

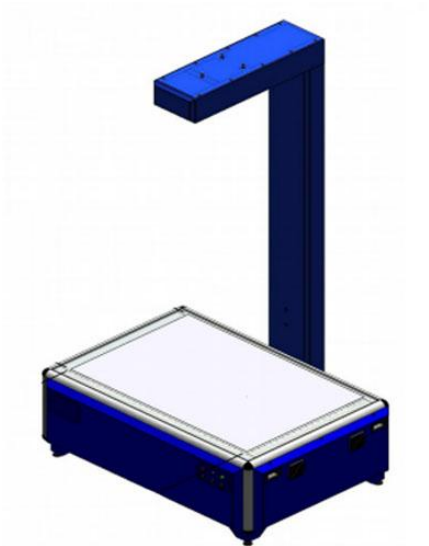


PRODUCTIVITY
QUALITY INC

Planar Calibration Manual

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Backlight Calibration - Monthly

Backlight Calibration:

Backlight calibration should be performed when the light levels from the table have changed, or when the ambient light level has changed dramatically. e.g. a light in the table has broken, dirt has become ground into a scratch in the glass surface.

****Fluorescent Tube Machines**** The ambient lighting calibration should only be performed after the tables lights output has stabilized, by leaving them on for at least 15 minutes. With LED lights this stabilization happens in milliseconds, so there is no need to wait.

Led Lighting

- Remove all parts and debris from glass
 - Any parts or debris left on the glass during this process will become a problem for any future measurements.
 - **If your machine has a Surfscan attachment, turn it off using the front panel button before performing the Backlight Calibration.**
- Go to Calibrate>Backlight
 - The system will now take two pictures to assess table brightness and ambient light levels
- Once complete the system will provide you with a prompt saying, "Backlight Calibration Complete". You may now move onto the next step.

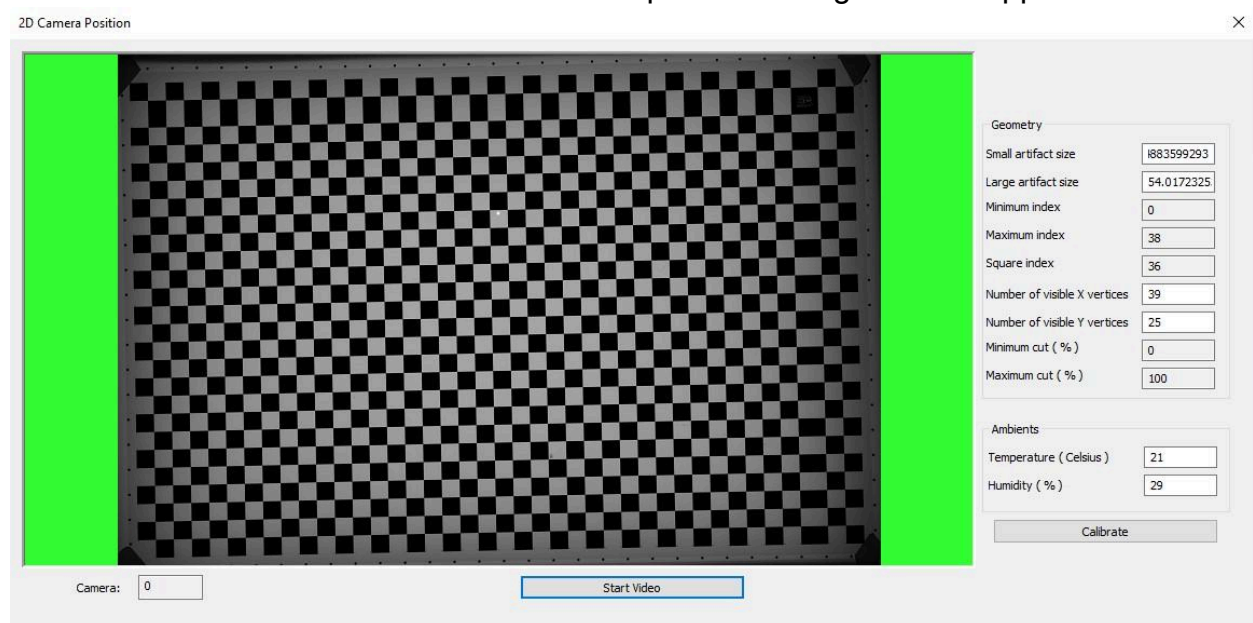
Calibrate	Support	Window	Help
Field of View			
Calculate Optimal Bandwidth			
Auto Calibrate Exposure			
White Balance			
Camera Tilt			
Backlight			
Camera Position			
Glass Overlay			
Table Dot Markers			
Scale			
Scale and Flatness			
Multi-Camera Trim			
Dot Laser			
Line Laser			>
3D			>
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Camera Position

Ensure Planar machine is fully assembled in a suitable operating environment, with all panels fitted before attempting calibration including the top horizontal mast cover.

