METALLURGIC CHARACTERIZATION OF SIMILAR MATERIAL AA1100 IN MICRO FRICTION STIR SPOT WELDING (µFSSW) FOR VEHICLE PANEL APPLICATIONS

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ABSTRACT

The Micro Friction Stir Spot Welding (µFSSW) process is a welding technique used for metal plates with thin thickness. One of the benefits of this welding technique is its ability to produce high-quality welds with minimal deformation. The objective of this study was to analyze the impact of depth of penetration, dwell time, and tool geometry on the material flow trend in the macro-structure of welds created using the µFSSW technique with AA1100 thin aluminum plates. The study examines the impact of altering the depth of the chisel, dwell time, and tool geometry on the parameters. The study involved categorizing the parameters of penetration depth into 500 microns. The dwell time was divided into three different lengths of time: 300 ms, 500 ms, and 700 ms. Additionally, the tool geometry was classified into two types: tool-1. Furthermore, the macro test was conducted in order to assess the weld's depth, contour profile, and stretch macrostructure. The macro test results will be utilized to analyze the relationship between material flow and each weld zone in order to evaluate the welding outcomes of all existing parameters. The study found that the depth of penetration, dwell time, and tool geometry have a significant impact on the weld depth and metallography of welds using AA1100 thin plates. The influence of these factors is observed alongside different tool geometries. It was observed that deeper weld penetration and longer stirring time generally lead to increased effects, although the relationship is not always directly proportional.

Kata Kunci: *Micro Friction Stir Spot Welding, Aluminum, Metallography, Similar material*