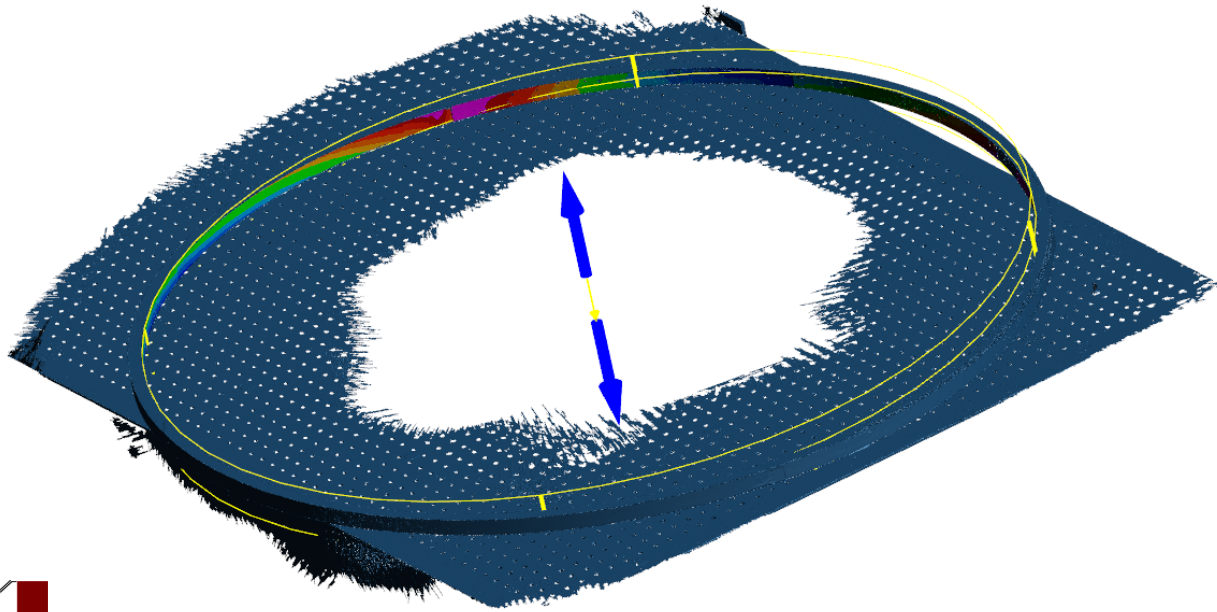
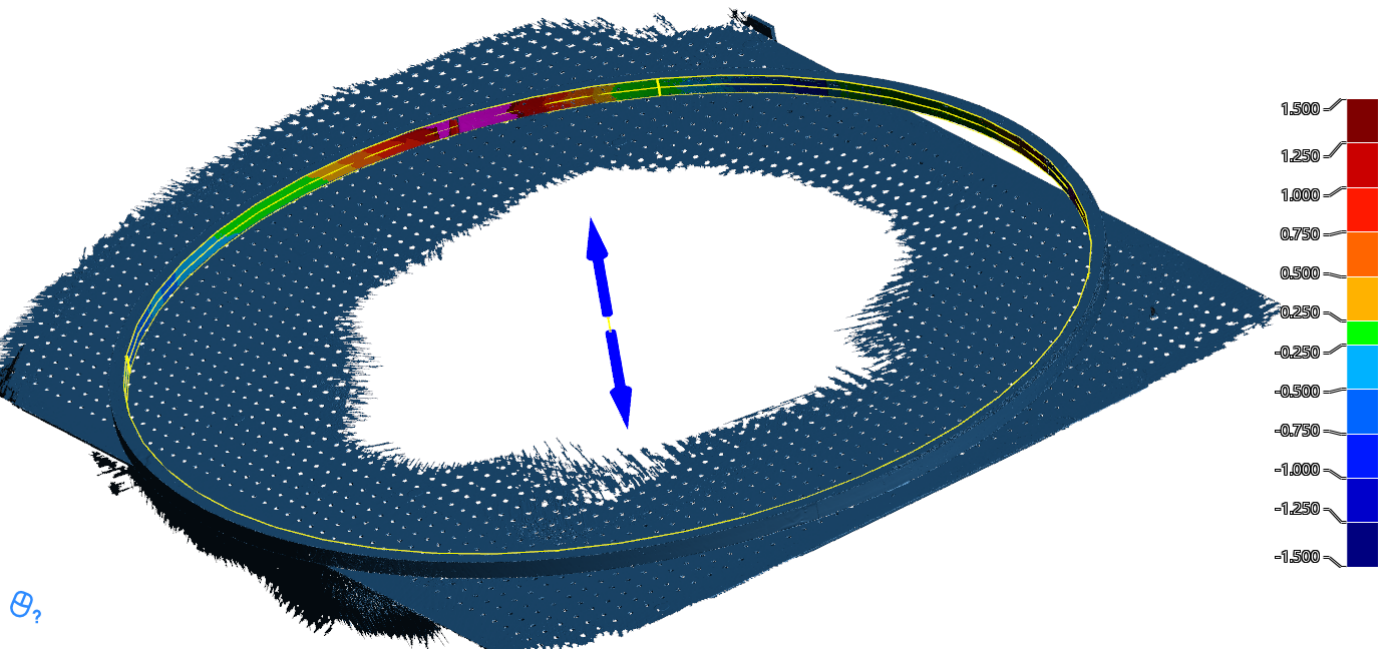


