## **PM Bills of Material**

Maintenance bills of material (BOMs) are used to describe the way in which a piece of equipment or functional location is structured and to allocate the spares to a piece of equipment or assembly for maintenance purposes. Bills of material can either be created individually for each piece of equipment/ functional location, or they can be valid for an entire group of technical objects. A bill of material can be allocated to a technical object in one of the two following ways:

One or more pieces of equipment/functional locations refer to a bill of material. If all the pieces of equipment are identical in terms of their construction, the bills of material items are valid for all the pieces of equipment allocated. If different materials or assemblies are valid for individual pieces of equipment, the common bills of material can still be used. In this case the equipment-specific differences are documented by means of variant items.

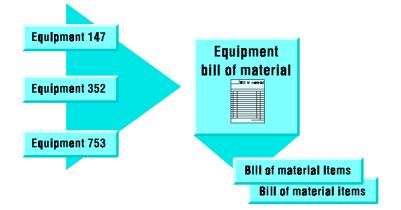


Figure 3-17: Direct Allocation of Bills of Material

If a company has several identical pieces of equipment, grouped under a material number which defines that particular category, then this "category bill of material" is automatically valid for all these pieces of equipment.

Indirect Allocation by Material Category

**Direct Allocation** 

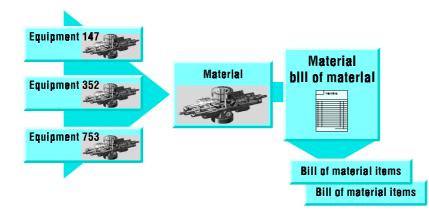


Figure 3-18: Indirect Allocation of Bills of Material

Including Bills of Material	The bill of material structures are included in system structuring in the over- all structuring of individual operational systems, for example functional locations or pieces of equipment, enabling a unified and consistent struc- turing method. In addition to this "top-down" approach, <b>where-used lists</b> enable you to keep track of the usage of materials and assemblies at higher structural levels.				
Temporal Period of Validity	Bills of material are valid from an organizational view for a particular planing plant, but also from a temporal aspect for a certain period in time. When changing items, for example when replacing a material with anothe material from a specific point in time, the relevant entries can be made lentering a validity date, from which the change is effective.				
Bill of Material Header	In the bill of material header, the planner assigns the bill of material to one of more plants, defines the period of validity and defines whether the BOM is released for maintenance in its current form (status management).				
Item Sub-item	The object parts are described in the items. They can be divided from an engineering perspective (assemblies) or they can be spares or, in the case of documents and drawings, they can also be text items. Items are different tiated by item category. Sub-items are used to specify the place of installa- tion.				
Item Categories	Within a bill of material the items are differentiated by item category. The item categories relevant for maintenance are:				
	□ Stock items				
	These parts are automatically reserved when used in the PM order.				
	Non-stock items				

A purchase requisition is automatically created for these materials when they are used for maintenance purposes, which then leads via Purchasing to an order-specific material procurement. Non-stock items can be created with or without a material master record.

#### □ Variable-sized items

These items are distinguished by the fact that format entries, for example length and width, are taken and converted into the quantity required on a stockable quantity basis. In this way variable data, such as the size of a steel sheet required to repair some planking can be entered directly during order processing, without having to keep creating new material master records with fixed dimensions.

#### Document items

Using document items, documents such as drawings or safety regulations can be integrated in the bill of material.

#### □ Text items

These are used for adding texts as required.

### **Bill of Material Maintenance**

Bills of material in the PM System are created and changed on a single-level basis. Most of the maintenance takes place on a single overview screen. If, for example, additional information is required for a piece of equipment, the system automatically takes the user to the appropriate detail screen.

List Edit Goto Details Environment	Equipment: Structure List / / A Options System Help !
Explode/conceal Explode whole Conc	zeal level Explode level Select all
Equipment P-3000-N002 Description Pump,electrical,150	Valid from 22.02.95
P-3000-N002 Pump,electrica	1,150-200 GPM
100-100 Spiral (	
100-400 Dischar DG-1000 Rubber	ge cover L
100-600 Support	
100-431 Washer	L Change Material BOM: Material Item Overview
KR117185 distanc	Material BOM Edit Goto Details Environment Settings System Help
- IL-1000	
100-430	Item - full 1-line new items Header - qty/Ing.txt Delete item Sub-item overview
100-431	Material P-3000 Pump, electrical, 150-200 GPM
W-1000	Plant 3000 New York
SB-1000 R-1000	Alternative BOM 1
WH-1000	
KR117185	BOM items
+ G-1000 Gearbox	S Item Component Quantity Un ItmCat SortStrng Change no.
- + M-3000 Motor f	Component text Asm SIs Valid from Valid to
	□ 0918 188-188 1,988 PC L
	Spiral casing 🛛 🕅 🖾 22.11.1994 - 31.12.9999
	□ 0828 188-488 1,888 PC L
L	Discharge cover 🕅 🗌 22.11.1994 - 31.12.9999
	Rubber Seal
	0848     188-669     2,000     PC     L       Support base     □     □     22.11.1994     - 31.12.9999
	8050 100-431 4,000 PC L
	Washer
	0060 KR117185 5,000 PC L
	distance plate
	□ 0070 WL-1000 V 1,000 PC N
	Impeller Assembly 🕅 🗌 06.01.1995 - 31.12.9999
	0080 C-1000 V 4,000 PC L
	Gearbox, electrical pump 🛛 🕅 🛛 24.11.1994 - 31.12.9999
	DCB (1) hwrz03 (DVR 14

