

283 Pages

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mySAP PLM

PLM310 : Preventive Maintenance and Service

SAP PLM : ALM - Plant Maintenance Certification

PLM310: Preventive Maintenance and Service

Part I of I

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THE BEST-RUN BUSINESSES RUN SAP

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**SAP PLM: ALM Plant
Maintenance
Certification Curriculum**

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Type Style	Description
Example text	Screen output. This includes file and directory names and their paths, messages, names of variables and parameters, and passages of the source text of a program.
Example text	Exact user entry. These are words and characters that you enter in the system exactly as they appear in the documentation.
<Example text>	Variable user entry. Pointed brackets indicate that you replace these words and characters with appropriate entries.

Icons in Body Text

The following icons are used in this handbook.

Icon	Meaning
	For more information, tips, or background
	Note or further explanation of previous point
	Exception or caution
	Procedures
	Indicates that the item is displayed in the instructor's presentation.

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Course Overview

This course provides an overview of the business processes for preventive maintenance and service. To begin with, you will learn to create and manage task lists. Next, you will learn to create and schedule single-cycle, time-based, performance-based, and condition-based maintenance plans. You will also learn to use the link between maintenance item and maintenance contract. Finally, you will learn about the possibilities of PM-QM linkage.

Target Audience

This course is intended for the following audiences:

- Project team leaders
- Project team members

Course Prerequisites

Required Knowledge

- PLM300: Plant Maintenance
- PLM300: Plant Maintenance

Recommended Knowledge

- PM/CS



Course Goals

This course will prepare you to:

- Identify the business processes for preventive maintenance and service
- Create work, time-based, performance-based, and condition-based maintenance plans



Course Objectives

After completing this course, you will be able to:

- Create task lists
- Manage task lists

- Create single cycle plans
- Schedule single cycle plans
- Create strategy plans
- Schedule strategy plans
- Create performance-based maintenance plans
- Schedule performance-based maintenance plans
- Create multiple counter plans
- Schedule multiple counter plans
- Use the link between maintenance item and maintenance contract
- Describe the options available for condition-based maintenance
- Describe the possibilities of PM-QM linkage

SAP Software Component Information

The information in this course pertains to the following SAP Software Components and releases:

Unit 1

Management of Task Lists

Unit Overview

This unit describes in detail the task lists involved in the preventive management process. To begin with, the unit explains the steps involved in the preventive management process. This includes the classification of maintenance task lists into various types. The unit also examines how to create, assign elements to, and organize these task lists. Further, this unit covers the various methods used to manage task lists effectively. In addition, you will learn how to use Where-Used lists and how to perform cost analysis for task lists. Finally, the unit describes how to customize task lists using configurable task lists and customized task list settings.



Unit Objectives

After completing this unit, you will be able to:

- List the steps involved in the preventive management process
- Identify the various maintenance task list types
- Organize maintenance task lists
- Create the elements in maintenance task lists
- Assign components to maintenance task lists
- Explain the relationships among the operations in a maintenance task list
- Use where-used lists
- Display task list objects
- Perform cost analysis for task lists
- Implement change management for task lists
- Select task lists for creating orders
- Create configurable task lists
- Customize task list settings

Unit Contents

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Lesson: Introducing Task Lists

Lesson Overview

This lesson provides an overview of the task lists involved in the preventive management process. To begin with, the lesson lists the steps involved in the preventive management process. Next, the lesson classifies the maintenance task lists into various types. The lesson also explains how to create, assign elements to, and organize task lists. Finally, the lesson describes the relationship between various operations in a maintenance task list.



Lesson Objectives

After completing this lesson, you will be able to:

- List the steps involved in the preventive management process
- Identify the various maintenance task list types
- Organize maintenance task lists
- Create the elements in maintenance task lists
- Assign components to maintenance task lists
- Explain the relationships among the operations in a maintenance task list

Business Example

You work as an SAP administrator for the Precision Pumps company. The company performs specific maintenance work for all the pumps at regular intervals. This work consists of a series of standard operations, such as the tasks to switch off, conduct a safety check, and disconnect the power supply of pumps. The company wants you to group these operations together in one task list, which can be used repeatedly for different maintenance orders.

Overview of Preventive Maintenance Process

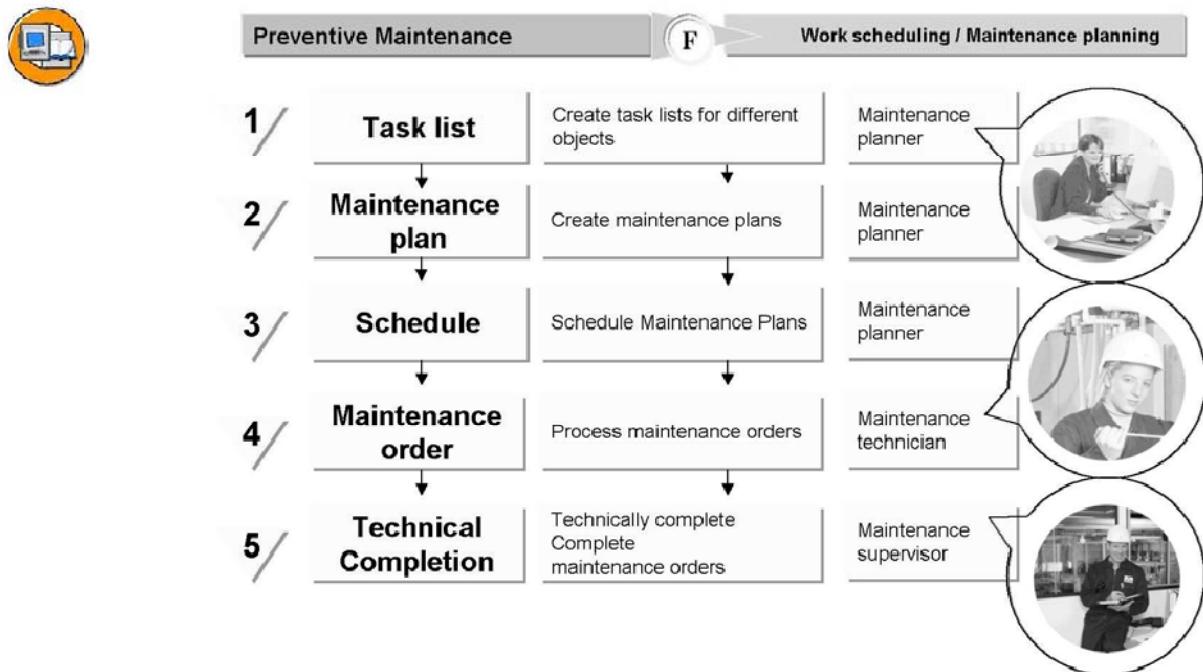


Figure 1: Preventive Maintenance: Process

The steps of the Preventive Maintenance process are as follows:

Step 1: The task list defines the object-dependent or object-independent process steps to be performed.

Step 2: The maintenance plan is created for the object and serves to automatically generate orders in accordance with particular guidelines. The maintenance plan can also be used to generate notifications and service entry sheets.

Step 3: The scheduling is responsible for the regular call up of orders, notifications, and service entry sheets as well as for recalculating planned dates.

Step 4: The maintenance order is automatically generated by the maintenance order and entered in the order list from where it is processed like the other orders.

Step 5: The technical completion marks the order and the corresponding planned date in the maintenance plan as finished. The date of the technical completion is used in the maintenance plan to calculate the next planned date.

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Classifying and Organizing Task Lists

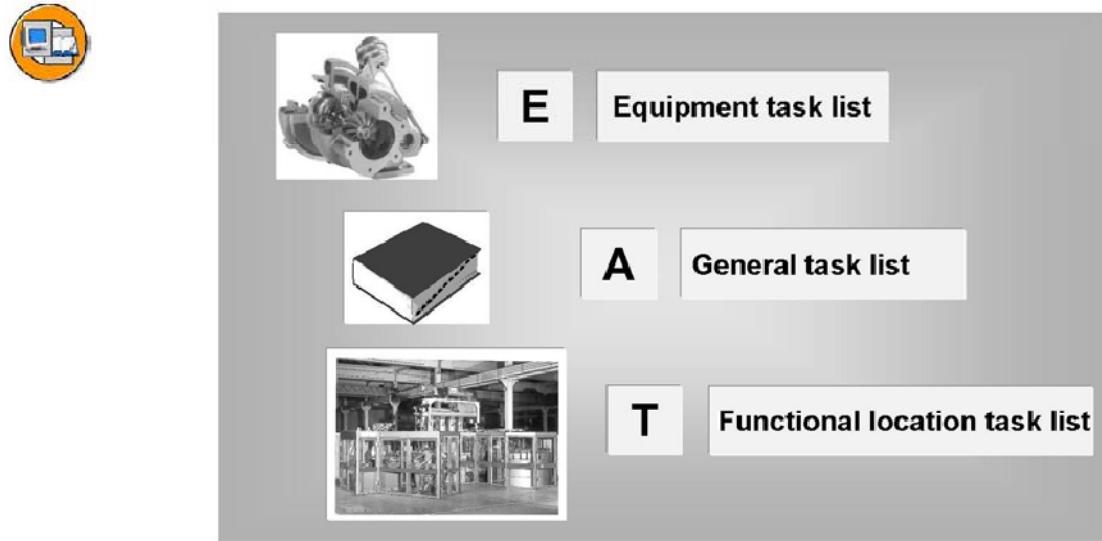


Figure 2: Maintenance Task List Types

In the Plant Maintenance (PM) system, there are three types of task lists. They are distinguished by their corresponding indicators:

- Equipment task list (E)
- Task list for functional location (T)
- General maintenance task list (A)

Equipment task lists are always object-based and created for a specific, individual piece of equipment, such as the steps to calibrate the measuring device, M-105.

Task lists for functional locations are also object-related and created for a specific functional location, such as the steps to inspect the hydraulic press, HP-200.

General maintenance task lists are general task lists without object reference, such as the general steps for pump maintenance.

All the three task list types can be used for routine and preventive maintenance.

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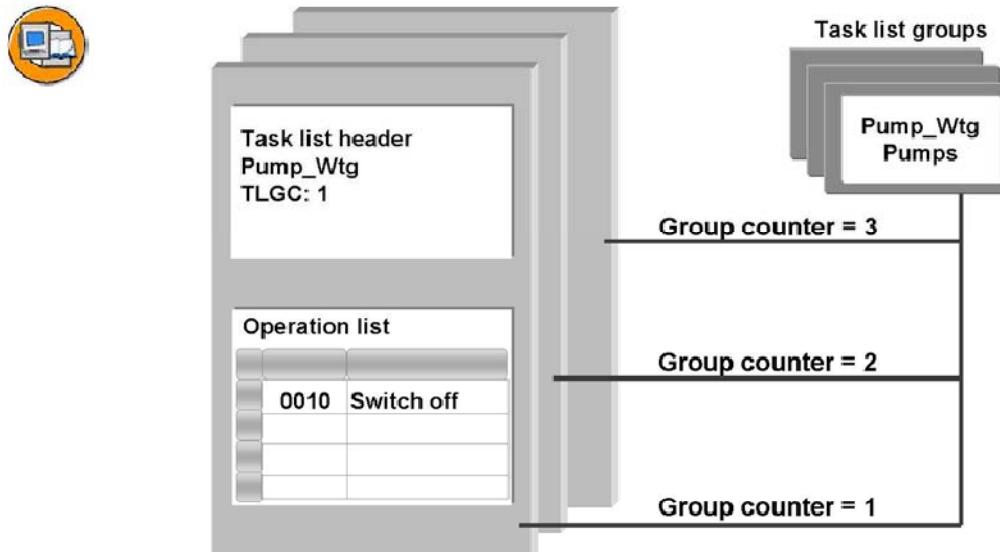


Figure 3: Maintenance Task Lists: Organization

The maintenance task lists in the PM System are combined into **task list groups**. A task list group contains all the maintenance task lists with the same steps or similar maintenance steps. The maintenance task lists within a task list group are identified by the group counter, which numbers the task lists within the group sequentially.

Depending on the task list type, task list groups are either object-based, such as equipment task lists and task lists for functional locations, or object-independent, such as general maintenance task lists.

Example:

- Task list group, 1, to measure the device, M-105
 - Task list no. 1 - Steps to inspect measuring devices
 - Task list no. 2 - Steps for calibration
- Task list group, PUMP_WTG, for pump maintenance
 - Task list no. 1 - Steps for pump inspection
 - Task list no. 2 - Steps for exchange of gears
 - Task list no. 3 - Steps to maintain the pump motor

In the PM system, all the maintenance task lists within a group are handled as one unit. For this reason, it is a good idea to divide your maintenance task lists into several small groups to enable processing. The data volume that the system has to process when accessing a task list group will, as a result, be reduced and the system response time will be shorter.

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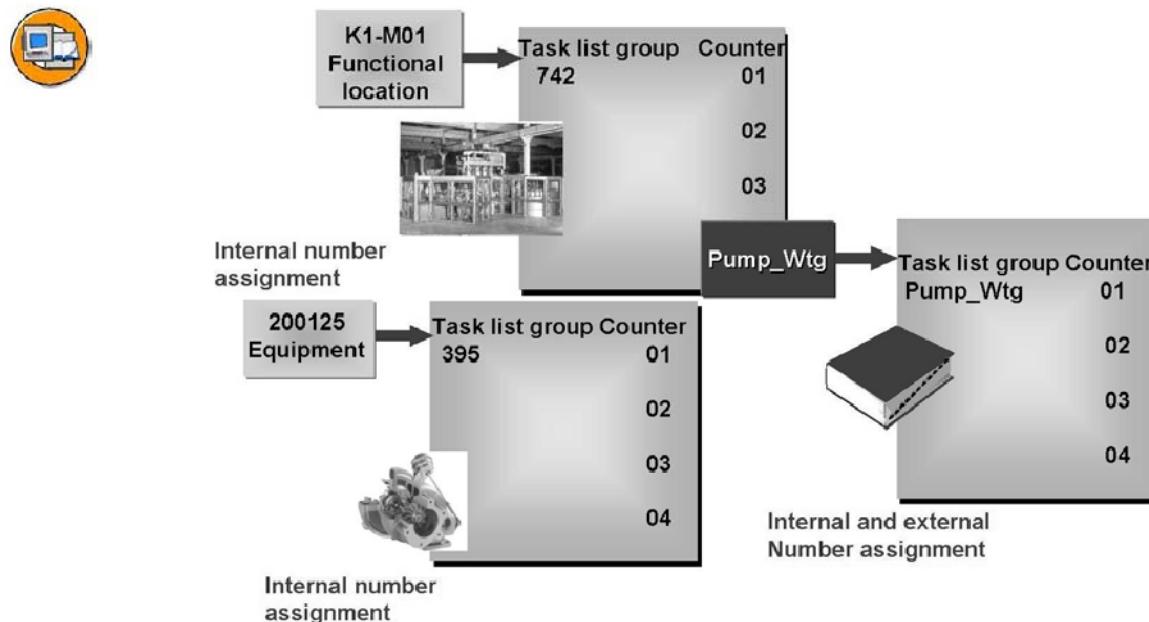


Figure 4: Maintenance Task Lists: Number Assignment

Number assignment for equipment task lists and task lists for functional locations

The numbers for equipment task lists and task lists for functional locations are assigned internally. This means that the system assigns the number when you create the task list and informs you of the number under which the task list is saved. The first task list that you create for a particular piece of equipment or functional location is identified by a task list group number and group counter. Further, task lists for the same piece of equipment are identified by the task list group counter within the group.

Number assignment for general maintenance task lists

The numbers for general maintenance task lists can be assigned internally or externally.

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Creating Task Lists

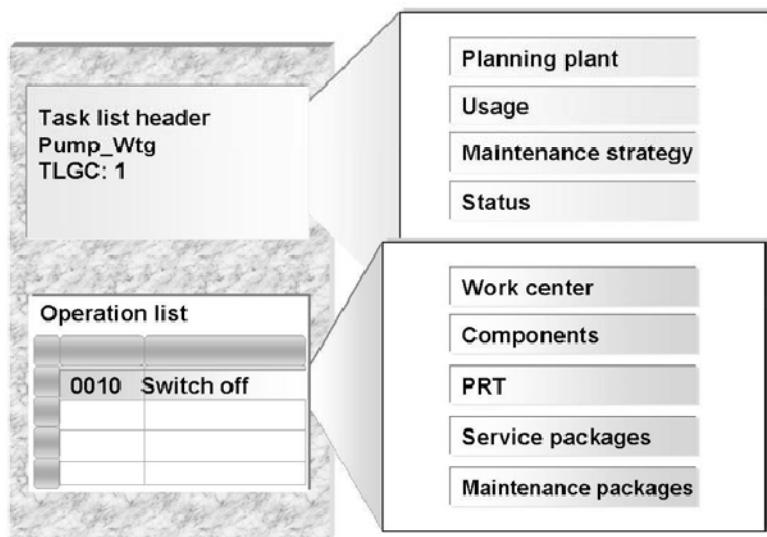


Figure 5: Maintenance Task Lists: Structure

The following assignments are made in the **task list header**:

- Plant
- Work center
- Planner group
- Maintenance strategy - Assembly
- Quality Management (QM) data
- Status
- Condition of technical system
- Profile

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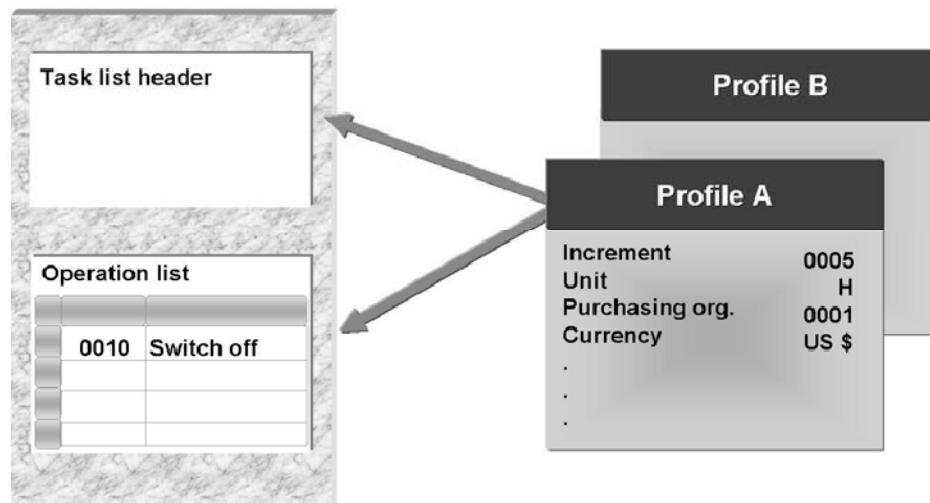


Figure 6: Maintenance Task Lists: Profile

Particular fields in different maintenance task lists often contain the same values or data. To reduce the time required to fill in these fields, you can create a **profile**, which contains the standard information required in the same combination or similar combinations during the processing of maintenance task lists.

When you create a task list, you can indicate the key for the profile, which contains the required data on the Initial screen. This data is automatically entered in the new maintenance task list. The profile data can be overwritten at any time.

Profiles are maintained in **Customizing**. You use the parameter ID PIN to preset a default profile in the user parameters.



Note: The profile, which is specified when a task list is created or changed, is not a part of the task list and is not saved. If an existing task list is changed, the profile must be reselected.

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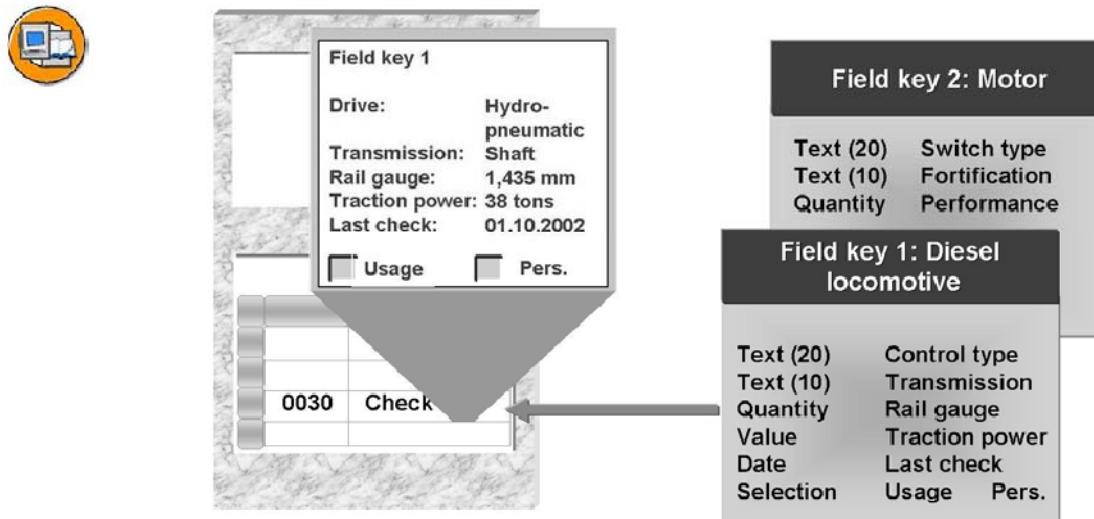


Figure 7: Maintenance Task Lists: User Fields

User fields are additional, user-specific data in the maintenance task lists that are assigned at **the operation level**.

User fields are maintained in **Customizing**.

User fields are:

- 10 or 20 character text fields
- Quantity fields
- Value fields
- Date fields
- Selection fields

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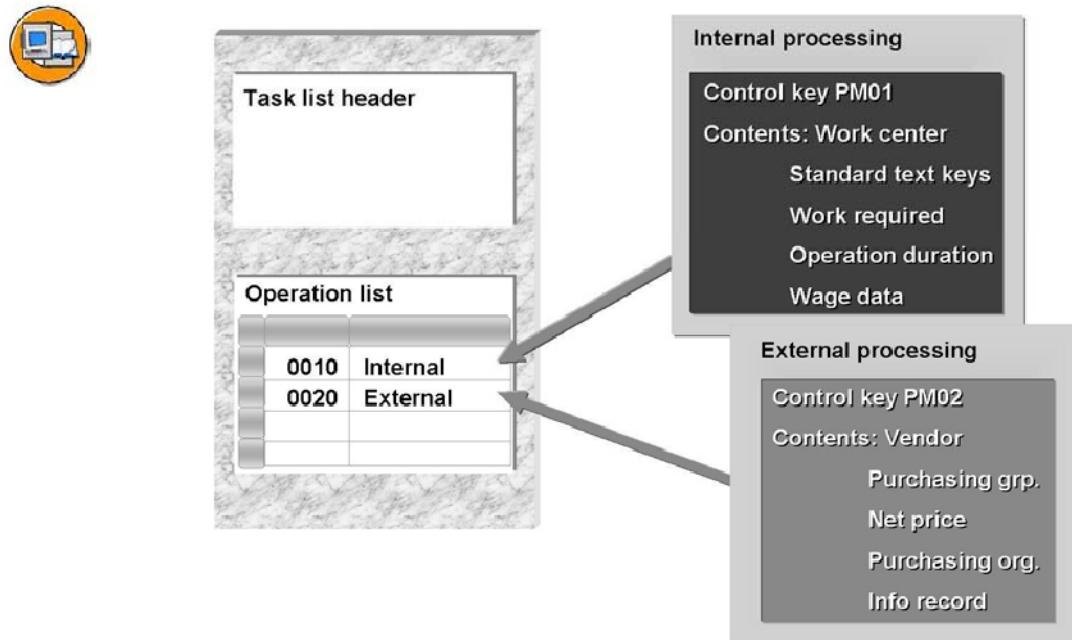


Figure 8: Control of Operations

The control key defines whether an operation is to be processed internally or externally.

Additional control parameters that are important for operation processing are set if the operation should be:

- Included in scheduling
- Subject to costing
- Confirmed
- Printed
- Others

Control keys are maintained in Customizing.

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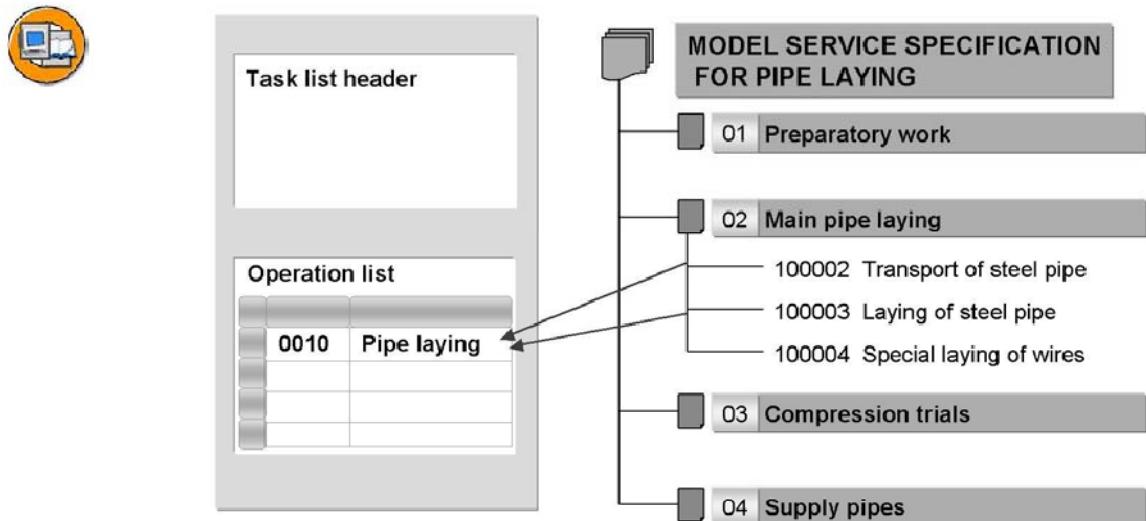


Figure 9: Service Packages in Task List

Services can be assigned as service packages, which means service master records, to an operation in the task list. You create and maintain service masters in Materials Management, MM-SRV.

There are the two possible scenarios, services for operations to be **processed externally** and services for operations to be **processed internally**. In both cases, a specific **control key** is created and assigned to the operation.

You can assign service packages to the operation either by entering an individual service number or by selecting one or more services from the **standard or model service specifications**.

In addition to using service packages, services can also be entered manually in the service specifications for the operation. Notice that all the information, such as the price, unit of measure, and description must be entered manually.

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Assigning Components in Task Lists

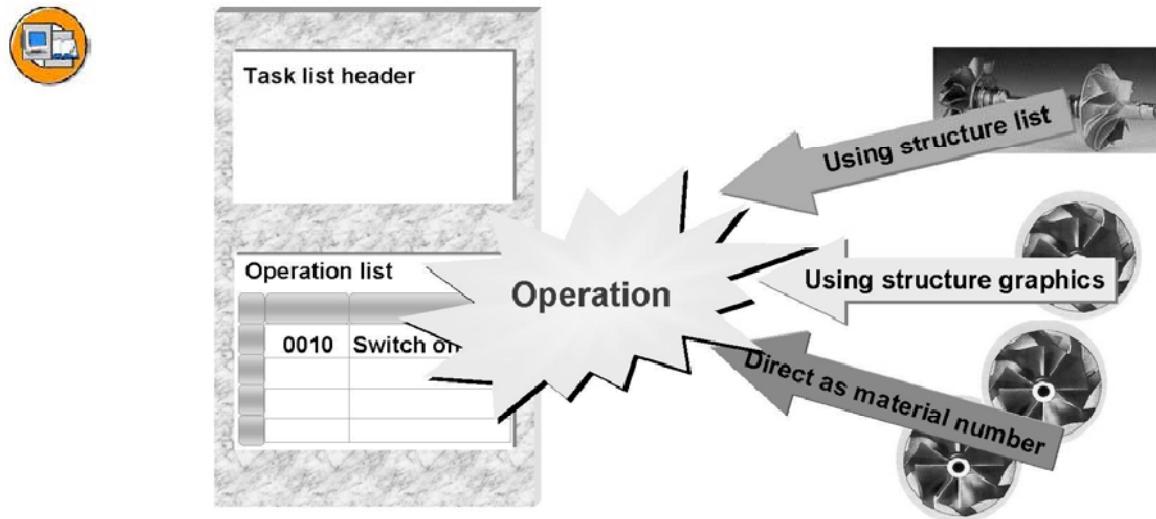


Figure 10: Maintenance Task Lists: Component Assignment

You can assign **material components** to the operations in maintenance task lists. You can retrieve the material components from the **bill of material (BOM)** for the maintenance object, such as equipment, functional location, or header assembly, which is assigned to the maintenance task list. In this case, the bill of material corresponds exactly to the content of the structure list.

You can also assign the stock materials that are not listed in the bill of material for the maintenance object directly to the maintenance task list. This is termed a **free material assignment**. The assignment is made using the material number. To make a free material assignment, you must indicate a BOM usage, which is normally used in Plant Maintenance in Customizing (Control Data for Task Lists). If you make a free assignment, the system then creates an internal **bill of material**. This cannot be processed from the application.

The material components assigned to the maintenance task list are copied into the maintenance order when the maintenance task list is expanded in the maintenance order.

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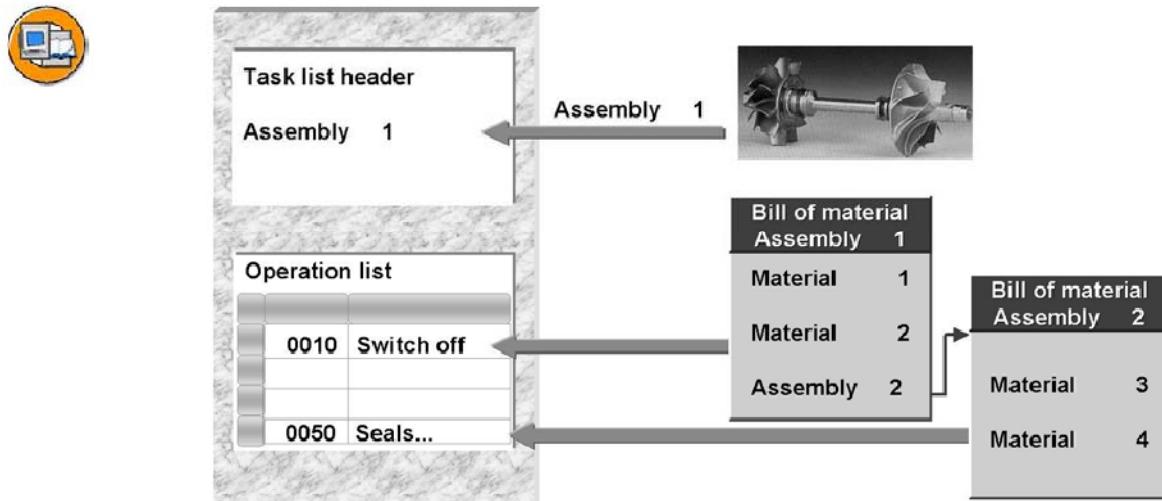


Figure 11: General Task Lists: Component Assignment

Material components in the general maintenance task list are assigned using the assembly in the general task list header. To assign material components to a general maintenance task list, you must first enter an assembly in the general task list header.

You can assign material components to a general task list from the bill of material for the assembly, (assembly 1), bill of material for the subassembly, (assembly 2), or general list of materials.

You can only change the assembly in the maintenance task list header if all the components used for the operations can be deleted.

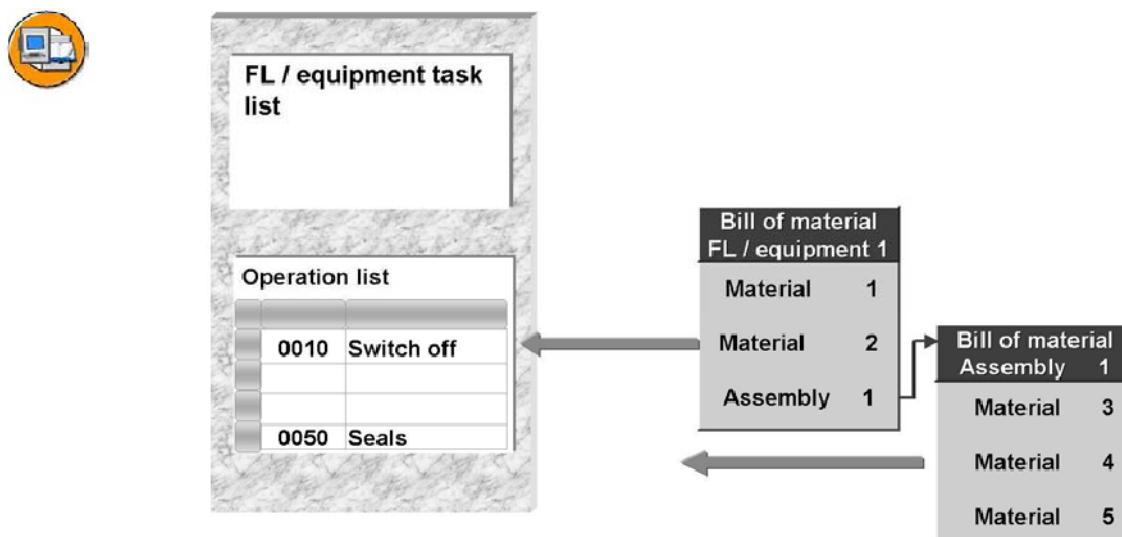


Figure 12: Functional Location / Equipment Task Lists: Component Assignment

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You can assign material components from the bill of material for the functional location/equipment or the bill of material for subassemblies to task lists for functional locations/equipment.

The material components that you want to assign to an equipment task list or functional location task list do not have to be available in the respective bill of material when the assignment is made. You can also assign the stock material freely.

The system does not automatically add the freely assigned material to the bill of material. The initial bill of material is kept in its original form so that you can call it again at any time.

To enable the free assignment of materials for maintenance task lists, your system administrator has to indicate a BOM usage for maintenance-relevant BOMs, such as the usage, 4, in the SAP standard system in the **Customizing** settings for maintenance task lists.

After the material has been freely assigned, do not change the assigned usage. If you do make changes, the existing free material assignments may be lost.

Defining Relationships in Task Lists

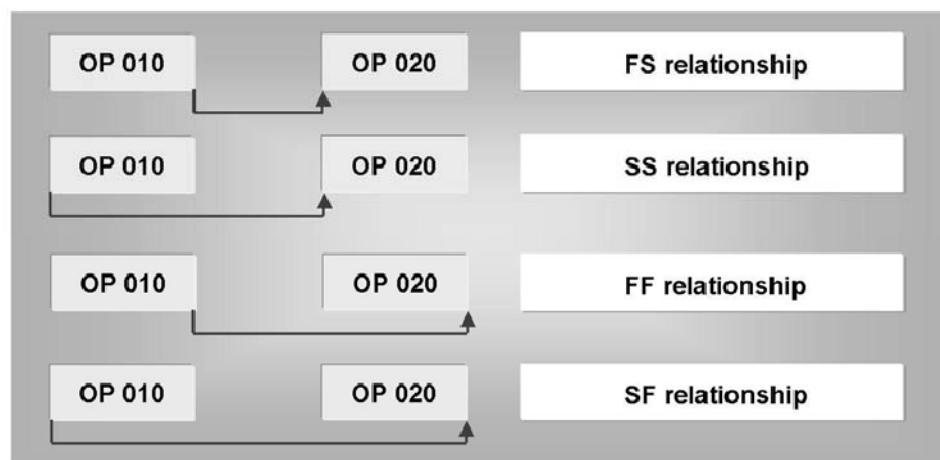


Figure 13: Relationships

The chronological order and time-based dependency of the individual operations is very important for efficient planning and implementation of comprehensive maintenance work. For this reason, it is important to set up a time-based relationship between the individual **operations** in a maintenance task list. This means to link or network them to one another. For this purpose, the network technology and relationships are available in the PM system.

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A **relationship** describes the logical and time-based dependency between two operations in a maintenance task list. The relationship indicates whether an operation precedes or follows another operation.

The type of relationship defines how the individual operations are linked with each other. There are four types of relationships:

- **FS relationship:** The end of one operation is linked to the start of the following operation.
- **SS relationship:** The start of one operation is linked to the start of the following operation.
- **FF relationship:** The end of one operation is linked to the end of the following operation.
- **SF relationship:** The start of one operation is linked to the end of the following operation.



Note: The relationship view must be defined before a relationship is created. If this is not defined, problems can arise with the sequence of the operations.

Continued on next page

Exercise 1: Task List Management

Exercise Objectives

After completing this exercise, you will be able to:

- Describe the concept of task lists
- Create object-based and object-independent task lists

Business Example

At IDES, recurring work steps for standard preventive maintenance, inspection, and repair work is to be displayed in task lists.

A distinction is to be made between object-specific task lists and general task lists.

Task:

In the plant, 1000, create a new task list (category: general maintenance task list) in the task list group, PM310-##, using the MECHANIK work center. The task list will be used only in Plant Maintenance. Assign it the status, *Released* (general).

The following data is used in PM courses:

Description	Training System	IDES
General		
Controlling area:	1000	1000
Company code:	1000	1000
Plant:	1000	1000
Storage location:	0001	0001
Purchasing organization:	1000	1000
G/L account:	417000	417000
Vendors:	1000, 1101, 1102 SRV-1	1000
Technical Objects		
Equipment	TEQ-##	P-1000-N001

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Equipment with synchronous serial number and synchronous material/construction type	TEX-##	-
Inspection equipment	10003540, 10003541	1000350, 10003541
Equipment with equipment BOM	T-SM0100 –T-SM0120	
Configurable equipment	P-6000-N001	P-6000-N001
Functional locations	K1 ## (*) SERV-PRO-RZ-##	K1 SERV-PRO-RZ-##
Operating hours counter for FL -> K1-M01-2, K1-M01-3, K1-M02-2, K1-M02-3	Created in course	
Status profile for equipment	PMSTAT	
Materials and Bills of Material		

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Materials: Pump without serial number – standard price batches	T-FP1##	P-2001
Pump with serial number – standard price batches	T-FP2##	P-2002
Pump with serial number – moving average price batches	T-FP3##	P-2003
Material with serial profile PM2 (synchronous equip./serial number)	T-FP400	-
Pump without serial number – moving average price batches	T-FP9##	P-2009
Material with condition-based valuation (standard price valuation)	P-2001	P-2001
Serial number profile (stock check = 1 > warning) Synchronous equip./serial number	PM1 PM2	PM1 -
Configurable material	P-6000	P-6000
Bill of material for material P-6000	P-6000	P-6000

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Materials for material BOM P-1000 (plant 1000, usage 4)	100-100	100-100
	100-400	100-400
	DG-1000	DG-1000
	100-600	100-600
	100-431	100-431
	KR117185	KR117185
	WL-1000	WL-1000
	G-1000	G-1000
	M-1000	M-1000
Materials for equipment BOM T-SM0100 – T-SM0120 (plant 1200, usage 4)	DPC9021	DPC9021
	C-1112	C-1112
	R-1120	R-1120
	R-1131	R-1131
	R-1160	R-1160
Configurable material (service)	INSPECTION_SERVICE	
Work Centers		
Work centers	T-ME## T-EL## T-EX##	Mechanics Electrics
Task Lists and Maintenance Planning		
Task lists:	PUMP_WTG PUMP_REP MM-CALIB	PUMP_WTG PUMP_REP MM-CALIB

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Profile	0000001	0000001
Maintenance plans	50	50
Service procurement	600000000000	600000000000
PM/QM link	51, 52	51, 52
Maintenance strategy (performance-based)	DFL	DFL
Cycle set	CS	CS
Configurable general task list for maintenance planning in conjunction with configurable equipment	PUMP_WTG 6	PUMP_WTG 6 (old status)
Maintenance plan with configurable equipment and configurable general task list	Maintenance plan 80	
Notification and Order Processing		
Service masters	100131, 100132	100131, 100132
Order type for generating inspection lots	PM06	PM06
Control key for internal service processing	PM05	PM05
Standard text keys	PM00001 – PM00008	PM00001 – PM00008
Settlement profile for refurbishment (for order type PM04)	PM_AWA	
Order type for investment orders	PM07	
Service masters for internal service processing (control key PM05)	100020, 100021	
Cost Centers and Activity Types		

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Cost centers Installed Technical systems External company	4300 4110 4350	4300 4110 4350
Activity types	1410 (repair) 1610 (external)	1410 (repair) 1610 (external)
Allocation cost element for activity type 1610		
Outline Agreements / Framework Orders		
Outline agreement Pipe laying work (vendor 1101)	4600000024	4600000024
Framework order for services	4500006496	4500006496
Service		
Maintenance contract	40000084	40000084
Configurable material (service)	INSPECTION_SERVICE	
Sold-to-party	1171	
Classes		
Variant class (used in configurable equipment and configurable general task list)	CL_P600	CL_P600
Project and Investment Program		
Project	I/5001	I/5001
Maintenance project profile	PM00001	PM00001
Investment program	PM-INV	PM-INV

- How are usage, status, and increment controlled in the task list? How can these parameters be predefined for users? Make the necessary changes for your users.

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2. How does the control key appear in the task list as a default value?
3. Create at least four operations specifying the standard times and using the suitable standard text keys. Which operations have you created? Which control keys have been used?
4. Specify that the task list is valid for the assembly, P-1000, by entering the assembly in the correct place in the task list. Where do you enter this information?
5. Assign the stock material, 100-431, to one of the operations. How do you do this?
6. Assign four Securing rings from the structure list to one of the operations. How do you do this?

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Solution 1: Task List Management

Task:

In the plant, 1000, create a new task list (category: general maintenance task list) in the task list group, PM310-##, using the MECHANIK work center. The task list will be used only in Plant Maintenance. Assign it the status, *Released* (general).

The following data is used in PM courses:

Description	Training System	IDES
General		
Controlling area:	1000	1000
Company code:	1000	1000
Plant:	1000	1000
Storage location:	0001	0001
Purchasing organization:	1000	1000
G/L account:	417000	417000
Vendors:	1000, 1101, 1102 SRV-1	1000
Technical Objects		
Equipment	TEQ-##	P-1000-N001
Equipment with synchronous serial number and synchronous material/construction type	TEX-##	-
Inspection equipment	10003540, 10003541	1000350, 10003541
Equipment with equipment BOM	T-SM0100 –T-SM0120	
Configurable equipment	P-6000-N001	P-6000-N001

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Functional locations	K1 ## (*) SERV-PRO-RZ-##	K1 SERV-PRO-RZ-##
Operating hours counter for FL -> K1-M01-2, K1-M01-3, K1-M02-2, K1-M02-3	Created in course	
Status profile for equipment	PMSTAT	
Materials and Bills of Material		
Materials:		
Pump without serial number – standard price batches	T-FP1##	P-2001
Pump with serial number – standard price batches	T-FP2##	P-2002
Pump with serial number – moving average price batches	T-FP3##	P-2003
Material with serial profile PM2 (synchronous equip./serial number)	T-FP400	-
Pump without serial number – moving average price batches	T-FP9##	P-2009
Material with condition-based valuation (standard price valuation)	P-2001	P-2001

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Serial number profile (stock check = 1 > warning)	PM1	PM1
Synchronous equip./serial number	PM2	-
Configurable material	P-6000	P-6000
Bill of material for material P-6000	P-6000	P-6000
Materials for material BOM P-1000 (plant 1000, usage 4)	100-100 100-400 DG-1000 100-600 100-431 KR117185 WL-1000 G-1000 M-1000	100-100 100-400 DG-1000 100-600 100-431 KR117185 WL-1000 G-1000 M-1000
Materials for equipment BOM T-SM0100 – T-SM0120 (plant 1200, usage 4)	DPC9021 C-1112 R-1120 R-1131 R-1160	DPC9021 C-1112 R-1120 R-1131 R-1160
Configurable material (service)	INSPECTION_SERVICE	
Work Centers		

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Work centers	T-ME## T-EL## T-EX##	Mechanics Electrics
Task Lists and Maintenance Planning		
Task lists:	PUMP_WTG PUMP_REP MM-CALIB	PUMP_WTG PUMP_REP MM-CALIB
Profile	0000001	0000001
Maintenance plans	50	50
Service procurement	600000000000	600000000000
PM/QM link	51, 52	51, 52
Maintenance strategy (performance-based)	DFL	DFL
Cycle set	CS	CS
Configurable general task list for maintenance planning in conjunction with configurable equipment	PUMP_WTG 6	PUMP_WTG 6 (old status)
Maintenance plan with configurable equipment and configurable general task list	Maintenance plan 80	
Notification and Order Processing		
Service masters	100131, 100132	100131, 100132
Order type for generating inspection lots	PM06	PM06
Control key for internal service processing	PM05	PM05
Standard text keys	PM00001 – PM00008	PM00001 – PM00008

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Settlement profile for refurbishment (for order type PM04)	PM_AWA	
Order type for investment orders	PM07	
Service masters for internal service processing (control key PM05)	100020, 100021	
Cost Centers and Activity Types		
Cost centers Installed	4300	4300
Technical systems	4110	4110
External company	4350	4350
Activity types	1410 (repair) 1610 (external)	1410 (repair) 1610 (external)
Allocation cost element for activity type 1610		
Outline Agreements / Framework Orders		
Outline agreement	4600000024	4600000024
Pipe laying work (vendor 1101)		
Framework order for services	4500006496	4500006496
Service		
Maintenance contract	40000084	40000084
Configurable material (service)	INSPECTION_SERVICE	
Sold-to-party	1171	
Classes		

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Variant class (used in configurable equipment and configurable general task list)	CL_P600	CL_P600
Project and Investment Program		
Project	I/5001	I/5001
Maintenance project profile	PM00001	PM00001
Investment program	PM-INV	PM-INV

1. How are usage, status, and increment controlled in the task list? How can these parameters be predefined for users? Make the necessary changes for your users.
 - a) Choose *SAP Menu → Logistics → Plant Maintenance → Preventive Maintenance → Work Scheduling → Task Lists → General Maintenance Task Lists → Create*.

The profile defines usage, status, and increment. You can enter the profile in the user parameters using the parameter ID PIN:

Choose *System → User Profile → Own Data, Parameters tab*.

