Material Resource Planning

Material Resource Planning (MRP) is the tool in SAP Business One to find the purchasing and production requirements driven by sales orders, advance/reserve invoices and forecasts. In SAP Business One MRP can be run with a number of parameters; the parameters and the purchasing and production recommendations are saved in scenarios. Produmex Manufacturing simply extends the scenario concept of SAP Business One.

1. Define Planning Data

Before starting the MRP, make sure that you set the following configurations:

1.1. Item Master Data

Define the planning parameters on the Item Master Data. The Produmex MRP will take into account the following fields from the Planning Data tab:

- *'Planning Method'*: Only items with 'MRP' set as the planning method will be taken into account in the MRP.
- *'Procurement Method'*: Determines the order type of the procurement recommendation.
  - Buy: Purchase orders will be recommended.
  - Make: Production orders will be recommended.
- *'Order Multiple'* and *'Minimum Order Qty'*: Affects the quantity to order on the order recommendations.
- *'Tolerance Days'*: Defines the number of days to adjust the due date range of order recommendations. If there is a Tolerance Day specified, the due date is calculated as: {Original Due Date- Tolerance Days}
- *'Lead Time'*: The Lead Time defines the following:
  - For operation items it defines the duration of the outsourcing.
  - For items with the procurement method 'Buy' it defines the duration of the purchasing
  - For items with the procurement method 'Make':
    - If there are no operations in their BoM, it defines the duration of the production.
    - If there are operations in their BoM, the duration of the production is calculated as the total length of the operations. If a Lead Time is set, it will be added to the total operations length.

The Lead Time is defined in days. On the 'Lead Time type' UDF set whether the lead time is calculated in calendar days or in work days.

For purchased items a 'Safety Lead Time' can be defined too. In this case the begin date of the purchase recommendation is calculated as: as {Due Date – (Lead Time + Safety Lead Time)}. *Please note: The Safety Lead Time is always calculated in calendar days, regardless of the 'Lead Time type' setting.*

1.2. Produmex Manufacturing settings

Configure the Produmex MRP settings on the MRP tab of Produmex Manufacturing Settings.

1.3. Bill of Materials

Adjust the following parameters on the Bill of Materials:

- Specify the operation details on the BoM Order Operation Details form.
- The *Operation granularity* value is used by the allocation algorithm. The quantity produced in an allocation must be the multiple of this value.

2. Run MRP to detect requirements

Follow the steps of the standard SAP MRP wizard.

The following MRP wizard settings are supported:

- **Scenario Details**
  - *Planning Horizon*
    - View Data in Periods Of Days/Weeks/Months (Please note: grouping are not supported.)
    - Planning Horizon Length
  - *Display preferences*
    - Display Items with No Requirements
    - Display Selected Items Only
- **Item Selection**
  - All Items/Selected Items
- **Inventory Data Source**
  - *Run By*
    - Company
    - Warehouse (*see note below)
  - *Include Data Source*
    - Include Existing Inventory
    - Include Demand
    - Include Supply
- **Documents Data Source**
  - *Sources of demand and supply*
    - Purchase Orders
    - Sales Orders
    - Production Orders
    - Reserve Invoices
    - Forecast
    - Inventory Level
  - *Recommendations*
    - Purchase Requests/Purchase Orders

Produmex MRP supports the selection of warehouses for filtering purposes only, but the recommendations are always generated for the entire company. It always combines the recommendations, and always uses the warehouse defined in the BoM instead of the demand document (for example Sales Order).
Since Produmex MRP supports Filtering by Warehouse; if the user wants a separate MRP for each warehouse or group of warehouses, they can define separate MRP Scenarios for each of them, and run them one-by-one.
This is especially important to understand when working with multi-branch companies.
In the forthcoming release run by warehouse will be disabled for Produmex MRP to avoid confusions and false expectations.

