INTRO TO CNC LATHE

Chapters 3 & 35

Review

- Canned programs
- Sub programs

CNC Lathe

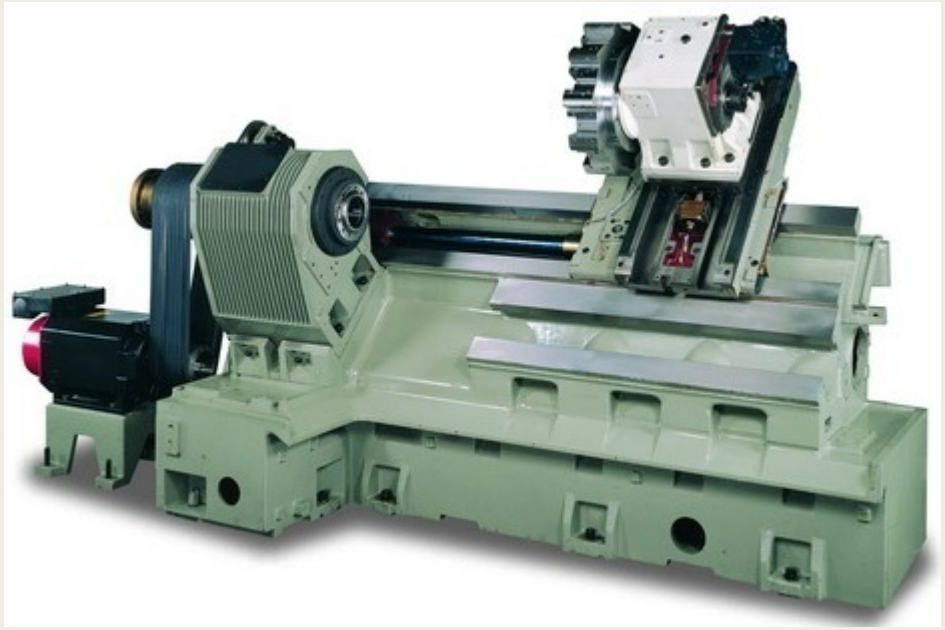
- Many parts, axis, tooling, and other apparatus are the same between engine lathes and CNC lathes
- Many of the G code we have already learned will also be used in CNC lathe operations with some distinct differences
- Feeds and speeds do not change just because it is CNC. It is important to be sure 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 Tuning 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

Slant Bed Lathe

- 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

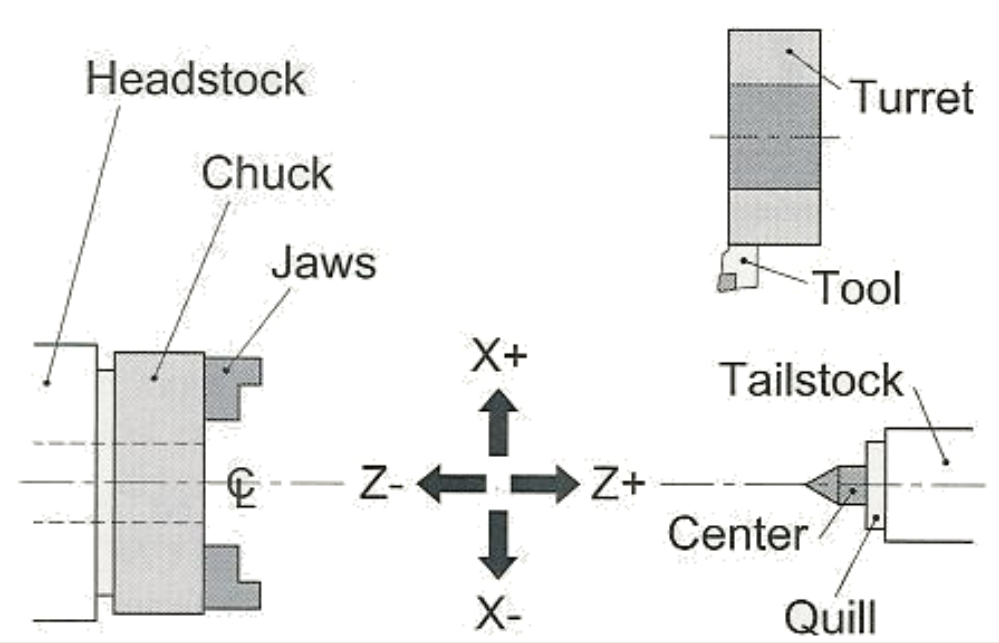
- Looks more like a standard engine lathe
- Typically has manual controls and a CNC controller to allow for either type of operation
- Can be more versatile

