



ProcessForce User's Guide

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How to Guide – ProcessForce Formulations and Bill of Materials

Path

Production > Bill of Materials > Bill of Material

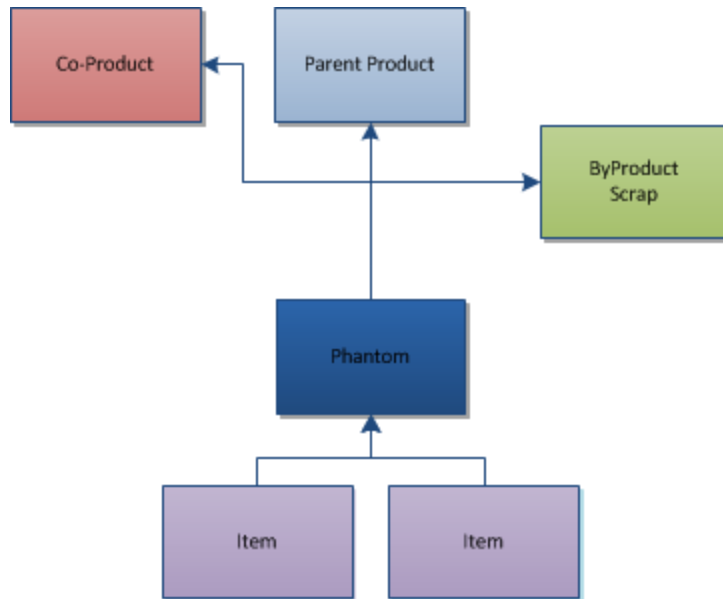
The Bill of Materials Form allows the user to define the relationship between parent and child items.

This functions supports the following:

- Items
- CoProducts
- ByProducts
- Scrap
- Intermediates (currently called Phantoms)
- Phantoms (future release)
- Make vs. Buy
- Manual vs. Backflushing
- Factors, Yield values and Scrap percentages
- Quantities
- UoM
- Formulas

Related pages:

- [Bill of Materials](#)
 - [Bill of Material Form Header](#)
 - [Items Tab](#)
 - [CoProducts Tab](#)
 - [Scrap Tab](#)
 - [WIP Items Tab](#)
 - [Attachments Tab](#)
 - [Planned Yield percent](#)
 - [Yield Analysis](#)
 - [Multi-level Bill of Materials](#)
 - [Semi-finished Items](#)
 - [Phantom Item](#)
- [Formula](#)
- [Mass Item Replacement](#)
- [Production Process](#)
 - [Yield – Time calculation](#)



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1.1 Bill of Materials

Bill of Materials is a list of all materials used to produce a specific product. ProcessForce allows also to define other values important during production of a specific product: Coproducts, Scraps or Work in Progress Items.

ProcessForce also allows to create Revisions: different Bill of Materials for one Item.

Related pages:

- [Bill of Material Form Header](#)
- [Items Tab](#)
- [CoProducts Tab](#)
- [Scrap Tab](#)
- [WIP Items Tab](#)
- [Attachments Tab](#)
- [Planned Yield percent](#)
- [Yield Analysis](#)
- [Multi-level Bill of Materials](#)

Path

Production > Bill of Materials

1.1.1 Bill of Materials form header

Path

Production > Bill of Materials > Bill of Material > Header

This form allows a user to define a bill of materials for a final product or product to be used as a part of another Bill of Materials.

Multiple Bills of Material may be defined for a product based on the Revision Code, which is defined within the Stock Management → Item Details → Revision Tab.

The Quantity and UoM represent the product quantity of the parent item.

Factor is a method to add an additional variable which affects the parent and the component quantities, for example yield or scrap.

The warehouse represents where the product will be produced.

Type field determine if a product is Internal (produced in the company) or External (order from subcontractor).

If required, the user can enter a Distribution Rule and a Project.

MRP Def. field allows the user to confirm if this Bill of Materials is the default for MRP, and also which revision of the item is the default for MRP. If this field is not checked the ProcessForce Bill of Materials is not synchronized with the SAP Business One Bill of Materials.

Batch Size allows the user to define the batch size of production used to determine the cost of a product, where there are fixed times such as setup, fixed runtime, stock and queue.

Bill of Materials

Item Number → Recipe-02 Type Internal Distribution Rules
 Description Recipe-02 Project
 Revision → default MRP Def.
 Quantity 1.000 UoM KG Batch Size 1.000
 Factor 1.000
 Warehouse → 01

#	Sequence	Item Number	Description	Description	Revision	Revision Description	Warehouse	Factor	Factor Description	Quantity	S..
1	10	→ Active-Item-03	→ Active-Item-03	Active-Item-03	→ code00	default	→ 01	1.000		0.250	
2	20	→ Active-Item-04	→ Active-Item-04	Active-Item-04	→ code00	default	→ 01	1.000		0.250	
3	30	→ Non-Active-03	→ Non-Active-03	Non-Active-03	→ code00	default	→ 01	1.000		0.400	
4	40	→ Non-Active-04	→ Non-Active-04	Non-Active-04	→ code00	default	→ 01	1.000		0.100	
5	0		→					0.000		0.000	

Remarks

OK Cancel You Can Also

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1.1.2 Items Tab

Path

Production > Bill of Materials > Bill of Material > Items Tab

This form allows the user to perform the following:

- Enter the components that are used in producing the parent product.
- Record the warehouse where the inventory is held. If the item is back flushed, this is the warehouse where inventory deductions occur.
- Define a factor and description. This factor is used as a variable to change the quantity.
- Enter a Quantity of the item in relation to the parent product.
- Add a Scrap% which affects the item quantity.
- The Result is a calculated value of the item and parent quantity relationship based on the defined [Formula](#).

- Use the default Formula (as defined on the General Settings/ProcessForce Tab) or change the expression format to calculate the item quantity (result). See [Formula](#) for additional information.

The screenshot shows the 'Bill of Materials' window with the following fields and values:

- Item Number: Recipe-02
- Description: Recipe-02
- Revision: default
- Quantity: 1.000
- Factor: 1.000
- Warehouse: 01
- Type: Internal
- UoM: KG
- Distribution Rules: Project, MRP Def. (checked), Batch Size: 1.000

The main table contains the following data:

#	Sequence	Item Number	Description	Description	Revision	Revision Description	Warehouse	Factor	Factor Description	Quantity	S..
1	10	Active-Item-03	Active-Item-03	Active-Item-03	code00	default	01	1.000		0.250	
2	20	Active-Item-04	Active-Item-04	Active-Item-04	code00	default	01	1.000		0.250	
3	30	Non-Active-03	Non-Active-03	Non-Active-03	code00	default	01	1.000		0.400	
4	40	Non-Active-04	Non-Active-04	Non-Active-04	code00	default	01	1.000		0.100	
5	0										

The 'List of Items' dialog box shows the following data:

#	Item No.	Item Description	In Stock
1	Active-Item-01	Active-Item-01	1,084
2	Active-Item-02	Active-Item-02	994
3	Active-Item-03	Active-Item-03	950
4	Active-Item-04	Active-Item-04	950
5	Bottle-01	Bottle-01	980
6	Bottle-02	Bottle-02	940
7	ByProduct-01	ByProduct-01	1
8	Choc Fruit & Nut	Chocolate Fruit and Nut	0
9	CoD	CoD	0
10	Label-01	Label-01	980

- UoM is the unit of measure for the item, and the default value is defined within the Item Master Data/Inventory Tab (see image below)
- Type is a display only field, and defines the method supply and demand method i.e. make or buy. These values are defined within the Item Master Data/Planning Data Tab (see image below)
- Select the Issue Type for issuing and consuming inventory. The valid values are Manual or Backflush. The default value is defined within the Item Master Data/General Tab (see image below)
- For each line item Project codes may be added.

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1.1.3 CoProducts Tab

Path

Production > Bill of Materials > Bill of Material > CoProducts Tab

1.1.4 Scrap Tab

Path

Production > Bill of Materials > Bill of Materials > Scrap Tab

This form allows the user to perform the following:

- Enter the products that are created as a consequence of producing the parent product.
- Record the warehouse where the inventory is held. If the item is back flushed, this is the warehouse where the inventory will be placed from a Production receipt.
- Define a factor and description. This factor is used as a variable to change the quantity.
- Enter a Quantity of the scrap in relation to the parent product.
- The Result is a calculated value of the scrap and parent quantity relationship based on the defined [Formula](#).
- Use the default Formula (as defined on the General Settings/ProcessForce Tab) or change the expression format to calculate the scrap quantity (result). See [Formula](#) for additional information.
- Enter the UoM, the default value is defined within the Item Master Data/Inventory Data Tab
- Select the scrap Type:-
 - The valid options are Scrap and ByProduct.
 - Both types of scrap create inventory transactions.
 - ByProducts can be re-used within production or sold to customers.
 - Scrap cannot be re-used.
- Select the Issue Type, Backflush or Manual. The default value is defined within the Item Master Data/General Tab.
- Enter the Project code for reporting and analysis purposes.
- Set Distribution Rule.
- Type in Remarks to a specific Scrap.

Bill of Materials

Item Number → Recipe-02 Type Internal

Description → Recipe-02

Revision → default

Quantity 1.000 UoM KG

Factor 1.000

Warehouse → 01

Distribution Rules

Project

MRP Def.

Batch Size 1.000

Items		Coproducts		Scrap		WIP Items		Attachments			
#	Sequence	Item Number	Description	Warehouse	Revision	Revision Description	Factor	Factor Description	Quantity	Result	Formula
1	10	Product-A	Product-A	01	code00	default	1.000		1.000	1.000	=U_Quantity()*U_Fact
2	0						0.000		0.000	0.000	

Remarks

Update Cancel

You Can Also

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1.1.5 WIP Items Tab

Path

Production > Bill of Materials > Bill of Materials > WIP Items

Production > Manufacturing Order > Manufacturing Order WIP Items

WIP Item tab (Work in Process Item) in ProcessForce shows what [Phantom Items](#) were used on a specific Bill of Materials / Manufacturing Order.

You can also:

- define a factor and description. This factor is used as a variable to change the quantity
- enter a Quantity of the intermediate product in relation to the parent product: the result is a calculated value of the intermediate product and parent quantity relationship based on the defined [Formula](#).
- Use the default Formula (as defined on the General Settings > ProcessForce tab) or change the expression format to calculate the Coproduct quantity (result). See [Formula](#) for additional information.

