

Material Requirements Planning (MRP) – BOM Scenario

March 2014



- Welcome to the **MRP BOM Scenario** course unit.
- This is the third course out of three available for the MRP topic.
- This unit describes the main aspects of BOM processing in MRP.
- You must be familiar with the **MRP Process** course unit before going through this unit.
- In addition, you must have a good knowledge of how bills of material are structured and be familiar with the processes in the *Production* module of SAP Business One.

Objectives



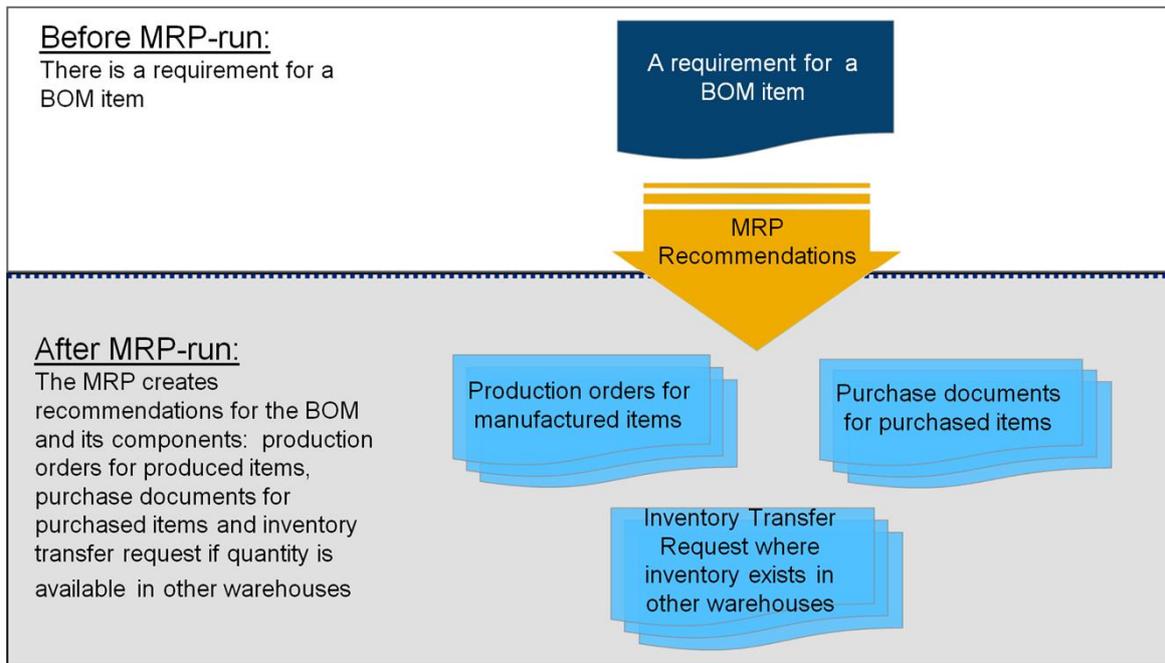
At the end of this unit, you will be able to:

- Run the MRP wizard for different BOM items
- Explain the MRP results for BOM items.

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BOM Processing in MRP - Concept



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- A BOM is combined from produced and purchased items. Parent items are produced and non-parent items are purchased (Note that parent items may be in different levels of the BOM)
- When running the MRP wizard for BOM items we can receive three types of recommendations:
 - Production order for produced items,
 - Purchase documents for purchased items
 - And inventory transfer request for both kind of items (assuming we chose to receive inventory transfer request recommendations and inventory is available in other warehouses)
- MRP calculates gross requirements for the highest BOM level by carrying down the parent demands through the BOM structure, to its lowest levels. This means that requirement for the parent item generates requirements for the children items, for all BOM levels.
- Note you can run the MRP wizard for different types of BOM items and BOM components. However, recommendations will be given for inventory items only.
- This means that assembly BOMs and sales BOMs that are not inventory items behave differently in the MRP run. We will further discuss this issue later on in this training.

Procurement Method Definition

Item Master Data	
<i>Item Number</i>	S10001
<i>Description</i>	Server Point
...	

