Bill of Material

In

Production Planning

Contents

What is Bill of Material?

- Bill of material is a one of the PP master data which contains information like list of components and its quantity required to produce an assembly or FG.
- In SAP different BOM categories are available which are used in different applications or functional areas in an organization

Bill of Material	Application Used
Material BOM	Production Planning
Equipment BOM	Plant Maintenance
Functional Location BOM	Plant Maintenance
Order BOM	Sales and Distribution
WBS BOM	Project System

Role of Material BOM in PP:

In production planning, Material BOM is used for below function.

1. Material Requirement Planning
2. Product costing
3. Material Consumption.

Usage of BOM in MRP:
- MRP uses Material BOM to calculate required Raw materials or SFG or components quantity for customer demand of finished materials.
- MRP perform 'Net requirement Calculation' at all level of BOM by exploding it to determine the shortage quantity.

Usage of BOM in Costing:
- During FG Product costing, system rollup its component costing by exploding BOM.
- Product costing comprise of **raw material, Activity and overhead** costs. Here Raw material Price is maintained material master and its required quantity for particular FG is maintained in BOM.
- During product costing system multiplies quantity in BOM with Material master price to determine its cost against the particular FG.

Usage of BOM in Production Consumption:
- When production order is created for an assembly or FG, its BOM components are copied to the Order.
- At the time of Goods issue against order, system post the consumption based on this BOM components in an order.

Material BOM technical types:

There are 3 different types of BOM types are used in PP.

1. Simple BOM
2. Multiple or Alternate BOM. (technical type '**M**')
3. Variant BOM (technical type '**V**')

Simple Bill of Material
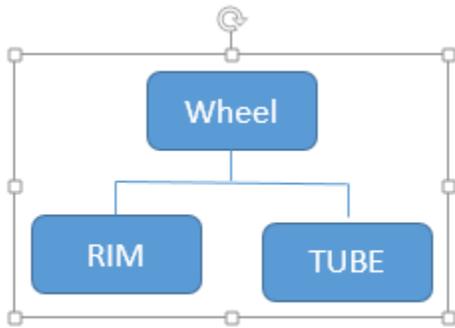
Alternate or Multiple BOM
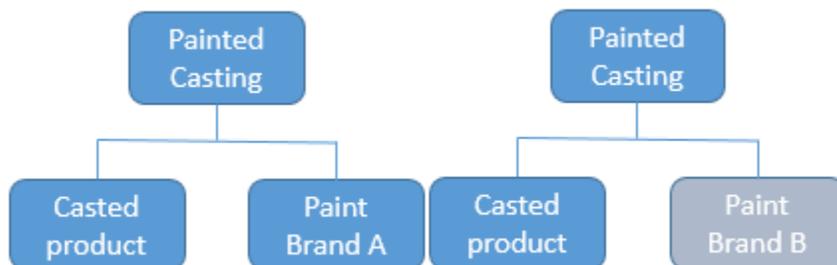
Here end product is same but components are different.
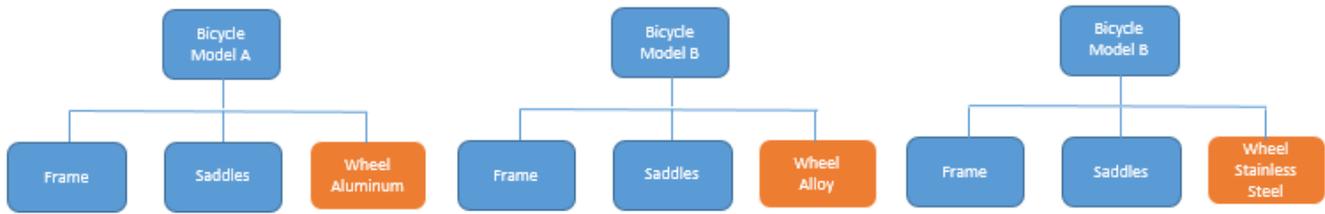
- Here end products are different but having common or similar parts like Frame, Saddles etc and variant part.

What is BOM Explosion?