# Metrology for pfrich end rings

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- ⬠ Laser scanned using Metrascan C-Track
- ⬠ Layed flat on optical table
- ⬠ Radial measurements were constrained to be axial
- ⬠ End ring 1 was bonded first, end ring 2 second



Above: best fit cylinder without constraint

Left: best fit cylinder constrained to optical table normal

**Calculation filter parameters**

Outlier filter: Percentage  
Percentage (%): 5.0

**Constraints**

Axis  
 Orientation: Line 1  
 Diameter (mm): 1260.210

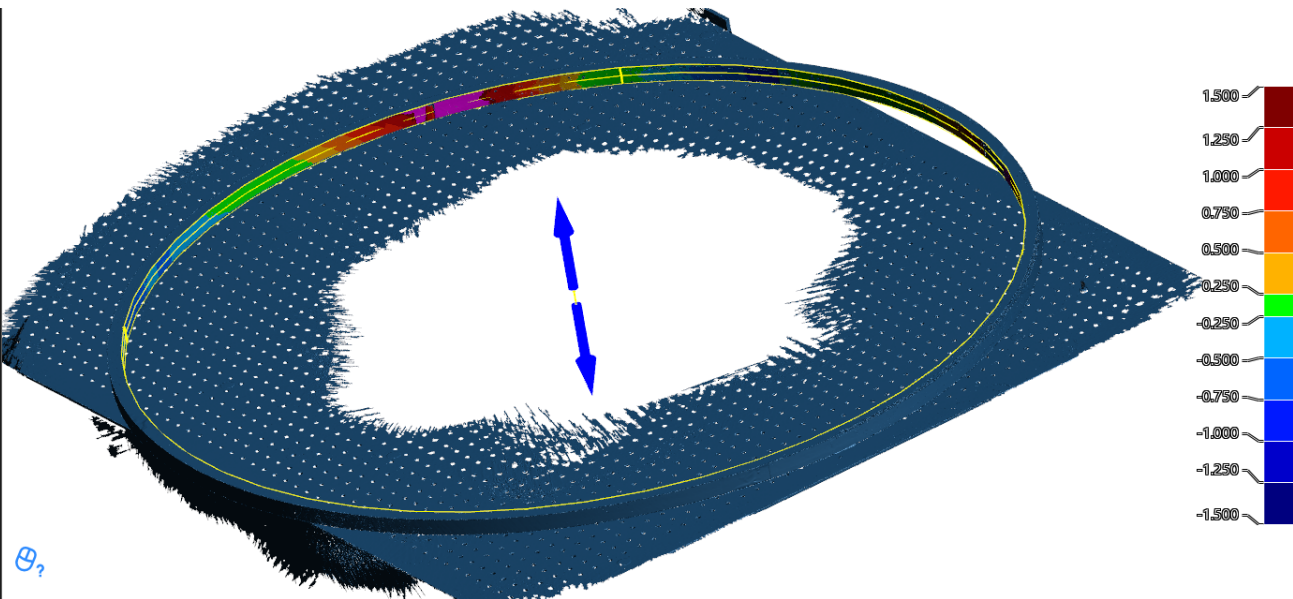
**Parameters**

**Entity details**

Diameter (mm): 1,260.210  
Radius (mm): 630.105  
Center (mm): (-153.452, -257.472, 2,910.546)  
Axis: (0.004, -0.990, -0.141)  
Standard deviation (mm): 0.590  
Min./Max. deviation (mm): 2.646

