

Material Information



Inconel 718

Introduction

Inconel 718 is a high-strength, corrosion-resistant nickel-chromium alloy engineered for extreme environments. In 3D printing, it's celebrated for its ability to retain mechanical integrity, making it ideal for aerospace and automotive components. With excellent weldability, fatigue resistance, and creep strength, Inconel 718 performs reliably under high-pressure, high-temperature conditions where other alloys might fail.

Advantages

Excellent fatigue resistance. Superior creep resistance. Outstanding oxidation and corrosion resistance. Good weldability. High-temperature strength.

Disadvantages

Exhibits residual stresses and anisotropic microstructures requiring extensive heat treatments, and may retain porosity that undermines fatigue performance.

Tolerance

±300µm or 0.3%

Recommendation

Inconel 718 is recommended for high-temperature, high-stress functional parts and rapid prototypes that demand exceptional strength, creep resistance, and corrosion resistance. From turbine blades, combustor liners, and rocket engine nozzles to high-pressure valves, heat exchangers, and downhole tools in oil and gas exploration, 3D printed Inconel 718 delivers reliable performance in extreme environments.

| Material Specifications | | |
|-------------------------|------------------------|------------------------|
| Hardness | ISO 6597-1:03-2006 | 300 HV |
| Density | WGE-Prod-067EN | 8.15 g/cm ³ |
| Relative density | WGE-Prod-067EN | 99.5% |
| Tensile strength | DIN EN ISO 6892-1:2009 | 980MPa |
| Elongation at Break | DIN EN ISO 6892-1:2009 | 13% |
| Yield strength | DIN EN ISO 6892-1:2009 | 700MPa |

| | | |
|-----------------|-------------------------|--------|
| Elastic modulus | DIN EN ISO 6892-1:2009 | 200GPa |
| Roughness Ra | ISO 4287 / AITM 1-00070 | 15 µm |
| Roughness Rz | ISO 4287 / AITM 1-00070 | 60 µm |

Attention

Although it is feasible to print complex structures with superalloy powder, the finished product can be difficult to work with due to its hardness and strength. We therefore recommend you consider all potential manufacturing processes when designing.

Applications

3DSPRO finds people using Inconel 718 to make functional parts and prototypes in the following industries and applications.

Aerospace:

Turbine blades, combustor liners, nozzle guide vanes, engine brackets, heat exchangers, fuel-pump impellers, and satellite structural components.

Automotive:

Turbocharger wheels, exhaust valves, valve springs, fuel-injection nozzles, high-performance exhaust manifolds, and gearbox housings.

Medical:

Surgical instruments (forceps, bone-cutting guides), sterilization trays, biopsy tools, and dental milling prototypes.

Consumer supplies:

Luxury watch cases, bespoke jewelry prototypes, decorative sculptures, high-temperature cookware molds, and custom hardware fittings.