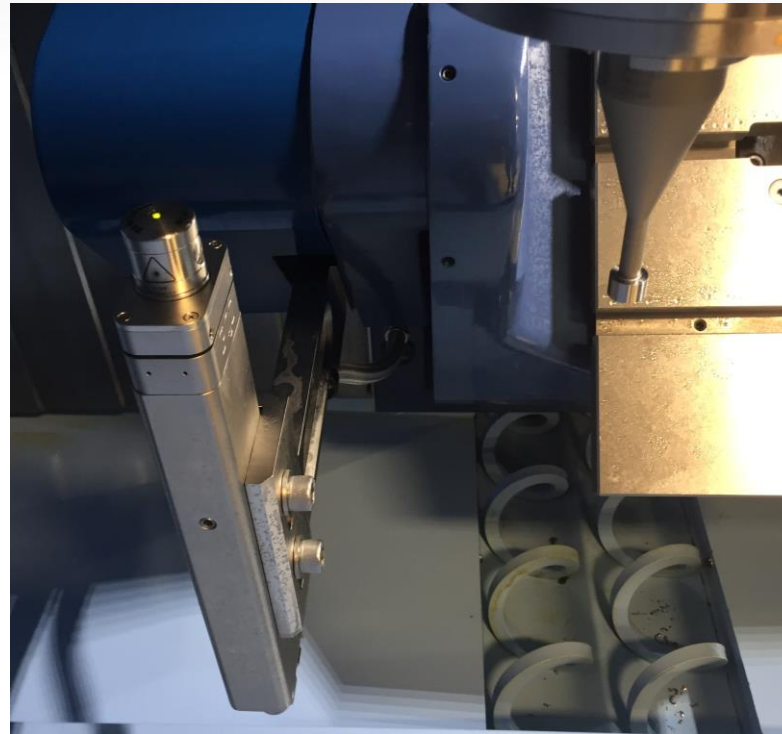


Non-Contact Tool Setting

NC4S



This presentation will give you step by step instructions on (re)aligning and (re)calibrating your laser tool setting system

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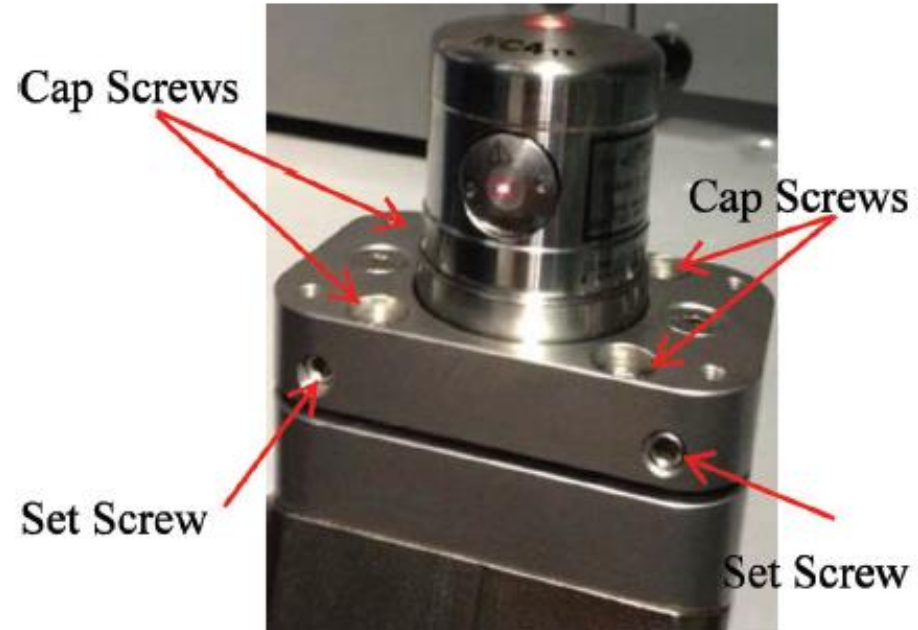
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Beam Parallel Alignment



- The first step in aligning your laser heads is to ensure that the beam is parallel to the machine. We do this by putting a tool in the spindle and finding a point of interest (POI) on the tool.
 - For Example: a decimal point on a printed tool value or making a mark with a marker on the tool
- Move the tool so that your selected POI lines up with the beam perfectly as close to the Transmitter (TX) Head as possible.
- Now manually drive the X axis toward the Receiver (RX) Head
- The end goal is to have the laser move as little vertically as possible, on the tool, from our POI.



