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Metallograpy of Remelted A356 Aluminium following Squeeze Casting

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Abstract : The demand for lightweight parts with high mechanical strength(s) and integrity, in sectors such as the aerospace and automotive is ever increasing, motivated by the need for weight reduction in order to increase fuel efficiency with components usually manufactured using a high grade primary metal or alloy. For components manufactured using the squeeze casting process, this alloy is usually A356 aluminium (Al), it is one of the most versatile Al alloys; and is used extensively in castings for demanding environments. The A356 castings provide good strength to weight ratio making it an attractive option for components where strength has to be maintained, with the added advantage of weight reduction. In addition, the versatility in castabilitiy, weldability and corrosion resistance are other attributes that provide for the A356 cast alloy to be used in a large array of industrial applications. Conversely, it is rare to use remelted Al in these cases, due the nature of the applications of components in demanding environments, were material properties must be defined to meet certain specifications for example a known strength or ductility. However the use of remelted Al, especially primary grade Al such as A356, would offer significant cost and energy savings for manufacturers using primary alloys, provided that remelted aluminium can offer similar benefits in terms of material microstructure and mechanical properties. This study presents the results of the material microstructure and properties of 100% primary A356 Al and 100% remelt Al cast, manufactured via the direct squeeze cast method. The microstructures of the castings made from remelted A356 Al were then compared with the microstructures of primary A356 Al. The outcome of using remelting Al on the microstructure was examined via different analytical techniques, optical microscopy of polished and etched surfaces, and scanning electron microscopy. Microstructural analysis of the 100% remelted Al when compared with primary Al show similar α-Al phase, primary Al dendrites, particles and eutectic constituents. Mechanical testing of cast samples will elucidate further information as to the suitability of utilising 100% remelt for casting.

Keywords : A356, microstructure, remelt, squeeze casting
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