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Spindle Probe





This presentation will give you step by step instructions on how to setup and (re)calibrate your spindle probe.



N320(CALIBRATE PROBE X-Y) (SN= 201608090) (MM= 38.1081) (IN= 1.50031) (D=EXACT DIAMETER OF RING) (B=NOMINAL DIAMETER OF RUBY) (U=OPTIMISE CALIBRATION 1=YES 0=NO) G65P9901M102.V1.D1.50037B.07874U0. M30

At the end of O8025 if the XY calibration has a U value, you have standard <u>Supatouch</u>

N340 (PROBE OPTIMIZATION) (B=NOMINAL DIAMETER OF RUBY) (A=DIRECTION POSITION) G65P9901M110B.23622A1.

At the end of O8025 if the Optimization is a stand-alone cycle, you have <u>Supatouch.V2</u>

What Software do I have?

At the end of O8025 if the XY calibration uses G175, you have Inspection Plus / Rengage

(CALIBRATE PROBE X-Y) (SN= 201506093) (MM= 38.16655) (IN= 1.50262) (D=DIAMETER OF RING) (S=WORK OFFSET SET FOR CENTER POSITION) G175D1.5S6 M30

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<u>PQI SUGGESTS ALWAYS</u> CALIBRATING XY BEFORE Z

Create Z Work Offset



We must create an initial Z work offset in order to properly run probe length calibration.

- Using: •
 - Tool of known length
 - Feeler gauge / gauge block of known size
- Find a flat perpendicular surface to your Z axis ٠
- Be sure applicable axis is not skewed ٠
- Manually touch off your 'feeler gauge' so it has just enough ٠ contact between your tool and surface that your feeler gauge can move but not bounce around
 - *you can also just use a known Z location in your machine if you have one

CALIBRATING Z)

- Now that we have touched off the tool ٠ do not move the machine Z axis
- We now must create a Z work offset using our known ٠ values





• Example:

- Z machine location = -15.73489 inch
- Tool length = 5.5 inch
- Feeler gauge = 2 inch gauge block
- We need to select a work offset to set... don't overwrite important existing offset numbers!
- G54 Z location
- Add all 3 known numbers together
- (-15.73489)+(-5.5)+(-2.0)=(-23.23489)
 - *Depending on machine control type you may have to add the values differently, as to make your numbers always more negative
- Be sure to calculate in appropriate machine units
- Our new Z position in G54 is -23.23489 (inch) this is the number that the Z calibration cycle will use to calculate the new probe length
- Be sure you change the offset callout from the length calibration program to match this offset!
- Calibrate directly on your Z-zero known surface! (remove gage block or feeler gage when calibrating)

(CALIBRATE PROBE LENGTH) (T=TOOL OFFSET FOR PROBE) G59(KNOWN Z SURFACE WORK OFFSET) N170G170T1 M30

Inspection Plus / Rengage

Supatouch

N330 (CALIBRATE PROBE LENGTH) (B=NOMINAL DIAMETER OF RUBY) (T=TOOL OFFSET FOR KNOWN TOOL) (Z=REFERANCE SURFACE POSITION) G54 (KNOWN Z WORK OFFSET) G65P9901M104Z0.B.07874 M30

Stylus Runout





- Any time you **break** or **replace** a stylus, you must redo your runout.
- Some ways of achieving this are with a dial indicator or a tool pre-setter.
 - Parlec, Zoller, Sperroni, etc.
- Per Renishaw Specification keep the runout below +/- .010 mm (.0004 in)
 - Ideally keep it below +/- .0025 mm (.0001 in)
 - The closer to zero the better





- The 2 screw holes nearest the tool holder are pointed set screws and hold the Probe into the Tool Holder, these must remain tight.
 - (Figure 2)
- The 4 screw holes nearest the Probe body are your XY Runout adjustment screws. (they may be ON the probe body)
 - (Figure 3)
- Rotate and make small adjustment to (4) adjustment screws every 180°
 - similar like how you would use a 'Four Jaw Chuck'
- When you get an acceptable number, make sure **all** screws are tight
 - no need to overtighten

