Walk-in Slide: AU 2014 Social Media Feed

1. Click on the link below, this will open your web browser

http://aucache.autodesk.com/social/visualization.html

2. Use “Extended Display” to project the website on screen if you plan to work on your computer. Use “Duplicate” to display same image on screen and computer.

CD5192 – 3D Printing: An Entrepreneur's View

Steven Schain

Spectra3D Technologies - President

www.spectra3d.com

Thank You

Class summary

Whether it's being used in rapid prototyping and consumer products or small-run manufacturing, 3D printing has become an important part of the workflows of many hobbyists, artists, engineers, and fabrication companies. This course will look at the landscape of the 3D printing industry in order to break through the hype that surrounds it. You will discover how 3D printing is being used in the real world for both personal and professional uses. From creating art to engineering prototypes, this course will also explore the expanding use of 3D printers and their place in an enhanced design workflow. The course discusses the current state and the future implications of 3D printing in the real world.

My Story…

- Trainer / Instructor
  - Teaching 3ds since 3D Studio DOS Release 3.
  - Autodesk Certified Instructor since 1998.
  - Trainer – The 3D Professor (3ds Max / Maya / AutoCAD)
- Business Owner
  - Started Spectralight Images, LLC, 1984
  - The 3D Professor, 2003, Instructor led training
  - Spectra3D Technologies, 2014, Stratasys sales
  - Graduated BASE Incubator after 4 years in 2014
  - Business development / coaching volunteer

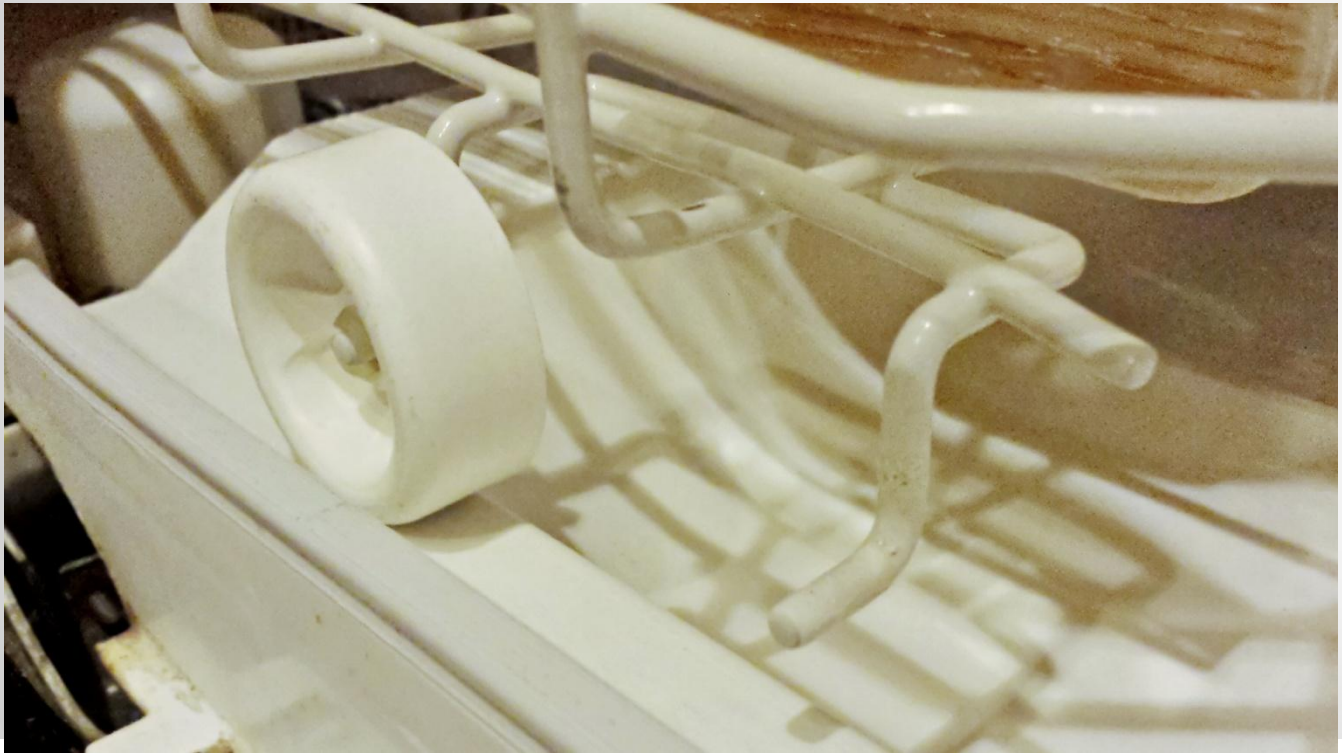
Key Learning Objectives

- What you will learn
  - What is 3D Printing/Rapid Prototyping?
  - Real-world applications
  - Tools for creation and deployment
  - A Look at the future of 3D printing

