TC820LTY-S Main Spindle Alignment

How To Align/Realign the TC820LTY-S Main Spindle

Written By: Phillip Brown



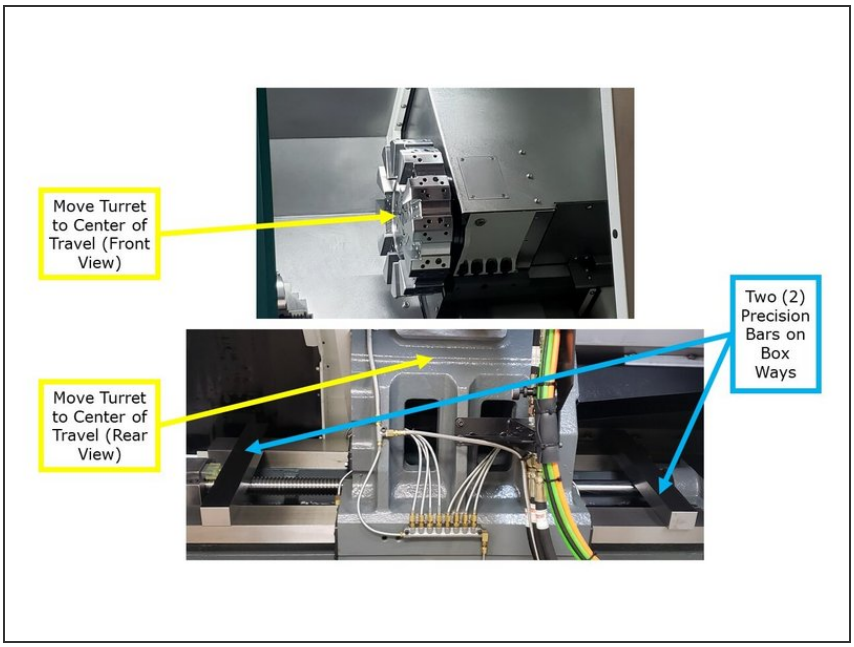
INTRODUCTION

This procedure will show the user how to Realign the Main Spindle on the TC820LTY-S. It can be used to realign in case of a spindle replacement, a crash, or both. In case of a crash there will be Links to realign the Turret and Sub-Spindle, because one or both of them may have gotten knocked out of alignment as well.

TOOLS:

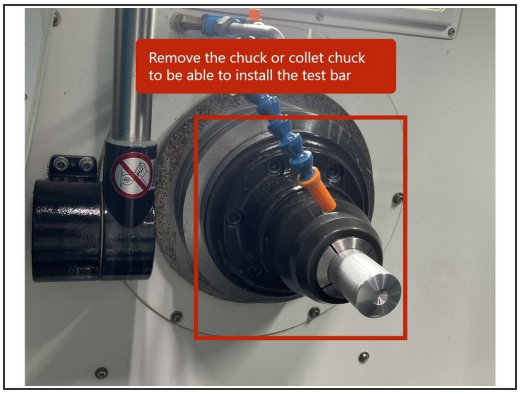
- SWI-TOOL-009 (1)
- Torque Wrench With 14mm Box End Adapter (1)
- Magnetic Base (1)
- Dial Indicator (0.0001" resolution) (1)
- Boring Bar Holder (1)
- 1 each 5 tenths (0.0005") coaxial indicator with .375" pilot (1)
- Coaxial Indicator Adapter (1)

