

GMA Spot Welding of A7075-T651/AZ31B Dissimilar Alloys Using Stainless Steel Filler

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ABSTRACT

The aim of this research was to investigate the welding joint's fracture toughness and fracture surface morphologies between A7075-T651 aluminum and AZ31B magnesium dissimilar alloys welded using a new technique of gas metal arc spot lap welding with unconventional ER308L-Si stainless steel filler. The fracture toughness of the welding joints was estimated from yield strength and absorbed charpy impact energy of the joints using Rolfe–Novak–Barsom correlation, and was compared with the fracture toughness of AZ31B parent metal. Fracture surface morphologies were investigated by scanning electron microscopy. The results showed that the joint can achieve a maximum fracture toughness of 93.08% of the AZ31B parent metal. Most of the joints failed at AZ31B alloy, while some failed at A7075-T651 alloy and ER308L-Si nugget. Brittle fracture mechanism was observed for all the joints. It was found that the new gas metal arc spot lap welding technique with ER308L-Si filler could offer very good mechanical properties.

KEYWORDS: A7075-T651, AZ31B, Dissimilar, Fracture, GMA, Spot, Toughness, Welding

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