
STUDY ON COMPUTER NUMERICAL CONTROL CNC MACHINES**Suraj Paratp Singh*¹, Himanshu Mann*², Kunal Baghel*³****Dr. Ashok Kumar Madan*⁴**

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ABSTRACT

The main objective of this paper is to “Study on Computer Numerical Control (CNC) machines for fabrication of rollers. This paper also includes various processes like facing, turning, parting, drilling, boring and knurling to improve production in order to decrease the production time and also to increase the efficiency in conventional lathe and CNC machines by writing the program on STC-25 CNC lathe.

Keywords: Study, Computer Numerical Control (CNC) Machines, various operations.

I. INTRODUCTION

Loads the design into the computer connected to the CNC machine. Computer design turns it into specific numbers (numbers) that control how the CNC cuts and produces the material. . Place the building material on the block with double-sided tape. This must be done carefully so that it does not fall off the block during processing. Block is placed in the vice on the CNC. It should be preserved very well. the machine is not secure when it starts to cut the material, it may fall out of the vice. When the machine starts to work, it moves up, down, left and right according to the clamp design. On-site maintenance. The machine prevents the operator from being pulled out of the vice by the force of the cutter. For safety reasons, the engine will not start if the guard is not in place. The CNC opens and cuts the shape from the material. The die material can be removed from the vice when the cutting machine stops. Total Time - Simple Design - 15 minutes.

1. 1 CNC Machine-Input, Process, Output

A CNC manufacturing facility requires three pieces of product.

II. COMPUTER

Computer is used for drawing.

But the design is just a picture and the CNC machine cannot use it to produce the product.

Computer software is required to convert the drawings into numbers (coordinates) that the CNC machine can use as it begins cutting and fixing parts. the material.

An Interface

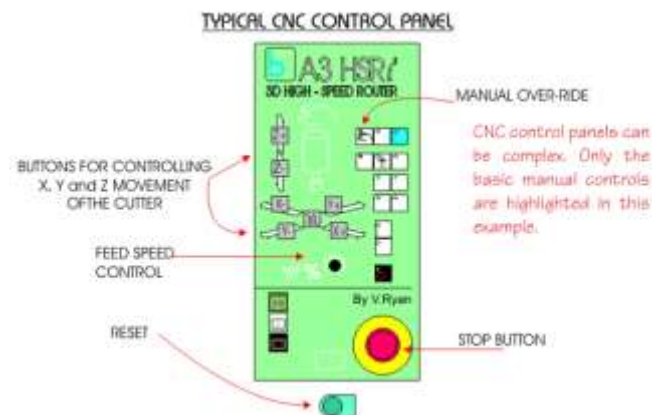
The computer cannot be connected directly to the CNC machine. The computer is connected to the interface. This converts the signal from the computer into a form that the CNC machine can understand. When the signal is sent to the CNC machine, the signal appears as a digital signal.

CNC (Computer Numerical Control) Machine

The signal from the interface controls the motors of the CNC machine. This signal determines how the vise moves. The vise moves in three directions (horizontal, vertical and depth) as X, Y and Z. This signal also controls the speed of the cutting tool.

1. 2 CNC Control Panel

CNC machine tool is basically controlled by computer and software. However, most CNC machines have many controls for manual use. The use of CNC machines is rare because simple operations are best done on cheap/basic/manual machines. When using a CNC machine manually it is used far below its capabilities and capabilities.



Reset Button:

The most important control button is usually the reset button. When the CNC machine is turned on, the reset button is pressed by the machine operator. This Zeros tool moves the tool to coordinate 0, 0, 0 on the X, Y, and Z axes. In simple terms, the reset button moves the device above the table to the corner of the machine. If the reset button is not pressed, the CNC machine may start cutting the product in the wrong direction or even miss the cutting and piecing table.

Manual Control:

The mower can be controlled manually, although it is rarely needed. The "X" and "Y" buttons control the movement of the tool along the horizontal plane. The "Z" button controls depth and up/down movements.

Stop Button:

Most control panels have a stop button. The machine stops very quickly when these keys are pressed.

