

Tormach CNC Mill

PCNC1100



Machine Purpose: CNC machine used for precision cutting, drilling & forming

Safety: **Must wear safety glasses while operating machine. Keep.** Beware of objects that dangle and could get caught in cutting tool. Beware of flying metal chips. **KEEP DOORS CLOSED WHILE OPERATING.**

Materials: Metals, Plastics, Synthetic

Machine Specs: 18"x9" bed size, 1.5 hp motor, .5" tooling, 1100 IPM, 5100 rpm spindle

Tooling: Located in red tool check next to machine, lista cabinets on wall in front of machine

Accessories: Smartcool Coolant system, Floor/Air/Mist Coolant, 10 ATC, TTS tool setter, 4" vice with soft jaw capability, sacrificial mounting plates

CAM Post: tormach.cps – Tormach Path Pilot

Interface software: Path Pilot

Instruction Required: 2 Class Checkout, Group Class Followed by Individual Instruction



TORMACH MACHINE INSTRUCTIONS

Start Up Procedure

1. Make sure estop (big red button) is depressed
2. Turn on Mains power
3. After software loads, release e stop button
4. Press green button (should hear a cachunk)
5. Click reset on screen (should be flashing)



Machine Reference Procedure

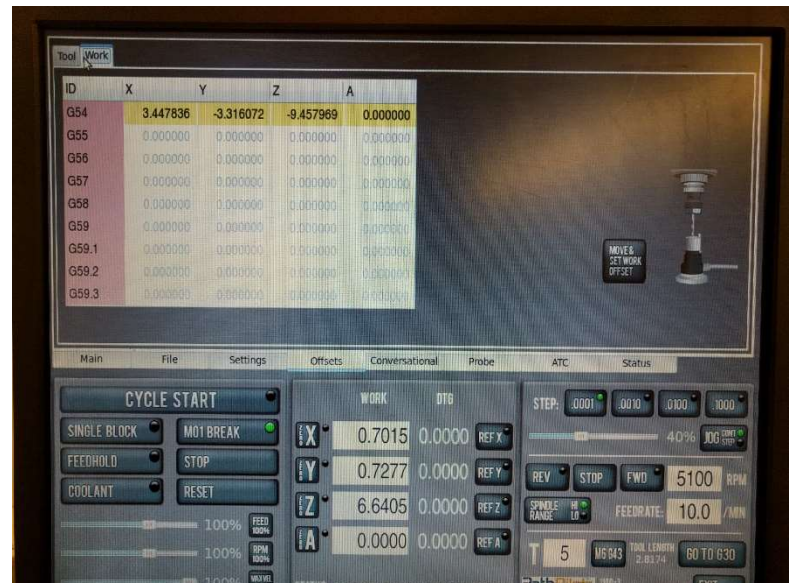
1. Make sure there is no tooling in the way of the bed and spindle door is closed.
2. On Screen Click "REF Z"
3. On Screen Click "REF X"
4. On Screen Click "REF Y".

Method 1 Haimer Probe

1. Insert Heimer probe into the spindle.
2. Enter "50" into the tool in spindle box
3. Make sure step increments are set to .0001
4. Using the keyboard/jog controller Jog/dial the probe tip near your x zero line.
5. Slowly move the probe until the dial reads both 0 at the top dial and bottom smaller dial.
6. Click Zero X to zero your X position
7. Repeat steps 3-6 for your Y/Z axes
8. Now your work is set in the X/Y/Z

