

Make vs. Buy: Should you bring Additive Manufacturing in-house or outsource it?



By using CAD files and 3D printers to build things, layer by layer—rather than extracting them from large pieces of material—Additive Manufacturing's (AM) applications are truly extensive.

For one thing, companies leveraging the power of AM can experiment with different designs, test for functionality, print prototypes and build parts with fewer components. They can build these parts in a fraction of the time, with much less material waste, compared to traditional manufacturing methods. Because AM uses a range of innovative materials, it's possible to manufacture components that are significantly stronger and lighter, able to reliably withstand high pressure environments and thrive in extreme temperatures. And because AM allows manufacturers to build parts from the ground up, it makes it easier to consolidate multiple components into one—and streamline manufacturing supply chains.

Given this host of benefits, more and more manufacturers are beginning to identify opportunities to integrate AM into their operations. As they do so, however, many are faced with a deceptively difficult question: Does it make more sense to build AM parts in-house or to partner with an external AM provider?

Here, we explore the pros and cons of each option, and highlight a few things to keep in mind before making an AM investment.



The pros and cons of AM outsourcing

Finding a trusted provider can streamline the AM journey, but to determine whether outsourcing is a better option for your organization, it's important to consider its benefits and disadvantages.

Pros

No up-front investment.

Unlike with in-house AM investments, an external provider allows manufacturers to lower their financial risk by offering a range of machines, technologies and expertise, so you're not starting from scratch but from experience. Having a strong team behind you can be particularly advantageous. After all, Design for Additive Manufacturing (DfAM) isn't something team members can learn overnight—it can take years to master the optimization of different materials, geometries and capabilities. Collaborating with a provider committed to making ongoing investments in this ever-evolving technology works in your favor too, as AM requires not only up-front purchases but ongoing financial commitments as well.

A greater range of AM technologies.

The right AM partner should have multiple AM technologies, offering manufacturers a level of flexibility they simply can't achieve in-house. Because AM isn't a one-size-fits-all process, these companies make sure the right technology is used for the right application, so as to truly optimize the use of this manufacturing method and get the properties a manufacturer requires.

A broad array of materials and testing capabilities.

Not only does the right AM provider offer expert knowledge about the potential and limitations of specific materials, but they have more experience

printing a wide variety of materials. Additionally, some providers, like Burloak, have materials testing laboratories—allowing them to conduct extensive testing to properly qualify a particular material. These labs employ materials engineers who are experts at what they do and ensure the metal powder has the exact characteristics a manufacturer is looking for.

Leading expertise.

Because AM providers specialize in all facets of AM, they're more inclined to attract the industry's top professionals. This makes it possible for manufacturers to access top-tier AM knowledge without having to invest in expensive training or recruitment programs.

End-to-end AM solutions.

With in-house investments, many companies gain access to the necessary machinery, but still have to pay for additional services such as materials testing, CNC machining, surface finishing, heat treatment and quality assurance. With the right AM partner, all these services are conducted under one roof, so you don't have to worry about sourcing additional providers.

Significant time savings.

If a long-time provider specializes in AM, you can rest assured they've seen it all—and are willing to leverage that knowledge. As a result, previous experience can prove invaluable, allowing you to save time and resources and avoid learning from your own mistakes.

The pros and cons of AM outsourcing (cont'd)

Cons

Third-party margins.

As with all third-party vendors, AM partners charge a fee for their equipment and expertise. In most cases, this is well worth the cost—unless you're willing to invest in a full-service solution, continually optimize in-house processes, update technologies for years to come and hire dedicated AM experts (or train existing experts to become proficient in AM technologies).

Scheduling.

When you work with an external provider, you must account for an additional party's schedule. Because you're relying on technology that isn't within your facility, it may take more time for a printed part to arrive. On the plus side, these lead times are typically still shorter than those of conventional manufacturing providers because AM reduces the number of steps required to build a final part. Additionally, vertically-integrated suppliers can complete everything in one place—including things like surface treatment, heat treatment and machining—which can save time, since many in-house AM operations must still outsource these steps.

Privacy.

To mitigate potential privacy breaches, it's important to work with an AM partner that prioritizes privacy and security. A best-in-class provider should restrict access to all proprietary information, forbid video and photography, store all files on highly secure networks and servers, require employees to achieve security clearances and implement other measures so privacy is no longer a concern.



