



**THE INFLUENCE OF HYDROGEN ENVIRONMENT  
ON MILD STEEL WELDS**

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"I declare that the content present in this thesis are my own work which was done at Universiti Teknologi MARA (UiTM) unless stated otherwise. The thesis has not been previously submitted for any other degree."

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## **ABSTRACT**

The main purpose of this project is to study the influence of hydrogen environment on mild steel welds. In the manufacturing process, the presence of hydrogen occurs when welding work is carried out. Problem that may take place are cracking cause by the hydrogen. Hydrogen cracking happens when weld metals such as mild steel become brittle and fracture due to the presence and absorption of hydrogen into the metal. This project will be carried out using mild steel as the main specimen. The specimen will be divided into two categories which is welded specimen and without welding specimen. The welding process using SMAW will be carried out with different type of parameter such as welding speed, diameter of electrode, current and also the voltage used. These parameters are necessary in order to find the most suitable heat input. Heat input is important because it control the cooling rates in welds and thus

affects the microstructure of the weld metal and the heat-affected zone (HAZ). A vary in microstructure directly affects the mechanical properties of welds. The welding sample will be cut into several parts with length 136mm, width 15mm and the thickness of plate 4mm. For the tensile test process, we will divide the welding coupon into three experiments. For the first experiment, the sample will undergo tensile test without any additional process. For the second experiment, the sample will be undergoing heat treatment process and the last experiment will be immersing in acid solution of 0.3M sulfuric acid ( $\text{H}_2\text{SO}_4$ ). Sulfuric acid will act as hydrogen catalyst during the experiment. From the result of the experiment we can concluded that, tensile strength, hardness and yield strength improved with plastic deformation whereas strength and ductility decreased because of strain hardening effect.