



Setting Backlash Compensation on the Sherline/MASSO CNC Controller

About Setting Backlash Compensation on the CNC Controller

Every machine has some amount of mechanical backlash in it. This is why there is “backlash compensation” in the settings and parameters on most CNC machines.

In the following instructions we will show you how to measure the amount of mechanical backlash in a given axis, and how to enter a backlash value on the setup page of the controller to compensate for the mechanical backlash.

We are going to show how to measure the mechanical backlash on one of our ball screw lathes. The same principles and techniques can also be applied to any axis on a CNC mill.

1. You will need a test indicator that measures in .0005" (.0127 mm) increments or lower.
2. When you measure mechanical backlash, you want to use a surface that is perpendicular to the axis to be measured. This could be the side of a table or crossslide, or the side of a tool holder or vice that has been indicated in square.
3. The tip on your indicator must be as close to 0 degrees or 90 degrees in relation to the indicator body. If you are measuring with your indicator tip at 45 degrees (as an example), the amount that your axis moves will not give you a 1-to-1 reading on your indicator (see Figure 1 for proper tip angle).

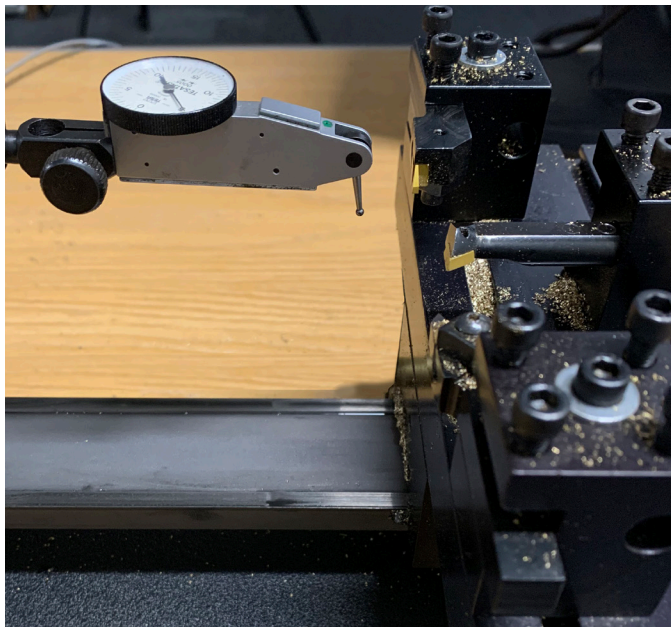


FIGURE 1

4. With your indicator mounted, jog the Z-axis until the tip is close to the surface to be measured.



FIGURE 2

5. Change your jog mode from “CONTINUOUS” to “STEP MODE” and increment “.010.” Now step jog the axis until the indicator needle moves.

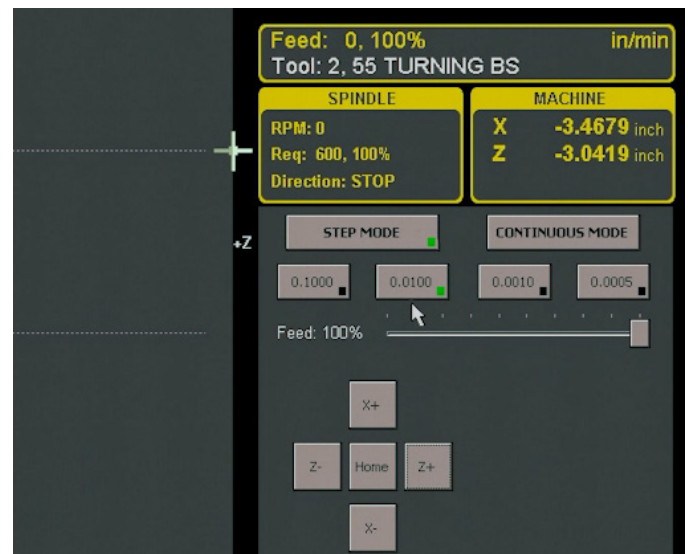


FIGURE 3—The cursor arrow is pointing to the .010 increment.

6. Once the needle moves, change your step increments to “.001.” Now continue to step the axis until it moves your needle .015”. This will make sure that a move of .010 will still be reading on your indicator.



