MULTIPURPOSE CNC PLOTTER MACHINE USING ARDUINO SYSTEM

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Abstract : "Multipurpose CNC Plotter Machine" is very great innovation idea made in modern world. As considering the drawbacks of conventional CNC Machine. The purpose of making Multipurpose CNC Plotter Machine is based on overcoming problems and efforts of conventional CNC machine. The Multipurpose CNC Plotter Machine are the best option in small scale industries. As small scale industries are having less space and less capital budget hence they cannot use conventional CNC machine. Hence the Multipurpose CNC Plotter Machine has been used as its size is small and compact easily portable, Multipurpose CNC Plotter Machine are easy to handle and the small complicated which are very difficult to made by hand that jobs can be done accurately and easily.

IndexTerms **– Multipurpose, Portable, Plotter.**

I. INTRODUCTION

About thousands of years ago human try to find ways to make their work easier. Thus variety of techniques and inventions are created to reduce the human work now a days CNC machine is most popular in manufacturing sector so as to reduce the burden on the people portable CNC milling machine this is the best options because it can be removed easily saving time and reducing the use of space CNC milling machine is a very important technology in the manufacturing industry now a days. Operating of portable CNC milling machines with low cost and simply InDesign will be a good news for the development of small scale.

The Project work presented is based on Multipurpose CNC Plotter Machine. There are various types of CNC machines are available in industry for manufacturing various products but they are very expensive and their capital cost is high as they are generally used for the large production that's why the portable CNC machines is the best option for low production volume with the help of portable CNC machines you can manufacture product at minimum cost portable CNC machines are the best option in small scale industries. The portable CNC machine is easy to handle and the small complicated jobs can be done accurately and easily.

II. OBJECTIVE OF STUDY

- The objective of this study is to design Multipurpose CNC plotter Machine which be able to do draw and drill on small sized jobs.
- To reduce the CNC machine size and make it portable.
- To reduce the cost of CNC machine and increase the productivity for small scale industries.
- To fabricated accurate portable CNC machine.

III. PROPOSED METHODOLOGY

We have selected the process Multipurpose CNC Plotter Machine and to fix the manufacturing process. We have done the following operations.

- Design Concept
- Design Calculation
- Modelling
- Selection Of Components
- Working Model

3.1 DESIGN CONCEPT

This project mainly aims at designing and fabricating a portable CNC machine which able to do milling and drilling operation with required accuracy also it has to be small and compact compared to conventional CNC machine, to that it will be easily portable.

3.2 DESIGN CALCULATION

3.2.1 THREADED ROD

Permissible bending stress for 303stainless steel
= 750 n/mm
Radius = 5 mm
Length = 500 mm

Bending strength = $\frac{P \times L}{4 \times Z}$

Where,

P = Load = 3.5 kg = 350 N

L = Length = 500 mm

Z = section modulus = 0.78 × r3 = 97.5 mm3

On solving,

σ = 448 N/ mm

Which is lower than the permissible value

Hence design is safe

Selecting threaded rod of 5 mm radius.



Fig.1 THREADED ROD OF 5MM RADIUS

3.2.2 ROLLER BEARING

Internal diameter = 10 mm
Required strength = 175 N
Hence selecting SKF6000 roller bearing
having dynamic capacity of 360 N
And static capacity of 190 N



Fig.2 ROLLER BEARING SKF6000

3.2.3 SLIDING ROD

Material = Steel rod
Permissible bending strength = 520 N
Load = P =175 N
Internal diameter = 16 mm
outer diameter = 20 mm
Length = 500 mm
Section modulus = (0.78 × (ro4 - ri4) / ro
= 3684.09 mm4
Bending strength = P×L / 4×z
On solving
σ = 42 N/mm
Which is lower than the permissible value
Hence design is safe.



Fig.3 SLIDING ROD

3.2.4 LINEAR BEARING

Internal Diameter = 20 mm
Load = 87.5 N
Hence selecting a LM20UU linear ball bearing.