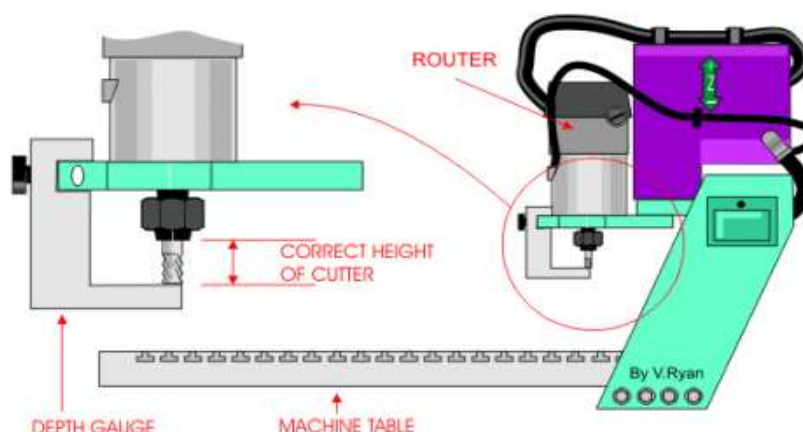
Speed and Feed:

In some CNC machines, the speed and feed of the tool can be changed manually. .

III. SETTING UP THE CUTTING TOOL TO THE CORRECT LENGTH

One of the few things a driver does is change the cutting tool. Every CNC machine tool has several cutting tools. Straight cutters, chamfering V-rooves and fillet cutters are some examples. If the design is a detail, it is necessary to change the cutting tool at least once during the production process. It is very important that all tools have the same length of mirror. If this is not done, the machine-d parts will be machined in the wrong direction. A special depth gauge is used to complete the cutting tool. This "rule" applies to all CNC machines, but different techniques can be used depending on the type of CNC machine.

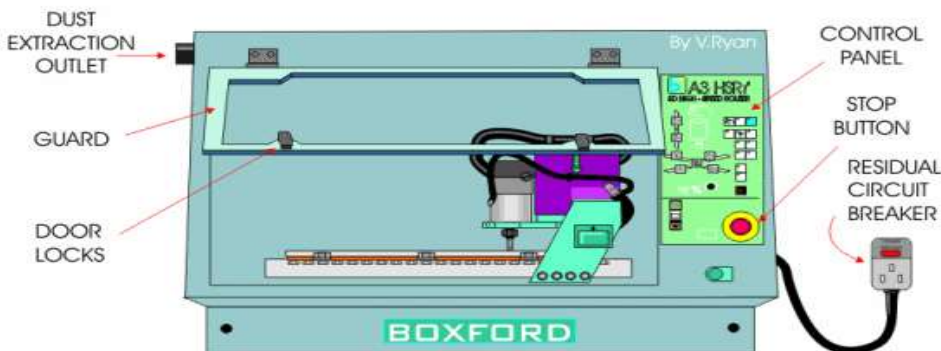
The cutting tool can be removed and replaced with a new one. After checking the distance from the tip of the tool to the pliers with a depth gauge, retighten the collet and locknut using a wrench.



2. 1 CNC Machines and Safety

CNC machines are very safe to use because they are designed to be as safe as possible. One of the main advantages of CNC machines is that they are much safer than manual machines. The video below shows the Boxford A3 HSRI² CNC mill marked with various safety features. CNC machines today are generally designed so that the cutting tool does not run unless an operator is on site. In addition, the best CNC machines closed the nursery as a tool for production equipment. The protection can only be activated when the clipper is stopped. Students/apprentices/machinists must receive "Quality" training before using CNC equipment. CNC router with built-in ejection for shaping materials such as wood and plastic. Inhalation of dust can be hazardous and may cause eye irritation.

The CNC Router shown above has an outlet for removing the housing. Since the router is completely closed, dust cannot escape into the environment. If vacuum is installed, dust can be removed. Most manual robot routers have a very limited suction system that traps airborne dust. The above CNC router has a power level. Older machines such as manual mills and center lathes have three power levels. Single phase power can be "plugged" into any available electrical outlet. The machine's power supply is powered by a residual current device (RCB). Single stage CNC machines are easier to transport as they only need to be disassembled and reassembled. Three-phase machines are specifically connected to a mains and not unplugged. Most CNC machines are operated behind closed doors or behind security guards. This means the job will not be damaged by "flying" explosives/heat. Good thinking is necessary for the use of all machines, including CNC machines. Basic safety training for working in the workshop and with other machines also applies to CNC machines



IV. PROGRAMMABLE FUNCTIONS

programmers should be aware that the functions of CNC machine tools are programmable (and command related to programmable functions). Many machines need to be operated manually with low cost CNC equipment. For example, on some CNC mills the only function that can be programmed is the axis axis. Almost everything may need to be enabled by the carrier. On this type of machine, spindle speed and direction, coolant and tool change must be enabled by the operator. On the other hand, with full CNC equipment almost anything can be programmed and the operator only needs to load and unload the workpiece. When the loop is open, the operator is free to do other company work. Consult your machine tool manual to see if your machine's functions are programmable. To give you some examples of how many programmable functions are used, here is a list of the most common programmable functions and their associated programming language.