Field Name or Data Type	Values
Parameter ID	PIN
Parameter value	0000001

2. How does the control key appear in the task list as a default value?
 - a) The control key is copied from the work center (Default Values screen in the work center master record).
3. Create at least four operations specifying the standard times and using the suitable standard text keys. Which operations have you created? Which control keys have been used?
 - a) Use the *Std txt* field to create the operations in the operation overview. Use the possible entries help, F4, in the *Std txt* field and select a suitable text key. The text module is displayed only after you have entered the data.

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4. Specify that the task list is valid for the assembly, P-1000, by entering the assembly in the correct place in the task list. Where do you enter this information?
 - a) Task list header, *Assembly field*, entry: P-1000.
5. Assign the stock material, 100-431, to one of the operations. How do you do this?
 - a) Select the operation. Choose *Components* and enter the material number and quantity. Select the item category, L, for the stock item.
6. Assign four Securing rings from the structure list to one of the operations. How do you do this?
 - a) Select the operation. Choose *Components*, *Component selection*, and then *Expand whole*. Select a material.

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Lesson Summary

You should now be able to:

- List the steps involved in the preventive management process
- Identify the various maintenance task list types
- Organize maintenance task lists
- Create the elements in maintenance task lists
- Assign components to maintenance task lists
- Explain the relationships among the operations in a maintenance task list

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Lesson: Managing Task Lists

Lesson Overview

This lesson covers the methods used to manage task lists effectively. To begin with, the lesson explains how to use where-used lists. In addition, it explains the method to display task list objects. Finally, it describes how to perform cost analysis for task lists and implement change management for task lists.



Lesson Objectives

After completing this lesson, you will be able to:

- Use where-used lists
- Display task list objects
- Perform cost analysis for task lists
- Implement change management for task lists

Business Example

You work as an SAP administrator for the Precision Pumps company, which performs specific maintenance work for all pumps. You have been asked to manage the assignment of work centers and the production resources to carry out this maintenance work. You also have to provide the cost analysis for these maintenance tasks to the executive board of the company.

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Using Where-Used Lists

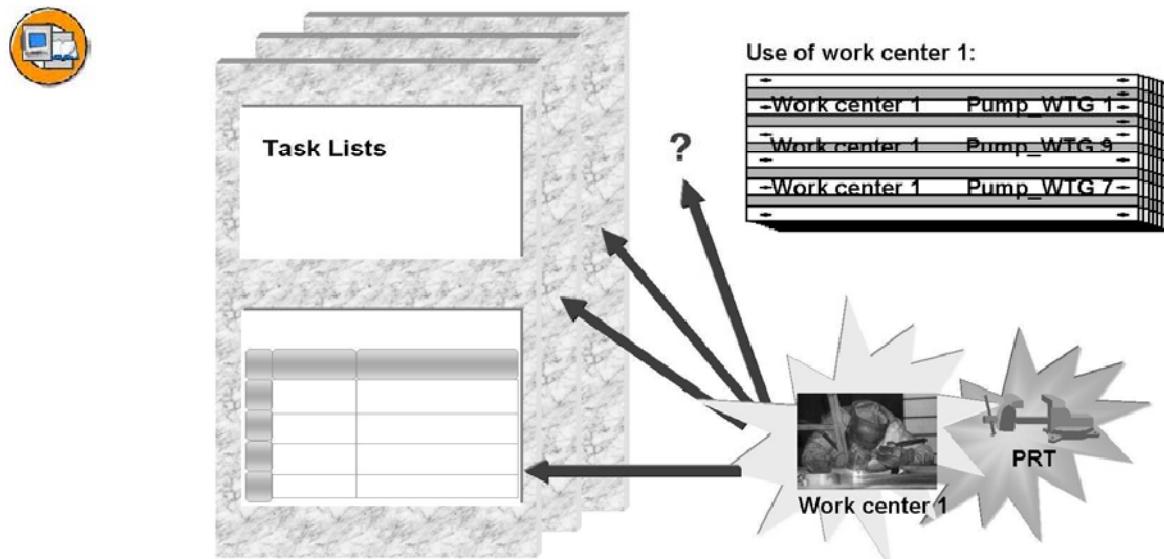


Figure 14: Mass Functions: Where-Used List

You often need to work out the use of **work centers** or **production resources and tools** (PRTs) in different task lists to plan capacities efficiently.

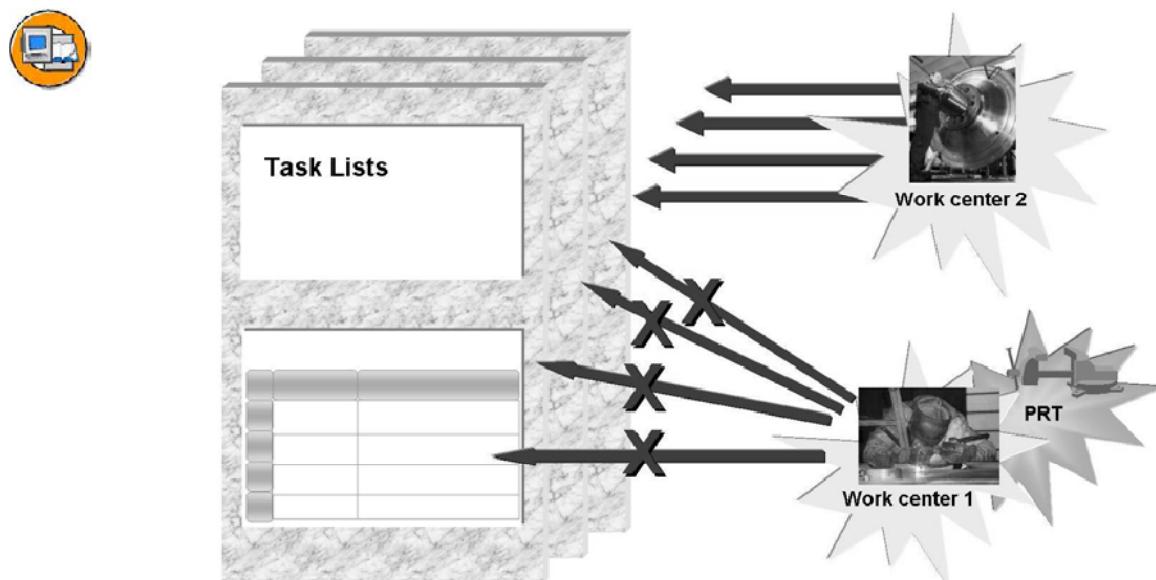


Figure 15: Mass Functions: Changes

The existing assignments of **work centers** and **production resources and tools** to task lists can be changed.

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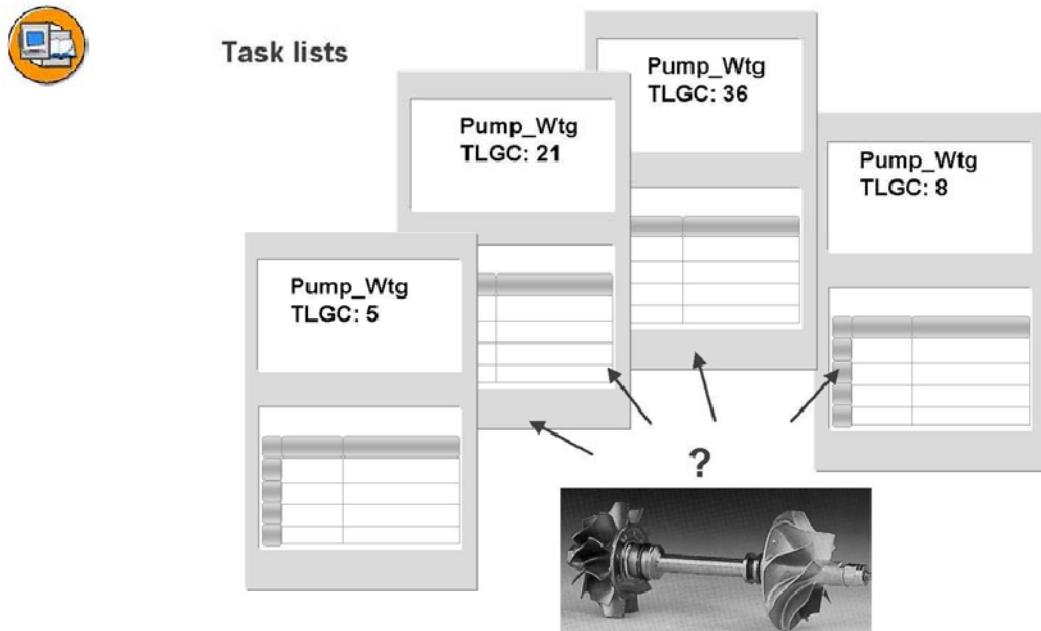


Figure 16: Material Where-Used List

You can check the use of materials in task lists using a where-used list.

This is particularly useful if the scheduled spare parts change and must be replaced.

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Displaying Task List Objects

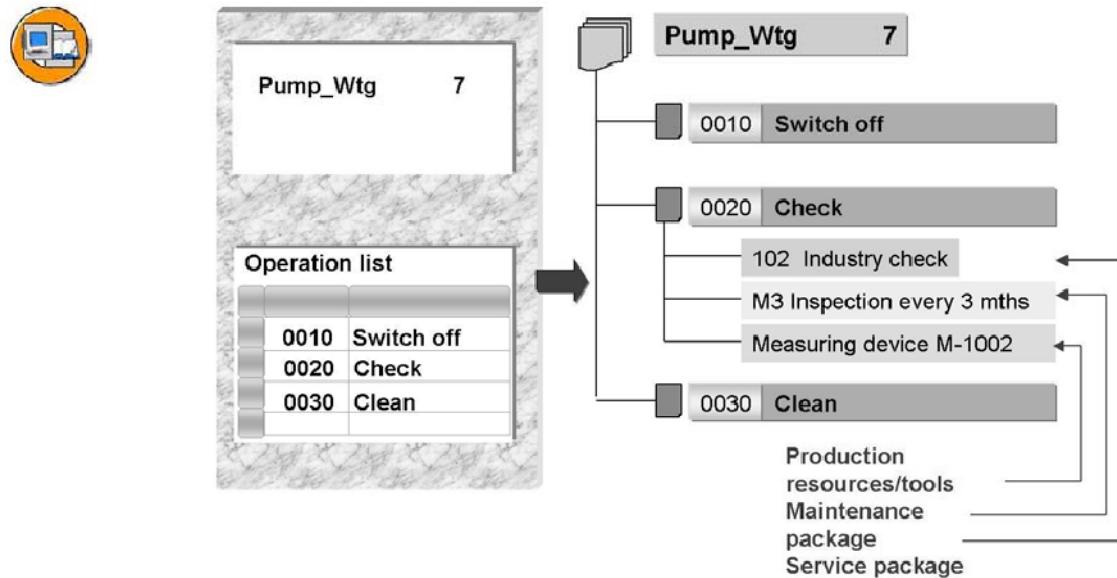


Figure 17: Object Overview

The different objects that can be assigned to a task list can be displayed within a total overview.

Objects that can be represented include:

- Materials
- Service packages
- Object dependencies
- Maintenance packages
- Inspection characteristics

You select the objects in Customizing for the multilevel list display of task lists.

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Performing Cost Analysis for Task Lists

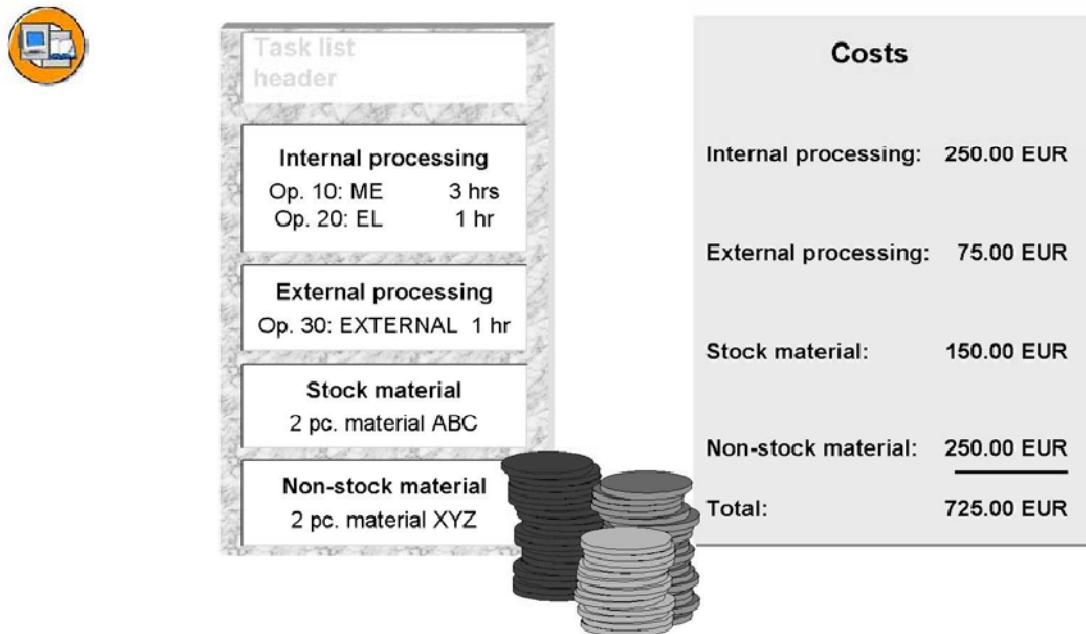


Figure 18: Maintenance Task List: Cost Analysis

You can execute the cost analysis program only for one task list type. This means that if you want to determine the costs for equipment task lists and functional location task lists, you must run the program one time for equipment task lists and one time for functional location task lists.

You can either refer the cost analysis to complete maintenance task lists or single out individual operations, such as all the external processing operations.

The following data is available in the cost analysis:

- All the material costs
- All the costs for external processing
- All the costs for internal processing

In the cost analysis, you can request a log that checks all the costing-related master data for completeness and consistency. The system checks whether all the activity types and valuation segments are maintained for the assigned materials. If errors occur, the relevant system messages are stored in the cost analysis log.

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Implementing Change Management for Task Lists

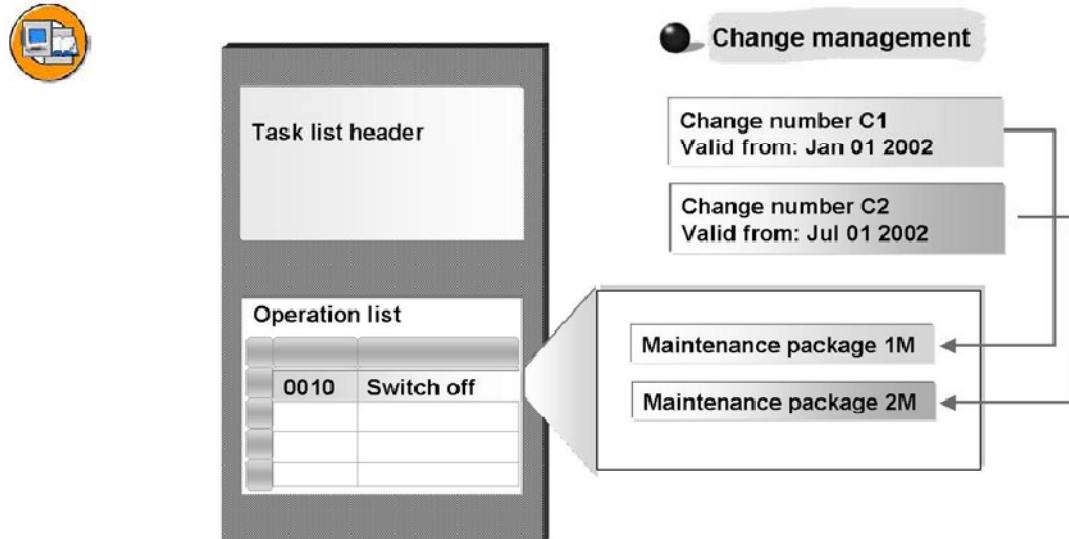


Figure 19: Task List – Change Management

Maintenance task lists can be used with Change Management (central function in Logistics).

Different versions of the same task list can be saved under different change numbers. If a certain combination of maintenance packages is valid only for a limited period of time, this can be achieved using change numbers.

The change number represents a version of a task list with a defined validity date.

If a task list with a change number is used in a maintenance plan, the validity date of the change number and, as a result, the validity of the maintenance package is checked against the plan date during scheduling. If a maintenance package is not valid for a certain plan date, it will be deactivated for this plan date.

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Exercise 2: Task List Management

Exercise Objectives

After completing this exercise, you will be able to:

- Create object-based and object-independent task lists

Business Example

At IDES, the recurring work steps for standard preventive maintenance, inspection, and repair work is to be displayed in task lists.

A distinction is to be made between object-specific task lists and general task lists.

Task:

The second operation that you created is to start two hours after the first operation has been completed. The third and fourth operations are to start immediately after the second operation has started.

1. Include these restrictions in the task list. How do you do this?



Hint: If you cannot start the network graphic, check that the following information has been entered in the profile under:

Extras - Settings - Profile:

Group: PM

Name: Network

2. Draw up a cost estimate for the task list that you have just created. What are the resulting costs?

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Solution 2: Task List Management

Task:

The second operation that you created is to start two hours after the first operation has been completed. The third and fourth operations are to start immediately after the second operation has started.

1. Include these restrictions in the task list. How do you do this?



Hint: If you cannot start the network graphic, check that the following information has been entered in the profile under:

Extras - Settings - Profile:

Group: PM

Name: Network

- a) In the task list, select *Goto → Network graphic*.

Choose *Link* and connect the end of the operation, 1, with the start of the operation, 2. Double-click the link displayed. Enter two hours in the *Relationship time interval* field. Connect the start of the operation, 2, with the start of the operation, 3. Connect the start of the operation, 2, with the start of the operation, 4.

2. Draw up a cost estimate for the task list that you have just created. What are the resulting costs?
 - a) Choose *SAP Menu → Logistics → Plant Maintenance → Preventive Maintenance → Work Scheduling → Evaluations → Task List Costing*.

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Lesson Summary

You should now be able to:

- Use where-used lists
- Display task list objects
- Perform cost analysis for task lists
- Implement change management for task lists

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Lesson: Customizing Task Lists

Lesson Overview

This lesson describes how to customize task lists. To begin with, the lesson explains the method to select task lists to create orders. The lesson also describes how to create configurable task lists. Finally, the lesson explains how to customize the task list settings.



Lesson Objectives

After completing this lesson, you will be able to:

- Select task lists for creating orders
- Create configurable task lists
- Customize task list settings

Business Example

You work as an SAP administrator for the Precision Pumps company. Three different types of electric pumps, A, B, and C, are used in a clarification plant of the company. There is only a slight difference in how these pumps are structured and maintained. You have been asked to combine the maintenance work required for all the three types of pumps into a single general task list.

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Selecting Task Lists for Creating Orders

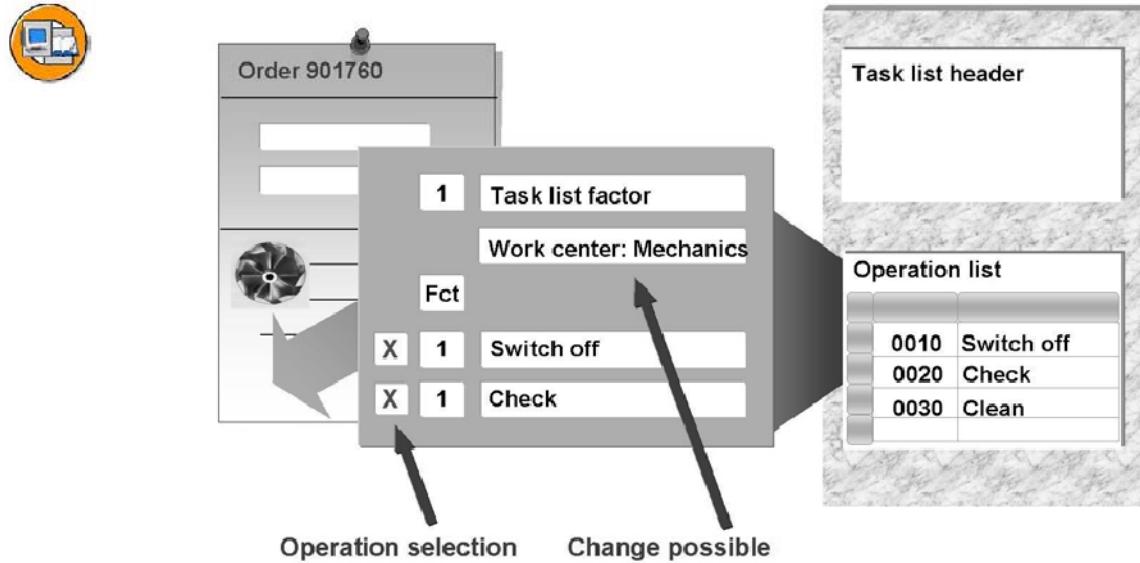


Figure 20: Task List Transfer

To enable you to create the orders for preventive maintenance, the existing task lists can be integrated directly into orders.

You can make settings in Customizing so that a **dialog box** appears when you include a task list in an order. This dialog box enables you to **choose operations**, **change the work center**, and **set execution factors**.

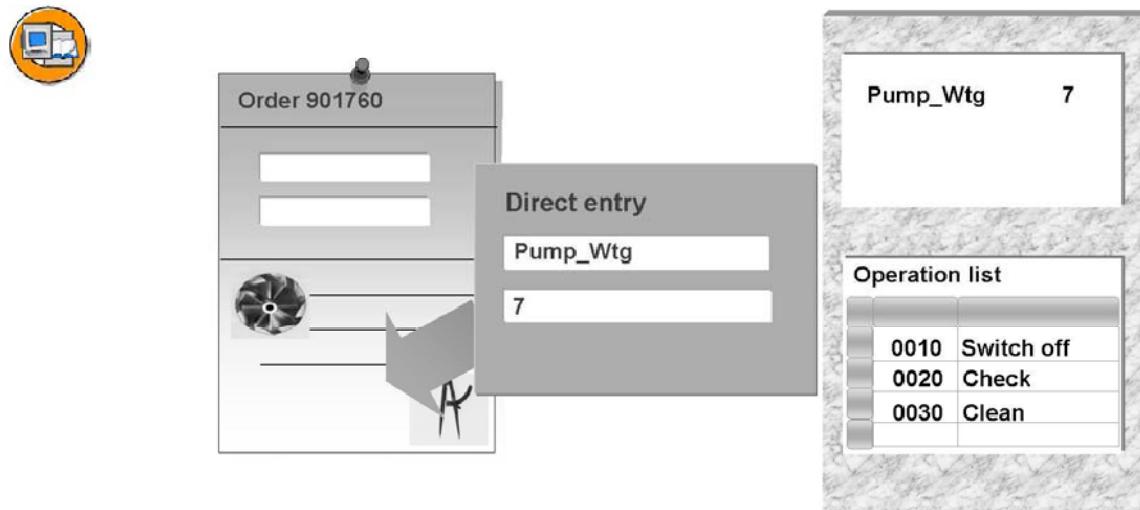


Figure 21: Selection Procedure for Task Lists I

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Within an order, task lists can be selected in different ways. If the task list group and the task list group counter are known, the task list can be selected by **direct entry**.

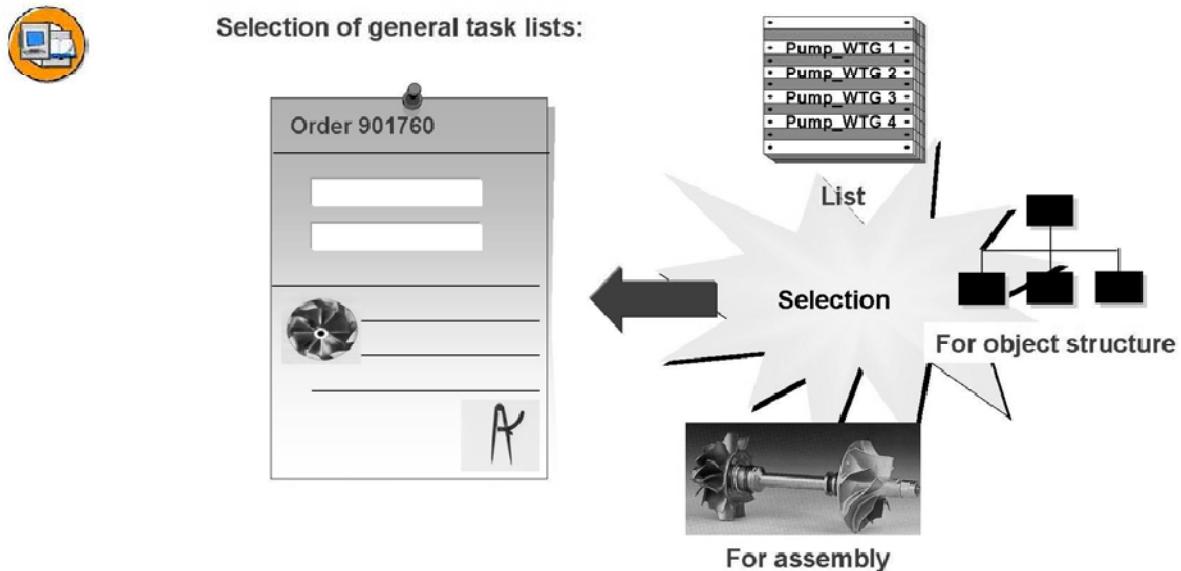


Figure 22: Selection Procedure for Task Lists II

Further selection procedures for task lists:

- **General task lists:** You can use a list to display a selection of general maintenance task lists. The selection criteria of the task list type, A, plant and status (released for order) are preset. You can add further criteria.
- **For object structure:** All the task lists that have been created for the objects that are subobjects of the reference object are selected here.
- **For assembly:** All the task lists that have been created for the object that was entered in the "Assembly" field in the order header are selected here.

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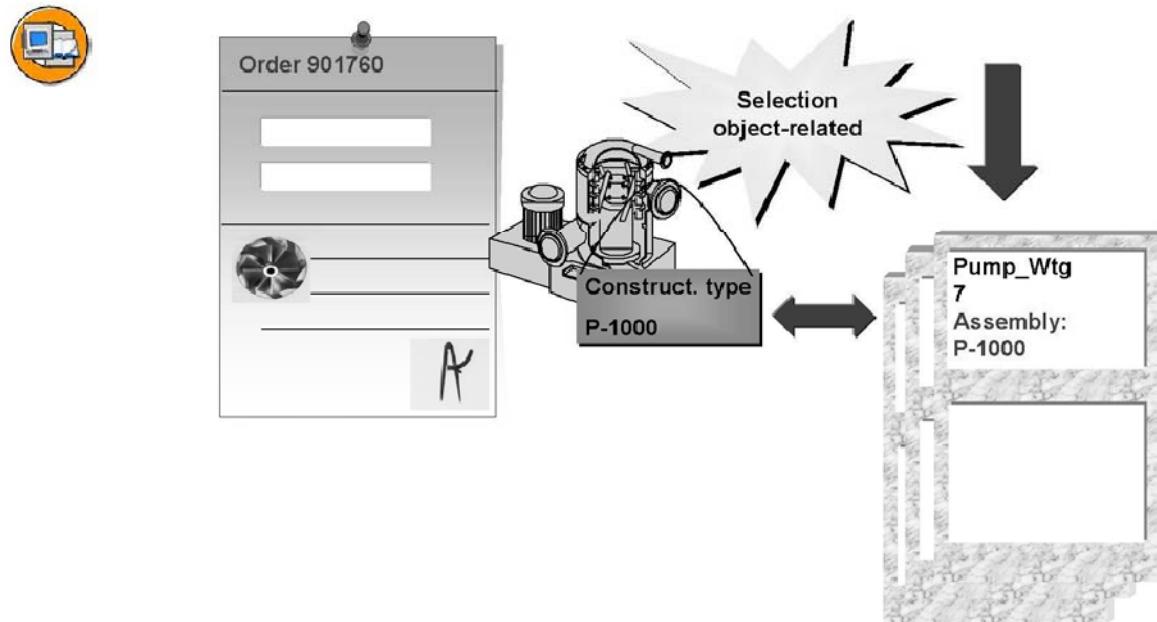


Figure 23: Selection Procedure for Task Lists III

The **object-related** selection procedure enables you to select task lists based on the reference object.

If a piece of equipment with the **construction type** is specified as the reference object, all the equipment task lists for the equipment concerned are supplied, as are all the general task lists for which the **assembly** in the task list header corresponds to the construction type for the equipment.

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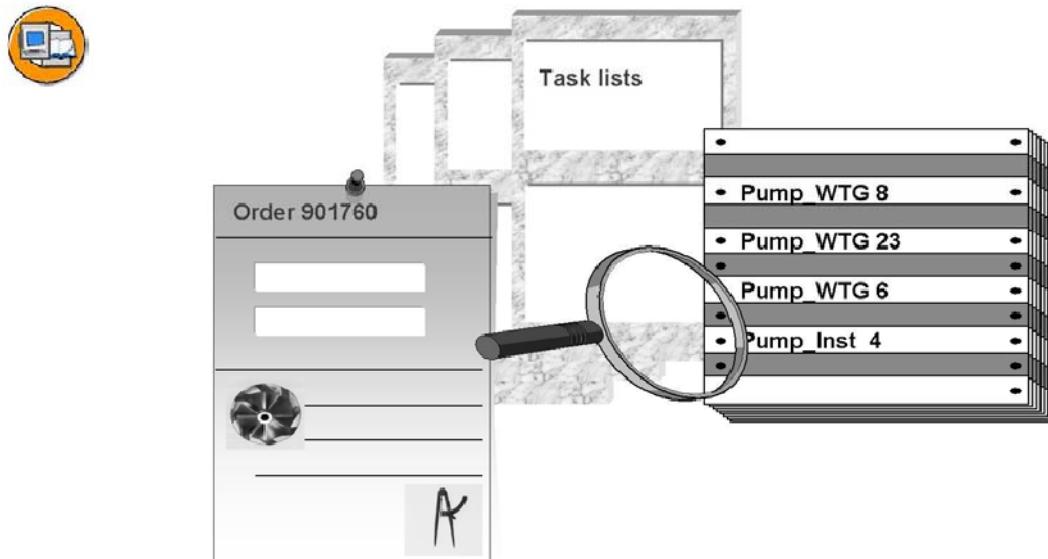


Figure 24: Overview of Included Task Lists

If the operations from several different task lists are used in an order, a list of all the task lists used can be displayed.

Creating Configurable Task Lists

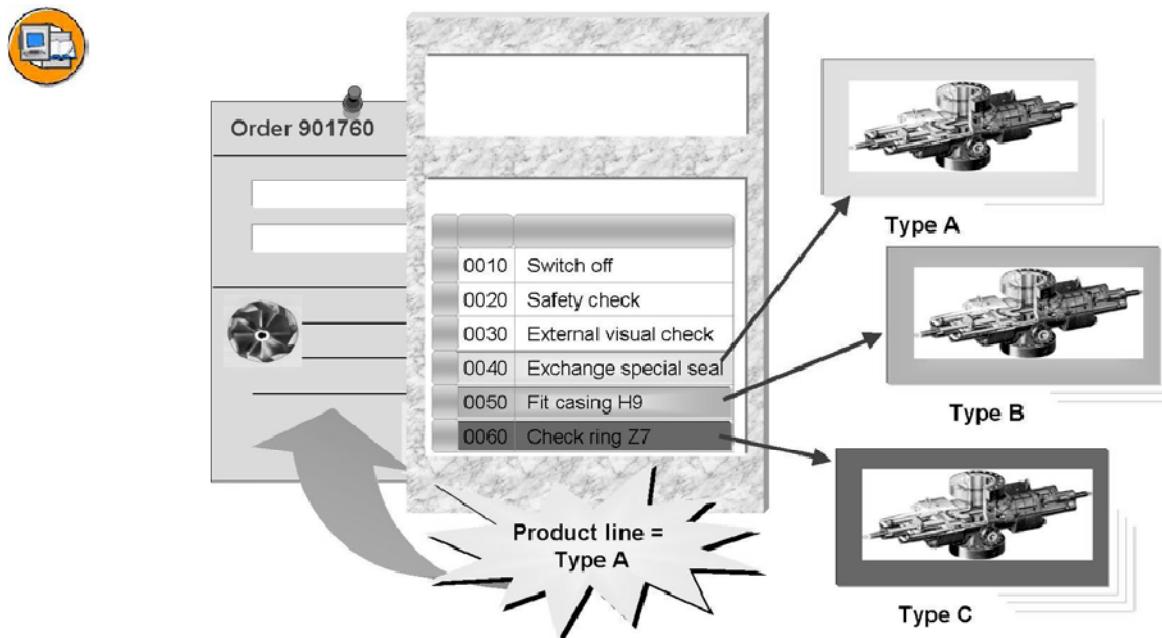


Figure 25: What are Configurable Task Lists?

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Configurable task lists enable you to group the operations for objects that are only slightly different. As a result, you need to create only one single task list for the different variants of an object.

When a configurable task list is included in an order, operations are selected on the basis of characteristics. Operations use **object dependencies**, which are a combination of characteristics and values. When a task list is selected, the characteristic value is requested.

For example: Three different types of electric pumps, A, B, and C, are used in a clarification plant. There is only a slight difference in how these pumps are structured and maintained. The aim is to combine the work required for all the three types of pumps into a single general task list.

The operations to be executed separately for each type are assigned a label, which means an object dependency, to indicate the type for which the operations are to be performed. For example, change only the special seal, XZ-100, for the type, A, because only the type, A, uses this seal.

Labels are not assigned to operations performed in the same way for all pumps, such as switching off, safety check, external visual check. As a result, these operations are activated for each type.

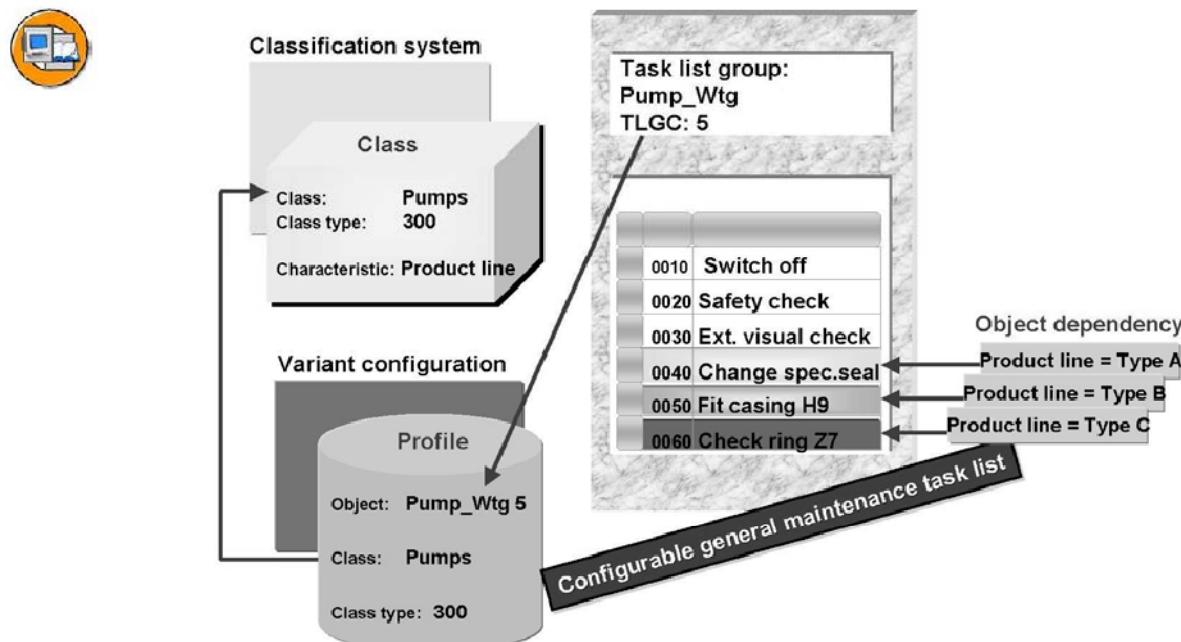


Figure 26: Functions I

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The prerequisites to create configurable task lists (general maintenance task lists) are:

- A **class** must be created for the relevant objects in the classification system. A configurable class must be assigned as the class type (**class type, 300**, in the standard system).
- The **characteristics** that help differentiate between objects are assigned to the class.
- A **configuration profile** is created in **the variant configuration**. This profile links the general maintenance task list (task list group and group counter), the class and class type.
- **Object dependencies** are assigned to the configurable operations in the general task list, such as Product line = type A.

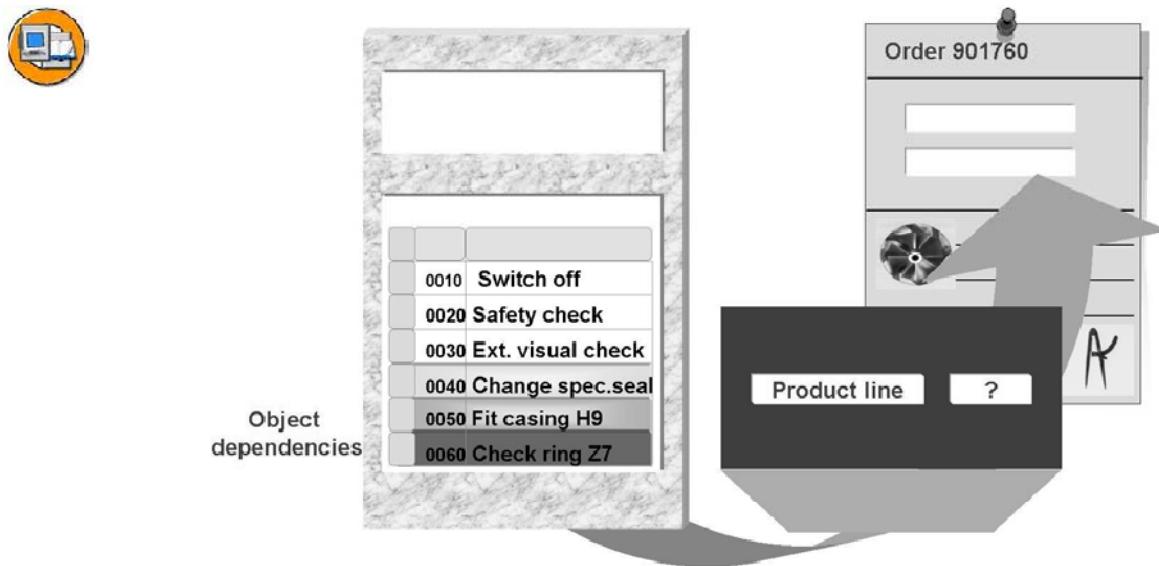


Figure 27: Functions II

When the configurable general task list is included in an order, the characteristic value is requested.

Depending on the features of the characteristic, you can enter the available values manually or display and select them from the possible entries help, F4.

When a value is entered, the operations that have this value for the characteristic in their object dependency are selected from the task list.

The operations that have no object dependencies are copied automatically. These operations are same for all objects.

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Customizing Task List Settings



- Profile
- User fields
- Control key
- Presetting for free material assignment
- Presetting for list display / list editing
- Configure order type for including task lists

Profile

The profile can be used to make settings for creating task lists, such as step-by-step progress of operations, calculation key, unit of duration, unit of work and so on.

User fields

The user fields can be used to define the fields for text, information about quantities, values, dates, deadlines, and indicators. Selection is made using a field key.

Control key

The control key defines the following parameters for the operations in the task list:

scheduling, determining capacity requirements, costs activity, costing, printing time ticket, printing completion confirmation, printing, completion confirmation, external processing, service, and text (calling up long text, long text available).

Presetting for free material assignment

You can use the free material assignment at any time to assign materials, general maintenance task lists, equipment task lists, or general task lists to functional locations, without the material being a component in the object, BOM. For example, equipment BOM. For these "free" materials not assigned to the object, BOM, the system generates a bill of material in the background. This bill of material cannot be maintained using application transactions.

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Exercise 3: Order and Task List

Exercise Objectives

After completing this exercise, you will be able to:

- Use the different selection methods to include task lists in orders

Business Example

When planning maintenance orders at IDES, existing, standardized steps in task lists are to be used as much as possible.

Task 1:

Create a new order for the piece of equipment, TEQ-##, and incorporate the task list that you have just created.

1. Take the following points into account:
 - Which selection methods are available?
 - Which is the most suitable method in this case?
2. In this case, the work is to be performed by the ELECTRIK work center and not the MECHANIK work center. Change the work center when you incorporate the task list.
 - How do you do this?
 - Which order number does the system assign?

Task 2:

Copy the general task list created in the first exercise of this unit and keep the same task list group.

1. How do you do this?

Write down the task list group and the group counter of the new general task list.

Task 3:

Generate a where-used list for the work center, MECHANIK.

1. Use the following data:

Continued on next page

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Work center	MECHANIK
Plant	1000
Task list type	A
Task list status	4
Task list usage	4
Overview variant	L00000000070

In which task lists is the work center used?

Continued on next page

Solution 3: Order and Task List

Task 1:

Create a new order for the piece of equipment, TEQ-##, and incorporate the task list that you have just created.

1. Take the following points into account:

Which selection methods are available?

Which is the most suitable method in this case?

- a) Choose *SAP Menu → Logistics → Plant Maintenance → Maintenance Processing → Order → Create (General)*.

Direct entry, to reference object, general task lists for assembly, general task lists for object structure, general task lists.

Most suitable method:

Choose *Extras → Task list selection → To reference object*.

(As this selects all the task lists with the entry, P-1000, in the task list header, – compare also the entry in the Construction type field in the maintenance data for the equipment).

2. In this case, the work is to be performed by the ELECTRIK work center and not the MECHANIK work center. Change the work center when you incorporate the task list.

How do you do this?

Which order number does the system assign?

- a) Change the work center in the task list selection window.

Task 2:

Copy the general task list created in the first exercise of this unit and keep the same task list group.

1. How do you do this?

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Write down the task list group and the group counter of the new general task list.

- a) Choose *SAP Menu → Logistics → Plant Maintenance → Preventive Maintenance → Work Scheduling → Task Lists → General Maintenance Task Lists*.

Create General Task List - Copy Reference (Copy reference icon)

Select the general maintenance task list and enter the task list group. The system creates a new general task list. Maintain the *Task list status* field. Enter the value: 4. Select *Copy*.

Task 3:

Generate a where-used list for the work center, MECHANIK.

1. **Use the following data:**

Work center	MECHANIK
Plant	1000
Task list type	A
Task list status	4
Task list usage	4
Overview variant	L00000000070

In which task lists is the work center used?

- a) Choose *SAP Menu → Logistics → Plant Maintenance → Preventive Maintenance → Work Scheduling → Evaluations → Usages → Work Center Usage*.

Enter the plant, work center, and type. Select *Execute*. Enter the overview variant.

Task lists:

For example, General, external, Pump_Mnt, Pump_Rep, Pump_Wtg, Valv_Wtg

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Exercise 4: Configurable Task Lists

Exercise Objectives

After completing this exercise, you will be able to:

- Use the different selection methods to include task lists in orders

Business Example

When planning maintenance orders at IDES, the existing, standardized steps in task lists are to be used as much as possible.

Task 1:

Pumps of different variants can be maintained using the configurable task list, PUMP_WTG 6.

1. Create a new order and include the operations only from PUMP_WTG 6 for the pumps that have an internal char: **steel casing**.

Use the following data:

Order type	PM01
Equipment	TEQ-##
Task list group (task list)	PUMP_WTG
Task list group counter	6

How do you do this?

Task 2:

Optional

Make the necessary additions so that the task list created in the previous exercise becomes a configurable task list.

1. Create a configuration profile for the task list.

Use the following data:

Class:	PUMPEN
Class type:	300

Continued on next page

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How do you do this?

Why must the configuration profile be created?

Which profile have you created?

2. Assign object dependencies to one or more operations in the task list.

Use the following data:

Characteristic:	Pump Capacity (FL)
Characteristic values:	10 m ³ /s, 20 m ³ /s, 30 m ³ /s

How do you do this?

3. Create a new order and check whether the object dependencies that you created influence the operation selection correctly.

How do you include the task list in the order?

Which characteristic valuation have you made?

Continued on next page

Solution 4: Configurable Task Lists

Task 1:

Pumps of different variants can be maintained using the configurable task list, PUMP_WTG 6.

1. Create a new order and include the operations only from PUMP_WTG 6 for the pumps that have an internal char: **steel casing**.

Use the following data:

Order type	PM01
Equipment	TEQ-##
Task list group (task list)	PUMP_WTG
Task list group counter	6

How do you do this?

- a) Choose SAP Menu → Logistics → Plant Maintenance → Maintenance Processing → Order → Create (General).

Field Name or Data Type	Values
Task list group	PUMP_WTG
Task list group counter	6
Internal characteristic- casing	S (steel)

Task 2:

Optional

Make the necessary additions so that the task list created in the previous exercise becomes a configurable task list.

1. Create a configuration profile for the task list.

Use the following data:

Class:	PUMPEN
Class type:	300

Continued on next page

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How do you do this?

Why must the configuration profile be created?

Which profile have you created?

- a) Choose *SAP Menu → Logistics → Plant Maintenance → Preventive Maintenance → Work Scheduling → Task Lists → General Maintenance Task Lists → Configuration Profile → Create.*

Field Name or Data Type	Values
<i>Enter task list group</i>	PLM310-##
<i>Enter task list group counter</i>	1
<i>Enter profile names</i>	Use any name
<i>Class type</i>	300
<i>Status</i>	1 (released)
<i>Class assignment</i>	PUMPS

The configuration profile links the class and the general maintenance task list. The characteristics at the operation level are recognized only when the assignments have been made in the configuration profile.

2. Assign object dependencies to one or more operations in the task list.

Use the following data:

Characteristic:	Pump Capacity (FL)
Characteristic values:	10 m ³ /s, 20 m ³ /s, 30 m ³ /s

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How do you do this?

- Choose SAP Menu → Logistics → Plant Maintenance → Preventive Maintenance → Work Scheduling → Task Lists → General Maintenance Task Lists → Change.