Method 2 ETS Z Zero

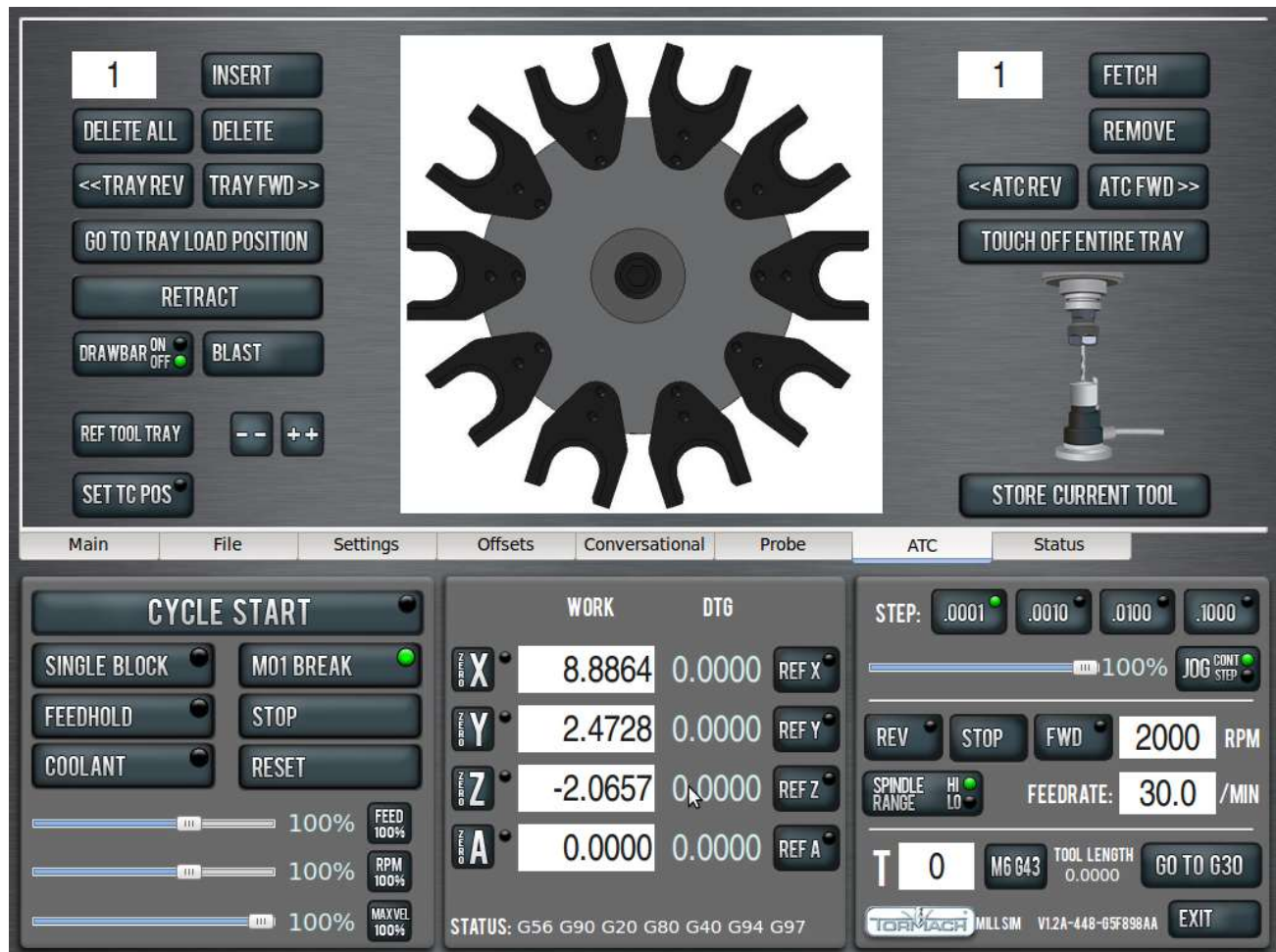
1. Physically fix your work surface on the bed, vice or sacrificial surface
2. Position Tool Setter on Zero Plane of work surface, Plug in tool setter
3. Double check Tool setter is stable on work surface
4. Double check tool setter is fully connected by depressing top and making sure the red light (both on screen and on the unit ignites)
5. Navigate to Offsets > Work
6. Make Sure Spindle is Empty, Collet is closed and Tool 0 listed as in spindle
7. Press Move & Set Work Offset. Now you Z offset has been set relative to your zero plane



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Using the ATC

1. Navigate to ATC Menu
2. Delete all tools in ATC menu
3. Physically Remove any tools from spindle
4. Make sure Tool in Spindle is listed as 0
5. Click Go To Load position
6. Physically Insert Tool into ATC Fork
7. Assign tool numbers as tools are placed in ATC - Click insert
8. Tray Rev/Fwd to turn ATC and load up to 10 tools, remember to click insert and assign tool numbers as you load
9. Click Retract to Move ATC to home position and clear the spindle



Notes: If the atc option is not on the screen it has been disabled, please do not use.



