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Dissimilar welding of aluminum alloys 2024 T3 and 7075 T6 by TIG process with double tungsten electrodes

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Abstract: The aim of this work is to study the metallurgical and mechanical properties of dissimilar assemblies of 2024 T3 and 7075 T6 structural hardening aluminum alloy by the TIG twine electrode arc welding process. It will include a weld performed according to optimized welding parameters followed by a study of the macroscopic and microscopic evolution of the dissimilar assembly (2024-7075) using optical and scanning electron microscopy (SEM); in addition, the phase compositions were analyzed with an energy dispersive spectrometer (EDS). Tensile and microhardness tests were performed. The tensile fracture was observed by SEM. This paper suggests that when the double tungsten electrode TIG welding is used, a stable arc has been formed with a good bead appearance. The heat dissipated by the arc generates several zones (molten zone (WZ), bonding zones (LZ), heat-affected zones (HAZ)) with different microstructures or precipitates of the type ? (Al2 Cu), S (Al2 Cu, Mg) and ? (Mg Zn2), S (Al2 Cu Mg) are formed in the heat-affected zone (HAZ) of base metals 2024 and 7075 respectively. The microhardness is lower in the molten zone and higher in the heat-affected zone of 7075 T6 alloy, which cried out an embrittlement and a 44% and 37% drop in the tensile strength of 7075 T6 and 2024 T3 base metals respectively.

Keywords : 2024 and 7075 aluminum alloy, Aluminum with structural hardening, microstructure, Double electrode TIG processing, Dissimilar welding