

# PRINTING

# 3D



# WHAT IS 3D PRINTING?

3D printing, also known as additive manufacturing, is a method of creating a three dimensional object layer-by-layer using a computer created design. Each of these layers can be seen as a thinly sliced cross-section of the object.



# HISTORY OF 3D PRINTING

1981

The first documented iterations of 3D printing can be traced back to the early 1980s in Japan. In 1981, Hideo Kodama was trying to find a way to develop a rapid prototyping system. He came up with a layer-by-layer approach for manufacturing, using a photosensitive resin that was polymerized by UV light. Chuck Hull develops the first 3D printing technology called stereolithography, which uses UV light to solidify layers of liquid resin to create 3D objects.

1984 - 1994

The development of different types of 3D printers such as:

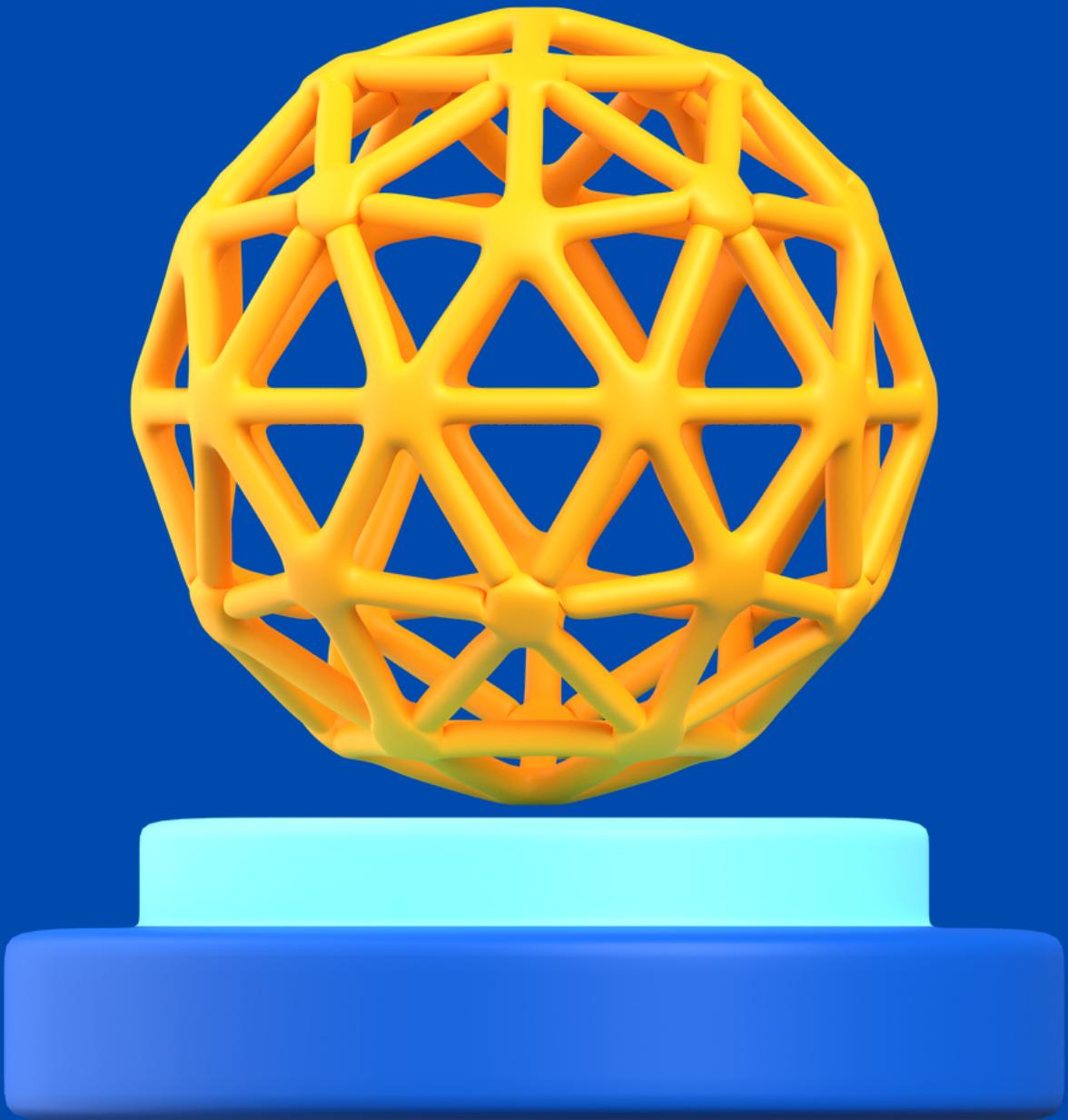
- Selective Laser Sintering (SLS)
- Fused Deposition Modeling (FDM)

