

Accepted Manuscript

Weldability of an iron meteorite by Friction Stir Spot Welding a contribution to in-space manufacturing

William Todd Evans, Kelsay E. Neely, Alvin M. Strauss, George E. Cook



PII: S0094-5765(16)31407-2

DOI: [10.1016/j.actaastro.2017.09.001](https://doi.org/10.1016/j.actaastro.2017.09.001)

Reference: AA 6452

To appear in: *Acta Astronautica*

Received Date: 29 December 2016

Revised Date: 10 July 2017

Accepted Date: 1 September 2017

Please cite this article as: W.T. Evans, K.E. Neely, A.M. Strauss, G.E. Cook, Weldability of an iron meteorite by Friction Stir Spot Welding a contribution to in-space manufacturing, *Acta Astronautica* (2017), doi: 10.1016/j.actaastro.2017.09.001.

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 proof before it is published in its final 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.

Weldability of an Iron Meteorite by Friction Stir Spot Welding

A Contribution to In-Space Manufacturing

William Todd Evans, Kelsay E. Neely, Alvin M. Strauss, George E. Cook

William Todd Evans¹
William.t.evans@Vanderbilt.edu

Kelsay E. Neely¹
kelsay.e.neely@Vanderbilt.Edu

Alvin M. Strauss¹,
Al.Strauss@Vanderbilt.edu

George E. Cook¹
George.E.Cook@Vanderbilt.edu

¹Department of Mechanical Engineering, Vanderbilt University, 101 Olin Hall, 2400 Highland Avenue, Nashville, TN 37235, United States of America

Corresponding Author: William T. Evans, +1 (615) 875-9438

Abstract

Friction Stir Welding has been proposed as an efficient and appropriate method for in space welding. It has the potential to serve as a viable option for assembling large scale space structures. These large structures will require the use of natural in space materials such as those available from iron meteorites. Impurities present in most iron meteorites limit its ability to be welded by other space welding techniques such as electron beam laser welding. This study investigates the ability to weld pieces of in situ Campo del Cielo meteorites by Friction Stir Spot Welding. Due to the rarity of the material, low carbon steel was used as a model material to determine welding parameters. Welded samples of low carbon steel, invar, and Campo del Cielo meteorite were compared and found to behave in similar ways. This study shows that meteorites can be Friction Stir Spot Welded and that they exhibit properties analogous to that of FSSW low carbon steel welds. Thus, iron meteorites can be regarded as another viable option for in-space or Martian construction.

Keywords

Friction Stir Spot Welding, Friction Stir Welding, meteorite, in-space construction, invar, low carbon steel

Funding

This work was supported by the NASA Tennessee Space Grant Consortium.

Download English Version:

<https://daneshyari.com/en/article/5472134>

Download Persian Version:

<https://daneshyari.com/article/5472134>

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