Overageing characteristics of alloy A356 and Al-Mg-Si casting alloys

Solid State Phenomena

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Abstract

Al-Si-Mg casting alloys, such as Al-7Si-0.3Mg alloy A356, are heat treatable and can be precipitation hardened to the T6 temper condition. However, Al-Mg-Si casting alloys (5xx series) are generally not considered to be heat treatable. These 5xx series castings are known for good castability and good resistance to corrosion, especially in marine environments. This paper investigates the extent to which 5xx series alloys could possibly be artificially aged. The influences of artificial ageing time on the overageing characteristics of both Al-Mg-Si and A356 casting alloys have been studied. A356 aluminium alloy castings were produced using the CSIR rheo-high pressure die casting process (R-HPDC). Al-Mg-Si alloys were cast using permanent mould casting. The rate of overageing of these alloys is of importance for potential higher temperature applications. The overageing characteristics of Al-Mg-Si and A356 aluminium alloys have been investigated at an artificial ageing temperature of 190oC for ageing times up to 128 hours. It is shown that the rate of overageing of Al-Mg-Si casting alloys is lower than for alloy A356. This could possibly result in the use of these alloys in applications at temperatures that are higher than where alloy A356 can be employed. It also allows the possibility of using the 5xx series alloys as an alternative to other Al-alloys for R-HPDC applications.