



SNS COLLEGE OF TECHNOLOGY

(An autonomous institution)



Department of Mechanical Engineering

Unit – III

Topic

3D Printing

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3D Printing

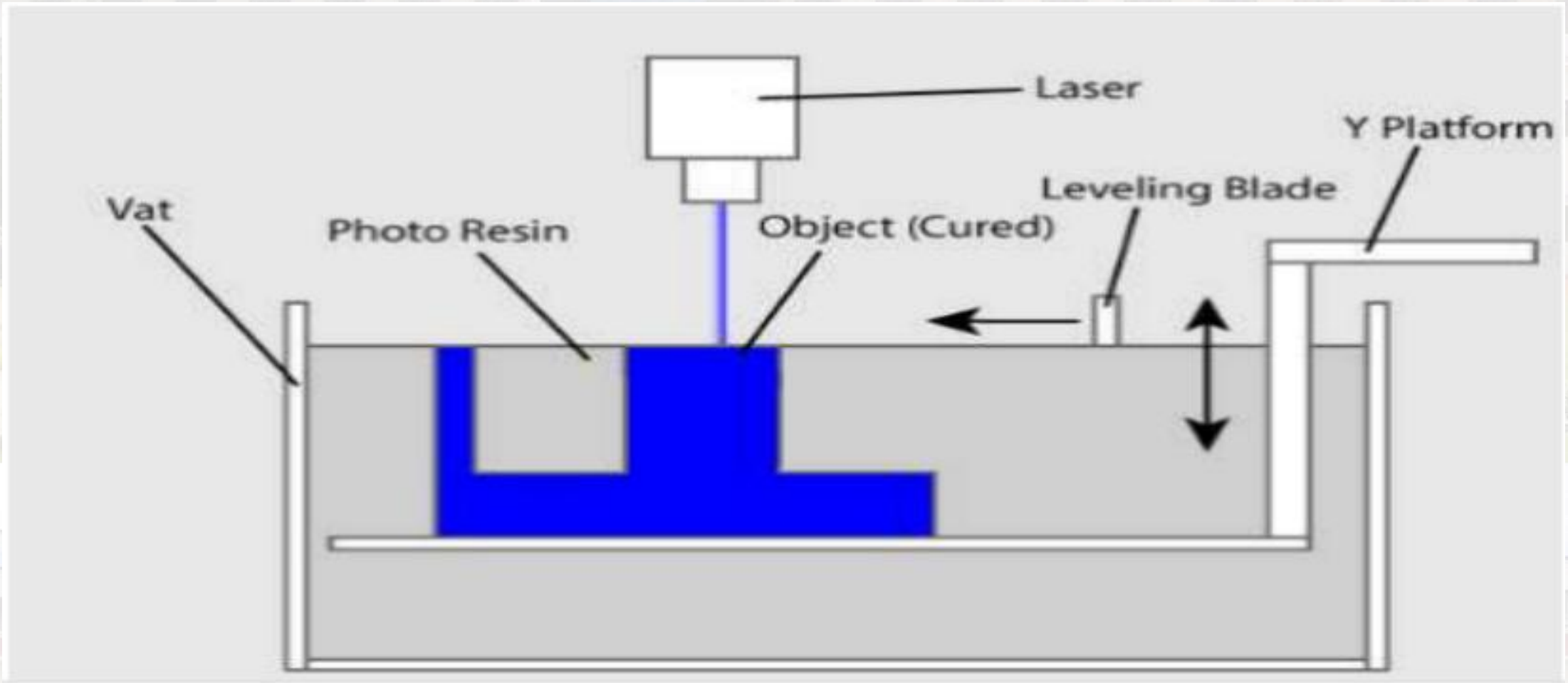
3D printing, also known as **additive manufacturing**, is a process of **creating three-dimensional objects** from a digital file by adding material layer by layer.

This technology has gained significant popularity and applications in various industries due to its versatility, cost-effectiveness, and ability to produce complex and customized objects.

Here are some key points to understand about 3D printing:



3D Printing





3D Printing



Rapid Prototyping Technologies

The classification method is based on the form of the starting material in the RP process:

- (1) **Liquid-based**
- (2) **Solid-based**
- (3) **Powder-based**





3D Printing



Liquid based technique

Stereolithography apparatus(SLA)

Solid Ground curing(SGC)

Solid based technique

Fused deposition modelling(FDM)

Laminated object manufacturing(LOM)

Powder based technique

Selective laser sintering(SLS)

3D Printer



3D Printing



Working Principle

3D printing starts with a **digital 3D model** of the object to be printed.

This model is typically created using **computer-aided design (CAD) software** or obtained from 3D scanning.

The 3D printer reads the digital file and then **adds material layer by layer** to build the physical object.

The material used can vary widely, including plastics, metals, ceramics, and even organic materials like food and biological tissue.



