



SELECTIVE LASER SINTERING (SLS) TECHNOLOGY



Kaushal Dahal
2023006226



CONTENT



01

PRINCIPLES

02

PROCESS

03

APPLICATIONS

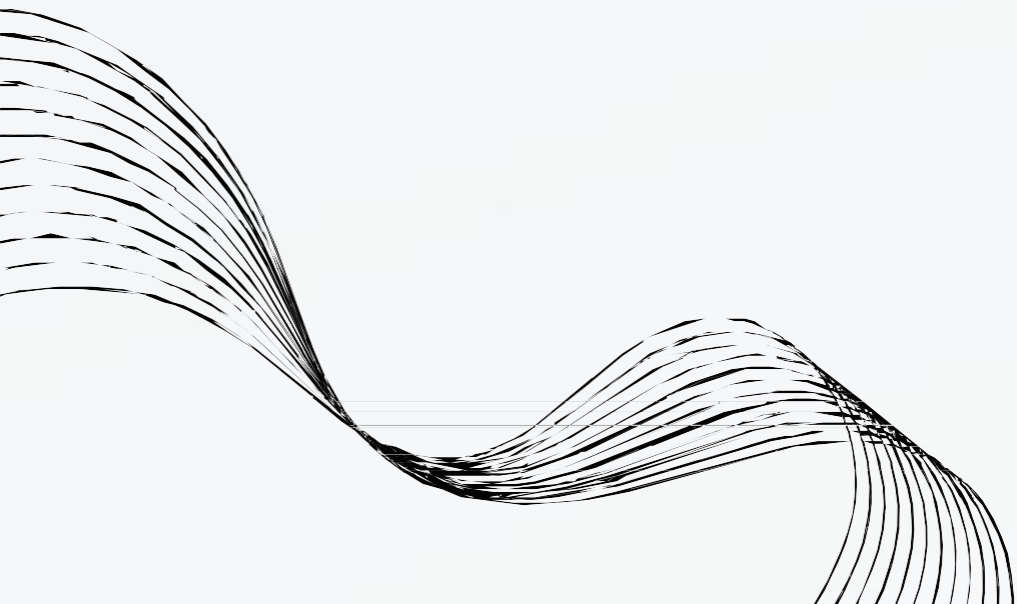
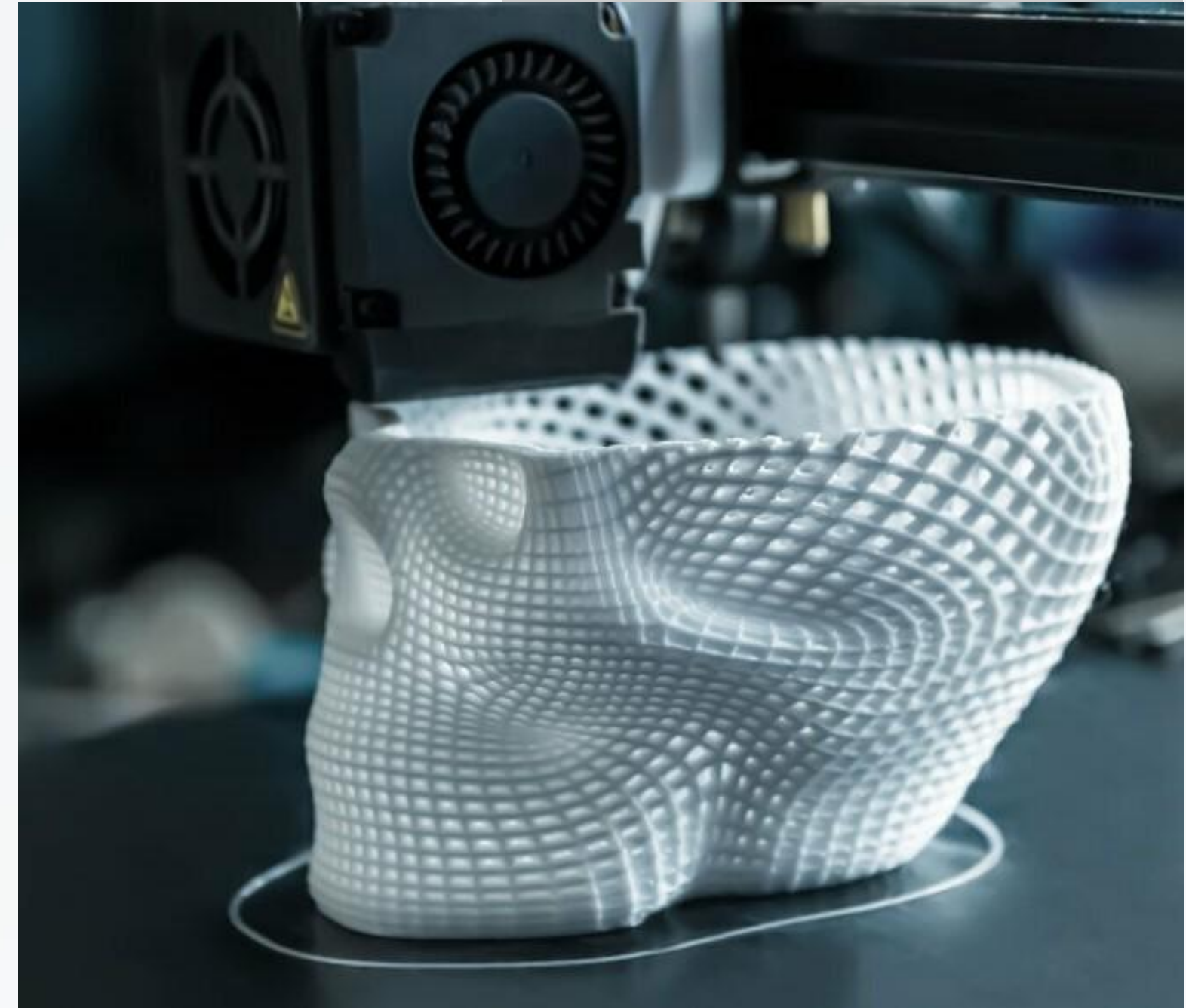
04