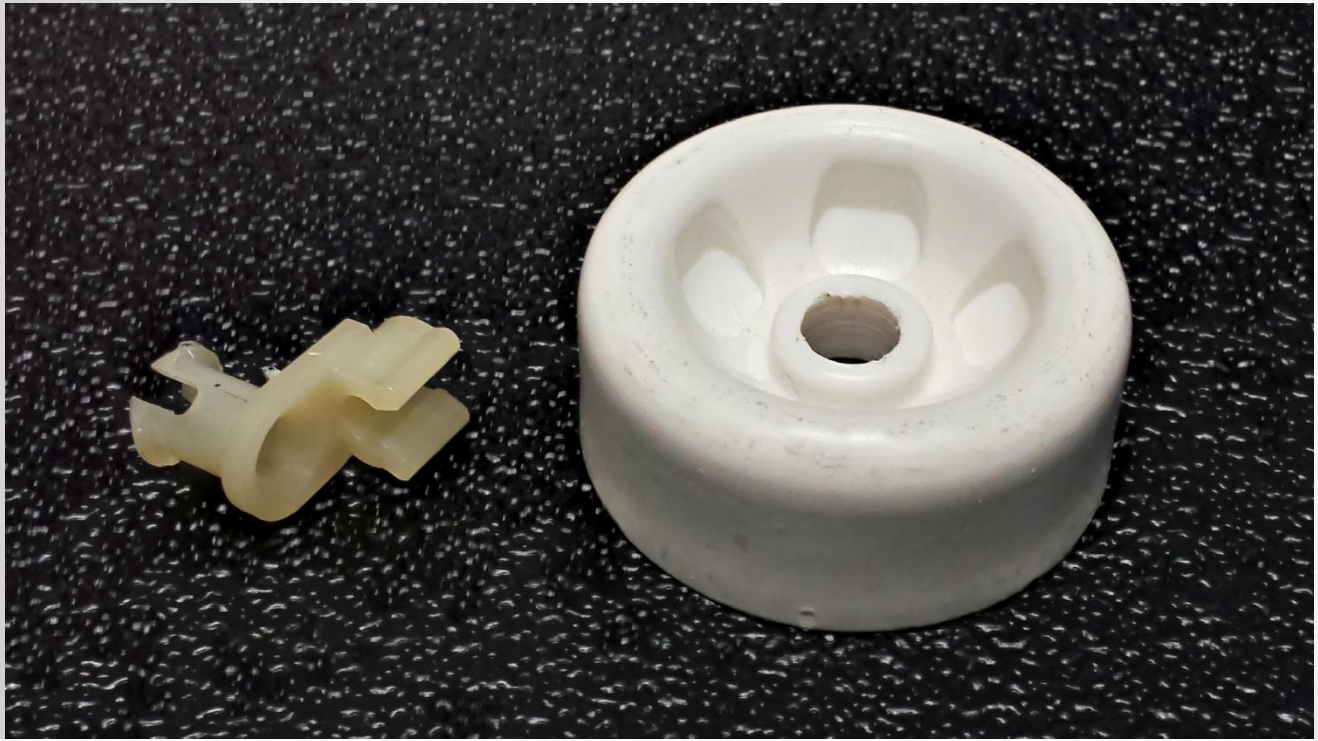
3D Part Courtesy of *Rapid Prototyping Services, LLC*

