

# Routings (PP-BD-RTG)



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## Icons

Icon	Meaning
	Caution
	Example
	Note
	Recommendation
	Syntax
	Tip

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## Routings (PP-BD-RTG)

### Purpose

Routings enable you to plan the production of **materials** (products). Therefore, routings are used as a template for production orders and run schedules as well as as a basis for product costing.

### Integration

In order to	You also require the components
Plan the usage of materials	<i>Material master (LO-MD-MM)</i>
Plan the use of work centers	<i>Work centers (PP-BD-WKC)</i>
Plan the external processing of operations	<i>Purchasing (MM-PUR)</i>
To plan quality inspections that accompany production	<i>Quality planning (QM-PT)</i>
To prepare cost calculation according to routings	<i>Controlling (CO)</i>
To plan and to document changes to routings	<i>Engineering Change Management (LO-ECH)</i>
To classify routings	<i>Classification system (CA-CL)</i>
To automatically calculate the planned values for the activities to be produced	<i>CAPP Standard Value Calculation (PP-BD-CAP)</i>

In the R/3 System, routings have the same basic structure as the following objects:

- Master recipes
- Inspection plans
- Maintenance plans
- Standard networks

Therefore, routings are cumulated with these objects under the superordinate term *Task list*.

### Features

In a routing you plan

- The **operations** (work steps) to be carried out during production
- The activities to be produced in the operations as a basis for determining dates, capacity requirements and costs.
- The use of materials during production
- The use of work centers
- The quality checks to be carried out during production



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**Business Object - Routing (Generic)**

## Business Object - Routing (Generic)

### Definition

A routing is a description of which **operations** (process steps) have to be carried out and in which order to produce a **material** (product). As well as information about the **operations** and the order in which they are carried out, a routing also contains details about the work centers at which they are carried out as well as about the required **production resources and tools** (includes jigs and fixtures). **Standard values** for the execution of individual operations are also saved in routings.

Routings (generic) consist of the following objects:

- Routing
- Rate routing
- Reference operation set
- Reference rate routing

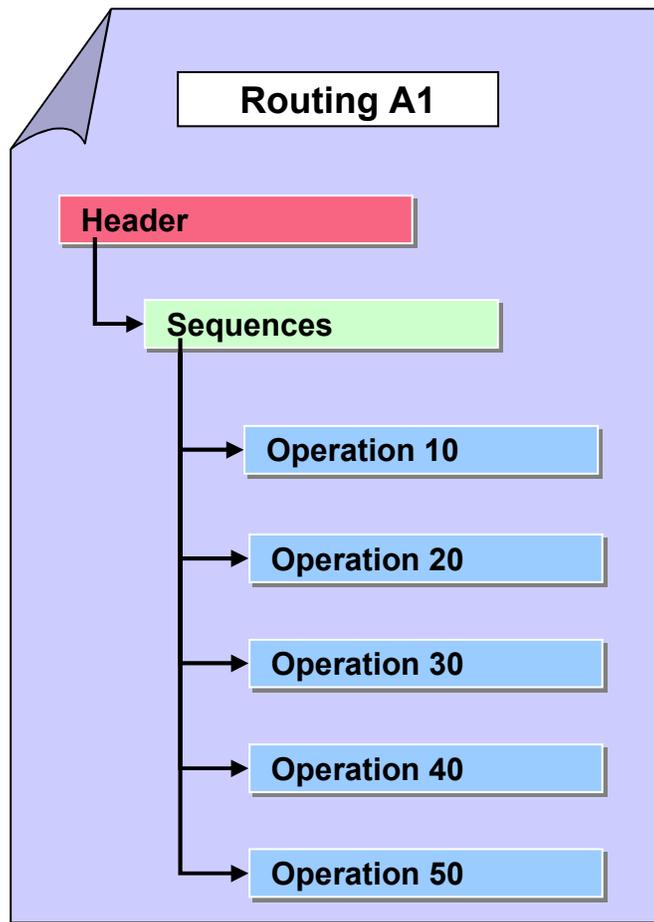
### Use

A routing is used as a source for creating a **production order** or a **run schedule header** by copying.

### Structure

A routing is composed of a **header** and one or more **sequences**. The header contains data that is valid for the whole routing. A sequence is a series of **operations**. Operations describe individual process steps, which are carried out during production (see *Routing* graphic)

A routing is identified by its **group** and **group counter**.



Routing

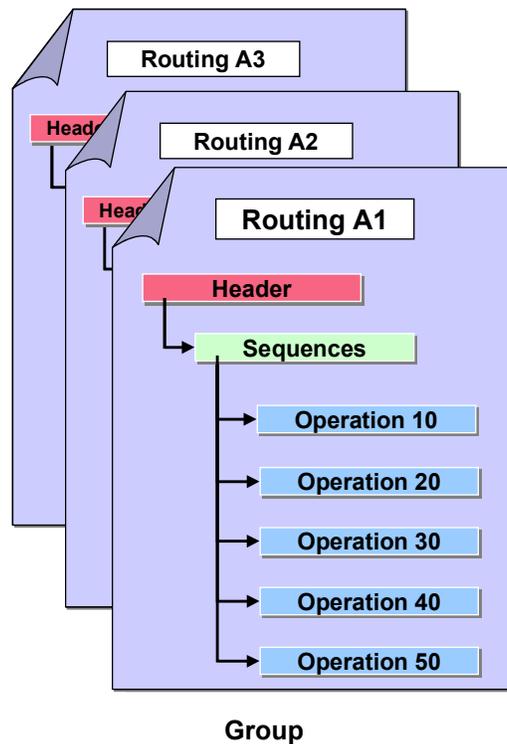
## Integration

### Group and Group counter

Routings within a group are distinguished by their **group counter**.

In the graphic the three routings in group A are identified by their group counter 1,2 or 3.

## Business Object - Routing (Generic)

**Assignment of a material to be produced to a routing**

Before you can produce a material with a routing, you have to assign the material to the routing. The routing and the material can exist in different plants.

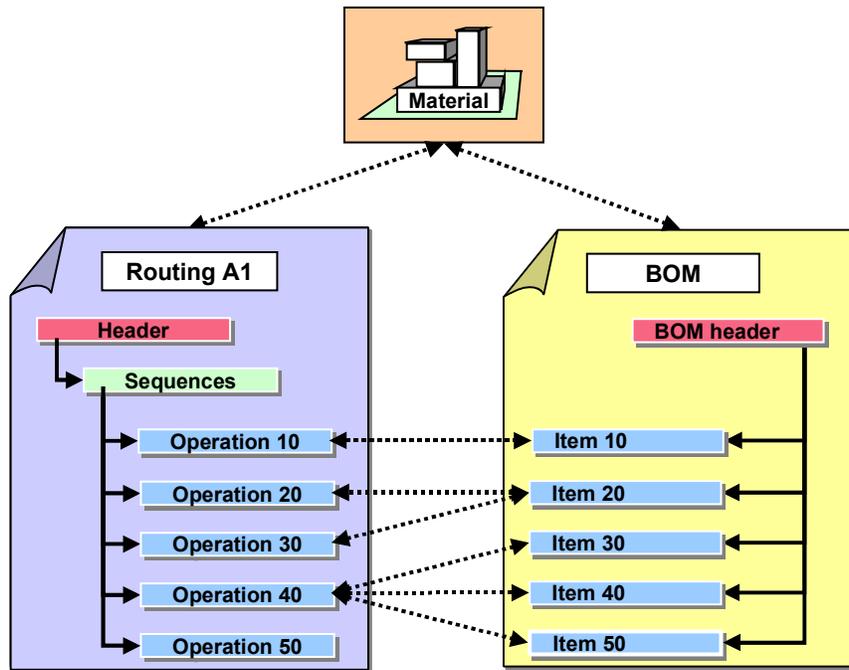
According to the **task list type**, a routing can

- Have one or more materials to be produced assigned to it.  
(This is relevant for normal routings and rate routing that are used directly for producing a material.)  
You do not have to assign a material to a routing. However, you cannot use the routing (rate routing) in a production order or run schedule header, until you have done so.
- Have no material to be produced assigned to it  
This applies to reference operation sets and reference rate routings that can only be used as part of a routing or rate routing.

**Assignment of material components to operations**

If a **bill of material (BOM)** has been assigned to a routing, you can assign its components to the routing operations. In general the BOM assigned to a routing is the material BOM for the material to be produced by the routing (see *Assignment of Materials* graphic) You can also assign BOMs to reference operation sets or reference rate routings.

Business Object - Routing (Generic)



Assignment of Materials to be Produced and Material Components

## Routing Structure and Navigation

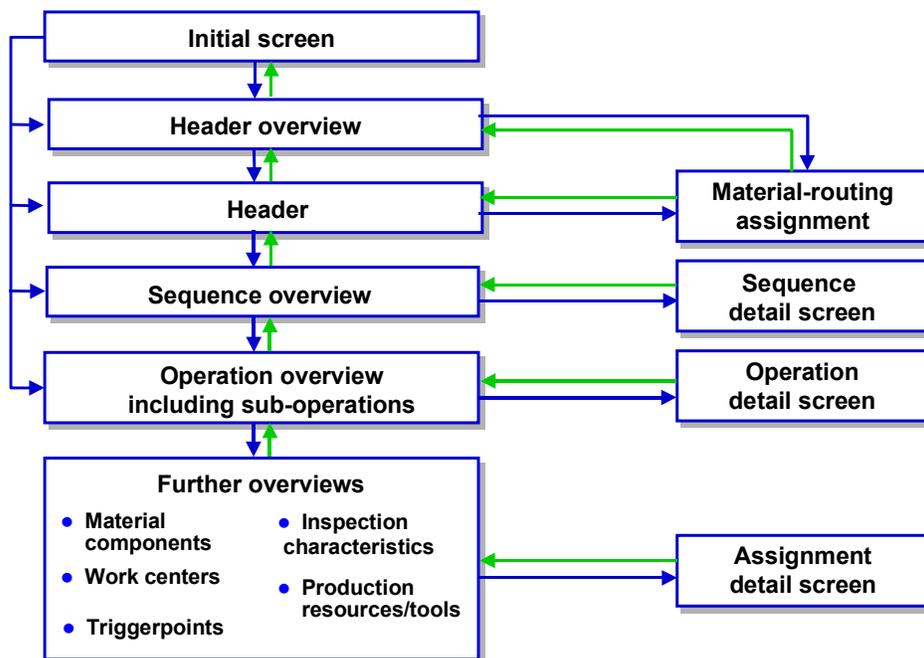
### Use

According to how detailed the data in the routing is, it is assigned to different levels in the structure. There are clear and uniform navigation routes, with which you can arrive at any screen.

#### See also:

[Business Object - Routing \(generic\) \[Page 10\]](#)

The following graphic illustrates the navigation levels and some of the navigation routes for routings.



The individual data can be found on the following levels:

- On the **initial screen** you enter data that is required to identify or select routings.
- On the header overview the routings in a group are displayed.
- The header contains data that is valid for the whole routing. For instance, information about
  - The status and use of the routing
  - General parameters for quality checks during production
  - The validity period

You can call up the following information from the header:

- Details about assignments of material component to the routing. That is, about the materials that are produced by the routing.

---

**Routing Structure and Navigation**

- A long text for a more detailed description of the routing
- The **sequence overview** contains, for instance,
  - The sequences, that are a group of process steps in a routing
  - The sequence category, whether the sequence is a **standard sequence**, a **parallel sequence** or an **alternative sequence**.
- The **operation overview** contains, for instance,
  - Operations and sub-operation, which describe the process steps in the routing
  - The work center where they are carried out
  - A short description of the process step

The operation overview is the **central screen for routing maintenance**. From here you can branch to the header, the detail screens for operations and sub-operations as well as other overviews for routings.
- On the **detail screens** for operations and sub-operations you can find data that is relevant to individual operations or sub-operations, such as,
  - Details about external processing or personnel qualifications
  - Standard values and other information for scheduling
  - Parameters for quality checks during production
- Further overview screens exist for the assignments and assignments to each operation or sub-operation. An overview is presented of the following objects that are relevant for a process step:
  - Material components
  - Work centers
  - Production Resources/Tools
  - Inspection characteristics
  - Trigger points
- The additional information for each assignment or assignment is contained on the relevant **detail screen**. This could be scheduling data for work centers or control indicators for inspection characteristics.

## Maintaining Routings and Rate Routings

# Maintaining Routings and Rate Routings

## Purpose

This process describes how to create or change a routing or rate routing.

Editing a routing is often a very simple process consisting of only a few steps, which can all be carried out by a single person. Sometimes however, the process is more complicated, for instance if the production of a material is planned by several departments according to their own business points of view.

This process documentation describes those aspects of editing routings and rate routings that are generally the most important. Possibly some of the steps described here are not so important for your individual needs.

For more detailed information about the individual process steps, refer to the special process documentation

## Prerequisites

For information about the prerequisites for individual process steps, refer to the relevant process documentation.

## Process flow



This process is valid for both routings and rate routings. For simplicity's sake only routings are discussed in the following topic.

1. You create a routing by first entering only the data that is absolutely essential.
2. If required, you can assign one or more materials to the routing.



You can also assign materials in the first step. This could be useful, if for instance you know from the start that a certain material is to be assigned to the routing.

You can also assign materials later. However you can only carry out certain steps after you have assigned material to a routing.

3. You edit the routing header.
4. You design the basics of the production process by creating one or more sequences of operations.
5. According to your needs, you can carry out the following steps in which ever order you like.
  - You plan the usage of material components in production.
  - For in-house operations you plan the use of work centers.
6. If you want to schedule a routing (see process step 9), enter the following detailed data for the operations:
  - For in-house operations you enter standard values and if necessary user fields with extra data that is not included in the standard system.

**Maintaining Routings and Rate Routings**

- For externally processed operations you enter the details of the vendor. You can do this by entering a purchasing info record. (See general operation data.)



Please note that this data is also taken into account in product costing and capacity planning.

7. If you intend to inspect the quality during production, you enter the inspection specifications and if necessary the PRTs that you need as test equipment.
8. You check the consistency of the routing data.
9. You schedule the routing.  
If necessary you transfer the scheduling results to the material master record of the material to be produced. This data forms the basis for determining basic dates in material requirements planning.
10. After you have finished editing the routing, you release it for use in production orders and/or costing. You set this status in the general header data.
11. You save the routing.

---

## Routing

### Routing

#### Definition

Routings are used directly in production orders for a material.

#### Use

A routing can be used without restrictions. Some functions from other task list types such as **rate routings** and **inspection plans** are also available in routings.

#### Structure

As well as a standard sequence a routing can also have parallel and alternative sequences. You can assign a routing to a material to be produced.

#### Integration

You can include reference operation sets in a routing as often as you like and in any order to reduce the amount of input.

## Rate Routing

### Definition

A routing for whose operations the production quantity and a fixed duration has been defined. Thus the production rate is also defined.

### Use

Rate routings are used when you plan on a quantity basis, for example in repetitive manufacturing.

### Structure

A rate routing has the same structure as a routing. You can assign a rate routing to a material to be produced. It can have **parallel sequences**.

### Integration

You can include reference rate routings in a rate routing as often as you like and in any order to reduce the amount of input.

## First Steps in Routing Maintenance

# First Steps in Routing Maintenance

## Purpose

The intention of this process documentation is to introduce you to routing maintenance. It describes the process you must follow to create or change the basic structure of a routing. Having carried out these steps, you can complete the data for the various specialist areas

## Prerequisites

The following data has been created in the system:

- The change master record for routings requiring a history
  - For more information, see the R/3 Library *LO - Engineering Change Management* under *Maintaining a Change Master*
- For routings that you want to assign to a revision level, the corresponding revision level for the material to be produced.
  - For more information, see the R/3 Library *LO - Engineering Change Management* under *Maintaining a Change Master* → *Assigning a Revision Level to a Material*.
- The master records of the work centers used in the routings

## Process Flow

1. Depending on the activity you want to carry out, you choose one of the following functions:
  - Create routing
  - Create routing by copying
  - Change routing recipe
2. You enter the initial data required for routing maintenance. This includes:
  - When you create a routing, the group to which the routing is to belong
  - When you change a routing, the group or material together with the plant for which the routing is to be selected
  - When creating or changing a routing, the validity period for which you want to maintain the routing

Depending on the change procedure required, you proceed as follows (refer to [Managing Changes \[Page 194\]](#))

Change procedure	Maintain the routing
Without history	key date
With history	With a change master record (change number)
With history for revision level	For the relevant revision level of the material to be produced

**First Steps in Routing Maintenance**

3. You enter the header data for the routing. You specify, for instance:
  - Where the routing can be used (for instance, in production or the maintenance department)
  - The routing status (for example, *Created*)
  - The responsible planner
4. You represent the individual process steps in your routing as follows:
  - For each self-contained process steps you create an operation.
  - For partial steps you create suboperations.

When maintaining operations and suboperations, you specify, for example, the control key that determines their business relevance.

You save the routing

## Group

# Group

## Definition

A group combines routings according to user-defined criteria. Routings in a group do **not** have to belong to the same plant.

## Use

When you create a routing, you can assign it to a group. You combine routings in a group that describe

- Similar production processes for different materials
- Different production processes for the same material (for example for various lot-size ranges).

Grouping helps you find routings later.



When you maintain a routing, the system loads all routings belonging to the same group. You are, therefore, advised to combine only small numbers of routings into a group.

If you do not want to group your routings, you can let the system assign a group key when you create a routing. In this case, the system creates a new group for each new routing.

## Creating a Routing

### Use

You use this procedure to create a completely new routing.

If a routing already exists in your system with similar data, you can copy this data into the new routing. In this case use the procedure [Creating Routings by Copying \[Page 26\]](#)

### Prerequisites

The following data already exists in the system:

- If you want to maintain the routing with **history**: The corresponding change master record.
- If you want to link the routing with a **revision level**: The relevant revision level of the material to be produced.

### Procedure

1. On the R/3 main menu choose *Logistics* → *Production* → *Master data* → *Routings* and then *Routings* → *Routing* (or other task list type) → *Create*. Note: In the following procedure the task list type *Routing* is referred to, primarily in menu paths. The same paths are also valid for the other task list types (reference operation sets, rate routings and reference rate routings). If you want to maintain such an object choose the <task list type> instead of *Routing*.
2. Enter the relevant data on the initial screen.
3. Choose *Enter*.

The screen that then appears depends on whether you are creating a new group or adding to an existing group.

Activity	The following screen is displayed.
Create group	<i>Create Routing Header Details</i> Continue as in Step 5.
Add to group	<i>Create Routing Header overview</i> Continue as in Step 4.

4. Choose *Edit* → *New entries*.
5. Enter the data on the *Header Details* screen.
6. Choose *Goto* → *Operation overview*. The *Operation Overview* screen appears.
7. Create operations and sub-operations for your routing.

### Save the routing.

Save the routing.

## Creating a Routing by Copying

### Use

You can reduce the effort required to create a routing by copying another routing completely or partially.

### Prerequisites

The source exists in the system.

### Features

The source and the new routing can belong to different **company codes**. The company codes must, however, belong to the same controlling area. In particular, the source and routing to be created can belong to **different** plants. The data are copied from the source to the routing being created. However be aware of the following exceptions and special features.

### Copying from a Source in Another Plant

Plant-dependent data are handled in the following manner when copying between plants:

- In the case of the materials to be produced by the routing, the reference to the plant of the source is kept in the new routing.
- All other data are copied with reference to the plant of the new routing.
- The data on the detail screens of the routing objects are checked. You have to change the data, if an entry
  - Does not exist in the plant of the new routing
  - Does not agree with the work center data in the plant of the new routing

## Creating Routings by Copying

# Creating Routings by Copying

## Use

You use this procedure to reduce the effort in creating new routings by copying from an existing routing.

If a suitable source routing does not exist in your system use the procedure [Creating a Routing \[Page 23\]](#).

## Prerequisites

The following data already exists in the system:

- The source (routing)
- If you want to maintain the routing with **history**: The corresponding change master record.
- If you want to link the routing with a **revision level**: The relevant revision level of the material to be produced.

## Procedure

1. On the R/3 main menu choose *Logistics* → *Production* → *Master data* → *Routings* and then *Routings* → *Routing* (or other task list type) → *Create*.



In the following procedure the task list type *Routing* is referred to, primarily in menu paths. The same paths are also valid for the other task list types (reference operation sets, rate routings and reference rate routings). If you want to maintain such an object choose the <task list type> instead of *Routing*.

2. Enter the relevant data on the initial screen.
3. Choose *Routing* → *Copy from*.
4. Select the required task list type and choose *Continue*.
5. Enter the necessary data for selecting a source routing.  
All routings that fit the selection criteria are displayed in a dialog box.
6. Place the cursor on the required source and choose *Choose*.  
The data is copied from the source to the new routing. For information about exceptions and special features, refer to [Create by Copying \[Page 25\]](#)
7. If necessary, append or change the header data that was copied and choose *Continue*.  
The changes are checked completely by the system.  
For example, if you have changed the plant from that of the source and the original work centers do not exist in the new plant, the details screen with the relevant fields is displayed automatically.  
If no inconsistencies are found, the operation overview is displayed.
8. If necessary, change or append the operations and sub-operations that were copied.  
Save your routing.



## Routing Creation (Using the Results from Configuration Simulation)

### Use

You can use this function after you have exploded the routing of a configurable material in **configuration simulation**. This function allows you to use the results of such an explosion as a source for a routing.

### See also:

*LO - Variant configuration* by choosing *Simulation*.

## Routing Creation via Batch Input

### Use

You can use Batch-Input to transfer routing data from an external system to R/3.

### Features

You can create routings and reference operation sets using Batch Input.



You can only use Batch Input to **create** routings, you cannot use it to **change** them..

You use program RCPTRA01 to generate Batch Input sessions, with which you can fill the following screens:

#### Sequence of processed screens during batch input

Screen	for routings	for reference operation sets
Initial screen	yes	yes
Routing header	yes	yes
Header overview	yes	yes
Material-task list assignment	yes <sup>1</sup>	NO
Routing long texts	yes	yes
Sequence overview	yes	NO
Sequence detail	yes	NO
Sequence long texts	yes	NO
Operation overview (for operations <b>not</b> referenced)	yes	yes
Referenced operation sets	yes	NO
Operation detail	yes	yes
User-defined fields in operation	yes	yes
Operation long texts	yes	yes
Component overview	yes	yes <sup>2</sup>
PRT overview	yes	yes
PRT detail	yes	yes

<sup>1</sup> In batch input, the material assignment to task list does not take place on the initial screen as is the case with online processing.

---

**Routing Creation via Batch Input**

<sup>2</sup> The superior material (header material) to which the components belong is internally processed before the component overview. When processing online, you receive a dialog box here where you enter the header material.

**Activities**

You use the program RCPTRA01 to generate Batch Input sessions from an input file. the system can then generate routings from the Batch Input sessions.

**See also:**

*BC - Basis-Programming Interface* by choosing *Transferring Data with Batch Input*

## Creating Routings Using Batch Input

### Purpose

You use this process to create routings via Batch Input.

### Prerequisites

If you want to work with batch input sessions, you have to activate the **entry tool** in the routing profile of the R/3 System. Therefore, you have to choose a profile in which the entry tool is activated for field BIPKO-PROFIDNETZ (record type 3).

### Process Flow

When creating routings and reference operation sets via Batch Input sessions, the first steps in routing maintenance is via the **task list group**.. Material assignments are made afterwards. You should therefore enter the group number and the group counter in the *task list group* field of the input file. If you do not, the system automatically assigns internal group numbers and creates a new group for each routing.

#### See also:

For more information about data structure and the sequence of data records in the input file refer to the program documentation for program RCPTRA01.

## Changing Routings

# Changing Routings

## Use

You use this procedure to change the data of individual routings.

If you want to change objects in several or all of your routings, you should use one of the following procedures:

[Changing Work Centers \(Mass Changes\) \[Page 220\]](#)

[Replacing PRTs \(Mass Changes\) \[Page 227\]](#)

## Prerequisites

The following data already exists in the system:

- The source (routing)
- If you want to maintain the routing with **history**: The corresponding change master record.  
(See R/3 Library *LO Engineering Change Management, Maintaining Change Master Records*)
- If you want to link the routing with a **revision level**: The relevant revision level of the material to be produced.  
See R/3 Library *LO Engineering Change Management, Assigning a Revision Level to a Material*)

## Procedure

1. On the R/3 main menu choose *Logistics → Production → Master data → Routings*.
2. Choose *Routing → Change*.

Note: In the following procedure the task list type *Routing* is referred to, primarily in menu paths. The same paths are also valid for the other task list types (reference operation sets, rate routings and reference rate routings). If you want to maintain such an object choose the <task list type> instead of *Routing*.

3. Enter the relevant data on the initial screen.
4. Choose *Enter*.

The screen that then appears depends on the group you entered.

If there	you reach the
is only one routing in the group	operation overview for this routing
are several routings in the group	<i>header overview</i>

5. The further procedure depends on which data you want to change or enter. For information, refer to

[Editing Header Dat \[Page 34\]](#)<sup>a</sup>

[Editing Operations and Sub-operations \[Page 58\]](#)

[Editing Material Components \[Page 82\]](#)

## Editing Header Data

# Editing Header Data

## Purpose

In this process you edit the data in the routing header. This is the data that is valid for the whole routing. You edit both general entries for processing the routing as well as data for various specialist areas (for example quality management).

Use the current process, if you want to edit all the header data at once, irrespective of whether they are thematically linked or not. You can find some of process steps below in other process documentation, which describes more specialist aspects of editing routing data.

## Prerequisites

The following data already exists in the system:

- The dynamic modification rule that you want to use for carrying out quality testing during production using this routing.
- The classes for classifying the routing

If you want to classify the routing, the corresponding classes must have been created in the system.

## Process flow

1. You enter or change the routing header data. You determine:
  - The status and usage of the routing.
  - The planner group responsible for maintaining the routing
  - whether and for which order types the standard values should be calculated using the application component *CAPP-Calculation of Standard Values* (PP-BD-CAP) when an order is created.
2. In the QM data you decide:
  - Whether the inspection is carried out using inspection point or not.
  - Whether the inspection scope is to be adjusted dynamically and if so, at which level.  
According to your decision you enter further data for inspection scope processing and dynamic modification.
3. You enter a long text with explanations and notes for the header.
4. If you want to find the routing in future by using self-defined classification attributes, classify the header.

## Maintaining the Header

1. In the header overview select the routing whose header data you want to maintain.
2. Choose *Details* → *Header*.

Enter the relevant data on the *Header Details* screen

## Material Assignment for Routings

## Material Assignment for Routings

### Use

You use this function to determine which material is to be produced with a routing or rate routing.

On the basis of this assignment, the routing can be used for sales and operations planning, material requirements planning, creating production orders and product costing for this material.