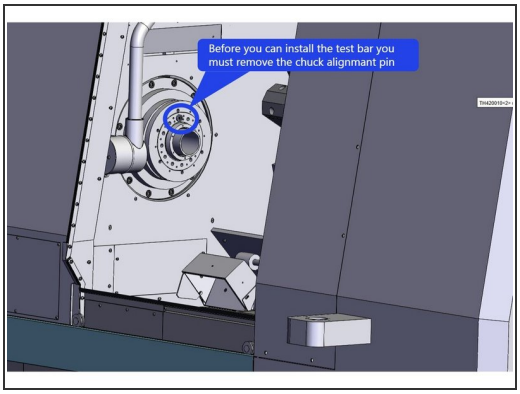
Step 1 — Getting Started

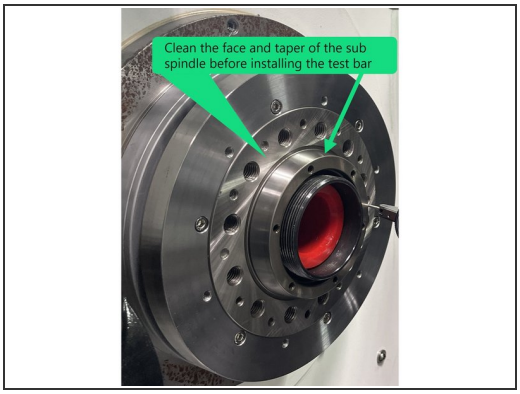


- Before you can get started with the Main Spindle alignment you must be sure the machine is level. If the machine is not level it's bed can become twisted and this can move the machine centers out of alignment. This can make the machine appear to be out of alignment when the machine is actually out of level. Use the below link to level the machine.
  - Link to level the machine: TRAK TC820si & TRAK TC820LTYsi - Leveling

