



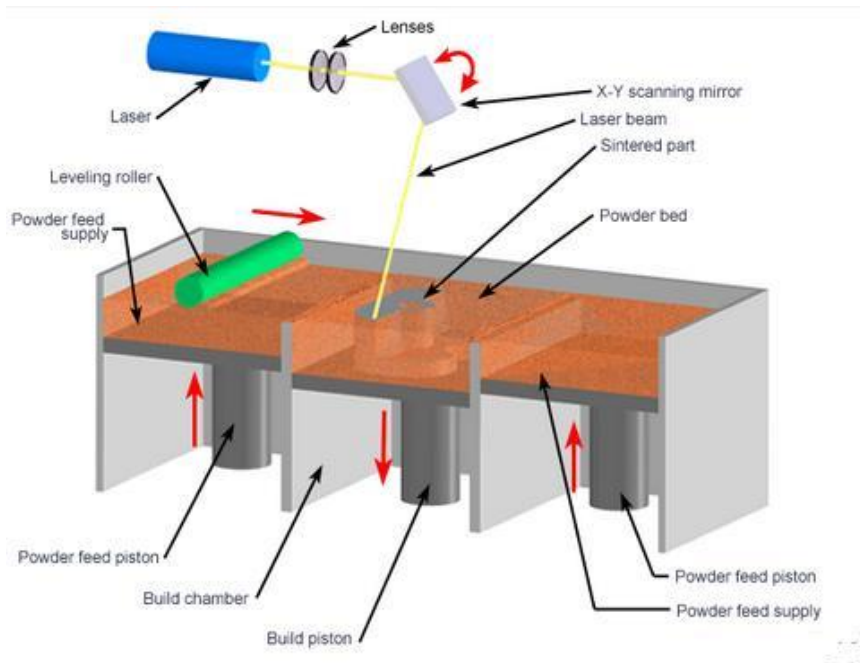
UNIT-4- POWDER BASED ADDITIVE MANUFACTURING SYSTEMS

Selective Laser Sintering (SLS)

Selective laser sintering is an additive manufacturing (AM) technology that **uses a high-power laser to sinter small particles of polymer powder into a solid structure based on a 3D model**. SLS 3D printing has been a popular choice for engineers and manufacturers for decades.

How does selective heat sintering work?

It works by **using a thermal print head to apply heat to layers of powdered thermoplastic**. When a layer is finished, the powder bed moves down, and an automated roller adds a new layer of material which is sintered to form the next cross-section of the model.



What is the difference between selective laser sintering and laser sintering?

“**Selective Laser Sintering and Direct Metal Laser Sintering are essentially the same thing**, with SLS used to refer to the process as applied to a variety of materials—plastics, glass, ceramics—whereas DMLS refers to the process as applied to metal alloys.

What is important in SLS?

The consideration of **size limitations** is very important when designing for SLS 3D printing. The following are some of the size limitations in these technologies. Wall thickness: To prevent collapse during printing or breakage during post-processing or use, it is necessary to design parts with sufficiently thick walls.

CO2 laser

SLS uses a **computer-controlled CO2 laser** versus an ND: YAG fiber laser for DMLS, but both “draw” slices of a CAD model in a bed of material, fusing micron-sized particles of material one layer at a time.

What are the characteristics of SLS?

- High detail resolution.
- Long life cycle without infiltration.
- Flexible and smooth.
- Very low refresh rates.
- Easy to color.

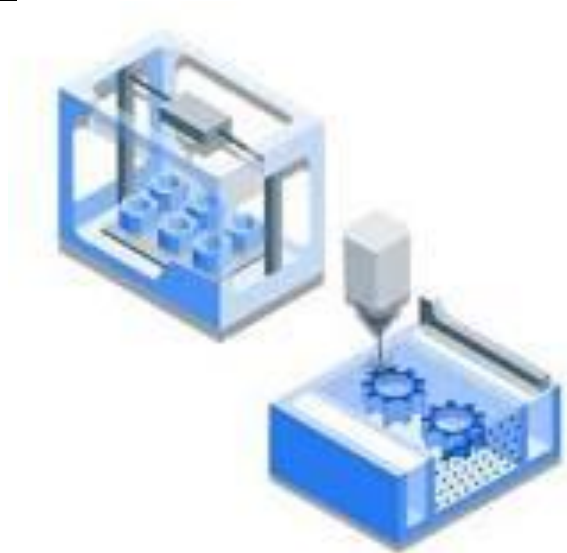
What is the finish of SLS?

For a standard SLS 3D printed finish, air pressure is necessary to remove powder from the part. For any remaining powder sticking to the part's surface, plastic bead blasting is employed for removal. The result is a **grainy, matte surface finish similar to the roughness of medium-grit sandpaper**.

Is SLS soluble in water?

It is **highly soluble in water** and non-volatile. It tends not to be persistent in the environment. It is highly toxic to aquatic organisms. It is low to moderately toxic to humans but may cause allergic reactions of skin, eye or respiratory tract.

Is SLS better than FDM?



SLS may be the better option if your project requires complex and/or functional prototypes. It is also recommended for use in mass-production scenarios. FDM, however, is great for simple proof-of-concept prototypes and can be a good point of entry into AM due to its relatively low cost.

What is SLS advantage and disadvantage?

Advantages: **mechanically resilient, no support structures are required, flexible components, variety of materials, the most complex shapes possible, thermally resilient.**

Disadvantages: slightly rough surface, slow manufacturing process, only single-color models are possible.