Choose *Select operation; Extras* → *Object dependencies* → *Editor*.

Field Name or Data Type	Values
<i>Relationship type</i>	Selection condition
<i>Enter object dependencies</i>	For example, CP = 10

- Create a new order and check whether the object dependencies that you created influence the operation selection correctly.

How do you include the task list in the order?

Which characteristic valuation have you made?

- Choose SAP Menu → Logistics → Plant Maintenance → Maintenance Processing → Order → Create (General).

Choose *Extras* → *Task list selection* → *To reference object*.

Enter the task list group and the task list group counter for the configurable task list.

After the task list has been selected, the *Characteristic Valuation* screen appears.

The value of the characteristic, such as 10, 20, or 30, is entered here.

Select F3 to go back.

The operations, the object dependencies which contain this value, are included in the order.

Continued on next page



Lesson Summary

You should now be able to:

- Select task lists for creating orders
- Create configurable task lists
- Customize task list settings

Continued on next page



Unit Summary

You should now be able to:

- List the steps involved in the preventive management process
- Identify the various maintenance task list types
- Organize maintenance task lists
- Create the elements in maintenance task lists
- Assign components to maintenance task lists
- Explain the relationships among the operations in a maintenance task list
- Use where-used lists
- Display task list objects
- Perform cost analysis for task lists
- Implement change management for task lists
- Select task lists for creating orders
- Create configurable task lists
- Customize task list settings

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Test Your Knowledge

1. E, T, and A are indicators for distinguishing object-based task lists.
Determine whether this statement is true or false.
 True
 False

2. Out of the following types of relationship, which is the one that indicates that the end of one operation is linked to the end of the following operation.
Choose the correct answer(s).
 A FS relationship
 B FF relationship
 C SF relationship
 D SS relationship

3. You can assign service packages to an operation in a task list either by entering an individual service number or by selecting one or more services from the

Fill in the blanks to complete the sentence.

4. To make a free material assignment, you must indicate a BOM usage in _____.

Fill in the blanks to complete the sentence.

5. List the steps involved in the preventive maintenance process.

Continued on next page

6. Why should you divide your maintenance task lists into several small groups?

7. The different versions of the same task list can be saved under different change numbers.

Determine whether this statement is true or false.

- True
 False

8. Where-Used lists are needed to work out the use of _____ or production resources and tools in different task lists to plan capacities efficiently.

Fill in the blanks to complete the sentence.

9. List the objects that can be represented in task lists.

10. What are the types of data available in the cost analysis?

11. How do you display a selection of general maintenance lists to create orders?

Continued on next page

12. What are the prerequisites to create configurable task lists?

13. You can use free material assignment to assign materials, general maintenance task lists, equipment task lists, or general task lists to functional locations, without the material being a component in the _____.

Fill in the blanks to complete the sentence.

Continued on next page



Answers

1. E, T, and A are indicators for distinguishing object-based task lists.

Answer: False

E and T are indicators for distinguishing the equipment task list and the task list for the functional location respectively, which are both object-based task lists. A is the indicator for general maintenance task lists, which are general task lists without object reference.

2. Out of the following types of relationship, which is the one that indicates that the end of one operation is linked to the end of the following operation.

Answer: B

The FF type of relationship indicates that the end of one operation is linked to the end of the following operation.

3. You can assign service packages to an operation in a task list either by entering an individual service number or by selecting one or more services from the standard or model service specifications.

Answer: standard or model service specifications

4. To make a free material assignment, you must indicate a BOM usage in Customizing.

Answer: Customizing

5. List the steps involved in the preventive maintenance process.

Answer: The steps involved in the preventive maintenance process are:

Step 1: Create the task lists for different objects.

Step 2: Create maintenance plans.

Step 3: Schedule maintenance plans.

Step 4: Process maintenance orders.

Step 5: Technically, complete the maintenance orders.

Continued on next page

6. Why should you divide your maintenance task lists into several small groups?

Answer: You should divide your maintenance task lists into several small groups to enable processing. This is because the data volume that the system has to process when accessing a task list group is less, and, as a result, the system response time is short.

7. The different versions of the same task list can be saved under different change numbers.

Answer: True

The different versions of the same task list can be saved under different change numbers.

8. Where-Used lists are needed to work out the use of work centers or production resources and tools in different task lists to plan capacities efficiently.

Answer: work centers

9. List the objects that can be represented in task lists.

Answer: Objects that can be represented in task lists include:

- Materials
- Service packages
- Object dependencies
- Maintenance packages
- Inspection characteristics

10. What are the types of data available in the cost analysis?

Answer: The following data is available in the cost analysis:

- All the material costs
- All the costs for external processing
- All the costs for internal processing

Continued on next page

11. How do you display a selection of general maintenance lists to create orders?

Answer: You can use a list to display a selection of general maintenance task lists. The selection criteria of the task list type, A, plant, and status are preset in the list. You can add further criteria, as required.

12. What are the prerequisites to create configurable task lists?

Answer: The prerequisites to create configurable task lists are:

- A class must be created for the relevant objects in the classification system.
- The characteristics that help differentiate between objects have to be assigned to the class.
- A configuration profile has to be created in the variant configuration.
- Object dependencies have to be assigned to the configurable operations in the general task list.

13. You can use free material assignment to assign materials, general maintenance task lists, equipment task lists, or general task lists to functional locations, without the material being a component in the object BOM.

Answer: object BOM

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Unit 2

Single-Cycle Maintenance Planning

Unit Overview

This unit provides a detailed overview of single-cycle maintenance plans. To begin with, the unit explains the functions and structure of a maintenance plan. Next, the unit explains how to call up orders, assign task lists, and include configurable general task lists in maintenance plans. The unit also describes the scheduling of maintenance plans. This includes the monitoring of single cycle plans. Further, this unit describes how to call notifications to maintenance plans. Finally, the unit explains how to call external services and make customizing settings in maintenance plans.



Unit Objectives

After completing this unit, you will be able to:

- Understand the functions and structure of a maintenance plan
- Call up orders
- Assign task lists to maintenance plans
- Include the configurable general task lists in maintenance plans
- Identify the scheduling functions and parameters of a single cycle plan
- Assign scheduling parameters in a single cycle plan
- Monitor single cycle plans
- Determine the cost of a maintenance plan
- Change the documents in a maintenance plan
- Call up the notifications in a maintenance plan
- Determine the automatic tasks for maintenance plans
- List the steps for maintenance plan-based service procurement
- Call the external services in maintenance plans
- Make the customizing settings in maintenance plans

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Lesson: Introducing Single-Cycle Maintenance Plans

Lesson Overview

This lesson provides an overview of single-cycle maintenance plans. The lesson explains the functions and structure of a maintenance plan. The lesson also explains how to call up orders and assign task lists to maintenance plans. Finally, the lesson describes how to include the configurable general task lists to maintenance plans.



Lesson Objectives

After completing this lesson, you will be able to:

- Understand the functions and structure of a maintenance plan
- Call up orders
- Assign task lists to maintenance plans
- Include the configurable general task lists in maintenance plans

Business Example

You work as an SAP administrator for the Precision Pumps company. In accordance with the industry standards, the portable fire extinguishers in your company must be inspected every two years. Because the law regulates the inspection, the same activities must be performed each time.

You have been asked to plan the inspections using a maintenance plan with a fixed maintenance cycle, which automatically triggers a suitable task on the date of the inspection. This task should contain all the necessary operations and the relevant planning data. You have to use the internal processing - "Order" call object to generate a maintenance order that contains all the operations to be performed and the required materials. This should ensure that when the task is completed, the technical information and costs can be verified and updated.

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Creating Single-Cycle Maintenance Plans

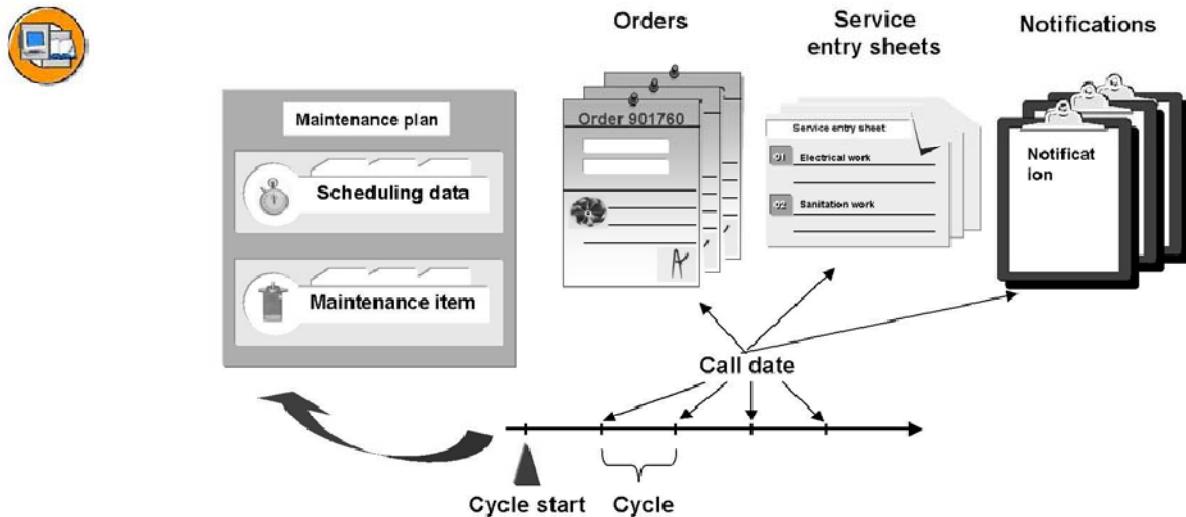


Figure 28: Maintenance Plan: Functions

A maintenance plan is used to generate a **call object** automatically for a particular date.

A call object can be a maintenance order, maintenance notification, or service entry sheet.

The order and notification can also be generated at the same time.

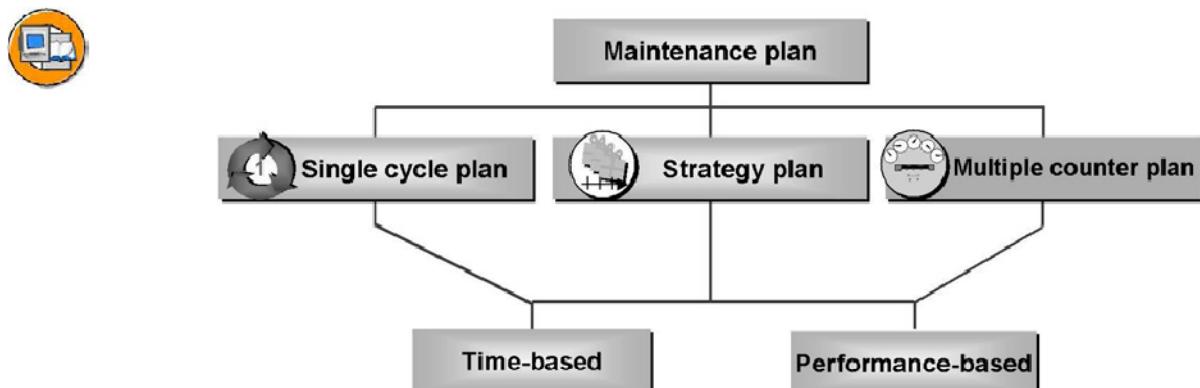


Figure 29: Overview: Maintenance Plans

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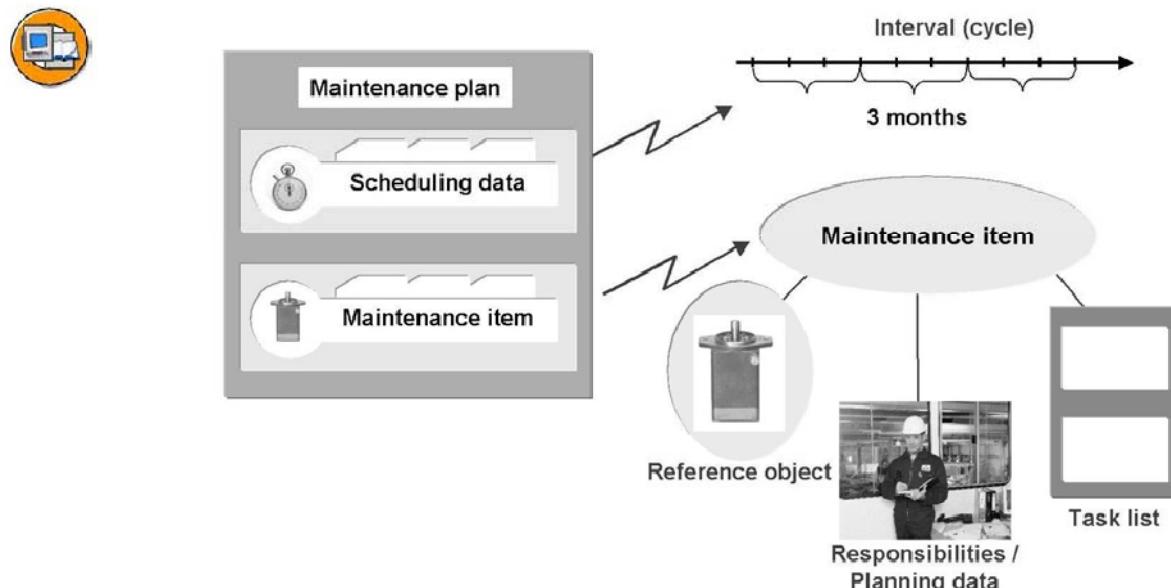


Figure 30: Structure of a Maintenance Plan

The maintenance item contains the following data areas:

- **Planning data:**
 - Maintenance planning plant, maintenance planner group, order type, maintenance activity type, main work center, and business area.
- **Reference object**
- **Task list**

The maintenance interval (cycle) is assigned at the level of the maintenance plan:

- **Interval**
 - Cycle, offset, cycle text

A maintenance plan can consist of several maintenance items. In this case, an order, notification, or service entry sheet is created for each maintenance item.

Example:

In a maintenance plan, the different components of a water pump should be maintained. For example, you could create a maintenance item for the pump itself, another item for the electric motor, and a third for the pump gears. Each maintenance item has its own task list. All the items are a part of the same maintenance plan and, for this reason, have the same times, which means the same scheduling data.

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Figure 31: Single Cycle Plan

A maintenance plan can be entered on one screen that contains all the relevant data:

- Cycle
- Object
- Planning data
- Task list

Calling Up Orders

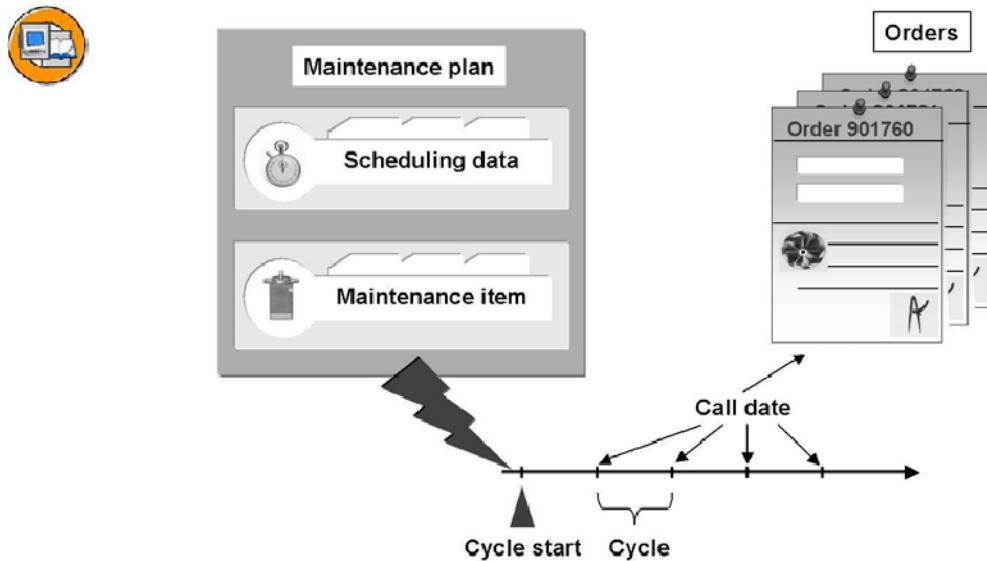


Figure 32: Calling Up Orders

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Maintenance plans can generate maintenance orders automatically.

The **call object, Order**, is selected when the maintenance plan is created using the **category of the maintenance plan**.

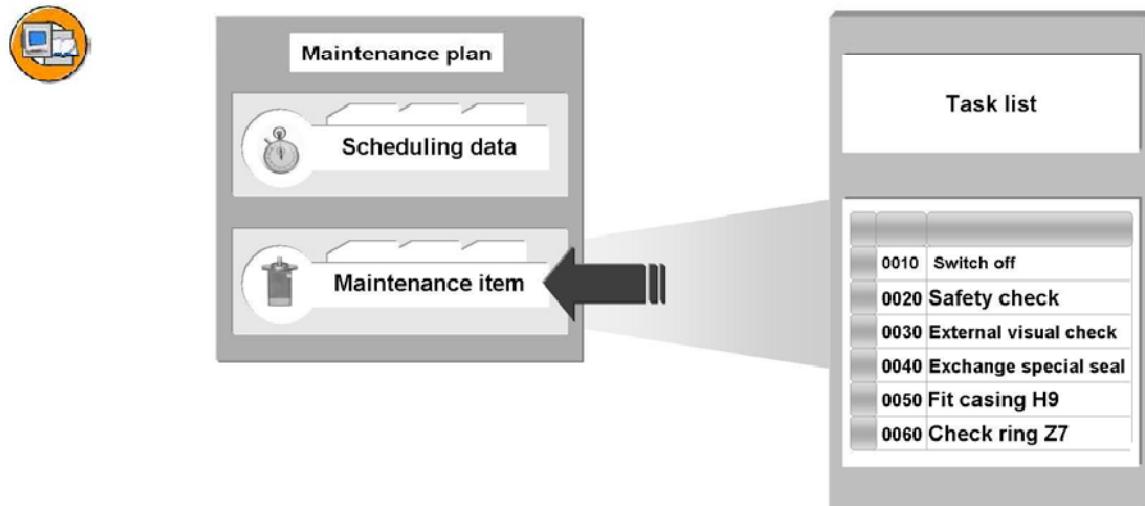


Figure 33: Maintenance Plan with Task List

You can assign a task list in the maintenance item. This task list defines the operations to be executed for the objects specified in the maintenance item.

You also have the option to create new maintenance task lists from the maintenance plan, such as general maintenance task lists, equipment task lists, and functional location task lists.

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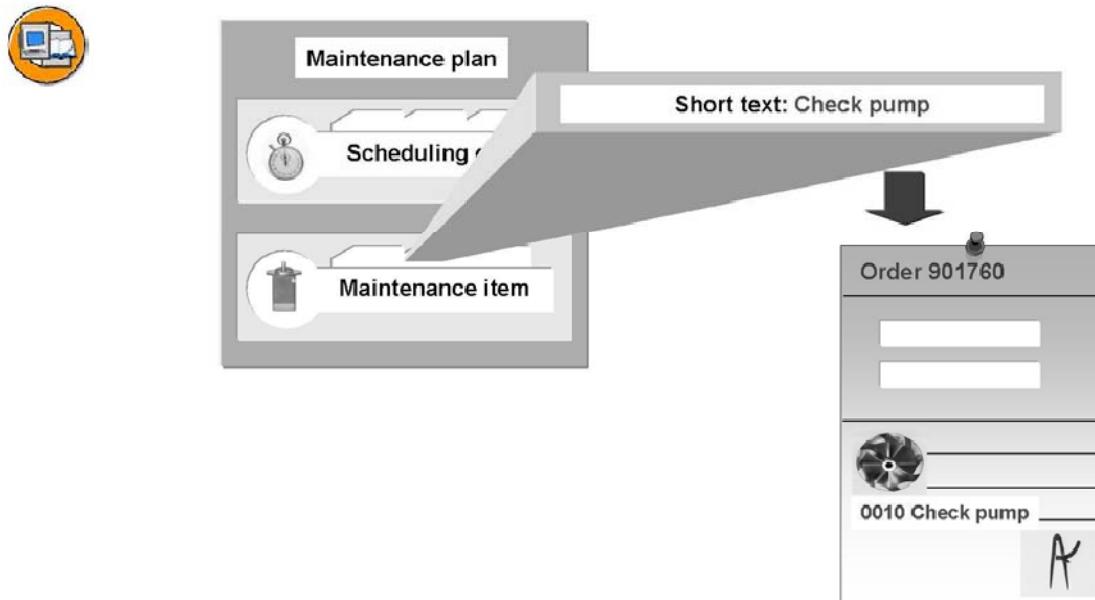


Figure 34: Maintenance Plan Without Task List

If no task list has been entered in the maintenance item for the maintenance plan, the system copies the short text for the maintenance plan into the maintenance order as an operation description.

In this way, short orders can be generated without a task list.

The planner can add additional operations to the maintenance order, if required.

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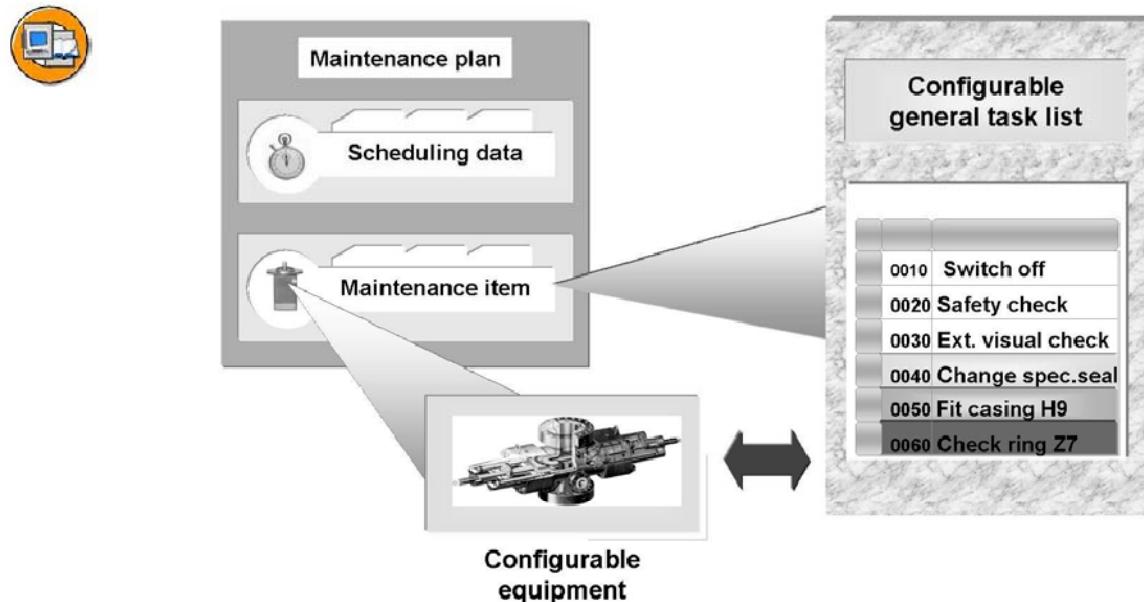


Figure 35: Including Configurable General Task Lists

You can also include the **configurable general maintenance task lists** in the maintenance plan.

A prerequisite for this is a **configurable piece of equipment** as a reference object in the maintenance item.

The configuration profiles of the general maintenance task list and equipment must refer to the same class.

The object dependencies to the items in the equipment BOM and the operations in the general maintenance task list must use the same characteristics.

In the piece of equipment, a value is assigned to the characteristic, such as the category of the water pump = A, in the *Configuration* view. This valuation is then used to select from the general maintenance task list, the operations that have the same object dependencies (category of water pump = A).

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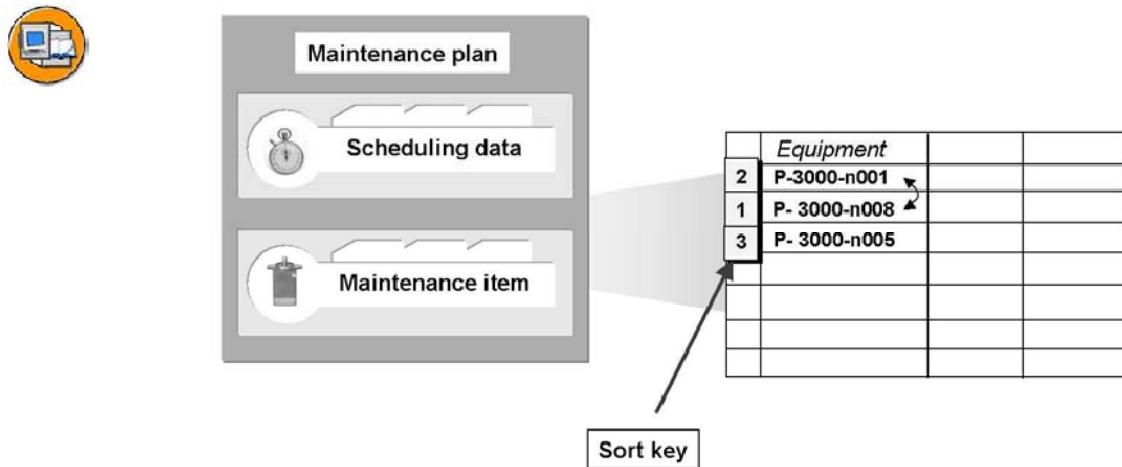


Figure 36: Object List and Sort Field

The object list contains all the objects that require maintenance in this item. You can specify functional locations, pieces of equipment, assemblies, serial numbers, or materials.

You can change the sequence of the table control columns in the object list, as required. The sort field contained in the first column of the table enables you to sort the objects and, as a result, determine the sequence in which the objects are maintained. This enables you to plan an inspection route for the responsible workman. You can use either a numeric or an alphanumeric key to sort the objects.

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Exercise 5: Calling Orders

Exercise Objectives

After completing this exercise, you will be able to:

- Describe the structure of a single-cycle maintenance plan
- Create a single-cycle maintenance plan

Business Example

At IDES, all the maintenance work and inspections to be performed at fixed intervals for the foreseeable future are to be controlled using single-cycle maintenance plans.

All the routine maintenance work is to be covered by the maintenance orders that are generated automatically.

Task:

The pumps for biological cleaning at the clarification plant, ##, are to be maintained at regular intervals.

1. Create a single cycle plan with a three-month interval for the pump, TEQ-##. Use the general maintenance task list, PUMP_WTG (task list group counter: 1), to indicate the work steps.

How do you do this?

What prompt appears when you save the single cycle plan?

Which maintenance plan number does the system assign?

2. Create a second maintenance item for the motor in the pump, TEQ-##.

How do you select the motor?

Which general maintenance task list do you choose?

Continued on next page

Solution 5: Calling Orders

Task:

The pumps for biological cleaning at the clarification plant, ##, are to be maintained at regular intervals.

1. Create a single cycle plan with a three-month interval for the pump, TEQ-##. Use the general maintenance task list, PUMP_WTG (task list group counter: 1), to indicate the work steps.

How do you do this?

What prompt appears when you save the single cycle plan?

Which maintenance plan number does the system assign?

- a) Choose *SAP Menu → Logistics → Plant Maintenance → Preventive Maintenance → Maintenance Planning → Maintenance Plans → Create → Single Cycle Plan*.

Leave the maintenance plan number field blank (this entry is assigned internally but can also be assigned externally).

Maintenance plan category: **Plant maintenance**

Field Name or Data Type	Values
Cycle	3 months
Reference object (equipment)	TEQ-##
Task list – Type	A
Task list - TaskLstGrp	PUMP_WTG
Task list - GrpCr	1

Planning data: This is read from the equipment.

Exception: Order type and maintenance activity type, which are set in Customizing as default values for the maintenance item.

Prompt when saving: Question about the cycle start date; Default value: Today's date

2. Create a second maintenance item for the motor in the pump, TEQ-##.

How do you select the motor?

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Which general maintenance task list do you choose?

- a) Choose *SAP Menu → Logistics → Plant Maintenance → Preventive Maintenance → Maintenance Planning → Maintenance Plans → Change.*

In the maintenance item section, Item tab

Click *Create More Items* (white sheet of paper icon).

Enter the equipment, TEQ-##, as the reference object. Determine the structure of the piece of equipment by double-clicking TEQ-## in the equipment master record. Select *Structure*.

Equipment TEQ-## contains a bill of material in which the motor is defined as the assembly, M-1000.

Use *F3* to return to the maintenance plan.

Enter the assembly, M-1000, as a reference object for the new maintenance item.

General maintenance task list:

- Click the *task list* (binoculars icon).
- Activate the *General task list* check box and enter *motor* in the *Short text* field. For example, the general task list, PUMP_WTG 2.

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Lesson Summary

You should now be able to:

- Understand the functions and structure of a maintenance plan
- Call up orders
- Assign task lists to maintenance plans
- Include the configurable general task lists in maintenance plans

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Lesson: Scheduling Single-Cycle Maintenance Plans

Lesson Overview

This lesson provides an overview to scheduling single-cycle maintenance plans. To begin with, the lesson identifies the scheduling functions and parameters of a single cycle plan. Next, the lesson describes how to assign scheduling parameters in a single cycle plan. Further, the lesson describes how single cycle plans can be monitored. The lesson also explains how to determine the cost of maintenance plans. Finally, the lesson explains how to change the documents in a maintenance plan.



Lesson Objectives

After completing this lesson, you will be able to:

- Identify the scheduling functions and parameters of a single cycle plan
- Assign scheduling parameters in a single cycle plan
- Monitor single cycle plans
- Determine the cost of a maintenance plan
- Change the documents in a maintenance plan

Business Example

You work as an SAP administrator for the Precision Pumps company. In accordance with the industry standards, portable fire extinguishers in your company must be inspected every two years. Because the law regulates this inspection, the same activities must be performed each time. The company wants you to schedule the inspections using the following scheduling tasks: cycle start, call horizon, scheduling period, completion requirement, shift factors, and factory calendar.

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Scheduling Functions and Parameters

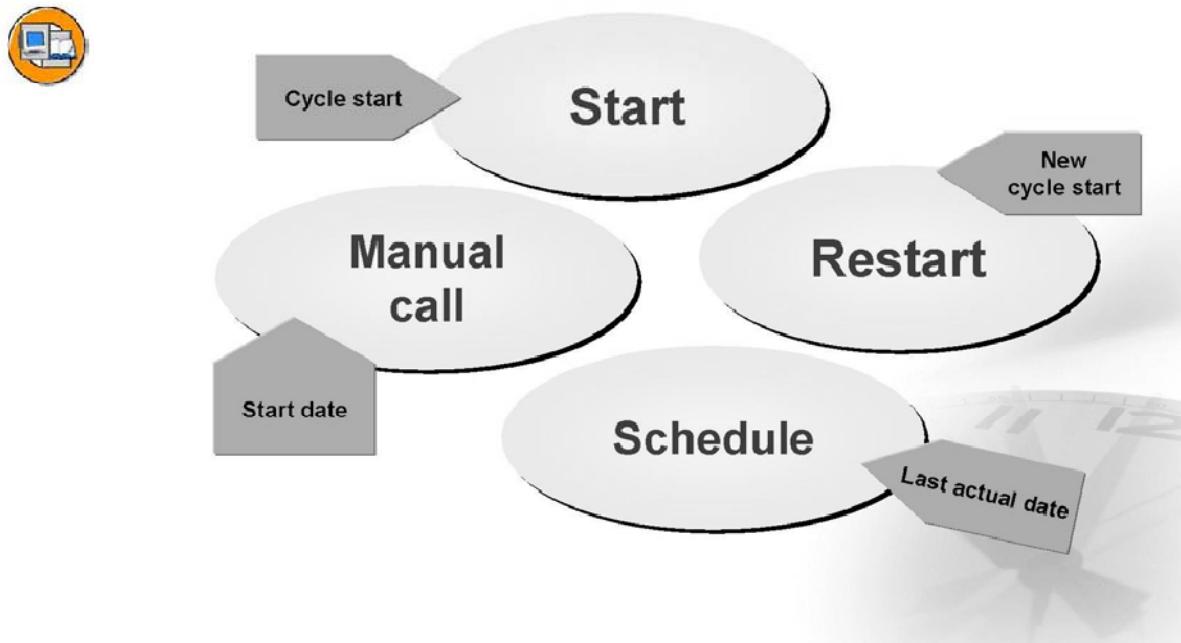


Figure 37: Scheduling Functions - Single Cycle Plan

Start: The maintenance plan is started for the first time. If a start date has already been entered in the scheduling parameters, this is proposed. If no start date has been specified, you must enter this information.

Restart: If you accidentally set the wrong start date at the beginning or if the framework conditions have changed, you can restart the maintenance plan. All the existing waiting planned dates can be deleted. This does not affect the calls that have already been carried out.

Schedule: Calculates new planned dates, call dates, and, if applicable, calls the next maintenance order. Scheduling can be executed manually but is normally performed as deadline monitoring automatically for several maintenance plans using a system job.

Manual call: If you also want to schedule a maintenance plan call for a particular date, you can schedule this manually. You can use a manual call to insert additional dates without making an impact on normal scheduling. To do this, you indicate a new call date.

You can use the **Deactivate** function to block maintenance plans for a certain period of time. The system then sets the status, INAK, in the maintenance plan. This blocks scheduling. Any planned dates still waiting are displayed

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as blocked. You cannot make calls in this status. You can deactivate a maintenance plan in the *Change* and *Scheduling* modes. You can reactivate blocked maintenance plans at any time.

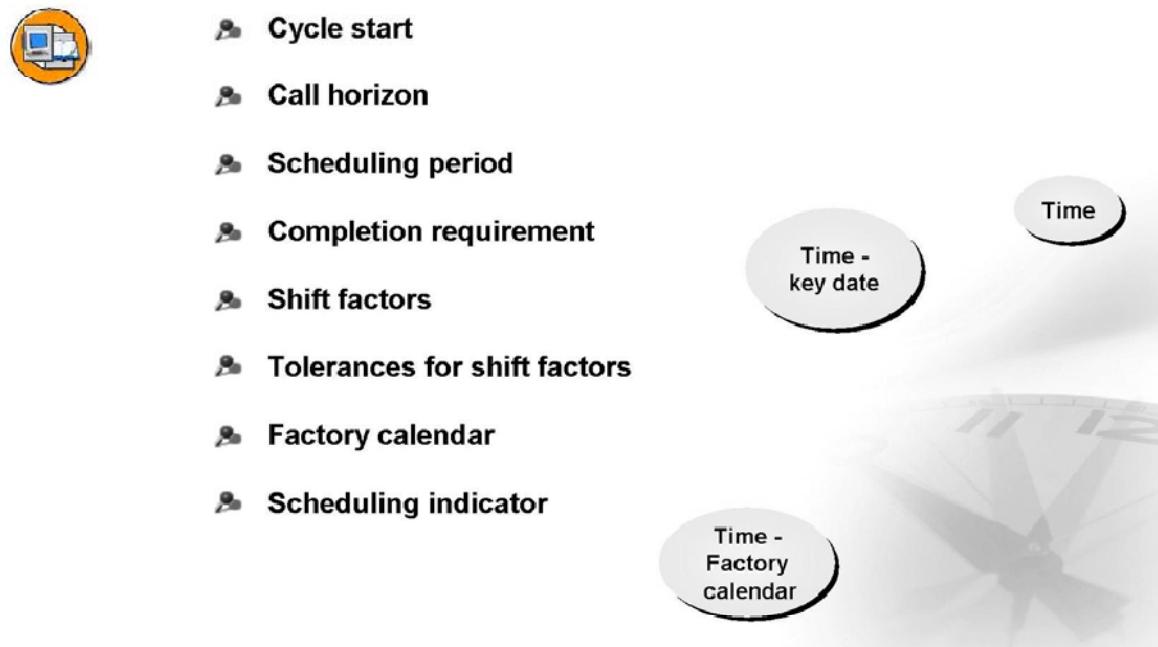


Figure 38: Scheduling Parameters – Single Cycle Plan

Cycle start: Start date to calculate planned and call dates.

Call horizon: Determines when a maintenance call object, such as a maintenance order, is generated for a waiting maintenance call.

Scheduling period: Determines the period of time for which the system generates planned or call dates during scheduling.

Completion requirement: Determines that the next maintenance call object is generated when the previous call object has been completed.

Shift factors: The shift factors for the early/delayed confirmation of a maintenance task define what percentage of the shift should be considered for the next date.

Tolerances for shift factors: The tolerances for early/delayed confirmation define the time period for which the positive or negative differences between actual and planned dates do not affect subsequent scheduling.

Factory calendar: For a single cycle plan, the factory calendar for the planning plant is copied into the scheduling parameters as a default value. It can be changed for each single cycle plan.

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Scheduling indicator: Indicates the type of time-based scheduling involved:

- Time (= based on calendar): The dates are calculated in **calendar days**.
- Time - key-date-based: The dates are always calculated from the cycle start **for the respective key date**.
- Time - factory calendar: The dates are calculated in **workdays**.

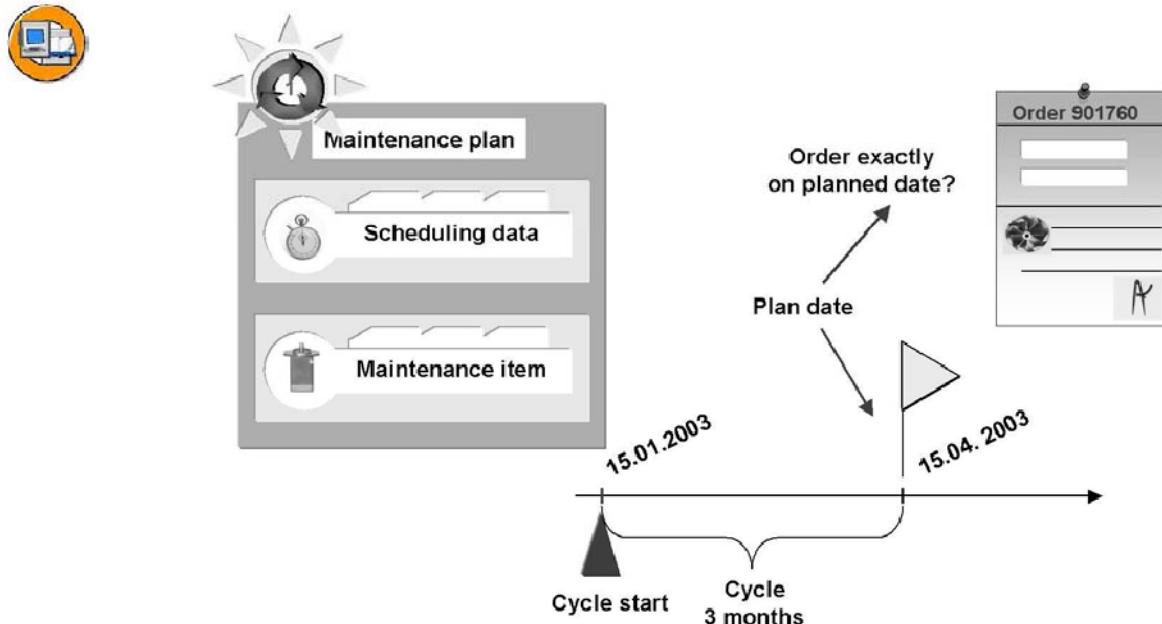


Figure 39: Cycle Start and Planned Date

When you create a single cycle plan, the **cycle** is assigned, indicating the period until each **planned date** (= **due date of the task**). Orders are generated based on the planned date.

The **call date** (= **date the order was created**) is normally before the planned date so that there is a certain preprocessing phase. For example, for material procurement.

The **cycle start** defines the date from which the calculation of the planned dates should begin.

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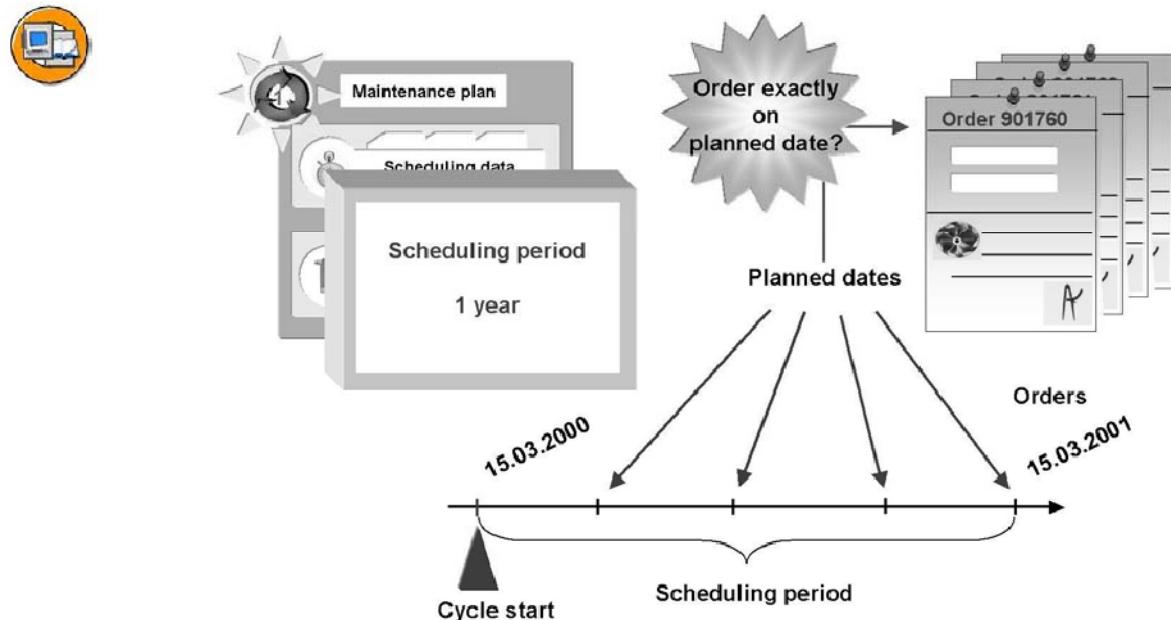


Figure 40: Scheduling Period

The **scheduling period** is one of the **scheduling parameters** in the maintenance plan.

The scheduling period indicates the period for which planned dates should be calculated in advance.

The scheduling period can be used for time- and performance-based preventive maintenance.

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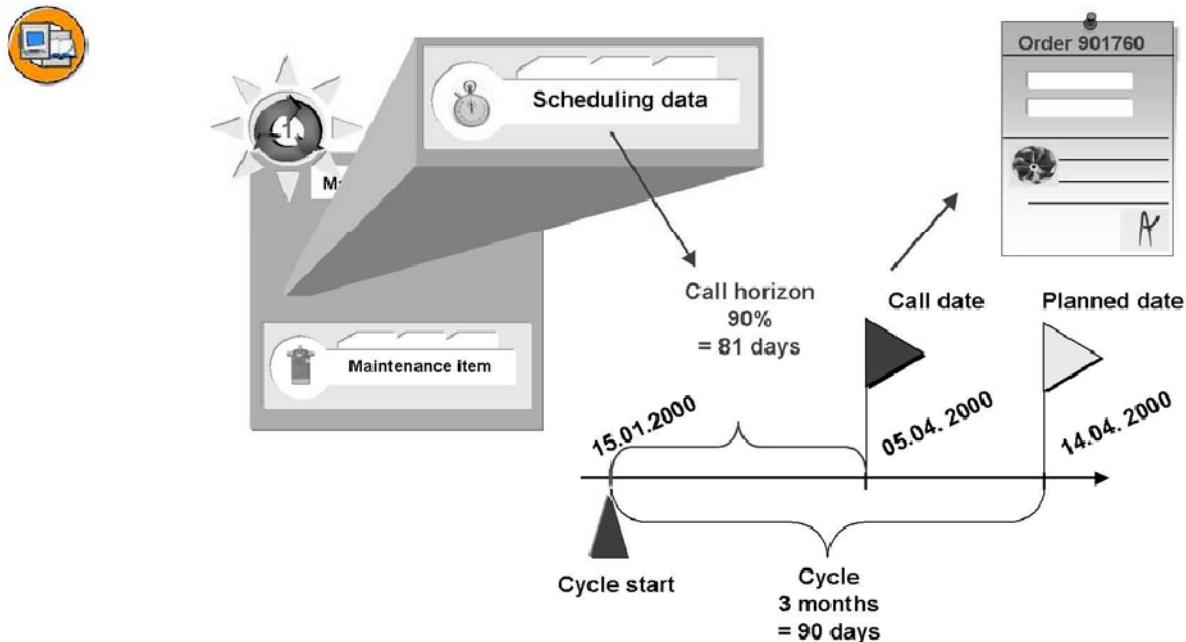


Figure 41: Call Horizon

The **call horizon** scheduling parameter is used to define when the order (notification/service entry sheet) is actually generated compared to the planned date.

This extensive control of order generation enables you to make a preliminary run of planning the order before the planned date. The due maintenance task can, as a result, be performed and completed punctually on the planned date.

The call horizon is specified as a percentage of the cycle: 100% means that the order is generated exactly on the planned date. 0% means that the order is generated when the maintenance plan is started.

For a call horizon of 90% and a cycle of three months (= 90 days), the call - the generation of the order - would, as a result, occur after 81 days (= 90% of 90 days).

→ **Note:** Specifying the call horizon is not sufficient for the order to be generated, the maintenance plan must be scheduled for this.