Figure 3-19: Structure List and Item Overview of Single-Level Bill of Material

#### **Engineering Change Management**

**Change History** Engineering change management controls and documents connected changes to basic data. Basic data changes can be documented using this functionality in a comprehensive change history. Furthermore, engineering change management ensures that changes are automatically taken into account with the operative functions in maintenance planning.

Engineering change management is a central basic data function, which can be used for the following objects:

- material
- document
- bill of material
- task list

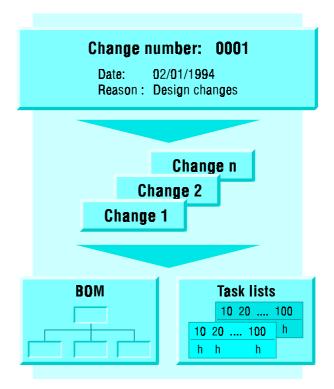


Figure 3-20: Engineering Change Management

**Change Number** Changes are sorted by date and reason for change using a freely definable change number. Since changes are often carried out for several basic data objects at the same time, any number of basic data objects can be changed using one change number.

### **Networking Operational Systems**

The elements of an operational system are not only related to one another, they are usually also related to elements from other operational systems. From a production point of view, a production system, such as a paper manufacturing system, consists of a large number of functional locations, which are linked in terms of their processing.

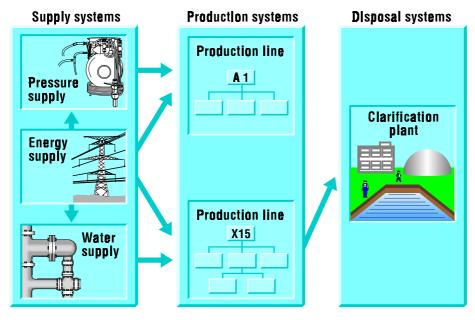


Figure 3-21: Networking Operational Systems

However, at the same time there are links to other operational systems, such as for example supply and disposal plants or energy supply systems.

Object networks built up between either functional locations or pieces of equipment can be represented between elements of different systems.

An object link contains descriptive information on the type of link, the direction of the link (directional/non-directional links) and the technical objects involved. In addition, technical links can be classified and evaluated according to specific criteria using the classification system.

The object links serve not only to document technical installations, but are also actively included in PM processing.

Supply and Disposal Systems

-	Display Object Network: G	aphic Display 🔻 🔺
<u>G</u> raphic <u>E</u> dit <u>O</u> ptions	⊻iews Details <u>H</u> elp	
	17	
Zoom in Zoom out Link	text -> Link Link text -> LinkObj	
Display area		
PS1-MD1 Main Distribution Board 1	L-3104 Power Supply Main Board - Sub Board	PS1-MD1-SD1 Sub Distribution Board 1
<u>۴</u>		÷
-Navigation area PS1-MD1 Main Distributio Board 1	DN - L-3104 Power Supply Main Boar	Board 1
		DCE 22C R/3

Figure 3-22: Clarification Plant - Network Representation

🗢 Display Object Link: Functional Locations 💌 🔺			
ObjLink <u>E</u> dit <u>G</u> o	oto <u>E</u> nvironment <u>S</u> ystem <u>H</u> elp	ļ	
Classification D	Documents ObjNetwork		
Link	L-3104		
Description	Power Supply Main Board - Sub Board		
Network ID	3002 Electricity supply network		
Objects linked			
Link frm FLoc.	PS1-MD1		
Description	Main Distribution Board 1		
Link to FLoc.	PS1-MD1-SD1		
Description	Sub Distribution Board 1		
FL LinkObjct			
Description			
D /!!			
Description of link			
ConsecNumber			
Valid frm	18.01.1995 Time 09:27:58		
Valid to	31.12.9999 Time 23:59:59		
Medium	1992 High-voltage current 330V		
AuthorizGroup			
RelTypePoss.	O One-way Two-way		
RelTypeUsed	O One-way Two-way O Rel. not used		
	DCB (1) hwrz03 C	DVR 12:12	

Figure 3-23: Object Link Master Data

Planning PM Notifications
When planning tasks that necessitate switching off an element within an operational system, the elements in other systems that are more or less closely affected can be identified and the corresponding plans can be determined for all the business areas involved.
Malfunction Analysis
It is similarly important in the case of the malfunction analysis to know the connections between different operational systems, in order to be able to limit the possible causes for the malfunction at a functional location or in a piece of equipment in this way.

