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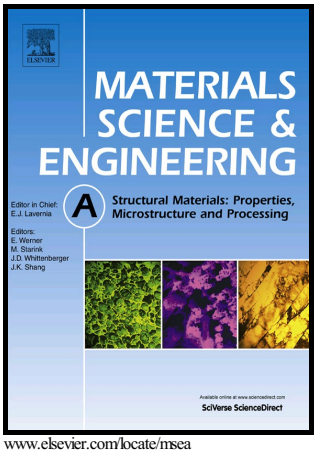

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Effect of Process Parameters on Microstructure and Mechanical Behaviors of Friction Stir Linear Welded Aluminum to Magnesium

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Abstract

The microstructure and lap-shear behaviors of friction stir linear welded wrought Al alloy AA6022-T4 to cast Mg alloy AM60B joints were examined. A process window was developed to initially identify the potential process conditions. Multitudes of welds were produced by varying the tool rotation rate and tool traverse speed. Welds produced at 1500 revolutions per minute (rpm) tool rotation rate and either 50 mm/min or 75 mm/min tool traverse speed displayed the highest quasi-static failure load of ~3.3 kN per 30 mm wide lap-shear specimens. Analysis of cross sections of untested coupons indicated that the welds made at these optimum welding parameters had negligible microvoids and displayed a favorable weld geometry for the cold lap and hook features at the faying surface, compared to welds produced using other process parameters. Cross sections of the tested coupons indicated that the dominant crack initiated on the advancing side and progressed through the weld nugget, which consists of intermetallic