Bill of Materials

Item Number: Top-02 Type: Internal Distribution Rules:
 Description: Top-02 Project:
 Revision: default MRP Def.
 Quantity: 1.000 UoM: Custom Batch Size: 1.000
 Factor: 1.000
 Warehouse: 01

Items		Coproducts		Scrap	WIP Items	Attachments		
#	Sequence	Item Number	Description	Revision	Revision Description	Unit of me...	Factor	Factor Descripti...
1	10	Recipe-01	Recipe-01	code00	default	KG	1.000	
2	0						0.000	

Remarks:
 Update Cancel

List of Items

Find:

#	Item No.	Item Description	In Stock
1	Recipe-01	Recipe-01	0.

 Choose Cancel New

You Can Also

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1.1.6 Attachments Tab

Attachments are added in the same manner as in SAP Business One:

Bill of Materials

Item Number: Recipe-02 Type: Internal Distribution Rules:
 Description: Recipe-02 Project:
 Revision: default MRP Def.
 Quantity: 1.000 UoM: KG Batch Size: 1.000
 Factor: 1.000
 Warehouse: 01

Items		Coproducts		Scrap	WIP Items	Attachments
#	Path	File Name	Attachment Date			
1	C:\Program Files (x86)\SAP\SAP Business One\Attachments	Validation.png	23.03.15	Browse		
2				Display		

Remarks:
 Update Cancel

You Can Also

Delete

1.1.7 Planned Yield percent

The concept of planned Yield is to:

- Increase the amount of raw materials issued to production to cater for the material loss
- Increase the production time used to produce the full quantity.

On this page:

- [Item Details](#)
- [Bill of Materials](#)
- [Production Process](#)
- [Changing the Bill of Material Planned Yield](#)
- [Manufacturing Order](#)
- [Planned vs Actual Yield](#)
- [Changing the Manufacturing Order Planned Yield](#)

Item Details

Within the Item Details form, for the parent item in the bill of materials, within the Yield % field the planned yield value

The screenshot shows the 'Item Details' form with the following fields and values:

- Item Number: Top-02
- Description: Top-02
- UoM: EA
- Yield: 100.00
- Allow Residual Qty:
- Ignore Yield:

The form includes a table with the following columns: #, Revision Code, Revision Name, Status, Valid From, Valid To, Is Default, and Is MR... The table contains three rows of data:

#	Revision Code	Revision Name	Status	Valid From	Valid To	Is Default	Is MR...
1	code00	default	Active			<input checked="" type="checkbox"/>	<input type="checkbox"/>
2	code01	new one	Active	06.07.15	25.09.15	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3			Active			<input type="checkbox"/>	<input type="checkbox"/>

At the bottom of the form, there is a 'Remarks' field and two buttons: 'OK' and 'Cancel'.

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Bill of Materials

The default planned yield is copied to the Bill of Materials header and also the value is added to each item added to the Bill of Materials.

If using planned yield it is recommended to modify the default Item, CoProduct and Scrap formulas to include the yield % calculation.

The result is an increase in the material quantity required to be consumed in production.

If using Scrap%, this will be a cumulative value to the material quantity.

Bill of Materials

Item Number: Recipe-02 Type: Internal

Description: Recipe-02

Revision: default

Quantity: 1.000 Total: 0.000 UoM: KG

Factor: 1.000 Yield: 90.00 Formula

Distribution Rules: Project, MRP Def., Batch Size: 1.000

#	umber	Description	Description	Revision	Revision Description	Warehouse	Factor	Factor Description	Quantity	Scrap %	Yield	Result	Fo...
1	ve-Item-03	Active-Item	Active-Item	code00	default	01	1.000		0.250	0.00	90.00	0.250	=U_Q
2	ve-Item-04	Active-Item	Active-Item	code00	default	01	1.000		0.250	0.00	100.00	0.250	=U_Q
3	-Active-03	Non-Active	Non-Active	code00	default	01	1.000		0.400	0.00	100.00	0.400	=U_Q
4	-Active-04	Non-Active	Non-Active	code00	default	01	1.000		0.100	0.00	100.00	0.100	=U_Q
5							0.000		0.000	0.00	100.00	0.000	

Remarks: [Empty text box]

OK Cancel You Can Also

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Production Process

To ignore the increase in production time for the operation/resource, check the Ignore Yield check box.

NOTE: Currently the additional time based on yield has not been implemented into costing.

Changing the Bill of Material Planned Yield

If the Yield % value is changed, a window opens and provides a number of options:

- Take No Action: change the header only
- All Rows: copy the value and updates all rows
- Where Yield is not 100%: copy the value and update all rows where yield % is not 100%.

The screenshot displays the SAP Bill of Materials (BOM) interface. At the top, the 'Bill of Materials' window shows details for 'Recipe-02' (Type: Internal) with a quantity of 1.000 and a yield of 95.00. An 'Update Yield' dialog box is open, allowing the user to select an action for different BOM items. The dialog has three sections: 'Items', 'Coproducts', and 'Scraps'. Each section contains three radio button options: 'Take No Action', 'All Rows', and 'Where Yield is not 100%'. A red arrow points to the 'Where Yield is not 100%' option in the 'Items' section. The background shows a table of BOM items with columns for Item Number, Description, Quantity, Factor, Warehouse, Total, Yield, UoM, and Formula.

#	umber	Descripti	Quantity	Factor	Warehouse	Total	Yield	UoM	Formula
1	ve-Item-03	Acti							
2	ve-Item-04	Acti							
3	-Active-03	Non							
4	-Active-04	Non							
5									

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Manufacturing Order

When the Manufacturing Order is created, the Planned Quantity is increased by the planned Yield % to increase the amount of items to be issued and resource time required.

Manufacturing Order

Item Code: Recipe-02, Type: Internal, Status: Not Scheduled, Routing: 02

Item Name: Recipe-02, Revision: code00, Warehouse: 01, Planned Quantity: 1.000, UoM: KG, Actual Quantity: 0.000

Items	Coproducts	Scrap	WIP Items	Operations	Others	Documents	Sales Orders	Attachments			
#	ption	Warehouse	Revision	Revision Description	Factor	Factor Description	Quantity	Scrap %	Yield	Planned Quantity	F
1	-Item-03	01	code00	default	1.000		0.250	0.00	90.00	0.250	=L
2	-Item-04	01	code00	default	1.000		0.250	0.00	100.00	0.250	=L
3	ctive-03	01	code00	default	1.000		0.400	0.00	100.00	0.400	=L
4	ctive-04	01	code00	default	1.000		0.100	0.00	100.00	0.100	=L
5					0.000		0.000	0.00	100.00	0.000	

Remarks:

Journal Remarks: Close Date:

Checked the Ignore Yield check box to not increase the operation/resource total time.

Manufacturing Order

Item Code: Recipe-02, Type: Internal, Status: Not Scheduled, Routing: 02

Item Name: Recipe-02, Revision: code00, Warehouse: 01, Planned Quantity: 1.000, UoM: KG, Actual Quantity: 0.000

Items	Coproducts	Scrap	WIP Items	Operations	Others	Documents	Sales Orders	Attachments	
Operations									
#	Sequence	Operation...	Operation Na...	Operation Sta...	Operation Ove...	Operation Overlay Code	Operation Quantity	Ignore Yield	Operat...
1	10	04	Prep	Not started			0.000	<input type="checkbox"/>	
2	20	03	Mixing	Not started			0.000	<input checked="" type="checkbox"/>	
3	0			Not started			0.000	<input type="checkbox"/>	

Line No.	Resource Code	Rresource Na...	Resource Type	Issue Type	Machine Code	Machine Line ...	Number of Re...	Has Cycles	Cycle Ca...
2	03	Mixer	Machine	Manual			0	<input type="checkbox"/>	1
6			Machine	Manual			0	<input type="checkbox"/>	1

Remarks:

Journal Remarks: Close Date:

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Planned vs Actual Yield

Based on the Yield Formula, the Actual Yield is calculated when materials receipts and issues are created.

The screenshot displays the 'Manufacturing Order' form. The 'Items' tab is active, showing a table with columns for 'Planned' and 'Actual' values, along with 'UoM'. The 'Yield' row is highlighted with a red circle, showing a Planned Yield of 95.00 and an Actual Yield of 0.00. Other rows include Total, Quantity, Rework, Factor, Coproduct Yield, ByProduct Yield, and Scrap Yield.

	Planned	Actual	UoM
Total	1.053	0.000	KG
Quantity	1.000	0.000	KG
Rework		0.000	KG
Yield	95.00	0.00	...
Factor		1.000	
Coproduct Yield		0.00	
ByProduct Yield		0.00	
Scrap Yield		0.00	

Other fields in the form include: Item Code (Recipe-02), Item Name (Recipe-02), Revision (code00), Warehouse (01), Planned Quantity (1.000), Actual Quantity (0.000), UoM (KG), Type (Internal), Series, Status (Not Scheduled), Routing (02), Required Date, Planned Start Date, Planned End Date, Scheduling Method (Forward), Priority (1), Calculated TI (0:00:00), Parent Document, Batch Number, Distribution Rule, Project, Batch Size (1.000), and Price (23.57). There are also fields for Remarks, Journal Remarks, and Close Date, along with 'Add' and 'Cancel' buttons.

Changing the Manufacturing Order Planned Yield

If the Yield% value is changed, a window opens and provides a number of options:

- Take No Action: change the header only
- All Rows: copy the value and updates all rows
- Where Yield is not 100%: copy the value and update all rows where yield % is not 100%.

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1.1.8 Yield Analysis

Introduction

The analysis of yield can be very simple, e.g. a comparison of Planned vs Actual quantity or complex, based on the comparison between the amount of a specific item used in production and a break down into Parent, Coproduct, Byproduct and Scrap actual quantity.

Below is a table illustrating some yield analysis examples:

Yield Basis	Yield Calculation	Example
Item Parent	Item Parent	Item Parent Actual Quantity / Item Parent Planned Quantity * 100
Item Parent	Item Parent + Coproducts + Scrap	(Item Parent Actual Quantity + CoProducts Actual Quantity + Scrap Actual Quantity) / Item Parent Planned Quantity * 100

On this page:

- [Introduction](#)
- [Yield Formulas](#)
- [Yield Formula Formats](#)

Related pages:

- [Yield Settings](#)

Yield Basis	Yield Calculation	Example
Item Parent	Item Parent + CoProducts - Scrap	$(\text{Item Parent Actual Quantity} + \text{CoProducts Actual Quantity} - \text{Scrap Actual Quantity}) / \text{Item Parent Planned Quantity} * 100$
Item Parent	Item Parent - CoProducts - Scrap	$(\text{Item Parent Actual Quantity} - \text{CoProducts Actual Quantity} - \text{Scrap Actual Quantity}) / \text{Item Parent Planned Quantity} * 100$
Item Parent	CoProducts + Scrap	$(\text{CoProducts Actual Quantity} + \text{Scrap Actual Quantity}) / \text{Item Parent Planned Quantity} * 100$
Item Parent	CoProducts - Scrap	$(\text{CoProducts Actual Quantity} - \text{Scrap Actual Quantity}) / \text{Item Parent Planned Quantity} * 100$
Specific Item	Item Parent	$\text{Item Parent Actual Quantity} / \text{Specific Item Actual Quantity} * 100$
Specific Item	Item Parent + CoProducts + Scrap	$(\text{Item Parent Actual Quantity} + \text{CoProducts Actual Quantity} + \text{Scrap Actual Quantity}) / \text{Specific Item Actual Quantity} * 100$
Specific Item	Item Parent + CoProducts - Scrap	$(\text{Item Parent Actual Quantity} + \text{CoProducts Actual Quantity} - \text{Scrap Actual Quantity}) / \text{Specific Item Actual Quantity} * 100$
Specific Item	Item Parent - CoProducts - Scrap	$(\text{Item Parent Actual Quantity} - \text{CoProducts Actual Quantity} - \text{Scrap Actual Quantity}) / \text{Specific Item Actual Quantity} * 100$
Specific Item	CoProducts + Scrap	$(\text{CoProducts Actual Quantity} + \text{Scrap Actual Quantity}) / \text{Specific Item Actual Quantity} * 100$
Specific Item	CoProducts - Scrap	$(\text{CoProducts Actual Quantity} - \text{Scrap Actual Quantity}) / \text{Specific Item Actual Quantity} * 100$
All Items	Item Parent	$\text{Item Parent Actual Quantity} / \text{All Item Actual Quantity} * 100$
All Items	Item Parent + CoProducts + Scrap	$(\text{Item Parent Actual Quantity} + \text{CoProducts Actual Quantity} + \text{Scrap Actual Quantity}) / \text{All Item Actual Quantity} * 100$
All Items	Item Parent + CoProducts - Scrap	$(\text{Item Parent Actual Quantity} + \text{CoProducts Actual Quantity} - \text{Scrap Actual Quantity}) / \text{All Item Actual Quantity} * 100$
All Items	Item Parent - CoProducts - Scrap	$(\text{Item Parent Actual Quantity} - \text{CoProducts Actual Quantity} - \text{Scrap Actual Quantity}) / \text{All Item Actual Quantity} * 100$

