THE FIVE BASICS OF AN EFFECTIVE BOM PROCESS

JIM BROWN | PRESIDENT | TECH-CLARITY

Tech-Clarity

BOM Processes Rely on Inadequate Solutions

Ineffective BOM Processes Cause Disruption

BOM management is critical to connecting design, purchasing, and production across a manufacturing business. Ineffective BOM processes, though, lead to low productivity and costly errors.

With that in mind, why do so many manufacturers rely on substandard BOM management approaches like spreadsheets and email? Is there a better way for companies to support BOM-related processes?

Tech-Clarity

Table of Contents

Tech-Clarity

The BOM is the Fundamental Communication Tool

BOMs are the Backbone of the Manufacturing Industry

BOMs are the fundamental way that manufacturers define, communicate, and realize their products. The bill of material is essentially the backbone of the manufacturing business, specifying what to buy and what to build. In many companies, BOM communication has to bridge disciplines across company boundaries.

## BOMs are The Primary Communication Tool in Industry

Sound BOM processes create a bridge that crosses all parts of the organization. They document engineering designs and provide the information that Purchasing needs to order parts. Then, they deliver the data needed for Manufacturing to plan and execute orders. BOM data also serves as the backbone for others to roll up important attributes like weight, costs, and more.

Successful BOM communication across Engineering, Purchasing and Manufacturing:
- Helps improve productivity
- Reduces the number of shipments delayed by missing parts
- Drives down scrap from using wrong parts or revisions
- Improves cost through item reuse

On the other hand, poor BOM communication often results in errors and inefficiency that impact performance.

> "Many companies operate with ineffective and immature BOM management without recognizing what it costs them in poor efficiency, excess cost, and lost time."
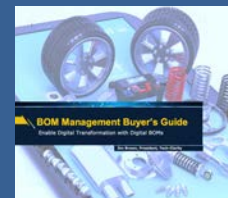
BOM Management Buyer's Guide
TECH-CLARITY

The Supply Chain Adds Complexity

Working with third parties like contract manufacturers makes communication even more difficult. Informal communication mechanisms like emails and spreadsheets quickly break down and lead to errors in these environments. BOM processes demand central, current data to support efficient operations.

Tech-Clarity

The BOM Process Status Quo

Spreadsheets are the de facto Standard

The easiest way to sum up the BOM process status quo in most manufacturers is with a single word – spreadsheets. BOM processes frequently involve very complex spreadsheets. They are hard to interpret, lead to duplicating data, don't manage data relationships, and often contain errors. As our BOM Management Buyer's Guide shares, many companies manage BOMs in ways that don't adequately support the business, including documents or embedding BOMs into CAD drawings in addition to spreadsheets.

Sharing BOMs via Email Creates Risk

Spreadsheets are not good for data management, and they are even more problematic when they're shared through email. As soon as a BOM is attached to an email it creates a risk that somebody will access it after it is no longer valid. These informal methods are also challenging because data in a spreadsheet can't easily be integrated with downstream people, processes, and systems. Because of this, unmanaged methods fall apart quickly for all but the simplest of companies.

Why Accept the Current Status Quo?

Why do manufacturers put up with this? Perhaps because it's the way they've always done it. Perhaps they don't recognize how many of their issues have poor BOM processes as the root cause. In many cases, they are just believe that fixing the problem is going to be complicated, time-consuming, and require expensive solutions.

They think that putting the basics of BOM management in place is going to slow them down, and that they're not ready for a PLM or ERP system. This is particularly true for smaller companies. But big companies often run with immature BOM management processes as well. How can manufacturers upgrade the status quo without adding additional cost and overhead?

> " When I worked for bigger companies, we had clerks that would keep track of what was going on. For a smaller company it's a challenge to move quickly and not stifle your ability to react, but also capture all of your knowledge so you can deal with issues when they come up. "

David Anderson
VERDETECH PRODUCTS

Tech-Clarity

The Five Fundamentals of a Successful BOM Process

Get BOM Processes in Control

Manufacturers who are ready to replace spreadsheets and email and get BOM processes under control can do so with reasonable effort. By focusing on the basics, they can make rapid improvements to productivity and reduce the impact of BOM-related errors.

This leads to the question "What are the most important factors needed to improve BOM process?" We've identified five key areas that can easily be addressed and make a big impact on the business.

