

# THE FUTURE IS HERE

3d Printing

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ENGT 279

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Things are going to change in the future, if they haven't already. Consumers will be able to print things they need at home. There will be no waiting for car parts for that car you need to fix, or do you need a new home in 24 hours. Well, in the near future we will be able to do things like that. Change will not only happen in the home, as 3d printing or additive manufacturing will change the way manufacturing produces parts because of how efficient they will become. And the most important is probably the future capability of printing human organs.

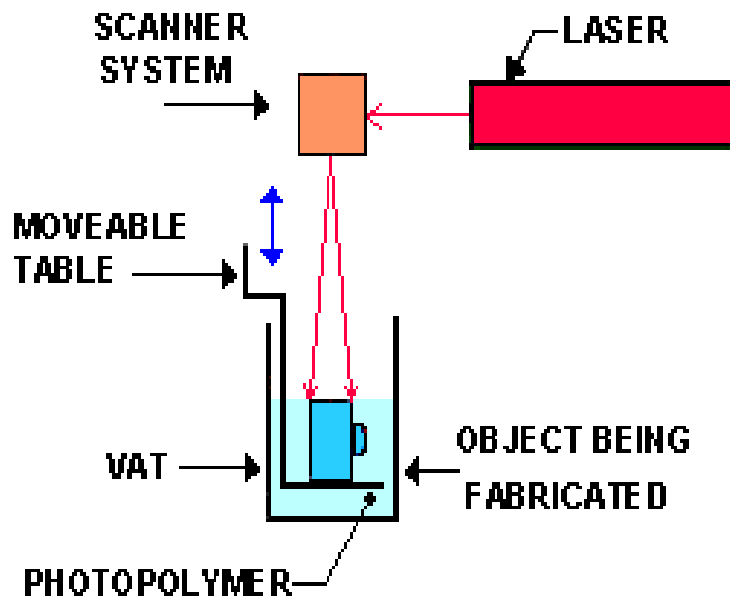
#### Brief History of 3d Printing

3D Printers were developed by Charles Hull in 1984, he has over 60 patents in the field of optics and rapid prototyping. His patent for this device was in 1986 and originally submitted for "Apparatus for Produce". A commercial apparatus was finally produced in 1986 and was initially called a Stereo lithography Apparatus. Two years later the first machines were released to the public. These first machines were popular in the late 1980's. The current technology is printing product for everyday life in every aspect. The medical industry is and planning to make certain body parts and we know have affordable 3d Printers in our homes.

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Current 3d technology

This technology (stereo lithography) is done by which a UV laser is shined into a vat of ultraviolet sensitive photopolymer, tracing the object to be created on its surface. The polymer solidifies wherever the beam touches it, and the beam “prints” the object layer by layer per the cad programing used. The problem with this technique is that it is very expensive.



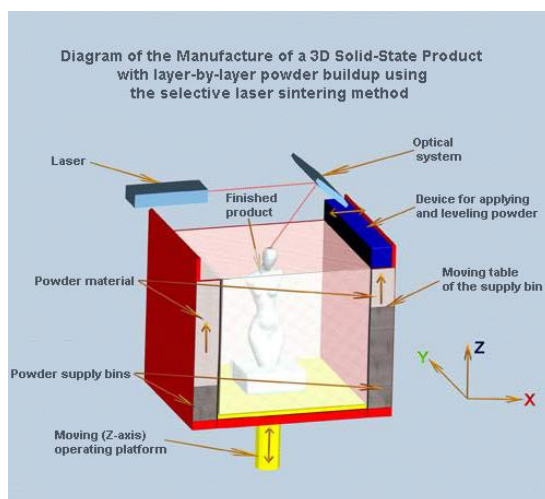
A big advantage of the 3D printer is that it gives a designer the ability to turn a concept or idea into prototypes relatively quick and on demand. This also allow rapid changes as opposed to having to rely on a production run, because a large production run is required and then hanges

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Made and then another production run is needed. Being able to use a 3d printer for Prototyping purpose reduces material and scrap essentially saving money for this process.

