

*Research Article*

# Effects of BOM mismatch on procuring material for customized product based companies.

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## Abstract

*In product companies the lead time of manufacturing is very important as it is the dormancy between initiation and accomplishment of a process. Lead time reduction is an important part of lean manufacturing. Working according to the lead time of the product company to produce optimum amount of products is difficult because of various reasons; one of them is mismatch of bill of material. The mismatch of bill of material causes problems like late procurement of material for production, inventory mismatch, scraping of excess material etc., which are commonly faced by product companies, specially the companies implementing customized product assembly. The mismatch of the bill of material will definitely lead to practices which are deviated from the ideal process flow and will affect the companies' efficiency to deliver the product on time. The errors caused due to bill of material mismatch can be eliminated to a great extent by studying the reasons and its implications on sourcing department of a company as an error less bill of material can help in executing a proper purchase order and maintaining a good inventory record abiding to the material present in stock.*

**Keywords:** BOM mismatch, material shortages, lead time, Product Company and vendor management.

## 1. Introduction

Big product companies are assemblers i.e. they procure material from supplier and then assemble those parts to form subassemblies and then mount these subassemblies to form a complete assembly. For example, let A be the product company which is recognized for building big trucks. It will fetch proprietary parts required for assembling the truck; such as engine, base frame, chassis, etc. from different suppliers and then assemble them to form a single unit. This package is offered to the customer by the product company. The product companies can be divided in 2 types:

1. Standard Manufacturer
2. Customized Manufacturer

In the standard manufacturing, the company makes a product and gives minimal choice to the customer, whereas in customized manufacturing the product company makes the product according to customer requirements. Customized products are costlier than the standard ones. Mobiles can be considered as an example of standard product where customer has to abide by the features provided by the company, whereas example of customized product can be mining

vehicles which are provided as per customer's requirement of power, depth of drilling etc.

In both the product companies the lead time of manufacturing the product is very important as lead time is the latency between start and end of process for particular product. For example, the lead time between placement of order and delivery of a new car may vary anywhere from 1 months to 4 months. In simple words, lead time in manufacturing milieu is the time from the moment the customer places an order to the moment it is delivered, including the time required to ship the parts from the supplier. This lead varies for almost all product companies due to various reasons. In industry, lead time reduction is an important part of lean flow for manufacturing products.

Lead time may differ due to various factors as lead time changes for different conditions. Because there is an actual lead time which is required to build the product and then there is requested order lead time which is demanded by the customer. Working according to the lead time of the product company to produce more products is difficult to cope up because of various reasons. One of the reasons is mismatch of the BOM. This mismatch will definitely lead to practices which are deviated from the ideal process flow and will affect the companies' efficiency to deliver the product on time. BOM mismatch are caused due to various reasons. A bill of material consist list of raw

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materials, sub-assemblies, intermediate assemblies, sub-components, parts and quantities of each and every part needed to manufacture the end product.

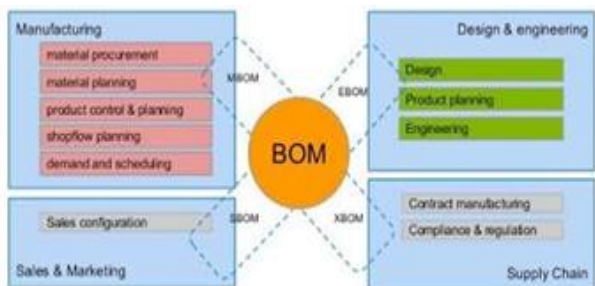


Fig.1 Influence of BOM on various departments

A bill of material is also used for communication between associated manufacturing partners (vendors). An error less bill of material can help in executing the purchase order and maintain a good inventory abiding to the material present in stock.

2. Reasons for bill of material mismatch

2.1 Full pledge Engineering BOM not created as per drawing

An engineering bill of material (EBOM) is the BOM reflecting the product as designed by engineering department. The engineering bill of material includes all substitute, alternate part numbers, and parts that are contained in drawing bill of material.

