

Why Titanium is an attractive metal?

The basic attributes because of which titanium is an attractive metal are its great strength to weight ratio, lightweight option for use in aerospace and petrochemical engineering and outstanding corrosion resistance that make it a popular metal for use in aerospace, chemical and architectural applications. Further its biological suitability is also useful in medical sector.

Titanium is first, widely used in the chemical engineering because of its excellent corrosion resistance properties specifically towards oxidizing acids. Second, aerospace engineering in which its potential to withstand in the high temperature and light weight properties are extremely significant. It has low density and small coefficient of thermal expansion which are of great use in the aircraft industry.

Application temperature

Following the engine structure and exhaust areas that function at the very high temperature, titanium or nickel based superalloys are attractions, but weight is an issue for nickel alloys. Titanium alloys used to product engine parts can operate up to 600oC. It is used in plug and nozzles that operate at temperatures more than 600oC in some conditions. Titanium can also be used at the extremely low temperatures for structures like impellers in rocket engines.

Corrosion Resistance Properties

Titanium produces highly adherent oxide layer that immediately forms upon exposure. This layer provides outstanding corrosion resistance and makes Titanium widely useful in petrochemical, pulp, paper, architectural and chemical industries.

Property Data

Substance	Grams per cubic cm	Tensile strength in MPa
Water	1.0	liquid
Aluminium	2.7	40-50, 310 in alloy
Titanium	4.5	240-434
Zinc	7.1	110–200
Nickel	8.9	140–195
Copper	8.9	210
Lead	11.3	12
Mercury	13.6	liquid
Gold	19.3	100

Physical Properties

Property	Ti	Fe	Ni	Al
Melting Temperature (°C)	1670	1538	1455	660
Allotropic Transformation (°C)	$\beta^{882} \alpha$	$\gamma^{912} \alpha$	-	-
Crystal Structure	bcc → hex	fcc → bcc	fcc	fcc

Room Temperature E (GPa)	115	215	200	72
Yield Stress Level (MPa)	1000	1000	1000	500
Density (g/cm ³)	4.5	7.9	8.9	2.7
Comparative Corrosion Resistance	Very High	Low	Medium	High
Comparative Reactivity with Oxygen	Very High	Low	Low	High
Comparative Price of Metal	Very High	Low	High	Medium

Available Forms

Wire, wire-mesh, sheet, plate, rod, bar, pipe, tubing, flanges, strip, foil