

PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON MECHANICAL AND INDUSTRIAL TECHNOLOGIES, VOLUME-1

BOOK OF ABSTRACT

EDITORS

Dr. Ashish Kumar Srivastava

Dr. Pramod Kumar

Prof. (Dr.) Mithilesh Kumar Jha

Prof. (Dr.) Sandeep Tiwari

**ICMIT
2025**

MAY 24-25, 2025



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MUZAFFARPUR INSTITUTE OF TECHNOLOGY, MUZAFFARPUR
DEPARTMENT OF SCIENCE, TECHNOLOGY AND TECHNICAL EDUCATION,
GOVERNMENT OF BIHAR, PATNA

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EDITORS

Dr. Ashish Kumar Srivastava

*Department of Mechanical Engineering
Muzaffarpur Institute of Technology, Muzaffarpur-842003, India*

Dr. Pramod Kumar

*Department of Mechanical Engineering
Muzaffarpur Institute of Technology, Muzaffarpur-842003, India*

Prof. (Dr.) Mithilesh Kumar Jha

*Principal
Muzaffarpur Institute of Technology, Muzaffarpur-842003, India*

Prof. (Dr.) Sandeep Tiwari

*Principal
Darbhanga College of Engineering, Darbhanga-846005*

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GOVERNMENT OF BIHAR, PATNA**

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Prof. Md. Irshad Alam

*Department of Mechanical Engineering
Muzaffarpur Institute of Technology, Muzaffarpur-842003, India*

Prof. Gulshan Kumar

*Department of Mechanical Engineering
Muzaffarpur Institute of Technology, Muzaffarpur-842003, India*

Prof. Irfan Haider

*Department of Mechanical Engineering
Muzaffarpur Institute of Technology, Muzaffarpur-842003, India*

Prof. Pappu Kumar

*Department of Mechanical Engineering
Muzaffarpur Institute of Technology, Muzaffarpur-842003, India*

Prof. Vikash Kumar

*Department of Mechanical Engineering
Muzaffarpur Institute of Technology, Muzaffarpur-842003, India*

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

Debnath Ghosh, Subhas Chandra Moi*

*Department of Mechanical Engineering, Dr. B. C. Roy Engineering College, Durgapur, West Bengal, India
Corresponding Author Email ID: subhas.moi@bcrec.ac.in*

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