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FRICTION STIR WELDING OF SIMILAR AND DISSIMILAR METALS: A REVIEW

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ABSTRACT

Friction stir welding is a prominent solid-state welding process widely used in different industries to join similar and dissimilar metals that are difficult to weld by a conventional fusion welding process. Nowadays, it's very popular in the aerospace industry, defence, automobile, railways, shipbuilding etc. Although, it was initially developed in 1991 at TWI (the welding institute) for joining of aluminium and its alloys but at present, it is used for many other metals and alloys like steel, titanium, magnesium, copper for both similar and dissimilar combination. This review paper provides an overview of various friction stir welded joint of similar and dissimilar combination of aluminium alloys and other metals. Effect of various process variables like tool geometry, tool material, tool rotation speed, welding speed, vertical pressure on tool shoulder, dwell time, tilt angle, plunge depth etc. on mechanical and microstructure properties of friction stir welded joint has been reviewed. This paper also analysed about various defect found due to process variables and wear analysis of FSW tool. The paper has attempted to present future research needs and development in friction stir welding process and tool. It is observed that friction stir welding of steel and other hard materials are not feasible unless proper tool material and tool design.

Keywords: friction stir welding, aluminium alloys, magnesium, steel, microstructure.