

## DISSIMILAR WELDING OF DUCTILE CAST IRON TO 304 STAINLESS STEEL

A. M. Sehsah<sup>1</sup>, M. M. Ghanem<sup>2</sup>, H. A. Abdel-Aleem<sup>3</sup> & M. El-Shennawy<sup>4</sup>

<sup>1,2,3</sup>Research Scholar, Manufacturing Technology Department, Welding Technology & NDT Lab., Central Metallurgical R&D Institute (CMRDI), Egypt

<sup>4</sup>Research Scholar, Mechanical Engineering Department, Faculty of Engineering, Helwan University, Egypt

### ABSTRACT

*In this study, effect of welding parameters on microstructure and mechanical properties of dissimilar austenitic AISI304 stainless steel/ductile cast iron DCIA536 joints was investigated. Plates of ductile cast iron (DCI) with 6mm thickness were manufactured, heat treated and inspected at CMRDI casting laboratory. The main welding parameters studied in this work are welding technique (with and without buttering layer at DCI side) and type of filling electrodes. Electrode types applied for this dissimilar joint included Inconel 182 (ENiCrFe-3), cast-iron- Ni-Fe-electrode (ENiFe-CI), and stainless-steel electrodes E309L. Microstructure of welded joints was investigated using optical microscope and scanning electron microscope (SEM) equipped with EDX instrument. Mechanical properties of welded joints were evaluated by hardness test, tensile and Charpy notch impact tests. In general, when using buttering technique at DCI side, it acts as obstacle layer to minimize carbon migration from DCI side to the weld and reduce formation of carbides in weld metal. The sample welded using buttering layer (ER Cu Al-A2) and filling groove with electrode ENiCrFe-3 had better mechanical properties compared with same sample without buttering technique.*

**KEYWORDS:** Dissimilar Welding, Ductile Cast Iron (DCI), AISI 304 Stainless Steel, SMAW, TIG, Microstructure Characteristics, Mechanical Properties

---

### Article History

**Received: 25 Apr 2021 / Revised: 27 Apr 2021 / Accepted: 10 May 2021**

---