ADVANTAGES & DISADVANTAGES

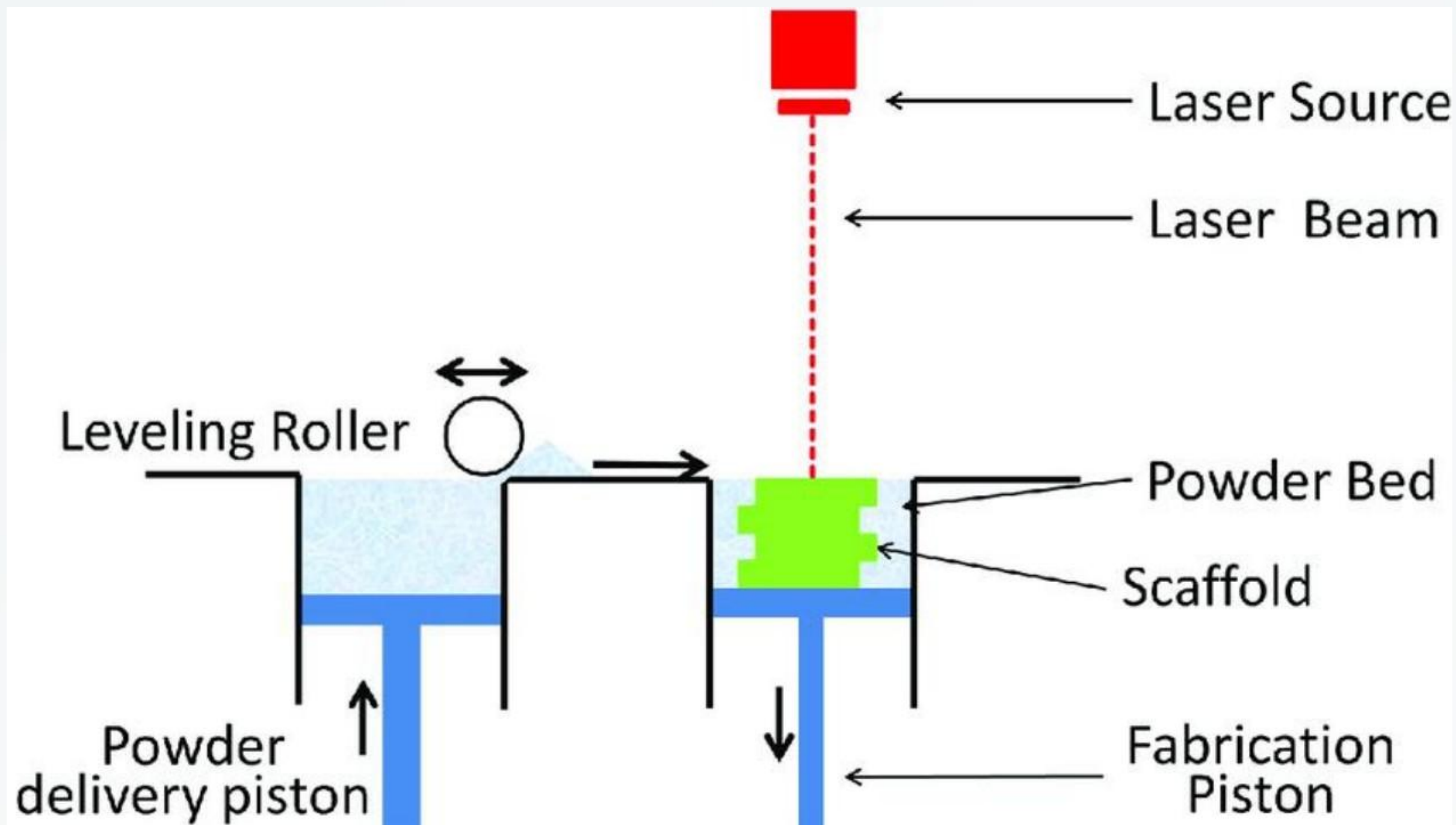
PRINCIPLES

Principle of operation • SLS uses a laser to heat and fuse powder particles at specific locations layer by layer.

