ABSTRACT

This final project aims to identify the effect of application of Post Weld Heat Treatment (PWHT) on the mechanical properties and metallurgical of the material in the welding of cast steel with carbon steel. Material used in this Final Project is cast steel (SC 42 W) and carbon steel with a size of 16 mm each. The welding method that used is SMAW. Then, the applications of PWHT is done accordance with ASME VIII procedures, in Table UHT-56. Tests were carried out consisted of four types, tensile strength (tensile strength), impact strength (impact test), hardness (hardness), and analysis of microstructures. From the test results are analyzed by comparing the material being welded and PWHT process with the material being welded without using PWHT treatment. Based on the test results, the material being welded and PWHT process decreased 18.58% in σyield and increased σultimate up to 12.10%. But in other side, the elongation of material is increase of 0.51% and a reduction of the area of 35.33%. While the results of the impact test of material being welded and PWHT process, at 20°C has an impact strength 3.90% greater than the material being welded without PWHT treatment, at 0°C 31.34% greater, and at -20°C has an impact strength 6.90% greater than the material being welded without PWHT treatment. From the microstructure test, with a magnification of 100X, the material being welded and PWHT process has a percentage of 17.35% more ferrite and pearlite percentage 17.35% lower and the grain size is 3.26% smaller than the material being welded without PWHT treatment. With a magnification of 400X, the material being welded and PWHT process has a ferrite percentage 6.84% more, perlite percentage 6.84% lower and grain size is 2.20% smaller than the material being welded without PWHT treatment. In accordance with the hardness test, the material being welded and PWHT process, the area of weld metal, HAZ, and base metal has an average hardness value 7.89% lower than materials are welded without PWHT treatment.

Keywords: Carbon Steel, Cast Steel, PWHT, SMAW, Welding.