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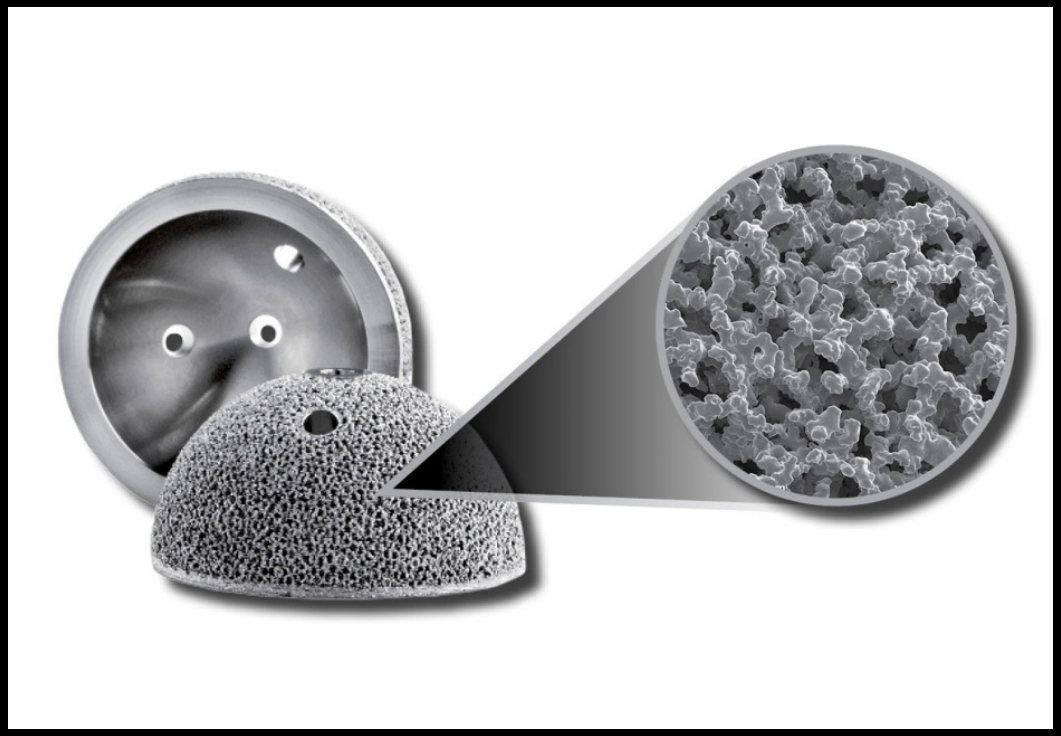
3D Printing
from PROTOTYPING to PRODUCTION

Sasitorn Srisawadi
sasitors@mtec.or.th

National Metal and Materials Technology Center (MTEC)
114 Thailand Science Park, Phahonyothin Road,
Khlong Nueng, Khlong Luang, Pathum Thani 12120, Thailand

www.stratasys.com



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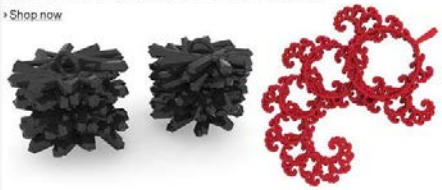
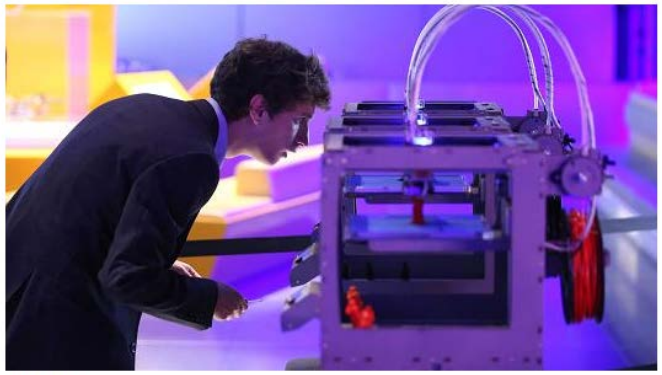


How 3-D printing will radically change the world

Linda Federico-O'Murchu
Sunday, 11 May 2014 | 6:00 AM ET

CNBC



Getty Images

A technician checks on a 3D printer as it constructs a model human figure in the exhibition '3D: printing the future' in the Science Museum on October 8, 2013 in London, England.

