

Investigation of friction stir welding between dissimilar materials AA 2219 and pure copper

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ABSTRACT

In this research work friction stir welding was carried out between dissimilar metal combination aluminum alloy 2219 and pure copper using bobbin tool design. The welding process was carried out considering three process parameters such as the tool revolution speed, tool feed rate and tool pin offset towards the aluminium side .Taguchi L9 orthogonal array was designed for the above three process parameters considering three levels for each parameters in the process and total nine experiments were performed on FSW machine setup. Tensile tests, hardness tests and the electric conductivity tests were carried out to analyze the welded joint performance characteristics. ANOVA (analysis of variance) was carried out for finding the contribution of each specific factor on average results and using minitab-19 S/N ratio graphs showing variation of tested properties from the mean values was established. ANOVA of both UTS and hardness shows that tool feed rate is the major contributing factor and joint strength and the hardness increases with increase in feed rate. Electric conductivity of the welded samples achieved by friction stir welding process is satisfactory and efficient in comparison to an ideal bimetal element prepared of the same materials with very less contact resistance between the base metals.

Keywords: Aluminum, Copper, dissimilar, friction stir welding, bobbin tool.