In the Real-World

The Problem

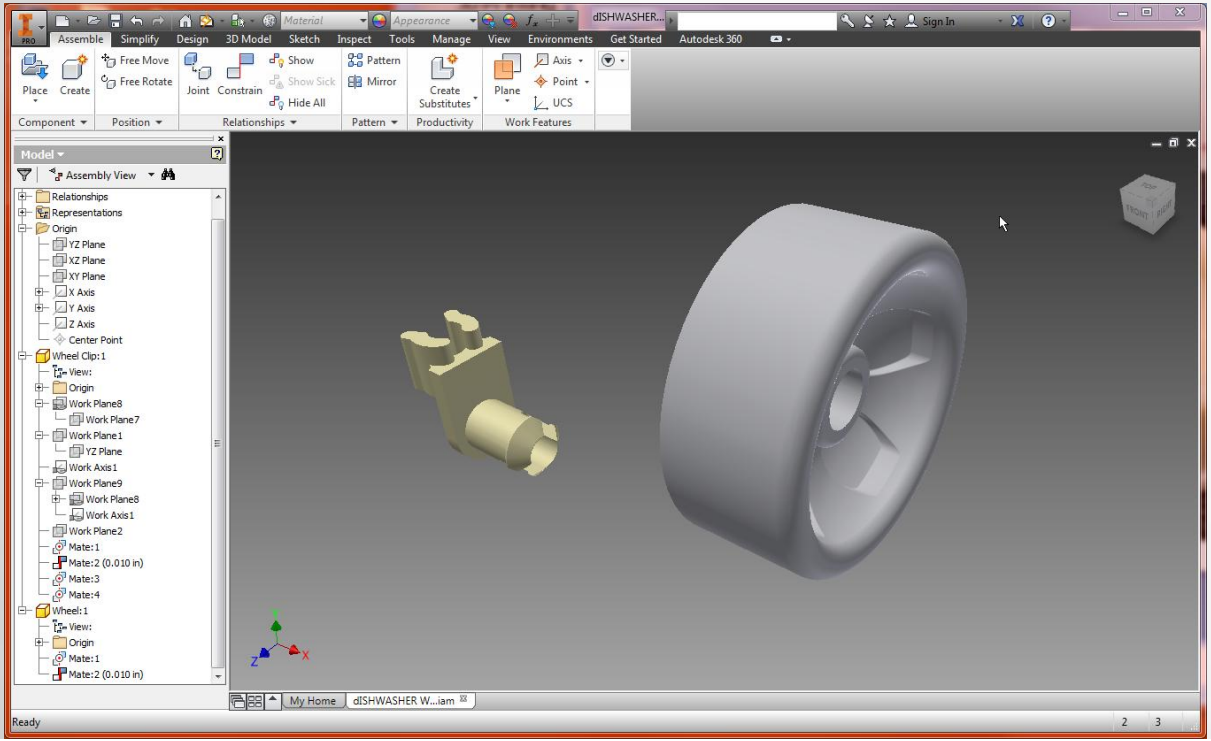


The Original

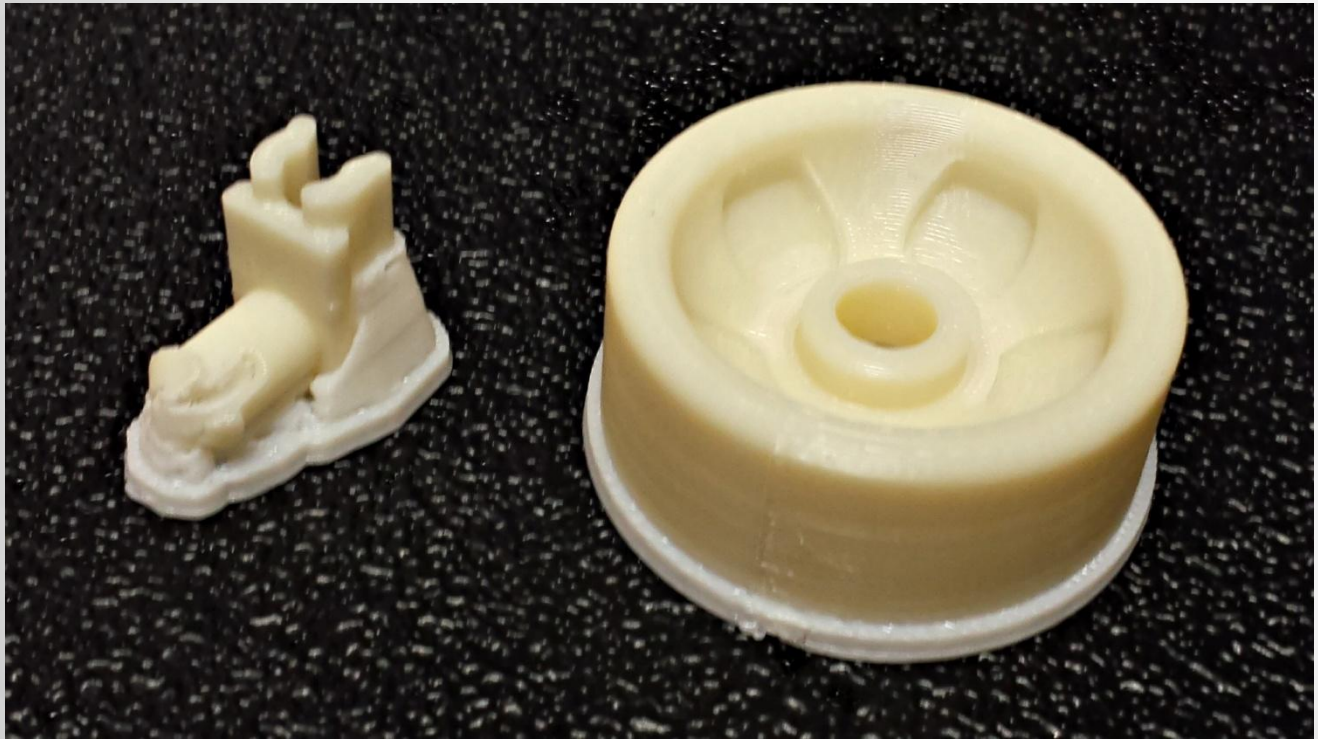


Measure

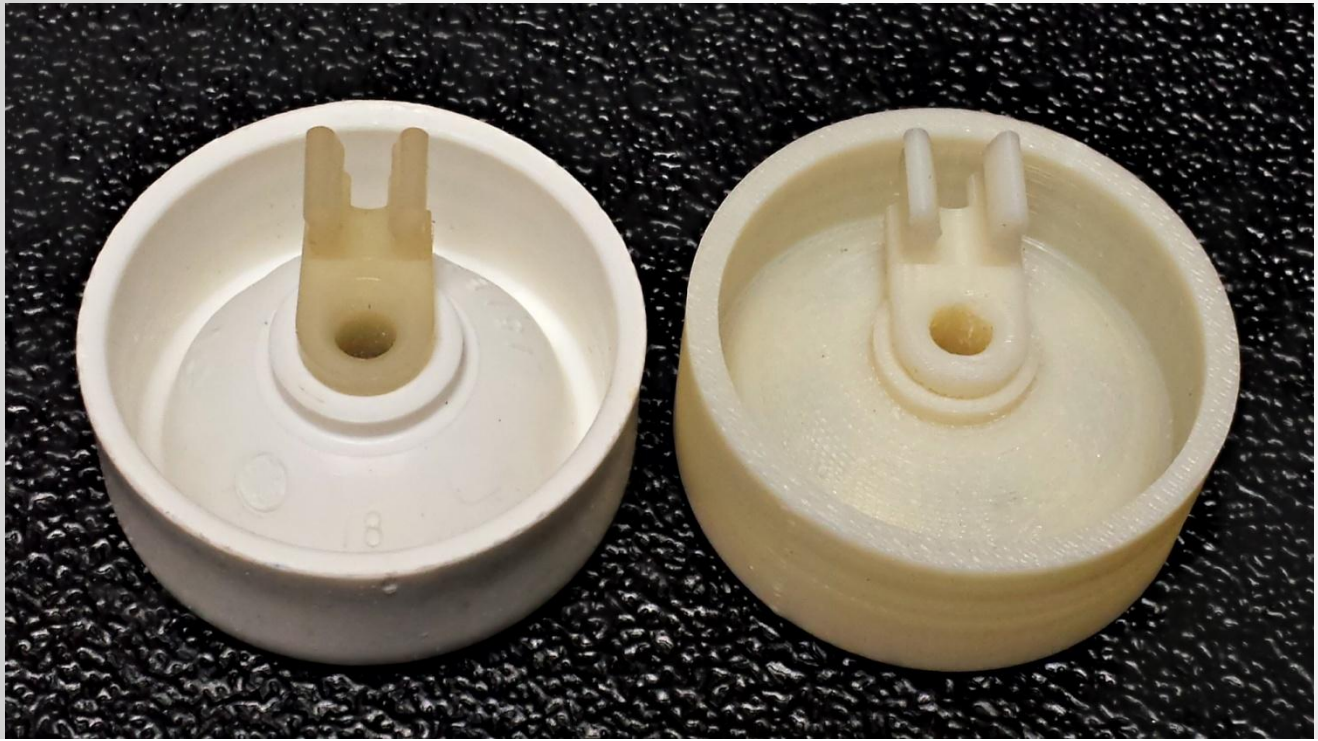
Design


Assemble
Simplify
Design
3D Model
Sketch
Inspect
Tools
Manage
View
Environments
Get Started
Autodesk 360
Place
Create
Free Move
Free Rotate
Joint
Constrain
Show
Show Sick
Hide All
Pattern
Mirror
Create Substitutes
Plane
Axis
Point
UCS
Component
Position
Relationships
Pattern
Productivity
Work Features
Model
Assembly View
Relationships
Representations
Origin
YZ Plane
XZ Plane
XY Plane
X Axis
Y Axis
Z Axis
Center Point
Wheel Clip:1
Work Plane8
Work Plane7
Work Plane1
Work Axis1
Work Plane9
Work Plane2
Mate:1
Mate:2 (0.010 in)
Mate:3
Mate:4
Wheel:1
My Home
Ready