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Tool Length Offset

Option 1 – Manually Measure

1. Measure the length from the face of the holder to the tip of the tool using the granite block
2. Write down on set up sheet or enter length directly into computer

Notes: End mills often are slanted from the tip towards the center so make sure to measure the tip rather than the middle.

Option 2 – ETS (only to be done after z zero work offset as been set)

Single Tool

1. Insert tool into spindle
2. Enter tool number into current tool window in PathPilot
3. Plug in & test ETS
4. Position ETS on Z Zero plane and tool above ETS
5. Navigate to offsets page, click move and set tool offset

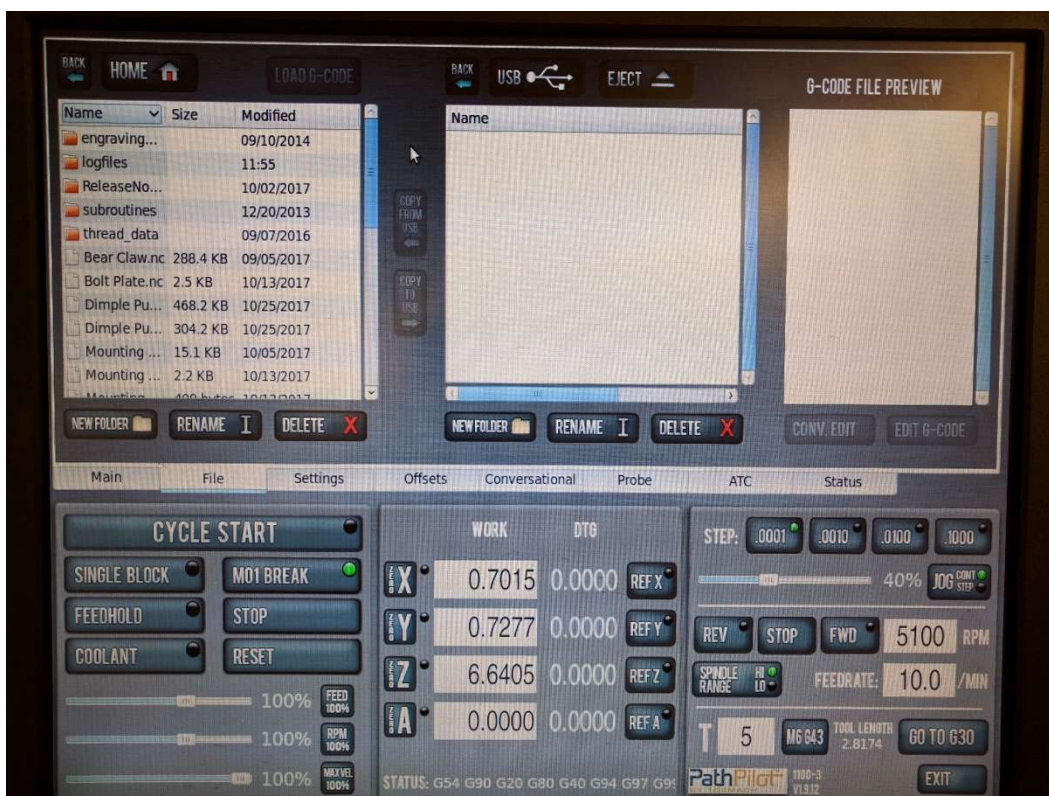
ATC tools (DO NOT REMEASURE SHOP STANDARD TOOLS)

1. Double check ATC is properly loaded and all tool numbers have been assigned
2. Plug in & test ETS
3. Position ETS on work offset Z Zero plane and spindle above ETS
4. Navigate to ATC page, click touch off entire tray