LATE 1990 - 2010

- Expansion of 3D printing technology as it is used for rapid prototyping in numerous different industries.
- The introduction of metal 3D printing technologies using processes like Direct Metal Laser Sintering (DMLS).
- 3D printing becomes more accessible to consumers and small businesses with the introduction of desktop 3D printers

# HISTORY OF 3D PRINTING

## THE TERM “3D PRINTING”



In 1995, the term “3D printing” was coined at MIT when then graduate students Jim Bredt and Tim Anderson modified an inkjet printer to extrude a binding solution onto a bed of powder, rather than ink onto paper.

# STAGES OF 3D PRINTING



## DESIGN

A 3D digital file is created using a 3D modeling program then exported as a STL or OBJ file. This file is then “sliced” into hundreds or thousands of lines so that the printer can understand the file.



## PRINTING

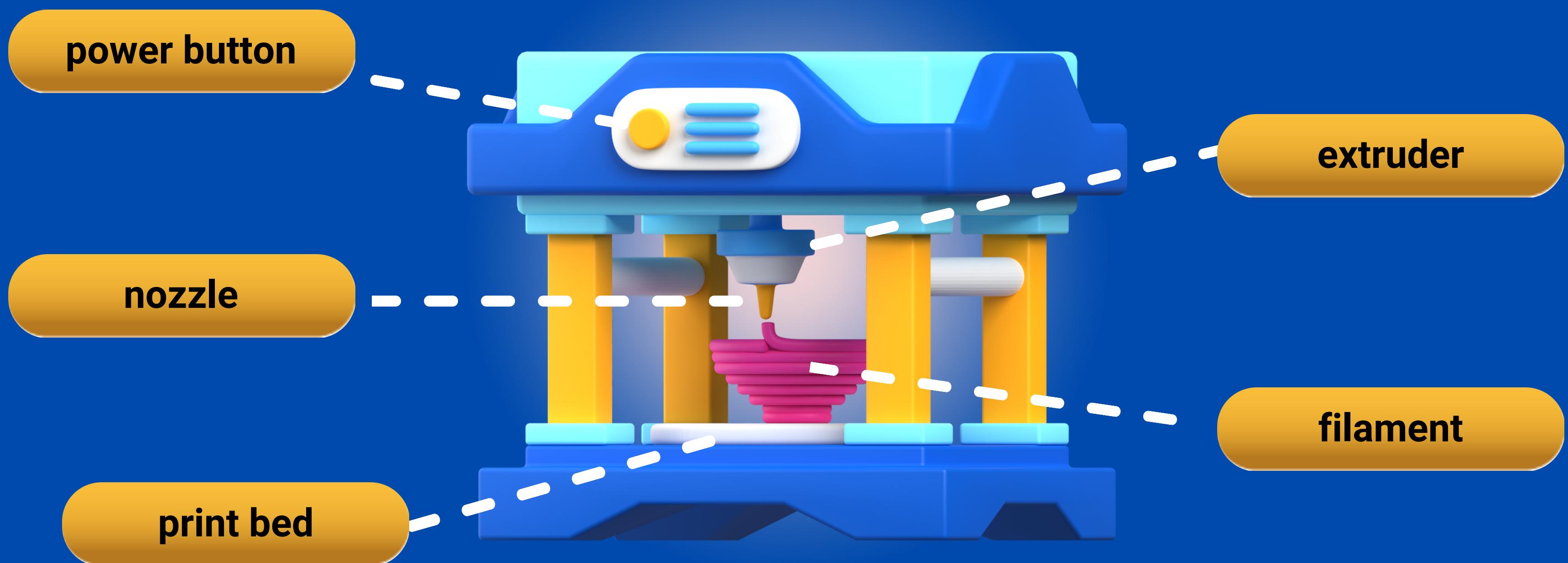
Choose the appropriate type of 3D printer.



