

Effect of Forging Pressure on Mechanical Properties and Microstructure of Similar and Dissimilar Friction Welded Joints (Aluminium, Copper, Steel)

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Abstract : The present work focuses on the effect of various process parameters on the mechanical properties and microstructure of joints produced by continuous drive friction welding and linear friction welding. An attempt is made to investigate the feasibility of obtaining an acceptable weld joint between similar as well as dissimilar components and the microstructural changes have also been assessed once the good weld joints were considered (using Optical Microscopy and Scanning Electron Microscopy techniques). The impact of forging pressure in the microstructure of the weld joint has been studied and the variation in joint strength with varying forge pressure is analyzed. The weld joints were obtained two pair of dissimilar materials and one pair of similar materials, which are listed respectively as: Al-AA5083 & Cu-C101 (dissimilar), Aluminium alloy-3000 series & Mild Steel (dissimilar) and High Nitrogen Austenitic Stainless Steel pair (similar). Intermetallic phase formation was observed at the weld joints in the Al-Cu joint, which consequently harmed the properties of the joint (less tensile strength). It was also concluded that the increase in forging pressure led to both increment and decrement in the tensile strength of the joint depending on the similarity or dissimilarity of the components. The hardness was also observed to possess maximum as well as minimum values at the weld joint depending on the similarity or dissimilarity of workpieces. It was also suggested that a higher forging pressure is needed to obtain complete joining for the formation of the weld joint.

Keywords : forging pressure, friction welding, mechanical properties, microstructure

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