Loading & Running Your Program

1. Put usb drive into slot on left side of screen
2. Goto File tab in path pilot
3. Click on "USB" on the desktop screen (the Center of the screen).
4. Find your file.
5. Click "copy from USB"
6. Find your G-code in the left side of the screen
7. Click "Load G-Code" (on the top of the screen).
8. Your code and 3D model of your part should automatically load in Main Tab. Review accordingly.
9. Confirm the tools you are using are noted appropriately in the G-Code. (Scroll until you see a "T_" for example "T5" and your tool is in the "T5" slot.) If the G-Code is noted as the incorrect tool, adjust in the code accordingly.
10. Confirm the Heimer indicator is no longer in the machine.
11. If necessary using the sliders (on the bottom, left of the desktop screen), adjust the "MAXVEL" from 100% to 20%. This allows the process to slow down enough for you to clearly see it.
12. Make sure doors are closed.
13. Click "Cycle Start". (on the left side of the screen).
14. Use "M01 break" if you want to automatically pause the run cycle between tool changes. If selected you will need to manually click "cycle start" before each tool change.



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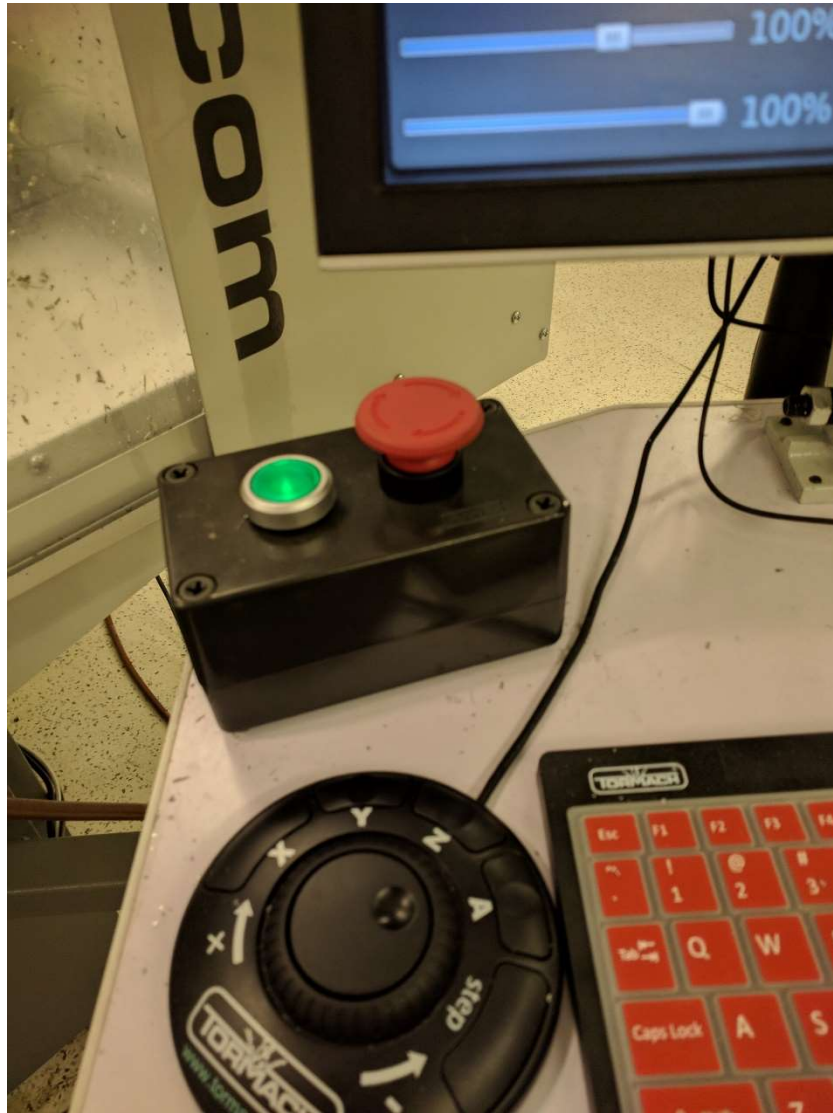
Main Page Screen for reference



