UNIVERSITI TEKNOLOGI MARA CAWANGAN TERENGGANU

MEC299

STUDY OF HARDNESS ON THE MILD STEEL IN VARIOUS COOLING MEDIUM

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SEM MARCH AUGUST 2022

ABSTRACT

The study of mild steel hardness on various cooling mediums is concerned with whether the hardness of mild steel is influenced by heat treatment and then chilled using various cooling mediums. The hardness of a material is commonly described as its resistance to persistent indentation. Vickers Hardness Test Machine will be used to determine the hardness of mild steel plates. The research objectives are to conduct a heat treatment experiment for mild steel plate in different cooling mediums such as air, water, and cooking oil, as well as to analyse the hardness of mild steel plate using the Vickers Hardness Test Machine. The study's findings will be identified, and the research question will then be solved.

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CHAPTER 1

1.0 INTRODUCTION

1.1 Introduction

This Final Year Project is about an experimental work. The main objective is to study the hardness profile on the mild steel in the various cooling medium (air, water, and oil). The main equipment used are furnace, Vickers Hardness Test machine. The expected duration of the experiment to be around 4-5 weeks.

1.2 Background of Study

The term "hardness" can refer to a variety of things. It can be thought of as resistance to permanent deformation in the metals industry [34]. By far the most valuable and widely used mechanical test for evaluating the properties of metals and other materials is the hardness test. A material's hardness is typically defined as its resistance to permanent indentation. In broad sense, an indenter is pressed into the surface of the metal to be assessed under a specific load for a specific time interval, and the size or depth of the indentation is measured. One of the ways of the hardness effect is through heat treatment. Heat treatment can be classified according to the numerous heat transfer media used, such as steam heat treatment, oil heat treatment, air, or inert gas heat treatment, and so on, with steam heat treatment and oil heat treatment being one of the most used in research and industry.

The primary purpose of the hardness test is to establish a material's fitness for a certain application or treatment to which it has been subjected. After the heat treatment, to complete this research the process needs to undergo the Vickers Hardness Test. This is one of the oldest hardness testing methods, and has a wide hardness scale, making it suitable for most metals and welds. The Vickers hardness test uses a 136° pyramidal diamond indenter that forms a square indent. The load is applied for a time of 10–15 s. The two axes of the diamond shaped indentation measured in millimetres are averaged (to give the dimension d) and the hardness is determined,

based on a calibration for different kilogram loads (P) [33].

The hardness effect is run on mild steel plate. Mild steel is a type of carbon steel with a low carbon content, and it is also referred to as "low carbon steel" [27]. One of the motives for choosing this material was to evaluate the endurance of the material, which is currently widely used. The mild steel plate will be heat treated and cooled using various cooling mediums, including air, water, and cooking oil. After going through the processes that have been outlined, a Vickers Hardness Test (figure 1.1) is performed to determine the hardness of mild steel.