INVESTIGATION ON THE EFFECT OF HEAT TREATMENT PROCESS ON CORROSION ENHANCEMENT OF Co-Ni-Fe COATED MILD STEEL

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DECLARATION BY THE CANDIDATE

"I declare that this thesis is the result of my own work except the ideas and summaries which I have clarified their sources. The thesis has not been accepted for any degree and is not concurrently submitted in the candidature of any degree."

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SUPERVISOR CERTIFICATION

"I declared that I read this thesis and in our point of view this thesis is qualified in term of scope and quality for the purpose of awarding the Bachelor of Mechanical Engineering (Manufacturing) (Hons)"

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ABSTRACT

Mild steel is the metal that usually used by oil and gas industry because it is a cheap material and easy to obtain in large-scale quantity but it has low corrosion resistance. Therefore, it is needed to be coated to increase its corrosion resistance. The objective of this research is to produce CoNiFe coating on the mild steel by using electrodeposition method. By applying heat treatment on mild steel that have been coated with nanoparticle CoNiFe, it is believed that it can produce a better coated mild steel with less porosity and lower corrosion rate. Heating process also provide a better surface hardness due to decrease size of the pore. Control of temperature and heating time is important in sintering process. Hence, this project was focused on the effect of heating temperatures and times on the corrosion and physical properties of CoNiFe coating. The coating parameters that were used are the optimum parameters that have been obtained from previous research. They are 3 pH value of electrolyte, 50 ± 5^{o}C temperature of electrolyte, 30 minutes deposition time, 0.45A direct current and 0.025 A/cm^{2} of current density. Heat treatment process was conducted in a tube furnace in argon gas atmosphere to avoid oxidation during sintering process. Different times of 1, 2, 3 hours and different temperatures of 700, 750, 800, 850, 900^{o}C, were used respectively. Coating by using electrodeposition method observed all element of CoNiFe are distributed evenly and homogenous. The effect of heat treatment was observed to produce a better corrosion resistance if compared with non- heat treated coating in 3.5% NaCl solution environment. The surface roughness and hardness was increased gradually with the increment of particle size and decrement of pore size respectively. Due to insufficient argon gas during heat treatment, oxygen was observed in EDX analysis as a result of oxidation.