Yield Basis	Yield Calculation	Example
All Items	CoProducts + Scrap	$(\text{CoProducts Actual Quantity} + \text{Scrap Actual Quantity}) / \text{All Item Actual Quantity} * 100$
All Items	CoProducts - Scrap	$(\text{CoProducts Actual Quantity} - \text{Scrap Actual Quantity}) / \text{All Item Actual Quantity} * 100$

Yield Formulas

Please check [the Yield settings](#) for default formulas.

Within General Settings > ProcessForce Tab > Bill of Materials and Manufacturing Orders tab, four additional default formulas have been added

- Yield
- CoProduct Yield
- ByProduct Yield
- Scrap Yield

When a default yield formula is added, this is copied to the corresponding yield formula field within the Bill of Material form:

General Settings

BP Budget Services Display Font & Bkgd Pgh Stock Resources Cash Flow Cockpit Cost Accounting ProcessForce Pricing Hide Functions

General Inventory Bill of Materials and Manufacturing Orders MRP QC Costing Subcontracting

Default formulas for Bill of Materials

Items $=U_Quantity()*U_Factor()*Items.U_Factor(<sequence>)*Items.U_Quantity(<sequence>)*100/(100 - Items.U_ScrapPercentage(<sequence>))$

Coproducts $=U_Quantity()*U_Factor()*Coproducts.U_Factor(<sequence>)*Coproducts.U_Quantity(<sequence>)$

Scrap $=U_Quantity()*U_Factor()*Scraps.U_Factor(<sequence>)*Scraps.U_Quantity(<sequence>)$

Phantoms $=U_Quantity()*U_Factor()*Phantoms.U_Factor(<sequence>)*Phantoms.U_Quantity(<sequence>)$

Yield $=U_ActualQty()/U_Quantity()*100$

ByProduct Yield

Coproduct Yield

Scrap Yield

Enable Bill of Materials synchronization between ProcessForce and SAP Business One

Enable synchronization between Manufacturing Orders and SAP Business One's Production Orders

Due Date Synchronizat Required Date

OK Cancel

To view, create and edit the Yield Formula, click on the yellow button to open the Yield Formula Form:

Bill of Materials

Item Number: Recipe-02 Type: Internal
 Description: Recipe-02
 Revision: default
 Quantity: 1.000 Total: 0.000 UoM: KG
 Factor: 1.000 Yield: 95.00 Formula: ...
 Warehouse: 01

Distribution Rules
 Project:
 MRP Def.
 Batch Size: 1.000

#	Sequence	Item Number	Description	Description	Revision	Revision Description	Warehouse	Factor	Factor Description	Quantity	Scrap %	Yield
1	10	Active-Item-03	Active-Item-	Active-Item-	code00	default	01	1.000		0.250	0.00	90.0
2	20	Active-Item-04	Active-Item-	Active-Item-	code00	default	01	1.000		0.250	0.00	100.0
3								1.000		0.400	0.00	100.0
4								1.000		0.100	0.00	100.0
5								0.000		0.000	0.00	100.0

Yield Formula Form

Yield Formula: $=U_ActualQty()/U_Quantity()*100$

OK Cancel

Remarks

OK Cancel

You Can Also

The Yield Formulas defined within the Bill of Material form are also copied to the Manufacturing Order form, and displayed by clicking on the yellow button.

If required, the Yield Formulas can be edited.

Manufacturing Order

Item Code: Recipe-02 Type: Internal
 Item Name: Recipe-02
 Revision: default
 Warehouse: 01
 Planned Quantity: 1.000 UoM: KG
 Actual Quantity: 0.000

Series: Primary 3
 Status: Not Scheduled
 Routing: 02
 Required Date:
 Planned Start Date:
 Planned End Date:

	Planned	Actual	UoM
Total	1.020	0.000	KG
Quantity	1.000	0.000	KG
Rework		0.000	KG
Yield	98.00	0.00	...
Factor		1.000	

Scheduling Method: Forward
 Priority: 1
 Calculated: 0:00:00
 Parent Document:

Yield Formula Form

Yield Formula: $=U_ActualQty()/U_Quantity()*100$

OK Cancel

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Yield Formula Formats

Below is an example of different Yield analysis formulas:

Yield Type	Default Description	Default Formula
Yield	Item Parent Actual Quantity / Item Parent Planned Quantity * 100	=U_ActualQty()/U_Quantity()*100
CoProduct	Total CoProduct Actual Quantity / Total CoProduct Planned Quantity * 100	=Coproducts.U_ActualQty.Sum()/if(Coproducts.U_Result.Sum()=0;1;Coproducts.U_Result.Sum())*100
ByProduct	Total ByProduct Actual Quantity / Total ByProduct Planned Quantity * 100	=Scraps.U_ActualQty.Sum(equals(Scraps.U_Type(),"Usefull"))/if(Scraps.U_Result.Sum(equals(Scraps.U_Type(),"Usefull"))=0;1;Scraps.U_Result.Sum(equals(Scraps.U_Type(),"Usefull")))*100
Scrap	Total Scrap Actual Quantity / Total Scrap Planned Quantity * 100	=Scraps.U_ActualQty.Sum()/if(Scraps.U_Result.Sum()=0;1;Scraps.U_Result.Sum())*100

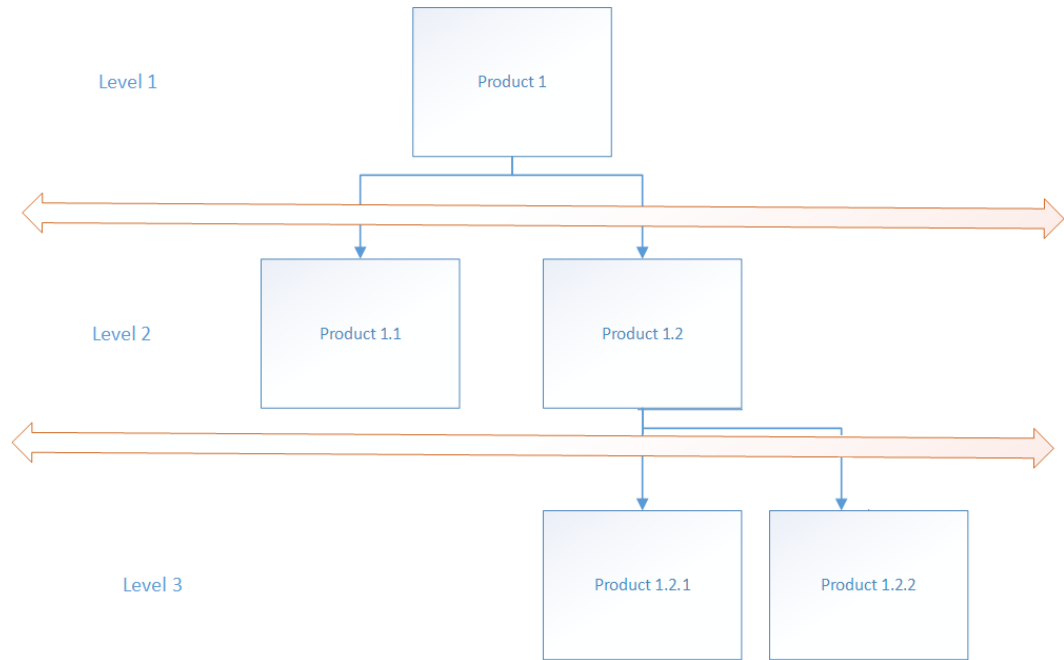
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1.1.9 Multi-level Bill of Materials

Bill of Materials can have a multi-level structure. That means that an Item that is a part of the Bill of Materials can have its own Bill of Materials too. In the example below Product 1 is a final good. Its Bill of Materials consists of Product 1.1. and Product 1.2. Product 1.2 also has its Bill of Materials (in this case it contains two Items: 1.2.1, 1.2.2):

Related pages:

- [Semi-finished Items](#)
- [Phantom Item](#)



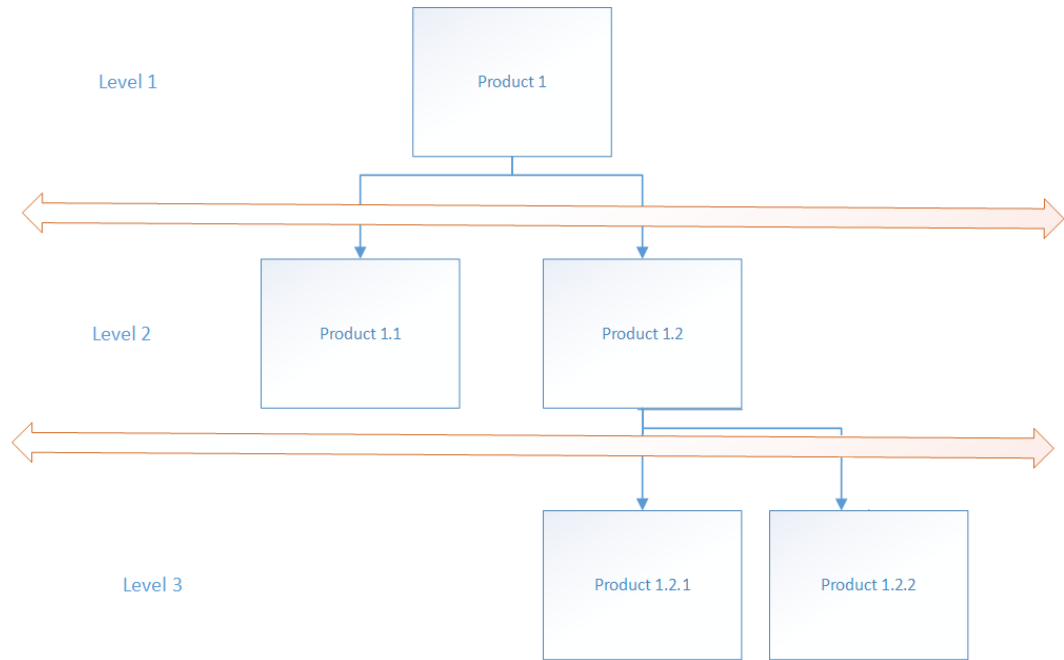
In ProcessForce there are two ways of dealing with this situation:

- **Semi-finished Items**: in this case Items in final good structure can have its own Bill of Materials for which another Manufacturing Order has to be created (apart from final good one). Items like this can also be produced separately (as a final good on a stand-alone Manufacturing Order) and stored.
- **Phantom Item**: it is also a Bill of Materials in a structure of another Bill of Materials but its production result cannot be stored nor produced separately: it is an element of production process of a final good. It does not require to create a separate Manufacturing Order, its components and Operations are added to a Manufacturing Order of a final good.