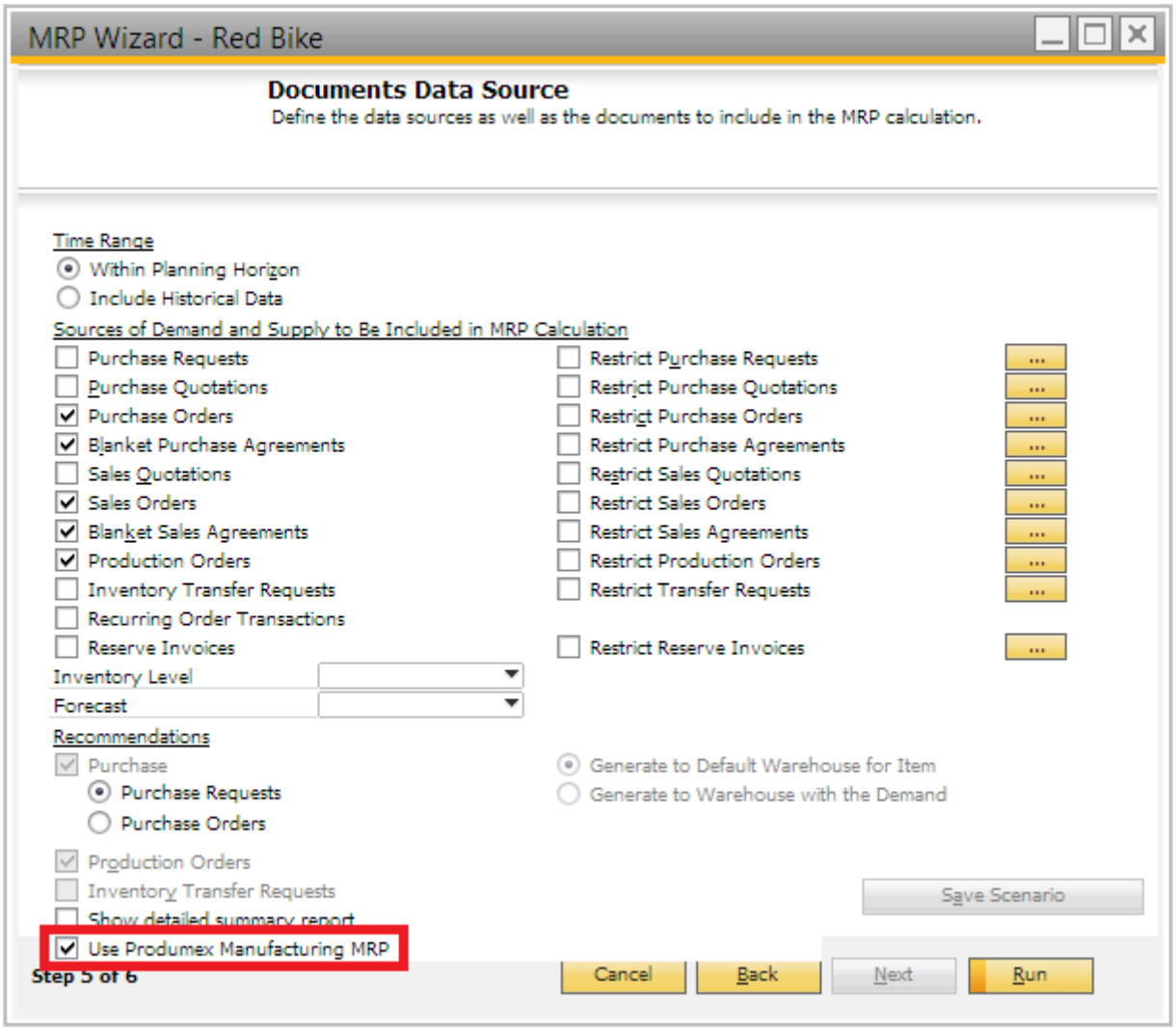
For MultiBranch companies it is very important to select warehouses from the same branch. Produmex MRP does not generate separate recommendations for the branches. If the company has multiple branches, it is highly advised to create separate MRP scenarios for each branches for the smoothest user experience.

When Produmex Manufacturing add-on runs, two additional checkbox is displayed on the **Documents Data Source** window:

- Use Produmex Manufacturing MRP: If enabled, the advanced Produmex Manufacturing MRP runs instead of the SAP Business One MRP.
- Show detailed summary report: If this setting is enabled, the detailed summary report can be printed after the MRP run. The ‘Select Report Layout’ form opens. Select the report layout and press the Print button to print the document. The default layout is the ‘MRP Summary Detailed (base)’ report.

  The MRP Summary report contains the following:
  - Report Name
  - From Date – To Date
  - From Item – To Item
  - Collected Input Data
  - MRP Recommendations
  - Error Log
  - MRP Log

In order to run the Produmex MRP, make sure that the ‘Use BX MRP’ box is checked on the ‘Documents Data Source’ screen.



After the 'Run' button has been pressed on the MRP Wizard screen, the advanced MRP logic of Manufacturing is executed suppressing the built-in MRP logic of SAP Business One. The algorithm of the advanced MRP is much more complex than the SAP MRP logic because it takes the available resource capacities into account.

After a Produmex MRP run the MRP summary data is saved to an xml file. The file is located in *C:\Program Files (x86)\SAP\SAP Business One\AddOns\BXP\Produmex Manufacturing.*
The file name is MRPData-*ScenarioName*.xml. Please note: The file for a given scenario is updated after each Produmex MRP run for the scenario.

3. MRP logic

I. Gross requirement

First the system queries the item selected on the MRP wizard, then based on the item BoMs identifies the dependent sub-products and raw materials. The gross requirements for these items are detected based on the demand sources selected on the 'Document Data Source' screen of the MRP wizard.

II. Net requirement

Then the system calculates the available item quantities based on the supply sources selected on the Document Data Source' screen of the MRP wizard. The net requirements are determined by subtracting the available quantities from the gross requirements.

III. Free Resource capacities

The system calculates the free capacities based on the existing allocations for released production orders, the simulated allocations for planned production orders, the resource shift schedules and the work plan.

Then the system starts the allocation of the production requirements to the free capacities. The Advanced MRP runs multiple simulations and evaluates each simulation with the weighting factors (MRP Fragmentation Weight, MRP Due Date Weight, and MRP Total Time Weight) set on the MRP tab of Produmex Manufacturing settings. The best outcome possible will be recommended.

