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Abstract: *This article compares the properties and uses of aluminum with other metals such as copper, titanium, magnesium, zinc and steel.*

Keywords: *Aluminum, Metals, Comparison, Corrosion resistance, Ductility, Cost-effectiveness, Recycling, Lightweight, Weldability, Formability, electrical conductivity.*

INTRODUCTION

Aluminum is a versatile metal that is widely used in many industries and applications due to its many advantages, including lightweight, corrosion resistance, and excellent thermal and electrical conductivity. However, there are many other metals that have different properties and uses, such as steel, copper, magnesium, zinc and titanium. In this article, we will compare aluminum to other popular metals, examining their properties, advantages, and disadvantages, and exploring their common uses in various industries.

COPPER:

Copper is a very strong metal that is very conductive, making it a good metal for electrical wiring. It is also known for its corrosion resistance, which is due to the formation of a protective layer of oxide on its surface. Copper is commonly used in architecture, as well as in pipes and plumbing fixtures.

However, copper is heavier than aluminum and more expensive, which can make it less practical for certain applications. It is also more prone to tarnishing and discoloration over time.

STEEL:

Steel is a very strong, durable metal that is used in a wide range of applications, including building and construction, automotive manufacturing, and household appliances. It is an alloyed metal, which means that it is made up of two or more elements, including iron, carbon, and other metals.

Steel is stronger than aluminum, which makes it suitable for heavy-duty applications. It is also relatively inexpensive and widely available. However, it is much heavier than aluminum, which can make it less practical for transportation or other weight-sensitive applications.

TITANIUM:

Titanium is a lightweight, strong metal that is highly corrosion-resistant, making it ideal for use in marine and aerospace applications. It is also biocompatible and is used in medical implants and prosthetics.

Titanium is lighter and stronger than steel, but more expensive. It is also more difficult to work with than other metals, which can increase manufacturing costs.

ZINC:

Zinc is a lightweight, corrosion-resistant metal that is used in a wide range of applications, including building and construction, automotive manufacturing, and electrical components. It is also a popular choice for roofing, due to its low maintenance requirements and long lifespan.

Zinc is lighter than steel and copper, but heavier than aluminum. It is also more expensive than aluminum, which can make it less practical for certain applications. However, it is highly resistant to corrosion, which makes it ideal for use in harsh environments.

MAGNESIUM:

Magnesium is a lightweight, low-density metal that is used in a wide range of applications, including aerospace, automotive manufacturing, and electronics. It is one of the lightest metals available, making it ideal for applications where weight is a factor.

However, magnesium is highly combustible and can be difficult to work with. It is also less strong than other metals, which can limit its use in heavy-duty applications.

Aluminum is one of the most widely used materials in the aerospace industry. This is due to its excellent combination of mechanical properties, low density, and corrosion resistance. It is used in various forms, including sheets, plates, extrusions, forgings, and castings. Some of the commonly used aluminum alloys in aerospace applications are:

1. 2024-T3: This is a high-strength alloy used for structural components such as wing and fuselage structures, and landing gear components.

2. 7050-T7451: This is a high-strength alloy used for fuselage frames, bulkheads, and wing skins.

3. 6061-T6: This is a versatile alloy used for structural components, such as wing and fuselage structures, and fuel tanks.

4. 7075-T6: This is a high-strength alloy used for structural components, such as wing spars and landing gear.

In conclusion, aluminum is a lightweight, durable, and versatile metal that has a wide range of useful properties. Compared to other metals such as steel, zinc, and copper, it has a low density, high corrosion resistance, excellent thermal conductivity and electrical conductivity, and good machinability. These properties make aluminum highly desirable in a variety of industries, from aerospace to construction to electronics. Additionally, its recyclability and sustainability give it a unique advantage over other metals in terms of environmental impact. Overall, aluminum's unique set of properties and uses make it an essential material in modern society. Aluminum is also used extensively in the manufacturing of aircraft frames, due to its light weight and high strength. The use of

aluminum alloys in aircraft construction has revolutionized the aerospace industry, making aircraft lighter and more fuel-efficient.

LIST OF USED LITERATURE:

1. "Alyuminiy va po'lat: loyihangiz uchun qaysi material to'g'ri?", Texas Iron & Metal.: <https://www.texasironandmetal.com/aluminum-vs-steel-material-right-project/>
2. " Mis va alyuminiy - Past kuchlanishli quruq turdagi transformatorlardagi o'tkazgichlar". Electric Motors & Drives
<https://www.emd-inc.com/blog/copper-vs-aluminum-conductors-in-low-voltage-dry-type-transformers>
3. "Aluminum vs. Copper – Conductors in Electrical Systems" by Grana
<https://grana.com/blog/aluminum-vs-copper-conductors-in-electrical-systems/>
4. " Alyuminiyga qarshi Titan: afzalliklari, kamchiliklari va foydalanish " Metal Tek.
<https://www.metaltex.com/metal-blog/aluminum-vs-titanium-pros-cons-and-uses/>
5. "Aluminum vs. Magnesium: A Lightweight Comparison" by AR Metallizing.
<https://www.armetallizing.com/technical-center/aluminum-vs-magnesium-a-lightweight-comparison/>
6. "Aluminum and copper alloys compared" by Continental Steel & Tube.
<https://continentalsteel.com/aluminum-and-copper-alloys-compared/>
7. "Aluminum vs. Stainless Steel: Which Is Better for Your Project?" by IMS.
<https://www.imsfastpak.com/2019/01/17/aluminum-vs-stainless-steel-which-is-better-for-your-project/>