



HARDWARE READINESS CHECKLIST

What do I need before I go into production?

Product Information

| | |
|---------------------|-----------------|
| Company Name | Company Contact |
| Company Phone | Company Email |
| Company Website | |
| Product Name | |
| Product Description | |

Exploded Bill of Materials (BOM)

- | | |
|-------------------------------------|---------------------------------------|
| <input type="checkbox"/> MPN | <input type="checkbox"/> Lead Times |
| <input type="checkbox"/> QPA | <input type="checkbox"/> Price Curver |
| <input type="checkbox"/> Red Design | <input type="checkbox"/> Description |

Tips and common pitfalls: A bill of materials (BOM) may look different for mechanical vs electrical vs assembly partners (redacted for quoting multiple CMs). See what questions they have on the BOM. Do you know the story of every component: the reason it's in your BOM and its long-term availability? Do you have specification ranges for parts with tolerances? Acceptable and unacceptable alternates (process for handling alternates, who gets final decision, etc). If can't find suitable alternatives, perhaps your margin for error is too slight to scale the product effectively. Try harder to make the product more robust. What is consigned/CFM (Customer Furnished Material) versus what does the CM purchase. Assembly complexity of screws, snaps, etc. Review components on Octopart to make sure that components are not going EOL (end of life). Single-sourced critical components should be flagged.

Gerbers and Silkscreens

- Manufacturing specs
- Printed Circuit Board (PCB) fab drawing
- Gerbers
- Silkscreens

Tips and common pitfalls: Wrong FR4 (the green board inside most devices and computers) material used, wrong copper weight. High frequency, high voltage, and certain comms traces have specific trace requirements that need to be called out.

CAD and Schematics

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|----------------------------------|--|
| Standard Hardware: | For Tooled Parts: |
| <input type="checkbox"/> Board | <input type="checkbox"/> 3D |
| <input type="checkbox"/> Housing | <input type="checkbox"/> 2D with manufacturing tolerances |
| | <input type="checkbox"/> GD&T (Geometric dimensioning and tolerancing) Specs |

Tips and common pitfalls: Fiducial marks and tolerances. Line widths and spacing are adequate. Undercuts. Tooling draft angles. Part fit and assembly, bossing, joinery. Designs should not be final, in order to facilitate design for manufacturing/design for assembly (DFM/DFA) adjustments with manufacturing partner.

CMF (Color, Material, and Finish) File

Tips and common pitfalls: uncommon materials should be flagged (gold, platinum, expensive stainless, etc.)

Assembly Documentation

- Standard operating Procedures (SOP) Notes:
- Estimated assembly time
- Any specialized skills and/or equipment

Tips and common pitfalls: Don't forget solder mask and screen Computer Aided Design (CAD) for printed circuit board assembly (PCBA). This may be optional at an early stage as it will change once the manufacturing partner has been engaged. An exploded view of the mechanical design might be sufficient.

Testing Documentation

- Estimated test time
- Any specialized skills or equipment? Test jigs?
- Functional test plan, and definition of pass/fail
- First article delivery timeline
- Environmental screening, vibration, etc.
- Testing requirements such as United Laboratories (UL), Federal Communications Commission (FCC), Radio Frequency (RF), CE (a certification standard for Europe), NSF (test/certification standard for kitchens), etc.
- Manufacturing certs requirements such as MFi (certification standard for Apple iPhones), ISO (certification standard for factories and supply chain partners), FDA (certification standard for factories and supply chain partners)

Tips and common pitfalls: How to store and retrieve test results. Environmental testing and Intellectual Property (IP) rating. Do you need to hire a source inspector? Learn about AQL (Acceptable Quantities). For example, do you need to test all parts, or do you have the confidence to test on a certain percentage? Is this an option?

Logistics Plan

- Freight on Board (FOB) Notes:
- Who pays
- What shipping points
- Tariffs

Tips and common pitfalls: Underestimating the costs for logistics & fulfillment. Modeling in ocean freight costs, when cost of cash or other factors would compel you to use airfreight. Know the different intercoms - most typical are Free Carrier (FCA) for air and Freight on Board (FOB) for ocean.

Manufacturing Forecast

- Proforma that reflects your 3-5 year sales/manufacturing forecast
- Target dock dates you need to hit for sales samples as well as first shipment and replenishment

Tips and common pitfalls: out of alignment with your Engineering Validation Test (EVT), Design Validation Test (DVT), Product Validation Test (PVT), Production Plan (PP) and year 1 quantities.

Agreements

- Get a Manufacturing Service Agreement (MSA) in place before starting
- Have a tooling agreement in place with supplier prior to ordering tooling
- Make sure Non-Disclosure Agreements (NDAs) are in place with all component suppliers, partners, etc.
- Send someone to the contract manufacturer (CM) during project kickoff and first run

Tips and common pitfalls: Ensure you review an MSA and know the points to ask. Make sure you are shielding them from revisions; only send docs over that are ready to go. Reconcile version conflicts quickly and with a process. Find a right-sized, right-capabilities supplier: a supplier that is not too large or too small, and one that has expertise required (for example: highly manual assembly, precise placement of components, lengthy testing requirements, etc. Pick manufacturers that have the capabilities to match your needs today vs. those you aspire to—a contract manufacturer's revenue and volumes per customer should be in line with your 2-3 year forecast. Electrostatic discharge (ESD), intellectual property (IP) sensitivity (i.e., test whether you can walk into another line and pick up paperwork on a tour), professionalism, etc. Not adequately funded for pre-manufacturing, manufacturing, etc. It's a courtship. (See MAKE IT Factory Audit Report for more guidance.)

Pitch

Prepare a pitch deck showcasing your company. Get the factory excited about working with you! Pick your ten most compelling message points and build the deck around your unique story. Cover the following key points along the way:

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- Your team and why you are the right team to build the business.
 - Product description and what makes it special.
 - Marketing Strategy: Understand who your target is, what their "pain point" is and how you will address it. Who is your market? How big is the market? If you are able to capture x amount of it, that means x units and x revenue. Where does your target market "hang out" and how will you reach them? Start developing customer demand up front to support distribution and production. Consider partnerships, industry Budget for and have someone on your team who understands marketing and the various options/platforms. Focusing on what your consumer wants: don't be afraid to pivot.
 - Competitive landscape: make sure you understand what similar products are already on the market. Describe your points of differentiation and intellectual property position. Sometimes the biggest competition is the current way of doing business: how will you change customer behavior?
 - Demonstrated demand: Have you demonstrated traction in the market yet? Do you have purchase orders or commitments already in place? Focus on quality revenue; 1000 who will be repeat customers and evangelists are more important than 10,000 one-time buyers. Do you have media coverage?
 - Distribution plan: be creative about where your product would be well received and diversify your distribution channels. Consider industry-specific channels, direct to consumer, online marketplaces, Amazon, retailers.
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- Funding: where is your funding coming from (revenues, friends and family, debt, venture capital, payment terms)? Many factories will want money upfront for research, development, and possibly production. Make sure to understand your BOM and timelines very well, which impact funding requirements. If you are looking for a loan, consider borrowing against a business asset such as equipment, or against a purchase order. Not having a track record can make obtaining a loan very difficult. Borrowing against your house or 401k is extremely risky – carefully consider all other options first. Friends and family loans are the most common funding sources for start-ups, but for hardware you will likely have to raise much more money. Equity funding like venture capital is often required. Factories will run a credit check; be prepared.

 - Plan: Projections for next 5 years: projected volume, direction of the company or product line

Special Thanks:

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