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Semi-finished Items

Semi-finished Item is an Item that has its own Bill of Materials but is also a part of a finished product Bill of Materials. In the example below Product 1.2 is semi-finished: it has its own structure (Product 1.2.1 and 1.2.2). For this kind of Items another Manufacturing Order has to be created (apart from finished product one) when final product is produced. Items like this can also be produced separately (as its own final product) and stored.



Semi-finished Items Manufacturing Orders (linked to final product Manufacturing Order) can be managed from [Semi-finished Product Scheduling Board](#).

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Phantom Item

A Phantom Item is a Bill of Materials template that can be a part of another Bill of Materials. It is not a Stock Item – it is never receipt to any Warehouse. It serves only as a marking point in a master Bill of Materials production process (Phantom Items do not create inventory nor financial transactions). Phantom Item is an alternative to Semi-Finished product. You can use Bill of Material Item on a master Bill of Materials but in this case a separate, linked Manufacturing Order is needed for each child BOM. Using Phantom on BOM does not create separate MOR: it explodes (adds its content) on Items Tab and on Operations tab (adds operations defined in Phantom Production Process).

On this page

- [Phantom Item](#)
- [Material Phantom](#)

Phantom Item

Setting up

Path

Inventory > Item Master Data > Production Data tab

The screenshot shows the 'Item Master Data' form with the 'Production Data' tab selected. The 'Phantom Item' checkbox is checked, and the 'Issue Method' is set to 'Backflush'. The 'Inventory Item', 'Sales Item', and 'Purchase Item' checkboxes are unchecked. The 'Production Data' tab is selected.

To use a specific Item as Phantom be sure to check the following settings:

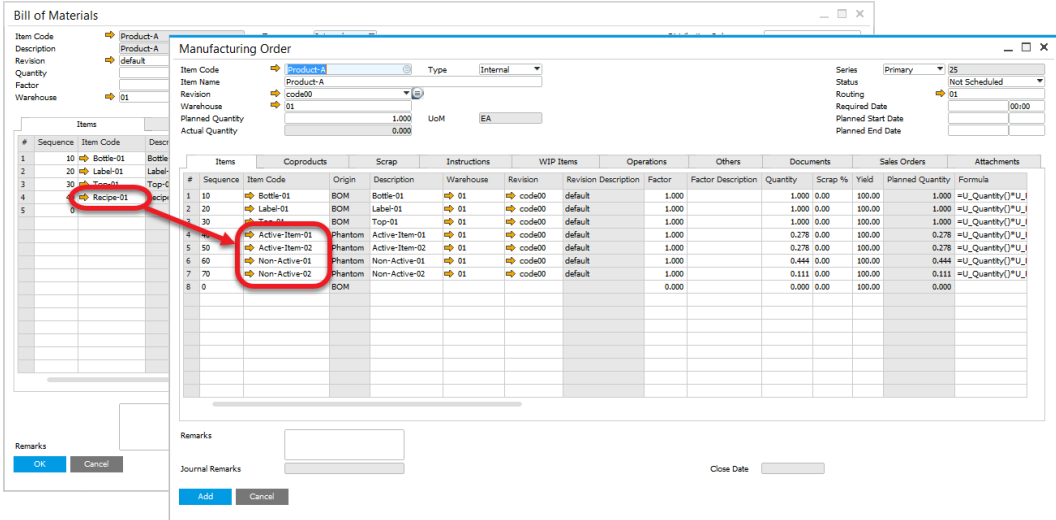
- Phantom Item check box checked
- Inventory, Sales and Purchase Item fields un-checked
- Issue Method set up to Backflush

Also mind that a Phantom (as every Non-Inventory Item) cannot be managed either by Batches, or Serials (Item Master Data > General tab).

Example

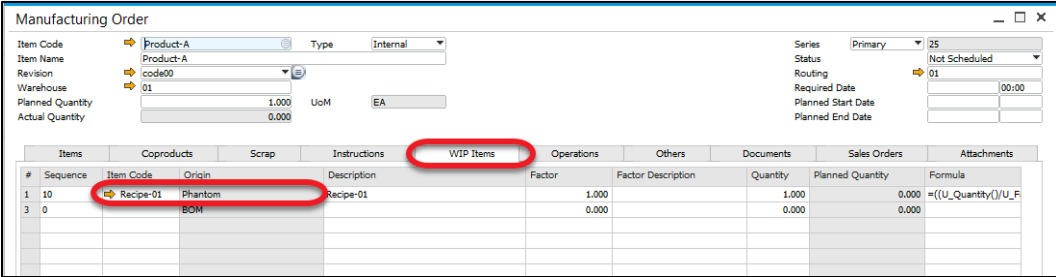
We have a beverage – Product-A. One piece of it consists of a packaging (Bottle-01, Label-01, Top-01) and actual drink (Recipe-01), which is a separate Bill of Materials. Packaging elements can be bought or produced and taken from inventory during production. But drink (as a Phantom Item) can never be used on a separate Manufacturing Order (just for Recipe-01) nor goes into stock - it can only be produced during Product-A production process and be a part of it. It also means that drink is not received to Warehouse and then issued for Product-A

production process, but all the elements enter the manufacturing process together which result in Product-A:



As it can be seen on the screenshot above, the Phantom from master Bill of Materials exploded on connected a Manufacturing Order: every Item from Recipe-01 was added to Manufacturing Order > Items tab. Because of it there is no need to create a separate Manufacturing Order for Recipe-01 Bill of Materials (as we would have to do is it was a Semi-finished Product). Note that also Operations defined for the Phantom in its Production Process are added to Operations tab.

You can check what Phantom Item were used on a specific Manufacturing Order in WIP Items tab:



You can also add a Phantom manually to a Manufacturing Order. On adding a document after this, a communication form will pop up with information about Phantoms being present on a document and that it will be expanded automatically. It is required to confirm the communication before adding a document.

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Material Phantom

This function combines regular and Phantom Item approach: it is still an Inventory Item (for which it is possible to create a separate Manufacturing Order) but can be exploded on a master Bill of Materials to avoid creation of linked Manufacturing Order for Bill of Materials used on another BOM. Material Phantom can also be, unlike Phantoms, Sale or Purchase Item.

Example

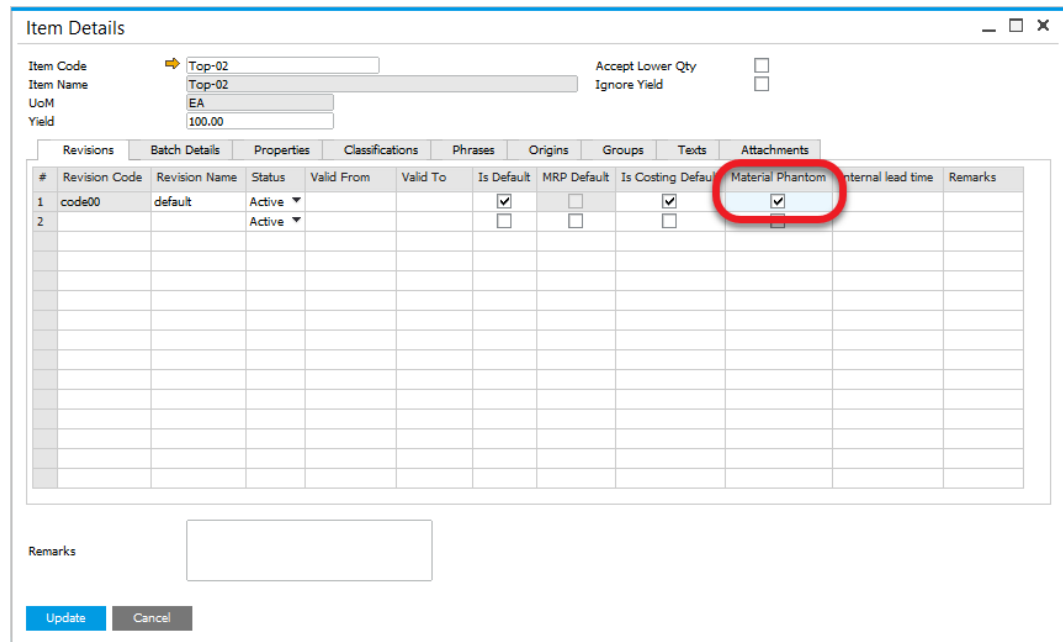
An Engine Item is usually produced during a Car Item production process in Company. To do this, Company uses Engine as Material Phantom on Car BOM (to avoid creating additional, linked Engine Manufacturing Order). Engine is not taken into inventory but is created during Car production process and is a part of Car final good. But in some cases Company wants to sell Engine separately. It is possible to create a separate Manufacturing Order for Engine in cases like this.

Setting up

Material Phantom option can be set up for a specific revisions in Item Details:

Path

Inventory > Item Details

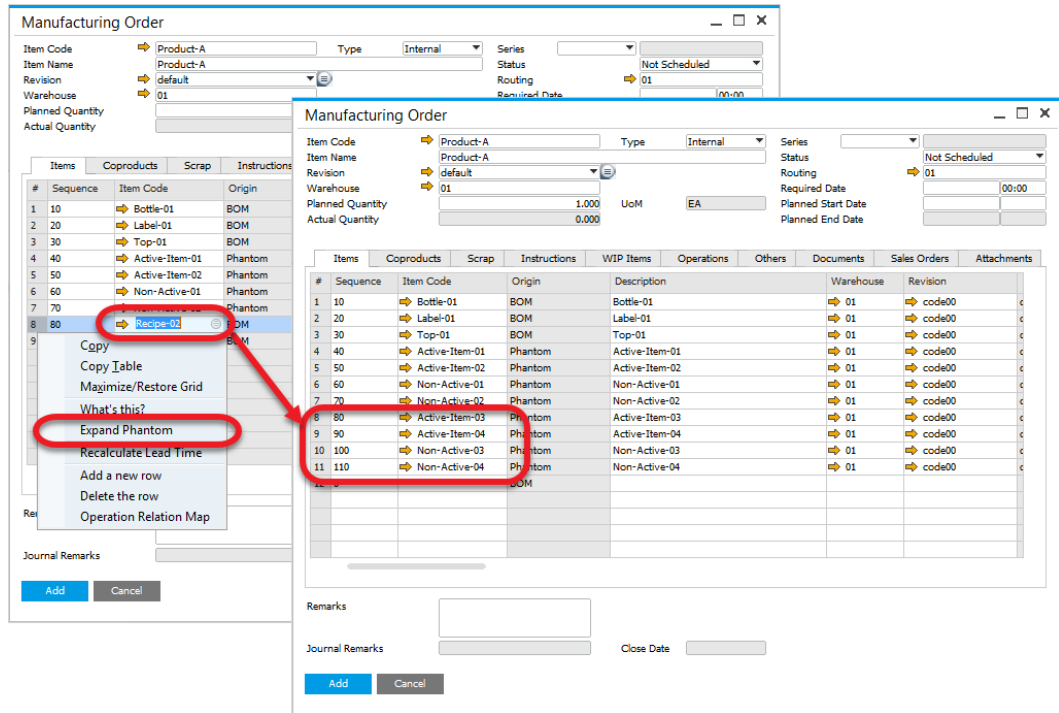


The screenshot shows the 'Item Details' window with the 'Revisions' tab selected. The 'Material Phantom' checkbox is checked for revision 1 and circled in red.