Step 2 — Prep Spindle and Install Test Bar

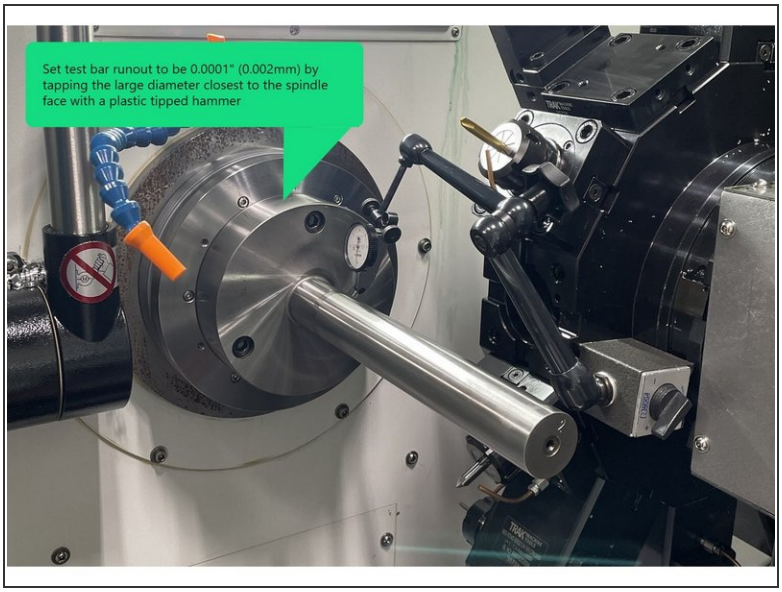


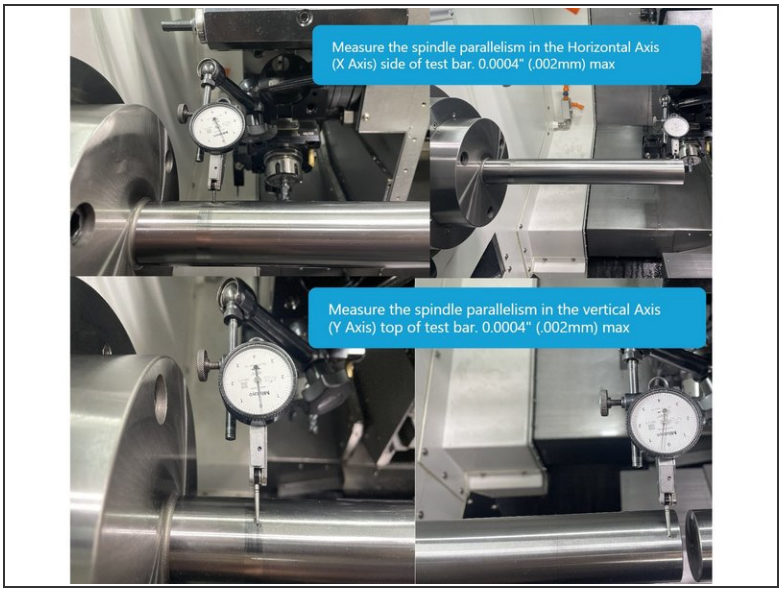




- To check the alignment of the main spindle you first need to remove the chuck or collet chuck from the main spindle. Then once removed close the chuck. **The test bar must not be up against the draw tube of the hydraulic chuck assembly. It must be against the spindle face.**
- Before you can install the test bar you will need to remove the alignment pin in the spindle face. See Photo 2.
- Next you need to clean the spindle face and taper and check for any debris stuck to it. Then check for any knicks or dings and remove them with a fine stone (1000 or 1500 grit). Do the same to the test bar mounting surface, then wipe the spindle face and test bar clean with a soft cloth and install the test bar to spindle face.

Step 3 — Check the Alignment of the Main Spindle





ⓘ ***Before getting started first verify that the Main Spindle needs to be realigned.***

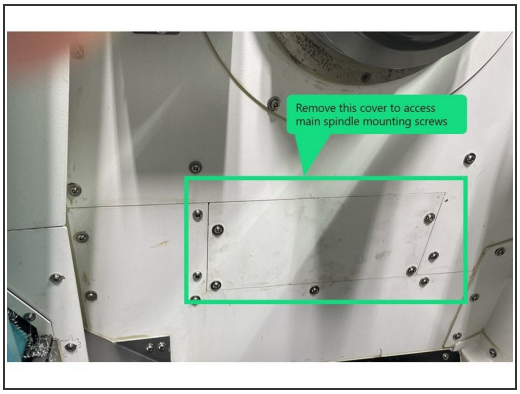
- Install the test bar to the spindle and snug the screws.
- Install a dial indicator to the turret and move the Z1 axis so that the indicator can measure the test bar closest to the Main Spindle face. Set up the indicator to measure the spindle runout.
- Rotate the spindle to measure the runout near the spindle face and adjust to 0.0001" or better (0.002mm). Use a plastic tipped hammer to tap test bar to achieve the desired runout. Torque the test bar mounting screws to 86 in-lbs (100 kgf.cm) and then again to 177in-lbs (200 kgf.cm) . Check runout to verify it didn't change when torqued.
- Set the indicator to measure the horizontal accuracy (side of test bar). Zero the indicator closest to the spindle face and move the Z1 Axis (turret) towards the end of the bar. This should measure no more than 0.0004"/10.0" (0.01mm/250mm). See Photo 2
- Next set up the indicator to measure the vertical accuracy (top of the test bar). Zero the indicator closest to the spindle face and move the Z1 Axis (turret) towards the end of the bar. It also should not measure any more than 0.0004"/10.0" (0.01mm/250mm). See Photo 2

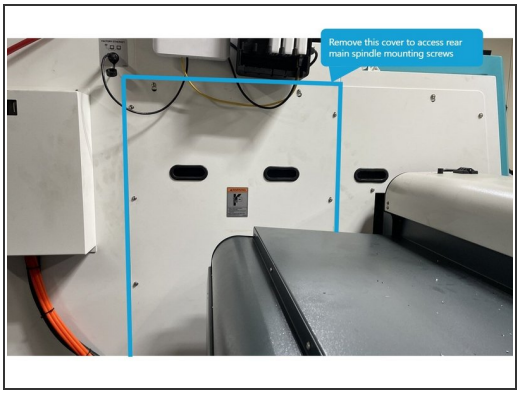
ⓘ *If either of the above measurements are above 0.0004"/10.0" (0.01mm/250mm) the main spindle needs to be adjusted.*

- If it is determined that the Main Spindle is out of alignment the following procedure will assist you in getting it back into alignment.