Burloak's Materials Testing Laboratory allows the company to conduct extensive testing to properly qualify a particular material.

The pros and cons of bringing AM in-house

Bringing AM machines in-house is one way to streamline your manufacturing efforts, but it's not for everyone. To determine whether it makes sense for your organization, it's important to fully understand when in-house AM can strengthen your organization.

Pros

Gain a better understanding of the technology.

If you want to familiarize yourself with this new and emerging manufacturing technique, and better understand its industry applications, bringing AM in-house is one way to get a grasp on its costing models, business processes and manufacturing processes, while building some in-house competency.

For instance, there are large OEMs out there that have full-fledged Additive Manufacturing centers—but they have no intention to use them to manufacture their parts, because that doesn't fit into their business model. Rather, they use their in-house AM facilities to better understand how this technology can work within their end products and meet their evolving needs. At the same time, they are building out a supply chain of AM providers, like Burloak, to do scalable manufacturing when the time comes.

Conduct development work.

In-house AM can work well for companies in the product development phase as it allows them to experiment, benchmark and iterate proprietary designs. It should be noted, however, that doing developmental work in-house is still a significant investment, which is why many companies leave that, along with scalable production, to trusted AM service providers.



AM providers should be equipped with multiple AM technologies, offering manufacturers a level of flexibility they simply can't achieve in-house.

Accelerate design cycles.

By keeping AM machines close to in-house engineers, these team members have more flexibility to iterate the designs, print prototypes and better understand the technology. That said, this type of set-up isn't well-suited to product scalability, as you need much more than a couple of printers to build qualified AM parts.

Secure supply chains.

Some companies want to streamline their supply chains by conducting all their AM in-house. This typically only works if it fits into your business model—and success really depends on the industry and application. Some industries simply cannot afford to do everything in house. For these companies, single-sourcing or multi-sourcing might make more sense and achieve the same goal.

The pros and cons of bringing AM in-house (cont'd)

Cons

Very high investment costs.

Metal AM systems don't come cheap. In many cases, upfront investment costs are millions of dollars—with individual printers costing between \$1 million to \$2 million alone. On top of this, there are downstream services to consider—such as precision machining, heat treatment, quality assurance and materials labs. It's therefore important for companies to do the math upfront and make sure they have a strong business case for AM before investing in the technology.

Process complexities.

AM is about more than printing parts. You also need qualified professionals who can design for Additive Manufacturing (DfAM), select and characterize the appropriate powder, invest in post-processing (which includes steps like machining, surface finishing and heat treatment), ensure quality control and assurance—and the list goes on. Given the costs and expertise associated with these additional processes, most companies must outsource them, negating many of the benefits of in-house AM.

Shortage of expertise.

DfAM and printer operation both require unique professional skillsets which aren't easy to come by. While the industry is advancing, it's still very nascent, making it difficult to find trained professionals to bolster your in-house team. Without these qualified professionals, you run the risk of costly mistakes,

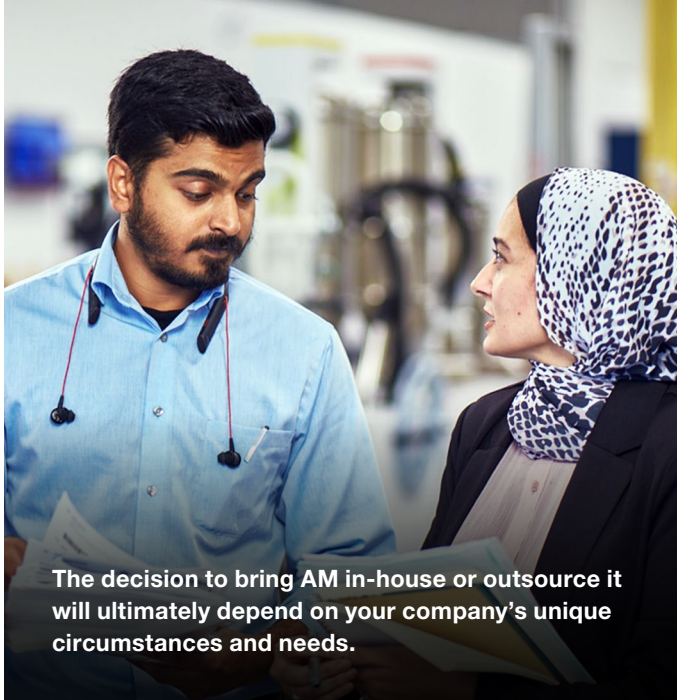
such as missed design or production guidelines. Because of this, outsourcing may be a better way to familiarize yourself with the technology and eliminate risks arising from a lack of experience.

