

STUDIES ON MECHANICAL AND METALLOGRAPHIC ASPECTS OF DIFFUSION BONDING OF AA7075 ALUMINIUM ALLOY AND AZ80 MAGNESIUM ALLOY

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ABSTRACT

The major issue faced by Al and Mg alloys while joining using conventional welding techniques is the formation of oxide films and brittle intermetallics in the bond region. Hence, in this study, an attempt is made to join AZ80 Magnesium alloy with AA7075 Aluminium alloy using the diffusion bonding process. Experimental trials are carried out by maintaining bonding time and pressure constant in a vacuum while varying the temperature. The welded specimens are subjected to mechanical tests and metallographic examinations to evaluate the bond integrity, strength and quality. The tensile shear strength of the bonded specimens is found to typically increase with increasing temperature. The width of the intermetallics is narrower for lower diffusion bonding temperatures and tends to increase with the rise in joining temperature due to the increase in the inter-diffusion of molecules. The microstructures also reveal the grain growth in the bonded material due to recrystallization. Equiaxed and more homogeneous grains are observed in the bonded region due to the negligible or absence of heat affected zone.

KEY WORDS: Diffusion bonding, AZ80, AA7075, tensile testing.

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