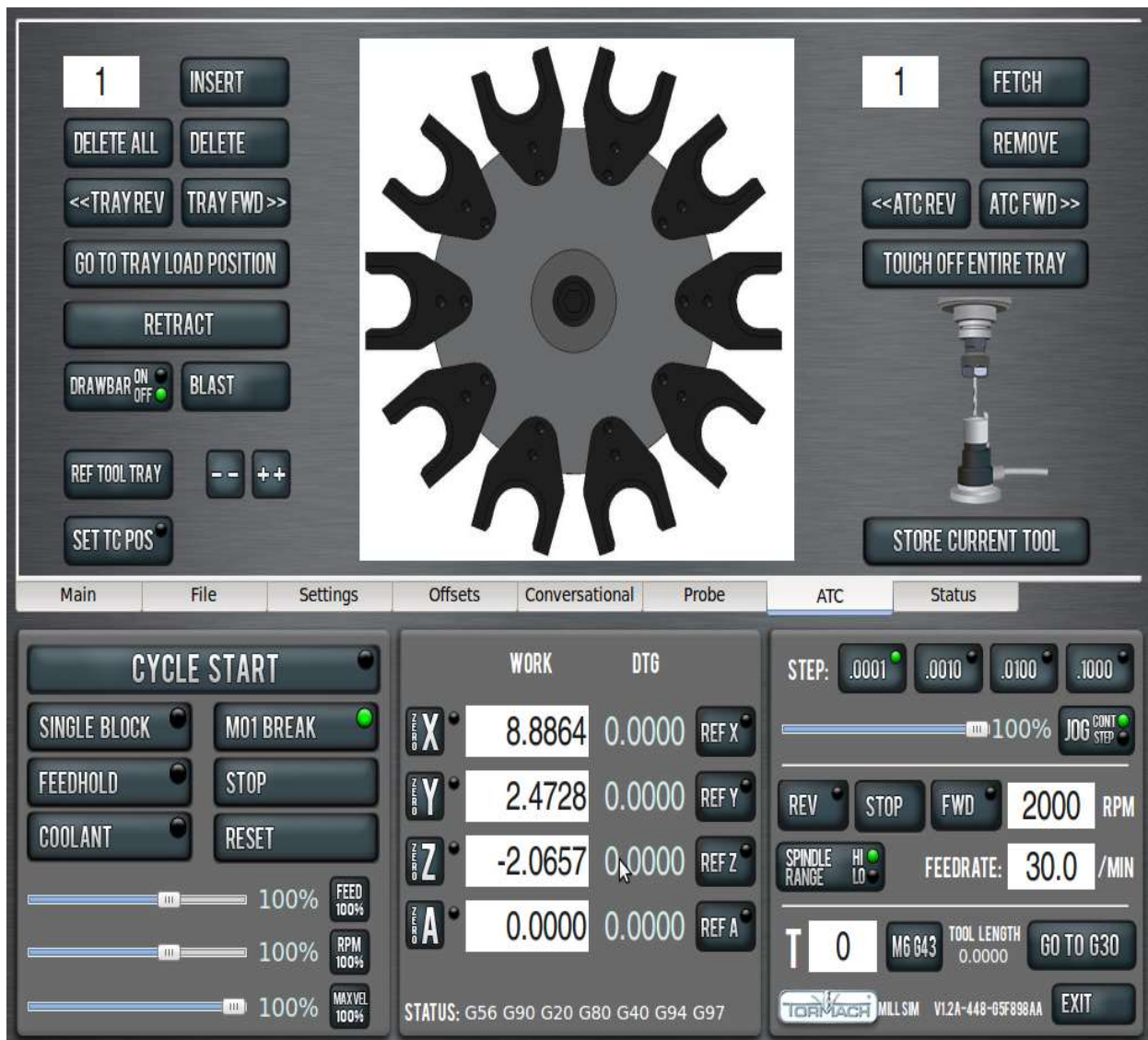
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Turn Off Procedure:

1. Unload your tools from the tool tray
2. Leave empty tool holder in spindle
3. Press E-stop button
4. Click Exit in PathPilot
5. Click ok to power off
6. Turn off Mains Power



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Main Controls

Cycle Start: Starts any code loaded on the main screen

Single Block: Runs your code line by line

Feed Hold: Stops movement in the XYZ while a program is running but does not stop the spindle, and pauses location in the code. Click cycle start to resume.