IV. Order recommendations

Based on the scheduling of the required productions, production and purchase order recommendations are generated.
The recommended quantities for purchase orders depend on the net required quantity and the predefined planning rules such as 'Order multiple', 'Order Interval', 'Minimum Order Quantity'.
The recommended quantities for production orders depend on the net required quantity and the predefined planning rules such as 'Order multiple', 'Minimum Order Quantity'. The 'Order Interval' is a setting not supported for production orders.

4. MRP results

The results of the advanced MRP are displayed in an overview matrix. When there are issues with the items/allocations, an additional error list form will open.
Please note: The MRP Error List does not takes into account the MRP item selection therefore it will open whenever an error is detected in the MRP regardless if it is linked to the selected items or not.

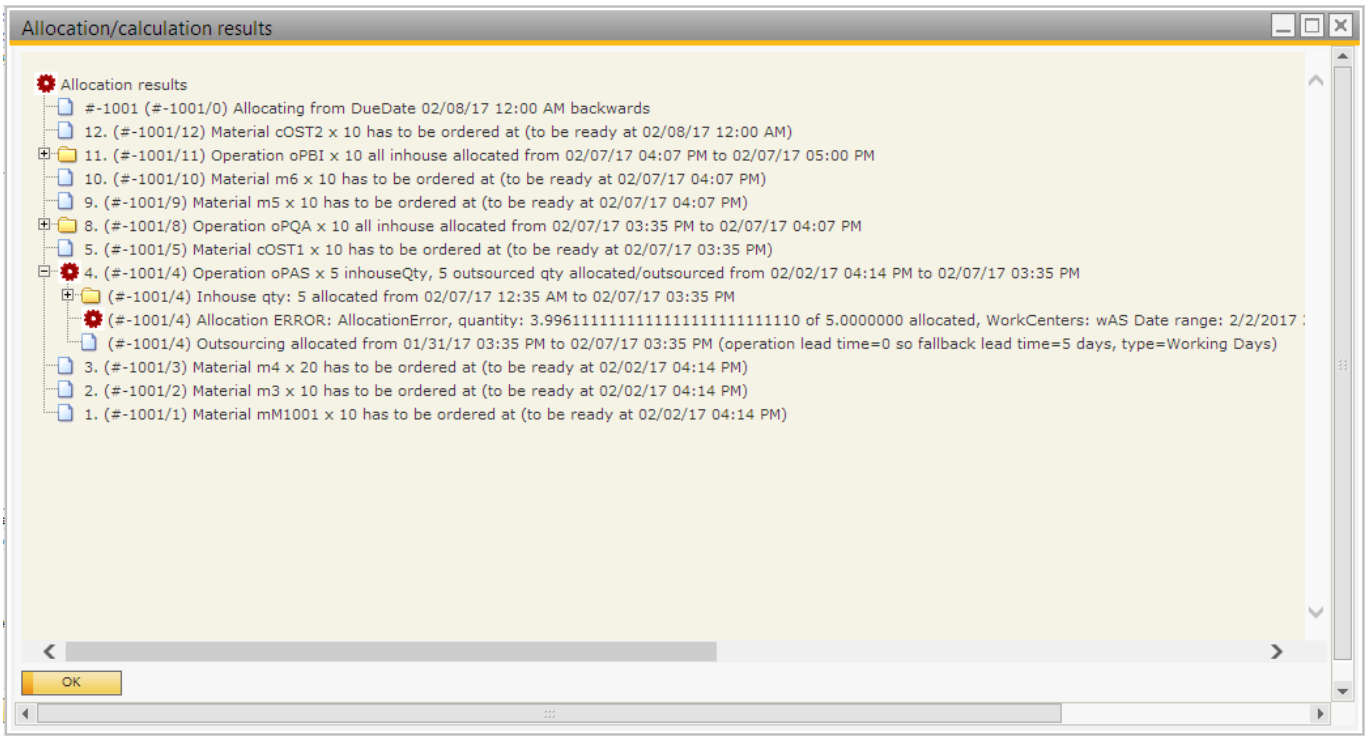
4.1. MRP Error List form

On the 'MRP Error List' grid allocation errors are listed. Click on the red x to see further details regarding the error. On the System Message the detailed description will be shown.

Click on the 'Ok' button to open the 'Allocation/calculation results' form.

4.2. Allocation/calculation results form

On this form the allocation results will be displayed. The red cog indicates an allocation error where the system could not allocate enough capacity for the operation.



Allocation errors have to be solved manually. The possible solutions are:

- Close the document that created the demand.
- Modify the due date of the document that created the demand. *Please note: You also have to modify the due date of every related order.*

4.3. MRP results form

On the 'MRP results' form order recommendations are displayed on an overview matrix. Values in red indicate unfulfillable recommendations while orange values indicate recommendations that cannot be completely fulfilled.

When clicking on a button, the Pegging Information form opens. This form explains the driving factors behind the given recommendation.

For Multibranch companies the branch name of the warehouse is shown. Keep in mind that Produmex MRP always combines the requirements from all the warehouses selected in the demand warehouse filter. Likewise, it combines the recommendations for all demands, and the target warehouse always comes from the BOM for production order recommendations or the default warehouse for purchase recommendations. Again, order recommendations are never generated for the actual demanding

warehouse, the target warehouse for order recommendations come from BOM and item master data when working with Produmex MRP.