- BOM explosion means break down of assembly in higher level to Components in lower level.
- System break down the assembly by means of its lower level code. Lower level code will be assigned by the system automatically, when an item is linked with the BOM.
- When one material is appearing in several assembly BOM at different levels, system represents lowest low level code.
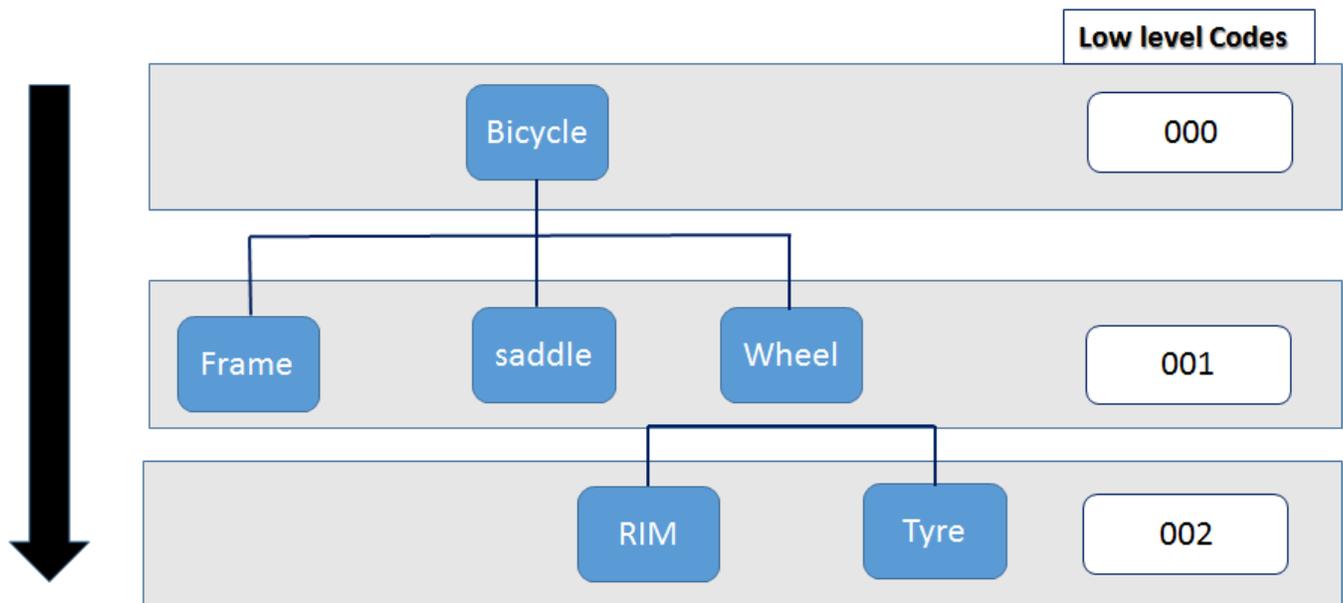
- We can display the lower level code a material in Material master (MM03) (Additional data or by clicking)

E be

Display Material ALMR02 (Raw material)