Spindle control

An "S" word is used to indicate spindle speed (in RPM for machining centre). M03 is used to rotate the spindle clockwise (forward). M04 rotates the spindle clockwise. M05 turns off the spindle. Note that the vendor also has a feature called Constant Surface Speed

Automatic tool changer (machining center)

A "T" word is used to indicate the machine on which the station will be placed on the spindle. On most machines, the M06 indicates the machine as a spare. TOOL CHANGE (Turning Centers) Turning centers use the four digit "T" word to indicate tool change. The first two digits of the T word indicate the station number of the turret, and the last two digits indicate the offset number used by the device. For example,

T0101, the specified station number is one and the offset number is one.

Coolant control

M08 is used to open the coolant flow. M07 is used to activate the coolant spray if equipped. M09 kills coolant.

Automatic pallet changer

M60 guide is mainly used for pallet changer. Certification All types of CNC machine tools require some form of certification. While applying for different reasons on different types of machines, each type of payment allows the CNC user to take into account the tool not related to the build time. Before discussing how to get paid using CNC, let's understand the payment process in general. Support is used in many areas of daily life. Pilots must balance wind speed and direction during setup. Competitors must pay for the weather and track conditions when negotiating the tracks. If your calculator has memory, you know that you can store a fixed value in each memory for use during calculations. This will save you from entering too many numbers for repeated calculations. Like the memory of an electronic calculator, offsets in the CNC are memory locations where values can be placed. The values in the memory of the calculator have no meaning in the calculation unless they are told by the user, and the values in the CNC control offsets have no meaning until they are said in the CNC program. From a gunner's perspective, you can think of the cost saved in CNC offset as the amount of adjustment required for the rifle to compensate for the distance from the target. Note that the rifle should only be set for a single target away from the target. Most CNC machines have at least one offset for each tool.

Offsets

All payouts are based on offset. You can think of CNC offsets like the memory of an electronic calculator. If your calculator has memory, you know that you can store a fixed value in each memory for use during calculations. This will save you from entering too many numbers for repeated calculations. Like the memory of an electronic calculator, the offset in the CNC is a memory location where the value can be placed. The values in the memory of the calculator have no meaning in the calculation unless they are told by the user, and the values in the CNC control offsets have no meaning until they are said in the CNC program. From a gunner's perspective, you can think of the cost saved in CNC offset as the amount of adjustment required for the rifle to compensate for the distance from the target. Note that the rifle should only be set for a single target away from the target. Most CNC machines have at least one offset for each tool.

V. CNC PROGRAMMING

1. Turning

Tool Holder: PDJNL 25*25

Insert: DNMG 150604

N5 G54;

N10 M42;

N20 G95 S300 M4;

N25 LIMS=600;

N30 T01 D1 M8;

N35G00 X80 Z0;

N40X70;

N45 G01 Z-75 F0. 2;

N50 G00 X71 Z0;

N55 X60;

N60 G01 Z-50 R0. 2;

N65 X70;

N70 G00 X200 Z200;

N75 M30;

2. Step Turning

N5 G54;

N10 M42;
N15 G95 S300 M0. 4;
N20 T01 D1 M8;
N25 G00 X30 Z0;
N30 G00 X40 Z0;
N35 CYCLE95;
CYCLE95 ("STEP TURN", 5, 0. 1, 0. 1 . . .) X40
N40 G00 X200 Z200 M17;
N45 M30;
STEP TURN: (SUB PROGRAM)
N05 G01 X0 Z0 F0. 2;
N10 G01 X20 Z-10;
N15 G01 X20 Z-30;
N20 G01 X30 Z-30;
N25 G01 X30 Z-45;
N30 G01 X40 Z-45;
N35 G01 M17;

3. Taper Turning

N5 G54;
N10 M42;
N15 G95 S300 M. 4;
N20 T01 D1 M8;
N25 G00 X01 Z0;
N30 G01 X80 Z-45 F0. 2;
N35G00 X81 Z0;
N40 G01 X60 Z-30 F0. 2;
N45 G00 X81 Z0;
N50 X50;
N55 G01 Z-68 F0. 2;
N60 X60 Z-15;
N65 G00 X51 Z0;
N70 X40;
N75 G01 X50 Z-6. 5 F0. 2;
N80 G00 X200 Z200;
N85 M30;

VI. CONCLUSION

In the study of computer numerical control machines, can increase productivity in research of computer numerical control tools. CNC programming is a way of working on a CNC machine. Using a CNC lathe can improve productivity, precision and time management, but the only downside is the cost. This cannot be used for all small jobs it is suitable for high volume products and complex shapes.

CNC-lathe is designed for commercial use in mass production only and is not suitable for small businesses due to its high initial cost.

VII. REFERENCES

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