

Dissimilar friction stir welding of thick plate AA5052-AA6061 aluminum alloys : effects of material positioning and tool eccentricity

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ABSTRACT

Dissimilar friction stir welding of AA5052-AA6061 was conducted to assess the effect of material positioning on the welds produced using tools with predetermined eccentricity. Microstructural observation, thermal cycle measurement, and mechanical property evaluation was subsequently conducted. Evidence shows that AA6061 is better suited to welding while placed on the advancing side (AS), since better transverse tensile strength (up to 215 MPa) and elongation (up to 7.6%) can be achieved. On the other hand, higher peak temperatures were generally observed in the AS regardless of base material positioning, where peak temperatures of more than 350 °C were recorded by the thermocouple located closest to the stir zone. Metallurgical analysis reveals that tool eccentricity enhances the AS material flow in the stir zone but limits dissimilar material mixing.

KEYWORDS

Aluminum alloys; Dissimilar welding; Friction stir welding; Thermal cycle; Microstructure

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