3D Printing



CAD Model ----- 3D Object



**3D CAD
Model**



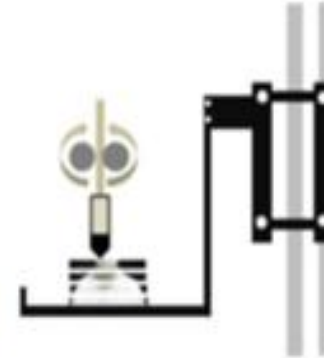
**Printable
File (e.g. STL)**



**Slicing
Software**



**Layer Slices
& Tool Path**



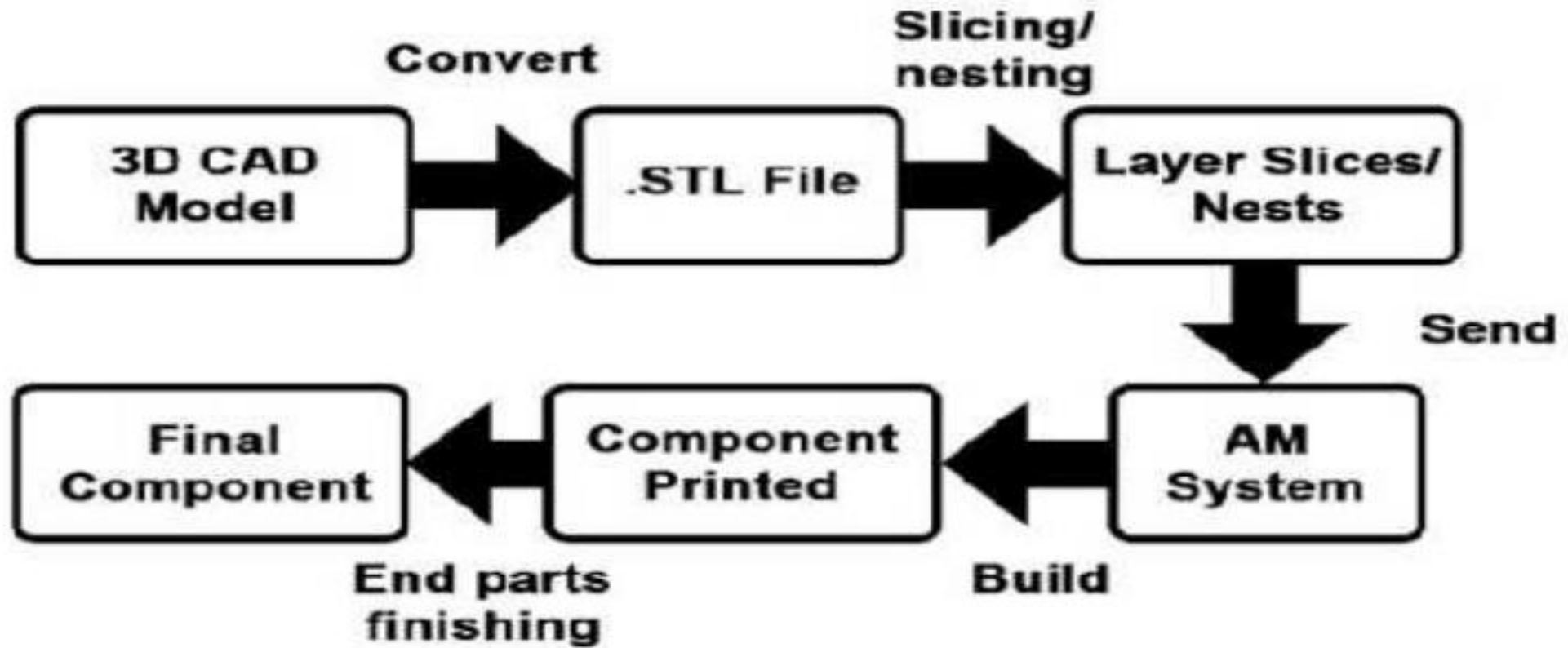
**AM
Process**



**Physical
3D Object**



3D Printing





3D Printing



Applications:

3D printing is used in a wide range of applications, including

- ❖ **Rapid prototyping**
- ❖ **Product design**
- ❖ **Aerospace and automotive manufacturing**
- ❖ **Healthcare (custom prosthetics and implants)**
- ❖ **Dental (orthodontics and crowns)**
- ❖ **Fashion**
- ❖ **Art**
- ❖ **Education and**
- ❖ **Even food production.**



3D Printing



Advantages:

Customization: 3D printing allows for the creation of highly customized and personalized products.

Rapid Prototyping: It's a valuable tool for quickly creating prototypes and testing product designs.

Complex Geometries: 3D printing can produce intricate and complex shapes that are difficult or impossible to achieve with traditional manufacturing methods.

Reducing Waste: It can be more resource-efficient because it only uses the material needed for the object.



3D Printing



Challenges:

Speed: 3D printing can be a slow process, making it unsuitable for large-scale production.

Material Limitations: The materials used in 3D printing may not have the same properties as those used in traditional manufacturing.

Quality Control: Achieving consistent quality can be a challenge.

Intellectual Property: The ease of copying 3D models can raise intellectual property concerns.



Thankyou