This calibration should only be performed yearly as a part of the full system calibration, when the machine is moved, or as instructed by a PQI or InspeCVision representative.

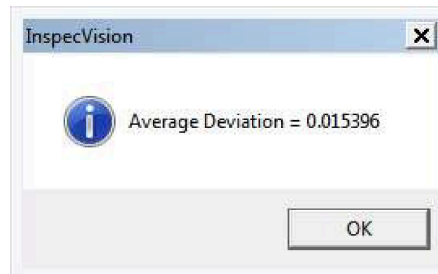
1. **Before starting this calibration**, create a backup of the existing calibration by go to Help >Export Setting>System Backup. Save file to known location and label as “as found”.
2. Clean glass surface with a suitable cleaning agent. Locate the calibration sheet. Carefully place it onto the table. Ensure it is sitting level with the label facing up and oriented at the top right side of the table. Handle the sheet with care as any damage or creases in the sheet will cause errors and inaccuracies in the calibration.
3. Before continuing with the camera position calibration, ensure that there are no lights above the table. Any reflections from lights that can be seen in the field of view can cause the calibration to fail.
4. Carefully use your hands to flatten the sheet to the table and remove any air in between the two surfaces. If needed, fix the sheet down with **low tack** tape. Next, go to Calibration>Camera Position. The camera position dialog will then appear.



- When ready click “Calibrate”. After a few moments, the software will process the image and the following message box below should appear. Click “OK”.



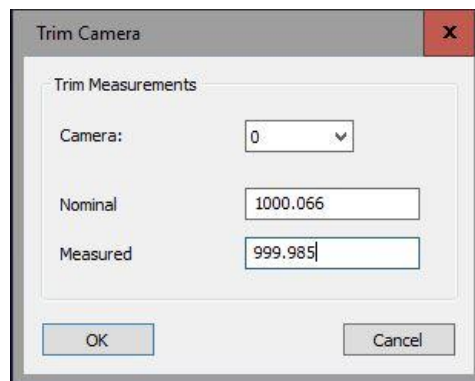
- If the calibration process fails, it is likely that the camera position sheet needs to be adjusted. The camera position dialog box will show which intersections the system was able to find, and which ones are missing. Adjust the sheet so the system can find the missing intersections.
- After clicking “OK” the software calculates an approximate calibration accuracy. This is shown as an “Average deviation”. This number depends on the machine model you are calibrating. The number should be below the accuracy of your machine. The machine accuracy is located on the front of your machine with the model number. For example, a P150.35 has a 0.035mm accuracy while a P70.20 has a 0.02mm accuracy. When you receive this message the camera position calibration is complete.



- If the average deviation is above the accuracy of your machine, repeat step 3 of flattening the sheet and recalibrate until the result is acceptable.
- Carefully remove the calibration sheet and store in a safe place. Preferably rolled up with the label on the outside and in a protective tube. **Damaged sheets will affect calibration accuracy.**

Scale Calibration - Monthly

1. Turn on the Planar machine, clean the table and place the supplied Scale plate onto the surface. **The Scale plate must be at ambient temperature.**
2. You must be in metric with 3 decimal places. In the options menu.
3. Open the PLR file for the Scale plate. This is normally located in: C:\PQI Service\Support. It may also be in a PQI Service folder on the desktop.
4. Place the part in the center of the glass with the label facing upward.
5. Select AutoInspect.
6. After the inspection is complete, open the report manager and go to the Inspection Report. The deviation value should be less than the quoted accuracy of the system. If the measured value is within tolerance, then scale calibration is not required. If it is out of tolerance, then continue to the following steps.
7. Go to Calibration>Scale. A dialog box will appear. The fields will be automatically populated with the most recent software. In old software, the values must be manually entered (based on the report values). Click "OK".