To locate an item on the grid, enter the item code to the ‘Find item’ field. The system will scroll down and highlight the item. Change the display with the ‘Period’ setting. Possible values:

- Day: Recommendations will be grouped daily.
- Week: Recommendations will be grouped weekly.
- Month: recommendations will be grouped monthly.

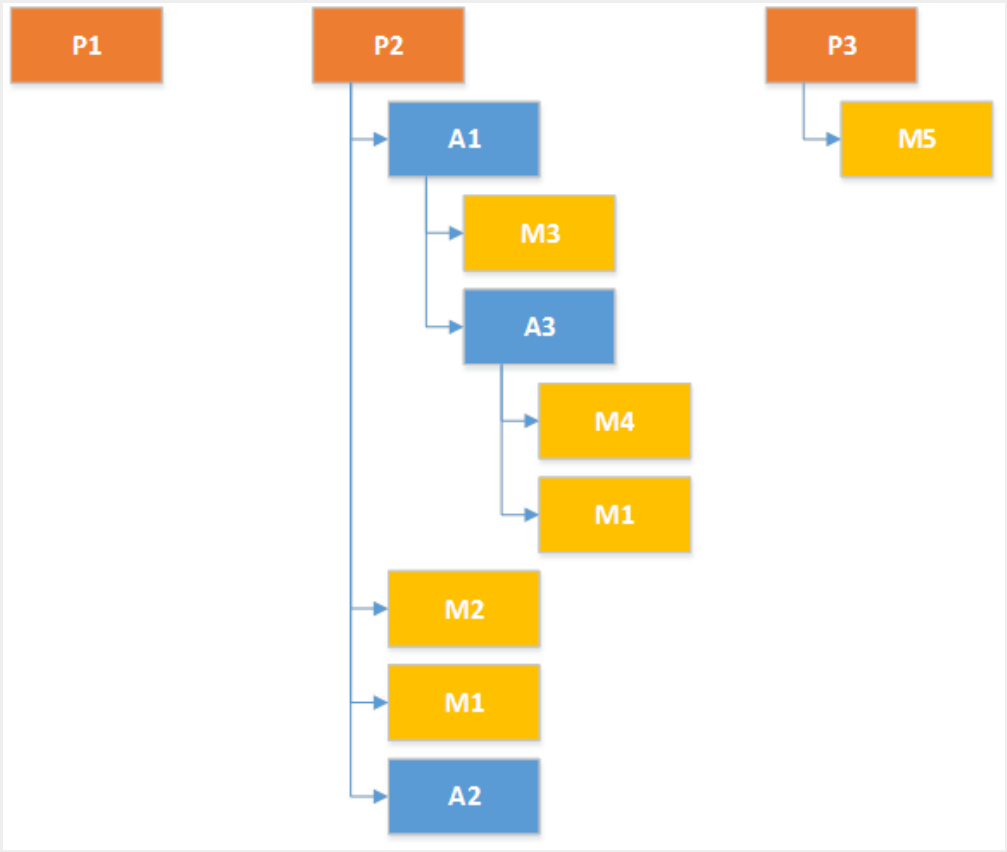
If the ’Display after MRP’ checkbox is enabled, the MRP order recommendations will be displayed on the grid.

To see the material account, select a line, then select the Material account option from the right-click menu. The ’Material account with recommendations’ window opens. For more information please see: Material account grid

The items are sorted by hierarchy/alphabetical order, regardless of the ‘Sort by’ MRP Wizard setting.

The list starts with the item on the highest level. When there are more than one items on the highest level, the first item is the alphabetically first from such items. If an item has a BoM, then the materials in BoM order will follow that item. Subassemblies are listed after the raw materials, regardless of the BoM order. If there is a material/subassembly that belongs to multiple BoMs, the item is listed only once, at the lowest level. The recommendations for the given item are merged.

Example
Hierarchy:



Sequence: P1 - P2 - M2 - A2 - A1 - M3 - A3 - M4 - M1 - P3 - M5

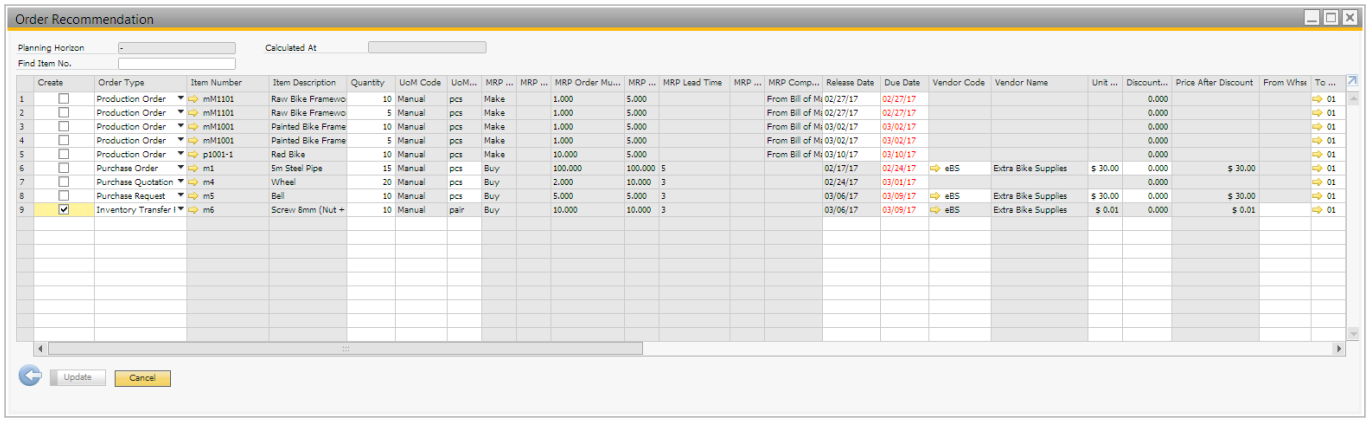
5. Creating Production and Purchase Orders from Recommendations

