAP would include the following scripting code:

```
if (NC_CODE!=null && LOOP_COUNT>=3) exit(true);
```

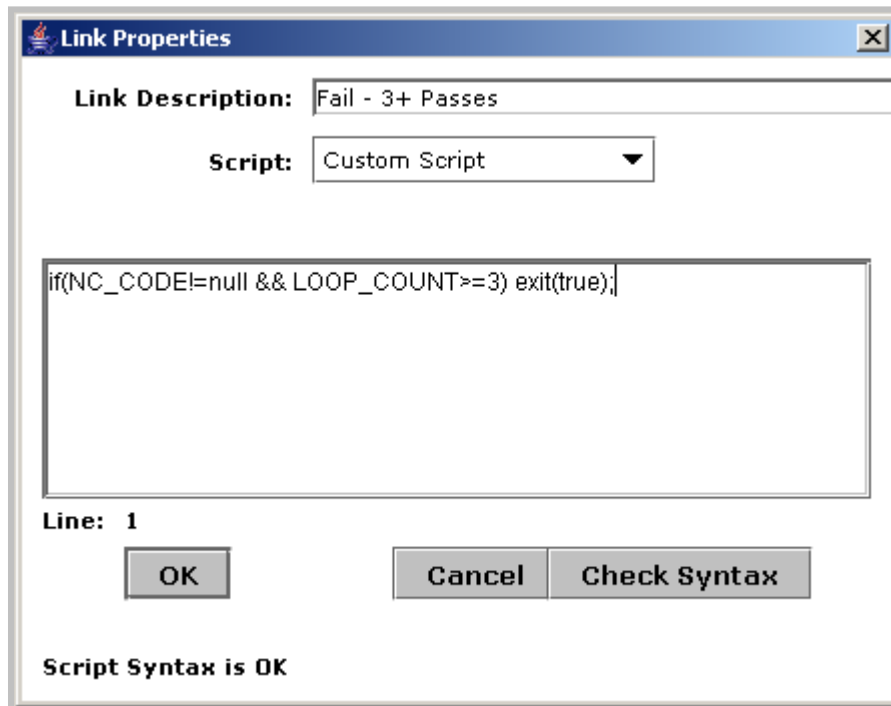


Figure 2: Next Step Logic

- The TEST-to-PMR_ROUTING next step is defined to cover the case where the SFC fails, but the loop count is less than 3, as specified in this sample code:

```
if (NC_CODE!=null && LOOP_COUNT<3) exit(true);
```
- The TEST-to-PMR_ASSEMBLE next step is defined to handle the special case when the failure (NC) that is logged is MISSING_COMPONENT, to send the SFC directly back to ASSEMBLE. The script logic for this would be something like the following:

```
if (NC_CODE == "MISSING_COMPONENT") exit(true);
```
- The TEST-to-PMR_ASSEMBLE next step is defined in this sample coding without scripting. If none of the exceptions described above are encountered, the SFC is allowed to travel through to SHIP.

A.1.3 Exit Values

Each script returns an exit value indicating if the step should be the next step for the SFC. These return values can be simple true/false values or numeric values to indicate importance.

A.1.3.1 True or False Values

The simplest case is when the scripts return true or false. This works well when the decisions are mutually exclusive (no two steps can be true at the same time). If several steps return a true value, all of the choices for the next step are displayed to the operator. The operator must then decide among the choices displayed.

A.1.3.2 Numeric Values

To make configuring the scripts easier, it is possible to return a number value (a priority) to help the operator decide which step the routing should proceed to. The number value is displayed on the screen and allows the operator to decide that one path will take priority over other valid (true) paths. A number value allows the example above to return a high priority for the “SCRAP (Failure – 3+ Passes)” path:

Return	Next Step	Script
false	SHIP	<code>if (NC_CODE==null)exit(true);</code>
true	PMR ROUTING (Failure)	<code>if (NC_CODE!=null) exit(true);</code>
600	SCRAP (Failure – 3+ Passes)	<code>if (NC_CODE!=null && LOOP_COUNT>=3) exit(600);</code>
false	ASSEMBLE (Missing Component)	<code>if (NC_CODE=="MISSING_COMP") exit(true);</code>

Using numeric values simplifies the logic for the **PMR ROUTING (Failure)** script because the `LOOP_COUNT` is no longer relevant for this line of code:

```
if (NC_CODE!=null) exit(true);
```

The numeric return also keeps the scripts independent of each other. For example, if the customer changes the loop limit to 4 in the **SCRAP (Failure – 3+ Passes)** script, no changes to the other scripts are necessary.

For the sake of comparison, these return values are treated as priorities to allow some step scripts to return true/false and others to return numbers:

Return	Priority
true	500
false	0
(null)	499
(no script)	499

Note: Return steps with the **Any Operation** or **Previous Operation** set may have multiple next steps also. This means the same script can be executed multiple times, once for each possible return step. Also, the scripts for the next steps are not executed in any specific order.