**Error distribution**

OK Cancel



End Ring 1: 630.105 mm  
Std. Dev. 0.590 mm  
**0.167 mm off nominal**

**Calculation filter parameters**

Outlier filter: Percentage  
Percentage (%): 5.0

**Constraints**

Axis  
 Orientation: Line 1  
 Diameter (mm): 1259.712

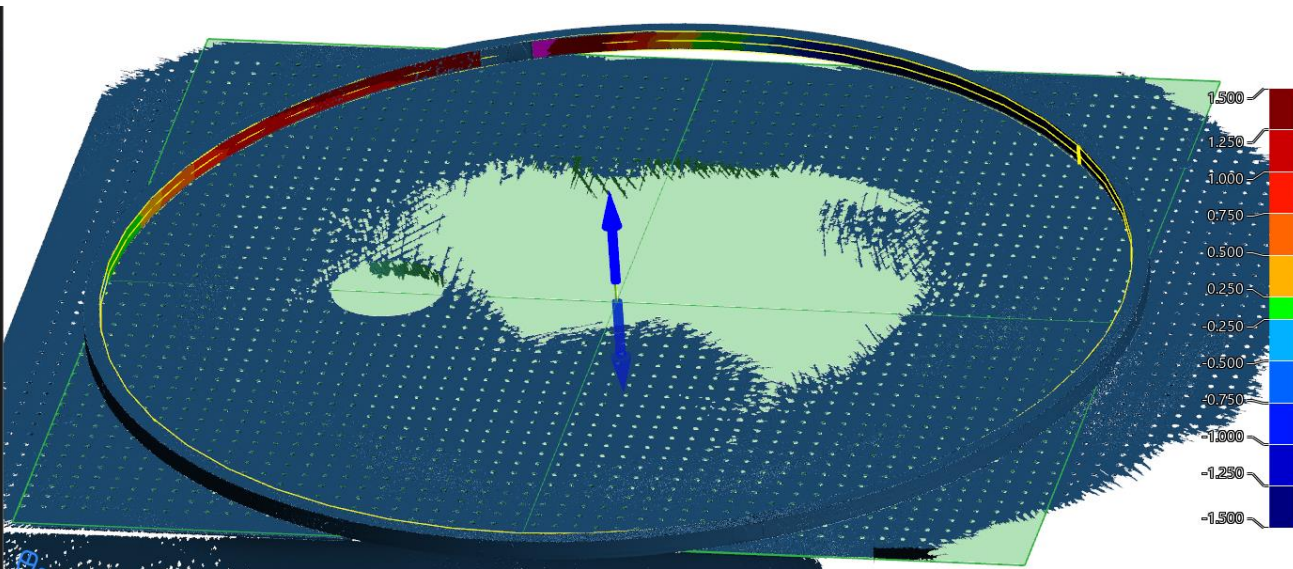
**Parameters**

**Entity details**

Diameter (mm): 1,259.712  
Radius (mm): 629.856  
Center (mm): (-81.674, 193.043, 2,975.660)  
Axis: (0.014, -0.994, -0.104)  
Standard deviation (mm): 1.171  
Min./Max. deviation (mm): 3.905