Fig.4 LINEAR BEARING LM20UU

3.3 MODELLING

After selection and calculation of parts we select the standard body dimensions,

Complete Body Dimensions:

Overall height = 500 mm Overall Length = 500mm Overall Width = 410 mm

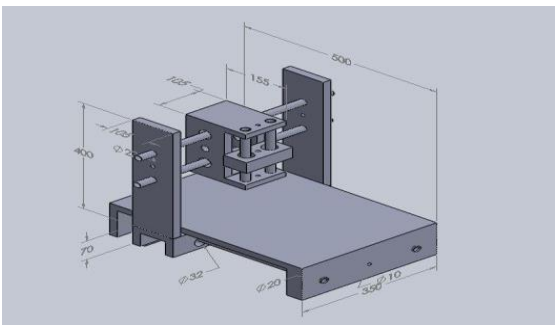


Fig.5 SOLID MODEL DESIGN

3.4 SELECTION OF PARTS

- Body :



Fig.6 PLY WOOD

- Positioning Motor :



Fig.7 DC MOTOR RS 555

- Lead Screw :



Fig.8 SS 304

- Microcontroller :



Fig.9 ARDUINO UNO

3.5 WORKING MODEL

After the process of calculation of parameters, Selection of elements and assembly of the model, we did programing part and set up the system using ARDUINO and its drives. With the help of power supply then we ran the plotter and checked the accuracy of movements in X,Y and Z – axis respectively.



Fig.10 ACTUAL WORKING MODEL

IV. RESULT'S AND DISCUSSION'S

As mention above the purposed of the project is full filled. The analysis of the machine is done on a normal condition were the operating parameters is perfect. In our Multipurpose CNC Plotter Machine Drawing, drilling and milling operation are properly done. It works very efficiently and convenient as the work done by normal conventional CNC machine. The space required is also less for our Multipurpose CNC Plotter Machine as compared to the conventional CNC machine. The cost of machine is less because the material required for Multipurpose CNC Plotter Machine is less and economically feasible. The more use of this machine in small industries will increase the production rate very effectively.

INPUT : The basic diagram has given as input which was of 150 mm*150 mm.

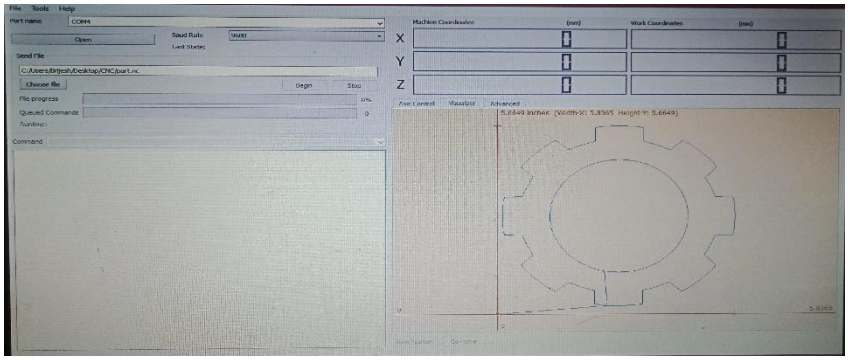


Fig.11 INPUT USING GRBL CONTROLLER

OUTPUT : As a result our CNC Plotter successfully engraved a Gear diagram with proper accuracy on the plywood.



Fig.12 ENGRAVED PRODUCT

V. CONCLUSION

While concluding this part we feel quite satisfied in having completed the project well long time. The multipurpose CNC plotter machine is the best option for small production volume units.

With the help of this, the cost of production becomes low and increase in the productivity of that production which is a small production. It can be easily transportable as compared to the conventional CNC machines. The design creation imposed challenging problems which however were welcome by us due to availability of good research paper the selection of choice of raw materials help does is machine of the various components to get finite tools and making the machine in a proper size and ways to complete the complicated jobs in a proper way and easily.

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