### Prerequisites

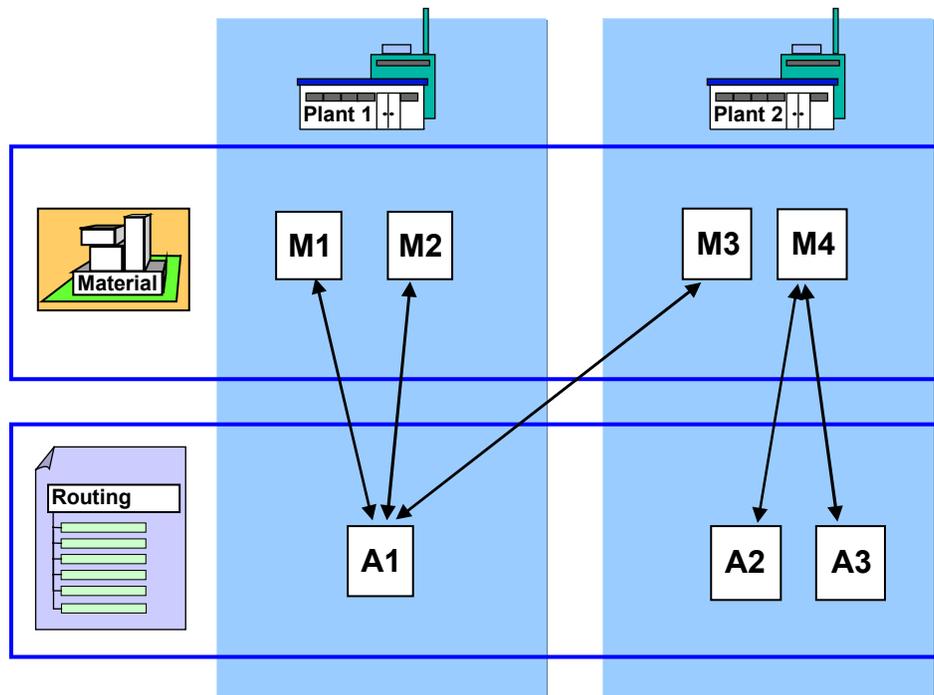
The material to be produced has a material master record in the system.

The material master record has been assigned a material type that is intended for assignment to a routing or rate routing (see Customizing for routings).

### Features

You can link routings and the material to be produced in the following ways (see graphic):

- A routing can be used to produce several materials (for example red and green chairs).
- Material and routing can belong to different plants, for example the planning plant and the production plant must not be the same.
- A material can be produced with different routings. The different routings can be from different plants.





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**Assigning Material to a Routing**

## Assigning Material to a Routing

### Prerequisites

The material to be produced has a material master record in the system.

The material master record has been assigned a material type that is intended for use in a routing or rate routing (see Customizing for routings).

### Procedure

1. On the *Header Overview* screen, choose *Routing* → *Material assignment*.
2. Enter the following data:
  - The group counter of the routing, to which you want to assign material.
  - The material
  - The plant for the material

Choose *Continue*.

## Editing Production Versions

### Use

You use production versions to determine which alternative BOM is used with a routing to produce a material or create a master production schedule.

### Integration

Production versions are used in sales & operations planning (SOP), material requirements planning, creating production orders as well as product costing to select the most suitable routing.

### Prerequisites

The material, for which you want to create a production version, must exist in the system.

### Features

For one material you can have several production versions for various validity periods and lot-size ranges.

You assign each production version to an alternative BOM and up to three work centers for different planning levels.

- In detailed planning you determine which routing is used for materials requirements planning, product costing and in production orders.
- In rate-based planning you determine which (rate) routing is used in repetitive manufacturing.
- In preliminary planning you determine which rough-cut planning profile is used for sales and operations planning.
- If you want to create capacity requirements during preliminary planning, you can use a routing instead of a rough-cut planning profile.

### Activities

You edit production versions for a material in the **material master record** in the *Work scheduling* view (see R/3 Library *LO - Managing Material Master Data*) There you can

- Create several production versions for one material/routing combination

Delete production versions

## Editing QM Data in the Header

### Use

If quality inspection accompany production, the routing can take over the role of an inspection plan.

You determine the basic data for the inspection in the QM data of the header (that is, in the data for quality management).

### Prerequisites

You have installed the application component *Quality management (QM)*.

The following data exist there:

- The inspection data of the material to be produced.
- If you want to dynamically adjust the inspection scope,
  - the dynamic modification criteria of the routing origin (see Customizing for quality management)
  - the dynamic modification rule

### Features

#### Use of Inspection Points

You plan inspections that accompany production in the operation that is affected. If an inspection is to be repeated at a certain interval during the operation, you can use inspection points to add more detail.

Inspection points for inspections during production are freely defined reference objects for entering inspection results below operation level. You group results from a certain interval in an operation together. The interval can be defined as referring to time (for instance 2 hours), a quantity (for instance 5 containers) or any chosen event.

In the QM data in the header you decide:

- Whether you use inspection points
- which field combination you use for identifying the inspection points (for instance *Lock Container* and *Shift*)
- whether you want to group the inspection points for partial lots and batches together.

#### See also:

R/3 Library *QM Quality Management, Quality Management in Logistical Processes* → *QM in Production*

#### Dynamic Modification of the Inspection Scope

You can dynamically modify the inspection scope to the expected quality level:

You use a dynamic modification rule to lay down the conditions under which inspections are tightened or reduced. On the basis of the rule the system evaluates the results of the last inspections. From the so determined inspection severity it lays down the inspection scope for the individual characteristics using a sampling procedure or further dynamic modification criteria.

---

**Editing QM Data in the Header**

In the QM data in the header you decide:

- Whether the inspectionscope is dynamically modified
- Whether this is done at inspection lot level or at inspection characteristic level, that is with different dynamic modification rules for individual characteristics.
- Which dynamic modification rule is used
- If you work at characteristic level this value only serves as a default for the characteristic dynamic modification rule.
- If you work at inspection lot level, which dynamic modification criteria are used for sample determination, for example, vendor or manufacturer.

You always assign the sampling procedure to the characteristic

**See also:**

R/3 Library *QM Quality Management, Dynamic Modification*

**External Numbering in Results Recording**

For results recording you determine in the the header,

- Whether an inspector can issue an external number or not

Whether an external number has to be unique.

---

**Maintaining QM Data in the Header**

## Maintaining QM Data in the Header

### Prerequisites

You have installed the application component *Quality management (QM)*.  
The following data exist there:

- The inspection data of the material to be produced.
- If you want to dynamically adjust the inspection scope,
  - the dynamic modification criteria of the routing origin (see Customizing for quality management)
  - the dynamic modification rule

### Procedure

1. On the header overview select the routing, for which you want to maintain quality management data (QM data).
2. Choose *Details* → *Header*.
3. Enter the parameters for the inspection points and dynamic modification.



To activate the use of inspection points, you must enter a field combination in the Inspection points field.

## Creating a Long Text for Routing

1. In the header overview select the routing for which you want to enter a long text.
2. Choose *Goto* → *Long text*.  
The text editor screen appears.
3. Enter the desired text.
4. Save your text.

Return to the header overview.

---

**Routing Classification**

## Routing Classification

### Use

You use classification to group routings according to your own point of view. This gives you additional criteria for finding routings.

### Integration

You have installed the application component *CA-CL Classification system*.

### Prerequisites

The classes with which you want have been created in the system with class type *018 task list class*.

The classes have been assigned characteristics to describe the individual routing attributes.

### Features

You classify routings by assigning similar routings to the same task list class. You can assign every task list in a task list class one characteristic value for each characteristic in the class.

When call up routings later, a search help is available, with which you can find routings by entering the class or its characteristics. Using this search help you can call up, for instance:

- All the routings in a class

All the routings in a class that have particular characteristic values.

## Classifying Routings

### Prerequisites

You have installed the application component *CA-CL Classification System*.

The class type *018 task list class* has been created for classifying task lists.

The classes have been assigned characteristics to describe the individual routing attributes.

### Procedure

1. On the *Header Details* screen choose *Extras* → *Classification* → *Header* and then *Edit* → *New Entries*.
2. Enter the class with class type 018 task list to which you want to assign the routing.
3. Choose *Edit* → *Values*.

A list of class characteristics for the task list class appears.

Enter characteristic values that are valid for the selected routing.

## Editing Sequences

# Editing Sequences

## Purpose

In this process you design the basics of the production process by creating one or more sequences of operations. First you create a number of sequences, during which you only enter the absolutely necessary details for the operations.

Use this process, if you want to create all the sequences at once. However, you can also enter all the data for the operations and suboperations in one sequence before you create the next sequence. In this case you must switch between the current process and the process [Editing Operations and Suboperations \[Page 58\]](#)

## Prerequisites

In the system the general entries about the routing header data have already been created.

## Process flow

1. You create the operations in the standard sequence. For every operation you enter at least the **control key** in the operation overview of the routing.
2. If one or more operations in your production process are to be replaced under certain conditions, create one or more alternative sequences. Enter a **lot size**, if you want the system to automatically select an alternative sequence based on the lot size.
3. If in your production process several operations are to be processed simultaneously, create one or more parallel sequences.
4. If you want to schedule your routing and have created parallel sequences, specify where floats exist due to operations with differing durations being executed at the same time. To this purpose, you create an alignment key for the standard sequence and every parallel sequence.

You save the routing.

## Sequence

### Definition

A linear sequence of operations (production steps), which are carried out after another, according to their operation numbers.

### Use

You use a single sequence to represent a simple linear series of production steps in production. If you want to represent a more complex series of production steps, you link several sequences with relationships to predecessors and successors.

### Structure

A sequence contains a number of consecutive operations.

### Integration

A sequence is subordinate to the routing header.

In the simplest case a routing only has one sequence, the standard sequence. Every other sequence is either an alternative or a parallel sequence, depending on whether its operations are performed as an alternative to the standard sequence or in parallel (at the same time) with the standard sequence. Only **routings** can have alternative sequences, parallel sequences can be created in both routings and **rate routings**.

---

**Standard Sequence**

## Standard Sequence

### Definition

A linear series of operations, orientated on the production process, from which parallel and alternative sequences can branch off.

### Use

The system automatically creates the standard sequence, when you create a routing. You create parallel or alternative sequences, if you do not want to execute all the operations in a routing consecutively. The standard sequence serves as a **reference sequence** for parallel and alternative sequences.

## Parallel Sequence

### Definition

A linear sequence of operations that is parallel to a sequence of operations in the standard sequence.

### Use

A parallel sequence enables you to process several operations at the same time. A parallel sequence is carried out at the same time as the corresponding section in the standard sequence. It is a special form of overlapping operations.

### Integration

You can create parallel sequences in **routings** and rate routings. You cannot create them in reference operation sets or reference rate routings.

---

**Alternative Sequence**

## Alternative Sequence

### Definition

A linear sequence of operations that is an alternative to a sequence of operations in the standard sequence.

### Use

You use an alternative sequence for example, if

- The production flow is different for certain lot-size ranges  
For instance you can machine a work piece on conventional machine or on NC machines. A NC machine has a longer set-up time than a conventional machine. However the machining costs are considerably less. Therefore whether you use NC machines will depend on the lot size.
- The production flow changes under certain business conditions.  
For instance, if you have a capacity problem, you have some production steps performed externally by a vendor.

### Integration

You can only create alternative sequences in routings. You cannot create them in reference operation sets, reference rate routings or rate routings.

## Maintaining the Standard Sequence

1. Call up the sequence overview and select the standard sequence.
2. Select the menu options *Details* → *Sequence*.

The *Sequence Details* screen is displayed. As well as fields for the description and alignment key there are also fields for administrative data for the sequence.

---

**Creating a Parallel Sequence**

## Creating a Parallel Sequence

### Use

You use this function to create a parallel sequence in a routing.

### Prerequisites

The following data already exists in the system:

- General entries about the routing header data
- At least one operation in the standard sequence

### Features

Only the first operation of a referenced operation set (or reference rate routing) that has not been unlocked can be used as a branch or as a return operation for alternative or parallel sequences. To use other operations within a reference operation set (or reference rate routing) for your parallel sequence, you must first unlock the reference.

## Creating a Parallel Sequence

1. Call up the sequence overview.
2. Choose *Edit → New entries*.  
The *Choose Sequence Category* dialog box appears.
3. Select *Parallel sequence* and press *Continue*.  
The *Sequence Details* screen is displayed.
4. Enter the necessary data.
5. Select *Operation overview* to create operations for the parallel sequence.

---

**Creating an Alternative Sequence**

## Creating an Alternative Sequence

### Use

You use this function to create an alternative sequence in a routing.

### Prerequisites

The following data already exists in the system:

- General entries about the routing header data
- At least one operation in the standard sequence

### Features

You can enter a lot-size range, so that the system automatically selects the alternative sequence if an order lies within this range. The lot size range of an alternative sequence can differ from the one specified in the routing header. However, it must overlap at least partially with the lot size range in the routing header.

Only the first operation of a referenced operation set that has not been unlocked can be used as a branch or as a return operation for alternative or parallel sequences. To use other operations within a reference operation set for your alternative sequence, you must first unlock the reference.

## Creating an Alternative Sequence

1. Call up the sequence overview.
2. Select the menu options *Edit* → *New entries*.  
You reach the *Choose Sequence Category* dialog box.
3. Select *Alternative sequence* and choose *Continue*.  
The *Sequence Details* screen is displayed.
4. Enter the necessary data.
5. Select *Operation overview* to create operations in the alternative sequence.

## Alignment key

## Alignment key

### Definition

Determines where floats are in the standard sequence or a parallel sequences.

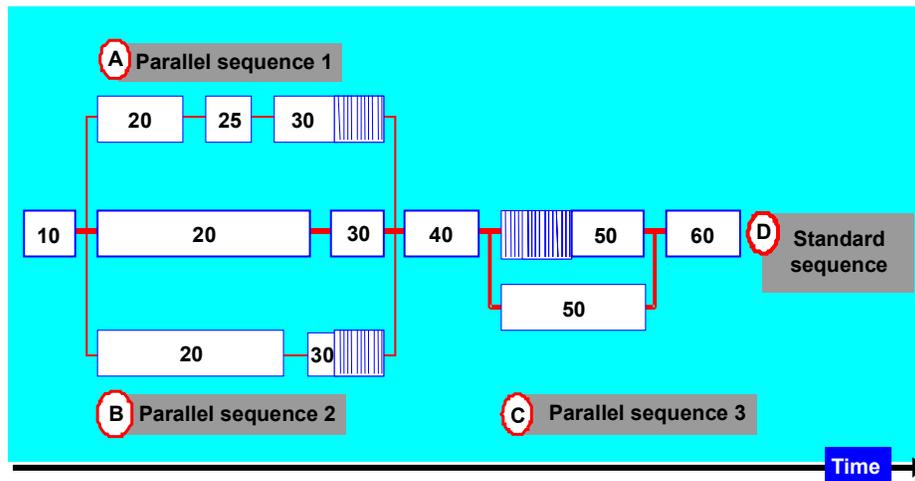
### Use

If several sequences in a routing are to be carried out in parallel, the lead times of these sequences generally differ. As a result, floats occur within the sequences. These floats can be either at the start or the end of a sequence. The alignment key determines where a possible float is in a sequence.

- If the sequence is aligned with the earliest date, the float is at the finish of the sequence.
- If the sequence is aligned with the latest date, the float is at the start of the sequence.

### Integration

An alignment key is assigned to the standard sequence and to each of the parallel sequences. The following graphic shows the relationship between the alignment key and how sequences are scheduled. The floats are hatched in the graphic. Although the parallel sequences A and B are aligned to the earliest possible date, the standard sequence has an alignment key, that aligns the sequence to the latest possible dates.



The alignment key is valid for **all** of the sections in the standard sequence for which there are parallel sequences.

In the above example this is true for operations 20 and 30 as well as operation 50 in the standard sequence.



## Editing Operations and Sub-operations

# Editing Operations and Sub-operations

## Purpose

In this process you edit the individual steps needed to produce a material. You enter general data about these production steps and data that are required in subsequent processes, for instance scheduling and costing.

The following process steps are also described in the other processes for editing routings; these describe the initial steps in editing routings as well as various other subjects. Use the current process, if you want to edit all the operation and sub-operation data at once, irrespective of whether they are thematically linked or not.

## Prerequisites

The following data already exists in the system:

- General entries about the routing header data
- The master records of the work centers, where the production steps are to be carried out.
- For externally processed operations you enter the details of the vendor. You can do this by entering a purchasing info record. (See general operation data.)

## Process flow

1. You represent the individual production steps in your routing as follows:
  - You create an operation for each production step.
    - To add more detail to an operation, you create sub-operations for this operation.  
You need to determine the following:  
For in-house processing operations and sub-operations the work center where the operations/sub-operations are to be carried out  
If you want to determine the work center later (for instance, when the routing is used to create a production order or a run schedule), assign a dummy work center provisionally.  
The control key that determines the business properties of the operations and sub-operations
2. In order to schedule the routing, plan capacities, and for costing, you have to enter the following details about the operations and sub-operations:
  - For in-house operations and sub-operations you enter standard values and if necessary user fields with extra data that is not included in the standard system.
  - For externally processed operations and sub-operations assign the data of the vendor, who receives the order.
3. If you use the component *payroll accounting (PY)* and work with incentive wages, you can enter a wage type for use as a default for time ticket confirmations and time tickets.
4. If a quality inspection is to be carried out for a production step, you define the QM data for the operation,

---

**Editing Operations and Sub-operations**

- Which view is called up first when you confirm inspection results
- How long the inspection interval between inspection points is
- Whether assignment of the last partial lot takes place during results recording for the operation (optional)
- 5. You enter a long text with explanations and notes for the operation or sub-operation.

You save the routing.

## Operation

# Operation

## Definition

Used in a routing, to describe the activity that is to be carried out during a process step.

## Use

Operations are the central object in routings. The system uses operation data to determine dates, capacity requirements and costs for a production process.

## Structure

Depending on your requirements, an operation can contain the following data:

- A control key, which determines
  - Whether the operation is processed internally or externally by a vendor.
  - Whether dates, capacity requirements and costs are determined
  - Whether, afterwards in order processing, a confirmation can or must be made
- A wage type for settling incentive wages
- **External processing data**, which form the basis for externally processing sub-operations, including scheduling and costing
- **Standard values**, which are planned values for the activities to be performed in a sub-operation.
- **User-defined fields** with any customer-defined data
- **Inspection specifications** for quality inspection during the operation

## Operations

The operation data includes:

- The **plant** in which the operation is to be carried out
  - An operation that is not to be carried out in the plant in the routing can be assigned to another plant. Both plants only have to belong to the same controlling area.
- The work center where the operation is to be carried out
- **Standard values** for determining dates, capacity requirements and costs

## Integration

### Plant

An operation that is not to be carried out in the plant in the routing can be assigned to another plant. Both plants only have to belong to the same controlling area.

### Work center

Usually an operation is assigned to a work center where it is carried out. If **standard values** have been maintained in the work center, they are copied to the operation. If you set a reference

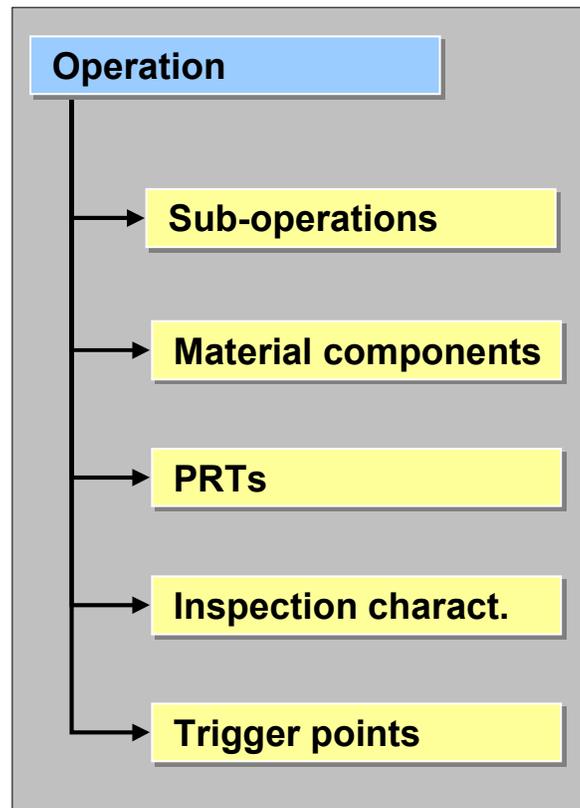
indicator, you stipulate that a standard value can only be changed in the work center. This change is automatically transferred to the routing.

### Subordinate routing objects

The following objects can be assigned to an operation at a subordinate level (see graphic below)

- **Sub-operations**, with an operation can be described in a more detailed manner
- **Material components**, that are used to manufacture the finished product
- **Production resources and tools** necessary for executing the operation
- **Inspection characteristics** for quality inspections during the operation
- **Trigger points**, for triggering certain functions when an operation is carried out

### Operations and subordinate routing objects



Operation

## Sub-Operations

### Definition

Is subordinate to an operation and is used for more detailed planning of the process step that is described in the operation.

### Use

For example, you can use sub-operations to assign several people or machine that are required at the same time, to an operation. An sub-operation can be costed, but can only be scheduled relative to superior operation. You can cumulate standard values from sub-operations on the corresponding operation. You can determine whether sub-operations belonging to an operation are copied into the production order.

### Structure

Depending on your requirements, a sub-operation can contain the following data:

- A control key, which specifies
  - Whether costs are determined for the sub-operation
  - Whether the sub-operation is processed internally or externally by a vendor.
  - Whether, afterwards in order processing, a confirmation can or must be made
- A wage type for settling incentive wages
- Standard values, which are planned values for the activities to be performed in a sub-operation.
- **External processing data**, which form the basis for externally processing sub-operations
- **User-defined fields** with any customer-defined data

## Integration

### Operation

- An operation that is not to be carried out in the plant in the operation or routing can be assigned to another plant. The plants only have to belong to the same controlling area.
- A sub-operation can be assigned to another plant as its superior operation.
- The unit of measure in the sub-operation can differ from the one in the operation.

### Subordinate routing objects

You cannot assign material components, production resources/tools nor inspection characteristics to sub-operations, only to operations.

## Control Key

## Control Key

### Definition

A user-defined key that determines how any operation or sub-operation is handled in order processing and in product costing.

### Use

You define control keys in Customizing for either work centers, production orders or routings.

You assign a control key to an operation or sub-operation in routings or production orders. You can save a control key in a work center, so that when the work center is assigned to an operation or sub-operation in a routing, it is copied over.

### Structure

The following table describes which settings are included in a control key, and whether these setting are relevant for operations or sub-operations.

For detailed information about individual setting in routings or production orders, call up the input help (F4) for the control key and then in the *detailed information* section the F1 help for the indicator.

**Control key: Relevance for a (sub)operation**

Settings for	Operation	Sub-Operations
Scheduling	X	X
Capacity Planning	X	X
Costing	X	X
Automatic Goods Receipt	X	
Inspection characteristics	X	
Rework	X	
Printing confirmations	X	X
Printing time tickets	X	X
Printing in general	X	X
External Processing	X	X
Scheduling externally processed operations	X	
Confirmation	X	X



## Editing External Processing Data

# Editing External Processing Data

## Use

External processing is when you have individual production steps, that is operations or sub-operations, carried out outside of your company by a vendor.

You enter the data you need for awarding and processing external processing contracts in the operation or sub-operation. When you create a production order the system automatically creates a purchase requisition for the operation or sub-operation

## Prerequisites

You have installed the application component *Purchasing (MM-PUR)*.

The relevant purchasing master data are created in this component (see R/3 Library *MM-Purchasing, Master Records from the Purchasing View*).

## Features

### Entries in Routings

You decide whether an operation or sub-operation is processed externally via its **control key**. You also determine in the control key whether externally processed operations are scheduled on the basis of their standard values or the planned delivery time.

Additionally you enter the following data that is required for the further processing of the order.

- Whether the work is to be done in subcontracting, that is whether you are going to supply the vendor with components
  - In subcontracting operations the assigned material components are automatically provided.
  - You can however remove individual components from the list of components to be provided. To do so, set the *material provision indicator* correspondingly in the BOM item.
- **Data of the vendor**
  - If known, you can enter the purchasing info record of a particular vendor with the responsible purchasing organization. You require a purchasing info record that does not have a material master record and is intended for procurement types *Normal* or *Subcontracting*.
  - The relevant vendor data are then copied from the purchasing info record.
  - Otherwise you enter the sort string, material group and the planned delivery time.
  - Purchasing will then pick a vendor, using this data, when the purchase order is created.
- The cost element
  - You need this information to settle externally processed operations and sub-operations that have been marked as relevant for costing in their control keys.

### Processing Externally Processed Operations During Order Processing

When a production order is created, the external processing data is copied to the production order. You can change this data in the production order.

---

**Editing External Processing Data**

When you save the production order, the system automatically creates a purchase requisition for the externally processed operations and sub-operations. This is then processed in purchasing.

**Activities**

You enter the control key when you edit operations and sub-operations on the overview screen.

You enter the remaining external processing data on the detail screen of the operation or sub-operation.

---

**Providing Components**

## Providing Components

### Prerequisites

If you want to assign a material component as a part-to-be- provided to an operation, you

- choose a control key that allows external processing
- set the *Subcontracting* indicator in the purchasing data for the operation.

### Procedure

1. In the operation overview choose *Goto → CompAlloc. gen.*  
The *Material Component Overview* screen appears
2. Select the BOM item that you want to provide and choose *Edit → New Assignment.*  
The *New Assignment* screen appears.
3. Enter the operation that the component is to be provided for and choose *Continue.*  
You return to the *Material Component Overview* screen
4. Save you routing.

## Additionally Assigning Components Without Providing them

### Prerequisites

You have already assigned a material component to an operation as a to-be-provided component

You now want to assign another component to the same operation, but this component is **not** to-be-provided.

### Procedure

1. In the operation overview choose *Goto → CompAssig. gen.*  
The *Material Component Overview* screen appears
2. Select the BOM item that you want to provide and choose *Edit → New Assignment.*  
The *New Assignment* screen appears.
3. Enter the operation that the component is to be provided for and choose *Continue.*  
You return to the *Material Component Overview* screen.
4. Choose *Extras → BOM.*  
The item overview for the BOM appears
5. Select those BOM items that are not to be provided and choose *Goto → Item → Status/Long text.*  
The *Item: Status/Long text* screen appears.
6. Enter  $\perp$  in the *Mat. provision ind.* field and choose *Back* twice.  
You return to the *Material Component Overview* screen
7. Save your routing.

## Standard Value Editing

# Standard Value Editing

## Use

You use this function to enter planned values for the activities to be performed in an operation or sub-operation, for example the required processing time or energy.

You can refer to the standard values for an operation or sub-operation in work center formulas. Thus the standard values are the basis for scheduling, capacity planning and calculation.

