

3D Printing Technology

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1. History of 3D Printer

The internet set humankind on a path to a democracy and egalitarian world. It is never been a better time to begin a big business or turn up with a world changing idea. New 3D printing companies have come out in the last five years a future inventor, designer and marketer. This article shows the evolution of 3D printing technology.

Nearly three decades ago perform machine parts, toys and artificial organs were being created. Engineer Charles Hall printed a small cup using a plastic material and ultraviolet light. This process was named stereo lithography. In this process a liquid photo polymer is alleviated and bonded with UV light. He founded the company 3D systems in 1986 to sell 3D printers to the likes of Mercedes Benz and General Motors. The first sold for about \$ 100,000 in 1988. Competition began to arrive in 1989 from Israel based company Stratasys. They used a process called fused deposition modeling. Plastic is dissolved and infused layer by layer through hot nozzle. In 2009 a group of three people were set

to make a big difference in 3D printing industry. They were Briefed Ettus, Zac Koken and Adam Men they created MakerBot. In the same way apple brought mainframes to the desktop. MakerBot wanted to do the same to the 3D printing. They focused on developing their products quickly and were dedicated to open source business. MakerBot released the replicator as the first affordable home 3D printer. The printer used a process similar to fused deposition modeling. The question was now on as to whether a company like MakerBot could survive against bigger, older brother corporations such as 3D systems and Stratasys. To focus on growing and making some more money the new printer was designed of a closed source. Activist Cody Wilson became famous when he was able to create the world's first 3D printed gun. MakerBot banned this design from their website after this causing. Cody started his own site with name DEF-CAD. To fight negative press MakerBot released a video of a 3D prosthetic arm made for a child. It

received significantly less views than Cody Wilson's Liberator pistol. In 2011 Maxilla Bosque inspired by MakerBot set out to make his own 3D printer. He formed the company Formlabs and launched a Kickstarter operation to gain funds and enter into the market. A printer cost \$2,300 on the campaign and it was big success with the campaign raising almost three million dollars but there were issues with production. Formlabs is the true innovator for technology. Both companies continue to make new printers. MakerBot has many ranges now while under \$1000 and Formlabs has created to form one plus which is a significant provident over the previous version printing at twice the speed. The future of 3D printing seems bright. Overall all is making products cheaper and is allowing anyone to prototype and visualize the product from their desktop. The things being created from 3D printers are likely to change the world. The vision of reasonable prosthetics is a huge leap for Humanity. Recently company opened bionics has now produced a prosthetics arm with moving fingers for under \$1500. In the future we may see a return to small markets. For this time they will exist worldwide across the internet.

2.Introduction-3D Printing Process

3D printing technology is already changing the way we produce objects from tools and toys to clothing and even body parts.3D printing is part of process known as additive manufacturing, where an object is created by adding material layer by layer.

Additive manufacturing allows designers to create complex parts for machines, airplane and cars at a fraction of the cost and time of standards means like forging, molding and sculpting. Now, smaller consumer friendly 3D printers are bringing additive manufacturing to home and business. The first step in 3D printing is creating a blueprint of the object you want to print. You can use modeling software like Blender to create your own design. Once you have a finished design it is time to send it to the printer. Some printer like the MakerBot Replicator 2, have removable bio-plates spools in the back of the devices almost like a string. When the printer receive the data, it pulls the material through a tube, melts it and deposit it to the plate, where it instantly cools.3D object is created through layering where the printer will add one layer of the object at a time until you have a fully structure.

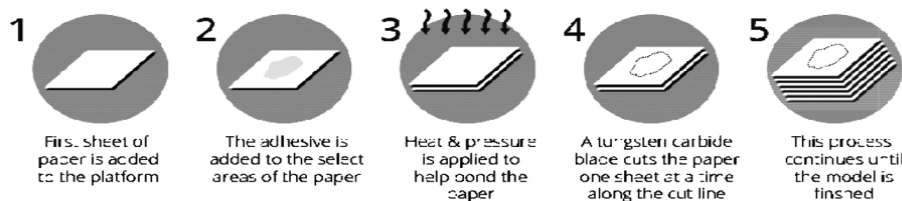


Figure (a)

