Selective Laser Sintering (SLS)

The SLS process begins with heating up a bin of polymer powder to a temperature just below the melting point of the material. A recoating blade or roller then deposits a very thin layer of powder - typically 0.1 mm thick - onto the build platform.

A CO2 laser scans the surface of the powder bed and selectively sinters the particles, binding them together. When the entire cross-section is scanned, the building platform moves down one layer and the process repeats.The result is a bin filled with parts surrounded by unsintered powder.

After printing, the bin needs to cool before the parts are removed from the unsintered powder and cleaned. Some post-processing steps can then be employed to improve their visual appearance, such as polishing or dying.

SLS parts have very good, almost-isotropic mechanical properties, so they are ideal for functional parts and prototypes. Since no support structures are required (the unsintered powder acts as support), designs with very complex geometries can be easily manufactured.

SLS is also excellent for small-to-medium batch production (up to 100 parts), since the bin can be filled throughout its volume and multiple parts can be printed at a single production run.

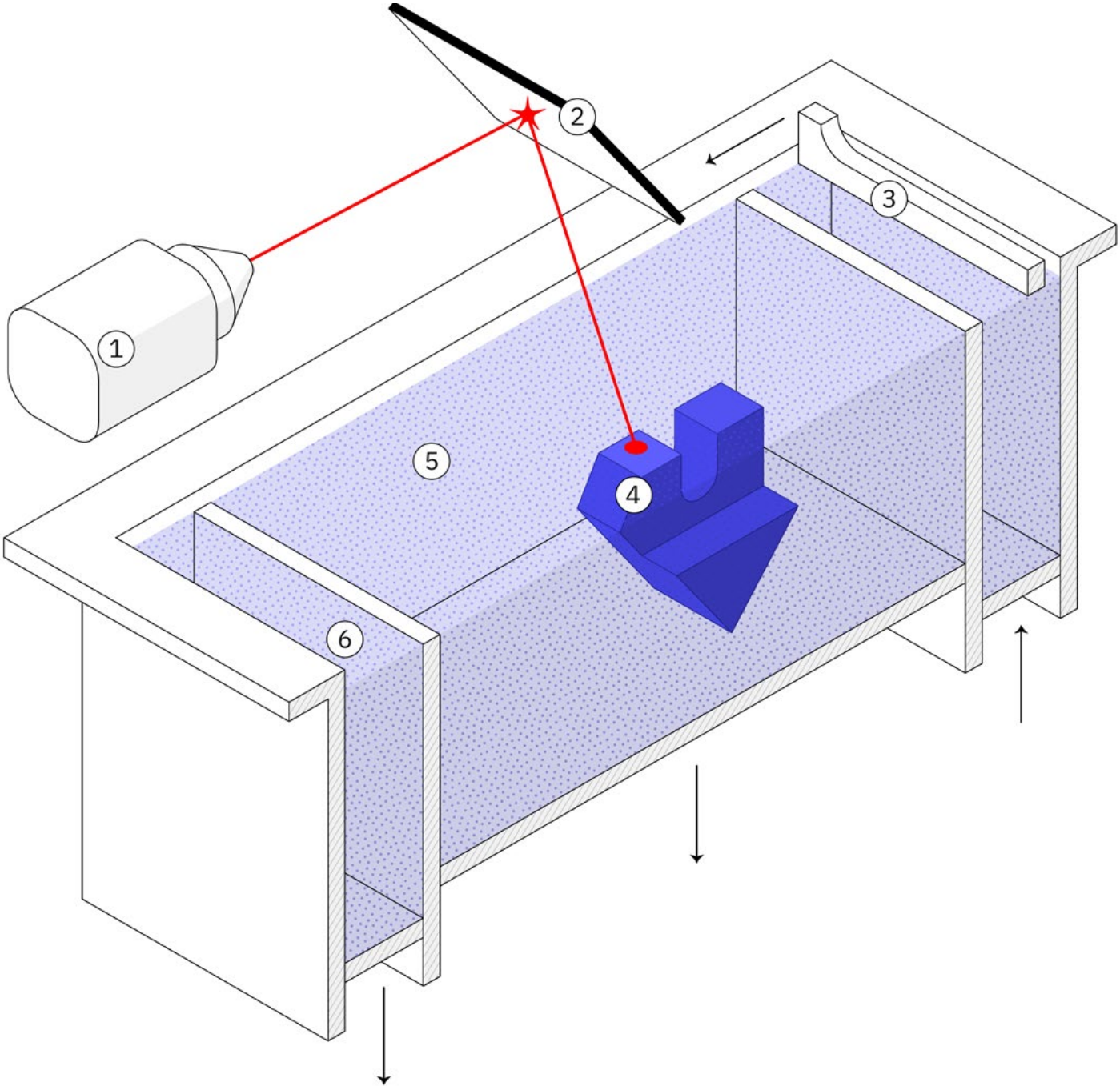
SLS printers are usually high-end industrial systems. This limits the availability of the technology and increases its cost and turn-around times (compared to FDM or SLA, for example). SLS parts have a naturally grainy surface and some internal porosity. If a smooth surface or watertightness is required, additional post-processing steps are needed. Beware that large flat surfaces and small holes need special attention, as they are susceptible to thermal warping and oversintering.

Learn more about the SLS process →

Popular SLA / DLP materials

SLS is used for both prototyping and small-batch production of functional plastic parts with good mechanical properties.

> Nylon > TPU > Carbon filled > Glass filled > PA 11



1	Laser	4	Printed part
2	XY scanning mirror	5	Building platform
3	Recoater	6	Overflow bin

Pros

+ Ideal for functional prototypes
+ Complex geometries - no support needed
+ Small batch production capabilities

Cons

- Higher cost than FDM or SLA
- Slower turn-around due to batch production
- Grainy surface & internal porosity