Proceedings of the International Conference on Applied Mechanical Engineering Research (IC-AMER2019)
NIT Warangal, India – May 02-05, 2019
Paper No. XXX (The number assigned when the papaer is accepted)

Underwater friction stir welding of AA7xxx sheet alloys & their Studies on Microstructural and Mechanical Properties of Aluminium Alloys

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Abstract

The aim of the present work is to investigate on the mechanical and microstructural properties of underwater friction stir welding of AA 7xxx aluminium alloys joined by friction stir welding (FSW). The two sheets, aligned with perpendicular rolling directions, have been successfully welded. Some aluminium alloys are difficult to join using traditional fusion (melting and solidification) welding techniques. Friction Stir Welding (FSW) is a solid-state welding technique that can join two plates of material without melting the work piece material. This process uses a rotating tool to create the joint and it can be applied to aluminium alloys in particular. Microstructure (Optical and SEM) and mechanical properties of friction stir welded joints were studied. In the present study, AA 7xxx aluminium alloy was underwater friction stir welded at a fixed rotation speed of (800-1400) rpm and various welding speeds ranging from 50 to 200 mm/min in order to clarify the effect of welding speed on the performance of underwater friction stir welded joint. The results revealed that the precipitate deterioration in the thermal mechanically affected zone and the heat affected zone is weakened with the increase of welding speed, leading to a narrowing of softening region and an increase in lowest hardness value. Tensile strength firstly increases with the welding speed but dramatically decreases at the welding speed of 200 mm/min

Keywords: AA 7xxx Alloy, Underwater frictionstir welding, Mechanical properties, Microstructure correlation of weldability and conventional metal.

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