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Design optimization of spot welds for optimal strength of structure

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Resistance spot welding (RSW) is particularly employed for high volume and rapid welding applications in automotive assembly process for joining multiple metal sheets and parts. The failure of spot welded joints are linked to several factors like, weld nugget size, edge distance, spacing between spot welds, sheet thickness, material properties of heat affected zone, residual stresses and material inhomogeneity. Finite element analysis (FEA) of multiple spot welded joints under tensile-shear load are investigated to attain optimum strength and desired factor of safety. The analysis shows that spacing between the adjacent spot welds, edge distance and thickness of the sheets are primary factors affecting the strength of the joints for a given material. The optimal edge distance increases the strength of the weld by providing clearance of spot welds from plate edge. The optimal spacing of spot welds is the thin line between the stress superimposition and supporting effect of spot welds. The variation of sheet thickness effects the strength of spot welds as the optimal edge distance changes with thickness. For asymmetric thickness of sheets, strength is defined by thinner sheet and for symmetric sheet edge optimal edge distance varies with thickness.

Biography

Zaheer Abbas pursued his BE in Aerospace from College of Aeronautical Engineering at the National University of Engineering & Technology in 2010. He is currently pursuing MS in Aerospace Engineering from National University of Engineering & Technology.

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