## POST-PROCESS

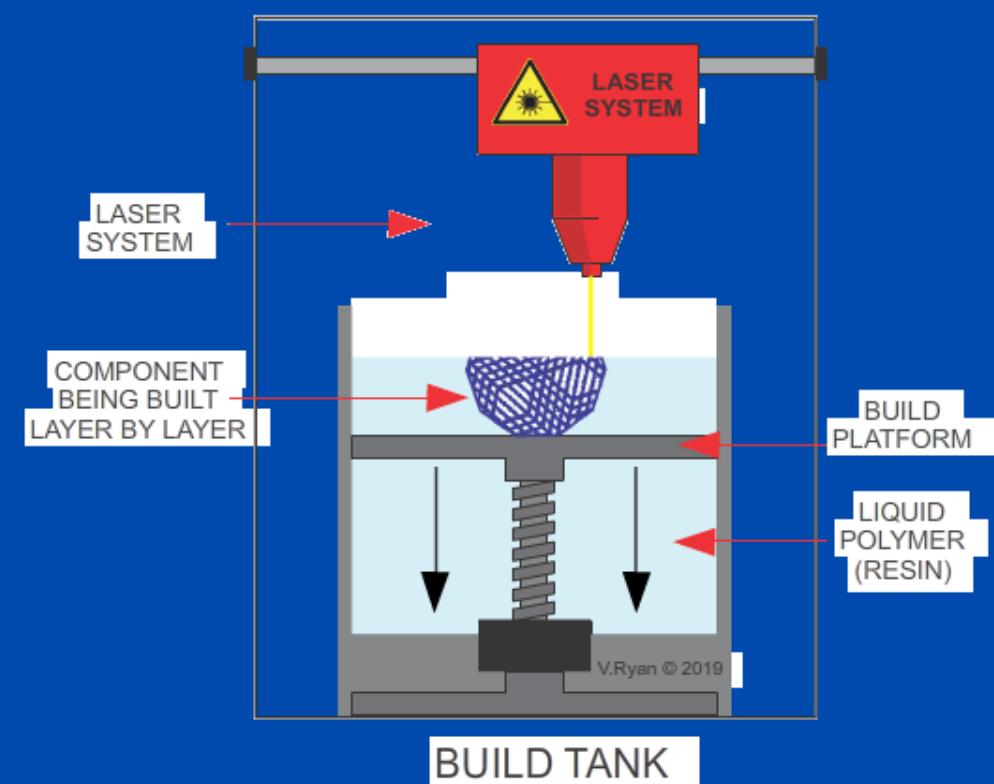
Depending on the technology and the material, the printed parts may require rinsing in isopropyl alcohol (IPA) to remove any uncured resin from their surface, post-curing to stabilize mechanical properties, lasers to sinter metals, manual work to remove support structures, or cleaning with compressed air or a media blaster to remove excess powder.

