

The role of tool offset on the microstructure and mechanical properties of Al/Cu friction stir welded joints

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ABSTRACT

In this study, dissimilar butt joining of 6061 aluminum alloy and commercially pure copper via friction stir welding was performed with varying tool offset value. The mechanical properties were compared using transverse tensile testing. It was found that as the tool offset decreased from a position of 2 mm–0 mm, the ultimate tensile strength of the welded joint increased, and then decreased drastically when the offset was more than 1.6 mm. X-ray tomography results showed that an effective mechanical interlocking structure was formed with a chaotic interface along the joint line. In addition, in-situ tool temperatures measurement showed that the stir zone peak temperature was highly dependent on tool offset.

KEYWORDS

Friction stir welding; Intermetallic compounds; Microstructure; Mechanical properties; Temperature

ACKNOWLEDGEMENT

This work was supported by the Priority Academic Program Development of Jiangsu Higher Education Institutions (PAPD); the Nanjing University of Aeronautics Astronautics PhD short-term visiting scholar project [grant number 180105DF06]; and China Scholarship Council (CSC).