 Org. Levels

| Basic data 1 | Basic data 2 | Purchasing | Foreign trade import | Purchas... |

Display Material ALMR02 (Basic Data 1, Raw material)

```
Material        ALMR02           Organic Acids Mix
Industry sector M                Mechanical Engineering
Material type   SAJ              Raw material
Low-level code  001
Created by           APOUSER1     on      07.11.16
Last changed by                  on      00.00.00
```
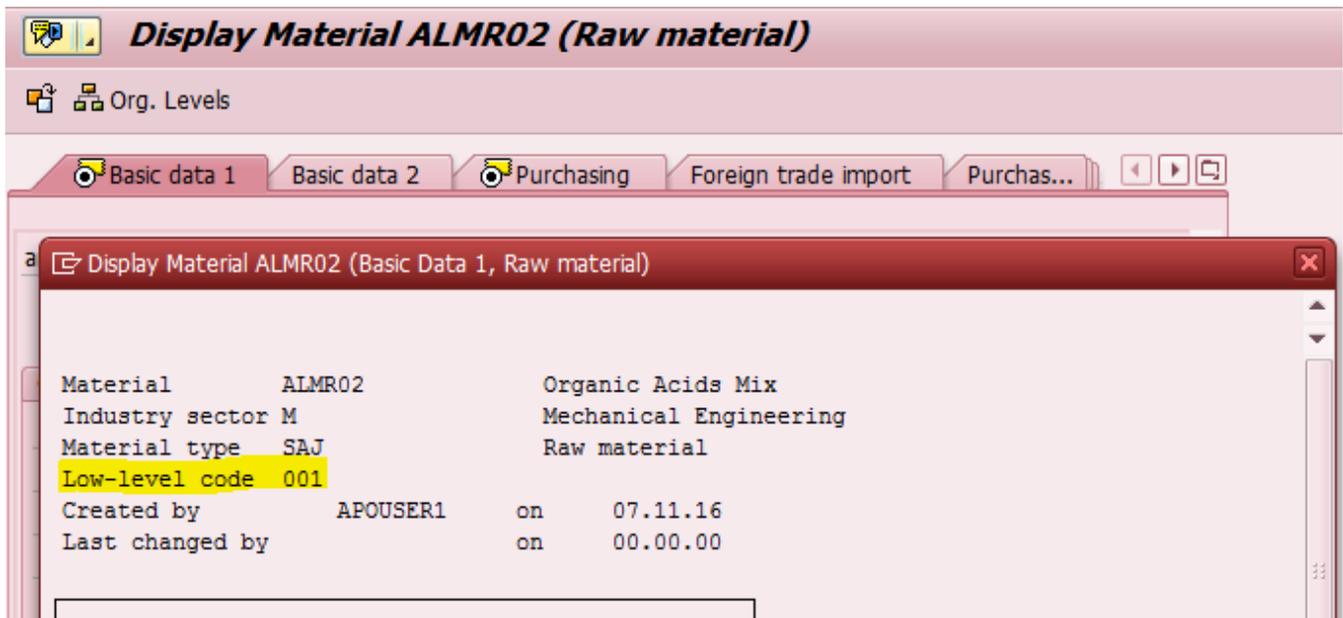
How to Create Bill of material:

Bill of Material can be created by accessing below transaction code or menu path.
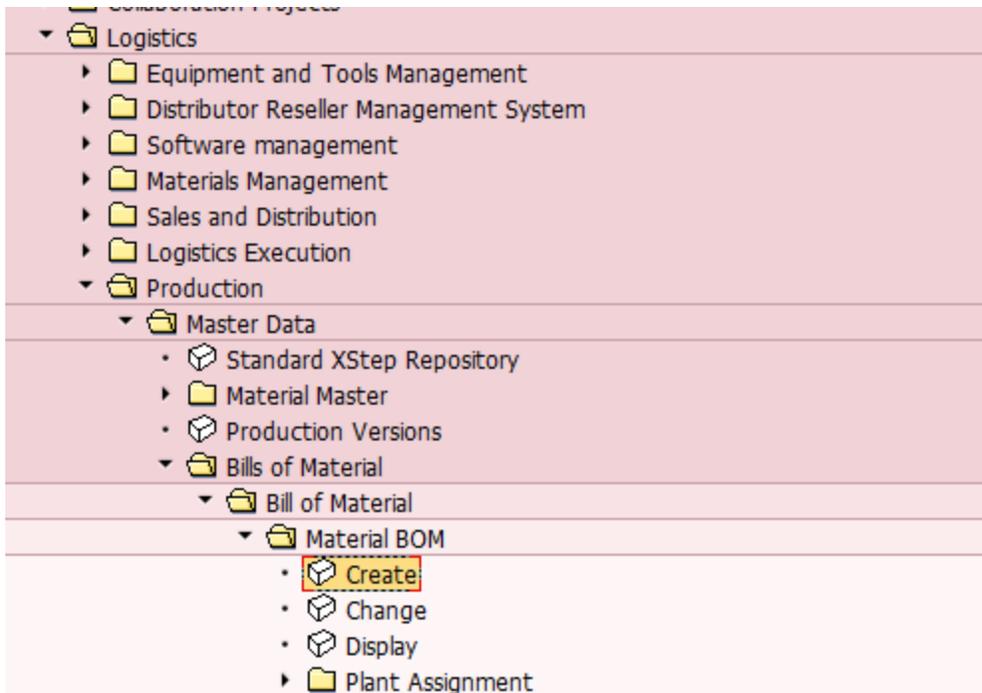
Transaction Code	Description
CS01	Create Material BOM

- A material master must be exist for all assembly and components before creating BOM.
- Here **BOM Usage** controls application or business function who can use this Bill of Material.