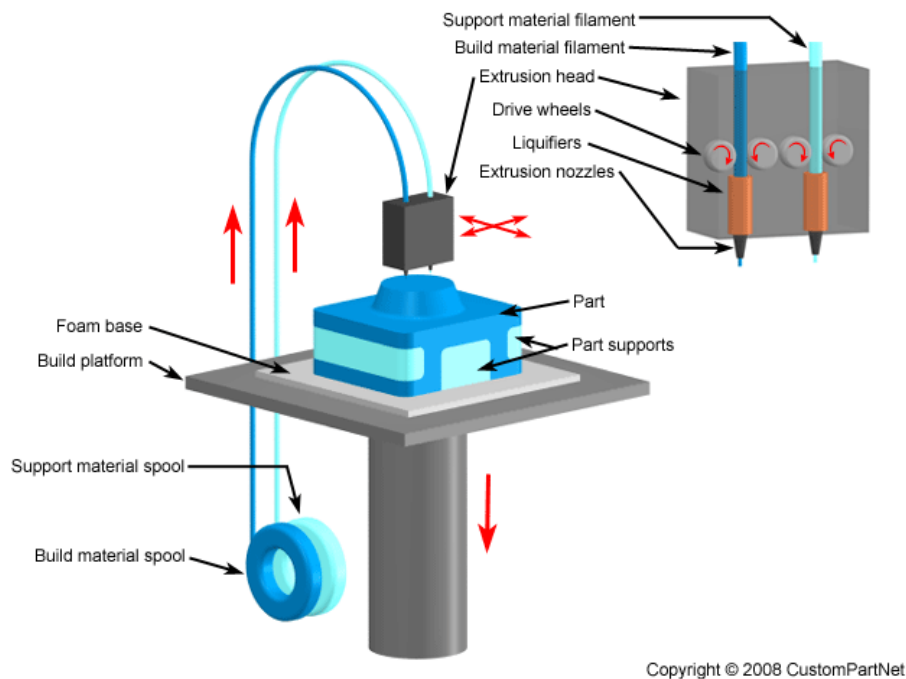
Uses of the 3D are increasing starting from the use of creating prototypes for concept product and more increasingly for the purpose of final products and replacement parts. They are being use in a lot of industries from making tools making jewelry, tools and tripods. The automotive and aviation industry are using these printers for parts.

Another type of 3D technology is called “Selective Laser Sintering”. One of the technologies used by today's 3D printers is called selective laser sintering (SLS). During SLS, tiny particles of plastic, ceramic or glass are fused together by heat from a high-power laser to form a solid, three-dimensional object. The SLS process was developed and patented in the 1980s by Carl Deckard — then an undergraduate student at the University of Texas — and his mechanical engineering professor, Joe Beaman.



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Fused Deposition Modeling (FDM) is a layer additive manufacturing (or 3d Printing) process that uses production-grade thermoplastic materials to produce end of use product or prototype. FDM has many current applications: concept models, Functional Prototypes, End of use parts and Manufacturing parts. These are used in many Industries: Aerospace, Automotive, Commercial, Consumer, Industrial, and Medical.



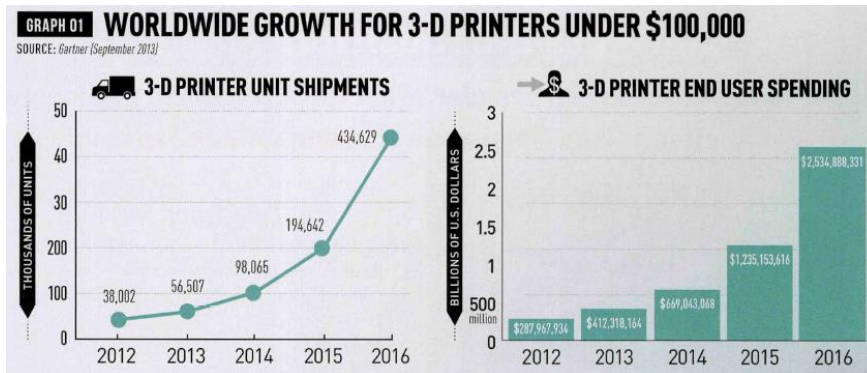
### Future of 3d printing

The future of additive printing or 3d printing is not going to be limited. It is and is going to change the way that we live in every aspect of our life. It will also change the way that our

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military operates. As stated in the GISMODDO website, the army is working on 3d technology that will benefit everyone. Let's start with the possibilities. 3D printing makes it possible to manufacture pretty much anything in just a few hours, and, as you can surely imagine, this capability would come in very handy on the battlefield. A piece of equipment breaks—but, instead of scrapping it or attempting a trip back to base, Soldiers can simply 3D-print the replacement part they need to get back up and running in a matter of minutes (or hours). This would be especially handy in remote areas or on the open ocean where it's not so easy to keep an extensive inventory of spare parts. The military will be at an advantage when they are able to print ammunition with minutes as the 3d capabilities get more efficient and faster within minute this will change the battle forever .3d printing does not only have a future in the military it will change all our lives as we know it. The major indicator that will change 3d printing is the cost. As the graph shows, shipping of 3d printers less than 100,000 has been increasing rapidly. It is predicted that the shipment of these will increase 75 % by 2014 and double by 2015. With the cost of decreasing this will revolutionizing manufactures from fabricating specialty parts or products.