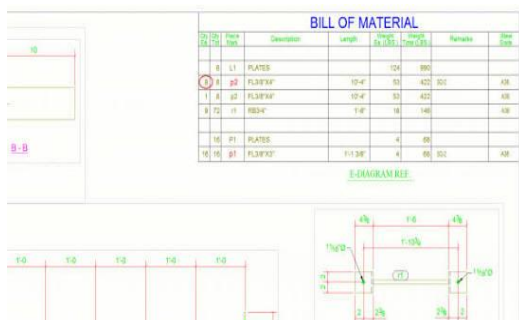


Fig.2 Drawing bill of material

Note that the engineering BOM is not related to configuration bill of material as CBOM is used to reflect the selection of items to create saleable end product. All other BOM are procured from EBOM as it is the basic to start with. Most of the EBOM are multilevel, referred as indented BOM which provides a display of all items that are in parent-children relation. The sales bill of material (SBOM) is made abiding with the EBOM. This SBOM is made for the procurement of the material from the vendor by the sourcing team. The EBOM reflects all the part numbers of parent part as well as child parts as per the drawing. Whereas SBOM reflects only the parent part number for proprietary items. But in emergency situations for procuring material after

modification of drawing there are chances of creating a SBOM as a substitute for instance instead of an EBOM , which denotes a deviated practice from ideal process flow and creates problem in future for next order. The EBOM should reflect all the items at each and every level of the subassembly as it is used as a standard reference for all further BOM's. Error in single EBOM can cause problem of mismatch for downstream BOM's.

2.2 BOM not updated at instance as per modification

EBOM carries the list of parts in the drawing BOM with specified part number of the items. So if a part gets added for modification of the component then it will change the BOM in the drawing and this change should immediately reflect in the EBOM to avoid further complications. This can create confusion in the down streams for some instance as the drawing and the BOM will not match and time will be wasted in solving the issue by a correct method. If the error goes unnoticed then can lead to procurement of wrong material from vendors end which will leave the product company with two options , one is to use the item as procured to match the led time or just scrap it at the companies end.

2.3 Lack of link between the software

In most of the company's lots of software are used for different operations. For example, engineering works on drawing software and has to update the BOM in the ERP systems for the referral of sourcing, stores and assembly for various operations.

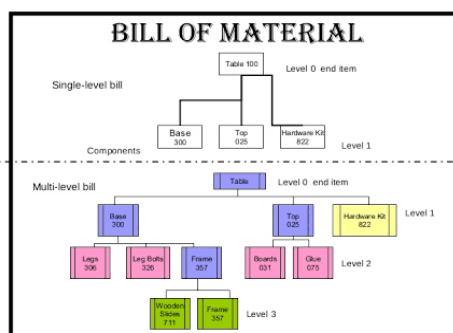


Fig.3 Difference in single and multilevel BOM

This can cause a problem if these software are not linked to each other. Because engineer will have to take a dump of the BOM and upload it in the ERP or product life cycle management (PLM) systems database and updating the BOM from one system to other is a manual process which can cause errors and can differ depending on the person updating the bill. Also it depends on the tediousness of the job for updating the bill into different software for different departments as engineer has to check for materials available on hand and check forecasted material list, then communicate

with other departments for suggestions about the procurement of the material if there is any problem.

The error of manual linking between the software will cause lot of problems on the floor as shortage will be discovered on the machine floor due to drawing and bill mismatch. This will unnecessarily cause an increase in the lead time of the product.

#### *2.4 Lack of communication between the departments:*

The problem of BOM mismatch if identified can be solved by adhering to a proper process only if the tool for communication is used at its best. All other departments have to convey this mismatch problem to engineering to get a solution on it but If there is lack of communication in the departments then it can lead to problem of mismatch forever and can also affect the inventory. For example, if assembly finds a BOM and drawing mismatch such that an item is different in the bill, then they have to convey this to engineering and if they fail to do so and take a corrective action by themselves will can a problem in future for inventory and also create a risk of failure of the part on-field. So the communication tool used should be powerful and must get followed by each department for each and every problem.

### **3. Effects of BOM mismatch for procuring material**

#### *3.1 Shortages are created*

The direct effect of BOM mismatch on lead time is by creating shortages and indirectly increasing the lead time. Lead time may differ due to various factors as lead time changes for different conditions. Working according to the lead time of the product company to produce more products is difficult to cope up because of various reasons; one of them is shortage of the material and one of the reasons for shortage creation is indirectly mismatch in the bill of material. Shortages have lot of implications such as; alternative items getting used for class-C items (mostly Kanban items), over time for completing the work on time after procurement of material to match the lead time of the machine, use of proprietary items without test certificate, work of outgoing quality department gets difficult etc. Shortages can stop the assembly line affecting the delivery date of the product. Toyota's japans factory assembly line was paused for a week due to shortages is a good example of the implication of the problem.

