



Industrial Technology Virtual Learning

Advanced Metals/Understanding CNC Milling

May 18, 2020



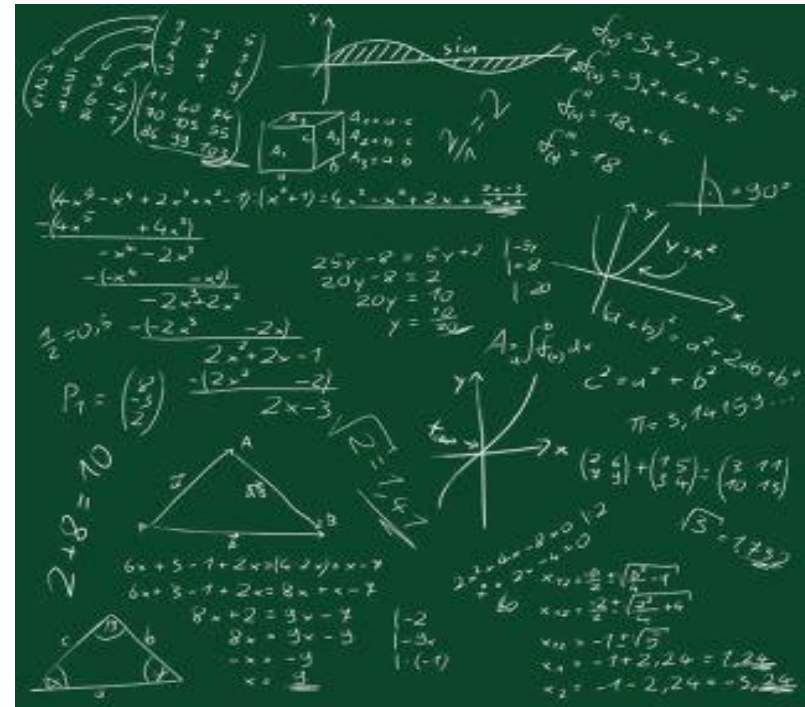
Understanding CNC Milling: May 18, 2020

Objective/Learning Target:

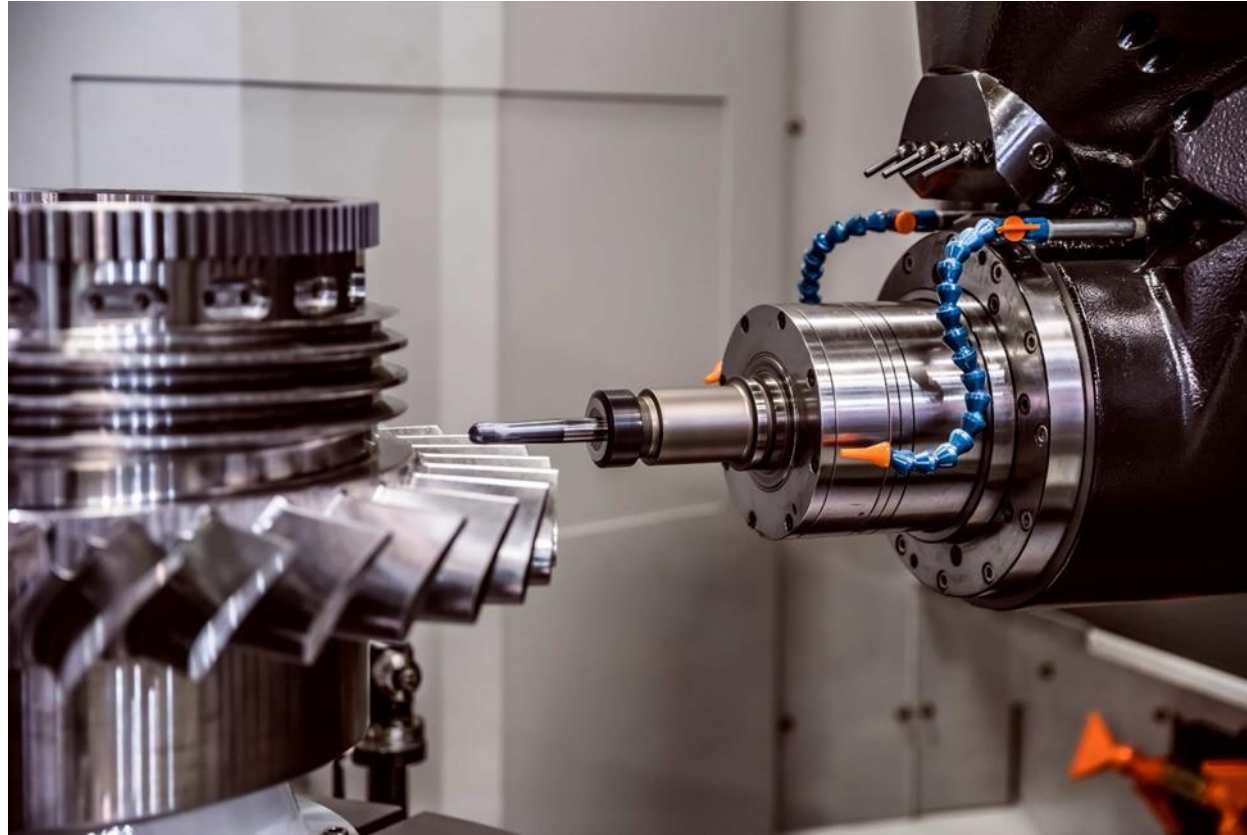
At the conclusion of this assignment the students will understand how a CNC Mill operates, the basic production process of producing a part, along with the types of suitable materials used in production. At the end of the assignment students knowledge of the subject will be checked with a short quiz.

