



# Finding the Right Manufacturer for Your Design

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What should a designer look for in a fabricator and why does finding the right one equate to value?

## Overview

To receive a quality PCB, you need an efficient design and a manufacturer capable of producing it. This paper will examine the challenges and best practices associated with matching your design requirements to a manufacturer's capabilities.

Your needs as a designer will vary depending on the board you are designing and the function for which it is intended. Each new design could require you to evaluate how your manufacturers can suit the project. Production deadlines, budget constraints, and project profile all play a role in the decision-making process.

Priorities can shift during production, making good communication between fabricator and designer all the more critical. When the production schedule tightens or volume increases, you need to have confidence your PCB manufacturer can and will respond.

Design engineers should be prepared to choose the most capable manufacturer—one that can deliver the right solution for your specific project. Keep in mind each design will bring unique challenges with it and no single manufacturer will be the right fit for every design. Vetting your PCB suppliers early on in your design cycle whenever possible will facilitate a smooth handoff from design to “best fit” board shop.

## Begin with Open, Two-Way Communication

Your designs will vary in complexity. So will your production volumes and schedules. Regardless of your top priority for a given design, you will want a manufacturing partner available for consultation at every stage of production.

A good manufacturer will collaborate with you—respecting your expertise without being afraid to identify design pitfalls that could keep your board from properly functioning. This open, two-way communication serves as the foundation for a solid relationship between the designer and manufacturer.

Without that dialogue, how can you be sure you have chosen the right manufacturing partner for your design?

### The Necessary Constant: Access to Your Manufacturer

Good communication cannot exist without round-the-clock access to your fabricator. Though many fabricators tout 24/7 availability, few truly provide it.

“I used to never expect replies from U.S. West Coast companies until after I shut down on this side of the world. Now, I have a manufacturing partner with people manning the phone at 1 a.m.—experts who can actually respond to my needs.”

—Jim Donnett, *Bio-Signal Group*

If your manufacturer makes you wait, you could end up doing the same thing to your customer. When your ability to provide value to your customer hinges on responsiveness, you need a manufacturer who understands and supports that need.

Level of access is, therefore, a clear indicator of your manufacturer’s overall commitment to delivering value.

## Matching Priorities to Capabilities

Once communication has been established, you can better determine if a manufacturer possesses the right production capabilities for a specific design. What you value most from a manufacturer can vary from one design to the next; however, focusing on a primary manufacturing priority does not diminish the importance of or exclude other production elements.

Just because you need a PCB manufactured quickly does not necessarily mean you are willing to sacrifice quality or accept less in terms of service. In general, if you

have more than one top priority, a manufacturer with a broader set of capabilities is more likely to be a fit for your needs.

Complexity of design matters. A fourteen-layer board will present more challenges than a two-layer. Once the technology needs are fully understood, designers will prioritize needs using these basic categories:

- Service
- Speed
- Quality, Innovation and Scalability
- Price

Setting priorities can sometimes prove difficult. Collaboration with the manufacturer is critical—as are the depth and breadth of that manufacturer’s production capabilities. No designer approaches a production without a budget and a deadline. If the dialogue about delivery or cost also considers other factors, you are less likely to rely on cutting corners during production.

### No One Goes It Alone

Unless your designs serve a specialized niche, the PCBs you create may serve a multitude of industries, with a variety of materials demands and regulatory requirements. No single manufacturer will have the classifications and materials inventory necessary to meet every design need. Look for PCB manufacturers who forge and maintain partnerships aimed at expanding their capabilities.

“I think manufacturing partnerships are much needed in the industry. It would certainly modify the way our company thinks about prototyping new products.”

—Jeff Robinson, NetFabric Corp, [www.netfabric.net](http://www.netfabric.net)

Consider every aspect of production in your decision-making process. The symbiotic relationship among technical capabilities, speed, price, quality, and service means all play a part in achieving your primary goal.

### Service

The service provided by your manufacturer will impact every element of production. Whether you value speed, quality, or cost control the most, level of service will likely determine if a manufacturer can deliver on any of them.

If you want to learn about a manufacturer’s commitment to quality service, do some straight-forward research. Though some of your results may be considered

anecdotal, when viewed as a complete picture, answers to the following can tell you a great deal about the level of service a given manufacturer will provide.

- Guarantees – Does the manufacturer offer guarantees of service delivery or call-back windows? If so, do those guarantees come with caveats?
- Testimonials – Are the manufacturer’s customers publicly endorsing them in forums, social media, or website testimonials?
- Colleagues – What are other designers saying about the manufacturer?

Use what you learn from these sources to inform your dialogue with prospective manufacturers. Thorough research arms you with confidence that your manufacturer will provide service equal to its claims.

### Great Service Means Better Technology Solutions

Design errors and production holds can result from the process of converting CAD files to the Gerber files required for manufacturing. How you convert matters. Look for a manufacturer who understands the risks inherent in this process and can help ensure a smooth transition.

Many designers benefit from free or low-cost software able to accept native CAD files or different formats. If you want to be done with the process as soon as your design is complete, these tools will help you achieve that goal.

“Since I began using an integrated CAD software tool, the results have far exceeded my expectations.”

—Bill Conley, *FassTech*, [www.fasstech.com](http://www.fasstech.com)

A truly integrated CAD software product will help reduce cycle time and increase your ability to deliver on time. Consider this as you evaluate potential manufacturing partners.