- If the beam has moved, adjust the TX laser head using the top and front adjustment screws halfway back towards your beginning POI
 - Cap screws will adjust your beam up and down
 - Set screws adjust your beam left and right
- Now drive the XYZ axis back to the TX head and reposition the tool so the beam is back on the POI
 - Repeat this process until you have minimal deviation from the POI on the tool.
 - A slight horizontal deviation is okay
- Ensure all screws are snug and align the laser heads to each other (slide 6)

Horizontal Alignment



Red = no signal



Amber = some signal



Green = good signal

- If you make any adjustments to your laser brackets or laser heads you **must** run O8060 (alignment cycle) then O8061 (calibration cycle)
- When to align the beam:
 - You hit a laser bracket with substantial force and change the status of the LEDs.
 - You hit one of the laser heads and change the status of the LEDs.
 - A change in the machines Grid Shift or Spindle
- If your LEDs are Amber or Red you should Adjust The laser Heads.
- If your LEDs are Green you can adjust the bracket.



Fig. 1

- To start the adjustment process, place your Voltage Cap on one of the laser heads (Figure 1)
 - This should turn on the number display
- Then go into the electrical panel and find the laser interface (Figure 2)
- Flip the second switch from the top to the right (Figure 3)
 - *Note Orientation
 - If switch 3 is already flipped on, then leave 3 on.
- Now your Voltage Cap is displaying your laser Head communication voltage
 - This number **must** be above 1
 - This number should be the highest achievable number (1v or above is operational)



Fig. 3



Fig. 2



- You may need to raise or lower the RX laser bracket using the bolts in slotted holes, if the laser does not line up with the RX lens hole vertically
- We ideally only want to adjust the TX laser horizontally
- If adjustment is needed
 - loosen the bolts in the slotted hole
 - Use the vertical adjustment screws on the opposite side of the bracket, to move the bracket up or down so the beam meets the RX lens hole
- ensure the bolts get firmly tightened back down.
- Now adjust the TX head accordingly using the front horizontal set screws
- And fully adjust the RX head to get the highest number possible on your voltage cap

Fig. 1



Fig. 2

Fig. 3 (The beam is **not** centered)

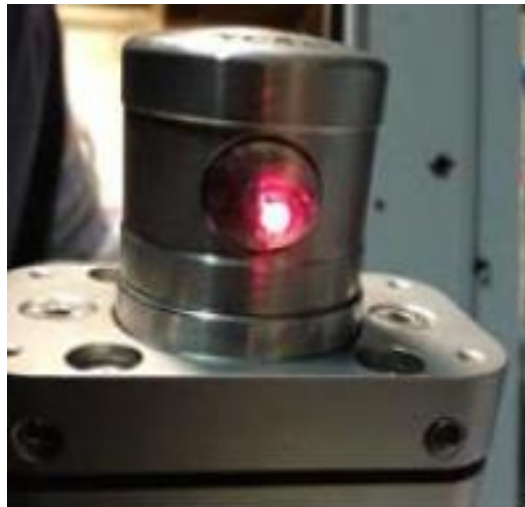
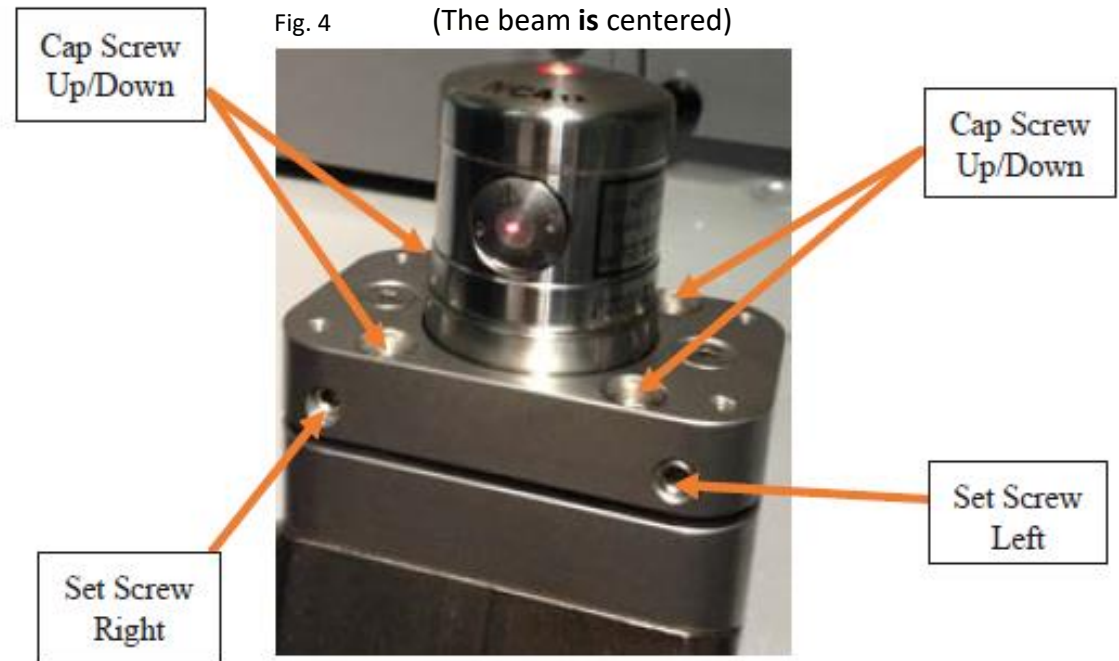


