3D Printing/ CAD



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What is 3D Printing?

- Also known as Additive Manufacturing
- The creation of solid object by layering material in line with the electronic instructions
- Currently there are many different companies that sell 3D printers commercially





Types of 3D printing

- FDM- what most people think of, layer by layer
- SLA- laser beam hardens resin in a vat
- SLS- similar to SLA, but uses powder
- SLM- similar to SLS, but uses metals
- EBM- uses electron beam instead of laser
- LOM- builds material up and cuts into it







Materials

- Plastic
- Engineering plastic
- Biomaterials
- Metal Materials
- Ceramic Materials
- Gold and Silver
- Titanium
- Nylon





History of 3D printing



- Early additive manufacturing equipment and materials were developed in the 1980s.
- 3D printing is used to create a 3D model from a picture where users can test a design before investing in a larger version.
- The term 3D printing originally referred to a powder bed process employing standard and custom inkjet print heads, developed at MIT in 1993 and commercialized by Z Corporation.

Pros and Cons of 3D Printing Pros Cons **Rapid Prototyping** There's material limitations \bullet \bullet Allows for companies to transition Can only use a certain group of Ο materials design to prototype faster **Creates More Jobs** Could Possibly Produce Harmful Items \bullet There's little or no oversight which Companies have to hire more people to Ο design, maintain, build, and fix the opens the possibility of creating printers weapons such as knives and guns Contributes to advancements in Medicine Potential Copyright issues \bullet Can 3D print individual organs using the Makes it easier to create more 0 Ο DNA of recipients so there's no fear of accurate counterfeit items organ rejection

Applications of 3D printing



- 3D Printing Organs
 - Uses patients own cells to print a new organ, runs no risk of organ rejection
 - Can 3D print lungs, ears, noses, and more
- 3D printing prosthetics
 - Printed a new prosthetic foot for Buttercup the Duck

Buttercup's First Steps With Her Prosthetic Foot

Applications continued

- Helps the automotive industry
 - Can make prototypes of car parts, such as brake rooters and vents
 - Cars have been made using 3D printing technology
 Urbee 2, Kia Telluride, Strati
 - Ford is using many 3D printing technologies too
- Can also be used for food
 - Chocolate- Hershey's has a printer for making designs
 - \circ Foodini- 3D prints, except with food











What is CAD?

- CAD (computer-aided design) software is used by architects, engineers, drafters, artists, and others to create precision drawings or technical illustrations. CAD software can be used to create two-dimensional (2-D) drawings or three-dimensional (3-D) models.
- CAD software is used to increase the productivity of the designer, improve the quality of design, improve communication through documentation.







Types of CAD

- 2 Dimension CAD Used in early days of CAD, uses 2D shapes for design
- 3 Dimension CAD- Creates 3D images can be seen in any direction after introducing planes
 - Wire-Frame- Uses lines and arcs to create a skeleton like model
 - Surface Models- Joins 3D surfaces and making everything in background invisible
 - Solid Models- Similar to Surface model except includes weight, density, and volume, most useful and commonly used

2D CAD







Use CAD through Onshape

- Demonstration!
- Onshape is a free CAD software open to the public
- <u>https://cad.onshape.com/signin</u>



Any Questions?