- For example BOM in design phase will have usage '2' which cannot be used for production purpose.

Usa...	Pro...	Eng/d...	P...	Spa...	Sal...	Cost...	Usage text
1	+	-		-	.	-	.	Production
2	.	+		-	.	-	.	Engineering/design
3	.	.		-	.	.	.	Universal
4	-	-		+	-	-	.	Plant maintenance
5	.	.		-	.	+	.	Sales and distribution
6	.	.		-	.	.	+	Costing

In component overview,

All the components required to produce the assembly (for base quantity)

article	ALMF01	250 ml Orange Juice Pack
Plant	1100 Berlin	
BOM	00003450	
Alternative BOM	1	
BOM Usage	1 Production	
Technical type		
BOM group		

Quants/long txt | Further data | Admin. data | Doc. assignment

BOM and alternative text

BOM text: _____

Alt Text: _____

Quantity data

Base quantity 1 PC

Validity

Change Number		BOM status	1
Valid From	07.11.2016	Authorization group	
☐ Deletion Indicator		☐ Deletion Flag	

Item	ICt	Component	Component description	Quantity	Un	A...	SIs	Valid From	Valid to	Change No.	P...	SortStrng	Item ID
0010	L	ALMR01	Orange Pulpy	200,000	ML	☐	☐	07.11.2016	31.12.9999		☐		00000001
0020	L	ALMR02	Organic Acids Mix	5,000	ML	☐	☐	07.11.2016	31.12.9999		☐		00000002
0030	L	ALMR03	Sugar Solution	50,000	ML	☐	☐	07.11.2016	31.12.9999		☐		00000003
0040	L	ALP01	250 ml Package box	1	PC	☐	☐	07.11.2016	31.12.9999		☐		00000004
0050	L					☐	☐				☐		

article   ALMF01   250 ml Orange Juice Pack
Plant   1100 Berlin
Alternative BOM   1

Material   Document   General

BOM Structure:

- BOM has below unique structure which is applicable for all BOM types.
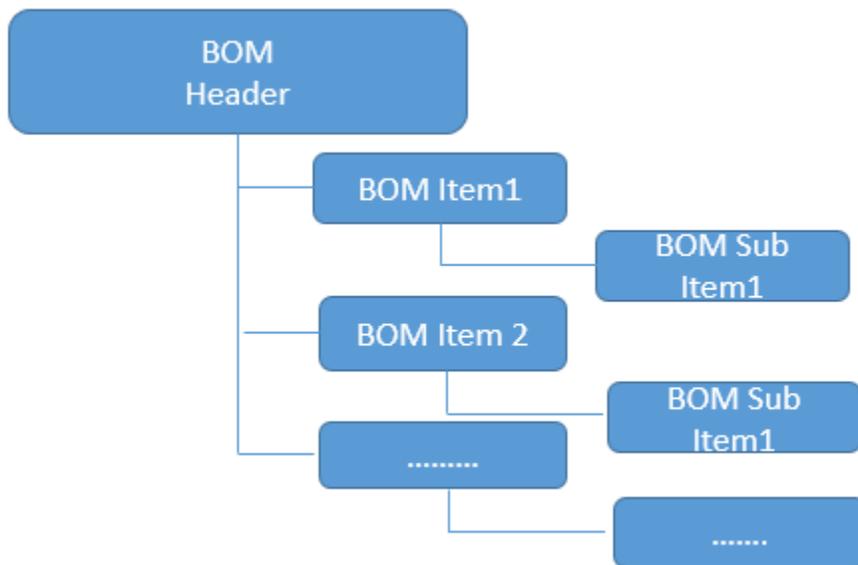
BOM Header

BOM header contains below information:

BOM number

This number is assigned internally by the system. System uses this for linking with transaction data and other PP applications like MRP, Production order etc.