Step 4 — Removal of Covers to Access Main Spindle Mounting Screws for Alignment

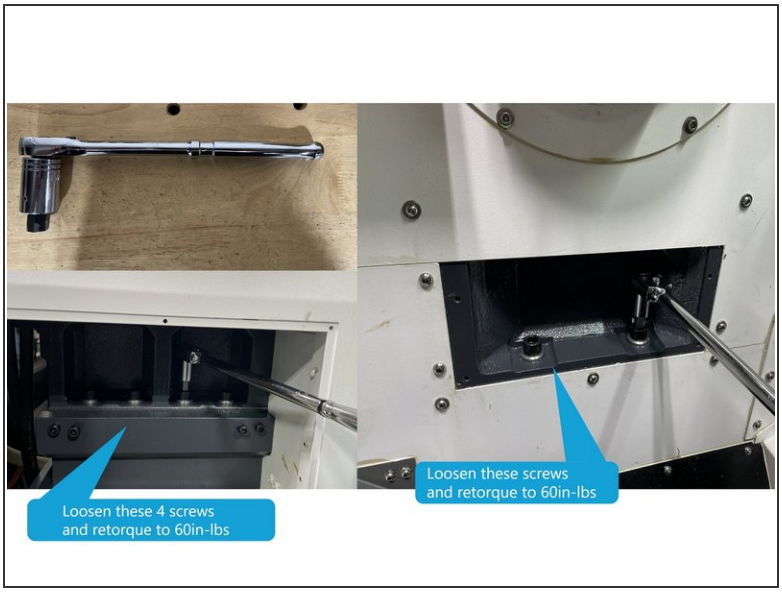


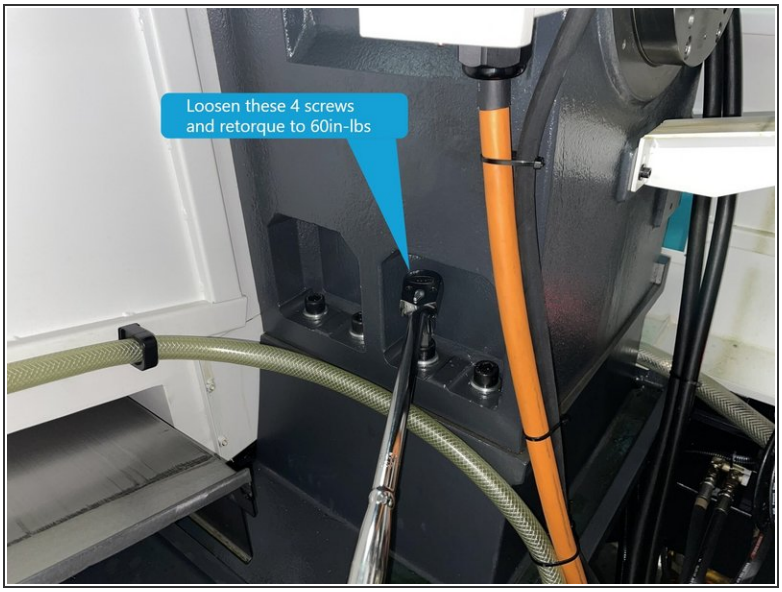




- To do the alignment of the TC820LTY-S Main Spindle, you need to remove a few covers. The next few points in this step will show which covers need to be removed.
  - To access the mounting and adjustment and screws on the front side of the machine remove the cover shown in photo 1.
  - There are also 2 screws on the inside of the work area under the main spindle, remove the cover as shown in photo 2 to access those screws.
  - To access the final four (4) spindle mounting screws, remove the left side rear cover as shown in photo 3.

