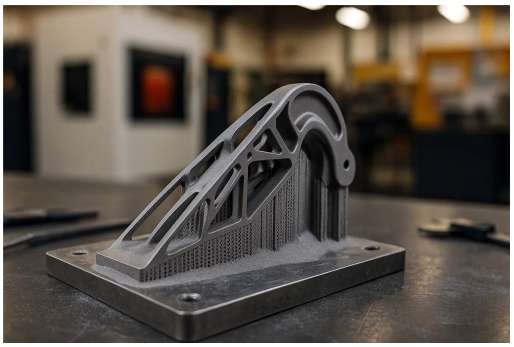
CNC MACHINING

Aluminum 7075-T6

High Strength Aerospace Alloy

Aluminum 7075-T6 is a premium aerospace alloy that provides steel-like strength while remaining lightweight. It is ideal for CNC-machined components that demand maximum performance, fatigue resistance, and tight tolerances.



MACHINING ENVELOPE	LEAD TIME	TOLERANCE	PROCESS
1000 × 600 × 500 mm	**5-7 business days**	**±0.025 mm typical**	**CNC Machining**

MECHANICAL PROPERTIES

Aluminum 7075-T6 delivers exceptional strength and fatigue resistance, giving highly stressed aerospace brackets, motorsport uprights and suspension links, and high strength structural inserts a proven alloy from prototype to production. Its balanced mechanical profile handles demanding load conditions without turning brittle and keeps parts intact under repetitive stress.

The Aluminum Association rows show what the alloy typically delivers, and the T651 rows show a stockist's typical figures for plate and bar; for design minimums, use the stock specification for the form and size. Fracture toughness depends on direction and is lowest through the thickness of the plate, so keep major loads in the plane of the plate where possible. The fatigue value comes from polished, fully reversed specimens, so machined finish, notches and corners set the real fatigue life of a part.

PROPERTY	VALUE	TEST STANDARD
Ultimate Tensile Strength (typical)	**572 MPa**	Aluminum Association typical
Yield Strength (typical)	**503 MPa**	Aluminum Association typical
Elongation at Break (typical, 1.6 mm sheet / 12.7 mm bar)	**11 %**	Aluminum Association typical
Tensile Strength (T651 plate, 6.35–12.7 mm)	**538 MPa**	Aircraft Materials typical
Yield Strength (T651 plate, 6.35–12.7 mm)	**462 MPa**	Aircraft Materials typical
Elongation (T651 plate, 6.35–12.7 mm)	**9 %**	Aircraft Materials typical
Modulus of Elasticity (average of tension and compression)	**71.7 GPa**	Aluminum Association typical
Shear Strength	**331 MPa**	Aluminum Association typical
Shear Modulus	**26.9 GPa**	ASM Aerospace Specification Metals data
Poisson's Ratio	**0.33**	ASM Aerospace Specification Metals data
Fatigue Strength (5×10^8 cycles, fully reversed)	**159 MPa**	Aluminum Association typical (R.R. Moore specimen)
Fracture Toughness K_IC (L-T / T-L / S-L)	**29 / 25 / 20 MPa·√m**	ASM Aerospace Specification Metals data
Hardness, Brinell (10 mm ball)	**150 HB**	Aluminum Association typical
Hardness, Vickers (converted from Brinell)	**175 HV**	ASM Aerospace Specification Metals data

THERMAL PROPERTIES

Aluminum 7075-T6 conducts heat far better than stainless steel, which helps housings and mounts carry heat away from components. It also expands about twice as much as steel, so check clearances where aluminum parts meet steel ones.

The solution treatment and ageing temperatures describe how the T6 temper is produced. Prolonged exposure above the ageing temperature lowers strength over time, so 7075-T6 suits parts that run at ambient or moderately warm temperatures rather than hot service.

PROPERTY	VALUE	TEST STANDARD
Melting Range (solidus – liquidus)	**477–635 °C**	Aluminum Association typical
Thermal Conductivity (25 °C)	**130 W/m·K**	Aluminum Association typical
Coefficient of Thermal Expansion (20–100 °C)	**23.6 ×10⁻⁶/K**	Aluminum Association typical
Coefficient of Thermal Expansion (20–300 °C)	**25.2 ×10⁻⁶/K**	ASM Aerospace Specification Metals data
Specific Heat	**960 J/kg·K**	ASM Aerospace Specification Metals data
Solution Heat Treatment Temperature	**466–482 °C**	ASM Aerospace Specification Metals data
Artificial Ageing Temperature (T6)	**121 °C**	ASM Aerospace Specification Metals data

PHYSICAL PROPERTIES

The low density of aluminum makes Aluminum 7075-T6 parts lightweight yet strong, which matters most for flying and moving hardware.