#	Revision Code	Revision Name	Status	Valid From	Valid To	Is Default	MRP Default	Is Costing Default	Material Phantom	Internal lead time	Remarks
1	code00	default	Active			<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
2			Active			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		

Usage

On adding a Material Phantom Item to a Manufacturing Order you can explode it by using context menu on the Item:



The application also displays a system message when there is a Material Phantom Item that was not exploded (*There are phantoms. All phantoms will expand automatically. Do you want to continue?*). It is not possible to add a Manufacturing Order with Material Phantom Item that has not been exploded.

If a specific Item is required to be used on Bill of Materials as a regular Item (without its BOM, just as an Inventory Item) in some cases and as a Material Phantom (A BOM that will explode on a master BOM) in other, it is required to create two separate revisions that will differ from each other by Material Phantom check box checked and by the fact that non-Material Phantom revision will not have a BOM assign.

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External links

[Phantom Item concept](#)

1.2 Production Process

Production Process allows to assign a specific Routing to a production Item and to bind specific Item to Operations on a Routing.

On this page:

- [Adding a Routing](#)
- [Default Routing and Alternatives](#)
- [Operation Overlay](#)
- [Resources](#)
- [Tooling](#)
- [Operation Bind](#)
 - [Manufacturing Order Operation Bind](#)
- [Instructions tab](#)
- [Validity Period](#)

1.2.1 Adding a Routing

To add a Routing from within the Bill of Material form, right mouse button click menu, select the Production Process menu option. You can also reach the form by choosing the following path in the main menu:

Path

Production > Bill of Materials > Production Process

Bill of Materials

Item Number: Recipe-02 Type: Internal Distribution Rules:
 Description: Recipe-02 Project:
 Revision: default MRP Def.
 Quantity: 1.000 UoM: KG Batch Size: 1.000
 Factor: 1.000
 Warehouse: 01

#	Sequence	Item Number	Description	Description	Revision	Revision Description	Description	Quantity	S..
1	10	Active-Item-03	Active-Item-03	Active-Item-03	code00	default		0.250	
2	20	Active-Item-04	Active-Item-04	Active-Item-04	code00	default		0.250	
3	30	Non-Active-03	Non-Active-03	Non-Active-03	code00	default		0.400	
4	40	Non-Active-04	Non-Active-04	Non-Active-04	code00	default		0.100	
5	0							0.000	

Context menu on row 1: What's this?, Remove, Copy, Production Process, Costed Bill of Materials

Remarks:

OK Cancel You Can Also

or in the context menu on Item Details form:

Item Details

Item Code: Top-02 Accept Lower Qty:
 Item Name: Top-02
 UoM: Custom

#	Revision Code	Revision Name	Status	Valid From	Valid To	Is Default	MRP Default	Is...
1	code00	Summer	Active	01.05.15	28.11.17	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
2	code01			01.11.15	30.04.16	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
3						<input type="checkbox"/>	<input type="checkbox"/>	

Context menu on row 2: Copy, Copy Table, Maximize/Restore Grid, What's this?, Add a new row, Delete the row, Create/Open Bill of Materials, Open Technology

Remarks:

OK Cancel

1.2.2 Default Routing and Alternatives

To add a Routing or multiple alternative Routings, select and enter a Routing Code from in the second column.

If the Routing is the default routing to be used with Manufacturing Orders, check the box in the "Default" column.

If the Routing is the default routing to be used for Product Costing, then check the box.

The screenshot shows the 'Production Process' dialog box. At the top, it displays 'Item Number' as 'Recipe-02', 'Description' as 'Recipe-02', and 'Revision' as 'default'. Below this are tabs for 'Routings' and 'Operation Bind'. The 'Routings' tab is active, showing a table with columns: '#', 'Routing Code', 'Routing Name', 'Default', 'Roll-up Default', and 'Remarks'. The first row is selected, showing routing code '02' and name 'Mixing Process', with both 'Default' and 'Roll-up Default' checkboxes checked. Below this is a table for 'Operation Properties' with columns: 'Operation Sequence', 'Operation Code', 'Operation Name', 'Operation Overlay Sequence', 'Operation Overlay Code', 'Overlay Quantity', and 'Remarks'. It lists operations 10 (Prep), 20 (Mixing), and 0. At the bottom is a 'Resource Properties' table with columns: 'Resource Code', 'Resource Name', 'Default', 'Resource Type', 'Issue Type', 'Machine Code', 'Number of Resources', 'Has Cycles', 'Cycle Capacity', and 'Queue Time'. It lists resources 05 (Prep), 02 (Pack), and an unnamed resource.

#	Routing Code	Routing Name	Default	Roll-up Default	Remarks
1	02	Mixing Process	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
2			<input type="checkbox"/>	<input type="checkbox"/>	

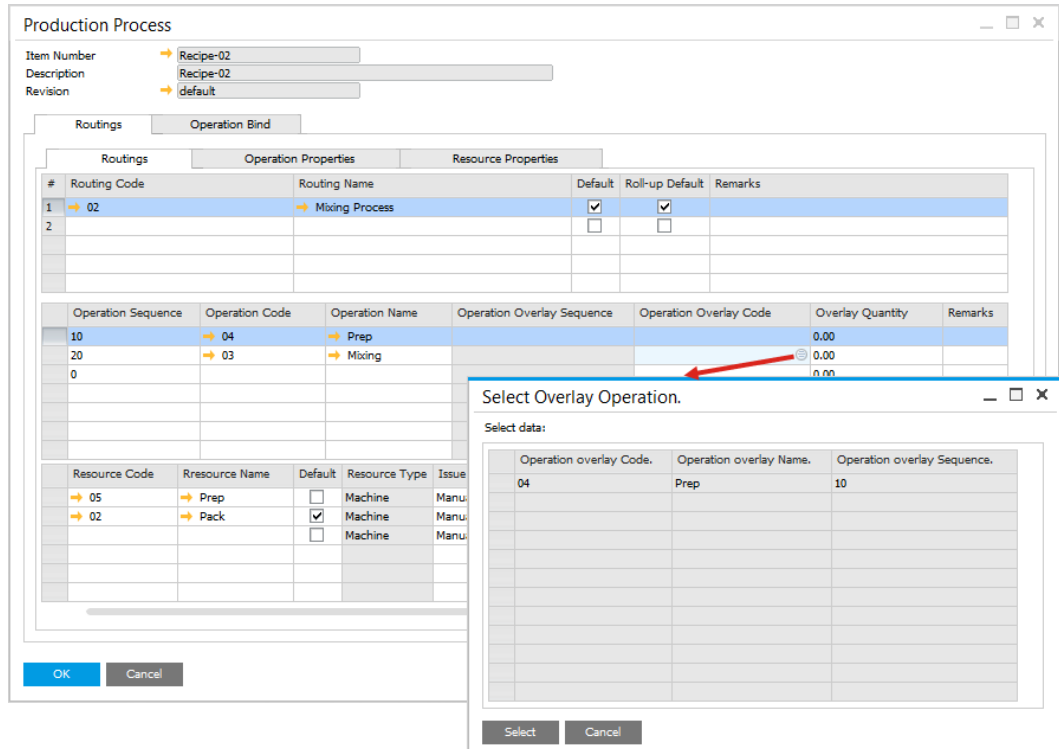
Operation Sequence	Operation Code	Operation Name	Operation Overlay Sequence	Operation Overlay Code	Overlay Quantity	Remarks
10	04	Prep			0.00	
20	03	Mixing			0.00	
0					0.00	

Resource Code	Resource Name	Default	Resource Type	Issue Type	Machine Code	Number of Resources	Has Cycles	Cycle Capacity	Queue Time
05	Prep	<input type="checkbox"/>	Machine	Manual		1	<input type="checkbox"/>	1.000	0.000
02	Pack	<input checked="" type="checkbox"/>	Machine	Manual		1	<input type="checkbox"/>	1.000	0.000
		<input type="checkbox"/>	Machine	Manual		0	<input type="checkbox"/>	1.000	0.000

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1.2.3 Operation Overlay

If the production process allows overlapping operations, the user can enter an Operation Overlay Code (Operation Code) and a Quantity after which next operation starts.



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1.2.4 Resources

By Clicking on the Operation Code column, the Resources within the Operation are displayed within the third column.

If required for this specific combination of Item Number, Revision, Routing, Operation and Resource, the Time and Rate values can be changed, additional Resources added or existing Resources removed.

If there are alternative resources for the operation, add several Resources and select one as the 'Default'.