FIGURE 4

7. We were moving the axis in the minus direction to load the indicator. Now we are going to make a positive move of .010" and see how much the indicator moves. Go to your MDI Command screen and type in “G91 G00 Z.01.”



FIGURE 5

8. On our indicator the .010 command made the indicator change by .0085. This means that we have .0015" mechanical backlash.



FIGURE 6

9. Go to the F1 SETUP screen. Type in your password. Then double click on the axis that you are checking. In this case it is the Z-axis.

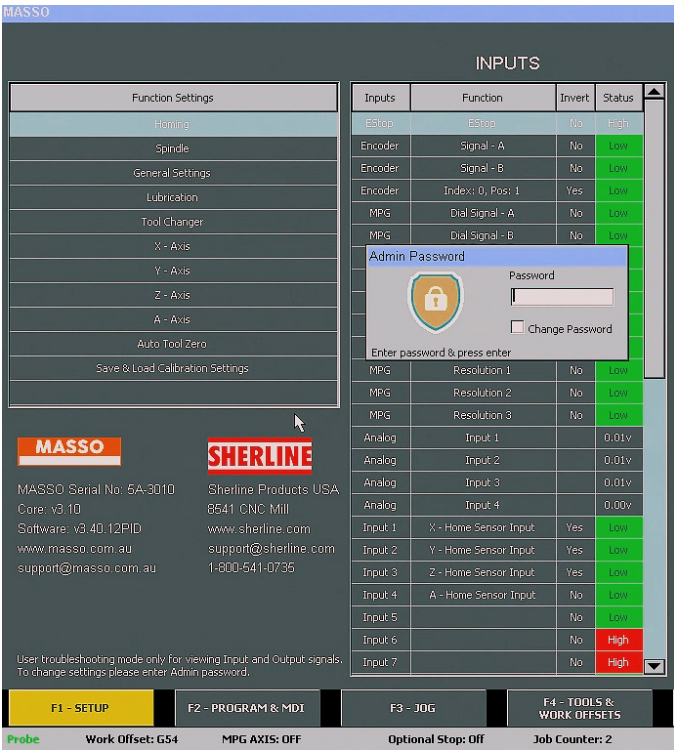


FIGURE 7— F1 SETUP screen.

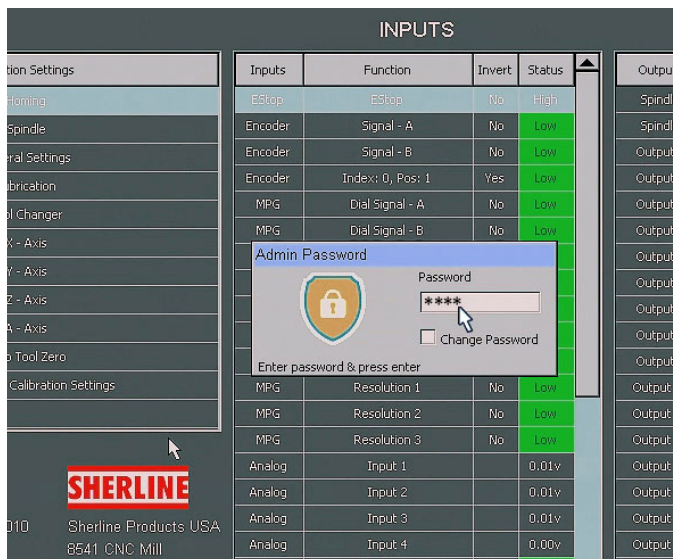


FIGURE 8— Input your password.

