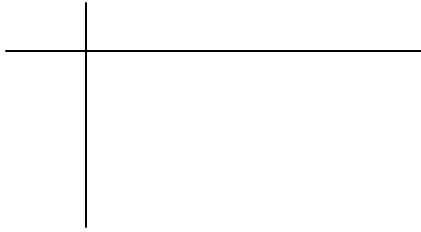
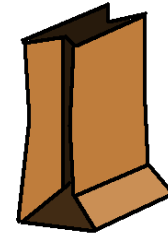
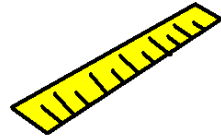


LUNCH 'N LEARN



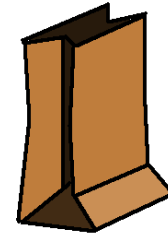
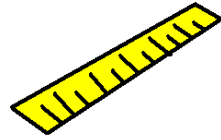
Spline Measurements... with Calypso!



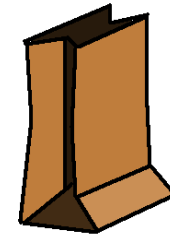
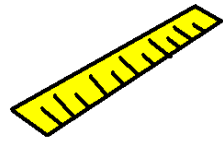
So...

You have a part with a spline on it.

You need to measure pitch, “over pin” diameter, and runout.

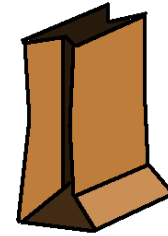
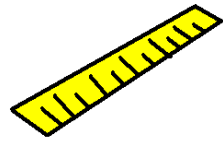


I HAVE THE ANSWER!



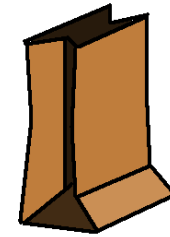
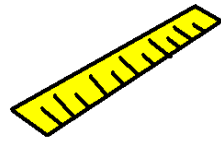
If you desktop looks like this...





make it look like this...



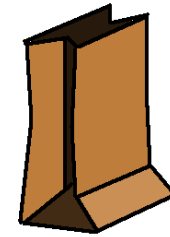
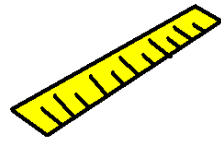


LUNCH 'N LEARN

+

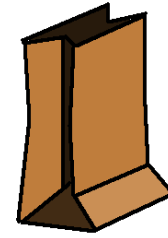
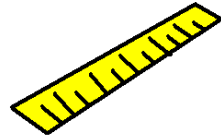
Spline Measurements...

with Calypso!
Any Questions?



You don't have Gear Pro?
You can do it in Calypso!!!!

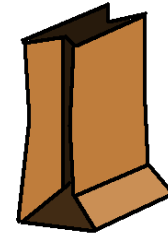
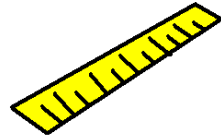




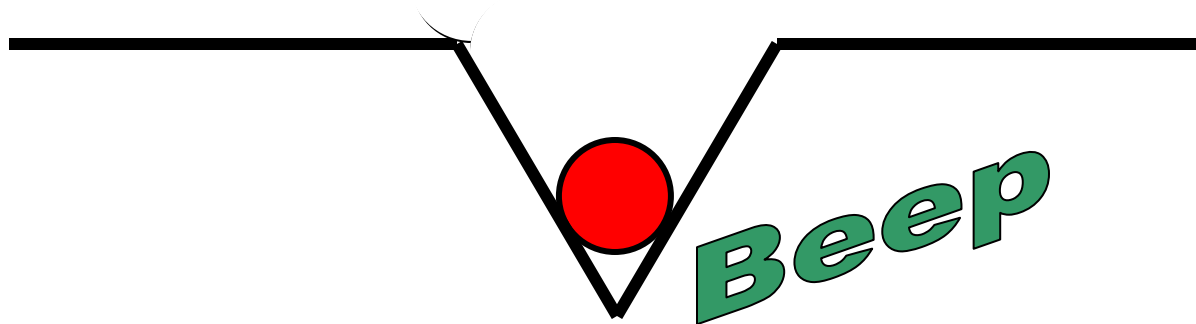
To pull it off, you need to know lots
of little tricks!

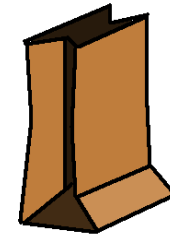
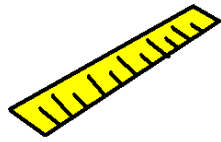
Trick 1

Self-Center Points



Self-Center Points





Calypso User Desk - (C) Carl Zeiss - spline

File Edit View Resources Features Constructio

Define Nominal Geometry (Probe, Enter, or

Features

Point1

Comment Projection Strategy
None Evaluation

Clearance Group Nominal Definition Alignment

CP +Z Options Base Alignme

Tolerance For: Nominal Actual

X	0.9120	0.908
Y	-0.0000	-0.076
Z	-0.0476	-0.114
i	-1.0000	-1.000
j	0.0000	0.000
k	0.0000	0.000

Sigma Form Points
0.0000 0.0000 1

Min Point no Point no Max

OK Reset

Strategy

Point1

Point List

Point1

Display of Normal

Coordinates Relative To Feature

No.	X Coord
1	0.0000

Clearance D
Probing Poi

OK

Self Center Probing: Point1

Probe Self Centering

Clamping of the machine axis in

X clamped
 Y clamped
 z clamped

Adjust measuring force

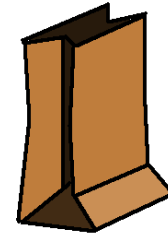
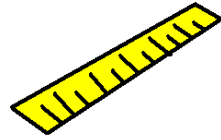
Probe In Normal Direction
 Own Selection

Fx: 0.0000 mN
Fy: 0.0000 mN
Fz: -200.0000 mN

Coordinates relative to Feature

OK Cancel

Self Center Probing Execute Now!



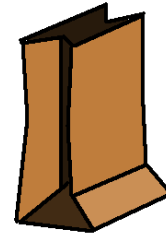
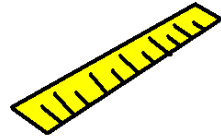
Self-Center Points

are available in :

Points

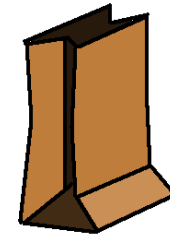
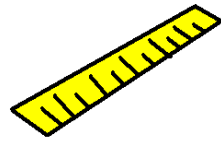
Lines

Circles



Trick 2

Mid Point Point Evaluation



Types of Point Evaluation

 Mid Point

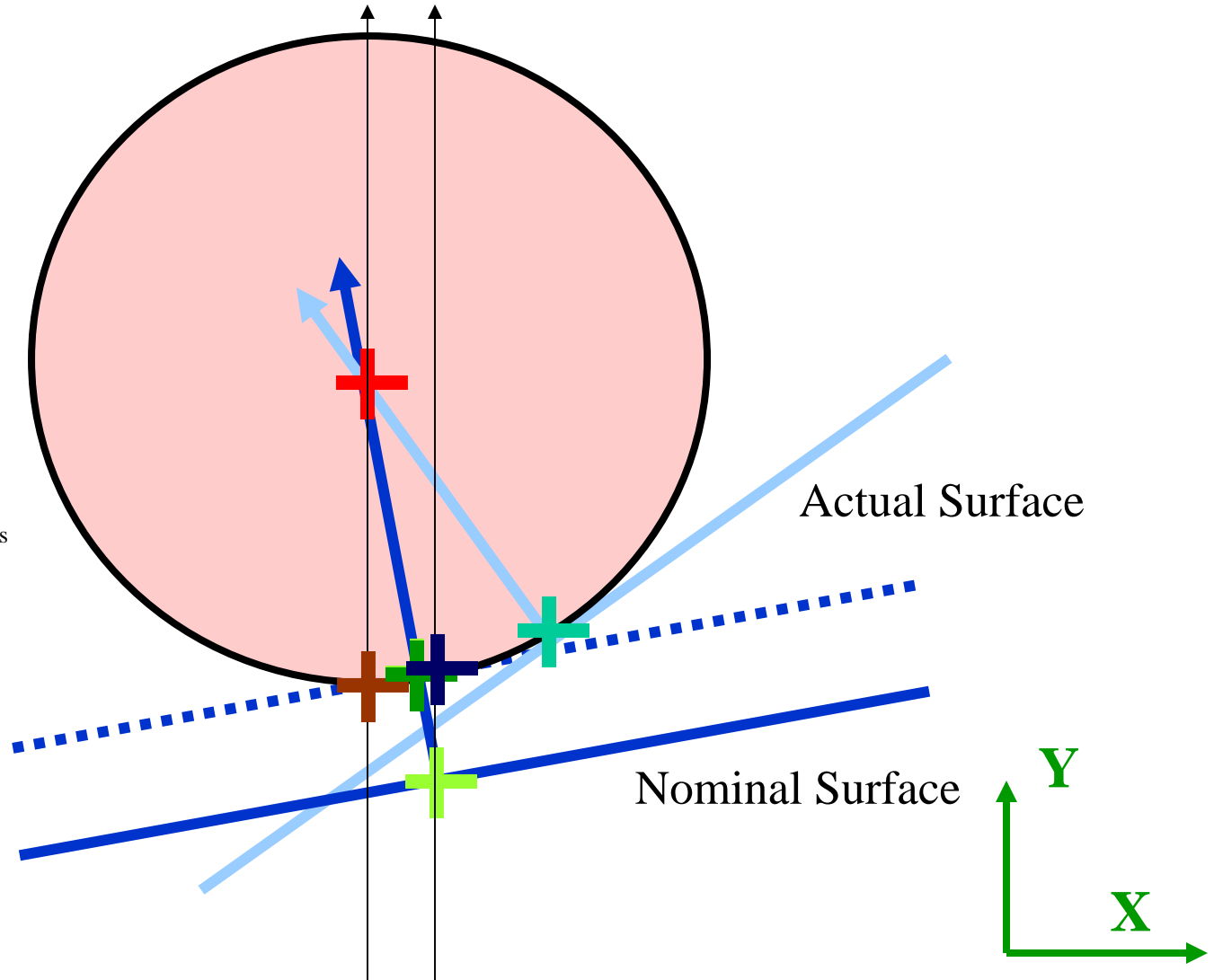
 Cad Point

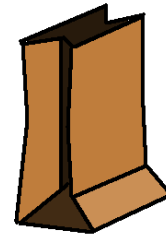
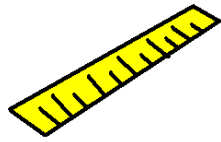
 Touch Point

