

MECHANICAL BEHAVIOUR OF ALUMINIUM 6061 ALLOY REINFORCED WITH Al₂O₃ & GRAPHITE PARTICULATE HYBRID METAL MATRIX COMPOSITES

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ABSTRACT

Aluminium metal matrix composites (MMCs) have gained importance in various industries because of their good mechanical properties such as wear resistance, low density, high strength and good structural rigidity. Aluminium MMCs are preferred in the fields of aerospace, military, automotive, marine and in many other domestic applications. In this study, it is intended to develop and study the mechanical behaviour of Al6061/Al₂O₃/Graphite reinforced hybrid Aluminium metal matrix composites. The composite is prepared by using Liquid Metallurgy Route (Stir Casting Technique), although powder metallurgy produces better mechanical properties in MMCs, liquid state has some important advantages such as better matrix particle bonding, easier control of matrix structure, simplicity, low cost of processing, nearer to net shape and wide selection of material. Al6061 alloy is taken as the base matrix to which Al₂O₃ and graphite particulates are used as reinforcements. 6 wt% of Al₂O₃ is added to the base matrix, whereas, the graphite is varied from 2, 4 and 6 wt% into the base matrix. For each composite, re-inforcement particles are pre-heated to a temperature of 200°C and then dispersed in steps of 3 into the vortex of molten Al6061 alloy to improve wettability and distribution. The hardness and tensile properties of prepared composites were examined. Mechanical properties like hardness and tensile strength of Al6061 alloy was increased by addition Al₂O₃ particles. The Micro-Vickers hardness of the Al6061-6wt% Al₂O₃ was found to decrease with addition of graphite content in the composite but the effect of graphite content on tensile strength of the composite was less.

KEYWORDS: 6061Al Alloy, Al₂O₃ and Graphite Particulates, Tensile Strength, Hardness, Hybrid Metal Matrix Composites, Stir-Casting