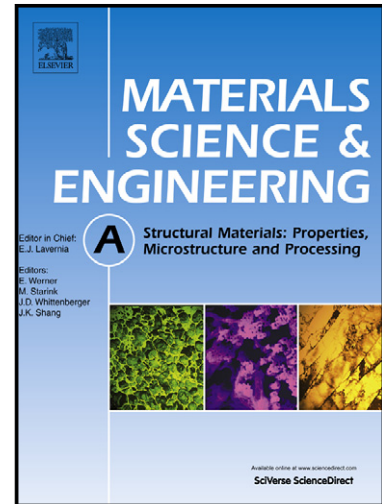


# Author's Accepted Manuscript

Influence of tube spinning on formability of friction stir welded aluminum alloy tubes for hydroforming application

X.S. Wang, Z.L. Hu, S.J. Yuan, L. Hua



[www.elsevier.com/locate/msea](http://www.elsevier.com/locate/msea)

PII: S0921-5093(14)00416-X  
DOI: <http://dx.doi.org/10.1016/j.msea.2014.03.125>  
Reference: MSA30974

To appear in: *Materials Science & Engineering A*

Received date: 22 December 2013  
Revised date: 25 March 2014  
Accepted date: 26 March 2014

Cite this article as: X.S. Wang, Z.L. Hu, S.J. Yuan, L. Hua, Influence of tube spinning on formability of friction stir welded aluminum alloy tubes for hydroforming application, *Materials Science & Engineering A*, <http://dx.doi.org/10.1016/j.msea.2014.03.125>

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.

# Influence of tube spinning on formability of friction stir welded aluminum alloy tubes for hydroforming application

X.S. Wang<sup>1</sup>, Z.L. Hu<sup>1,2,3</sup>, S.J. Yuan<sup>1</sup>, L. Hua<sup>2</sup>

1. State Key Laboratory of Advanced Welding and Joining, Harbin Institute of Technology, Harbin 150001, PR China

2. Hubei Key Laboratory of Advanced Technology of Automobile Parts, Wuhan University of Technology, Wuhan 430070, PR China

3. State Key Laboratory of Materials Processing and Die & Mould Technology, Huazhong University of Science and Technology

## Abstract

Due to economic and ecological reasons, the application of tailor-welded blanks of aluminum alloy has gained more and more attention in manufacturing lightweight structures for automobiles and aircrafts. In the study, the research was aimed to highlight the influence of spinning on the formability of FSW tubes. The microstructural characteristics of the FSW tubes during spinning were studied by electron backscattered diffraction (EBSD) and transmission electron microscopy (TEM). The formability of the FSW tubes with different spinning reduction was assessed by hydraulic bulge test. It is found that the spinning process shows a grain refinement of the tube. The grains of the FSW tube decrease with increasing thickness reduction, and the effect of grain refinement is more obvious for the BM compared to that of the weld. The difference of grain size and precipitates between the weld and BM leads to an asymmetric W-type microhardness distribution after spinning. The higher thickness reduction of the tube, the more uniform distribution of grains and precipitates it shows, and consequently results in more significant increase of strength. As compared with the result of tensile test, the tube after spinning shows better formability when the stress state changes from uniaxial to biaxial stress state.

**Keywords:** Friction stir welding; Aluminum alloy; Spinning; Hydroforming; Formability

Download English Version:

<https://daneshyari.com/en/article/1574969>

Download Persian Version:

<https://daneshyari.com/article/1574969>

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