

# Computerized Drilling Machine

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**Abstract**— The objective of this is to develop a model of Computerized control drilling machine which can drill small holes on thin wooden sheet at various locations by giving variable X and Y coordinates. The paper also aims the route optimization of the drilling tool to target given locations with optimal travel.

**Keywords**-CNC drilling, Computerized Drilling;Drilling machines;

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## I. INTRODUCTION

This paper aims to fabricate the model of drilling machine which will make use of computerized numerically control technique in machine tool building to enable the operator to communicate with machine tool through series of numbers, characters, and symbols. It enables to drill small holes on a thin sheet of wood with greater accuracy and repeatability. The operating commands which control the machine tool are executed automatically with amazing speed, accuracy, efficiency and repeatability.

Numerical control is the operation of a machine tool by a series of coded instructions consisting of numbers, letters of the alphabets, and the symbols which the machine control unit can understand. The instructions are converted into electrical pulses of current with which the motor are controlled to carry out the necessary operations on the work piece. The numbers, letters and symbols are coded instructions which refers to specific distances, positions, functions, or motions which the machine tool can understand as it machines the work piece.

Single spindle drilling Machine :

One of the simplest numerically controlled machine tools is the single spindle drilling machine. Most drilling machines are programmed on three axis :

- a. The X axis controls the table movement to the right and left.
- b. They Y axis controls the table movement towards or away from the column.
- c. The Z axis controls the movement of spindle up and down to drill holes.

As manufacturers are under tremendous pressure to improve product quality in terms of accuracy, dimension while maintaining high productivity, they need to address numerous problems in machine tools those affect the production, accuracy, increased time level during operation stages. Solving those problems or to develop CNC machine is a huge challenge.

This project aims to fabricate the model of CNC drilling machine which can help to develop machine of the industry grade. Theory of interfacing the machine tools with computer through electronics manipulation circuit supplying the distributed power supply to run the various parts of the machine is to be studied to develop the model.

It also aims to provide friendly GUI (Graphic User Interface) for easy operation.

## II. THE FLOW OF PROJECT

The first of project is to design the basic component of machine. The dimensions of the frame are decided. Then in

second step a prototype is modeled for checking the complete assembly. After modeling actual fabrication of machine is done. Simultaneously for getting signals from computer a motor drive is designed and GUI is created.

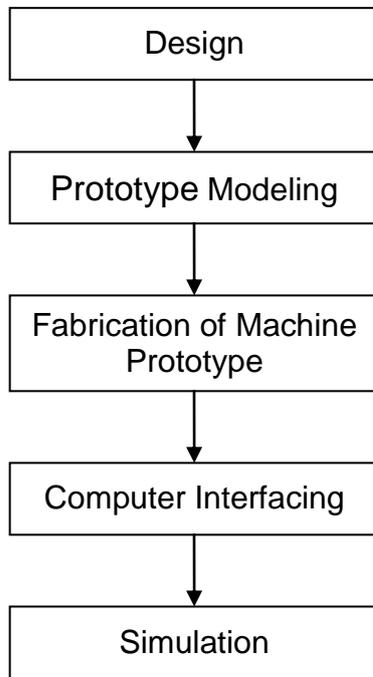


Fig 1: Process flow

### III. MACHINE ELEMENTS

Every machine comprises different elements. To comprise this model of the CNC machine following elements has to be fabricate and assemble.

Machine Elements:

1. Frame Structure Base, Column, Table, Head,
2. Mechanical Drive for Power Transmission
3. Stepper motors to position table at given X and Y coordinates.
4. DC / Stepper Motors for Up and Down movement of the head tool
5. Bearings.

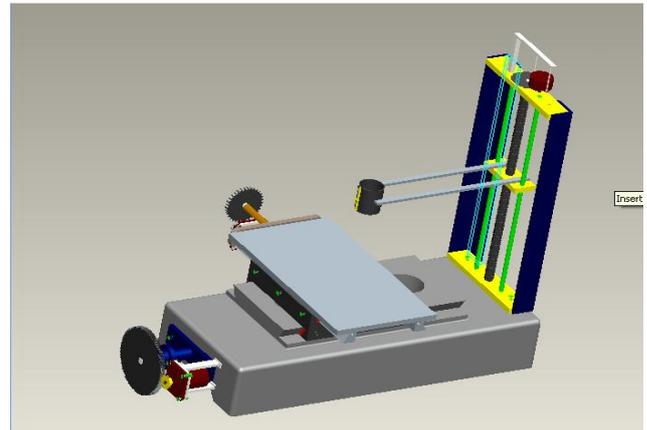


Fig. 2 Prototype of drilling machine

### IV. FABRICATION

Fabrication of the machine includes firstly the fabrication of the mechanical components which includes fabrication of the base of the machine made up of cast Iron, the X- table, Y- table and the column to hold the drilling tool. The X and the Y movement of the table is achieved with the help of the lead screw assembly which is driven by the stepper motors fitted on the respective tables. The Z movement of the drilling tool is also achieved with the help of lead screw assembly which is again driven with the help of stepper motors. The power from the motor to the lead screw assembly is transmitted with the help of the gearing mechanism with different gear ratios. Next is the fabrication of the electronics circuit which includes the power circuit, driver circuits, the microcontroller circuits etc. The stepper motors are controlled by the software program which is achieved by the interfacing between the machine and the computer.

### V. COMPUTER INTERFACING

Computer Interfacing is a boundary across which two independent system meet and act on or communicate with each other. In computer interfacing there are several types of interfaces:

- 1) User Interface: The user interface allows the user to communicate with the operating system. The communication is done by keyboard, mouse etc.

- 2) Software Interface: Software interface includes the languages and codes that the applications use to communicate with each other and with hardware.
- 3) Hardware Interface: Hardware interface is related with data transfer of one hardware device to other. This includes communication through the wires plugs and sockets.
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This project consists of all interfaces. The user interface and software interface are created through visual basic language. The data transfer is done by using parallel port.

#### CONCLUSIONS

Computerized drilling machine is more efficient than conventional drilling machine. Due to calibration this machine drills exact hole at multiple locations. It also reduces the labor work since the complete work is controlled by computer and its signals. It saves time of manufacturing so it is more suitable for mass production.

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