

Additive Manufacturing or 3D printing: is a process of making a three dimensional solid object of virtually any shape from a digital model (source Wikipedia). This handout is also available at <http://www.spaanenterprises.com/3D-Printing.html>

3D printing technology: A disruptive technology and potentially the 3rd industrial revolution

- 70's Stereo Lithography (SLA) laser cured liquid photo polymer - *3D Systems (NYSE:DDD)*
- 80's Fusion Deposition Modeling (FDM) melting plastic filament - *Stratasys Inc. (NASDAQ:SSYS)*
- 80's Selective Laser Sintering (SLS) for metal, ceramics, or plastics, etc... - *University of Texas*
- 90's Rapid Prototyping service bureaus became available - *Raychem, Quickparts, SolidConcepts, etc...*
- 2007 Reprap homegrown (FDM) "self-replicating" printer hits open source maker movement
http://reprap.org/wiki/RepRap_Family_Tree
- 2012 consumer level printers hit the mainstream media
- 2013 MakerBot makes the Today Show, 3D Systems "Cube" sold at Staples.

The youtube 3D printed adjustable wrench evolution: Printed on professional printers



Scan, scale and print



Jay Leno adopts 3D printing



Objet1000 prints biggest adjustable wrench

Professional printers: Cost range from \$10K to \$675K



Stratasys Printers

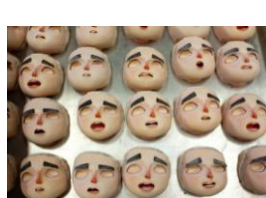


3D Systems Z Printers



Objet1000 Printer

Professional printed models: Bike, Guitar, Ball park, Geometric ball, Fashion wear, Jewelry, Masks (Hollywood), Shoes



3D printing in medicine: Regenerative medicine - 3Dprints tissue with cells



Dental



Prosthetics



Face rebuilding



Kidney

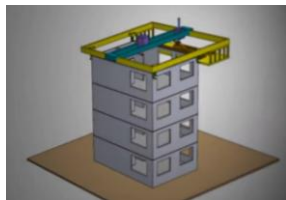


Ears

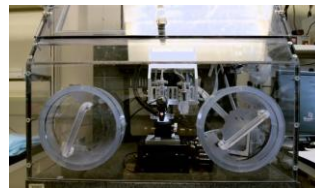
Bio Printing a human body parts: <http://www.youtube.com/watch?NR=1&v=G0EJmBoLq-g&feature=fvwp>



Chocolate food printer



Concrete printed building

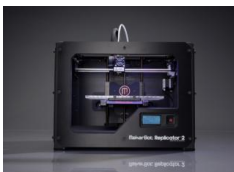


BIO Plotter

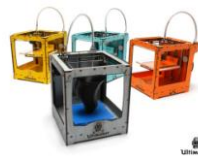


NASA 1st Printer in space

Consumer grade entry level printers: Ranges from \$400 to approx \$3,600



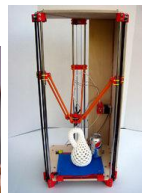
MakerBot "Replicator 2"



"Ultimaker"



3D Systems "Cube"



Delta "Rockstock"



Form 1



Make Magazine

Consumer grade printed models:



Self replicated printed parts



Nautilus Gears



Chess Set



Ford Engine Block



RoboHand

The future of 3D Printing or Additive Manufacturing The future is limitless...here are my predictions...

- UPS/Kinko's will have 3D printing and supporting services, Dept stores...etc. will follow (1-2 years)
- Jobs will come back to the USA with major help from Additive Manufacturing Technology (1-3 years)
- Printed circuit boards can be made 3 dimensional and printed into the product (next 2-4 years)
- Auto part stores will print parts on demand and start eliminating stocked items (next 4-6 years)
- Printed body parts and organs will be available as alternative choice (2-7 years)
- Complete functional products will be printed in one build (5-10 years)
- 3D printer appliance in every home... like a microwave. It will print food, shoes, etc...(5-10 years)