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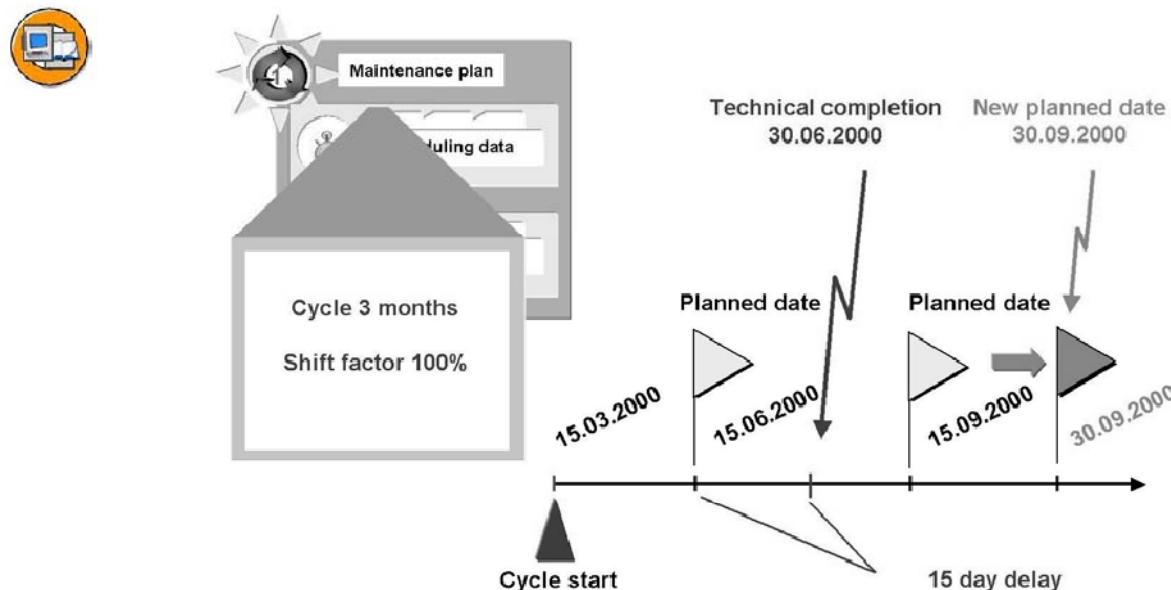


Figure 42: Shift Factor and Completion Requirement

The **shift factor** enables you to react to an early or late completion of a call object. If the shift factor is 100%, the difference (delay/time ahead of schedule) will be added in full to the completion date, to determine the new planned date.

If the **completion requirement** is activated, the system only generates the next call object after the previous call object has been completed.

This activity has the following effects:

The next order is created only after the previous **order** has been **technically completed**. When the order has been completed, two different times can be specified:

- **Reference time** for the maintenance order. This is relevant for the order history.
- **Completion date** for calling the maintenance plan. This is relevant for further scheduling in the maintenance plan.

The next notification is created only after the previous **notification** has been **completed**.

The next service entry sheet is only created only after the previous **service entry sheet** has been **accepted**.

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Monitoring Single-Cycle Maintenance Plans

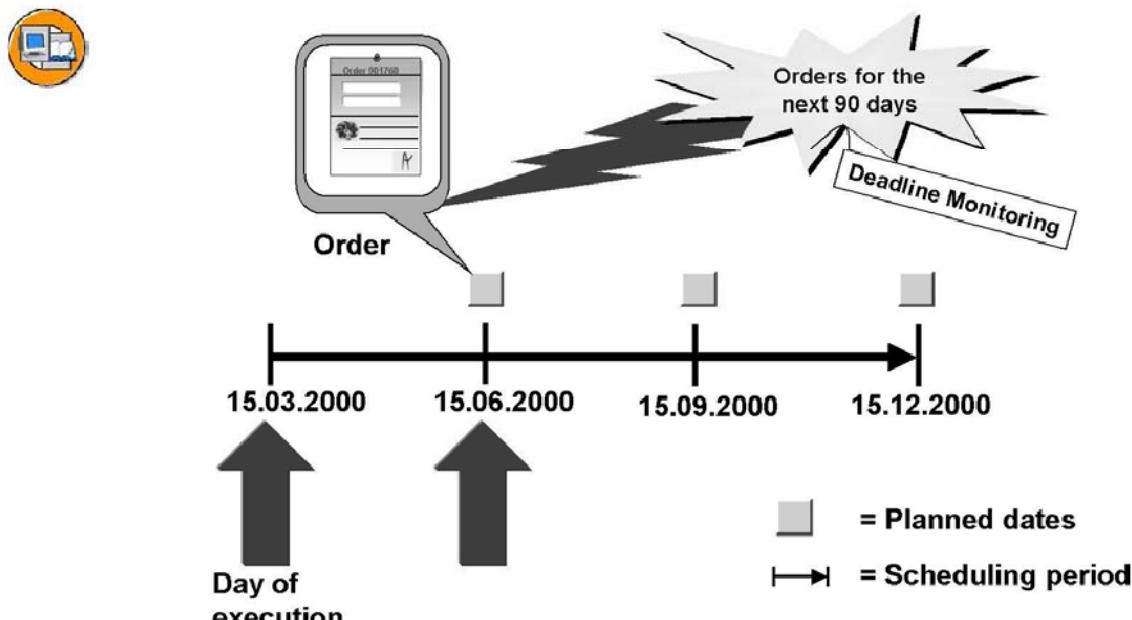


Figure 43: Deadline Monitoring

You can use **deadline monitoring** to monitor maintenance plans regularly. Two functions can be executed here:

Rescheduling: For example, if the scheduling parameters have changed since the last scheduling, deadline monitoring can execute a complete rescheduling. All the existing planned dates are deleted and recalculated.

Calling up orders/notifications/service entry sheets: In addition to rescheduling, waiting planned dates can be converted into orders. In this case, a time period is specified in days. All the planned dates and call dates that lie within this period of time are converted into orders.



Caution: Without deadline monitoring or manual scheduling, the planned dates will not be recalculated and orders will not be generated. The maintenance plan created is, for this reason, not active in itself.

Deadline monitoring is used in close conjunction with the **call horizon**. For example, executing deadline monitoring daily and no entry in the Orders field for the next n days combined with a call horizon of 90% > results in a preliminary run that corresponds exactly to the call horizon.

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If no scheduling period is defined in the maintenance plan, a new planned date is added automatically when the current waiting call is converted into an order.

Deadline monitoring can be executed either in dialog or automatically by a system job.

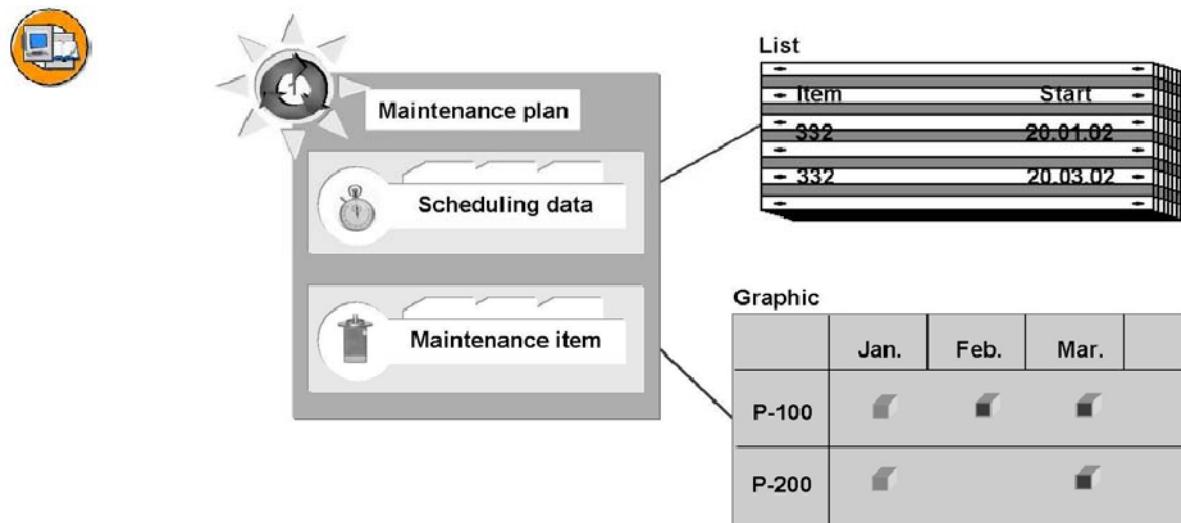


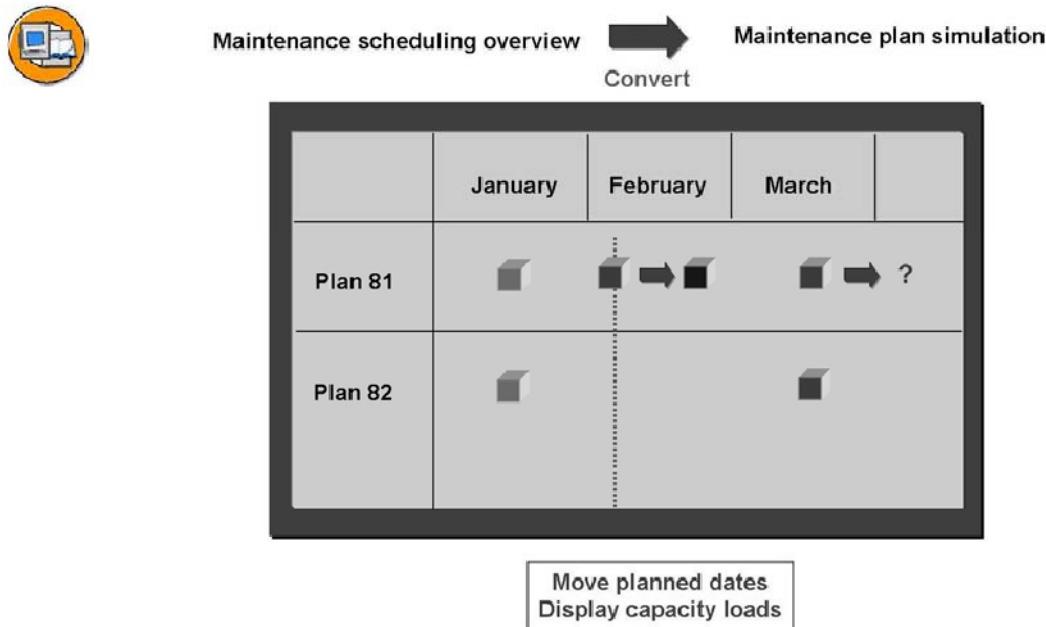
Figure 44: Scheduling Overviews

You can call scheduling overviews as a **list** or **graphic**.

The **list** contains the planned dates and the call dates for each maintenance item.

In the **graphic**, planned dates and call dates are displayed in different colors depending on their status.

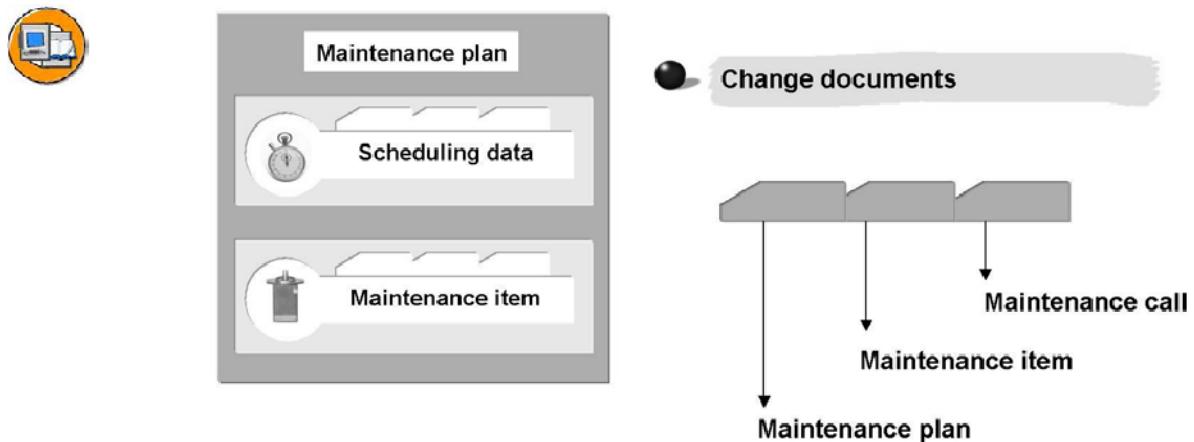
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**Figure 45: Maintenance Plan Simulation**

You can switch from the graphical maintenance scheduling overview to the **maintenance plan simulation**.

Planned dates can be moved using Drag&Drop, either individually or with follow-up dates.

Capacity overviews can still be displayed for the performing work centers.

**Figure 46: Change Documents**

Change documents can be created if the fields are changed in the maintenance plan or the maintenance item, or if the maintenance calls are modified.

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The creation of change documents must be activated in the maintenance plan category, Customizing settings.

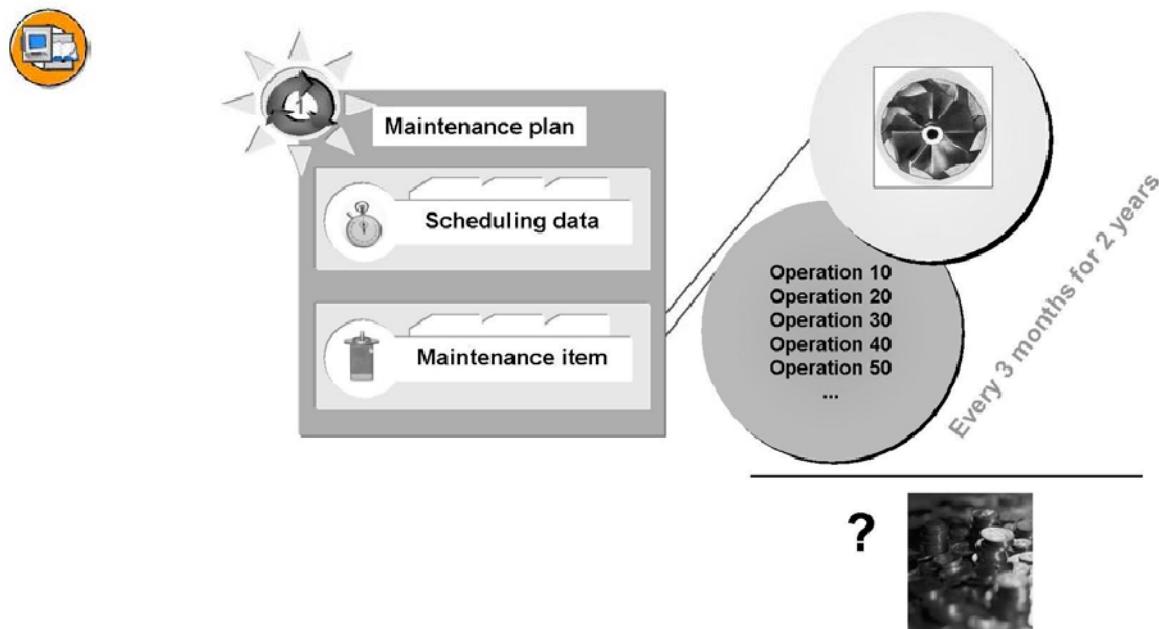


Figure 47: Maintenance Plan Cost Estimate

You can use the maintenance plan cost estimate to determine the costs of maintenance for a specific period.

Object-based cost estimate

In this case, you can determine the maintenance costs for a technical object for a specific period of time. A call occurs after list editing is performed for maintenance items only in the change mode.

General cost estimate

This allows you to calculate the maintenance costs for one or more maintenance plans.

In both cases, the active maintenance dates (waiting planned dates, calls - skipped dates are not considered) during the period in question are used for the cost estimate. If the period specified extends past the last active date, the system simulates the relevant dates.

Values are assigned to work time and material using the rates and prices valid **when the cost estimate is made**. Different rates, such as for internal service, for future posting periods are not considered.

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Exercise 6: Scheduling

Exercise Objectives

After completing this exercise, you will be able to:

- Describe the individual scheduling parameters
- Start/schedule a maintenance plan

Business Example

Scheduling starts maintenance plans. Through repeated scheduling, planned dates are recalculated and orders called.

Deadline monitoring is the key tool in this context.

Task:

1. Set up the following scheduling parameters in your maintenance plan:

Shift factor for late completion	0
Shift factor for early completion	0
Cycle modification factor	1
Call horizon	0
Scheduling period	1 year
Start of cycle	Today's date
Completion requirement	<input checked="" type="checkbox"/>
Scheduling indicator	Time-factory calendar

2. What effects do the parameters for call horizon, scheduling period, and completion requirement have?
3. Start the maintenance plan using these scheduling parameters. What options are available?
4. How must the parameters be configured so that the call date, which means the date the order is generated, falls exactly on the planned date?
5. How many orders are generated for this maintenance plan after three months have expired? Display the orders.

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6. How has the situation changed after six months?



Hint: After the maintenance plan has been started, the cycle start date is not displayed in the scheduling parameters.

Continued on next page

Solution 6: Scheduling

Task:

- Set up the following scheduling parameters in your maintenance plan:

Shift factor for late completion	0
Shift factor for early completion	0
Cycle modification factor	1
Call horizon	0
Scheduling period	1 year
Start of cycle	Today's date
Completion requirement	<input checked="" type="checkbox"/>
Scheduling indicator	Time-factory calendar

- Choose SAP Menu → Logistics → Plant Maintenance → Preventive Maintenance → Maintenance Planning → Maintenance Plans → Change. Go to the *Maintenance plan scheduling parameters* tab and enter parameters.

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2. What effects do the parameters for call horizon, scheduling period, and completion requirement have?

- a) **Call horizon:**

Determines when the order is generated based on the calculated planned date.

0% = Order immediately at start of maintenance plan.

100% = Order exactly on planned date.

All levels in between are possible.

Scheduling period:

The period of time for which the planned dates will be calculated.

Completion requirement:

If a maintenance order has been called, this must be technically completed, before the follow-up order can be generated. This prevents a second order from being called up if the processing of the first order is delayed.

3. Start the maintenance plan using these scheduling parameters. What options are available?

- a) **First option:**

Choose *SAP Menu → Logistics → Plant Maintenance → Preventive Maintenance → Maintenance Planning → Scheduling for Maintenance Plans → Schedule*.

Choose *Edit → Start*.

Second option:

Choose *SAP Menu → Logistics → Plant Maintenance → Preventive Maintenance → Maintenance Planning → Scheduling for Maintenance Plans → Deadline Monitoring*.

Prerequisite:

You have already entered a cycle start in the maintenance plan.

Selection of maintenance plans using maintenance plan number, maintenance plan category, or sort field.



Note: The Rescheduling incl. and Immediate start for all the indicators must be selected.

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4. How must the parameters be configured so that the call date, which means the date the order is generated, falls exactly on the planned date?
 - a) The call horizon must be set to 100%.
5. How many orders are generated for this maintenance plan after three months have expired? Display the orders.
 - a) One order is always generated for each maintenance item. As a result, two orders are generated for the current maintenance plan.

The orders can be displayed in two ways:

 - In the display/change mode on the *Maintenance plan schedule calls* tab.
 - In the scheduling mode on the *Scheduled calls* tab.
6. How has the situation changed after six months?



Hint: After the maintenance plan has been started, the cycle start date is not displayed in the scheduling parameters.

- a) If the maintenance plan is not amended further, there is no action after six months, in other words, when the second order is due.

The maintenance plan must be scheduled so that orders are generated. To this end, **deadline monitoring** is to be executed automatically at regular intervals (system job).

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Exercise 7: Optional Exercises for Calling Orders

Exercise Objectives

After completing this exercise, you will be able to:

- Create maintenance plans with an object list
- Create maintenance plans without a task list

Business Example

At IDES, all the maintenance work and inspections to be performed at fixed intervals for the foreseeable future are to be controlled using single-cycle maintenance plans.

All routine maintenance work is to be covered by maintenance orders that are generated automatically.

Task:

All the biological cleaning pumps at the clarification plant, K1, are to be maintained at three-month intervals.

1. Create a new single cycle plan with an object list and a suitable task list for the biological cleaning pumps.

Which reference object do you choose for the maintenance item?

How do you select the pumps?

How do you select the task list?

Which task list have you included?

What maintenance plan number does the system assign?

2. Use the object list sort function to define the sequence in which work is to be carried out on the pumps, inspection round planning.

The inspection round is to be performed in the following order:

Stop 1	P-1000-N999
Stop 2	P-1000-N006
Stop 3	P-1000-N005

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Stop 4	P-1000-N003
Stop 5	P-1000-N004
Stop 6	P-1000-N002
Stop 7	P-1000-N007
Stop 8	P-1000-N001

Which steps must you carry out?

Make sure that all the operations for your task list in the most recent maintenance order have been performed eight times. How can you do this?

3. For the above maintenance plan, define the same parameters as in the previous exercise and start the plan. How do you do this?

What options do you have to start the maintenance plan?

Display the maintenance order and check the object and operation lists for the order.

4. Create a maintenance plan to control the biological cleaning valves in the pump station in the clarification plant, ##, which are represented as functional locations. Cleaning is to be carried out every six months. This plan is to generate "short orders" which means the orders that do not use a task list.

How do you enter the work to be carried out?

Which reference object do you choose?

How do you make a reference to the valves in the maintenance plan?

Which valves are affected?

Enter the current date as the cycle start and calculate the planned dates for two years. How do you do this?

What maintenance plan number does the system assign?

Start the maintenance plan and check the calls. How do you do this?

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Solution 7: Optional Exercises for Calling Orders

Task:

All the biological cleaning pumps at the clarification plant, K1, are to be maintained at three-month intervals.

1. Create a new single cycle plan with an object list and a suitable task list for the biological cleaning pumps.

Which reference object do you choose for the maintenance item?

How do you select the pumps?

How do you select the task list?

Which task list have you included?

What maintenance plan number does the system assign?

- a) Choose *SAP Menu → Logistics → Plant Maintenance → Preventive Maintenance → Maintenance Planning → Maintenance Plans → Create → Single Cycle Plan*.

Field Name or Data Type	Values
Reference object	K1-B (functional location)
Task list	For example, PUMP_WTG 1

To create the object list:

On the *Object list item* tab, choose *Equipment selection*.

Selection criteria:

Functional location: **K1-B***

Description of object: **Multiple selection**

Individual values (green): ***pump***

Individual values (red): ***mot*** (All motors are excluded)

Make a selection, choose *Select all*, and confirm.

All the pumps for biological cleaning are copied into the object list.

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2. Use the object list sort function to define the sequence in which work is to be carried out on the pumps, inspection round planning.

The inspection round is to be performed in the following order:

Stop 1	P-1000-N999
Stop 2	P-1000-N006
Stop 3	P-1000-N005
Stop 4	P-1000-N003
Stop 5	P-1000-N004
Stop 6	P-1000-N002
Stop 7	P-1000-N007
Stop 8	P-1000-N001

Which steps must you carry out?

Make sure that all the operations for your task list in the most recent maintenance order have been performed eight times. How can you do this?

- a) Inspection round planning using the sort field:

For example, enter the numerical keys, **0001** to **0008**, in the appropriate sequence in the *Sort* column of the object list and choose *Sort*.

3. For the above maintenance plan, define the same parameters as in the previous exercise and start the plan. How do you do this?

What options do you have to start the maintenance plan?

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Display the maintenance order and check the object and operation lists for the order.

a) **First option (individual):**

Choose SAP Menu → Logistics → Plant Maintenance → Preventive Maintenance → Maintenance Planning → Scheduling for Maintenance Plans → Schedule.

Choose Edit → Start.

Second option (multiple):

Choose SAP Menu → Logistics → Plant Maintenance → Preventive Maintenance → Maintenance Planning → Scheduling for Maintenance Plans → Deadline Monitoring.

4. Create a maintenance plan to control the biological cleaning valves in the pump station in the clarification plant, ##, which are represented as functional locations. Cleaning is to be carried out every six months. This plan is to generate "short orders" which means the orders that do not use a task list.

How do you enter the work to be carried out?

Which reference object do you choose?

How do you make a reference to the valves in the maintenance plan?
Which valves are affected?

Enter the current date as the cycle start and calculate the planned dates for two years. How do you do this?

What maintenance plan number does the system assign?

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Start the maintenance plan and check the calls. How do you do this?

- a) Choose *SAP Menu → Logistics → Plant Maintenance → Preventive Maintenance → Maintenance Planning → Maintenance Plans → Create → Single Cycle Plan.*

Leave the maintenance plan number field blank (this entry is assigned internally but can also be assigned externally).

Maintenance plan category: **Plant maintenance**

Field Name or Data Type	Values
Work to be performed	Description of maintenance item - Copied as default operation for the order
Reference object	##-B01
Entry of valves	Object list item tab Functional location: ##-B01* FunctLocation description: Vent*
Selection criteria	
Start of cycle	Today's date
Scheduling period	Twice yearly

Choose *SAP Menu → Logistics → Plant Maintenance → Preventive Maintenance → Maintenance Planning → Scheduling for Maintenance Plans → Schedule.*

Choose *Edit → Start.*

Save. Open the maintenance plan again (scheduling mode), select the first line (if this contains a call), and click *Display call object* (glasses icon).

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Lesson Summary

You should now be able to:

- Identify the scheduling functions and parameters of a single cycle plan
- Assign scheduling parameters in a single cycle plan
- Monitor single cycle plans
- Determine the cost of a maintenance plan
- Change the documents in a maintenance plan

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Lesson: Handling Notifications Through Maintenance Plans

Lesson Overview

This lesson describes how to call up notifications in a maintenance plan. It also explains how to determine the automatic tasks for maintenance plans.



Lesson Objectives

After completing this lesson, you will be able to:

- Call up the notifications in a maintenance plan
- Determine the automatic tasks for maintenance plans

Business Example

You work as an SAP administrator for the Precision Pumps company. In accordance with the industry standards, the portable fire extinguishers in your company must be inspected every two years. Because the law regulates this inspection, exactly the same activities must be performed each time.

You have been asked to plan the inspections using a maintenance plan with a fixed maintenance cycle, which automatically triggers a suitable task on the date of the inspection. This task should contain all the necessary operations and the relevant planning data. You have to use the Internal processing - "Notification" call object because only some inspections result in a repair task and you have to ensure that a request (notification) can be generated for the maintenance plan instead of an order. This request can be converted into an order, if required. If no repairs are carried out, the costs of the inspection need not be tracked.

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Calling Up Notifications

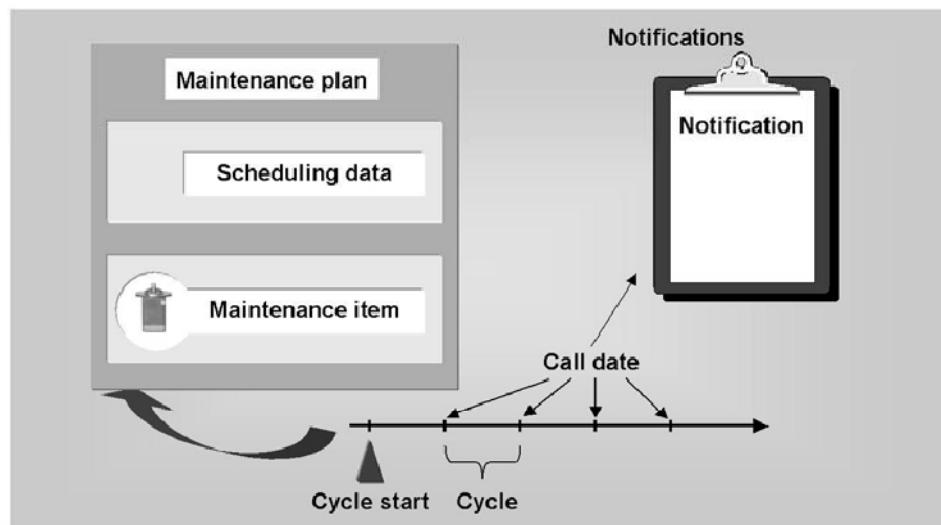


Figure 48: Calling Notifications

Maintenance plans can generate maintenance notifications automatically. This is often the case if the maintenance task initially consists of only a brief routine inspection that does not necessitate an order. Here, you could use a maintenance request.

If the check identifies any potential damage or a malfunction, an order can be created based on the request.

The **call object**, **Notification**, is selected when the maintenance plan is created using the **category of the maintenance plan**.

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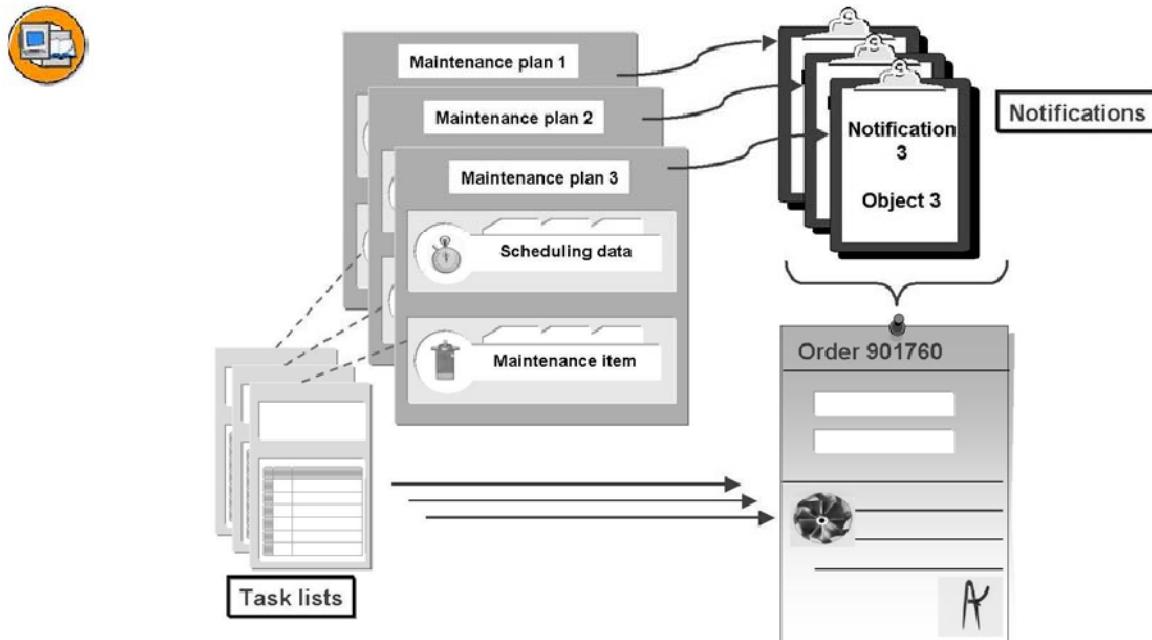


Figure 49: Worklist for Call Object Notification

If the maintenance of a technical system, which consists of the system parts with different maintenance cycles, should be processed within an order, this can be performed using a worklist of requests (notifications).

The individual maintenance plans generate the maintenance requests for the respective part of the system. At the time, X, all the requests for the technical system are collected and converted into an order. The task lists from the relevant maintenance item are then copied to the order.

The object, for which the task should be performed, is clear for each operation in the order.

The reference object for the order is normally the superior technical system, such as the functional location to which the order costs are settled.

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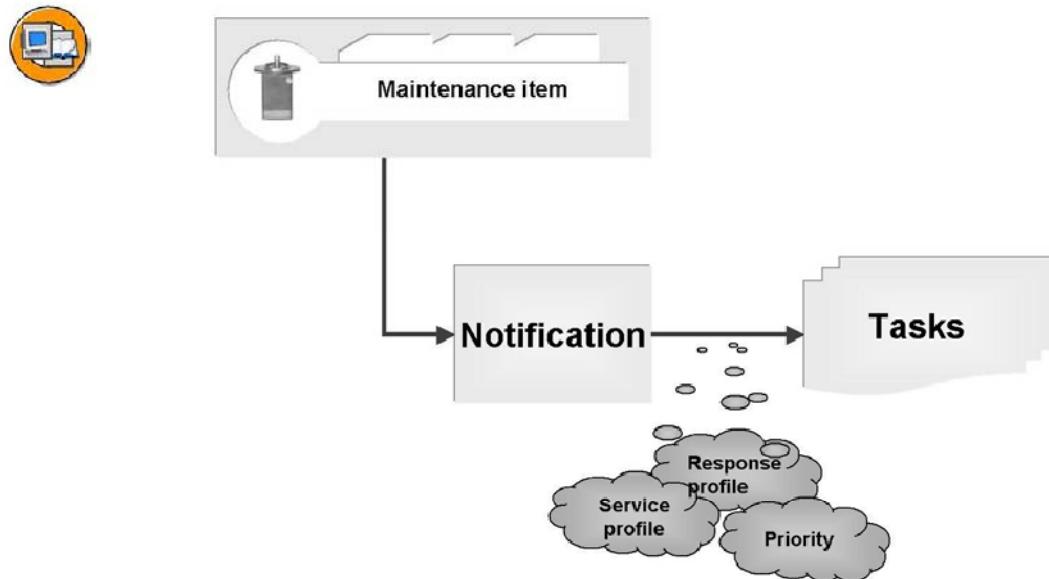


Figure 50: Automatic Tasks

Automatic determination of tasks:

- You can trigger automatic task determination for the maintenance plans that generate a notification as a call object.
- If a notification is generated, the system uses the **response profile**, **service profile**, and **priority** to determine at which times, and over which time period, certain tasks must be performed for this notification.
- **Example:**

Maintenance requests should first be generated for the routine inspection of the water pumps for biological cleaning at the clarification plant because often the work required is minimal with negligible costs, and, for this reason, not processed using an order. Depending on the notification type, the steps to be executed can be defined automatically as tasks in the maintenance request.

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Exercise 8: Calling Notifications

Exercise Objectives

After completing this exercise, you will be able to:

- Create a single cycle plan with the Notification call object

Business Example

Where experience shows that inspections do not necessarily result in a maintenance order, maintenance requests are to be generated from the maintenance plan. These requests can be converted into an order, if required.

Task 1:

For the brief inspection of the functional location, ##-B02-2A (inlet), a maintenance request is to be generated at six-month intervals. This request is to be converted into an order only if the inspection determines that the location is damaged or malfunctioning.

1. How do you create the maintenance plan?

Which notification type do you enter?

Enter today's date as the cycle start and calculate the planned dates for two years. How do you do this?



Hint: You can enter the cycle start on the *Scheduling parameters* tab when creating the maintenance plan.

If you do not enter a cycle start, a prompt appears when you save the maintenance plan.

What maintenance plan number does the system assign?

Start the maintenance plan and check the calls. How do you do this?

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Task 2:

Complete the maintenance tasks for pumps and pump motors in the pump section, 1, of the biological cleaning, K1-B, using as few orders as possible.

Group the requests generated by different maintenance plans that are available at a certain time into one order.

1. Create a single cycle plan for the pump, P-1000-N0001, with the following data:

Maintenance plan category	Notification
Cycle	6 months
Reference object (equipment)	P-1000-N001
Notification type	M1
Maintenance planner group	I##
Task list	PUMP_WTG 1
Call horizon	0
Scheduling period	1 year
Start of cycle	Today's date

2. Create a single cycle plan for the pump motor, M-1000-N051, with the following data:

Maintenance plan category	Notification
Cycle	5 months
Reference object (equipment)	M-1000-N051
Notification type	M1
Maintenance planner group	I##
Task list	PUMP_WTG 2
Call horizon	0
Scheduling period	1 year
Start of cycle	Today's date

3. Start both the maintenance plans. How do you do this?

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Check the notification date and the required start date for the two notifications created. What are the relevant dates?

4. Maintenance is to be carried out for the pumps and motors in the pump section, 1, of the biological cleaning, K1-B.

Select all the requests created for your planner group in the pump section, 1, and assign them to a new order.

How do you do this?

Which reference object appears by default in the order? Do you need to change this?

Which entries appear in the operation list for the order?

How are the work steps assigned to the object?

Continued on next page

Solution 8: Calling Notifications

Task 1:

For the brief inspection of the functional location, ##-B02-2A (inlet), a maintenance request is to be generated at six-month intervals. This request is to be converted into an order only if the inspection determines that the location is damaged or malfunctioning.

1. How do you create the maintenance plan?

Which notification type do you enter?

Enter today's date as the cycle start and calculate the planned dates for two years. How do you do this?



Hint: You can enter the cycle start on the *Scheduling parameters* tab when creating the maintenance plan.

If you do not enter a cycle start, a prompt appears when you save the maintenance plan.

What maintenance plan number does the system assign?

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Start the maintenance plan and check the calls. How do you do this?

- Choose SAP Menu → Logistics → Plant Maintenance → Preventive Maintenance → Maintenance Planning → Maintenance Plans → Create → Single Cycle Plan.

Leave the maintenance plan number field blank (this entry is assigned internally but can also be assigned externally).

Field Name or Data Type	Values
Maintenance plan category	Notification
Notification type	M1
Start of cycle start	Today's date
Scheduling period	Twice yearly

Choose SAP Menu → Logistics → Plant Maintenance → Preventive Maintenance → Maintenance Planning → Scheduling for Maintenance Plans → Schedule.

Choose Edit → Start.

Save. Open the maintenance plan again (scheduling mode), select the first line (if this contains a call), and click *Display call object* (glasses icon).

Task 2:

Complete the maintenance tasks for pumps and pump motors in the pump section, 1, of the biological clearing, K1-B, using as few orders as possible.

Group the requests generated by different maintenance plans that are available at a certain time into one order.

- Create a single cycle plan for the pump, P-1000-N0001, with the following data:

Maintenance plan category	Notification
Cycle	6 months
Reference object (equipment)	P-1000-N001
Notification type	M1
Maintenance planner group	I##

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Task list	PUMP_WTG 1
Call horizon	0
Scheduling period	1 year
Start of cycle	Today's date

- a) Choose *SAP Menu → Logistics → Plant Maintenance → Preventive Maintenance → Maintenance Planning → Maintenance Plans → Create → Single Cycle Plan.*
- Enter the parameters specified. Save your entries.
2. Create a single cycle plan for the pump motor, M-1000-N051, with the following data:

Maintenance plan category	Notification
Cycle	5 months
Reference object (equipment)	M-1000-N051
Notification type	M1
Maintenance planner group	I##
Task list	PUMP_WTG 2
Call horizon	0
Scheduling period	1 year
Start of cycle	Today's date

- a) Choose *SAP Menu → Logistics → Plant Maintenance → Preventive Maintenance → Maintenance Planning → Maintenance Plans → Create → Single Cycle Plan.*
- Enter the parameters specified. Save your entries.
3. Start both the maintenance plans. How do you do this?

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Check the notification date and the required start date for the two notifications created. What are the relevant dates?

- a) Choose *SAP Menu → Logistics → Plant Maintenance → Preventive Maintenance → Maintenance Planning → Scheduling for Maintenance Plans → Deadline Monitoring*.

Field Name or Data Type	Values
Maintenance Plan	Enter maintenance plan numbers
Call objects for n days	0
Rescheduling incl. Rescheduling	<input checked="" type="checkbox"/>
Immediate start for all	<input checked="" type="checkbox"/>

Choose *SAP Menu → Logistics → Plant Maintenance → Preventive Maintenance → Maintenance Planning → Maintenance Plans → Display or Change*.

Select the *Maintenance plan scheduled calls* tab.

Field Name or Data Type	Values
Notification date	Today's date
Required start date	Today's date + 180 or 150 days

4. Maintenance is to be carried out for the pumps and motors in the pump section, 1, of the biological cleaning, K1-B.

Select all the requests created for your planner group in the pump section, 1, and assign them to a new order.

How do you do this?

Which reference object appears by default in the order? Do you need to change this?

Which entries appear in the operation list for the order?

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How are the work steps assigned to the object?

- a) Choose *SAP Menu → Logistics → Plant Maintenance → Maintenance Processing → Notification → List Editing → Change.*

Field Name or Data Type	Values
Selection criteria: Notification status	Outstanding
Notification type	M1
Maintenance planner group	I##
Functional location	K1-B*

Select notifications and choose *Create order*.

Field Name or Data Type	Values
Notification date	Today's date
Created by	PLM310-##
Reference object	Reference object of first notification
Retain reference object?	Possible in this case because both the objects form an equipment hierarchy. In the case of several independent objects, the next highest functional location should be made the reference object.
Operation list for order	Consists of the two task lists from the maintenance items in the maintenance plans.
Assignment of work step - object	Equipment column in table control for operation list

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Lesson Summary

You should now be able to:

- Call up the notifications in a maintenance plan
- Determine the automatic tasks for maintenance plans

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Lesson: Handling External Services Through Maintenance Plans

Lesson Overview

This lesson describes the process of procurement of maintenance plan-based external services. To begin with, the lesson lists the steps for maintenance plan-based service procurement. In addition, it explains how to call the external services in maintenance plans. Finally, it examines how to make the customizing settings in maintenance plans.



Lesson Objectives

After completing this lesson, you will be able to:

- List the steps for maintenance plan-based service procurement
- Call the external services in maintenance plans
- Make the customizing settings in maintenance plans

Business Example

You work as an SAP administrator for the Precision Pumps company. In accordance with the industry standards, portable fire extinguishers in your company must be inspected every two years. Because the law regulates this inspection, the same activities must be performed each time.

You have been asked to plan the inspections using a maintenance plan with a fixed maintenance cycle, which automatically triggers a suitable task on the date of the inspection. This task should contain all the necessary operations and the relevant planning data. Because the inspection is to be carried out by an external company with which a framework agreement has been concluded, you have to use the External processing - "Service entry sheet call" object. The sold-to-party can use the maintenance plan to obtain an exact overview of the due dates. The maintenance plan should generate service entry sheets. These can be made available to the service provider to record the services provided.

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Calling Up External Services

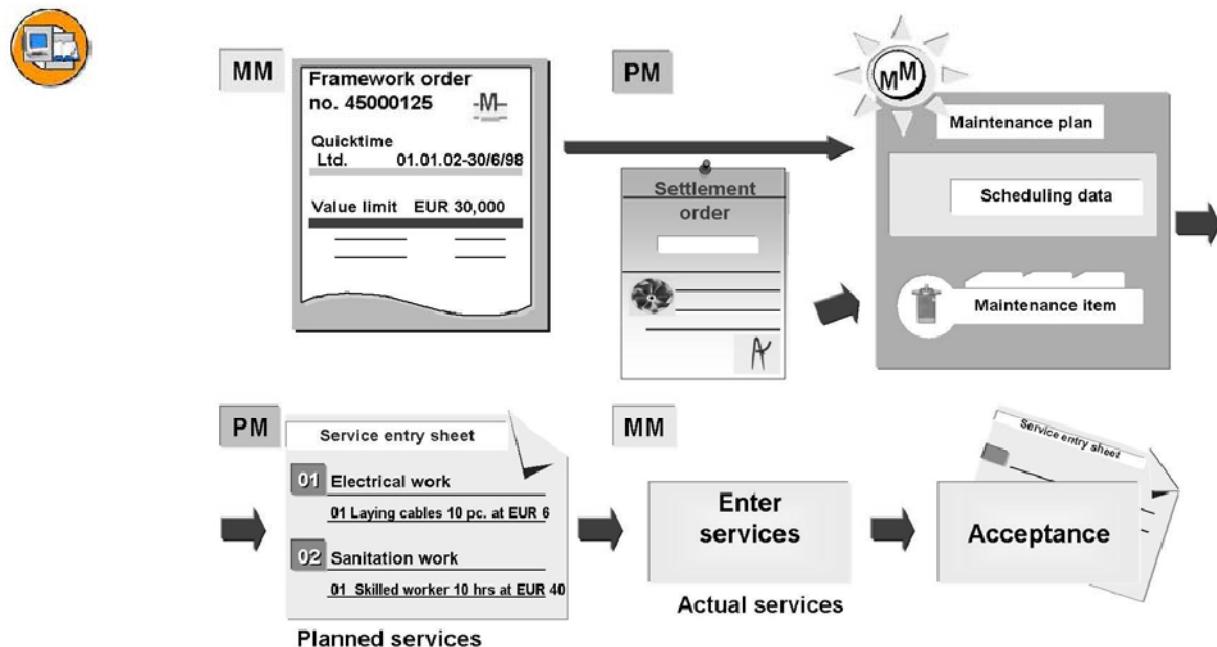


Figure 51: Process for Maintenance Plan-Based Service Procurement

Sequence of steps for maintenance plan-based service procurement:

1. Create a framework order (MM).
2. Create a settlement order (PM).
3. Create a maintenance plan and enter the required services (PM).
4. Generate a service entry sheet (schedule maintenance plan) (PM).
5. Enter services (MM).
6. Accept the service entry sheet (MM).

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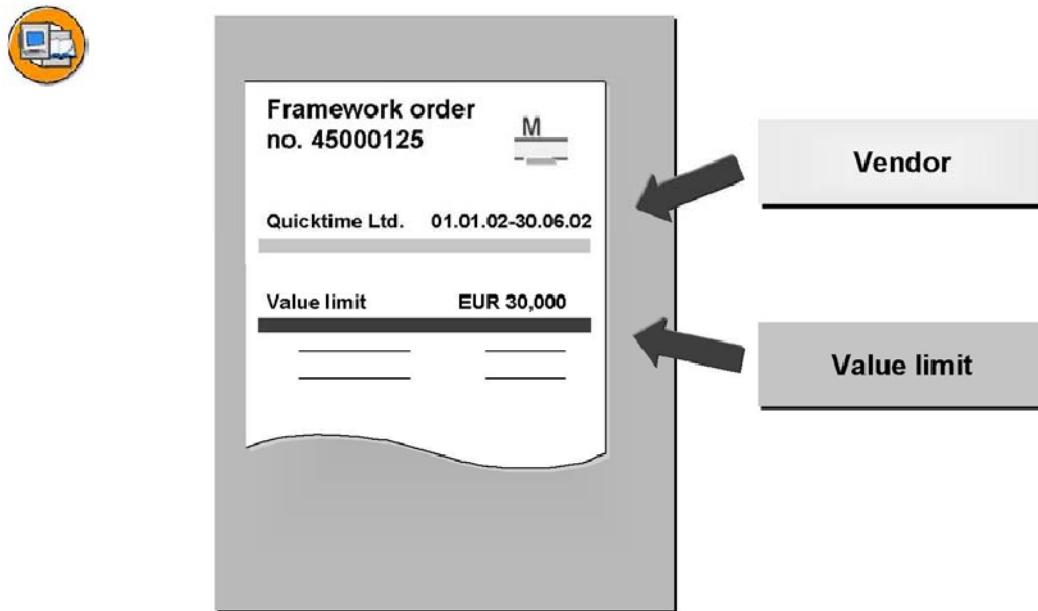


Figure 52: Creating a Framework Order, (MM)

1. Create framework order.

A framework order, category: FO, must first be created in Materials Management (Purchasing). The **vendor** and a **value limit** are entered.

