

advantages of aluminium

Aluminium Properties

A unique combination of properties makes aluminium and its alloys one of the most versatile engineering and construction materials available today.

Lightweight

Aluminium is one of the lightest available commercial metals with a density approximately one third that of steel or copper.

Its high strength to weight ratio makes it particularly important to transportation industries allowing increased payloads and fuel savings. Catamaran ferries, petroleum tankers and aircraft are good examples of aluminium's use in transport.

Excellent Corrosion Resistance

Aluminium has excellent resistance to corrosion due to the thin layer of aluminium oxide that forms on the surface of aluminium when it is exposed to air.

In many applications, aluminium can be left in the mill finished condition. Should additional protection or decorative finishes be required, then aluminium can be either anodised or painted.

Strong

Although tensile strength of pure aluminium is not high, mechanical properties can be markedly increased by the addition of alloying elements and tempering. You can choose the alloy with the most suitable characteristics for your application. Typical alloying elements are manganese, silicon, copper and magnesium.

Strong at Low Temperatures

Where as steel becomes brittle at low temperatures, aluminium increases in tensile strength and retains excellent toughness.

Easy to Work

Aluminium can be easily fabricated into various forms such as foil, sheets, geometric shapes, rod, tube and wire. It also displays excellent machinability and plasticity ideal for bending, cutting, spinning, roll forming, hammering, forging and drawing.

Aluminium can be turned, milled or bored readily, using the correct toolage. In fact, most aluminium alloys can be machined speedily and easily. An important factor contributing to the low cost of finished aluminium parts.

Aluminium is a popular choice of material for complex-sectioned hollow extrusions. Almost any method of joining is applicable - riveting, welding, brazing or soldering. A wide variety of mechanical aluminum fasteners simplifies the assembly of many products.

Adhesive bonding of aluminium parts is successfully employed in many applications including aircraft components, car bodies and some building applications.

Good Heat Conductor

Aluminium is about three times as thermally-conductive as steel. This characteristic is important in heat-exchange applications (whether heating or cooling).

Aluminium is used extensively in cooking utensils, air conditioning, industrial heat exchangers and automotive parts.

High Reflectivity

Aluminium is an excellent reflector of radiant energy through the entire range of wave lengths. From ultra-violet through the visible spectrum to infra-red and heat waves, as well as electromagnetic waves such as radio and radar.

Aluminium has a light reflectivity of over 80% which has led to its wide use in lighting fixtures. These reflectivity characteristics also lead to its use as an insulating material. For example, aluminium roofing reflects a high percentage of the sun's heat, promoting a cool interior atmosphere in summer, yet insulating against heat loss in winter.

Good Electrical Conductor

Aluminium is one of the two common metals having electrical conductivity high enough for use as an electrical conductor. The conductivity of electrical-conductor grade (alloy 1350) is about 62% that of the International Annealed Copper Standard.

However, aluminium is only a third the weight of copper, which means it conducts about twice as much electricity as copper of the same weight.

Aluminium is widely utilised in power-transmission cables, transformers, busbars and bases of electrical bulbs.

Easy Surface Treatment

For many applications, aluminium requires no protective or decorative coating; the surface supplied is entirely adequate without further finishing. Mechanical finishes such as polishing, embossing, sand blasting, or wire brushing meet a variety of needs.

Where the plain aluminium surface does not suffice, a wide variety of surface finishes are available to suit. Chemical, electrochemical and paint finishes are all used.

Above all, anodising treatment can provide excellent corrosion resistance and a wide range of colour variations. Such finishes are widely used for both interior and exterior applications.

advantages of aluminium continued...

Non-magnetic

Aluminium has non-magnetic properties which make it useful for electrical shielding such as busbar or magnetic compass housings. Other applications include computer disks and parabolic antennas.

Non-toxic

The fact that aluminium is essentially non-toxic was discovered in the early days of the industry. It is this characteristic which enables the metal to be used in cooking utensils without any harmful effect on the body. Aluminium with its smooth surface is easily cleaned, promoting a hygienic environment for food processing. Aluminium foil wrapping and containers are used extensively and safely in direct contact with food products.

Easy to recycle

Due to a low melting temperature, it is economically recyclable, requiring only about 5% the energy required for smelting. It is an ideal material in this age of energy and resource saving.

Sound absorbing

Used for ceilings.

Shock absorbing

Due to its low modulus of elasticity, aluminium is used for automobile bumpers and the like.

Non-sparking

Aluminium is void of sparking properties against itself and other non-ferrous metals.

These are the characteristics that give aluminium its extreme versatility....

In the majority of applications, two or more of these characteristics come prominently into play;

For example, lightweight combined with strength in aircraft, railway rolling stock, trucks and other transportation equipment.

High resistance to corrosion and high thermal conductivity are important for the chemical and petroleum industries; these properties combine with non-toxicity for food processing equipment.

Attractive appearance together with high resistance to weathering and low maintenance requirements have led to extensive use in buildings of all types.

High reflectivity, excellent weathering characteristics, and light weight are all important in roofing materials.

Light weight contributes to low handling and shipping cost whatever the application.

Many applications require the extreme versatility which only aluminium possesses. Almost daily, unique combinations of these properties are being put to work in new ways.