

Abstract

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Oxide Film Defects in Al Alloy Castings

The properties of light alloy castings are strongly affected by their inclusion content, particularly double oxide films (bifilms), defects 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. In this work, the effect of time on double oxide film defects has been studied for different Al alloys. The results suggested that bifilm defects once entrained experience changes in their internal atmospheres which significantly affect their morphology and their influence on mechanical properties. These changes involve the consumption of both oxygen and nitrogen inside the defect (with the former occurring first), which was enhanced mechanical properties, but this was followed by hydrogen diffusion into the bifilms with a corresponding decrease in properties.