INTRO TO CNC LATHE

Chapters 3 & 35
Review

- Canned programs
- Sub programs
CNC Lathe

- Many parts, axis, tooling, and other apparatus are the same between engine lathes and CNC lathes.

- Many of the G code we have already learned will also be used in CNC lathe operations with some distinct differences.

- Feeds and speeds do not change just because it is CNC. It is important to be sure you know the proper speeds and feeds and apply them.
  - NOTE: for the EMCO lathes a Speed and Feed sheet is on the wall.
CNC Lathe / Turning Center

- CNC lathes and turning centers are very similar in that they are both based on an engine lathe.
- Similar to a standard lathe in that it is a tool designed to remove stock from a rotating work piece.
- The majority of the cutting tools are designed to be single point.
- Most CNC lathes / turning centers use turrets to hold a number of cutting tools at once.
- Some turning centers have multiple turrets and even live tooling for milling operations.
Most turning centers and CNC lathes are designed with a slanted bed. This allows the chips to fall away easily and for coolant to be effectively collected. This often removes any option for manual operation.
Standard, Flat, or Tool Room Lathe

- Looks more like a standard engine lathe
- Typically has manual controls and a CNC controller to allow for either type of operation
- Can be more versatile
Components of the CNC Lathe

- Tailstock – designed to support the end of the work away from the chuck
- Bed – supports all the components of the lathe
- Controller – computer attached to run the CNC program
- Turret – holds the tools for quick changes
- Tool – the component that does the actual cutting
- Chuck – holds the workpiece
- Enclosure – walls and doors that completely contain the operation
- Components can vary greatly between models
Axis

- Typically the chuck to the tailstock is the Z axis
- The tool cutting path is in the X axis
- There are a multitude of other axis movements specific to each model of lathe (C&Y)
Types of Axis Programming

- X represented as a DIAMETER
  - Most common for CNC - Haas controllers
- X represented as a RADIUS
  - Mostly for older machines - Compact 5
- X represented as a NEGATIVE RADIUS
  - Front turret machines
- Z axis is along the length of the part
- Most axis still apply with right angle / live tooling
Tooling

- Most tooling turrets are made for repetition and are thus designed for quick access and changing of tools.
- They can be as basic as HSS cutters, rotating carbides, up to diamond tip cutters.
- They can also be live tooling either in the standard axis or in the additional axis.
- They may also utilize gang tooling which is many tools arranged on a flat bed similar to a table top.
- Use the correct tool orientation/hand for your operation.
Similar Codes

- G00, G01, G02, G03 for interpolation are all the same
- G80 to G89 for drilling and boring cycles
- G20 and G21 for inch / Metric
- G40, G41, and G42 for tool offsets
- G54, G55…. For work offsets
- G90 and G91 for absolute and incremental
- Most of the M codes remain exactly the same
- This means that your safety line can stay the same!
  - At least for the FlashCut programs
Different Codes

- Tools are changed differently no M06 just a T0101
  - This loads the preset offset with the tool

- Speeds / Feeds are handled differently as well
  - Speed is still designated with a S word
  - G50 will specify the maximum speed
  - G96 is an adjustable speed that will adjust the speed with changing diameter
  - G97 specifies the specific spindle speed – cancels G96
  - G98 feed per minute
  - G99 feed per revolution
Different Codes (continued)

- G70 finishing cycle (most lathes)
- G71 ID/OD stock removal cycle
- G72 face stock removal cycle (most lathes)
- G75 grooving with a pec/chip break cycle
- G32, G35, G36 threading cycles
IMPORTANT NOTE

- Ensure you know what feed rate you are programming

- G98 F10 = 10 inches per minute IPM

- G99 F.002 = 2 thousands per revolution IPR

- G99 F10.0 = 10 inches per REVOLUTION!!!!
Lab Work

- You have to reconfigure flash cut to the Compact 5 lathe
  - Compact5-V3-V4
Lab Work (continued)

- For the flash cut you must program the X as a positive radius
- See speeds and feeds chart for tool use
- Tool 1 for facing
- Tool 3 for profiling
- Tool 5 for parting off part and as a part stop
- If you program your finished profile first you can work back from it to do roughing pass
- Use .05 for rapid move clearance level
Lab Work (continued)

- Go slightly past your boundary on the start and end of your profile to allow for nose radius
- Remember to compensate for the width of your cutoff tool
- At part off slow the RPM manually and ramp up as you get deeper
  - Use M00 with notes to remember
- Compare the tool path on screen to the machine relative position
REMINDER:

■ **NOTE**: E-Stop on machine only stops the rotation of the spindle it does not immediately stop the feed of the tool.
Extra Credit

- Design, make drawing, program, and run a machinist ring or cube
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