CNC Laser Cutting Machine

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***Abstract* –**

# Introduction

In the industry, a widely used component for cutting and engraving materials is a CNC laser cutting machine. The machine operates by using a high-energy infra-red laser light beam. A focusing lens is attached to the laser in order to concentrate the energy into single focal point, thereby vaporizing and melting the material of interest. In order to alter the position of the laser into a desired location, a computer program known as CNC drives the positon of both the x and y axes. Asides the orientation of the axes, CNC codes can adjust the intensity of the laser to optimized the speed of the engraving or cutting of the material. Finally, by using machine vision, through the process of object orientation we can determine the position of the material. This process allows alteration of the material for better result, so that during the process the engraving or cutting is accurately done. The creation of the CNC Laser Machine will be conducted into four different parts: the mechanics between the positions of the CORE x-y axes, the laser machine circuit, CNC software for control and intensity, and finally detection system.

# Construction

* 1. *CORE x-y axes*

Design Implementation

CORE X-Y motion

* 1. *Laser Cutter*

1. Laser Operational Function.

A laser cutter operates by using a parallel beam of light consisting of a specific wavelength color, through a laser tube. By inserting an optical lens through the laser tube, the laser can be controlled to intensify the cutting and engraving. By using a microcontroller the pointer will move according to defined input file of a drawing. This can then be used to determine to whether the material is set up for engraving or cutting.

1. Risk Management

Because lasers are highly dangerous certain health and safety regulations are attached towards the tube to prevent casualties. The tube will be connected with exhausters to regulate the fumes and toxic vapors generated by the laser. During operation hours the laser can reach high temperatures, as a result a cooling for the test tube is attached. Lastly, laser goggles are essential to prevent the ranges of the wavelength of the laser. This ensures that the person who uses the laser will not be blinded caused by the laser tube.

* 1. *CNC software*

Interpretation of G-Code to translation into motion

Understanding/ creating the algorithm behind the intensity and motion of the CNC laser

* 1. *Computer Vision System*

Computer vision ‘C.V’ system will be used to identify the working space of the machine. A camera will be placed on top and parallel to the working space. The camera will take a picture of the object that will be cut and send the picture to the microcontroller or Raspberry Pi (to be determined). The open CV along with the algorithm (triangle similarity technique) will be used to determine the dimension of the object. Based on the dimension, the microcontroller will be updated so that the cutting process stays within the working space.

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# Hardware Block Diagram

# Functional Operation Flowchart

# System Modeling

Now we want to be able to model the system so that others

# References

[1] http://www.hydram.co.uk/technical/laser-cutting-tech/