Forbes

Rakesh Sharma
Contributor

I write about technology, business, and Silicon Valley trends

TECH 1/15/2014 @ 3:45PM | 17,665 views

The Future Of 3D Printing And Manufacturing

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3D printers are extensively used in manufacturing. However, so far, their use has been limited and restricted to specific processes. What will a future 3D printing manufacturing ecosystem look like?

GE Considers 3D Printing Turbine Blades for Next Generation Boeing 777X's GE9X Engines

BY BRITTNEY SEVENSON · AUGUST 6, 2014

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If one company should be considered the leader within the metal additive manufacturing space, that company should be General Electric. GE has been utilizing laser sintering to 3D print components for their jet engines for quite a while now.

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What is 3D printing?

- Layer-based manufacturing
  - Fabrication process that ADDS material instead of REMOVING it
- Printing (depositing) material
  - Making layers on top of each other to build up
  - Building the part from a series of cross sections

Benefits

- Reduced lead time
  - Single run without the need for tools, dies, and lathes
  - From CAD into physical part OVERNIGHT

www.printm3d.com

www.proxyarch.com

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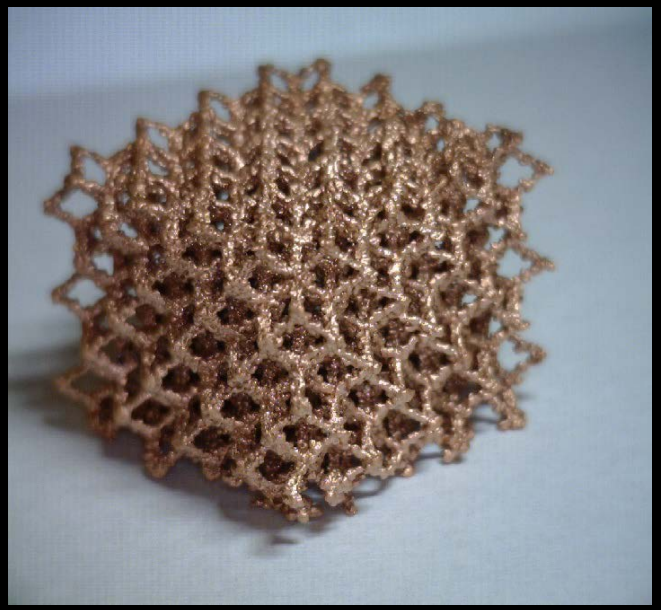
Benefits

- Complex geometries
  - Complicated features, hollow part, scaffold etc.
  - Impossible to fabricate using conventional processes

www.eos.info



www.camal.ncsu.edu

Benefits

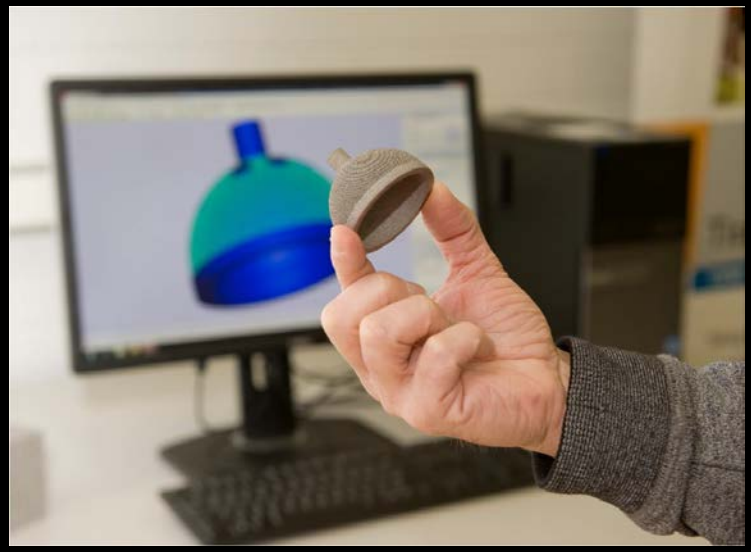
- Reduced cost
  - When only a few parts is to be produced
  - Directly built from CAD file without tooling

www.uhasselt.be

Benefits

- Very high material utilization
  - Exotic metal is expensive
  - Almost no material is lost during the process

www.edacafe.com



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Rapid Prototyping

A couple of centuries

Additive Manufacturing

- Product prototype — *Reduce the lead time during product design stage*
- Obsolete models — *No molds is needed in inventory*
- Implants — *Customize to fit the patients*
- 3D printed organ — *No more waiting for an organ transplant*
- Customized consumer products — *Customers can design their own products and submit online*
- And so on…

