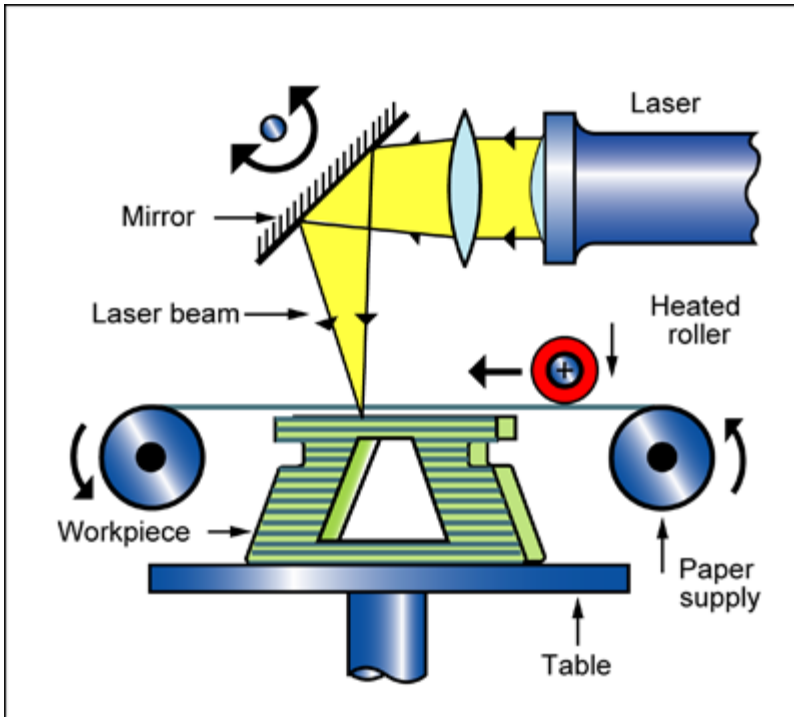


Description

Process schematic



The process

In LAMINATED OBJECT MANUFACTURE (LOM) the prototype or model is usually built up from layers of paper (polymers or metals are also possible with some machines), laminated with a heat sensitive polymer binder. To create one layer, binder-coated sheet material is fed from a roll, positioned over the model, and cut to shape by a guided laser beam. The cut profile is pressed onto the model by a heated roller, bonding it to the layers beneath and the sequence is repeated. The process is faster than SLA or SLS because only the outline of the part needs to be covered by the laser. When using paper the finished material resembles wood. As with other rapid prototyping processes, a CAD solid model of the part is used to create the instructions to guide the laser.

Material compatibility

Natural materials



Shape

Circular prismatic



Non-circular prismatic



Flat sheet



Dished sheet



Solid 3-D



Hollow 3-D



Economic compatibility

Relative tooling cost

low

Relative equipment cost

high

Labor intensity	high		
Economic batch size (units)	1	-	10

Physical and quality attributes

Mass range	0.1	-	50	kg
Range of section thickness	1	-	100	mm
Tolerance	0.25	-	2	mm
Roughness	100	-	140	μm
Surface roughness (A=v. smooth)	C			

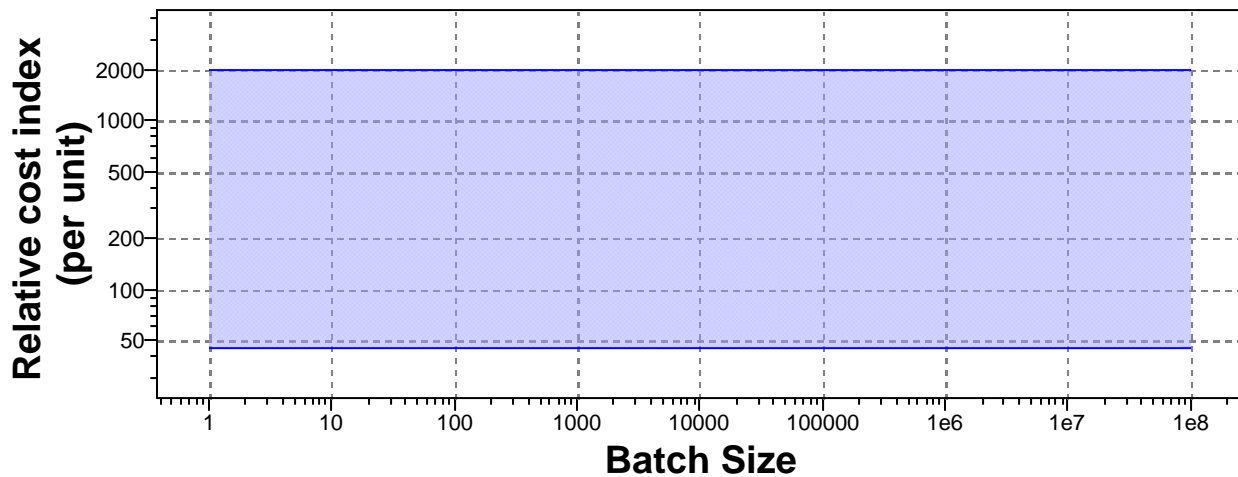
Process characteristics

Primary shaping processes	✓
Discrete	✓
Prototyping	✓

Cost model and defaults

Relative cost index (per unit)	* 45.6	-	2e3
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Parameters: Material Cost = 8USD/kg, Component Mass = 1kg, Batch Size = 1e3, Overhead Rate = 150USD/hr, Discount Rate = 5%, Capital Write-off Time = 5yrs, Load Factor = 0.5



Material Cost=8USD/kg, Component Mass=1kg, Overhead Rate=150USD/hr, Capital Write-off Time=5yrs, Load Factor=0.5, Discount Rate=5%

Capital cost	1.13e5	-	2.07e5	USD
Material utilization fraction	* 0.5	-	0.7	
Production rate (units)	0.08	-	5	/hr
Tooling cost	* 0	-	0.1	USD
Tool life (units)	1e5	-	1e6	

Supporting information

Design guidelines

The process can create large objects with thick wall sections, but there are inherent difficulties with undercuts and re-entrant features, and thin sections may warp.

Technical notes

The build envelope (L x W x H) ranges from 160 x 210 x 135 mm to 6050 x 2045 mm and unlimited in the z-axis. Typical layer thickness is 100 - 190 μm .

Objects may be built at up to 6.35 mm per hour in the z-direction.

Virtually any sheet material can be used: paper, metals, plastics, fibers, synthetic materials, glass or composites.

Typical uses

Making prototypes and models quickly from CAD systems. Patterns for sand-casting; accurate 3D topographical maps.

The economics

After the initial cost of the machine (around \$6400), it can cost as little as \$10 to make a fist-sized object out of paper.

Links

MaterialUniverse

Reference