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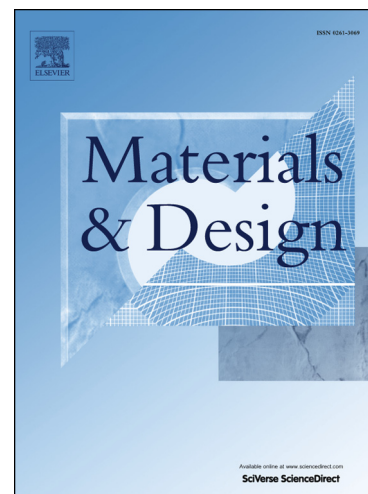
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Effect of welding parameters on microstructure and mechanical properties of friction stir welded joints of a super high strength Al-Zn-Mg-Cu aluminum alloy

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Abstract

Samples made of a super high strength aluminum alloy with high Zn content were friction stir welded with rotation rates of 350-950rpm and welding speeds of 50-150mm/min. The effect of welding parameters on the microstructure and mechanical properties was investigated. It was observed that the grain size of the nugget zones decreased with the increasing welding speed or the decreasing tool rotation rate. Most of the strengthening precipitates in the nugget zone were dissolved back and the intragranular and grain boundary precipitates in the heat affected zone coarsened significantly. The greatest ultimate tensile strength of 484 MPa and largest elongation of 9.4 were obtained at 350 rpm-100mm/min and 350 rpm-50mm/min, respectively. The ultimate tensile strength and elongation deteriorated drastically when rotation rate increased from 350 to 950rpm at a constant welding speed of 100 mm/min.

Keywords: Super high strength aluminum alloy; Friction stir welding; Microstructure; Mechanical properties

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