CNC LASER ENGRAVER

Deepak Mehendiratta[1], Siddharth[2], Mr. Vinay Kumar[3]
[3]HOD
[1,2,3]Mechanical Department, Mahavir Swami Institute of Technology, Sonepat , India

ABSTRACT: *This paper describes variety of research of Laser Engraving Process on CNC Machine. The main motive behind our research is to design a Laser Engraver based on a CNC Machine. We were using a lowcost Arduino based on open source hardware and software. The Laser Engraver Machines depends on principle of CNC with restricting limited area depends upon X,Y and Z Axis. Our main objective behind this research is to design Laser Engraver and to use open source software for controlling our Machine. X and Y axis were controlled by two stepper motors while the Z axis movement is to be controlled with help of Servo Motor. Basically in general there are some different types of Laser which are used in Laser Engraving Process like CO2 Laser, Neodymium Doped Yttrium Aluminium Garnet (Nd: YAG) Laser , Fiber Laser etc. But we are using Laser Diode which is also known as Injection Laser Diode.*

I. INTRODUCTION

Laser Engraving is defined as a process of using lasers to engrave an object. In this process removal of material takes place from top surface to a specified depth. Laser Marking also sounds similar like Laser Engraving but in reality both terms are very different from each other. As Laser Marking just discolor the surface without penetrating the object on the surface. The above technique does not involve use of Inks nor it includes tool bits which are used to penetrate on the surface. Above mentioned properties distinguish between traditional techniques with Laser Engraving. The machine consists of three parts basicallyaLaser , Controller and a Surface. The Laser is Drawing Tool i.e. the beam emitted from laser allows controller to penetrate or trace the given pattern on the required Surface. Then the controller determines the Direction, intensity and speed. At last the surface is chosen to match the type of material the laser will work on.

II. METHODOLOGY

Firstlywe provide the supply current in Arduino V3 with the help of USB data cable to transfer the program from Computer to Mother Board. We used stepper Drivers which provides the further movements to stepper motors in form of G codes. Arduino is mounted on CNC shield. The CNC shield distributing the current in form of commands to Arduino. The work of CNC shield is to convert the commands of G codes into digital Pulse by stepper motors. The movement is divided into three axis i.e. X , Y and Zaxis respectively. Firstly in X direction stepper motor will moving in Left and Right and similarly Y direction stepper motor will moving in front and back directions and at last the Z direction stepper motor will be moving in Up and Down direction. Laser will be mounted on Z axis and will penetrate on surface according to commands received for Engraving. The accuracy of this machine is very high as compared to other traditional machines. We also tried some difficult designs with help of our Laser Engraver. Drafting and Scaling of CNC engraver is a difficult and main process. CNC Laser Engraver is able to engrave complex sketch engravings. The coordinates were upload to controller from a separate program. The image file is transformed into a G code via an open source software which is BENBOX in our case. Then further the code is transferred to microcontroller by which motor mechanism is instructed to engrave the required image.

III. CONCLUSION

In This research paper we used concept of low cost CNC Laser Engraver Machine which is easily controlled via Computer. Our project is a low cost project as compared to other high cost Machines. The machine is quite simple in construction and can be carried anywhere without any effort. Many other researchers used different types of techniques for optimization like GLA Technique ,anova analysis etc. Our Machine is of low cost , easy to control and there is no need of skilled person required(As in case of CNC machines high skilled labour is required in that cases.)

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