



# Manufacturer Assessment Questionnaire Checklist

- Always ask a manufacturer exactly how they will do something, and not just if they can do it.
- When dealing with China definitely make sure you are speaking with the actual manufacturer. There are many middlemen in China that present themselves as the manufacturer.
- Always get samples of similar products they have manufactured.
- Get referrals when possible.
- Depending on the level of support you require, it can also be a good idea to measure how much they like your product. For example, my manufacturer liked and believed in my product (and more importantly me), so they gave me fantastic payment terms and financed my molds.
- You may also want to ask them their annual revenue so you can get a feel for the size of the manufacturer. You don't one too small or too new, but also you don't want one too big. CM's are ranked in tiers with:

Tier 1: >\$5 Billion	Tier 2: \$500M to \$5B
Tier 3: \$100M to \$500M	Tier 4: <\$100M

- Ideally you should visit the factory or hire a 3rd party to perform an audit especially if you have no trusted referrals.
- Always request to see similar products they have manufactured. Ask what were the biggest challenges the design team faced and if you can speak with them.
- Share your Bill of Materials with them and ask them which parts on your BoM will be difficult? What are their recommendations? Manufacturers who specialize in your kind of product can likely give you this answer for 80% of your components at a glance.
- Describe a difficult aspect of your product and ask them how they would deal with it.
- Ask for an Org Chart. This gives an idea of whether they even have a company structure.
- How long they have been in business at each location(s)? This gives an idea about the company stability.
- What is their employee turnover rate? A high rate might indicate that their employees might not be well trained since the employee churn is high.
- Ask if they have a corporate employee training program in place.
- Do they have a control chart, AKA Process chart? Some companies have two versions: A detailed one that they will only show you onsite, and a watered-down one that they will freely send you.

- Do they have a PFMEA which is used to identify failures in a process? This gives an idea if they have thought about their process properly, and what can go wrong.
- Do they have prominently displayed work instructions?
- How are their operators trained? Is there a regular retraining program?
- For operations requiring operator judgment for pass fail, do they have a GR&R process?
- Do they have an incoming inspection process? What AQL do they use for each component.
- Do they keep, Certificates of Compliance for critical components/assemblies from suppliers?
- What kind of outgoing inspection do they perform? Do they do Ongoing Reliability Testing?

# Questions for Electronics Suppliers

## ASSEMBLY

- Can you support 2-sided Surface Mount Pick & Place Technology (SMT)?
- How many SMT lines do you have in full production? What is the maximum component placement per hour?
- What type of SMT equipment do you have? Age of equipment?
- Can you support SMT placement of 0201, 0402, 0603, 12/16/20 mil pitch, BGA, LGA, Mini BGA components?
- Can you support Automated Through-Hole technology?
- Can you support Through-Hole reflow (THR) technology?
- Can you support Paste & Glue Top/Bottom Side (SMD) technology?
- Can you support Pin Insertion and/or Compliant Pin insertion technology?
- Can you support conformal coating?
- Can you support Box Build, Subassembly, and System Build services?
- Can you support Cable and Harness Assembly Services?
- Can you support 100% lead-free and RoHS complaint assembly?
- Do you offer Router, V-Cut, and Punch depaneling?

## SOLDERING

- Can you support SMT reflow technology? What sort of reflow equipment do you have?
- Do you have a suitable program for solder paste storage, including FIFO use, activation time limit, proper checking on temperature profile to match the paste being used.
- Do you have a process to ensure regular inspection and cleaning of stencils?
- Can you support Nitrogen SMD reflow?
- Can you support Wave Soldering technology?
- Can you support Selective Soldering technology?
- Can you support hand soldering at a work station?

- Can you support No Clean soldering process?
- Can you support hot-bar soldering?

## **INSPECTION & TESTING**

- Do you support Automated Optical Inspection (AOI)?
- Do you support Automated X-Ray inspection (AXI)?
- Do you have 2D or 3D automated solder paste inspection (SPI)?
- Do you have Automated In-Circuit Test equipment?
- Can you produce In-Circuit fixtures in-house?
- Can you produce test jigs, fixtures, and other custom tooling in-house?
- Do you have any in-house production wireless/RF test equipment?

## **OTHER SERVICES**

- Can you support High Volume Flash programming? What equipment do you have? Can you flash microcontrollers from major brands such as TI, Atmel, STMicro, etc.?
- Can you support automated QR code / label placement onto PCBAs?
- Do you have a BGA rework station and trained technicians?
- Do you have in-house reliability testing equipment or services?

## **SUPPLY CHAIN MANAGEMENT**

- Do you have an organized supply chain team?
- How do you handle alternates and parts shortages?
- Who are your major electronics distributors?

## **CAD**

- What CAD System(s) do you use?
- What is your preferred method for transferring files?
- Do you have a FTP site?
- What file formats do you prefer?
- Do you offer any design services?

## **DFM**

- Do you offer a full DFM review PRIOR to a Purchase Order?
- Do you have in house DFM software such as Valor?
- Do you offer component sourcing verification using tools such as Silicon Expert?
- Do you offer full system design and assembly review for product improvement and cost reduction?