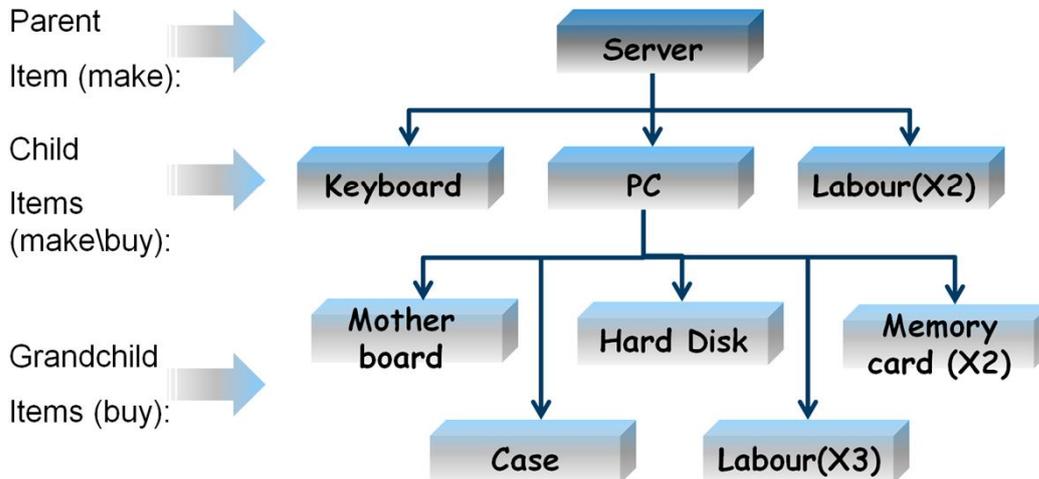
Planning Data	
<i>Planning Method</i>	MRP
<i>Procurement Method</i>	Make
<i>Order Interval</i>	None
<i>Order Multiple</i>	None
<i>Minimum Order Qty.</i>	0
<i>Lead Time</i>	2 Days
<i>Tolerance Days</i>	None Days

- In the **MRP Process** course unit we learned about the *Procurement Method* definition in the *Planning Data* tab of the *Item Master Data* window.
- We saw that in the *Procurement Method* field we define whether we purchase an item or produce it.
- This setting affects the default for the type of recommendation we receive from the MRP run.
- In this training we run a scenario for a production BOM item and therefore we set the *Procurement Method* definition to *Make* for the top level of the BOM. This means we will receive recommendations for production orders and not for purchase documents for this item. Recommendations for purchase documents will be given for any child item that is defined with the *Buy* procurement method.

Scenario Details



BOM SKETCH



- In the image you can see the BOM we use in our scenario. This is a production BOM of a **server**.
- The top-level parent item is the server item that is defined as a *Make* item in the *Item Master Data* window.
- The server is composed of a **keyboard**, a **desktop PC** and **labour** hours.
 - The **keyboard** is defined as a *Buy* item.
 - **Labour** is also defined as an item in the system in order to easily manage working hours quantity and pricing. The **Labour** item is not an inventory item and is excluded from the MRP run.
 - The **PC** item is defined as a *Make* item and is also a BOM in the system.
 - It is composed from the following items: a **motherboard**, a **hard disk**, **2 memory cards**, a **case** and **3 labour** hours.
 - All these item are defined as *Buy* items.
- In the next slide we will analyze MRP recommendations given for a BOM item.

Recommendations for the BOM Parent Item

The screenshot displays the SAP MRP wizard interface. At the top, 'Step 3 of the wizard' is indicated. Under 'Item Selection', 'Selected Items' is chosen, and 'S10001 Server Point' is listed as the parent item. The 'MRP Report' window shows a table with columns for item number, item description, and planning periods (9-14). The parent item 'S10001 Server Point' is highlighted, and its child items 'P10009 PC Set', 'C00098 Case', and 'C00999 Hard Disk Seagate 500 GB' are also listed. A 'Pegging Information - BOM' window is open for item 'C00999', showing demand details from various sources, including an MRP requirement and a sales order.