→ **Note:** Entries are not required for the service specifications.

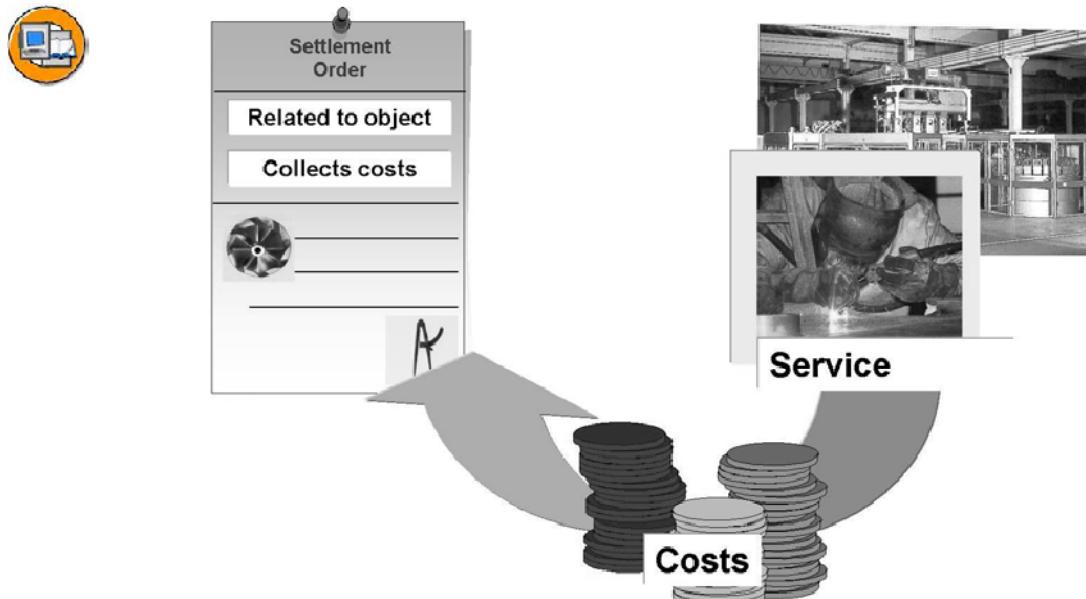


Figure 53: Creating a Settlement Order (PM)

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2. Creating a settlement order.

In Plant Maintenance, an order is created with reference to an object. This order is used as a settlement order and collects costs.

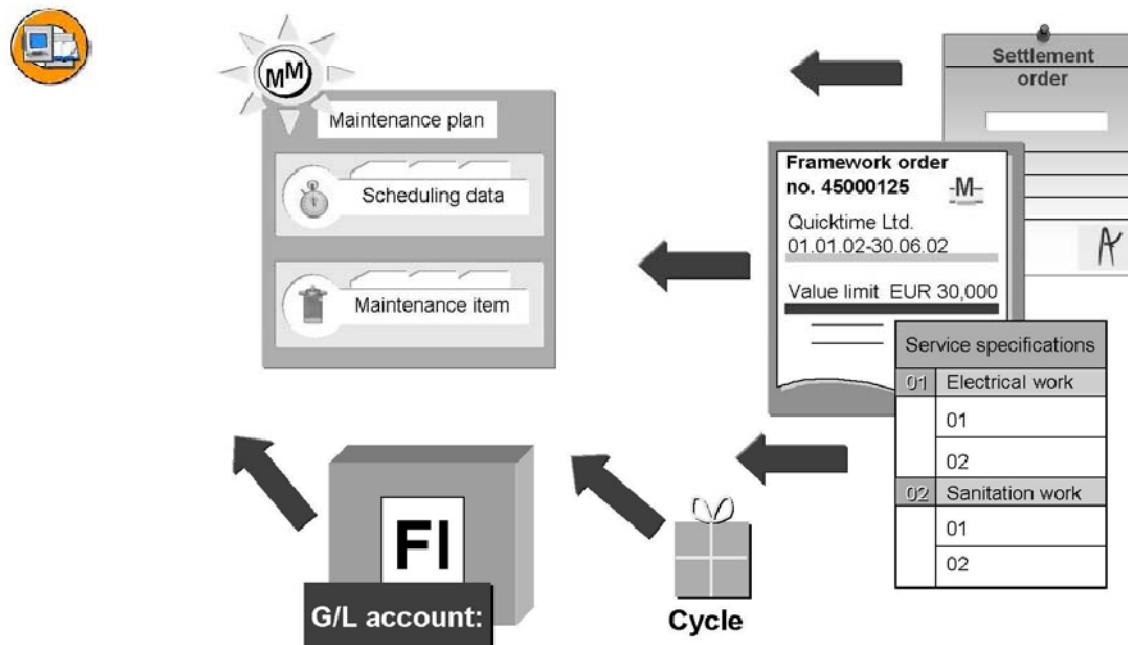


Figure 54: Creating a Maintenance Plan (PM)

3. Create a maintenance plan.

- A **maintenance plan** with the category, MM, is created with reference to the **framework order** and **the settlement order**.
- A **G/L account** must be entered in the maintenance plan to update the costs in G/L accounting.
- Costs are updated in Controlling using the **settlement order**.
- The services to be performed can be entered using **service specifications**, such as the standard or model service specifications.
- **Services** can also be entered manually with reference to the different purchasing documents, such as contract, purchase order, purchase requisition, and quotation, or a service master record, MM. You can use the outline function to assemble new service specifications from individual services.
- **Pricing** is determined using the conditions recorded at the level of service (service master record), vendor and service, or plant, vendor, and service.

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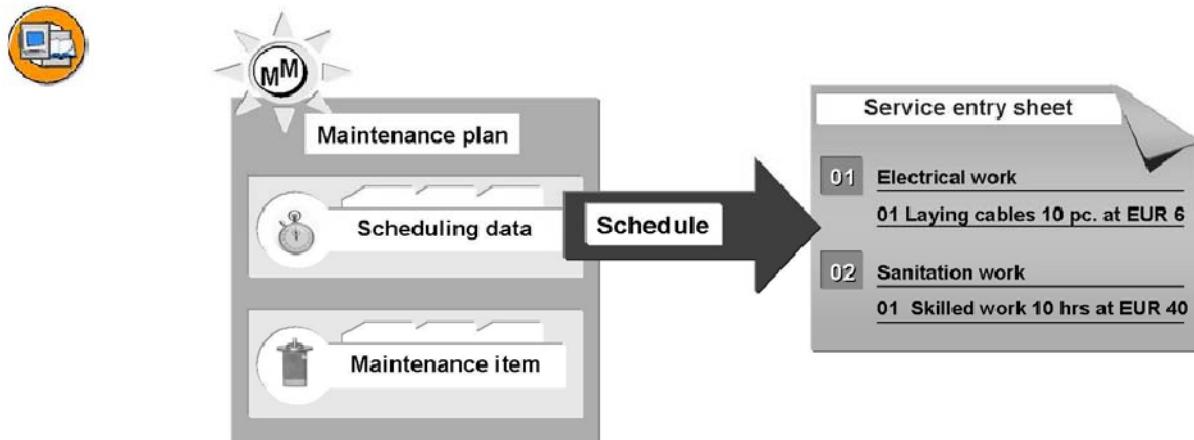


Figure 55: Generating a Service Entry Sheet (PM)

4. Generate a service entry sheet.

The scheduling of the maintenance plan is used to calculate a planned date for which the services are called. When the services are called, a service entry sheet is automatically generated for the framework order.

- **Note:** When the service entry sheet is called, the external company can be notified automatically, such as by automatic fax or an E-mail message, using the MM messaging function.

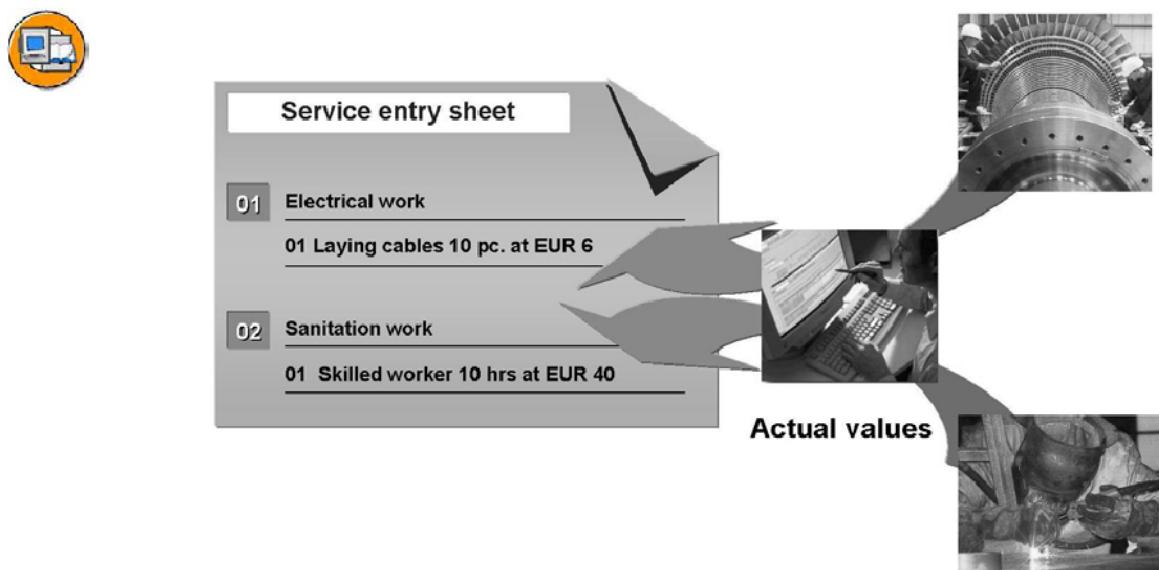


Figure 56: Entering Services, (MM)

5. Enter services:

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In Materials Management, the service entry sheet is updated for the purchase order. This means that the actual services and prices are entered, in case these differ from the values previously entered. When the actual values are entered, they are checked against the value limit in the framework order.

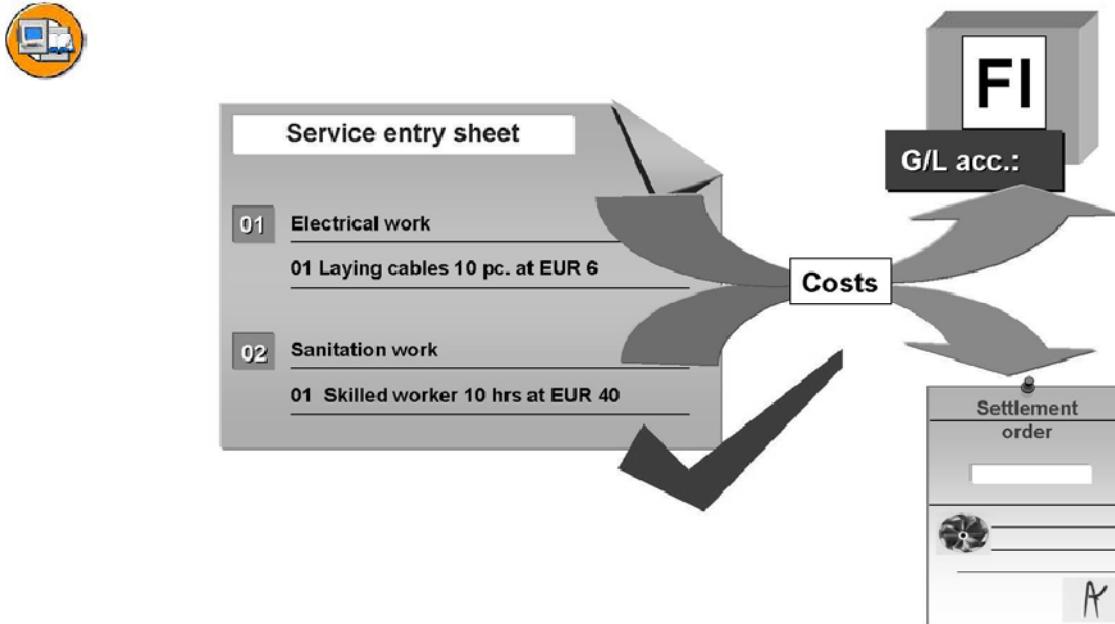


Figure 57: Acceptance (MM)

6. Accept the service entry sheet.

In Materials Management, the service entry sheet is accepted after the services have been entered. Costs are then updated in both the settlement order in the PM and the G/L account entered in the maintenance plan.

The settlement order must be **released** for the costs to be debited.

7. Further procedure:

More planned dates for calls can be generated by carrying out deadline monitoring for the maintenance plan again.



- Maintenance plan category
- Completion data
- Number range
- Default order type for maintenance item
- Adapt order type
- Settings for graphical scheduling overview

Continued on next page

Maintenance plan category:

You can use the maintenance plan category to configure the call object to be generated.

Completion data

Here, you can indicate that call dates be completed separately. This means that the completion date for the maintenance plan can be specified separately from the order reference date.

Number range:

The maintenance plan category is assigned to a number range.

Default order type for maintenance item:

You can use this option to configure the order type proposed automatically in the maintenance item when a maintenance plan is created.

Adapt order type:

For the order type, you must define whether or not the system should automatically release the maintenance order when it is generated. This setting is made in Customizing for Maintenance and Service Processing in the configure option for order types.

Settings for graphical scheduling overview:

In this option, you can set the default parameters and, in particular, the time frame for the graphical scheduling overview. These also affect the scheduling overview, which is started from the object information in the order or notification.

Continued on next page

Exercise 9: Calling External Services

Exercise Objectives

After completing this exercise, you will be able to:

- Create a maintenance plan with the “Service entry sheet” call object

Business Example

At IDES, external companies perform certain maintenance services. For the purposes of simple planning and subsequent acceptance, these services are to be represented using service master records.

A single cycle plan is to be used to monitor that these services are carried out at regular intervals. The single cycle plan generates a service entry sheet as a call object that is used to accept the services carried out by the external company.

Task:

Determine the purchase order number of the framework order for the vendor, 1006 (Blacks AG), who orders an inspection of smoke alarms and fire extinguishers as a service.

1. How do you do this?

What is the number of the purchase order?

2. Create a settlement order for the functional location, K1.

Which order number does the system assign?

Release the order.

3. Create a maintenance plan to enter the services performed. Which maintenance plan category do you choose?

Use the following data:

Continued on next page

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Cycle:	1 year
Purchase order number:	From task 1
G/L account:	417000
Order number:	From task 2
Activities:	100131 100132

4. Start the maintenance plan.
Under which number is the service entry sheet created?
5. Enter the actual data and then accept the service entry sheet. How do you do this?

Continued on next page

Solution 9: Calling External Services

Task:

Determine the purchase order number of the framework order for the vendor, 1006 (Blacks AG), who orders an inspection of smoke alarms and fire extinguishers as a service.

- How do you do this?

What is the number of the purchase order?

- Choose SAP Menu → Logistics → Materials Management → Purchasing → Purchase Order → List Displays → By Vendor.

Field Name or Data Type	Values
Vendor	1006 (Blacks AG)
Document type	NB (Standard purchase order)
Purchasing group	008
Item category	D
Result	Purchase order 4500008500, item 10

- Create a settlement order for the functional location, K1.

Which order number does the system assign?

Release the order.

- Choose SAP Menu → Logistics → Plant Maintenance → Maintenance Processing → Order → Create (General).
- Create a maintenance plan to enter the services performed. Which maintenance plan category do you choose?

Use the following data:

Continued on next page

Continued on next page

Cycle:	1 year
Purchase order number:	From task 1
G/L account:	417000
Order number:	From task 2
Activities:	100131 100132

- a) Choose *SAP Menu → Logistics → Plant Maintenance → Preventive Maintenance → Maintenance Planning → Maintenance Plans → Create → Single Cycle Plan.*

Field Name or Data Type	Values
Maintenance plan category	Service provided

4. Start the maintenance plan.

Under which number is the service entry sheet created?

- a) Choose *SAP Menu → Logistics → Plant Maintenance → Preventive Maintenance → Maintenance Planning → Scheduling for Maintenance Plans → Schedule.*

Choose *Edit → Start.*

5. Enter the actual data and then accept the service entry sheet. How do you do this?

- a) Choose *SAP Menu → Logistics → Plant Maintenance → Maintenance Processing → Completion Confirmation → Services.*

Field Name or Data Type	Values
Purchase order	4500008500
Transfer of task list activities	<input checked="" type="checkbox"/>
Service entry	Services
Release code	AA

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Lesson Summary

You should now be able to:

- List the steps for maintenance plan-based service procurement
- Call the external services in maintenance plans
- Make the customizing settings in maintenance plans

Continued on next page



Unit Summary

You should now be able to:

- Understand the functions and structure of a maintenance plan
- Call up orders
- Assign task lists to maintenance plans
- Include the configurable general task lists in maintenance plans
- Identify the scheduling functions and parameters of a single cycle plan
- Assign scheduling parameters in a single cycle plan
- Monitor single cycle plans
- Determine the cost of a maintenance plan
- Change the documents in a maintenance plan
- Call up the notifications in a maintenance plan
- Determine the automatic tasks for maintenance plans
- List the steps for maintenance plan-based service procurement
- Call the external services in maintenance plans
- Make the customizing settings in maintenance plans

Continued on next page



Test Your Knowledge

1. Which are the data areas included in a maintenance item?

Choose the correct answer(s).

- A Reference object
- B Interval
- C Task list
- D Planning data
- E Cycle text

2. The call object, _____, is selected when the maintenance plan is created using the category of the maintenance plan.

Fill in the blanks to complete the sentence.

3. In a piece of equipment, a value is assigned to the characteristic in the _____ view.

Fill in the blanks to complete the sentence.

4. If no task list has been entered in the maintenance item, the system copies the _____ for the maintenance plan into the maintenance order.

Fill in the blanks to complete the sentence.

5. Values are assigned to work time and material using the rates and prices valid when the cost estimate is made.

Determine whether this statement is true or false.

- True
- False

6. Change documents can be created if the fields are changed in the maintenance plan or if the maintenance calls are modified.

Determine whether this statement is true or false.

- True
- False

Continued on next page

7. Which scheduling parameter of a single cycle plan determines that the next maintenance call object is generated when the previous call object has been completed?

Choose the correct answer(s).

- A Scheduling period
- B Shift factors
- C Scheduling indicator
- D Factory calendar
- E Completion requirement

8. What are the functions executed with the help of deadline monitoring?

9. If _____ is activated, the system generates the next call object only after the previous call object has been completed.

Fill in the blanks to complete the sentence.

10. In the worklist for notification call object, the reference object for the order is normally the _____ to which the order costs are settled.

Fill in the blanks to complete the sentence.

11. If a notification is generated, the system uses the _____, _____, and _____ priority to determine at which times, and over which time period, certain tasks must be performed for this notification.

Fill in the blanks to complete the sentence.

Continued on next page

12. Which customizing setting is used to configure the call object that is to be generated?

Choose the correct answer(s).

- A Adapt order type
- B Default order type for maintenance item
- C Settings for graphical scheduling overview
- D Number range
- E Completion data

13. List the steps for maintenance plan-based service procurement.

14. Maintenance plans with the category, MM, are created with reference to the _____ and the settlement order.

Fill in the blanks to complete the sentence.

Continued on next page



Answers

1. Which are the data areas included in a maintenance item?

Answer: A, C, D

Planning data, reference object, and task list are the data areas included in a maintenance item.

2. The call object, Order, is selected when the maintenance plan is created using the category of the maintenance plan.

Answer: Order

3. In a piece of equipment, a value is assigned to the characteristic in the Configuration view.

Answer: Configuration

4. If no task list has been entered in the maintenance item, the system copies the short text for the maintenance plan into the maintenance order.

Answer: short text

5. Values are assigned to work time and material using the rates and prices valid when the cost estimate is made.

Answer: True

Values are assigned to work time and material using the rates and prices valid when the cost estimate is made.

6. Change documents can be created if the fields are changed in the maintenance plan or if the maintenance calls are modified.

Answer: True

Change documents can be created if the fields are changed in the maintenance plan or if the maintenance calls are modified.

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7. Which scheduling parameter of a single cycle plan determines that the next maintenance call object is generated when the previous call object has been completed?

Answer: E

The scheduling parameters completion requirement determines that the next maintenance call object is generated when the previous call object has been completed.

8. What are the functions executed with the help of deadline monitoring?

Answer: The functions executed with the help of deadline monitoring are:

- Rescheduling of scheduling parameters.
- Calling up of orders, notifications, or service entry sheets.

9. If completion requirement is activated, the system generates the next call object only after the previous call object has been completed.

Answer: completion requirement

10. In the worklist for notification call object, the reference object for the order is normally the superior technical system to which the order costs are settled.

Answer: superior technical system

11. If a notification is generated, the system uses the response profile, service profile, and priority to determine at which times, and over which time period, certain tasks must be performed for this notification.

Answer: response profile, service profile

12. Which customizing setting is used to configure the call object that is to be generated?

Answer: E

Completion data is used to configure the call object that is to be generated.

Continued on next page

13. List the steps for maintenance plan-based service procurement.

Answer: The steps for maintenance plan-based service procurement are:

1. Create a framework order.
2. Create a settlement order.
3. Create a maintenance plan and enter the required services.
4. Generate a service entry sheet (schedule maintenance plan).
5. Enter services.
6. Accept the service entry sheet.

14. Maintenance plans with the category, MM, are created with reference to the framework order and the settlement order.

Answer: framework order

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Unit 3

Maintenance Planning with Time-Based Strategy

Unit Overview

This unit provides an overview of time-based maintenance strategy. The unit explains the maintenance strategy and the importance of maintenance packages. The unit also explains how to create and schedule a time-based maintenance strategy.



Unit Objectives

After completing this unit, you will be able to:

- Explain the maintenance strategy and maintenance packages
- Create time-based maintenance strategy plans
- Perform scheduling based on time using scheduling parameters

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Lesson: Time-Based Maintenance Strategy Plans

Lesson Overview

This lesson provides an overview of the time-based maintenance strategy. The lesson begins by explaining the maintenance strategy and maintenance packages. Next, the lesson explains how to create a time-based maintenance strategy. Finally, the lesson explains how to perform scheduling based on time.



Lesson Objectives

After completing this lesson, you will be able to:

- Explain the maintenance strategy and maintenance packages
- Create time-based maintenance strategy plans
- Perform scheduling based on time using scheduling parameters

Business Example

You work as an SAP administrator for the Precision Pumps company. An external visual inspection for rust and water-tightness is performed on the water pumps at the company each month. Notice that the wear in the gearbox for the pump is only checked one time every year. The company wants to plan and perform maintenance easily and efficiently at different maintenance intervals, such as monthly and yearly. Use the maintenance strategy to plan and perform maintenance at different levels.

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Creating Time-Based Maintenance Strategy Plans

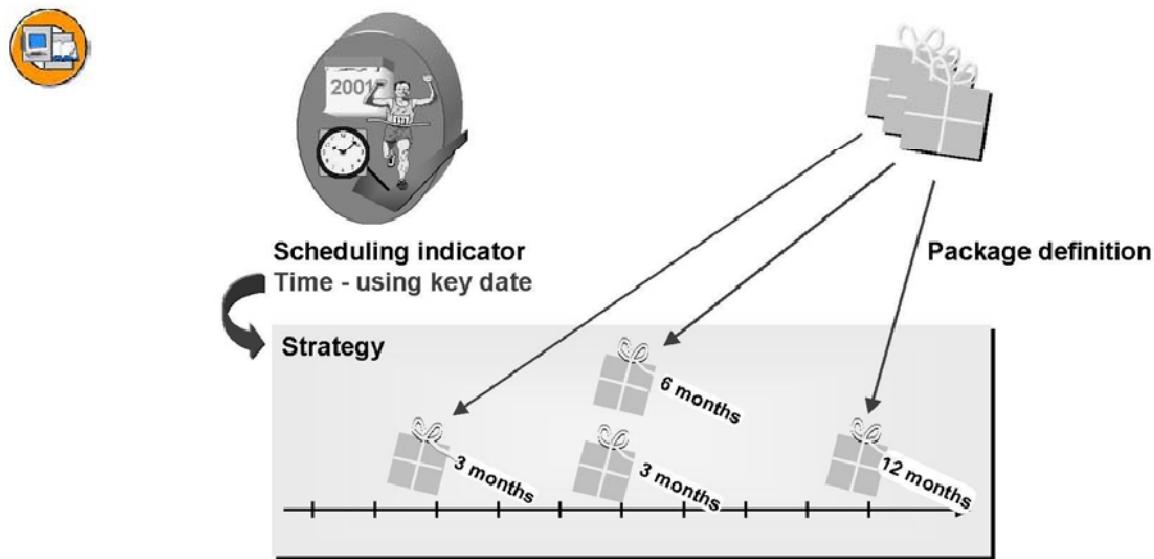


Figure 58: Maintenance Strategy

The **maintenance strategy** consists of several maintenance packages and incorporates the scheduling rule for preventive maintenance. Maintenance strategies can be assigned to **the task list**.

The maintenance strategy uses the following parameters:

- Scheduling indicator (time: calendar-based, time: using key date, time: using factory calendar)
- Call horizon
- Shift factors and tolerances
- Factory calendar
- Package sequence and where-used list

You can assign any number of **maintenance packages** to a maintenance strategy.

→ **Note:** The maintenance packages for a strategy should not have different cycle units, such as month and year. A strategy consisting of one month and one year should be defined as one month and twelve months.

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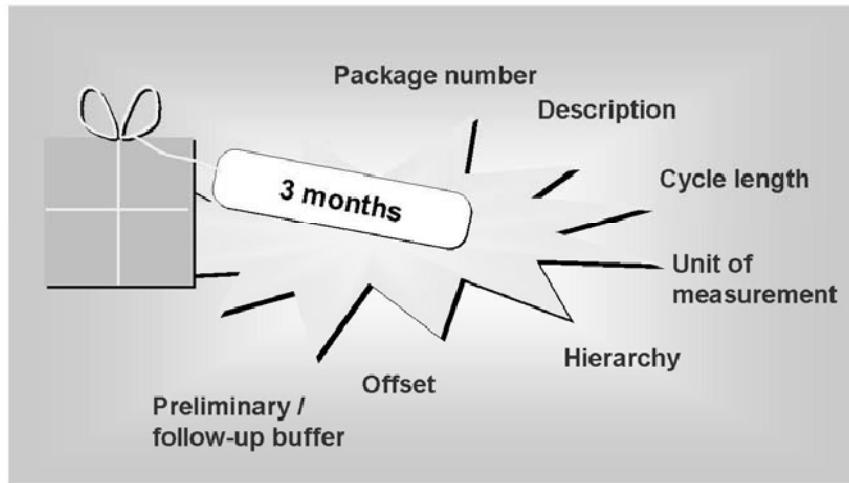


Figure 59: Maintenance Package

Maintenance packages are a part of a **maintenance strategy**. Maintenance packages define the frequency at which specific operations are carried out. They are assigned to the **operations** in a task list.

The important parameters for a maintenance package are:

- **Maintenance package number**
- **Description**
- **Cycle length**
- **Unit of measurement**
- **Hierarchy**

If two maintenance packages are due at the same time, the hierarchy defines the maintenance package that is performed.

- **Offset**

The offset determines the first due date of a maintenance package.

- **Preliminary / Follow-up buffer**

The preliminary or follow-up buffer is specified in days with reference to the planned date and sets the start and end dates for a maintenance order.



Note: If you set one of the two buffers to 0, the planned date can still be displayed later in the order.

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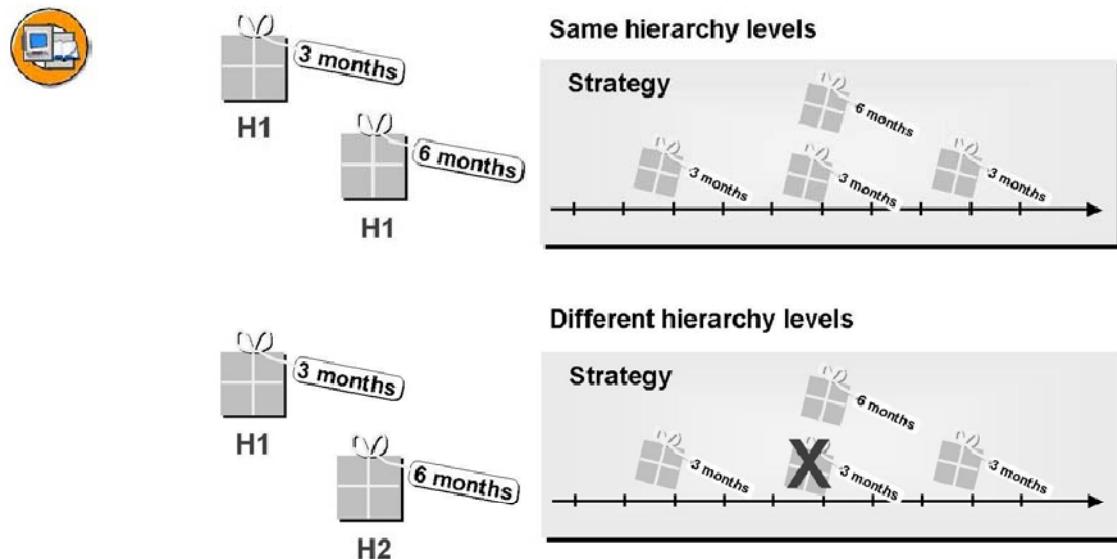


Figure 60: Hierarchy of Maintenance Packages

The **hierarchy** of maintenance packages defines whether all the maintenance packages that coincide should be executed or certain maintenance packages should be ignored. For this reason, a **hierarchy level** is assigned to each maintenance package.

If the maintenance packages with the same hierarchy level coincide, these maintenance packages are executed.

If maintenance packages have different hierarchy levels, the maintenance package with the lower level is not executed.

Example:

For vehicle maintenance, the spark plugs are to be cleaned every three months and changed every six months. To ensure that cleaning and changing are not both carried out after six months, which would mean that the spark plugs would firstly be cleaned and then thrown away, the six-month package, change spark plugs, is assigned a higher hierarchy than the three-month package, clean spark plugs, and the latter is deactivated.

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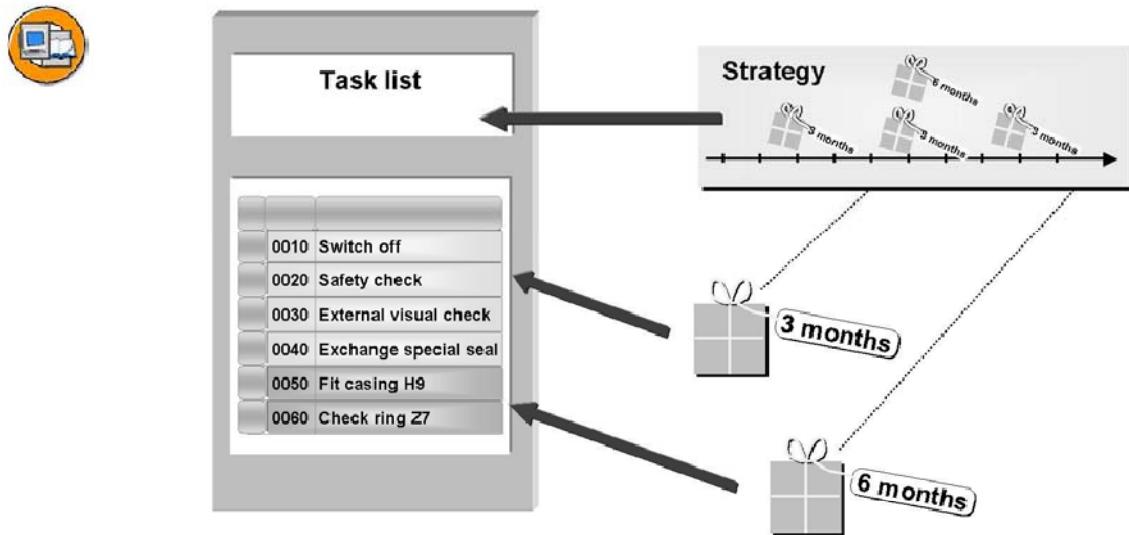


Figure 61: Task List and Maintenance Strategy

You can create the task lists for use in preventive maintenance. To prepare the task lists for use in **strategy plans**:

1. A **strategy** is defined in the task list header.
2. The **maintenance packages for the strategy** are assigned to the **operations** in the task list. In this way, the frequency with which the operations should be executed is defined.

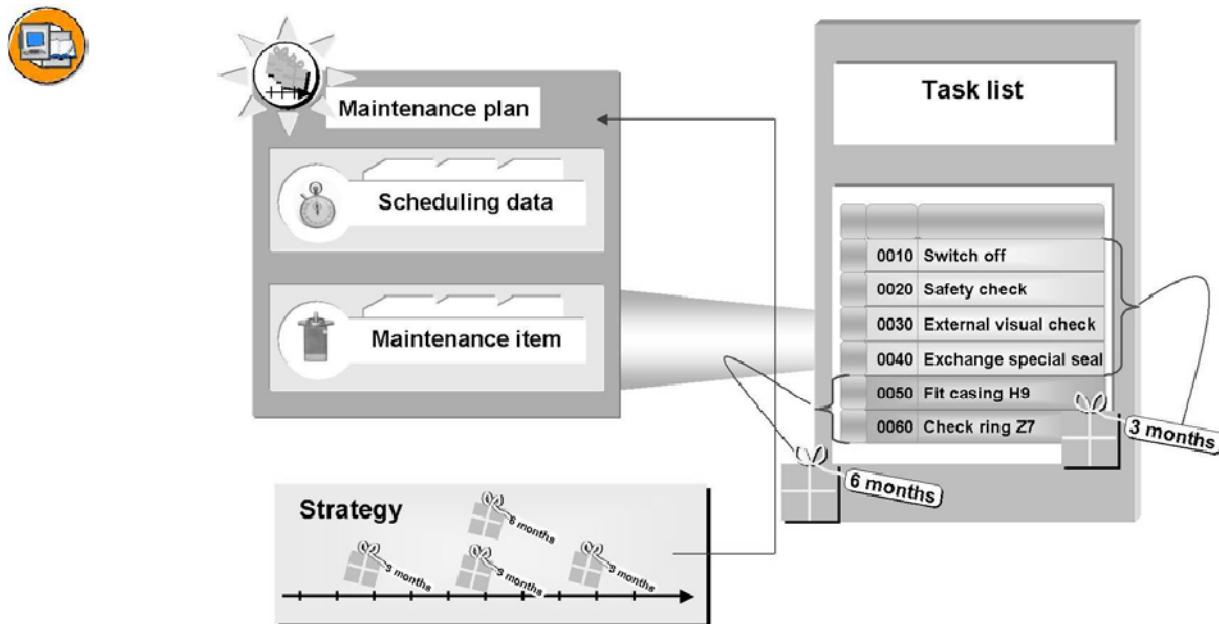


Figure 62: Creating a Time-Based Strategy Plan

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When a **time-based strategy plan** is created, the corresponding **strategy** is assigned to the maintenance plan.

You can either select the required task list or enter it directly. When the selection is made, the maintenance strategy is already preset as a selection parameter so that only the task lists with the relevant strategy are selected. You can also create a general maintenance task list from the maintenance plan, more exactly, from the maintenance item.

When you include the task list, the maintenance packages used are checked and displayed in the cycles for the maintenance plan. Only the maintenance packages used by the task list are displayed.

Scheduling Functions and Parameters for Time-Based Strategy Plans

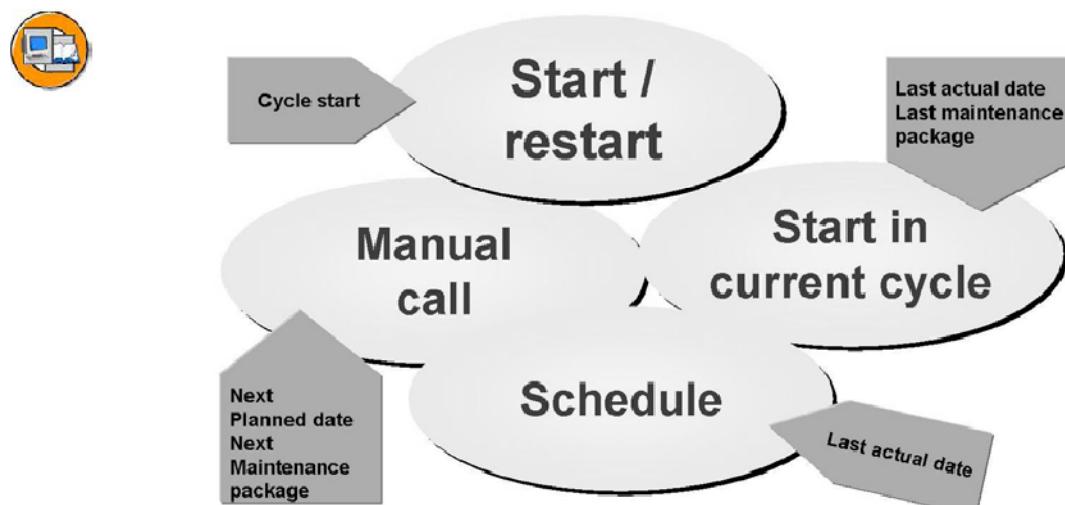


Figure 63: Scheduling Functions - Single Cycle Plan

The scheduling functions for the strategy plan are the same with one exception, the single cycle plan.

Exception: **Start in cycle**

At the start of the cycle, you can go directly into an existing process flow for preventive maintenance.

Example:

A strategy has a one-month, three-month, and twelve-month package. When the maintenance plan is created, preventive maintenance is already in operation in real life: Two weeks ago, the eighth one-month package was

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executed. The start in the cycle enables the maintenance plan not to start with the first one-month package but with the ninth one-month package and the third three-month package.

Factory calendar: For the strategy plan, the factory calendar for the strategy is copied into the scheduling parameters as a default value. It can be changed for each strategy plan.

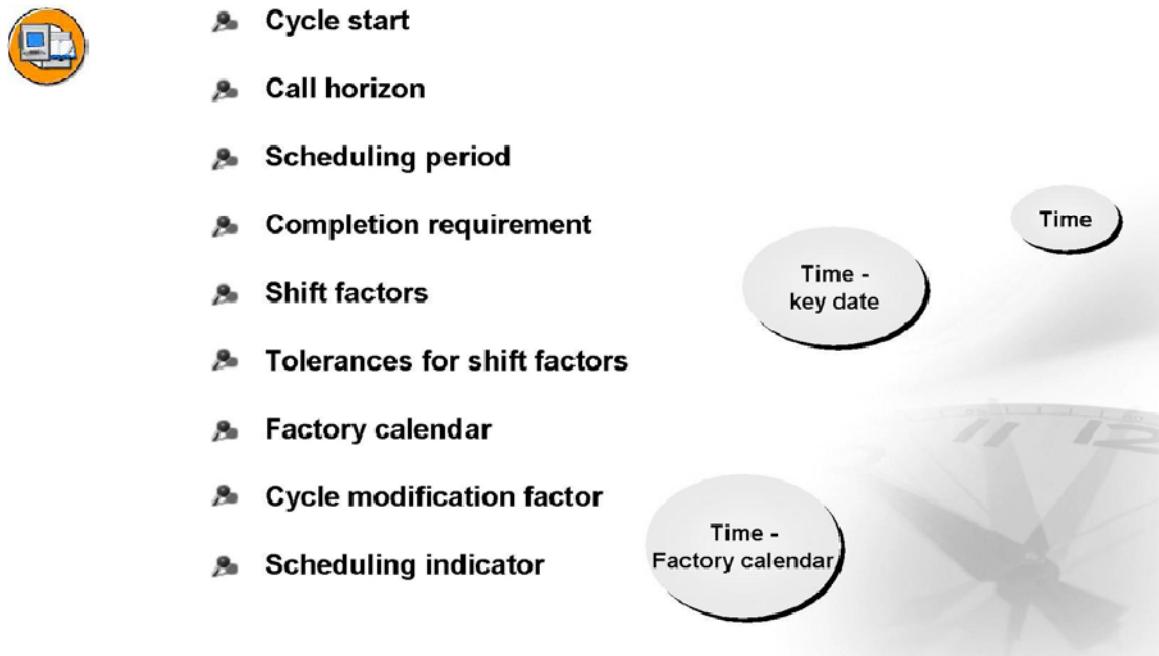


Figure 64: Scheduling Parameters - Strategy Plan

Cycle start: Start date for calculating planned and call dates.

Call horizon: Determines when a maintenance call object, such as a maintenance order, is generated for a waiting maintenance call.

Scheduling period: Determines the period of time for which the system generates planned or call dates during scheduling.

Completion requirement: Determines that the next maintenance call object is generated when the previous call object has been completed.

Shift factors: The shift factors for the early/delayed confirmation of a maintenance task define the percentage of the shift that should be considered for the next date.

Tolerances for shift factors: The tolerances for early/delayed confirmation define the time period for which the positive or negative differences between actual and planned dates do not affect subsequent scheduling.

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Factory calendar: You can use your own calendar, if necessary.

Cycle modification factor: Used to change the cycle times for a maintenance strategy individually for each maintenance plan. A cycle modification factor greater than one extends the cycle times valid for the strategy, a factor less than one reduces them.

Scheduling indicator: Indicates the type of time-based scheduling involved:

- Time (= based on calendar): The dates are calculated in **calendar days**.
- Time - key-date-based: The dates are always calculated from the cycle start **for the respective key date**.
- Time - factory calendar: The dates are calculated in **workdays**.

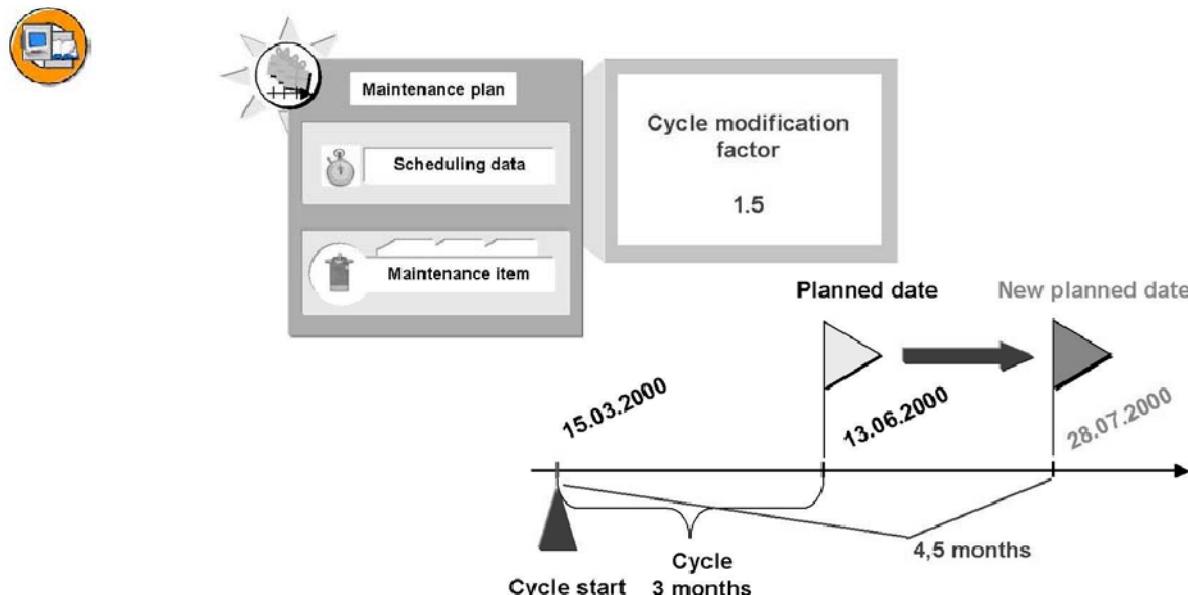


Figure 65: Cycle Modification Factor

The **cycle modification factor** is one of the **scheduling parameters** for the maintenance plan.

The **cycle modification factor** can be used to extend or shorten the maintenance cycle, such as to react to temporary additional requirements without changing the maintenance strategy.

The cycle modification factor is valid only for the maintenance plan in which it has been defined.

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Exercise 10: Task List and Maintenance Strategy

Exercise Objectives

After completing this exercise, you will be able to:

- Create time-based maintenance plans with a strategy using all the associated parameters
- Schedule time-based maintenance plans with a strategy using all the associated parameters

Business Example

At IDES, maintenance work on particular technical systems is carried out at specific time intervals. For example, an external visual inspection is to be carried out on all the water pumps every three months and an internal visual inspection every six months.

Task:

1. Display the maintenance strategies that are available in the system. Which maintenance packages are used for calendar-based scheduling? Display the detail view for this strategy. How do you do this?
2. Which hierarchy level is assigned to the yearly maintenance package and what significance does this have?
3. What hierarchy levels do the one-month and three-month packages have and what affect does this have?
4. What should you be aware of when selecting the cycle units for packages using hierarchies?
5. How do you create a package so that it is executed just one time?
6. How do you create a package so that it is executed using the actual cycle but only after a certain period?
7. In the task list group, PM310-##, create a new general maintenance task list and assign a maintenance strategy with which you can carry out key-date scheduling.

Which maintenance strategy do you choose?

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Where is the strategy assigned to the task list?

8. Create the operations for the task list. How do you proceed if you want various operations to be executed at different intervals? Use all the packages in the strategy at least one time.

Continued on next page

Solution 10: Task List and Maintenance Strategy

Task:

1. Display the maintenance strategies that are available in the system. Which maintenance packages are used for calendar-based scheduling? Display the detail view for this strategy. How do you do this?
 - a) Choose *SAP Menu → Logistics → Plant Maintenance → Preventive Maintenance → Maintenance Planning → Maintenance Strategies → Display*.
Select *strategy* in the strategy overview and click *Detail* (magnifying glass icon) or F2.
2. Which hierarchy level is assigned to the yearly maintenance package and what significance does this have?
 - a) The yearly package has the hierarchy level, **H2**. This, as a result, replaces all the packages with the hierarchy level, **H1**, if these are due at the same time.
3. What hierarchy levels do the one-month and three-month packages have and what affect does this have?
 - a) One-month and Three-month packages are both hierarchy level H1 packages. This means that both the packages are executed even if they are due at the same time.

