Abstract

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THE BEHAVIOUR OF ENTRAINMENT DEFECTS IN ALUMINIUM ALLOY CASTINGS

The results of experiments are reported in which air bubbles were held for varying lengths of time in melts of three different Al alloys, (commercially pure AI, Al-7Si-0.3Mg, (2L99), and Al- 5Mg alloy), with the air bubbles acting as analogs for the behavior of the interior atmosphere of double oxide film defects. After solidification a Pore Gas Analyser was used to measure the contents of the bubble, to determine how their oxygen, nitrogen and hydrogen content varied over time in the different alloys. The results showed that, firstly, oxygen should be consumed by reaction with the surrounding melt to form an oxide, followed by nitrogen, forming a nitride, probably A1N. Simultaneously, hydrogen dissolved in the melt passed in to the air bubble. At the end of the 40 minute holding period the air bubbles, and by analogy the interior atmosphere of a double oxide film defect, largely consisted of a nitrogen/hydrogen atmosphere. The reaction rates obtained from these experiments were used to estimate the time taken for the interior atmosphere of a typical double oxide film defect to be consumed, which was found to vary with alloy type, and to be about 25 minutes in the case of a defect in the Al- 7Si-0.3 Mg alloy.