A.1.3.3 Script Exceptions and Errors

If an error is found executing a script, the script engine throws an exception. This condition causes the transaction to roll back (including the complete itself). The rollback is also done if there are any other exceptions thrown by the script or any methods it calls. If you do not want the process to fail on script errors, you must catch the exceptions in your script. Please be aware that script syntax errors cannot be caught this way.

A.1.4 Examples of Scripting for Next Step Selection

This topic shows some examples of routings defined with scripting, with a description of their behaviors. The examples covered are:

- A.1.4.1 Simple Test/Debug Loop
- A.1.4.2 Failure-Dependent Routing
- A.1.4.3 Using Custom Data Fields

A.1.4.1 Simple Test/Debug Loop

This is a simple routing that starts with a TEST operation followed by either the SHIP or DEBUG step. The DEBUG step always returns to TEST for a re-test.

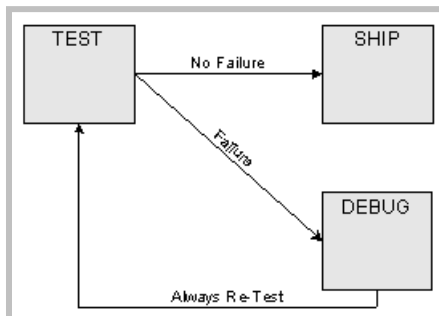


Figure 3: Simple Test/Debug Loop Examples

The script logic associated with the TEST step is shown below:

From/To Steps	Script
TEST to SHIP (No Failure)	<code>if (NC_CODE==null) exit(true);</code>
TEST to DEBUG (Failure)	<code>if (NC_CODE!=null) exit(true);</code>

The other next steps have no scripts associated with them. There are two possible scenarios with this routing:

- The SFC passes the TEST and proceeds to SHIP.
- The SFC fails the TEST and is sent to DEBUG. The SFC is repaired at DEBUG by adding a repair NC Code. The SFC is then sent back to TEST. It passes the TEST and is sent to SHIP.

A.1.4.2 Failure-Dependent Routing

This routing will send the failing SFC to two different locations, depending on the NC_CODE. The same thing can be done with the Failure ID associated with the NC_CODE.

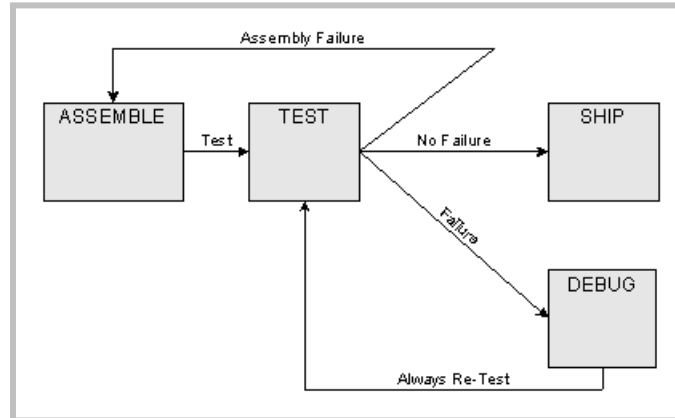


Figure 4: Failure-Dependent Routing Example

The script logic associated with the TEST next step is shown below:

From/To Steps	Script
TEST to SHIP (No Failure)	<pre>if (NC_CODE==null) exit(true);</pre>
TEST to DEBUG (Failure)	<pre>if (NC_CODE==null) exit(false); if (NC_CODE!="MISSING_COMP") exit(true); else exit(false);</pre>
TEST to ASSEMBLE (Assembly Failure)	<pre>if (NC_CODE==null) exit(false); if (NC_CODE=="MISSING_COMP") exit(true); else exit(true);</pre>

The other next steps have no scripts associated with them. There are three possible scenarios with this routing:

1. The SFC passes the TEST and proceeds to SHIP.
2. The SFC fails the TEST with the **MISSING_COMP** NC Code and is sent to ASSEMBLE. The assembly problem is fixed on the SFC and at ASSEMBLE. The SFC is then sent back to TEST. It passes the TEST and is sent to SHIP.
3. The SFC fails the TEST and is sent to DEBUG. The SFC is repaired at DEBUG by adding a repair NC Code. The SFC is then sent back to TEST. It passes the TEST and is sent to SHIP.

A.1.4.3 Using Custom Data Fields

This routing will use the custom field associated with the SFC's material to determine where to send the SFC when it fails.