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4. What should you be aware of when selecting the cycle units for packages using hierarchies?

- a) Packages must always coincide with one another.

For example:

1 year = 365 days

12 months = 12 * 30 = 360 days

This means that at the end of the year, a three-month package would not coincide exactly with a yearly package. As a result, the hierarchy is not active and both packages are executed.

Solution: In the case of monthly and yearly packages, define the yearly package as a twelve-month package.

5. How do you create a package so that it is executed just one time?
- a) Only maintain the offset in the package.
6. How do you create a package so that it is executed using the actual cycle but only after a certain period?
- a) You must maintain both the offset and the cycle in the package.
7. In the task list group, PM310-##, create a new general maintenance task list and assign a maintenance strategy with which you can carry out key-date scheduling.

Which maintenance strategy do you choose?

Where is the strategy assigned to the task list?

- a) Choose *SAP Menu → Logistics → Plant Maintenance → Preventive Maintenance → Work Scheduling → Task Lists → General Maintenance Task Lists → Create.*

Task list group, PM310-##.

Assign the maintenance strategy, B, in the task list header.

8. Create the operations for the task list. How do you proceed if you want various operations to be executed at different intervals? Use all the packages in the strategy at least one time.
- a) In the operation overview for the task list, select *Maint. packages* and activate the required packages for the respective operation.

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Exercise 11: Time-Based Strategy Plan

Exercise Objectives

After completing this exercise, you will be able to:

- Create time-based maintenance plans with a strategy using all the associated parameters
- Schedule time-based maintenance plans with a strategy using all the associated parameters

Business Example

At IDES, maintenance work on particular technical systems is carried out at specific time intervals. For example, an external visual inspection is to be carried out on all water pumps every three months and an internal visual inspection every six months.

Task:

1. Display the **Scheduling by key date** maintenance strategy and check the maintenance packages.

Which values are set for the preliminary/follow-up buffers?

What impact do these values have on the order that is generated?

2. Create a time-based strategy plan for key-date scheduling for the piece of equipment, TEQ-##, with the objective of incorporating the task list created in the previous exercise.

Set the scheduling period to one year.

What must you take into account with regard to the maintenance strategy?

How do you do this?

What maintenance plan number does the system assign?

3. Start the maintenance plan in the cycle so that the next due package is the yearly package and the last maintenance task was executed eight days ago.

How do you do this?

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Which confirmation date have you entered?

Which package have you chosen?

Check the scheduled calls.

Why is the first planned date waiting?

4. Release the first planned date manually because you want to start this work in advance. How do you do this?
5. Skip the second planned date because the work should not be carried out. How do you do this?
6. How can you ensure that the third planned date is carried out on a new date that you have defined?

Continued on next page

Solution 11: Time-Based Strategy Plan

Task:

1. Display the **Scheduling by key date** maintenance strategy and check the maintenance packages.

Which values are set for the preliminary/follow-up buffers?

What impact do these values have on the order that is generated?

- a) Choose *SAP Menu → Logistics → Plant Maintenance → Preventive Maintenance → Maintenance Planning → Maintenance Strategies → Display*.

Scheduling by key date (B):

Field Name or Data Type	Values
1-monthly package	Preliminary buffer: 1 day Follow-up buffer: 1 day
3-monthly package	Preliminary buffer: 2 days Follow-up buffer: 2 days
12-monthly package	Preliminary buffer: 3 days Follow-up buffer: 3 days

A preliminary buffer or follow-up buffer of two days shifts the start/end dates for the order forwards or backwards with reference to the planned date.

2. Create a time-based strategy plan for key-date scheduling for the piece of equipment, TEQ-##, with the objective of incorporating the task list created in the previous exercise.

Set the scheduling period to one year.

What must you take into account with regard to the maintenance strategy?

How do you do this?

Continued on next page

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What maintenance plan number does the system assign?

- a) Choose *SAP Menu → Logistics → Plant Maintenance → Preventive Maintenance → Maintenance Planning → Maintenance Plans → Create → Strategy Plan.*

Field Name or Data Type	Values
Maintenance plan category	Plant maintenance
Scheduling period	Yearly

The maintenance strategy for the task list must correspond with that of the maintenance plan.

In the Task list section on the Maintenance Item screen, enter *A* as the maintenance plan category, task list group, and group counter, or choose *Select task list* and enter the corresponding selection criteria.

3. Start the maintenance plan in the cycle so that the next due package is the yearly package and the last maintenance task was executed eight days ago.

How do you do this?

Which confirmation date have you entered?

Which package have you chosen?

Check the scheduled calls.

Continued on next page

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Why is the first planned date waiting?

- a) Choose SAP Menu → Logistics → Plant Maintenance → Preventive Maintenance → Maintenance Planning → Scheduling for Maintenance Plans → Schedule.

Select *Start in cycle*.

Field Name or Data Type	Values
Completion date	Today's date – 8 days
Offset	Select package Select eight 1-monthly package Select Set start offset Select Back

The first call is waiting, because there is a call horizon of 90% set by key date scheduling, strategy B.

4. Release the first planned date manually because you want to start this work in advance. How do you do this?
 - a) Choose SAP Menu → Logistics → Plant Maintenance → Preventive Maintenance → Maintenance Planning → Scheduling for Maintenance Plans → Schedule.

Select the line with the planned date and click the *Release call* (green flag icon).
5. Skip the second planned date because the work should not be carried out. How do you do this?
 - a) Choose SAP Menu → Logistics → Plant Maintenance → Preventive Maintenance → Maintenance Planning → Scheduling for Maintenance Plans → Schedule.

Select the second planned date and *Skip call*.
6. How can you ensure that the third planned date is carried out on a new date that you have defined?
 - a) Choose SAP Menu → Logistics → Plant Maintenance → Preventive Maintenance → Maintenance Planning → Scheduling for Maintenance Plans → Schedule.

Select the third planned date and *Fix call*.

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Lesson Summary

You should now be able to:

- Explain the maintenance strategy and maintenance packages
- Create time-based maintenance strategy plans
- Perform scheduling based on time using scheduling parameters

Continued on next page



Unit Summary

You should now be able to:

- Explain the maintenance strategy and maintenance packages
- Create time-based maintenance strategy plans
- Perform scheduling based on time using scheduling parameters

Continued on next page



Test Your Knowledge

1. You can assign only one maintenance package to a maintenance strategy.
Determine whether this statement is true or false.
 True
 False

2. If maintenance packages have different hierarchy levels, the maintenance package with the lower level is not executed.
Determine whether this statement is true or false.
 True
 False

3. You can create a general maintenance task list from the maintenance plan.
Determine whether this statement is true or false.
 True
 False

4. The _____ parameter of the maintenance package determines the first due date of a maintenance package.
Fill in the blanks to complete the sentence.

5. You can use the scheduling parameter, _____, to change the cycle times for a maintenance strategy individually for each maintenance plan.
Fill in the blanks to complete the sentence.

Continued on next page



Answers

1. You can assign only one maintenance package to a maintenance strategy.

Answer: False

You can assign any number of maintenance packages to a maintenance strategy.

2. If maintenance packages have different hierarchy levels, the maintenance package with the lower level is not executed.

Answer: True

If maintenance packages have different hierarchy levels, the maintenance package with the lower level is not executed.

3. You can create a general maintenance task list from the maintenance plan.

Answer: True

You can create a general maintenance task list from the maintenance plan.

4. The Offset parameter of the maintenance package determines the first due date of a maintenance package.

Answer: Offset

5. You can use the scheduling parameter, cycle modification factor, to change the cycle times for a maintenance strategy individually for each maintenance plan.

Answer: cycle modification factor

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Unit 4

Maintenance Planning with Performance-Based Strategy

Unit Overview

This unit provides an overview of a performance-based maintenance strategy. The unit explains how to use counters. The unit also explains how to create and schedule a performance-based maintenance strategy.



Unit Objectives

After completing this unit, you will be able to:

- Create and use counters
- Create performance-based maintenance strategy plans
- Perform scheduling based on performance

Unit Contents

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Lesson: Performance-Based Maintenance Strategy Plans

Lesson Overview

This lesson provides an overview of the performance-based maintenance strategy. To begin with, the lesson explains counters and how to use counters. Next, the lesson explains how to create performance-based maintenance strategy plans. Finally, the lesson explains how to perform scheduling based on performance.



Lesson Objectives

After completing this lesson, you will be able to:

- Create and use counters
- Create performance-based maintenance strategy plans
- Perform scheduling based on performance

Business Example

You work as an SAP Administrator for the Precision Pumps company. The company wants to perform different maintenance tasks based on their output. For example, a safety check should be performed after 20,000 liters and all the seals changed after 100,000 liters. Use the performance-based maintenance strategy and the regularly entered counter reading to plan preventive maintenance. In this way, the maintenance dates calculated are adjusted automatically based on the counter readings entered.

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Creating Performance-Based Maintenance Strategy Plans

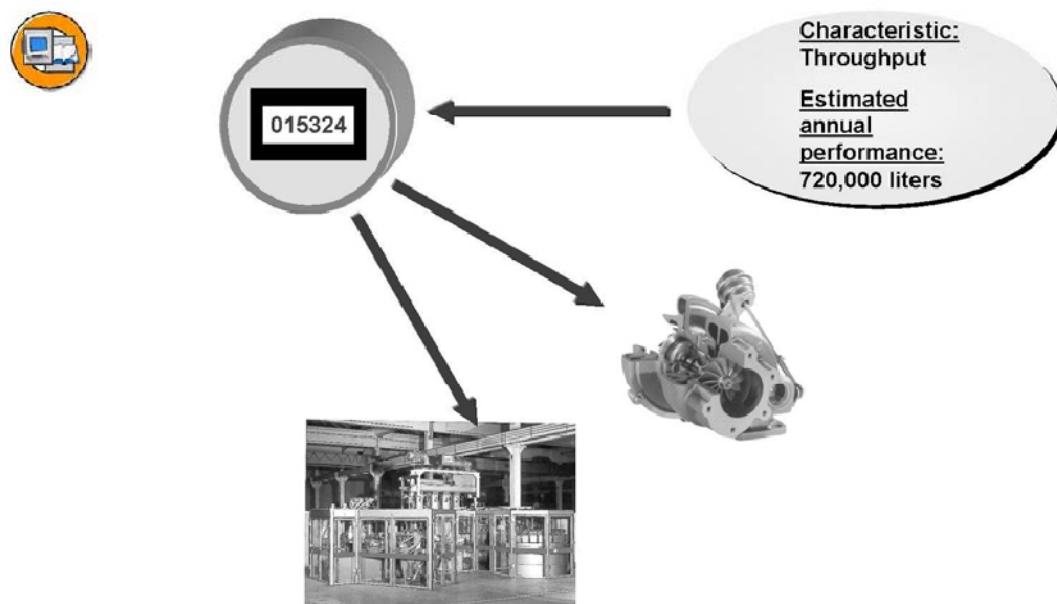


Figure 66: Creating a Counter

Counters are represented in the SAP R/3 Enterprise as a special form of **measuring points**. They are always created with reference to the object, such as equipment, but obtain their own master record in the system.

A **characteristic**, such as operating hours or flow, is assigned to the counter from the classification system. The characteristic is always used linked with the respective **characteristic unit**, such as hours or liters.

The **estimated annual performance** is a part of the counter and is entered as a fixed value. It forms the basis to calculate the maintenance intervals.

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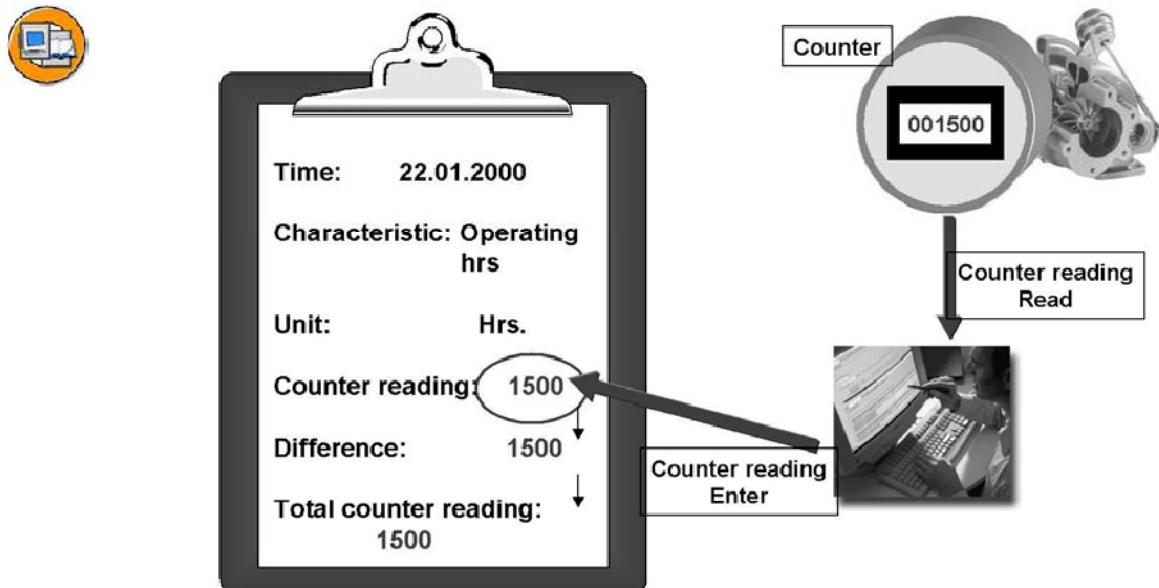


Figure 67: Creating an Initial Measurement Document

The initial measurement document is the first measurement document that is entered for a newly added counter. It represents the current counter reading at this time.

If no initial measurement document is created for the new counter, a maintenance plan that uses this counter cannot be started.

Performance-based maintenance planning is based on the measurement documents that should be entered frequently to represent the service process as accurately as possible.

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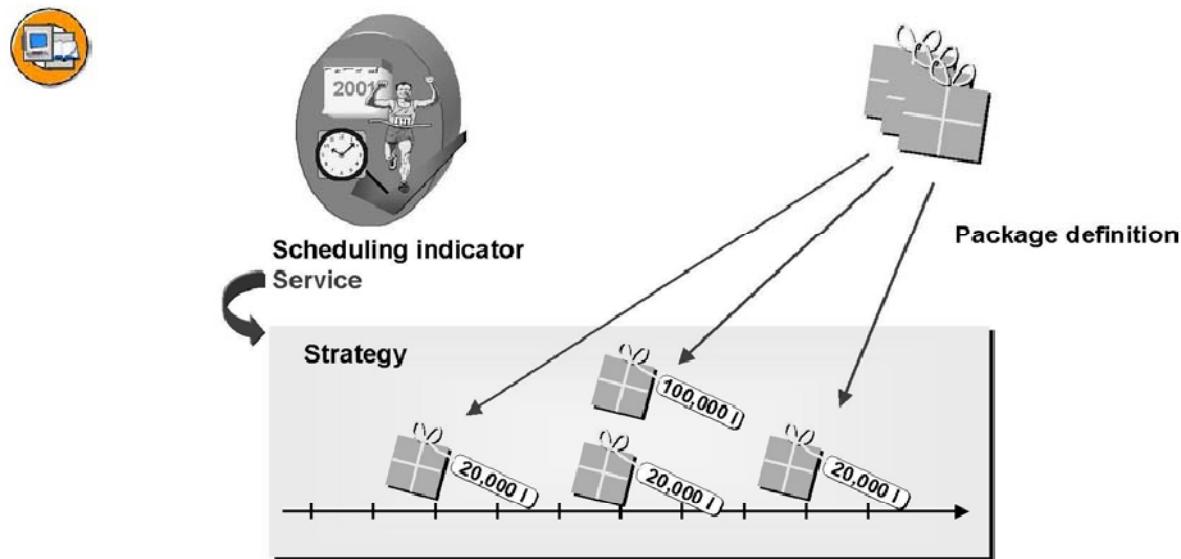


Figure 68: Performance-Based Maintenance Strategy

Performance-based maintenance - Example:

Specific maintenance work should be carried out on a pump after 20,000, 100,000, and 150,000 liters of throughput.

For **performance-based maintenance**, a strategy is defined with the *Performance* scheduling indicator (activity).

A **strategy unit** is assigned, such as liters for maintenance based on the volume of throughput.

In the strategy, maintenance packages are defined that use the same parameters as in time-based maintenance. For example, a specific throughput quantity is entered as the cycle length. For example, 20,000 liters.

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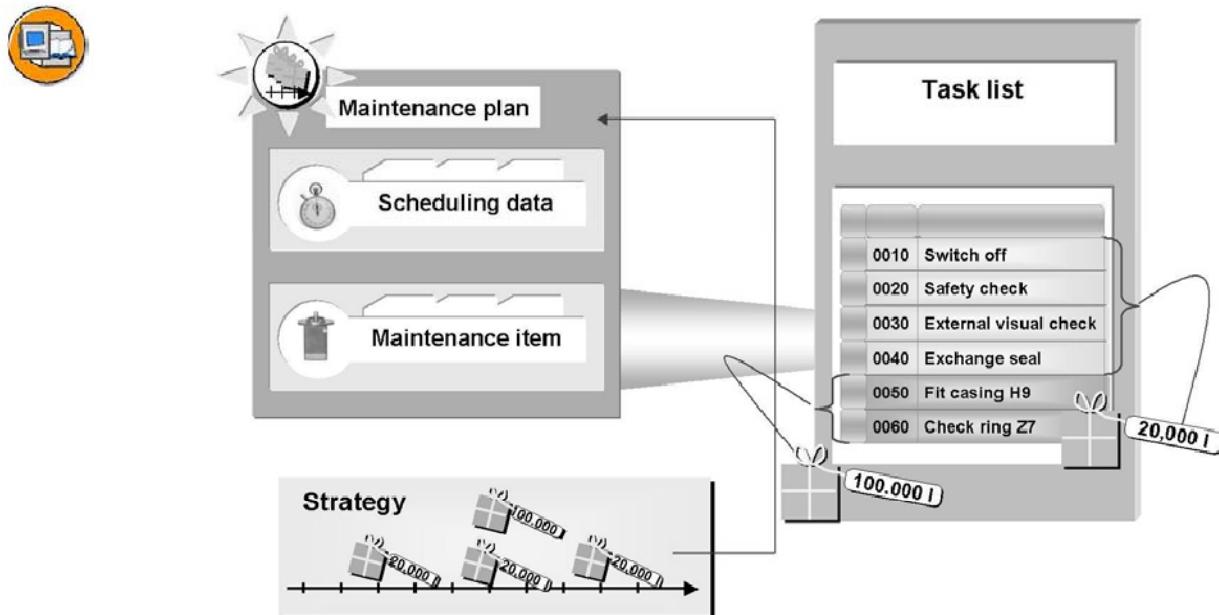


Figure 69: Creating a Performance-Based Strategy Plan

The performance-based maintenance plan can be created as a single cycle plan or a strategy plan.

To create a performance-based maintenance plan, a counter must be available for the reference object of the maintenance item.

When the plan is created, questions must be answered about the category of the maintenance plan and the maintenance strategy. This is analogous to creating a time-based maintenance plan.

When the reference object is entered, the counter is proposed automatically, depending on the unit for the maintenance strategy, such as liters. For the performance-based single cycle plan, the counter is proposed automatically after the maintenance cycle and the reference object have been entered.

You can either select the required task list or enter it directly. When the selection is made, the maintenance strategy is already preset as a selection parameter so that only the task lists with the relevant strategy are selected. You can also create a general maintenance task list from the maintenance plan, more precisely from the maintenance item.

When you include the task list, the maintenance packages used are checked and displayed in the cycles for the maintenance plan. Only the maintenance packages used by the task list are displayed.

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Scheduling Functions and Parameters for Performance-Based Strategy Plans

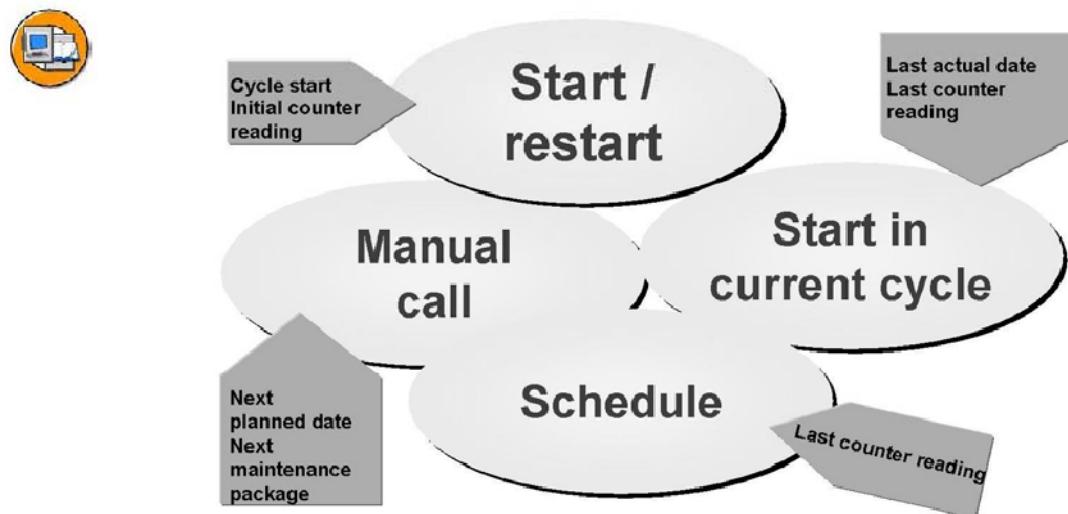


Figure 70: Scheduling Functions

The scheduling functions for the performance-based strategy plan are the same with one exception, the single cycle plan.

Start in cycle

Continued on next page

At the start of the cycle, you can go directly into an existing process flow for preventive maintenance.



Note: When you start the performance-based maintenance plan, a smaller counter reading than that of the last measurement document can be entered. The reason for this is that by entering a smaller counter reading, a type of start in the cycle is achieved. This means the first date can come earlier for the same cycle.

Notice that you cannot enter a larger counter reading than that of the last measurement document. This is because maintenance planning should be structured based on the current data documented in the system using measurement documents.



- Call horizon
- Scheduling period
- Initial counter reading
- Completion requirement
- Shift factors
- Tolerances for shift factors
- Cycle modification factor

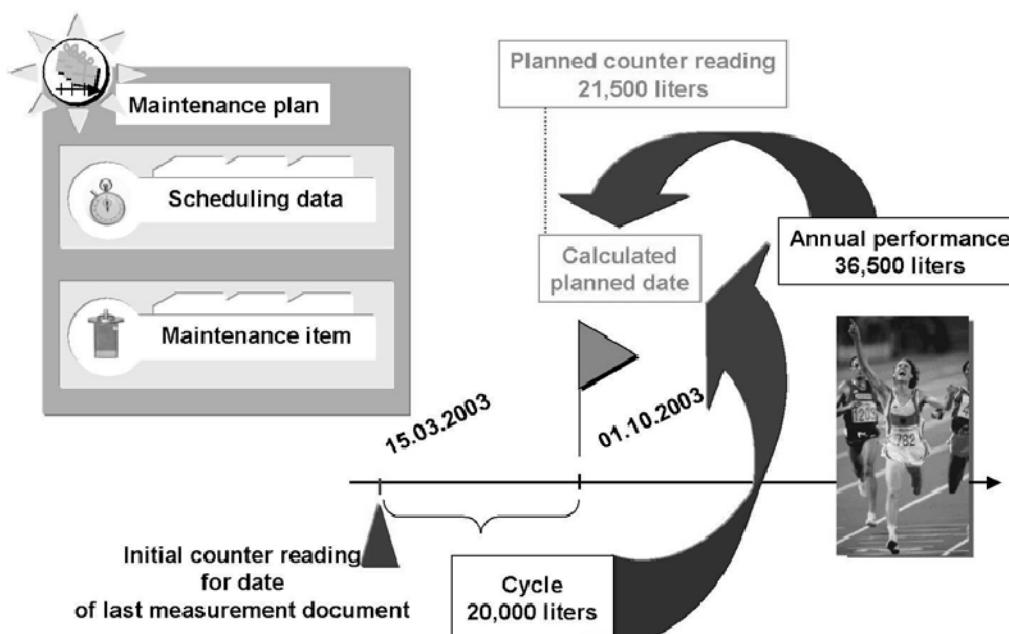


Figure 71: Basic Scheduling Functions

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The scheduling of a performance-based maintenance plans is based on the **estimated annual performance** entered in the reference object counter.

The **daily performance** is then calculated from the estimated annual performance.

Next, a time period is calculated from the daily performance and the maintenance cycle. By adding this time period to the start date of the maintenance plan, a new **planned date** is determined.

At the same time, a new **planned counter reading** is calculated by adding the cycle value to the current counter reading.

For example:

Estimated annual performance	36,500 liters
Internal calculation of daily performance	$36,500 : 365 \text{ days} = 100 \text{ liters per day}$
Planned date for a cycle of 20,000 liters	$20,000 : 100 = 200 \text{ days}$

This means that, beginning from the cycle start, the first planned date is set after 200 days.

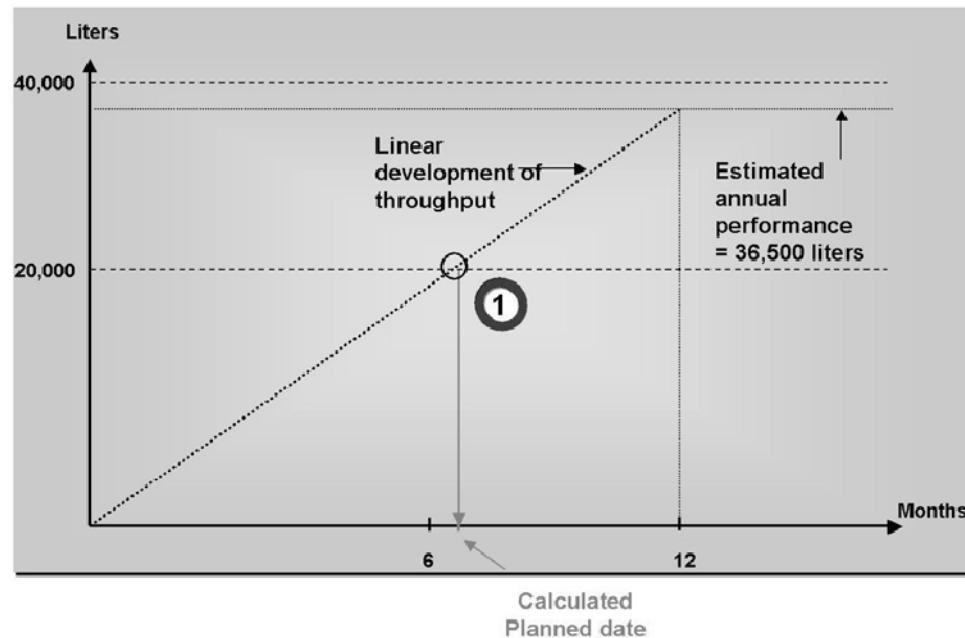


Figure 72: Scheduling Functions (1)

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1. A planned date is calculated based on the estimated annual performance, depending on the cycle.

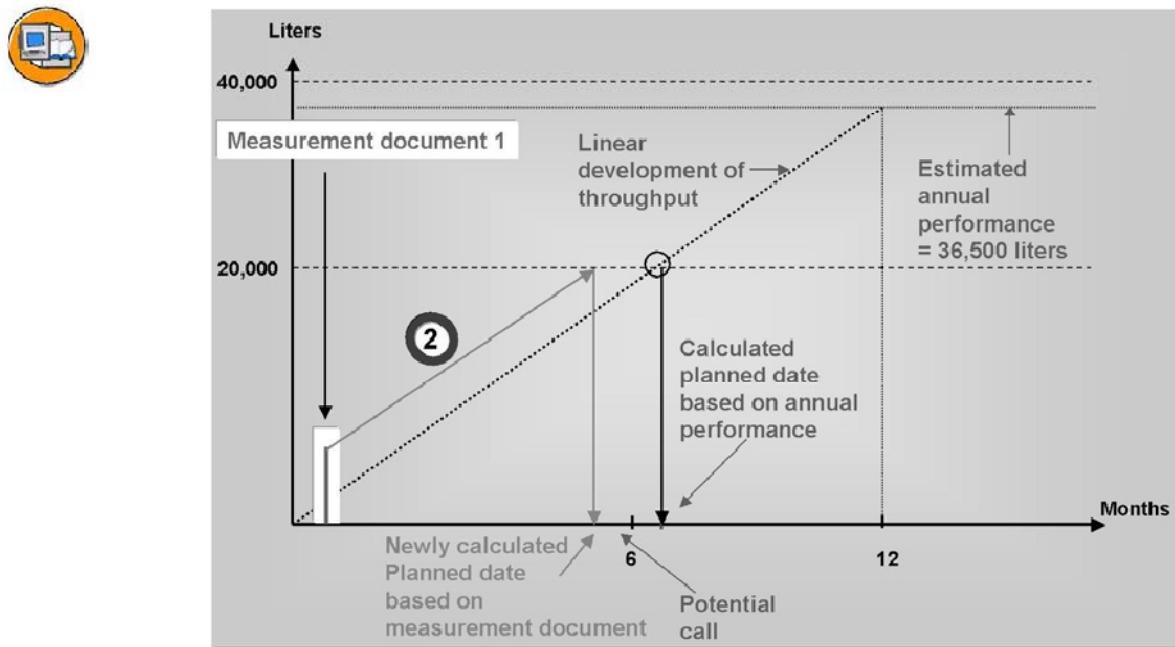


Figure 73: Scheduling Functions (2)

2. If a measurement document is entered, the planned date is recalculated. In other words, the planned dates are controlled directly by the measurement documents entered.

This means that to obtain a planned date that exactly reflects the performance throughput, measurement documents must be **regularly** entered.

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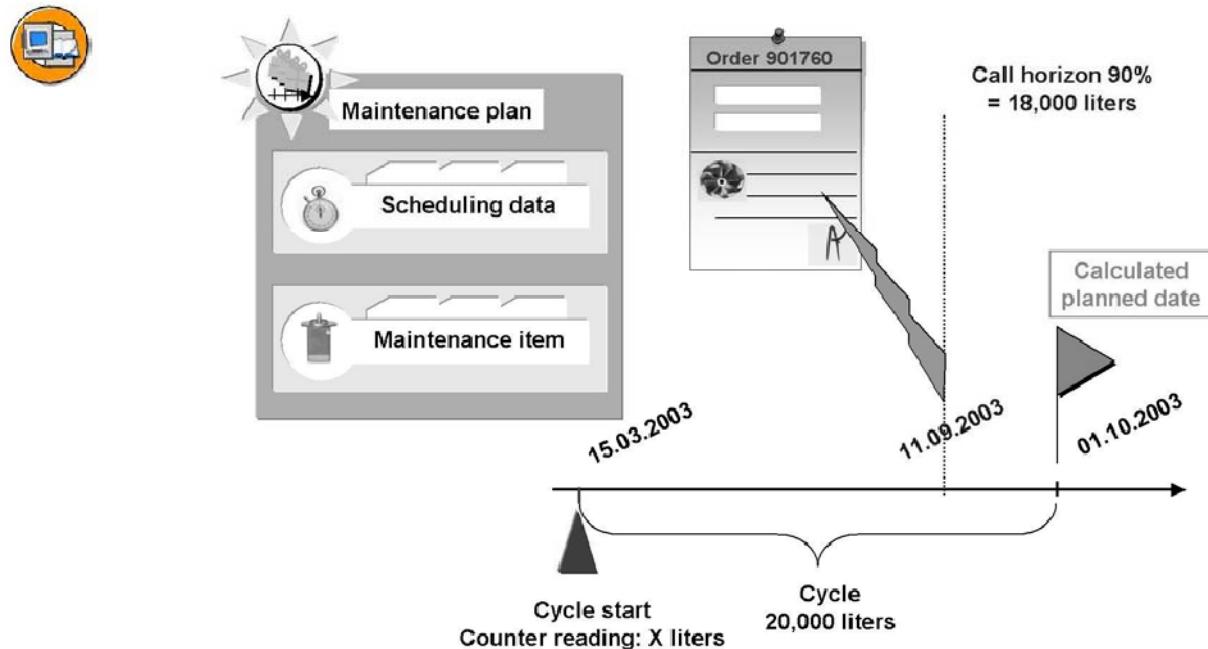


Figure 74: Call horizon

The call horizon is specified as a percentage and refers to the duration of the cycle. It specifies when an order should be generated with reference to a calculated maintenance date.

For example:

- Annual throughput: 36,500 liters.
- Results in a daily throughput quantity of 100 liters.
- Selected cycle: 20,000 liters.
- Results in a cycle duration of 200 days.
- Cycle start is a counter reading of 0 liters on March 15, 2003.
- Results in a planned date on October 01, 2003.
- Call horizon should be 90%, meaning that the order is not created on October 01, but on September 11 after 180 days.

Continued on next page



Caution: The above example is a calculation of planned dates that does not take account of measurement documents. If measurement documents are created, the planned dates are recalculated based on these measurement documents.



Note: If no value is specified for the call horizon when scheduling the maintenance plan, the system assumes that the call horizon is 0%. As a result, a call is made immediately, which means that an order is generated when the maintenance plan is started, independently of the counter reading. If the cycle duration should be kept, it is a good idea to set a call horizon of 100%.

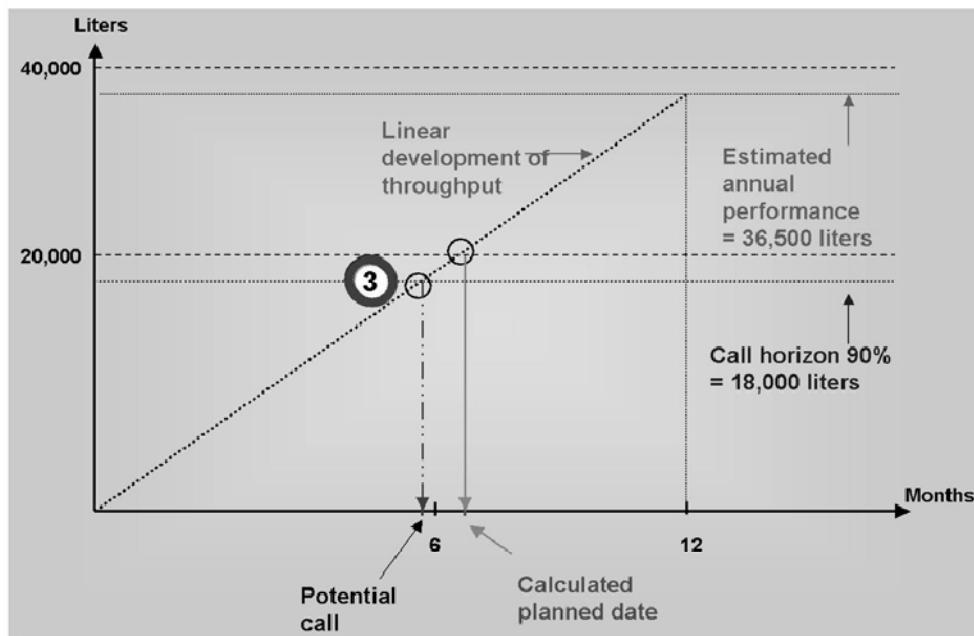


Figure 75: Scheduling Functions (3)

3. If you are working with a call horizon of 90%, the calculated planned date also appears in the list of scheduled calls.

Notice that the call (when the order is generated) occurs earlier:

For example:

Cycle start: March 15, 2003

Estimated annual performance: 36,500 liters

Calculated daily performance: 100 liters

Continued on next page

Resulting planned date: October 01, 2000

Call horizon: 90%

Call date: After 180 days, as a result, September 10, 2003

This means that an order would be generated on September 10, 2003, if no measurement documents were to be entered before that period.

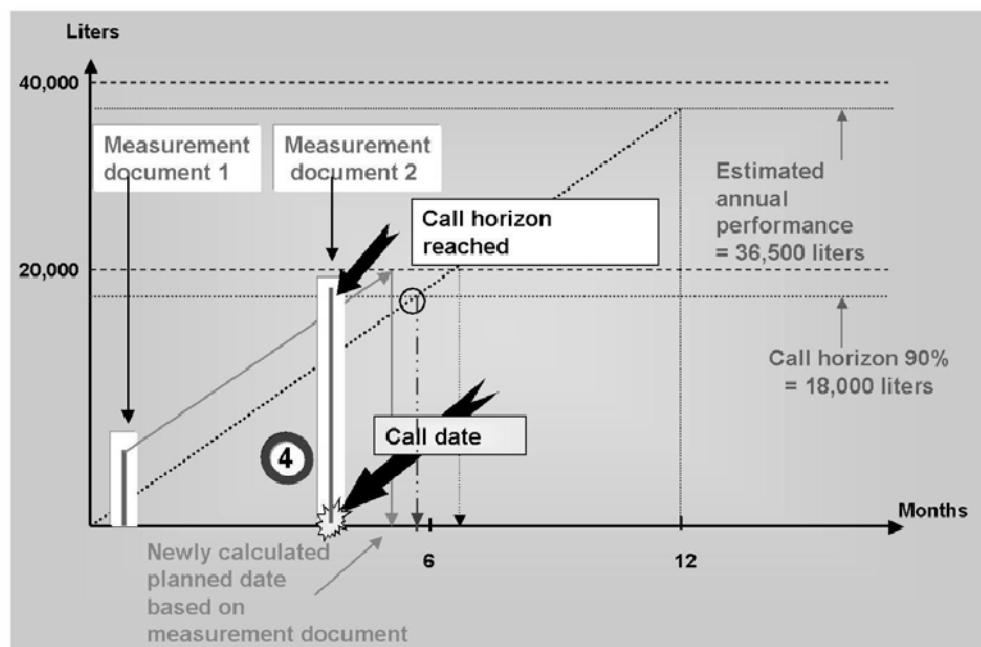


Figure 76: Scheduling Functions (4)

4. If a measurement document is entered, which reaches or exceeds the **call horizon**, the call is carried out. This means that the order, notification, or service entry sheet is generated.



- IPRM0002
- IPRM0003
- IPRM0004
- IPRM0005

In the case of strong seasonal variances, such as in agriculture, the calculation of planned dates can be structured using the customer exit, **IPRM0002**, according to your own specifications. The planned date calculated by the system is then modified.

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The user-defined fields in the maintenance item can be defined using the customer exit, **IPRM0003**.

You can use the customer exit, **IPRM0004**, to perform checks to ensure that certain fields are always filled when saving the maintenance plan or maintenance item.

In performance-based strategy plans, you can use the customer exit, **IPRM0005**, to determine according to your own rules, which maintenance packages will next fall due, dependent upon the previous counter reading.

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Exercise 12: Counters and Measurement Documents

Exercise Objectives

After completing this exercise, you will be able to:

- Create a counter for a technical object
- Create a measurement document

Business Example

At IDES, performance-based, which means counter-based, maintenance is carried out in some areas.

For example, the pumps used in the pump station for biological cleaning are maintained based on the flow in liters.

Task:

1. Create a flow counter with an annual performance of 36,500 liters for the piece of equipment, TEQ-##. Which characteristic do you use?
2. Create the initial measurement document with 0 liters. How do you do this?

Continued on next page

Solution 12: Counters and Measurement Documents

Task:

1. Create a flow counter with an annual performance of 36,500 liters for the piece of equipment, TEQ-#. Which characteristic do you use?
 - a) Choose *SAP Menu → Logistics → Plant Maintenance → Management of Technical Objects → Equipment → Change.*
Select *Measuring points/counters*, and then *New entries*.

Field Name or Data Type	Values
Measuring point (number)	Assigned automatically
Characteristic	FLOW IN LITERS
Counter indicator	<input checked="" type="checkbox"/>
Description of measuring point	For example, flow in liters counter

Select a new measuring point and choose *Measuring point* in the detail view of the measuring point.

Field Name or Data Type	Values
Counter overflow mark	For example, 1000000
Annual performance	36500

2. Create the initial measurement document with 0 liters. How do you do this?
 - a) Choose *SAP Menu → Logistics → Plant Maintenance → Management of Technical Objects → Equipment → Measurement Documents → Create.*

Field Name or Data Type	Values
Measuring point	From section 4-1
Counter reading	0

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Exercise 13: Performance-Based Maintenance Plan

Exercise Objectives

After completing this exercise, you will be able to:

- Create and schedule performance-based strategy plans

Business Example

At IDES, performance-based (counter-based) maintenance is carried out in some areas.

For example, the pumps used in the pump station for biological cleaning are maintained based on the flow in liters.

Task:

1. Create a general maintenance task list with the maintenance strategy, DFL, and three operations.

Use the following data:

Task list group	PM310-##
Profile	0000001
Planning plant	1000
Work center	T-ME##
Usage	4
Task list status	4
Maintenance strategy	DFL

Which packages are defined in the maintenance strategy?

Link the operations to a package. When doing this, use all the packages in the strategy. How do you do this?

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2. For the piece of equipment, TEQ-##, create a maintenance plan for performance-based maintenance using the strategy, DFL, and incorporate the general task list created in the previous step into the maintenance plan.

How do you do this?

Which maintenance plan number does the system assign?

Continued on next page

Solution 13: Performance-Based Maintenance Plan

Task:

1. Create a general maintenance task list with the maintenance strategy, DFL, and three operations.

Use the following data:

Task list group	PM310-##
Profile	0000001
Planning plant	1000
Work center	T-ME##
Usage	4
Task list status	4
Maintenance strategy	DFL

Which packages are defined in the maintenance strategy?

Continued on next page

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Link the operations to a package. When doing this, use all the packages in the strategy. How do you do this?

- a) Choose *SAP Menu → Logistics → Plant Maintenance → Preventive Maintenance → Work Scheduling → Task Lists → General Maintenance Task Lists → Create.*

Field Name or Data Type	Values
Task list group	PM310-##
Profile	0000001

Select *New entries*.

Field Name or Data Type	Values
Task list group counter	2 (assigned automatically)
Description	For example, maintenance according to flow in liters
Work center	T-ME##
Usage	4
Task list status	4
Maintenance strategy	DFL

Maintenance packages

Field Name or Data Type	Values
Package 1	Every 10,000 liters
Package 2	Every 50,000 liters
Package 3	Every 100,000 liters

Assign maintenance packages:

Choose *Maint. packages* and select *packages* for the respective operation.

2. For the piece of equipment, TEQ-##, create a maintenance plan for performance-based maintenance using the strategy, DFL, and incorporate the general task list created in the previous step into the maintenance plan.

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How do you do this?

Which maintenance plan number does the system assign?

- a) Choose *SAP Menu → Logistics → Plant Maintenance → Preventive Maintenance → Maintenance Planning → Maintenance Plans → Create → Strategy Plan.*

Field Name or Data Type	Values
Maintenance plan	Leave blank
Maintenance plan category	Plant maintenance
Maintenance strategy	DFL
Reference object	TEQ-##
Counter	Determined automatically from reference object
Task list - Type	A
TaskLstGrp	PLM310-##
Task list - GrpCr	2



Hint: When you save the performance-based strategy plan, the current counter reading is automatically set as the default initial counter reading. You can confirm this to copy it to the maintenance plan.

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Exercise 14: Scheduling

Exercise Objectives

After completing this exercise, you will be able to:

- Create and schedule performance-based strategy plans

Business Example

At IDES, performance-based (counter-based) maintenance is carried out in some areas.

For example, the pumps used in the pump station for biological cleaning are maintained based on the flow in liters.

Task:

1. Check the scheduling parameters for the maintenance plan from the final step of the previous exercise.

Which values are set for the shift factors, call horizon and scheduling period? Where do these values originate?

What significance does the scheduling period have here?

Start the maintenance plan and enter the initial counter reading entered in the section, 4-2. How do you do this?

What is the calculated planned date?

What is the call date?

2. Enter a new counter reading that is more than 10,000 liters. Which menu path do you use?

3. Call the deadline monitoring function, enter the maintenance plan number, and execute.

How have the scheduled calls changed?

Which order number does the system assign?

4. Release the maintenance order generated above and technically complete it immediately.

How do you make the selection?

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How have the scheduled calls in the maintenance plan changed?

5. How do you lock a maintenance plan for scheduling?
6. Display the scheduling overview as a list for all the performance-based strategy plans created during the training course period. How do you do this?
7. Display the same maintenance plans in the graphical scheduling overview. Simulate the scheduled calls for the next six months. What factors must you take into account?

Continued on next page

Solution 14: Scheduling

Task:

1. Check the scheduling parameters for the maintenance plan from the final step of the previous exercise.

Which values are set for the shift factors, call horizon and scheduling period? Where do these values originate?

What significance does the scheduling period have here?

Start the maintenance plan and enter the initial counter reading entered in the section, 4-2. How do you do this?

What is the calculated planned date?

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What is the call date?

- a) Choose *SAP Menu → Logistics → Plant Maintenance → Preventive Maintenance → Maintenance Planning → Maintenance Plans → Display.*

Field Name or Data Type	Values
Shift factor for late completion	100 %
Shift factor for early completion	100 %
Call horizon	90 %
Scheduling period	0 days

The scheduling parameters are proposed by the strategy, DFL, and can be changed in the maintenance plan.

Choose *Maintenance plan → Schedule.*

Alternatively,

choose *SAP Menu → Logistics → Plant Maintenance → Preventive Maintenance → Maintenance Planning → Scheduling for Maintenance Plans → Schedule.*

Choose *Edit → Start.*

Current counter reading is proposed; confirm

Planned date / call date:

Field Name or Data Type	Values
Planned date	Today's date + 100 days
Call date	Today's date + 90 days

2. Enter a new counter reading that is more than 10,000 liters. Which menu path do you use?
- a) Choose *SAP Menu → Logistics → Plant Maintenance → Management of Technical Objects → Equipment → Measurement Documents → Create.*

Field Name or Data Type	Values
Counter reading	For example, 10,500

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3. Call the deadline monitoring function, enter the maintenance plan number, and execute.