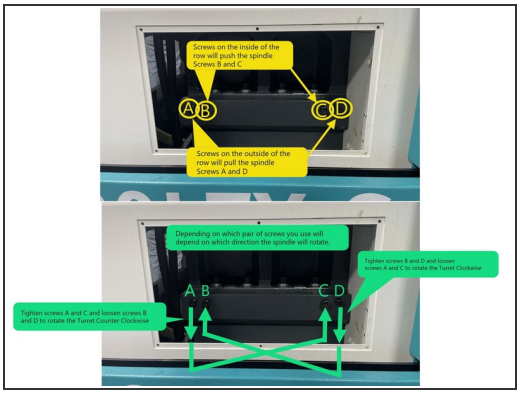
Step 5 — Prepare Spindle for Adjustment

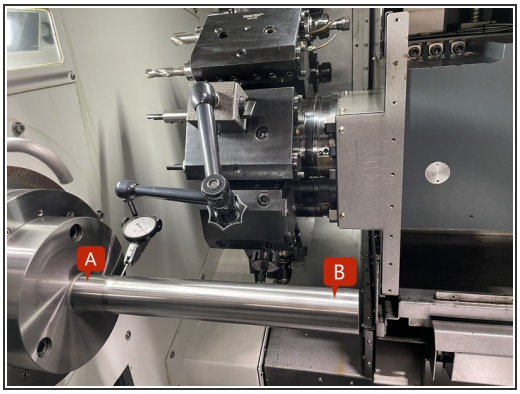


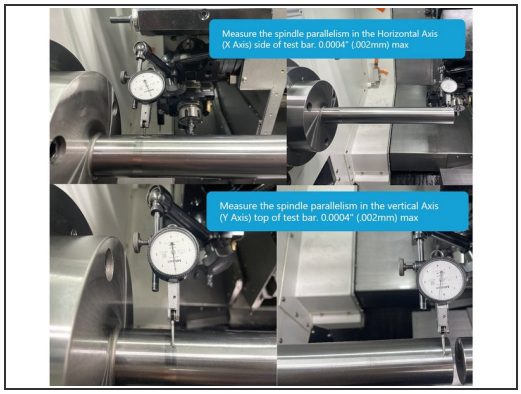


- To adjust the main spindle you need to loosen the screws attaching the spindle to the main casting. To do this you will need a long 1/2 drive ratchet and a stubby 14mm hex driver socket. Loosen all 10 screws and then retorque to 60 in-lbs (70 kgf.mm). Photos 1 and 2 show the screw locations.

Step 6 — Alignment of the Main Spindle







- To align the Main Spindle Horizontal Accuracy there are 4 adjustment screws in the base casting, two screws to push the spindle and 2 screws to pull it.

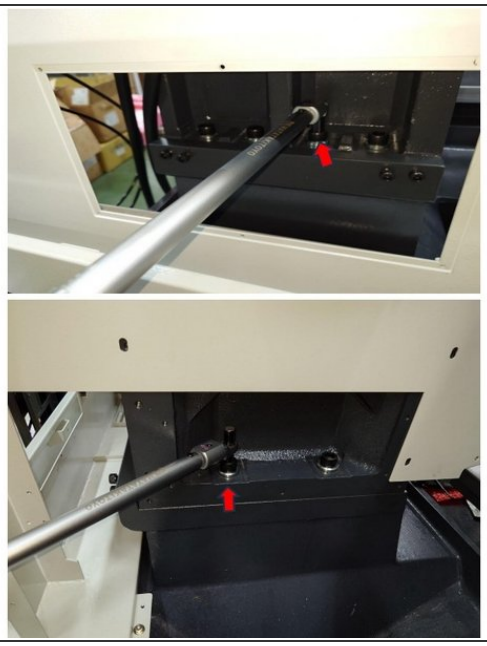
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- The two screws on the base casting, depicted by the circles in the center of the row (screws B and C), will push the Spindle, while the two screws depicted by the circles on the outside of the row (screws A and D) will pull the Spindle. This motion will cause the Spindle to rotate so it can be aligned. See Photo 1
- Depending on whether the spindle requires a counterclockwise or clockwise adjustment, choose a pair of screws to tighten or loosen to adjust the headstock. To rotate the Main Spindle counter clockwise tighten screws A and C and loosen screws B and D, For a clockwise adjustment tighten screws B and D and loosen screws A and C. See Photo 1
- Photo 2 shows the measurement points on the Main Spindle alignment bar.
- Zero the indicator on point "A" of the test bar. Move to point "B" on the test bar and, using a pair of screws adjust the main spindle to where points "A" and "B" are within 0.0004"/10.0" (0.01mm/250mm). Tighten or loosen the adjustment screws in small increments to realign the main spindle.
- Next set up the indicator to measure the top of the Test Bar and make the same measurement as above. It should not measure any more than 0.0004"/10.0" (0.01mm/250mm). See Photo

ⓘ ***When measuring the Main Spindle Alignment Bar the free end of the bar must be slightly higher than the mounting end.***