The Advanced MRP logic of Produmex Manufacturing creates and saves the order recommendation into the same database as used by the SAP Business One's original simple MRP logic. This way the standard 'Order Recommendation' form extended by the Produmex Manufacturing add-on is used to review the recommendations for a scenario.

On this form the recommendations created by the MRP are listed. By default the order type for items with 'Make' planning method is Production order. For items with 'Buy' planning method the default recommendation type is 'Purchase Request'.

It is possible to change the order type to 'Purchase Quotation', 'Purchase Request' or 'Inventory Transfer Request'.

Values in white cells can be adjusted.



The add-on extends the SAP Business One recommendations database table (ORCM) with the following user defined fields:

- Available Quantity: The available quantity.
- Begin Date: The recommended begin date. Adjustable value.
- Begin Time: The recommended begin time. Adjustable value.
- BX Production Comments: Production comments.
- Committed Quantity: The committed quantity.
- Customer Code: The card code of the customer.
- Customer Name: The name of the customer.
- Customer Ref. No: The customer reference number.
- Due Time: The calculated due time.
- In Stock Quantity: The quantity in stock.
- Is Grouped: Indicates whether the order recommendation is grouped nor not.
- IsMTO: Indicates whether the recommendation was created in MTO planning or not.
- Ordered Quantity: The ordered quantity.
- Project: The project code.
- SOL Reference Code: Recommendation reference code.
- Top Order Doc Entry: The doc entry of the top order.

- Top Order Doc Line: The top order line the recommended order is linked to.
- Top Order Doc Number: The top order number.
- Top Order Type: The type of the top order. Possible values: Sales or Production.

To create an order/request from a recommendation, select its line with the 'Create' checkbox then click on the 'Update' button.

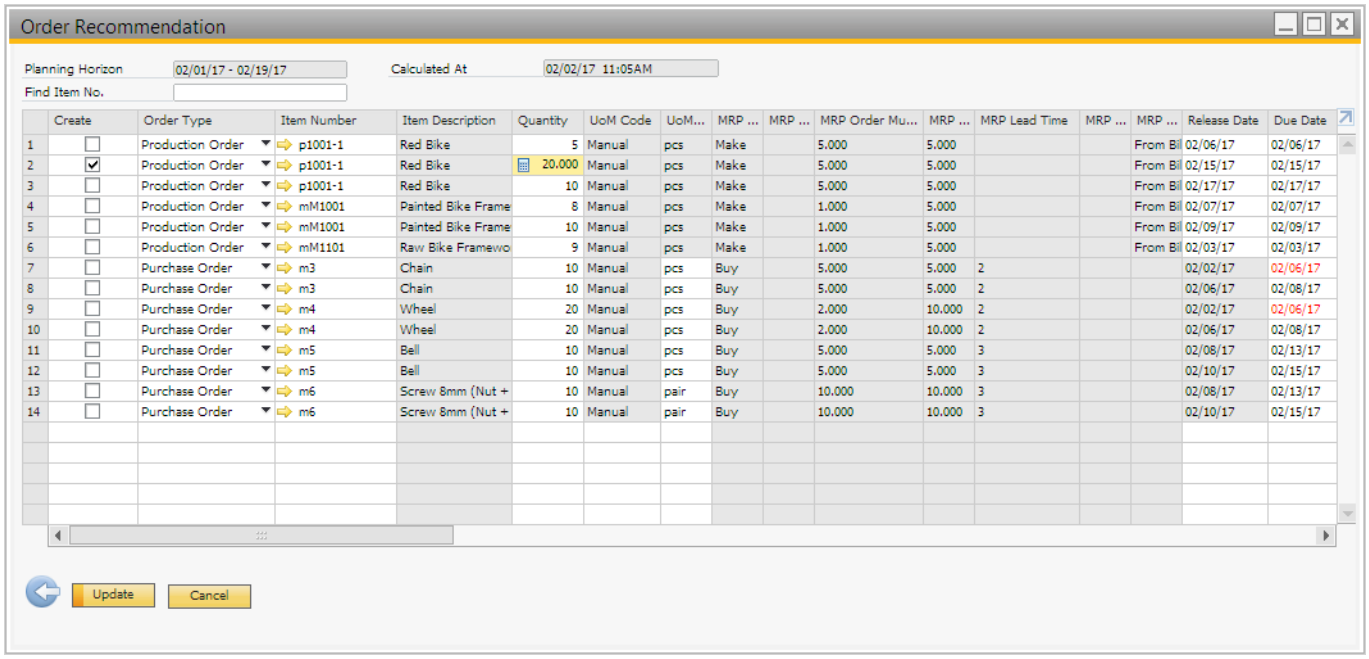
5.1. Outsourcing orders

With default settings, outsourcing purchase orders have to be created manually. To automate the order generation, enable the 'Automatic Generation of Outsourcing Purchase Orders on Production Order Release' option on the Prod.Order tab.