# Classification

We need to be able to group similar objects in classes wherever we work in maintenance with large numbers of objects, such as

- **D** pieces of equipment
- functional locations
- □ assemblies
- □ spares

We also need to be able to create class-specific data for the objects (such as dimensions, power, and so on). It is important to be able to search for similar objects using the classification system.

The classification system is a cross-application basic data function which allows you to classify any number of data objects within the R/3 System. You can classify materials, task lists, documents, but also customers and vendors, or inspection characteristics.

Within the PM System application area, the classification system can help employees in maintenance to find similar parts, reducing the number of different parts and avoiding data redundancy. Material classification is therefore an aid in reducing both stock levels and the time required for stock-keeping.

You can use the classification system to search for similar task lists in work **Task List** scheduling.

#### **Classes and Characteristics**

Classes can be structured either on a single level or in multi-level class hierarchies. Catchwords, which are assigned to every class, can be used to help search for the appropriate class.

Characteristics describe the properties of classifyable objects. The user can define characteristics freely and assign any number of them to the classes. The characteristics and their values can be inherited over several class levels in the case of hierarchically structured classes. Freely-definable formats and value ranges, which are assigned to the characteristics, simplify classification.

Object		Classes		Characteristics	Values
Equipments		Ratary pumps		Power consumption	25,0 KW
		:		Medium	Water
		forklift truck		Max. lift	3,25 m
				Max.drop weight	5000 KG
	1	Pumping station I		Required power	20 KW
Functional				Medium	KOH
locations		Elevator III		Test required	Y (Y/N)
				: Operating mode	Working day
Assemblies		Waste water filter		Installation type	geflanscht
Assemblies		: Keyboards	◀	Key setting	English
	1	Gaslets		Pressure stage	300 bar
Spares		:		: Material	St50-2
		Rolling bearing	Norm	DIN 924	
, in the second s	,			: Roll barrel	Tonne
1	Schaltpläne	1	Format	DIN A0	
Documents				: CAD-controllrd	Y (Y/N)
Dooumenta		Instructions		Language	D
	'			: Nopages	163
	1	Maintenance instructions		gesetzl. Vorgeschr.	Y (Y/N)
Task lists				: Vorschrift	MedGV
		Repair		Approx. costs	2450 DM
		instructions		: External Input	N (Y/N)

Figure 3-24: Example of Classification System Usage

**Multi-lingual Functionality** Both the characteristic descriptions and their assigned values can be maintained in several languages. In this case you can search for objects in all the languages specified.

> Master records often contain a large amount of descriptive information. These master data fields can be defined as a characteristic and be copied straight from the master record when you classify the object.

**DIN-Data** The classification system supports the transfer of data in DIN 4001 format from external storage media. In this case the system automatically generates the classes and characteristics required.

## Classification

assembly structures

You classify objects when maintaining basic data, or using the functions for mass classification. The system automatically sets up screens based on the characteristics, in which the characteristics can be evaluated.

An o	bject can be assigned to one or more classes.	Multiple Classification
	can classify a material directly from a CAD system, using the CAD tion library. You can also search for materials from the CAD system.	CAD Integration
Sear	ch in Classes	
as po the o	aim of classification is to find the objects you are looking for as quickly ossible. The search is divided into two steps. First, you must determine object class. You can search using the class names, the catchwords, the hical class hierarchy display or the matchcode function.	Class Search Function
	in a class, the object is selected using the characteristics. You can use values or value ranges for this purpose. The characteristics can be pre-	Characteristic Selection
pareo searc	d on a department-specific basis, to maximize the efficiency of the the the the user can only display and choose the character- that are relevant to that department.	Views
	nsive evaluation functions are available, allowing you to carry out a matic analysis of classified datasets.	Evaluations
Why	is systems structuring necessary ?	
	A well-structured operational system is the basic precondition	
	for efficient planning, execution and analysis of maintenance work	
	t particularly characterizes the PM System in the area of systems turing ?	
	Variable systems structuring with an unlimited number of structural levels	
	Function and object-related representation of operational systems	
	Option to represent complex relations between production,	
	supply and disposal systems	
	Central maintenance functions using reference structures and	
	multi-level data transfer within a hierarchy	
	Integration of individual technical structures and general	