**Error distribution**

OK Cancel



End Ring 2: 629.856 mm  
Std. Dev. 1.171 mm  
**0.416 mm off nominal**



Measurement method

Calculation filter parameters

Outlier filter: Percentage  
Percentage (%): 5.0

Constraints

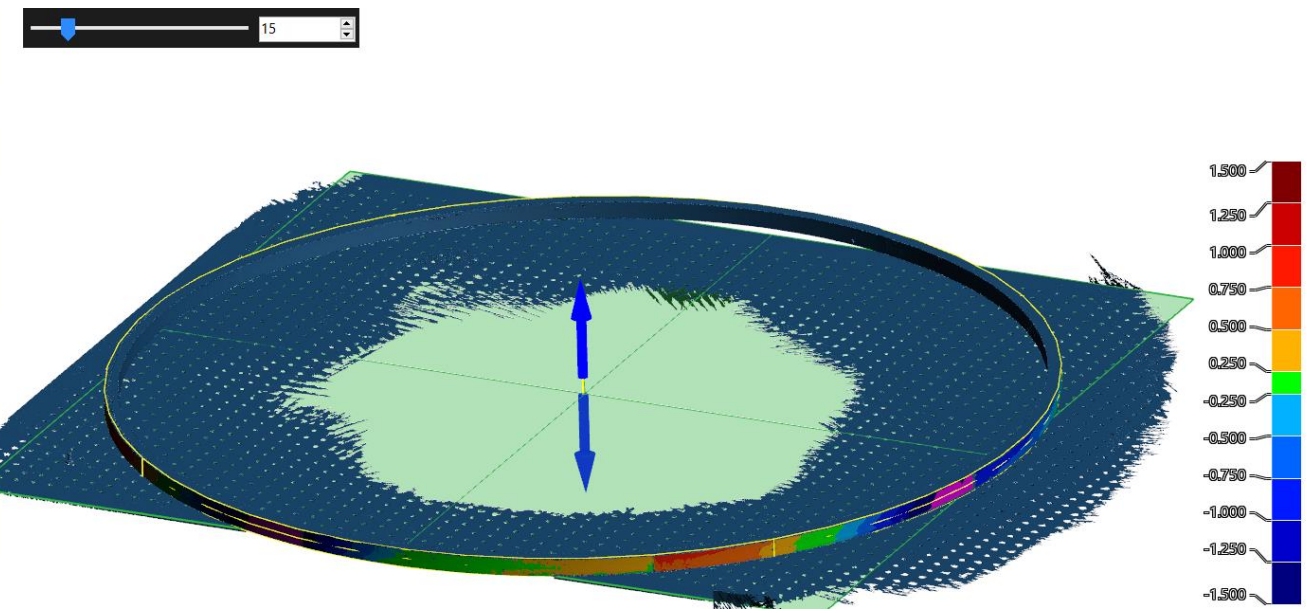
Axis:   
Orientation: Line 1  
Diameter (mm): 1299.484

Parameters

Entity details

Diameter (mm): 1,299.484  
Radius (mm): 649.742  
Center (mm): (-153.061, -257.518, 2,910.750)  
Axis: (0.004, -0.990, -0.141)  
Standard deviation (mm): 0.648  
Min/Max. deviation (mm): 2.885