Equipment maintenance.

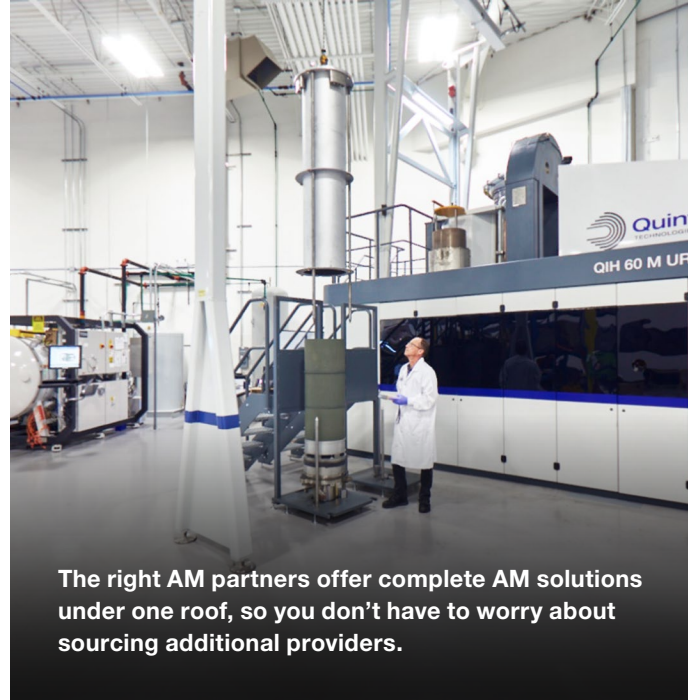
On top of risks associated with equipment breakdown, AM technology is continuously evolving, as printer manufacturers are constantly trying to meet demands for scalability. For instance, for Laser Powder Bed Fusion (LPBF), manufacturers consistently add more lasers and increase the size of build envelopes. To make sure your AM technology remains cutting-edge and in good repair, continuous investment must be part of your long-term strategy—and you must budget for regular equipment and system maintenance as well.



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Things to consider when weighing your options

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For instance, one thing you must consider is the frequency and scale of production. If you're going to produce a constant stream of parts and prototypes, it might make sense to purchase an in-house system and then engage a third-party supplier when it's time to scale up. If you only need a one-off prototype here and there, however, it's likely not worth the in-house investment.

In a similar vein, if you're looking to produce end-use parts, it's likely wise to find an end-to-end provider that can offer design, manufacturing and post-processing solutions in one place—along with a skilled and knowledgeable team with extensive AM experience.

Lastly, it's important to have a clear view of the costs associated with each option. AM involves much more than purchasing a 3D printer. To truly compare costs of in-house investments versus outsourcing, you must take the cost of skilled professionals, materials, hardware, post-processing, maintenance and technology updates and investments into account—as well as the risks (and potential costs) of something going wrong.



**Burloak
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If you outsource, the right partner is key

If you've considered the pros and cons—as well as your unique circumstances—and have determined that AM outsourcing is the best option for your organization, the next step is to find a trusted provider.

At Burloak Technologies, we've been supporting companies on their AM journeys for many years. Over that period, we've worked alongside a vast range of businesses, helping to integrate AM into space, aviation, industrial manufacturing, automotive, energy applications—and others.

Our customers have access to the expertise and knowledge of some of the top AM professionals in the business, and an extensive assortment of vertically-integrated AM technologies, including:

- laser powder bed fusion
- electron beam powder bed fusion
- high speed extrusion
- fused deposition modelling
- directed energy deposition
- selective laser sintering
- CNC machining
- hot isostatic pressing
- vacuum heat treatment
- surface finishing equipment

Additionally, thanks to our two North American locations (our AM Centre of Excellence in Oakville, Ontario and our production facility in Camarillo, California), our extensive network of AM partners and over 165 years of experience of our parent company, Samuel, Son & Co., we have the knowledge and resources to help our customers with all their AM scaling needs.

All of these features mean that, when a customer makes the decision to outsource their AM, we can offer them the most passionate experts, the latest technology and the best AM solutions to their complex manufacturing challenges.

To learn more about Burloak Technologies, contact us.

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