



Figure 1 <http://www.geeky-gadgets.com/wp-content/uploads/2013/11/Robox-3D-Printer5.jpg>

About 3-D Printing

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Article taken from :

<http://3dprinting.com/what-is-3d-printing/>

Other information from :

<http://3ddesktopprinting.blogspot.com/p/what-are-some-advantages-of-3d-printing.html>

<http://www.rapid3d.co.za/low-cost-3d-printers/>

What 3D printing is

3D printing or additive manufacturing is a process of making three dimensional solid objects from a digital file. The creation of a 3D printed object is achieved using additive processes. In an additive process an object is created by laying down successive layers of material until the entire object is created. Each of these layers can be seen as a thinly sliced horizontal cross-section of the eventual object.

How does 3D Printing work?

It all starts with making a virtual design of the object you want to create. This virtual design is made in a CAD (Computer Aided Design) file using a 3D modelling program (for the creation of a totally new object) or with the use of a 3D scanner (to copy an existing object). This scanner makes a 3D digital copy of an object and puts it into a 3D modelling program.

To prepare the digital file created in a 3D modelling program for printing, the software slices the final model into hundreds or thousands of horizontal layers. When this prepared file is uploaded in the 3D printer, the printer creates the object layer by layer. The 3D printer reads every slice (or 2D image) and proceeds to create the object blending each layer together with no sign of the layering visible, resulting in one three dimensional object.

Methods and technologies of 3D Printing

Not all 3D printers use the same technology to realize their objects. There are several ways to do it and all those available as of 2012 were additive, differing mainly in the way layers are build to create the final object. Some methods use melting or softening material to produce the layers. Selective laser sintering (SLS) and fused deposition modelling (FDM) are the most common technologies using this way of printing. Another method of printing is to lay liquid **materials** that are cured with different technologies. The most common technology using this method is called stereolithography (SLA).

Selective laser sintering (SLS)

This technology uses a high power laser to fuse small particles of plastic, metal, ceramic or glass powders into a mass that has the desired three dimensional shape. The laser selectively fuses the powdered material by scanning the cross-sections (or layers) generated by the 3D modelling program on the surface of a powder bed. After each cross-section is scanned, the powder bed is lowered by one layer thickness. Then a new layer of material is applied on top and the process is repeated until the object is completed.

Personal printing

Personal 3D printing or domestic 3D printing is mainly for hobbyists and enthusiasts and really started growing in 2011. Because of rapid development within this new market printers are getting cheaper and cheaper, with prices typically in the range of \$250 – \$2,500. This puts 3D printers into more and more hands.

The RepRap open source project really ignited this hobbyist market. For about a thousand dollars people have been able to buy the RepRap kit and put together their own personal 3D printer, complete with any customizations they were capable of making. What really speeds the development is the open source idea. Everybody working on the RepRap shares their knowledge so other people can use it and improve it again.

This rapid development of open source 3D printers is gaining interest in both the developed as well as the developing world and it enables both hyper-customization and the use of designs in the public domain to fabricate open source appropriate technology through conduits such as Thingiverse and Cubify. This technology can also assist in sustainable development as such technologies are easily and economically made from readily available resources by local communities to meet their needs.

Advantages and Disadvantages¹

Advantages

- ❖ Affordable
- ❖ Huge variety and customisation
- ❖ Constant improving of prototypes
- ❖ Eco-friendly

Disadvantages

- ❖ Violation of copyrights
- ❖ Harming of authenticity
- ❖ Printing of weapons
- ❖ Fraud syndicates

¹ <http://3ddesktopprinting.blogspot.com/p/what-are-some-advantages-of-3d-printing.html>

Future

It is predicted by some additive manufacturing advocates that this technological development will change the nature of commerce, because end users will be able to do much of their own manufacturing rather than engaging in trade to buy products from other people and corporations.

3D printers capable of outputting in colour and multiple materials already exist and will continue to improve to a point where functional products will be able to be output. With effects on energy use, waste reduction, customization, product availability, medicine, art, construction and sciences, 3D printing will change the manufacturing world as we know it.

Low-cost 3D Printers²

	UP Plus 2 – R19 995.00 (incl. VAT)	UP Mini – R9 995.00 (incl. VAT)
Build Volume	140mm x 140mm x 135mm	120mmx120mmx120mm
Layer Thickness	0.15, 0.2, 0.25, 0.3, 0.4 (mm)	0.2, 0.25, 0.35 (mm)
Consumables	1.75mm ABS (Variety of colours)	1.75mm ABS (Variety of colours)
Operating Systems	Windows XP, Vista, 7, 8 and Mac OSX	Windows XP, Vista, 7, 8 and Mac OSX
Warranty	12 month return to base	12 month return to base

² <http://www.rapid3d.co.za/low-cost-3d-printers/>