Bell Ringer

Can you describe how you've used your skills with mathematics, computers, or machines to resolve a problem?



Understanding CNC Milling



CNC Milling

CNC milling, or Computer Numerical Control milling, is a machining process which employs computerized controls and rotating multi-point cutting tools to progressively remove material from the work piece and produce a custom-designed part or product.



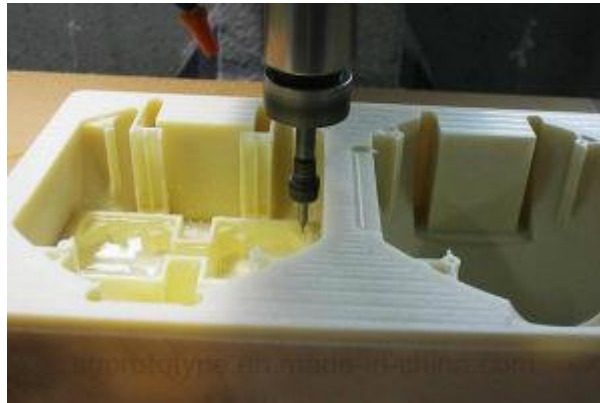
Computer Numerical Control (CNC) is programmed code that represents instructions for precise movements to be carried out by machines. Indirectly, this code defines how to automatically create, produce, or transform a virtual object into a real one.