## Prerequisites

The following data are contained in the master record of the work center that is assigned to the operation or sub-operation:

- A standard value key, which determines which standard values you can enter
- A rule for maintenance for every standard value, which determines if you must, should or can enter a value
- Default values for the units of measure for the standard values as well as the necessary activity types (if required)

## Features

Depending on the standard value key, you can edit up to six different standard values for an operation or sub-operation

You enter the standard values with reference to the base unit of measure for the material to be produced. With costing-relevant operations or sub-operations that are carried out at a work center with a cost center, you also define the associated activity type.

## Processing Standard Values

Standard values are important for planning. The system uses standard values for the following functions:

- Scheduling of in-house operations and sub-operations and, if the relevant settings have been made, externally processed operations.
- Determining capacity requirements for operations and costs for operations and sub-operations
- The standard values of subordinate sub-operations are cumulated in the operation.

When you create an operation or sub-operation, the system checks whether you have to enter standard values. If this is required by the rules of maintenance for the work center, a message is displayed.



If you replace the work center for the operation or sub-operation with a new work center, the standard value key of the new work center is then valid. Standard values that you have already entered are not deleted, but could take on a new meaning. Therefore you should check all the standard values after replacing a work center.

## Cumulating Standard Values

If an operation has sub-operations, you can cumulate the standard values of the sub-operations in the operation. If necessary, you can correct the cumulated standard values in the operation.

The process is as follows:

A standard value is identified by its parameter ID. The system compares the parameter IDs of the standard values in the operation to the corresponding sub-operations. The standard values of sub-operations with the same parameter ID are cumulated in the operation.

For additional information about parameter IDs, refer to the *PP Work Centers* guide.

### Proceed as follows to cumulate standard values:

1. Call up the operation overview.
2. Select the operation in which you want to cumulate values.
3. Select the menu options *Edit* → *Cumulate std values*.

The standard values of the sub-operations are cumulated in the operation.



If a standard value is already maintained in the operation, this value is overwritten with the cumulated value.

---

**CAPP Standard Value Calculation**

## CAPP Standard Value Calculation

When **creating** or **changing** a routing, you can calculate standard values with CAPP. The system displays the calculated standard values in the *Standard values* section of the *Operation Details* screen. The value type assigned to the CAPP method for calculating determines the fields in which the calculated standard values are displayed. You can define value types in Customizing.



The standard values of an operation can only be calculated with CAPP if there is at least one CAPP process assigned to the work center at which the operation is carried out.

### Proceed as follows to calculate standard values:

1. On the operation overview, select the operations for which you want to calculate standard values.
2. Select the menu options *Extras* → *CAPP* and specify whether you want the processes and methods to be selected manually or automatically by the system.

With **automatic selection**, the system selects the processes and methods which are marked with a standard indicator.

With **manual selection**, you make the selection. The system branches to the *Sub-calculations* screen which shows a list of all the processes assigned to the work center. Select the desired process and select the menu options *Std val. calculation* → *Next screen*.

On the following screens, you can select a method and assign values to characteristics.

The results from the individual calculations are displayed within CAPP on the *Method Result* screen. The *Sub-calculations* screen shows the results of any calculations carried out for an operation.

If the standard values of an operation in a routing have been calculated using CAPP, on the *Operation Details* screen, the system displays the year when the calculation was carried out as well as a key which specifies that the values were calculated with CAPP.

For additional information about calculating standard values using CAPP, refer to the *PP CAPP Standard Value Calculation* guide.

## Editing User-Defined Fields

### Use

You use this function to assign data fields to an operation or sub-operation. You define the usage and meaning of these data fields yourself. You can enter business information or values for formula parameters that are not included in the standard system.

### Prerequisites

A field key is defined in Customizing for routings, in which the required combination of user-defined fields is stored.

### Features

By assigning a field key to an operation or sub-operation, you determine

- Which user-defined fields are available in the particular object
- Which field names or key words are used for these fields

You can then enter data in these user-defined fields. Note that the system does not check your entries.

### Types of User-Defined Fields

Depending on the field key, up to twelve data fields with various field formats are available. These are:

- Up to four **general fields** for any text

You can use them to store information about people responsible, substitutes or telephone numbers, for example.

- Up to two quantity fields

You can assign additional formula parameters to the quantity fields in the field key. With the help of formula parameters you can use the values of the quantity fields in work center formulas, to calculate processing times, capacity requirements and costs.

In addition there is also a field for the unit of each quantity field. Default values and their units which you have maintained in Customizing for formula parameters are transferred, but you can change this data.



If you have entered data in the quantity fields and then change the field key, the old values remain unchanged.

- Up to two value fields

In addition there is also a field for the unit of each value field.

- Up to two date fields

Here you can enter internal start dates, for instance.

- Up to two **checkboxes**

---

**Editing User-Defined Fields**

You can use these to indicate whether an operation is to be included in evaluations in the Info System, for instance.

**Activities**

You can find the user-defined fields on the detail screens for operations and sub-operations

## Maintaining Operations/Sub-Operations

### Prerequisites

The following data already exists in the system:

- The general routing header data
- The work centers at which the operations and suboperations are to be carried out
- If required, standard texts that you can copy to the long texts of operations and sub-operations

### Procedure

1. Call up the operation overview.
2. Enter the data for the operations and sub-operations on the operation overview.

In the following table you can determine

- Which fields are relevant for operations and which for sub-operations
- Which fields can possibly have a default value

<b>Field</b>	<b>for operation</b>	<b>for sub-operation</b>	<b>default from</b>
<i>Operation</i> (operation number)	X	X	Routing profile
<i>SOp</i> (sub-operation)		X	
<i>Work center</i>	X	X	
<i>Plant</i>	X	X	Header
Control Key	X	X	Work center
<i>Standard text key</i>	X	X	Work center
<i>Description</i>	X	X	
<i>Object deps</i> (Object dependencies)	X	X	
<i>Long text exists</i>	X	X	
<i>Classification</i>	X		
<i>Cumul(ation) type</i>	X		
<i>Suboper do not apply to order</i>	X		
<i>Base quantity</i>	X	X	
<i>Unit</i> (for operation)	X	X	Header
<i>Standard value</i>	X	X	
<i>Unit</i> (for standard value)	X	X	Work center
<i>Activity type</i>	X	X	

**Maintaining Operations/Sub-Operations**

<i>Scrap</i>	X	X	
<i>User field key</i>	X	X	
<i>Referenced task list group</i>	X	X	Referenced task list
<i>Referenced group counter</i>	X	X	Referenced task list

You can change each of these default value in the routing, except when you have set a reference indicator for a default value in the work center. If necessary you can also change the profile in the routing.

3. Save your routing.

The system saves the routing.



If you have not entered data for an operation or sub-operation that should or must be entered according to the rule for maintenance of the work center, the *Check operation* screen is displayed automatically. In this case, enter the necessary data and choose *Continue*. The system then saves the routing.

## Deleting an Operation/Sub-Operation

1. In the operation overview of the routing select the operation or sub-operation that you want to delete.
2. Choose *Edit* → *Delete* and confirm the command.

The operation or sub-operation is deleted. When you delete an operation, all their subordinate sub-operations are automatically deleted as well.

---

**Searching for an Operation/Sub-Operation**

## Searching for an Operation/Sub-Operation

1. In the operation overview go to the position from where you want to search for an operation/sub-operation.

The starting point for a search is always the first operation or sub-operation on the screen page.

You can search forwards or backwards.

2. On the operation overview, choose *Edit* → *Find*.

A dialog box appears for entering search criteria.

3. Enter your search criteria and whether you want to search forwards or backwards.

4. Choose *Continue*.

The system goes to the first operation or sub-operation that fits the criteria.

To find the next fit, choose *Edit* → *Find next*.

## Maintaining Detail Screens for Operations / Sub-operations

1. In the operation overview of the routing select the operation or sub-operation for which you want to enter detailed data.
2. Choose *Details* → *Operation*.

Enter the data on the *Operations details* screen.

---

**Creating a Long Text for an Operation/Sub-Operation**

## Creating a Long Text for an Operation/Sub-Operation

1. In the operation overview of the routing select the operation or sub-operation for which you want to enter a long text.
2. Goto the detail screen by choosing *Details* → *Operation*
3. Choose *Goto* → *Long text*.  
The text editor screen is displayed.
4. Enter the desired text.
5. Save your text.
6. Choose *Back* to leave the text editor.

---

**Omitting Sub-Operations in the Production Order****Omitting Sub-Operations in the Production Order**

1. In the operation overview set the *Sub-oper. do not apply to order* indicator for all the operations, whose sub-operations should not be transferred to the production order.
2. Save your routing.

## Maintaining Material Components

# Maintaining Material Components

## Purpose

This process describes how you determine, when materials are to be made available in your production process.

## Prerequisites

The following data already exists in the system:

- The operations in the routing
- The master record for the material to be produced
- The bill of material (BOM) for the material to be produced

## Process flow

1. In case you have not already done so, you assign the material to be produced to the routing.
2. You assign the material components or phantom assemblies in your BOM to the operations in the routing, in which they are to be staged.

According to the item category of the assigned components you make further decisions about their processing (for example, backflushing of stock items).

3. You check the consistency of the material component assignment.
4. You save the routing.



You can assign a routing material components from several BOMs or alternative BOMs, by repeating this process. In this case when you create a production order, you select the BOM and thus which material components are to be assigned in the production order. The system can do this automatically, depending on the settings

## Activities

Material components in a BOM that are not assigned to an operation in the routing are automatically assigned to the first operation when you create a production order.

If you have assigned a phantom assembly to an operation in a routing, the system automatically assigns all of the material components in the phantom assembly to the same operation as the phantom assembly when you create a production order.

If you have assigned individual material components from the phantom assembly to various operations without also allocating the phantom assembly, the system assigns the material components that have not been assigned and the phantom assembly to the beginning of the first operation when you create a production order.

## Backflushing

### Use

A goods issue has to be posted for every material that is withdrawn during order processing. This can occur at the following times:

- Directly as the goods are issued
- When the operation is confirmed, the materials assigned to the operation have the goods issue posted. This is known as backflushing.

### Activities

You decide whether a material can be backflushed in three different places. These are the master records of

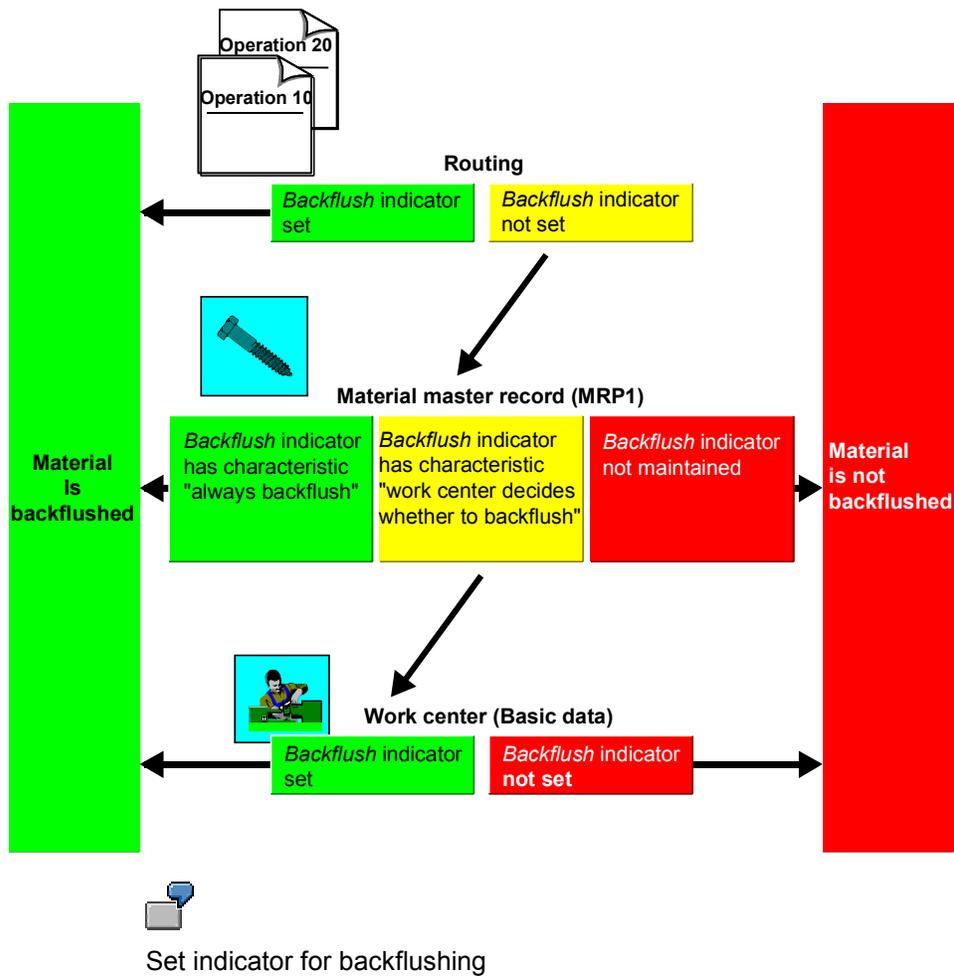
- The routing
- The material master
- The work center

If you set the *Backflush* indicator in the routing, the material is always backflushed regardless of what you entered in the material master record.

If you do **not** set the indicator in the routing, whether the material is backflushed or not depends on how you set the indicator in the material master record.

In the graphic you can see which indicators you have to set and where to control backflush.

Backflushing



- in the **material master record** if the material is **always** to be backflushed.
- in the **routing** if the material is only to be backflushed **sometimes**.

## Assigning Material Components to Operations/sub-Operations

### Procedure

1. Call up the material component overview for the routing.

The following table shows you the screens the system branches to depending on whether bills of material exist for the material.

#### Screen Sequence for Material Component Overview

If there is	you reach the
<b>no</b> bill of material for the material	<i>Material component assignment</i> dialog box. You can branch directly to the bill of material maintenance and create a bill of material.
<b>one</b> bill of material for the material	<i>Material Component Overview</i> screen.
<b>several</b> bills of material for the material	<i>Choose Alternative BOM</i> dialog box. Select the bill of material whose components you want to assign.

2. Select the material component that you want to assign to an operation.
3. Select the menu options *Edit* → *New assignment*.  
The *New Assignment* screen appears.
4. Enter the operation and the sequence in which you want to assign the material component:  
You can assign the material component
  - directly
  - via an operation list

To display the operations to which you can assign material components, choose *Operation list* in the *New Assignment* dialog box. From here you can select an operation.
5. Choose *Enter*.

### Result

The system assigns the material components to the operation.

---

**Reassigning Material Components**

## Reassigning Material Components

### Use

You use this procedure to assign a material that has already been assigned to one operation to another operation.

### Procedure

1. Call up one of the following screens:
    - The material component overview for the routing  
To do so, choose *Goto* → *Comp. assig. -gen.* in the operation overview
    - The material component overview for the operation  
In the operation overview select the operation and choose *Goto* → *Comp. assig. -op.*
  2. If you have several materials are to be produced by the routing or several alternative BOMs have been assigned to the routing, select the material or alternative BOM whose material components you want to maintain.
  3. Select the components to be reassigned and choose *Edit* → *Reassign.*  
The *Reassign Components* dialog box appears and you can see the number of the sequence and the operation to which the material component was assigned.
  4. Enter the number of the new sequence and the new operation.  
If you do not know the number, you can call up a list of all the sequences and operations with their descriptions by choosing *Operation list.*  
You can select a sequence and an operation from this list.
  5. Choose *Continue.*  
The system reassigns the components to the new operation.
  6. Select the component assignment and choose *Details* → *Mat.components* → *General data.*  
A screen appears with settings for processing components.
  7. Check and if necessary correct the existing settings.
- Return to the overview of component assignments by choosing *Back.*

## Deleting Component Assignments

### Prerequisites

If you have already edited material components in a routing that belong to a different BOM as the material components you want to delete, you must call up the group again.  
For technical reasons you can only edit data for one BOM each time you call up the transaction.

### Procedure

1. Call up one of the following screens:
  - The material component overview for the routing  
To do so, choose *Goto* → *Comp. assig. -gen.* in the operation overview.
  - The material component overview for the operation  
In the operation overview select the operation and choose *Goto* → *Comp. assig -op.*
2. Select the components, whose assignment you want to delete.
3. Choose *Edit* → *Delete*.

### Result

The system deletes the component assignment. You can reassign the material components.

---

**Sorting Material Components**

## Sorting Material Components

1. On the material component overview of the routing, choose *Edit* → *Sort*.

The *Sort Items* dialog box appears

2. Select the desired sort criteria.
3. Choose *Sort*.

The system displays the material components in the specified order.

## Filtering Material Components

### Use

You use this procedure, if you only want to see particular material components in the material component overview of the routing.

### Procedure

1. Choose *Edit* → *Filter*.

The *Filter Item List* dialog box appears.

2. Select the desired filter criterion.
3. Choose *Choose*.

The system filters out the material components that meet the selection criterion.

#### **Choose one of the following ways to display all the material components:**

Use the filter criterion *All items*.

Go back to the operation overview and call up the material component overview again.

---

**Displaying Administrative Data for a Component Assignment**

## Displaying Administrative Data for a Component Assignment

1. Call up one of the following screens:
  - The material component overview for the routing
    - To do so, choose *Goto → Comp. alloc. -gen.* in the operation overview
  - The material component overview for the operation
    - In the operation overview select the operation and choose *Goto → Comp. alloc -op.*
2. Select the components for which you want to display the administrative data.
3. Choose *Details → >Material components → Administrative data*  
The administrative data for the assignments is displayed.

## Consistency Check for Material Assignment

### Use

You can assign a material component to only one operation. However, you can assign a material component to several operations if the operations belong to alternative sequences. The following are examples of how you can unintentionally assign a material component to several operations:

- if you reference an operation set which has material components assigned to its operations
- if you edit routings using history

To avoid any errors, you can carry out a consistency check for the material assignment.

---

**Checking the Consistency of Material Assignments**

## Checking the Consistency of Material Assignments

On the material component overview of the routing, choose *Extras* → *Check consistency*.

- If the assignments are **consistent**, the system issues a corresponding message.

If the assignments are **inconsistent**, the system marks the assignments in question.

## QM Data Maintenance

### Purpose

If quality inspections are carried out during the manufacturing process, production and inspection operations are often very closely linked with each other. For this reason, the master recipe in the R/3 System also acts as an inspection plan for inspections during production. This means that the team in quality management (QM) completes the master planning data with a number of inspection specifications. This section describes how you enter these inspection specifications for the routing.

### Prerequisites

The following data already exists in the system:

- The basic QM data
- The inspection data in the material master record of the material to be produced (*quality management* view).
- The operations in the routing

### Process flow

1. With the QM data in the header you decide:
  - Whether the inspection is carried out using inspection points or not.
  - Whether the inspection scope is modified dynamically and at which level it is to take place

According to your decision you enter further data for inspection scope processing and dynamic modification.

2. With the QM data in the operations you decide:
  - Which view is called up first when you confirm inspection results
  - How long the inspection interval between inspection points is
  - Whether the last partial lot assignment takes place during results recording for the operation (optional)
3. You create the inspection characteristics to be checked in the respective process step for the operations and phases of your routing. For each characteristic, you specify the following:
  - Which sampling procedure is to be used
  - Whether test equipment is to be assigned to the characteristic for the inspection
  - Which dynamic modification rule is to be used, provided that you have specified in the header that dynamic modification is to take place at characteristic level
4. If you need test equipment to carry out the inspection, you check whether it has been maintained as production resources/tools (PRT) in the system. If necessary, you add the missing master records.

**QM Data Maintenance**

The PRT category you use depends on the business function of the production resource/tool (for example, PRT category "material" for production resources/tools you want to take into account in inventory management).

5. You assign the production resources/tools to the operations of your routing for which they are required as test equipment.
6. You assign the production resources/tools of the operations to the inspection characteristics for which they are required as test equipment.

If you have assigned more than one header material to your routing, you can assign different PRTs for each header material.

**See also:**

QM - Quality Management, sections *Basic Data*, *Inspection Planning*, and *Quality Management in the Logistical Processes*

## Inspection Points

You plan inspections that accompany production, in a routing with reference to the operation that is affected. If several individual inspections are to be carried out during the operation, you can use inspection points to add more detail.

Inspection points are freely defined reference objects for entering inspection results below operation level. To define inspection points you use one of the following references:

- Quantity (for instance, container)
- Time (for instance, date and time of day)
- Freely definable event

With time-related intervals you can define whether only one quantity is entered per partial lot, or whether the quantities of the individual inspection points are added together.

### Entries in Routings

In the routing header you decide,

- Whether you want to use inspection points
- Which field combinations and therefore which reference you use to define the inspection points (for instance, *container* and *shift*)
- Whether you want to combine product quantities for partial lots and batches



If you do not enter any data for field combinations and partial lot assignment the Customizing settings for quality management apply.

For each respective step in the operations for the routing you define,

- What the inspection interval should be between the inspection points (for instance, 10 minutes or 3 containers)
- How the quantity should be entered with time-related intervals
- Whether the last partial lot assignment, which is therefore relevant to goods receipt, takes place during results recording (optional)

You can transfer the quantity of the last partial lot to inventory management via order confirmation, where it is used as a default value for goods receipt.

#### See also:

*QM - Quality Management, Quality Management in Logistical Processes → QM in Production*

## Dynamic Modification

# Dynamic Modification

You can dynamically modify the inspection scope to the expected quality level.

Dynamic modification can take place on inspection lot or inspection characteristic level. The inspection scope is adapted to conform to the current quality level with assistance from sampling procedures and dynamic modification rules. The dynamic modification rule lays down the conditions under which inspections are tightened or reduced. The system evaluates the number and results of the last checks with this rule. From the inspection severity determined this way it lays down the inspection scope for the individual characteristics using the sampling procedure.

## Entries in Routings

On the header level of a routing you define,

- Whether the inspection scope is dynamically modified
- On which level (lot or inspection characteristic) the dynamic modification takes place
- Which dynamic modification rule is used when doing this

Depending on which dynamic modification level you have selected, the dynamic modification rule is either binding or just a default for the characteristic dynamic modification rule.

You always assign the sampling procedure to the characteristic

### See also:

QM - *Quality Management, Basic Data* → *Dynamic Modification of the inspection scope*

## Editing QM Data in the Header

### Use

If quality inspection accompany production, the routing can take over the role of an inspection plan.

You determine the basic data for the inspection in the QM data of the header (that is, in the data for quality management).

### Prerequisites

You have installed the application component *Quality management (QM)*.

The following data exist there:

- The inspection data of the material to be produced.
- If you want to dynamically adjust the inspection scope,
  - the dynamic modification criteria of the routing origin (see Customizing for quality management)
  - the dynamic modification rule

### Features

#### Use of Inspection Points

You plan quality inspections that accompany production, in your routing with reference to the operation, during which the inspection should take place.. If an inspection is to be repeated at a certain interval during the operation, you can use inspection points to add more detail.

Inspection points for inspections during production are freely defined reference objects for entering inspection results below operation level. You group results from a certain interval in an operation together. The interval can be defined as referring to time (for instance 2 hours), a quantity (for instance 5 containers) or any chosen event.

In the QM data in the header you decide:

- Whether you want to use inspection points
- which field combination you use for identifying the inspection points (for instance *Lock Container* and *Shift*)
- whether you want to group the inspection points for partial lots and batches together.

#### See also:

R/3 Library *QM Quality Management, Quality Management in Logistical Processes* → *QM in Production*

#### Dynamic Modification of the Inspection Scope

You can dynamically modify the inspection scope to the expected quality level:

You use a dynamic modification rule to lay down the conditions under which inspections are tightened or reduced. On the basis of the rule the system evaluates the results of the last inspections. From the so determined inspection severity it lays down the inspection scope for the individual characteristics using a sampling procedure or further dynamic modification criteria.

### Editing QM Data in the Header

In the QM data in the header you decide:

- Whether the inspection scope is dynamically modified
- Whether this is done at inspection lot level or at inspection characteristic level, that is with different dynamic modification rules for individual characteristics.
- Which dynamic modification rule is used  
If you work at characteristic level this value only serves as a default for the characteristic dynamic modification rule.
- If you work at inspection lot level, which dynamic modification criteria are used for sample determination, for example, vendor or manufacturer.

You always assign the sampling procedure to the characteristic

**See also:**

R/3 Library *QM Quality Management, Dynamic Modification*

### External Numbering in Results Recording

For results recording you determine in the header,

- Whether an inspector can issue an external number or not
- Whether an external number has to be unique.

## Maintaining QM Data in the Header

### Prerequisites

You have installed the application component *Quality management (QM)*.  
The following data exist there:

- The inspection data of the material to be produced.
- If you want to dynamically adjust the inspection scope,
  - the dynamic modification criteria of the routing origin (see Customizing for quality management)
  - the dynamic modification rule

### Procedure

1. On the header overview select the routing, for which you want to maintain quality management data (QM data).
2. Choose *Details* → *Header*.
3. Enter the parameters for the inspection points and dynamic modification.



To activate the use of inspection points, you must enter a field combination in the Inspection points field.

---

**Maintaining QM Data in the Operation**

## Maintaining QM Data in the Operation

### Prerequisites

QM data has been entered in the header.

### Procedure

1. In the operation overview of the routing select the operation for which you want to edit QM data.
2. Choose *Details* → *Operation*.
3. Enter the inspection specifications.

## Inspection Characteristics

Using inspection characteristics in the routing, you identify the objects for which an inspection is to take place and how this inspection is to be performed. The system distinguishes between qualitative inspection characteristics (for example, the color of the product) and quantitative inspection characteristics (for example, the density of a material).

In the routing, you create inspection characteristics for the operations for which the inspection is to be carried out.

To simplify and standardize inspection planning, you can use the following options:

- You can use master inspection characteristics, that is, characteristics that are created as master records in quality management.
- You can use a control key that contains default values for the control indicator of the characteristics.
- You can maintain default values for characteristic maintenance in the planning profile.

**See also:**

*QM - Quality Management, Inspection Planning → Inspection Plans and Reference Operation Sets* section

---

**Maintaining Insp. Characteristics for Operations**

## Maintaining Insp. Characteristics for Operations

1. In the operation overview of the routing select the operation for which you want to enter inspection characteristics.
2. Choose *Details* → *Insp. characteristic* → *General data*.
3. Enter the characteristic data.

For more detailed information, see the R/3 Library *QM - Quality Management*, section *Inspection Planning* → *Inspection Plans and Reference Operation Sets*.

## Deleting Inspection Characteristics

### Procedure

1. On the characteristic overview, select the inspection characteristic you want to delete.
2. Choose *Edit* → *Delete*.

### Result

The inspection characteristic is deleted in the routing.

Master inspection characteristics you have referenced or copied when you created the inspection characteristic are **not** deleted.

## Production Resources/Tools

### Definition

The Business Object *Production Resource/Tool*(PRT) is a moveable operating resource used in production or plant maintenance.

