



Additive Manufacturing

The Flexibility Additive Manufacturing Can Add to Your Future

Kip Hanson | Mar 01, 2017

What You Need To Know

There are several ways to build 3D products.

3D printing is not replacing traditional machining but becoming a greater asset as a complement to traditional machining.

Certain 3D printing materials deliver the best ROI.

A look at how industrial 3D printing is transforming modern manufacturing.

Whether you're intimately or marginally familiar with 3D printing, chances are, it's having an impact on your manufacturing business. Also known as additive manufacturing, this important technology produces three-dimensional objects directly from a CAD model by slicing material into paper-thin layers and then "building" finished, sometimes complex, products from the bottom up.

There are several ways to print a 3D object—the most common of which involves using laser-based powder bed fusion technology and filament "hot glue gun-style" deposition modeling. Parts or other objects can be made from a variety of metals and plastics, including titanium, cobalt chrome, engineering grade polymers and more, in nearly any shape imaginable.

The Additive Machining Proof Is in the Details

As the additive machining technology evolves, industrial 3D printing continues to become a bigger, greater, more complementary mainstream asset. Unlike machined parts, which generally go up in price as geometry becomes more complex, or as the material removal increases, properly designed 3D printed parts can be cost neutral regardless of geometric complexity or materials used.

Acrylonitrile butadiene styrene, or ABS, is a petroleum-based thermoplastic and is the cheapest plastic to print. It's used to make a variety of products for mass production, including pipes, components for cars, household kitchen appliances and even some toys. It would be virtually impossible via

conventional methods to machine a part that's shaped like a honeycomb, spider web or delicate lattice structure, but it's no problem using 3D printing techniques. The endless possibilities are opening doors once held firmly in place in the aerospace, medical and automotive industries.

Industrial 3D Printing Is Not What You Think

If you're thinking 3D printing will put machine shops out of business, think again. Terry Wohlers, principal consultant and president of Wohlers Associates Inc., an additive manufacturing consulting firm based in Fort Collins, Colorado, says 3D printing complements traditional machining by easing tooling constraints and advancing development time.

"Even a shop with no desire or opportunity to supply 3D-printed parts to their customers can realize tremendous benefits by having a machine on-site," he says. "Some examples include printing devices like jigs and fixtures or building up a scale model of a part to provide a visual before the actual cutting begins."

Not only does Wohlers think that the additive 3D printing learning curve is manageable, but he also points out that desktop printers are so inexpensive today that there's little reason even owners of small shops shouldn't consider having one on hand. "It's another tool in the toolbox, one that adds a lot of flexibility," he says.

Strike any preconceived notions you may have about the cost of 3D printers. Though it's true that some powder-metal printers are easily tagged at \$500,000 or more, there are a number of smaller, plastic-based desktop extrusion printers (such as the *MakerBot Replicator Mini+*, which sells for as low as \$999 online) that allow shops to get their additive 3D-printing feet wet by testing basic functionality.

Additive Insights into the Future

The ability to produce functional, end-use parts, such as jet engine components or orthopedic implants (a rapidly growing sector of the 3D printing industry), requires a substantial investment of time and money—along with making sure your 3D printing system is capable of making accurate, fully dense metal or polymer products. Metal additive equipment manufacturer Concept Laser Inc. in Grapevine, Texas, understands these stipulations. President and CEO John Murray says the most successful 3D printing companies are indeed those that embrace the potential to produce radically new product designs.

"Reducing part count, taking out weight, increasing reliability—those are the real gains with additive manufacturing," says Murray. "That said, this isn't a plug-and-play endeavor. A good rule of thumb is to take six months to learn the machine, the process and the materials, especially when you're striving for metal end-use parts. It's also a good idea to be involved in the design process up front in order to optimize the parts for the printing process. That's when people see the biggest improvements."

Whether you need a quick, workholding device for a machining operation or you're designing the next-generation aircraft engine, 3D printing is, in many cases, a viable solution. The important thing is to remove prior concepts and really look at these product designs from an entirely new perspective. Take a class, read some books (we suggest the textbook "*Additive Manufacturing Technologies: 3D Printing, Rapid Prototyping and Direct Digital Manufacturing*," by Ian Gibson, David Rosen and Brent Stucker), partner with a 3D equipment or service provider—however you do it, staying relevant means you'll take the time to learn something new about the additive manufacturing technologies that get faster, bigger and more involved every year.



Key Takeaways

- Additive manufacturing can become a groundbreaking mainstay of your company.
- 3D printing complements traditional machining.
- Embrace the potential of 3D printing to produce new products.

How have you used 3D printing in your shop?

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