

The Effect of the Weld Current Types on Microstructure and Hardness in Tungsten Inert Gas Welding of the AZ31 Magnesium Alloy Sheet

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Abstract : In this study, the butt welding of the commercial AZ31 magnesium alloy sheets have been carried out by using Tungsten Inert Gas (TIG) welding process with alternative and pulsed current. Welded samples were examined with regards to hardness and microstructure. Despite some recent developments in welding of magnesium alloys, they have some problems such as porosity, hot cracking, oxide formation and so on. Samples of the welded parts have undergone metallographic and mechanical examination. Porosities and homogeneous micron grain oxides were rarely observed. Orientations of the weld microstructure in terms of heat transfer also were rarely observed and equiaxed grain morphology was dominant grain structure as in the base metal. As results, fusion zone and few locations of the HAZ of the welded samples have shown twin's grains. Hot cracking was not observed for any samples. Weld bead geometry of the welded samples were evaluated as normal according to welding parameters. In the results, conditions of alternative and pulsed current and the samples were compared to each other with regards to microstructure and hardness.

Keywords : AZ31 magnesium alloy, microstructures, micro hardness TIG welding

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