ABSTRAK

Penelitian ini bertujuan untuk menganalisis pengaruh media pendingin pasca pengelasan terhadap sifat mekanik dan mikrostruktur sambungan baja karbon rendah yang dilas menggunakan proses Shielded Metal Arc Welding (SMAW). Variasi media pendingin yang digunakan meliputi udara, air, dan oli, dengan arus pengelasan tetap sebesar 80 Ampere. Pengujian yang dilakukan meliputi uji tarik, uji kekerasan, serta pengamatan mikrostruktur pada daerah logam las (HAZ). Hasil uji tarik menunjukkan media pendingin udara memiliki kekuatan luluh (*Yield Strength*) sebesar 29,96 N/mm^2 dan kekuatan tarik ultimit (*Tensile Strength*) sebesar 223,4 N/mm^2, media pendingin oli kekuatan luluh 38,41 N/mm^2 dan kekuatan tarik ultimit 294,2 N/mm^2, sedangkan media pendingin air diperoleh kekuatan luluh 31,87 N/mm^2 dan kekuatan tarik ultimit 253,3 N/mm^2. Berdasarkan hasil tersebut, media pendingin oli menghasilkan nilai kekuatan tarik tertinggi dibandingkan media lainnya. Hasil uji kekerasan media pendingin udara memiliki nilai kekerasan rata-rata 71,1 HRC, air sebesar 90,6 HRC, dan oli sebesar 98,9 HRC. Peningkatan nilai kekerasan pada media oli disebabkan oleh laju pendinginan yang moderat, sehingga menghasilkan struktur mikro lebih halus dan padat dibandingkan pendinginan dengan udara atau air. Secara keseluruhan, hasil penelitian menunjukkan bahwa media pendingin oli memberikan hasil terbaik dalam meningkatkan kekuatan tarik dan kekerasan sambungan las baja karbon rendah pada arus pengelasan 80 Ampere. Variasi media pendingin pasca las berpengaruh signifikan terhadap perubahan sifat mekanik dan mikrostruktur hasil pengelasan.

Kata kunci: *SMAW, Media Pendingin, Baja arbon rendah, Kekuatan tarik, Kekerasan, Mikrostruktur.*

ABSTRACT

This study aims to analyze the effect of post-weld cooling media on the mechanical properties and microstructure of low-carbon steel joints welded using the Shielded Metal Arc Welding (SMAW) process. The cooling media used included air, water, and oil, with a fixed welding current of 80 Amperes. Testing included tensile testing, hardness testing, and microstructural observations in the weld metal zone (HAZ). The tensile test results showed that the air-cooled medium had a yield strength of 29.96 N/mm2 and an ultimate tensile strength of 223.4 N/mm2. The oil-cooled medium had a yield strength of 38.41 N/mm2 and an ultimate tensile strength of 294.2 N/mm2. The water-cooled medium had a yield strength of 31.87 N/mm2 and an ultimate tensile strength of 253.3 N/mm2. Based on these results, the oil-cooled medium produced the highest tensile strength compared to the other media. The hardness test results showed an average hardness of 71.1 HRC for the air-cooled medium, 90.6 HRC for the water-cooled medium, and 98.9 HRC for the oil-cooled medium. The increase in hardness in the oil medium was due to the moderate cooling rate, resulting in a finer and denser microstructure compared to cooling with air or water. Overall, the research results show that oil cooling media provides the best results in increasing the tensile strength and hardness of low-carbon steel weld joints at a welding current of 80 Amperes. Variations in post-weld cooling media have a significant effect on changes in the mechanical properties and microstructure of the weld results.

Keywords : SMAW, Cooling Medium, Low Carbon Steel, Tensile Strength, Hardness, Microstructure.