 Plane Point
Assuming plane measurement always

 Space Point

 Net Point





Calypso User Desk - (C) Carl Zeiss - spline

File Edit View Resources Features Construction Size Form and Location Plan CAD Extras Planner Window Help Info

Define Nominal Geometry (Pro)

Features

Point1

Comment	Projection
	None

Clearance Group: CP +Z

Nominal Definition: Options

Tolerance For: Nominal

X	0.9120
Y	-0.0000
Z	-0.0476
i	-1.0000
j	0.0000
k	0.0000

Sigma: 0.0000

Form: 0.0000

Min: Point no: Point no

OK Reset

Evaluation - Point1

Preassignment for evaluation method: LSQ Feature

Evaluation Constraints

Location: X Y Z

Normal Vector

Point Modification

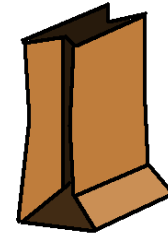
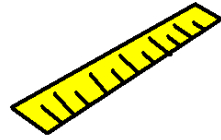
Stylus Radius Correction

Space Point Mode

- Touch Point
- Touch Point
- Plane-Point
- Space Point
- Net Point**
- Midpoint
- CAD Face Point

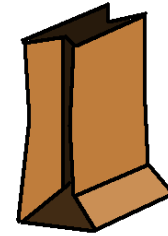
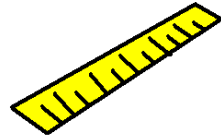
OK Cancel Help

0.2 inch

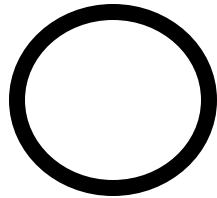


Trick 3

Maximum or Minimum Feature



Max/Min Features



Max Y

Min X

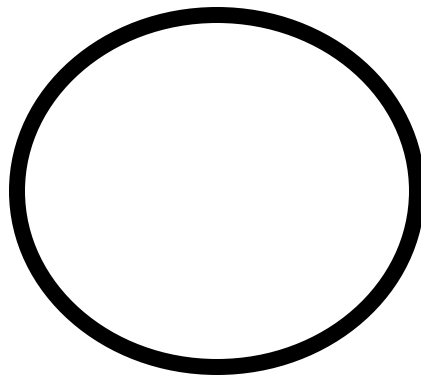
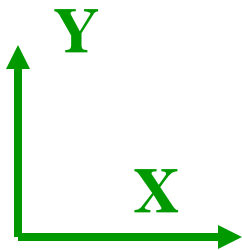
Max X

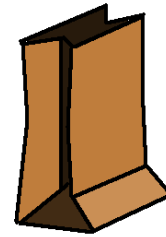
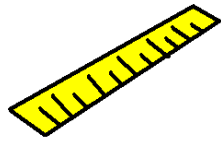
Min Diameter



Min Y

Max Diameter





Calypso User Desk (C) Carl Zeiss Jena

File Edit Features CAD Extras Planner Window Help Info

Features

Maximum Feature2

Alignment: Base Alignment

Select existing Features

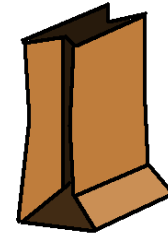
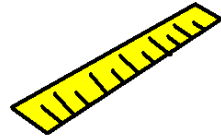
- Point1
- Point2
- Point3

Point2

Tolerance For:	Nominal	Actual
<input type="checkbox"/> X	0.9120	0.9665
<input type="checkbox"/> Y	-0.0000	0.0000
<input type="checkbox"/> Z	-0.0476	-0.0816
i	-1.0000	-1.0000
j	0.0000	0.0000
k	0.0000	0.0000

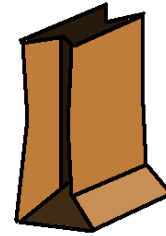
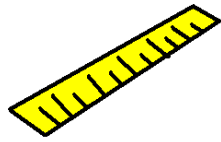
OK Reset

0.2 inch

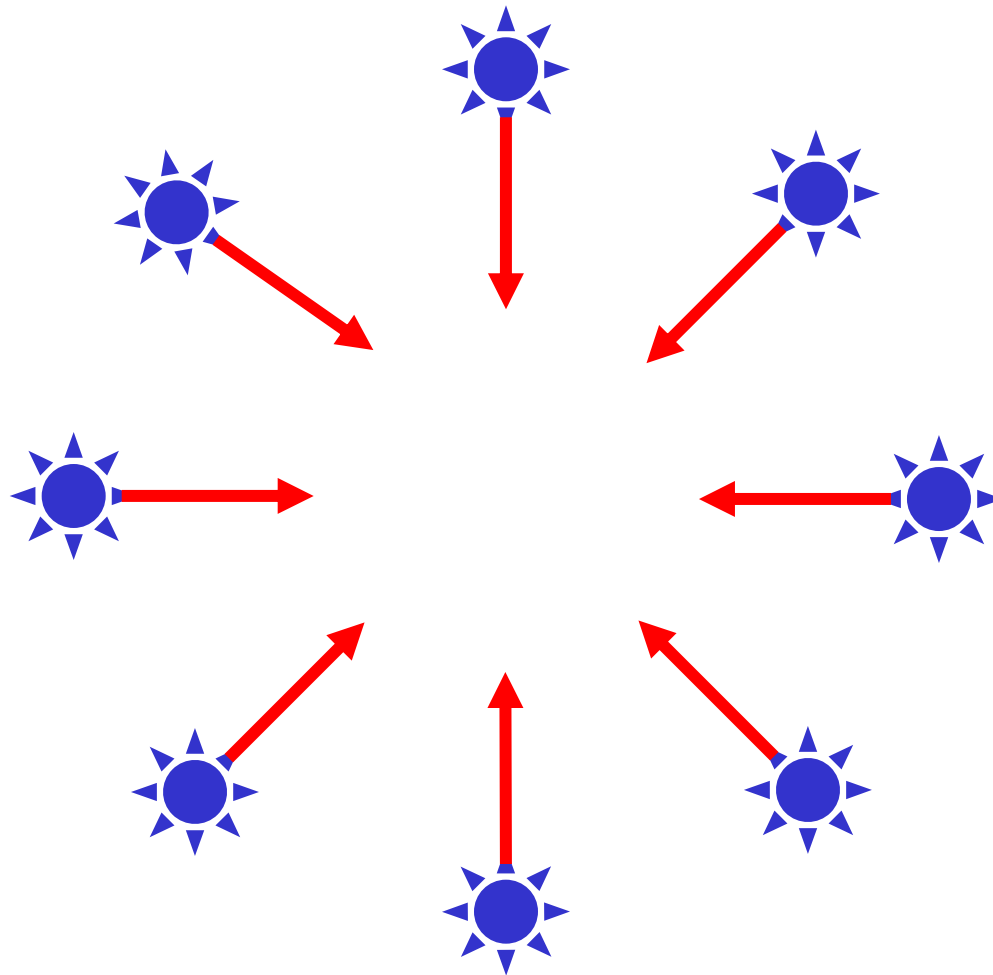


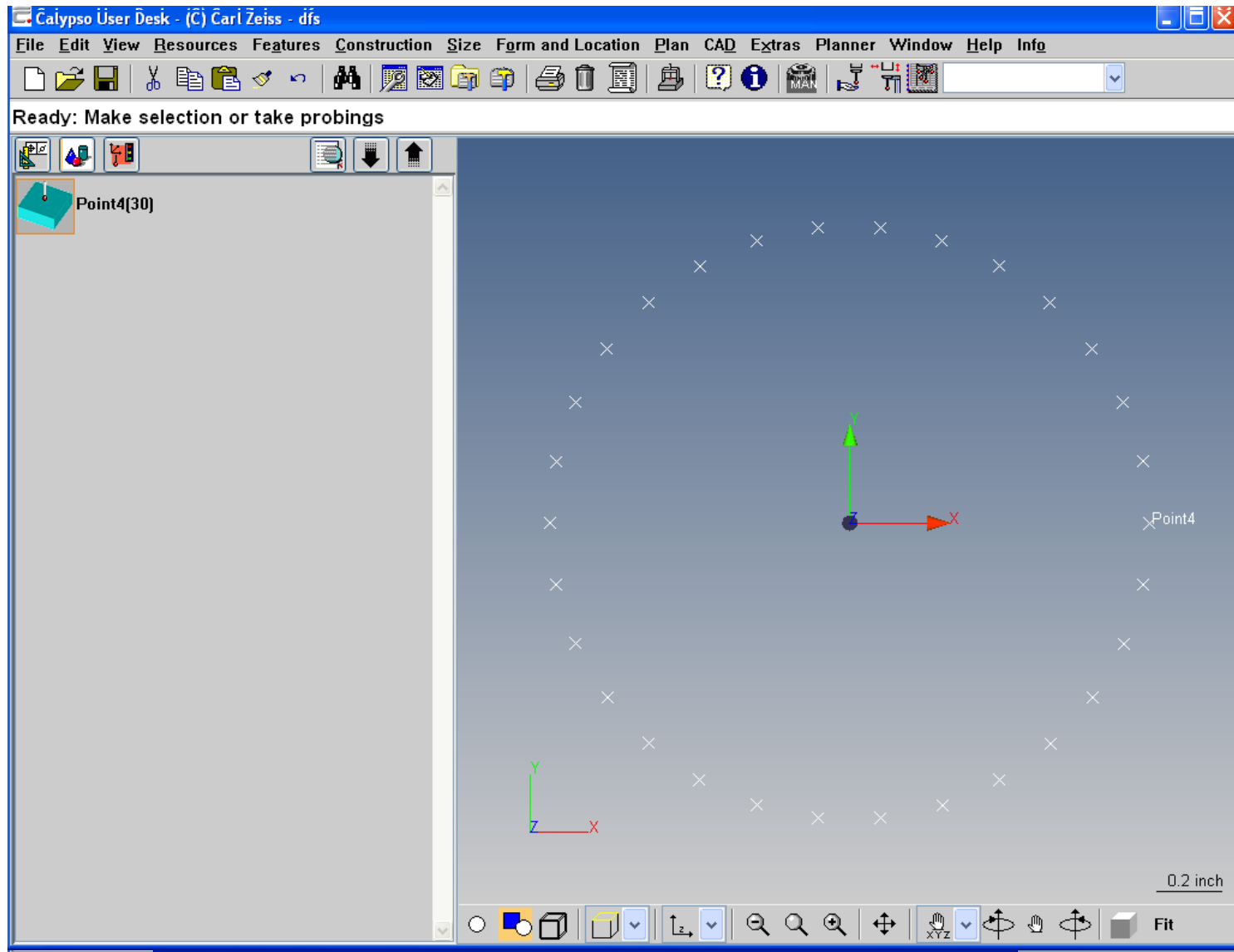
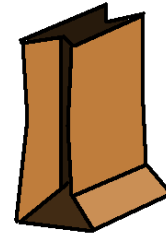
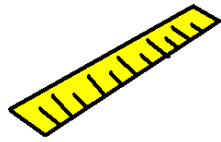
Trick 4

