EFFECT OF COOLING MEDIA POST WELD HEAT TREATMENT ON DISSIMILAR WELDING OF ST 37 AND SS 304 ON TENSILE STRENGTH, HARDNESS, AND MICROSTRUCTURE

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ABSTRACT

Dissimilar welding can lead to residual stress, which can be reduced through the Post Weld Heat Treatment (PWHT) process. In PWHT, variations in cooling media influence the cooling rate and the final mechanical properties of the welded joint. This study aims to determine the effect of different cooling media between water, oil, and air after PWHT on tensile strength, hardness, and microstructure. The materials used were ST 37 and SS 304 plates with a thickness of 12 mm, welded using the Shielded Metal Arc Welding (SMAW) method, followed by PWHT at a temperature of 630°C for 1 hour. The results showed that the highest tensile strength was obtained with water cooling, reaching 439.67 MPa with a strain value of 2.2%. All tensile test specimens fractured at the ST 37 base metal, indicating good weld joint quality. Based on hardness testing, the highest hardness value in the ST 37 base metal was obtained with water cooling at 159.2 HVN. In the Heat Affected Zone (HAZ) of ST 37, the highest hardness was also achieved with water cooling at 176 HVN. The highest hardness in the SS 304 base metal was obtained with oil cooling at 264 HVN, while in the HAZ of SS 304, the highest hardness was achieved with water cooling at 249 HVN. In the weld metal region, the highest hardness value was obtained with air cooling at 278.7 HVN. Microstructure observations support hardness results in each tested region.

Keywords: PWHT*, cooling media, tensile test, hardness test.*