

Strain flow localization across the dissimilar friction stir joints between AA6061-T6 and AA7075-T6 alloys during tensile loading

N. Dimov^{a,b,c}, T. Sapanathan^d, F. Khodabakhshi^{a*}, S. Krishnamurthy^a, J. Benoist^c, E. Charkaluk^b, A. Simar^a

^a UCLouvain, iMMC, Louvain-la-Neuve, Belgium

^b LMS, CNRS, Ecole Polytechnique, Institut Polytechnique de Paris, Palaiseau, France

^c Thales Global Services (TGS), 19 Avenue Morane Saulnier, Velizy-Villacoublay, 78140, France

^d Curtin Corrosion Centre, WA School of Mines: Minerals, Energy and Chemical Engineering, Faculty of Science and Engineering, Curtin University, Perth, WA, Australia

*Presenting author: E-mail: farzad.khodabakhshi@uclouvain.be (F. Khodabakhshi)

Abstract

Butt-joint friction stir welding (FSW) technology was utilized to fabricate dissimilar welds between AA6061-T6 and AA7075-T6 aluminum alloys under various processing conditions. Similar welds of these alloys were also manufactured using the same FSW parameters for comparison. Subsequently, different microstructural characterizations were conducted to study the integrity of both similar and dissimilar weldments, focusing on material flow profiles and intermixing. Following this, the transverse tensile fracture of the welds was analyzed using digital image correlation (DIC) techniques. This analysis examined the strain localization behavior of the processed weldments based on the evaluated FSW parameters, revealing the grain structure in different regions and the material flow profiles.

Keywords: Friction stir welding (FSW); Aluminum alloys; Microstructure; Digital image correlation (DIC); Strain localization.