

Accepted Manuscript

Title: Optimizing weld quality of a friction stir welded aluminum alloy

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PII: S0924-0136(15)00021-7
DOI: <http://dx.doi.org/doi:10.1016/j.jmatprotec.2015.01.019>
Reference: PROTEC 14260

To appear in: *Journal of Materials Processing Technology*

Received date: 12-9-2014
Revised date: 16-1-2015
Accepted date: 20-1-2015

Please cite this article as: <doi><http://dx.doi.org/10.1016/j.jmatprotec.2015.01.019></doi>

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Optimizing weld quality of a friction stir welded aluminum alloy *H. Doude¹, J. Schneider¹, B. Patton¹, S. Stafford¹, T. Waters¹, C. Varner¹*

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Abstract

A series of welds were completed at various processing parameters for a threaded tool in butt friction stir welded (FSWed) panels of AA 2219-T87 to determine the optimal welding parameters. The panels were sectioned transversely along the entire panel and characterized by tensile tests, hardness, and macrostructure imaging. High speed data acquisition collected the force data during the welds. X-ray diffraction was used to interpret the qualitative amount of equilibrium 2nd phases present. Variations in the mechanical properties were correlated with volumetric defects and metallurgical changes in the precipitate state. An optimal parameter window was chosen based on the UTS, hardness, changes in the weld forces, and the presence of volumetric defects. Guidelines were developed for future production welding of precipitation hardened aluminum alloys.

Keywords: friction stir welding, process parameters, weld quality

1 Introduction

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