

Three-Dimensional (3D) Printing Applied to General Public Use & Public Work Use

Lecture 3

Applications of Three-Dimensional (3D) Printing

by

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Applications of Three Dimensional (3D) Printing Technologies

1. Education – General Public Use
2. Prototyping and Manufacturing
3. Medicine – General Public Use
4. Construction – Public Work Use
5. Art and Jewelry – General Public Use
6. Food – General Public Use

Applications in Education – General Public Use

- Students create prototypes without the need for expensive tooling.
- Students design and produce models they can actually hold.
- Turn ideas and images into 3-dimensional physical objects.
- Applicable to design, engineering, architecture, graphic design, biology, and chemistry.
 - Produce a prototype of a machined part.
 - Construct models with complex parts.
 - Create organs in the human body.
 - Make 3D models of molecules and chemical compounds.



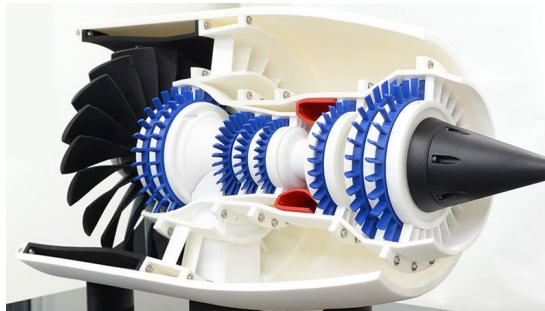
3D Printing Class



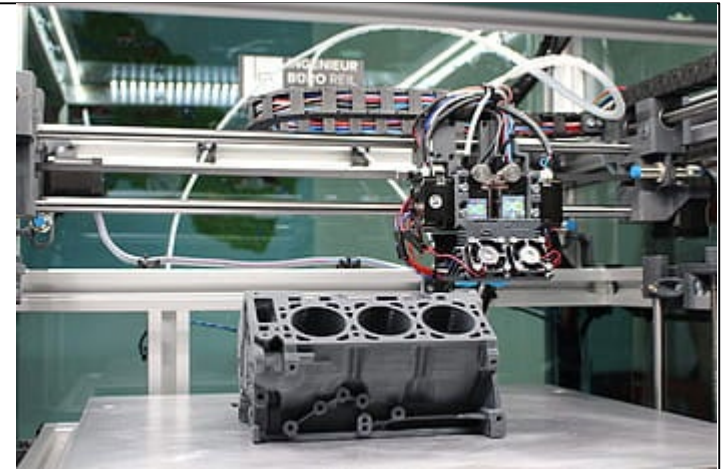
3D Printing Class

Applications in Prototyping and Manufacturing

- Create prototypes in hours, not weeks, and at a fraction of the cost of using the traditional injection-molded prototype.
- Automotive and aerospace industries manufacture parts using 3D printing.
- Manufacture industrial parts using Selective Laser Sintering (SLS) and Direct Metal Laser Sintering (DMLS).



3D Printed Jet Engine Prototype



3D Printing of Industrial Part



3D Printed Industrial Part 4

Applications in Medicine - General Public Use

- Produce custom-made prosthetics for patients.
- Produce metal orthopedic implants.
- Produce hip, knee, and pelvis implants.
- Produce artificial organs, a process called Bioprinting.
- Produce tissues for pharmaceutical testing.
- Produce pills with high porosity for high dosages and easy digestion.
- Make patterns for downstream metal casting of dental crowns.
- Produce hearing aids,
- Produce orthotic insoles for shoes.
- Produce face masks
- Produce face shields
- Produce Covid-19 testing kits



3D Printed Respirator



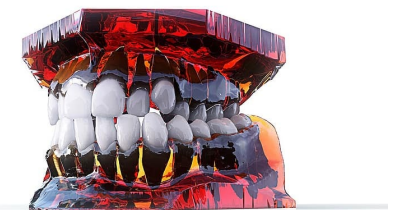
3D Printed Face Shield



3D Printed Prosthetic Hand



3D Printed Organs



3D Printed Teeth and Jaw

Applications in Construction - Public Work Use

- Produce buildings and construction components for the private, commercial, industrial, and public sectors.
- 3D printed construction parts include:
 - Wall elements
 - Concrete foundations
 - Concrete wall onsite
 - Micro-reinforced concrete for pedestrian bridges
- Advantages of 3D printing:
 - More complex and accurate constructions
 - Reduced waste
 - Short construction time
 - Low labor costs
 - Greater functional integration