Error distribution



End Ring 1: 649.742 mm  
Std. Dev. 0.648 mm  
**0.420 mm off nominal**

Calculation filter parameters

Outlier filter: Percentage  
Percentage (%): 5.0

Constraints

Axis:   
Orientation: Line 1  
Diameter (mm): 1299.774

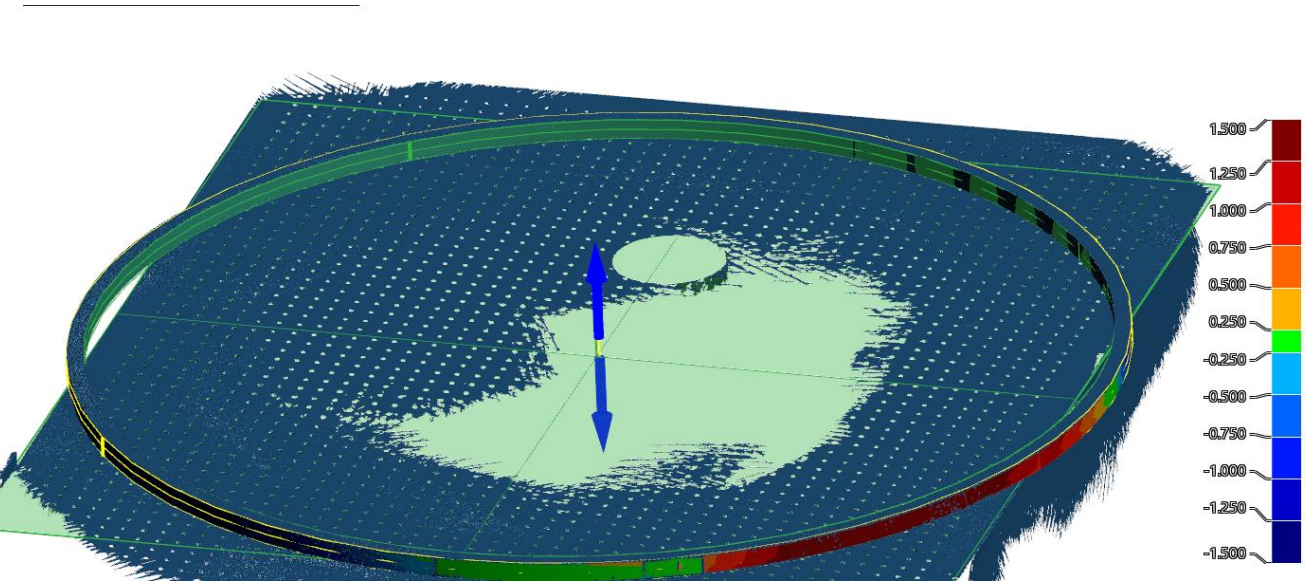
Parameters

Entity details

Diameter (mm): 1,299.774  
Radius (mm): 649.887  
Center (mm): (-81.833, 192.868, 2,975.825)  
Axis: (0.014, -0.994, -0.104)  
Standard deviation (mm): 1.272  
Min/Max. deviation (mm): 4.220