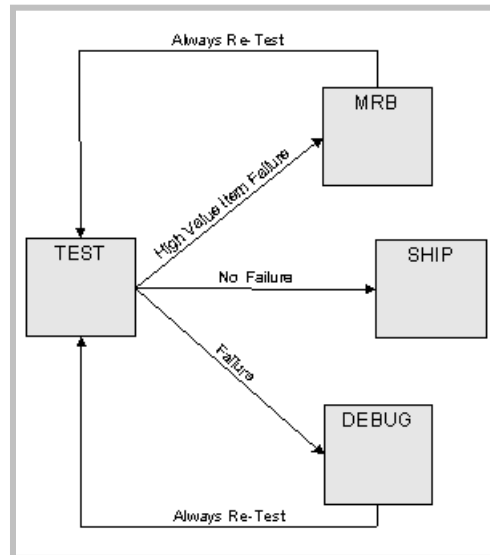


Figure 5: Failure-Dependent Routing Example

The script logic associated with the TEST next step is shown below:

From/To Steps	Script
TEST to SHIP (No Failure)	<pre>if (NC_CODE==null) exit(true);</pre>
TEST to DEBUG (Failure)	<pre>if (NC_CODE==null) exit(false); // Get the custom property COST cost=getCustomItemProperty("COST"); // Default the cost to \$100 if (cost==null) cost =100; // If the item is worth less than \$500, go to DEBUG if (cost<500) exit(true); else exit (false);</pre>
TEST to MRB (High Value Failure)	<pre>if (NC_CODE==null) exit(false); // Get the custom property COST cost=getCustomItemProperty("COST"); // Default the cost to \$100 if (cost==null) cost =100; // If the item is worth more than \$500, go to MRB if (cost>=500) exit(true); else exit (false);</pre>

The two lengthier scripts for the failure cases illustrate how to retrieve data for objects in the system, including custom data fields.

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The script for TEST to MRB is described below:

1.	If there is no failure, then the SFC should not follow the TEST to MRB path: <code>if (NC CODE==null) exit(false);</code>
2.	This statement gets the custom COST property for the material using the convenience method <code>getCustomItemProperty()</code> : <code>cost=getCustomItemProperty("COST");</code>
3.	The next statement sets a default value for the Item's cost if COST is not defined. <code>if (cost==null) cost =100;</code>
4.	The last statement includes the logic to decide whether to send the SFC to MRB: <code>if (cost>=500) exit(true); else exit (false);</code>

The size of the script is not limited, but longer scripts will run more slowly.

A.1.5 Methods Available for Scripts

The methods described below are available for scripts. The methods are documented in more detail in the javadocs, in `ScriptHelper.java` (`core.sys.server`). Check the javadocs for the current definition.

A.1.5.1 `exit()`

This method stops the script execution and returns a value to the Next Step logic. This value is used to determine which next step is used. See [Scripting for Next-Step Selection](#).

A.1.5.2 `getItemProperty()` [SFC, Operation, Resource, User]

This method allows the script to get a single property from the Material, SFC, Operation, Resource or User object.

The method itself is documented in the javadocs, in `ScriptHelper.java` (`core.sys.server`). Check the javadocs for the current definition.

If more than one property is needed, the script should use the `getEJBProperties()` method instead.

A.1.5.3 `getCustomItemProperty()` [SFC, Operation, Resource]

This method allows the script to get a single custom property from the Material, SFC, Operation or Resource object. There is no GUI available to write these custom properties, but you can import them through the XML interface.

The method itself is documented in the javadocs, in `ScriptHelper.java` (`core.sys.server`). Check the javadocs for the current definition.

A.1.5.5 `getEJBProperties()`

This method allows the script to get column values from EJBs associated with database tables. Use this method to retrieve simple fields or sub-tables (e.g. Operation Certifications).

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The method itself is documented in the javadocs, in ScriptHelper.java (core.sys.server). Check the javadocs for the current definition.

A.1.5.6 calleJB()

This method allows the script to call any method on an EJB. The method is somewhat complex and requires knowledge of the EJB being called. Therefore, use this method only as a last resort. Please consult your Professional Services Organization (PSO) for more information about using this method.

The method itself is documented in the javadocs, in ScriptHelper.java (core.sys.server). Check the javadocs for the current definition.

A.1.5.7 print(value,...)

This method prints one or more values to the WebLogic console (CMD window under Windows). This should only be used for debugging and testing purposes.

A.1.5.8 printAll()

This method prints all of the variables available to the script. This should only be used for debugging and testing purposes.

A.1.5.9 executeQuery(SQLString)

This method executes a single SQL query and returns the results in a Data object. This may be null if no records are found.

A.1.5.10 getOpenNCs()

This method returns any open NCs for the SFC being completed. This returns a Data object containing the NC_DATA information. See the javadoc for NCDataBOBean.getOpenNCs() for details.

A.1.6 Data Available for Scripts

There are several variables defined that the scripts may use. Some of these variables are defined for the convenience of the scriptwriter. Some defined variables may also exist inside the COMPLETE_DATA (see the next section) or in the NC_DATA variables.