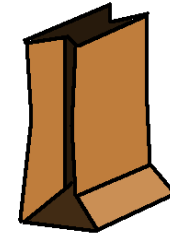
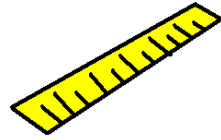
Rotational Patterns



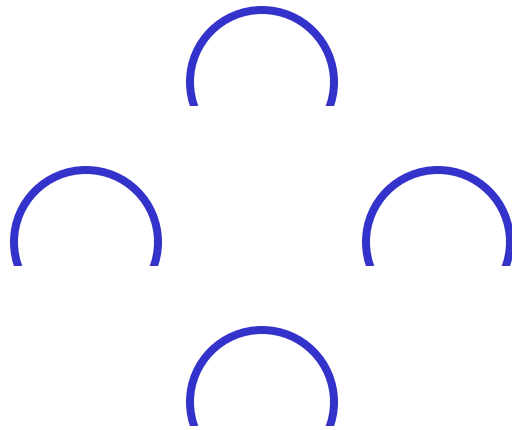
Rotational Patterns



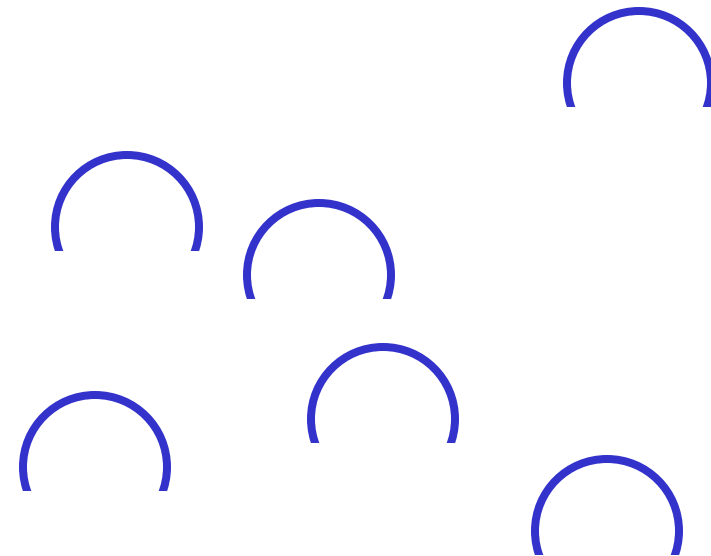




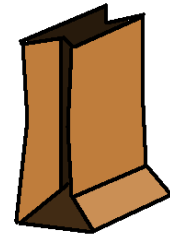
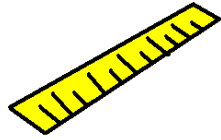
Other Types of Patterns



Rotational



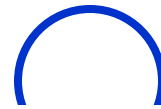
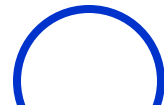
Position List



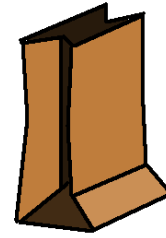
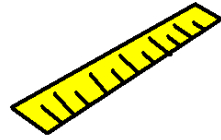
Other Types of Patterns



1D Linear

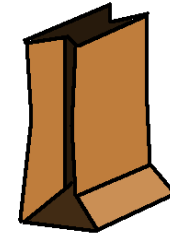
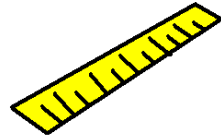


2D Linear



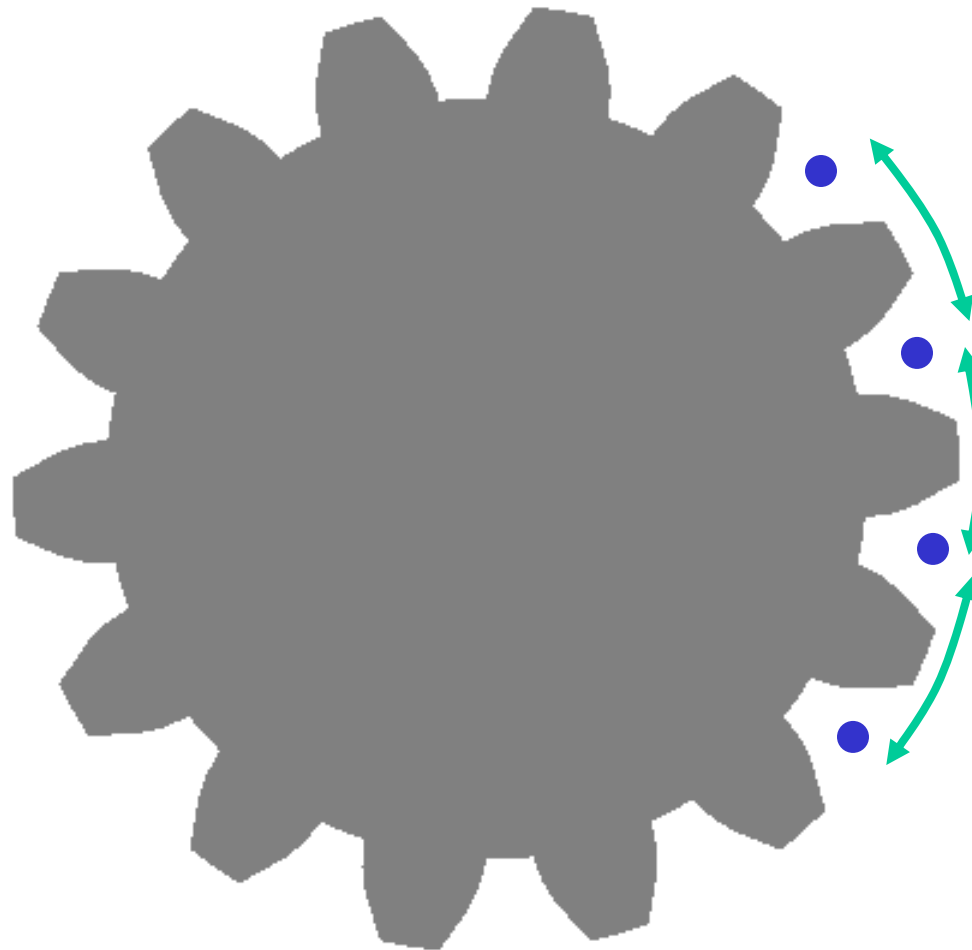
Trick 5

Circular Pitch

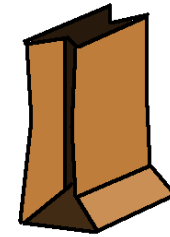
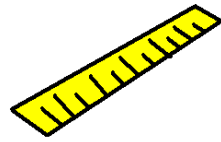


Circular Pitch Parameters

f_p : Individual Pitch Error

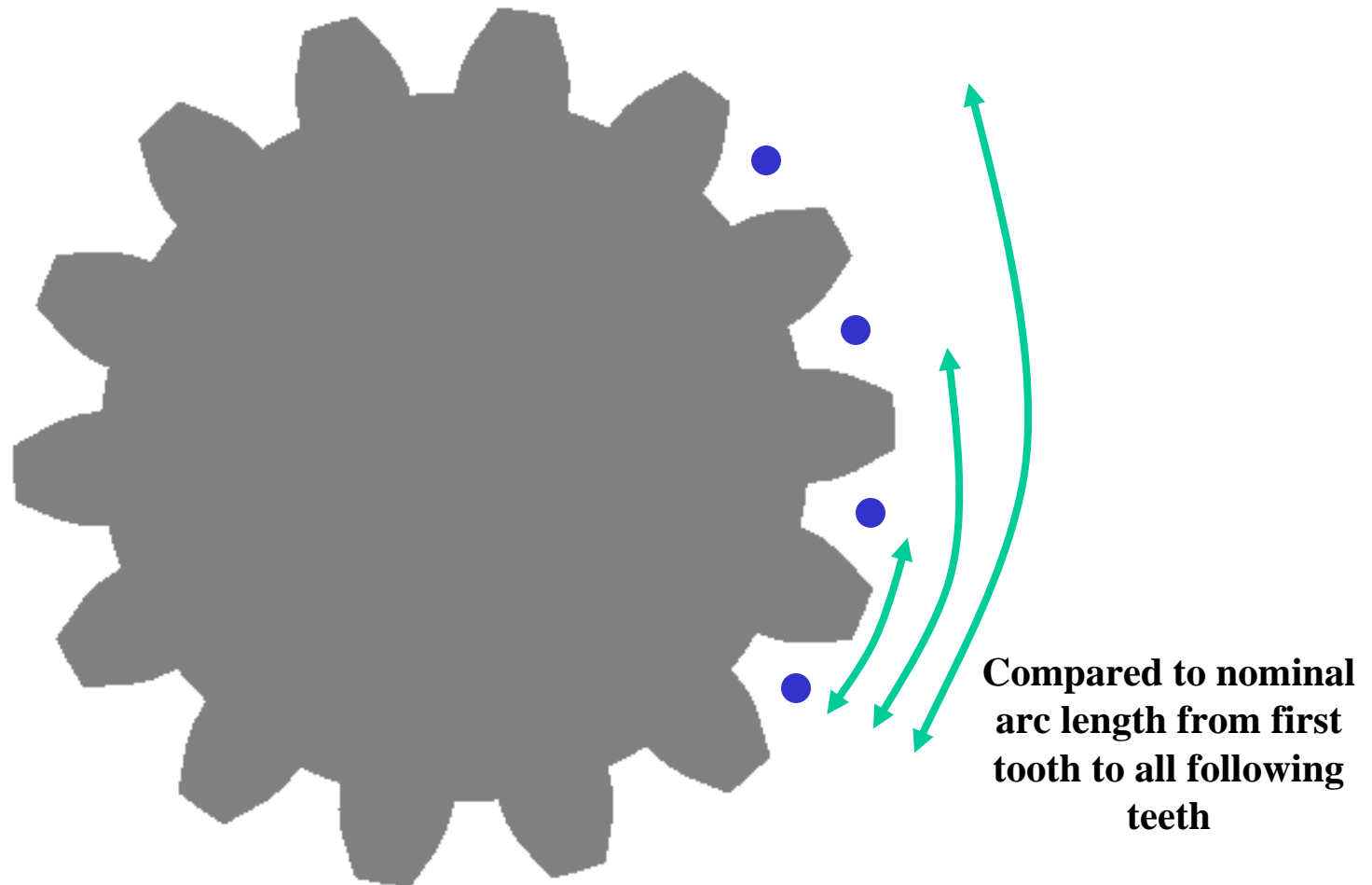


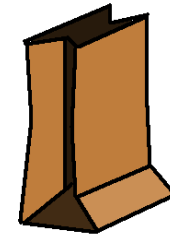
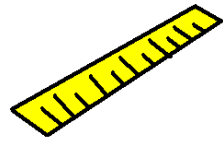
Compared to Nominal
Arc Length



