



Altium

Bill of Materials Management

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What is a BOM in PCB design?

What is a BOM in PCB Design?

The “Bill of Materials”, commonly referred to as the BOM. In the case of a PCB design, the bill of materials is a list of all the parts needed to build that specific printed circuit board. A PCB BOM is generated from PCB design software. Here is a list of some of the more common core elements that you will see in a PCB BOM.

- **Comment** - Each part type on the PCB needs to have a unique identification which is listed as a comment in the BOM
- **Description** - This is a basic description of the part. In the case of the comment 27-0477-03 listed above, the description could be “CAP 10uF 20% 6.3V”.
- **Designator** - Each individual part on the board will have its own unique reference designator. In the case of the 10uF capacitor, it could be “C27”.
- **Footprint** - This is the name of the physical CAD footprint used by the part. For instance, C27 could be using a CAD footprint named “CAP-1206”.



Advanced uses for a BOM

- **Change the format of the BOM** - BOM looks can be changed by organizing it differently. BOM can be grouped by the comment information or by footprint information.
- **Include components that are not fitted** - There is an option to include parts that are designated as being un-stuffed (not fitted) in the BOM.
- **Generate BOMs for different variants of the board** - Generate different BOMs for different variants after different stuffing options (fitted or not fitted) for parts in different variations of the board are created.



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How to ensure Profitability in low volume Manufacturing

Considerations for profitability in low volume manufacturing

- **Use Commonly Available Parts** - Availability of a particular component is important when it comes to low volume production.
- **Avoid Components With Short Life Cycle** - Avoid using components that were also heavily used in automotive and mobile applications.
- **Place All Surface Mounted Components On The Same Layer** - The cost of stencils used in surface mounted components assembly is significant in low quantity manufacturing.
- **Panelize Your Design** - It is a cost effective measure that can also shorten the lead time of the assembly process.
- **Flying Probe Test** - Method of testing should be based on the nature of project.
- **Include Assembly Friendly Design Features** - Assembly machines need fiducial markers to precisely mount surface mounted components.
- **Establish A Systematic Post Assembly Test Procedure** - A properly constructed test procedure saves time in quality control and ensure a timely delivery.
- **Prepare An Accurate BOM List** - BOM list should always match the sample going to PCB assembly supplier.



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Benefits of BOM Management Tools

BOM Management Tools and Real Time Part Access

A delay due to a poorly managed manual part selection process can completely break the creative flow that was started. Here are some of the ways the process can fall apart if not managed efficiently.

- The design engineers may not know what parts are available in stock or which ones need to be re-ordered
- A manually controlled part selection process is prone to human error
- Design cycle delays
- Temporary parts used by engineering may cause problems later on in the design cycle



Benefits of BOM management tools

The source of problems with a manual part selection process are the overhead of managing all of the documentation and human error.

- Engineers will no longer have to be concerned if their part inventory lists are correct and up-to-date.
- With BOM management tools connecting different functions within the design process, engineers will find that new part qualification will have less of an impact on their design cycle time.
- Access to new part information through the BOM management tools will give engineers accurate part data immediately.



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How PCB BOM Management can Reduce Delays in Manufacturing

PCB BOM Management Can Reduce Delays in Manufacturing

Good PCB BOM management can help engineering and manufacturing work together to reduce or eliminate the potential delays and streamline the assembly process.

Potential problems with new and non-standard parts - In manufacturing, a new or non-standard part will have to be evaluated for the following assembly criteria:

1. Will it work with the current assembly processes?
2. If not, will it require entirely new equipment?
3. Will it require assembly by hand, will additional labor and workstations be required?

BOM management tools offer real-time solutions - BOM management tools synchronize component handling in procurement, engineering, and manufacturing departments, by providing real-time access to the BOM. Real-time access with BOM management tools also allows manufacturing to see when new and non-standard parts are being ordered.



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Efficient Communication between Departments with BOM Tools

Efficient communication between departments with BOM Tools

Communication problems with manually created BOMs:

- **Word of mouth** - One common scenario of this problem is when an engineer makes a value change to a part and verbally asks a co-worker to record it.
- **Version control** - If versions are incorrectly tracked on the BOM, important part decisions may be made from outdated information.
- **Time**- Waiting for updated preliminary BOMs to be distributed takes time.
- **Delivery failures** - If the BOM distribution list is incomplete, or staff changes are not accounted for, the BOM may not get delivered to key personnel.



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Efficient Communication between Departments with BOM Tools

Communication solutions with PCB BOM management tools

- Real-time changes and actions with the BOM by being “online” with your coworkers.
- When a part change is requested, the requester can see the change happen real-time.
- Version control will no longer be a problem as the parts list in the BOM will be “live”.
- Time will be saved that currently gets wasted while waiting for preliminary BOMs to be distributed.
- PCB BOM management tools are accessible to every team member.



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PCB BOM Creation as a Living Document

PCB BOM Creation as a Living Document

The BOM document is created as the PCB is being designed according to these steps.

- As design engineers add parts to the schematic, those parts are added to the BOM by the engineers or other members of the design team.
- As parts are changed or deleted on the schematic, the BOM is continually updated by the design team.
- When the schematic is ready for layout, the BOM is updated with the component reference designators from the schematic.
- After the layout is complete, the schematic is updated with reference designators that have been renumbered in the layout. Those updates are then updated to the BOM.
- At any point in the design process when design updates require part changes, those changes are updated to the BOM as well.
- Once the design is finalized, the BOM is compared to the layout and the schematic to verify that it is complete and correct.