The composition rows are the registered limits for UNS A97075. Zinc and magnesium give the alloy its strength after ageing, while copper adds strength but lowers corrosion resistance. The machinability rating compares 7075 with other aluminum alloys, not with steel.

PROPERTY	VALUE	TEST STANDARD
Density	**2.81 g/cm³**	Aluminum Association typical
Machinability Rating (0–100 aluminum alloy scale)	**70**	ASM Aerospace Specification Metals data
Zinc (Zn)	**5.1–6.1 %**	Aluminum Association (UNS A97075)
Magnesium (Mg)	**2.1–2.9 %**	Aluminum Association (UNS A97075)
Copper (Cu)	**1.2–2.0 %**	Aluminum Association (UNS A97075)
Chromium (Cr)	**0.18–0.28 %**	Aluminum Association (UNS A97075)
Iron (Fe)	**≤ 0.50 %**	Aluminum Association (UNS A97075)
Silicon (Si)	**≤ 0.40 %**	Aluminum Association (UNS A97075)
Manganese (Mn)	**≤ 0.30 %**	Aluminum Association (UNS A97075)

Titanium (Ti)	**≤ 0.20 %**	Aluminum Association (UNS A97075)
Other Elements (each / total)	**≤ 0.05 / ≤ 0.15 %**	Aluminum Association (UNS A97075)

ELECTRICAL PROPERTIES

Aluminum 7075-T6 conducts electricity, so it suits conductive housings, grounded fixtures and functional prototypes that interact with electrical systems.

Its alloying additions make it a weaker conductor than pure aluminum or 6061, so choose those where conductivity matters most. Anodized surfaces insulate, so mask grounding points before anodizing.

PROPERTY	VALUE	TEST STANDARD
Electrical Resistivity (20 °C)	**5.15×10^{-8} Ω·m**	Aluminum Association typical

CHEMICAL PROPERTIES

These ratings are screening guidance built from general aluminum behavior and rated lower for 7075 because it contains copper. Its natural oxide film protects it in mildly acidic to mildly alkaline conditions, strong acids and alkalis attack it, and oils, hydraulic fluids and most fuels do not.

It corrodes galvanically when coupled with steel, stainless steel or copper, so isolate dissimilar fasteners. The T6 temper is more prone to stress corrosion cracking than the overaged T73-type tempers, so avoid sustained tensile stress through the plate thickness, and confirm ratings with application-specific testing.

CHEMICAL	RATING
Seawater (unprotected)	**Poor**
Atmospheric Corrosion	**Moderate**
Weak Acids	**Moderate**
Strong Acids (HCl, H_2SO_4)	**Poor**
Alkaline Solutions	**Poor**
Strong Bases (NaOH)	**Poor**
Motor Oil	**Excellent**
Hydraulic Fluids	**Excellent**
Fuels	**Good to Excellent**
Organic Solvents	**Good**

COMPLIANCE

Aluminum 7075 is registered as UNS A97075. Its plate and sheet are produced to ASTM B209, bar and rod to ASTM B211 and extrusions to ASTM B221, in tempers that include T6 and T651. Strength falls as plate gets thicker, so check the specification values for the plate thickness a part is cut from.

STANDARD	STATUS
UNS A97075 (AA 7075, ISO AlZn5.5MgCu) Registered composition: zinc 5.1–6.1%, magnesium 2.1–2.9%, copper 1.2–2.0%, chromium 0.18–0.28%	Alloy specification
ASTM B209 / B211 / B221 (7075-T6, T651) Product specifications for 7075 plate and sheet (B209), bar and rod (B211) and extrusions (B221), including the T6 and T651 tempers	Stock specification

MANUFACTURING

Colours & finishes	**Deburring, bead blasting, hard anodizing and conversion coating**
Surface finish	**As-machined Ra 1.6-3.2 µm; precision finish Ra 0.4 µm**