CNC Machining

(Computer Numerical Control Machine)

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Aim: To write CNC codes and perform the process (milling and turning using the written codes)

Materials required:

i) Milling machine
ii) Turning machine
iii) Nylon or acrylin

Machining is a process in which a material (often metal) is cut to a desired final shape and size by a controlled material-removal process.

Milling is a machining process that involves the use of cutting tools that are rotated at a set speed and then brought into the contact with a work piece.

Turning is a form of machining, a material removal process, which is used to create rotational parts by cutting away unwanted material.

G-code is the most widely used computer numerical control programming language. It is used mainly in computer manufacturing to control automated machine tools.

Some of the G-codes.

G00 – Rapid move

G01 – Linear move.

G02 – Circular interpolation

G03 – Counterclockwise interpolation

G21 – set units to mm

G90 – Absolute coordinates

Some M-codes

M01 – Program Stop

M02 – End of Program

M03 – Spindle On Clockwise.

M04 – Device on Counter Clockwise.

M06 – Tool Change

M08 – Coolant on.

M09 – Coolant off

Milling : Program to machining of the given material.

```
G00   X5   Y10   Z5   F20   S2000
G01   Z-1
G01   X25
G02   X41   R8
G01   X46
G01   Y25
G03   X41   Y30   R5
G01   X30
G02   X20   R5
G01   X5   Y10
G01   Z20
```

- Set up the milling machine with the acrylyn material
- Open the application and write the code in it and set the home axes and touch off. accordingly
Start the milling process and wait until the process comp.

Turning:

```
G00   X9   Z1   F50   S2000
G00   X8.3   Z1
G01   X8.3   Z-10
G01   X8.7
G00   Z1
G00   X8.1   Z1
G01   Z-10
G00   X8.7   Z-10
```

```
G00  X8.7  Z1
G00  X7.9
G01  Z-10
G01  X8.7
G00  Z1
G00  X7.7
G01  Z-10
G01  X8.7
G00  Z1
G00  X7.5
G01  Z-10
G01  X8.7
G00  Z1
G00  X7.5
G01  Z-10
G01  X8.7
G00  X7.1
G01  Z-5
G01  X8.7
G00  Z1
G00  X6.9
G01  Z-5
G01  X8.7
G00  Z1
G00  X6.7
G01  Z-5
G01  X8.7
G00  Z1
G00  X6.5
G01  X6.5  Z-5
G01  X8.7  Z-5
```

Precaution

- Rapid move should not be used when the tool is touching the material.
- During milling, turn on the spindle before moving it dencarly, otherwise the material or the tool may get damaged.
- If something goes wrong, turn off the process, then of the spindle.
- In turning, the cut on the material should not be more than 0.2mm in thickness at one time.