



QUICK GUIDE

to Additive Manufacturing



Additive manufacturing has become a critical part of the design, prototyping and production process for engineers and production professionals, so it's important to better understand its applications, benefits and overall role. This Quick Guide to Additive Manufacturing is designed to answer some of the most common questions around 3D manufacturing, rapid prototyping and on-demand production.



► WHAT ARE THE BEST APPLICATIONS FOR ADDITIVE MANUFACTURING?

Design engineers rely on additive manufacturing across the entire product development cycle—from consumer use testing to functional testing; design iteration to on-demand production. It's the ideal method for understanding many performance parameters of a design before moving to production.

Financial modeling - Use additive manufacturing to identify and optimize cost implications of a component prior to mass production.

Complex design iteration - Additive technologies allow engineers to evaluate minute variations of a component at a very low cost. Since there are no tooling costs, design decisions like hole placements, bosses, or chamfers can be quickly and easily replicated to improve performance.

Short-term “bridge to tooling” - By producing low-volumes of a specific part or component, companies can keep inventory on hand even while awaiting delivery of mass production shipments from overseas.

Digital inventory - Low-run, spare or legacy parts with minimal demand are ideal for additive manufacturing thanks to lower production costs.

Assembly aids - Tools, jigs and other machine/robotic fixtures (for holding parts on an assembly line, for example) that may be sensitive to temperature or require consistent design modification are ideally suited to additive manufacturing.

▶ WHAT BENEFITS CAN ADDITIVE MANUFACTURING DELIVER TO MY BUSINESS?

The obvious answer is speed. By eliminating the tooling requirements, lead times and large part quantities, additive manufacturing truly turns weeks of production into days or even hours. But the benefits go far beyond rapid turnaround time.

Freedom of design - Many new components incorporate intricate geometries that are simply impossible to produce via traditional manufacturing. Additive methods allow engineers to create not only prototypes with complex form factors, but fully functional parts.

First-mover advantage - With the ability to rapidly iterate in the design phase, engineers can gain the competitive edge in both innovation and production.

Flexibility of materials - In industries like aerospace, lower-cost materials can sometimes replace more expensive materials to ensure cost-efficient test protocols or produce more affordable production parts.



▶ HOW DO I COMPARE POTENTIAL ADDITIVE MANUFACTURING SUPPLIERS?

Every engineer, production supervisor or operations professional will have their own criteria for choosing an additive partner. The key is to check off as many boxes as possible and minimize overall risk:

- Does the supplier understand ALL customer requirements, from timelines to dimensional accuracy to preferred materials?
- Does the supplier take the time to understand the project parameters? Do they offer consultative advice or simply a transactional process?
- What is the supplier's track record for on-time delivery?
- Does the supplier have a low rate of return?
- What is the supplier's production capacity? How many machines do they have on site? Do they routinely outsource projects?
- Does the supplier have the required industry certifications?
- How long has the supplier been in the additive industry?
- Does the supplier offer easy access to on-staff engineers?



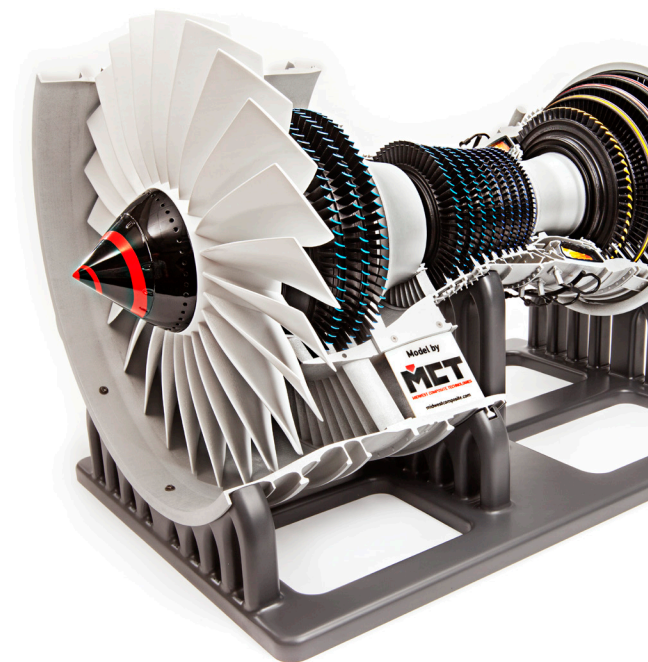
► IS IT IMPORTANT THAT A SUPPLIER PROVIDE BOTH ADDITIVE AND TRADITIONAL MANUFACTURING CAPABILITIES?

