

THE EFFECT OF SMAW WELDING CURRENT ON DISSIMILAR WELDED JOINTS OF ST 37 AND SS 316 STEEL ON TENSILE STRENGTH, HARDNESS AND MICROSTRUCTURE

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ABSTRACT

This study aims to determine the effect of variations in SMAW welding current on This research aims to analyze the effect of variations in Shielded Metal Arc Welding (SMAW) welding current on ST 37 steel and 316 stainless steel dissimilar welded joints on tensile strength, Vickers microhardness and microstructure. Welding was carried out using E7018 electrodes with varying currents of 90 A, 100 A, and 110 A at a V seam angle of 60°. Tests include the ASTM E8 tensile test, Vickers ASTM E92 microhardness test, and microstructure observations in the weld metal area, HAZ ST 37, and HAZ SS 316. The results show that variations in welding current have an effect on the mechanical properties and microstructure of the welded joint. A current of 100 A produces the best connection characteristics with a tensile strength of 262.87 MPa, a strain of 1.05%, and a hardness value of 305.8 HV at HAZ ST 37, 378.5 HV for weld metal, and 376.6 HV at HAZ SS 316. Meanwhile, the highest hardness value for weld metal was obtained at a current of 90 A of 392.5 HV. Microstructure observations show that current variations affect grain size and phase characteristics due to differences in heat input. Based on the research results, it can be concluded that variations in SMAW current have a significant effect on the tensile strength, hardness and microstructure of dissimilar ST 37 and SS 316 welded joints, with a current of 100 A producing the most optimal welded joint quality.

Keyword: SMAW, dissimilar welding, ST 37, SS 316, E7018, hardness, microstructure.