

Stereolithography

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What is Stereolithography (SLA)?

- A "rapid-prototyping" process which produces a physical, three dimensional object from a 3D CAD file.
- Based on the principle of curing (hardening) a liquid photopolymer into a specific shape.

Comparison Between SLA and FDM (Fused Deposition Modeling)

- Precision of Dimensions

Table I Average Deviations of Dimensions (copied from Reference 2)

Methods	Deviations
SLA components	+0.05mm
	-0.06 mm
FDM components	+0.24 mm
	-0.18 mm

- Surface Quality

- roughness of the untreated surfaces of SLA components $>10^3$ better than FDM components.

- Dimension Change with Humidity

- permanent changes in the dimensions occur when SLA components stored under humid conditions.

Benefits of SLA

- Crisp, highly-detailed pieces
- Speed of delivery (usually 2-3 days)
- Tolerances within .005"/inch
- Save Money
- Save Time
- Test Product
- Catch Errors
- Improve Design
- Sell Product
- Rapid Manufacturing

SLA Materials

Table II Physical Properties of SLA Materials

Material	Appearance	Viscosity (cps)	Density (g/cm³)
DSM Somos® 10120	Optically clear	130 cps at 30°C	1.12 g/cm ³ at 25°C
DSM Somos® 9120	Transparent Amber	450 cps at 30°C	1.13 g/cm ³ at 25°C
Cibatool® SL 5195	Clear	180 cps at 30°C	1.16 g/cm ³ at 25°C

Applications of SLA Technology

- Aesthetic & conceptual models
- Parts requiring detail & accuracy
- Master patterns for castings and secondary processes

Conclusions

- Stereolithography is fast and effective.
- Stereolithography can be applied to almost every industry, including oil refining, petrochemical, power, marine, and municipal
- Stereolithography saves time, money, allows speed delivery, and improve designs