Yes, there are many advantages to the customer when a manufacturing partner can offer a full array of additive technologies and traditional manufacturing machines, too. First, the supplier's team can tailor the solution rather than simply offering an "additive-or-nothing" approach. Secondly, the supplier can seamlessly move from prototyping to traditional machines without the need to qualify a new source of supply. Finally, having both capabilities under the same roof ensures stringent prototype tolerances can be maintained when moving from prototyping to the high-volume manufacturing phase.

► HOW CRITICAL IS CUSTOMIZATION OF A SUPPLIER'S SERVICES?

If the part design rests on simple geometries and common materials, price tends to drive the purchase decision. But if the prototype is complex or the material selection plays a key performance role, engineering expertise and manufacturing flexibility is critical. Likewise, if the part is destined for mass commercialization, it is imperative that the supplier's processes, systems and timelines are tailored to meet the engineer's specific expectations to deliver the highest possible quality.

In additive manufacturing, one size never fits all. Every order must meet specific customer specifications, so it's important to choose a partner with the ability to adopt its process and deliverables for every customer.





► WHAT SHOULD I LOOK FOR WHEN EVALUATING A SUPPLIER'S IN-HOUSE TEAM?

With so many emerging businesses claiming to have additive capabilities, it's vital to assess the supplier's true experience level before assigning a project.

- How long has the company focused on additive technologies? (A few years in the business may not offer the necessary experience to manage complex or cost-sensitive projects.)
- What is the average experience level of each technician or engineer?
- Does the team have prior experience working in customer manufacturing environments so it understands the challenges engineers and production professionals face?
- Does the team understand the critical demands of industries such as automotive or aerospace?
- What other capabilities does the team offer? For example, can it provide industrial design, painting, assembly and finishing services on site?

► I SEE A LOT OF 'GET A QUOTE' FEATURES ONLINE. SHOULD I TALK TO THE SUPPLIER FIRST?

For low-value parts, sending specifications via a web portal may be acceptable. But for more complex prototypes or functional part designs, a true engineer-to-engineer dialogue is critical to minimize risk and ensure the part is acceptable. Without minimal collaboration, turnaround time can be impacted, and key design considerations misinterpreted. (For example, checking a box in an online form field that says "smooth finish" might mean a light texture or a matte finish or something else entirely.) The ability to have a collaborative dialogue with your supplier can ensure the confidence that you will get the right result the first time, every time.



ISO 9001

The company has met defined requirements for a quality management system in manufacturing.

AS9100

Certifies that the company meets additional aerospace-focused quality standards for DOD, NASA and FAA.

► HOW IMPORTANT IS ISO OR OTHER CERTIFICATIONS?

Industry certifications such as ISO 9001 or AS9100 are essential for doing business in certain industries (such as aerospace). Yet other manufacturers that rely on additive capabilities can benefit from this level of rigor as well. That's because these certifications involve multiple audits, significant process improvements and can take months or years to acquire. The result? Suppliers who have earned these certifications demonstrate a higher commitment to mitigating customer risk and have proven they are serious about quality.

This Quick Guide to Additive Manufacturing is brought to you by Midwest Composite Technologies. We have served manufacturing customers for more than 40 years. Our focus is on plastic and metal 3D printing, prototyping and on-demand production. We offer a full suite of additive technologies and traditional manufacturing capabilities, along with an experienced staff of engineers, technical personnel and customer service professionals. We invite you to contact our team with any further questions you may have.



Midwest Composite Technologies, Inc., 1050 Walnut Ridge Drive, Hartland, WI 53029

(262) 367-8254 | sales@midwestcomposite.com | midwestcomposite.com