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BOOK OF ABSTRACT

ICMIT 2025

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MAY 24-25, 2025

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Investigation of mechanical properties of 304L stainless steel welds using TIG, MIG and dual-sided TIG-MIG welding methods

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ABSTRACT

Welding of stainless steel, particularly 304L grade is widely used in industries demanding high corrosion resistance and mechanical strength. But the quality of welded joint depends not only on the input process parameters but also on the different welding methods. The present work represents the study of effect of different welding methods on the joint quality / mechanical-metallurgical characteristics of AISI 304L stainless steel specimens. Three different welding techniques namely Tungsten Inert Gas (TIG), Metal Inert Gas (MIG) and a combined dual-sided TIG-MIG welding approach have been applied during the preparation of welded samples. Butt joint configuration has been prepared using this three welding methods and joint quality is estimated by ultimate tensile strength and correlated with hardness and microstructure. Due to the development of very fine skeletal δ-ferrite grains in the weld zone and mild precipitation, the results show that the dual-sided TIG-MIG welding approach demonstrates the maximum joint efficiency when compared to individual TIG and MIG welding processes. In all situations, the weld metal's hardness value is found to be significantly higher than that of the base metal and the HAZ zone, and the MIG welding process shows the highest hardness value when compared to other techniques.

Keywords: TIG Welding, MIG Welding, Joint Quality, Hardness, Stainless Steel