#	Item No.	Item Description	9	10	11	12	13	14
1	S10001	Server Point	10				25	1
2	P10009	PC Set					30	10
3	C00098	Case	10					
4	C00999	Hard Disk Seagate 500 GB	10		10	60	20	
		Initial Inventory					70	
		Supply	10					20
		Demand	10				70	20
		Final Inventory						

Source	Type	Due Date	Quantity	Whse	Remarks
P10009	MRP Requirement	23.03.14	60	01	
396	Sales Order	17.03.14	10	01	Document Source

- In step 3 of the wizard we choose which items to include in the run.
- When running the wizard for items that are not BOM related, we receive recommendations for the chosen items (assuming there is a demand).
- The story is different when running the wizard for BOM related items:
 - When a parent item is chosen in step 3, all the child items in the BOM chain are included in the MRP recommendations. In the report we see the parent item and all the child items from all the BOM levels, that have recommendations.
 - This behavior is due to the fact that once a demand exists for the parent item, another demand is generated for the child item for every level of the BOM.
 - Once the child item is presented in the report, then all the demand of the item is presented, including direct demand for the item, not coming from its parent item. Recommendations will be given to all types of demand.
- In the image we see that only the **server** parent item is chosen in step 3 of the wizard. After we run the report, we received recommendations for both the parent item and the child item with a demand.
- We can also see an expanded view of the child **hard disk** item. It has two types of demand: one that is coming from the BOM requirement and another not related to the BOM.
- Note that the order of appearance of the different items is determined in step 2 of the wizard as explained in the **MRP Process** course unit.

Recommendations for the BOM Child Item

Step 3 of the wizard

Item Selection
 All Items
 Selected Items

#	Item No.	Item Description	MRP Procurement Method
1	C00999	Hard Disk Seagate 500 GB	Buy

Child item

Planning Horizon: 13.01.14 - 04.05.14
 Calculated At: 13:12

Find Item No. [] MRP Report

Repgrt Recommendations Filter Possible Problem Items

Preview MRP Run Results

#	Item No.	Item Description	9	10	11	12	13	14
1	C00999	Hard Disk Seagate 500 GB	10			10	60	20
		Initial Inventory					70	20
		Supply	10					
		Demand	10				70	20
		Final Inventory						

BOM requirement

Requirement not related to the BOM

Pegging Information - BOM

Item Number: C00999
 Description: Hard Disk Seagate 500 GB
 Period From: 17.03.14 To: 23.03.14

Source	Type	Due Date	Quantity	Whse	Remark
P10009	MRP Requirement	23.03.14	60	01	
396	Sales Order	17.03.14	10	01	Document Source

- We went back and run the MRP again, this time for the **hard disk** child item.
- Even when the parent item is not chosen, the demand derived from the parent item (from all the BOM levels above the chosen item) will also appear in the report.
- In the next slides we will see how the child items lead time affect the parent item lead time.

Cumulative Lead Time Concept

Report

Preview MRP Run Results

#		Item number	Description	Past Due Date	1.3	3.3	5.3	7.3
1	▶	S10001	Server		$2 + 2 + 2 = 6$ days			
2	▶	P10009	PC		$2+2 = 4$ days			
3	▶	C00999	Hard Disk		2 days			
4	▶	C00009	Memory Card		2 days			
5	▶	C00098	Case		2 days			

- 2 days lead time defined for each item
- View data in periods of 2 days

- One of the main concepts in MRP BOM processing is the cumulative lead time. This is the total time needed to produce a BOM, considering the lead time of its components.
- This calculation is done by adding together the highest lead time of each BOM level. The total of this calculation is the cumulative lead time of a BOM.
- Look at the example shown in the image. This is an illustration of the MRP report displaying the **server** BOM item and its components. Note that only components with recommendations are displayed in the report. The items are sorted by assembly sequence so the first item we see is the **server** parent item, then the **PC** child item and then the grandchild items: **hard disk**, **memory card** and a **case**.
- We know that each item (parent, child or grandchild) has a lead time definition of **2** days but note that the parent and the mid-level child items have a lead time that is higher than **2** days.
- The reason the **PC** item is showing a lead time of **4** days is due to the fact we need to wait **2** days for the grandchild items to arrive from the vendor and additional **2** days are needed to assemble the **PC** item.
- The reason the **server** item is showing a lead time of **6** days is because we need **4** days to assemble the **PC** child item (considering the lead time of the components) plus another **2** days to assemble the **server** item.