3D Printed House



3D Printed Wall



3D Printed Bridge ⁶

Applications in Art and Jewelry - General Public Use

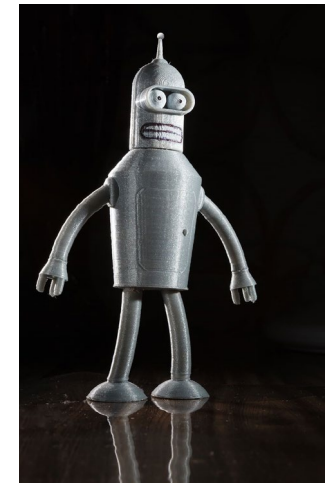
- Experiment with designs by jewelry makers.
- Produce individual, intricate, unique pieces of jewelry, or customized pieces at a much lower cost.
- Artistic creations include:
 - Vases
 - Sculptures
 - 3D images of voices using the sound waves from the voices
 - 3D paintings for visually impaired people



3D Printed Sculpture



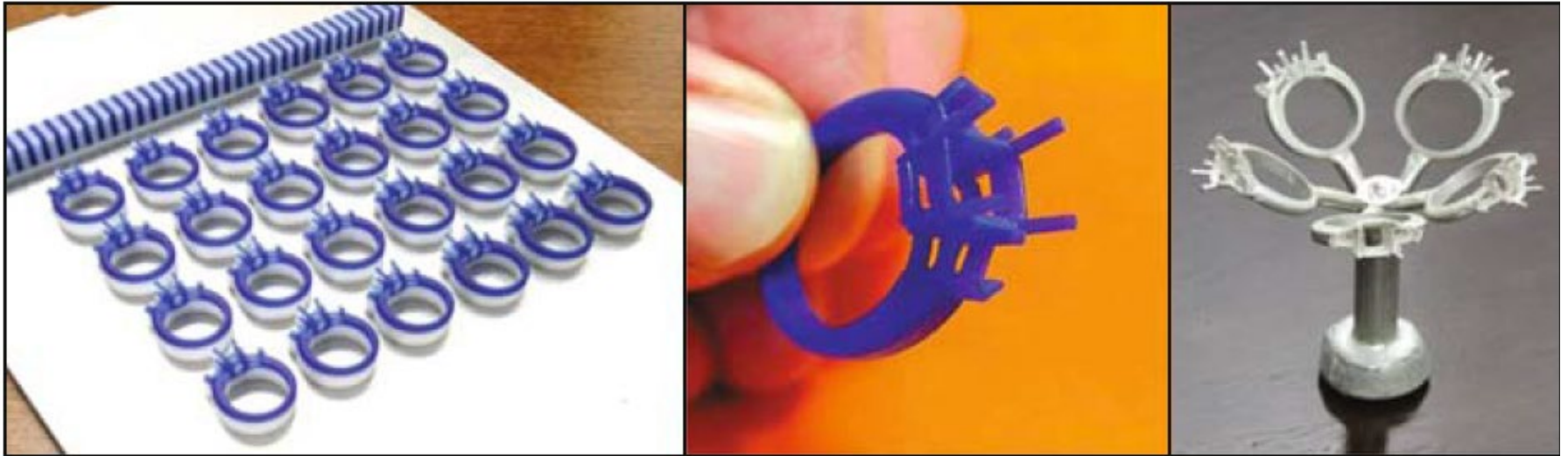
3D Printed Ring



3D Printed Sculpture

3D Printed Ring

- 3D printing is employed to create molds for manufacturing of metal rings using casting.



Applications in Food - General Public Use

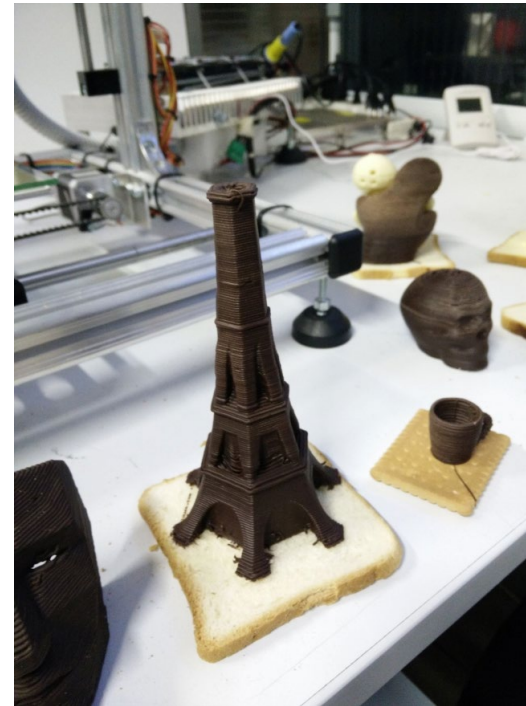
- Produce chocolate.
- Produce pasta.
- Produce refined meat.



3D Printing of Pasta



3D Printing of Refined Meat



3D Printed Chocolate Sculpture

End of Lecture 3