



Hardware Prototyping Workshop

August 9, 2023

SUNY New Paltz

Bill of Materials

Eric Fasser
FuzeHub

10:45 am

Bill of Materials (BOM)

- Why is BOM important?
 - To accurately calculate, and ultimately minimize, your product's cost, or **Cost of Goods Sold (COGS)**
- Why is COGS important?
 - Maximize profit margins
 - Decide which distribution channels to pursue
 - Make informed decisions about capital investments as you scale up

COGS: Mistakes/Misconceptions

- Insufficient understanding of the market and customer expectations (e.g., needs, price points, and competition)
- Introducing a product at too high of a price point due to high cost of production
- Poor understanding of product costs that leads to unsustainable margins
- Failing to obtain an intimate understanding of manufacturing cost and takt time in order to optimize scaling strategy
- Calculating your COGS on an incomplete Bill of Materials

COGS: Best Practices

- Reduce complexity of product design before making critical investments in manufacturing
- Reduce product costs before launch, allowing for introduction of product at appropriate price point
- Accurately assess your product costs that lead to sustainable margins
- Obtain an intimate understanding of manufacturing cost to optimize scaling strategy
- Calculate your COGS using an **intelligent BOM**

Bill of Materials (BOM)

- An intelligent Bill of Materials is a very detailed list of everything needed to assemble your product.
- When done accurately and correctly, a BOM can help with planning and tracking:
 - Cost trade-offs using different suppliers
 - Cost trade-offs using different materials
 - Estimate future product costs (at different volumes)
 - Track minimum order quantities and price breaks
 - Lead time planning, impact on cash flow
 - Component cost as percentage of total product
 - Supply chain quality and tracking defective parts

BOM: Key Considerations

A BOM should contain **all** items that make up your product:

- Purchased parts (i.e. housings, injection molded parts)
- Purchased assemblies (i.e. customized circuit boards)
- Raw materials (i.e. bar stock, metal sheets, lumber)
- Commodity items (i.e. screws, wires, clips)
- Indirect components (i.e. boxes, shipping labels, packing materials)
- Consumables (i.e. tape, glue, lubricants)

BOM: Key Considerations

A BOM should include details such as:

- Component or Part Number (PN, P/N, Part#)
- Revision number
- Description
- Quantity and Unit of Measure
- Weight / Critical Dimensions
- Material
- Supplier
- Cost

