

## **A STATISTICAL ANALYSIS OF JOINT STRENGTH OF DISSIMILAR ALUMINIUM ALLOYS FORMED BY FRICTION STIR WELDING USING TAGUCHI DESIGN APPROACH, ANOVA FOR THE OPTIMIZATION OF PROCESS PARAMETERS**

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### **ABSTRACT**

Friction Stir Welding (FSW) is a solid state joining process, eliminates the drawbacks of common fusion welding are widely used in ship building, aviation and automotive industries. In the present work an attempt has been made to optimize the process parameters of friction stir welding between two dissimilar aluminium alloys (AA7075 and AA6061) to evaluate the output quality characteristics using Taguchi design method. An interaction effect of input parameters is also studied to predict their influence on the output response. Five control factors of mixed levels (2 and 3 levels), L18 orthogonal array are selected to determine the optimum condition for process parameters to improve the performance of FSW. The performance of FSW for dissimilar alloys of aluminium is evaluated in terms of joint's yield strength, Taguchi technique has been employed using orthogonal array, S/N ratio followed by ANOVA (analysis of variance) to study contribution of each parameter and interaction of them on output and confirmation tests at 95 % confidence level to compare with experimental results. Optimal combination of parameters is presented with a good agreement found between the estimated and experimental results within the preferred significant level after verifying experimentally. It was confirmed that Taguchi design method with ANOVA and confirmation tests successfully improved the quality characteristics of yield strength of FSW process.

**KEYWORDS:** Design of Experiments (DOE), Taguchi Design Method, Signal To Noise (S/N) Ratio, Optimization, FSW, ANOVA, Confirmation Tests