How have the scheduled calls changed?

Which order number does the system assign?

- a) Choose *SAP Menu → Logistics → Plant Maintenance → Preventive Maintenance → Maintenance Planning → Scheduling for Maintenance Plans → Deadline Monitoring*.

When the planned counter reading, 10,000 liters, is reached or exceeded, the planned date is converted into a call, which means an order is generated.

A new planned date is also attached. This data is calculated as follows:

(Next planned counter reading – current counter reading) / daily performance = position for next planned date, for example:

$$(20,000 \text{ liters} - 12,000 \text{ liters}) / 100 \text{ days} = 80 \text{ days}$$

4. Release the maintenance order generated above and technically complete it immediately.

How do you make the selection?

How have the scheduled calls in the maintenance plan changed?

- a) Choose *SAP Menu → Logistics → Plant Maintenance → Maintenance Processing → Order → Order List → Change*.

Selection criteria: Status Outstanding, maintenance plan number

Select *Release order* and then *Technical completion*.

After the order has been technically completed, the corresponding call is marked as completed in the maintenance plan. The date of the technical completion is entered as the confirmation date.

5. How do you lock a maintenance plan for scheduling?

- a) Choose *SAP Menu → Logistics → Plant Maintenance → Preventive Maintenance → Maintenance Planning → Maintenance Plans → Change Maintenance plan → Functions → Active Inactive → Deactivate*.

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6. Display the scheduling overview as a list for all the performance-based strategy plans created during the training course period. How do you do this?
- a) Choose *SAP Menu → Logistics → Plant Maintenance → Preventive Maintenance → Maintenance Planning → Scheduling for Maintenance Plans → Scheduling Overview → List.*

Selection criteria:

Field Name or Data Type	Values
Created by	PLM310-00 to PLM310-18
Created on	Enter the course date
Strategy	DFL

7. Display the same maintenance plans in the graphical scheduling overview. Simulate the scheduled calls for the next six months. What factors must you take into account?
- a) Choose *SAP Menu → Logistics → Plant Maintenance → Preventive Maintenance → Maintenance Planning → Scheduling for Maintenance Plans → Scheduling Overview → Graphical.*

Field Name or Data Type	Values
Created by	PLM310-00 to PLM310-18
Created on	Enter the course date
Strategy	DFL
Date to	Current from date + 6 months
With further dates	<input checked="" type="checkbox"/>

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Lesson Summary

You should now be able to:

- Create and use counters
- Create performance-based maintenance strategy plans
- Perform scheduling based on performance

Continued on next page



Unit Summary

You should now be able to:

- Create and use counters
- Create performance-based maintenance strategy plans
- Perform scheduling based on performance

Continued on next page



Test Your Knowledge

1. When scheduling a performance-based strategy plan, if a measurement document that reaches or exceeds the call horizon is entered, the call is terminated.

Determine whether this statement is true or false.

- True
- False

2. The _____ document is the first measurement document that is entered for a newly added counter.

Fill in the blanks to complete the sentence.

3. What happens when you enter the reference object when creating a performance-based maintenance strategy?

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Answers

1. When scheduling a performance-based strategy plan, if a measurement document that reaches or exceeds the call horizon is entered, the call is terminated.

Answer: False

When scheduling a performance-based strategy plan, if a measurement document that reaches or exceeds the call horizon is entered, the call is carried out.

2. The initial measurement document is the first measurement document that is entered for a newly added counter.

Answer: initial measurement

3. What happens when you enter the reference object when creating a performance-based maintenance strategy?

Answer: When the reference object is entered, the counter is proposed automatically, depending on the unit for the maintenance strategy. For example, liters.

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Unit 5

Maintenance Planning with Cycles of Different Dimensions

Unit Overview

This unit provides an overview of multiple counters. The unit explains how to create multiple counter plans. The unit also explains how to schedule multiple counter plans.



Unit Objectives

After completing this unit, you will be able to:

- Create a multiple counter plan
- Schedule a multiple counter plan

Unit Contents

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Lesson: Multiple Counter Plans

Lesson Overview

In this lesson, you will get an overview of multiple counter plans. You will learn how to create and schedule multiple counter plans.



Lesson Objectives

After completing this lesson, you will be able to:

- Create a multiple counter plan
- Schedule a multiple counter plan

Business Example

You work as an SAP administrator for the XYZ airline company. In this organization, changing the engine of an aircraft is dependent on the following criteria:

- Number of flying hours
- Number of take-offs/landings

The company wants the engine to be replaced either after 18,000 flying hours or after 12,000 take-offs/landings.

To plan and execute this task, use a multiple counter plan in which the two characteristics, Flying hours and Take-offs/landings, are linked.

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Creating Multiple Counter Plans

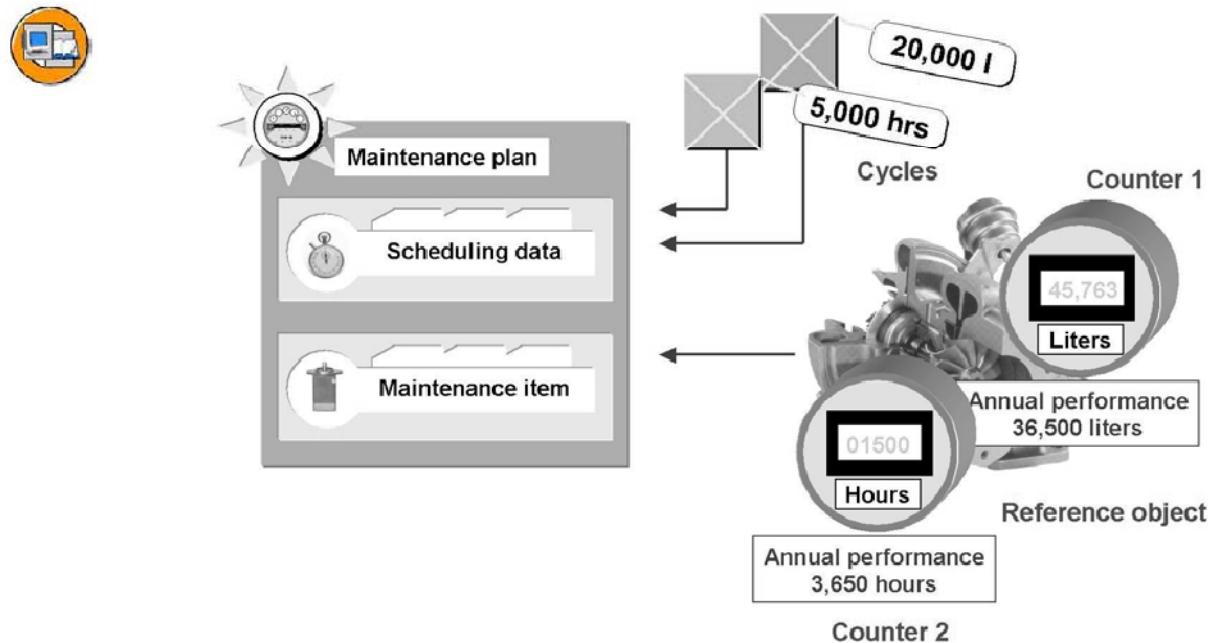


Figure 77: Multiple Counter Plan - Structure I

A multiple counter plan is a maintenance plan that can have cycles with different dimensions. You can assign cycles freely to the multiple counter plan. A strategy cannot be used here.

Based on the cycles entered, the counters from the reference object are proposed by comparing the units.

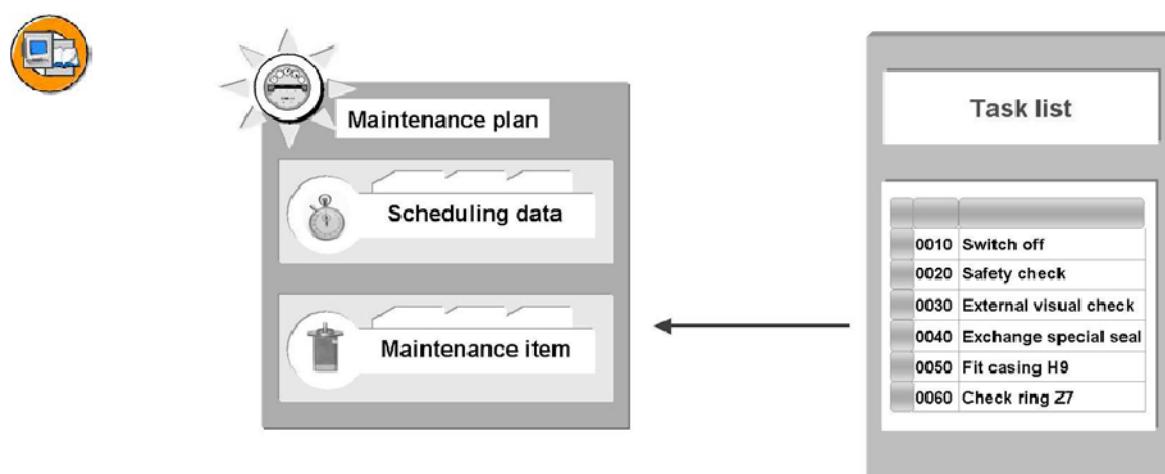


Figure 78: Multiple Counter Plan - Structure II

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The task list included in the multiple counter plan cannot have a reference to a strategy. As a result, no operations are selected.

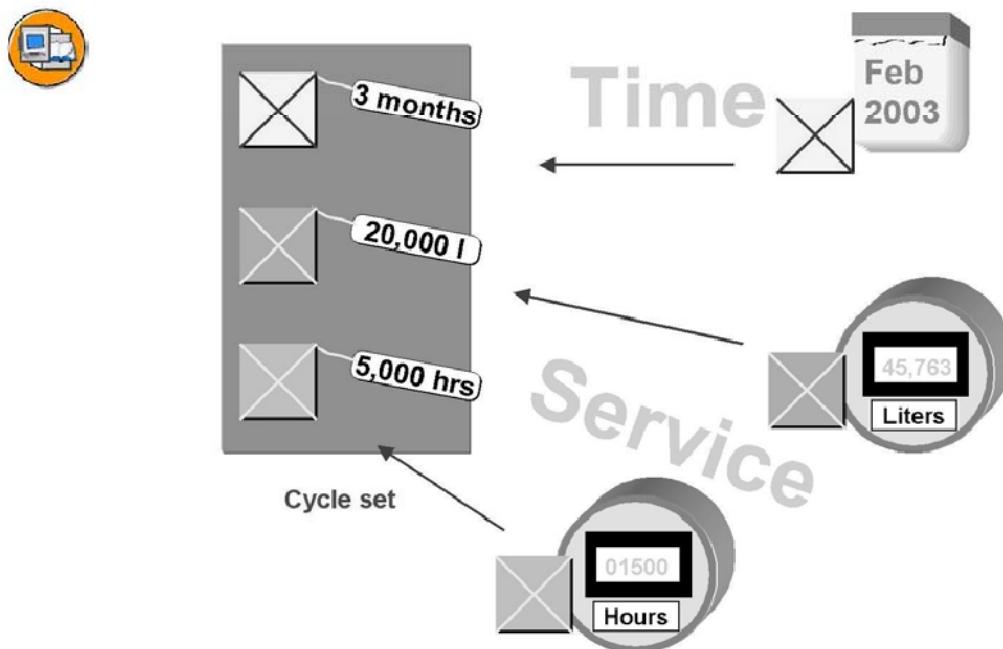


Figure 79: Cycle Set

You use the cycle set as a template to create a multiple counter plan. It consists of a series of maintenance cycles. In contrast to the maintenance strategy, the cycle set does not have a reference function. This means that after the maintenance plan has been created, there is no link between the cycle set and the maintenance plan.

After the cycle set has been included in the maintenance plan, the individual cycles can be changed or deleted.

A maximum of one time-based cycle can be used in a multiple counter plan.

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Scheduling of Multiple Counter Plans

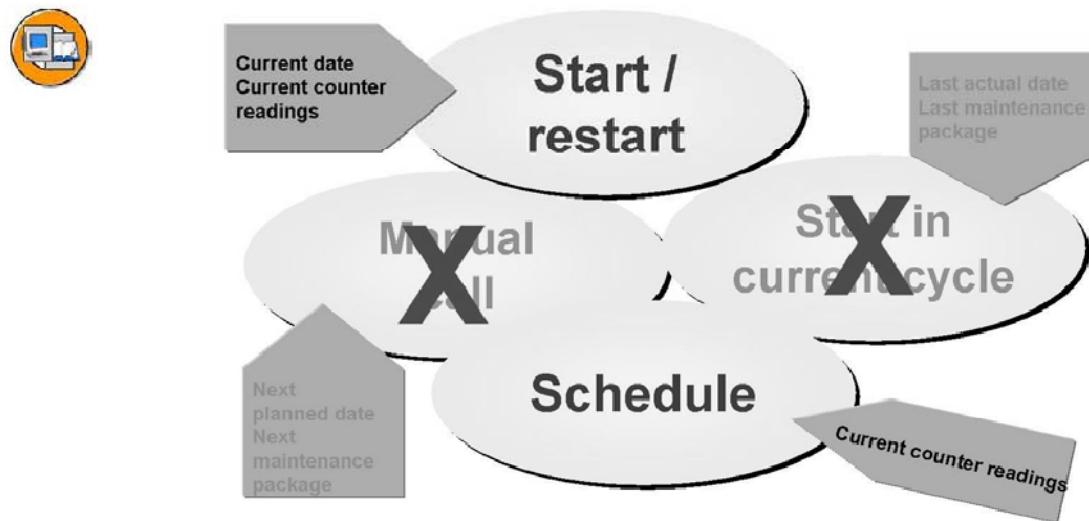


Figure 80: Scheduling Functions

The multiple counter plan is started based on the current counter readings for the current date.

Scheduling is always updated based on the current counter readings. No processing of a series of single cycles, as is the case with the strategy, occurs here. For this reason, it is important to enter the current counter readings using measurement documents before scheduling.

A restart is possible.

The functions, *Start in current cycle* and *Manual call*, are not used for multiple counter plans.

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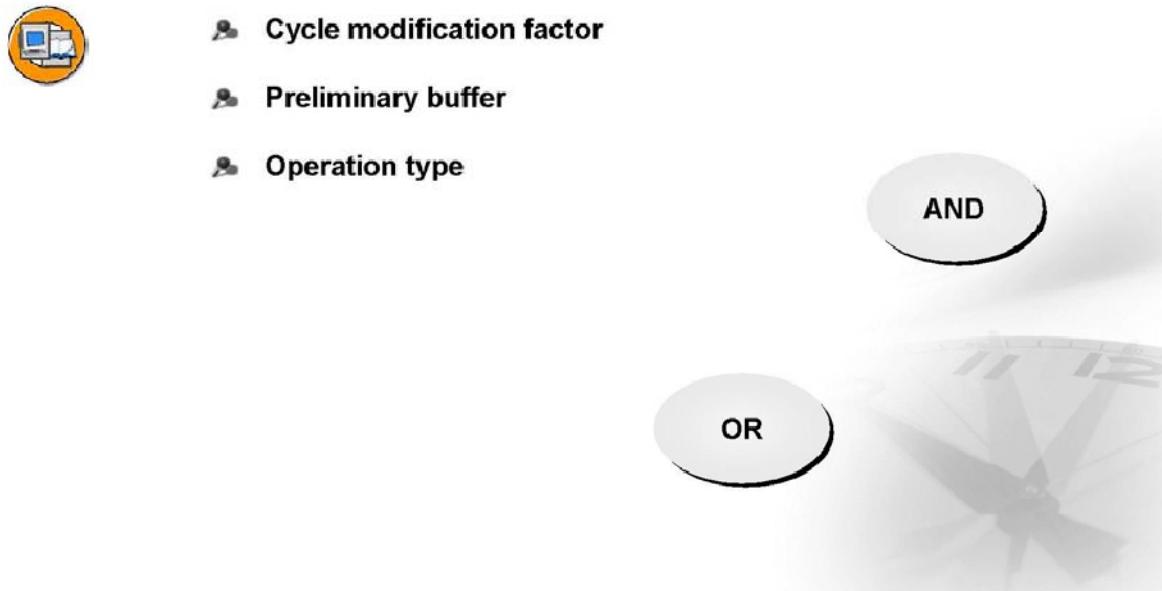


Figure 81: Scheduling Parameters - Multiple Counter Plan

The multiple counter plan recognizes the following **scheduling parameters**:

- **Cycle modification factor**

As in the strategy plan, the cycle modification factor extends or shortens the maintenance cycle.

- **Preliminary buffer**

Defines the call date for the order in relation to the calculated planned date and, as a result, also the basic start date for the maintenance order.

It is specified in days.

- **Operation type**

Determines the type of link for the maintenance cycles. If the AND link is used, the order is created only when all the cycles are due. For an OR link, the order is created when one of the cycles is due.

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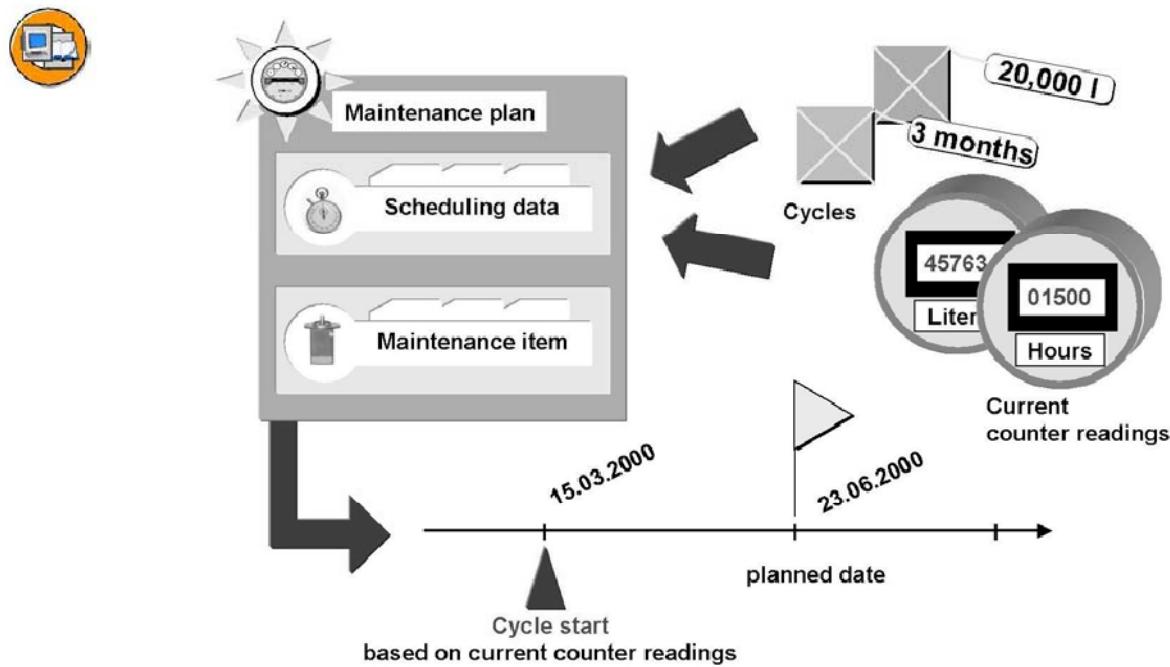


Figure 82: Starting a Multiple Counter Plan

The plan is started based on the current counter readings and the current date.

The first planned date is calculated starting from the current date. For the OR link type, the planned date is calculated based on the smaller interval arising from the cycle and performance/day.

→ **Note:** Perfect scheduling is ensured only if the following process flow is observed:

1. Generate order.
2. Complete order.
3. Enter measurement document when the order is completed (or enter measurement documents regularly).
4. Reschedule the maintenance plan.

In contrast to the performance-based strategy plan, when you schedule the multiple counter plan, no high numbers of cycles occur to determine the new planned date. Instead, scheduling is always calculated from the current counter readings. As a result, if the multiple counter plan is scheduled after a called order is completed, before the current measurement document has been entered, the scheduling is reset to the old counter readings and the same planned date will be calculated as for the previous scheduling function.

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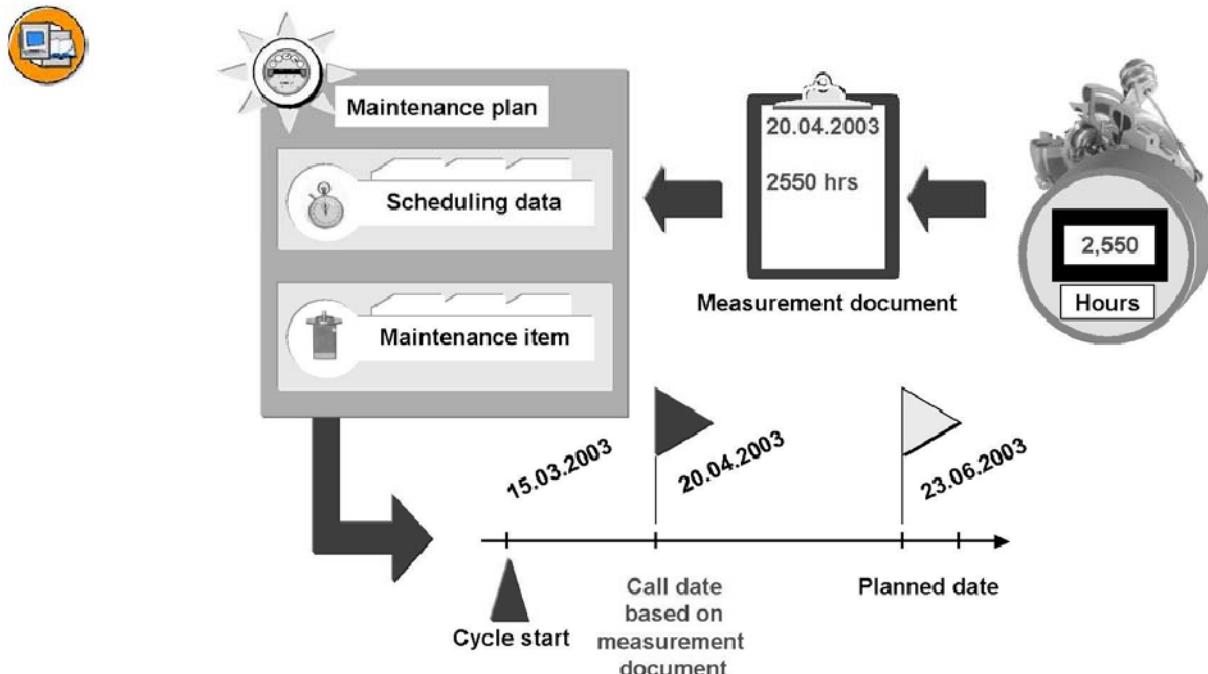


Figure 83: Creating a Measurement Document

The actual call date is determined from the **measurement documents** entered, which record the changes to the counter reading. If the **maintenance cycle** is due because of such a measurement document, the call is made immediately.

If the cycle is not due as a result of a measurement document being entered, the call is made on the planned date calculated.

Continued on next page

Exercise 15: Multiple Counter Plan

Exercise Objectives

After completing this exercise, you will be able to:

- Create a multiple counter plan
- Schedule a multiple counter plan

Business Example

At IDES, the performance-based maintenance of system parts with different capacity levels can be controlled using several characteristics.

For example, in the clarification plant, the pumps that are used irregularly are maintained based on the flow in liters and the number of operating hours.

Task:

1. Create a second counter that keeps a track of the operating hours for the piece of equipment, TEQ-##. Enter an annual performance of 3,650 hours.

Which characteristic do you choose for the counter and how do you determine it?

2. Enter an initial measurement document for this counter. How do you do this?

3. Display the cycle set, ZS.

Which menu path do you use?

Which cycles are defined?

What is the function of a cycle set?

What is the difference between a cycle set and a strategy?

4. Create a multiple counter plan. Use the following data:

Cycle set	ZS
Equipment	TEQ-##
Task list	PUMP_WTG, GrpCr 7
Operation type	OR

Continued on next page

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Which menu path do you use?

What maintenance plan number does the system assign?

Continued on next page

Solution 15: Multiple Counter Plan

Task:

1. Create a second counter that keeps a track of the operating hours for the piece of equipment, TEQ-##. Enter an annual performance of 3,650 hours.

Which characteristic do you choose for the counter and how do you determine it?

- a) Choose *SAP Menu → Logistics → Plant Maintenance → Management of Technical Objects → Equipment → Change*.

Select *Measuring points/counters*, and then *New entries*.

Field Name or Data Type	Values
Measuring point (number)	Assigned automatically
Characteristic	OPERATING_HOURS_1
Counter indicator	<input checked="" type="checkbox"/>
Description of measuring point	For example, flow in liters counter

Select a new measuring point and choose *Measuring point* (in the detail view of the measuring point).

Field Name or Data Type	Values
Counter overflow mark	For example, 1,000,000
Annual performance	3650

2. Enter an initial measurement document for this counter. How do you do this?
 - a) Choose *SAP Menu → Logistics → Plant Maintenance → Management of Technical Objects → Equipment → Measurement Documents → Create*.

Field Name or Data Type	Values
Measuring point	From section 5-1
Counter reading	0

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3. Display the cycle set, ZS.

Which menu path do you use?

Which cycles are defined?

What is the function of a cycle set?

What is the difference between a cycle set and a strategy?

- a) Choose *SAP Menu → Logistics → Plant Maintenance → Preventive Maintenance → Maintenance Planning → Cycle Sets → Display*.

Field Name or Data Type	Values
Cycle set	ZS
Cycle 1	Every 10,000 liters
Cycle 2	Every 1,000 operating hours

A cycle set is used as a **template** for cycles when you create a multiple counter plan. The cycles can be changed in the maintenance plan without affecting the cycle set.

The difference between a **strategy** and a **cycle set** is that a strategy always has cycles of the same dimension, such as time. Conversely, a cycle set can have cycles of different dimensions, such as time, liters, and flow in liters.

A relationship also exists between a strategy and a strategy plan, which means if the strategy is changed, the strategy plans that indicate them change too. This relationship does not exist between a cycle set and a multiple counter plan.

4. Create a multiple counter plan. Use the following data:

Cycle set	ZS
Equipment	TEQ-##
Task list	PUMP_WTG, GrpCr 7
Operation type	OR

Which menu path do you use?

Continued on next page

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What maintenance plan number does the system assign?

- a) Choose *SAP Menu → Logistics → Plant Maintenance → Preventive Maintenance → Maintenance Planning → Maintenance Plans → Create → Multiple Counter Plan.*

Field Name or Data Type	Values
Maintenance plan	Leave blank
Maintenance plan category	Plant maintenance
Cycle set	ZS
Reference object	TEQ-##
Counter	Determined automatically from reference object
Task list - Type	A
TaskLstGrp	PUMP_WTG
Task list - GrpCr	7

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Exercise 16: Scheduling Multiple Counter Plans

Exercise Objectives

After completing this exercise, you will be able to:

- Create a multiple counter plan
- Schedule a multiple counter plan and generate calls

Business Example

At IDES, the performance-based maintenance of system parts with different capacity levels can be controlled using several characteristics.

For example, in the clarification plant, the pumps that are used irregularly are maintained based on the flow in liters and the number of operating hours.

Task:

1. Start the maintenance plan based on the current counter readings.
Which notification is displayed at the start?
Which planned date is calculated?
2. Enter a counter reading that calls up a maintenance order for one of the counters.
Which counter reading have you entered and how high does it have to be?
Check the order generated by the maintenance plan.
Which order number does the system assign?
Release the order and technically complete it immediately. During the technical completion, enter two new counter readings for the flow in liters and operating hours counters. How do you do this?
3. Display the maintenance plan after the order has been technically completed.
What effect does the completion have?

Continued on next page

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Call the deadline monitoring function and reschedule the maintenance plan. How do you do this?

Check the situation for planned/call dates. What effect does the rescheduling have?

Continued on next page

Solution 16: Scheduling Multiple Counter Plans

Task:

1. Start the maintenance plan based on the current counter readings.

Which notification is displayed at the start?

Which planned date is calculated?

- a) Choose *SAP Menu → Logistics → Plant Maintenance → Preventive Maintenance → Maintenance Planning → Scheduling for Maintenance Plans → Schedule*.

Choose *Edit → Start*.

Field Name or Data Type	Values
Notification	Scheduling is based on the counter readings for today's date
Planned date	Today's date + 100 days [^]

2. Enter a counter reading that calls up a maintenance order for one of the counters.

Which counter reading have you entered and how high does it have to be?

Check the order generated by the maintenance plan.

Which order number does the system assign?

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Release the order and technically complete it immediately. During the technical completion, enter two new counter readings for the flow in liters and operating hours counters. How do you do this?

- a) Choose *SAP Menu → Logistics → Plant Maintenance → Management of Technical Objects → Equipment → Measurement Documents → Create.*

The measurement document created must reach one of the planned counter readings so that an order is called.

Choose *SAP Menu → Logistics → Plant Maintenance → Maintenance Processing → Order → Order List → Change.*

Selection criteria: Status Outstanding, maintenance plan number

Select *Release order* and then *Technical completion*.

After the order has been technically completed, the corresponding call is marked as completed in the maintenance plan. The completion date specified on completion is entered in the maintenance plan.

3. Display the maintenance plan after the order has been technically completed.

What effect does the completion have?

Call the deadline monitoring function and reschedule the maintenance plan. How do you do this?

Check the situation for planned/call dates. What effect does the rescheduling have?

- a) When the order is technically completed, the call is selected as completed.

Choose *SAP Menu → Logistics → Plant Maintenance → Preventive Maintenance → Maintenance Planning → Scheduling for Maintenance Plans → Deadline Monitoring.*

As a result of rescheduling, a new planned date has been calculated, based on the counter readings entered for the technical completion of the last order.

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Lesson Summary

You should now be able to:

- Create a multiple counter plan
- Schedule a multiple counter plan

Continued on next page



Unit Summary

You should now be able to:

- Create a multiple counter plan
- Schedule a multiple counter plan

Continued on next page



Test Your Knowledge

1. When you schedule a multiple counter plan, high numbers of cycles occur the new planned date.

Determine whether this statement is true or false.

- True
- False

2. The _____ is used as a template to create a multiple counter plan, which consists of a series of maintenance cycles.

Fill in the blanks to complete the sentence.

Continued on next page



Answers

1. When you schedule a multiple counter plan, high numbers of cycles occur the new planned date.

Answer: False

When you schedule a multiple counter plan, high numbers of cycles do not occur to determine the new planned date. Instead, scheduling is always calculated from the current counter readings.

2. The cycle set is used as a template to create a multiple counter plan, which consists of a series of maintenance cycles.

Answer: cycle set

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Unit 6

Maintenance-Plan-Based Sales of Services

Unit Overview

The unit provides an overview of maintenance contracts. To begin with, you will learn about the concept of maintenance contracts. Then, you will learn how to create a contract-based maintenance plan with reference to the contract item.



Unit Objectives

After completing this unit, you will be able to:

- Describe the functions of a maintenance contract
- Create a contract-based maintenance plan

Unit Contents

Lesson: Maintenance Contracts	220
Exercise 17: Maintenance Contract and Maintenance Plan.....	225

Lesson: Maintenance Contracts

Lesson Overview

This lesson provides an overview of maintenance contracts. To begin with, the lesson explains the concept of maintenance contracts. The lesson also explains how to create a contract-based maintenance plan with reference to the contract item.



Lesson Objectives

After completing this lesson, you will be able to:

- Describe the functions of a maintenance contract
- Create a contract-based maintenance plan

Business Example

You work as an SAP administrator for the Precision Pumps company. The company provides services for your customers regularly. They want to ensure that when the service task is due, a service order or notification is called up with reference to the maintenance contract of the customer. Use the contract-based maintenance plan to achieve this.

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Introducing Maintenance Contracts

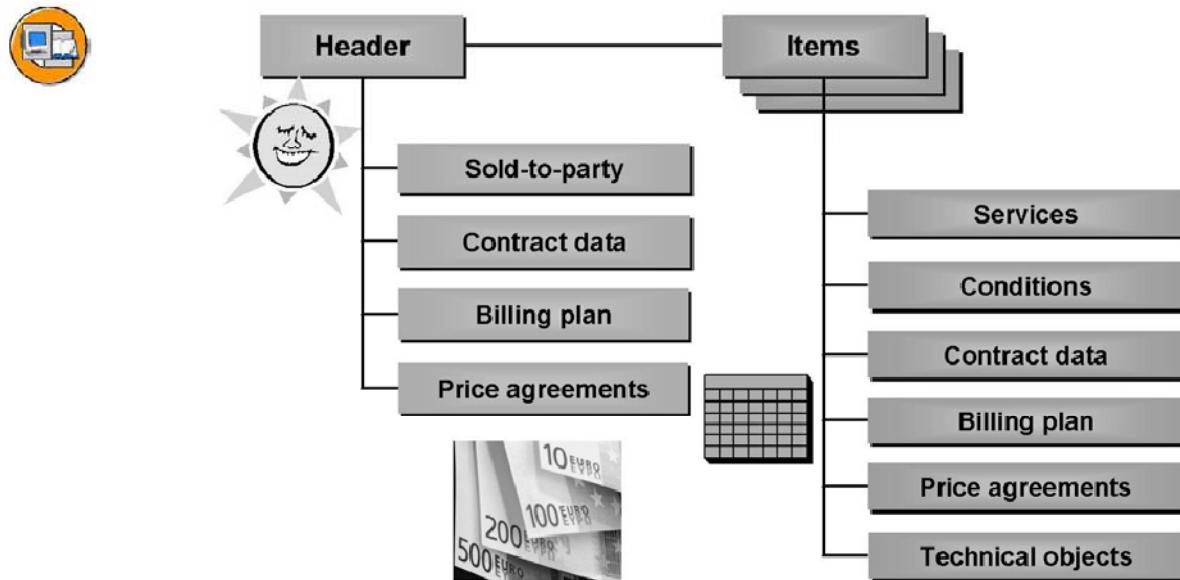


Figure 84: Brief Overview: Maintenance Contract

The service contract is a sales document.

In the standard settings, the sales document type, SM (Service and Maintenance), is used.

The **contract header** contains the assignment to the sold-to-party and additional partner information. The contract data and price agreements can also be defined for the contract header. These are valid for all items, unless otherwise specified. The billing plan header is used to determine the settlement periods and billing dates for the billing plans of the items.

The **contract items** contain the service products and conditions. The contract data, billing plan, and price agreements can also be defined at the item level. The technical objects at which services are performed are also assigned at the item level.

The following elements can be entered as **technical objects**: Functional locations, pieces of equipment (with or without an assembly), or serial numbers.

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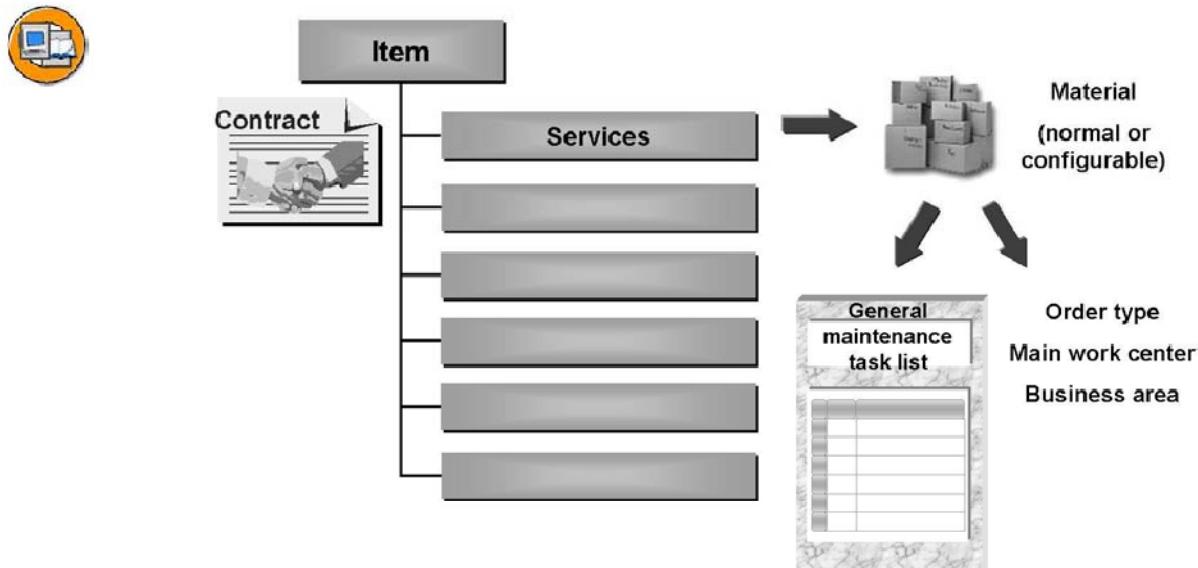


Figure 85: Material and General Maintenance Task List

The contract item contains the services that are mainly specified as configurable materials.

In addition to the data in the material master, the material contains a series of links. It indicates the following:

- General maintenance task list
- The work center responsible
- Order type
- Business area

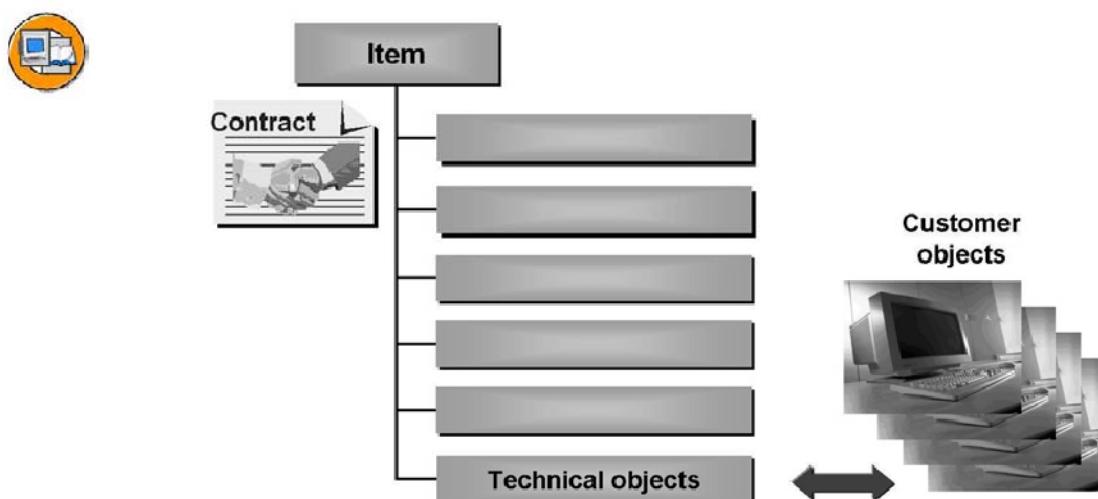


Figure 86: Contract Item and Technical Objects

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The technical objects, such as pieces of customer equipment, are assigned to the contract item.

Creating Contract-Based Maintenance Plans

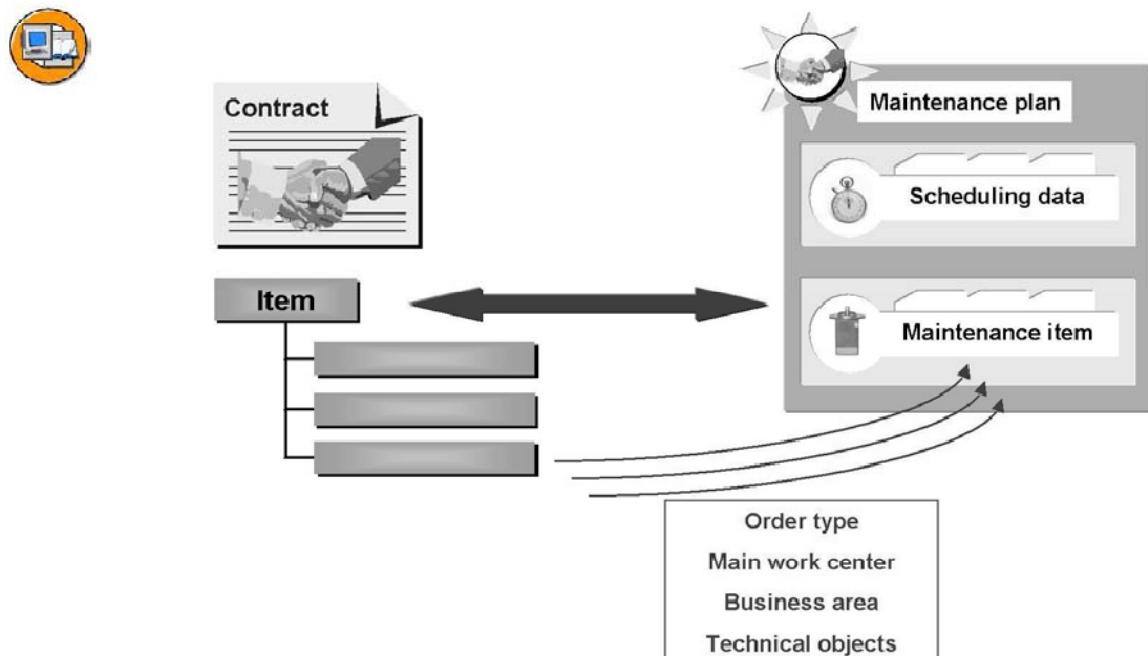


Figure 87: Connection of Maintenance Plan to Maintenance Contract

You can create a maintenance plan with reference to a service contract item. You can use this maintenance plan category to simplify the processing of services that you have agreed in the outline agreements for service objects.

When a maintenance plan is created with reference to a contract item, the system automatically copies certain data into the maintenance item. The **start date** is proposed from the contract item. If the service order is the call object for the maintenance plan, an object list is created as a reference to the **object list** for the contract.

The object list can be changed only in the contract item.

Default values are also copied into the maintenance item using the service product from the contract item.

Because you have assigned a **general task list** to the service product, the system obtains the information about the maintenance plan type when a maintenance plan is created with the *Service order* call object. The strategy for

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the maintenance plan is determined using the maintenance strategy, which is specified in the general task list. If no strategy is specified in the general task list, a single cycle plan is created.

During **scheduling**, the system creates service notifications or service orders with reference to a contract.

Continued on next page

Exercise 17: Maintenance Contract and Maintenance Plan

Exercise Objectives

After completing this exercise, you will be able to:

- Create a maintenance plan with reference to an item in a maintenance contract
- Schedule a maintenance plan with reference to an item in a maintenance contract

Business Example

IDES services a series of its products based on maintenance contracts.

For this reason, a layered service concept is offered to maintain Personal Computers. Before a service task becomes due, a service order is to be created automatically on time with reference to the customer's maintenance contract. A maintenance plan that is linked to the item in the maintenance contract is used to this end.

Task:

1. You conclude a maintenance contract with your customer, Hi-Tech, covering regular inspections of its EDP equipment.

Display the maintenance contract, **40000084**, and determine the following data:

Sold-to-party	?
Material	?
Duration	?
Technical Objects	?

How do you do this?

2. To generate the service orders for these maintenance tasks at regular intervals, create a maintenance plan for this maintenance contract.

Continued on next page

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Maintenance plan category	Service order with contract
Sales document	40000084
Item	10
Planning plant	1200

Check the cycle start date and the object list. Which entries have been made?

Which task list has been assigned?

Why?

Save the maintenance plan. What maintenance plan number does the system assign?

3. Schedule the maintenance plan with the following parameters:

Call horizon	0
Scheduling period	Duration of maintenance contract
Confirmation requirement	<input checked="" type="checkbox"/>
Start of cycle	Copy default value

Start the maintenance plan. How do you do this?

Display the service orders generated by the maintenance plan and check whether the operations and objects have been copied correctly. How do you do this?

4. Call the graphical maintenance scheduling overview for the maintenance plan created above.

Display the service dates for the duration of the maintenance contract. How do you do this?

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Solution 17: Maintenance Contract and Maintenance Plan

Task:

1. You conclude a maintenance contract with your customer, Hi-Tech, covering regular inspections of its EDP equipment.

Display the maintenance contract, **40000084**, and determine the following data:

Sold-to-party	?
Material	?
Duration	?
Technical Objects	?

How do you do this?

- a) Choose *SAP Menu → Logistics → Customer Service → Service Agreements → Contracts → Contract → Display*.

Field Name or Data Type	Values
Sold-to-party	1032
Material	INSPECTION_SERVICE
Technical Objects (<i>Display using Extras → Technical objects</i>)	Maxitec-R 3100 personal computer with equipment numbers
Duration	27.01.2003 - 26.01.2008 (<i>Item detail tab, select item and choose Item details, then select the Contract data tab</i>)

2. To generate the service orders for these maintenance tasks at regular intervals, create a maintenance plan for this maintenance contract.

Continued on next page

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Maintenance plan category	Service order with contract
Sales document	40000084
Item	10
Planning plant	1200

Check the cycle start date and the object list. Which entries have been made?

Which task list has been assigned?

Why?

Save the maintenance plan. What maintenance plan number does the system assign?

- a) Choose *SAP Menu → Logistics → Plant Maintenance → Preventive Maintenance → Maintenance Planning → Maintenance Plans → Create → For Contract Item.*

The default contract start for the maintenance contract is the cycle start date, January 27, 2003.

The object list contains the technical objects from the contract item (see above).

Task list:

Field Name or Data Type	Values
Type	A
Task list group	61
Task list group counter	1

The task list is assigned to the service product using the following path:

SAP Menu → Logistics → Customer Service → Service Agreements → Environment → Sales and Distribution → Service Products for Maintenance Plans.

3. Schedule the maintenance plan with the following parameters:

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Call horizon	0
Scheduling period	Duration of maintenance contract
Confirmation requirement	<input checked="" type="checkbox"/>
Start of cycle	Copy default value

Start the maintenance plan. How do you do this?

Display the service orders generated by the maintenance plan and check whether the operations and objects have been copied correctly. How do you do this?

