

A Review on the Studies on Mechanical and Tribological Properties of Aluminum and Magnesium Alloys Welded by Friction Stir Welding

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Abstract : In recent years, friction stir welding (FSW) has attracted the main attention of the concerned researcher especially in case of joining of nonferrous alloys like aluminum and magnesium due to its unmatched properties with respect to other welding techniques. Friction stir welding is a solid state welding process which is most suitable for the welding of nonferrous alloys, especially aluminum and magnesium alloys. Aluminum and magnesium alloys are widely used for structural applications of all types of automobiles due to their superior mechanical properties with their low density. This paper deals with the critical review of the different properties (like tensile strength, microhardness, impact strength, corrosion resistance, and metallurgical investigation on SEM) obtained by the FSW of aluminum and magnesium alloys. After a critical review of the existing published literature on concerned topics, all the properties of welding joints are compared in the tabulated manner to optimize the selection of materials and FSW parameters according to mechanical and tribological properties. Different tool designs used for the FSW process are also thoroughly studied, and the influence of the design of the tool used in FSW on the different properties has also been incorporated in this paper. It has been observed from the existing published literature that FSW is the most effective and practical technique for joining the non ferrous alloys especially aluminum and magnesium alloys, and among the different FSW tools, left hand threaded tri-flute (LHTTF) tool is best for the welding of non ferrous alloys like aluminum and magnesium alloys which gives the superior mechanical properties to welding joint.

Keywords : aluminum, friction stir welding, magnesium, structural applications, tool design

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