### Use

The R/3 System differentiates between the following types of production resources/tools, according to their properties and business function:

- Materials that are accounted for in materials management, for instance in inventory management, requirements planning and procurement.
- Equipment, for instance measuring instruments or valuable tool, which are serviced
- Documents, for instance drawings or programs, which use the document management system.
- Miscellaneous production resources/tools (with a PRT master record), that require less maintenance in the system.

Production resources/tools can be assigned to operation, activities or phases in task lists (including standard networks and recipes), production orders and maintenance orders as well as networks.

Production resources/tools that are used for testing during production, can be assigned to the corresponding inspection characteristic in the inspection plan.

At the moment you cannot use PRTs in process orders.

### Integration

You can use user-defined criteria to classify PRTs to help you find PRTs in the system.

PRTs can be linked with a document info record so that you can refer to further information, for example a design drawing..

#### See also:

*CA - Classification system* and *CA - Characteristics*

*CA - Document Management* → *Maintaining the Basic Data of a Document Info Record*

## Creating a Production Resource/Tool as a Material

## Creating a Production Resource/Tool as a Material

1. On the R/3 main menu choose *Logistics* → *Production* → *Master data* → *Prod.resources/tools* and then *Prod.resources/tools* → *Material* → *Create general*.  
If the production resource/tool (PRT) is not to be used immediately but from a particular date in the future, choose *Material* → *Create* → *Schedule*
2. Enter the relevant data on the initial screen.  
You must enter a material type for which you can maintain the “Prod. resources/tools” view. An example of such a material type is *FHMI* in the standard system.
3. Choose *Enter*.  
The *Select View(s)* dialog box appears.
4. Select the *Production resources/tools* view and any views for any other areas in which the PRT is to be used. Choose *Continue*.  
The *Organizational Levels* dialog box appears
5. Enter the plant, that you want to assign the PRT to, and if necessary organizational levels and profiles for the other views  
If you have entered a material to copy from in the initial screen, additionally enter the organizational levels from which data is to be transferred.
6. Choose *Continue*.  
The first view appears.
7. Enter the necessary data and then choose *Next view*..
8. Repeat step 6, until you have edited all the views..

You use the MM/PP status to release the material for use as a PRT.

---

**Creating a Production Resource/Tool as a Material**

You cannot change the base unit of measure or the unit of issue after you have assigned the material as a PRT to operations.

9. Save the material.

**See also:**

*LO - Managing Material Master Data*, in particular *Creating Material Master Records* and *Maintaining Material Master Records*

## Creating a Production Resource/Tool as a Piece of Equipment

## Creating a Production Resource/Tool as a Piece of Equipment

1. On the R/3 main menu choose *Logistics* → *Production* → *Master data* → *Prod.resources/tools* and then *Prod.resources/tools* → *Equipment* → *Create..*
2. Enter the relevant data on the initial screen.  
Use an equipment category that allows you to enter PRT data. In the standard system this is the equipment category *P*.
3. Choose *Enter*.
4. If you have entered a source to copy from on the initial screen, select the data to be copied now, and choose *Continue*.
5. Enter the *General Data*.
6. Choose *PRT data*, and enter the relevant data.



The production resource/tool receives the status *Released* automatically. If you want to lock it, for example because it is defective, choose *Equipment* → *Functions* → *ProdRes/Tools* → *Lock PRT*.

7. Enter further data on the other screens of the master record as required.
8. Save the piece of equipment.

**See also:**

*PM - Structuring Technical Systems* by choosing the section *Working with Equipment*

---

**Creating Production Resources/Tools as a Document**

## Creating Production Resources/Tools as a Document

1. On the R/3 main menu choose *Logistics* → *Production* → *Master data* → *Prod.resources/tools* and then *Prod.resources/tools* → *Document* → *Create*.
2. Enter the relevant data on the initial screen.  
Use a document category that is intended for use as a production resource/tool.
3. Choose *Enter*.
4. Enter the document data.  
For more information, see *CA - Document Management Guide*.



You release the document for use as a PRT by maintaining the document status..

5. Save the document.

**See also:**

*CA - Document Management Guide*

## Creating a PRT with a PRT Master Record (Miscellaneous)

1. On the R/3 main menu choose *Logistics* → *Production* → *Master data* → *Prod.resources/tools* and then *Prod.resources/tools* → *PRT master (misc.)* → *Create*.
2. Enter the relevant data on the initial screen and choose *Enter*.
3. If you have entered a source to copy from on the initial screen, select the data to be copied now, and choose *Continue*.
4. Enter the relevant data on the *Basic Data* screen
5. Choose *Goto* → *Defaults* and enter default values for the assignment of the production resource/tool (PRT) to operations.

In case you want to take particular properties of the PRT into account in the formulas for total quantity and usage value, define the formulas as formula constants for the PRT. To do this, choose *Extras* → *Formula constants*.

6. If required, enter additional test for the PRT.
  - To create language dependent short texts, choose *Extras* → *Short text*.
  - To create long texts, choose *Extras* → *Long text*.
7. Save the production resource/tool.

---

**Classifying Production Resources/Tools**

## Classifying Production Resources/Tools

This procedure describes how you classify a production resource/tool(PRT) with a **PRT master record (miscellaneous)**.

For information about how to classify the other PRT categories, see -

- for materials - LO - Managing material Master Data
- for equipment - PM - Structuring Technical Systems
- for documents - CA - Document Management Guide

### Prerequisites

The class that you want to assign the PRT to, must have been created with the class type *009 Production resource/tool* in the classification system, see *CA - Classification System*.

### Procedure

1. On the R/3 main menu choose *Logistics → Production → Master data → Prod.resources/tools* and then *Prod.resources/tools → PRT master (misc.) → Change*.
2. Enter the PRT and choose *Enter*.
3. On the *Basic Data* screen choose *Goto → Classification*.
4. Enter the class that you want to assign the PRT to. This class must belong to the *009 Production resource/tool* class type
5. Choose *Edit → Values*.  
A list of class characteristics for the PRT class appears.
6. Enter characteristic values that are valid for the PRT.
7. Save the PRT.

### Result

The production resource/tool is assigned to a class. You can now find the PRT by searching for its characteristics or characteristic values.

## Linking a Document to a Production Resource/Tool

This procedure describes how you can link a document to a production resource/tool(PRT) with a **PRT master record (miscellaneous)**.

For information about how to assign documents to the other PRT categories, see -

- for materials - LO - Managing Material Master Data
- for equipment - PM - Structuring Technical Systems
- for documents - CA - Document Management Guide

### Prerequisites

The document that you want to link the PRT with has been created in document management. Its document type permits it being assigned to PRTs (set up in Customizing) - see *CA - Document Management Guide*.

### Procedure

1. On the R/3 main menu choose *Logistics → Production → Master data → Prod.resources/tools* and then *Prod.resources/tools → PRT master (misc.) → Change*.
2. Enter the PRT and choose *Enter*.
3. On the *Basic Data* screen choose *Sie Extras → Document data*
4. Enter the data of the documents, which you want to link with the PRT. Choose *Continue*.
5. Save the PRT.

### Result

The documents are now linked with the PRT. You can display and print them in the PRT master record.

## Releasing/Locking Production Resources/ Tools

### Use

When you create or change a production resource/tool (PRT), you can determine whether it is freely available by using the status. You can thus temporarily lock a PRT, which is for instance defective. The status is taken into account when you

- assign PRTs to operations in routings or production orders.
- check PRT availability in production

### Features

How and why you release an individual PRT, depend on the PRT category.

- For **Materials, Equipment** and **Documents** you determine whether they can be used as a PRT by setting a status.



If you check PRT availability in production orders,

- the system also performs a static inventory audit - it checks whether a sufficient quantity is available at the present time
  - the system also checks the PRT usage counter for equipment.
- For production resources/tools with **PRT master records (misc.)** you use the status to determine specially,
    - whether the PRT can be assigned in resource planning, that is in routings and production orders.
    - whether the PRT is available for production and consequently whether availability checks are permissible in an order.

#### See also:

*LO - Managing Material Master Data*

*PM - Structuring Technical Systems*

*CA - Document Management Guide*

## Maintenance Planning for Production Resources/Tools

### Use

If you use production resources/tools (PRT) that have an equipment master record you can,

- plan and monitor the wear of the PRT
- create a maintenance plan that accounts for the

You can thus plan your maintenance activities sensibly. The current wear level is taken into account during availability checks in production orders..

### Features

You create the following information for the maintenance planning of PRTs :

- a PRT wear counter that gives information about the level of wear for a PRT.
- the wear to be expected for each operation
- an activity related maintenance plan

### PRT Wear Counter

In Plant Maintenance you create a counter for the PRT. You assign the counter a characteristic whose unit is suitable for measuring PRT wear. You enter the counter in the equipment master record of the PRT.

You determine the initial counter level by creating the number of available units in a measurement document. When you confirm a production order the system produces a corresponding measurement document for the relevant PRT. In other words the counter level is updated automatically.

#### See also:

*PM - Entering Measurement and Counter Readings*

### Expected Wear

You determine the expected wear during the assignment of PRTs to routings by creating the following data:

- a usage value that is the expected wear for the base quantity of the material to be produced.
  - The usage value must have the same unit as the PRT wear counter.
- a formula with which the system can calculate the total wear for the order, that is the expected wear for the order quantity.

The system also uses this formula to calculate the actual wear from the confirmed yield during confirmation. The PRT wear counter is updated with the values that have been calculated in such manner (see *PRT wear counter* above).

---

**Maintenance Planning for Production Resources/Tools****Maintenance Plan**

You define a maintenance plan, so that PRTs are regularly serviced. In the maintenance plan you lay down which tasks are carried out at which counter levels. You enter this maintenance plan in the PRT equipment master record.

**See also:**

*PM - Maintenance Planning*

## Creating a PRT Wear Counter

### Prerequisites

The production resource/tool (PRT) is a piece of equipment.

A characteristic has been created in the classification system to describe the wear - see *CA - Characteristics*. A unit has been assigned to this characteristic

### Procedure

1. Choose *Logistics Plant maintenance* → *Technical objects* and then *Environment* → *Measuring points* → *Create*.
2. On the initial screen enter the following data:
  - the measuring point object *Equipment*
  - the PRT (category equipment) for which you want to create the counter.
3. Select the *MeasPoint is cntr* indicator and choose *Enter*.
4. On the *General Data* screen enter the necessary data.
  - Assign the counter a characteristic with a suitable unit for measuring wear
5. Save the counter data.

---

**Creating Measurement Documents for PRT Wear Counters**

## Creating Measurement Documents for PRT Wear Counters

### Prerequisites

The PRT wear counter has been created in the system

### Procedure

1. Choose *Logistics Plant maintenance* → *Technical objects* and then *Equipment* → *Measurement documents* → *Create*.
2. On the initial screen enter the necessary data, and then choose *Enter*.
3. On the *General Data* screen enter the counter reading.
4. Save the measurement document.

## Assigning PRT wear counters to Production Resources/

### Prerequisites

The production resource/tool (PRT) has an equipment master record.

The PRT wear counter exists in the system.

### Procedure

1. Choose *Logistics → Production → Master data → Production resources/tools* and then *Production resources/tools → Equipment → Change*.
2. Enter the data on the initial screen and choose *Enter*.
3. Choose *PRT data*.
4. Enter the counter in the *MeasPoint* field.
5. Save the data.

---

**Assigning Maintenance Plans to Production Resources/Tools**

## Assigning Maintenance Plans to Production Resources/Tools

### Prerequisites

The production resource/tool (PRT) has an equipment master record.

The maintenance plan has been created, see *PM - Maintenance Planning*.

### Procedure

1. Choose *Logistics* → *Production* → *Master data* → *Production resources/tools* and then *Production resources/tools* → *Equipment* → *Change*.
2. Enter the data on the initial screen and choose *Enter*.
3. Choose *PRT data*.
4. Enter the maintenance plan that you want to use for the PRT.
5. Save the data.

## Deletion of Production Resources/Tools

### Use

You use this function to delete production resources/tools (PRT) that are no longer available from your system. This prevents you from using outdated PRTs in routings and production orders.

### Features

Fundamentally there are two functions for deleting master records:

- **Delete immediately**

This is only possible for production resources/tools that have a **PRT master record(misc.)**

The prerequisites are that the PRT

- is not assigned to an operation
- is not linked with any documents

The PRTs are deleted logically, which means you can no longer access the master records. The records are still physically in the database.

- **Deletion Flag**

You can set a deletion flag for **all PRT categories**. For PRTs with a PRT master record this only possible if the PRT is no longer assigned to an operation.

You can continue to display PRTs that have a deletion flag, you cannot however change them or assign them again. These PRTs are then deleted from the database in the next archiving session or when the deletion program is run. This only happens if the PRTs are not used anywhere..



There are no archiving or deletion programs for PRTs with PRT master records (misc.) yet.

You can cancel a deletion flag any time you like, as long as the PRT has not been deleted from the database.

#### See also:

*LO - Managing Material Master Data*

*PM - Structuring Technical Systems*

*CA - Document Management Guide*

---

**Deleting Production Resources/Tools with a PRT Master**

## Deleting Production Resources/Tools with a PRT Master

### Prerequisites

You can only delete a production resource/tool (PRT)

- if it is no longer assigned to an operation
- if it is no longer linked with a document

### Procedure

1. Choose *Logistics* → *Production* → *Master data* → *Production resources/tools* and then *Production resources/tools IIRT master (misc.)* → *Change*.
2. Enter the PRT.
3. Choose *Prod. Resources/Tools* → *Delete* and confirm the command.

## Production Resources/Tools: Setting/Canceling a Deletion Flag

This procedure describes how you set or cancel a deletion flag for a production resource/tool with a **PRT master record (misc.)**.

For information about how to set deletion flags for the other PRT categories, see -

- for materials - LO - Managing Material Master Data
- for equipment - PM - Structuring Technical Systems
- for documents - CA - Document Management

### Prerequisites

You can only set a deletion flag for a production resource/tool with a PRT master record (misc.) if it no longer assigned to any operations.

### Procedure

1. Choose *Logistics* → *Production* → *Master data* → *Production resources/tools* and then *Production resources/tools* → *PRT master (misc.)* → *Change..*
2. Enter the PRT and then choose *Enter*.
3. On the Basic Data screen choose *Edit* → *Deletion flag on/off*.

### Result

The deletion flag is changed, depending on the initial state it is either set or canceled. You cannot assign PRTs that have a deletion flag set.

---

**Assignment of Production Resources/Tools to Operations**

## Assignment of Production Resources/Tools to Operations

### Use

You use this function in routings to determine which production resources/tools (PRT) are required to carry out an operation.

You can subsequently assign the PRTs as test equipment to the operation inspection characteristics.

### Prerequisites

The PRTs must have a master record in the system. According to the PRT category the following conditions have to be met additionally:

- Materials, equipment and documents must be released, using their status, as production resources/tools.
- Production resources/tools with a PRT master record (misc.) must be released in their status for use in resource planning.
- PRTs with material masters, PRT masters or equipment masters must be intended for use in routing in their task list usage.

### Features

You can assign a PRT to several operations.

During assignment you can enter data that determine how the PRT should be treated during order processing.

## Assigning Production Resources/Tools to Operations

### Prerequisites

The PRTs must have a master record in the system. According to the PRT category the following conditions have to be met additionally:

- Materials, equipment and documents must be released, using their status, as production resources/tools.
- Production resources/tools with a PRT master record (misc.) must be released in their status for use in resource planning.
- PRTs with material masters, PRT masters or equipment masters must be intended for use in routing in their task list usage.

### Procedure

1. In the operation overview of the routing select the operation you want to assign PRTs to.
2. Choose *Goto* → *Prod.resources/tools*.
  - If you have already assigned PRTs to this operation the PRT overview for the operation appears.

In this case choose *Edit* → *New entries* and the category of the PRT you want to assign.
  - If no PRTs have yet been assigned the dialog box for PRT with category *Material* appears.

If you want to assign a PRT with a different category, choose the corresponding function key.
3. Enter the PRT as well as the item number and the basic data for PRT assignment and choose *Continue*.
4. If you want to assign more PRTs, choose *Edit* → *New Entries* and the required PRT category. Continue as in step 3.

After you have finished assigning PRTs, choose *Back*.
5. Select the assigned PRTs on the PRT overview and enter additional data about the assignments as required.
  - To enter default values, choose *Details* → *Prod. resources/tools* → *General view*.
  - To enter usage dates, choose *Details* → *Prod. resources/tools* → *Dates*.
  - To enter a long text, choose *Goto* → *Long text*.

## Production Resources/Tools: Deleting an Assignment to an Operation

### Procedure

1. In the operation overview of the routing select the operation whose PRT you want to edit.
2. Choose *Goto* → *Prod.resources/tools*.
3. Select the PRT assignment you want to delete.
4. Choose *Edit* → *Delete* and confirm the command.

The PRT assignment is deleted.

## Assignment of Test Equipment to Inspection Characteristics

### Use

You use this function in inspection planning in routings to determine which production resource/tool (PRT), for instance which measuring instrument, is required for carrying out quality testing during production

When the order is released the system assigns the test equipment to the inspection lot. You can display the PRTs for the relevant operation during results recording for an inspection characteristic, test equipment are marked separately.

### Prerequisites

PRTs that you want to use as test equipment must be assigned to the same operation as the corresponding inspection characteristic.

The assignment of test equipment must be allowed in the control indicator for the inspection characteristic.

### Features

You have the following choices for assigning test equipment

- You assign a piece of test equipment directly to an inspection characteristic.
- If you have entered several materials to be produced in the routing header, you can additionally assign each material/inspection characteristic combination its own test equipment.

When it creates an inspection lot the system assigns test equipment to the material/inspection characteristic combination. If no assignment has been made to the combination, the test equipment that has been assigned to the inspection characteristic is used.

---

**Assigning Test Equipment to Inspection Characteristics**

## Assigning Test Equipment to Inspection Characteristics

### Prerequisites

Production resources/tools (PRT) that you want to use as test equipment must be assigned to the same operation as the corresponding inspection characteristic.

The assignment of test equipment must be allowed in the control indicator for the inspection characteristic.

### Procedure

1. In the operation overview of the routing select the operation whose inspection characteristics you want to edit.
2. Choose *Goto* → *Insp. char. overview*.
3. Select the inspection characteristic that you want to assign test equipment to.
4. If you want to assign test equipment directly to the inspection characteristic:
  - a) Choose *Details* → *Insp. characteristic General data*.
  - b) In the *References* section enter the item number of the PRT that you want to use as a piece of test equipment

If you want to assign each material/inspection characteristic combination different test equipment:

- a) Choose *Goto* → *Insp. char. overview*.

An overview of assignment values to inspection characteristics appears.

- b) If the required material is not yet displayed in the overview, choose *Edit* → *New Entries*, place the cursor on the material and choose *Select*.
- c) Select the material in the value overview and choose *Sel. Value* → *Insp. Equip. Assgmt.*
- d) Enter the item number of the PRT that you want to use as an item of inspection equipment and choose *Continue*.

## Trigger points

You assign trigger points to operations in a routing in order to trigger certain functions in the production order later.

Trigger points can trigger functions when an operation's status changes or when an operation is confirmed. The person making the confirmation decides if the function is triggered when the operation is confirmed.

Trigger points can trigger the following functions:

- **Release succeeding operations**

You can release all operations that follow the operation which has the trigger point assigned to it.
- **Release up to stop indicator**

You can release all operations up to and including the next operation for which the *Rel/Stop* indicator is set.
- **Release preceding operations**

You can release all operations before the operation with the trigger point assigned to it.
- **Create order by copying**

You can create a new order. You can create a new order without reference to a material by copying a reference operation set.
- **Insert reference operation set**

You can insert a reference operation set into an existing order. To do this, you must enter the operations between which you would like to insert the reference operation set.
- **Start workflow task (for example, send mail to a user)**

## Standard Trigger Points

Standard trigger points can be copied to create trigger points. If you copy a standard trigger point to create a trigger point, the system automatically transfers all necessary data from the standard trigger point into the trigger point you are creating. This reduces the time and work involved in creating a trigger point.

[Creating Standard Trigger Points \[Page 129\]](#)

## Trigger Point Groups

You can combine several standard trigger points into a trigger point group. If you copy from a trigger point group, the system automatically transfers all standard trigger points in the trigger point group to the operation. Using trigger point groups considerably reduces the time and work involved in creating trigger points.

You can maintain trigger point groups in Customizing.

## Trigger points

### See also:

[Creating Trigger Points \[Page 130\]](#)

[Creating a Trigger Point by Copying \[Page 132\]](#)

For additional information about trigger points, refer to the R/3 Library *PP Production Orders*.

## Creating a Standard Trigger Point

### Proceed as follows to create a standard trigger point:

1. From the R/3 main menu, select the menu options *Logistics* → *Production* → *Master data* → *Std. trigger point* and then *Standard trigger pt* → *Create*.

You reach the initial screen for creating standard trigger points.

2. Enter a number or a name and press `ENTER`.

You reach the detail screen for the standard trigger point.

3. Maintain the data and save your entries by selecting the menu options *Std. trigger point* → *Save*.

The standard trigger point data corresponds to that of a normal trigger point. [Creating a Trigger Point \[Page 130\]](#)

For additional information about standard trigger points and trigger points, refer to the *PP Production Orders* guide.

## Creating a Trigger Point

## Creating a Trigger Point

You can assign trigger points to operations in a routing or a production order.

### Proceed as follows to create a trigger point in a routing:

1. Call up the operation overview.
2. Select the operation for which you want to assign a trigger point and select the menu options *Goto* → *Trigger pnt overview*.  
 You reach the *Operation Trigger Points* screen where any existing assignments are displayed.
3. Enter the usage and/or description.
4. Indicate the function the trigger point should serve:

The indicator...	specifies that...
<i>Functions</i>	the trigger point triggers the functions you entered on the detail screen for trigger points (for example, release operation or include reference operation set).
<i>RelStop</i>	the operation is the last in a series of operations released by the trigger point. If the function <i>release up to stop</i> was triggered in a previous operation, all subsequent operations are released up to the operation with the <b>RelStop</b> indicator.



You can set **both** indicators for a trigger point since both usages are possible.

5. Select a trigger point and the menu options *Details* → *Trigger point*.  
 You reach the *Trigger Point Details* screen.
6. In the *Trigger Point Functions* area, indicate the function which the trigger point is to carry out and select the menu options *Extras* → *Trigger point para*.

You reach the dialog box *Parameters for Function* where you enter additional information, if necessary. Which fields appear in the dialog box depends on the function you selected. For example, if you selected "insert reference operation set", you have to enter the group and group counter of the reference operation set and the operation numbers between which the reference operation set is inserted.

Press **Back** to branch back to the detail screen.



The functions on the detail screen are effective only if you have set the *functions* indicator on the *Trigger Point Overview* screen.

7. Maintain the following data on the detail screen:

**Creating a Trigger Point**

- the system status which triggers the function
  - the status change which triggers the function (*reset status* and/or *set status*)
  - the *once* indicator if the function is to be triggered one time
  - the type of event which triggers the function (manually and/or by a change in status)
8. Branch back to the trigger point overview and save your routing.

[Creating a Trigger Point by Copying \[Page 132\]](#)

For additional information about trigger points, refer to the *PP Production Orders* guide.

---

**Creating a Trigger Point by Copying**

## Creating a Trigger Point by Copying

You can create trigger points by copying from existing trigger points. In this way, you can assign standard trigger points to operations in a routing as well as in a production order.

**Proceed as follows to create a trigger point by copying:**

1. Call up the operation overview.
2. Select the operation for which you want to assign a trigger point and select the menu options *Goto* → *Trigger pnt overview*.  
You reach the *Operation Trigger Points* screen where any existing assignments are displayed.
3. Select the menu options *Edit* → *Create by copying* → *Stand. trigger point*  
**or**  
select the menu options *Edit* → *Create by copying* → *Trigger point group*  
You reach a dialog box.
4. Enter a standard trigger point or a trigger point group and press *Continue*.  
The trigger points are created.

**See also:**

[Creating a Trigger Point \[Page 130\]](#) for data on the detail screen for trigger points.

For additional information about trigger points, refer to the *PP Production Orders* guide.

## Scheduling Routings

An order or task list is scheduled to determine dates for all of its operations. In addition, capacity requirements are determined by scheduling.

Scheduling can be order-related or non order-related:

- **Order-related** scheduling is carried out for planned orders and work orders. In work orders, scheduling is always carried out using a routing. Planned orders can be scheduled using the in-house production time in a material master record and the routing. The determined dates are saved.

For additional information about order-related scheduling, refer to the R/3 Library *PP Production Orders* and *PP Material Requirements Planning*.

- **Non order-related** scheduling is carried out using routings. This type of scheduling can be used to calculate the in-house production time of a material and compare it to the lot size-independent in-house production time from the material master record. The lot size-independent in-house production time from the material master record can then be automatically or manually adjusted.

### Control Key

The control key of an operation influences scheduling in the following ways:

- If the control key of the operation specifies that the operation can be **scheduled**, the system calculates the duration and the dates of the operation segments.
- If the control key of the operation specifies that the operation **cannot be scheduled**, the system assigns a duration of zero to all operation segments.
- If an operation is **externally processed** and the *Sched external op.* indicator *Fremdvorgang* im Steuerschlüssel
  - Has **not** been set, the system schedules the operation by using the planned delivery time on the external processing screen of the operation
  - Has been set, the system uses the standard value from the externally processed operation to calculate the duration of the operation, as for an internally processed operation

### Rules for Calculating Times

If times that are calculated in scheduling correspond to work start, work finish or midnight, the following rules apply:

- Start times are scheduled for work start or 0:00.
- Finish times are scheduled for work finish or 24:00.
- If an operation with a duration of zero is scheduled for one of these times, the following rules apply:
  - For forward scheduling, the start and finish times are scheduled for work finish or 24:00.
  - For backward scheduling, the start and finish times are scheduled for work start or 0:00.

## Scheduling Routings

This is necessary to make sure that the finish time is not before the start time.

The following sections describe the features in scheduling and the factors that are taken into account and influence the calculation of the dates:

- [Scheduling Types \[Page 135\]](#)
- [Floats Before and After Production \[Page 138\]](#)
- [Operation Segments \[Page 139\]](#)
- [Operating Time \[Page 145\]](#)
- [Sub-Operation Dates \[Page 147\]](#)
- [Alignment Key in Parallel Sequences \[Page 148\]](#)
- [Reduction Measures \[Page 149\]](#)
- [Splits \[Page 155\]](#)
- [Overlapping \[Page 156\]](#).

**See also:**

[Example: Calculating Operation Dates \[Page 162\]](#)

## Scheduling Types

A routing can be scheduled using the following scheduling types:

- **forward scheduling:** The system schedules forward starting from the basic start date.
- **backward scheduling:** The system schedules backward starting from the basic finish date.
- **“today” scheduling:** The system carries out forward scheduling using the current date as a basic start date.
- **no scheduling:** The individual operations are **not** scheduled. Based on the floats before and after production, the system calculates the scheduled start and finish and enters these dates in all operations.