<u>Supatouch</u> XY Calibration



- This cycle is in program O8025 line N320
 - Or MDI Template Programs
- Ensure the D (exact diameter of feature) and B (nominal diameter of Stylus ruby) values are correct and in machine units
- Manually drive the spindle probe roughly centered into your calibration ring or feature, making sure the ruby is fully inside
- Run the cycle
- If your probe macro variables start at 540 (standard)
 - Stylus X runout is in 542
 - Stylus Y runout is in 543
 - All Supatouch calibration data is in Metric

N320 (CALIBRATE PROBE X-Y) (SN= 201608090) (MM= 38.1081) (IN= 1.50031) (D=EXACT DIAMETER OF RING) (B=NOMINAL DIAMETER OF RUBY) G65P9901M102.V1.D1.50037B.07874 M30



<u>Supatouch</u> <u>Z Calibration</u>



- This cycle is in program O8025 line N330
 - Or MDI Template Programs
- Ensure that the T (Tool number if not using H1 style tool offsets) and B (nominal diameter of Stylus ruby) values are correct and in machine units
- Manually drive the probe about half an inch above the point you touched off your tool
 - be sure applicable axis are at not at a skewed angle
- Don't forget to match the programs work offset callout to the one you set
- Run the cycle
 - This will update probe length in 3 spots
 - Tool data
 - Tool offset (T number in program)
 - Macro variable for probe calibration

N330 (CALIBRATE PROBE LENGTH) (B=NOMINAL DIAMETER OF RUBY) (T=TOOL OFFSET FOR KNOWN TOOL) (Z=REFERANCE SURFACE POSITION) G54 (KNOWN Z WORK OFFSET) G65P9901M104Z0.B.07874 M30



*If Z moves positive and alarms when cycle starts,

the active Fanuc Offset Length may be longer than actual length. Zero out offset and run again*

Standard Supatouch Probe Optimization(not required)



- Optimization only suggested to be run:
 - During initial probe setup
 - After drastically changing stylus length / ruby size
 - After probe body crash
 - After major machine service
- To reoptimize the spindle probe, delete Macro Variable #545 (assuming standard base number for calibration data)
 - You can check where the base number is by looking in O9424
- If you delete Variable #545, you MUST calibrate XY then Z on the probe
 - It will now force the Optimization cycle
 - The XY cycle will touch 40 times in X
 - Then the Z cycle will do 40 touches during Z Calibration
 - It does this at different feed rates to tell the probe the optimum feeds / speeds to move and take measurements in XYZ

09424(REN*SETTINGS) (PQI-MAKINO 8/17/2017) #111=540(BASE*NO) #100-[DPM[6000 2]]

Supatouch.V2 Probe Optimization(not required)



- This stand-alone cycle is in program O8025 line N340 in the newest Supatouch Software
 - Or MDI Template Programs
- Optimization only suggested to be run:
 - During initial probe setup
 - After drastically changing stylus length / ruby size
 - After probe body crash
 - After major machine service
 - If you run probe optimization, you MUST calibrate XY and Z on the probe
- You can change the 'A' value to change what direction the probe will take its point in either X or Y
 - Start about half an inch above the edge of a 90° corner
 - You do not need to have a calibrated probe to run this cycle
- The XY cycle will touch 40 times, the direction is specified by the 'A' value
- Then the Z cycle will do 40 touches in Z
 - It does this at different feed rates to tell the probe the optimum feeds / speeds to move and take measurements in XYZ



Supatouch.V2 Probe Optimization(Continued)



- When prompted check #100 #102
 - While in "input mode" you may manually lower the values below if you want to slow down probe movement speeds in the specified axis, however, <u>do not</u> increase the predetermined values.
 - If you are satisfied with the pre-determined values, hit cycle start twice then fully recalibrate your probe.
 - MF#100 = Measure Feedrate
 - Maximum permissible measuring feedrate (machine units)
 - If this number is set below your current software's minimal single touch speed (about 30-40 inch per min), then your probe measurements will default to 2 touch probing. This is Okay!
 - ZPF#101 = Z position Feedrate
 - Maximum permissible Z-axis positioning feedrate (machine units)
 - XYPF#102 = XY Position Feedrate
 - Maximum permissible X or Y-axis positioning feedrate (machine units)
- When you are satisfied with the values in #100-#102, hit cycle-start. Then
 you will be prompted to calibrate XY and Z on the probe, hit cycle-start to
 end the optimization program.
- At this point you MUST calibrate XY and Z to be able to use your spindle probe.