6. Combining Production and Purchase Orders

When the delivery date of some sales orders are close, it might be more efficient to combine these to start a single production order scheduled according to the earliest due date.

To combine the productions, first create a production order with the earliest due date and increase its quantity with the total quantity of the other recommendations. Do not create any other orders at this time, just the combined production order.



	Create	Order Type	Item Number	Item Description	Quantity	UoM Code	UoM...	MRP ...	MRP ...	MRP Order Mu...	MRP ...	MRP Lead Time	MRP ...	MRP ...	Release Date	Due Date
1	☐	Production Order	p1001-1	Red Bike	5	Manual	pcs	Make		5.000	5.000			From Bi	02/06/17	02/06/17
2	☑	Production Order	p1001-1	Red Bike	20.000	Manual	pcs	Make		5.000	5.000			From Bi	02/15/17	02/15/17
3	☐	Production Order	p1001-1	Red Bike	10	Manual	pcs	Make		5.000	5.000			From Bi	02/17/17	02/17/17
4	☐	Production Order	mM1001	Painted Bike Frame	8	Manual	pcs	Make		1.000	5.000			From Bi	02/07/17	02/07/17
5	☐	Production Order	mM1001	Painted Bike Frame	10	Manual	pcs	Make		1.000	5.000			From Bi	02/09/17	02/09/17
6	☐	Production Order	mM1101	Raw Bike Framewo	9	Manual	pcs	Make		1.000	5.000			From Bi	02/03/17	02/03/17
7	☐	Purchase Order	m3	Chain	10	Manual	pcs	Buy		5.000	5.000	2			02/02/17	02/06/17
8	☐	Purchase Order	m3	Chain	10	Manual	pcs	Buy		5.000	5.000	2			02/06/17	02/08/17
9	☐	Purchase Order	m4	Wheel	20	Manual	pcs	Buy		2.000	10.000	2			02/02/17	02/06/17
10	☐	Purchase Order	m4	Wheel	20	Manual	pcs	Buy		2.000	10.000	2			02/06/17	02/08/17
11	☐	Purchase Order	m5	Bell	10	Manual	pcs	Buy		5.000	5.000	3			02/08/17	02/13/17
12	☐	Purchase Order	m5	Bell	10	Manual	pcs	Buy		5.000	5.000	3			02/10/17	02/15/17
13	☐	Purchase Order	m6	Screw 8mm (Nut +	10	Manual	pair	Buy		10.000	10.000	3			02/08/17	02/13/17
14	☐	Purchase Order	m6	Screw 8mm (Nut +	10	Manual	pair	Buy		10.000	10.000	3			02/10/17	02/15/17

Now run the MRP again, and this time the required production and purchase order recommendations are automatically combined by the MRP. Now all production and purchase orders may be created from the recommendations.

If you have Bill of Materials with a number of levels with own-manufactured components, then this combination process may have more iterations. Always start combining the production orders of the

topmost products. The purchase order recommendation should only be combined when no more combined production order is needed.

7. Job Scheduling Control Panel

To overview the scheduling of the production orders on a graphical panel, open the Job Scheduling Control Panel.

8. Production Management Cockpit

After the production orders have been created, they can be managed easily on the Production Management Cockpit.

