

3D printing: The smart person's guide

By [James Sanders](#) | February 17, 2016, 12:42 PM PST



MakerBot Replicator

Image: Sarah Tew/CNET

3D printing provides businesses the ability to quickly produce parts for rapid prototyping before employing traditional manufacturing techniques, and the ability to adopt just-in-time manufacturing to reduce warehousing costs. For hobbyists, 3D printing allows for the custom creation of parts to meet the needs of their projects, such as a plastic housing for a circuit board.

This guide to 3D printing is both an easily digestible introduction to a new paradigm, as well as a "living" guide that will be updated periodically to keep IT leaders in the loop on new 3D printing technologies and ways in which they can be leveraged.

Executive summary

What is it?

3D printing, also known as additive manufacturing, is a catchall term for various technologies that allow for the creation of three-dimensional objects.

Why does it matter?

3D printing allows for rapid prototyping of industrial parts without the costs of one-off prototype manufacturing. 3D printing can also be leveraged to create production-quality parts on demand, reducing the need for warehouses.

Who does this affect?

While additive manufacturing has been in use in industrial settings for decades, the rapidly decreasing cost of printers and various types of materials that can be used make 3D printers an economical solution for hobbyists.

When is this happening?

3D printers have seen increasing popularity since 2010, as prices for printer hardware have fallen.

How do I get it?

3D printers are now ubiquitous enough that users can purchase one in big box electronic or hardware stores, and can be used with computers running Windows 10, OS X, or any modern Linux distribution.

What is 3D printing?

3D printing is a catchall term that refers to a variety of additive manufacturing technologies first introduced in Japan in 1981. Different 3D printing technologies are used depending on the type of printer in use, and the type of material being printed.

Extrusion printing such as [fused deposition modeling](#) (FDM) or fused filament fabrication (FFF) is the most common type of printer, due in large part to the low cost of printing hardware and [thermoplastic](#) materials. The [MakerBot Replicator](#) is the most popular and affordable FDM printer.

[Photopolymer](#) printers, which use a liquid resin cured by ultraviolet light, are increasingly affordable for small projects and hobbyists. Printers such as [LittleRP](#) and [mUVe](#) are attractive options, and they can use resin from third-party vendors such as [MakerJuice](#) at a reduced price. [B9Creator](#) is a high-precision photopolymer printer that is accurate to 30 micrometers, though the increased precision comes with a higher price.

Powder bed printing allows for the printing of metal alloys, polymers, and other materials such as plaster and calcium carbonate. Various types of powder bed printers exist, including powder bed / inkjet head (3DP), electron-beam melting (EBM), selective laser melting (SLM), and direct metal laser sintering (DMLS).

For thermoplastics, selective heat sintering (SHS) and selective laser sintering (SLS) printers are available. These types of printers are generally rarer and reserved for industrial applications, with printer prices starting at \$50,000 and exceeding \$1 million depending on the type of printing, material used, and maximum printable area. Due to the cost of printers that work directly with metals, you may choose to use 3D printers to create a plastic mold for the traditional fabrication of metal parts.

Why does 3D printing matter?

Various industries can benefit from the increased speed and reduced costs of 3D printing compared to traditional methods of rapid prototyping.

For engineering firms, having the ability to create an object using an onsite 3D printer (rather than sending the design to a manufacturing facility, perhaps on a different continent) can speed up a given workflow by weeks and save substantial amounts in courier fees alone. With in-house prototype manufacturing, worries of IP theft by a third-party facility are nonexistent. For finalized designs, 3D printing in manufacturing can reduce warehousing costs by moving to a just-in-time production model. This is particularly helpful for niche products with low install bases.

For creative works such as custom jewelry, 3D printed samples for design and fit are quick and cost-efficient demonstrations.

Who does 3D printing affect?

In addition to the aforementioned industrial uses, 3D printing allows hobbyists to create unique items in their homes or local makerspaces, and share those designs as parts in larger projects. Designers can share their designs on websites such as [Thingiverse](#). This is particularly helpful for hardware projects, like a [blade server-esque rack for Raspberry Pi units](#).

When is 3D printing happening?

3D printing is rapidly reaching the level of being a social phenomenon, in much the same way that previous advances in technology (such as smartphones) have been. The [Jolla Phone](#) has [official resources for users to print their own phone covers](#). Various other [strange uses for 3D printing](#) have been devised.

3D printing has also made headway into the art world, with a [3D printed version of the Mona Lisa](#) produced as part of a project for blind people to appreciate famous paintings.

How do I get a 3D printer?

3D printers are increasingly ubiquitous. In the US, standard FDM printers can be purchased in various big box electronics and hardware stores for under \$1,000. For the DIY crowd, you can build a 3D printer yourself with [instructions from RepRap](#). Mattel and Autodesk have

collaborated on building the [ThingMaker](#), a \$299 3D printer targeted to kids and teens that is expected to debut in time for the 2016 gift-giving season.

Before you decide which 3D printer to purchase, look to our sister site CNET for reviews of popular 3D printers to decide which one is right for you.

<http://www.techrepublic.com/article/3d-printing-the-smart-persons-guide/?ftag=TRE684d531&bhid=26823807311204785260254093470841>



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