Numbe	Value	Memo	^			
100	50.0000		Ξ			
101	150.0000					
102	250.0000					
Operato	Operator Message					
MF#100*ZPF#101*XYPF#102*CYC*START*T O*SAVE						
		Close				
112	0.0000					

Inspection Plus / Rengage XY Calibration



- This cycle is at the end of program O8025
- Ensure that the D (exact diameter of feature) and S (work offset for center position) values are correct and in machine units
 - S value will update an XY position for center of the ring / feature, to your specified offset
- Manually drive the spindle probe roughly centered into your calibration ring or feature, making sure the ruby is fully inside
- Run the cycle

(CALIBRATE PROBE X-Y) (SN= 201506093) (MM= 38.16655) (IN= 1.50262) (D=DIAMETER OF RING) (S=WORK OFFSET SET FOR CENTER POSITION) G175D1.5S6 M30



Inspection Plus / Rengage Z Calibration



- This cycle is at the end of program O8025
- Ensure that the T (Tool number of probe) value is correct
- Manually drive the probe about half an inch above the point you touched off your tool
 - be sure applicable axis are at a skewed angle
- Don't forget to match the programs work offset callout to the one you set
- Run the cycle
 - This will update probe length in 3 spots
 - Tool data
 - Tool offset (T number in program)
 - Macro variable for probe calibration

(CALIBRATE PROBE LENGTH) (T=TOOL OFFSET FOR PROBE) G59(KNOWN Z SURFACE WORK OFFSET) N170G170T1 M30



*If Z moves positive and alarms when cycle starts,

the active Fanuc Offset Length may be longer than actual length. Zero out offset and run again*

<u>Batteries</u>





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- DO NOT buy cheap batteries, it will affect probe potential runtime.
 - Consult your small Renishaw (probe specific) manual for best batteries to use.
- After changing the battery it is **not** required to recalibrate the probe.
 - All calibration information is stored in the machine control
 - After the new batteries are in the probe **don't** deflect the stylus. Let the LEDs complete their light cycle.
 - This short light cycle is the settings inside the probe.
 - The lights will Blink Green at the end if you put acceptable batteries in.



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Renishaw suggested batteries



× 2

AA 1.2 V

OMP40 Ecocel: TC-4511. TC-4521, TC-4531 Saft: LS 14250 C, LS 14250 Sonnenschein: SL-750 TL-5101 Xeno: XL-050F



Dubilier: SB-AA02 Maxell: ER3S Sanyo: CR 14250 SE Sonnenschein: SL-350, SL-550 Tadiran: TL-4902 TL-5902, TL-2150, Varta: CR 1/2 AA

RMP60

× 2 AA 1.5 V

Saft:

Xeno:

Battery types					
Alkaline x2	Lithium Thionyl Chloride x2		Nickel Cadmium/Nickel Metal Hydride x2		
AA 1.5 V	Saft: Sonnenschein: Tadiran: Xeno:	LS 14500 SL-760/S TL-5903/S, TL-2100/S XL-060F	AA 1.2 V		
RMP600					
Battery types					
Alkaline	Lithium-thionyl chloride		Nickel Cadmium / Nickel Metal Hydride		

× 2

TL-5903/S, TL-2100/S

LS 14500

XL-060F

Tadiran: SL-760/S

OMP400 / RMP400

Battery type: 1/2 AA Lithium Thionyl Chloride (3.6 V) x 2







1.8 Nm - 2.2 Nm 1.3 lbf.ft - 1.6 lbf.ft) M-5000-370

- To replace a stylus, simply, unscrew the old / broken stylus (using the Renishaw tool, paperclip, etc.) then, install the new one.
 - These styli have fine threads and probes have sensitive triggers so do not overtighten
- With every stylus change, you must:
 - Redo your Runout
 - Redo XY & Z calibration
- *PQI supplies a variety of different styli



<u>Basic</u> Troubleshooting



- Probe will not turn on / blinking green-blue when on
 - Change batteries
- Probe beginning to record odd values
 - Recalibrate probe XY & Z
- Probe not repeatable
 - Ensure stylus is not loose
 - Recalibrate probe XY & Z
- Probe blinking Red when not triggered
 - Restart probe
 - Contact PQI
 - Office: 763-249-7149
 - Toll Free: 800-772-0620



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