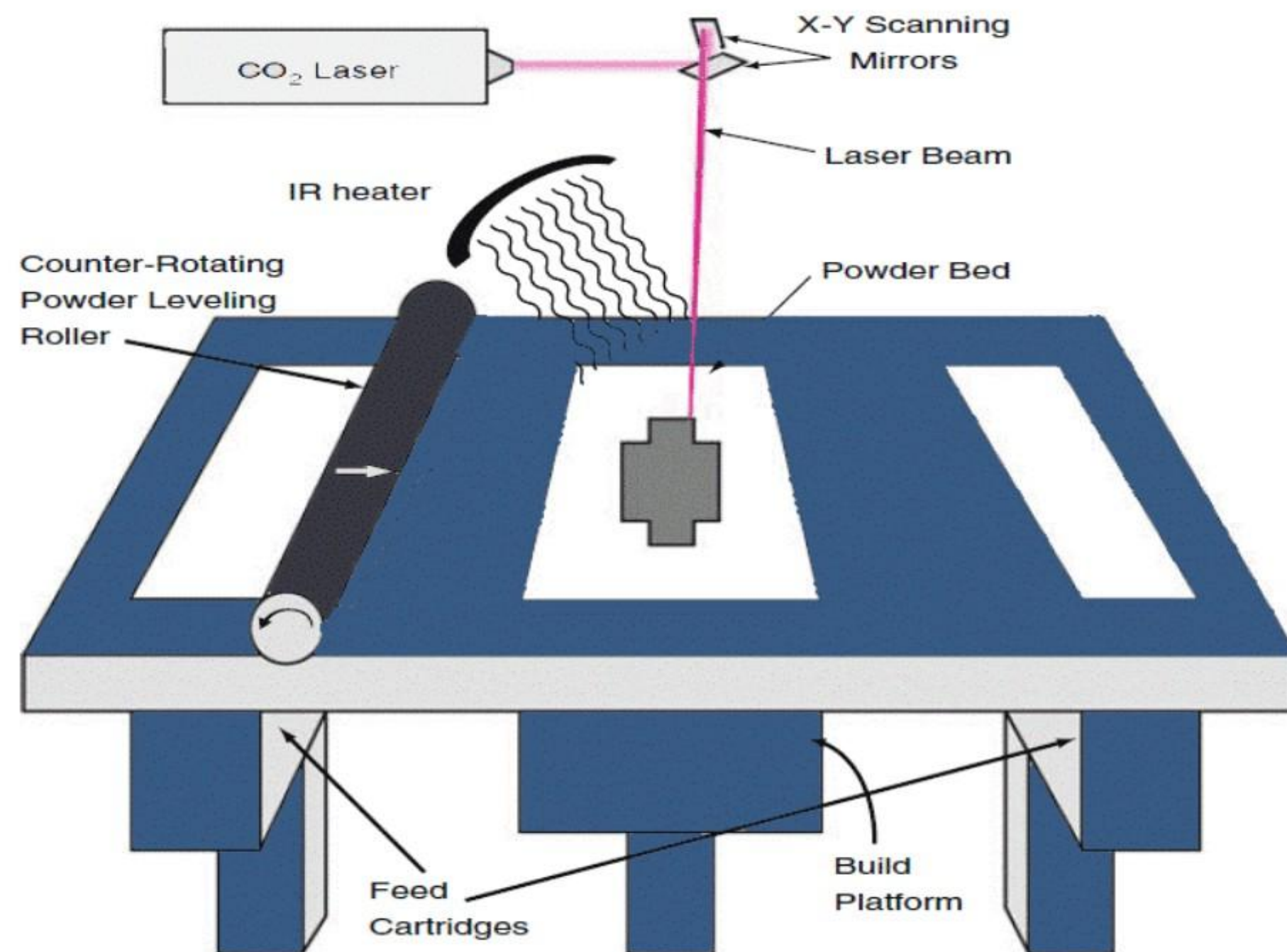
Materials Used: • Can include thermoplastics, ceramics, and metals. Laser Type: • High-powered CO₂ or fiber lasers are typically used.