Alternate BOM:
This field represents alternate BOM if more than one BOM is exist for the material.

Technical type:
- This field tells which technical types the BOM belongs to be.
- When we creates BOM for an assembly, system creates Alternate '1' with technical type " " (Blank).
- When we creates BOM second time for same assembly It creates Alternate '2' and changes technical types as "**M**"
- Products which has common similar parts ,BOM will be created as Variant BOM (Technical types 'V')

BOM Base quantity:

- This is quantity for which component quantity will be entered. This base quantity will be used in BOM explosion at the time of MRP and costing.

Significance of each fields in BOM Item:

Item Category:
Each BOM components are assigned with Item category which classify the BOM items.

Stock Item	Item can be kept in stock .System generates reservation at the time order creation
Non-Stock Item	Item cannot be kept in stock, may be procured directly at the time of consumption. System generates PR or Planned order at the time of Order creation
Variable Size Item	Different sized materials are assigned with this Item category.Requied quantity is calculated based on Sizes and Formula entered.
PM Structure Item	This item category will be used only for Plant maintenance BOM
Intra Material	Temporary material which exist between 2 operations/phases. Commonly used in Process Industry.
Document Item	Document (Design, Drawing, photos etc.) can be assigned to the BOM as Item using this Item category. A valid document master record is required for this.
Text Item	A text for long text or required for shop floor paper can be maintained here
Class Item	This item category is used for configurable material to classify the materials.

Basic Data in BOM Item:

Quantity Data:

Fixed Indicator:

- When component quantity is not based on assembly quantity and always consumed in fixed amount, this indicator can be used.

Example:

Catalyst used for a chemical process is always fixed without respect to quantity of FG produced.

Component scrap:

- Scrap occurs when component is convert into final assembly is 'Component Scrap'
- Component scrap can be occurs by means of any one of the following
  - ✓ Losses during storage
  - ✓ Losses during delivery from Vendor
  - ✓ Losses during transport to production
- Component scrap can also be entered in BOM as well as Material master.
- Component scrap maintained in material master is applicable for all BOM products.
- When different component scrap percentage is required for particular product can be maintained in BOM.
- Let Say 1 PC of Assembly **A1** requires, 2 PC of Raw material **R1** which has 20 % component scrap in Bill of material. Assume that there is not stock available for A1 and R1.
- When demand of 500 PCs is received for assembly, MRP calculates requirement quantity as follows.

| Material	Requirement quantity	Component Scrap	MRP Planned quantity
	PCs	%	PCs
A1	100		100
R1	200	10%	220

Operation Scrap with Net Indicator:

Here system will only consider the operation scrap percentage entered here and not include assembly scrap (if anything) entered in material master MRP-1 view.

Let say requirement quantity of R1 and R2 is 100 PCs

Material	Assembly scrap	Operation scrap in BOM	Net Indicator	MRP Calculated quantity
	%	%		PCs
R1	10%	2%		112.2
R2	10%	2%	X	102

General data:

- Co-Product Indicator is activated if more than one finished product is produced in a production process.
- Material which are defined as **co-product** will be entered with (Negative sign) .This means, that particular material will be considered as "Output Material" along with header material.
- Material entered with Negative sign but no co-product indicator is activated will be consider as "**By-products".**

Recursive Allowed:
- When same material is as header material as well as BOM Item, the BOM is called as Recursive BOM.
- This is the case frequently happens in Process industry as well as Pharmaceutical.

For example consider below example,

- In foundry process, Liquid metal is produced by melting charge materials like ion, brass etc. are melted and poured in to mold to form a casting.
- During this melting process unconsumed liquid metal also consumed in every cycle.

Liquid metal (Unconsumed) + Charge Material (Ion, Brass etc.)   (High temp)-→ Liquid metal

- Here input and output materials are same which cause recursive in BOM. It leads BOM will be exploded indefinitely without stop.
- By setting the indicator recursive allowed at BOM item level BOM explosion will be stopped.

