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MARA

**UNIVERSITI TEKNOLOGI MARA CAWANGAN
TERENGGANGU**

MEC299

**EFFECT OF MICROSTRUCTURE ON LOW CARBON
STEEL DUE TO VARIABLE TEMPERATURE USING
PLASMA CUTTING**

AHMAD SHAKELL NAIM B MD SANUSI

2020879608

SUPERVISOR:

ENCIK TS MOHD RIDHWAN B MOHAMMED REDZA

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ABSTRACT

A type of metal is low carbon steel, which has an alloying ingredient with only a little amount of carbon. The average carbon percentage of black steel pipe is between 0.04 percent and 0.40 percent, and the average manganese concentration is between 0.30 and 1.4 percent. It has evolved into one of the most popular types of steel used for building because of its reduced cost when compared to other types of steel. In addition, this product can be used effectively to make a wide range of products, such as flat-rolled sheets or steel strips. Low carbon steel needs to be refined extensively before it can be utilised as a heating product. How much heat can low carbon steel withstand because of how much heat it can withstand and what will happen to it if it is exposed to high or low temperatures. When steel is taken out of the press, it retains its strength and does not become brittle, although low carbon steel has a limited ability to measure energy before fracture. The main Objective is to compare microstructure of low carbon steel before and after cutting by using plasma cutting with different temperature. Next , to define mechanical properties of low carbon steel which its toughness, hardness analysis by using rockwell hardness test machine. Sample preparation is the first step in the techniques. Copper was utilised as the material because it is readily available and can be used in laboratory milling. Using a lab microscope, the copper specimen's microstructure is examined, and its hardness is assessed using a Vicker hardness testing device. There will be 6 copper specimen copper plates tested. Safety should come first to prevent harm, so put on your glasses to block out flash and your apron to keep your clothes from catching fire before you start cutting. On six copper specimen plates, the cutting procedure will be carried out using a plasma cutter with various temperature settings. The specimen plate will then be cooled to lower the temperature after being cut. The cut edge surface microstructure of each specimen will then be examined using a microscope in a laboratory setting.

TABLE OF CONTENTS

1.0 Introduction	6
1.1 Background of study	
1.2 Problem Statement	
1.3 Objectives	
1.4 Scope of Work	
1.5 Expected result	
2.0 Literature Review	13
2.1 Heat treatment	
2.2 Annealing	
2.3 Normalizing	
2.4 Quenching	
3.0 Methodology	17
3.1 Flowchart	
3.2 Preliminary Result	
3.3 Gantt Chart	
4.0 References	23

CHAPTER 1

INTRODUCTION

1.0 Introduction

The main design characteristics of strong, durable, and low-cost material to be employed in industries such as aviation, railway, and automotive to make high-quality, high-performance vehicles at a reasonable price. Because of their outstanding formability and weldability, low carbon steel steels are widely employed in various industries.

Low and medium carbon steels contain insufficient carbon content to modify their crystalline structure, making them incapable of being tempered or toughened. Even though it is hard, medium carbon steel becomes tougher and is impossible to cut with a hacksaw. When steel is heated till it blazes and then immediately immersed in pure water, it becomes hard but brittle. When it comes to hacksaw steel that is soft or easy to cut, the flaming steel is cooled gently utilising ambient air. The microstructure behaviour of steels determines the mechanical properties of a metal.

The purpose of heat treatment is to manipulate the microstructure to generate and control mechanical qualities for industrial use. As this type of materials has been selected in this study to examine the effect microstructure of low carbon steel with variable temperature using plasma cutting [1] [2]

1.1 Background of study

Carbon steel's greatest advantage is its long-term durability. It is a sturdy and shock-resistant substance, which is why it is so useful in construction projects. Steel buildings, such as businesses, government buildings, and dwellings, are more resistant to natural calamities like earthquakes and tornadoes. Carbon steel is a long-lasting material that is easy to recycle and reuse.

Carbon steel is significantly less expensive to make than other metals since a little goes a long way. Because of its longevity, less metal can be utilised while still fulfilling the same purpose as material Steel is a relatively simple and safe material to work with. It's also popular in cookware because it doesn't release potentially dangerous chemicals into the meal.

Carbon steel has an almost infinite number of construction applications, and the contemporary world as we know it would not be possible without it.

Building frames in commercial, government, and residential structures are made of low-carbon steel. Low-carbon steel is also used in bridges, steel pipelines, and numerous automotive parts. Nails, wires, pipes, and chain are examples of smaller low carbon steel good made of other metals, such as copper, such as pipes [3] [4].