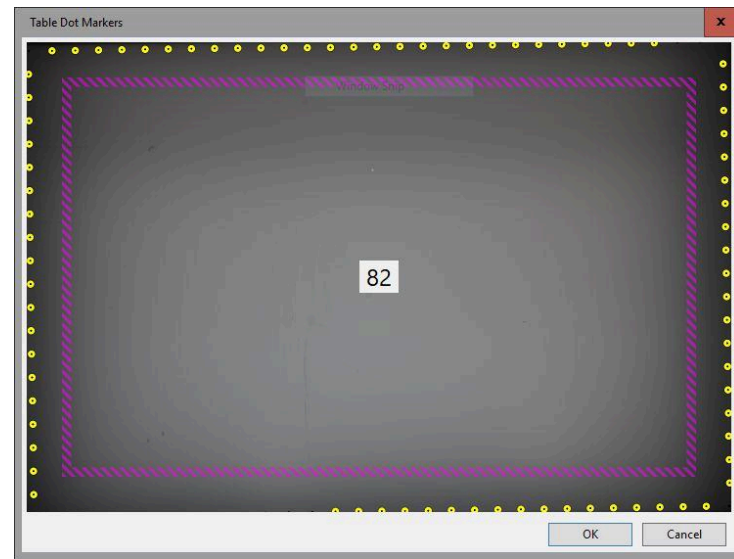
8. A message will then appear indicating a successful scale calibration. Click "OK".
9. Repeat steps 5-8 until the machine is within specifications.

Table Dot Markers

This calibration should only be performed yearly as a part of the full system calibration, when the machine is moved, or as instructed by a PQI or InspecVision representative.

Process:

- Clear all parts and debris from glass
- Go to Calibration>Table Dot Markers
- Once complete you should see an image like this. →
- You should be able to see the dots on all 4 edges of your table. The system should be able to locate 75% or more of the dots.
- If you do not see the dots on all 4 sides. Then the camera may need to be adjusted. Contact PQI for assistance.
- **Do not perform any camera adjustments without the direction of an InspecVision or PQI representative.**



Planar Accuracy Verification: ISO 10360-4

Accuracy Acceptance Test Procedure

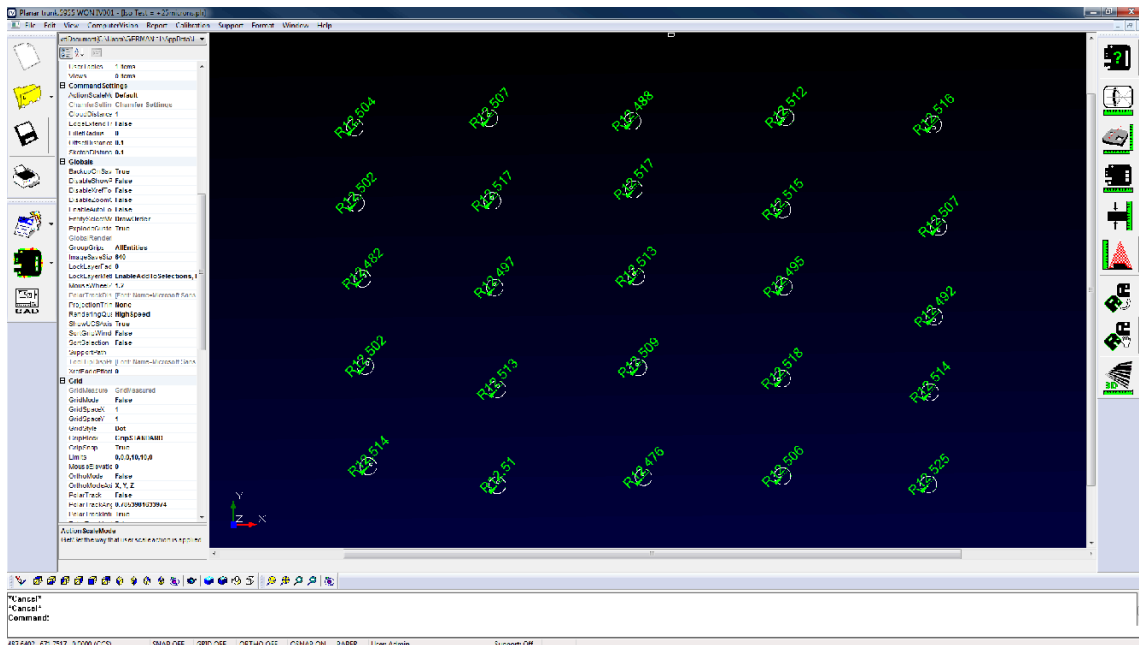
1. Ensure that the equipment has been fully and securely installed and in a suitable environment with no strong light sources or windows. The ambient light level should be soft, even and consistent throughout the test procedure.
2. Fully calibrate the Planar machine as outlined Above. The test is only valid after a complete calibration has been carried out by a Productivity Quality engineer, certified representative or persons who have been trained and certified by Productivity Quality or approved representative.
3. Clean the glass table surface with a suitable cleaning agent to ensure that there are no traces of grease or dirt that could affect the measurement results. Carefully clean the ISO Disc to ensure that there is no residual film or debris that could also affect the measurement results. Take care of the outer edges of the disc which is what will be measured by the machine. Do not use any cleaning agents on the disc that can damage it.
4. The measurements can begin. First set up the component properties of the ISO disc. The material type is Cast Iron and the thickness is approximately 3mm (this may vary, check the thickness on the lab measured report for the disk). Go to Support Mode and choose Record Support Mode Data. To take the measurements use the ComputerVision>Reposition function and then press Measure Shape each time.

