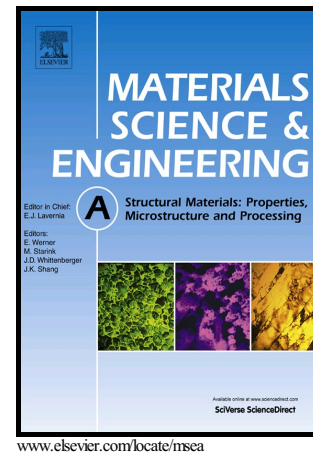


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Effect of welding energy on microstructure and strength of ultrasonic spot welded dissimilar joints of aluminum to steel sheets

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Abstract

Two dissimilar ultrasonic spot welded joints of aluminum to commercial steel sheets at different levels of welding energy were investigated. The tensile lap shear tests were conducted to evaluate the failure strength in relation to microstructural changes. The main intermetallics at the weld interface in both joints was θ (FeAl_3), along with η (Fe_2Al_5) phase in Al-to-AISI 304 stainless steel joint and Fe_3Al phase in Al-to-ASTM A36 steel joint, respectively. The welding strength of Al-to-AISI 304 stainless steel weld samples was slightly higher than Al-to-ASTM A36 steel weld samples, whereas the fracture energies of Al-to-AISI 304 stainless steel weld samples were significantly higher as compared with Al-to-ASTM A36 steel weld samples. The welding strength of both Al-to-Steel welds were higher than other reported dissimilar USW joints in literature. The fracture surfaces of both weld joints exhibits the growth of IMC layer

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