Fig. 4 (The beam is centered)



- If you need to adjust the laser heads, remove the cover plates with the (4) Philips screws (Figure 1)
- Adjust TX laser head (figure 2) to get beam to shine back into the center of the RX head. Adjust the 2 set screws in front for right/left adjustment. (Figure 4)... try not to adjust the TX cap screws as that will affect your parallelism with the machine
- Now Adjust RX laser head to achieve the best signal.
 - You may have to repeat these steps to achieve the highest achievable number (1v or above is operational)
 - Remove voltage cap and make sure all screws are snug
 - Screw the cover plate back on
 - You **MUST** Flip Switch 2 back, on the laser interface in the electrical cabinet

Bracket Alignment



- Run the alignment program O8060 with the Master Cal Tool. Some tools will vary depending on the machine. Make sure that the values etched on the tool match what is in the program.
 - K=Length, R=Reference Diameter
- The program will put the tool at the rough X and Y position. You will then jog the tool to break the beam (Red LED) and then back out (green LED)
- Go back to memory and re-start program. The program will come to a M00 and you will check Macro Var #102.

- Macro #102 should be under .001 inch

- After you have run the alignment, you can just hit the 'reset' hard key

- We must now run laser calibration



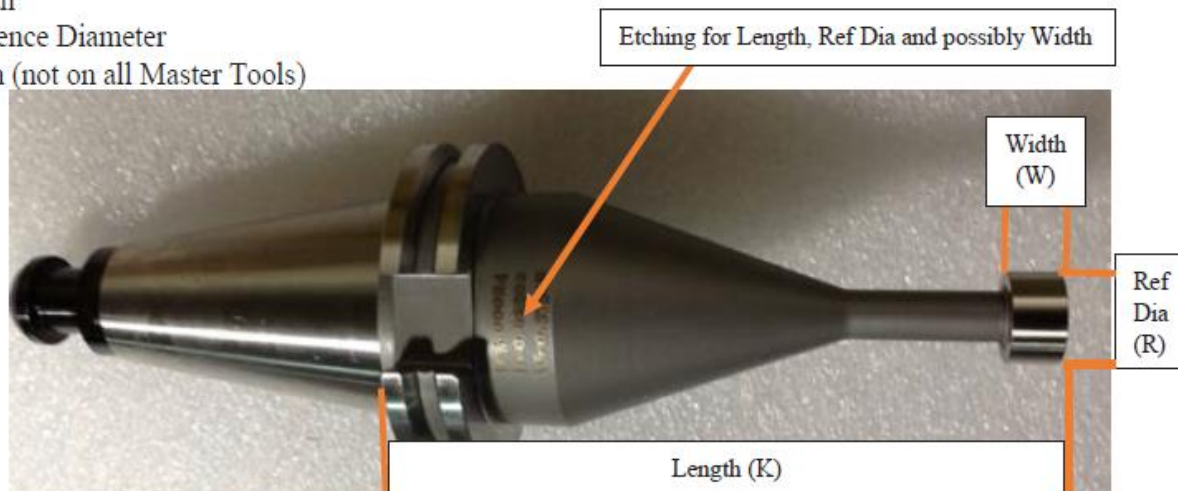
Calibration



- Double check that all values match your master tool exactly:
 - K (tool length)
 - R (reference tool diameter)
 - W (tool width)
 - Y (tool radius – .055 in)
- Run O8061
- After calibration Var #520-#531 are populated (This depends on the O9460 or O9760 settings program. The program number will depend on the age of Renishaw software.

- O9760 = TSM1(push in measurement)
or
- O9460 = TSM2(pull out measurement)) will be updated with the Laser Calibration values.
 - #120=520(BASE NUMBER)
- Do **NOT** overwrite the values in these macro variables with your own cycles.
- Now your laser is ready to use.

K= Length
R= Reference Diameter
W=Width (not on all Master Tools)



(LASER CALIBRATION)

```
G91G28Z0  
G90G80G49G40G0  
G65P9861B1.T1K5.00012R.62543Z.15  
G65P9861B1.T1K5.00012R.62543Z.15Y.272W.37436  
M30
```

***Some versions of software may have only one line in the calibration program.

(LASER CALIBRATION)

```
G91G28Z0  
G90G80G49G40G0  
G65P9861B1.T1K5.00012R.62543Z.15Y.272W.37436  
M30
```

Basic Troubleshooting



- If you have Red LED status
 - Check to see machine air is ON and air is coming out of laser heads
 - Check to see if Transmitting laser is hitting the Receiving head on center
- Amber LEDs
 - Re-align and Re-Calibrate laser
- Green / Amber rapidly flashing LEDs
 - Switch the set-up Switch 2 on the laser interface (slide 5) for 5 seconds and then switch back.
- Is the laser-beam a 'shotgun pattern' not a 'pin-point'
 - Clean laser heads
- LEDs on laser won't turn on
 - Contact PQI
 - Office: 763-249-7149
 - Toll Free: 800-772-0620