

عنوان مقاله:

Bimetal friction stir welding of aluminum to magnesium

محل انتشار:

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خلاصه مقاله:

FSW material flow and phase transformation were studied at the interface of dissimilar welding of Al ۶۰۱۳ to Mg. Defect free butt weld was obtained when aluminum and magnesium test plates were placed in the advancing side and retreating side respectively, and the tool was placed ۱ mm off the weld centerline into the aluminum side. In order to understand how the materials flow during FSW, steel shots were implanted as indexes into the test plate's intimate face and welding was performed with determined optimum parameters. X-ray images were used to evaluate secondary positions of the steel shots at weld zone. It was revealed that steel shots implanted in the advancing side test plate were penetrated from advancing side into the retreating side with a relatively large rotational displacement of α . But shots implanted in retreating side test plate remained only in retreating side, without penetrating into the advancing side, and displaced by a low angle of β . It could be concluded that to reach defect free welds by FSW between two dissimilar metals, the tool should be inserted in harder metal and harder metal should be placed in the advancing side too. EDS analysis was performed in order to study formation and distribution of intermetallic phases in the welds interface. Two intermetallic compounds formed sequentially at Al۶۰۱۳/Mg interface were Al_۳Mg_۲ and Al_{۱۲}Mg_{۱۷} in weld condition. Welded specimens were heat treated and their effects on mechanical properties of welds and formation of new intermetallic layers were investigated.

کلمات کلیدی:

Dissimilar welding, Friction Stir Welding, interface, Material Flow, Intermetallic compounds, mechanical properties

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