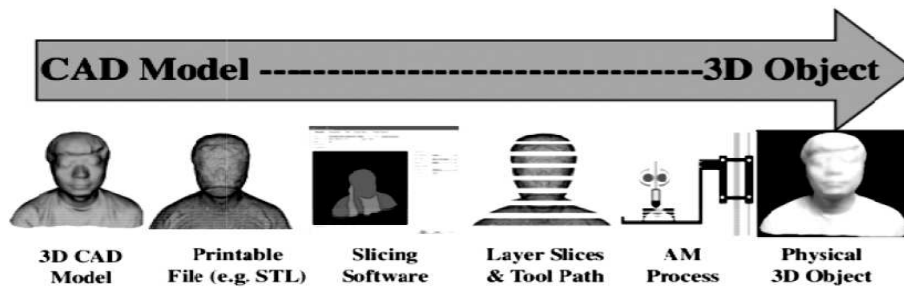


Figure (b)

Figure 1 : 3D printing Process

The most common material used in 3D printing is plastic. But the use of some other material allow for the creation of some pretty amazing products beyond simple tools and toys. 3D printing food is becoming very popular and additive manufacturing has allowed for the creation of some pretty complex treats. In the medical world, doctors are testing bio-materials for regenerative medicine. By using patient's cell, doctors could 3D print small body parts ears and noses. Some surgeons have even tested 3D printed organs for transplants. Recently Giant 3D printers in China printed ten houses in just one day and at a cost of less than \$5,000 per house proving just how cost and time efficient 3D printing can be.

3.The 3D Printing Revolution

3.1 - 3D Printing

3D printers turn computer model into real physical things. They do this by building up an object in a great many every thin layers. Some technologies achieve this by extruding molten

materials such as standard Scylla plastic from a print head Nozzle. Other technologies lay down successive layers of powder but are the selectively fused solid with a laser beam or other heat source or else bonded with a spray on adhesive. For many years Tweedy printing has been used in rapid prototyping and to help produce mold masters but more recently pioneers such as freedom of creation and make eyewear have begun to use 3D printers to digitally manufacture final products or parts thereof. This means but it is already possible to purchase spectacles furniture and many other items that have 3D printed and this trend is set to continue. Today 3D printers can build items in a wide variety of materials including plastic, metals, and glass, concrete and chocolate.

3.2- 3D printing Advantages

As the technology develops this will allow an increasing number of parts and products to be stored digitally online. Items will then be able to be delivered digitally across the internet

so reducing physical transportation costs and permitting more local manufacturing because it is an additive process. 3D printing will also reduce materials wastage as well as permitting high levels of products customization.

- 1.Digital object storage
- 2.Digital object delivery
- 3.More local manufacturing
- 4.Reduced materials wastage
- 5.Products Customization

3.3- Impact of 3D Printing

Today when somebody wants some new Footwear they usually go to a store. Predefined number of styles and sizes from which they can choose. All of these shoes have previously been manufactured in distant factories in the hope that somebody one day may want to buy them. Now let us consider what may happen in the future. Rather than travelling to a store a customer may go online select a design, color , material and size and then print out their shoes on a personal 3D printer in their own home. Creative consumer may even customize their shoe design using an app created by the manufacturer or may even come up with a new shoe style all by themselves. Of course many people may not want will be able to afford a personal 3D printer. Nevertheless they could still create or customize their own shoes on a computer and then use an online printing service to dispatch them to their own home. Alternatively they may visit a local

3D printing bureau to get their shoes printed out or perhaps they may still purchase their shoes from a specialist footwear store by now one is able to offer a far wider range of digital design that are printed out on demand. In time it may even be possible to return an old pair of shoes so that the material they are made from can be recycled and reprinted into a new design.

3.4- 3D Printing towards Personal Manufacturing

Many of the ideas in the previous scenario may sound fantastical but already 3D object marketplaces like Thingivers and Craft works are springing up on the internet. Online printing g services such as Shapeways , Sculpt Rio, are also starting to thrive online. Anybody with a 3D design therefore already has many options for sharing it over the internet and printing it out. Personal 3D printers are now also available. For many years it has been possible to build your own 3D printer using open source designs from RepRep or fab@home. More recently we have seen the launch of consumer 3D printers for those without DIY skills. These include the up personal 3D printer as well the cube 3D printer from 3D systems.3D printing is not going to replace traditional manufacturing. It may increasingly permit personal manufacturing to take place at home, in store and online.

4.Conclusion

Ultimately, when we look at the potential of 3d printing technology, it's clear that mass manufacturing will not be completely eliminated. It eliminates the need for complex supply chains and excessive waste while decentralizing production, wealth and knowledge.

In the long run, 3D printing can help create a “decentralized, rural-based, self-reliant economy,” where production and consumption are once again reunited.