Alternate Item group:

- We can group to gather all alternate items using Alternate Item group.
- Alternate Item group uses 3 keys to determine the alternate material.
  - Usage Probability
  - Priority
  - Strategy
- MRP uses Usage Probability and priority to create dependent requirements.
- Production order also creates reservation based on usage probability.
- But consumption is based on strategy defined in alternate Item group.

This can be explained with following example:

Let say manufacturing car where different brand of tyres are used to fit in the car. Depends upon availability, suitable tyre will be used by the system. Let say Requirement for tyre (based on Car requirement) is 1000 PC and below settings were maintained in BOM items for an Alternate Items Tyre Brand A, Tyre Brand B and Tyre Brand C.

Material	Usage Probability	Priority	MRP Planned Order /Reservation in Order	Available Quantity	CONSUMPTION IF Strategy 100% Availability	CONSUMPTION IF Strategy According to Usage probability
Brand A	30	1	300	200	0	300
Brand B	30	2	300	1000	1000	300
Brand C	40	3	400	1200	0	400
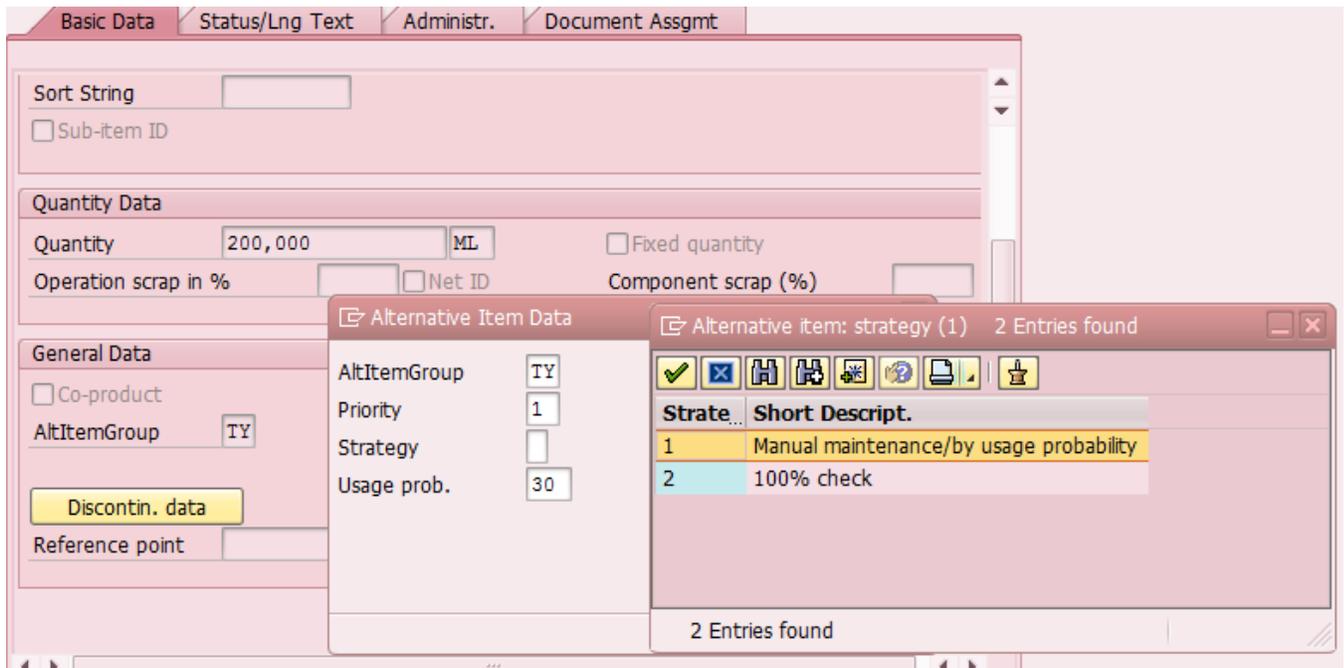
Discontinuation Item:

- Discontinuation material is material which is replaced by its follow up material .We can maintain discontinuation material in Material master as well as Bill of material.
- Bill of material setting override material master record setting.
- MRP will transfer the dependent requirement to follow up material if discontinuation component is no longer in stock or insufficient stock.