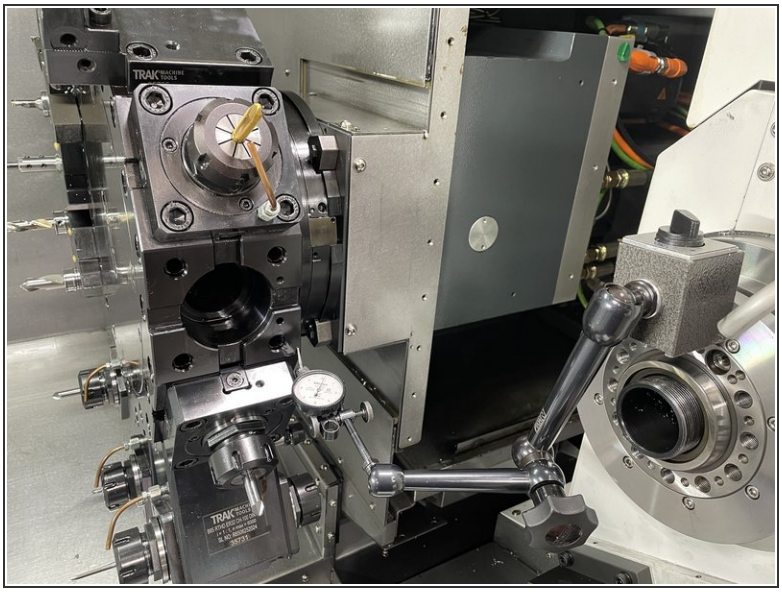
ⓘ This adjustment process may take several tries before achieving the correct alignment.

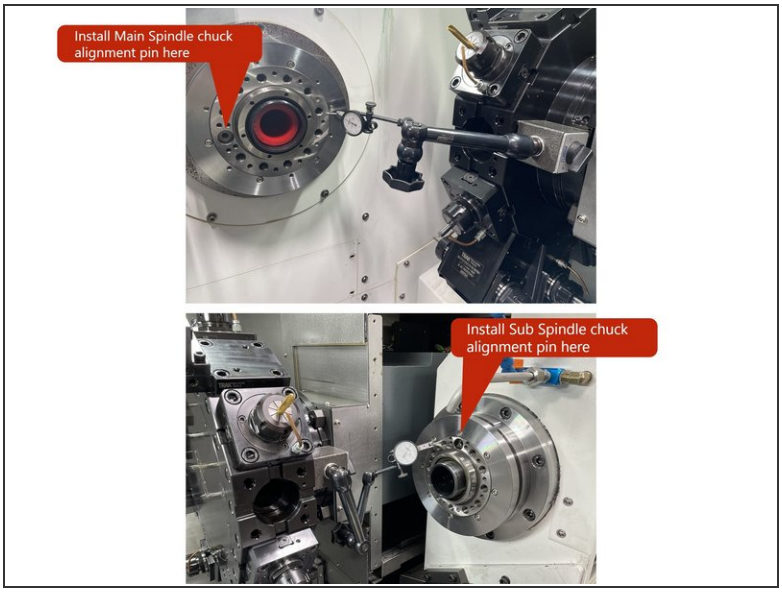
Step 7 — Torque Mounting Screws and Verify Main Spindle Alignment



- Once the horizontal accuracy is back in alignment retorque the mounting screws to 187 ft-lbs (2600 kgf.cm) Recheck the horizontal accuracy to verify it didn't change when the spindle mounting screws were torqued.

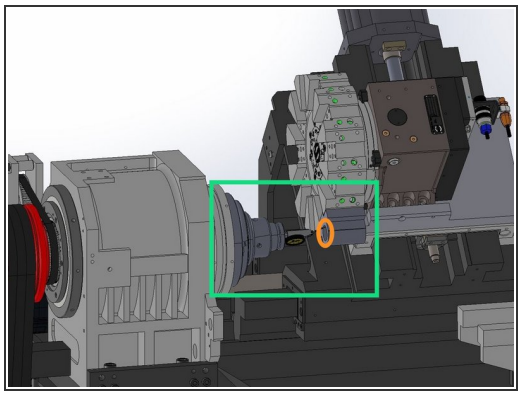
Step 8 — Verify Turret and Sub-Spindle Assembly Alignment