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)

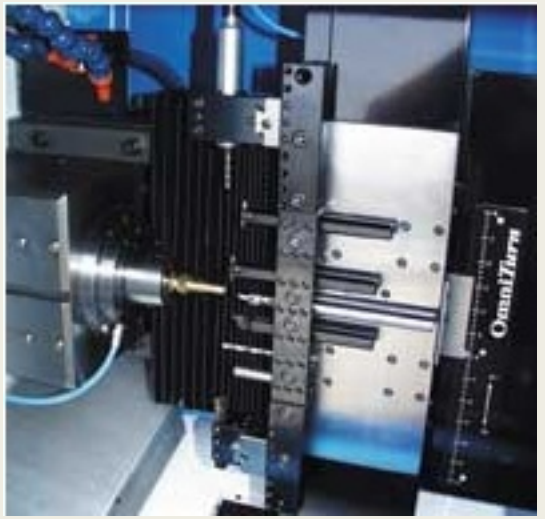


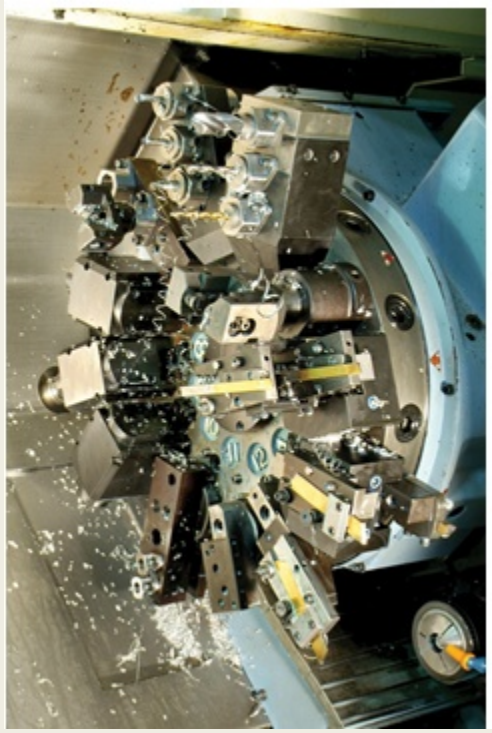
Types of Axis Programming

- X represented as a DIAMETER
  - *Most common for CNC - Haas contollers*
- 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 wihich 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)

