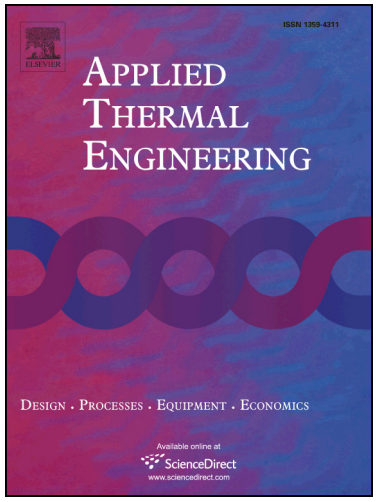

Research Paper

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PII: S1359-4311(17)30121-7
DOI: http://dx.doi.org/10.1016/j.applthermaleng.2017.04.142
Reference: ATE 10291

To appear in: *Applied Thermal Engineering*

Received Date: 16 February 2017
Revised Date: 24 April 2017
Accepted Date: 26 April 2017

Please cite this article as: P. Zhang, T. Cui, Q. Li, Effect of Surface Roughness on Thermal Contact Resistance of Aluminium Alloy, *Applied Thermal Engineering* (2017), doi: http://dx.doi.org/10.1016/j.applthermaleng.2017.04.142

Effect of Surface Roughness on Thermal Contact Resistance of Aluminium Alloy

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Abstract: The thermal contact resistance (TCR) between aluminium alloy materials is a universal phenomenon in many application fields. Since thermal interface materials are not suitable for all interface contact structures in design engineering, TCR in practical engineering has many problems. This study investigated the TCR of five types of aluminium alloy materials through experimental measurement and detailed analysis. The surface morphology of the contact surfaces were characterized by differences in average roughness (Ra) produced by a lathe with different feeding speeds. The results indicated that due to the different morphology and contact randomness of the two surfaces during contact, TCR was not directly related to surface roughness. Further, surface roughness and surface flatness had a coupled effect on TCR and most importantly, the pursuit of high surface finishes by costly machine processes and loading pressures could not effectively enhance the heat transfer of the contact surfaces.

Key words: thermal contact resistance; aluminium alloy material; roughness; heat transfer of contact surface