  Conditions must fulfill Discontinuation:

MRP	• Both discontinuation and follow up materials must be MRP relevant.
UOM	• Both item must have same Unit of measure
BOM Item Category	• Both Items should be Stock Item • Item category Stock item (L) and Variable Size Item are valid Item categories
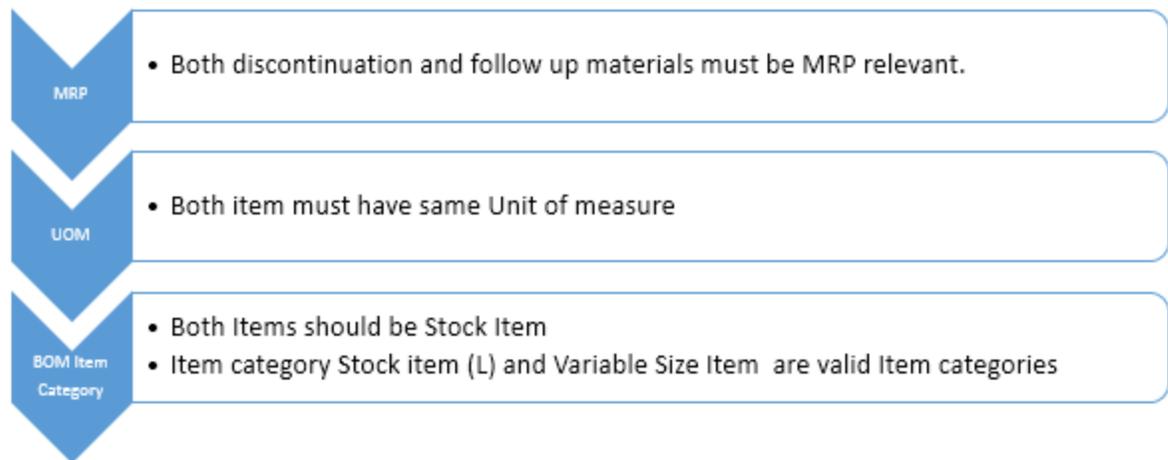
There are certain cases where we cannot activate discontinuation logic.

1. We cannot activate discontinuation logic for Alternate Items.
2. Co-products cannot be a discontinuation item
3. Non stock items cannot be discontinuation item.

Sort String:

- Based Sort string, system sort the component's display in report and PP transactions.

Status/Long text

The below Indicators are set by default based on usage. Still we can set or uncheck at BOM item level.

Production Relevant Indicator:
- This Indicator will be activated by default for BOM usage '1' and '3'.
- If this indicator is activated, Item is relevant for Material Planning and production order.
- Item which you want to use only for costing purpose but not for Planning and Production order use like bulk material, this Indicator can be deactivated.

Engineering/Design Indicator:
- This Indicator will be activated by default for BOM usage '2'
- Usage of this BOM in other application like Costing, Production are optional.

Plant Maintenance Indicator:
- Item is relevant for Plant Maintenance and will be set by default for usage '4'.

Spare Part Indicator:
- It is generally used in Plant maintenance (equipment BOM) which can be assigned to the equipment operations.

Costing relevancy:

- Item relevancy for costing is decided by this Indicator.
- On deselecting this Indicator, Particular BOM Item will be excluded from Costing but not relevant for Production/Planning.

Material Provision Indicator:

This Indicator controls relevancy of MRP. Generally used for Subcontract materials.

- If Subcontract components are provided by the production plant, no need to activate this Indicator.
- So that MRP generate dependent requirement for the components.
- If components are not provided by production plant and is already available in Vendor location, activate this indicator. So that MRP will not plan or generate dependent requirement.

Bulk Material:

- Material which are available directly at the machine location like Grease, Washers can be defined as Bulk material

For bulk materials,

- ✓ Item will not relevant for Costing
- ✓ Dependent requirement will not be generated by MRP.
- ✓ There will not be any Production storage location for this item to issue from Store, as it is directly available at Machine/Work center location.
- ✓ Replenishment is based on consumption based planning.
- If a Material is used as bulk material for all products, we can set it in Material master (MRP2 view).
- If it is used for some products and not for every products means we can set it at BOM item level.

