

عنوان مقاله:

CFD Modelling of Friction Stir Welding of Aluminum to Steel butt joint

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خلاصه مقاله:

In this article effects of friction stir welding (FSW) tool rotational and traverse speeds were studied on heat generation and temperature distribution in welding zone of AA1100 aluminum alloy and A441 AISI joint. Computational fluid dynamics method was used to simulate the process with commercial CFD Fluent 6.4 package. To enhance the accuracy of simulation in this Study, the welding line that is located work-pieces interface, defined with pseudo melt behavior around the FSW pin tool. Simulation results showed that with increase of FSW tool rotational speed, the generated heat became more and dimensions of the stir zone will be bigger. The calculation result also shows that the maximum temperature was occurred on the advancing side. The computed results demonstrated that with increasing tool linear speeds the heat generation experienced growth down trend. With increasing traveling speeds the time to reach maximum temperature in stir zone growth but the tool rotational speed dose not effect on time to reach maximum temperature. The model outcomes show that more than 85% total heat was produced by tool shoulder and the maximum heat with selected parameters in this study was 935 kelvin degrees. The computed results shows that the maximum value of strain rate achieved was 29 S⁻¹ for A441 AISI side and 42 S⁻¹ at AA1100 side.

کلمات کلیدی:

Friction Stir Welding, Dissimilar joint, Computational Fluid Dynamic, Thermal modelling

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