

**TO OBTAIN THE OPTIMUM PARAMETERS FOR WELDING OF  
ALUMINUM USING FRICTION WELDING TECHNIQUE.**

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## **ABSTRACT**

Aluminium is normally difficult to weld by fusion methods due to the associated problems such as the effects of softened aluminium alloy on joint strength. Such problems can be alleviated by the friction joining process. A research was conducted to investigate and determine the optimum parameters for welding of cylindrical aluminium (AA6061) using friction welding technique. Given a constant speed of friction welding system at 1720 rpm (while operating), there are only four parameters that can be varied: heating pressure (or friction pressure), heating time (or friction time), forging pressure (or upset pressure) and forging time (or upset time). Five (5) welding samples are prepared for each parameter investigation and experiments carried out for each different diameter of 15.6 mm, 12.6 mm, 9.6 mm, 8 mm and 7 mm. The tensile stress of each sample is recorded and a graph of stress against each parameter plotted. The optimum value of each parameter is obtained by combining with the visual findings. The visual quality of the weld was based on the characteristic of the flash curl formation. A further experiment then conducted for refinement of the optimum values of parameters obtained and the new tensile test value and quality of appearance recorded and compared with the earlier optimum findings. The analysis of weld quality will be evaluated by Visual Inspection, Digital Radiography Inspection, Tensile Test, Bending Test and Metallography Analysis of the fusion zone. It is observed that the effect of increasing friction pressure, friction time, upset pressure and upset time will increase the metal loss by way of increasing the dimensions of the formed flash and the shortening of the component. An optimum level of that parameter should then be selected to minimize the metal loss without sacrificing the strength of the joints.

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