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Friction stir welding between the high-pressure die casting of AZ91 magnesium alloy and A383 aluminum alloy

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Friction stir welding between the high-pressure die casting of AZ91 magnesium alloy and A383 aluminum alloy

ABSTRACT

Defect-free Friction stir welded joints between the AZ91 Mg alloy and A383 Al alloy were obtained at a welding speed of 40 mm/min and a rotational speed of 900 rpm. Mg and Al were intermixed and presented intercalated strips microstructure. The second phases Si, Al₃Mg₂, Al₁₂Mg₁₇ and Mg₂Si distributed uniformly in stir zone at a rotational speed of 900 rpm, and there is a narrow intermetallic compounds layer (~10 μm) at the interface of the two base metals. The tensile strength of the dissimilar AZ91/A383 joint is 93 MPa, which is approximately 45% of the A383 alloy. The sufficient material intermixing and uniform distribution of second phases are helpful to the joint properties.

Keywords: Friction stir welding; Microstructure; Mechanical properties; High-pressure die casting alloys ; AZ91 magnesium alloy; A383 aluminum alloy

1. Introduction

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