Bill of Material Functionality

2014 ASUG Wisconsin Chapter Meeting

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Pentair is a global water, fluid, thermal management, and equipment protection partner with industry leading products, services, and solutions that fit our customers' changing needs. With anticipated 2012 revenues of approximately $8 billion, Pentair employs 30,000 people worldwide, working with customers and partners on six continents.

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designs, manufactures, installs, and services products and systems used in the movement, storage and treatment of water.

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designs, manufactures and markets valves, actuators, and controls throughout the energy and process industries.

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designs, manufactures and markets heat management solutions and enclosures that house and protect sensitive electronics and electrical components.

- **FOUNDED IN 1966**
- **HEADQUARTERED IN SCHAFFHAUSEN, SWITZERLAND WITH MAIN US OFFICES IN MINNEAPOLIS, MINNESOTA**
- **37 CONSECUTIVE YEARS OF INCREASED ANNUAL DIVIDENDS TO SHAREHOLDERS**
- **APPROXIMATELY 100 MANUFACTURING LOCATIONS AROUND THE WORLD AND 30,000 EMPLOYEES WORLDWIDE**
- **TRADED ON THE NEW YORK STOCK EXCHANGE SINCE 1996 AND PUBLICLY TRADED SINCE 1966**
- **PENTAIR AND TYCO’S FLOW CONTROL BUSINESS MERGED ON SEPTEMBER 28, 2012 BRINGING TWO STRONG LEGACIES TOGETHER**
JDE to SAP Conversion

• JDE – 200+ models will convert to 18+ Pump Models using SAP Variant Configuration

• Engineering to Order (ETO) solution to include SAP-ECC – Project Systems, Sales Variant Configuration, Engineering BOMs and Order BOMs

• Partnering with eLogic – who will “pump us up” into “VC” and “ETO” experts
eLogic – Who We Are

**COMPANY**
Independent, successful, and profitable since 1999 startup
4 Partners – ALL “Hands-On Practitioners”
50+ EE’s – core skills/deep domain expertise
Proven ‘ecosystem’ of expert specialists

**INDUSTRY EXPERTISE**
- Industrial Manufacturing
- High Tech
- Heavy Equipment
- Medical Devices
- Food & Beverage
- Power & Energy

**CORE COMPETENCIES**
- Variant Configuration Experts
- Configuration Architecture
- Commerce Strategy and Road Mapping
- Integration and Optimization
- Systems and Knowledge Integration

**DIFFERENTIATORS**
- Domain Mastery.
- Industry Recognized Thought Leaders.
- Trusted C-level Advisors.
- No Excuses Delivery Model.

**SAP SOLUTION COVERAGE**
- Variant Configuration
- Project Systems
- CPQ Applications
- Integration
- Hybris/SSC early adopter

**100x100**
100 Best Practices from 100+ SAP Implementations

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What is a Bill of Material (BOM)?

**BOM** - A formally structured list of the components that make up a product or assembly

- **Product A**
  - **Sub Assy. 1**
    - Component X
    - Component Y
  - **Sub Assy. 2**
    - Component X
    - Component Z
  - **Sub Assy. 3**
    - Component D
What most people know about SAP BOMs

- Material BOM
- BOM Header
- BOM Items (stock and text items)
- BOM Status
- Single Level BOM
- Multi Level BOM
What most people know about SAP BOMs

- **Single Level BOM**
  - Product A
  - Sub Assy. 1
    - Component X
    - Component Y
  - Sub Assy. 2
    - Component X
    - Component Z
  - Sub Assy. 3
    - Component D

- **Multi Level BOM**
  - Product A
  - Sub Assy. 2
  - Sub Assy. 3
The BOM Functionality we use in Solutions

- Item Categories
- BOM Applications
- ECM
- BOM Categories
- BOM Usage
- BOM Groups
- Group BOMs
- Configurable BOMs
- Utilities
- Item Relevance
- Technical Types
BOM Categories

- Equipment (EQST)
- Order (KDST)
- Material (MAST)
- BOM HEADER (STKO)
- Standard (STST)
- Document (DOST)
- Functional Location (TPST)
- WBS (PRST)

