

Material Information



Stainless Steel 416

Introduction

Stainless Steel 416, also known as AISI 416 or UNS S41600, is a free-machining martensitic stainless steel containing approximately 12–14% chromium and an increased sulfur content. The sulfur addition provides excellent machinability and chip control, making 416 particularly suitable for CNC-machined components with extensive turning, drilling, threading, and other machining operations.

Advantages

Excellent machinability, good strength, good wear resistance, and the ability to achieve increased hardness through heat treatment. Stainless Steel 416 can be machined rapidly and cleanly with conventional cutting tools, while also providing good grinding and polishing characteristics for precision components.

Disadvantages

Stainless Steel 416 has lower corrosion resistance than austenitic stainless steels such as 304 and 316. Its sulfur content, while improving machinability, also limits its suitability for certain fabrication processes and can reduce corrosion performance compared with lower-sulfur stainless grades.

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 excellent machinability, heat-treatable strength, wear resistance, and moderate corrosion resistance makes Stainless Steel 416 suitable for CNC-machined components used in automotive, aerospace, industrial, energy, and general engineering applications. It is particularly appropriate for precision parts where machining efficiency and dimensional consistency are important.

Material Specifications (For reference only.)	
Tensile strength	275MPa
Shear modulus	83GPa

Elongation at Break	30%
Hardness	156 HB
Density	7.8 g/cm ³

Attention

Stainless Steel 416 is available in annealed and heat-treated conditions, and its mechanical properties can vary significantly with heat treatment. When higher strength or hardness is required, the appropriate hardening and tempering condition should be specified. For parts exposed to corrosive environments, passivation may also be considered because sulfides exposed during machining can act as potential sites for corrosion initiation.

Applications

3DSPRO finds people using Stainless Steel 416 to make functional parts and prototypes in the following industries and applications.

Automotive parts and supplies:

Shafts, valve components, pins, bolts, fittings, and other precision mechanical parts requiring good machinability and wear resistance.

Aerospace components:

Fittings, shafts, fasteners, brackets, and other precision-machined components used in relatively moderate corrosion environments.

Industrial equipment:

Valve components, pump parts, gears, bushings, machine components, and other parts requiring efficient machining and heat-treatable hardness.

Energy and general engineering:

Threaded components, precision fittings, fasteners, couplings, and other CNC machined parts where machinability, strength, and dimensional stability are important.