# 3D PRINTING PARTS



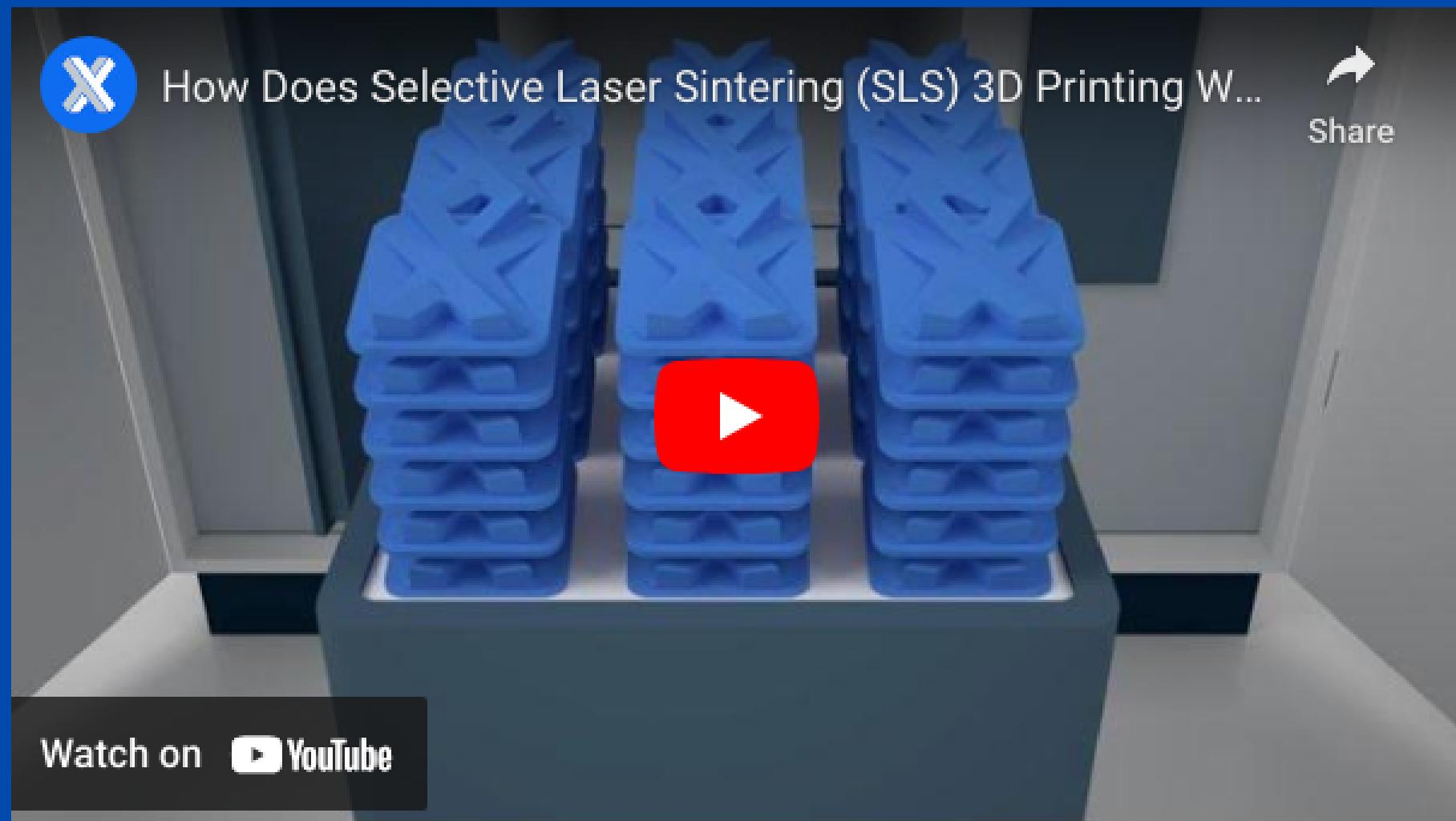
# STEREOLITHOGRAPHY (SLA)

- SLA is a 3D printing technology that uses a liquid resin that is solidified by a UV laser layer by layer.
- The UV laser selectively cures the resin to create each layer of the object being printed.
- SLA produces high-resolution prints with smooth surface finishes, making it suitable for detailed prototypes and intricate designs.



