

The Effect of Natural Pre-Ageing on the Mechanical Properties of Rheo-High Pressure Die Cast Aluminium Alloy 2139

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Abstract

Near-net shape casting of wrought aluminium alloys has proven to be difficult due to hot tearing. The Council for Scientific and Industrial Research (CSIR) has successfully processed wrought aluminium alloy 2139 into plate castings using the Rheo-high pressure die casting process (R-HPDC). Alloy 2139 is a Ag-containing aluminium alloy from the Al-Cu-Mg 2xxx series family. The addition of Ag enhances the age hardening response through the formation of co-clusters that act as precursors to the formation of plate-like Ω precipitates. These co-clusters typically form during natural ageing and 12-24 h of natural pre-ageing is normally specified before artificial ageing in Ag-containing Al-Cu-Mg alloys. The T6 hardness and tensile properties of R-HPDC 2139 alloy were investigated with and without natural pre-ageing. It is shown that there is no significant difference in both peak hardness and tensile properties in R-HPDC alloy 2139 with and without natural pre-ageing. The possible precipitation phenomena in both cases are discussed.