SHERLINE PRODUCTS
INCORPORATED 1974

MASSO Threading Program Using a Spring Finish Pass

We had a customer who was having a problem with his MASSO Conversation Threading program.

He said that when he programmed the major diameter and the minor diameter of his thread. The major diameter was good, but the minor diameter was .015 - .020" larger than the minor diameter that he input into the conversation settings.

He was cutting a 3/8-16 thread.

Specs for a 3/8-16 2A Class Thread:

Major Diameter = .3737 - .375

Minor Diameter = .297

Pitch Diameter: .331 - .334

Thread Pitch = .0625"

To check his problem, I made a test program that would do the following:

1. All turning and threading operations are done with the threading tool.
2. Rough turn the OD to .374 by Z-.600.
3. Rough thread the part to Minor diameter of .298" by Z-.500.
5. Then we make a finish pass on the Major diameter of .373 by Z-.500. This is to clean up the O.D..
6. Then we copy the last 5 thread passes from the rough threading cycle. We add one more pass that is .001 deeper than the last pass of the rough threading cycle. This becomes our "Spring Pass" for cleaning up the threads. This threading cycle cuts the minor diameter to .297 by Z-.500.

Conclusion

1. When we ran the program below, all of the minor diameters came out on size within .001".
2. The threading spring pass cut material on the last four passes of the program.
3. The Minor diameter being oversize on the customers parts was probably due to flex in the material during the first threading cycle and/or a dull threading tool which will push the part away as it is cutting the thread.
4. We strongly suggest using a spring pass threading cycle on all of your threads in order to get your threads on size along with consistent thread form and pitch.

Thank you,
Sherline Products Inc.

Tip

I have never cut a thread that was perfect and on size on the first try. You will find that most of the time you will need to move your tool offset in and rerun the program in order to bring your thread to the correct size. In the attached program the threading cycle makes 30 passes to cut the thread. When you recut the thread to bring it to size, the cutter is only going to remove material on the last couple passes (depending on your offset amount). You will save a lot of time if you cut and paste the "SPRING Threading Cycle" and make a short program. Then run this program after each tool offset change to get your thread on size. See Program 38 16 FIN THRD at the end for the Finish Threading program that you will use to bring your threads to size after each tool offset change.

Sample Program

Program Name: 38 16 THRD

```
(----Program units: inch----)
G90 G20

(---MASSO - OD Wizard---)

T3 M6

(---Start Spindle---)
M3 S2000
G4 P2000
( ------- Finish Cut ------- )
S2000
G0 Z0.0500
G0 X0.3740
G1 Z-0.6000 F3.0000
G0 X0.3750
G0 Z0.0500

(---MASSO - Threading Wizard---)

T3 M6
```

(---Start Spindle---)
M3 S400
G4 P3000

(------- Start Threading -------)
G0 Z0.1994
G0 X0.3720
G32 Z-0.5000 F0.0625
G0 X0.4240
G0 Z0.1989
G0 X0.3700
G32 Z-0.5000 F0.0625
G0 X0.4240
G0 Z0.1983
G0 X0.3680
G32 Z-0.5000 F0.0625
G0 X0.4240
G0 Z0.1978
G0 X0.3660
G32 Z-0.5000 F0.0625
G0 X0.4240
G0 Z0.1972
G0 X0.3640
G32 Z-0.5000 F0.0625
G0 X0.4240
G0 Z0.1967
G0 X0.3620
G32 Z-0.5000 F0.0625
G0 X0.4240
G0 Z0.1961
G0 X0.3600
G32 Z-0.5000 F0.0625
G0 X0.4240
G0 Z0.1956
G0 X0.3580
G32 Z-0.5000 F0.0625
G0 X0.4240
G0 Z0.1950
G0 X0.3560
G32 Z-0.5000 F0.0625
G0 X0.4240
G0 Z0.1945

