

Material Information



Aluminum 2024

Introduction

Aluminum 2024 is a high-strength 2xxx series aluminum alloy with copper as its primary alloying element. It offers a strong combination of strength, fatigue resistance, and machinability, making it a widely used material for CNC-machined components that require higher mechanical performance than general-purpose aluminum alloys.

Advantages

High strength-to-weight ratio, good fatigue performance, and good machinability with the ability to achieve a good surface finish. Aluminum 2024 is also suitable for precision CNC machining of complex mechanical components where strength and dimensional consistency are important.

Disadvantages

Aluminum 2024 has lower corrosion resistance than many other aluminum alloys, particularly 6xxx series alloys. It also has relatively poor weldability. For parts exposed to corrosive environments, protective treatments or suitable surface finishes may be required.

Tolerance

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

Recommendation

The high strength, fatigue resistance, and machinability of Aluminum 2024 make it suitable for CNC-machined components used in aerospace, automotive, and industrial applications. It is particularly well suited to structural and mechanical parts where strength and weight reduction are important.

Material Specifications (For reference only.)	
Tensile strength	348MPa
Yield strength	300MPa
Fatigue strength	138MPa
Elongation at Break	16%
Hardness	120 HB

Young's modulus	72GPa
Density	2.79 g/cm ³
Thermal conductivity	165 W/(m·°C)

Attention

Aluminum 2024 has lower inherent corrosion resistance than many other commonly machined aluminum alloys. For parts exposed to moisture, chemicals, or outdoor environments, an appropriate protective finish or coating should be considered. Clad forms of 2024 are also used when improved corrosion protection is required. The final properties of Aluminum 2024 depend on its temper, such as T3, T4, or T351, so the required temper should be specified when material performance is critical.

Applications

3DSPRO finds people using CNC-machined Aluminum 2024 for functional components and precision parts in the following industries and applications.

Aerospace components:

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

Automotive and transportation:

Mechanical brackets, shafts, housings, suspension-related components, and lightweight structural parts.

Industrial equipment:

Gears, shafts, couplings, hydraulic components, machine parts, and precision mechanical components.

General engineering:

Prototypes, fixtures, brackets, connectors, and other CNC-machined parts requiring a high strength-to-weight ratio.