Coolant: Turns flood coolant on and off. Typing M08 into the MDI will turn on flood coolant. Typing M07 will turn on the Mist (or air if knob is adjusted)

M01 Break: Pauses a running program between tool changes. You will need to click cycle start after pauses.

Stop: Stops the program and movement entirely. You will lose your position in the code if you need to restart.

Reset: Used to reset digital communication after a power off

Estop Button (physical): Kills all power and air to the machine. You will lose all position data and have to restart from beginning of tool path.



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Zero X/Y/Z/A: used to zero the current G home to the location of the offset point. A is not currently used on our machine (for turning)

Ref X/Y/Z/A: Sends the bed and spindle to their home positions. Used when referencing after powering down or E stopping.

Work #: Tool Tip position relative to work offset position.

DTG #: Distance to go to end of current movement from tool path or MDI entry.

Step (.0001, .0010, .0100, .1000): Step size increment used with incremental movement. Click to change. Recommended to leave on .0001

Slider %: Percent of max jog speed when using continuous movement.

Job Con/Step: Changes keyboard arrow movement type. Increment: movement length based on step per click, 1 arrow press=movement of step distance

Rev/Stop/Fwd: Turns the spindle on CCW/Stops/CW

#RPM: spindle speed you want the spindle to run manually

Spindle Hi/Low: Current physical set up (our machine is default to HI)

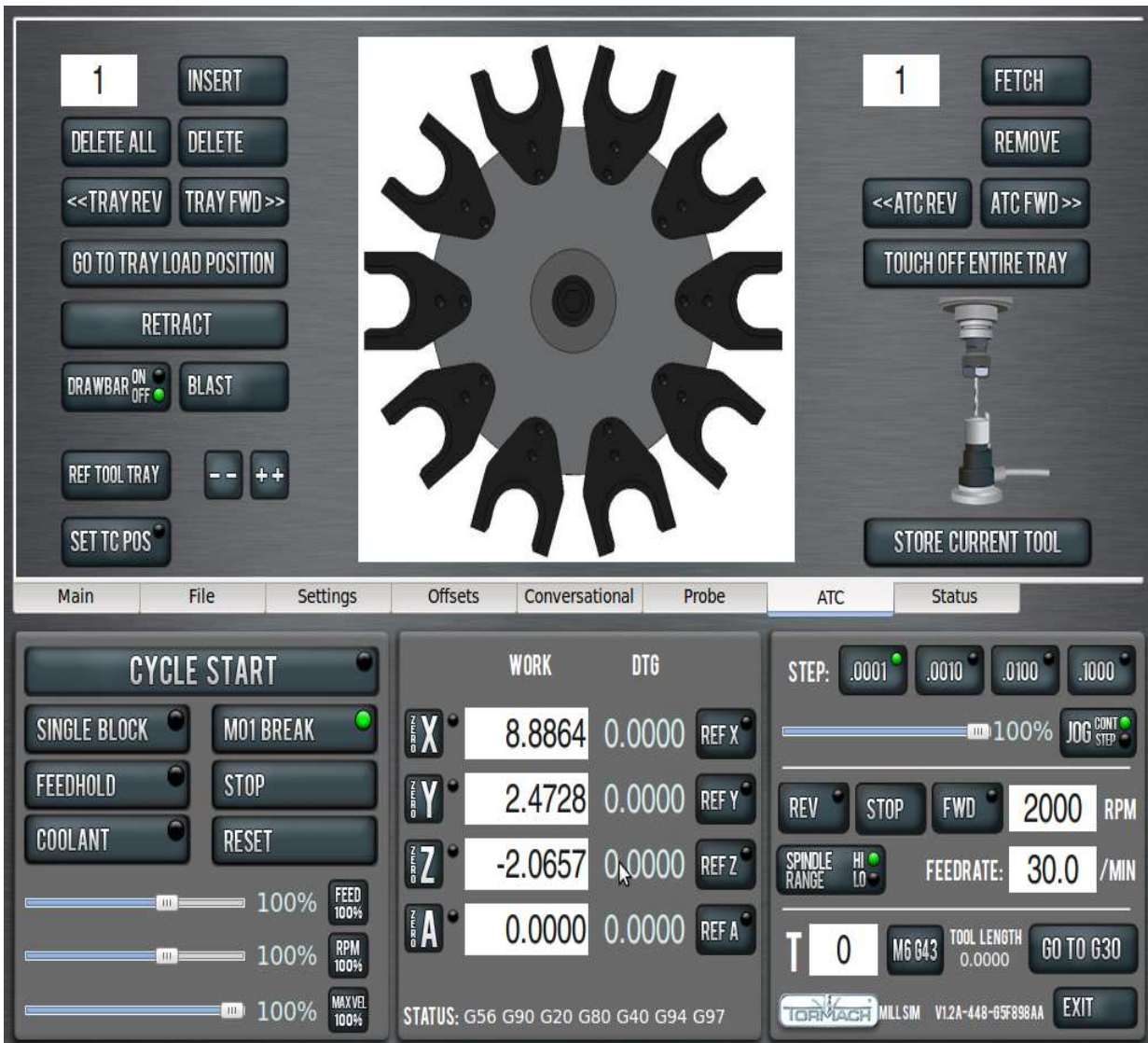
Feedrate #: Inchs per minute for manual gcode movement