G0 X0.3540
G32 Z-0.5000 F0.0625
G0 X0.4240
G0 Z0.1939
G0 X0.3520
G32 Z-0.5000 F0.0625
G0 X0.4240
G0 Z0.1933
G0 X0.3500
G32 Z-0.5000 F0.0625
G0 X0.4240
G0 Z0.1928
G0 X0.3480
G32 Z-0.5000 F0.0625
G0 X0.4240
G0 Z0.1922
G0 X0.3460
G32 Z-0.5000 F0.0625
G0 X0.4240
G0 Z0.1917
G0 X0.3440
G32 Z-0.5000 F0.0625
G0 X0.4240
G0 Z0.1911
G0 X0.3420
G32 Z-0.5000 F0.0625
G0 X0.4240
G0 Z0.1906
G0 X0.3400
G32 Z-0.5000 F0.0625
G0 X0.4240
G0 Z0.1900
G0 X0.3380
G32 Z-0.5000 F0.0625
G0 X0.4240
G0 Z0.1895
G0 X0.3360
G32 Z-0.5000 F0.0625
G0 X0.4240
G0 Z0.1889
G0 X0.3340
G32 Z-0.5000 F0.0625
G0 X0.4240

```
G0 Z0.1884
G0 X0.3320
G32 Z-0.5000 F0.0625
G0 X0.4240
G0 Z0.1878
G0 X0.3300
G32 Z-0.5000 F0.0625
G0 X0.4240
G0 Z0.1873
G0 X0.3280
G32 Z-0.5000 F0.0625
G0 X0.4240
G0 Z0.1867
G0 X0.3260
G32 Z-0.5000 F0.0625
G0 X0.4240
G0 Z0.1861
G0 X0.3240
G32 Z-0.5000 F0.0625
G0 X0.4240
G0 Z0.1856
G0 X0.3220
G32 Z-0.5000 F0.0625
G0 X0.4240
G0 Z0.1850
G0 X0.3200
G32 Z-0.5000 F0.0625
G0 X0.4240
G0 Z0.1845
G0 X0.3180
G32 Z-0.5000 F0.0625
G0 X0.4240
G0 Z0.1839
G0 X0.3160
G32 Z-0.5000 F0.0625
G0 X0.4240
G0 Z0.1834
G0 X0.3140
G32 Z-0.5000 F0.0625
G0 X0.4240
G0 Z0.1828
G0 X0.3120
G32 Z-0.5000 F0.0625
```

G0 X0.4240
G0 Z0.1823
G0 X0.3100
G32 Z-0.5000 F0.0625
G0 X0.4240
G0 Z0.1817
G0 X0.3080
G32 Z-0.5000 F0.0625
G0 X0.4240
G0 Z0.1812
G0 X0.3060
G32 Z-0.5000 F0.0625
G0 X0.4240
G0 Z0.1806
G0 X0.3040
G32 Z-0.5000 F0.0625
G0 X0.4240
G0 Z0.1800
G0 X0.3020
G32 Z-0.5000 F0.0625
G0 X0.4240
G0 Z0.1795
G0 X0.3000
G32 Z-0.5000 F0.0625
G0 X0.4240
G0 Z0.1789
G0 X0.2980
G32 Z-0.5000 F0.0625
G0 X0.4240
G0 Z0.2000

(---MASSO - OD Wizard---)

T3 M6

(---Start Spindle---)
M3 S2000
G4 P2000

(------- Finish Cut -------)
S2000

```
G0 Z0.0200
G0 X0.3730
G1 Z-0.6000 F2.0000
G0 X0.3740
G0 Z0.0200

(---MASSO - Threading Wizard---)

T3 M6

(---Start Spindle---)
M3 S400
G4 P3000

( ------- Start SPRING Threading Cycle ------- )

G0 X0.3940
G0 Z0.1806
G0 X0.3040
G32 Z-0.5000 F0.0625
G0 X0.4240
G0 Z0.1800
G0 X0.3020
G32 Z-0.5000 F0.0625
G0 X0.4240
G0 Z0.1795
G0 X0.3000
G32 Z-0.5000 F0.0625
G0 X0.4240
G0 Z0.1789
G0 X0.2980
G32 Z-0.5000 F0.0625
G0 X0.4240
G0 Z0.1789
G0 X0.2970
G32 Z-0.5000 F0.0625

G0 X0.4240
G0 Z0.1789
G0 X0.2970
G32 Z-0.5000 F0.0625

G0 X0.4240
```

