



Image credit: EOS

# MATERIALS FOR 3D PRINTING

## **TOOL STEEL**



**DANISH  
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# 1.2709 / A646 / M300

## Tool steel alloy

This alloy is primarily used for tools and molds. It is characterized by great hardness and high ductility. It is good for parts that are exposed to a lot of wear and/or high temperatures.

We print tool steel with Laser Powder Bed Fusion technology that prints in powder and uses a laser to weld the powder layers together. The technology requires support structure to attach the part to the build platform. The support is mechanically removed after printing.

The raw prints that come out of the printer have a surface finish similar to a cast metal part. The surface can subsequently be processed with various finishes.

The technology can print parts that meet ISO 2768-m 1 - however, the tolerances depend a lot on the geometry of the part.

### Technology:

- Laser Powder Bed Fusion

### Printers:

- SLM Solutions - SLM280

### Build volume:

- 280 x 280 x 365 mm

### Layer thickness

- 30 µm (fine)
- 50 µm (normal)

### Possible post-processing:

- De-stressing
- Heat treatment
- Deburring
- Media blasting
- Conventional processing

MATERIAL PROPERTIES (STANDARD)	50 µm, 400 W	
	Raw print	Heat treated
TENSILE STRENGTH [Rm]	1174 ±20 MPa	1940 ±34 MPa
YOUNG'S MODULUS [E]	170 ±8 GPa	198 ±40 GPa
YIELD STRENGTH [Rp0,2]	965 ±25 MPa	1789 ±35 MPa
ELONGATION AT BREAK [A]	14 ±5 %	6 ±2 %
REDUCTION OF CROSS SECTION [Z]	55 ±11 %	28 ±4 %
VICKERS HARDNESS [HV10]	342 ±22	575 ±10
POWDER DENSITY	8,0 g/cm <sup>3</sup>	
PART DENSITY	>99,5 %	

SURFACE TEXTURE	Raw	Processed
Average roughness [Ra]	9 ±1	0,8

### Design features:

- Minimum feature size 0,6 mm
- Minimum channel size Ø2 mm
- Minimum wall thickness vægtykkelse 1 mm
- Support for overhangs less than 45°
- Hole for emptying powder Ø5 mm

### Design guides:

- Minimize the volume of the part as much as possible
- Avoid large changes in the cross-sectional area of the part
- Use camphors and roundings - they are "free"
- Consider the print orientation in your design

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