

Material Information



Titanium Grade 5

Introduction

Titanium Grade 5, also known as Ti-6Al-4V or UNS R56400, is an alpha-beta titanium alloy containing approximately 6% aluminum and 4% vanadium. It offers an excellent combination of high strength, low weight, fatigue resistance, and corrosion resistance, making it one of the most widely used titanium alloys for CNC-machined components.

Advantages

High strength-to-weight ratio, excellent corrosion resistance, good fatigue performance, and good mechanical properties at low to moderate temperatures. Titanium Grade 5 also provides useful resistance to seawater and many aggressive environments while maintaining a relatively low density compared with steel.

Disadvantages

Titanium Grade 5 is more difficult to machine than common metals such as aluminum and steel because of its low thermal conductivity, tendency to gall, and high cutting-zone temperatures. It also has a higher material and machining cost than many conventional engineering metals.

Tolerance

3DSPRO can manufacture and inspect to tight tolerances, including sub +/- 0.001" tolerances, per your drawing specifications and GD&T callouts.

Recommendation

The combination of high strength, low weight, fatigue resistance, and excellent corrosion resistance makes Titanium Grade 5 suitable for CNC-machined components used in aerospace, automotive, medical, marine, energy, and industrial applications. It is particularly appropriate for parts where high mechanical performance and weight reduction are both important.

Material Specifications (For reference only.)	
Tensile strength	880MPa
Fatigue strength	240MPa
Elongation at Break	14%

Hardness	334 HB
Density	4.43 g/cm ³

Attention

Titanium Grade 5 requires carefully controlled CNC machining conditions. Low cutting speeds, appropriate feed rates, sharp tooling, sufficient coolant, and continuous tool engagement are important for controlling heat generation, galling, and tool wear. Non-chlorinated cutting fluids are generally recommended, and titanium chips require appropriate handling because they can be combustible.

Applications

3DSPRO finds people using Titanium Grade 5 to make functional parts and prototypes in the following industries and applications.

Aerospace components:

Aircraft structural components, turbine engine components, fasteners, brackets, fittings, and other lightweight high-strength parts.

Medical equipment:

Orthopedic components, surgical instruments, implants, and other precision parts requiring high strength and corrosion resistance.

Automotive and motorsports:

High-performance fasteners, suspension components, brackets, exhaust components, and other lightweight mechanical parts.

Marine and industrial equipment:

Marine fittings, shafts, pumps, valves, heat-transfer components, and other parts requiring high strength and excellent corrosion resistance.