Advantages of PCB BOM automatically created as a living document

BOM management tools automatically compile the bill of materials data as a living document while the design is in progress.

With automatically creating a BOM as a living document, these potential problems can be eliminated.

- Parts that are added, changed, or modified on the schematic are automatically updated to the BOM in real-time without human interaction.
- Component reference designators are automatically added to the BOM and are continually updated to reflect changes made in the layout.
- Final verification to check for human data entry error is not required as the BOM has been updated automatically from the schematic and layout data.



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Obsolescence Information Management for PCB BOM Maintenance

Obsolescence Information Management for PCB BOM Maintenance

At work, the sheer volume of components makes it necessary to have good software for managing of this information. Here are the important benefits.

- **Managing small changes can take Large amounts of time** – It is necessary to find a replacement for the part and document the change in every BOM in which it's used when the component suppliers notifies that a part is going to be obsolete.
- **Finding alternate parts** - The component must have the same footprint and value, and have good or better specification values.
- **The cost of the replacement** - If a similar replacement is available, it is important to consider how the component affects the design, and why the original was selected to begin with.
- **Where Did I Put That?**-Finding every instance of where a component was used in every product of the company can prevent problems.



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**PCB BOM management Tools
and paperless manufacturing
BOM system**

PCB BOM Management Tools and paperless Manufacturing BOM system

PCB BOM management tools can provide an online bill of materials and other electronic documentation to drive the paperless manufacturing processes. The manufacturing process of a PCB requires a lot of documentation. The distribution of electronic documentation to devices on the manufacturing floor can be classified in three categories:

1. Mobile devices for individual contributors.
2. Desktop workstations for data management.
3. Large wall-mounted displays for group announcements and information.



Benefits of a paperless manufacturing BOM to your company

- **Paper costs money** - The manufacturing process can create thousands and thousands of documents. The cost of paper for each of these documents over time can be substantial.
- **Distributing paper costs time** - Paper has to be manually distributed, and that takes time. Each delay due to late or lost documents can contribute to schedule slip.
- **Managing document files costs labor** - All of those thousands and thousands of documents that you will collect over time will need to be cataloged and stored. This is a very labor-intensive activity that is magnified when documents need to be updated for engineering change orders or scanned for electronic storage.
- **Paper documentation errors cost profit** - Ultimately all of these different costs will end up costing your company profit.



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**How Online BOM Management can
get help Build Teamwork**

Online BOM management can help Build Teamwork

There is a design side and a manufacturing side of the company. What ties the two sides together is the documentation process. When the documentation process is broken, errors can creep in. This causes schedule slips, re-designs, and entire projects being scrapped. These kinds of problems can negatively impact the self-esteem of both engineering and manufacturing personnel.

- The impact on engineering** - The engineering department usually has people with a creative flair in their personality. When that environment is disrupted by broken processes or bad communication, the creative process is interrupted.

- The impact on manufacturing** - The manufacturing department is full of people who are motivated by success. When the assembly line goes down though, these folks tend to take it hard.



Communication Improvement with Online BOM Management for PCB Design

- Part inventories** - With part inventories listed and maintained in the BOM management tools, engineering can have immediate access to them. These parts will be up-to-date eliminating problems due to incorrectly listed parts.

- Part requests** - Engineering will be able to file part requests online through the BOM management tools. With immediate access to current part information, they will know which parts are available for ordering instead of having to wait for approval.

- Bill of materials** - Manufacturing will have confidence that the BOMs that they receive will be accurate and ready for the assembly line.

- Online access and distribution** - All personnel throughout the company will have the same online access to the BOM management tools. This will ensure open communications and timely distribution of all required documentation.



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How Multi-Level BOMs Can Organize Your Next System Design

Problems Managing a Traditional Multi-Level BOM

- **Manual editing can lead to input errors** - There is the possibility of introducing errors into the master multi-level BOM.
- **The two sub-assembly BOMs are not connected** - There isn't any electronic connection between the two designs, when two separate BOMs are created. This forces human verification to make sure that both BOMs and their designs are using common components to lower manufacturing costs.
- **Parts may not get updated across both sub-assemblies** - Without an electronic connection between the two designs, parts that are updated in one may not be flagged for updates in the other.



BOM Tools Can Help with Multi-Level BOMs

With online BOM tools you will be able to add individual PCB BOMs as sub-assemblies into a master multi-level BOM. This will give you the following benefits:

- **The multi-level BOM is created by the online tools** - The work will be done by the BOM management system when multi-level BOM is created.
- **The separate BOMs are connected electronically** - Once separate BOMs are added as sub-assemblies, they get connected together in the master multi-level BOM. This gives an ability to compare components through the system to verify commonality of designs.
- **Online BOM tool functionality works across all sub-assemblies** - With functionality such as part life-cycle and purchasing built into the online BOM tools, the parts across all sub-assemblies can be managed.
- **Sub-assemblies can be pulled out for manufacturing** - If required, sub-assemblies can be pulled out of the main multi-level BOM as an individual BOM and sent to a different manufacture.
- **Sub-assemblies can be modified individually** - Sub-assemblies can be changed out with other sub-assemblies for updates or corrections.



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Generic description



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