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ABSTRACT BOOK

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**Effect of Friction Time on Mechanical and Microstructure
Properties of Aluminum – Ceramic Dissimilar Joints**

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ABSTRACT

The ceramic-Aluminum contact has strongly existed in modern tools, due to the particular combination of metal properties such as ductility, high electrical and thermal conductivity and the ceramics properties like the high hardness, the corrosion and the wear resistance. In recent years, a several techniques have been developed to achieve good contact or total bonding between these materials such as diffusion bonding, brazing, ultrasonic joining and friction welding.

In this experimental work, AA1100 aluminum alloy rods was friction welded to Alumina 99.9 wt% ceramic rods, and the effect of friction time on mechanical and structural properties of welded joints are investigated. The welding process was carried out by a direct friction welding machine. The welding specimens were rotated at a constant rotational speed of 900 rpm, a friction pressure of 20 MPa, a forging force of 18 MPa and a forging time of 3 sec. Three different friction times were applied 4, 5 and 6 seconds. Three point bending test and Vickers microhardness measurements are used to evaluate the strength of joints and study the mechanical properties in weld region. The microstructures of joints and fracture surface of the joint interface were examined by optical microscopy, SEM and EDS. The experimental results show that bending strength increases with increasing friction time. The SEM observation shows that the increase in friction time led to the appearance of cracks in the microstructure of the interface area, which means that the long heating rate influenced the microstructure of the weld.

Keywords: *Friction Welding, Alumina, AA1100 Aluminum alloy*

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