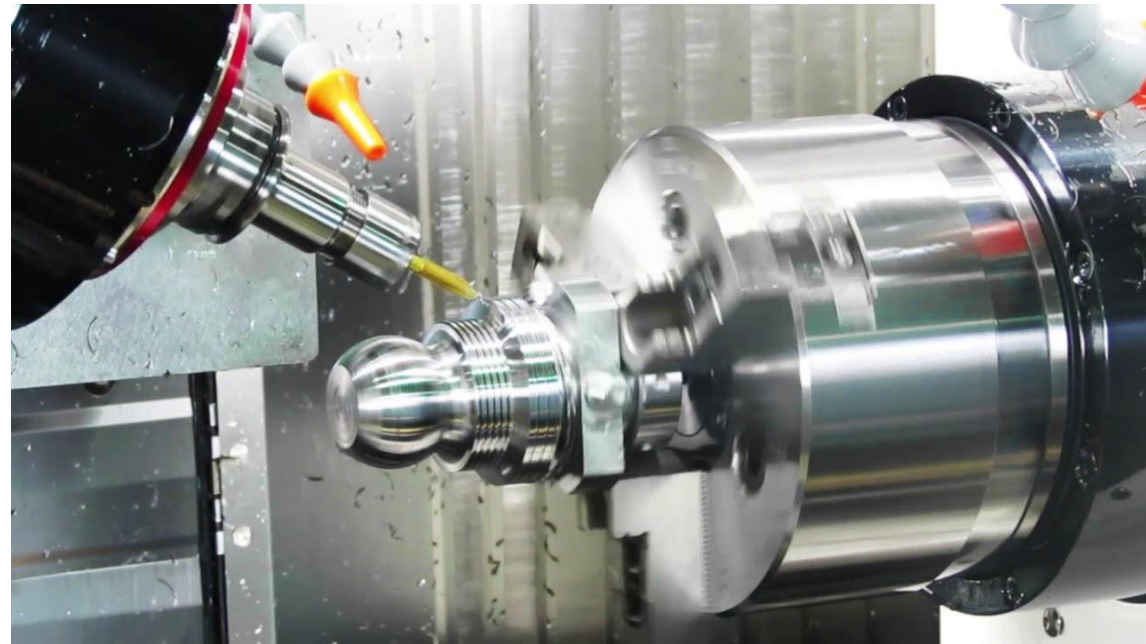
Based on this definition, a CNC machine must interact with a computer equipped with software that transforms numerical code into Cartesian coordinates. This allows the machine to work with a high degree of precision, just like a robot.



CNC milling process is suitable for machining a wide range of materials, such as **metal**, **plastic**, **glass**, and **wood**, and producing a variety of custom-designed parts and products.