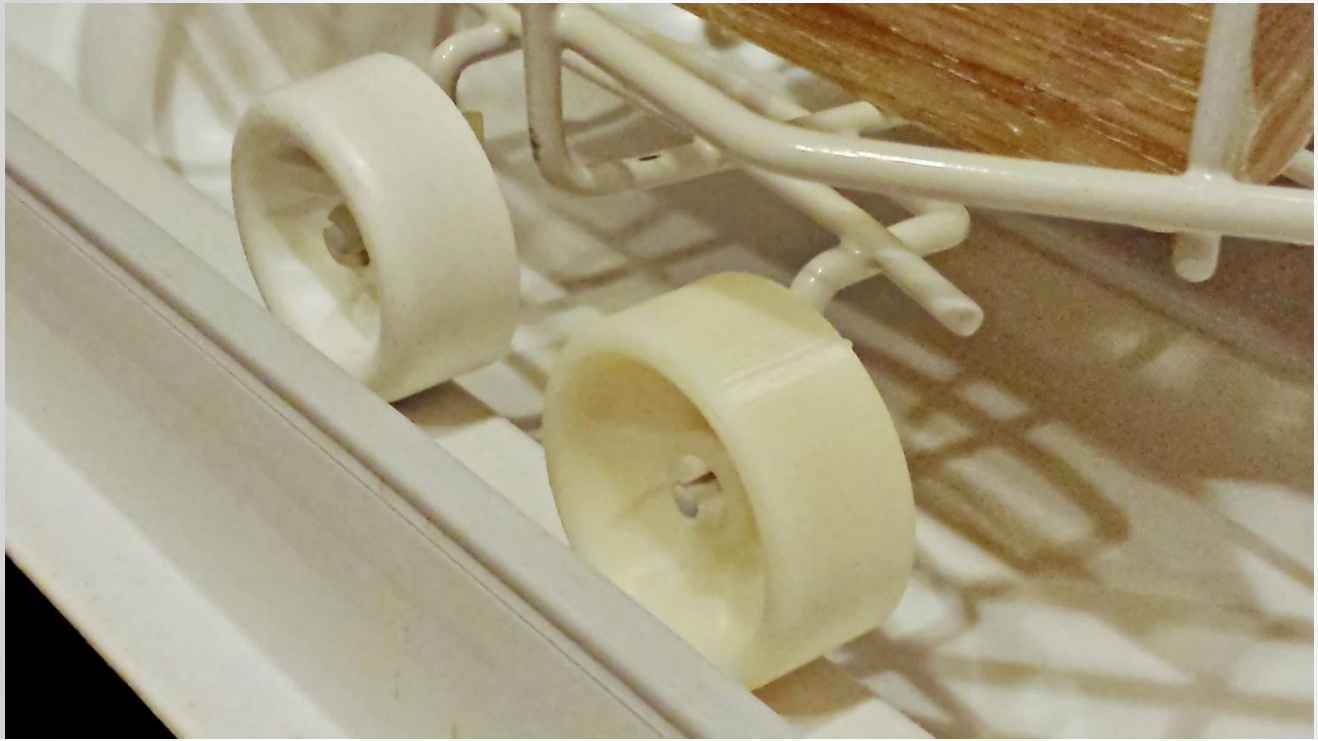
Print



Compare



Install



Business Case

3D Printing Business

Printing Service

Peripheral Service

The Costs: Printer

Purchase

Monthly Lease

The Costs: Other

Variable Cost

Materials

Power

Time

Lease/Loan

Fixed Costs

Overhead

Income Streams

Printing Service

One Off Part Production

Design

Finishing

Peripheral Service

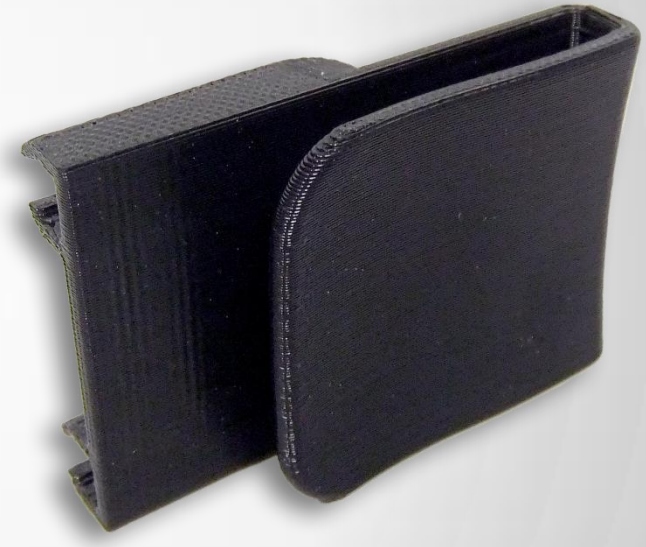
Profit!!!

- Monthly Lease: $380/Month
- Material Costs: $5/cu”
- Printing Charge: $75+ per part ($150 avg.)
- Break Even @ $150: ~4 Prints/Month
- $ at 10 Prints/Month: $820 Profit

What's it All About?

Rapid Prototyping

- A model or sample built to:
  - Test a concept
  - Evaluate a design
  - Establish a process
  - Perform a functional task
  - Just for fun!!!



3D Part Courtesy of *Rapid Prototyping Services, LLC*

The Old Way…

Traditional Process

- Part development
- Creation of part mold
- Mold final part

Image Courtesy of Valencia Plastics, Inc.

What's Wrong?

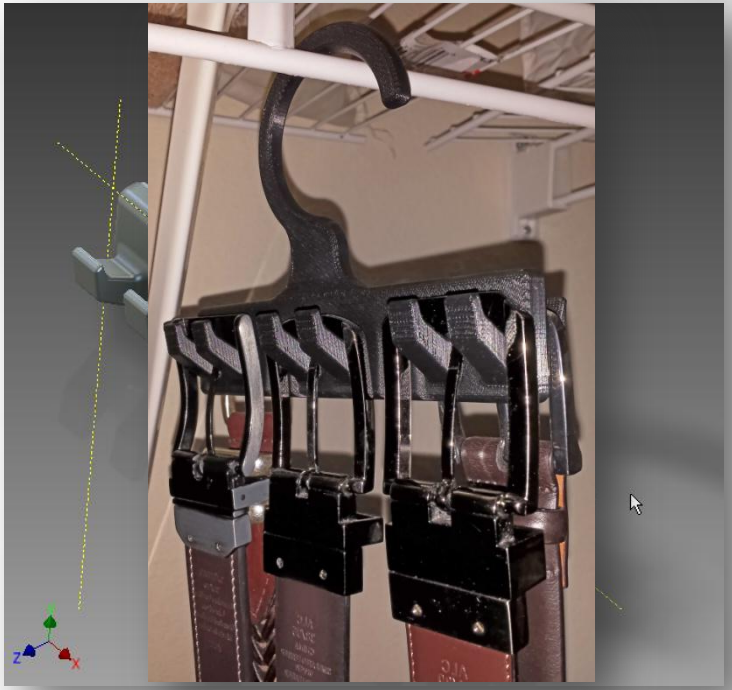
- Cost

- Rework

The New Way…

Rapid Prototype Process

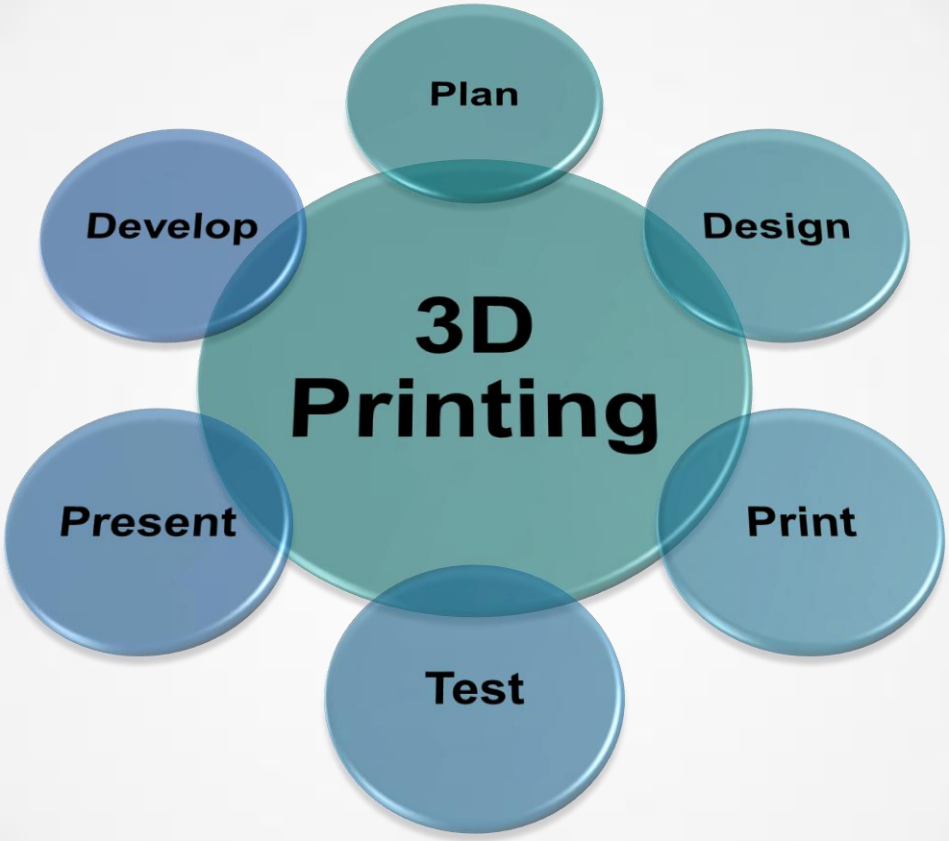
- CAD Model Design
- Model Analysis
- 3D Printing