2D SCHEMATIC REPRESENTATION OF SLS

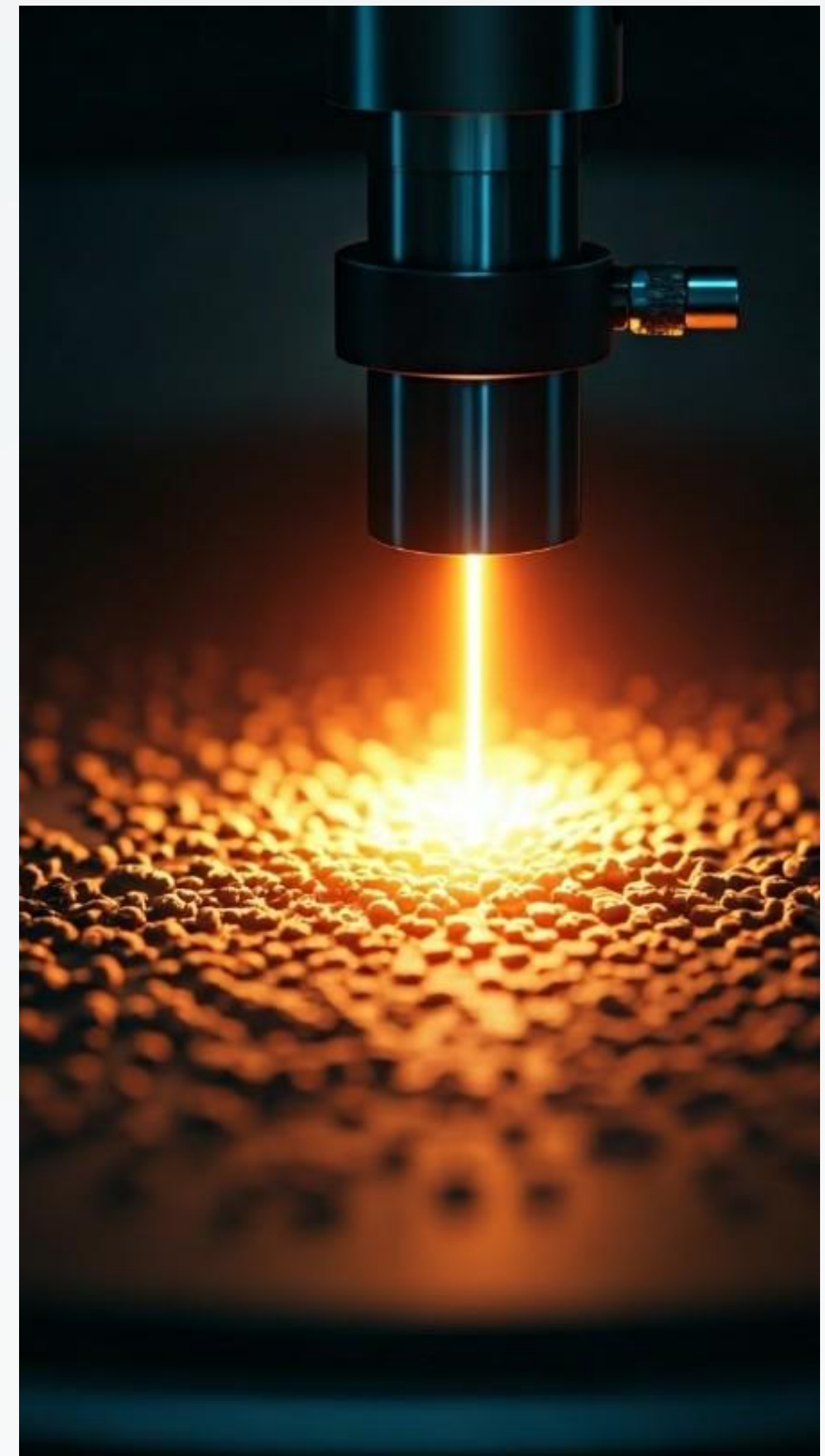


3D SCHEMATIC REPRESENTATION OF SLS



PROCESS FLOW OF SLS

1. CAD Model: A digital 3D model is created using CAD software.
2. Pre-processing: The model is sliced into thin layers and sent to the SLS machine.
3. Powder Layering: A thin layer of powder is spread over the build platform.
4. Laser Sintering: The laser selectively heats the powder particles to fuse them into a solid form.
5. Repetition: The platform lowers slightly, and the process repeats layer by layer.
6. Cooling & Post-processing: The build cools down before being removed and cleaned.



MATERIALS USED IN SLS

Polymers: Nylon (PA 12, PA 11),
TPU

Metals: Stainless steel,
Aluminum, Titanium

Ceramics: Zirconia, Alumina

Composites: Polymer-metal
and polymer-ceramic
composites



APPLICATIONS

1. Prototyping:

- **Fast, cost-effective prototype production for automotive, aerospace, and consumer products.**

2. End-use parts:

- **Small production runs for functional parts, especially in medical, aerospace, and electronics industries.**