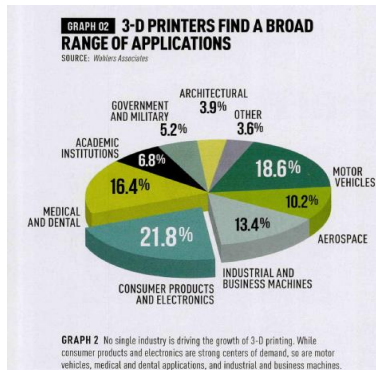
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Graph credit: Mechanical Engineering- The graphs indicated the increase in usage of 3d printers that cost less than \$100,000.

Today prototyping has been the major use of additive manufacturing (3d printing). However, this has changing rapidly. The following graph shows the current applications 3d printers are beused in various industries. Consumer products and electronics are the largest users of 3d printers.

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Based on research I have done and as shown on the previous chart and data 3d printing (or additive manufacturing) will change the world eventually as we know it. In the near future we will be able to print things on demand. The personal home user will not need to have knowledge of CADD or any other design software we will be able to buy the design from a company on line and print what we need at home. Imagine we need a pair of shoes and we like the design we buy the file from the particular company and we print it right there. This advantage is not only for the consumer but the manufacturer. This manufacturer no longer has to deal with the cost of producing the product from design to sales to testing to manufacturing.

3d printing will also create a demand for on demand products that can't be produced with cheap material at home. What this means is that you need a part for your car that needs to be produce out of steel. It can be taken down to the local steel 3d printing store it is scanned and printed and it will be produced in hours. What this does is reduce cost just like in the home

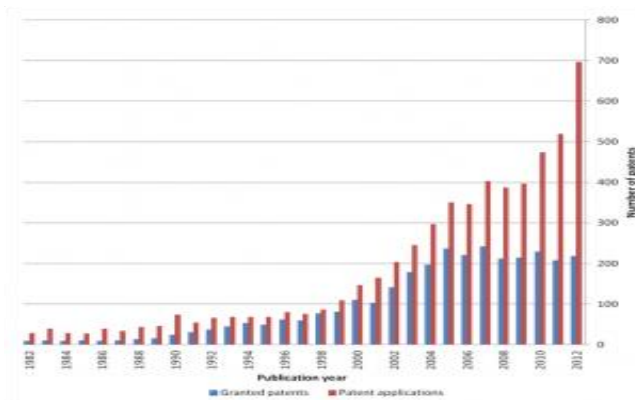


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Incident, from the design to manufacturing to sales. The decrease in manufacturing cost comes from not needing a production line to produce the part. Another advantage is that if a product is bad and need reproduced the product will be able to be recycles and reused in the 3d printer process.

### Changing of Technology

In current times the downfall of home printers is that they only print plastics. However there are 3d printers that print a variety of material from metals to ceramics and some are more will be printing food. Some of these process are being used but not available to the public, until patent are up on these processes. This is why plastic is the primary material being used in home 3d printing. The medical industry has a stake in this changing technology because in the future we will be able to print Organs from 3d printed cells. The printing of metals will change very soon as the Patent of laser sintering will expire this year and next year stereo lithography printer will be released.



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As discussed earlier both types of printers work by exposing powdered liquids and materials respectively to a laser, which seals particles to create the final shape, it's faster and more capable greater detail than the pervasive laying down of melted plastic. Another technology in the future is the technology of printing a house that use concrete as material and laying it is several inches at a time. The structure of a house can be built in 24 hours. If we look at the electronics industry, just imagine when the printing of Electronics will be available. This will allow the printing of many objects and little assembly time needed.

#### Conclusion

In summary, there are currently a few different types of 3d printing or otherwise known as additive printing: Fused Deposition Modeling (FDM), Selective Laser Sintering, and stereo lithography. Over the next several years these will be more available to the public as most of these processes will have their patents expired. I predict that the 3d printing will start off behind like the internet did in reference to regulations. Thing like regulation on weapons for printing need to be formed before it gets out of hand.

