Using the Virtual Reference Sphere Procedure

When calibrating a stylus tip in Calypso software it is recommended that you use Dynamic Tensor calibration at least in the initial calibration. This allows Calypso to gather the "bend data" of each individual stylus. Tensor or Geometric calibration may be used for recalibration purposes.

When using Dynamic Tensor calibration is not uncommon to receive this type of error.



This error requires you to rotate the reference sphere so that Calypso can access an unobstructed path around the reference sphere. To resolve this you may have reloaded the master probe and re-reference the sphere location. Then reloaded the stylus system and went through the entire calibration process.

Next time, try this procedure.

Creating a Set of Virtual Reference Spheres

Within the Stylus System Qualification dialog box click on the Reference Sphere Management icon.

C Probing sy	/stem q	ualification			×
Stylus syst	tem S	Stylus Mana	gement		
1	C2	2		A▶B	

This will open the Reference Sphere Management dialog. It is here that you will create the Virtual Reference Sphere positions. You may create as many positions as you would like. Below in Table 1 are listed the most used positions and these rotations might be a good start.

102	Active reference sphere				
	Reference sphere 1				
	Settings	Clearance Distance		Ref. sphere component	s
	Sphere Radius 0.5	903 -X	-0.9843	Other	
	Serial Number 1879.0	+X	0.9843		0
	X Offset 18.0	513 -Y	-0.9843		IL
	Y Offset -36.5	390 +Y	0.9843		100 A
	Z Offset -15.1	558 -Z	-0.9843		
	Sigma 0.0	000 +Z	0.9843		
	Roundness (µm) 0.00	DOO Tilt and rotation angle			
	Update stylus da Yes	Inclination angle	135.0000		
	Shaft Radius 0.1	969 Rotation angle	45.0000		
	Virt. ref. sph. No	Inclination angle	Rotation angle		
	Date 13.12.2017	- F	Y		
	Temp. coeff. 5.5				
	Pos. valid No				
	Functions				
	New Copy C	Copy as virtual reference sphe	e RSH S	haft Definition	
	Delete Activate	Print			
~			[Reset	Apply

Above is your default Reference Sphere position screen. We will now add the Virtual Reference Sphere positions. To begin, click on the Copy as Virtual Reference Sphere button. This will bring up this next prompt.

-15.1558	-Z	-0.9843
0.0000	+Z	0.9843
[c. ••••	The and retraining any	
es Ple	ase enter reference s	phere number:
2		
0	OK Ca	ancel
3.12.2017	F	Y
	-15.1558 0.0000 es Ple 2 0 3.12.2017	-15.1558 -Z 0.0000 +Z Flease enter reference s OK Ca 3.12.2017 -Z

Calypso will automatically select the next number for the reference sphere. Leave the number as is and click ok.

Now another reference sphere is added.

leierence sphere 2			
Settings	Clearance Distance		Ref. sphere components
Sphere Radius 0.	5903 -X	-0.9843	Other
Serial Number 1879.0_1	+X	0.9843	9
X Offset 18.	D513 -Y	-0.9843	
Y Offset -36.	5390 +Y	0.9843	
Z Offset -15.	1558 -Z	-0.9843	
Sigma 0.1	0000 +Z	0.9843	
Roundness (µm) 0.1	DODO Tilt and rotation angle		
Update stylus da Yes	Inclination angle	135.0000	\frown
Shaft Radius 0.1	1969 Rotation angle	135.0000	(1)
Virt. ref. sph. Yes	Inclination angle	Rotation angle	\mathbf{O}
Date 13.12.2017	7	Y	
Temp. coeff. 5.	5000		
Pos valid No			
		8	
New Conv	Conv as virtual reference onber	е Вен е	haft Definition
	Di i	• 101101	and committee
Delete	Print		

Change the Rotation Angle (1), in this case to 135 degrees, and Click Apply (2).

Let's add another position. Click back on number 1 in the list and repeat the steps. Click on the Copy as Virtual Reference Sphere button. Name this one #3 and click ok. Highlight #3 in the list and change the rotation angle to 225.00 degrees and click Apply.

Settings	Clearance Distance	Ref. sphere components
Sphere Radius 0.5903	-X -0.9843	Other
Serial Number 1879.0_1_2	+X 0.9843	0
× Offset 18.0513	-Y -0.9843	ll II
Y Offset -36.5390	+Y 0.9843	<u></u>
Z Offset -15.1558	-Z -0.9843	
Sigma 0.0000	+Z 0.9843	
Roundness (µm) 0.0000	Tilt and rotation angle	
Update stylus da Yes 🔍	Inclination angle 135.0000	
Shaft Radius 0.1969	Rotation angle 225.0000	
Virt. ref. sph. Yes	Inclination angle Rotation angle	
Date 13.12.2017		
Temp. coeff. 5.5000		
Pos. valid No		
- Functions		
New Copy Copy as v	virtual reference sphere RSH S	Chaft Definition
Delete Activate Print		

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Ref Sphere	Inclination	Rotation
Position		
1	135	45
2	135	135
3	135	225
4	135	315
5	135	0
6	135	90
7	135	180
8	135	270

Repeat the steps until all of the positions in Table 1 are created.