Focus on the Fundamentals

BOM Processes should be implemented and enabled in a way that ensures that they are:

- Accurate
- Current
- Complete
- Clear
- Actionable

These are ways that companies can get BOMs under control and put them to work. They might be the ultimate solution, or may serve as a stepping stone for a more formal solution, but the important thing is that they can be accomplished relatively quickly and provide value.

BOM Process Fundamentals

Accurate　　Current　　Complete　　Clear　　Actionable
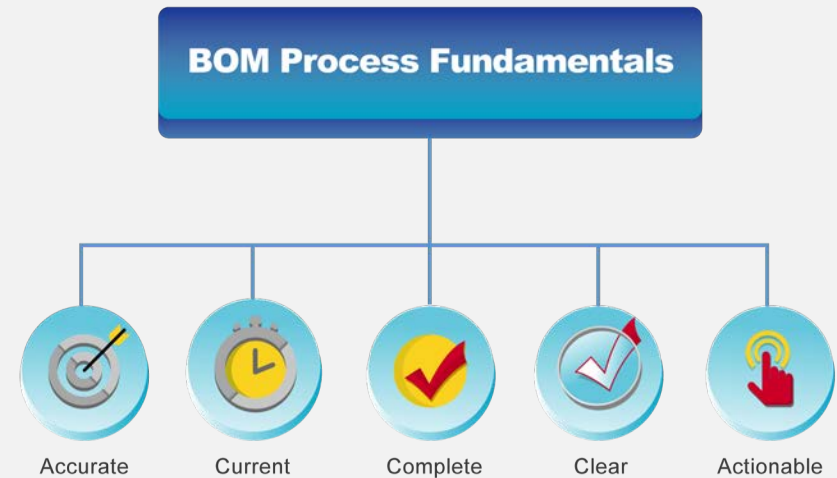
Lower the Barriers and Increase Collaboration with a Targeted Cloud Solution

One option is using a targeted cloud solution built to address the five BOM Process Fundamentals. Many companies are considering cloud software because it lowers the barriers to adopting new technology. The cloud also helps ensure that everyone access the latest data, and that data is digitally accessible instead of locked up in files or on drawings. As David Anderson of Verdetech Products shares, "We're trying to do everything on the web so we have universal data access."

Tech-Clarity

1) Aim for Accuracy

Provide Accurate Data Downstream

Manufacturers rely on their BOM to let downstream operations know what they need to execute on. Clearly, accurate information is important or the wrong parts could be ordered or an incorrect revision could be produced.

Get Data from the Source

How can companies make sure their information is accurate? First, existing data should be gathered directly from the source whenever possible instead of manually reentered. For BOM information, this means pulling product structures and metadata from CAD in order to capture the engineer's intent. Beyond initially collecting this data, it must be kept in sync as designs change.

Allow Visibility and Collaboration

Secondly, the information should be available and visible to people across different roles, including those in the supply chain. They should have the ability to review and provide input based on their perspective and expertise.

Avoid Duplicate BOM and Item Information

Finally, information should have a single master source. This means that part information shouldn't be input on a BOM by BOM basis. Part data should come from an item master that can be kept up to date centrally. Then, that data should be dynamically supplied to the BOM. This keeps information up to date, helps encourage accuracy, reduces duplication, and allows companies to determine where parts are used.

Unfortunately, our research[1] shows that about two-thirds of companies find data inconsistencies between systems at least on a weekly basis. Part data duplication on each BOM will, by its nature, become inaccurate. This doesn't have to be the case. "We have a parts catalog for parts used over and over in different projects to create a single version of truth," says Michael White of Digitalcarbon[2]. "I just edit my catalog and bring part data into my BOMs."

FREQUENCY OF ENCOUNTERING PRODUCT DATA INCONSISTENCIES[1]

25%   16%
        6%
8%   18%
    28%
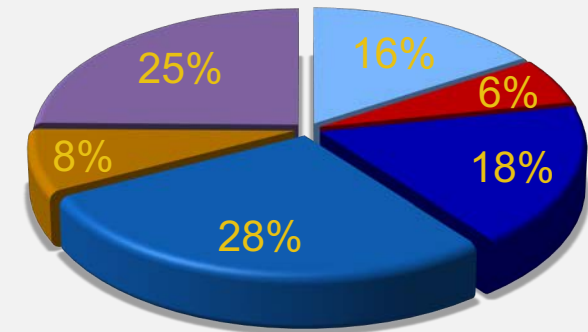
- ■ All of the time
- ■ At least once an hour
- ■ At least once a day
- ■ At least once a week
- ■ At least once a month
- ■ Occasionally

Tech-Clarity

2) Keep Data Current

Keep BOMs Up to Date

Outdated data has lost its value, regardless of how accurate it may have been. BOM data needs to be up to date, and manufacturers have to be confident that they can access the current version when they need it. How can manufacturers ensure they keep their BOMs current? In addition, how they can know what their BOM looked like at a certain point in time if they have to go back to resolve issues?

