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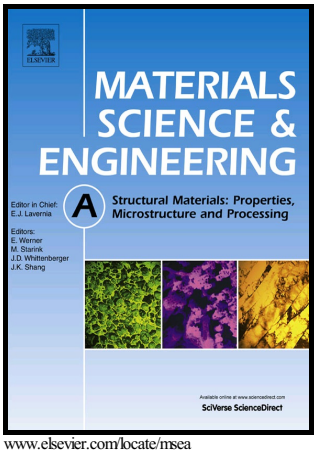

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Friction stir butt welding of strain-hardened aluminum alloy with high strength steel

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Abstract

Dissimilar metal joining is challenging because of intermetallic compound (IMC) formation. Solid state welding techniques provide an opportunity. 5083-H116 aluminum alloy and HSLA-65 steel sheets were butt welded by friction stir welding. Joint strength and failure position were determined by IMC thickness and stress concentration at welded interface.

Keywords: friction stir welding; dissimilar; high strength steel; stress concentration; digital image correlation

1. Introduction

Combination of Al and steel has attracted significant attention because of its great application potential in industry due to light weighting requirements [1-3]. Solid state joining methods such as friction stir welding (FSW) [4], friction welding [5] and hybrid metal extrusion and bonding [6] with lower welding heat input have been favored as compared with conventional fusion welding techniques. Limited chemical reaction and diffusion between Al and steel generally