### Speed

A smooth, speedy production depends on having the right personnel, materials, and equipment properly coordinated from start to finish.

As a PCB is manufactured, it will pass from process to process. If a necessary resource is not immediately available at the point of transition, your board waits and production slows down. Ask your manufacturer questions to help you understand how they deal with bottlenecks and manufacture boards with minimal wait times. Here are some examples:

- What is the manufacturer’s sweet spot with regard to lot size and lead time? Meaning, how many boards can it effectively produce in what amount of time? If your volume passes beyond a certain threshold, can the manufacturer still deliver on time?

- Does the manufacturing floor have around-the-clock coverage in all production departments?
- How are production holds handled, beginning in pre-engineering and continuing through every element of the manufacturing process?
- If production does go on hold, what happens? Is the ship date automatically extended or will the manufacturer commit to accelerating production?
- Does the manufacturer have personnel and equipment redundancy throughout the production process?

The size of the production facility and staff will also help you verify a manufacturer's claims about production speed. When speed is your top priority, carefully consider all available information to be sure your manufacturer can ship a quality board on time.

### Preventing Delays Before Production Begins

Before you engage with a manufacturer about your PCB design, you should already have a deadline. A protracted pre-sales engagement can delay your ship date just as easily as production wait time, so consider carefully how a manufacturer handles the quotation and pre-engineering process.

How flexible is the manufacturer's quotation process? Are all quotes handled in the same manner or does the manufacturer treat them differently based on production volume, shipping deadline, and/or PCB complexity?

Look for a manufacturing partner able to tailor the pre-sales process to the needs of your design. This will likely foreshadow its ability to manufacture the board to your requirements.

## Quality, Innovation and Scalability

PCB designers value manufacturers who deliver quality boards, offer innovative ideas during production, and possess the capability to scale with a project. Manufacturers who own these attributes are better prepared to grow and adapt with your needs.

### Quality

Quality is of the utmost importance to designers and their customers. A bad prototype or production board can be costly in terms of both dollars and lost time. When judging a potential manufacturer's ability to produce, ask pointed questions about their quality assurance process and reliability certifications.

- What certifications does the manufacturer hold?
- How long have the certifications been in place?

- Is the manufacturer open to an on-site audit?
- Will the QA manager be available to discuss requirements?
- Has the manufacturer been first-to-market or best-in-class in categories that make a difference to your project?

If the manufacturer is forthcoming with these answers, you can be more confident in both willingness to maintain open dialogue and ability to build quality boards.

### **Innovation**

Finding a manufacturer capable of innovation is both critical and challenging. A fabricator offering creative production ideas can save you time and money. Since the ability to innovate is not something for which a manufacturer can produce certifications or offer guarantees, you should talk to the manufacturer, and ask specifically how their brand of innovation benefits your design.

- Can the manufacturer cite examples of innovative solutions that helped move projects similar to yours from prototype to production?
- Does the manufacturer make it a practice during prototyping to find cost savings before going into production?
- Will the manufacturer offer design input that can reduce the complexity of production, improve output and save money on the boards themselves?

You are an expert in the art of creating high-functioning, innovative PCB designs. You want a fabricator to take a leading-edge approach to building boards from them. Find one by establishing an open dialogue and asking questions until you are satisfied the manufacturer will make the most of your design.

### **Scalability**

As your projects grow, you need a board shop that can grow with you. Scaling refers to more than tolerance for higher production volume, something that is relatively easy to verify. You must also determine if your prospective manufacturer is poised to evolve with the PCB industry.

Today's boards are getting smaller and doing more. How can you determine if a manufacturer is prepared for that and other trends to continue?

- Find out if the manufacturer actively plans and executes a strategy for continuous expansion of capabilities.
- Ask the manufacturer to share its technology roadmap.
- Prioritize longevity. Look for a board shop that has weathered industry storms, so you can be sure it will be there to serve your needs in the future.

If the manufacturer has a good plan for the future of PCB manufacturing, you can be more confident of its ability to produce your designs now and into the future.

## Price

Manufacturers successful over the long haul understand they must realize margins that will sustain continuous reinvestment in their production facility, personnel, and process improvement. Artificially thin margins inevitably lead to cost cutting that will eventually impact quality and reputation.

While you should never assume the more expensive PCB is always better, the cheaper one can come with hidden risks you may not see until it is too late. It is, therefore, critical that you ensure the quoted price matches what you require from the manufacturer. If pricing seems too good to be true, find out why.

Begin by comparing prices from several shops. If one still stands out as much lower than the competition, consider the following:

- How long has the company been doing business?
- Is an on-site or virtual tour of the manufacturing facility possible?
- If the facility is not at headquarters, does manufacturing take place at a satellite location or an offshore company production facility?
  - If it has neither, ask if the organization is actually a PCB manufacturer or merely a board broker.

By answering these questions, you can better determine how the lower price might impact the production process. Is the manufacturer offering a lower price because it has efficient, value-driven production processes? Or is the quote a loss-leader attempt to buy business from the competition? When pricing is your top priority, look for the most stable and reputable manufacturer your budget will tolerate.

## Conclusion

Matching your design to the right manufacturer is critical to a successful production of your board. The vetting process for fabricators hinges on good communication. Use an open dialogue to determine if your design requirements will be met by the manufacturer you are considering. Whether your design priorities focus on speed, cost, innovation, or quality, be aware that a manufacturer's commitment to service will likely be the key to manufacturing your board successfully.

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