



DEPARTMENT OF ROBOTICS & MECHATRONICS ENGINEERING  
UNIVERSITY OF DHAKA

Course code : RME 3212

Course name : Manufacturing Process with CNC Programming Lab

Experiment no : 04

Experiment name : CNC turning operation with chamfering.

Group no : 06

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## Objective:

- Learn CNC turning operation
- Learn to operate CNC machine

## Theory:

CNC milling is a machine process which produces custom-designed parts or components by progressively removing material from the workpiece using rotating multi-point cutting tools and computerized controls. These systems usually have three linear degrees of freedom. They can move freely around the X, Y, and Z axes while the workpiece remains stationary. This limited dimensional operation reduces the speed of operations, making milling more suitable for prototyping and smaller production runs.

CNC turning is a manufacturing process that involves holding bars of material in a chuck and rotating them while feeding a tool to the piece to remove material until the desired shape is achieved. As the desired shape is achieved through the removal of material, it is also known as subtraction machining. All of the work can be completed from one side if the CNC turning center has only one turret, but some turning centers have a main spindle and sub-spindle for even faster operation. With this configuration, the main spindle partially machines the workpiece, which is then moved to the sub-spindle to complete the job on the other side of the part. The speed of CNC turning operations makes it an ideal process for large production runs with short lead times.

The production capabilities of CNC milling include a range of processes, such as:

- Chemical
- Electrical
- Mechanical
- Thermal

CNC mills provide superior material conservation efficiency, which leads to a reduction in material costs over the machine's lifespan. CNC mills fabricate products such as complex short-run production parts, precision components and parts, and prototype parts.

CNC turning lathes, on the other hand, are used to conduct operations such as:

- Drilling
- Facing
- Grooving
- Knurling
- Parting

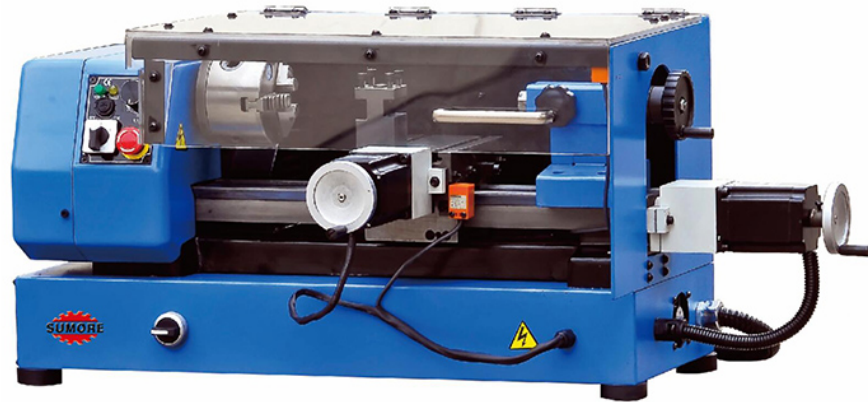
CNC milling and turning are used in a number of industries, including:

- Wood working
- Electrical industry
- Electrical discharge machine (EDM)
- Metal removing
- Material fabrication

The most common reason for Chamfer Edges is to make sure they're not sharp. Machining operations can leave razor-sharp edges that can cut fingers and flesh. Even if the edge is not too sharp, there may be burrs left behind by the machining process. Cutting a chamfer removes the burrs and saves on other methods of Deburring. Sharp Edges and Burrs are often unacceptable for finished parts. Chamfer Mills can be an important part of deburring operations. If a print specifies "break all edges", chamfer the edges with a chamfer mill. Another use for chamfers is to cause the head of a bolt to recess and be flat on a surface. Chamfers are also more pleasing to the eye. They make the edge less delicate and harder to damage. If two pieces are to be welded together, put a chamfer along the welded joint for both pieces to support the welding process.

### Equipment:

- CNC lathe machine



- Wood piece



### Procedure:

- First we fix the wood piece to the CNC lathe machine and turn on the machine.
- Then we code to get our desired shape.
- After completing the code, we see the simulation if it's doing the chamfering operation correctly.
- As the correct chamfering operation is done in the simulation, we do the operation in real with the lathe machine.
- The CNC lathe machine does the turning operation and we get our desired shape.

### Code:

```
N10 M03 S2000;  
N20 G94 G00 X0.057 Z 5.430 F50;  
N30 G01 X-4.5 F50;  
N40 Z-35;  
N50 X0.057 Z-45;  
N60 M30;
```

### Result:



### **Discussion:**

We got our expected shape. Initially, we struggled to find the machine zero and workpiece zero, but finally we could figure that out and fix our code properly.

Even though it took a long time, the code got our expected shape and we could do the turning operation properly.

### **Reference:**

- <https://www.technoxmachine.com/blog/what-basics-cnc-milling-turning/#:~:text=NC%20turning%20is%20a%20manufacturing.also%20known%20as%20subtraction%20machining>
- <https://www.cnccookbook.com/chamfer-tool-speeds-and-feeds/>

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25.08.2022



Fig: Workpiece after operation

Code:

N11 M03 S1500

N12 G94 G00 X0 Z0 F50

N13 G01 X-5 F50

N14 Z-20

N15 G01 X0 Z-30 F50

N16 M30