BOM Items (STPO)
## BOM Category Details

### Using BOMs to Represent Different Objects

<table>
<thead>
<tr>
<th>Category</th>
<th>Material</th>
<th>Order</th>
<th>Equipment (SM)</th>
<th>WBS (PS)</th>
<th>Standard (PS)</th>
<th>Document</th>
<th>Functional Location (PM)</th>
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<td>IB01</td>
<td>CS71</td>
<td>CS81</td>
<td>CV11</td>
<td>IB11</td>
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<td>IB02</td>
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<td>IB03</td>
<td>CS73</td>
<td>CS83</td>
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<td>KDST</td>
<td>EQST</td>
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<td>STST</td>
<td>DOST</td>
<td>TPST</td>
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<td><strong>Keys</strong></td>
<td>Material</td>
<td>Sales Order</td>
<td>Equipment</td>
<td>WBS Element</td>
<td>Standard Network</td>
<td>Doc. Number</td>
<td>Functional Location</td>
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<td>Plant</td>
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<td>Usage</td>
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<td>Material</td>
<td>Usage</td>
<td>Usage</td>
<td>Version</td>
<td>Usage</td>
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BOM Alternatives

Material BOMs have Alternatives

Alternatives are subsets of the items in a BOM Group

BOM Group Technical Types:

- **Simple** – One Material has One Alternative (most common)
- **Multiple** – One Material has Multiple Alternatives
- **Variant** – Many Materials Share the Items in a BOM Group (each material has exactly one alternative)
Technical Type Summary

Simple BOM Group
- Item A
- Item B

Alternative 1 for Material X

Multiple BOM Group
- Item A
- Item B
- Item C

Alternative 1 for Material X
Alternative 2 for Material X

Variant BOM Group
- Item A
- Item B
- Item C

Alternative 1 for Material Y
Alternative 2 for Material Z
Multiple BOMs are typically used when a Material can be manufactured with various production methods.

Alternative Selection in a Multiple BOM can be based on:
- BOM Explosion Date
- Lot Size
- Production Version

<table>
<thead>
<tr>
<th>AltBOM</th>
<th>BOM St</th>
<th>DID</th>
<th>Alternative Text</th>
<th>Base quantity</th>
<th>BUn</th>
<th>From Lot Size</th>
<th>To Lot Size</th>
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<tr>
<td>1</td>
<td>1</td>
<td></td>
<td>Small Batch</td>
<td>1</td>
<td>EA</td>
<td>1</td>
<td>120</td>
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<tr>
<td>2</td>
<td>1</td>
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<td>Large Batch</td>
<td>1</td>
<td>EA</td>
<td>121</td>
<td>9, 999, 999, 999</td>
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</table>
Variant BOMs can be used when many Materials share several or all Items.

Hint: Variant BOMs simplify BOM maintenance of similar materials.
BOM Groups

A BOM Group contains:
Alternatives for a Material BOM

Group BOMs

A Group BOM contains:
Plant Allocations for Alternatives

Hint: Use Group BOMs to share a BOM across multiple plants
BOM Item Categories

Various categories of items that can be used in BOMs

Inputs by Item Category:
- L: Stock - Material
- N: Non-Stock - Description, Costing / Purchasing Data
- D: Document - Document Info Record
- K: Class - Type 200 or 300 Class (allowed in Configurable BOMs only)
- R: Variable Size - Material, Dimensional Data and Formulas
- T: Text - Description
BOM Item Category Tabs

The tabs allow direct data entry by category.

Item detail tabs also vary by item category.
BOMs are Created...to Explode!

You must understand how this works so that your BOM is not a dud

OCCUPATIONAL HAZARD:
Do not discuss BOM explosion with your colleagues while in airport security lines.
Inputs to BOM Explosion

This can be a complex topic, but the basic inputs are:

- Key Fields by BOM Category (e.g. Material and Plant)
- BOM Application
- BOM Explosion Date
- Lot Size

Other considerations for MRP and Costing include:

- Material Master and IMG Settings
- Demand Type (i.e. individual or collective)
- Production Version
BOM Applications define settings for the selection of BOMs during an explosion.

The most important setting is the BOM Selection ID.

Other settings influence Alternative Determination.

<table>
<thead>
<tr>
<th>Application</th>
<th>SellID</th>
<th>AltSel</th>
<th>ProdVers</th>
<th>Application description</th>
<th>ExpMRP</th>
<th>PIndOr</th>
<th>RelCstg</th>
<th>RelWkSch</th>
<th>RelOrd.</th>
<th>CollWith</th>
<th>SalesOrd.</th>
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<td>Inventory management</td>
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<td>✔</td>
<td>✔</td>
<td></td>
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<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>INST</td>
<td>03</td>
<td>✔</td>
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<td>✔</td>
<td>✔</td>
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<td>PC01</td>
<td>05</td>
<td>✔</td>
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<td>✔</td>
<td>Production - general</td>
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<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
</tbody>
</table>
BOM Selection ID