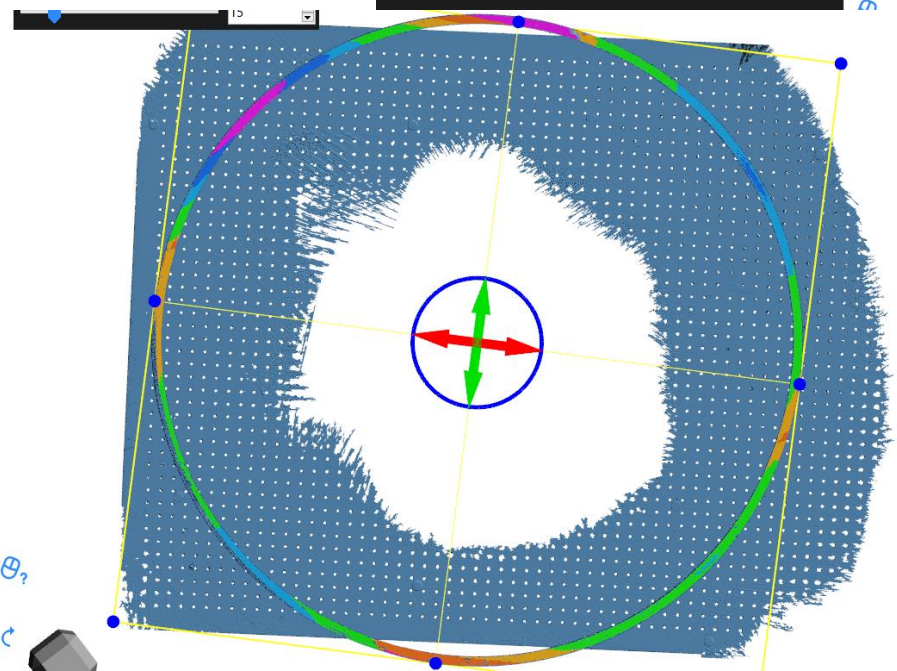
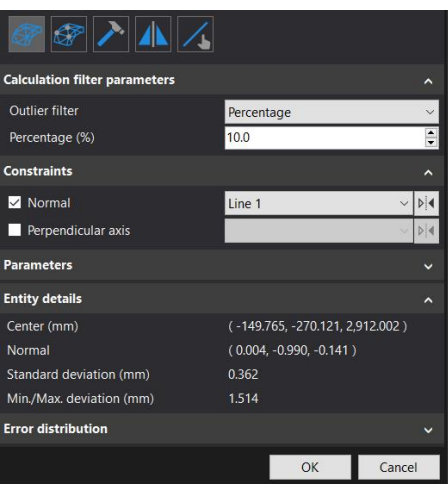
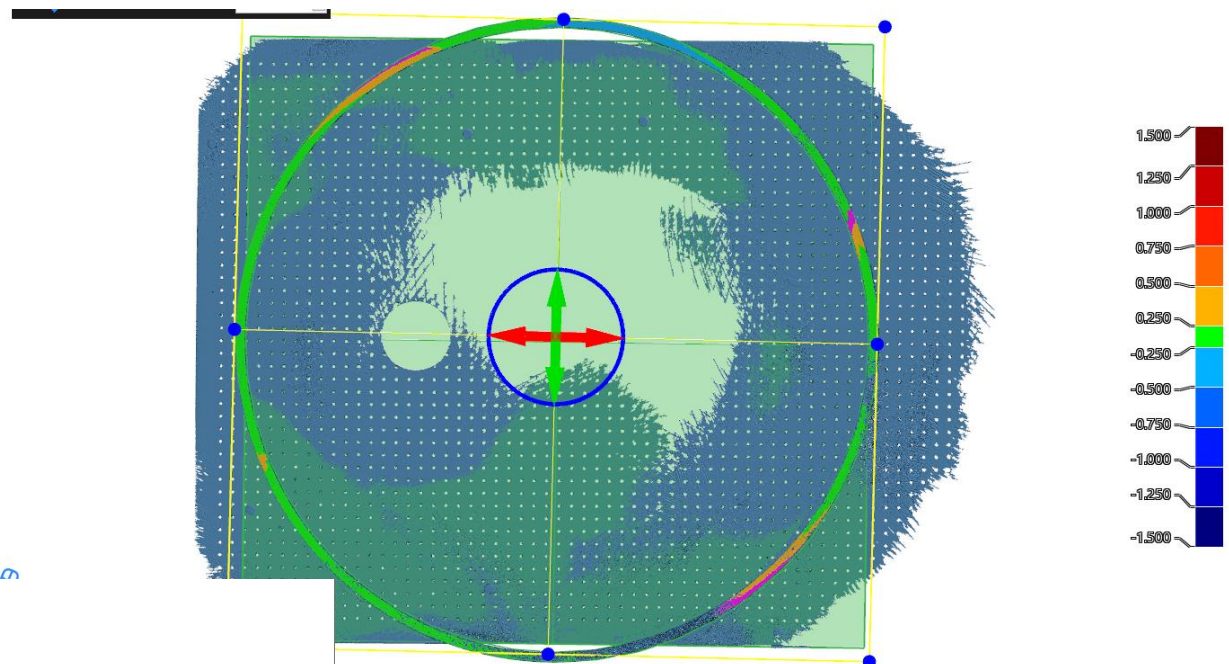
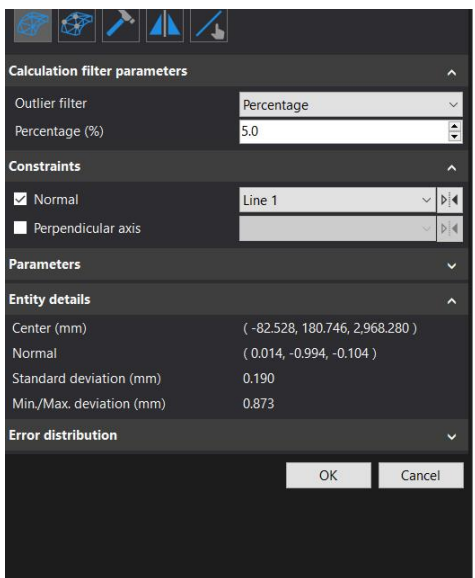
Error distribution