Production Process

Item Number → Recipe-02
 Description → Recipe-02
 Revision → default

Routings Operation Bind

#	Routing Code	Routing Name	Default	Roll-up Default	Remarks
1	→ 02	→ Mixing Process	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
2			<input type="checkbox"/>	<input type="checkbox"/>	

Operation Sequence	Operation Code	Operation Name	Operation Overlay Sequence	Operation Overlay Code	Overlay Quantity	Remarks
10	→ 04	→ Prep			0.00	
20	→ 03	→ Mixing			0.00	
0					0.00	

Resource Code	Resource Name	Default	Resource Type	Issue Type	Machine Code	Number of Resources	Has Cycles	Cycle Capacity	Queue Time
→ 05	→ Prep	<input type="checkbox"/>	Machine	Manual		1	<input type="checkbox"/>	1.000	0.000
→ 02	→ Pack	<input checked="" type="checkbox"/>	Machine	Manual		1	<input type="checkbox"/>	1.000	0.000
		<input type="checkbox"/>	Machine	Manual		0	<input type="checkbox"/>	1.000	0.000

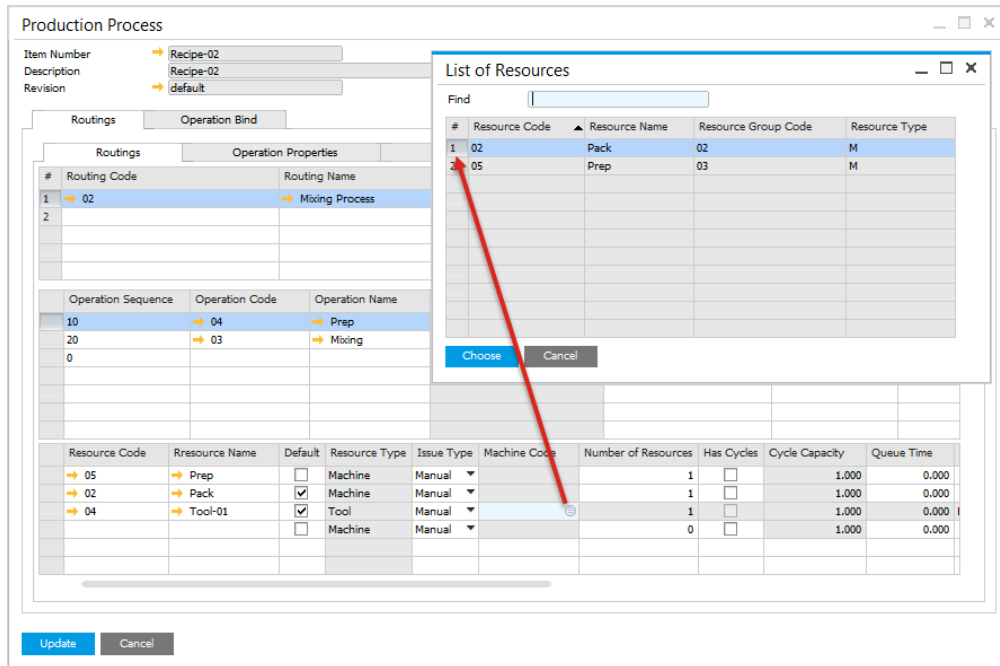
OK Cancel

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1.2.5 Tooling

When adding a Tool select the "Machine Code" which is referring to it.

This example illustrates which machine the tool can be used on, for making the specific product.

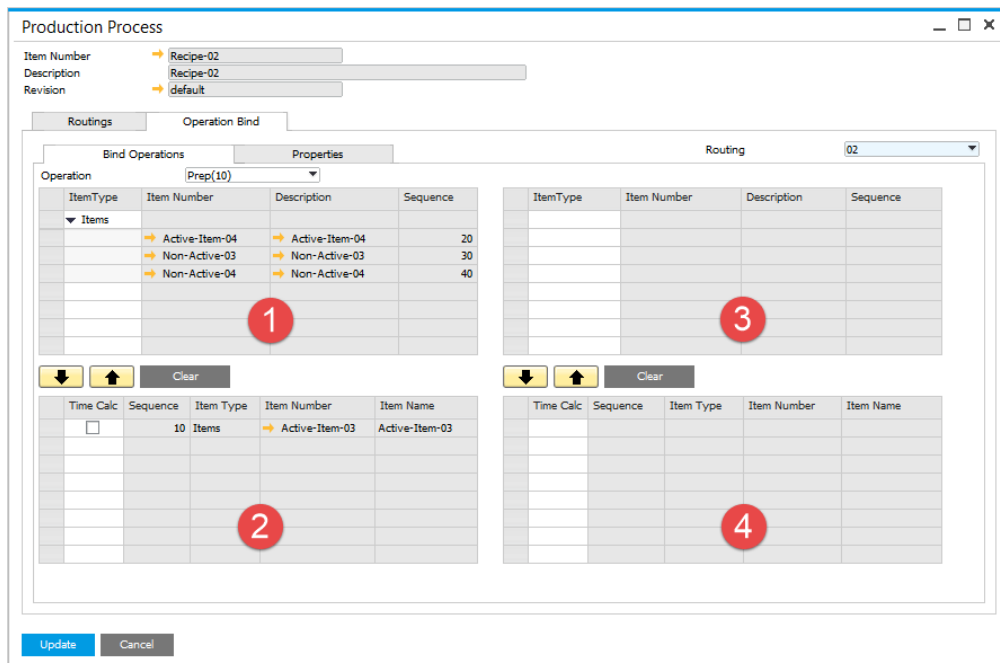


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1.2.6 Operation Bind

Operation Bind allows user to link Items with Operations.

The window is divided into four parts:



1. Items that are available to be linked with selected operation as an input to this operation.
2. Items that are already selected as an input for operation.
3. Items that are available to be linked with selected operation as an output of this operation.
4. Items that are already selected as an output of operation.

To bind an operation, a user have to choose a Routing from defined for this Process Routings and then Operation:

The screenshot shows the 'Production Process' window with the 'Operation Bind' tab selected. The 'Routing' dropdown is set to '02' and the 'Operation' dropdown is set to 'Prep(10)'. The interface displays two tables for item mappings and time calculations.

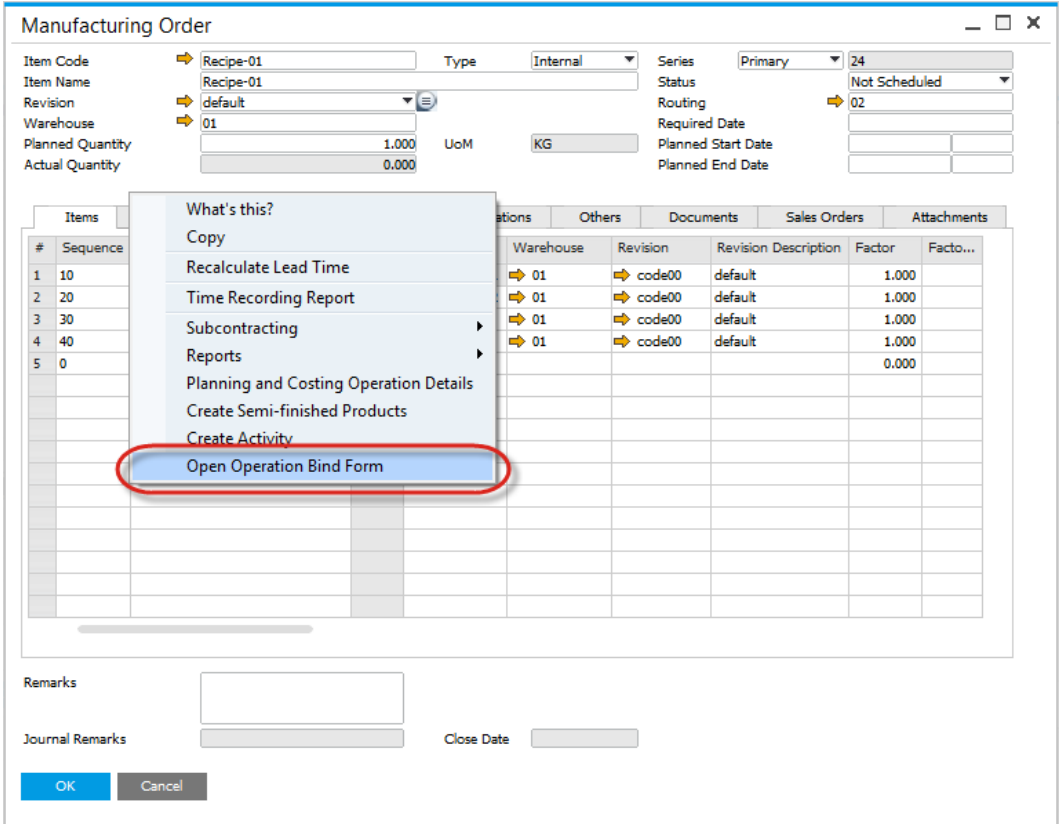
Item Type	Item Number	Description	Sequence
Items	Active-Item-04	Active-Item-04	20
	Non-Active-03	Non-Active-03	30
	Non-Active-04	Non-Active-04	40

Time Calc	Sequence	Item Type	Item Number	Item Name
<input type="checkbox"/>	10	Items	Active-Item-03	Active-Item-03

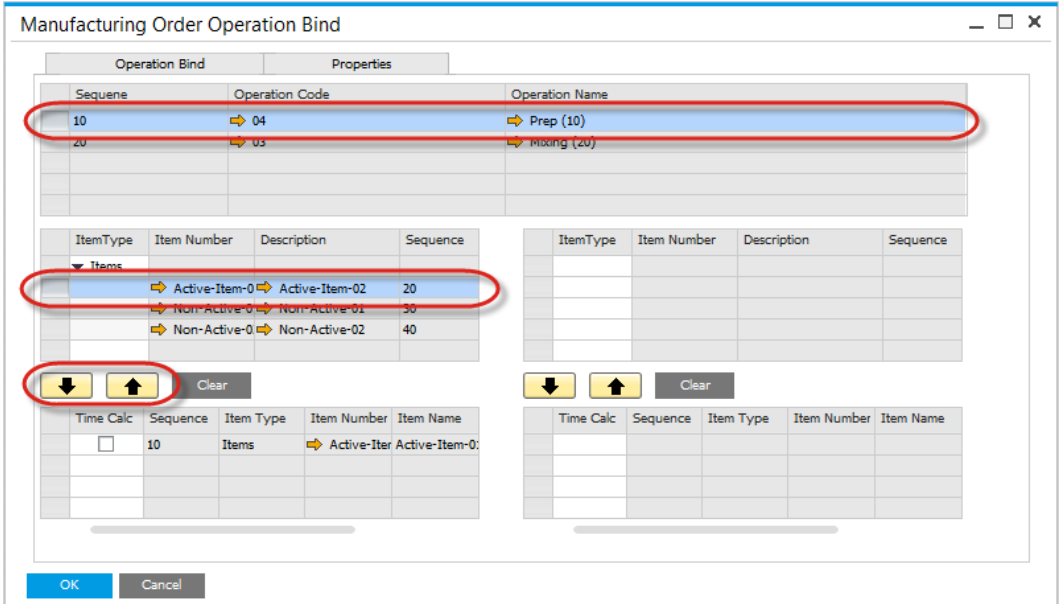
In Operation Binding you can also specify that you want to change quantity used to calculate selected operation time. In Process Force time for operation is calculated based on planned quantity of a final product. You can change this behavior for each of your operation by selecting Time Calc check box. Result quantity of selected item will be taken to calculate operation time.

Manufacturing Order Operation Bind

Operation Bind can be defined or change individually for a specific Manufacturing Order. To do that click Open Operation Bind Form on the context menu on Manufacturing Order form.



Click an Operation row and Item row and use arrows to bind both elements:

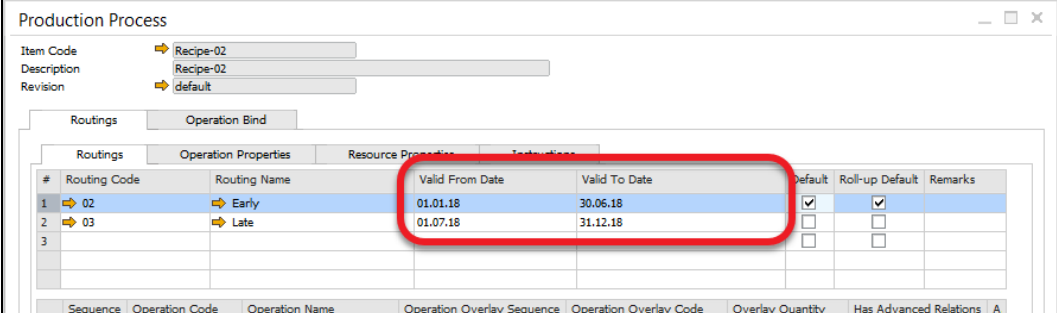


1.2.7 Instructions tab

Instructions tab is available from Production Process form, Routing tab. It is an editable text area that can hold any related text documentation.