Circular Pitch Parameters

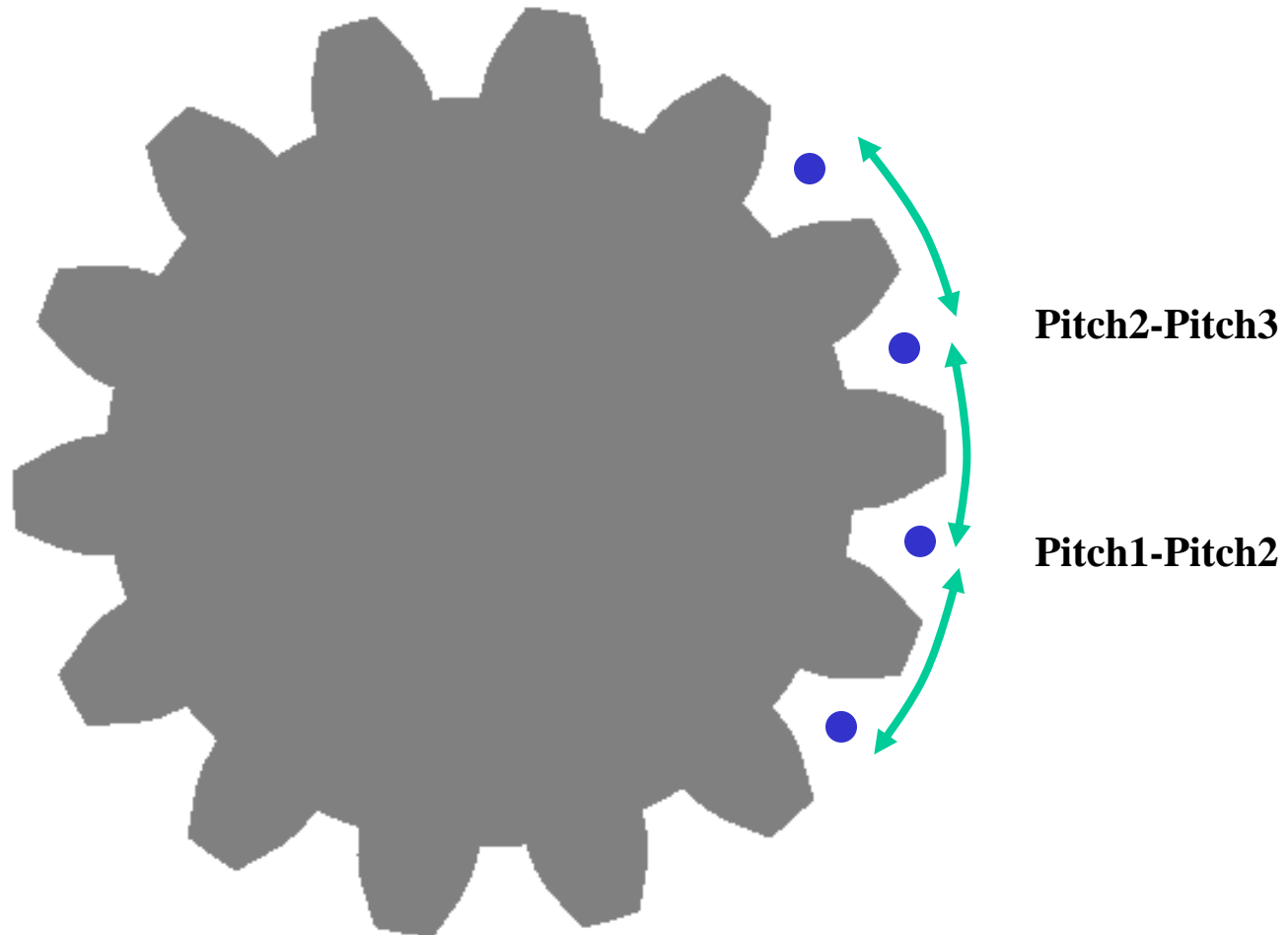
F_p : Cumulative Pitch Error

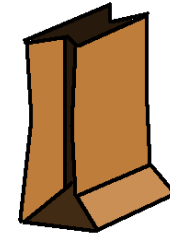
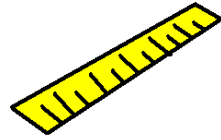




Circular Pitch Parameters

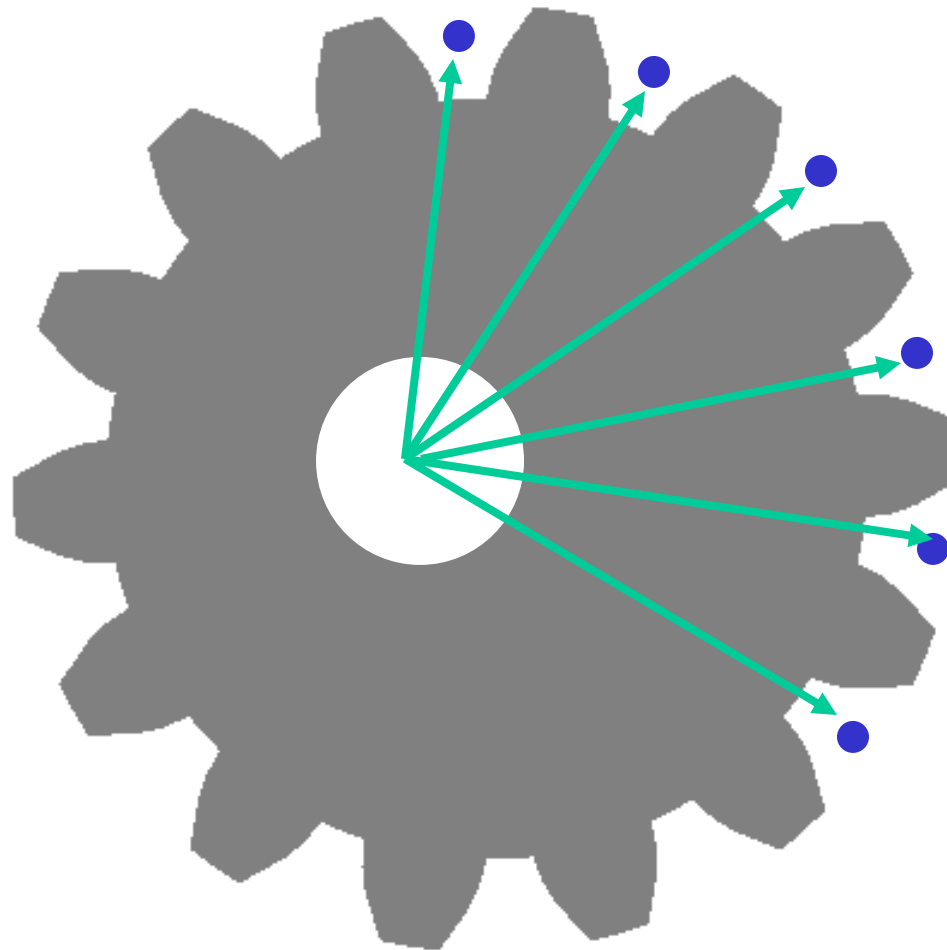
f_u : Pitch Error (comparative)



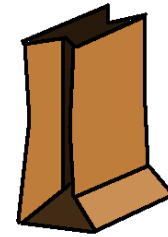
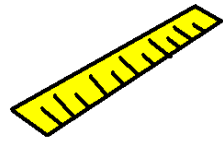


Circular Pitch Parameters

f_r : Pitch Radial Runout

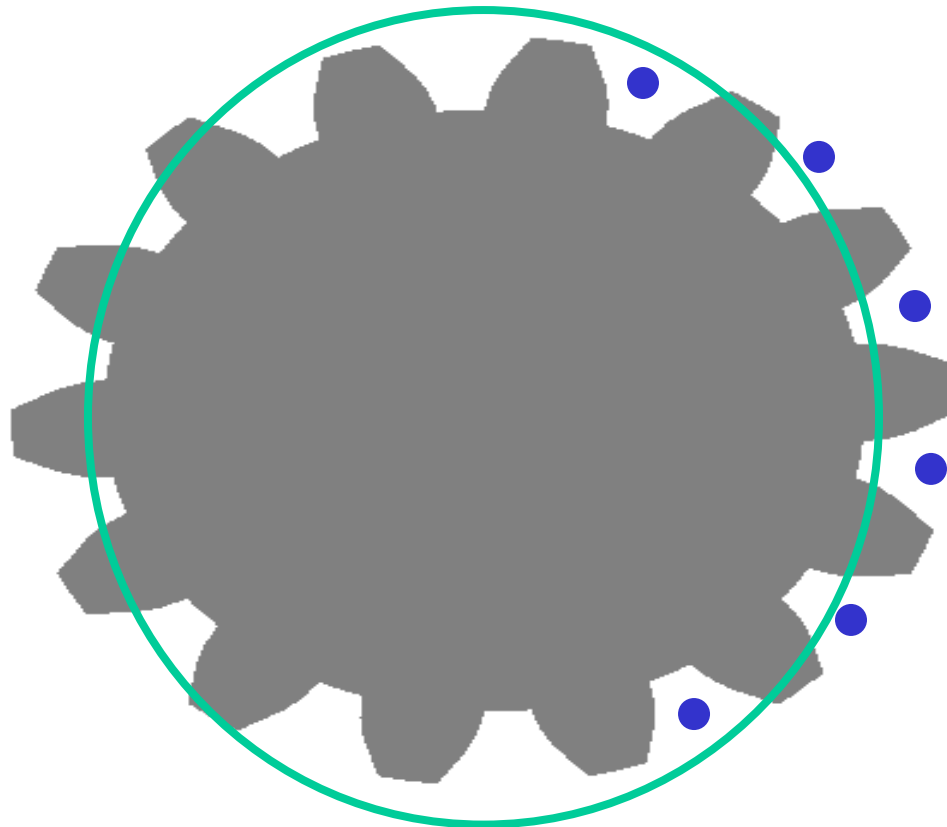


Radial error from datum

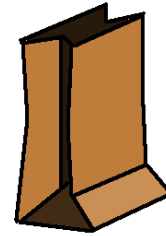
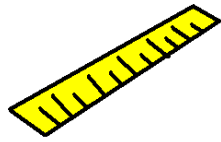


