

Stainless Steel 3D Printing

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About Stainless Steel Metal 3D Printing

3D printing stainless steel is commonly done using DMLS (direct metal laser sintering) technology which works by fusing individual layers of powder together with a laser until the part is complete. Stainless steel parts created with this method have the same density as cast versions of the metal—there are no porosity problems. Solution annealing is not required as parts come off the machine with the necessary properties.

3D Printed Stainless Steel at a Glance

Application	Medical implants and devices, chemical processing components
Advantages	Excellent corrosion resistance, biocompatible, PH Stainless Steel has excellent strength properties
Disadvantages	Parts have a level of anisotropy
Lead Time	3 days
Price	\$\$-\$\$\$
Minimum Feature Size	Typically 0.016" - 0.020" (0.406 mm - 0.508 mm)
Layer Height	0.0012" - 0.0016" (0.0305 mm - 0.04064 mm)
General Tolerances	0.005" (0.127 mm) is possible for the first inch of height. For every inch thereafter, an additional 0.002" (0.0508 mm) is added to the tolerance.
Max Part Size	10" x 10" x 10" (254 mm x 254 mm x 254 mm)

DMLS Stainless Steel 316L

Stainless steel 316L is a steel alloy that is well known for its exceptional chemical and environmental resistance. This makes it ideal for complex medical applications as well as consumer-grade products. SS316 is however not suitable for temperatures between 427°C and 816°C. Parts made using stainless steel 3D printing can be polished and machined. Typical applications include spectacle frames, turbine blades, and components exposed to corrosive chemicals.

DMLS Stainless Steel 316L Properties

Tensile Strength, Yield (MPa)	Fatigue Strength (MPa)	Elongation at Break (%)	Hardness (Brinell)	Density (g/cm^3)
640 ± 50	530 ± 60	40 ± 15	89	7.9

DMLS Stainless Steel 17-4

Stainless steel 17-4 is precipitation-hardened stainless steel with good corrosion resistance and high strength (much higher than that of stainless steel 316L). Further heat treatment can increase the material strength to over 1300 MPa. This material is used in parts that need significant strength but must avoid carbon steel's propensity for rusting. Surgical instruments are the most common items made from this material.

DMLS Stainless Steel 17-4 Properties

Tensile Strength (MPa)	Yield Strength (MPa)	Elongation at Break (%)	Hardness (Brinell)	Density (g/cm3)
886 ± 70.4	860.6 ± 75.7	19.9 ± 1.2	247	7.79

Finishes

Stainless steel 3D printing results in parts with a density equal to that of machined steel. They can also be machined or polished in the same fashion.

Standard: Standard finishing refers to the removal of any support structures. The surface of the part is also medium blasted to create a uniform appearance.

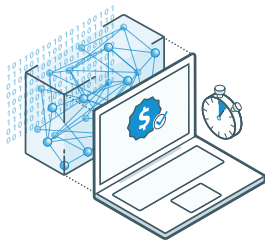
CNC Machining or Polishing: In some cases, specific features can be machined or polished using a CNC unit. However, these are evaluated on a case-to-case basis.



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cheap. Ensure that stainless steel is necessary for your application over cheaper 3D printing metals like stainless steel or composite metals printed with binder jetting.



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