## **QUALITY SYSTEMS**

- Identify the Quality system certifications governed by your design & manufacturing facility. Provide certificates.
- Do you measure your suppliers using any standards?
- Do you employ Six Sigma in your business? Some companies do not implement six-sigma, but still use other similar tools so be sure to ask.
- Do you have a climate-controlled QC room?
- Do you have a CMM machining for inspecting parts?
- Do you have tensile testing equipment for destructive testing?
- Do you have x-ray inspection capability?
- Do you, by standard process, provide full bubble-drawing First Article Inspection reports?
- Do you maintain a qualified list of suppliers?
- Do you have a traceability system in place down to the component level? Lot control / serialization?
- Do you have material inspection procedures to ensure verified components and quality inbound material?
- Do you maintain an ESD safe assembly environment?
- Do you have a process for storing PCB's? Most PCB's have humidity and oxidation issues if not stored properly prior to being populated.
- For BGAs, LGAs or CSPs do you bake the PCB's prior to use to prevent warping during reflow, and cracking of solder joints?

# Questions for Plastic (enclosure) Suppliers

## **MOLDING AND SECONDARY OPERATIONS**

- Do you have a standard process for recording a molding parameters document? If yes, please provide a copy in English.
- Do you have equipment for continuous desiccant drying of materials?
- Please attach a copy of your drying procedure (in English).
- Please attach a copy of your ultrasonic machine set up and controls (in English).
- Do you perform Design of Experiments. What Software? Please provide examples
- Do you have any clean room molding rooms?

## **INJECTION MOLDING PRESSES**

- How many presses do you have <25 Ton?
- How many presses do you have between 25 and 100 ton? Please provide list.
- How many presses do you have between 100 and 150 ton?
- How many presses do you have between 250 and 500 ton?
- Do you have vertical presses? If yes list down number of presses stating the details like tonnage, make, type and year
- Do you have presses for two and three shot molding? If yes list down number of presses stating the details like tonnage, make, type and year
- What is your current capacity utilization?
- What is the average age of your equipment?
- Do you have robots at the presses to avoid manual handling?
- What is the mix of hydraulic and electric presses in your facilities?

## **MOLDING CAPABILITY**

- What type of material drying system do you utilize?
- Is your material drying system capable of dew points to - 40 degree F?
- Can you perform 100 to 200 ton 2-shot molding?
- Can you perform Insert Molding: (metal, plastic, glass) ?
- Can you perform Overmolding (TPU, TPE) ?

- Can you perform thin wall molding? What do you consider thin wall specify flow path to thickness ratio?
- Do you monitor mold temperature? If yes please attach the procedure and list of equipment
- Can you perform in-mold decorating? Describe with examples.
- Can you perform in-mold labeling? Describe with examples.
- Do you do optical quality molding with clear plastics (PC, PMMA) ?
- What is the maximum part size you can produce?
- What is the minimum part size you can produce?

## **SECONDARY OPERATIONS CAPABILITY**

- Can you perform Pad Printing (Closed Well System) ?
- Can you perform Painting?
- Can you perform Vacuum Metallizing?
- Can you perform basic Mechanical Assembly?
- Can you perform Ultrasonic Welding?
- Can you perform Heat Staking?

## **TOOLING**

- Do you offer in-house tool making?
- What type of materials do you use for tooling (Steels, Aluminums etc.)?
- Do you utilize MUD tool bases or standard tool bases?
- Do you utilize high-speed machining centers?
- Do you have wire EDM?
- Do you have conventional machining equipment?
- Do you perform in-house tool changes?
- Do you have in-house tool maintenance?
- Do you perform laser etching for graphics?
- Do you have Air-conditioned Tool Storage?
- What kind of analysis do you perform for gates, runners, mold heating, and shear rate?
- Do you use hot runner systems?
- Do you provide 3D design of the tools before you start tooling?



## **CAD**

- What CAD System(s) do you use?
- What is your preferred method for transferring files?
- Do you have a FTP site?
- Can you use Adobe Illustrator and graphic file translation for engraving icons in tools?
- Do you offer screen-sharing web conferencing tools to review parts in 3D?

## **DFM**

- Do you offer a full DFM review PRIOR to a Purchase Order?
- Do you have in house flow-simulation?
- Does your DFM review include Draft Analysis, Parting Line, Gate location, ejector location, cooling system, tool material, insert and mold base design, flow simulation, sink mark analysis, warpage, knit lines, and suggested changes?
- Do you provide documented DFM presentations with revision control and colored images for clarity, in English?

## **QUALITY SYSTEMS**

- Identify the Quality system certifications governed by your design & manufacturing facility and please provide certificates.
- Do you measure your suppliers using any standards?
- Do you employ Six Sigma in your business?
- Do you have a climate-controlled QC room?
- Do you have a CMM machining for inspecting parts?
- Do you have tensile testing equipment for destructive testing?
- Do you have x-ray inspection capability?
- Do you provide full bubble-drawing First Article Inspection reports?
- Do you maintain a qualified list of suppliers?