The **scheduling type** determines which [basic dates \[Page 137\]](#) you have to enter. The following table shows the dates you must enter for the individual scheduling types as well as the dates that are then calculated using scheduling.

If you enter both basic dates, the system will make sure that the dates determined using forward or backward scheduling are within the specified period. If necessary, it will apply [reduction measures \[Page 149\]](#).

### Determining Dates in Routings

If the scheduling type is	and you enter the	the system calculates the
forward scheduling	basic start date	scheduled start scheduled finish basic finish date
	basic start and basic finish dates	scheduled start scheduled finish
backward scheduling	basic finish date	basic start date scheduled start scheduled finish
	basic finish and basic start dates	scheduled start scheduled finish
no scheduling	basic start and basic finish dates	scheduled start scheduled finish

**Scheduling Types**

<p>“<b>today</b>” scheduling</p>	<p>-</p>	<p>scheduled start scheduled finish basic finish date</p>
	<p>basic finish date</p>	<p>scheduled start scheduled finish</p>

You can set up scheduling types for routings in Customizing for capacity planning under *Operations* → *Scheduling*.

## Basic Dates

Scheduling is carried out starting from the basic dates. The SAP system distinguishes between basic start and basic finish dates. You can maintain these dates in the routing on the *Scheduling* dialog box.

Floats Before and After Production

## Floats Before and After Production

Since malfunctions and other disturbances in the production process can never be fully prevented, the system carries out scheduling using a float before and a float after production.

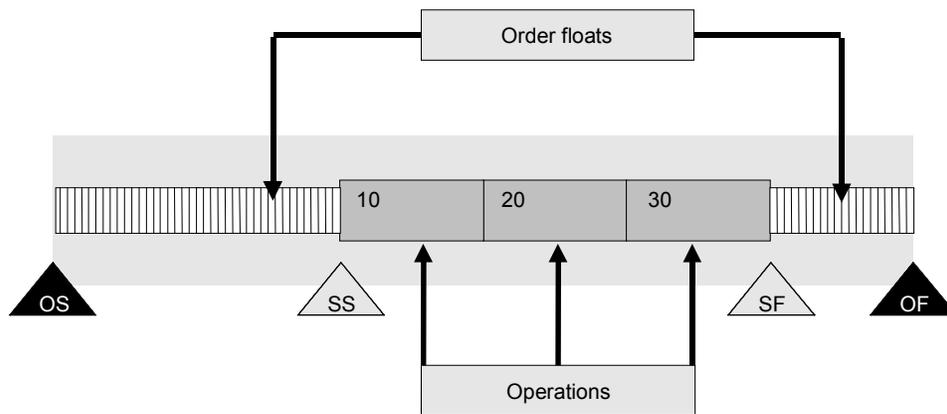
The **float before production** has the following two functions in the order:

- It can compensate for delays in the staging of the material components.
- If there is a capacity bottleneck at the work centers involved, you can move the production dates forward in the future. In this way it serves as a float for capacity leveling.

The **float after production** is used in the order to compensate for unexpected interruptions in the production process. It prevents a delay of the scheduled finish.

The system calculates the **scheduled start** by adding the float before production to the basic start date. It calculates the **scheduled finish** by subtracting the float after production from the basic finish date (see figure).

The floats before and after production are defined in the material master record using a scheduling margin key.



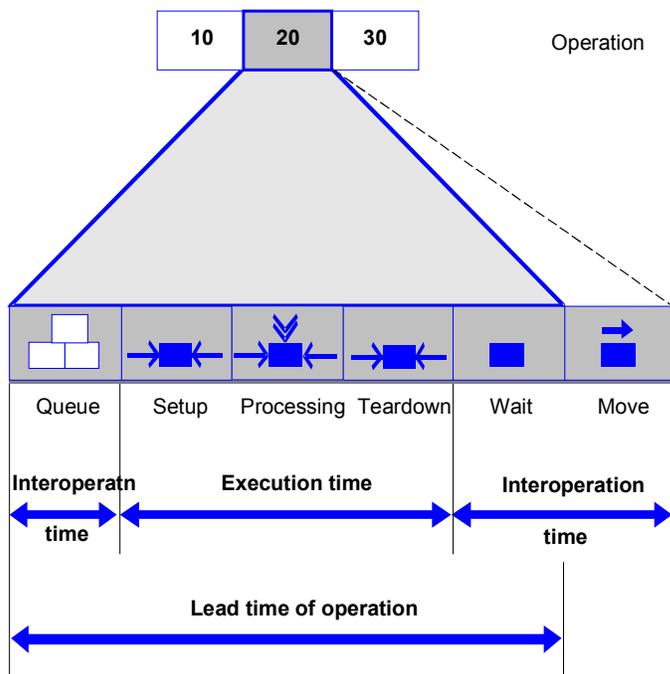
## Operation Segments

The lead time of an operation can be divided into the following segments:

- queue time
- setup time
- processing time
- teardown time
- wait time

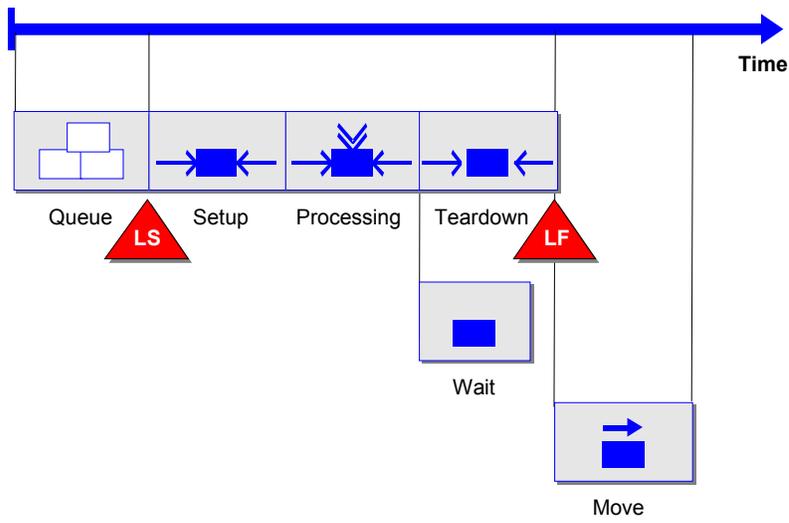
In addition to these operation segments, you can define a **move time**. The move time is the time needed to move a material from one work center to the next one. Move time is always between two operations and is assigned to the preceding operation.

The operation segments and the move time are used to determine the **execution time**, **lead time** and **interoperation time** of an operation. The following figure shows the various segments which make up these operation times.



Using the *teardown/wait simul.* indicator in the *interoperation times* section of the *Operation Details* screen, you can specify whether teardown and wait are to be considered as simultaneous or consecutive operation segments in scheduling. If teardown and wait times are simultaneous, the lead time of the operation is reduced (see the following figure).

Operation Segments



See also:

[Duration of Individual Operation Segments \[Page 141\]](#)

Duration of Individual Operation Segments

## Duration of Individual Operation Segments

The following table shows the most important data from work centers and routings which the system uses in calculating the duration of the individual operation segments.

### Data from Work Centers and Routings Used to Calculate Duration

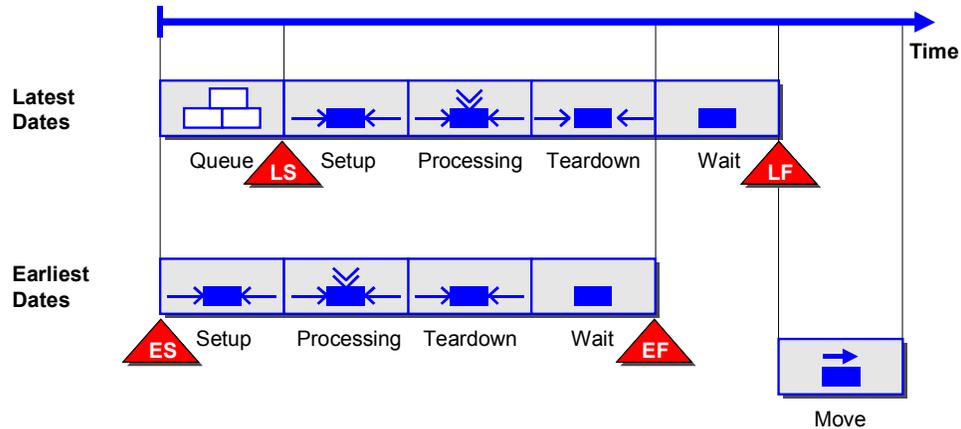
Routing	Work center
standard and minimum <a href="#">queue time [Page 142]</a>	standard and minimum <a href="#">queue time [Page 142]</a>
minimum wait time	<a href="#">formulas [Page 143]</a> for calculating individual operation segments of execution time (setup, processing, teardown)
standard and minimum <a href="#">move time [Page 144]</a>	<a href="#">location group [Page 144]</a>
number of splits (partial lots)	
standard values	

Queue Time

## Queue Time

In addition to the floats before and after production, you can define an operation float in the form of a **queue time**. The queue time is used to compensate for malfunctions and delays within an operation.

The queue time is the interval between the **earliest** and **latest dates** of the operation (see the following figure). During each scheduling run, the system calculates the earliest and the latest dates for the individual operation segments.



You can maintain the queue time in both the work center and operation. However, the system only schedules with the queue time in the work center if you have not maintained the queue time in the operation. If the lead time of an operation must be reduced, the system can shorten the standard queue time as far as the minimum queue time.

## Formulas for Calculating Setup, Processing and Teardown

The system calculates the duration of the operation segments that make up the **execution time** (setup, processing and teardown) using formulas. You can enter a separate formula for each of these three operation segments in the work center. You can use the following parameters in the formulas:

- **standard values** depending on the standard value key
- **formula constants from the work center**
- **general operation values**, such as
  - lot size
  - base quantity
  - number of splits (partial lots)
- **values from user-defined fields in the operation**



If you have not maintained a formula or standard values for a formula to calculate duration times for one of the three operation segments (setup, processing or teardown), the system calculates for the corresponding operation segment using a duration of zero.

The formulas used to calculate the duration are not the same as those used to calculate capacity requirements. They are maintained separately in the work center. The system can only calculate the duration of the individual operation segments if you have maintained the formulas on the *Scheduling* screen in the work center.



To calculate the setup, processing and teardown times of an operation, the system always uses the smallest unit for the standard values. If you want the times to be calculated using a larger unit, you must change the smallest time unit of the standard values.

### See also:

For examples of formulas, refer to the *PP Work Centers* guide.

## Move Time

### Move Time

You can maintain the **move time**

- in the individual operations
- in Customizing per location group in the move time matrix

In the *interoperation times* section of the *Operation Details* screen, you can maintain a minimum and a standard move time. If reduction measures are carried out, the system schedules the operations using the minimum move time (see also [Reduction Measures \[Page 149\]](#)).

Only if you do not maintain move times in the *interoperation times* section of the *Operation Details* screen, the system determines the move time using the move time matrix.

### Location Groups

You can combine work centers which are in close proximity to each other into **location groups**. You can define location groups in Customizing. You can assign a work center to a location group on the *Scheduling* screen of the work center.

### Move Time Matrix

In the **move time matrix**, you can specify planned values for the move time within a location group or from one location group to another. For each entry, you can specify a minimum and a standard move time. You maintain the move time matrix in Customizing.

## Operating Time

The operation dates can only be calculated if the **operating times** of the capacities are known in addition to the **duration** of the individual operation segments. In scheduling, each operation segment is lined up along the time axis according to the operating time of the capacity. The individual operation dates are determined from this distribution.

The **operating time** specifies when work is carried out at a work center. The calendar corresponding to the operating time defines working days and holidays. You can define the operating time per working day by specifying the start and finish of the work as well as the breaks.

The following rules apply to scheduling:

- If the unit of the operation segment is smaller than the unit "day", scheduling is carried out taking into account the operating time per working day.
- If the unit of the individual operation segment is "day" or greater than "day", the system schedules in the unit "day" taking into account the valid calendar.

If **no operating time** has been maintained for a time interval, the system uses an operating time from 0:00 to 24:00.

## Queue, Setup, Processing and Teardown

For the operation segments queue, setup, processing and teardown, the system uses the operating time per working day defined in the work center as well as the calendar of the work center or operation.

The operating time per working day is calculated in the work center based on the following data:

- work start and finish
- break times
- capacity utilization rate

The **capacity utilization rate** is a percentage value which expresses the ratio between productive operating time and theoretical operating time. It reflects technical and organizational malfunctions. You can maintain the capacity utilization rate relevant to scheduling in capacity maintenance for the capacity category used as a scheduling basis.

The **calendar** in the work center has the highest priority. If you have not maintained a calendar in the work center, the calendar in the operation is used. If you have not maintained a calendar in the operation or the work center, the Gregorian calendar is used.



In work center maintenance, you maintain the operating time of a work center on the header screen for the capacity category used in scheduling.

Enter the capacity category used in scheduling on the *Scheduling* screen for the work center.

## Operating Time

### Wait Time

The wait time is scheduled without taking the factory calendar into account. This means that it can be scheduled daily from 0.00 to 24.00.

### Move Time

The operating time for the move is determined using the parameters in the move time matrix. In the *Calendar* field, you can specify whether the system should use the operating time from the

- source work center
- target work center
- move time matrix

Enter the shift start and shift finish in the move time matrix to determine the operating time per working day.

### External Operations

For external operations, the delivery time is specified in days. These operations are scheduled based on the Gregorian calendar.

## Sub-Operation Dates

Sub-operations are not divided into individual operation segments in scheduling. The system schedules start and finish dates for the sub-operations from their reference dates.

To define the start and the finish of a sub-operation, you must maintain the following data on the *Operation Details* screen:

- a reference date (for example, start of setup or finish of the execution of the corresponding operation)
- an offset
  - If the offset is positive, forward scheduling is carried out starting from the reference date.
  - If the offset is negative, backward scheduling is carried out starting from the reference date.



If you have not maintained scheduling data for a sub-operation, the start date of setup and the finish date of execution are transferred to the sub-operation.

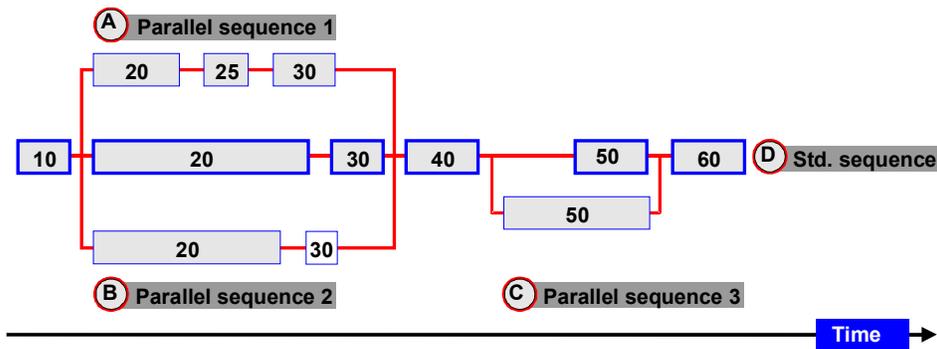
Alignment Key in Parallel Sequences

## Alignment Key in Parallel Sequences

If several sequences in a routing are to be carried out in parallel, the lead times of these sequences generally differ. As a result, floats occur within the sequences. The alignment key controls whether these floats are to be positioned at the start or at the finish of the sequence:

- If the sequence is aligned with the earliest possible date, the float is at the finish of the sequence.
- If the sequence is aligned with the latest possible date, the float is at the start of the sequence.

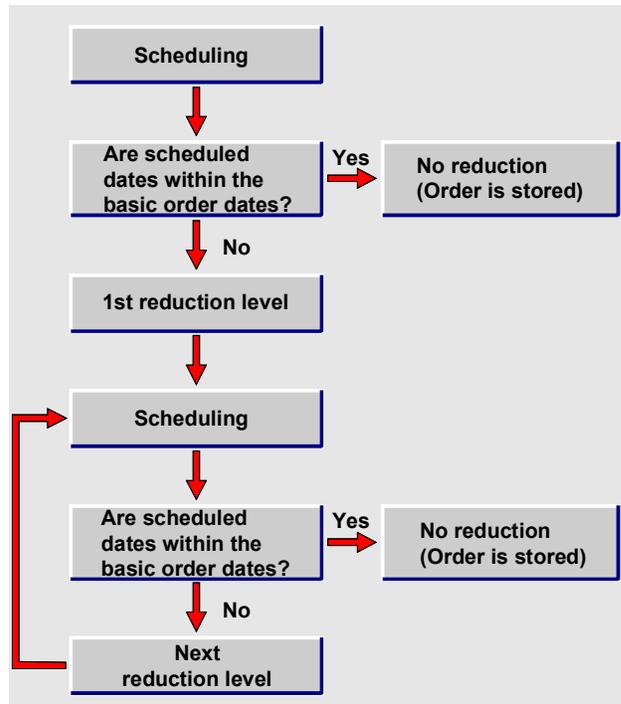
An alignment key is assigned to the standard sequence and to each of the parallel sequences. The following figure shows the relationship between the alignment key and how sequences are scheduled. The floats are hatched in the graphic. Whereas the three parallel sequences are aligned with the earliest possible date, the standard sequence is aligned with the latest possible date.



## Reduction Measures

If the lead time calculated in scheduling is longer than the time between the basic dates, the system will carry out reduction measures to reduce the lead time.

Reduction is carried out step by step. After each reduction measure, the system checks whether the calculated dates are within the basic dates. If this is the case, no further reduction measures are carried out.



### See also:

[Reduction Strategy \[Page 150\]](#)

[Reduction in Operation \[Page 151\]](#)

[Reduction of Floats Before and After Production \[Page 154\]](#)

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**Reduction Strategy**

## Reduction Strategy

You can assign a **reduction strategy** to each operation in the *interoperation times* section of the *Operation Details* screen. This strategy specifies

- how many reduction levels may be applied to an operation (maximum of six levels)
- which reduction measures are carried out at the individual levels

You can set reduction strategies in Customizing for routings under *Operation Data*.

## Reduction in Operation

The following reduction measures can be carried out with respect to the operation:

- Reduction of the **queue time**: For each reduction level, you can specify the percentage by which the queue time is to be reduced. However, you cannot reduce to a value smaller than the minimum queue time.
- Reduction of the execution time by [splitting \[Page 155\]](#) Dividing an operation between several people or machines results in a reduction of the execution time.
- Reduction of the lead time by [overlapping \[Page 156\]](#)  
You can reduce the overall lead time of an order by overlapping operation processing.
- Reduction of the **move time**  
You can reduce the standard move time as far as the minimum move time.



The minimum wait time cannot be reduced.

---

**Reduction in Routings with Parallel Sequences via the Critical Path**

## Reduction in Routings with Parallel Sequences via the Critical Path

### Use

In order to reduce the lead time of a routing with parallel sequences, you specify that reduction is only carried out on operations, if a reduction in their execution time leads to a reduction in the overall lead time of the order. The sequence of such operations in the routing with parallel sequences forms the "critical path". If applying reduction measures to an operation, would not lead to an overall lead time reduction, this operation is not reduced.

In this reduction type reduction measures are carried out until the overall lead time has been reduced sufficiently. You can consequently retain floats for uncritical operations and prevent unnecessary splits or overlaps.

### Prerequisites

You set up reduction via the critical path in *Scheduling parameters* for planned orders and production orders by selecting the reduction type.

In the operation overview for the routing you can select another reduction type via the menu path *Extras → Scheduling → Schedule*. This overwrites the settings you made in Customizing (as do the other settings for reduction).

If a routing does not contain parallel sequences, there is no critical path. **All** operations are then reduced, irrespective of whether you have selected reduction via the critical path or not.

### Activities

#### Process Flow for Reduction

In reduction via the critical path the system first determines which operations lie on the critical path. These operations are then lead time scheduled using the selected reduction strategy and reduction level 1. The floats in your order are also reduced according to the settings. If the overall lead time has been sufficiently reduced after this first reduction run, no further reduction is carried out.

If it is not sufficient, the system determines the critical operations (operations on the critical path) again. This could include different operations than in the first critical path. The reduction level of the operations on the new critical path is increased by one, the uncritical operations are left as they are. Lead time scheduling is carried out for the routing again. If the routing can be carried out within the framework dates or the basic dates respectively, the reduction is sufficient.

If the reduction is not sufficient, the system repeats this process until it is sufficient or in all operations on the critical path the maximum reduction level has been reached:

1. Determine critical path
2. Increase the reduction level of critical operations by 1
3. After lead time scheduling, check whether the overall lead time has been reduced sufficiently.

In this process only the critical operations are reduced in each reduction step. Consequently each operation is reduced by the smallest reduction level necessary.

---

**Reduction in Routings with Parallel Sequences via the Critical Path****Recommendations for Working with Reduction via the Critical Path**

Reduction via the critical path places greater demands on the system as reducing all operations step-by-step. The following procedure is a good compromise between performance and effective scheduling.

1. Carry out a reduction run for all operations.

All the operations are reduced to the same reduction level. You carry out this reduction, to determine the maximum reduction level, at which the critical operations have to be reduced, so that the overall lead time of the routing is sufficiently reduced.

2. Execute the reduction again, but this time via the critical path.

Enter as the maximum reduction level the level you determined above.

Through this procedure, only the critical operations are reduced with the maximum level that is necessary to reduce the overall lead time. Other critical operations are reduced with a smaller reduction level. The operations whose reduction does not contribute to a reduction of the overall lead time are not reduced.

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**Reduction of Floats Before and After Production****Reduction of Floats Before and After Production**

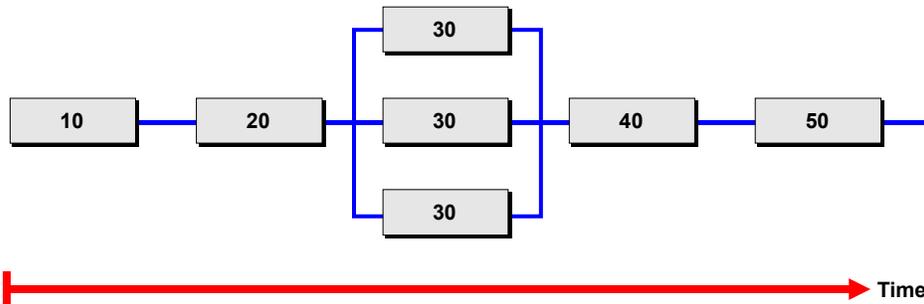
Floats before and after production are used to compensate for interruptions in the production process. To reduce the floats before and after production in non order-related scheduling, on the dialog box *Scheduling*, enter the percentage by which the floats should be reduced at each reduction level.

## Splitting

An operation is split if it is carried out on several machines or by several persons at the same time (see figure).

Splitting an operation has the following effects on the operation dates:

- The processing time/execution time becomes shorter.
- Setup and teardown must be carried out more than once for the operation.

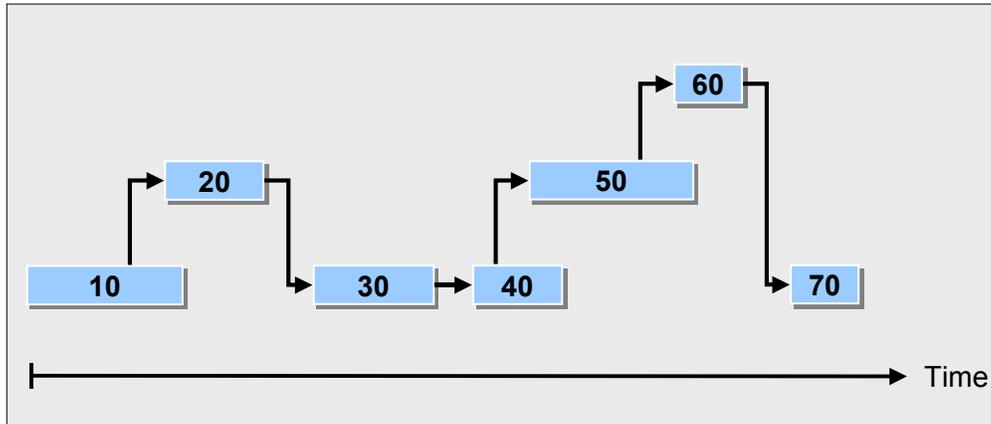


## Overlapping

## Overlapping

### Use

To reduce the lead time of a routing or production order you can overlap operations. This means that an operation starts before the previous operation has finished (see *Overlapping* graphic, for instance, operations 40 and 50).



Overlapping

### Features

You can define for each individual operation whether it should overlap with the next consecutive operation and in what way. To do this you can set the following indicators:

- *Required overlapping*  
This means the operations always overlap
- *Optional overlapping*  
This means the operations overlap if scheduling uses a **reduction level** that allows overlapping
- *Flow manufacturing*  
This means the system extends the lead time of all operations, that overlap using flow manufacturing, to the same length as the lead time of the longest of these operations. As with *required overlapping*, the operations always overlap.

For every type of overlapping you can

- Define a **minimum overlap time** which only allows overlapping after a particular minimum limit has been reached.
- Define a **minimum send-ahead quantity** to ensure that the operation is performed for a particular minimum quantity of the material to be produced, before the next operation starts.

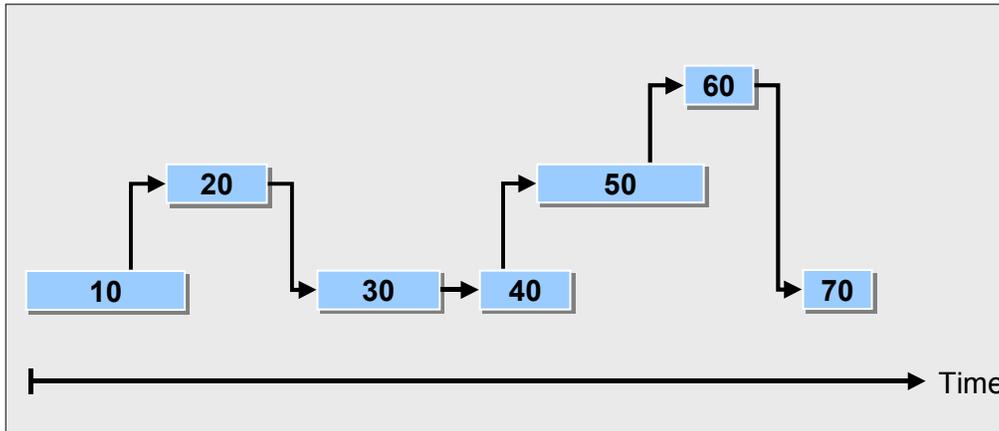
## Activities

You enter the overlap indicator, minimum overlap time and minimum send-ahead quantity on the operation details screen.

