

Dissimilar FSW of AA2024 and AA7075: Effect of materials positioning and tool deviation value on microstructure, global and local mechanical behavior

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Abstract: In this work, the effect of material location and tool deviation on the global and local mechanical behavior of dissimilar AA2024/AA7075 friction stir weld joints was investigated. The results showed that increasing the tool deviation value up to 1mm towards the AA2024, fixed in advancing side, improved the material mixing quality and enhanced the grain refinement in the stir zone. It was found that the highest ultimate tensile strength was obtained when the AA2024 alloy was fixed in the advancing side for 1mm tool deviation towards this material. Above this deviation value, a gradual decrease of the global mechanical properties of the weld joints was noticed. Digital image correlation (DIC) technique coupled to tensile testing revealed an improvement of local strain in the stir zone and the heat affected zones of the dissimilar joints when AA2024 alloy was positioned in the advancing side.

Keywords : Dissimilar friction stir welding, tool deviation, DIC, mechanical properties, microstructure