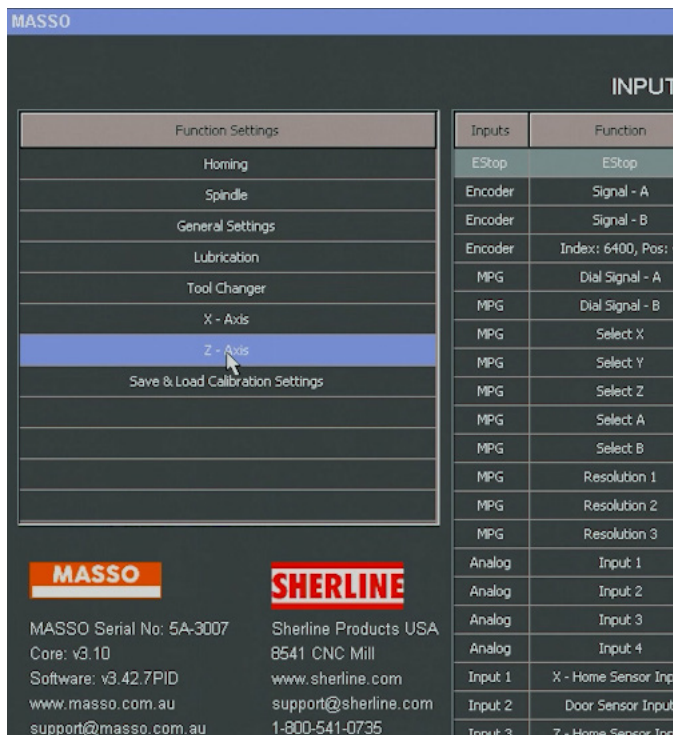


FIGURE 9— Double click on the Z-axis field.

- Click in the Backlash field on the Z-Axis window and input .0015". Then click on "Save."

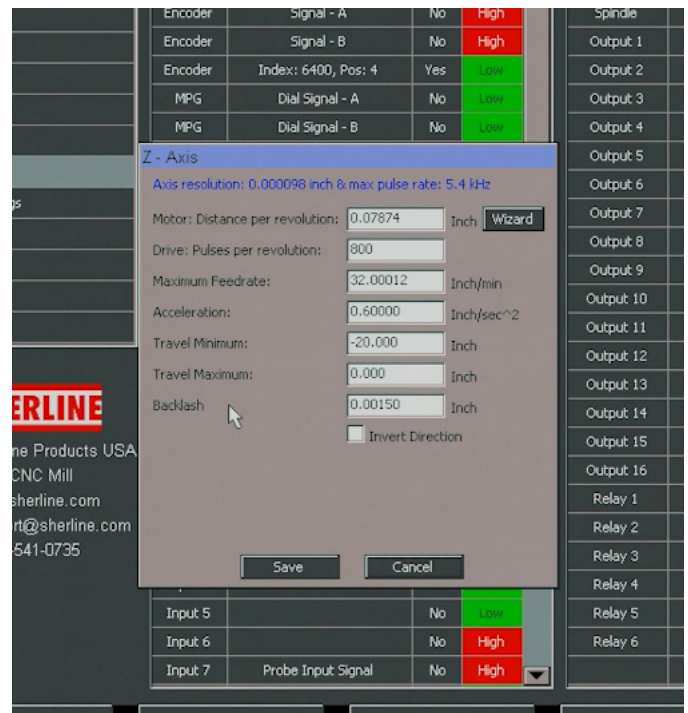


FIGURE 10

- Open the MDI Command screen again. Type in "G91 G00 Z-.0085". This command should move your indicator needle back to the +.005 position again.



FIGURE 11



FIGURE 12

12. Now type in "G91 G00 Z.010" and your indicator should move .010 and be on the -.005 reading on the indicator dial.

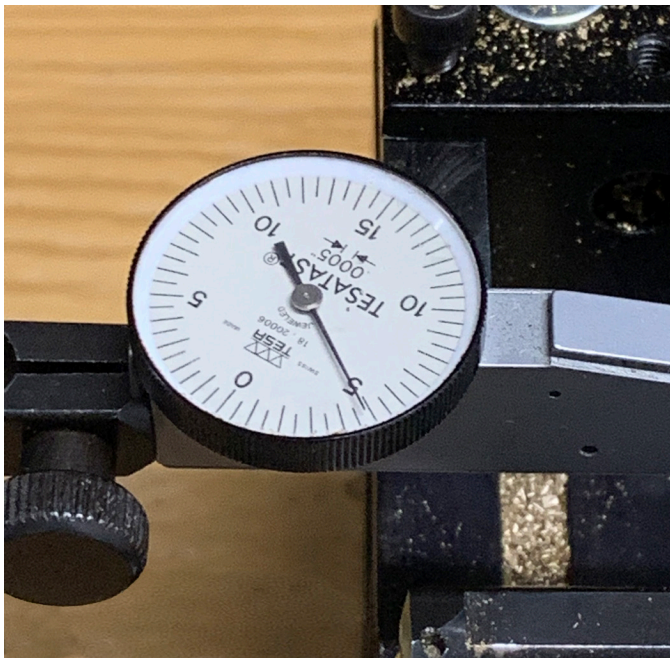


FIGURE 13—The backlash on the Z-axis is set.

