**Microstructural study and Mechanical behavior of AA6061-AA8011 aluminum Alloy sheets joined by friction stir welding**

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***Abstract*— Friction Stir Welding (FSW ) a recent technique was invented by The Welding Institute (TWI) in 1991, which uses a non-consumable rotating welding tool to create frictional heat and plastic deformation at the welding location and affecting the formation of a joint while the material is in the solid state. In this work Friction Stir butt Welding on AA6061-AA8011 Aluminum Alloy is carried out on Vertical Milling Machine. During FSW important process parameters such as Tool Rotational speed, welding speed, tilt angle and Material placing is varied and corresponding changes are noted. These process parameters are optimized using Taguchi method of design. Experiments were performed with rotational speeds of 1000, 1300, 1600 rpm at three welding speed of 70, 80, 90 mm/min feed rate, keeping axial load at 2.5 KN, tool tilt angle at 3 degree and changing material placing i.e., advancing and retreating sides alternatively, it was found that there is no defect concentration for tool speed of 1300 rpm, 90 mm/min feed rate and AA8011 on advancing sides. Mechanical and Microstructural behavior of these Alloys were studied after FSW. The resultant microstructures were characterized by using optical microscope. For evaluating mechanical properties Vickers hardness test and tensile test was performed. As a result of the experiment it has been found that maximum tensile strength of 101Mpa was obtained at welding speed of 90 mm/min, tool rotational speed 1300 rpm and placing AA8011 on advancing side.**