The Selection ID defines the Order of Priority of BOM Usages (i.e. sequence in which they are searched)

For example, Selection ID “01” will search for:
1. Search for BOM Usage “1”
2. If not found, then search for BOM Usage “3”
3. If not found, then search for BOM Usage “2”
BOM Usages

BOM Usages are Defined for Various Purposes/Functions

BOM Usage Controls the Item Status of BOM Items

Settings

(+): Required  (-): Not allowed  (.): Optional
Each BOM Item has Item Status

For example, the status of this item is:
- Engineering relevance is optionally left blank
- Production relevance must be set
- Plant Maintenance relevance cannot be set
- Spare Part indicator is optionally left blank
- Sales relevance cannot be set
- Costing relevance is optionally set to “X” (i.e. 100% relevant)

Item Status Influences BOM Explosion

For example, BOM applications explode as follows:
- Production: Explodes production relevant items
- Sales: Explodes sales relevant items
- Costing: Explodes cost relevant items
A Universal Usage BOM is exploded in Sales and MRP

Material “X” BOM
- Item “A” (sales relevant)
- Item “B” (sales and production relevant)
- Item “C” (production relevant)

Sales Order
- Material “X”
  - Item “A”
  - Item “B”

Production Order
- Material “X”
  - Item “B”
  - Item “C”

Sub-Items
Component List
BOM Categories in MRP BOM Explosions

MRP can find BOMs in different Categories as follows:

For Unrestricted Use Demand
1. Search for Material BOM

For Sales Order Item Demand
1. Search for Order BOM
2. Else search for Material BOM

For Project (WBS) Demand
1. Search for WBS BOM
2. Else search for Material BOM

The latter two require this MRP Parameter setting!
BOM Explosion Example – BOM Search

MRP BOM Explosion for Sales Order 123 Item 10

Selection ID is “01”
Selected BOM in bold

**Root Material**
1. Order BOM Usage 1
2. Order BOM Usage 3
3. Order BOM Usage 2
4. Material BOM Usage 1
5. Material BOM Usage 3
6. Material BOM Usage 2

**Assembly Material**
1. Order BOM Usage 1
2. Order BOM Usage 3
3. Order BOM Usage 2
4. Material BOM Usage 1
5. Material BOM Usage 3
6. Material BOM Usage 2

**Subassembly Material**
1. Order BOM Usage 1
2. Order BOM Usage 3
3. Order BOM Usage 2
4. Material BOM Usage 1
5. Material BOM Usage 3
6. Material BOM Usage 2

Different BOM Category and Usage can be found at any material / level
So What Happens in a BOM Explosion?

Find the relevant BOM with:
1. Matching Key Fields for the BOM Category
2. A matching BOM Usage per BOM Selection ID
3. Validity Dates that include the BOM Explosion Date
4. Lot Size range that includes the Lot Size
5. **BOM Status** that is Released

Return relevant items from the BOM into the Result:
1. Validity Dates that include the BOM Explosion Date
2. Item Status that matches the BOM application
3. Item Quantity computed as Lot Size * Component Quantity / Base Quantity  (except for fixed quantity items)
So there is a LOT of BOM functionality in SAP (and we have only talked about the basics!)

How does one learn how to use it well?

We will address a few common topics…

… and perhaps you have a few of your own
“My BOM didn’t Explode Any Items!”

This can be a complex topic but start by determining:

• **What is the BOM Explosion Date?**

Was a relevant BOM found?
1. Matching Key Fields for the BOM Category
2. A matching BOM Usage per BOM Selection ID
3. **Validity Dates that include the BOM Explosion Date**
4. Lot Size range that includes the Lot Size
5. BOM Status that is Released

Was a BOM was found that resulted in no Items?
1. **Validity Dates that include the BOM Explosion Date**
2. Item Status that matches the BOM application
“How is BOM Explosion Date Determined?”

