

Accepted Manuscript

Microstructure and Fatigue Behavior of Novel Multi-Ring Domed Resistance Spot Welds for Thin X626-T4 Aluminum Sheets

Liting Shi, Jidong Kang, David R. Sigler, Amberlee S. Haselhuhn, Blair E. Carlson

PII: S0142-1123(18)30396-7

DOI: <https://doi.org/10.1016/j.ijfatigue.2018.08.022>

Reference: JIJF 4818

To appear in: *International Journal of Fatigue*

Received Date: 16 May 2018

Revised Date: 9 August 2018

Accepted Date: 13 August 2018

Please cite this article as: Shi, L., Kang, J., Sigler, D.R., Haselhuhn, A.S., Carlson, B.E., Microstructure and Fatigue Behavior of Novel Multi-Ring Domed Resistance Spot Welds for Thin X626-T4 Aluminum Sheets, *International Journal of Fatigue* (2018), doi: <https://doi.org/10.1016/j.ijfatigue.2018.08.022>

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.



Microstructure and Fatigue Behavior of Novel Multi-Ring Domed Resistance Spot Welds
for Thin X626-T4 Aluminum Sheets

Liting Shi ^{a, b*}, Jidong Kang ^a,

David R. Sigler ^c, Amberlee S. Haselhuhn ^c, Blair E. Carlson ^c

^a CanmetMATERIALS, 183 Longwood Road South, Hamilton, ON L8P 0A5, Canada

^b School of Chemical Engineering and Technology, Tianjin University, Tianjin 300072, China

^c General Motors Global R&D Center, 30500 Mound Road, Warren, MI 48092-2031, USA

*Corresponding author: liting.shi@canada.ca (Liting Shi)

Abstract

Resistance spot welding of aluminum alloys is increasingly used in the automotive industry for vehicle lightweighting and better fuel efficiency. In this contribution, General Motor's aluminum spot welding process including Multi-Ring Domed (MRD) electrodes and Conditioning, Shaping, and Sizing (CSS) weld schedule were used for welding of 0.8-mm thick X626-T4 aluminum alloy sheet. The resultant spot welds had an equiaxed grain structure adjacent to the weld nugget periphery. Within the weld nugget, fine columnar grains were found at the nugget perimeter, while welding defects were concentrated in the centre of the nugget. Using modified shear specimens, it was determined that the weld nugget is the weakest location while the heat affected zone is enhanced by precipitation aging due to a combination of welding and paint bake thermal cycles. We then derived a new equation for calculating minimum weld nugget diameters to ensure that interfacial fracture would not occur during tensile and fatigue testing. Load controlled fatigue test results showed that using structural stress

Download English Version:

<https://daneshyari.com/en/article/11263146>

Download Persian Version:

<https://daneshyari.com/article/11263146>

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