ABSTRACT

Welding on A36 carbon steel with backing ceramic by FCAW is one of main activity in shipbuilding. Application of the backing ceramic is made if there is a gap spacing standards designated in IACS no.47. Preheat and Post Weld Heat Treatment (PWHT) is a method of heat treatment carried out in welding. The main purpose of the heat treatment is to change or restore the mechanical properties of a metal. The purpose of this Final Project is to determine the effect of combinations’ variations of the use of preheat and PWHT on A36 and obtain comparative results of mechanical tests of each of the various combinations of use of preheating and PWHT.

In this Final Project is done with a variety of combinations preheat of 300°C and PWHT of 600°C on A36 carbon steel having a thickness of 13.7 mm with backing ceramic by FCAW. Then done with mechanical testing includes: tensile test, bending test, impact test, and hardness test. Especially on impact test, will be seen also fracture toughness values with the conversion of its impact test value.

From the test results it is known that when compared to the material without preheat and without PWHT, for material with preheat only will influence decreasing of 6.18% yield strength and 3.43% tensile strength, decreasing of 2.74% absorbed energy on weld metal and increasing of 2.67% hardness on weld metal. In the other hand, for material with PWHT only will influence decreasing of 6.86% yield strength and 12.35% tensile strength, decreasing of 1.37% absorbed energy on weld metal and decreasing of 11.12% hardness on weld metal. Then, for material with preheat and PWHT will influence decreasing of 0.89% yield strength and 4.68% tensile strength, decreasing of 2.74% absorbed energy on weld metal and decreasing of 12.75% hardness. The higher values of yield strength and tensile strength, value of hardness will be higher as well. However, values of absorbed energy and fracture toughness will decrease.

Keyword: A36, Backing Ceramic, FCAW, Preheat, PWHT