CNC milling machining process along with **drilling**, **turning**, and a variety of other machining processes, meaning that material is removed from the work piece via mechanical means.



Overview of CNC Milling Process

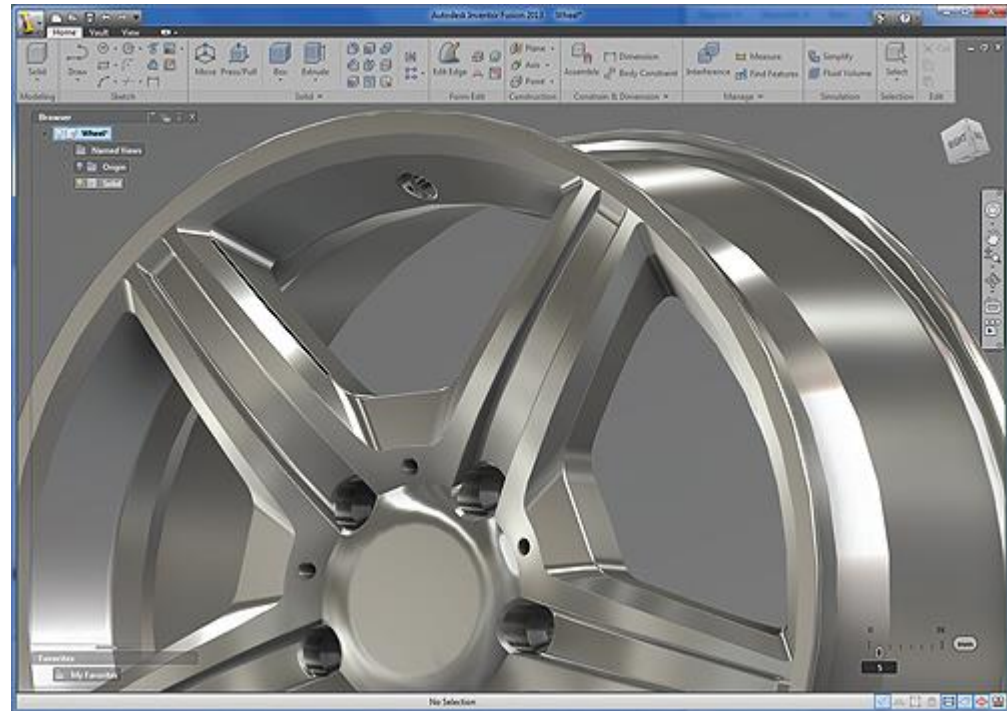
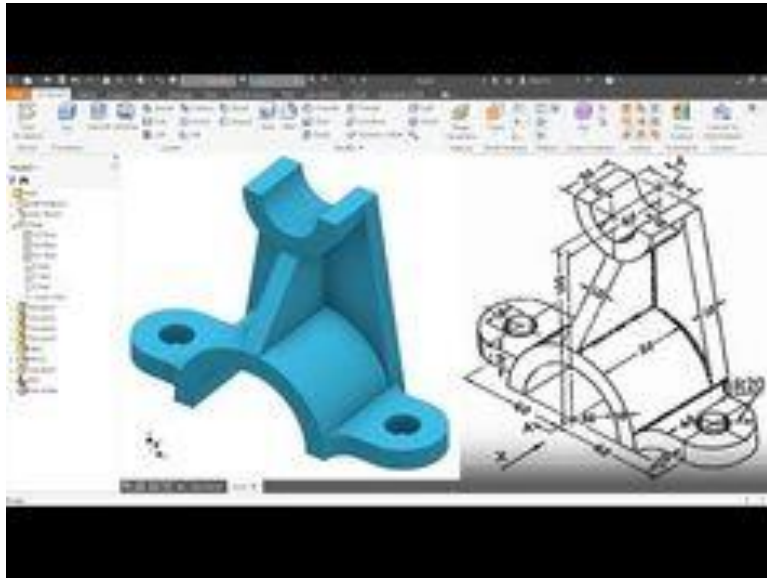
The CNC milling process utilizes computerized controls to operate and manipulate machine tools which cut and shape stock material.