Circular Pitch Parameters

fre : Pitch Roundness



**Error of points to a
perfect Circle**



Calypso User Desk - (C) Carl Zeiss - spline

File Edit View Resources

Circular Pitch

Circular Pitch1

Comment

Select Feature

Circular Pitch1

Feature 1

Point4(*)

Unit of the Angle Characteristics (fp Fp fu)

Arc Length [in]

Angle [°]

Tolerance Classes

Fine

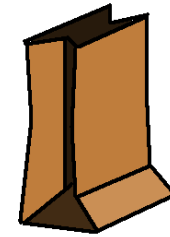
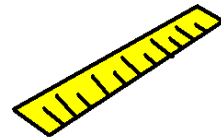
	Upper Tolerance	Lower Tolerance
<input checked="" type="checkbox"/> Individual Pitch Error fp	0.0020	-0.0020
<input checked="" type="checkbox"/> Cumulative Pitch Error Fp	0.0020	-0.0020
<input checked="" type="checkbox"/> Pitch error fu	0.0020	-0.0020
<input checked="" type="checkbox"/> Fr Rad.Runout	0.0020	-0.0020
<input checked="" type="checkbox"/> Fre Roundness	0.0020	-0.0020

OK Reset










Extras Planner Window Help Info

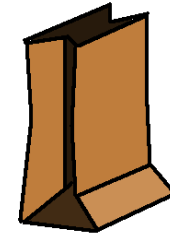
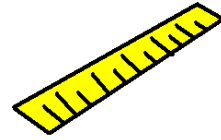
0.2 inch

Fit



Circular Pitch Output

	Circular Pitch1(12)^fp Minimum Individual Pitch Error	0.1903 0.1910	0.0020	-0.0020	--	-0.0007
	Circular Pitch1(14)^fp Maximum Individual Pitch Error	0.1923 0.1910	0.0020	-0.0020	---	0.0013
	Circular Pitch1(5)^Fp Minimum Cumulative Pitch Error	0.9538 0.9551	0.0020	-0.0020	---	-0.0013
	Circular Pitch1(18)^Fp Maximum Cumulative Pitch Error	3.4399 3.4383	0.0020	-0.0020	---	0.0016
	Circular Pitch1(15)^fu Minimum Pitch Error	-0.0014 0.0000	0.0020	-0.0020	---	-0.0014
	Circular Pitch1(13)^fu Maximum Pitch Error	0.0010 0.0000	0.0020	-0.0020	---	0.0010
	Circular Pitch1(14)^Fr Minimum Radial Runout	-0.0026 0.0000	0.0020	-0.0020		-0.0006 -0.0026
	Circular Pitch1(20)^Fr Maximum Radial Runout	0.0016 0.0000	0.0020	-0.0020	---	0.0016
	Circular Pitch1(14)^Fre Minimum Roundness	-0.0022 0.0000	0.0020	-0.0020		-0.0003 -0.0022
	Circular Pitch1(19)^Fre Maximum Roundness	0.0013 0.0000	0.0020	-0.0020	---	0.0013



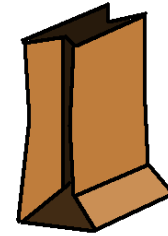
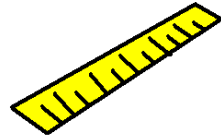
Circular Pitch Output

Calypso Default Printout c:\Zeiss\Calypso\home\om\workarea\inspections\spline

Printout

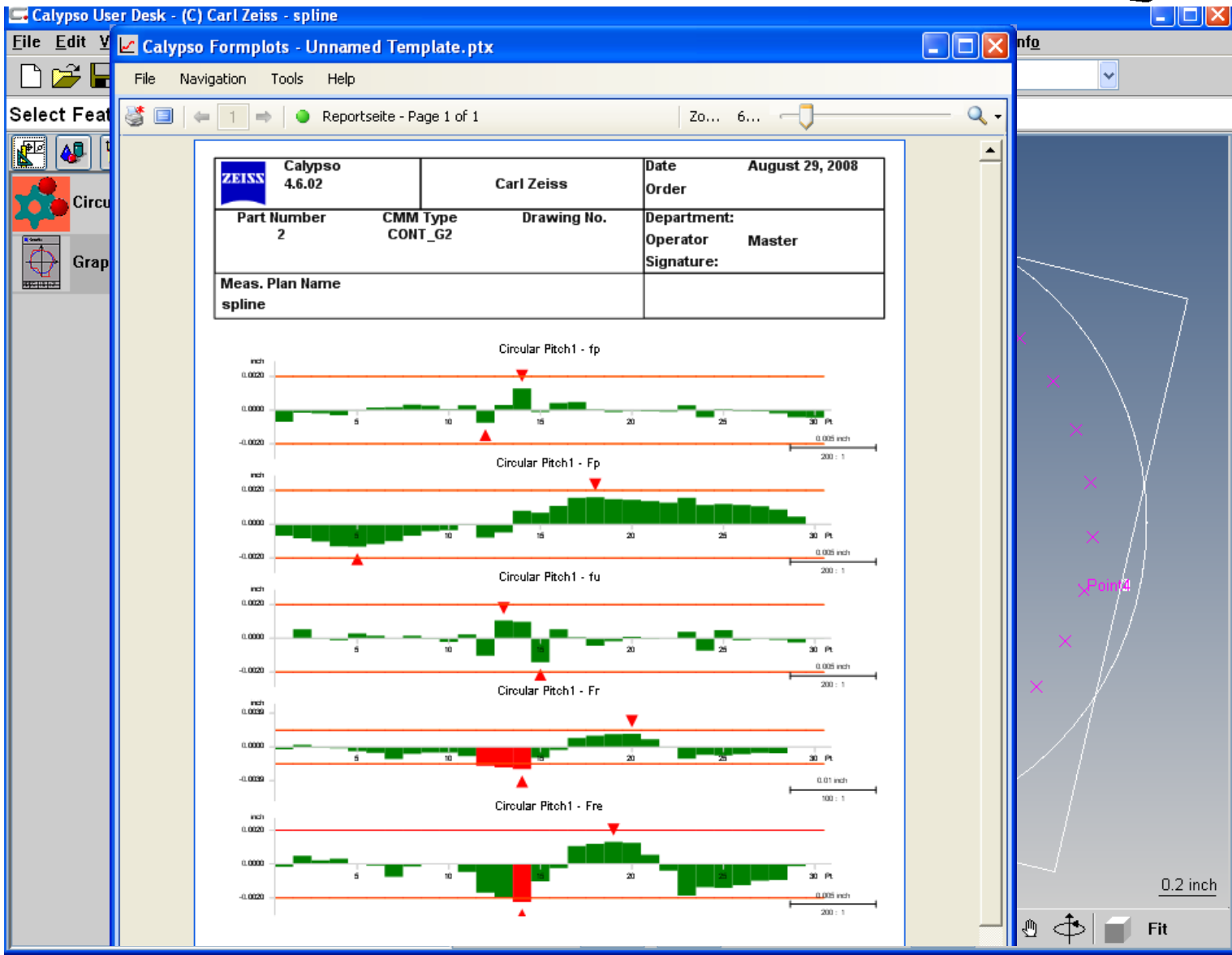
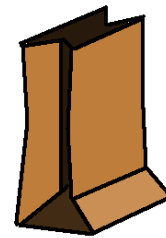
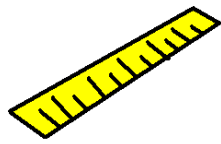
Point4(*)

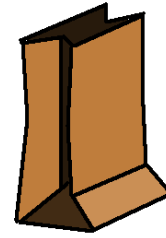
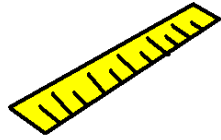
	p	pk	fp	Fp	fu	Fr	Fre
1/2	0.1903	0.1903	-0.0007	-0.0007	0.0000	-0.0003	-0.0002
2/3	0.1909	0.3812	-0.0001	-0.0008	0.0005	0.0002	0.0005
3/4	0.1908	0.5720	-0.0002	-0.0010	0.0000	-0.0001	0.0002
4/5	0.1907	0.7628	-0.0003	-0.0013	-0.0001	-0.0001	0.0003
5/6	0.1910	0.9538	0.0000	-0.0013	0.0003	-0.0005	0.0000
6/7	0.1912	1.1449	0.0001	-0.0012	0.0002	-0.0007	-0.0001
7/8	0.1912	1.3361	0.0002	-0.0010	0.0000	-0.0014	-0.0008
8/9	0.1913	1.5275	0.0003	-0.0007	0.0002	-0.0008	-0.0001
9/10	0.1913	1.7187	0.0003	-0.0004	-0.0001	-0.0006	0.0000
10/11	0.1911	1.9098	0.0001	-0.0003	-0.0002	-0.0007	0.0000
11/12	0.1913	2.1011	0.0003	-0.0001	0.0002	-0.0011	-0.0005
12/13	0.1903	2.2914	-0.0007	-0.0008	-0.0010	-0.0022	-0.0017
13/14	0.1913	2.4827	0.0003	-0.0005	0.0010	-0.0024	-0.0019
14/15	0.1923	2.6750	0.0013	0.0008	0.0010	-0.0026	-0.0022
15/16	0.1909	2.8659	-0.0001	0.0007	-0.0014	-0.0012	-0.0010
16/17	0.1914	3.0573	0.0004	0.0011	0.0005	-0.0004	-0.0002
17/18	0.1915	3.2488	0.0005	0.0015	0.0001	0.0011	0.0011
18/19	0.1911	3.4399	0.0000	0.0016	-0.0004	0.0013	0.0012
19/20	0.1909	3.6308	-0.0001	0.0015	-0.0002	0.0015	0.0013
20/21	0.1910	3.8217	0.0000	0.0014	0.0001	0.0016	0.0012
21/22	0.1909	4.0127	-0.0001	0.0013	-0.0001	0.0009	0.0005
22/23	0.1909	4.2036	-0.0001	0.0013	0.0000	0.0000	-0.0004
23/24	0.1913	4.3949	0.0003	0.0015	0.0004	-0.0014	-0.0018
24/25	0.1906	4.5855	-0.0004	0.0011	-0.0007	-0.0009	-0.0014
25/26	0.1911	4.7766	0.0001	0.0012	0.0005	-0.0010	-0.0014
26/27	0.1910	4.9675	-0.0001	0.0011	-0.0001	-0.0009	-0.0012
27/28	0.1909	5.1585	-0.0001	0.0010	0.0000	-0.0007	-0.0010
28/29	0.1908	5.3493	-0.0002	0.0009	-0.0001	-0.0007	-0.0009
29/30	0.1906	5.5399	-0.0004	0.0004	-0.0002	0.0000	-0.0001
30/1	0.1906	5.7305	-0.0004	0.0000	0.0000	0.0000	0.0000