It depends on the Application Area; here are a few examples:

- **Sales**
  - BOM Application and Explosion Level are configured in Item Category
  - Always Exploded with Entry Date of Order Item
  - MV45AFZZ/USEREXIT_MOVE_FIELD_VBAP – Change STDAT
  - MV45AFZD/USEREXIT_CONFIG_DATE_EXPLOSION – Change STDAT
  - Using BOM Explosion Number

- **Production**
  - BOM explosion is a two part setting
  - BOM Explosion Configuration (Explosion Date – BOM explosion number/order start date, Order start date, Order Finish Date, BOM Explosion Number/Order Finish Date)
  - Material Master (MRP4 view) – Selection Method – Selection By Order Quantity, Explosion Date, Production Version, Only by Production Version
BOM Explosion Date Configuration Settings

OPPQ: Configured by Plant

- **Control parameters for BOM explosion/routing selection**
  - Explosion date
  - BOM explosion number
  - Excl. Bulk Mat.
  - SOrd/WBS BOM Active
  - BOM expl.no. for MTO production

Material Master

- **BOM explosion/dependent requirements**
  - Selection method
  - Individual/coll.
  - Version Indicator

- **Bill of Material/Configuration**
  - Config. Strategy: 01
  - Mat. Variant Action: 4
  - ATP material variant
  - Structure scope
  - Application

- **Structure sc... Short Descript.**
  - Do not explode material structure
  - Explore single-level bill of material
  - Explore multi-level bill of material
  - Configuration, no BOM explosion
  - Configuration, poss. with BOM explosion
  - Structure from Customer_Function (prod...
1. A Sales Order Item is created for Material A today
   - Default BOM Explosion Date set to July 25, 2014

2. A Production BOM is created for Material A tomorrow
   - Default Valid-From Dates set to July 26, 2014

3. MRP is Run the Next Day and **no BOM is found**

**BEST PRACTICE:** Maintain BOMs with a “Low Date”!
“How do I Phase In/Out a BOM or Item?”

With ECM Number
Additions and changes are Valid-From the change number date; deletions are Valid-To the change number date.

Without ECM Number
Additions are Valid-From the effective date; changes take effect immediately (beware if BOM is re-exploded for existing orders).

Discontinuation
After the Effective Out Date, MRP will automatically pass demand to the Follow-up material after in stock inventory of Discontinued material has been planned.
“Can I Change Plants in a BOM Explosion?”

The Answer is Mostly Yes…using Special Procurement

Root Material
Plant 1000

Assembly Material
Plant 2000

Subassembly Material
Plant 3000
“What is a Configurable (aka Super) BOM?”

Allows allocation of Variant Configuration rules (object dependencies) that are evaluated during BOM Explosion

- Selection Conditions determine whether an Item is Included in the Result
- Procedures change BOM Item fields like Quantity or Description
Example Configurable BOM Explosion

Items marked with X are excluded from the Result

LEGEND:
Selection Condition evaluated to TRUE
Selection Condition evaluated to FALSE

- Component Y and Sub Assembly 2 are Excluded by Selection Condition
- Sub Assembly 3 is unconditionally Included in the Result
“What IMG Configuration is for BOMs?”

Noteworthy Configuration
- BOM Usage
- BOM Status
- History Requirements
- Item Categories
- Variable Size Item Formulas
- Order of Priority for Usages
- BOM Applications
- Alternative Determination
“How can I simulate a BOM Explosion?”

Use Transactions CS11 and CS12 for Material BOM

Or Transactions
CSK1/2/3 – Order BOM; CSP1/2/3 – WBS BOM
CS14 – BOM Comparison
“How do I find BOMs where a part is used?”

Use Transactions CS15

Where-Used List: Material: Initial Screen

Material: ELOGIC_EGG

Type of where-used list:
- Direct
- Using classes

Used in:
- Equipment BOM
- Order BOM

Selection:
- Valid From: 18.07.2014
- Valid to: 

Material Where-Used List

<table>
<thead>
<tr>
<th>Material</th>
<th>Description</th>
<th>Key date</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELOGIC_EGG</td>
<td>eLogic Egg</td>
<td>18.07.2014</td>
</tr>
</tbody>
</table>

Plant: 3000
Component number: ELOGIC_COOKIE, ELOGIC_DOUGH
Item: A00
Required quantity: 1.000
Unit: EA
Resulting qty: 0.250
Unit: EA
Resulting qty: 1.000
Unit: LB
“Can I make BOM changes en masse?”

Use Transaction CS20
- Change Item Data
- Delete Items
- Add Items
- Add Documents
- Add Class
Your Turn to Talk to Us!

Ask questions today & keep up the conversation tomorrow!

Talk with us on twitter @elogicgroup

Learn more on our blog – blog.elogic.com

Reach out to us – info@elogic.com

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Bill of Material Functionality

2014 ASUG Wisconsin Chapter Meeting
Friday, July 25, 2014
University of Wisconsin Oshkosh College of Business

Thank You for Attending
Evaluate This Session – BOM Functionality

- Provide feedback via this short survey

  bit.ly/ASUG14

- Provide event feedback in the same survey