Go to g30: Goes to the work offset home position (x:0, y:0, z:0) specific to tool length currently programmed in.

T# (bottom right corner) - Identifies the tool currently in the spindle, also used to fetch and store tools

- Tool 0 is an empty spindle
- If you change from a 0 to a number in the ATC it will fetch that tool
- If you change from a 0 to a number not in the ATC it will think it's holding that tool
- If you change from a tool number stored in the ATC to a number stored in the ATC it will put away the current tool in the ATC and Fetch the new tool number entered. Entering zero will put away the current tool and leave an empty spindle.
- If you change from a tool number stored in the ATC to a number not stored in the ATC it will put away the current tool in the ATC and allow you to load the new tool





ATC Menu

Insert Number Box - Assigning a tool being inserted into the 3 o'clock position in the ATC

Delete All - Deletes all saved saved tools in the digital ATC (careful as path pilot no longer knows where tools are stored)

Delete - Deletes just the tool in the 3 o'clock position from the digital ATC, or current tool in spindle from software.

Tray Rev/Tray FWD - Turns the ATC clockwise/CCW so you can load the forks.

Go to tray load position - Moves the spindle head out of way and ATC under the spindle, opening the ATC gate.

Retract - Moves the spindle head up, and ATC to the home position, Closing the ATC Gate

Draw Bar On/Off - Opens the drawbar. (careful if a tool is loaded it will drop)

Blast- Shoots air down the collet

Ref Tool Tray - References the ATC turned position upon initiation after start up

SET TC Pos - Used for calibrating the ATC rotation position

--/++ - Used in calibration of the ATC

rotation position



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Remove/Number Box - Used to delete ATC stored tool number entered, The ATC will fetch tool entered and remove digital home from carousel, you must remove tool from spindle/machine manually following this button.

ATC Rev/ATC FWD - Will fetch the next tool stored in the spindle in fwd or rev

Touch off Entire Tray - used in conjunction with the tool setter, will cycle through the entire tray to measure each tools

Store Current Tool - Will use the ATC to store the tool currently in the spindle to its home in the ATC

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- If you change from a tool number stored in the ATC to a number not stored in the ATC it will put away the current tool in the ATC and allow you to load the new tool



Tormach Checklist

- Did you reference the machine in the XYZ?
- How is your work piece held? _____
- XY Zero, what point of your stock or part?
 - Circle Answer SW,NW,NE, SE, CENTER, Other _____
 - Is G54 default Yes/No, if no what home position are you using? _____
- Work piece Z Zero
 - What Tool did you use?
 - Heimer
 - TTS
 - Manual Block
 - Which side of your stock is Zero?
 - Top
 - Bottom
 - How did you zero bottom? _____
- What tools are you using?

