

Material Information



Alloy Steel 4340

Introduction

Alloy Steel 4340, also known as AISI 4340 or UNS G43400, is a nickel-chromium-molybdenum low-alloy steel known for its high strength, toughness, ductility, fatigue resistance, and excellent hardenability. It can be heat-treated to a wide range of strength levels, making it suitable for CNC-machined components used in demanding mechanical applications.

Advantages

High strength, excellent toughness, good fatigue resistance, and superior hardenability compared with 4140-type chromium-molybdenum steels. Alloy Steel 4340 can also be machined in annealed or normalized and tempered conditions and heat-treated to achieve different combinations of strength and toughness.

Disadvantages

Alloy Steel 4340 has limited inherent corrosion resistance compared with stainless steels and may require protective treatment in corrosive environments. Its machinability also decreases as hardness and strength increase, making hardened material more demanding to machine and potentially increasing tooling wear.

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, toughness, fatigue resistance, and deep hardenability makes Alloy Steel 4340 suitable for CNC-machined components used in aerospace, automotive, defense, energy, and industrial applications. It is particularly appropriate for shafts, gears, landing-gear components, and other heavily loaded mechanical parts that require high strength and reliable performance.

Material Specifications (For reference only.)	
Tensile strength	470MPa
Shear modulus	74GPa

Elongation at Break	22%
Hardness	217 HB
Density	7.85 g/cm ³

Attention

Alloy Steel 4340 is commonly supplied in annealed, normalized, or heat-treated conditions, and its mechanical properties vary significantly with heat treatment. When machining hardened 4340, tooling and cutting conditions should be selected according to the material hardness. Welding also requires careful control because of its hardenability; suitable preheating and post-weld heat treatment may be required depending on the material condition and application.

Applications

3DSPRO finds people using Alloy Steel 4340 to make functional parts and prototypes in the following industries and applications.

Aerospace components:

Aircraft landing-gear components, shafts, fittings, structural parts, fasteners, and other highly stressed mechanical components.

Automotive and transportation:

Power-transmission shafts, gears, axles, crankshafts, and other high-strength mechanical components.

Industrial equipment:

Heavy-duty shafts, gears, bearings, dies, couplings, and other components requiring high strength, toughness, and fatigue resistance.

Energy and general engineering:

Pressure-resistant components, tool bodies, spindles, fasteners, and other CNC-machined parts subjected to high mechanical loads.