

A novel perception toward welding of stainless steel by activated tig welding: a review

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ABSTRACT

Stainless steel is a widely used material in various industries such as aerospace, chemical processing and transportation. Tungsten Inert Gas (TIG) or Gas Tungsten Arc Welding (GTAW) process is extensively used for joining thin sections of stainless steel. However, it is not useful in joining thick sections in a single pass. Activated TIG (A-TIG) significantly increases weld penetration up to 1.5– 4 times in a single pass. Because of its deep penetration ability, A-TIG is the focus of research amongst the researchers. This article reports the mechanisms associated with A-TIG, effects of various weld parameters on weld bead geometry and optimization techniques to optimize the process variable of the A-TIG welding process. The present work also analyzes the consequence of activated fluxes on microstructure and mechanical properties of A-TIG weld metal. Along with this, recent developments in the TIG welding process have been discussed. The study concludes that the A-TIG welding process enhances the weld penetration to a great extent, but a high amount of slug gets deposited on the weld surface. This drawback can be overcome by novel variants of the A-TIG welding process such as Flux Bounded TIG (FB-TIG) and Flux Zone TIG (FZ-TIG) welding processes which enhance the future scope of research.

Keywords: Tungsten, Inert , Gas, Welding, flux, Marangoni, bead, width, penetration, microstructure, stainless steel