- a) Choose *SAP Menu → Logistics → Plant Maintenance → Preventive Maintenance → Maintenance Planning → Scheduling for Maintenance Plans → Schedule.*

Choose *Edit → Start.*

Call the scheduling of the maintenance plan in the scheduling mode (or display mode) again and select the line, *New start*, called in the list of scheduled calls. Click the *Display call object* (glasses icon).

The task list and the object list for the maintenance item have been copied into the service order (*Operations and Objects* tabs).

- 4. Call the graphical maintenance scheduling overview for the maintenance plan created above.

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Display the service dates for the duration of the maintenance contract.
How do you do this?

- a) Choose *SAP Menu → Logistics → Plant Maintenance → Preventive Maintenance → Maintenance Planning → Scheduling for Maintenance Plans → Scheduling Overview → Graphical.*

Field Name or Data Type	Values
From date	27.01.2003
To date	26.01.2008
With equipment	<input checked="" type="checkbox"/>
With maintenance plans	<input checked="" type="checkbox"/>
With orders	<input checked="" type="checkbox"/>
Maintenance plan	From section 6-2

Continued on next page



Lesson Summary

You should now be able to:

- Describe the functions of a maintenance contract
- Create a contract-based maintenance plan

Continued on next page



Unit Summary

You should now be able to:

- Describe the functions of a maintenance contract
- Create a contract-based maintenance plan

Continued on next page



Test Your Knowledge

1. In a maintenance contract, the _____ contain the service products and conditions.

Fill in the blanks to complete the sentence.

2. The system obtains the information about the maintenance plan type when a maintenance plan is created with the _____ call object.

Fill in the blanks to complete the sentence.

Continued on next page



Answers

1. In a maintenance contract, the contract items contain the service products and conditions.

Answer: contract items

2. The system obtains the information about the maintenance plan type when a maintenance plan is created with the Service order call object.

Answer: Service order

Continued on next page

Unit 7

Condition-Based Maintenance

Unit Overview

In this unit, you will learn about condition-based maintenance. First, you will learn about the connection of the process control system to the R/3 Plant Maintenance (PM) system. In addition, you will learn how to handle the process data in the R/3 PM system.



Unit Objectives

After completing this unit, you will be able to:

- Explain the connection of a process control system to the R/3 Plant Maintenance (PM) System
- Explain how to handle process data in the R/3 Plant Maintenance (PM) system

Unit Contents

Lesson: Interface Process Control System with R/3 PM System 236

Lesson: Interface Process Control System with R/3 PM System

Lesson Overview

This lesson provides an overview of condition-based maintenance. It explains the connection of the process control system to the R/3 Plant Maintenance (PM) system. In addition, the lesson explains how to handle The process data in the R/3 PM system.



Lesson Objectives

After completing this lesson, you will be able to:

- Explain the connection of a process control system to the R/3 Plant Maintenance (PM) System
- Explain how to handle process data in the R/3 Plant Maintenance (PM) system

Business Example

You work as an SAP administrator at the Precision Pumps company. The lift at the company breaks down. The company wants you to use the condition-based maintenance strategy so that the lift repair is automatically triggered by the transmission of the current condition data. For example, if a motor in the lift breaks down, a specific malfunction code needs to be transmitted to trigger a corresponding notification in the PM component of SAP R/3 Enterprise.

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Connecting R/3 PM System to Process Control System

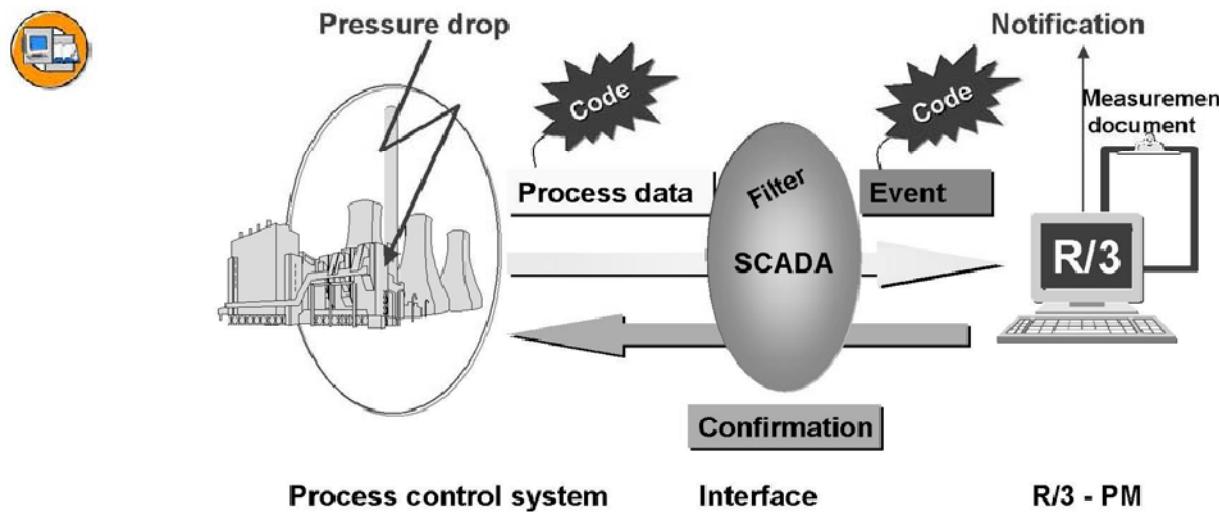


Figure 88: Connection: Process Control System - PM

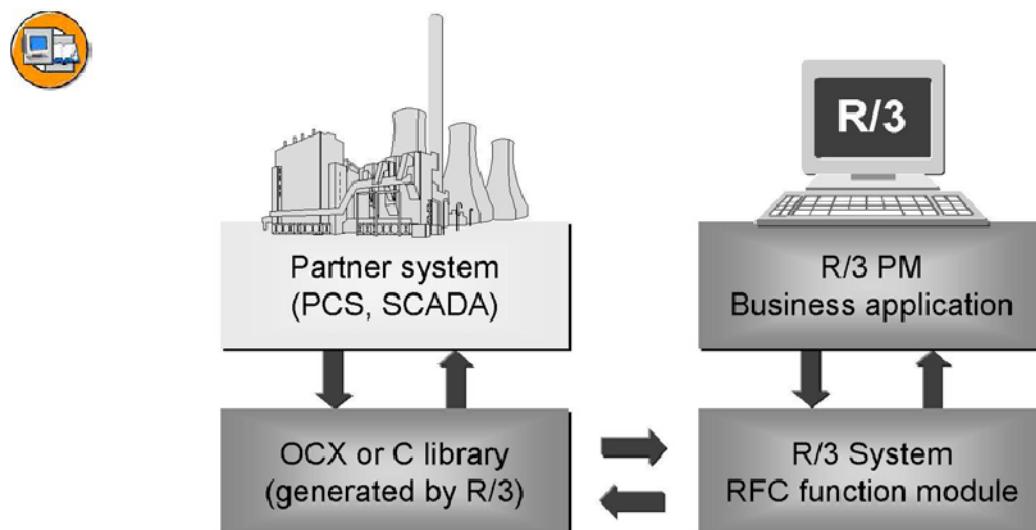


Figure 89: Communication Profile

Communication between R/3 Enterprise and the partner system is based on **RFC modules** (RFC = Remote Function Call).

R/3 Enterprise provides a series of RFC modules that form a defined interface to transfer and edit the process data.

A client RFC module, C library, is generated within R/3 Enterprise. This module can then be implemented in the partner system and forms the interface to the R/3 Enterprise.

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The modules can be configured in such a way that when a tolerance value is exceeded, an event is triggered, which generates a notification in the PM component of R/3 Enterprise.

After the notification has been created, the current system condition can be displayed by the person responsible (customer exit).

All the necessary modules are contained in the standard R/3 Enterprise.

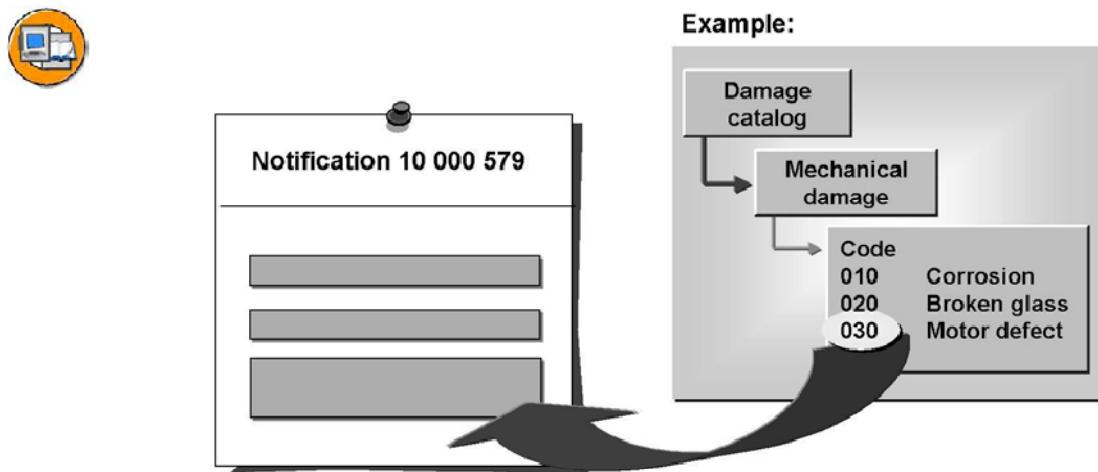


Figure 90: Notification with Code

With the appropriate configuration, the process data can be transferred together with **condition codes**.

If the condition codes for the external system have been matched with the codes in the PM component of R/3 Enterprise, the condition code transferred can be copied directly into the notification and record the appropriate damage.

Continued on next page



Lesson Summary

You should now be able to:

- Explain the connection of a process control system to the R/3 Plant Maintenance (PM) System
- Explain how to handle process data in the R/3 Plant Maintenance (PM) system

Continued on next page



Unit Summary

You should now be able to:

- Explain the connection of a process control system to the R/3 Plant Maintenance (PM) System
- Explain how to handle process data in the R/3 Plant Maintenance (PM) system

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Test Your Knowledge

1. How is a notification generated in the PM component of SAP R/3 Enterprise?

2. How can you record the appropriate damage using the condition code?

Continued on next page



Answers

1. How is a notification generated in the PM component of SAP R/3 Enterprise?

Answer: A notification is generated in the PM component of SAP R/3 Enterprise when the RFC modules are configured such that when a tolerance value is exceeded, an event is triggered.

2. How can you record the appropriate damage using the condition code?

Answer: If the condition codes for the external system have been matched with the codes in the PM component of SAP R/3 Enterprise, the condition code transferred can be copied directly into the notification to record the appropriate damage.

Continued on next page

Unit 8

Maintenance-Plan-Based Test Equipment Management

Unit Overview

This unit provides an overview of integrating Plant Maintenance (PM) and Quality Management (QM). To begin with, you will learn about the basics of the integration of PM and QM. Next, you will learn how to use inspection characteristics in task lists. You will also learn how to create maintenance plans that generate orders with an inspection lot. In addition, you will learn how to make a characteristic valuation and usage decision. Finally, you will learn how to make important settings in Customizing.



Unit Objectives

After completing this unit, you will be able to:

- Use the inspection characteristics in task lists
- Create the maintenance plans that generate orders with an inspection lot
- Make a characteristic valuation and a usage decision
- Make the important settings in Customizing

Unit Contents

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Exercise 18: Maintenance Plan-Based Test Equipment Management ..	253

Lesson: Integrating Plant Maintenance and Quality Management

Lesson Overview

This lesson provides an overview of integrating Plant Maintenance (PM) and Quality Management (QM). The lesson begins with an introduction to the integration of PM and QM. Next, it explains how to use the inspection characteristics in task lists. The lesson also explains how to create the maintenance plans that generate orders with an inspection lot. In addition, the lesson explains how to make a characteristic valuation and a usage decision. Finally, the lesson explains how to make the important settings in Customizing.



Lesson Objectives

After completing this lesson, you will be able to:

- Use the inspection characteristics in task lists
- Create the maintenance plans that generate orders with an inspection lot
- Make a characteristic valuation and a usage decision
- Make the important settings in Customizing

Business Example

You work as a SAP Administrator at the Precision Pumps company. The company wants the bathymetry gauge (depth measurement) to be checked regularly. If any part malfunctions, a report should be generated and recorded with the appropriate error code. Perform the planning and execution using a maintenance plan that automatically generates an inspection lot.

In the QM component, the measurement readings for the characteristics, Length and Diameter, of the probe, pin, need to be entered for this inspection lot. If the measurement readings lie outside of the tolerances, such as where The adjustment is necessary, the status of the gauge should be changed accordingly and a malfunction report should be generated with the appropriate error code.

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Overview of PM-QM Integration

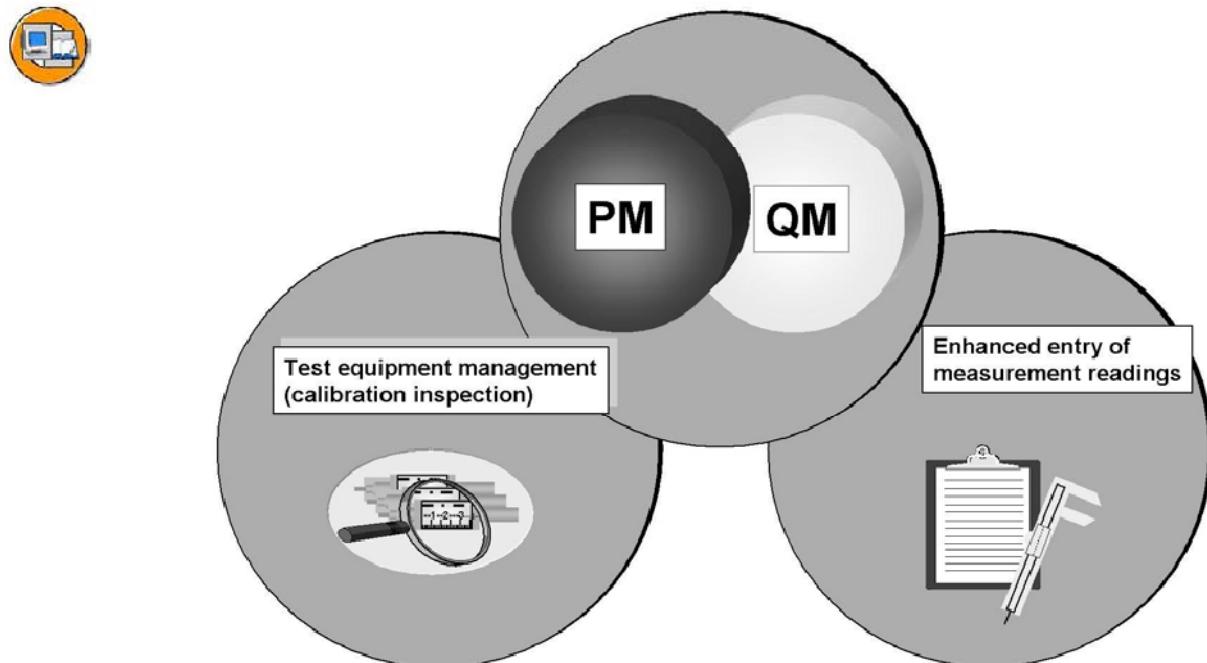


Figure 91: PM-QM Integration

The integration of Plant Maintenance (PM) and Quality Management (QM) is subdivided into two areas:

- Test equipment management (calibration inspection)
- Enhanced measurement reading entry

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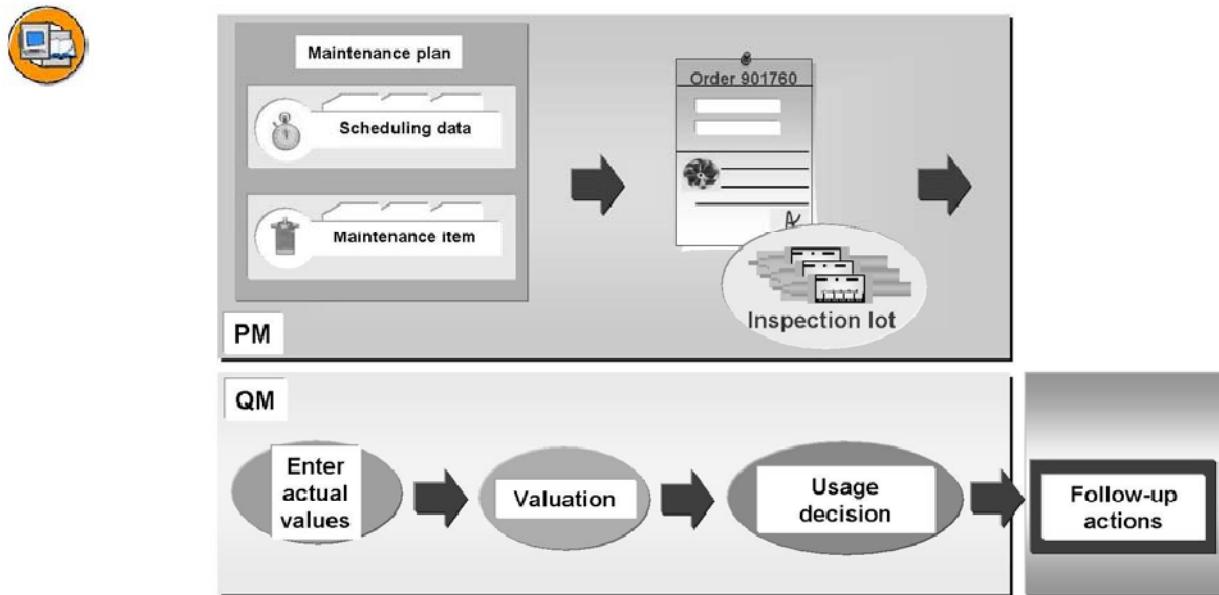


Figure 92: Process Flow

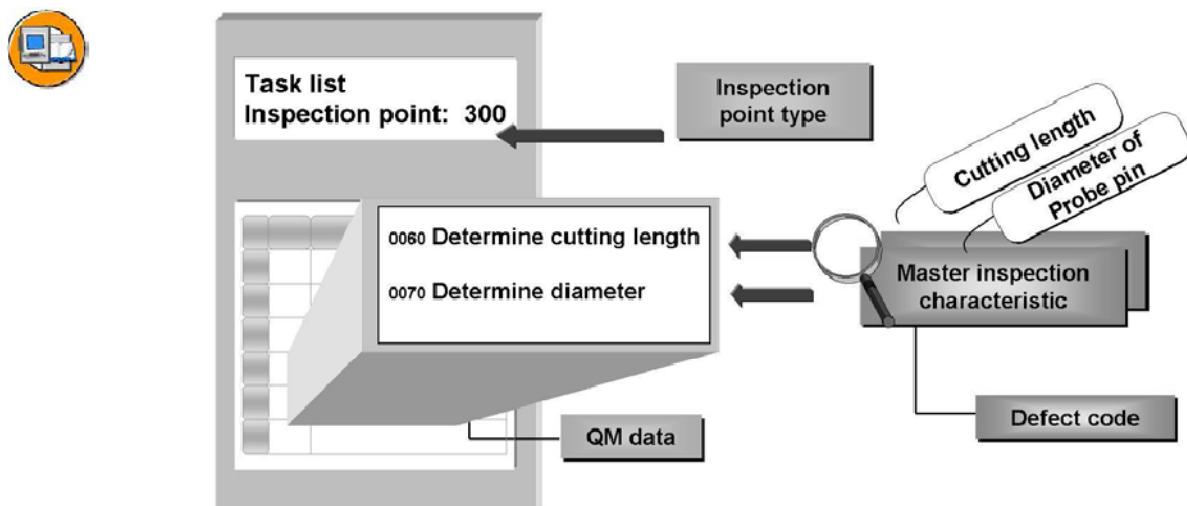


Figure 93: Task List

A **task list** that contains all the inspection operations is created for the work to be performed.

The inspection point type is set in the task list header.

The **master inspection characteristics** are assigned to the corresponding **operations** in the task list.

If the measurement readings are not to be updated, a general characteristic is assigned to the operation.

Continued on next page

The inspection point completion is still defined in the QM data for the operation, such as automatic valuation.

A **defect code** is assigned to the characteristic. The defect code is copied to the automatically generated **notification** if this characteristic is rejected during an inspection.

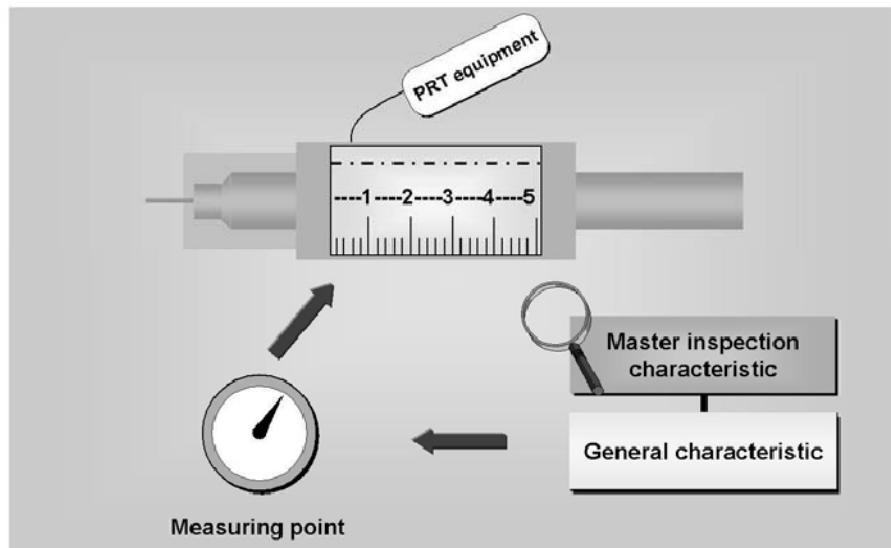


Figure 94: Characteristic Assignment for Tracking Measurement Readings

The test equipment to be checked must be created as a **production resource/tool equipment**.

If the measurement readings are to be updated, a **measuring point** must be assigned to the equipment.

A general characteristic is assigned to the measuring point that is defined in the class system.

In QM, a **master inspection characteristic** is created that references the general characteristic and, as a result, produces the link to the measuring point.

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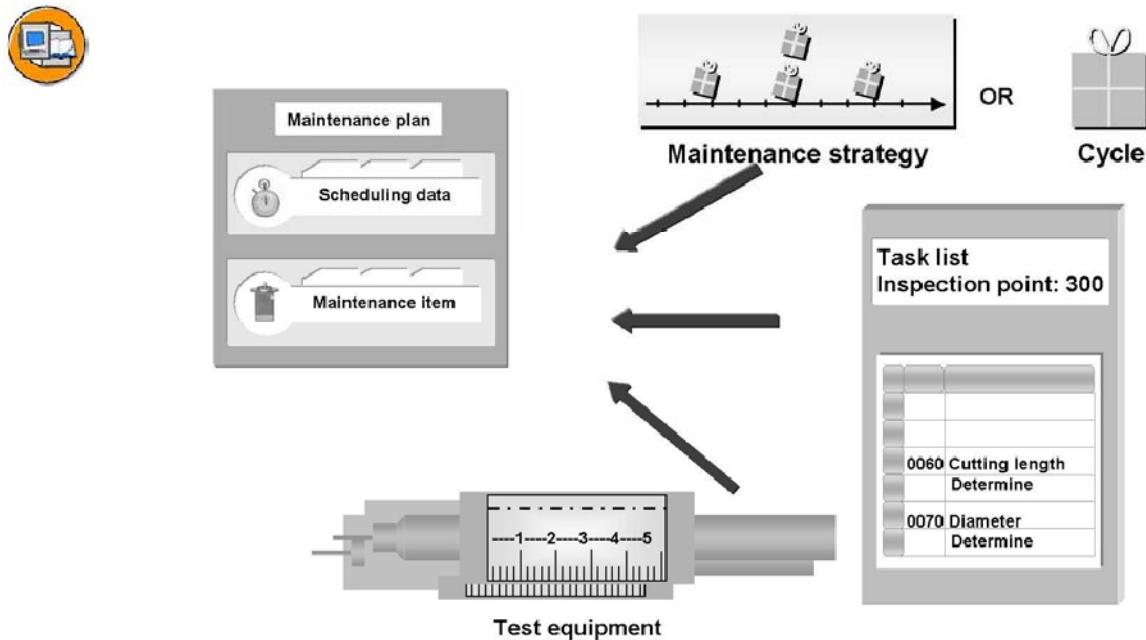


Figure 95: Maintenance Plan

A **maintenance plan** is created to plan and monitor inspection dates.

You can assign a **maintenance strategy** or a **cycle**, the previously created **task list**, and one or more **objects** (test equipment) to the maintenance plan.

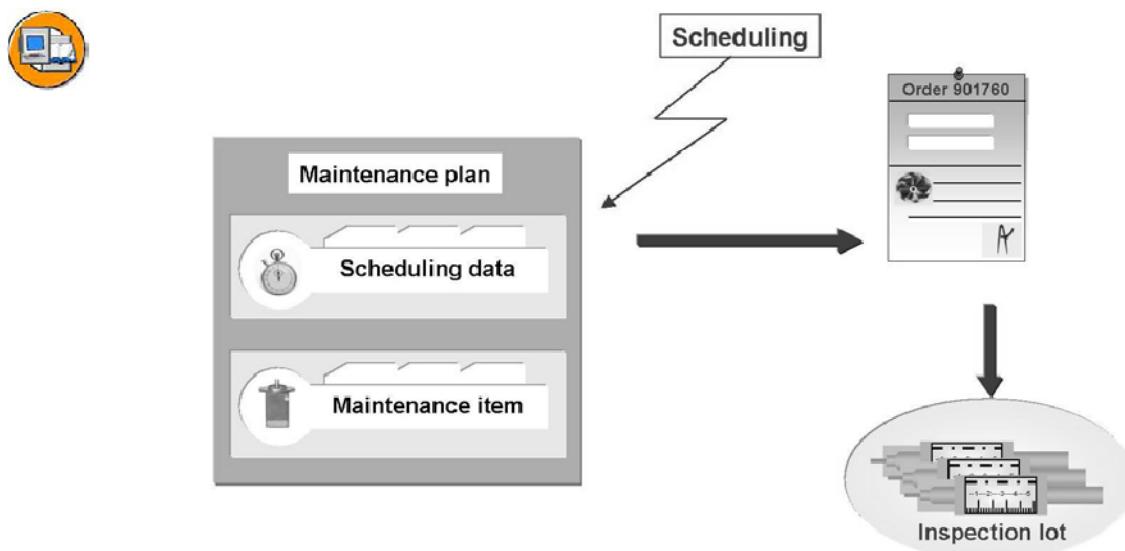


Figure 96: Generating an Inspection Lot

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The maintenance plan is **scheduled** and, as a result, generates an **order with an inspection lot** when the order is released.

The important factor here is the **order type**, which is set in Customizing beforehand and represents the link between PM and QM. An automatic release can be preset for this order type.

The order is generated in **deadline monitoring** according to the **scheduling parameters** set in the maintenance plan.

You can also generate orders manually from the maintenance plan.

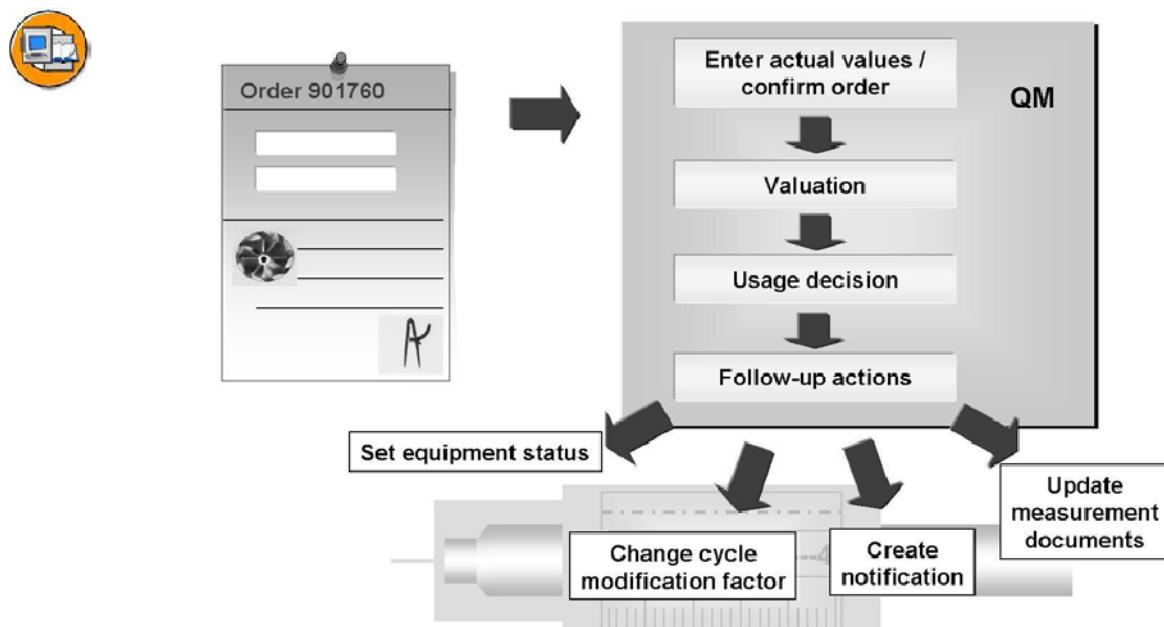


Figure 97: Processing in QM

The **measurement readings** that result from the inspection are entered as an **inspection result** for the respective object and operation in QM. When the information is entered, the **actual values** are compared with the target values.

After the actual values have been entered, a **valuation** is made for the equipment:

The inspection completion follows the valuation.

A **usage decision** is made for the inspection lot based on the inspection results. This is achieved by entering predefined codes, UD codes.

Continued on next page

You can assign a **follow-up action** to the UD code. The following scenarios can occur here:

- The actual values lie in the tolerance range.
The equipment status is updated. For example, it is released for production.
- The actual values do **not** lie within the tolerance range.
One or more inspection characteristics are rejected. A malfunction report can be generated automatically, if required. In addition, the status of the object is set accordingly, such as Not usable - repair.

An adjustment of the **cycle modification factor**, which means the lengthening or shortening of the cycle, and the **updating of measurement documents** can also be triggered by the usage decision.



- Creation of control charts
- Creation of histograms
- Creation of run charts

The advantage of using the enhanced entry of measurement readings lies in using certain functions from Quality Management:

The **control chart** is a graphical means for the quality technician to regulate, analyze, and document the processes in production and other quality-relevant areas. Control charts were developed to differentiate the systematic deviations from a target value in a characteristic, such as signals from unavoidable random fluctuations of individual measurement readings, such as interferences. The control chart forms the core of **the statistical process control (SPC)**.

The **histogram** is a graphical display of a frequency distribution as a bar chart and serves to simplify the visualization of a data record. You can identify the typical and extreme values of a sample and assess the location, range of dispersion, and form of distribution.

The **run chart** is a graphical display of the single values for a quantitative characteristic across a time axis.

You can use these functions to create the trend analyses for a given characteristic easily.

Continued on next page

Customizing Settings for PM-QM Integration



- Order type
- Inspection type and order type
- Inspection point
- Control key
- Follow-up actions

Order type

In PM Customizing, an order type must be created for the calibration inspection.

Assigning the **inspection type** to the **order type**

In PM Customizing, the order type for the calibration inspection must be assigned to the previously defined inspection type for Plant Maintenance.

Inspection point

In QM Customizing, an inspection point of the categories, Equipment or Functional location, must be defined. The inspection point is entered in the task list header.

Control key

In QM Customizing, a control key that expects an inspection characteristic must be created for the task list.

Follow-up actions

In QM Customizing, follow-up actions can be defined that can then be linked to the codes for usage decisions. If a particular code is assigned when the usage decision is made, the assigned follow-up actions, such as updating measurement readings and status changes, are executed automatically.

Continued on next page

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Exercise 18: Maintenance Plan-Based Test Equipment Management

Exercise Objectives

After completing this exercise, you will be able to:

- Call a maintenance order with an inspection lot
- Enter the actual data for the inspection lot
- Enter a usage decision for the inspection lot

Business Example

A maintenance plan that generates maintenance orders with inspection lots is to be used to regularly monitor the test equipment.

Within the PM-QM link, this should also provide the basis for further processing of the actual data determined in QM.

Task 1:

1. You want to conduct a calibration inspection at regular intervals for the measurement equipment and want to use a maintenance plan for this purpose.

Create a new single cycle plan and incorporate the general maintenance task list for the calibration inspection. Create an object list with two pieces of test equipment.

Use the following data:

Planning plant	1000
Planner group	I##
Order type	PM06
Main work center	T-EL##
Business area	1000

Continued on next page

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General maintenance task list/group counter:	MM-CALIB / 1
Pieces of equipment (in object list)	10003540, 10003541
Cycle	3 months

How do you do this?

Which additional entries are required?

What is the function of the order type in this scenario?

2. Schedule the maintenance plan for today's date.

How do you do this?

How can you determine the inspection lot number?

What is the origin of the inspection lot?

What is the status of the order?

3. It is determined during the calibration inspection that the equipment, 10003540, has both an invalid zero point deviation and an unacceptable full-scale deviation. The values for the equipment, 10003541, for both the characteristics lie within the permitted tolerances.

Enter the inspection results that are appropriate for this scenario.

How do you do this?

Which valuation do you make for both the pieces of equipment?

Task 2:

After recording results and making the valuation, a usage decision that is linked to the appropriate follow-on functions should be created for the inspection lot.

1. Make a usage decision for the inspection lot.

How do you do this?

Which follow-on functions did you trigger and which were triggered automatically?

2. Check the equipment, 10003540. What has changed?

Continued on next page

Solution 18: Maintenance Plan-Based Test Equipment Management

Task 1:

1. You want to conduct a calibration inspection at regular intervals for the measurement equipment and want to use a maintenance plan for this purpose.

Create a new single cycle plan and incorporate the general maintenance task list for the calibration inspection. Create an object list with two pieces of test equipment.

Use the following data:

Planning plant	1000
Planner group	I##
Order type	PM06
Main work center	T-EL##
Business area	1000
General maintenance task list/group counter:	MM-CALIB / 1
Pieces of equipment (in object list)	10003540, 10003541
Cycle	3 months

How do you do this?

Which additional entries are required?

Continued on next page

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What is the function of the order type in this scenario?

- a) Choose *SAP Menu → Logistics → Plant Maintenance → Preventive Maintenance → Maintenance Planning → Maintenance Plans → Create → Single Cycle Plan.*

No reference object is required.

The order type is responsible to generate the inspection lot (an inspection type for the order type is created in Customizing).

The order type must be configured so that the order generated is released immediately.

2. Schedule the maintenance plan for today's date.

How do you do this?

How can you determine the inspection lot number?

What is the origin of the inspection lot?

What is the status of the order?

- a) Choose *SAP Menu → Logistics → Plant Maintenance → Preventive Maintenance → Maintenance Planning → Scheduling for Maintenance Plans → Schedule.*

Choose *Edit → Start.*

In the scheduling function, select Sched. calls. Select the call and choose Orders. Click the order number. In the order, select Inspection lot (to the right of the order short text).

Inspection lot number, such as 140000000250

Status REL (Released), ILCR (Inspection lot created)

3. It is determined during the calibration inspection that the equipment, 10003540, has both an invalid zero point deviation and an unacceptable full-scale deviation. The values for the equipment, 10003541, for both the characteristics lie within the permitted tolerances.

Enter the inspection results that are appropriate for this scenario.

How do you do this?

Continued on next page

Continued on next page

Which valuation do you make for both the pieces of equipment?

- a) Choose *SAP Menu → Logistics → Quality Management → Quality Inspection → Worklist → Results Recording.*

Inspection lot origin: 14 (Plant Maintenance)

Expand the relevant operation in the dialog structure (left column) and double-click the corresponding equipment for the inspection lot.

Both the inspection characteristics appear on the Entry screen.

Enter the actual values.

For example, Equipment, 10003540.

Field Name or Data Type	Values
Zero point deviation	1.3
Display on full scale	100.5

Save and confirm the dialog box that appears – *Can be used with the standard follow-up functions.* For example, Equipment, 10003541.

Field Name or Data Type	Values
Zero point deviation	1.7
Display on full scale	104.5

Save and confirm the dialog box that appears – *Cannot be used.*

Task 2:

After recording results and making the valuation, a usage decision that is linked to the appropriate follow-on functions should be created for the inspection lot.

1. Make a usage decision for the inspection lot.

How do you do this?

Continued on next page

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Which follow-on functions did you trigger and which were triggered automatically?

- a) Choose *Logistics → Quality Management → Quality Inspection → Inspection Lot → Usage Decision → Record*.

The inspection lot last processed appears by default.

(or enter the inspection lot number)

Choose the relevant code in the *UD code* field, such as A for **usable**, and save.

When you save the usage decision, the window to change the status of objects and the cycle modification factor appears.

One response to the valuation of the equipment, **10003541**, could be a reduction of the cycle modification factor, which results in the maintenance cycle being shortened.

A malfunction report, category, MQ, was generated with two items, zero point error and end of scale error, and the corresponding error codes.

Measurement documents were still generated for all the measurement readings.

2. Check the equipment, **1000354,0**. What has changed?

- a) The equipment, **10003541**, has been assigned the status, NPRT (PRT not ready for use), as a result of the usage decision.

Continued on next page



Lesson Summary

You should now be able to:

- Use the inspection characteristics in task lists
- Create the maintenance plans that generate orders with an inspection lot
- Make a characteristic valuation and a usage decision
- Make the important settings in Customizing

Continued on next page



Unit Summary

You should now be able to:

- Use the inspection characteristics in task lists
- Create the maintenance plans that generate orders with an inspection lot
- Make a characteristic valuation and a usage decision
- Make the important settings in Customizing

Continued on next page



Test Your Knowledge

1. In QM Customizing, the inspection point is entered in the task list header.
Determine whether this statement is true or false.
 True
 False

2. If the measurement readings are not to be updated, a master inspection characteristic is assigned to the operation.
Determine whether this statement is true or false.
 True
 False

3. The _____ is a graphical display of the single values for a quantitative characteristic across a time axis.
Choose the correct answer(s).
 A Control chart
 B Histogram
 C Run chart
 D Pie chart

4. The order is generated in _____ according to the scheduling parameters set in the maintenance plan.
Fill in the blanks to complete the sentence.

Continued on next page



Answers

1. In QM Customizing, the inspection point is entered in the task list header.

Answer: True

In QM Customizing, an inspection point of the categories, Equipment or Functional location, must be defined. The inspection point is entered in the task list header.

2. If the measurement readings are not to be updated, a master inspection characteristic is assigned to the operation.

Answer: False

If the measurement readings are not to be updated, a general characteristic is assigned to the operation.

3. The _____ is a graphical display of the single values for a quantitative characteristic across a time axis.

Answer:

The run chart is a graphical display of the single values for a quantitative characteristic across a time axis.

4. The order is generated in deadline monitoring according to the scheduling parameters set in the maintenance plan.

Answer: deadline monitoring

Continued on next page



Course Summary

You should now be able to:

- Create task lists
- Manage task lists
- Create single cycle plans
- Schedule single cycle plans
- Create strategy plans
- Schedule strategy plans
- Create performance-based maintenance plans
- Schedule performance-based maintenance plans
- Create multiple counter plans
- Schedule multiple counter plans
- Use the link between maintenance item and maintenance contract
- Describe the options available for condition-based maintenance
- Describe the possibilities of PM-QM linkage

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Appendix 1

mySAP PLM (ALM Plant Maintenance)

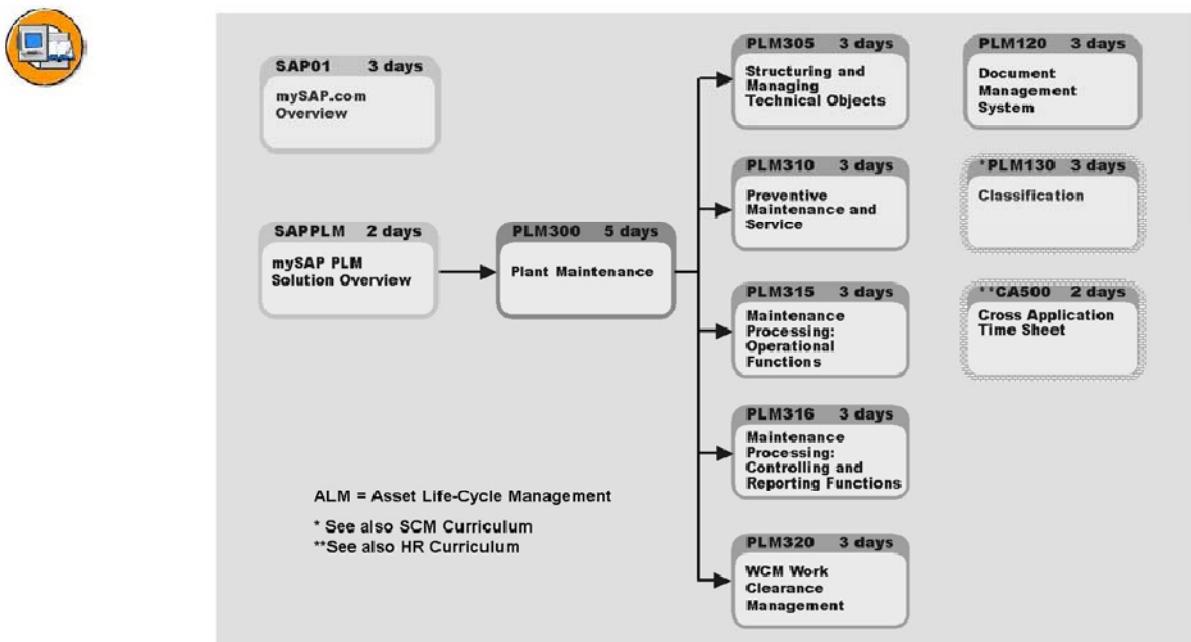


Figure 98: mySAP PLM (ALM Plant Maintenance)

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Appendix 2

Customizing Paths: Task Lists and Maintenance Planning

To access Customizing:

Choose *SAP Menu → Tools → Customizing → IMG → Edit Project.*

Select *SAP Reference IMG.*

Task lists

Field Name or Data Type	Path
Define task list usage	<i>Plant Maintenance and Customer Service → Maintenance Plans, Work Centers, Task Lists and PRTs → Task Lists → General Data → Define Task List Usage</i>
Profile	<i>Plant Maintenance and Customer Service → Maintenance Plans, Work Centers, Task Lists and PRTs → Task Lists → Control Data → Define Profiles with Default Values</i>
Free material assignment	<i>Plant Maintenance and Customer Service → Maintenance Plans, Work Centers, Task Lists and PRTs → Task Lists → Control Data → Define Presetting for Free Assignment of Material</i>
Control key	<i>Plant Maintenance and Customer Service → Maintenance Plans, Work Centers, Task Lists and PRTs → Task Lists → Operation Data (Maintain Control Keys</i>

User fields	<i>Plant Maintenance and Customer Service → Maintenance Plans, Work Centers, Task Lists and PRTs → Task Lists → Operation Data → Define User Fields</i>
Edit list	<i>Plant Maintenance and Customer Service → Maintenance Plans, Work Centers, Task Lists and PRTs → Task Lists → Set List Editing for Task Lists</i>
Preset list display	<i>Plant Maintenance and Customer Service → Maintenance Plans, Work Centers, Task Lists and PRTs → Task Lists → Presetting for List Display of Multi-Level Task Lists</i>

Maintenance plans

Field Name or Data Type	Path
Maintenance plan categories	<i>Plant Maintenance and Customer Service → Maintenance Plans, Work Centers, Task Lists and PRTs → Maintenance Plans → Set Maintenance Plan Categories</i>
Completion data	<i>Plant Maintenance and Customer Service → Maintenance Plans, Work Centers, Task Lists and PRTs → Maintenance Plans → Set Maintenance Plan Categories</i>
Number ranges	<i>Plant Maintenance and Customer Service → Maintenance Plans, Work Centers, Task Lists and PRTs → Maintenance Plans → Define Number Ranges for Maintenance Plans</i>
Sort fields	<i>Plant Maintenance and Customer Service → Maintenance Plans, Work Centers, Task Lists and PRTs → Maintenance Plans → Define Sort Fields for Maintenance Plan</i>
Field selection	<i>Plant Maintenance and Customer Service → Maintenance Plans, Work Centers, Task Lists and PRTs → Maintenance Plans → Define Field Selection for Maintenance Plan</i>
Edit list	<i>Plant Maintenance and Customer Service → Maintenance Plans, Work Centers, Task Lists and PRTs → Maintenance Plans → Set List Editing for Maintenance Plans</i>

Continued on next page

Parameters for graphical maintenance scheduling overview	<i>Plant Maintenance and Customer Service → Maintenance Plans, Work Centers, Task Lists and PRTs → Maintenance Plans → Set List Editing for Maintenance Plan Overall Overview</i>
PM-QM: Order type	<i>Plant Maintenance and Customer Service → Maintenance and Service Processing → Maintenance and Service Orders → Functions and Settings for Order Types → Configure Order Types</i>
PM-QM: Inspection type for order type	<i>Plant Maintenance and Customer Service → Maintenance and Service Processing → Maintenance and Service Orders → Functions and Settings for Order Types → Assign Inspection Types to Maintenance/Service Order Types</i>
PM-QM: Inspection point	<i>Quality Management → Quality Planning → Inspection Planning → General → Define Identifier for Inspection Points</i>
PM-QM: Control key	<i>Quality Management → Quality Planning → Inspection Planning → Operation → Define Control Keys for Inspection Operations</i>
PM-QM: Follow-up actions	<i>Quality Management → Quality Inspection → Inspection Lot Completion → Define Follow-Up Actions</i>

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Feedback

SAP AG has made every effort in the preparation of this course to ensure the accuracy and completeness of the materials. If you have any corrections or suggestions for improvement, please record them in the appropriate place in the course evaluation.