

BOOK OF ABSTRACT

4TH INTERNATIONAL CONFERENCE

on

INDUSTRIAL ENGINEERING AND MECHANICAL POWER

IEMPOWER 2025

[18TH JULY - 20TH JULY, 2025]

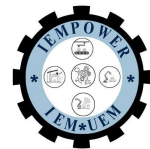
ORGANIZED BY

DEPARTMENT OF MECHANICAL ENGINEERING

INSTITUTE OF ENGINEERING & MANAGEMENT, KOLKATA

SCHOOL OF UNIVERSITY OF ENGINEERING AND MANAGEMENT





**4TH INTERNATIONAL CONFERENCE
ON
INDUSTRIAL ENGINEERING AND MECHANICAL POWER
IEMPOWER 2025**

18th July - 20th July, 2025 | Kolkata, West Bengal, India

organized by



DEPARTMENT OF MECHANICAL ENGINEERING
INSTITUTE OF ENGINEERING & MANAGEMENT, KOLKATA
SCHOOL OF UNIVERSITY OF ENGINEERING AND MANAGEMENT

Co-Hosted by

SMART Society, USA

American Society of Heating, Refrigeration, and Air Conditioning
Engineers

(ASHRAE) East India Chapter

Partners

Climate Change Research (CoE_CCR)

IEM Institute of Fundamental Research (CoE_IIFR)

Additive Manufacturing (CoE_AM)

Atal Community Innovation Center (CoE_ACIC)





Experimental Investigation on Surface Property of Mild Steel Welded Joints using MMAW technique

Sagnik Goswami¹, Subhadeep Mishra², Nirjhar Bhattacharyya³, Sankhadip Mondal⁴, Prof. Joydip Ray⁵

[1,2,3,4,5] Institute of Engineering & Management, Kolkata

This experimental research is centered on the experimental investigation of the mechanical characteristics of the AISI 1010 mild steel following the application of the Manual Metal Arc Welding (MMAW) process. The main purpose of this research was to examine the effect of the parameters of welding and post-weld heat treatment (PWHT) on the hardness of the welded joints. 18 mild steel samples were prepared and welded with different parameters of current (100 A, 145 A, 190 A), electrode diameter (2.5 mm, 3.2 mm, 4.0 mm), and PWHT temperature (490°C, 540°C, 610°C) employing the Taguchi L9 orthogonal array. All the specimens were also put to a test for any surface defects and cracks by a dye penetration test. Brinell hardness test was performed for all the samples both pre and postheat treatment to analyze the hardness change induced by the process of welding as well as thermal exposure. The gathered information was analyzed with the help of Minitab software, wherein Taguchi DOE, analysis by regression as well as Taguchi analysis was carried out to identify the effect and contribution of each factor towards hardness. The analysis indicated that the effect of PWHT temperature and welding current was more pronounced towards hardness than the effect of electrode diameter. The best combination of parameters was also identified with the aim to get the highest hardness. This study offers a practical method for the optimization of welding conditions for enhancing the mechanical characteristics of weld joints of mild steel and is a valuable aid for related metallurgical studies.

Keywords: Dye Penetration Testing (DPT), Manual Metal Arc Welding (MMAW), Mild Steel, Post-Weld Heat Treatment (PWHT), Taguchi Design of Experiments (DOE)