# SELECTIVE LASER SINTERING (SLS)

- **SLS is a 3D printing process that utilizes a high-powered laser to fuse powdered materials, such as plastics or metals, into a solid object layer by layer.**
- **The laser selectively sinters (heats and fuses) the powdered material according to the 3D model's specifications.**
- **SLS does not require support structures, as unsintered powder acts as self-supporting material during printing, allowing for more intricate and complex designs.**

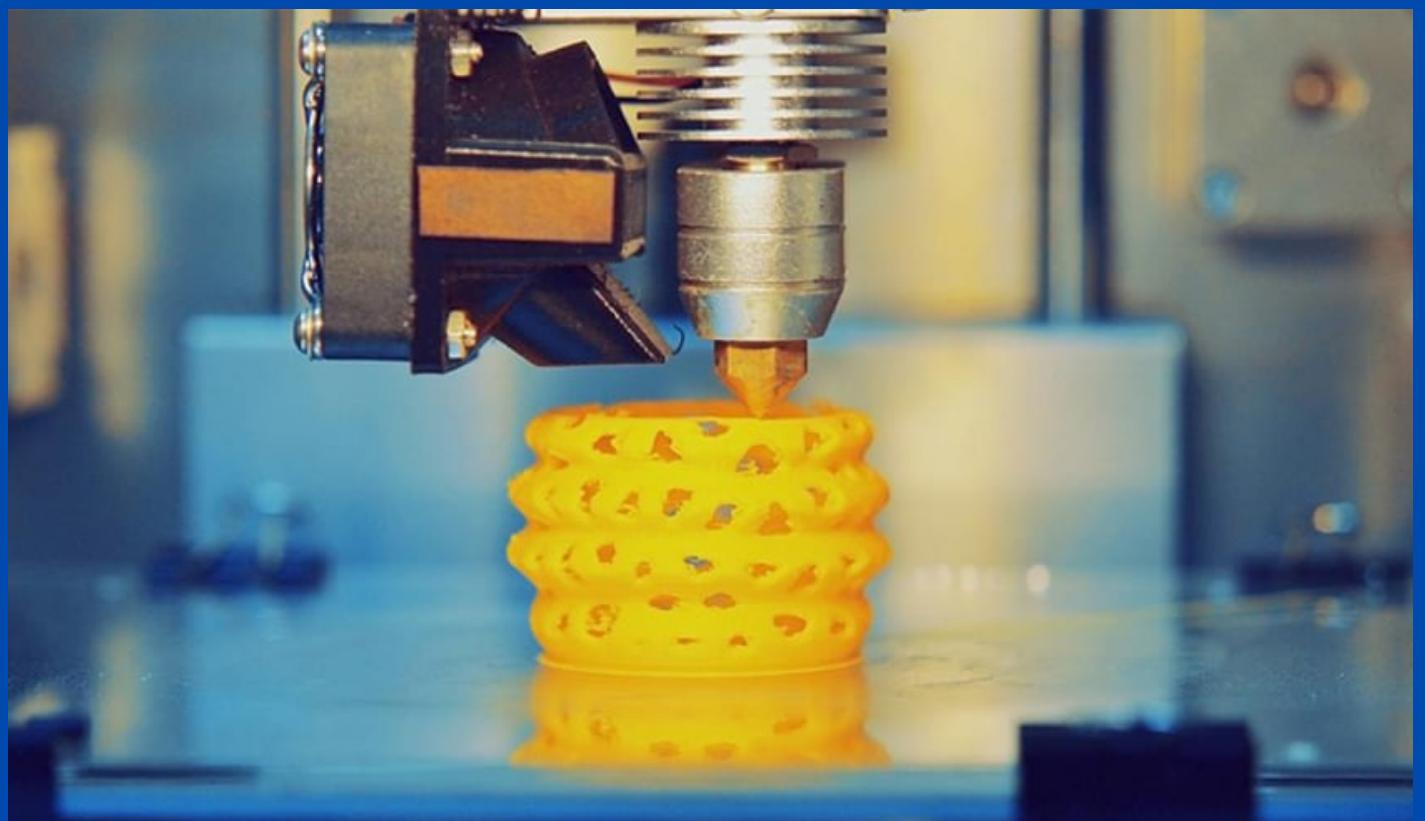
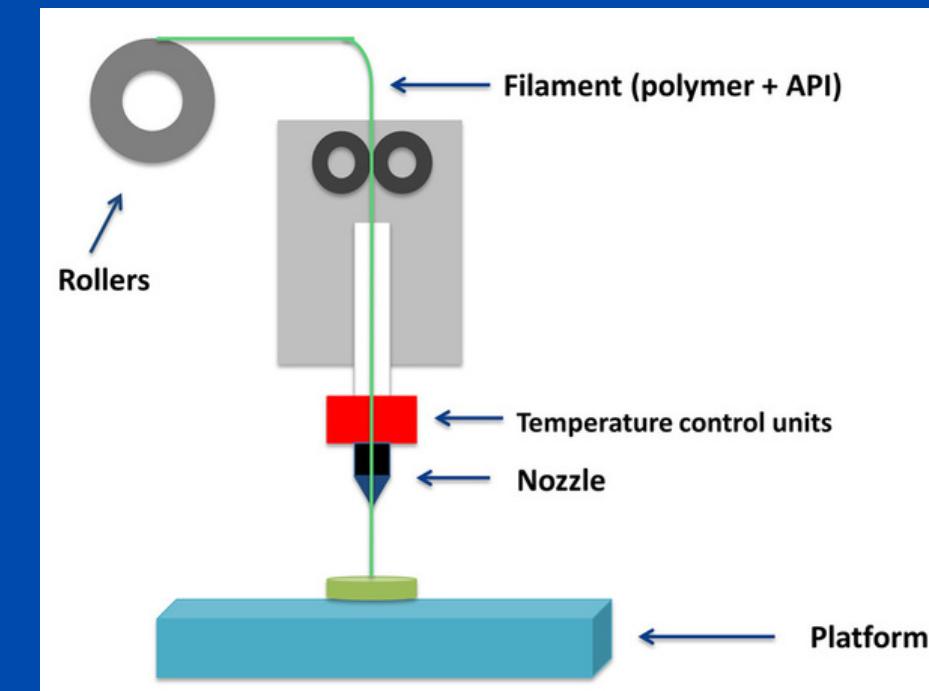