Ignore Cumulative Lead Time

Report

Preview MRP Run Results

#		Item number	Description	Past Due Date	1.3	3.3	5.3	7.3
1	▶	S10001	Server		2 days ↔			
2	▶	P10009	PC		2 days ↔			
3	▶	C00999	Hard Disk		2 days ↔			
4	▶	C00009	Memory Card		2 days ↔			
5	▶	C00098	Case		2 days ↔			

- 2 days lead time defined for each item
- View data in periods of 2 days

- In step 2 of the MRP wizard we can choose to ignore cumulative lead time.
- When we do so the parent item lead time is the lead time defined for it in the *Item Master Data*.
- In the image we see there is no dependencies between the different BOM levels and all items have a lead time of 2 days – as defined in the *Item Master Data*.
- Note that since the production of any parent item is dependent on the child item lead time, it is recommended not to ignore the cumulative lead time.

1st Scenario - Theoretical Recommendation (1/3)

Planning Horizon **13.01.14** - **31.03.14** Calculated At 12:52

Find Item No.

Repgrt Recommendations

Preview MRP Run Results Filter Possible Problem Items

#	Item No.	Item Description	7.3	28.3	29.3	30.3	31.3	Future Data
1	▶ S10001	Server Point						10
	▶	Initial Inventory						
	▶	Supply						10
	▶	Demand						10
	▶	Final Inventory						
2	▶ P10009	PC Set					10	
3	▶ C00999	Hard Disk Seagate 500 GB				10		

- Theoretical recommendation is the name given to a recommendation that appears in the *Future Data* column.
- These kind of recommendations are given for *Make* (BOM) items only.
- Theoretical recommendations do not generate order recommendation (In the *Order Recommendations* window) and this is why they are called “Theoretical”.
- In the **MRP Process** course unit , when we discussed *Buy* items, we saw that recommendations were given only within the planning horizon period.
- With *Make* items we can see recommendations in the *Future Data* column as well.
- Look at the image. In the demand row of the **server** we see a demand for **10 server** units within the future data period.
- This demand created a recommendation within the *Future Data* column.

1st Scenario - Theoretical Recommendation (2/3)

Planning Horizon **13.01.14** - **31.03.14** Calculated At 12:52

Find Item No.

Repgrt Recommendations

Preview MRP Run Results Filter Possible Problem Items

#	Item No.	Item Description	7.3	28.3	29.3	30.3	31.3	Future Data
1	S10001	Server Point						10
		Initial Inventory						10
		Supply						10
		Demand						10
		Final Inventory						
2	P10009	PC Set					10	
3	C00999	Hard Disk Seagate 500 GB				10		

Pegging Information - BOM

Item Number S10001
Description Server Point
Period From 01.04.14 To 04.04.14

Supply Details

Source	Type	Due Date	Quantity	Whse	Remarks
	Production Order	02.04.14	10	01	Supply from Theoretical Recommendation

Pegging Information - BOM

Item Number S10001
Description Server Point
Period From 01.04.14 To 04.04.14

Recommendation Details

Source	Type	Due Date	Quantity	Whse	Remarks
	Production Order	02.04.14	10	01	Theoretical Recommendation

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- Now, let us look at the pegging information of the supply and recommendation values shown in the *Future Data* column.
- In each of the pegging information windows, we can see a remark indicating this is a theoretical recommendation.
- The purpose of this recommendation is to balance the future demand (instead of showing negative quantity).
- In the image we can see that the final inventory of the **server** parent item is clear.
- In the next slide we will see how the cumulative lead time of the **PC** and **Hard disk** child items caused the recommendations to appear in the *Future Data* column.

1st Scenario - Theoretical Recommendation (3/3)

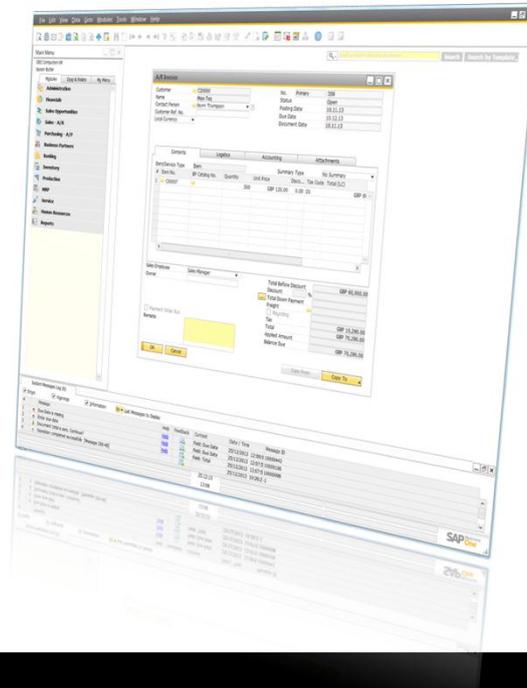
- Defined lead time = 1 day
- The demand due date of the server item is April 2nd

