



# MFG-201(L) INTRO TO CNC

Course:

1946 Classroom

1950 Lab

# Meeting times

- Classroom – Monday and Wednesday 1:00PM – 2:20PM
- Lab – Tuesday and Thursday 8:00AM – 11:15AM

# Personal Introductions

- Andrew Paad
- Office BTC-105B
- Office Hours – Monday and Wednesday 2:30PM – 4:30PM
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# Course Objective

- This is an introductory course for CNC machinery. Students will become familiar with the basic operation of CNC milling and turning centers. A strong emphasis will be placed on manual G and M code programming format. Students will learn how to properly set-up fixture, select proper tooling, program and operate CNC machinery.


# Syllabus

- Review remaining syllabus
- Keep with your classwork and project files in a binder / folder
- Keep schedule with you so you know what is coming up
- Keep good notes



# INTRODUCTION TO CNC

Numerical Control  
Chapter 1



# Numerical Control

- Originated in 1952
- Was not used in production manufacturing until the 1960's
- Dramatic increase in 1972 with the invention of CNC

# Definition of Numerical Control

- An operation of machine tools by means of specifically coded instructions to the machine control system



# NC and CNC Technology

- Primary similarities
  - *Both run a program to control machinery*
- Primary differences
  - *NC uses “hardwired” technology where CNC uses “softwired”*
  - *NC were fed by punch tape CNC use computer language*

# Conventional Vs. CNC Machining

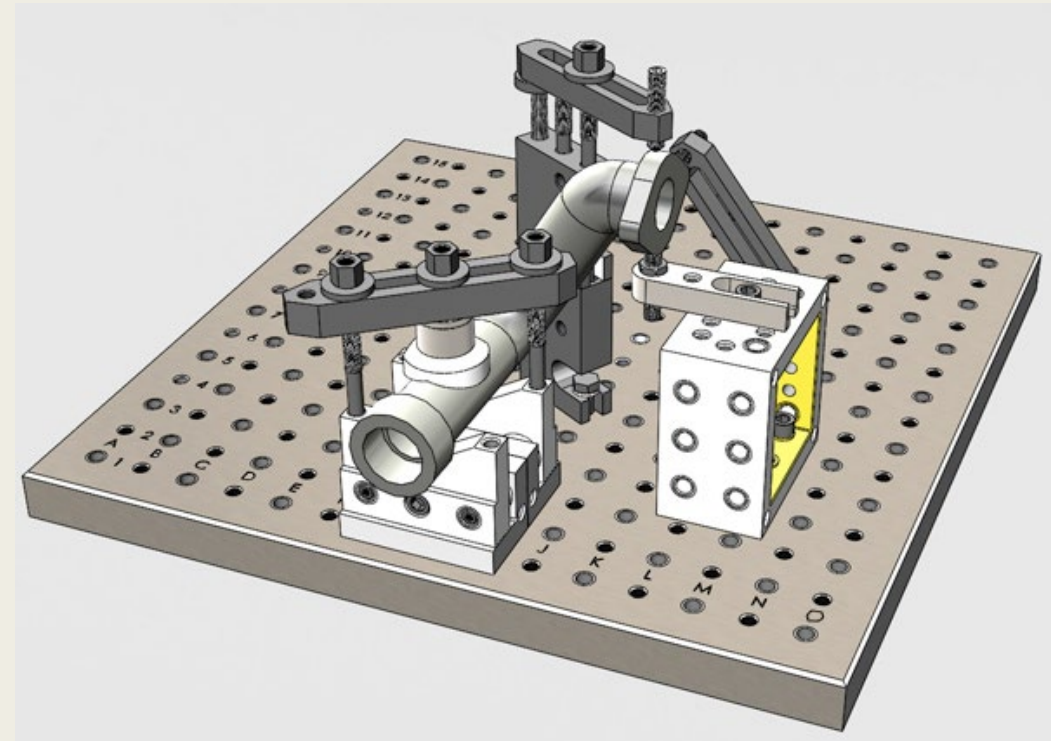
- Which is superior?
- Is the process for machining with either system different?
- Is there an advantage to using CNC over manual machining?
- Is there an advantage to using manual machining over CNC?

# CNC Advantages

1. Setup time reduction
2. Lead time reduction
3. Accuracy and repeatability
4. Contouring of complex shapes
5. Simplified tooling and work holding
6. Consistent cutting time
7. General productivity increase

# 1. Setup Time Reduction

- Setup time can be potentially reduced by
  - *Modular fixturing*
  - *Standardized tooling*
  - *Fixed locators*
  - *Automatic tool changing*
  - *Pallets and auto-feeders*
  - *Multiple setups in one run*



## 2. Lead Time Reduction

- Once the initial program is written the next run is near immediate
- Changes can be made with little or no impact
- Fixtures and tooling does not need to be changed with a design change

# 3. Accuracy and Repeatability

- The programs are stored and will remain the same
- Removes the human element from machining
- Minimal impacts to repeatability due to tool wear and temperatures

## 4. Contouring of Complex Shapes



# 5. Simplified Tooling and Work Holding

- Many tools can be replaced by a single tool in a CNC machine
- Can eliminate the need for special tooling
- Can reduce or eliminate special work holding devices
- Can eliminate multiple setup holding devices for a single part



# 6. Cutting Time and Productivity

- Cutting (commonly cycle time) on a CNC remain constant
- One operator can, in some cases, run many machines
- One machine can run many parts in one setup

# Types of CNC Machine Tools

- Mills and Machining centers
- Lathes and Turning centers
- Drilling machines
- Boring mills and profilers
- EDM wire machines
- Punch presses and shears
- Flame cutting machines
- Routers
- Water jet and Laser profilers
- Cylindrical grinders
- Welders
- Benders winders, and spinning machines



# Personnel for CNC

- Programmers
- Operators
- Multitude of up and down stream personnel

# Homework

- Think about a project you would like to build
- It could be anything within the capabilities of the shop
- It does not have to be an industrial application
- Based on complexity it could replace some of your projects

# Alpena Community College: TAACCCT Grant

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