#### *3.2 Extra efforts by sourcing team*

Sourcing team forms a link between engineering, sourcing commodities and suppliers to procure the material for assembling a particular product. In business, sourcing team is an interface for procurement practices which aims for finding, evaluating and engaging suppliers for acquiring goods

and services. Sourcing department will have to take extra efforts for shortages created due to BOM mismatch as the sourcing team will have to work on the problem and take quick actions for procuring the material as early as possible to match the products lead time. Sourcing team has to attend these problems simultaneously abiding to their daily work. Tediousness of the job can increase if there is a need of finding a new supplier if the existing supplier is unable to deliver the item to be procured in expected time abiding to the quality of the item to be procured. The problem of finding new supplier who qualifies for procurement according to the companies' norms and policy is one of the top challenges faced by sourcing team (from the survey of 500 sourcing professionals). Therefore shortages created due to such BOM mismatch are unnecessarily creating an agitated atmosphere for sourcing team.

#### *3.3 Inventory mismatch with physical use*

Inventory refers to the material that the product company holds for the ultimate goal of delivering a product. There are lots of reasons for causing a mismatch in inventory; one of the problems for causing inventory mismatch is related to the bill of material mismatch. If a C class item shown in the drawing is not recorded in the BOM then this material will not be available on the shelves to build the assembly due to this its alternative may get used by the worker who may or may not take proper approval of the product manager on the assembly floor. The approval for such actions will be given by the product manager to match the lead time of the product and keep the assembly floor running, as C class items are marginally important for the company. C class items are the one whose alternative can be used by taking a proper deviation action and approval of engineering department in urgency period to complete the production in given lead time. But this deviation causes increase in inventory for the alternative item used. For example if there is shortage of adapter A then in urgency condition to continue the work on assembly line, deviation is taken and alternative adapter B is used to complete the subassembly. It will cause shortage of adapter B for the other subassembly. In short shortage and inventory mismatch remains constant and will cause a problem for future assemblies.

#### *3.4 Unwanted material gets procured*

After modification of a particular drawing in which an old item is getting removed, it should reflect in the bill of material. But if a BOM mismatch happens due to reasons like not creating a full pledge Engineering BOM as per drawing or BOM not updated at instance as per modification in the product or lack of link between the software etc. then it can cause procurement of the unwanted old item which is going to get added in the scrap list. This BOM error gone unnoticed will

unnecessarily occupy space in the store shelves and increase the inventory, plus the time and efforts invested in procuring the material will go in vain.

### 3.5 Loss due to Scraping of material

For product companies, scrap is the transcending unusable material that is left over after a product has been completely manufactured. This residual amount has minimal value and is usually sold for its material content. A product company takes lot of care for not creating scrap but this situation arises due to various reasons and one of them is BOM mismatch. This BOM mismatch causes procurement of unwanted material which lies on the shelves. The efforts of sourcing team for procurement of those components are also wasted. The price of scraped components depends on the material they are made of. The value of scrap in international market is low and recently saw a hike in last five years, still the gap is a huge between the values of the material when procured from supplier and when it's scrapped at companies end. The components that get scraped at companies end shows nothing but inefficiency of the product company and a root cause analysis on this issue can open up roots of different practices that are deviated from the ideal process.

### Conclusions

By studying the reasons and effects of bill of material mismatch which are practical based; helps in improving the process flow and systems used in a product company. The problem of bill of material mismatch is a root cause to lot of deviated practices followed in the company. Solving bill of material mismatch problem can cure all the deviated practices. Solving the bill of material problem should be first priority because it forces various departments to work with the deviated process and also makes these deviated practices a bench mark for a particular time which can harm companies' efficiency. The problem of bill of material mismatch can be solved by integrating proper links between the software used in the company, by constantly training work force abiding to practical use of software, by using effective tools for communication between the departments, by regularly checking the inventory and scrap list etc. Making a error less bill of material will definitely increase the efficiency of a product company by working in most optimized way.

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