OK Cancel



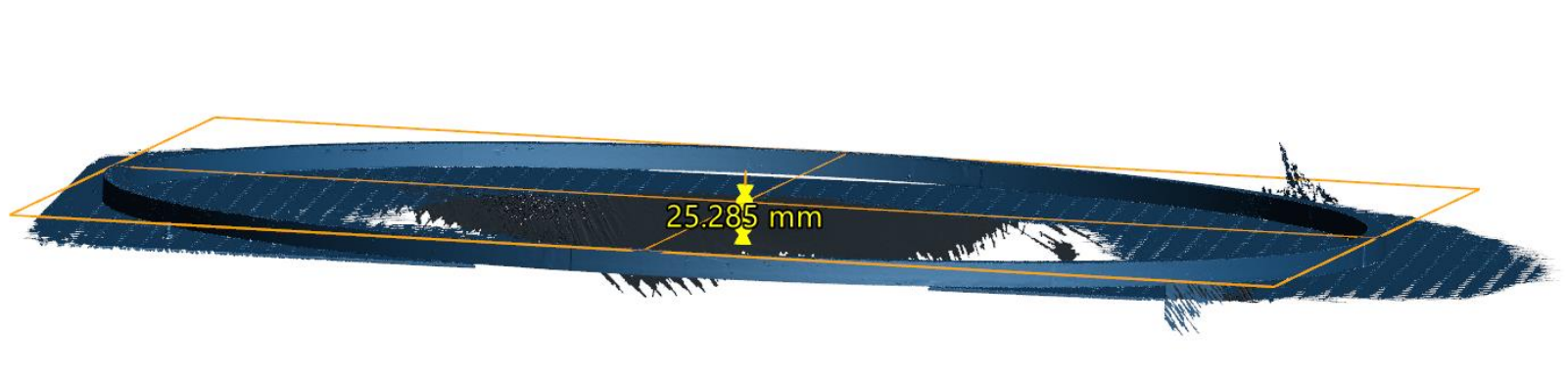
End Ring 2: 649.887 mm  
Std. Dev. 1.272 mm  
**0.565 mm off nominal**

Flatness was measured by comparing the best fit plane of the surface (constrained by optical table normal) to the measure mesh of the surface

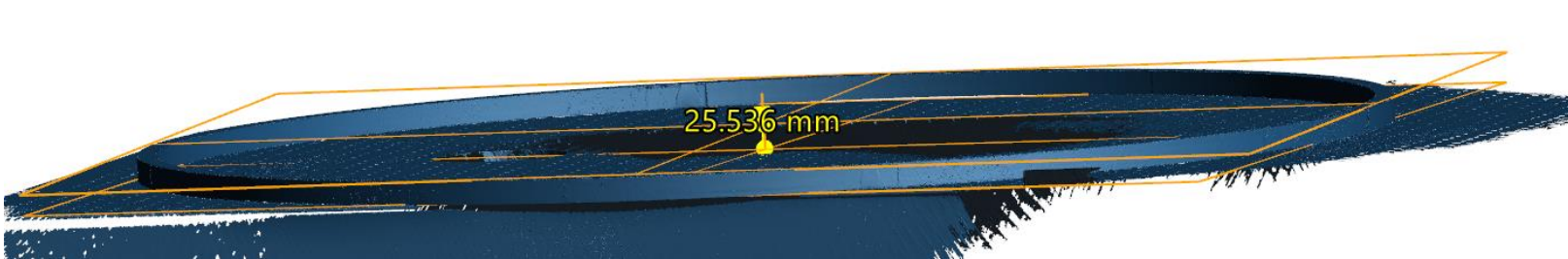




Measured thickness by finding the distance between top surface plane and optical table plane



End Ring 1: 25.285 mm  
**0.115 mm off nominal**



End Ring 2: 25.536  
**0.136 mm off nominal**

Circle - Circle 121

Name: Circle 121

Measurement method: [Icons]

Construction method: Average point selection

Construction: [Icons]