1.2.8 Validity Period

It is possible to set a period of validity for a Routing on a Production Process:



The screenshot shows the 'Production Process' form with the 'Routing' tab selected. The form displays a table of routing entries. A red box highlights the 'Valid From Date' and 'Valid To Date' columns for routing 1.

#	Routing Code	Routing Name	Valid From Date	Valid To Date	Default	Roll-up Default	Remarks
1	02	Early	01.01.18	30.06.18	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
2	03	Late	01.07.18	31.12.18	<input type="checkbox"/>	<input type="checkbox"/>	
3					<input type="checkbox"/>	<input type="checkbox"/>	

Example usage

A specific company in the food industry for a specific Item has defined a single Bill of Materials, but different Routings based on the period of the year (which can be connected to temperature, humidity, etc.).

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1.2.9 Yield – Time calculation

Depending on the production process, the yield may have an impact on the production time.

Checking the Ignore Yield check box will calculate the extra time required to produce the planned quantity within the manufacturing order.

The default setting will be copied to the manufacturing order.

Production Process

Item Number: Recipe-02
 Description: Recipe-02
 Revision: default

Routing: 02 Operation Bind: Mixing Process

#	Routing Code	Routing Name	Default	Roll-up Default	Remarks
1	02	Mixing Process	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
2			<input type="checkbox"/>	<input type="checkbox"/>	

Operation Sequence	Operation Code	Operation Name	Operation Overlay Sequence	Operation Overlay Code	Overlay Quantity	Ignore Yield	Remarks
10	04	Prep			0.00	<input type="checkbox"/>	
20	03	Mixing			0.00	<input checked="" type="checkbox"/>	
0					0.00	<input type="checkbox"/>	

Resource Code	Rresource Name	Default	Resource Type	Issue Type	Machine Code	Number of Resources	Has Cycles	Cycle Capacity	Queue Time	Queue ...
05	Prep	<input checked="" type="checkbox"/>	Machine	Manual		1	<input type="checkbox"/>	1.000	0.000	Fixed M
		<input type="checkbox"/>	Machine	Manual		0	<input type="checkbox"/>	1.000	0.000	Fixed M

Update Cancel

Manufacturing Order

Item Code: Recipe-02 Type: Internal Series: Primary 3
 Item Name: Recipe-02 Status: Not Scheduled
 Revision: default Routing: 02
 Warehouse: 01 Required Date: Planned Start Date: Planned End Date:
 Planned Quantity: 1.000 UoM: KG
 Actual Quantity: 0.000

Items Coproducts Scrap WIP Items Operations Others Documents Sales Orders Attachments

Operations: 03 Operation Properties: Mixing Resource Properties: Mixer

#	Sequence	Operation...	Operation Na...	Operation Sta...	Operation Ove...	Operation Overlay Code	Operation Quantity	Ignore Yield	Operat...
1	10	04	Prep	Not started			0.000	<input type="checkbox"/>	
2	20	03	Mixing	Not started			0.000	<input checked="" type="checkbox"/>	
3	0			Not started			0.000	<input type="checkbox"/>	

Line No.	Resource Code	Rresource Na...	Resource Type	Issue Type	Machine Code	Machine Line ...	Number of Re...	Has Cycles	Cycle C...
2	03	Mixer	Machine	Manual			1	<input type="checkbox"/>	
6			Machine	Manual			0	<input type="checkbox"/>	

Remarks:

Journal Remarks: Close Date:

OK Cancel

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1.3 Mass Item Replacement

Path

Production > Bill of Materials > Mass Item Replacement

This form allows the user to quickly search, change and replace one Item with another.

The user selects the Item that needs replacing, chooses which Bill of Materials will be updated, by checking the update box, and then enter the replacement Item.

It is possible to set a quantity ratio. The current quantity value set for a replacing material will be multiplied by the entered quantity value (which is by default set as 1.000). The same can be done for scrap value by using Scrap Ratio field.

Mass Item Replace

For replacing an item within all available Bill of Materials, first the replacing item must be defined.
This item will be used as the searching criteria for retrieving a list of matching Bill of Materials.
Only those Bill of Materials, which have this item defined as a Material, will be retrieved.

Replacing Item Code → Active-Item-01 Revision Code → code00
Description Active-Item-01 Revision Name default

#	Update	Item Code	Item Description	Revision Code	Revision Name	Sequence	Qu...
1	<input checked="" type="checkbox"/>	→ Recipe-01	Recipe-01	→ code00	→ default	10	

The replacing material within all matching Bill of Materials, will be replaced with a new item that can be defined in the field below. It is also possible to set a quantity ratio for a new item. The current quantity value set for a replacing material will be multiplied by the entered quantity ratio value.

Replacement Item Code → Active-Item-02 Revision Code → code00
Description Active-Item-02 Revision Name default
Quantity Ratio 1.000
Scrap Ratio 1.000

OK Cancel

1.4 Formula

Overview

Formulas are a very flexible but simple method in calculating the quantity relationship between an item and its parent.

On installation a default formula is installed within the General Settings/ProcessForce/Bill of Materials and Manufacturing Tab.

This default formula can be changed to meet the needs of the user and will be used when entering Bill of Materials.

If user defined fields are added to the form, these can also be used within the formula.

All the expressions as per Microsoft Excel formulas can be used.

Values from other Tabs can be used within a formula to calculate a value. For example, a specific Item within the Bill of Materials has a 10% Scrap Percentage. A Scrap item master is added to the Scraps Tab. The amount of scrap produced will be the difference between the Item Result and the Item Quantity.

On this page:

- [Overview](#)
- [Formula Nomenclature](#)
- [Formula Functions](#)
- [Using User-Defined Field in Formulas](#)
- [Yield Formulas](#)

The screenshot shows the SAP General Settings window, specifically the 'Bill of Materials and Manufacturing Orders' tab. The 'Default formulas for Bill of Materials' section is highlighted with a red box. The formulas are as follows:

Field	Formula
Items	$=U_Quantity()*U_Factor()*Items.U_Factor(<sequence>)*Items.U_Quantity(<sequence>)*100/(100 - Items.U_ScrapPercentage(<sequence>))$
Coproducts	$=U_Quantity()*U_Factor()*CoProducts.U_Factor(<sequence>)*CoProducts.U_Quantity(<sequence>)$
Scrap	$=U_Quantity()*U_Factor()*Scraps.U_Factor(<sequence>)*Scraps.U_Quantity(<sequence>)$
Phantoms	$=U_Quantity()*U_Factor()*Phantoms.U_Factor(<sequence>)*Phantoms.U_Quantity(<sequence>)$
Yield	
ByProduct Yield	
Coproduct Yield	
Scrap Yield	

Below the formulas, there are several checkboxes and dropdown menus for synchronization and scheduling options:

- Enable Bill of Materials synchronization between ProcessForce and SAP Business One
- Enable synchronization between Manufacturing Orders and SAP Business One's Production Orders
- Due Date synchronization Type: Required Date (dropdown), Default Scheduling Type: Backward (dropdown)
- Default priority for production: 6 (dropdown), Sum Semi Finished
- Forbid changing Sales Order line while Manufacturing Order is already assigned to
- Use MRP Minimum Quantity and Order Multiple for Semi Manufacturing Order Quantities

At the bottom, there are 'OK' and 'Cancel' buttons.

Default formulas:

Items:

```
=U_Quantity()*U_Factor()*Items.U_Factor(<sequence>)*Items.U_Quantity(<sequence>)*100/(100 - Items.U_ScrapPercentage(<sequence>))
```

Coproducts:

```
=U_Quantity()*U_Factor()*CoProducts.U_Factor(<sequence>)*CoProducts.U_Quantity(<sequence>)
```

Scrap:

```
=U_Quantity()*U_Factor()*Scraps.U_Factor(<sequence>)*Scraps.U_Quantity(<sequence>)
```

Phantom:

```
=U_Quantity()*U_Factor()*Phantoms.U_Factor(<sequence>)*Phantoms.U_Quantity(<sequence>)
```

1.4.1 Formula Nomenclature

Items	CoProducts
Items.U_Factor(<sequence>) = Factor value within Items Tab	CoProducts.U_Factor(<sequence>) = Factor Value within CoProducts Tab
Items.U_Quantity(<sequence>) = Quantity value within Items Tab	CoProducts.U_Quantity(<sequence>) = Quantity value within CoProducts Tab
Items.U_ScrapPercentage(<sequence>) = Scrap Percentage value within Items Tab	CoProducts.U_Results(<sequence>) = Results value within CoProducts Tab
Items.U_Results(<sequence>) = Results value within Items Tab	

Scraps	Phantoms
Scraps.U_Factor(<sequence>) = Factor Value within Scraps Tab	Phantoms.U_Factor(<sequence>) = Factor Value within Phantoms Tab
Scraps.U_Quantity(<sequence>) = Quantity Value within Scraps Tab	Phantoms.U_Quantity(<sequence>) = Factor Value within Phantoms Tab

Scraps	Phantoms
Scraps.U_Results(<sequence>) = Results value within the Scraps Tab	Phantoms.U_Results(<sequence>) = Results value within Phantoms Tab

Other Variables
U_Factor() = Factor Value within form Header
U_Quantity() = Quantity value within the form Header













The screenshot shows the 'Bill of Materials' form. At the top, there are fields for 'Item Code' (Recipe-02), 'Description' (Recipe-02), 'Revision' (default), 'Quantity' (1.000), 'Factor' (1.000), and 'Warehouse' (01). Below these are 'Total' (1.000) and 'Yield' (100.00) fields. To the right, there are 'Distribution Rules', 'Project', 'MRP Def.' (checked), and 'Batch Size' (1.000) fields. The main table has columns: Sequence, Item Code, Description, Revision, Revision Description, Warehouse, Factor, Factor Description, Quantity, Scrap %, Yield, and Result. The table contains 5 rows of data. Red circles highlight the 'Quantity' field in the top left and the 'Factor' and 'Quantity' columns in the table header.





