World Academy of Science, Engineering and Technology
International Journal of Materials and Metallurgical Engineering
Vol:8, No:05, 2014

The Strength and Metallography of a Bimetallic Friction Stir Bonded Joint between AA6061 and High Hardness Steel

Authors : Richard E. Miller

Abstract : 12.7-mm thick plates of 6061-T6511 aluminum alloy and high hardness steel (528 HV) were successfully joined by a friction stir bonding process using a tungsten-rhenium stir tool. Process parameter variation experiments, which included tool design geometry, plunge and traverse rates, tool offset, spindle tilt, and rotation speed, were conducted to develop a parameter set which yielded a defect free joint. Laboratory tensile tests exhibited yield stresses which exceed the strengths of comparable AA6061-to-AA6061 fusion and friction stir weld joints. Scanning electron microscopy and energy dispersive X-ray spectroscopy analysis also show atomic diffusion at the material interface region.

Keywords : dissimilar materials, friction stir, welding, materials science
Conference Title : ICMMSE 2014 : International Conference on Manufacturing and Materials Science and Engineering
Conference Location : Amsterdam, Netherlands
Conference Dates : May 15-16, 2014