Example: Overlapping Using Flow Manufacturing

## Example: Overlapping Using Flow Manufacturing

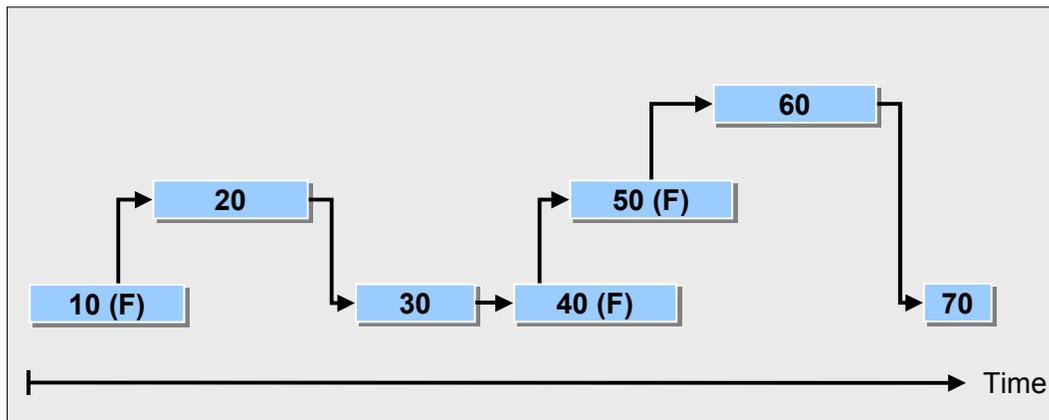
Graphic 1 shows the operations in your routing or production order with the execution times that have been calculated from the standard values and formulas in the work center.



Graphic 1: **Overlapping (no flow manufacturing)**

Operations 10, 40 and 50 for which you set the Flow manufacturing indicator, are shown in graphic 2 with "F". There are two groups of consecutive operations that overlap using flow manufacturing, namely

- Operations 10 and 20  
Here operation 10 has the longest execution time (according to standard values, see graphic 1). It is adopted for operation 20 (see graphic 2).
- Operations 40, 50 and 60  
Here operation 50 has the longest execution time (according to standard values, see graphic 1). It is adopted for operations 40 and 60 (see graphic 2).



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**Example: Overlapping Using Flow Manufacturing**

Graphic 2: **Overlapping Using Flow Manufacturing**

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**Transferring Scheduling Results to a Material Master Record**

## Transferring Scheduling Results to a Material Master Record

You can specify the in-house production time dependent or independent of lot sizes in the material master record. After non order-related scheduling has been carried out for a routing, you can update the in-house production time dependent on lot sizes in the material master with the new data determined by scheduling. It is important for requirements planning that the scheduling data in the material master and the routing agree.

In requirements planning, the system first calculates the basic order dates from the data in the **material master record**. In detailed planning, the data in the **routing** is used. If, for example, you have maintained a shorter in-house production time in the material master than in the routing, the system begins reduction measures even though this may not be your intention.

The following data can be transferred when you update the material master:

- Setup time
- Processing time
- Interoperation time
- Assembly Scrap

The assembly scrap is determined from the total operation scrap in the routing.

- Base quantity

The lot size you used to schedule the routing is copied in the material master as the base quantity.

If you have maintained an in-house production time dependent on lot size in the material master, this value is set to zero when the material master is updated.

To update a material master record, you need authorization object **C\_ROUT\_MAT** in your user master record.

### See also:

[Updating Material Master Records \[Page 168\]](#)

## Sources of Error: What to do if... ?

### What you can do if scheduling does not work or all operations are scheduled with a duration of zero

In the routing, check whether

- the control key in the operation allows scheduling.  
To do this, position the cursor on the control key and press F4. Check if the scheduling indicator in the control key is selected for scheduling. (see Overview: Scheduling a Routing)
- the scheduling data is maintained for the work center in the operation.  
To do this, select the operation and the menu options *Environment* → *Operation* → *Work center*. You reach the basic data screen for the work center. Select the menu options *Goto* → *Scheduling* and check whether a capacity category is maintained as a basis for scheduling. Also check whether formulas are maintained for calculating the execution time. For additional information about work center data, refer to the *PP Work Centers* guide.
- the standard values in the work center agree with the standard values maintained in the operation.
- the scheduling type you set in Customizing allows for scheduling operation dates.  
For example, scheduling type “3” specifies for finite scheduling that the operation dates are to be taken from the order header and not scheduled.
- the control key defines the operation as an operation for rework.  
In this case, the indicator *Rework* is set in the control key. An operation for rework in a routing cannot be scheduled because the rework quantity has not yet been determined. You get a value of “0” for all operation segments in scheduling. Only the operations in orders have dates.

### What you can do if scheduling determines a different assembly scrap for various lot sizes of the same material

In this case, a rounding error has occurred when the system calculated the assembly scrap. Remove the rounding error by increasing the value for rounding decimal places in Customizing. To do this, choose the menu options *Global Settings* → *Check unit of measurement* → *Units of measurement* in Customizing and increase the value in the *Decimal pl. rounding* field.

**Example: Calculating Operation Dates**

## Example: Calculating Operation Dates

A routing consists of operation 10 and operation 20. You want to schedule for a quantity of 100 pieces. You select a basic start date of Tuesday the 2nd. The scheduling type is forward scheduling.

### Duration of Individual Operation Segments

The system first calculates the duration of the operation segments. Using the formulas in the work center, it calculates the lead time of operation 10. For each standard value, the performance efficiency rate is taken into account.

setup	+ processing	+ teardown	= execution time
0.5 hours	+ 6.5 hours	+ 0.5 hours	= 7.5 hours

To calculate the lead time of the operation, the queue time and the wait time are added to the execution time:

queue	+ execution	+ wait	= lead time
7 hours	+ 7.5 hours	+ 15 hours	= 29.5 hours

The move time between operation 10 and operation 20 is 0.5 hours. It is defined in the first of the two operations, that is, operation 10.

### Operating Time

The operating times of work centers are calculated as follows:

1. The working hours at the work center are calculated:

work finish	- work start	= working hours
16:00	- 8:00	= 8 hours

2. The break times are subtracted from the working hours:

working hours	- breaks	= 8 hours - 1.33 hours = 6.67 hours
---------------	----------	-------------------------------------

3. The capacity utilization rate is taken into account:

6.67 hours	* capacity utilization rate	= 6.67 hours * 90% = approx. 6 hours
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The operating time for the move is defined in the move time matrix using a shift start of 7:00 and a shift finish of 17:00. It corresponds to 10 hours.

### Calendar Selection

Next, the system selects the valid factory calendars. The same factory calendar is specified in both work centers. According to the factory calendar, Monday through Friday are working days.

**Example: Calculating Operation Dates**

**Dates**

After the durations of the individual operation segments have been calculated, the system determines the operation dates. For this purpose, the system lines up the order floats along the time axis taking into account the operating times.

Since forward scheduling is carried out for the routing, the system starts from the basic start date, that is Tuesday the 2nd.

Starting from the basic start date, the system first adds the **float before production** (one day, in our example) on the time axis. The scheduled start is Wednesday the 3rd.

Then, the **operation segments** of the two operations are added on the time axis.

**Calculation of the Operation Dates for Operation 10**

Segment	Duration	Time/Day	Start	Finish
queue	7 hours	6 hours	Wed., 3rd 8:00	Thurs., 4th 9:20
setup	0.5 hours	6 hours	Thurs., 4th 9:20	Thurs., 4th 10:00
processing	6.5 hours	6 hours	Thurs., 4th 10:00	Fri., 5th 10:40
teardown	0.5 hours	6 hours	Fri., 5th 10:40	Fri., 5th 11:20
wait	15 hours	24 hours*	Fri., 5th 11:20	Sat., 6th 2:20
move	0.5 hours	10 hours	Mon., 8th 8:00	Mon., 8th 8:30

\* The wait time is scheduled without regard to the factory calendar.

The same procedure is now carried out for operation 20:

The sum of queue time, setup time, processing time and teardown time totals 19 hours. The operating time per day is 6 hours. Consequently, the finish of the setup is scheduled for Thursday the 11th at 16:00. The wait time for operation 20 is 5 hours. Since the wait time is scheduled without regard to the factory calendar, it does not have to be within the operating time defined for the day. Operation 20 is the last operation in the order, therefore there is no move time.

Finally, the **float after production** (one day, in our example) is added on the time axis. Therefore, the basic finish date of the order is Friday the 12th.

## Scheduling a Routing

# Scheduling a Routing

By scheduling routings, you can better control the lead times. When you create a routing, it is already possible to check the expected lead time and if necessary adjust the routing.

Routings are scheduled without reference to an order.

### Proceed as follows to schedule a routing:

1. Call up the operation overview for the routing.
2. Choose *Extras* → *Scheduling* → *Schedule*.  
You reach the *Scheduling* dialog box.
3. Maintain the data on the dialog box. The system proposes **forward scheduling** for the scheduling type.
4. Choose *Continue*.

You reach the *Enter overview variant* dialog box.

5. Enter the overview variant you want to use to display the scheduling results. Choose *Continue*.

The routing is scheduled. You reach the *Schedule Overview* screen containing the scheduling data.

6. After the scheduling run has been carried out, you can display
  - the [scheduling results \[Page 165\]](#)
  - a [Gantt chart \[Page 166\]](#) with scheduling results
  - the [scheduling log \[Page 167\]](#)

You can also schedule all routings in a group at once. You can find further information on this topic in [Updating the material master records \[Page 168\]](#)

### See also:

[Sources of error: What to do if...? \[Page 161\]](#)

## Scheduling Results

To display scheduling results, select the menu options *Extras* → *Scheduling* → *Results*.

You see the following data:

- basic start and finish dates
- scheduled start and finish dates
- in-house production time from the material master record
- scheduled in-house production time



If you select *Update mat. master*, the **assembly scrap** determined by the system is also written to the temporary file.

For additional information about updating the material master, refer to the section [Transferring Scheduling Results to a Material Master Record \[Page 160\]](#).

---

**Gantt Chart****Gantt Chart**

To see a graphic display of the scheduling results, select the menu options *Extras* → *Scheduling* → *Gantt chart*.

## Scheduling Log

During each scheduling run, a scheduling log is created in the routing. This log contains the system messages which occurred, for example, if data relevant to scheduling is not maintained in a work center or an operation.

The scheduling log is used to

- collect the messages issued by the system
- sort and group the system messages according to specific criteria

System messages can be distinguished according to their **message type**. There are four different message types displayed in the scheduling log:

- notification message
- warning messages
- error messages
- termination messages

To display a scheduling log, select the menu options *Extras* → *Scheduling* → *Display log*.

For additional information about logs, refer to the section [Displaying an Error Log \[Page 228\]](#).

## Updating Material Master Records

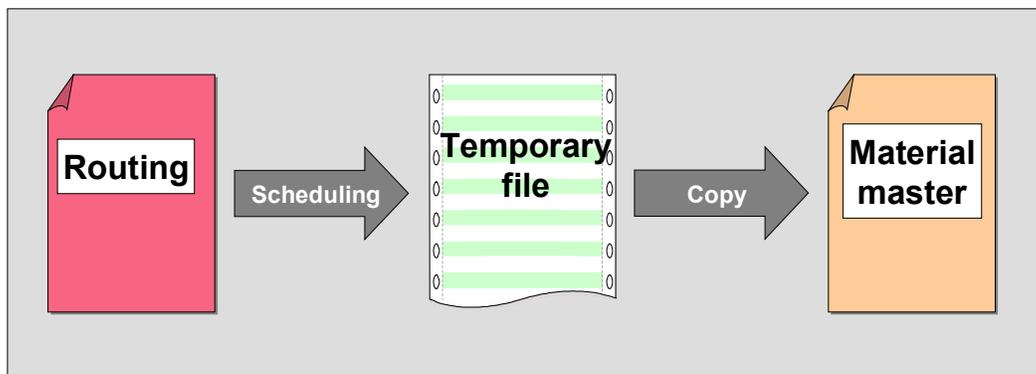
## Updating Material Master Records

### Use

You use this function to update material master records. In particular you replace the execution times (and possibly **assembly scrap**) in the material master by the execution times that were calculated in scheduling.

### Features

The following times are updated: set-up., teardown, processing and interoperation times. The assembly scrap is also updated, if required. The base quantity in the material master record is also replaced by the scheduling lot size.



### Updating Material Master Records

Updating material master records in two steps (see *Updating Material Master Records* graphic)

1. You schedule the routings for the materials whose master records you want to update. You save the results in a temporary file.
2. You copy the scheduling results from the temporary file to the corresponding material master record.

You can execute both of these steps either manually or automatically.



If you have entered a lot size independent in-house production time, it is set to zero after an update.

If assembly scrap has been entered in a material master record and you update the assembly scrap, the following applies: If scheduling does not calculate an assembly scrap value, then the assembly scrap value is overwritten with the value 0.



---

**Copying Data to the Temporary File Manually**

## Copying Data to the Temporary File Manually

### Procedure

1. Carry out scheduling in the routing for the material. To do this, access the operation overview by entering the exact material on the initial screen and **not** by entering the group alone. Switch to the operation overview and choose *Extras* → *Scheduling* → *Schedule*.

The *Scheduling* dialog box appears.

2. Enter the lot size and choose *Continue*.

The *Enter Overview Variant* dialog box appears.

3. Enter a overview variant and choose *Continue*.

The *Scheduling Overview* for the routing appears.

4. Choose *Extras* → *Scheduling* → *Results*.

The *Scheduling Results* dialog box appears. Here the newly scheduled lead times are listed together with the lead times specified in the material master record. In addition, the lot size from scheduling is shown across from the base quantity in the material master record.

5. Choose *Update mat. master*.



You can carry out scheduling several times in a routing (for example, with various lot sizes). The results from each scheduling run are stored in a temporary file.



If you do not see the function key *Update mat. master* on the dialog box, you did not enter the material on the initial screen for routing maintenance. In this case, repeat steps 1 through 4.

### Result

The system saves the scheduling results together with the calculated assembly scrap in the temporary file. You can update the relevant material master record now or later.

## Updating Material Master Records Manually

### Prerequisites

There are scheduling results for the material that you want to update in the temporary file.



You can copy the data from the temporary file to the material master record by using report program RCPMAU02.

### Procedure

1. From the routing menu, select the menu options *Extras*  *Material master*  *Update material master*.
2. The *Update Material Master: Initial Screen* appears.
3. Enter the plant and the production schedule for the scheduling results that you want to update. Choose *Enter*.
4. The *Update Material Master: Overview* screen appears. If you only enter the plant, the scheduling results for all of the materials in that plant are selected.
5. To view detailed information about the scheduling results before you update the material master, select the menu options *Goto*  *Details* or double-click on the corresponding line.
6. If you want to update the assembly scrap, set the *Update with assembly scrap* indicator.
7. Select the scheduling results on the list that you want to update and choose *Edit*  *Update mat. master*.

### Result

The scheduling results are copied to the material master records and a log is produced. If you have scheduled a material several times, the scheduling results from only **one** scheduling run can be updated in the material master.

---

**Copying Data to the Temporary File Automatically**

## Copying Data to the Temporary File Automatically

### Use

You use this function to schedule a material and to save the results in the temporary file automatically. You can use these scheduling results, for instance, to update the material master record manually.

### Integration

In case there are several routings for a material, the system has to determine which routing is to be scheduled. To do so, it uses the priority rules that you have specified in Customizing by choosing *Production* → *Capacity requirements planning* → *Operations* → *Scheduling* → *Define scheduling parameters for production orders*.

You can use report program RCPMAU01 to copy data automatically to the temporary file in the background.

### Features

There are various criteria for selecting the materials whose master records you want to update.

## Copying Data to the Temporary File Automatically

### Procedure

1. From the routing menu, select the menu options *Extras* → *Material master* → *Schedule material master*.
2. Enter the data for the materials, whose routings are to be scheduled.

You do not necessarily have to enter a material on this screen. For example, you can select all materials for one planer group or in one plant.



Note that the material cannot have the material type *KMAT*. The procurement type cannot be *external procurement*. The procurement type is on the *MRP 2* tab page of the material master.

3. Make sure that neither the *Update material master directly* nor the *Update with assembly scrap* indicators have been set.
4. Choose *Enter*.

The system schedules the routings and produces a results list with the scheduling results.

### Result

The system saves the scheduling results in the temporary file. You can update the relevant material master records now or later.

---

**Automatic Update of Material Master Records**

## Automatic Update of Material Master Records

### Use

You use this function to update the material master records automatically. This is particularly useful, if you have a large number of records to update.

### Integration

In case there are several routings for a material, the system has to determine which routing is to be scheduled. To do so, it uses the priority rules that you have specified in Customizing by choosing *Production* → *Capacity requirements planning* → *Operations* → *Scheduling* → *Define scheduling parameters for production orders*.

You can use report program RCPMAU01 to update automatically in the background.

### Features

There are various criteria for selecting the materials whose master records you want to update.

## Updating the Material Master Record Automatically

### Procedure

1. From the routing menu, select the menu options *Extras* → *Material master* → *Schedule material master*.
2. Enter the selection data for the materials, whose master records you want to update automatically.

You do not necessarily have to enter a material on this screen. For example, you can select all materials for one planer group or in one plant.



Note that the material cannot have the material type *KMAT*. The procurement type cannot be *external procurement*. The procurement type is on the *MRP 2* tab page of the material master.

3. Set the *Update material master directly* indicator.
4. If you want to update the assembly scrap, set the *Update with assembly scrap* indicator.
5. Choose *Enter*.

The system schedules the routings and updates the master records of the selected materials. It produces a results list with the scheduling results.

## Consistency Check

## Consistency Check

The system does not automatically check consistency between operations and sequences when you create or change a routing. Therefore, when you are creating a routing, you can create several operations with the same operation number if the exact order is not known and then delete the unnecessary operations or change the operation numbers at a later time.

### Automatic Consistency Check

In Customizing for routing, you can specify, depending on the status of the routing, that a consistency check is automatically carried out **before saving** the routing. (see [Activating the Automatic Consistency Check \[Page 178\]](#)) The system checks the following object relationships:

#### Scope of Consistency Check

Checked objects	Possible inconsistencies
Standard Sequence	The validity period of the standard sequence does not agree with the validity period of the header.
Operation and sub-operation numbers	The same number has been assigned more than once.
Branch and return operations	The branch operation is greater than the return operation. The branch or return operation of a sequence was deleted. The smallest operation number of an alternative sequence is smaller than the branch operation in the standard sequence. The largest operation number of an alternative sequence is larger than the return operation in the standard sequence.
Units of measure	The unit of measure for the routing does not agree with the unit of measure of the referenced operation set.
Lot size ranges	The lot size range of an alternative sequence exceeds the lot size range of the header. The lot size range of the header or alternative sequence exceeds the lot size range of the referenced operation set.

**In addition, the system checks the consistency of an operation's inspection characteristics when you exit the characteristic overview.** For additional information about this, refer to the R/3 Library *QM Quality Management*.

### Consistency Check During Task List Maintenance

During task list maintenance you can carry out a consistency check independently of the task list status. When the system carries out the check it writes a **check log** where system messages are displayed. You can use these system messages to decide whether you should save despite the inconsistencies or whether any errors must be corrected online.



When a consistency check is carried out in the background, the routing is always saved. If errors occur, the consistency log is also saved on the database.

### Consistency Check for Material Assignments

In addition to checking the consistency of operations and sequences, you can also check the consistency of the material component assignments to your routing.

Checking Material Component Assignments

### Consistency Check at Order Creation

Once a routing is checked and saved without inconsistencies, the system sets an internal indicator in the header so that no further check is carried out at order creation.

In the following cases, the system checks consistency again when an order is created:

- If you have saved a routing despite inconsistencies.
- If the valid from date of the change number (see also [Working with History \[Page 203\]](#)) for a checked routing has changed.
- If a configurable material is assigned to the routing.

For additional information about the consistency check at order creation, refer to the R/3 Library *PP Production Orders*.

---

**Activating the Automatic Consistency Check****Activating the Automatic Consistency Check**

1. In Customizing for routings, select *Routings* → *General data* → *Define routing status*.
2. Set the consistency check indicator.

## Checking a Routing

1. Call up the operation overview.
2. Select the menu options *Extras* → *Consistency check* → *Consistency check*.  
You reach the *Error Management and Analysis: Initial Screen*.
3. Select the menu options *Log* → *Display* → *Total*.  
You reach the consistency log.

Once you have checked the routing for consistency, you can display the consistency log anytime:

1. Call up the operation overview.
2. Select the menu options *Extras* → *Consistency check* → *Consistency log*.  
You reach the consistency log.

---

## Printing a Routing

### Printing a Routing

You can print routing data in a list.

You can limit the selection of routing data by entering the following criteria:

- Task list type
- Material
- Plant
- Group
- Group counter
- Key date
  - Planner group
- Status
- Use

For each selection criterion, you can specify an operator to determine whether the values are interpreted as single values or a range of values. In addition, you can control whether the specified value or range is to be excluded from the selection.

You can print the following routing objects in addition to operations:

- Long texts for routings or operations
  - Sub-operations with and without long texts
  - Material components
  - Production resources/tools with and without long texts
  - QM inspection characteristics with and without long texts
  - QM characteristic values
- CAPP process texts

For additional information about creating print lists, refer to the R/3 Library *Introduction to the R/3 System*.

## Printing a Routing

### Proceed as follows to create a print list of routing data:

1. From the initial menu in routing maintenance, select the menu options *Reporting* → *Routing list*.

You reach the *Print Routings or Reference Operation Sets* screen.

2. Enter your criteria for routing selection.

If you do not specify a key date, the system will use the current date.

3. Select the routing objects for which you want to print data. The system automatically displays data about the routing header, operations and sequences.

4. Select the menu options *Program* → *Execute*.

The system generates a list according to your specifications.

5. Select the menu options *List* → *Print*.

You reach the *Print Screen List* screen.

6. Maintain the print parameters and select the menu options *Output* → *Print*.

You receive a printed list.

---

**Maintaining Reference Operation Sets and Reference Rate Routings**

## Maintaining Reference Operation Sets and Reference Rate Routings

### Purpose

This process describes how to create or change a reference operation set or a reference rate routing and reference them in routings or rate routings.



This process is valid for both reference operation sets and reference rate routings that are included in routings or rate routings. For simplicity's sake only reference operation sets and routings are discussed in the following topic.

### Prerequisites

The routing, in which you want to include the reference operation set, has already been created in the system.

### Process flow

1. You create a reference operation set by first entering only the data that is absolutely essential.
2. You edit the reference operation set header.
3. According to your needs, you can carry out the following steps in whichever order you like.
  - You plan the usage of material components in production. To do so, you assign a BOM to a reference operation set.
  - For in-house operations you plan the use of work centers.
4. If you want to schedule a routing, in which you later include the reference operation set, enter the following detailed data for the operations of the reference operation set:
  - For in-house operations you enter standard values and if necessary user fields with extra data that is not included in the standard system.
  - For externally processed operations you enter the details of the vendor. You can do this by entering a purchasing info record.(See general operation data.)



Please note that this data is also taken into account in product costing and capacity planning.

5. If you intend to inspect the quality during production, you enter the inspection specifications and if necessary the PRTs that you need as test equipment.
6. You check the consistency of the reference operation set data
7. After you have finished editing the reference operation set, you release it for use in production orders and/or costing. You set this status in the header data.
8. You save the reference operation set.

---

**Maintaining Reference Operation Sets and Reference Rate Routings**

9. You can reference the reference operation set in as many routing as you like or use it to copy from.
10. If you want to remove the link between the referenced operations and the reference operation set, unlock the reference operation set in the relevant routing.

---

## Reference Operation Set

# Reference Operation Set

## Definition

A type of routing that comprises of a series of operations that recur frequently. It is used to create a routing.

## Use

A reference operation set cannot be used directly in production.

To reduce the effort needed to create a routing, you can

- **reference** the reference operation set

All the changes you make in the reference operation set are automatically implemented in the referenced operations of the routing.

If you have referenced a reference operation set in a routing, you can **unlock** this reference. In this case the operations of the reference operation set are copied into the routing and can be changed there. The connection to the reference operation set no longer exists, which means that any changes in the reference operation set are **not** transferred to the routing.

- use the reference operation set as a **source to copy from**

Operations are copied from the reference operation set to the new routing and can also be changed there. Changes you make in the reference operation set have no effect on the routing.

## Structure

A reference operation set has the same structure as a routing. You cannot assign a material to be produced to a reference operation set. It can have neither parallel nor alternative sequences.

## Reference Rate Routing

### Definition

A type of routing that comprises of a series of operations that recur frequently. It is used to create a rate routing. This means that the quantity to be produced and the time to do can be defined, with the result that you can define the production rate.

### Use

Reference rate routings are included in rate routings to reduce the effort involved in creating a rate routing. It cannot be used directly in production.

### Structure

A reference rate routing has the same structure as a routing. You cannot assign a material to be produced to a reference rate routing. It can have neither parallel nor alternative sequences.

## Reference to a Reference Operation Set/Reference Rate Routing

## Reference to a Reference Operation Set/Reference Rate Routing

### Use

You use this function to reference one or more reference operation sets or reference rate routings in a routing or a rate routing.

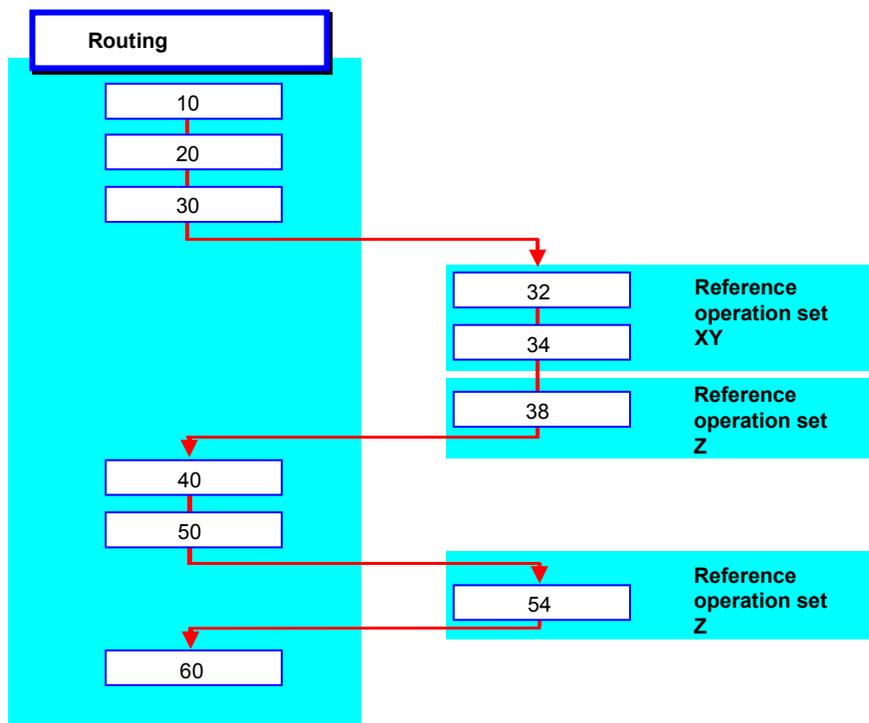
### Prerequisites

You can only reference a reference operation set or reference rate routing if it has the *released (general)* status.

