

Friction Stir Welding on Al 7075 alloy and effects of welding parameters on its mechanical properties and microstructure.

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Abstract

Friction stir welding is a relatively new technique developed by The Welding Institute (TWI) for the joining of aluminum alloys. The technique, based on friction heating at the faying surfaces of two pieces to be joined, results in a joint created by interface deformation, heat, and solid-state diffusion. In evaluating friction stir welding, critical issues (beyond a sound joint) include microstructure control and localized mechanical property variations.

A serious problem with fusion welding, even when a sound weld can be made, is the complete alteration of microstructure and the attendant loss of mechanical properties. Being a solid-state process, friction stir welding has the potential to avoid significant changes in microstructure and mechanical properties. The objective of this study is to evaluate the microstructural changes effected by friction stir welding of Al 7075.

In this study, the welding properties of the Al 7075 are to be studied by using friction stir welding (FSW). For this purpose, the present work is to investigate the effect of FSW parameters on the tensile strength, impact strength and microstructural behaviors of welding of the Al 7075 alloy. Aluminum sheets have to be joined using FSW and the samples are to be tested for the mechanical and microstructural properties to determine the optimal welding variables.

The welding process is to be performed using different feed rates, offset values and tool profiles while spindle speed is kept constant. The joining sheets are to be heated with hot air blowing behind the tool during the FSW process to prevent crack formation due to the residual stress. The objective of this study is to obtain better tensile and impact strengths at respective welding parameters.

Keywords: Friction Stir Welding, Al 7075 alloy, Welding parameters, Mechanical properties, Microstructure.