9. Detailed Summary Report

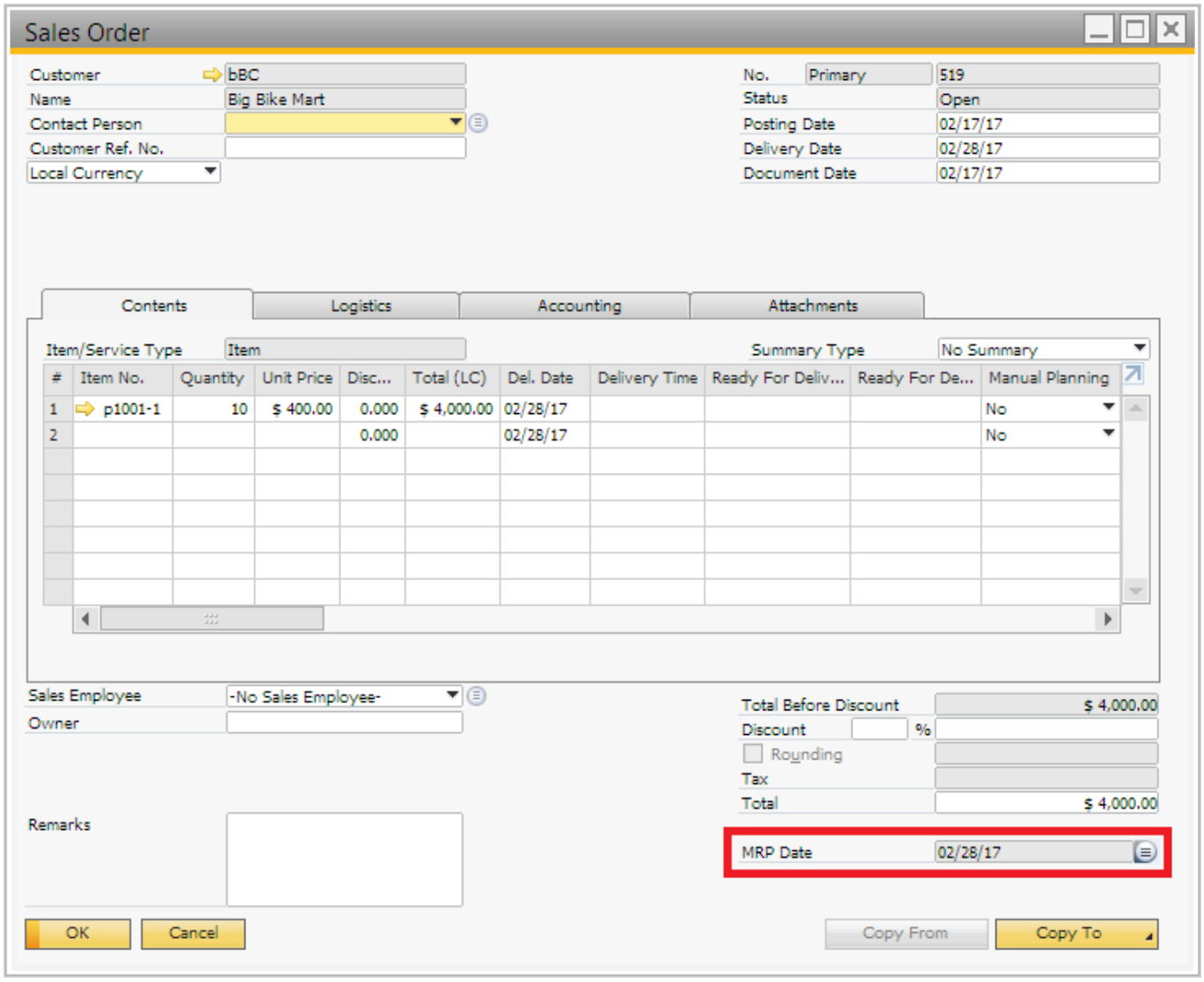
To print a detailed MRP summary report, tick the *'Show detailed summary report'* checkbox on the Document Data Source screen.

After the MRP run has been finished, the 'Select Report Layout' form will open. Select the report layout then click on the 'Print' button. To print the file in .pdf, check the *'Preview before print'* box. On the standard report the following is displayed:

- Collected input data
- List of MRP recommendations
- Error log showing the allocation errors
- MRP log showing the MRP steps

10. Available to Promise

10.1. Sales order



To calculate the earliest possible date to fulfill the sales order, click on the button next to the ‘MRP date’ field.

Starting from the current date, the planning logic of Produmex Manufacturing calculates the earliest date of fulfillment for each sales order line. The 'MRP Date' field will be filled with the latest date from the calculated fulfillment dates.

Please note: Only the Bill of Materials of the product is considered during the MRP Date calculation. The Bill of Materials of lower level assembly materials are not considered during the calculation.