BOM item

Item	30.3.	31.3.	Future Data
Server (parent)			Demand + Theoretical Recommendation
PC (2 nd level parent)		Recommendation	Demand (MRP requirement)
Hard Disk (child)	Recommendation	Demand (MRP requirement)	

- Let us further examine this scenario.
- Look at the image
 - The demand for the **server** item is due on April 2nd and there is a **1** day lead time for all BOM components.
 - Although both demand and recommendation are due beyond the planning horizon period, the item appears in the report.
 - This is due to the cumulative lead time principle. To produce the **server** item, we need to start by purchasing the **hard disk** item on March 30th. Then, we need to produce the **PC** item on March 31st and finally produce the **server** item on April 1st so it will be ready by April 2nd.
- Keep in mind that theoretical recommendations are relate to parent items only. The lowest level items of the BOM will not show recommendations in the *Future Data* column. However, the demand of the child items, for these theoretical recommendations, will be recorded in the MRP report, within the planning horizon period.

Demo: Theoretical Recommendations



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High level demo script notes:

Run the MRP wizard for a BOM

Make sure that because of the cumulative lead time, you receive theoretical recommendations

Show the results and pegging information and explain that the final inventory is cleared due to the theoretical information

Save recommendations and show there are no recommendations in the order recommendations window for this item.

Go back to step 2 of the wizard and change the end date of the wizard to be after the demand date of the parent item.

Run the wizard again and show that the theoretical recommendations are now regular recommendations.

2nd Scenario - Non Included Warehouses Scenario

Bill of Materials

Product No. P10009 X Quantity 1 Warehouse 01
 Product Description PC Set Price List Base Price
 BOM Type Production Distr. Rule Project

#	Item No.	Item Description	Quantity	UoM ...	Warehouse
1	L10001	Labour	3		01
2	C00001	Motherboard P4 Turbo	1		01
3	C00999	Hard Disk Seagate 500 GB	1	Eac	02
4	C00009	Keyboard Comfort USB	1		01
5	C00098	Case	1		01
6					

Run By

Company - Consolidate existing inventory, demand, and supply into default warehouse only.
 Warehouse - Include existing inventory, demand, and supply separately for each warehouse.

Include Data Source

Include Existing Inventory	Include Demand	Include Supply	Location	Warehouse Code	Warehouse Name
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		04	Consignment
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		05	Bin Warehouse
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Manchester	02	Backup Warehouse
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Feltham	01	General Warehouse
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		03	Drop Ship

System Message

Production orders and inventory transfer request were not recommended for 2 parent items due to components that are required from 1 warehouses whose demand has not been included in this MRP run (for example, item C00999 in warehouse 02).

OK

Annotations:

- Hard disk item is taken from warehouse 02 in the BOM definition
- Step 4 of the wizard
- Warehouse 02 is not included in the scenario
- recommendation will not be generated

- When running the MRP wizard, you may wish to exclude a certain warehouse due to the warehouse location or other logistical considerations.
- In step 4 of the wizard you can choose which warehouse to include in the wizard run.
- Let us examine a scenario where the warehouse defined for the child item in the BOM definition is not included in the MRP scenario.
- In the upper image we see the **PC set** BOM definition. Look at the **hard disk** child item, it is taken from warehouse **02**.
- Next look at the image of step 4 of the wizard. Note that we run the wizard by warehouse and that warehouse **02** is not included.
- With this scenario, when we run the wizard, before receiving recommendations, we receive a warning message saying no recommendations will be given to the BOM item since it cannot be produced.