Fig 152: Enter the component properties as shown.

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1	6	11	16	21
2	7	12	17	22
3	8	13	18	23
4	9	14	19	24
5	10	15	20	25

- Take measurements of the disc in a grid pattern as shown below. Beginning at the top left position and going down. When you reach the bottom of the glass, move over a column and start at the top again.
- There should be a 5 X 5 grid of measurements evenly distributed across the table as illustrated below. When finished, click OK to return to the main window. Then type “isodims” into the command window. This will fit circles to the measurements, add radius dimensions and save the results to the clipboard, making it easier to paste the results into a spreadsheet.



- The positions of the ISO disc on the table should be as above, with an even spacing between measurements.
- You can then paste these values into a spreadsheet to verify that the values are within specifications. A sample spreadsheet is located in C:\PQI Service\Support or on the desktop in a Support folder. You can paste the values directly in the “Results” box provided. You will need to manually enter the values for the ISO disk nominal measurement. This would be located on the lab measured report for the disk. The value in the spreadsheet needs to be the radius of the disk, your lab report may be reported as a

diameter. Then enter the quoted accuracy of your machine. Verify that the measurements of the ISO disk are within the accuracy of your machine. The spreadsheet should help quickly and easily verify those values.

Planar Accuracy Verification				
*User can enter/modify the Nominal Radius and Machine Accuracy values in cells: G5,G6 *Paste results from the planar test in the results box in cells: J5:N9				
Nominal Radius of ISO Disc (on Certificate) =		12.502		
Machine accuracy (in mm) =		0.020		
Number of results within high accuracy value =		25		
Percentage of table in within high accuracy value =		100%		
Positions of disc on the Planar table				
12.509	12.511	12.483	12.509	12.514
12.501	12.506	12.501	12.507	12.510
12.485	12.490	12.507	12.485	12.488
12.504	12.510	12.501	12.506	12.502
12.510	12.500	12.483	12.510	12.507
Table centre - high accuracy				
Max measurement value	12.51			
Min measurement value	12.485			
Average radius	12.501			
Standard Deviation	0.009			
Range/2 of measurements	0.0125			
Table Outer - Low Accuracy				
Max measurement value	12.514			
Min measurement value	12.483			
Average radius	12.502			
Standard Deviation	0.011			
Range/2 of measurements	0.0155			
Overall - Both Accuracy				
Max measurement value	12.514			
Min measurement value	12.483			
Average radius	12.502			
Standard Deviation	0.010			
Range/2 of measurements	0.0155			
Results				
12.509	12.511	12.483	12.509	12.514
12.501	12.506	12.501	12.507	12.510
12.485	12.490	12.507	12.485	12.488
12.504	12.510	12.501	12.506	12.502
12.510	12.500	12.483	12.510	12.507

- Go to Support Mode > Export Support Data > Advanced > Choose; Last 2D Measurement, Lighting Calibration, and camera position. Save this PSM file and the PLR file for future reference.

Obtaining Test Results

The machine shall be deemed to have passed the test under the following conditions:

- The radii measurements across most of the table have been measured within $\pm X \mu\text{m}$ (“X” Being the stated accuracy of the Planar machine being tested) of the 12.5mm nominal radius of the ISO Disc and no more than $\pm 2X \mu\text{m}$ at the outer edges of the table.
- To finish calibration, create another backup. By going to Help>Export Settings> System Backup. Label as finished/final.