Effects of Sheet Positioning, Tool Offset and Backing Plate Material on Temperature and Flow Characteristics in Dissimilar FSW of Al and Cu: A CFD Simulation Study

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Title: Effects of Sheet Positioning, Tool Offset and Backing Plate Material on Temperature and Flow Characteristics in Dissimilar FSW of Al and Cu: A CFD Simulation Study

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Abstract (150 words, Font 12): Friction stir welding (FSW) of dissimilar materials is a challenging task in terms of finding the appropriate set of process parameters that can result in a sound weld. FSW of aluminium and copper have applications in electrical connectors, batteries tab to bushbars joining, transformer foil conductors, and similar areas. Besides appropriate set of process parameters, defects-free welds in dissimilar welding can be obtained through the choice of sheet positioning, tool position offset, and also from backing plate material used. These choices affect the thermal characteristics of the process and hence the material flow characteristics, both of which can be easily captured from a validated CFD simulation of the process. This work is targeted towards understanding the effects of sheet positioning, tool offset and backing plate material on the temperature and material flow characteristics in dissimilar FSW of aluminium and copper. The choices to obtain characteristics close to similar FSW will be brought out.

Purpose: To understand the effects of sheet positioning, tool offset and backing plate material on the temperature and material flow characteristics in dissimilar FSW of aluminium and copper

Design/Methodology/ Approach: Numerical simulation

Findings: The choices of sheet positioning, tool offset and backing plate material for dissimilar FSW of Al and Cu to obtain characteristics very close to a similar FSW process will be brought out.

Research Limitations/ implications: The research applicability is limited to dissimilar FSW, especially of aluminum and copper, and its alloys.

Originality/ Value: Effect of backing plate material in dissimilar FSW will be brought out.

Keywords: Dissimilar friction stir welding, Aluminium and copper welding, CFD simulation, Sheet positioning, Tool offset, Backing plate material

Description: Paper writing and more simulations are underway