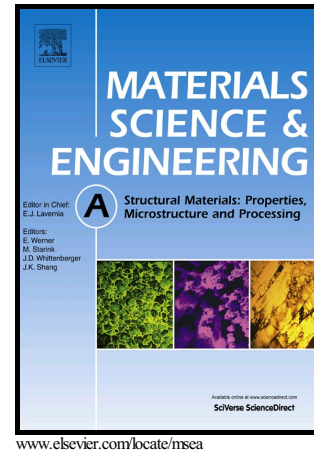


Author's Accepted Manuscript

Microstructure-based modeling of tensile deformation of a friction stir welded AZ31 Mg alloy

Weijun He, Li Zheng, Renlong Xin, Qing Liu



PII: S0921-5093(17)30070-9
DOI: <http://dx.doi.org/10.1016/j.msea.2017.01.053>
Reference: MSA34615

To appear in: *Materials Science & Engineering A*

Received date: 21 October 2016
Revised date: 5 January 2017
Accepted date: 18 January 2017

Cite this article as: Weijun He, Li Zheng, Renlong Xin and Qing Liu
Microstructure-based modeling of tensile deformation of a friction stir welded
AZ31 Mg alloy, *Materials Science & Engineering A*
<http://dx.doi.org/10.1016/j.msea.2017.01.053>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Microstructure-based modeling of tensile deformation of a friction stir welded AZ31 Mg alloy

Weijun He^{1*}, Li Zheng², Renlong Xin^{1*}, Qing Liu¹

¹College of Materials Science and Engineering, Chongqing University, Chongqing 400044, China;

²College of Materials Science and Engineering, Shenyang University of Technology, Shenyang 110870, China;

weijun.he@cqu.edu.cn

rlxin@cqu.edu.cn

*Corresponding author.

*Co-corresponding author.

Abstract

The deformation and fracture behaviors of friction stir welded (FSWed) Mg alloys are topics under investigation. The microstructure and texture of a FSWed Mg alloy were characterized by electron back scattered diffraction. Four characteristic sub-zones with different orientations in the FSWed Mg alloy joint were identified. The texture distribution across the stir zones and transition zone were obviously inhomogeneous. For comparison, four sub-regions in the base material were also characterized. Based on the experimental microstructure and texture, a crystal plasticity finite element model was developed to represent the friction stir welded Mg alloy. Simulations were carried out to study the effect of texture variation on the deformation behaviors during transverse tension. Compared with the base material case, strong macroscopic strain localization was observed for the FSWed joint case after transverse tension. Strain localization may have contributed to the decayed elongation of the FSWed joint in the transverse tension. Texture variation in the thermal-mechanical affected zone did not change the deformation mechanism in the stir zones, while it did decrease the strain localization, thus assuming to improve the elongation of the friction stir welded Mg alloy.

Keywords: Mg alloy; Friction stir welding; Crystal plasticity finite element method; Texture; Deformation mechanism

1. Introduction

Download English Version:

<https://daneshyari.com/en/article/5456240>

Download Persian Version:

<https://daneshyari.com/article/5456240>

[Daneshyari.com](https://daneshyari.com)