Trick 6

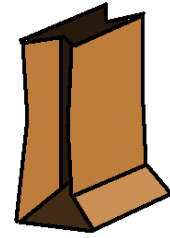
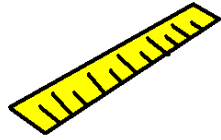
Graphic Element



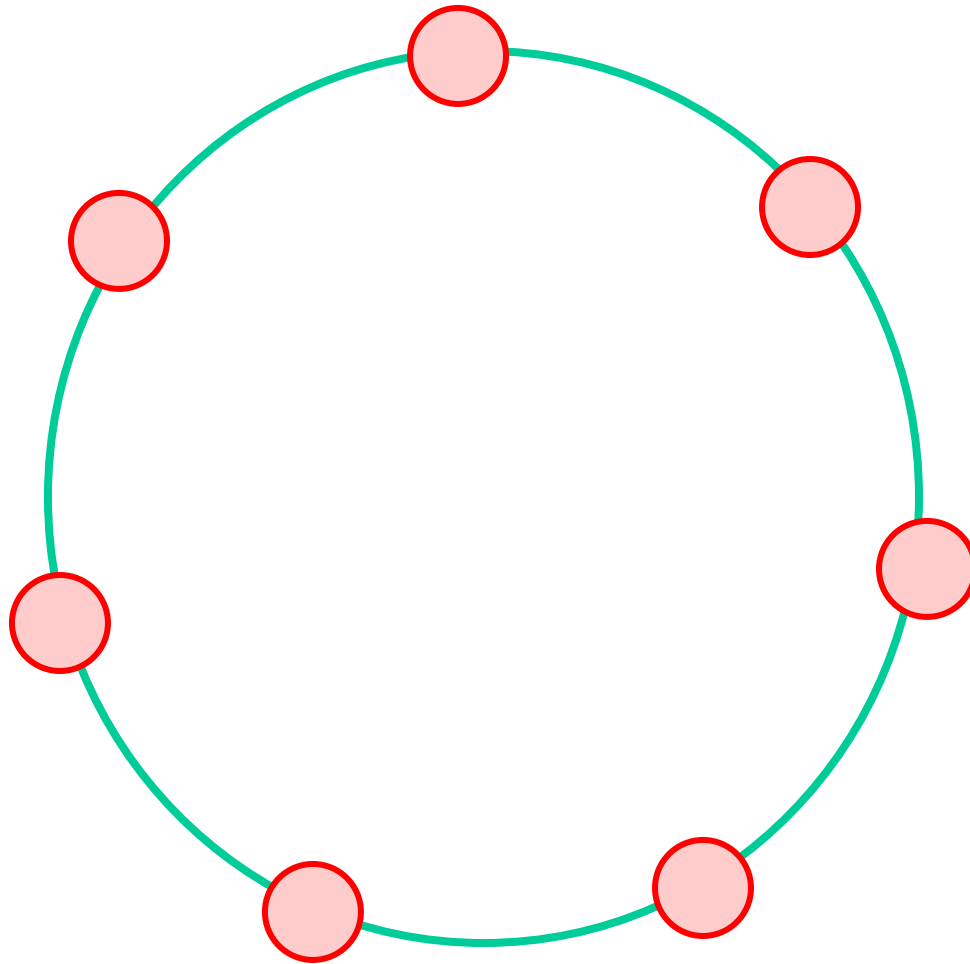


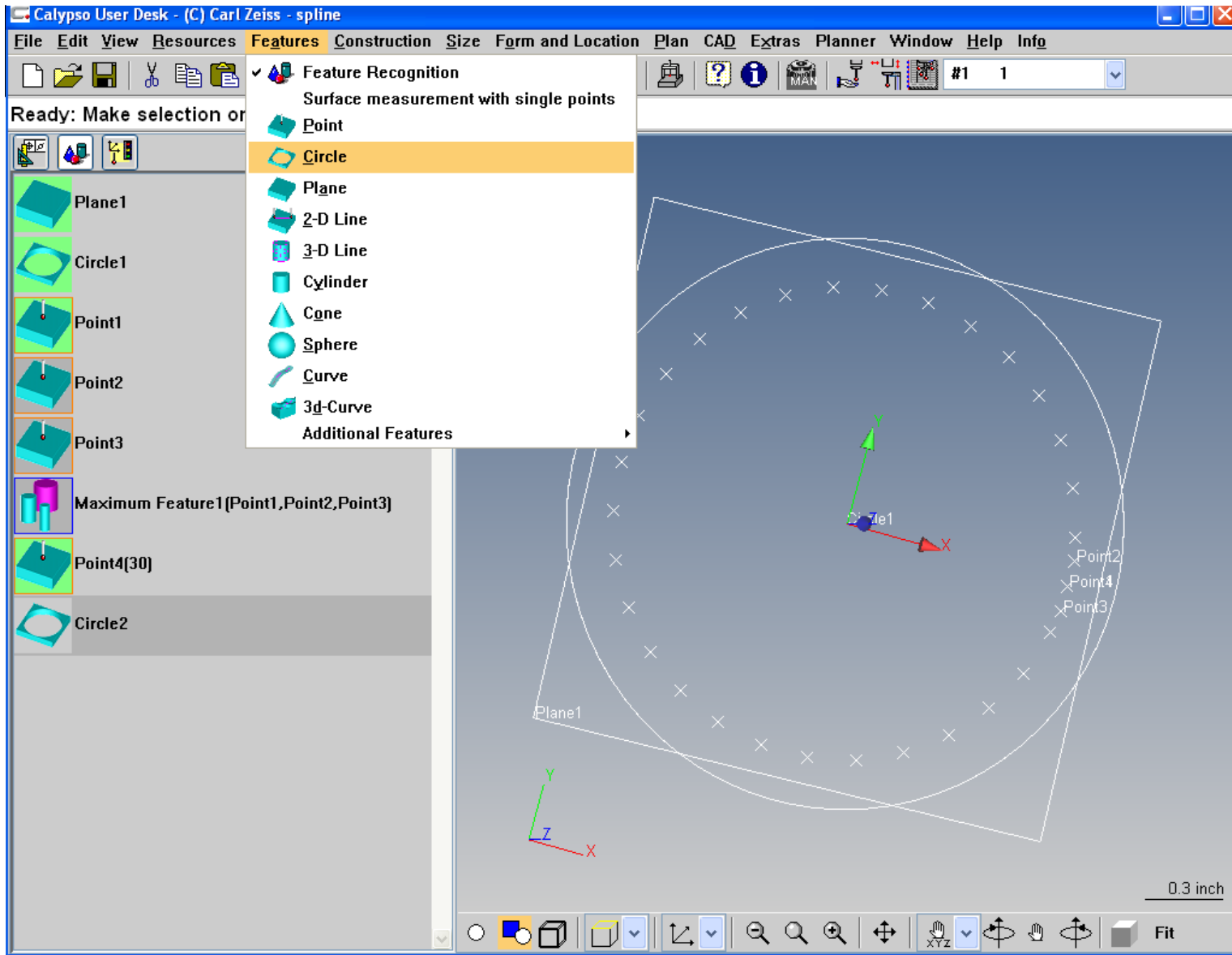
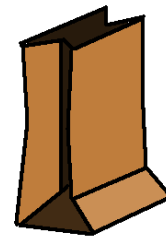
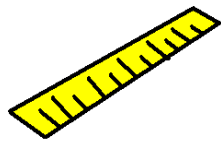
Trick →

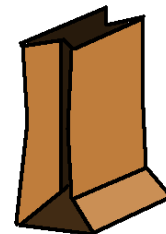
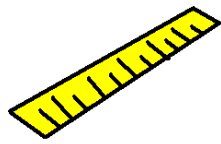
Recall



Recall







Calypso User Desk - (C) Carl Zeiss - spline

File Edit View Resources Features Construction Size Form and Location Plan CAD Extras Planner Window Help Info

Please Probe Point 1

Features

Circle3

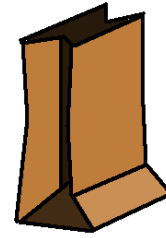
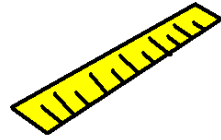
Comment	Projection	Strategy
Circle	None	Evaluation

Tolerance For:	Nominal Definition Alignment	
	Nominal	Actual
<input type="checkbox"/> X	0.0000	-0.0006
<input type="checkbox"/> Y	-0.0000	0.0038
<input type="checkbox"/> Z	-0.0476	-0.0444
<input type="checkbox"/> D	1.8241	1.8056
A1- X/Z	0.0000	0.0000
A2- Y/Z	0.0000	0.0000
Space Axis	Z	Z
Depth	0.0000	0.0000
Start Angle	0.0000	0.0000
Angle segment	360.0000	360.0000

Sigma	Form	Points
0.0004	0.0010	8
Min	Point no	Point no
-0.0006	2	1
		Max
		0.0004

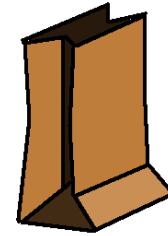
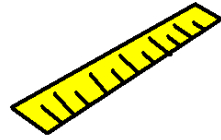
OK Reset

0.2 inch



Trick &

Result Element

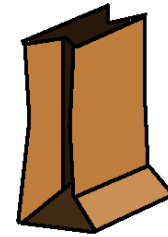
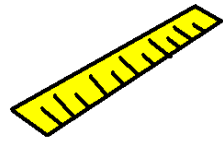


Result Element

Result Elements can be used to report values that are a calculations from measured features.

For Example...