G0 Z0.2000

(---Stop Spindle---)
M5

(---END OF PROGRAM---)
M30

Program Sample for Finish Thread Cycle

Program Name: 38 16 FIN THRD

(Program----38 16 FIN THRD----)
(----Program units: inch----)
G90 G20 G94

T3 M6

(---Start Spindle---)
M3 S400
G4 P3000

(------- Start SPRING Threading Cycle -------)

G0 X0.3940
G0 Z0.1806
G0 X0.3040
G32 Z-0.5000 F0.0625
G0 X0.4240
G0 Z0.1800
G0 X0.3020
G32 Z-0.5000 F0.0625
G0 X0.4240
G0 Z0.1795
G0 X0.3000
G32 Z-0.5000 F0.0625
G0 X0.4240
G0 Z0.1789
G0 X0.2980
G32 Z-0.5000 F0.0625

```
G0 X0.4240
G0 Z0.1789
G0 X0.2970
G32 Z-0.5000 F0.0625

G0 X0.4240
G0 Z0.1789
G0 X0.2970
G32 Z-0.5000 F0.0625

G0 X0.4240
G0 Z0.2000



(---Stop Spindle---)
M5
```

Low-Speed, High-Torque Pulley settings

1. The headstock pulley has a high range and a low range. The high range is good for most operations. The lower range has slower maximum RPM with higher torque. The low-speed belt setting is designed for heavy cuts in hard material and also for courser thread cutting.

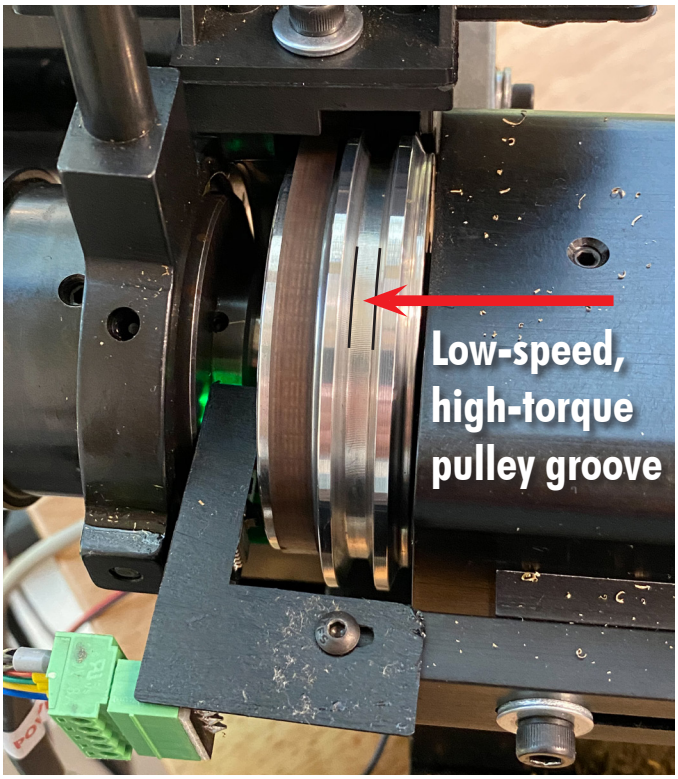

FIGURE 1—Use the pulley groove closest to the headstock for low-speed, high-torque settings.

2. If you use this pulley position, the maximum RPM of the spindle will be 1350 RPM, whereas the maximum RPM in the high-speed position is2800-3100 RPM. You will also need to change your settings for your spindle on the F1 Setup page so the control can sync the spindle speed and the Z-axis feed for thread cutting.
3. To do this click on the F1 Setup page. Then double click on “Spindle” in the function settings.