What's Right?

- Cost
- Materials
- Rework

Process


Plan
Develop
Design
3D Printing
Present
Print
Test

Uses & Applications

Image Courtesy of Stratasys

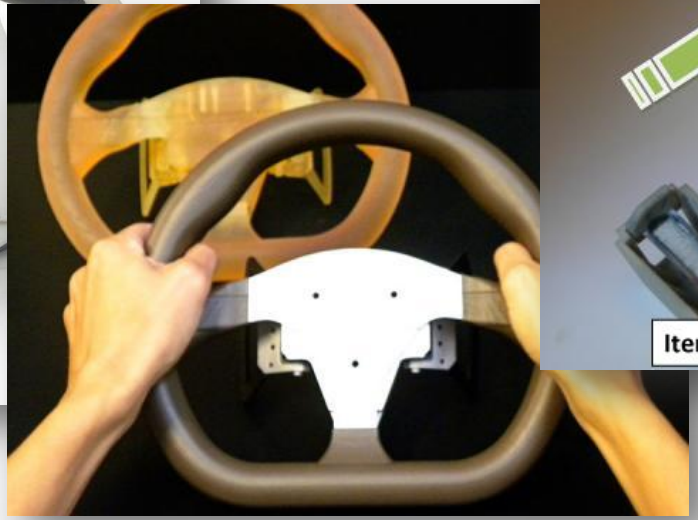


Image Courtesy of 3D Systems

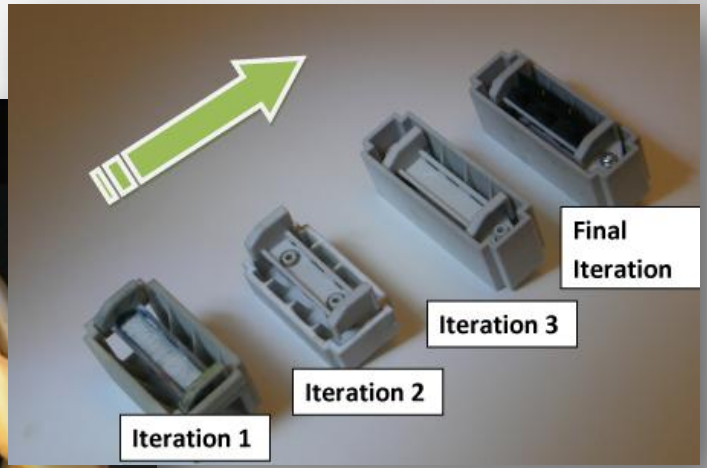


Image Courtesy of 3D Systems

Commercial

Concept Design

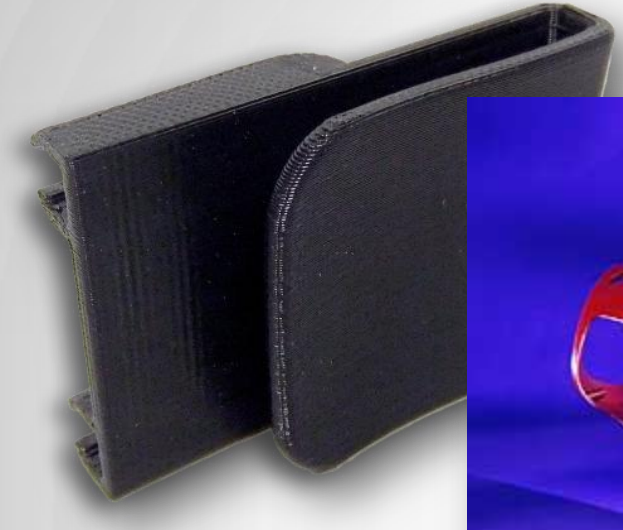


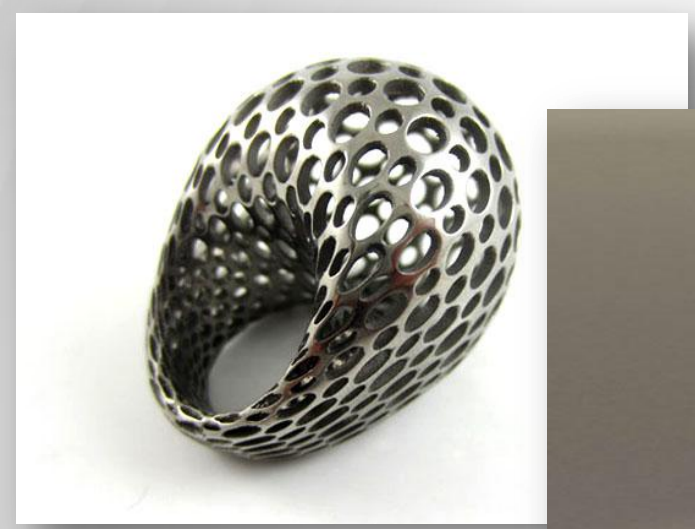
Image Courtesy of Rapid Prototyping Servic