The process follows the same basic production stages which all CNC machining processes do, including:

- Designing a CAD model
- Converting the CAD model into a CNC program
- Setting up the CNC milling machine
- Executing the milling operation

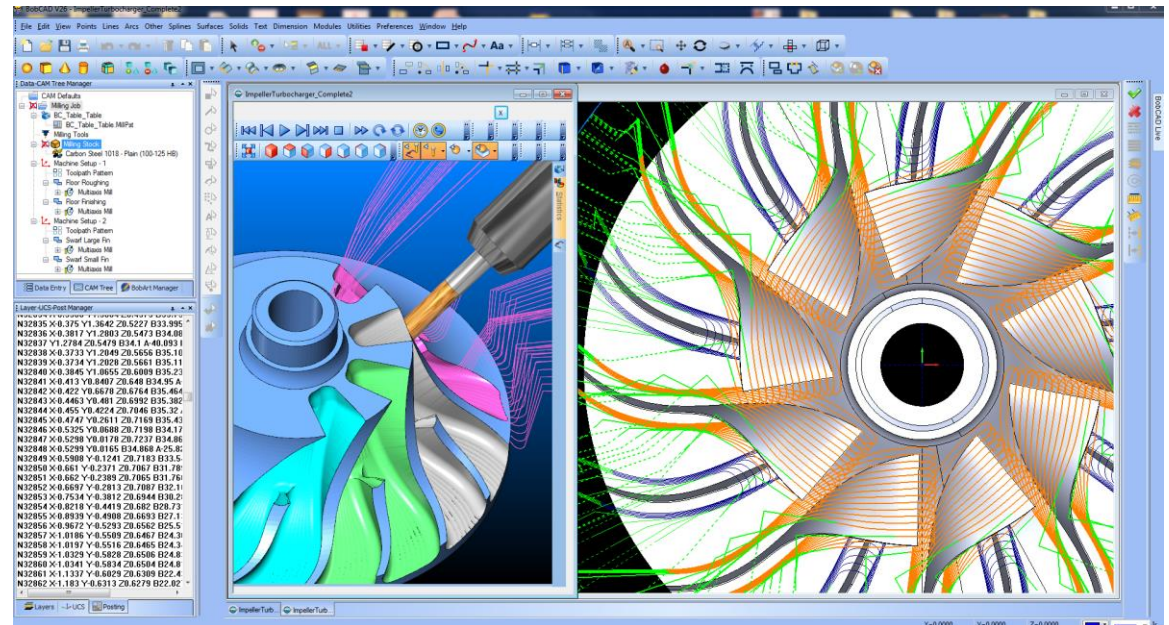
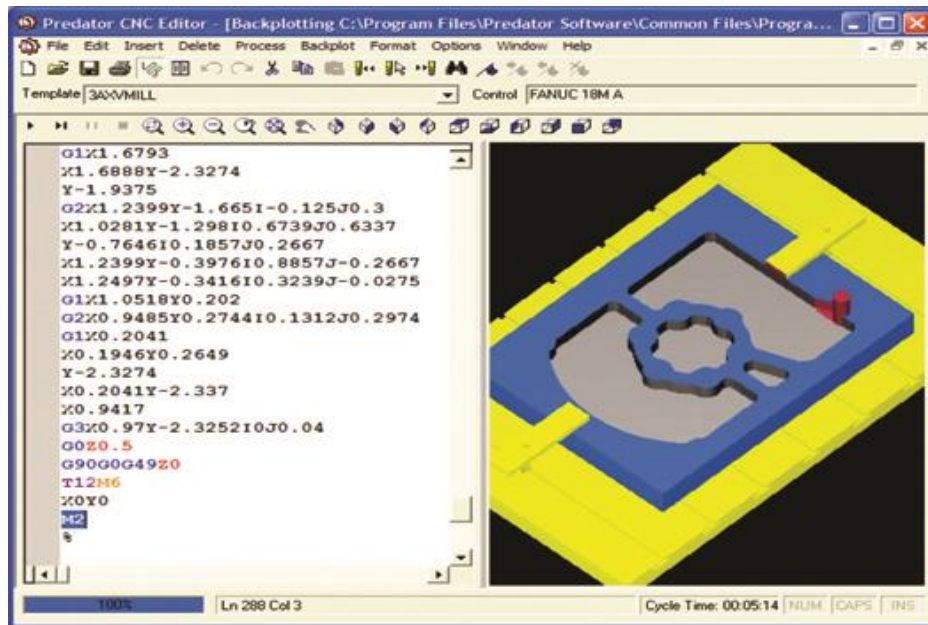
Designing a CAD Model

- The CNC milling process begins with the creation of a 2D or 3D CAD part design.