If you reference a reference operation set (or a reference rate routing) in a routing, both have to be in the same company code and the same controlling area.

### Features

The graphic below illustrates how reference operation sets are referenced in routings.



You **cannot** reference another reference operation set (or reference rate routing) in a reference operation set (or reference rate routing).

## Referencing Reference Operation Sets/Reference Rate Routings

1. In the operation overview of the routing or rate routing, select the menu options *Extras* → *Reference* → *Create*.

The *Operation in Referenced Operation Set* screen appears.

2. Enter data as required.



If the operations of the reference operation set (or reference rate routing) cannot be inserted with the increment you enter, the system automatically sets the operation increment to one. If the operations still cannot be inserted, the system issues a corresponding warning.

3. Choose *Goto* → *Back*.

You return to the *Operation Overview* screen. The operations of the reference operation set (or reference rate routing) are transferred to the operation overview of the routing.

## Unlocking Reference Operation Sets / Reference Rate Routings

### Use

You use this function, if you are referencing a reference operation set (or reference rate routing) in a routing (or rate routing) and want to convert the referenced operations to normal operations.

### Features

You can edit unlocked operations exactly like normal operations in a routing (or rate routing). In particular you can:

- change the data of unlocked operations
- insert other operations between unlocked operations

Changes that you make in the reference operation set (or reference rate routing) after unlocking have no effect on the routing (or rate routing)

---

**Unlocking Reference Operation Sets/Reference Rate Routings**

## Unlocking Reference Operation Sets/Reference Rate Routings

### Procedure

1. In the operation overview of the routing select an operation of the referenced reference operation set (or reference rate routing)
2. Choose *Extras* → *Reference* → *Unlock*.

### Result

The system copies the operations from the reference operation set (or reference rate routing) to the routing (or rate routing). You can now maintain them as normal operations.

## Replacing Reference Operation Sets / Reference Rate Routings

### Use

You use this function to replace a reference operation set (or reference rate routing) that is referenced in a routing (or rate routing) with another reference operation set (or reference rate routing).

### Features

You have the following possible choices: You replace the reference operation set (or reference rate routing)

- in one particular routing
- in all routing in which it is referenced

For more information about this possibility, refer to [Replacing Reference Operation Sets \(Mass Replacement\) \[Page 226\]](#).

---

**Individually Replacing Reference Operation Sets/Reference Rate Routings**

## Individually Replacing Reference Operation Sets/Reference Rate Routings

1. On the operation overview, select the operation in the reference operation set/reference rate routing you want to replace.
2. Choose *Edit* → *Delete*.

The system deletes the assignment of the old reference operation set (or reference rate routing)

3. Choose *Extras* → *Reference* → *Create* .

The system creates the new reference.

---

**Display of References**

## Display of References

### Use

You use this function to find out which reference operation set (or reference rate routing) is referenced in a routing (or rate routing) and how.

### Features

The following information is contained on the operation overview of the (rate) routing:

- The group of the referenced reference operation set (or reference rate routing)
- The group counter of the referenced reference operation set (or reference rate routing)
- You can also call up the following additional information
- The operation increment the system uses to insert operations from the reference operation set
- Long text

You can **not** use this function for unlocked reference operation sets (or reference rate routings)

## Displaying Information About a Reference

1. In the operation overview of the routing select an operation of the referenced reference operation set (or reference rate routing)
2. Choose *Extras* → *Reference* → *Display*.

The *Operation: Reference Operation Set* screen appears. You can see which task list is referenced and how.

## Change Management

# Change Management

## Use

Requirements for the documentation and checking of routings vary widely depending on the branch of industry and the product. They range from a fairly unrestricted maintenance of routing to detailed planning, documentation, and even strict approval procedures. To meet these requirements, the R/3 System offers various types of routing maintenance described below.

## Integration

**Change master records** and **engineering change hierarchies** are part of *Engineering Change Management*, which is a function in the component of the same name.

## Prerequisites

If you maintain a routing using history, you always refer to a change master record. You can include change master records in an engineering change hierarchy.

Before you can work with history, you must have created change master records and if necessary engineering change hierarchies.

### See also:

For more information, see the R/3 Library *LO - Engineering Change Management*.

## Features

### Change Documents

Changes that you make to particular fields can be recorded in **change documents**.

### Evaluating Change Documents

A function is available for evaluation, with which you can find change documents for selected groups, routing objects and the person who made the change. You can choose between the following ways of presenting the results.

- Overview of the change documents found in the evaluation period
  - The system displays the change documents in the order they were created. The administrative data are displayed for each change document (for example, changed by, change on date and validity).
  - You can also display the changes recorded in each change document. Information is displayed about the edited routing object, the activity carried out (*created, changed or deleted*) as well as the changed field contents.
- Overview of the changed routing objects
  - The system displays all routing objects that have change documents within the evaluation period. Information is displayed about the object, the activity carried out (*created, changed or deleted*) as well as the changed field contents. The objects are sorted according to category, that means first all headers are displayed, then material assignments etc.

## Working with History

If necessary you can maintain your routings with history. This is particularly useful, if you want to make very complex changes. If you

- **Never** work with history
  - Every routing object (header, operation etc.) has one and the same change status throughout its whole validity period.
  - Changes that you make in one routing object are valid for its whole validity period
- Work **with** history,
  - Maintain a routing with reference to a change master record. A change master record has a valid-from date and a change number, that identifies it.
  - The changes that make to a routing take affect from the valid-from date.
  - You can use the change master record for several materials and objects in the routing as well as the BOM, so that all the changes take affect on the valid-from date. (This is particularly useful for large changes in your production processes.)
  - You can include several change master records in an engineering change hierarchy. You can thus control the release process for related changes by using a release key.
  - You create another change status when you maintain a routing object with a particular change master record for the first time. Change statuses that you have already created remain untouched.
- always work with history
  - Your changes are entirely documented. You can always verify, who changed which routing object on which date.
- work with and without history.
  - You have several possibilities when maintaining routings.
  - Changes that you make without history are possibly documented incompletely.

## Evaluating Change Statuses

You can compare the change statuses of selected routings or routings objects. You receive.

- A list of the change statuses with the evaluation period with details about the validity, the date it was created and changed, by whom and the change number
- A list of the differences in the field contents in the selected changes statuses.

## Working with Change Documents

### Use

You use change documents to record changes that you make to individual fields in routings, irrespective of whether you use **Engineering Change Management** or not.

### Prerequisites

You must activate change documents for the field in question by setting the *Change document* indicator in the ABAP Dictionary. Note that this can affect system performance, particularly if you use change documents for too many fields

If you do not have authorization to maintain the ABAP Dictionary, contact your system administration.

### Features

#### Using Change Documents

You can document changes in all fields in routings. However you cannot produce change documents for BOMs that are assigned to the routing.

#### Evaluating Change Documents

A function is available for evaluation, with which you can find change documents for selected groups, routing objects and the person who made the change. You can choose between the following ways of presenting the results.

- Overview of the change documents found in the evaluation period

The system displays the change documents in the order they were created. The administrative data are displayed for each change document (for example, changed by, change on date and validity).

You can also display the changes recorded in each change document. Information is displayed about the edited routing object, the activity carried out (*created, changed or deleted*) as well as the changed field contents.
- Overview of the changed routing objects

The system displays all routing objects that have change documents within the evaluation period. Information is displayed about the object, the activity carried out (*created, changed or deleted*) as well as the changed field contents. The objects are sorted according to category, that means first all headers are displayed, then material assignments etc.

## Evaluating and Printing Change Documents

### Evaluating Change Documents

1. In the routings area menu choose Reporting → *Change documents* and then the task list type.
2. On the initial screen enter the selection criteria for the task list, select the objects to be evaluated and a view for presenting the results.
3. Choose *Program* → *Execute*.

According to which view you selected on the initial screen,

- an overview of the change documents found
- an overview of the objects with changes is displayed.

### Displaying the Routing Objects for a Change Document

Position the cursor on a change document in the document overview and choose *Choose*.

A list of the objects you have changed is displayed together with the changes.

### Printing the Results

1. Select the objects you want to print in the selected overview and choose *List* → *Print*.

Maintain the print parameters and choose *Output* → *Print*.

**Change Statuses**

## Change Statuses

### Definition

Depicts a particular processing status of a routing object ( for example header or operation).Change statuses are ordered sequentially, that is, each change status has a validity period that begins on the valid-from date and ends directly before the valid-from date of the subsequent change status.If there is no subsequent change status, the validity period finishes on 12/31/9999.

### Use

In the R/3 system every routing object has its own change status and consequently its own validity period. You create and edit change statuses with or without history. You work

- Without history by entering a key date.
- with history by entering the change number of a change master record. If you work with revision levels in materials management, you can also enter the revision level of the material to be produced. In this case the system determines the corresponding change number.

When you create a routing object, it has only one change status, which starts on he key date or the valid-from date in the change master record and ends on 12/31/9999.

If you never work with history, all routing objects have exactly one change status.

The first time you edit a routing object by entering a change number, you create a new change status. It is valid from the valid-from date of the change master record. The change status that was previously valid on this valid-from date still exists. Its validity period now ends immediately before the validity period of the newly created change status begins.

If a routing object has already been edited with a particular change number, a corresponding change status exists already. You can change this change status, so that the change is valid for the whole validity period of the change number.

### Creating and Changing Change Statuses

Function	History?	What happens?
Create routing object	no	A first change status is created. The key date is the valid-from date.
Change routing object	no	The change status, which is valid on the key date, is changed.
Create routing object	yes	A first change status is created. The valid-from date is the valid-from date from the change master record
Change routing object	yes	If the routing is being changed for the first time with the present change master record, a new change status is created. Its valid-from date is the valid-from date from the change master record Otherwise the change status that is valid on the valid-from date of the change master record is changed.



---

**Working without History**

## Working without History

In this process you maintain routings without history.

### Prerequisites

If you want to document changes to particular fields as change documents, you must make the corresponding setting in Customizing.

### Process Flow

You create a routing, valid from a particular **key date**.

The system creates only one change status for every routing object (header, operation etc.) you create. This status begins on the valid-from date of the change master record and ends on 12/31/9999.

You then create new routing objects or change existing ones in whichever order you like. In each case you enter a key date.

If you change an existing routing object, the system changes this change status. Thus your changes are valid for the whole validity period of the routing object. You can only reconstruct the previous change status, if the system has created the relevant change documents (see prerequisites).

## Working without History: Example

In this example you maintain a routing without using history.

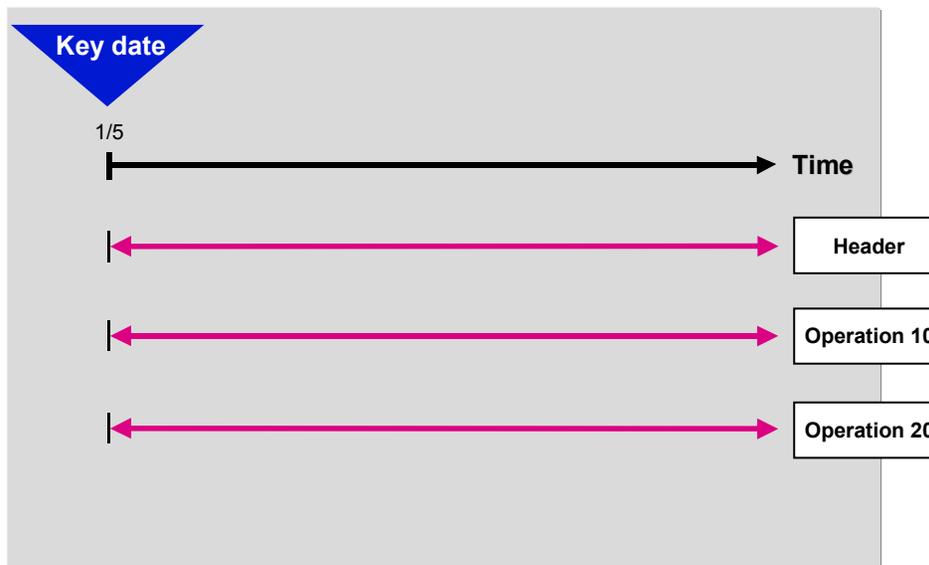
1. You create a routing with key date 1/5 and the following objects:

Header

Operation 10

Operation 20

The system creates a single change status for each object. This status is valid from 1/5 (see graphic below).



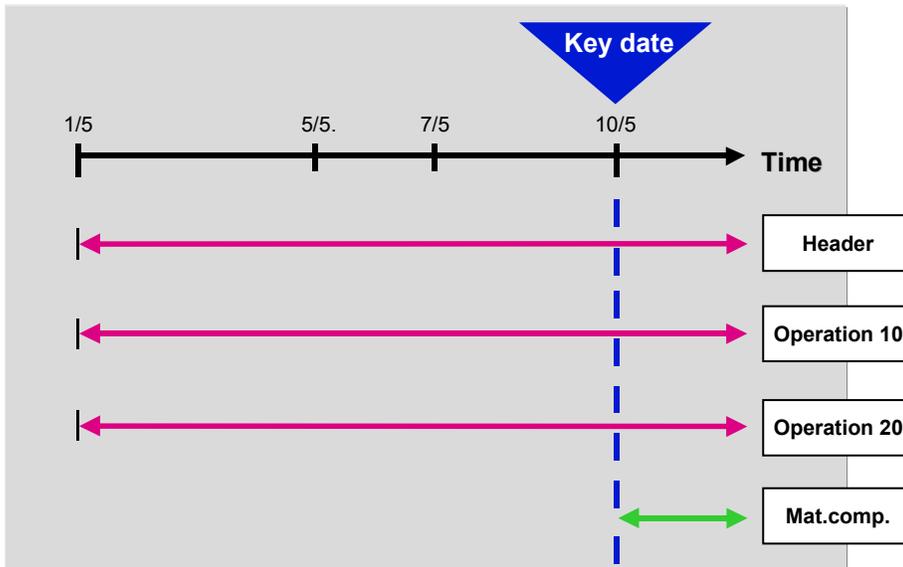
2. You change the following objects with key date 10/5:

Header

Operation 10

Your changes are valid from 1/5 indefinitely. You also assign a new material component (see graphic below).

Working without History: Example



3. You change operation 20 with key date 5/5. Your changes are valid from 1/5 indefinitely. You display the routing for the key date 7/5. The material component is not displayed, since the assignment is not yet valid on the 7/5. The header, operation 10 and operation 20 are displayed as changed.

## Working with History

### Purpose

In this process you always maintain routings with history.

### Prerequisites

The change master records with which you want to work, already exist in the system. You must have assigned each change master record a valid-from date. Depending on the type of change to be carried out, the change master record must either be intended for the following object types or contain object management records for the following individual objects:

Data to be maintained	Required object type/object management records
All routing data	Task list
Material and BOM	Task list and BOM
Production version	Task list, BOM and material



If you want to link changes of further objects with the routing changes, include these objects in the change master record.

The revision levels with which you want to work, already exist in the system.

If you want to documents changes to particular fields as change documents, you must make the corresponding setting in Customizing.

#### See also :

For more information about how you create and administer change master records and revision levels, refer to the R/3 Library *LO - Engineering Change Management*.

### Process Flow

When you create a routing, you enter the change number of the change master record.

Note: If you work with revision levels, you can also enter the revision level instead of the change number. In this case the system determines the change number that corresponds to the revision level.

Initially the system creates only one change status for every routing object (header, operation etc.)you create. This status begins on the valid-from date of the change master record and ends on 12/31/9999.

You then create new routing objects or change existing ones in whichever order you like. You also enter a change number. If you

change an existing routing object, the system creates a new change status, if you are editing this change master record for the first time. Otherwise the existing change status is changed. It is valid from the valid-from date in the change master record.

**Working with History**

## Working with History: Example

In this example you maintain a routing with history.

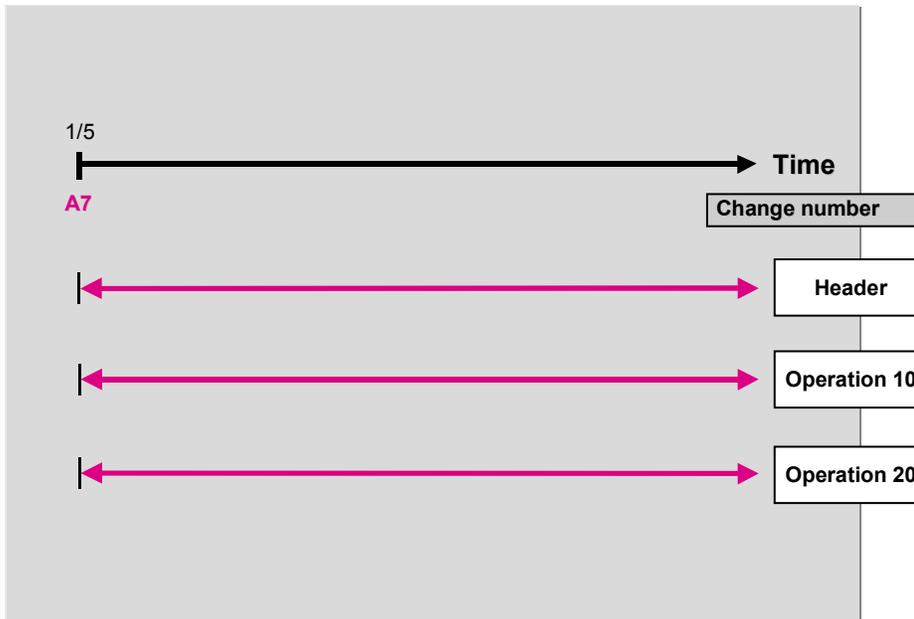
1. You create a routing with change number A7. The corresponding change master record is valid from 1/5. Your routing contains the following objects:

Header

Operation 10

Operation 20

The system creates a single change status for each object. This status is valid from 1/5 (see graphic below).



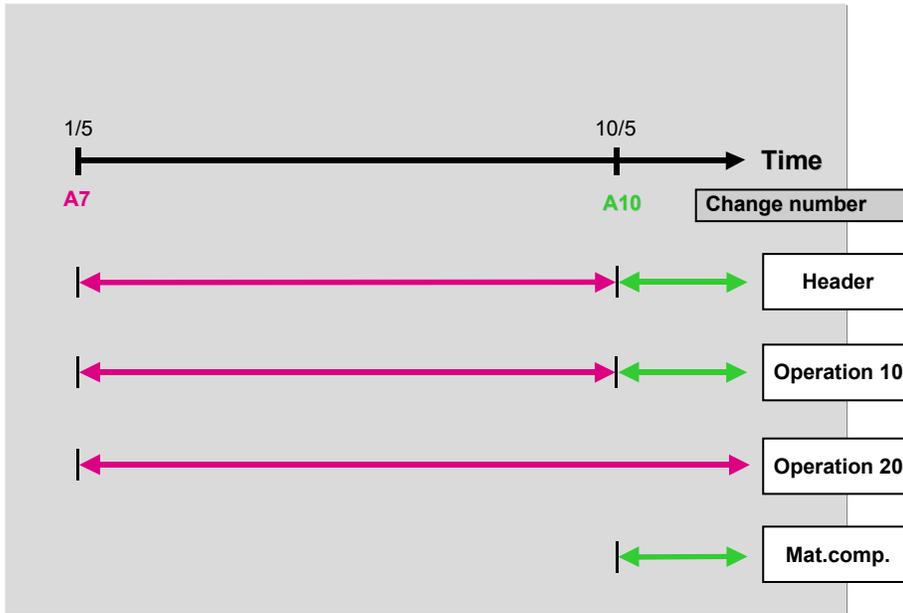
2. You change the routing with change number A10. The corresponding change master record is valid from 10/5. You assign a new material component to an operation and change following objects:

Header

Operation 10

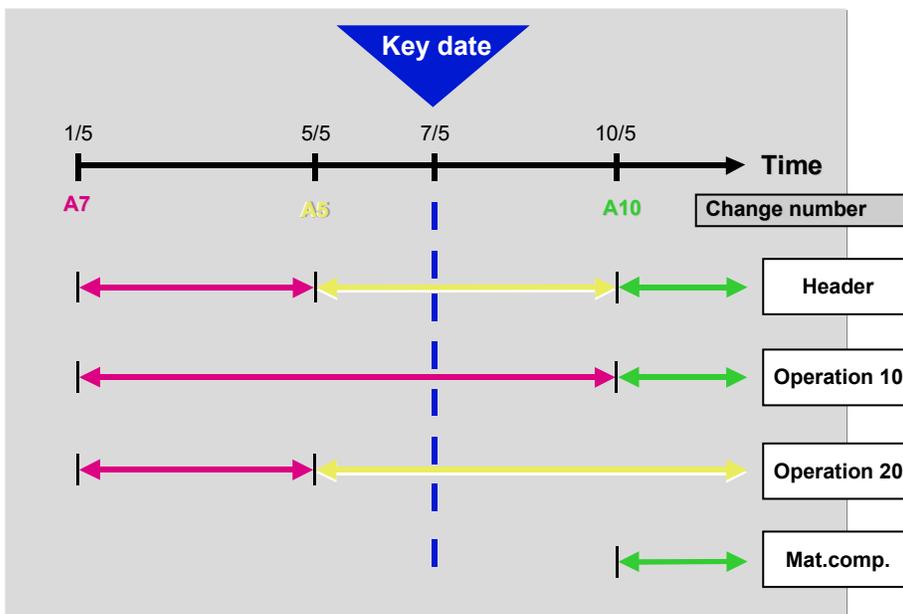
The system creates three new change statuses (see graphic below).

Working with History: Example



- You change the routing with change number A5. The corresponding change master record is valid from 5/5. You change the following objects:

- Header
- Operation 20



---

**Working with History: Example**

4. You display the routing for the key date 7/5 (see graphic above). The change status that is valid on the key date is displayed. Consequently you do not see the material component.

---

**Evaluating and Printing Change Statuses**

## Evaluating and Printing Change Statuses

### Evaluating Change Statuses

1. From the area menu for routings Choose *Reporting* → *Task list changes*.
2. On the initial screen enter the selection criteria for task lists and select the objects.
3. Choose *Program* → *Execute*.

An overview of existing change statuses with the changes between the statuses is displayed.

### Printing the Results

1. Select the change statuses you want to print in the overview and choose *List* → *Print*.

Maintain the print parameters and choose *Output* → *Print*.

## Editing Configurable Routings

You have to create configurable bills of material as well as configurable routings for configurable materials. A configurable routing describes the production process for all variants of a product. Instead of creating a routing for each variant of a product, you can create operations for one routing, or a “**super**” routing.

The “super” routing is a combination of operations, operation sequences and production resources/tools which are

- needed for **all** variants of the configurable material  
or
- variant-specific

You use selection conditions in a routing to specify which operations are required for a specific variant.



An operation specified for polishing is always necessary at the end of production for a car. However, operations to install and test an air conditioner are only necessary if air conditioning is an option chosen for the car.

You create a routing for a configurable material in the same way as any other routing. However, you must also maintain **object dependencies** for:

- Sequences
- Operations/sub-operations
- Production resource/tool assignments

In the operation overview, the indicator *OD* to the right of the operation allows you to see whether object dependencies already exist. By double-clicking on the indicator, you access assignment maintenance.

When you create an order for a configurable material, the system configures the appropriate routing using object dependencies.



You can use the results of a [configuration simulation \[Page 28\]](#) when you create a routing.

### See also:

For additional information about configuring routings and creating object dependencies, refer to the *LO Variant Configuration Guide*.

## Changing Values in a Routing

### Changing Values in a Routing

You can use object characteristics in object dependencies to access specific routing values and change them depending on the configuration. You can access the fields in the following tables:

- PLPOD (operations)
- PLFHD (production resources/tools)

You use **actions** and **procedures** to access the table field where you change a value.

The table shows the typical fields you can change using object dependencies.

**Table: Changeable Fields**

Routing table	Field
PLPOD (operations)	Standard value
	Unit of measure
	Operation text
PLFHD (production resources/tools)	Quantity of the PRT
PLFLD (operation sequences)	Lot size from...to

### Steps to Access a Field in a Routing

1. You create a characteristic that refers to one of the fields in the tables shown.
2. In an action, you assign the value to be used for a specific configuration to this field depending on the characteristic value assignment.
3. You assign the action to an operation. Once the operation is selected, the action is carried out and the value of the field changes.

#### See also:

For additional information about changing values in a routing, refer to the documentation *LO Variant Configuration Guide* in the section *Using Fields with a Reference to Master Data in Configuration*.

Creating Local Object Dependencies for an Operation

## Creating Local Object Dependencies for an Operation

1. Select an operation in the operation overview.
2. Choose the menu options *Extras* → *Object dependencies* → *Editor*.

<p>If the operation does not have any object dependencies,</p>	<p>you reach a dialog box. Choose a dependency type and press <i>Continue</i>. You access the editor screen for creating object dependencies.</p>
<p>If the operation has object dependencies,</p>	<p>you reach the assignment screen with existing object dependencies. Press <i>New entries</i>, enter the name of the new object dependency and press <i>Dependency editor</i>. A dialog box appears where you can enter a change number. Press <i>Continue</i>. You access the editor screen for creating object dependencies.</p>

**See also:**

For additional information about object dependencies, refer to *LO Variant Configuration Guide*.

---

**Creating Global Object Dependencies in an Operation**

## Creating Global Object Dependencies in an Operation

1. Select an operation in the operation overview.
2. Choose the menu options *Extras* → *Object dependencies* → *Assignments*  
or  
double-click on the *OD* indicator.

You access the *Maintain Dependency: Assignments to Objects* screen.

3. Enter the name of the dependency and the dependency type.  
Save the routing.

**See also:**

For additional information about object dependencies, refer to *LO Variant Configuration Guide*.

## Mass Changes and Where-Used Lists

### Where-Used Lists

By generating where-used lists, you can display the routings which use particular

- Work centers
- Reference operation sets, reference rate routings
- Production resources/tools (PRTs)

You may need this information if, for example, you want to delete a work center or reference operation set but you want to check first if it is being used in a routing. If you want, you can also display routings you have already deleted online but which still exist on the database.

You can use the overview variant to control the information in the list and the order in which it is listed (for example, material, validity, status, etc.).

### Replacing Data in Routings

If you want to replace an object in several routings with another object (for example, an old work center with a new one) you can use the **mass replace function**. You do not have to generate a where-used list in order to replace each work center individually. Instead, you can use the mass replace function to quickly and completely replace work centers in all routings where they are used.

