

Abstract

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Effect Of Mould Type and Solidification Time On Bifilm Defects and Mechanical Properties Of Al-7Si-0.3Mg Alloy Castings

The properties of light alloy castings are strongly affected by their inclusion content, particularly double oxide film defects (bifilms), which not only decrease the tensile and fatigue properties, but also increase their scatter. Recent research has suggested that oxide film defects may alter with time, as the air inside the bifilm would react with the surrounding melt, while the hydrogen dissolved in the melt could diffuse into the bifilm cavity to form hydrogen porosity. The mechanical properties of the casting were shown to be significantly dependent upon the new morphology of its entrained bifilms. In this work, the Weibull moduli of the tensile properties of three Al castings, all expected to contain oxide films of, approximately, the same amount were compared. The first casting was poured into a resin-bonded sand mould while the second and third castings were poured into ceramic moulds with the mould for the third casting being preheated prior to pouring. The results of mechanical property analysis and electron microscopy examination suggested a considerable influence of the type of the mould and the solidification time on the morphology of bifilms and by implication, on the reliability and reproducibility of the tensile properties.