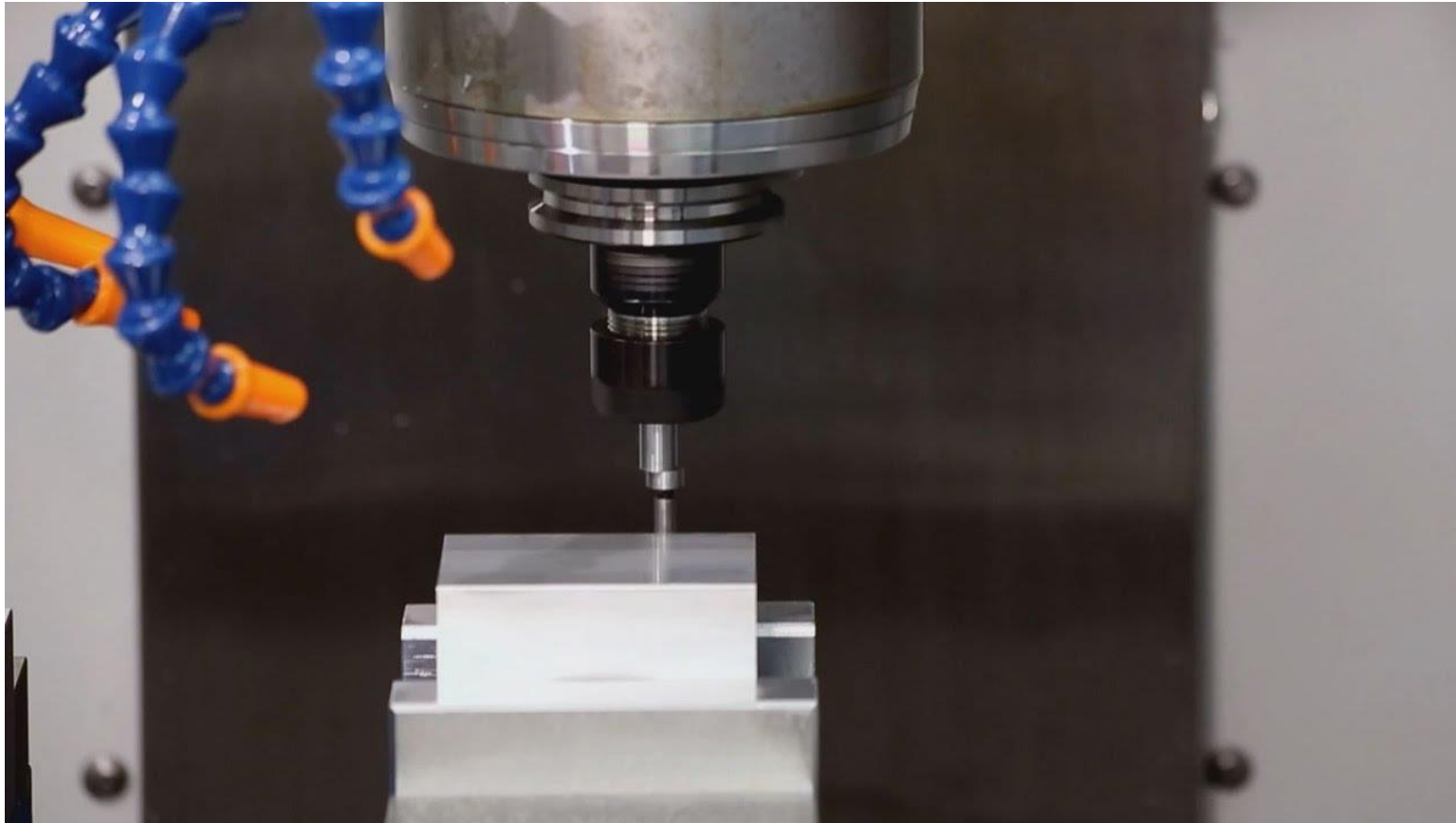
Converting the CAD Model into a CNC Program

Then the completed design is exported to a CNC-compatible file format and converted by CAM software into a CNC machine program which dictates the actions of the machine and the movements of the tooling across the work piece.



Setting up the CNC Milling Machine

Before the operator runs the CNC program, they prepare the CNC milling machine by affixing the work piece to the machine's work surface (i.e., worktable) or work holding device (e.g., vise), and attaching the milling tools to the machine spindle.



Executing the Milling Operation

- When the machine is ready, the operator launches the program via the machine interface prompting the machine to execute the milling operation.



Video CNC Operation

Please view the following video, *Extreme Fast Milling Machines in Action.*

<https://youtu.be/osqX7iQEnul>



References

- <https://all3dp.com/2/what-is-cnc-milling-simply-explained/>
- <https://www.thomasnet.com/articles/custom-manufacturing-fabricating/understanding-cnc-milling/>
- <https://www.ndd.com.tw/en/ndd-news/blog/181-cnc-turning-operations>

Quiz

Question #One

#1. What does CNC stand for?

- A. Numerical Computer Neutrality
- B. Control Neutral Computer
- C. Computer Numerical Control
- D. Comprised Natural Composite

Answer

Computer Numerical Control

Question #Two

#2. What are Two processes in CNC Milling?

- A. Signaling and Passing
- B. Facing and Aligning
- C. Spit and Polishing
- D. Drilling and Turning

Answer

Drilling and Turning

Question #Three

#3. Name Four materials that are suitable for machining?

Answer

Wood

Plastic

Glass

Metal

Question #Four

- #4. Which of the following are not a CNC machining processes?
- A. Designing a CAD model.
 - B. Converting the CAD model into a CNC program.
 - C. Setting up the CNC milling machine.
 - D. Executing the milling operation.
 - E. All of the Above.

Answer

All of the Above