Influences of Surface Cleanness on the Mechanical Properties of 7075 Aluminum Alloy after Heat Treatment

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ABSTRACT

This study adopts the 7075 aluminum alloys which are often used in the production of aeroplane parts to be simulated in the production of aeroplane parts. Because of oil pressure working, the oil pressure oil stained on it. After solution heat treatment and T62 artificial aging, if there is any difference in the mechanical propertie s of the stateof cleaning and noncleaning.The experimental contents including hardness testing, tensile testing, conductivity testing, intergranular corrosion testing and observation of Microstructure. In the conductivity testing result, cleaning and noncleaning alclad and noclad material all can conform to the quality demand no difference. In the results of mechanical strength, the yield strength, tensile strength and extension rate of noclad and alclad material for cleaning and noncleaning all can conform to the demand of quality document. But there are obvious differences, noncleaning specimen is lower 1.5ksi than cleaning ones at average value, and in extension rate, the noncleaning specimen is lower 1% than cleaning at average value. In HRE hardness values, nonclad and cleaning specimen is HRE 110.9-111.2, and noncleaning specimen is HRE 108.3-110.6, and noncleaning specimen is lower 1.1 HRE than cleaning one at average value. Cleaning alclad material specimen is HRE 108.6-109.2, and nocleaning is HRE 108.2-109.1, and HRE hardness values for noncleaning is lower 0.35 HRE than cleaning one at average value. Although there are differences they can also conform to the demand of quality document. The following are the values of intergranular corosion testing. The shallowest depth of cleaning nonclad specimen is 0.001 inch, and the thickest one is 0.002 inch; the shallowest depth of noncleaning nonclad viiispecimen is 0.0013 inch, and the thickest one is 0.0039 inch . the noncleaning specimen is thicker 0.003 inch~0.0019 inch than the cleaning ones; there is no obvious difference between cleaning alclad specimen and noncleaning ones. The experimental results reveal that the microstructure of cleaning and nonclean- ing of nonclad material which was under the polishing and by the observation of 200 times and 1000 times is bigger than normal, both have no phenomenon of high temperature oxidation or eutectic melting. But the surface of alclad material has the color of the oxidation. Observing the surface of nonclad material and alclad material specimen by a rate of 1000 times can find that the surface color of noncleaning for nonclad material and alclad material are murky, and they produce a hill, blister, and eutectic meltin in grain. Using the EDS to analyze the surface ingredients of specimen after the heat treatment can show that there is no unusual ingredients in noncleaning and cleaning for nonclad and alclad surface.Concluding all the results of experiment, the noncleaning pressure oil of 7075 aluminum alloys after heat treatment will cause the lower mechanical properties of nonclad, but because of the package of 7072 cladding material, there is no abvious difference for alclad material.

Keywords : 7075 Aluminum Alloy, Solution Heat Treatment, Artificial Aging, Conductivity, Intergranular Corrosion Testing

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