13. For the X-axis we do the same steps but there are two primary differences:

One, the indicator tip angle and the orientation of the indicator (see Figure 14).

Two, for each .001" move of the X-axis, you have to give it a command of .002". The reason for this is that the lathe software is set up to be programmed in diameter. Therefore, a command move of .001" is only going to move the axis .0005".

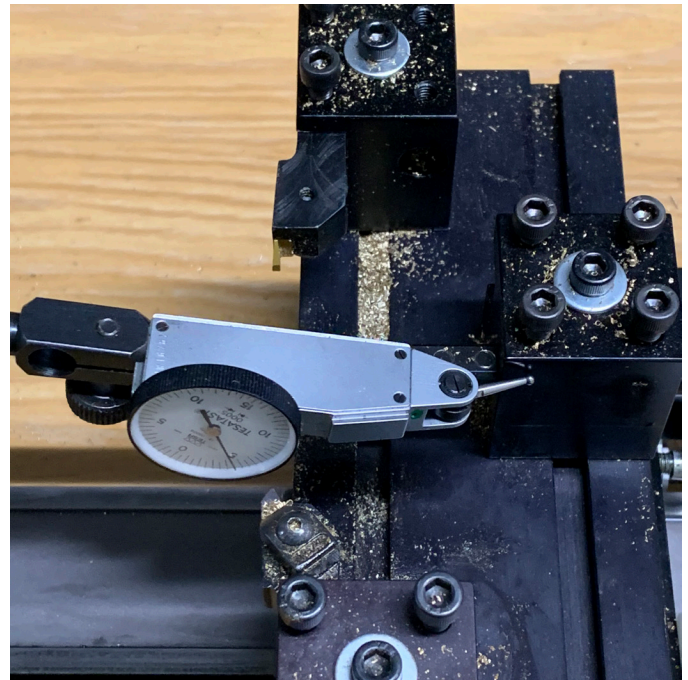


FIGURE 14—The indicator has been reoriented for the X-axis.

14. Load the indicator to .015 then, go to the MDI page and type in "G91 G00 X.020." This should move your crossslide .010". Our indicator moved .009". This is equal to .001" mechanical backlash.
15. Go to the F1 SETUP screen and double click on the X-axis.
16. Input .001" in the backlash field and hit save.
17. Since the backlash was at .001, we are going to make a move of .009 to load the indicator back to its original position. Go to the MDI screen and type in "G91 G00 X-.018."

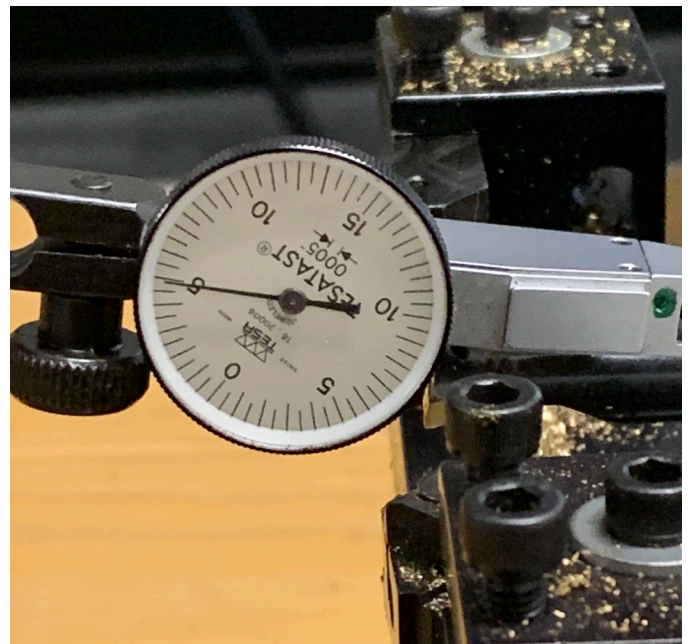


FIGURE 15

-
18. Now type in "X.020" and the indicator should move .010 on the dial.



FIGURE 16

19. If the amount of travel shown on your indicator is more of less than the .010 distance that the machine should have moved, increase or decrease the backlash amount on the setup page and move the axis + and then - .010" again and see what the indicator reads.
20. Use the same technique and indicator tip positioning on your mill for the X, Y, and Z-axis.

Thank you,
Sherline Products Inc.