CHARACTERIZATION OF SIMILAR PROPERTIES OF MAGNESIUM IN MICRO FRICTION STIR SPOT WELDING (μFSSW) FOR VEHICLE PANEL APPLICATIONS: SIMULATION AND EXPERIMENTAL STUDIES

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ABSTRACT

This study examines the parameters of micro-Friction Stir Spot Welding (μFSSW) on weld geometry, mechanical properties, and metallography on AZ31B-like materials. The thickness of the AZ31B material is 0.5 mm and 0.32 mm, respectively. The FSSW tool is made of high-speed steel (HSS) with a pin diameter of 0.25 mm and a shoulder diameter of 0.5 mm. The constant process parameters of the FSSW connection used are plunge depth, dwell time reduction rate, and high tool rotation speed of 33,000 rpm. The results of the FSSW weld geometry show that at a dwell time of 700 milliseconds and a plunge depth of 600 microns, the diameter of the weld pin and the diameter of the weld shoulder are close to the pin diameter and the diameter of the tool shoulder used. Dwell time, and plunge depth have a significant effect on tensile strength. The maximum shear load and cross load achieved were 387±17 N and 29±2 N, respectively. An intermetallic compound (IMC) was observed at the interface of the two materials, while at a dwell time of 700 milliseconds it had a cracking effect on the inside of the weld.

Kata Kunci: *micro–Friction Stir Spot Welding (μFSSW), high tool rotation speed, weld quality, AZ31B.*