Building an ETO BOM





Due to its unique nature, an ETO bill of materials requires more documentation, customizations & adaptations than a standard BOM.

Key Takeaways

- The first step to creating a BOM is a complete understanding of what the customer is looking for. In ETO manufacturing, customers are likely to make changes to the design and, therefore, the BOM, but paying close attention in the beginning can save changes in the end.
- Building an ETO BOM is more efficient when you have a good system in place for tracking parts. Don't forget, though, your BOM should also include descriptions for each part.
- BOM management is easier when working with Dynamic BOMs. They simplify the design, procurement, and manufacturing of each project and help ensure you're able to ship on time and within budget.

A bill of materials (BOM) is to an engineer like a recipe is to a chef; it needs to be just right to create that perfect, unique final product.

Creating a BOM organizes the materials and subassemblies needed to manufacture a product. Thanks to details such as quantity, lead time, <u>waste factors</u>, etc, the BOM also improves project management.

The tasks involved are complex, and some best practices are necessary to ensure accuracy, efficiency, and a successful outcome. It's also interesting to note that a bill of materials can vary greatly, from one organization to the next. In this article, we'll explore creating and working with a BOM, particularly in the Engineer To Order sector.

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Types of BOMs

Like most manufacturers, Custom Machine Builders face several types of BOMs, based on their function, structure, or configurability.

BOMs BY STRUCTURE

- Single-level BOMs are a high-level view of the parts needed to assemble the project. Any subassemblies or blends are left out, as it's just the finished components listed here. These BOMs are meant as a guide or where no additional processes are required downstream.
- Multi-level BOMs are necessary for projects with multiple levels of assembly. In these BOMs, the first level is the parent item, with levels below, often known as "sub-assemblies" or "child-assemblies," reserved for items that require additional work.

BOMs BY CONFIGURABILITY

- A standard BOM is a fixed or static list; intended for use when the product being manufactured doesn't change. There are no variations or options to customize. It is common for manufacturers to use such BOMs when their products don't change.
- A configurable or "matrix" BOM is typically used when there are modifications in a project. These variations may include a different size, color, or features. Most Engineer To Order manufacturers face changes like this regularly.

BOMs BY FUNCTION

- Engineering (EBOMs) focus a lot on the <u>product's design requirements.</u> Generated during the design process, they include a lot of detail. It's a comprehensive list of assemblies and sub-assemblies which helps clarify the engineering/design team's vision. For Custom Machine Builders, EBOMs can change a lot. ETO clients typically deal with a lot of change orders since they're building original equipment. Working with an ERP that <u>integrates directly with your CAD</u> simplifies this process.
- Manufacturing (MBOMs) focus more on specifying and supporting how a project will be built. Manufacturers assembling a project can find details on assemblies and components here. Some organizations also include the machinery needed throughout this process, including packaging requirements.

Why Engineer To Order BOMs are Different

<u>ETO manufacturing</u> is growing. Fast. The demand for <u>customized products</u> has never been higher. Concurrently, the need for better BOM management also continues to rise.

Several key aspects make ETO BOMs more unique and a little more difficult to work with.

- Customization and Variability: When you make standard products, your BOMs are consistently standard. ETO projects require customization and adaptation. Not only are the BOMs different from one project to the next, but you'll likely finish the project with a different BOM than you started with. This makes BOM management extremely difficult.
- Engineering's Involvement: Engineering is at the heart of ETO manufacturing. Their unique designs bring the client's vision to life. Together, the client and the engineering department work with continuous back and forth, at every stage of the project. Without the right software or tools in place, this process takes a big toll on engineering.
- Documentation and Traceability: When it comes to a standard BOM, documentation and traceability are pretty straightforward. ETO projects, however, require extensive documentation due to the rareness of each project. This is where BOM creation and BOM management can get tricky The Project Management Institute (PMI) has shown that more than 80% of ETO manufacturers struggle to maintain traceability in Engineer To Order projects.

Due to their unique nature, ETO BOMs require more documentation, customizations and adaptations than a standard bill of materials.

Steps to Build and Manage an ETO BOM

Many organizations think the first step in creating an ETO BOM is the part name and number. That's jumping the gun a little bit, though. The best first step to creating a BOM is a complete understanding of what the customer is looking for.