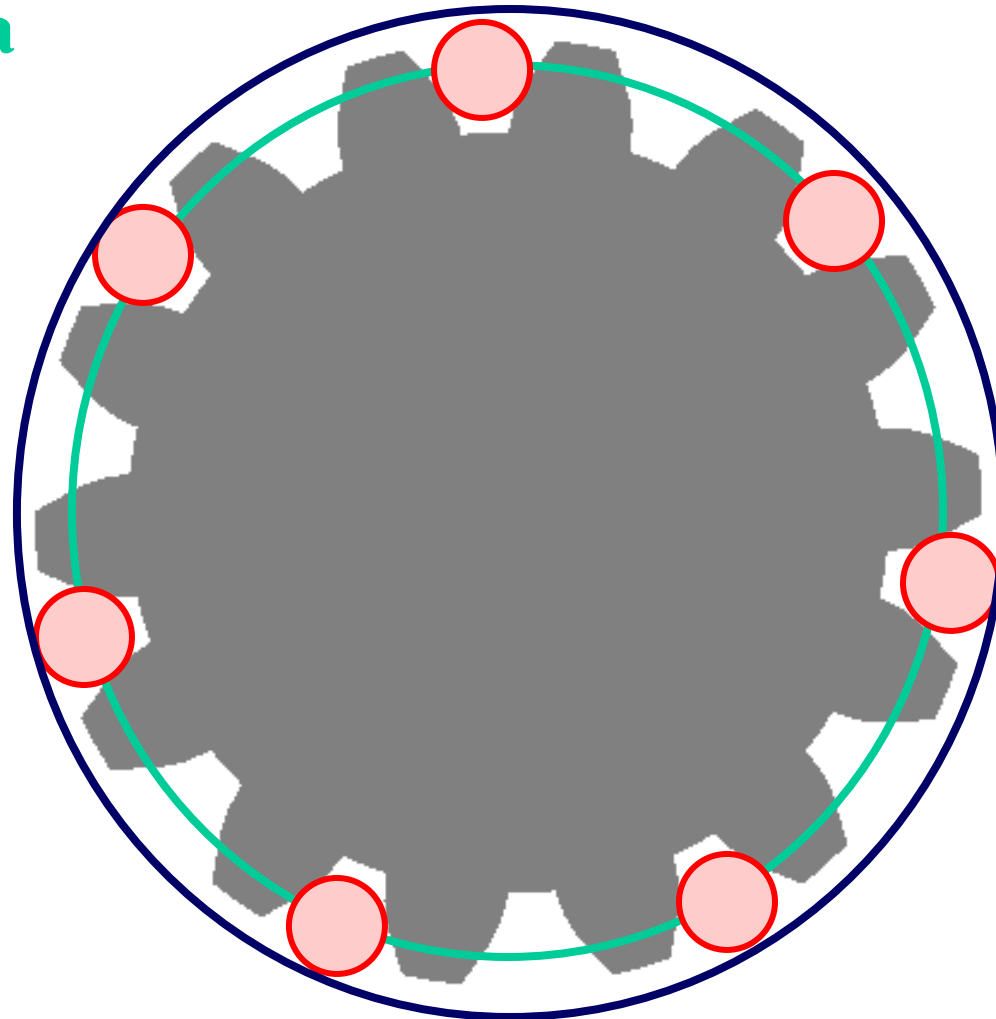
Over Balls Dia = Self Center Circ Dia + Stylus Dia

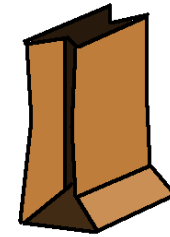
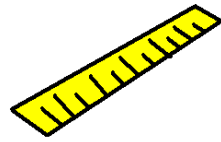


Self Center Circ Dia

+ Stylus Dia

Over Balls Dia





Calypso User Des Result Element

File Edit View Result Element1 Comment

Function Loop Nominal **Actual** Compute

Length in Inch

`getActual("Circle2").diameter+getProbe().diameter`

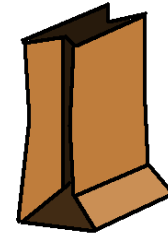
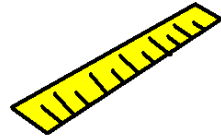
Characteristics	Features	Attributes
Circular Pitch1 Graphics Element1	Plane1 Circle1	x y
	Point4 Circle2	rotationAngle diameter radiusD2 radius angleForDisplay

Actual

OK Cancel Help

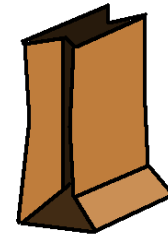
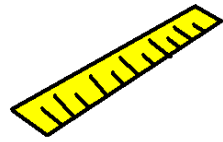
OK Reset

getActual("Circle2").diameter+getProbe().diameter



NOW....

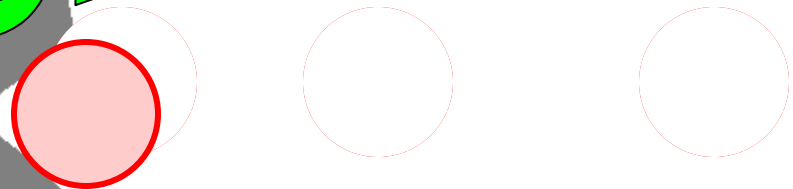
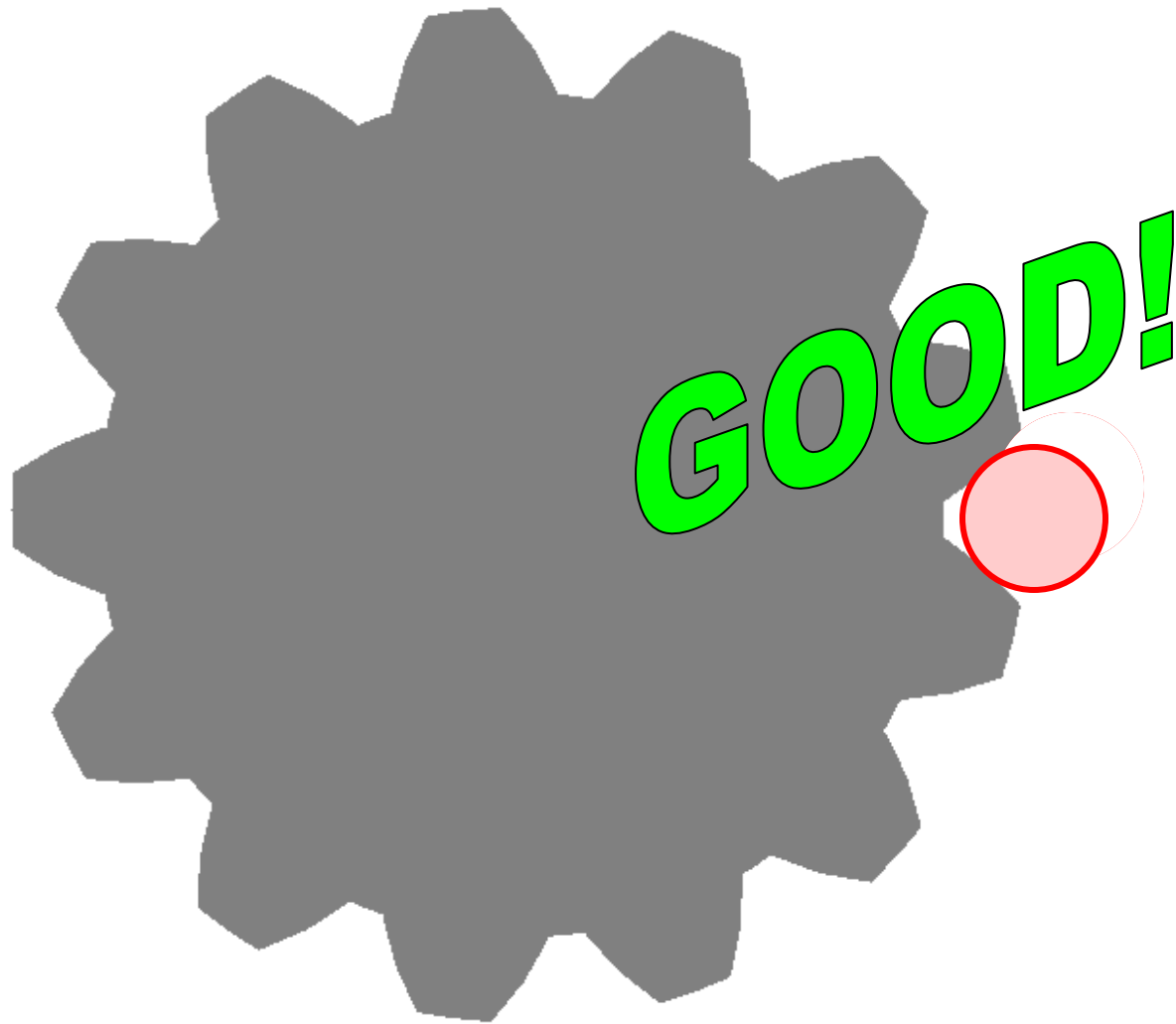
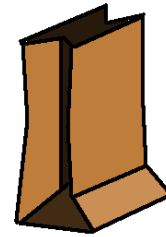
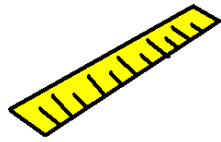
**We put it all
together!**

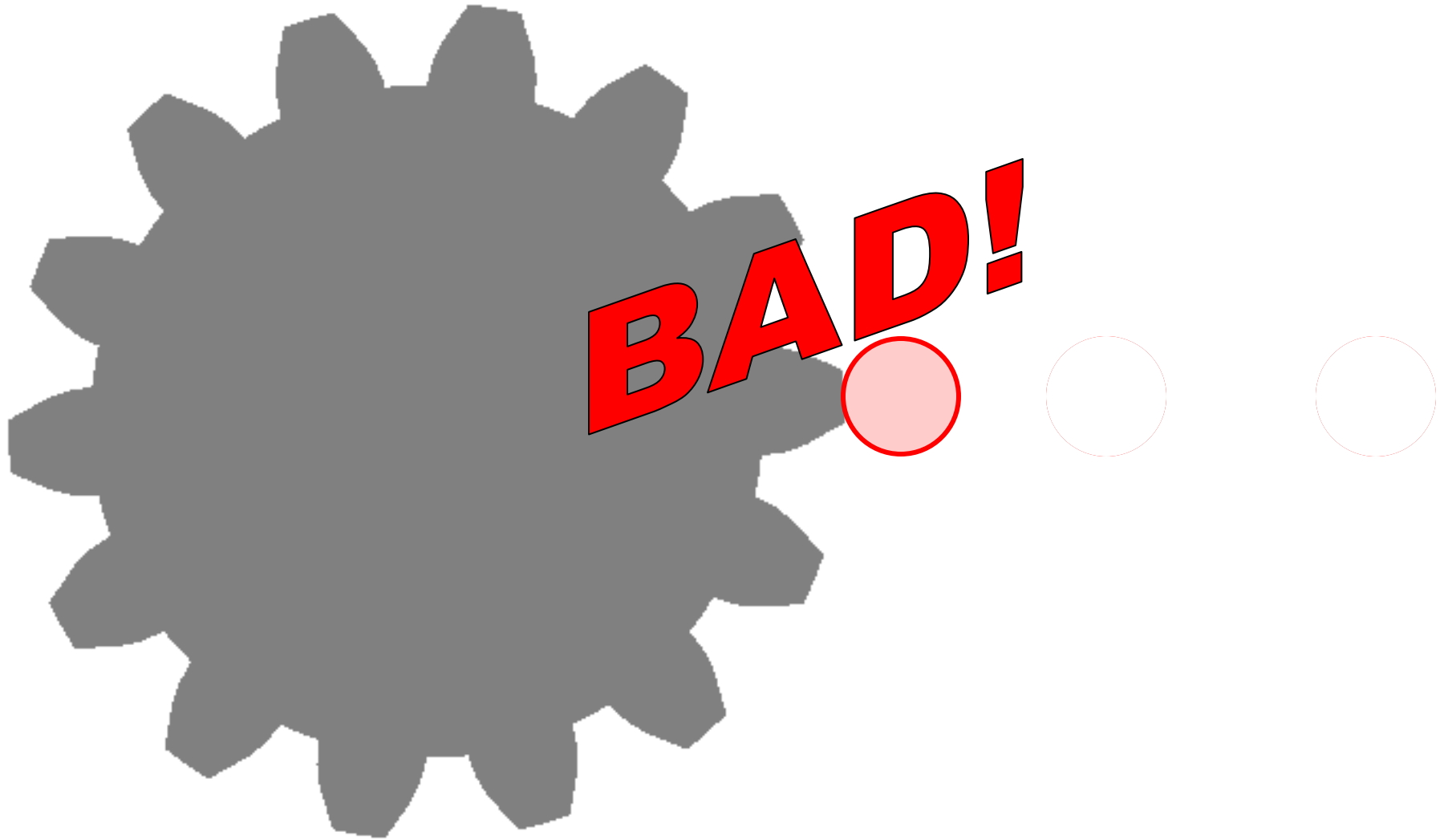
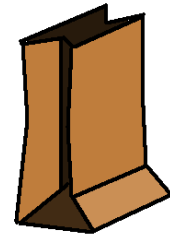
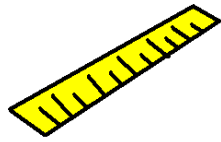