3. Medical Devices:

- **Customized implants, prosthetics, and dental devices.**

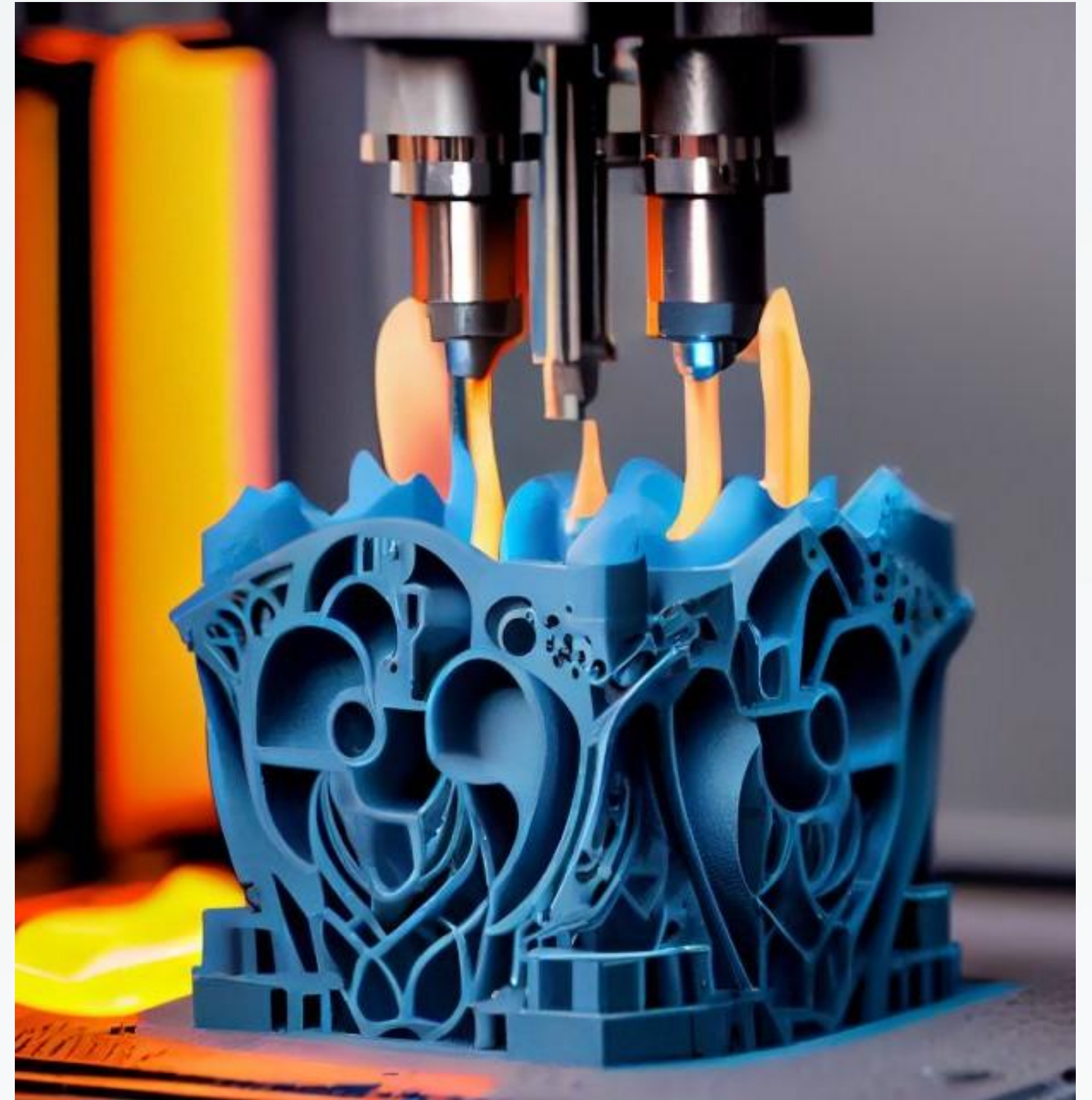
4. Automotive:

- **Parts like brackets, clips, and functional prototypes.**



ADVANTAGES

Support Structures are not reqd.: SLS doesn't require additional supports since unsintered powder acts as a support. **High Material Utilization:** Excess powder can be recycled for future builds. **Complex Geometries:** Allows for the creation of complex, intricate designs. **Wide Material Range:** Compatible with a variety of polymers, metals, and composites. **Durability:** Produces strong, durable parts suitable for functional testing and use.



DISADVANTAGES

High Cost: Machines and materials can be expensive, especially for metal SLS. **Surface Finish:** SLS parts can have a rough finish and may require post-processing. **Slow Process:** The process can be slow due to layer-by-layer construction. **Cooling Time:** The build must cool down slowly to avoid warping, which adds to the process time.