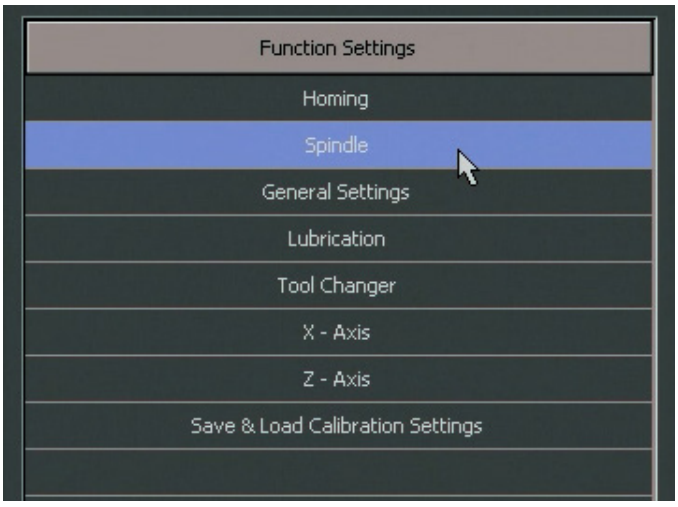

FIGURE 2

4. The “Spindle RPM at 10 volts” will be set at 2800-3100 for the high-speed pulley setting.

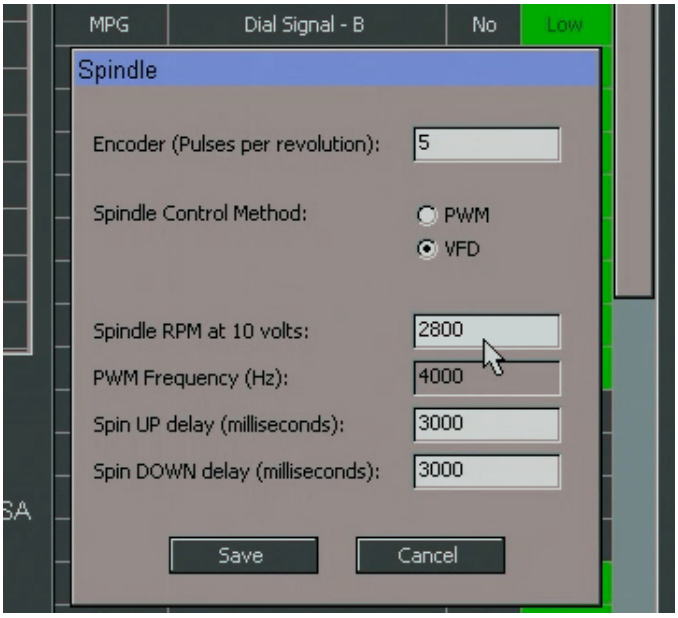

FIGURE 3

5. You will need to change this setting to 1350 and then click on Save.

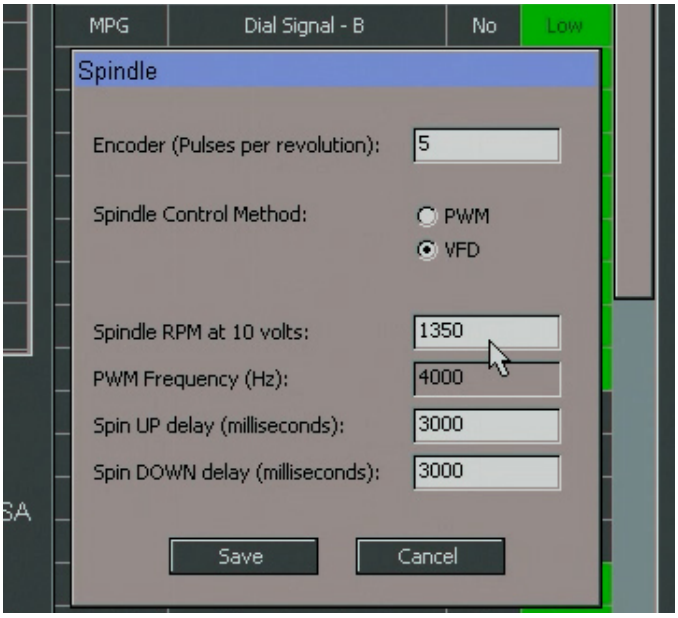

FIGURE 4—Change the Spindle RPM setting from 3100 to 1350 for the low-speed, high-torque setting.

Now you are set to cut threads using the low-speed/high-torque pulley.