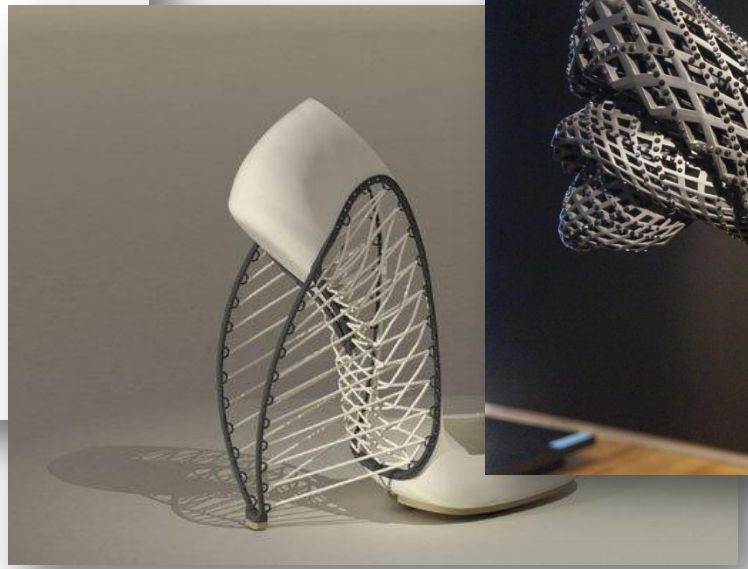
Image Courtesy of Rapid Prototyping Services, LLC

Image Courtesy of 3D Systems

Commercial

Production





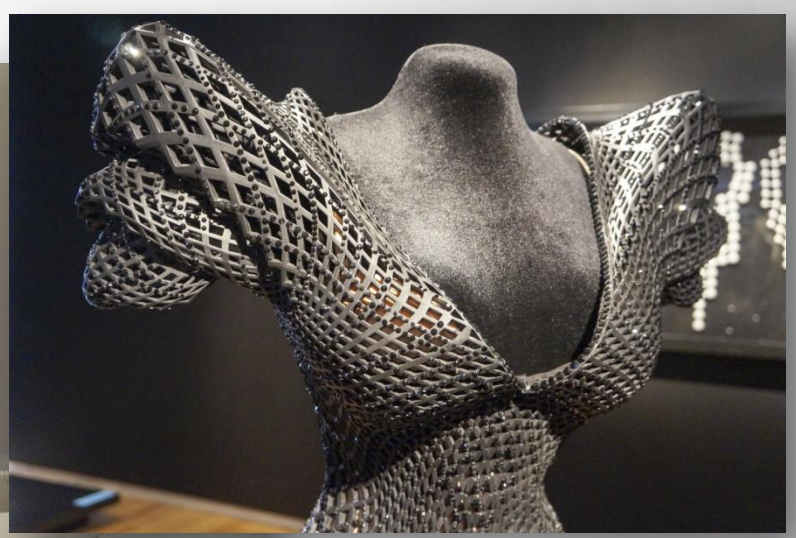


Image Courtesy of Shapeways

Fashion

Production

Image Courtesy of 3D System

Image Courtesy of Makerbot

Image Courtesy of Makerbot

Personal

Hobby and fun

Image Courtesy of Voxel Studio

Image Courtesy of The Sugar Lab

Image Courtesy of Micah Ganske

Artistic

Sculpture

Printer Types

Extrusion

- Fused Deposition Modeling(FDM)
  - Materials
    - ABS plastic
    - Polycarbonate
  - Professional Use