Table 1- Example of Virtual Reference Sphere Rotations

Remember all these steps where done to circumvent this error during calibration. Once you have completed the above steps it is not necessary to do them again. They will be stored for future use.

🕞 Warni	ng
•	The current stylus cannot be qualified with the reference sphere in this position. Please rotate the reference sphere so that the entire equator can be probed without a collision occurring.

Using a Virtual Reference Sphere Position during calibration

The stylus will do a tensor calibration before this error appears.

Once this error has occurred change the Mode to Dyn. Tensor Requalification Mode.



Rotate the Master Sphere on the CMM table to the desired position that will allow for a dynamic calibration. It is important to just rotate around the existing position on the table. Do move it to some other location just rotate it around where it is currently located.

Open the Reference Sphere Management dialog

🗲 Probing	system q	ualification			×
Stylus sy	vstem -	Stylus Mana	gement		
	ß	👌 🔧		A▶B	(the second seco

Now select the corresponding Virtual Reference Sphere that matches the new position on the table.

Update stylus	daYes	Inclination angle	135.0000
Shaft Radius	6.0000	Rotation angle	225.0000
Virt. ref. sph.	Yes	Inclination angle	Rotation angle
Date Temp. coeff. Pos. valid	27.12.2017 5.5000 Yes		×
Functions New	Сору	y as virtual reference sphe	re RSH Shat

Click Activate. This will now make, in this example, #3 active.

C. Probing system qua	lification				x
Stylus system St	ylus Managerr	ient	_		
1 B	🤰 🐪		A▶B]
Stylus system	Mode		Param	eter	
2.5mm Star	Dyn. Ten	sor Re 🔽	Standa	ard	~
Stylus name / no.	Geometry		Sphere	Coverage	
5X 🗸	5 Sphere	~	180.00	000	
Qualify stylus	Change s	tylus pos.	Ref. s	phere positio	n
Set Limit Value	s				
Stylus		Refe	erence s	phere	
Name	Date	Sph	ere No.	3 🗸	
5X	12/27/17	Тет	ıp.	20.0000	
🗙 Dynamic Q	ualification	SNo		F3898_1_1	-
R: 1.24	97	Date	•	22.12.2017	
C. 0.00		R:		14.9822	
5: 0.00		S:		0.0001	
X: -60.35	90	X:		412.7775	
Y: 0.71	59	Y:		-957.5134	
		Z:		-400.5971	
∠: 12.29	50 Type:	Tilt:		135.0000	
	VAST-XT	Rota	ate:	225.0000	
UK					

You can now see that the Reference Sphere is Sphere #3

Now click on the Qualify Stylus button.

🗔 Prob	oing system qualificat	tion		×
Stylus	system Stylus	Management		
	🏂 🙆 👌	*	AB AB	A
Stylus	s system	Mode	Param	eter
2.5m	m Star	Dyn. Tensor F	Re 🗸 Stand	ard 🗸 🗸
Stylu	nturaG2	Coomoter	Cahar	X
5	Please probe directi	with stylus 5> on of the shaft	(in the	ition
	Dupamic Qualif	Cancel		0
^	Dynamic Quam		SNo	F3898_1_1
R:	1.2497		Date	22.12.2017
S:	0.0001	•~	R:	14.9822
U	60.3500		5: V	A12 7775
X:	-00.3590		A. Y·	-957.5134
Y:	0.7159		7:	-400.5971
Z:	12.2950	Туре:	Tilt:	135.0000
		VAST-XT	Rotate:	225.0000
	ОК]		

The calibration is complete. Notice the Dynamic Qualification check mark is present and the Mode has changed back to Dynamic Tensor.

NOTE: By using the virtual sphere procedure, you first measure all styli in one position of the reference sphere and only then rotate the sphere to carry out the dynamic stylus qualification. Otherwise, you would have to requalify the sphere each time again.

You are prompted to move the stylus and touch the stylus in the direction of the shaft.

This will now begin the dynamic tensor calibration. This is the scanning of the master ball since the tensor calibration portion was already completed prior to the error.

C. Probing system qualifi	cation		×
Stylus system Stylu	is Management		
ڭ 🔕 🎝	• 🐕 🛛 🕄		в
Stylus system	Mode	Par	ameter
2.5mm Star	Dyn. tensor	✓ State	andard 🗸 🗸
Stylus name / no.	Geometry	Spl	nere Coverage
5X 🗸	5 Sphere	v 18	0.0000
Qualify stylus	Change stylus	pos. R	ef. sphere position
Set Limit Values			
Stylus		Referen	ce sphere
Name D	ate	Sphere	No. 1 🔽
5X	12/27/17	Temp.	20.0000
🗸 Dynamic Qua	lification	SNo	F3898
R: 1.2497	, ,	Date	27.12.2017
S. 0.0001	•~	R:	14.9822
3. 0.0001		S:	0.0002
X: -60.3590	1	X:	411.5350
Y: 0.7159	1	Y:	-956.2543
7. 12.2950		Z:	-400.5965
2. 12.2330	VAST-YT	Tilt:	135.0000
	TAULAL	Rotate:	45.0000
OK			
UK			