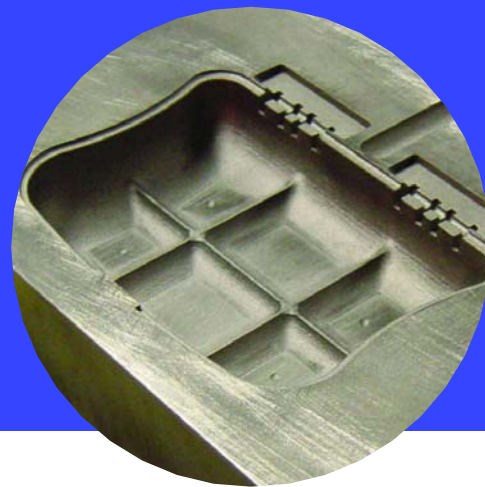


# LASERFORM™ A6 STEEL MATERIAL

for select SLS® (selective laser sintering) systems



Select images courtesy of  
Bastech, Inc.

**A component technology for rapid and low-cost  
manufacture of complex metal parts and tooling  
for injection molding and other applications.**

## Outstanding material attributes

LaserForm A6 steel material provides excellent material attributes for toolmaking and metal parts production:

### Process capabilities you can use

LaserForm A6 steel material using the SLS™ process produce parts and tools with exceptional green toughness, high accuracy and outstanding repeatability that are suitable for a broad array of applications.



### Design flexibility

Produce highly complex geometries and features that are difficult to produce using other technologies. Incorporate time- and cost-saving features like conformal cooling or heating channels into the tool design and improve molding cycle times.



Integrate Conformal  
Cooling (or Heating)  
Channels!

### Surface finish

Parts have an exceptional surface finish ranging from 5 - 10  $\mu\text{m}$  Ra from the process, and may require little to no additional post-processing, depending upon the application, with improved corrosion resistance compared to tool steel.



### Excellent machinability

Just like traditional metals, LaserForm A6 steel material can be machined, EDM processed, polished, etched, textured and more. LaserForm A6 material is magnetic and can be fixtured using magnetic chucks.



## Production tooling hardness

Produce parts or tools from the system with polished surface hardness\* as high as HRC=20, or heat treat to HRC=39 for added wear resistance. The surface can be coated for even higher surface hardness.

## 2X thermal conductivity

With thermal conductivity almost twice that of most tool steels, inserts produced with LaserForm A6 material offer up to 20-40%\* faster molding cycles for added productivity and capacity.



Vanguard™ SLS system

## Additive manufacturing using the SLS process

3D Systems' selective laser sintering (SLS) process and LaserForm A6 steel material is an

invaluable "tool in the toolbox" that designers, parts manufacturers and toolmakers alike can utilize to increase manufacturing efficiency and productivity, and augment traditional subtractive manufacturing processes such as CNC or EDM. Utilize your skilled labor force by offering rapid, cost-effective low-volume manufacturing of end-use metal parts, and near net shape tools for injection molding and die casting.



## Applications:

- Tooling inserts for injection molding and die-casting
- Direct metal parts

## Benefits:

- Fast! Design to part in as little as two days
- Ideal for complex geometries
- Exceptional green part toughness
- Complements existing fabrication processes
- Characteristics similar to tool steel
- High quality, fully dense, annealed parts
- Advanced thermal control capability for faster molding cycles

\* Results may vary.



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**3D Systems - Changing the way people design, develop and manufacture products**

# LASERFORM A6 STEEL MATERIAL

for select SLS systems

## Typical Properties

### System Requirements

SLS System	3D Systems' Vanguard™ or Vanguard HS SLS systems and Sinterstation® 2500plus system
Part Breakout	Breakout station (BOS) recommended
Oven	LaserForm oven
Software	LS software 3.2 or higher

