THREADING TIPS FOR THE SHOPMASTER

Following are some settings and tips to make threading easier on your SHOPMASTER machine. Remember the axes designations used here are for lathe mode.

1. STEPS PER INCH AND BACKLASH COMPENSATION.

Be sure you take the time to do these settings according to the file provided. Because the distance between threads can be very small, any error, especially on the Z axis can cause the threads to be wrong pitch or even wiped over by subsequent passes. Once you have made the adjustments and your machine can repeat accurately, be sure that backlash compensation is turned on while threading. Also set your % of Max to about 50-70 to insure a smooth transition from backlash move to the cutting move.

2. CONSTANT VELOCITY V EXACT STOP

Constant Velocity setting means that the axis moves at the same rate from the beginning of the program line to the end. Exact Stop is used when you want to turn up to a shoulder and the axis must stop exactly at that point each time. In the Exact Stop mode, in order to be sure the axis can stop at a fixed point, the axis will begin to decelerate before reaching the end. So while threading this REQUIRES Mach 3 to adjust both spindle speed and feed rate as the axis slows down. We have found that Mach 3 cannot reliably do both functions, therefore, while threading, always set your machine to Constant velocity so the axis feed remains the same for the entire cut. These settings are found in CONFIG>GENERAL CONFIG.

3. DISTANCE, IJ AND ACTIVE PLANE MODES

When using the threading wizard in Mach 3, these settings will be set automatically, but if writing your own program, be sure they are set as follows;
Distance = absolute
IJ   = incremental
Active plane = X,Z
These settings are found in CONFIG>GENERAL CONFIG

4. SPINDLE SETUP SETTINGS

Your settings should be as follows:
USE SPINDLE MOTOR OUTPUT   CHECKED
PWM CONTROL   CHECKED
STEP/DIR MOTOR   UNCHECKED
USE SPINDLE FEEDBACK IN SYNC MODE   CHECKED
CLOSED LOOP SPINDLE CONTROL   UNCHECKED
SPINDLE SPEED AVERAGING   CHECKED
These settings are found in CONFIG>PORTS & PINS> SPINDLE SETUP

5. FEED RATES AND SPINDLE RPM

The VFD drives and motors are more consistent at higher rpm's, so we try to cut threads with the spindle as fast as possible. However, this can change with material type etc. In your Z axis settings under CONFIG>MOTOR TUNING, you have established your feed rates from your previous tuning setups. For most PATRIOT and generation 1 and 2 MILL TURN machines, the Z will be about 40 IPM max. The generation 3 Mill Turn and Turnado will be from 60-80 IPM. Mach 3 synchronizes the spindle rpm and the feed rate to achieve the proper thread pitch. Course threads require faster feed rates than fine threads. In the threading wizard you may encounter an error message stating "Over Max Feed Rate !!!!".   This is saying that the spindle rpm is too fast for the maximum feed rate of your Z axis. Simply begin reducing the RPM setting down until the error message disappears.
NOTE: When making changes in the thread wizard settings you must hit ENTER on your keyboard to save the setting.

6. SETTING THE SPINDLE RPM FOR THREADING

Mach 3 has 2 functions working during threading. It receives signals from the spindle sensor to calculate the actual rpm – this is shown on the line marked S TRUE, while the rpm you set in the wizard is shown on the S line. Mach 3 uses the signals from the spindle sensor to match these lines. However you will see that S TRUE will fluctuate up and down by a few rpm.   The other function that Mach 3 does is to adjust the feed rate according to the rpm it is reading from S TRUE in order to keep the thread pitch constant. HOWEVER, we have found that trying to coordinate both of these functions is beyond the speed of the computer and Mach 3, because it simply cannot react fast enough to the spindle slowdown under load and try to adjust the spindle back to the proper rpm while changing the feed rate to match. Therefore we have found that by eliminating one of these functions, Mach 3 can keep the rpm/feed rate ratio at a much more consistent level.   Therefore, for threading we go into a semi-manual mode. On the VFD keypad we change the settings so the spindle is controlled by the keypad and the speed is set by the speed knob.

7. SETTING UP YOUR THREADING WIZARD

Once you have entered all your settings in the wizard and have selected the rpm you will use, click on SAVE SETTINGS and POST CODE then EXIT. That will download your threading file to the AUTO mode. On the bottom right you will see CYCLE, click on that and then you will see a box marked EDIT- click on that and the G Code file will show in a window. You want to put a pause in the program so that you can adjust your rpm.
You will see a line that reads M0 3 S??? (the S number will be the rpm you set in the wizard)
Hit enter and on the blank line and type in M1.   M1 is a code to stop the program. Close the edit window and say "yes" to save the changes.   Now you are ready to run the threading program- on the lower left selections you will see "CYCLE START" click on it and the program will begin. You will see a couple of quick Z, X moves, then nothing because you have come to the M1 command which has stopped the program. Now it's time to set your spindle rpm.

Go to your VFD key pad and press RUN and then turn the speed control knob to start the spindle. Watch your S TRUE line on the Mach 3 screen and adjust the control knob until the rpm matches the speed you selected in the wizard.   It won't be possible to get the match absolutely perfect, but within 1- 5 rpm is fine. Now you can go back to the Mach 3 screen, hit cycle start again and the program will run its full course. By setting the spindle speed manually, what you have accomplished is to eliminate one of the functions of Mach 3 and freed it up to "concentrate" on adjusting the feed rate to match the rpm.