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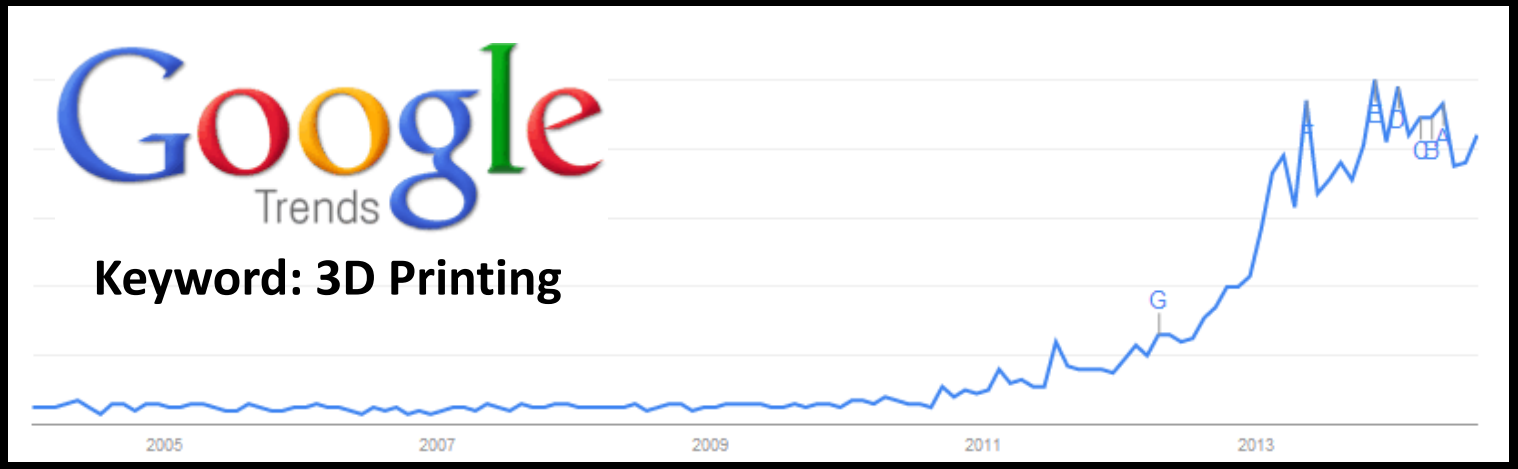
Where to start?

- Software to create 3D model
  - Designing your own part
  - Reverse engineering
- Affordable printers
  - 3D Systems Cube
  - MakerBot
  - Airwolf
  - RepRap
  - Etc.

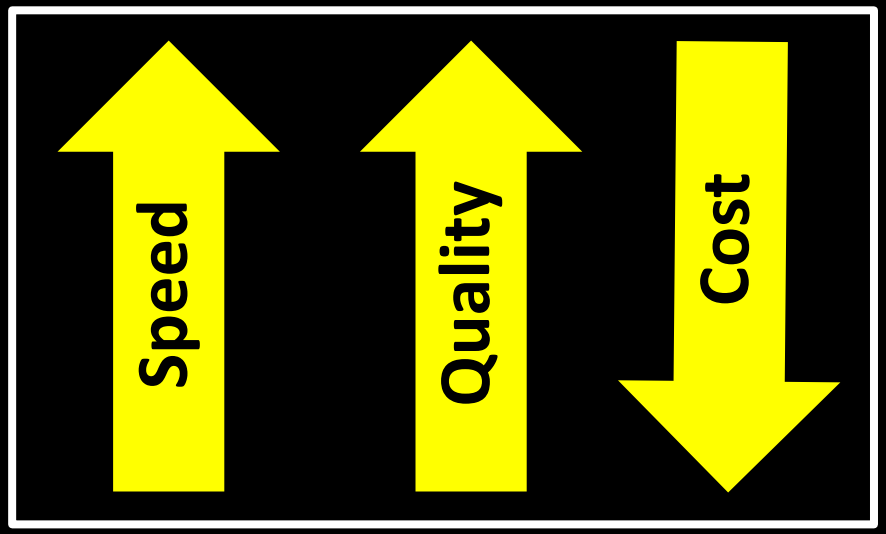
Getting serious about 3D printing?

- Stratasys Objet500 Connex3
  - Smooth surface (Layer thickness of 16 μm)
  - Multi-material (Polymer only)
- 3D Systems ProX 300
  - Direct Metal Printing (DMP)
  - Fully dense metal part
- EOS M 290
  - Fully dense metal part
  - Wide range of metals and alloys
- Arcam Q20
  - Bio-compatible metal

3D printing is moving forward



And this is why



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