

**UNIVERSITI TEKNOLOGI MARA**

**DEVELOPMENT OF A CO2 LASER  
ENGRAVER USING TROCEN  
CONTROLLER**

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## **ABSTRACT**

Laser engraving technology has brought about a paradigm shift in material customization and design, offering unparalleled versatility and precision in creating intricate and visually captivating patterns. By utilizing concentrated laser beams to modify or remove material surfaces, laser engravers have become indispensable tools in various industries. They consist of three key components: the laser source, control system, and engraving substrate. Laser engravers can accommodate an extensive range of materials such as metals, plastics, glass, wood, and textiles, allowing for precise customization and personalization. Their applications span across manufacturing, electronics, jewelry, signage, and artistic endeavors. Advantages include non- contact operation, high precision, scalability, and consistent reproduction of complex designs. Laser engraving technology also demonstrates potential for further innovation, with advancements in multi-axis systems, real-time monitoring, and automation. Ultimately, laser engravers empower creativity, efficiency, and quality in material customization, driving the continuous evolution of various industries.

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# TABLE OF CONTENTS

	<b>Page</b>
<b>CONFIRMATION BY SUPERVISOR</b>	<b>i</b>
<b>AUTHOR'S DECLARATION</b>	<b>ii</b>
<b>ABSTRACT</b>	<b>iii</b>
<b>ACKNOWLEDGEMENT</b>	<b>iv</b>
<b>TABLE OF CONTENTS</b>	<b>vi</b>
<b>LIST OF TABLES</b>	<b>vii</b>
<b>LIST OF FIGURES</b>	<b>viii</b>
<b>LIST OF ABBREVIATIONS</b>	<b>ix</b>
<b>CHAPTER ONE : INTRODUCTION</b>	<b>01 - 03</b>
1.1 Background of Study	01
1.2 Problem Statement	02
1.3 Objectives	02
1.4 Scope of Study	02
1.5 Significance of Study	03
<b>CHAPTER TWO : LITERATURE REVIEW</b>	<b>04 - 12</b>
2.1 Benchmarking/Comparison with Available Products	04
2.2 Review of Related Manufacturing Process	07
2.3 Patent and Intellectual Properties	09
2.4 Summary of Literature	12

# **CHAPTER ONE**

## **INTRODUCTION**

### **1.1 Background of Study**

In the world of industrial manufacturing, the ability to cut a material with a high precision and efficiency is a mandatory. It is important so that the cost and time of the production is kept minimize while maintaining the quality of a product. Therefore, technology has improved to achieve those standards with the improved method of cutting. One of the improvements is the use of laser cutting technology. Laser cutting is a technology that uses a laser to vaporize materials in order to cut through materials or engrave it.

The laser cutting method that applied on a machine can achieve a high precision cutting but it requires a controller to control the machine for the cutting process to be more efficient and quick. However, the efficiency and cutting capability depends on the laser type and specification. Each type of laser has its own pros and cons especially when it comes to price and cutting capabilities. The most cheap laser engraver that is available on the market is diode laser but its cutting performance is quite low.

The current solution to the first problem is by using a Computer Numerical Control (CNC) machine with laser as the attachment. This solution provides a better precision and a faster process as it is working automatically after being given an input from the user. Currently, the best laser type that is affordable and have a good cutting capability is CO2 laser. CO2 laser and CNC machine have proved the better quality and efficiency compared to diode laser and manual control machine.

The aim of this project is to customize a laser engraver machine controlled by Trocen AWC708s. The laser engraver is a CO2 laser which will be equipped with an air assist that will improve the cutting quality. Aluminum profile will be used as the main material for the construction of gantry and table.