Put BOMs Under Change Control

BOM data has to be kept under a managed change process. Change management is critical to tracking revisions and history. It ensures that people accessing the BOM to do their job can be assured that they are working on the latest design. As Verdetech Products' David Anderson shares, "When someone asks what the product costs, I don't have to worry if it's current or not."

Avoid Duplicating BOM Data in Emails

Of course, data currency is highly dependent on how the data is shared and accessed. Information sent in a spreadsheet or document via email is immediately outdated. As soon as BOM data is attached to an email, it is no longer under control and creates a risk that someone will access outdated information to guide their work, leading to errors. "Once you copy a BOM and send it out by email you lose control if you make an adjustment or a change," explains Michael White of Digitalcarbon.

Keep Data Centralized and Accessible

Email is a helpful tool for alerts and notifications, but not as a place to store data. Email alerts should point to common data. In many cases, companies are turning to the cloud because it's accessible inside and outside of the business and everyone will always get the same.

> " Engineers report, on average, they are working with outdated information 20% of the time. "
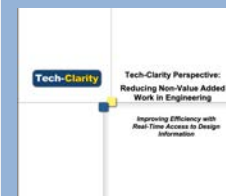
Reducing Non-Value Added Work in Engineering
TECH-CLARITY

Tech-Clarity

3) Manage Complete BOMs

Create Complete Product Definitions

Manufacturers rely on their BOMs to communicate the complete product composition, and do it in the right context. A BOM isn't just a collection of parts or a CAD structure. While CAD integration is important, it doesn't tell the whole story. As David Anderson of Verdetech Products explains, the BOM can communicate a rich amount of product data. "There's a mass of information that's all interrelated, it's important to encapsulate that knowledge instead of going back through emails and trying to recreate it," he says.

Manage BOM Relationships to Prevent Data Duplication

This information can include technical specifications like materials or commercial information like preferred suppliers. As mentioned earlier, it's important not to duplicate information from the item master. In the same way, vendor information should come from a vendor database so the information can be validated, there's no duplication, and Purchasing can find all references where the vendor is used.

Organize BOM Data by Role

BOM structures don't always fit the right format for execution, and have to be modified to provide the right information. For example, companies may want to add non-modeled parts, consumables, tooling, or other information. Also, people have different perspectives and need different data to play their role. For example, a designer might model an assembly with all of its underlying parts, but Purchasing my view it as a single item from a supplier. In a similar way, third parties like suppliers may only require access rights to a subset of information. Data has to

> " We can have a project expert review the BOM, and fix or add things. We can take lots of people with different knowledge bases and tie them in on the same platform. "
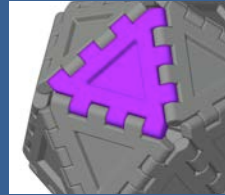
Michael White
DIGITALCARBON

be organized for the intended user and match their execution needs.

Create New Knowledge

BOM data can be used to calculate new details, including cost rollups, weights, ordered quantities, and more. These calculations are very hard to accomplish in spreadsheets due to the way they are organized. BOM data can also provide a rich source of insight by applying business intelligence and machine learning. The key consideration, though, is that all of this information should be kept in context.

Tech-Clarity

4) Communicate BOM Data Clearly

Focus on Clarity of Communication

A BOM isn't valuable unless it can be easily understood by the people that need product information to do their jobs. Remember, it's a communication tool. Too frequently, BOMs are large lists of numbers that mean very little to most people. How can companies ensure their BOMs are usable by others?

Create Personalized Data Views

First, different people need different views to make the BOM clear. It's import to provide information that's role and task appropriate. For example, people in the supply chain don't know your part numbers and you probably only want to share a subset of information with them.

Present BOMs in a Visual Context

Second, information should be presented in a visual, intuitive way. Thumbnails of parts, particularly if they are 3D, are much more approachable than long lists of numbers. Multilevel views that allow you to expand, contract, flatten, and drill down to get more information or access CAD files are more valuable than complex colors and indentations in spreadsheets.

