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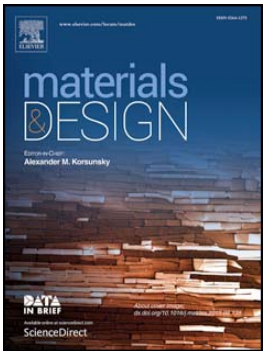

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PII: S0264-1275(16)30920-0
DOI: doi: 10.1016/j.matdes.2016.07.029
Reference: JMADE 2033

To appear in:

Received date: 10 June 2016
Revised date: 4 July 2016
Accepted date: 7 July 2016

Please cite this article as: Rezwanul Haque, Yvonne Durandet, Strength prediction of self-pierce riveted joint in cross-tension and lap-shear, (2016), doi: 10.1016/j.matdes.2016.07.029

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Strength prediction of self-pierce riveted joint in Cross-Tension and Lap-Shear

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Abstract

This paper describes a parametric study of the mechanical behaviour of self-pierced riveted (SPR) joints of steel sheets in two loading conditions (lap-shear and cross-tension). Higher strength was always observed in lap-shear testing than in cross-tension. In both loading conditions, the strength of a joint was greatly influenced by the hardness and thickness of sheet materials and die depth. An empirical model was developed to predict the joint strength in cross-tension loading using characteristic joint data determined directly from the SPR process (force-displacement) curve. All predictions of joint strength fell within 10% of the measured joint strength. Finally, a relationship was established between the joint strength in lap shear and cross-tension with less than 8% error. The developed relationship provides a useful tool for further studies especially for different rivet and die geometry.

Key words: Self-piercing riveting, SPR, Joint strength, Analytical model, Cross-tension, Lap-shear.

1. Introduction

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