

Experimental investigation of weldability of Al6063T6 using Pulse MIG Welding

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Abstract:

Aluminium is used for various applications, such as, airframes, missile bodies, fuel cells, and satellite components, because of its inherent advantages of high strength-to-weight ratio, high notch toughness at cryogenic temperatures, excellent corrosion resistance, ease in extrusion, and forming. However, weldability of aluminium is not considered good due to various reasons. Therefore, it is important to investigate the weldability of aluminium to obtain the proper welding parameters. In this work, the weldability of Al6063T6 was investigated using single pulse and double pulse MIG welding. The welding process parameters like current, voltage and welding speed were optimised practically. Butt joints of 3 mm thick sheets were prepared to investigate percentage elongation, ultimate tensile strength, and microstructure of the welded joints. Butt welded joint of 10 mm thick plates were fabricated for toughness, and hardness investigation. The microstructure of the different zones was investigated by using optical microscope. In the fusion zone of single pulse MIG welded joint FeSiAl were observed which increases the hardness of the welded joint and Mg₂Si were observed in greater amount in the double pulse MIG welded joint which decreases the hardness of the welded joint. But in both the cases the hardness of weld metal zone and heat affected zone were found lower than the base metal. The ultimate tensile strength (UTS) and percentage elongation of the welded joint was found lower than the base metal. Impact strength of double pulse MIG welded joint was found higher than the single pulse MIG welded joint. During tensile test most of the specimens were broken outside the welded joint, hence, it can be concluded that a good welded joint of aluminium can be obtained by using proper welding parameters.

Keywords:

Weldability, Al6063T6, MIG Welding, Mechanical properties, Microstructure.