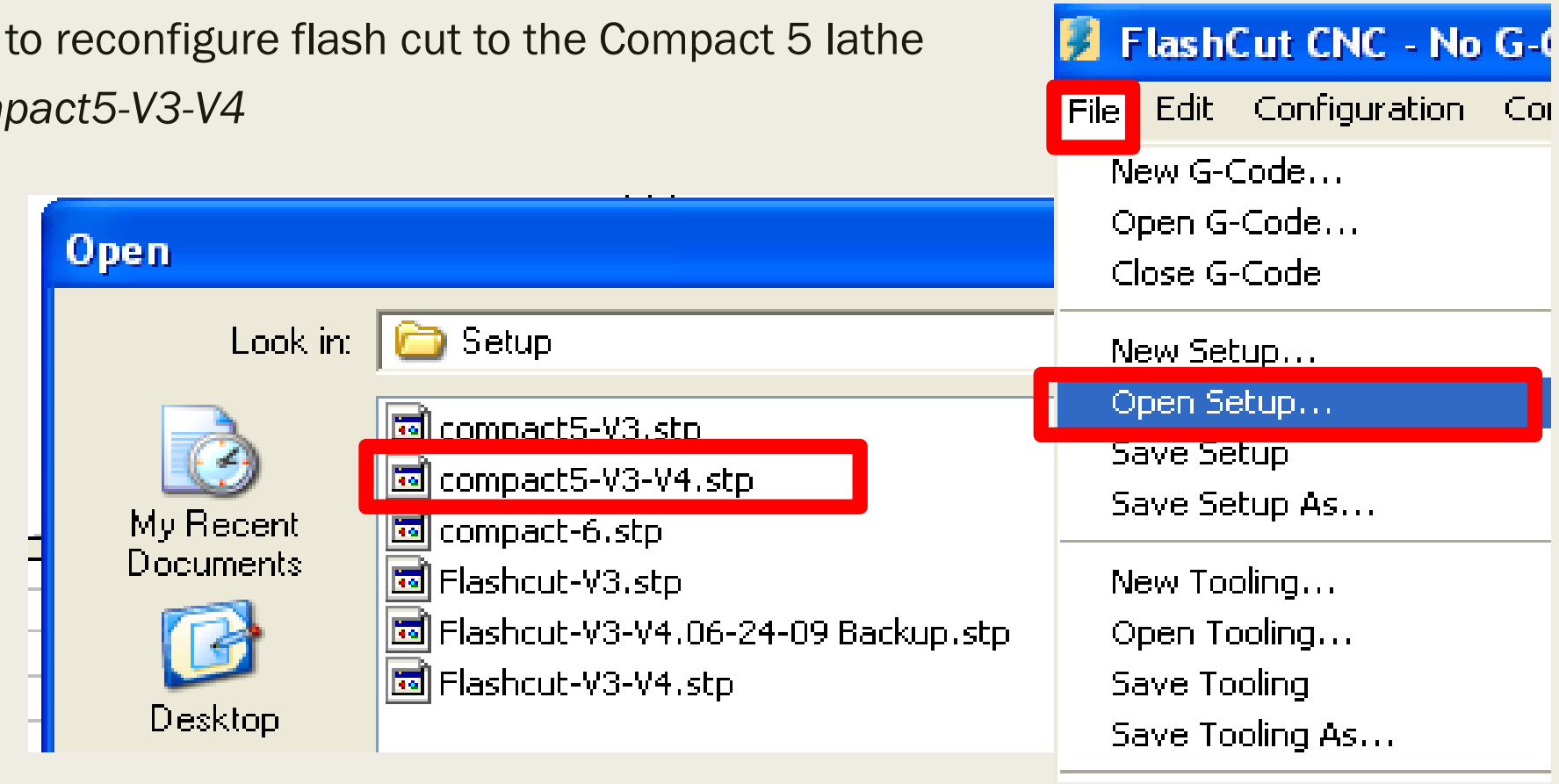
- G70 finishing cycle (most lathes)
- G71 ID/OD stock removal cycle
- G72 face stock removal cycle (most lathes)
- G75 grooving with a pec/chip break cycle
- G32, G35, G36 threading cycles

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*

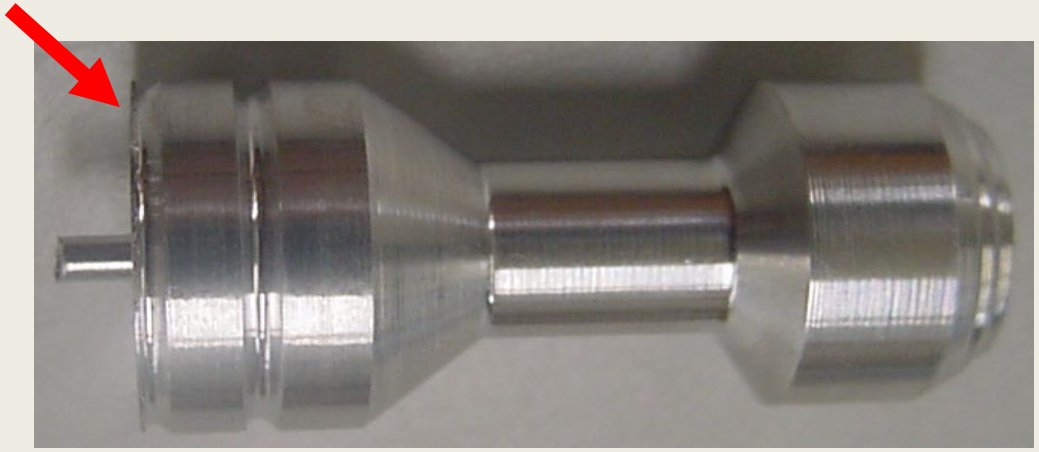


Lab Work (continued)

- 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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