# DIGITAL LIGHT PROCESSING (DLP)

- Digital Light Processing (DLP) is a 3D printing technology that uses a digital projector to selectively cure liquid resin layer by layer, creating a solid object.
- It's very similar to SLA with one significant difference -- where SLA machines use a laser that traces a layer, a DLP machine uses a projected light source to cure the entire layer at once.
- DLP printers are known for their speed and accuracy, making them suitable for producing detailed and intricate objects.

# FUSED DEPOSITION MODELING (FDM)

- SLS is a 3D printing process that utilizes a high-powered laser to fuse powdered materials, such as plastics or metals, into a solid object layer by layer.
- The laser selectively sinters (heats and fuses) the powdered material according to the 3D model's specifications.
- SLS does not require support structures, as unsintered powder acts as self-supporting material during printing, allowing for more intricate and complex designs.



# METAL 3D PRINTERS

- Metal 3D printers, are devices that use metal powders as raw materials to create three-dimensional objects layer by layer. Unlike traditional subtractive manufacturing methods (like machining), where material is removed from a solid block, metal 3D printers add material only where it's needed, allowing for complex geometries and designs.
- Metal 3D printers are widely used in industries like aerospace, automotive, healthcare, and engineering, where parts require high strength, precision, and complex shapes. However, its one of the most expensive types of 3d printers.





# THANK YOU !

