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Al 6061 Alloy

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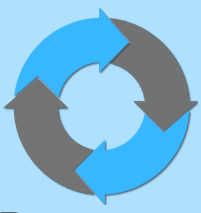
AL 6061 ALLOY

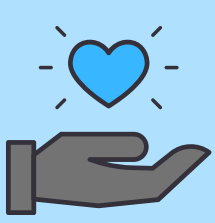


Process

Al 6061 can be manufactured using different manufacturing methods, depending on the desired mechanical properties. Annealing is one manufacturing process that involves heating Al 6061 to 775° Fahrenheit and held for 2-3hours. The second process is the tempering process which involves heating the material to 985° Fahrenheit holding for 2-3 hours and then quenching, rapidly cooling the material.

Structure

The different manufacturing processes produce a different structure for Al 6061. The annealing process allows the Mg elements to begin to melt inside the microstructure. This allows for an overall smoother grain pattern. The tempering process produces a similar structure but the instances of Mg are fewer due to the added heating and cooling processes that allowed the Mg to blend more into the Al structure.

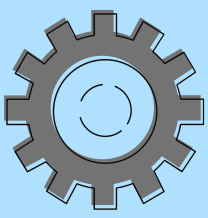


Properties

Al 6061 is widely used because of its resistance to corrosion, high strength, and low weight. Because of these three crucial traits, Al 6061 can be found in a wide variety of projects such as bicycle frames, motorboats, aviation, and marine construction.

Performance

Al 6061 has a compressive strength of 431.1 MPa and a tensile of strength of 97.5 MPa. Steel, which has a compressive and tensile strength of 500 MPa, may be stronger but is nearly three times as dense as the aluminum alloy. Al 6061 is crucial on projects where weight and strength are both critical factors.



Applications

Al 6061 has many uses. It can be seen in the frames of trucks, the skin of helicopter rotors, bridges, and boats. It can come in the form of bar, channel, pipe, and plate. All of these come in the three main tempers, O, T4, and T6.

References

https://www.onlinemetals.com/en/product-guide/alloy/6061

Microstructure Analysis on 6061 Aluminum Alloy after Casting and Diffuses Annealing Process - ScienceDirect

Hairul, Arsyad. Microstructure and Mechanical ... - Researchgate.net. www.researchgate.net/publication/348748736_Microstructure_and_Mechanical_Properties_of_Friction_Stir_Welded_AA6061AA6061_40_vol_SiC_Plates