

ST 27 CNC TURRET TOOLPOST

NEMA 23 BELT DRIVE MODEL

The CNC turret toolpost has a ratcheting device such that it rotates only in one direction and then reverses to lock against the ratchet pin. The 4 locating holes are precision machined into the base of the turret so that each 90 degree position is exactly 90 degrees from the prior one, allowing precise tool positioning in all 4 places. The turret cannot index to any position in between any of the locking spots, so it is limited to 0, 90, 180 and 270 positions. Each position on the turret is marked 1, 2, 3 and 4 for your reference.

The turret is controlled by a NEMA 23 size stepper motor which is cabled to work with the Gecko 540 drive and driven by a tooth belt drive. This design makes the toolpost much more compact and faster than the older NRMA 34 direct drive design. In your Mach 3 configuration for the A axis, under MOTOR TUNING you will set your STEPS to 111, your VELOCITY to 2000 and ACCELERATION to 10. In Mach3 under CONFIG>GENERAL CONFIG at the top left of the screen, set A axis to ANGULAR and check AUTO TOOL CHANGER. The turret turns clockwise to change positions and counterclockwise to lock against the ratchet. The stepper will be turning counterclockwise to change positions and clockwise to lock the turret. Test your stepper with a short G0A50 command to be sure it is turning the proper direction. If not, go to CONFIG>PORTS & PINS> MOTOR OUTPUTS and change the check mark under DIR LOW ACTIVE from red to green or vice versa to reverse the motor direction.

In your command line, first give it a G91 command to set Mach 3 in incremental mode. Then by jogging or by turning the hand wheel, rotate the turret until it goes past the ratchet to the 90 degree position for position # 1. This will be your zero or home position and will be your master tool position. Now write a G0A-110 command and you will see that the stepper will run in reverse until the turret is held tight up against the ratchet pin and is locked into place. Now if you want to move to position # 2 you will need to write the following command-

G0A200. Why 200? Because you first have to reverse the 110 command that locked the turret plus give it a 90 command to move to the next position. After it reaches position # 2, then you need to give it another G0A-110 command to lock it in place.

Following is a sample program that would rotate the turret a full 360 degrees.

ASSUME YOU ARE NOW IN POSITION #1 AND THE TURRET IS LOCKED

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G91      Sets you to incremental
G0A200   Reverses the -110 move to unlock the turret plus adds 90 degrees to move to position #2
G0A-110  Locks the turret into position #2
G0A200   Reverses the -110 move to unlock the turret and adds 90 degrees to move to position #3
G0A-110  Locks the turret into position #3
G0A200   Reverses the -110 move to unlock the turret plus adds 90 degrees to move to position # 4
G0A-110  Locks the turret into position # 4
G0A200   Reverses the -110 move to unlock the turret and adds 90 degrees to return to position #1
G0A-110  Locks the turret into position #1
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Now you have made one full rotation of the turret.

What if I want to go from Position #1 to position # 3? Position # 3 is 180 degrees from Position #1, so your command would be like this-

G91

G0A290 This reverses the -110 move to unlock the turret and adds 180 degrees to move to position #3

G0A-110 Locks the turret into position #3

Because the turret can only rotate freely in one direction, it is advisable to plan your tools so that they will follow from position #1 to #4 in sequence. However, if you need to use one or more tools multiple times during a program run you will need to write your codes for these operations.

FURTHER NOTES: After testing some different units, we have found that the reverse command can vary, so it will be necessary to adjust the above numbers according to your own toolpost.

EXAMPLE- if your turret requires a G0A-130 command to lock, then your command for a 90 degree move would be;

G0A220- 130 to unlock and 90 to move to the next position- then followed by

G0A-130 to lock the turret.

As you can see, this gets quite complicated when writing a program with a lot of lines and potential programming errors. Writing a command to go from Tool 1 to Tool 3 then back to Tool 1 can be complex. Fortunately a macro program has been developed to bypass all these lines and all you need to do is give a single command for each tool position and it will go there automatically.

You may contact Dan Mauch at DMAUCH@SEANET.COM to order a macro and he will pre-configure it according to the information you supply him from your toolpost.

