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CHARACTERIZATION OF ELECTRICALLY HYBRIDIZED FRICTION STIR WELDING OF MILD STEEL AND OPTIMIZATION OF PROCESS PARAMETERS

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ABSTRACT

The Electrically hybridized Friction Stir Welding (FSW) is newly developed solid-state joining technique, whereas the secondary heat source (electrical resistance) is added to achieve the desire heat energy during the mild steel material joining. The mild steel material solid state joining found most significant advancement in material joining as its eco-friendly technology due to the environment friendliness, comparatively to the other conventional joining. Friction stir joining process does not require shield gas or flux and its energy efficient process. Mild steel sheet is joined by hybrid friction stir joining by using tungsten carbide tool. A range of spindle rotation (500–1050 rev per min) and welding speed of 24-75 mm/min to attain defect free welds in 1.6 mm thick sheets. The heat inputs corresponding to different welding parameters influenced the weld mechanical properties, microstructure, including grain size and phases. The generated by friction due the tool rotation and tool- specimen contact surface. However, the additional heat source provides enough heat energy to produce fine grain size and achieve maximum strength of the weld joint. This research paper shows the process joining process parameter, process mechanism, parameter optimization, and future scope of development.

Keywords: Electrically Hybridized friction stir welding, mild steel, mechanical properties, joining efficiency, Taguchi optimization.