Note: For more information about the Data object and handles, see the *Developer's Guide*.

The following table describes the script variables:

Variable Name	Description
COMPLETE_DATA	This contains the detailed information from the <code>complete()</code> action. See below for details (Data).
QTY	The Qty completed successfully (int). Note: This may not contain a fraction. If a fractional value is needed, then use QTY in the COMPLETE_DATA (BigDecimal).
QTY_NON_CONFORMED	The Qty that was nonconformed (int). Note: This variable may not contain a fraction. If a fractional value is needed, then use QTY in the COMPLETE_DATA (BigDecimal).

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Variable Name	Description
LOOP_COUNT And TIMES_PROCESSED	This is the loop count for the completing step. It is the TIMES_PROCESSED value from the SFC_STEP table (int).
OPERATION	The operation that is being completed. This is also available as a handle in COMPLETE_DATA (OPERATION_BO) (String).
TO_OPERATION	The operation that is the potential next operation. This is also available as a handle in COMPLETE_DATA (TO_OPERATION_BO) (String).
RESOURCE	The resource the step is being completed at. This is also available as a handle in COMPLETE_DATA (RESOURCE_BO) (String).
SITE	The site the complete took place in. (String).
SFC	The SFC being completed. This is also available as a handle in COMPLETE_DATA (SFC_BO) (String).
ITEM	The SFC's Item. This is also available as a handle in COMPLETE_DATA (ITEM_BO) (String).
USER	The user completing the operation. This can be a resource if it is a process resource. This is also available as a handle in COMPLETE_DATA (OWNER_GBO) (String).
RETURN_OPERATION	If the next step is a Return step, this value is the operation to return to on the original routing (String).
RETURN_STEP_ID	If the next step is a Return step, this value is the step to return to on the original routing (String).
ELAPSED_TIME	The elapsed production time for the SFC (from start to complete) (long in milliseconds).
ELAPSED_QUEUE_TIME	The queue time for the SFC (before the start) (long in milliseconds).
PROCESS_LOT	The process lot this SFC is in. (String).
NC_DATA	The NC Data for the failure on completing the operation. This value is <code>null</code> if there was no failure logged. This value is a Data object containing the NC_DATA elements. See NCDDataBOBean for details (Data).
NC_CODE	The NC Code for the failure on completing the operation. This value is <code>null</code> if there was no failure logged. This value is also available as a handle in NC_DATA (NC_CODE_BO) (String).
FAILURE_ID	The Failure ID for the failure on completing the operation. This value is <code>null</code> if there was no NC logged or if the NC had no Failure ID entered (String).
REF_DES	The Ref Des for the failure on completing the operation. This value is <code>null</code> if there was no NC logged or if the NC had no Ref Des entered. If multiple Ref Des's are recorded as part of the NC, then the values are stored in NC_DATA (REF_DES_DATA) (String).
NC_COMPONENT	The component that was failed (String).

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A.1.6.1 COMPLETE_DATA

This is the Data from the Complete() action:

Variable Name	Description
SITE	The site the complete action took place in (String).
USER_BO	The user who performed the complete action (BOHandle).
ACTIVITY	The activity that triggered the complete action (String).
OPERATION_BO	The operation that was completed (BOHandle).
TO_OPERATION_BO	The operation that is the potential next step (BOHandle).
RESOURCE_BO	The resource the operation was completed at (BOHandle).
OWNER_GBO	The owner of the SFC (User or Resource if the resource is a process resource) (BOHandle).
SFC_BO	The SFC that was completed (BOHandle).
ITEM_BO	The item for the SFC (BOHandle).
TIMES_PROCESSED	The LOOP_COUNT (BigDecimal).
QTY	The Qty completed successfully. (BigDecimal).
QTY_NON_CONFORMED	The Qty that was nonconformed (failed) (BigDecimal).

A.1.7 Scripting Permissions

Scripting functionality is a powerful tool that allows access to generic functions and system resources. Execution of scripts potentially can harm the system. Authorization should be given to appropriate personnel only.

The following security role actions are available in SAP NetWeaver UME.

Security Role Action	Security Role Action Description
ME.Service.ManageScript	Allows SAP ME user to create and save routings and data collection values with custom scripts and formulas
ME.Service.ExecuteScript	Allows SAP ME user to execute custom routing scripts or formulas in Data Collection parameters

You have to assign the actions described above to all UME security roles and users that need to create or execute routing scripts.

1. Log on to SAP NetWeaver Administrator
2. Choose Configuration > Security > Identity Management > Search Criteria: Role and search for the SAP_ME_USER role
3. Choose Modify
4. On the Assigned Actions tab, search for ME.Service.ManageScript and/or ME.Service.ExecuteScript, as needed, in the Available Actions list and add the action(s) to Assigned Actions
5. Save the changes