Number	Description
▪ _____	_____
▪ _____	_____
▪ _____	_____
▪ _____	_____
▪ _____	_____
▪ _____	_____
▪ _____	_____
▪ _____	_____
▪ _____	_____
▪ _____	_____
- Tool Loading
 - How did you load your tools?
 - Single Tool in spindle for entire operation and assigned tool in spindle
 - Loaded ATC with multiple tools and assigned each number in ATC
- Tool Offset
 - What Method did you use to set tool length?
 - Electronic Touch Sensor (ETS)
 - Height Gauge & Granite Block with manual entry?
 - Shim Gauge/Touch off block
- Program
 - Did you program successfully load? Yes/No
 - Does the preview look correct? Yes/No
- Clean Up
 - Did you clean your chips and wipe down any moisture? Yes/No
 - Did you remove and put away any custom fixtures/jigs/hold downs? Yes/No
 - Did you put away tool _____ holders and machine accessories?
 - Yes/No



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Check Out System

You must go through both classes to utilize the machine

Group Class: Limited number of seat will cover details in this booklet

Individual 1 on 1: Available up to 4 days a week 10:30a-12p, everyday but Tuesday. This session is for you to prove basic comprehension of the machine, tool pathing and work set up. It is not a guided session but a double checked over. It your responsibility to have material, tool selection, and tool pathing ready before booking this session. Attending this session does not guarantee immediate independent usage of the machine, you may have to take it again if you have not adequately proved comprehension of the machine. It is recommended to have less then a 10 minute tool path, and required to utilize at least 2 tools.

Machine Reservation

Only once you have gone through both classes, with expressed approval after the individual 1 on 1 may you reserve the machine. The machine is available for up to 6, 30 minute windows (3 consecutive hours).

Schedule: 9-5 Monday-Friday, reserved everyday from 10:30a-12pm. 10:30a-12p is reserved for 1 on 1 checkout, maintenance, etc. If the machine is not reserved during that time, the time is given to whom ever holds the 9a-10:30a, if they don't need it whom ever holds the 12pm slot can claim it.

To reserve: Navigate to the prototyping shop pane in left hand column of the member portal-> click on Equipment reservation-> select the day you wish to reserve-> choose up to 6 time slots you wish to reserve.

The screenshot shows the Shopbot reservation system interface. On the left is a navigation menu with links: Home, Account Menu, mHUB Community, Membership, Reservations, Prototyping Shop (selected), Shop Schedule, Shop Training, Equipment, Equipment Reservations, and Assembly Tables. The main content area is titled 'Shopbot' and includes a search bar and a 'Make A Reservation' section. The 'Make A Reservation' section shows a calendar for April 2018 with dates 30, 31, 1, 2, 3, 4, and 5. The number of spots available for each date is: 17, 27, 14, 56, 42, 48, and 47 respectively. The date 2 (Monday, April 2, 2018) is highlighted. Below the calendar is a 'Make Selection:' section with a 'Reserving' button and a table of time slots from 8:00 AM to 11:30 AM. The table shows that the 8:00 AM slot is reserved for 'Shopbot CNC Router' and the 10:30 AM slot is reserved for 'TAMM CNC 1100'.

Shopbot

This is to reserve a block of time on the Shopbot CNC. Please make sure that you stay within your allotted time.
You must have taken Shopbot Training and be cleared by shop staff to run the machine on your own.
Please remember to clean up after your project!

Make A Reservation Not Quinn? [log out](#)

Select A Date

FRIDAY MARCH 2018	SATURDAY MARCH 2018	SUNDAY APRIL 2018	MONDAY APRIL 2018	TUESDAY APRIL 2018	WEDNESDAY APRIL 2018	THURSDAY APRIL 2018
30	31	1	2	3	4	5
17 spots available	27 spots available	14 spots available	56 spots available	42 spots available	48 spots available	47 spots available

Make Selection:

Reserving

8:00 AM	8:30 AM	9:00 AM	9:30 AM	10:00 AM	10:30 AM	11:00 AM	11:30 AM
Shopbot CNC Router							

https://member.mhubchicago.com/reservation?category_no=2155