With the mass replace function, you can replace the following objects in a routing:

- Work centers
- Reference operations sets/reference rate routings
- Production Resources/Tools

The system generates a list of all routings that use the object to be replaced.



When you use the mass replace function without a change number, the new objects will have the same validity periods as the old objects.

---

**Displaying a Where-Used List for a Work Center**

## Displaying a Where-Used List for a Work Center

Proceed as follows to display a where-used list of the routings in which a work center is used:

1. From the routings menu, select the menu options *Reporting* → *Where-used* → *Work centers*.

You reach the *Work Center Where-used: Selection* screen.

2. Maintain the *work center* and the *plant*. The system displays all operations valid on the key date you enter. If you do not enter a key date, the system displays **all** operations in which the work center is used.

Enter the *task list types* for which you want to generate a where-used list. Note that you cannot make a generic entry in the *type from* fields.

You can narrow down the search by entering the following data:

- status
  - usage
  - routing plant
  - planner group (only in connection to plant)
  - material number or material short text
3. If you also want to see routings that have already been deleted online but still exist on the database, set the *Extended log* indicator.

4. Select an overview variant. To select an overview variant, select the menu options *Settings* → *Object overview* or press the function key *Object overview*.

You reach the *Enter overview variant* dialog box. Enter the desired overview variant and press *Continue*.

5. Select the menu options *Goto* → *Execute*.

You see a list of all routings which use the work center.

6. To see the extended log with the list of deleted task lists, select the menu options *Goto* → *Log*.

You see the extended log with a list of all usages in deleted task lists, sequences and operations as long as these objects have not been physically deleted from the database.

**Proceed as follows to call up the detail screen for a routing object (for example, header details):**

Position the cursor on the corresponding object or select it and the menu options *Goto* → *Details*.

**Proceed as follows to call up the overview screen for a routing object (for example, routing overview):**

Position the cursor on the corresponding object or select it and select the menu options *Goto* → *Choose*.

**See also:**

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Displaying a Where-Used List for a Work Center

[Displaying Usage in Deleted Task Lists \[Page 219\]](#)

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**Displaying a Where-Used List for a Reference Operation Set**

## Displaying a Where-Used List for a Reference Operation Set

**Proceed as follows to display a where-used list of the routings in which a reference operation set/reference rate routing is used:**

1. From the routings menu, select the menu options *Reporting* → *Where-used* → → *Ref. operation sets*.  
You reach the *Use of Reference Operation Sets in Task Lists: Selection* screen
2. To display a where-used list for a reference rate routing, set the *ref. rate routing* indicator.
3. Enter the group and group counter of the reference operation set/reference rate routing. The system displays all routings valid on the key date you enter. If you do not enter a key date, the system displays **all** routings in which the reference operation set or reference rate routing is used.

Enter the *task list types* for which you want to generate a where-used list. Note that you cannot make a generic entry in the *type from* fields.

You can narrow down the search by entering the following data:

- status
  - usage
  - routing plant
  - group
  - material number or material short text
4. If you also want to see routings that have already been deleted online but still exist on the database, set the *Extended log* indicator.
  5. Select an overview variant. To select an overview variant, select the menu options *Settings* → *Object overview* or press the function key *Object overview*.  
You reach the *Enter overview variant* dialog box. Enter the desired overview variant and press *Continue*.
  6. Select the menu options *Goto* → *Execute*.  
You see a list of all routings which use the reference operation set/reference rate routing.
  7. To see the extended log with the list of deleted task lists, select the menu options *Goto* → *Log*.  
You see the extended log with a list of all usages in deleted task lists, sequences and operations as long as these objects have not been physically deleted from the database.

**Proceed as follows to call up the detail screen for a routing object (for example, header details):**

Position the cursor on the corresponding object or select it and the menu options *Goto* → *Details*.

---

**Displaying a Where-Used List for a Reference Operation Set**

**Proceed as follows to call up the overview screen for a routing object (for example, routing overview):**

Position the cursor on the corresponding object or select it and select the menu options *Goto* → *Choose*.

**See also:**

[Displaying Usage in Deleted Task Lists \[Page 219\]](#)

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**Displaying a Where-Used List for a Production Resource/Tool**

## Displaying a Where-Used List for a Production Resource/Tool

Proceed as follows to display a where-used (assignments) list of the routings in which a production resource/tool is used:

1. From the routings menu, select the menu options *Reporting* → *Where-used* → *Prod.resources/tools*.  
You reach the *Use of PRT in Task Lists: Selection* screen. Generally, the system proposes fields to display material PRTs.
2. If you want a different PRT category, select the menu options *Settings* → *PRT category* or press the corresponding function key. You reach a dialog box with the four PRT categories.  
Position the cursor on the desired PRT category and press *Continue*.
3. Enter data specific to the PRT category:
  - for a “document” PRT, enter a document number, document type, document part and the document version
  - for an “equipment” PRT, enter the number which identifies the equipment
  - for a “material” PRT, enter the material number and the corresponding plant
  - for a “miscellaneous” PRT, enter the key which identifies the PRT
4. Select an overview variant. To select an overview variant, select the menu options *Settings* → *Object overview* or press the function key *Object overview*.  
You reach the *Enter overview variant* dialog box. Enter the desired overview variant and press *Continue*.
5. Select the menu options *Goto* → *Execute*.  
You see a list of all routings to which the production resource/tool was assigned.

**Proceed as follows to call up the detail screen for a routing object (for example, header details):**

Position the cursor on the corresponding object or select it and the menu options *Goto* → *Details*.

**Proceed as follows to call up the overview screen for a routing object (for example, routing overview):**

Position the cursor on the corresponding object or select it and select the menu options *Goto* → *Choose*.

**See also:**

[Displaying Usage in Deleted Task Lists \[Page 219\]](#)

## Displaying Usage in Deleted Task Lists

When you display a where-used list and when you replace an object, you can also generate a log where you see the object's usage in routings which have already been deleted as long as these routings have not yet been physically deleted from the database.

### Proceed as follows to generate the extended log:

1. On the initial screen for where-used lists or replacement of an object, set the *Extended log* indicator.
2. Maintain the data and select the menu options *Goto* → *Execute*.  
You receive a selection list.
3. Select the menu options *Goto* → *Log*.  
You see the extended log with a list of all usages in task lists that have already been deleted, their sequences and operations as long as these objects have not been physically deleted from the database.

## Replacing Work Centers (Mass Replacement)

# Replacing Work Centers (Mass Replacement)

Proceed as follows to replace a work center in all or a large number of routings:

1. From the routings menu, select the menu options *Extras* → *Mass replace* → *Work centers*.

You reach the *Replace Work Center: Selection* screen.

2. Maintain the *plant* and the *work center* that you want to replace as well as the new *plant* and *new work center*. If you enter a change number, the start date of the validity period for the changes is taken from that change number, and the changes are logged.

If you specify a *key date*, the system only selects operations valid on this date. If you do not enter a key date, the system displays all operations in which the work center is used.

Enter the *task list types* for which you want to generate a where-used list. Note that you cannot make a generic entry in the *type from* fields.

You can narrow down the search by entering the following data:

- status
- usage
- routing plant
- group
- material number
- material short text

3. Select an overview variant. To select an overview variant, select the menu options *Settings* → *Object overview* or press the function key *Object overview*.

You reach the *Enter overview variant* dialog box. Enter the desired overview variant and press *Continue*.

4. You can maintain default values for the new work center before you replace the old work center with it. (see [Maintaining Default Values \(Mass Replace\) \[Page 222\]](#))

5. Select the menu options *Goto* → *Execute*.

You see a list of all routings and routing objects in which the work center is used.

If you want to replace the work centers using a batch input session, select the menu options *Settings* → *Change replace mode*. Usually, the system replaces **online**. You can also use the menu option *Change replace mode* to control whether certain screens are displayed for you to maintain during replacement. (see [Controlling Mass Replacement Processing \[Page 225\]](#))

6. If necessary, change the data in the routings/routing objects before you replace the work centers. (see [Displaying and Changing Data for Selected Routings \[Page 224\]](#))

7. Select all routings and routing objects in which you want to replace a work center with a new one.

To select many objects at the same time, select the menu options *Edit* → *Selections* and the desired object (for example, header, sequence or operation).

8. Select the menu options *Edit* → *Replace work center*.

**Replacing Work Centers (Mass Replacement)**

The system replaces the old work center in the selected headers, sequences and operations with the new work center.



If the work center cannot be replaced in all selected objects, you receive a system message. The objects in which it has not been replaced are marked by the system. Try to replace the work center again.

**See also:**

[Displaying Usage in Deleted Task Lists \[Page 219\]](#)

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**Maintaining Default Values (Mass Replace)**

## Maintaining Default Values (Mass Replace)

When you use the mass replace function to replace work centers, you can add to or change the default values and activity types proposed in the new work center for the operations in a routing. The default values in the work center master data do not change. You can also copy standard values, such as setup time.

You cannot change a default value in the new work center if you have set a reference indicator for the value. You can only change the default value in work center maintenance. Default values and activity types for which you have not set a reference indicator in the work center can be entered or changed.

Specific rules exist for transferring default values from the new work center and getting values from the old work center. For additional information, refer to [Default Values \[Page 223\]](#).

### Proceed as follows to change the default values for a new work center:

1. Follow steps 1 through 3 of [Replacing Work Centers \(Mass Replacement\) \[Page 220\]](#).
2. Select the menu options *Settings* → *Change new work cntr* or press the corresponding function key.

You reach the dialog box *Default Values: Change*.

3. Enter the key date for selecting an operation, if you have not already done so.

Change or add to the default values for the operations, standard values and activity types.

Set the **Transfer value** indicator for all default values that you want to transfer to the operation when the work center is replaced.

4. Press *Continue*.

You return to the transaction for replacing a work center.

## Default Values

The following rules apply when transferring default values to an operation at a work center:

If the control keys for the old and new work centers...	then...
do not agree	all values from the old work center are deleted. Only the values from the new work center or the values from the dialog box <i>Work Center Default Values</i> are copied during replacement.
agree	the values from the new work center or the values from the dialog box <i>Work Center Default Values</i> are copied during replacement. The fields left empty are filled with values from the old work center.

---

**Displaying and Changing Data for Selected Routings**

## Displaying and Changing Data for Selected Routings

You can carry out the following functions for the routings and routing objects displayed in the where-used list of the old work center:

- change routing data
- display detail screens for an operation
- display overviews of individual routing objects and, from these overviews, branch to other routing screens



Select the menu options *Environment* → *Display* ↔ *Change* to specify whether the system should branch to the routing in the change or display mode. For example, if you specify that when branching to the routing you are in the change mode, this setting remains when you branch to any other routing until you select the menu options *Display* ↔ *Change* again.

### Proceed as follows to access routing data:

1. Select the routing or routing object you want to view.
2. Select the menu options *Goto* → *Details* to branch to a **detail screen**  
**or**  
select the menu options *Goto* → *Choose* to branch to an **overview**.

## Controlling Mass Replacement Processing

Proceed as follows to control how the work center is to be replaced:

1. On the where-used list of headers, sequences and operations where the old work center is used, select the menu options *Settings* → *Change replace mode*.

You reach the *BDC Mode: Change* dialog box.

2. Maintain the following data:

**Function:** This key controls how the work center is replaced:

- *Online:* (standard default) Replacement is carried out immediately after you select the menu option *Replace work center*. The objects where you want the work center to be replaced are processed one after another. Depending on the *display mode* you select, the system will display certain screens for you to maintain after the replacement (for example, for default values).
- *Batch input session:* : A batch input session is created by the system. The work center is replaced at a later time. To replace the work center, you process the contents of the batch input session using session management. You can call up session management from every application by selecting the following menu options: *System* → *Services* → *Batch input* → *Edit*.

**Display mode:** The display mode controls which screens are to be displayed during replacement. You can choose between the following:

- all screens on which work centers were replaced
- only the screens on which errors occurred during replacement. For example, if the new work center has different standard values than the old one, and the standard values are required entries, then the entry screen for the new standard values will be displayed.
- no screen (standard default)

**Session:** Name of the batch input session that you want to use for replacing the work center at a later date.

**Authorization:** Name or identification with which the authorization for processing the batch input session is linked.

**Save mode:** Controls whether saving or updating during replacement occurs in synchronous mode (at the same time) or in asynchronous mode (delayed). In the standard version of the software, the update is carried out synchronously.

3. Save your entries by pressing the function key *Continue*.

## Replacing Reference Operation Sets (Mass Replacement)

## Replacing Reference Operation Sets (Mass Replacement)

Proceed as follows to replace a reference operation set in all or a large number of routings:

1. From the routings menu, select the menu options *Extras* → *Mass replace* → *Ref. operation sets*.  
You reach the *Replace Reference Operation Set: Selection* screen.
2. To replace a **reference rate routing**, set the indicator *Ref. rate routing*.
3. Maintain the group and group counter of the old and new reference operation set. Enter the increment to be used when the operations of the new reference operation set are inserted into the routing.
4. Select an overview variant. To select an overview variant, select the menu options *Settings* → *Object overview* or press the function key *Object overview*.  
You reach the *Enter overview variant* dialog box. Enter the desired overview variant and press *Continue*.
5. Select the menu options *Goto* → *Execute*.  
You see a list of all routings in which the old reference operation set/reference rate routing is included.  
If necessary, you can also enter a new reference operation set/reference rate routing for replacement than the one you originally entered.

Select the menu options *Settings* → *Replace with*. You reach the *Default Values: Change* dialog box. Enter the group and group counter of the new reference operation set/reference rate routing. Maintain the increment to be used when the operations of the new reference operation set are inserted into the routing. Press *Continue*.

From this point on, the process of replacing a reference operation set is the same as that of the work center. (see: [Replacing Work Centers \(Mass Replacement\) \[Page 220\]](#) from step 6 onward.)

## Replacing PRTs (Mass Replacement)

Proceed as follows to replace a production resource/tool in all or a large number of routings:

1. From the routings menu, select the menu options *Extras* → *Mass replace* → *Prod.resources/tools*.  
You reach the *Replace PRTs in Task Lists: Selection* screen where you can enter data for a production resource/tool with a **material master record**.
2. To replace a PRT with a **different category**, select the menu options *Settings* → *PRT category*.  
You reach the *Production Resources/Tools Category* dialog box. Choose the desired PRT category.
3. Maintain the PRT data. For additional information about the different PRT categories and their data, refer to the section [Production Resources/Tools \[Page 104\]](#).
4. Select the menu options *Settings* → *Replace with* and the PRT category of the **new** production resource/tool with which you want to replace the old one. Maintain the data for the new PRT and press *Continue*.
5. Select an overview variant. To select an overview variant, select the menu options *Settings* → *Object overview* or press the function key *Object overview*.  
You reach the *Enter overview variant* dialog box. Enter the desired overview variant and press *Continue*.
6. Select the menu options *Goto* → *Execute*.  
You see a list of all routings and sequences in which the old PRT is assigned to an operation.  
If necessary, you can also enter a different **new** PRT for replacement. To do this, select the menu options *Settings* → *Replace with* and the PRT category of the **new** production resource/tool.
7. To delete any PRT assignments before replacing the PRT, select the operation and the menu options *Edit* → *Delete PRT*.  
The old PRT assignment is deleted. The new PRT is not assigned to this operation after replacement.

From this point on, the process of replacing PRTs is the same as that of work centers. (see: [Replacing Work Centers \(Mass Replacement\) \[Page 220\]](#) from step 6 onward)

## Displaying an Error Log

### Displaying an Error Log

If errors occur when you carry out the mass replace function, the system creates an error log.

In the error log, you can

- display a list of messages issued by the system
- sort and group system messages according to specific criteria

System messages can be distinguished according to their **message type**. There are four different message types in the error log:

- notification messages
- warning messages
- error messages
- termination messages

#### Proceed as follows to display the error log:

1. On the where-used list, select the menu options *Goto* → *Log*.

You reach the *Error Management and Analysis: Initial Screen*. The system displays the number of messages issued for the individual message types.

2. Select the menu option *Log* → *Display* → *Total*.

or

select the menu options *Log* → *Display* → *For department* or *For message type...* to display the error log for a specific department or message type.

The log displays only the data fields defined with **field selection**. The field selection is preset in the system. To change the field selection, select the menu options *Settings* → *Field selection...* and select the data fields you want displayed in the error log.



Please note that the texts of the system messages are only displayed if the data field "message text" is selected.

#### Proceed as follows to sort system messages in the error log:

Select the menu options *Edit* → *Sort* and the desired sort criteria (for example, by department or by task list).

## Archiving and Deleting Routings

You can archive and delete routings with archiving object **PP\_PLAN**. This archiving object includes individual routings, which are uniquely identified by group and group counter, but not entire groups. Therefore, you can archive and delete individual routings within a group at any time. As always, you can archive and delete entire groups.

You can access the archiving function from the system administration menu as well as from the routings menu. From the routings menu, choose *Extras* → *Delete task lists* → *With archiving*.



You cannot reload archived routing data.  
At a later release, you will be able to display archived data.

### See also:

In the R/3 Library under *Basis Components* → *System Administration* → *Application Data Archiving and Reorganization*, you can find information about the following subjects:

- Object definition
- Tables affected
- Customizing
- Authorizations

Detailed procedures

## Selection Criteria

### Selection Criteria

You can select routings for archiving according to the following criteria:

- plant
- material  
You can select routings for several materials within one plant.
- task list type, group and group counter
- status
- usage
- group
- last time task list was called
- deletion flag

If you enter the deletion flag as a criterion for the archiving run with a delete program, you can only choose option *Delete over entire period*.

### Customer-Specific Selection Criteria

If the selection criteria from the standard program is not sufficient to your requirements or if you want to include other criteria, you can define your own selection criteria in the program.

#### Proceed as follows to define your own selection criteria:

1. Define your own archiving object. Copy from archiving object PP\_PLAN.
2. Write your own selection program. Copy from program RCPREWR1. Change only the two includes RCPPSEL for *Selection parameters* and RCPPPF01 for *Selections*.

## Dependencies

Before routings are archived and deleted, the system checks for the following usages:

1. Usage in a production version  
The routing is stored in the material master record as a part of a production version.
2. Usage in an inspection lot  
This criterion is only relevant if the Quality Management System (QM) is active in your system. You can only archive a routing if it is no longer used in an inspection lot.
3. For reference operation sets/reference rate routings: References in routings or rate routings  
You can only archive reference operation sets or reference rate routings if references to other task lists no longer exist.
4. Usage in a run schedule header  
A run schedule header always requires information from its routing, for example for confirmation. You can only archive this type of routing if the run schedule header is complete and archived.
5. Other usages which you can define using the SAP Enhancement CPRE0001

Therefore, the archiving functionality for routings is dependent on the following objects:

- material master records with production versions
- run schedule headers
- inspection lots (archiving object QM\_CONTROL)

## What Happens If a Routing Is Still Used

If during the usage check the system finds a routing which is still being used or which meets the checking criteria you specified (with SAP Enhancement CPRE0001), the system responds in **one** of the following ways:

- The archiving run is terminated. You receive an information message with the routing which is still being used. Do not set the *Log* indicator in variant maintenance for this result.
- The archiving run is completed and then you receive a log with a list of all routings which could not be archived or deleted because of the usage check. Set the *Log* indicator in variant maintenance for this result.

## Deletion/Archiving Criteria

# Deletion/Archiving Criteria

## Delete over Entire Period

If you delete over an entire period, all routings meeting your selection criteria (for example, material and status) are deleted.



You can also enter existing deletion flags as a selection criterion. If you do not explicitly specify deletion flags as a criterion, the system deletes routings regardless of whether they have deletion flags.

## Delete for Key Date

If you delete for a key date, all change statuses ending **before** this key date are deleted. Whether routings or routing objects have deletion flags or you have previously deleted them online is not important for the periods **before** the key date.

In addition, the system checks change statuses on or **after** the key date. In this case, whether you have already deleted these change statuses **online** is an important factor. The system deletes these change statuses from the database although they are on or after the key date. No gaps in time can occur: If a change status does **not** have an online deletion flag, the subsequent change statuses are **not** deleted from the database, even if they already have an online deletion flag.

Deleting for a key date is especially useful when you no longer need accumulated historical data.

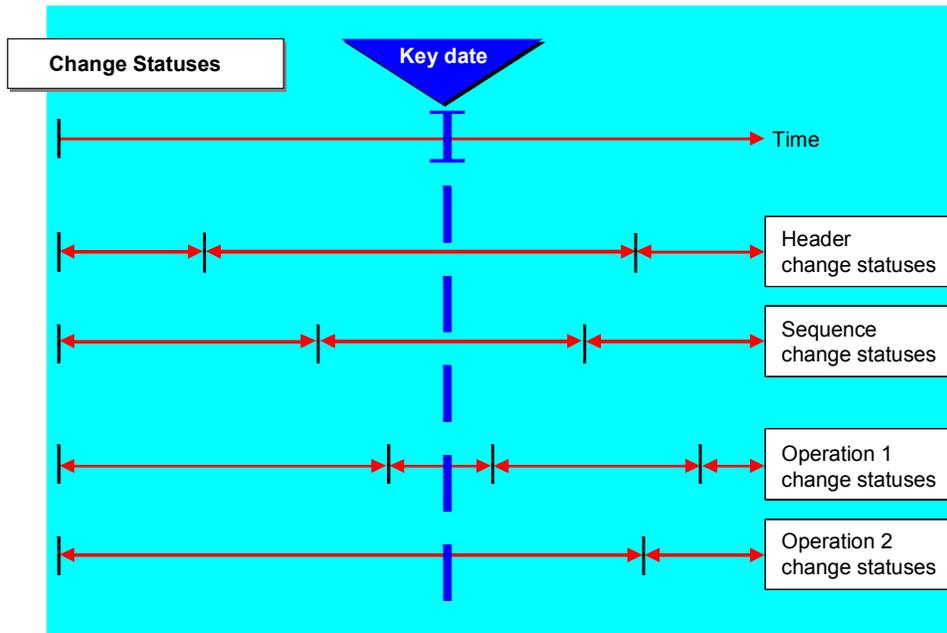
## Deletion Flag and Online Deletion Indicator

Note that you can remove a deletion flag at any time.

In contrast, you can no longer remove online deletion indicators that have been set. The system sets this indicator **internally** if you delete a routing object online (directly) during processing. You can no longer process the object after this point. However, the object is still physically present in the database until you start the deletion program.

## Routings with Several Change Statuses

If you change routings or routing objects with a change number, the routing has several change statuses. If you never make changes with a change number, the routing and its objects have only one change status.



### Deleting a Routing Online

If you **delete** a change status online in a routing with several change statuses, only this one change status along with its subordinate objects is locked for further processing. You can still access any other change statuses.



The change statuses of your routing are distributed as in the graphic. You delete a routing sequence online on a specific day (blue line). The system automatically deletes the change statuses of all subordinate objects, such as operations or component assignments, which are within the header change status. In this example, the change status for operation 2 is only partially deleted because it starts **before** the sequence change status. After the start of the deleted sequence change status, you can no longer access the change status of operation 2.

### Setting a Deletion Flag

When you set a **deletion flag** for a change status in a routing with several change statuses, the deletion flag is also set for the entire routing. If you enter deletion flags as a selection criterion for an archiving run, the entire routing with all routing objects is archived and deleted if it has a deletion flag set. If you remove a deletion flag, this also affects the entire routing.

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**Routings with Several Change Statuses**

**Proceed as follows to completely delete a routing with several change statuses from the database:**

- Set a deletion flag in the routing header. Select *Deletion flags* as a selection criterion for an archiving run with delete program.

**or**

- Specify the complete routing in the selection criteria for the archiving run and remove the selection *Over entire period*.

## Before Archiving

### Routings from Older R /3 Releases

Routings from older R/3 Releases may only have deletion flags in individual changes statuses.

You can use [program RCPREDEL \[Page 236\]](#) to set existing deletion flags in all change statuses of a routing. Execute this report **once** after transferring data from an older release to achieve the same level of data in the old and new routings.

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## Routings from Older R/3 Releases

### Routings from Older R/3 Releases

As of Release 3.0D, deletion flags always refer to all change statuses of a routing. When you set a deletion flag for a change status, the deletion flag is also set in the entire routing.

In previous R/3 Releases, deletion flags were handled differently. Program RCPREDEL was created for this reason.

#### **Program RCPREDEL: Set Deletion Flags in All Change Statuses**

Routings from older R/3 Releases may only have deletion flags in individual change statuses.

You can use program RCPREDEL to set existing deletion flags in all change statuses of a routing.

This is very important if you want to enter deletion flags as a criterion for your archiving run with a delete program.

You only have to run this program **once**. You do not need this program for the data you create after Release 3.0D.



If you try to archive routings from older releases (with deletion flags as selection criterion) and you do not use program RCPREDEL first, only the routings with a deletion flag in **all** change statuses are archived. The routings which have deletion flags in individual change statuses are not selected when you enter deletion flags as a criterion.

## Deletion without Archiving

You can also delete routings without archiving first.



When you delete without archiving, you may lose data unintentionally. You should only use this form of deletion for the data you have created for testing.

**See also:**

[Deleting Routings without Archiving \[Page 239\]](#)

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**Displaying Administrative Data**

## Displaying Administrative Data

The system displays administrative data concerning routing objects and their assignments on the *administrative data* area of various screens:

- **Information about the routing object:** For example, when material components are assigned to a routing, you can see the item number by which the material component is identified in the bill of material, its item category (for example, variable-sized item) and its quantity.
- **Information about the validity of the routing object or its assignments:** You can see the validity period of the routing object and its assignments as well as when and by whom the object or its assignments were created.
- **Information about changes made to a routing object or its assignments:** You can see whether the routing object or its assignments were changed using a change number as well as when and by whom the last change was made.

### Proceed as follows to call up administrative data for routing objects:

- **Header:**  
On the header overview, select the appropriate routing and the menu options *Details* → *Header*.
- **Operation or sub-operation:**  
On the operation overview, select the operation or sub-operation and the menu options *Details* → *Operation*.
- **Sequence:**  
On the sequence overview, select the sequence and the menu options *Details* → *Seq..*
- **Material component assignment:**  
On the material component overview, select the material component and the menu options *Details* → *Mat. components* → *Administrative data*.
- **Production resource/tool:**  
On the PRT overview, select the production resource/tool and the menu options *Details* → *Prod.resources/tools* → *Administrative data*.
- **Inspection characteristic:**  
On the characteristic overview, select the characteristic and the menu options *Details* → *Insp. characteristic* → *General data* → *Administrative data*.

## Deleting Routings without Archiving

Proceed as follows to delete routings without archiving them first:

1. In the R/3 main menu, select the menu options *Logistics* → *Production* → *Master data* → *Routings* and then *Extras* → *Delete task lists* → *Without archive*.

You reach the initial screen for archiving management.

2. Maintain the selection criteria to delete routings or routing objects and note the deletion criteria.
3. Press *Execute*.

The selected routings or routing objects are completely deleted from the database.  
You receive a log.