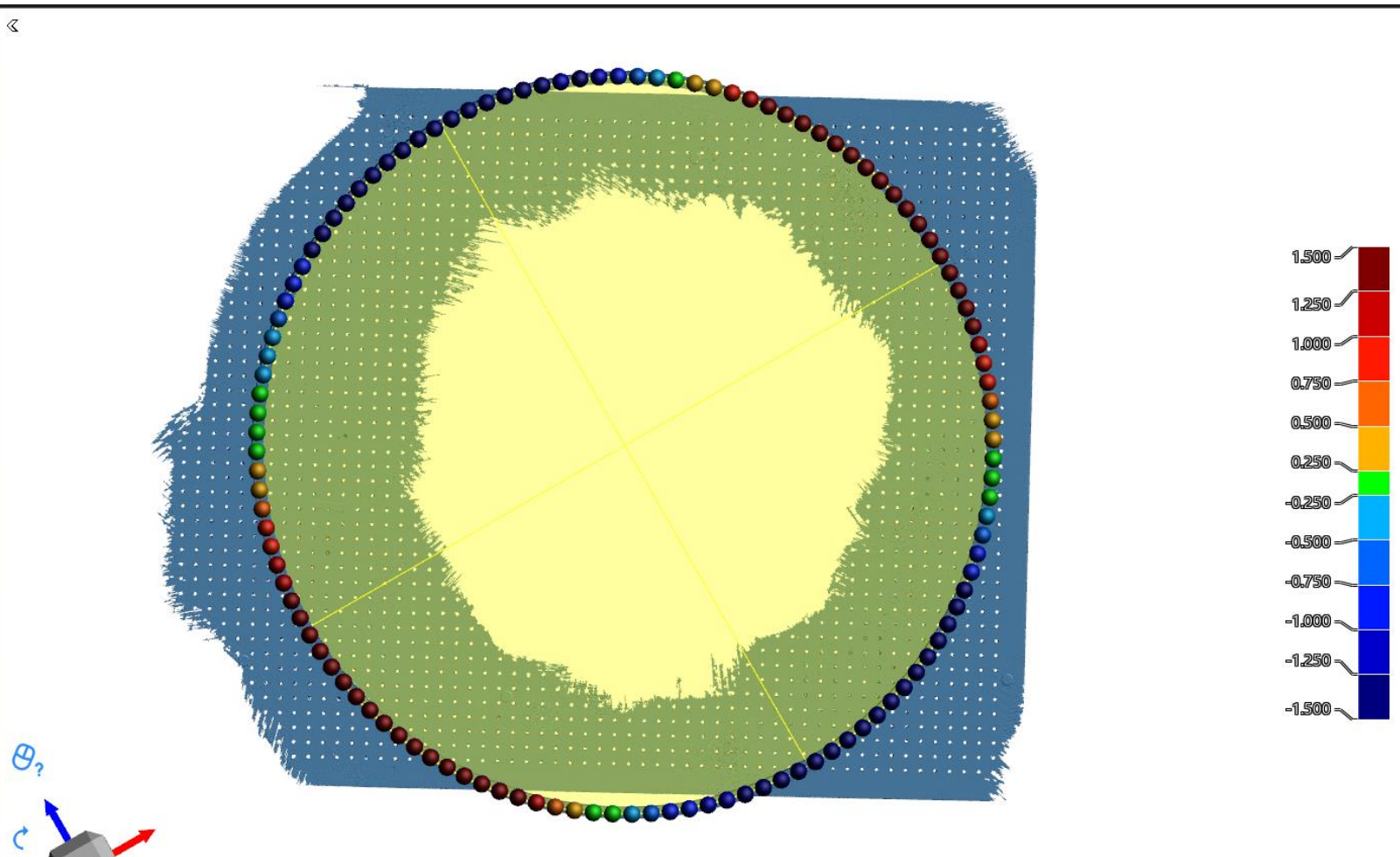
Selection

#	X	Y	Z	Dev.
116	-369.283	235.676	2403.070	-0.449
117	-397.928	233.481	2420.102	-0.068
118	-425.927	231.154	2438.494	0.068
119	-452.751	228.687	2458.372	0.347
120	-478.653	226.076	2479.760	0.633

Entity details

Diameter (mm): 1,283.445  
Radius (mm): 641.722  
Center (mm): (-60.056, 181.464, 2,963.270)  
Normal: (0.014, -0.994, -0.104)  
Standard deviation (mm): 1.397  
Min./Max. deviation (mm): 4.261

Error distribution



- Initial insert location measurement of Ring 2 confirms the lack of circularity evident in previous measurements
- Still looking for a good way to analyze the location of insert holes compared to specs