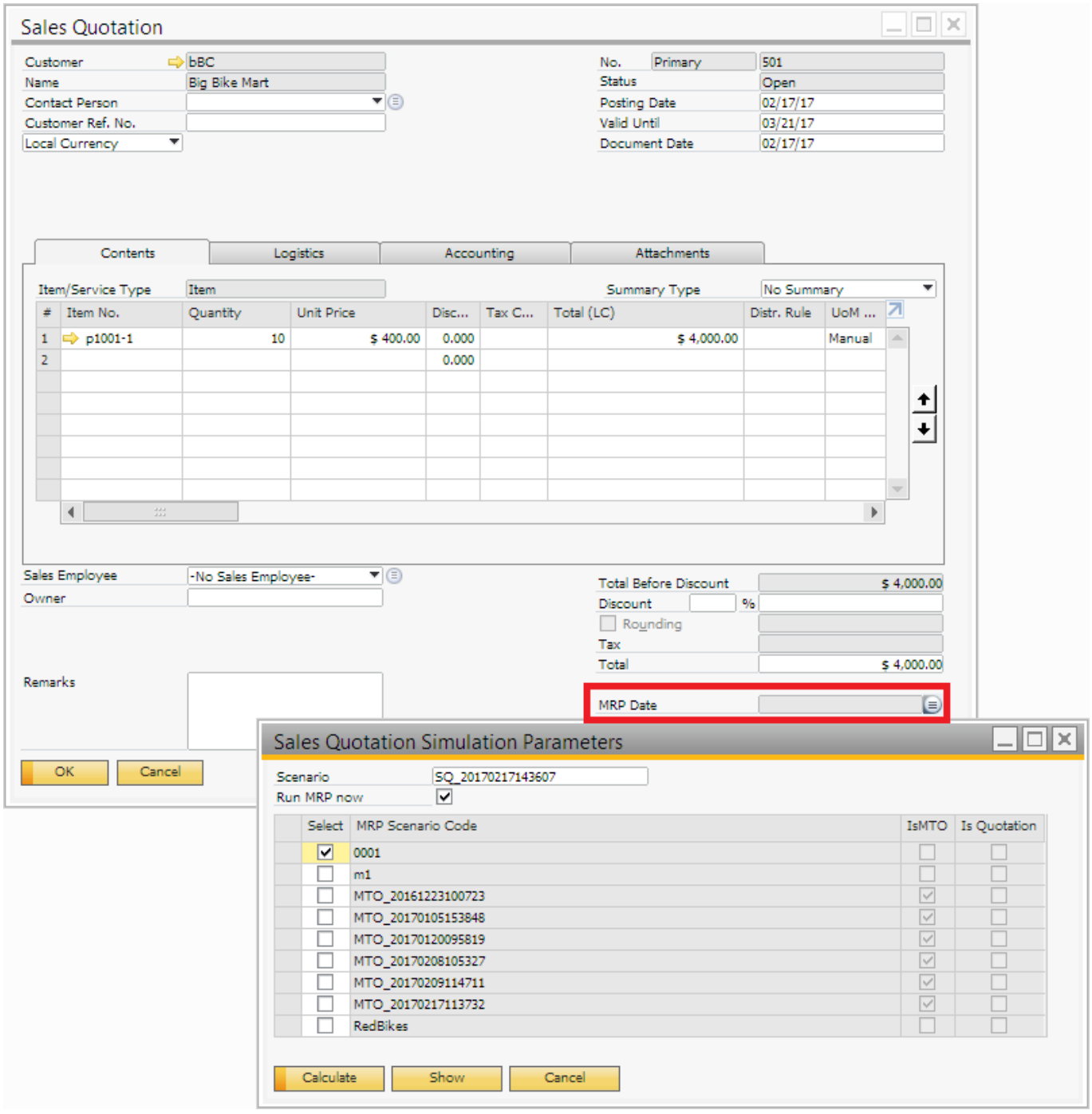
10.2. Sales quotation

The earliest fulfillment date can also be calculated for Sales Quotations. The form is extended by Produmex Manufacturing with a new ’MRP Date’ field. Click on the button next to the MRP Date field. Starting from the current date, the planning logic of Produmex Manufacturing will calculate the earliest possible date to fulfill the sales quotation.

Please note: Only the Bill of Materials of the product is considered during the MRP Date calculation. The Bill of Materials of lower level assembly materials are not considered during the calculation.

If the '*Advanced MTO Recommendation*' option is enabled on the MTO tab of Produmex Manufacturing

settings, a 'Sales Quotation Simulation Parameters' form will open. Select the simulation parameters on this form.



The system will create a new MTO scenario based on the sales quotation. Default scenario name is: SQ_ *YearMonthDayHourMinuteSecond* but it can be adjusted on the 'Scenario' field.

The 'MRP Mark' column of the purchase order determines which lines are taken into account in the simulation:

If the 'MRP Mark' is set to 'No' for each line, every sales quotation line will be taken into account. If there is at least one line with enabled 'MRP Mark', only lines where the 'MRP Mark' is set to 'Yes' will be taken into account.

Select the scenarios to include into the simulation on the grid. If the *'IsMTO'* checkbox is ticked, the scenario is an MTO scenario. If the *'Is Quotation'* checkbox is ticked, the scenario was created based on a sales quotation.

Based on the *'Sales Quotation Simulation Type filter'* option on the MTO tab of Produmex Manufacturing settings different scenarios are listed:

- VVMRPSimulationType_All: Current MRP and MTO scenarios are listed.
- VVMRPSimulationType_MTO: Only the current MTO scenarios are listed.
- VVMRPSimulationType_Quotation : Only the current MTO scenarios created based on a sales quotation are listed.

The system will read the order recommendations for the selected scenarios and will create a simulation with forward allocation strategy as if every production order recommendation were released. If the *'Run MRP now'* checkbox is ticked, the system will run again the selected scenarios.

Calculate

Click on the 'Calculate' button to run the MTO scenario for the sales quotation. The system will calculate the MRP Begin Date/Time and MRP End Date/Time for each line. The code of the scenario will also be added to each line.

The Order Recommendations form will open. It is possible to group recommendations for the same item. Select the *'Group Recommendations for Scenario ...'* option from the right-click menu. For more information about grouping recommendations please see: Make To Order

It is also possible to delete the scenario. Select the *'Delete Scenario ...'* option from the right-click menu.

Show

When the user clicks on the 'Show' button, the MRP calculation runs. The system fills the MRP Begin Date/Time, MRP End Date/Time and the MTP scenario code for each line.

The Order Recommendations form will open. The system creates an allocation simulation containing order recommendation operations from the sales quotation scenario and the selected scenarios and operations from planned production orders. The simulation is displayed on the Job Scheduling Control Panel.