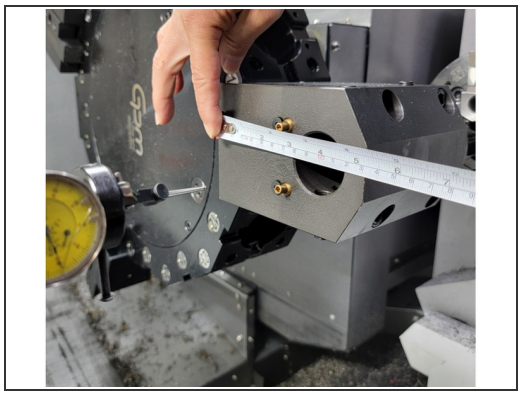


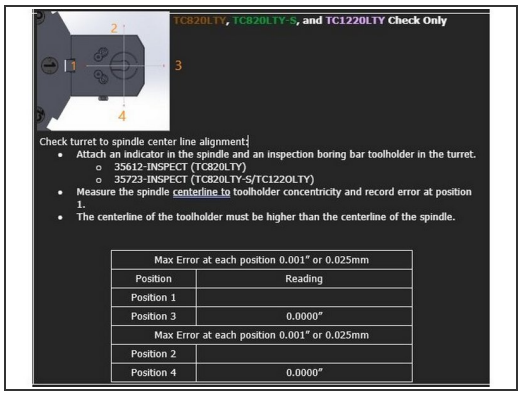


- In the event the main spindle alignment was knocked out of spec due to a crash you should verify the sub spindle, and turret alignments as well. The below links are used to measure and realign the sub spindle and turret assemblies.
  - Link: TC820LTY-S Sub Spindle Alignment
  - Link: TC820LTY-S Turret Disk Removal and Realignment
- Once all of the alignments have been completed, remove the test bars from the main and sub spindles and reinstall the chuck locating pins.

Step 9 — Spindle to Turret Centerline Concentricity Check







- Once the Main Spindle, Sub Spindle and Turret have been aligned, you need to verify the Turret reference location with the Main Spindle centerline. The next 2 steps will cover how to do that.

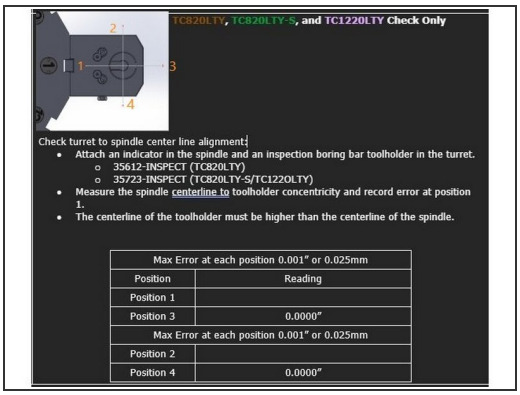
ⓘ Clean the 5C Collet Chuck with WD-40 or an equivalent, and use a fine grit deburring stone to check for dinks or high spots on the mounting and measuring faces.

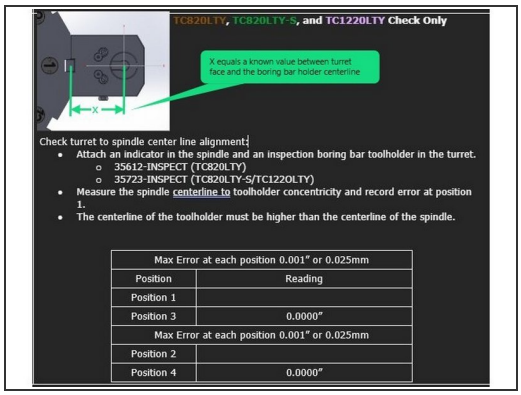
- Attach an inspected Boring Bar Tool Holder to the Turret, the offset between the turret face and center of the bore must be known, in this case it is 100mm. Install the 5C collet chuck onto the Main Spindle face. Using a high accuracy 3/8" 5C Collet install a Co-Axial dial indicator, so it is centered on the Spindle rotary axis.
- Position the indicator so it is measuring on the ID of the boring bar holder and adjust the axis so the turret is close to the centerline of the spindle. The X-Axis should be at the value equal to the offset between the turret face and the center of the bore on the Boring Bar Holder (in this case 100mm). The Y-Axis should be positioned on 0.
- Starting with the Co-Axial indicator set to Zero at position 3, rotate the spindle 360° and record the indicator movement at positions 1, 2, and 4.