BOM: Example

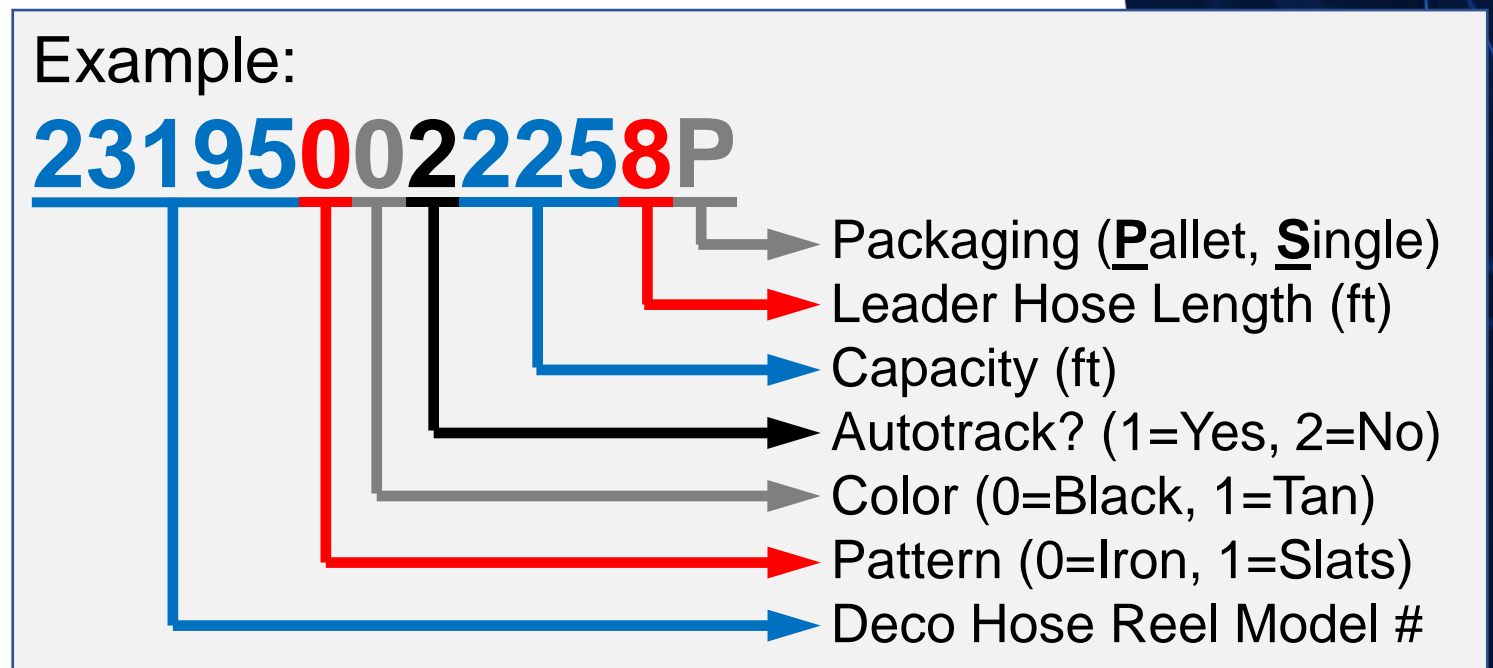
Part #	Description	Rev #	Qty	UoM	Material	Cost	Ext Cost	% Ttl
2249781	Top Panel, Black	B	1	Each	PP	\$2.17	\$2.57	10%
2249337	Side Panel, Left, Wrought Iron, Black	D	1	Each	PP	\$3.22	\$3.22	13%
2249338	Side Panel, Right, Wrought Iron, Black	D	1	Each	PP	\$3.24	\$3.24	13%
2249468	Front Panel, Wrought Iron, Black	E	1	Each	PP	\$2.98	\$2.98	12%
2249262	Back Panel, Wrought Iron, Black	C	1	Each	PP	\$2.76	\$2.76	11%
2247756	Crank Base, Black	B	1	Each	HDPE	\$0.75	\$0.75	3%
2247758	Crank Grip, Black	C	1	Each	HDPE	\$0.45	\$0.45	2%
2110798	Crank Screw, Stainless, #10 x 0.5"	A	1	Each	Stainless	\$0.03	\$0.03	0%
2247515	Hose Guide Assembly, Black	B	1	Each	HDPE	\$1.08	\$1.08	4%
2247518	Hose Guide Threaded Rod, Black	B	1	Each	HDPE	\$1.54	\$1.54	6%
2247519	Hose Guide Clip, Black	B	1	Each	HDPE	\$0.52	\$0.52	2%
2241379	Leader Hose Connector, Male, Black	A	1	Each	Nylon	\$0.86	\$0.86	3%
2241385	Leader Hose Asm, 4ft, Brass Cplng, FxF	A	1	Each	Various	\$2.22	\$2.22	9%
1975285	Water System Assembly, Black	B	1	Each	Nylon	\$1.07	\$1.07	4%
97-1178	Silicone Gel, Water System Lubricant	A	0.5	Ounce	Silicone	\$0.11	\$0.06	0%
L001779	Label, Deco Hose Reel, Color, Adhesive	B	1	Each	Film	\$0.37	\$0.37	1%
45-0067	Pallet, Wood, 40" x 48"	A	0.125	Each	Wood, Pine	\$3.21	\$0.40	2%
14-3387	Shrink wrap, Clear, 24", 60 gauge	A	16	Ft	PVC	\$0.06	\$0.96	4%

59% of total cost



BOM: Part Numbering

- An accurate part numbering system (that provides a unique, intelligent number to each part) will help avoid confusion and potential errors.
- Example: A part numbering system may have a root drawing number with additional numbers/letters to further identify part features (material, size, color, etc.).



BOM: Part Numbering

- Unique part numbers for different revisions of the same part help to track the subtle changes and avoid costly mistakes due to employee turnover, changing vendors, or part changes that aren't easily noticed (like material changes).
- As parts are assembled they become an assembly, and it may be useful to assign a Phantom Part Number to track the assembly. In some cases, it may also become a necessity when selling service parts.
- When purchasing a part from a vendor, you may need to change their Part Number to an internal Company Part Number, as you may be ordering the same part from several manufacturers who have unique part numbers.

Workshop #3

Intelligent BOM
Part Numbering

11:15 am

BOM: Exercise

- The worksheet is intended to help you start developing your Bill of Materials for your product.
- You may want to create multiple BOMs, for example a BOM for your current prototype versus your anticipated production model.
- You may want to use this as a tool to keep track of component quotes from different vendors, or to track different component varieties (i.e. materials or colors), or different order quantities.
- Don't forget to include all parts that are required to build your product and get it to the customer, including commodity items and packaging.