### Mechanical Properties\*

PROPERTIES	TEST METHOD	VALUE
Density	ASTM D792	0.28 Lb/in <sup>3</sup> (7.8 g/cm <sup>3</sup> )
Tensile - Yield Strength (0.2%)	ASTM E8	68 Ksi (470 MPa)
Tensile Strength	ASTM E8	88 Ksi (610 MPa)
Elongation	ASTM E8	2.0 - 4.0%
Young's Modulus	ASTM E8	20 Msi (138 GPa)
Compression - Yield Strength	ASTM E8	70 Ksi (480 MPa)
Hardness (Rockwell "C")	ASTM E18	HRc = 10 - 20 (polished surface)
	ASTM E18	HRc = 39 (as heat treated)
Thermal Conductivity	ASTM E457	23 BTU/ft-hr-°F (39 W/m°C) @215°C (419°F)
Thermal Expansion Coefficient	ASTM E831	4.14 µin/in/°F (7.45 µm/m/°C)

\*Data was generated from testing of infiltrated parts produced with LaserForm A6 steel material and a Vanguard HS SLS system using 3D Systems' defined parameters. Material properties may vary and are dependent upon part geometry and other factors.

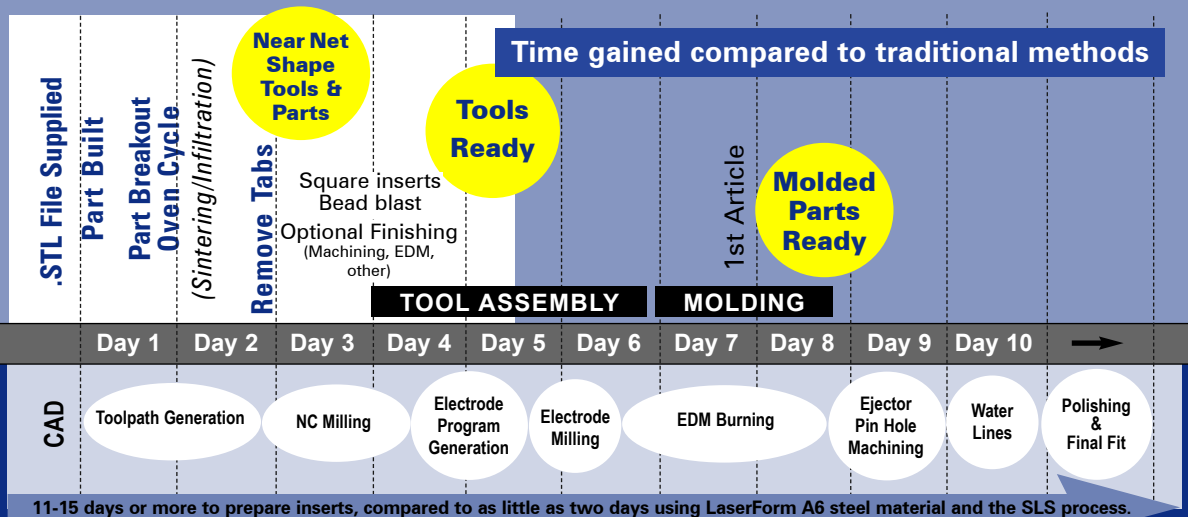
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### Comparison - Timeline for Producing Tooling and Parts

With 3D Systems' SLS system and LaserForm A6 steel material, produce functional metal parts or tooling in a few days - at a fraction of the time required for traditional processes.

### With the SLS system and LaserForm A6 steel material\*\*

\*\* Based in internal benchmarks. Assumes in-house resources and prioritization (no wait time due to other priorities). Results may vary and are geometry and size dependent.



### With traditional tooling\*\*\*

\*\*\* Assumes "typical" process of tooling preparation of inserts with complex geometry. Exceptions will occur. Results may vary.



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## 3D Systems

26081 Avenue Hall

Valencia, CA 91355 USA

tel 661.295.5600 ext. 2882

fax 661.294.8406

toll free 888.337.9786

email [moreinfo@3dsystems.com](mailto:moreinfo@3dsystems.com)

[www.3dsystems.com](http://www.3dsystems.com)

Nasdaq: TDSC

FRANCE

telephone +33 1 69 35 17 17

GERMANY

telephone +49 6151 357 303

HONG KONG

telephone +852 2923 5077

ITALY

telephone +39 039 68 904 00

JAPAN

telephone +81-3-5451-1690

UK

telephone +44 1442 282600

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