Product Understanding

Proper communication with your customers about their needs is an essential first step. According to McKinsey, when a product strategy fails, 70% of the time is due to not understanding the customers' needs. Paying close attention to the entire customer journey makes it much more likely that your customer will return.

In Engineer To Order manufacturing, the customer is likely to change the design, even after releasing the BOM. These last-minute changes can cost time and money. The engineering team can minimize them, however, if they have a clear understanding of the desired outcome.

Plan a System for Part Numbers

Better BOM management means a TOTALLY better system to track parts. To improve identification, tracking, and even <u>communication with your vendors</u>, you need a <u>part number</u>. Giving a unique identifier to each component in the BOM is important. There are 2 approaches to numbering your parts.

- A Basic Sequential System: This approach works best for smaller projects. Some manufacturers unintentionally overcomplicate it, though, with too many digits. Think about all your different screws in the project being numbered like this "000285", "000286"... etc. If using a sequential system, shorten them by eliminating the zero's at the front. This is not only more efficient, it also reduces the likelihood of errors.
- An Intelligent System: For larger assemblies, it helps teams to use letters representing the component. With this system, those same screws, for example, would label them as "SCRW285".

Whatever system you choose, remember that the best bill of materials also includes descriptions for each part. This makes it much easier for humans to scan and helps distinguish between similar components.

Tracking parts is much easier when they're numbered, it also helps to include descriptions.

Enter Data Early and Plan for Changes

Ideally, teams prefer to fully construct and approve a BOM at the beginning of a project. Engineering would be able to release it to procurement, who can order parts that all arrive on time, allowing manufacturing to assemble the project, in plenty of time to test and ship. That's a big ask for any manufacturer, but especially <u>difficult for ETO organizations</u>.

For Custom Machine Builders, clients typically request multiple design changes, even after releasing the bill of materials. These changes could include anything from drawing revisions to different or additional parts. By having standard procedures for change management, your team can keep a project on track.

Integrators, Panel Shops, and OEMs easily manage these changes in <u>an ERP/MRP system</u> designed for <u>ETO manufacturing</u>. The software should integrate smoothly with your computer-aided design (CAD) system. Doing so allows your team to track changes to the BOM, in real-time.

Material Specifications and Substitutes

You need detailed documentation for every component, including material specifications, dimensions, and other relevant information. While this is the best way to ensure consistency and quality, you'll want a backup plan, too. It's wise to account for potential alternates for as many items as possible. Being able to adapt quickly to shortages and <u>supply chain</u> <u>disruptions</u> can make or break a project.

Additionally, when considering the components required for each project, it's recommended you consider their lead times too. This is where working with a Dynamic BOM really comes in handy. They allow you the flexibility to release parts <u>to procurement in stages</u>. It saves each project time and money.

Test, Validate, and Assemble

Before signing off on the BOM, you may want to test and validate your design/BOM with a prototype. This is a good opportunity to ensure all the parts fit together and work as planned. This step can help ensure the manufacturing process will be executed without issues.

There are also times when detailed assembly instructions may be necessary. Those include instructions on the assembly prints that will help guide the manufacturing team through the build.

BOM Management

BOM creation, whether it's an engineering BOM or a manufacturing BOM, a single-level or multilevel BOM; requires dedication and attention to detail. Thought and time are always needed to improve BOM management. It's true, that working with Dynamic BOMs can simplify the design and manufacturing of custom machines. Dedicated BOM management is still necessary, though.

An ERP designed for ETO can make immediate improvements in engineering & procurement. Sales & manufacturing see benefits shortly after.

An ERP built for ETO companies will help many departments in your organization. Those working directly with the BOM, including engineering and procurement, see the most improvement. To learn more, or to see Dynamic BOMs in action, book a demo. You'll be glad you did.



"It's eerie how Total ETO mirrored our internal process of custom design." Rudi Groppe, President



"We've definitely seen a general improvement in the accuracy of data. We've gone from thinking a project is going well, to knowing it's going well." **Kevin Miller, CFO**



"Total ETO has improved our job costing metrics, providing enhanced operational decision making and production efficiency".

Ben Baker, Program Manager



"Total ETO quickly pays for itself with the admin costs saved." Mehrdad Tufani, Co-owner



"Total ETO tightly connects engineering, procurement, and accounting. The support has been top notch along with active meaningful improvements".

Kevin Marrick, President

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