3rd Scenario - Sales/ Assembly BOMs in MRP (1/2)

Sales/ Assembly BOM



- The parent is not an *Inventory* item
- Therefore no recommendations are generated for it
- Recommendations are given for the child items only
- A compensating supply entry is added to the MRP report to balance the demand



- In addition to production BOMs, we can also process sales and assembly BOMs.
- When running the MRP wizard for a production BOM we receive recommendations for production orders (or inventory transfer requests) for the parent item.
- When running the wizard for a sales or assembly BOM (that is not an inventory item), SAP Business One does not issue an actual recommendation for the parent item. It issues only the requirements for its child items (either production or purchase documents, according to the procurement method of the child items).
- Instead of regular recommendation, MRP generates a compensating entry in the supply row of the item to balance the demand and clear the final quantity.
- Recommendations for the child items are issued regularly, similar to a production BOM.

3rd Scenario - Sales/ Assembly BOMs in MRP (2/2)

Planning Horizon 30.12.13 - 06.04.14 Calculated At 09:32

Find Item No.

Repgrt Recommendations

Preview MRP Run Results Filter Possible Problem Items

#	Item No.	Item Descript...	12	13	14	Future P
1	M90001	Media Kit				
		Initial Inventory				
		Supply			20	
		Demand			20	
		Final Inventory				
2	H90001	Headphones			20	
		Initial Inventory				
		Supply			20	
		Demand			20	
		Final Inventory				

Display Items with No Requirements

No recommendations are given

Recommendations are given to the child item

Pegging Information - Q1_2014

Item Number M90001
Description Media KR
Period From 31.03.14 To 06.04.14

Supply Details

Source	Type	Due Date	Quantity	Whse	Remarks
	Assembly Tree Balancing	01.04.14	20	01	

Pegging Information - Q1_2014

Item Number M90001
Description Media KR
Period From 31.03.14 To 06.04.14

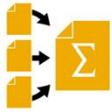
Demand Details

Source	Type	Due Date	Quantity	Whse	Remarks
401	Sales Order	01.04.14	20	01	Document Source

- Let us analyze an MRP report generated for a **media kit** assembly BOM. This BOM contains 2 child items: **headphones** and **DVD player**.
- We do not manufacture the parent item but we want to make sure we have the **media kit** components on hand in time to meet the demand.
- In the image we can see the **Media Kit** parent item and the **headphones** child item.
- We can also see a demand for the **Media Kit** parent item – a sales order for **20** units.
- To balance the demand the system created a supply entry for **20** units but no recommendation.
- Look at the *Type* column of the supply pegging information. It says: *Assembly Tree Balancing*.
- In addition, we can see that the **headphones** child item did receive recommendations.
- Note that the **Media Kit** item is displayed in the report even though it has no recommendations. This is because we chose, in step 2 of the wizard, to include items with no requirements.

Summary (1/2)

Key points:

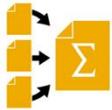


- When running the MRP wizard for BOM items we can receive three types of recommendations:
 - Production order for produced items (parent items),
 - Purchase documents for purchased items (child items)
 - And inventory transfer request for both kind of items
- When running the wizard for a parent item, SAP Business One also displays the demand of all the BOM child items.
- When running the wizard for a child item, SAP Business One displays all the demand for the item, including demand derived from its parent item.

Here are some key points to take away from this course:

- When running the MRP wizard for BOM items we can receive three types of recommendations:
 - Production order for produced items (parent items),
 - Purchase documents for purchased items (child items)
 - And inventory transfer request for both kind of items
- When running the wizard for a parent item, SAP Business One also displays the demand of all the BOM child items.
- When running the wizard for a child item, SAP Business One displays all the demand for the item, including demand derived from its parent item.

Summary (2/2)



- The cumulative lead time is the total time needed to produce a BOM, considering the lead time of its components.
- Recommendations that appear in the *Future Data* column are called *Theoretical Recommendations*.
- When running the wizard by warehouse level, SAP Business One does not generate recommendations when the warehouse defined for the child item is excluded from the run.
- Sales and assembly BOMs participate in the MRP run but no recommendations are given for the parent item.

- The cumulative lead time is the total time needed to produce a BOM, considering the lead time of its components.
- Recommendations that appear in the *Future Data* column are called *Theoretical Recommendations*.
- When running the wizard by warehouse level, SAP Business One does not generate recommendations when the warehouse defined for the child item is excluded from the run.
- Sales and assembly BOMs participate in the MRP run but no recommendations are given for the parent item.

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