INSTALLING THE MACRO

This Macro is only for lathe, so open LATHE in your Mach Loader

1. Go to CONFIG>TOOL TABLE and make sure that at this time before setting the tools that all of the settings are zero. This is to prevent inadvertent movement while first setting up the turret and later on you can set up the tool table.
2. In Mach3Turn click on the Operator at the top of the screen.
When the pop up window appears select VB Script Editor
3. Click on File
4. Click on Open File
5. Click on Mach3\macros\LATHE
6. Select M6Start.m1s
7. Right click on it and delete it.
8. Find the file M6Start.m1s you received from Dan Mauch and paste it to the Mach3\macros\LATHE directory
9. Open M6Start.m1s file using the VB Script Editor
10. You will see the safe position for each Tool Bit. In Operation of the ATC It will first move the X axis away from the spindle centerline the distance noted in T1SafePosX= 3.200 You can edit that distance to whatever works for you. Just be very careful with it. If your tool is a

boring bar or working the internal of a work piece then you may need to have the safe tool position move in the X- direction before retracting.

Similarly, you can edit T1safePosZ=2.200 to whatever position will give you a safe tool change.

Accomplish this for T1, T2, T3 and T4. Change this setting whenever you remove and install a different tool bit. You must redo the entire tool table if the master tool is changed.

11. Click on File Save

12. Close out the VB script Editor

On a lathe in diameter mode X0 is the centerline of the spindle. All movement away from the center towards the operator is in the X- direction.

On a lathe Z0 is the farthest projection of the stock away from the chuck/collet. Any movement towards the chuck from this position is Z- direction.

Use tool 1 as the master tool. It should be X=0 Z=0. The other tools are offsets from that position and noted in the tool table.

NOTE: It is normal for the CNC tool post to be used on the rear of the table, so in CONFIG>PORTS & PINS>TURN OPTIONS you will find settings to adjust for this position, including changing from diameter to radius mode if you prefer. You will also need to adjust the motor direction for M3, M4 commands if you are cutting from the backside. This is easily done under CONFIG>SPINDLE PULLEYS by changing the box marked REVERSED.

There are various You Tube Videos on setting up your tool table offsets.

WARNING!!! Always check your Safe tool change positions in your Macro whenever you add or change a tool after the original 4 tools are setup in both your Macro and tool table. ALWAYS test this with no stock in the chuck and with the spindle stopped. This is called testing position in air.

SETTING TOOLS TO CENTER

The toolpost can accept tools up to 1" thick, but we have always used ½" shank tools because they are in the proper range for the power of our machine. The toolpost has a mounting base which should be very close to putting a ½" tool at center on your machine, but because the actual height from the center of the spindle to the table surface can vary from machine to machine, you may need to shim the tools or the turret to get it exactly on center. Shimming the tool itself is easy just by putting a piece of stock the correct thickness under the tool, but a better solution is to find a piece of stock the correct thickness and shim between the top turret assembly and the base block.

Once this is done, any ½” shank tool will automatically center without further adjustment.

ASSEMBLING YOUR TOOLPOST

For better packaging and shipping, the toolpost comes in a partial KD format. However it only takes a few minutes to assemble the parts. You will find 3 major components in your package.

1. Main center turret
 2. Motor and bracket
 3. Mounting base plate
- Plus a bag with hardware

1. Temporarily install the small pulley on the shaft protruding from the main Center turret.



2. Turn the pulley counter clockwise until the turret turns to the 45 degree Position and exposes all four mounting holes. (this make take quite a few Turns)



3. Bolt the main center turret to the steel base plate using the 6mm Socket



Cap screws.

4. Bolt the motor to the bracket using the 3mm socket head screws, washers and nuts. Install the large pulley on the motor shaft.
5. Remove the pulley and mount the motor bracket to the main center turret using the 5 mm socket screws, leaving them just slightly snugged. Replace the small pulley on the shaft and align it with the motor pulley. Place the belt around both pulleys and adjust the bracket so the belt is tensioned and fully tighten the 4 5mm bolts.

NOTE: The bracket will cover the large tapped hole in the main center turret. This hole is not for oil, it is an electrical sensor mounting hole for other machines using a servo system.