Production Storage Location:

- ✓ Location from which Raw materials /components are consumed for production.
- ✓ On release of production order, store person will Issue the material from store to production storage location.
- ✓ Production storage location in BOM item has higher priority than location in material master (MRP2 view).
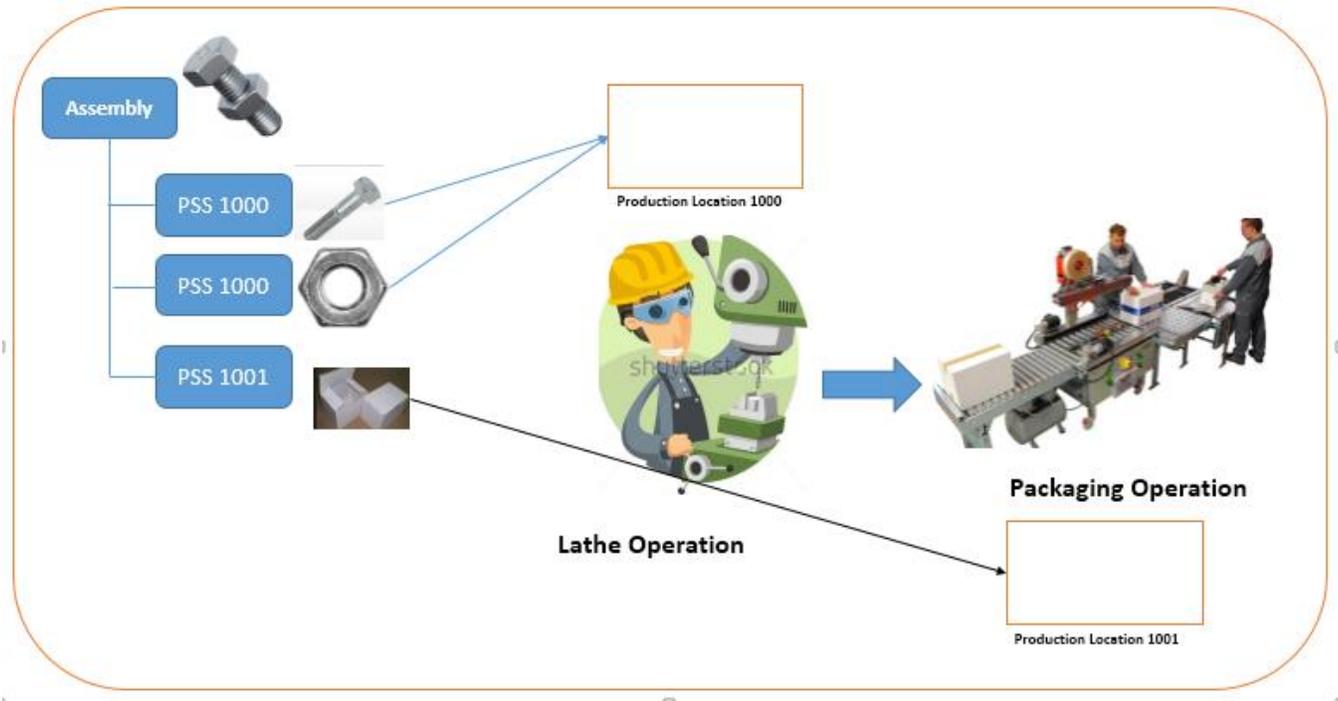
Supply Area:

- Supply area can be defined in any of the below master data:
    1. Work center
    2. Bill of Material
    3. Material Master
- Selection or determination of Supply area also in the same order.
- Supply area is assigned with Storage location.
- Supply area is used in the following scenarios.
    1. KANBAN
    2. Warehouse Management

Change Bill of Material

The transaction **CS02** is used to the Bill of material.

We can also change the BOM in mass using transaction **CS20**

This function enables to:

- ✓ Replace an items in all BOMs
- ✓ Change item data. Like quantity etc.