This 6 part series on aluminum examines the characteristics of the material and the myriad of applications in which it can be utilized.

**Aluminum and Aluminum Alloys: An Important Lightweight Component Material—Part 6**

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We previously covered the characteristics and applications of the aluminum alloy classifications: 1XXX Pure aluminum alloys, 2XXX Copper alloys, and the 3XXX Manganese alloys. We have also discussed the 4XXX Silicon alloys, 5XXX Magnesium alloys, and the 6XXX Magnesium-Silicon alloys. This final installment will conclude the presentation on aluminum alloys, by delineating the 7XXX, 8XXX, and 9XXX series.

**Zinc Alloys 7XXX**

The Aluminum-Zinc alloys may contain a range of 1 – 8% zinc. This proportion of zinc combined with a smaller percentage of magnesium results in a heat-treatable alloy with moderate to very high strength. This ultimate tensile range is 220 – 610 Mpa (32–88 ksi). These are among the strongest of the aluminum alloys. These alloys may be mechanically joined, as they are not very weldable. The atmospheric corrosion resistance is not very high as the 5XXX or 6XXX series. Zinc alloys are produced in plate and extrusions. [8]

Historically, the largest usage for the 7XXX has been in the aircraft industry. This is because it enhances the fracture-critical design applications. These will include aircraft wing structures. [7]

**Lithium Alloys 8XXX**

This category of aluminum alloys generally will include the lesser used alloying elements such as iron, nickel and lithium. These elements help to increase its ultimate tensile strength range from 120 to 240 Mpa (17 – 35 ksi). The 8XXX series is heat treatable and displays high conductivity, strength and hardness. It may be found in sheet or plate. [8]

A variety of uses exist for this group. The uncompromised electrical conductivity makes it a very useful conductor alloy. The lithium alloys because of its exceptionally high strength and stiffness is utilized in various aerospace applications helping to reduce product weight. Helicopter components may be forged of this material. [7]

**Unused Alloys 9XXX**

The 9XXX series is currently unused.

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**Reader Reply**

This month’s Tool-Tip is an answer to a question submitted by a subscriber.

**Question:** How does TuffPunch help with shock wave dispersion?

**Answer:** The TuffPunch design incorporates several items to mitigate the shock wave when perforating hard high tensile strength material. First the PS4 base tool steel has high compressive strength. This is combined with a cryogenic surface treatment to enhance this property. Additionally, the unique Tuff Punch head design incorporates a thicker 10 degree angled head. This design feature allows the perforating forces to travel up the punch shank and completely through the head. This eliminates the lateral shock waves that ordinarily produce stresses which result in punch head failure. Learn more at: daytonlamina.com/tuffpunch
The intention of this Aluminum alloy series was to describe the various metallurgical and mechanical properties of this highly used metal. The vast array of product applications across a myriad of industries makes this a formidable competitor to the large selection of steels now available.

References


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