Make BOM Data Accessible Downstream Digitally

Lastly, data needs to be interpreted by other systems as well as people. BOM data should be accessible in a database, not locked up in a spreadsheet or CAD file.

> " We use a cloud BOM solution to help our customers visually identify the appropriate maintenance parts. "

Joe Bassett
DAWN EQUIPMENT

> " One thing I really like about our solution is pictures, it's really hard to get people to use part numbers and names. "

David Anderson
VERDETECH PRODUCTS

Tech-Clarity

5) Put BOM Data into Action

Put BOMs to Use

Information is important, but has to be put to use to provide value. How can manufacturers ensure that their data can be used to drive higher efficiency and reduce errors?

Extend BOM Knowledge to Support Downstream Processes

Effective BOM execution combines data with BOM processes. It creates an integrated process that connects design intent from Engineering with what's needed to fulfill it downstream. BOM quantities aren't for reference only, they should be accessible for procurement requirements and manufacturing quantity calculations. They should also be available for rollups like costs or material quantities to make decisions.

Leverage BOM Explosions for Procurement and Production Planning

A BOM solution should also allow BOM explosions to help plan production and communicate demand to suppliers. It should share that information with an ERP system if available.

Consider Simpler Solutions

Some solutions are blurring the lines between BOM definition and execution by supporting additional BOM-related tasks like orders and. These solutions are worth a look, can provide value with fewer barriers to adoption, and can serve as a foundation to grow from at the point the company is ready for more formal systems like PDM, PLM, and/or ERP.

> " The processes for designing great products, purchasing parts, and outsourcing the work to contractors are heavily intertwined and require coordination. "

Joe Bassett
DAWN EQUIPMENT

Tech-Clarity

Next Steps

Go Beyond the Status Quo to Prevent Mistakes

Today's BOM process status quo, frequently relying on inadequate technology like spreadsheets and email, leads to inefficiency, excess cost, mistakes, quality issues, and late orders. The consequences of poor processes, especially for a smaller company, can be significant. As David Anderson of Verdetech Products shares, "Sometimes you get away with things by luck, but a major problem could kill a company." It's time for companies to raise the bar on BOM data and processes.

Take Advantage of Performance Improvements

Effective BOM management creates a cohesive process that connects everything from design to purchase orders to production. It goes further to provide the right information, including historical data, to resolve service issues. An effective process leverages a wealth of information in context, including CAD, items, and vendors, without duplicating data or allowing it to be shared without control.

Get Started

For many companies, implementing traditional systems may feel too cumbersome. But that doesn't mean they can't improve. Manufacturers can focus on the five identified opportunities to improve BOM processes and improve performance by using lighter weight, targeted cloud solutions. Cloud software fosters collaboration and comes with lower barriers to adoption. These systems can help manufacturers take a big step in the right direction and provide room to grow in the future. It's time to get started, start small, and incrementally improve BOM processes to reduce errors and improve performance.

> " We have an instant BOM in the cloud, none of this spreadsheet business. We can share it, both edit it live like a Google Doc, and everybody sees the changes. It's very powerful. "

Michael White
DIGITALCARBON

> " Our cloud BOM solution communicates information in a familiar way that looks and feels like spreadsheets but contains much more rich information. "

Joe Bassett
DAWN EQUIPMENT

Tech-Clarity

Acknowledgments

Jim Brown
President
Tech-Clarity, Inc.

About the Author

Jim is a recognized expert in enterprise software for manufacturers with over 25 years of experience in application software, management consulting, and research. He has extensive knowledge on how industrial companies use product innovation, product development, engineering, and other enterprise solutions to improve business performance.

Jim is actively researching the value of improving product innovation and operational performance through digitalization.

Tech-Clarity is an independent research firm focused on how manufacturers use digitalization, software technology, best practices, and IT services to drive operational improvement and business value. Tech-Clarity shares this knowledge with companies through publications, speaking, and strategic workshops to help company leaders understand and achieve the business value of product innovation, product development, engineering, manufacturing, service, Internet of Things (IoT), and other related software. The firm is dedicated to educating companies on making strategic improvements through the intelligent use of enterprise and digital software.

Tech-Clarity.com

TechClarity.inc

@TechClarityInc

Tech-Clarity

References
1) How Top Performers Implement, Operate, and Maintain PLM Integration – Tech-Clarity

2) Digitalcarbon, https://vimeo.com/album/5389311

This eBook is licensed to OpenBOM / www.openbom.com

openb⚬m

Tech-Clarity