Image Courtesy of Stratasys

Granular

- Direct Metal Laser Sintering (DMLS)
  - Most metal alloys

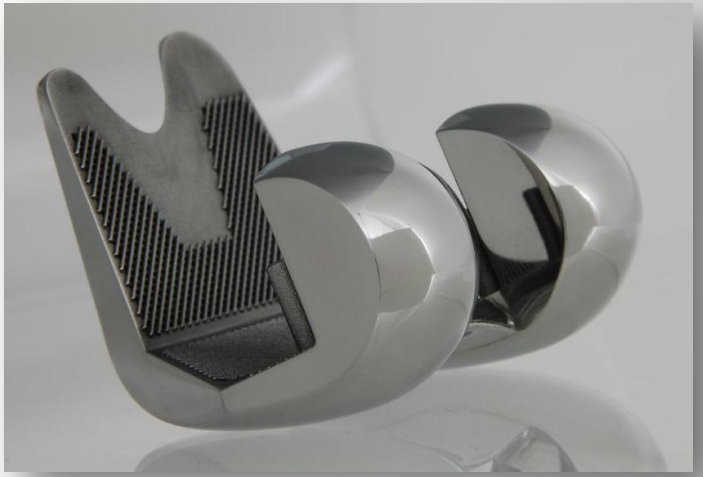


Image Courtesy of Morris Technologies

Granular

- Selective Laser Sintering (SLS)
  - Thermoplastics
  - Metal / Ceramic powders

Image Courtesy of Vladimir Bulatov

Granular

- Powder bed / Inkjet (PP)
  - Plaster or resin

Image Courtesy of Mcor Technologies

Other

- Plastic Jet Printing (PJP)
  - ABS / PLA / PVA filament

Image Courtesy of Cubify

Other

- Stereolithography (STL)
  - Laser cured resin

Image Courtesy of Formlabs

Other

- Laminated Object Manufacturing (LOM)
  - Paper
  - Metal foil & Plastic films

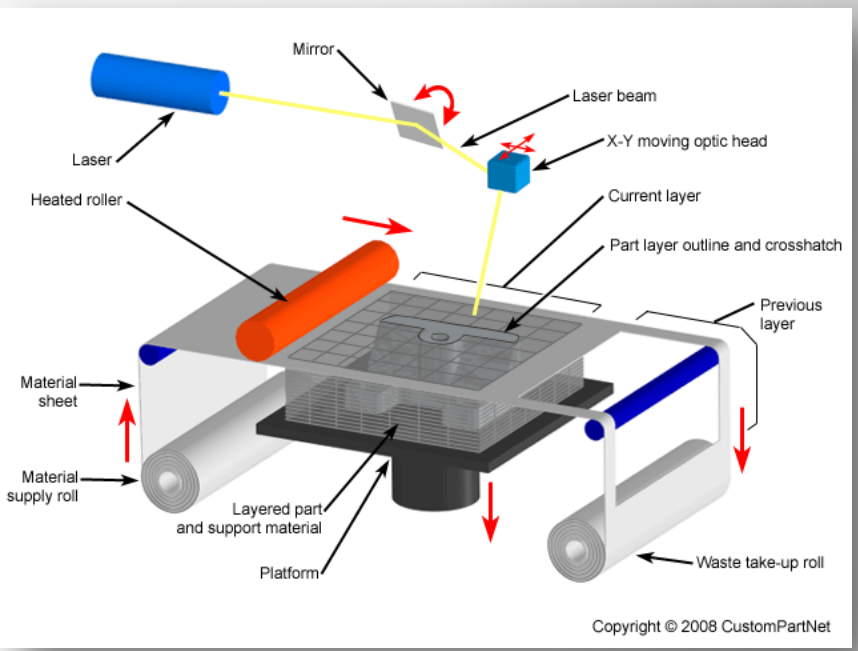


Image Courtesy of Custompart.net

The Printers…

Professional / Production

Mojo 3D Printers

uPrint SE Plus 3D Printers

Stratasys (www.stratasys.com)

$6,000 - $20,000

Fortus Series 3D Printers

Stratasys (www.stratasys.com)

$50,000 +

Projet 1500

Projet 160

3D Systems (www.3dsystems.com)

$10,000 +

3D Systems (www.3dsystems.com)

$50,000 +

Consumer/ Hobby

Replicator Mini

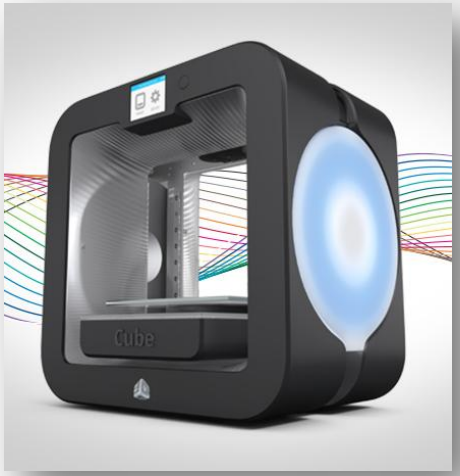
Replicator

Replicator Z18

Makerbot (www.makerbot.com)

$2,000 +

Cube



Cube 3

Cube Pro

3D Systems (www.cubify.com)

$1,500 +

Form 1+

Formlabs (www.formlabs.com)

$3,299 +

Tools for 3D Printing

Design Software

- AutoCAD
- Inventor
- Fusion 360
- Revit
- 3ds Max Design
- InfraWorks
- SketchBook Pro
- 123D Design

3D Printer Software

- Slicers
  - Slic3r
  - KISSlicer

The Future…

The Future of 3D Printing…

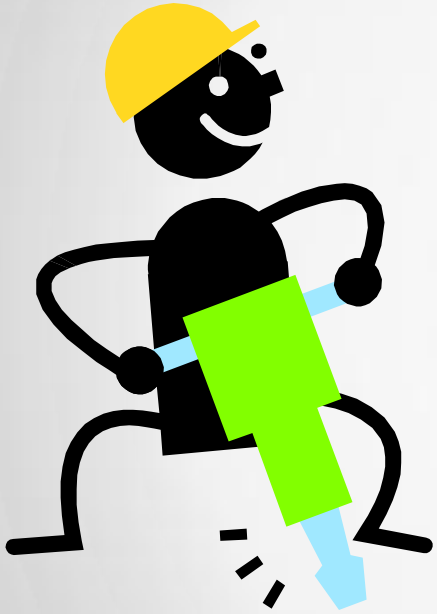
- On Demand
  - Replacement Parts
- Reduced Inventory
  - Simplicity

The Future of 3D Printing…

- Medical Uses
  - Custom Fit Items
- Mass Customization
  - ???

Questions?

Thank You



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www.spectra3d.com

Spectra3D TECHNOLOGIES

Session Feedback

- Via the Survey Stations, email or mobile device
- AU 2014 passes given out each day!
- Best to do it right after the session
- Instructors see results in real-time

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