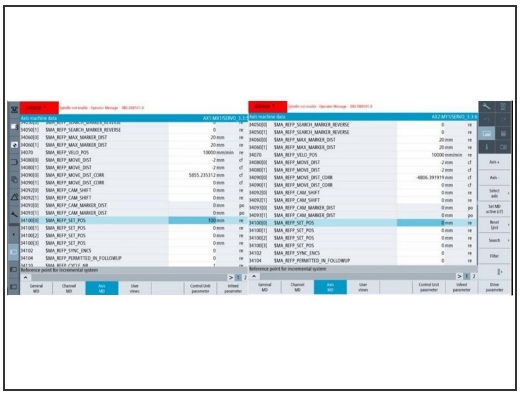
ⓘ **The maximum permitted error is 0.001" [0.025mm]. The centerline of the toolholder in the Y Axis must be higher than the centerline of the spindle.**

- Repeat check at turret position 7.

Step 10 — Adjustment to Spindle to Turret Centerline Concentricity

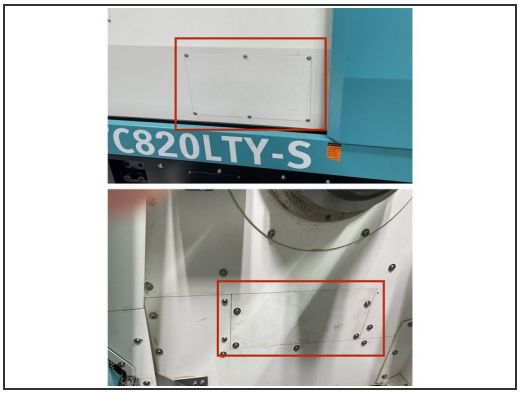




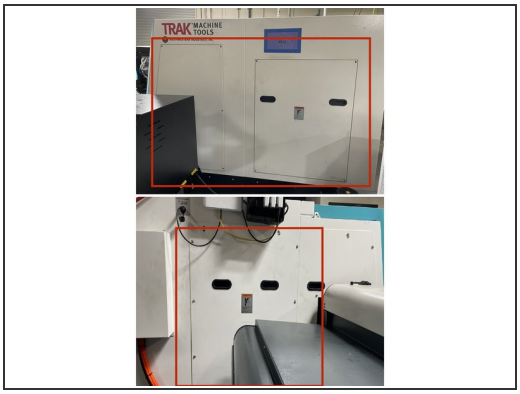


- To align the turret centerline with the main spindle move the X and Y axis positions until the centerline of the tool holder bore is within spec of the spindle centerline, 0.001" (0.025mm) or less.
- Starting with the Coaxial indicator set to Zero at position 3, rotate the spindle 360° and record the indicator movement at positions 1, 2, and 4.
  - ⓘ **The maximum permitted error is 0.001" [0.025mm]. The centerline of the toolholder in the Y Axis must be higher than the centerline of the spindle.**
- Verify parameter settings MD 34100[0]:
  - X-Axis MD 34100[0]: Set to the value between the turret mounting face and the centerline of the tool holder bore. In this case it is 100mm as shown in photos 2 and 3.
  - Y-Axis MD 34100[0]: Set to 0.
- Change parameter setting MD 34210[0] to 1 for the X and Y Axis. Press Jog -> Ref Point on the MCP and set the Feed Override to 0%.
- Press and hold the "X" and "+" buttons on the MCP to reset the X-Axis position. Press and Hold the "Y" and "+" buttons on the MCP to reset the Y-Axis position.

Step 11 — Reinstall Outer Covers







- Once the Main Spindle, Sub Spindle, and Turret alignments have been completed you can reinstall all of the outer covers that were removed. See Photos 1 thru 3.