Sequence	Item Code	Description	Revision	Revision Description	Warehouse	Factor	Factor Description	Quantity	Scrap %	Yield	Result	F
1	Active-Item-03	Active-Item-	code00	default	01	1.000		0.250	0.00	100.00	0.250	=1
2	Active-Item-04	Active-Item-	code00	default	01	1.000		0.400	0.00	100.00	0.400	=1
3	Non-Active-03	Non-Active-	code00	default	01	1.000		0.100	0.00	100.00	0.100	=1
4	Non-Active-04	Non-Active-	code00	default	01	1.000		0.000	0.00	100.00	0.000	=1
5	0					0.000		0.000	0.00	100.00	0.000	

1.4.2 Formula Functions

The following functions can be used within formulas:

Syntax	Description	As in Excel
ABS(x)	Returns the absolute value of x.	✓
ACOS(x)	Returns the arc cosine of x, in radians.	✓
ASIN(x)	Returns the arc sine of x, in radians.	✓

Syntax	Description	As in Excel
ATAN(<i>x</i>)	Returns the arc tangent of <i>x</i> , in radians.	
ATAN2(<i>x</i>; <i>y</i>)	Returns ATAN(<i>y</i> / <i>x</i>) taking signs of <i>x</i> and <i>y</i> into account.	
CEILING(<i>x</i>; <i>signif</i>)	Returns the nearest multiple of <i>signif</i> that is equal to or larger than <i>x</i> when <i>signif</i> is positive (that is, rounds towards plus infinity); and returns the nearest multiple of <i>signif</i> that is equal to or smaller than <i>x</i> when <i>signif</i> is negative (that is, rounds towards minus infinity). Returns NumError when <i>signif</i> is 0.0.	Almost
COS(<i>x</i>)	Returns the cosine of <i>x</i> , with <i>x</i> in radians.	
EXP(<i>x</i>)	Returns e^x , that is, $e = 2.71828\dots$ raised to the power <i>x</i> .	
FLOOR(<i>x</i>; <i>signif</i>)	Returns the nearest multiple of <i>signif</i> that is equal to or smaller than <i>x</i> when <i>signif</i> is positive (that is, rounds towards minus infinity); and returns the nearest multiple of <i>signif</i> that is equal to or greater than <i>x</i> when <i>signif</i> is negative (that is, rounds towards plus infinity). Returns an NumError when <i>signif</i> is 0.0.	Almost
IF(<i>e1</i>; <i>e2</i>; <i>e3</i>)	Evaluates <i>e1</i> ; if the result of <i>e1</i> is true, evaluates <i>e2</i> and returns the result; if the result of <i>e1</i> is false, evaluates <i>e3</i> and returns the result.	
LN(<i>x</i>)	Returns the natural (base $e = 2.71828\dots$) logarithm of <i>x</i> .	
LOG(<i>x</i>)	Returns the base 10 logarithm of <i>x</i> .	
LOG10(<i>x</i>)	Returns the base 10 logarithm of <i>x</i> .	
MOD(<i>x</i>; <i>y</i>)	Returns the signed remainder of <i>x</i> by <i>y</i> , that is, $x - \text{FLOOR}(x/y; 1) * y$. Returns NumError if <i>y</i> is 0.0.	
PI()	Returns $\pi = 3.14159\dots$, the ratio of the circumference to the diameter of a circle	
RAND()	Returns a pseudo-random number <i>x</i> from a uniform distribution such that $0 \leq x < 1$	
ROUND(<i>x</i>; <i>d</i>)	Returns <i>x</i> rounded to <i>d</i> decimal digits. That is, rounds to nearest integer when <i>d</i> is 0, to nearest multiple of 0.1 when <i>d</i> is 1, to nearest multiple of 10 when <i>d</i> is -1, and	

Syntax	Description	As in Excel
	so on. In case of a tie, rounds away from zero. First <i>d</i> is truncated (towards zero) to obtain an integer.	
SIN(x)	Returns the sine of <i>x</i> , with <i>x</i> in radians.	
SQRT(x)	Returns the square root of <i>x</i> .	
TAN(x)	Returns the tangent of <i>x</i> , with <i>x</i> in radians.	
EQUALS(string;string)	Returns <i>true</i> if strings are equal	

1.4.3 Using User-Defined Field in Formulas

It is possible to incorporate User-Defined Fields (UDFs) into formulas.

We can use either header or row UDFs in formulas.

- Mind that the formula result is a numeric value. Therefore User-Defined Fields used in it have to be created with Type set to Numeric
- Bill of Materials structure is copied to a specific Manufacturing Order created from this Bill of Materials. Therefore to use UDFs in formulas it is required to create the same UDFs in Bill of Materials and Manufacturing Order in the corresponding places, e.g. the same UDFs in headers, the same UDFs in corresponding tables.

1.4.4 Yield Formulas

To be able to calculate Yield in Bill Of Material and Manufacturing Order you have to replace Default formulas in General Settings:

- **Items**

```
=U_Quantity()*U_Factor()*Items.U_Factor(<sequence>)*Items.U_Quantity(<sequence>)*100/(100 - Items.U_ScrapPercentage(<sequence>))*100/Items.U_Yield(<sequence>)
```

- **CoProducts**

$$=U_Quantity()*U_Factor()*CoProducts.U_Factor(<sequence>)*CoProducts.U_Quantity(<sequence>)*100/CoProducts.U_Yield(<sequence>)$$

- **Scrap**

$$=U_Quantity()*U_Factor()*Scraps.U_Factor(<sequence>)*Scraps.U_Quantity(<sequence>)*100/Scraps.U_Yield(<sequence>)$$

- **Phantoms**

$$=U_Quantity()*U_Factor()*Phantoms.U_Factor(<sequence>)*Phantoms.U_Quantity(<sequence>)$$

Four new formula fields have been added to calculate the actual yield within the Manufacturing Order:

- Yield – this relates to the actual yield of the parent item
- CoProduct – this relates to the yield of the coproducts (Coproduct Tab) produced in production
- ByProduct – this relates to the yield of the ByProducts (Scrap Tab) produced in production
- Scrap – this relates to the yield of the Scrap (Scrap Tab) produced in production.

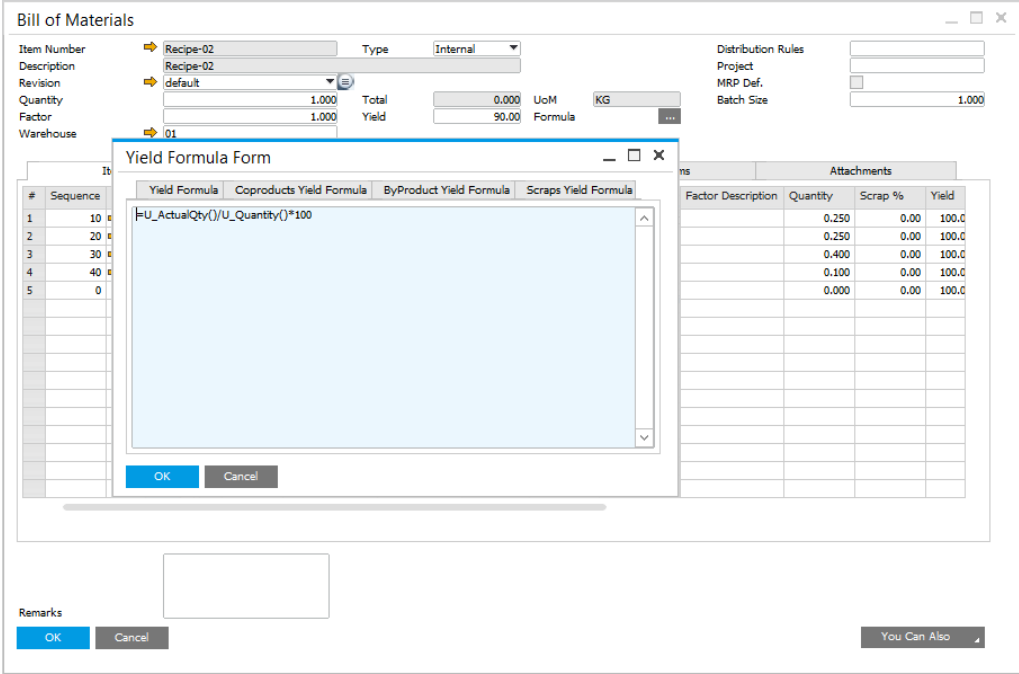
The screenshot shows the 'General Settings' dialog box with the 'Default formulas for Bill of Materials' section. The 'Yield' field is highlighted with a red circle. The formulas for the other fields are as follows:

Field	Formula
Items	$=U_Quantity()*U_Factor()*Items.U_Factor(<sequence>)*Items.U_Quantity(<sequence>)*100/(100 - Items.U_ScrapPercentage(<sequence>))$
Coproducts	$=U_Quantity()*U_Factor()*CoProducts.U_Factor(<sequence>)*CoProducts.U_Quantity(<sequence>)$
Scrap	$=U_Quantity()*U_Factor()*Scraps.U_Factor(<sequence>)*Scraps.U_Quantity(<sequence>)$
Phantoms	$=U_Quantity()*U_Factor()*Phantoms.U_Factor(<sequence>)*Phantoms.U_Quantity(<sequence>)$
Yield	
ByProduct Yield	
Coproduct Yield	
Scrap Yield	

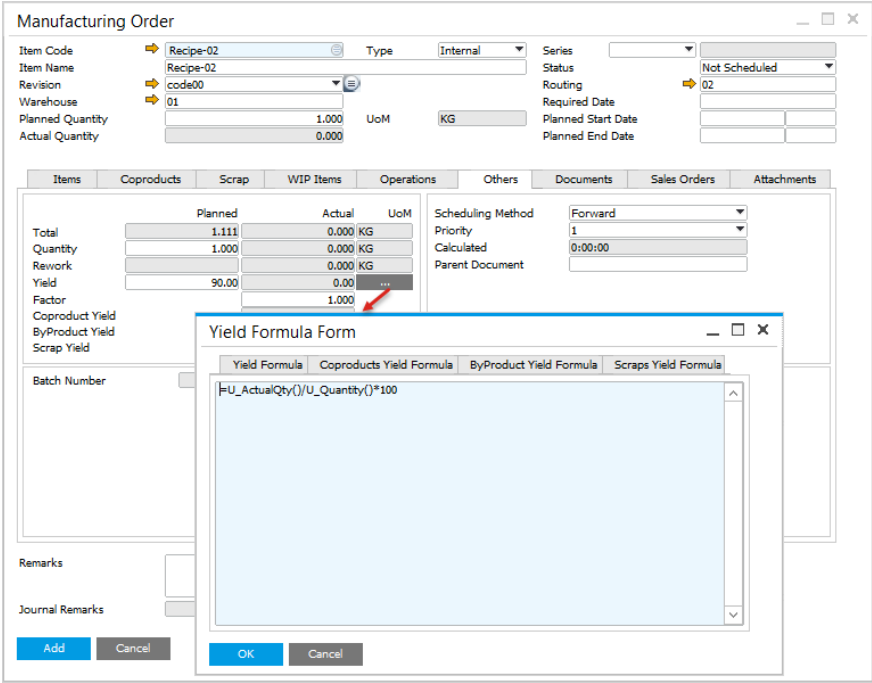
Below the formulas, there are checkboxes for synchronization and a dropdown for 'Due Date Synchronization Type' (set to 'Required Date') and 'Default priority for production' (set to '6').

As with standard formula behavior, the standard formula is copied to the Bills of Materials form and can be displayed by clicking the yellow button.

If required the formula can be modified for a specific bill of materials.



The formulas from the Yield Formula form are also copied to the Manufacturing Order, and can be modified if required.



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