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Influence of welding parameters on the IMCs and the mechanical properties of Ti/Al
butt joints welded by MIG/TIG double-sided arc welding-brazing

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Abstract

Sound welding-brazing butt joints of TiAl6V4 and 5A06 with excellent front and back appearance were obtained by MIG/TIG double-sided arc (DSA) welding-brazing. The relationships between the main welding parameters such as welding speed, TIG welding current and TIG position, the microstructure of the intermetallic compounds (IMCs) and the mechanical properties of Ti/Al butt joints were investigated. Experimental results revealed that the morphology, composition and thickness of Ti-Al IMCs depended on the welding heat input and the heat distribution. With increasing welding heat input and heat concentration, the thickness of the IMCs layers increased, the morphology changed from lamellar to serrated, and the phase composition changed from TiAl_3 to TiAl (adjacent to Ti6Al4V) and TiAl_3 (adjacent to the weld). Moreover, the relationship between the structure of the Ti-Al IMCs layers and the tensile strength of the joints without reinforcement was discussed further. Some joints achieved a high bonding strength of 240.3 MPa because of serrated IMCs

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