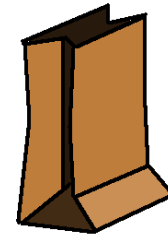
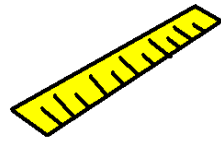
Alignment is the first task.

There is a challenge!

Orientation of the spline causes difficulty. Self-center points may hit the top of the spline square and not fall into the geometry.

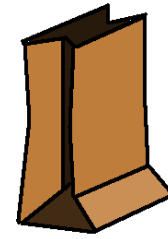
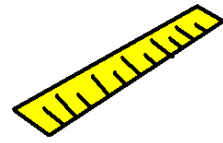






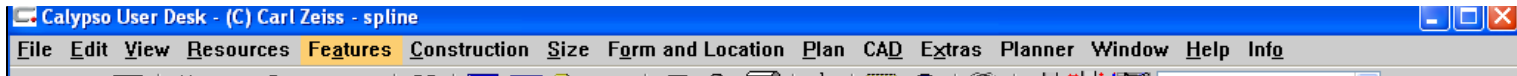
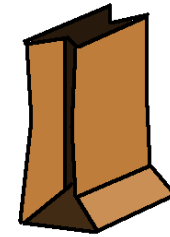
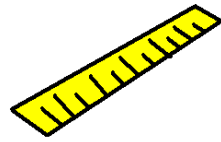
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Here's the part.





Simple Base Align

Base Alignment

spline-BS
Friday 08

Spatial Rotation +Z Axis
Plane1

Planar Rotation +X Axis
Point1

X Origin Circle1

Y Origin Circle1

Z Origin Plane1

Manual Alignment
Execute During Run As:
 Automatic Measurement
 Set base alignment to zero

Execute Manual Run Now

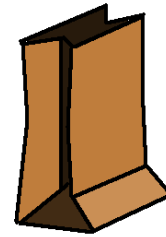
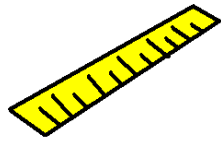
OK Reset

X = 0.9120
Y = -0.0000
Z = -0.0476

Plane1

Point1

0.2 inch



Calypso User Desk - (C) Carl Zeiss - spline

File Edit View Resources Features Construction Size Form and Location Plan CAD Extras Planner Window Help Info

Ready: Make selection or take probings

Plane1
Circle1
Point1

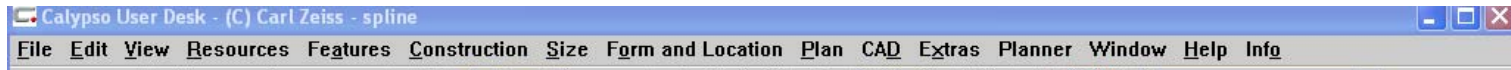
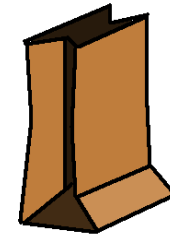
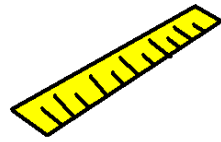
X = 0.9120
Y = -0.0000
Z = -0.0476

Plane1

Point1

0.2 inch

XYZ

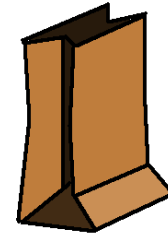
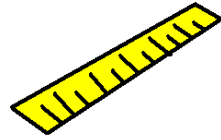


Change Point 1's evaluation to Midpoint

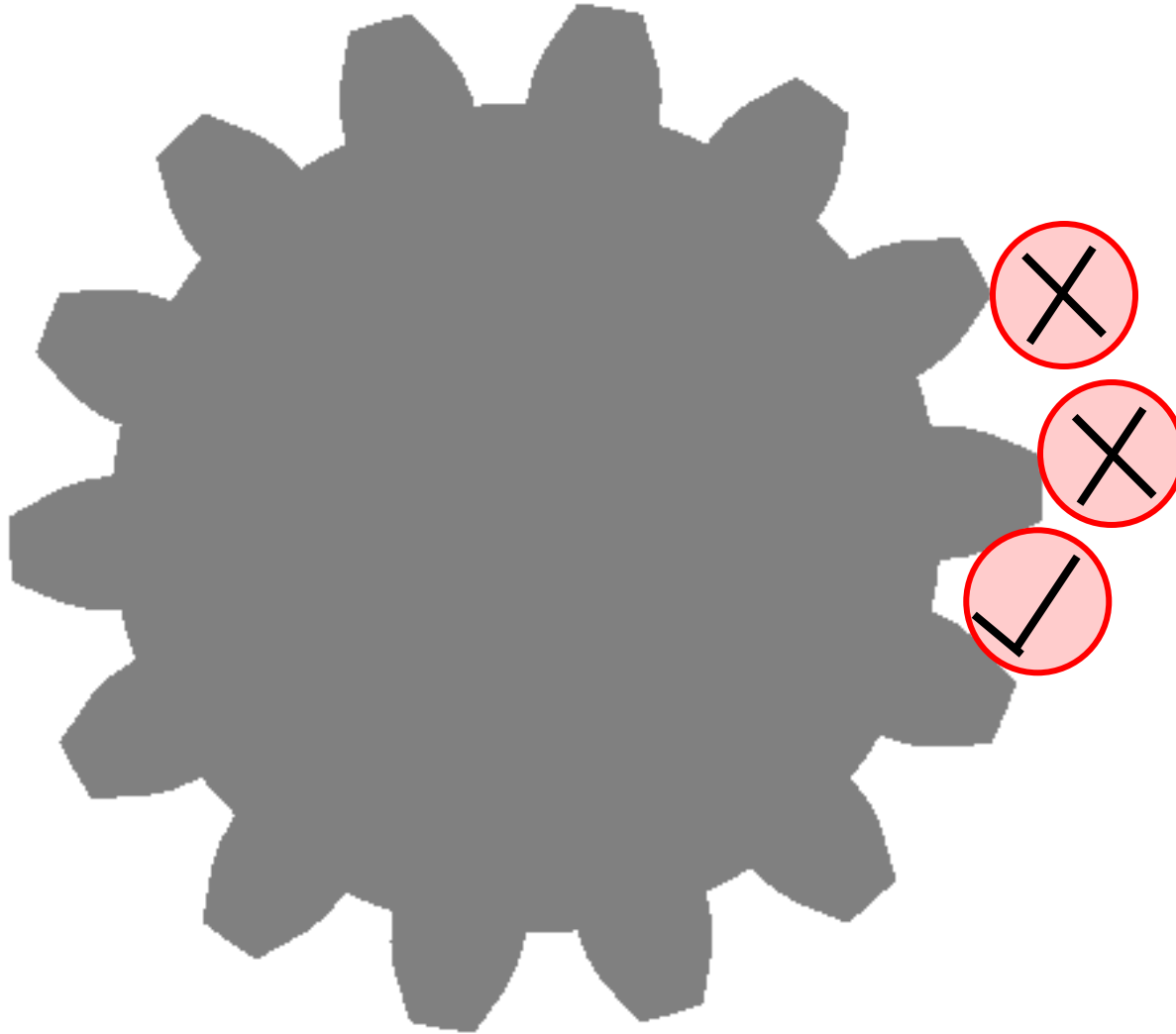
The screenshot shows the 'Evaluation - Point1' dialog box in the Calypso software. The 'Space Point Mode' dropdown menu is open, and 'Midpoint' is selected. The dialog also shows 'Preassignment for evaluation method' set to 'LSQ Feature' and 'Stylus Radius Correction' checked. The background shows a 3D model of a part with three points marked: Point1 (yellow), Point2 (green), and Point3 (blue). A coordinate system (X, Y, Z) is visible at the bottom left of the 3D view.

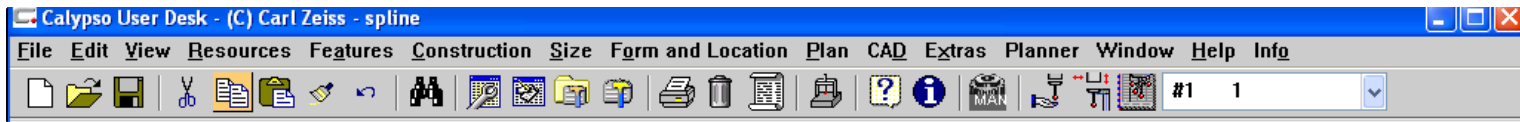
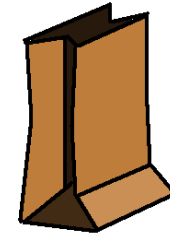
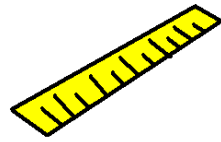
Clearance Group	Nominal	Actual
CP +Z	0.9120	0.9121
X	-0.0000	-0.0000
Y	-0.0476	-0.1141
Z	-1.0000	-1.0000
i	0.0000	0.0000
j	0.0000	0.0000
k	0.0000	0.0000

Sigma	Form	Points
0.0000	0.0000	1
Min	Point no	Point no Max

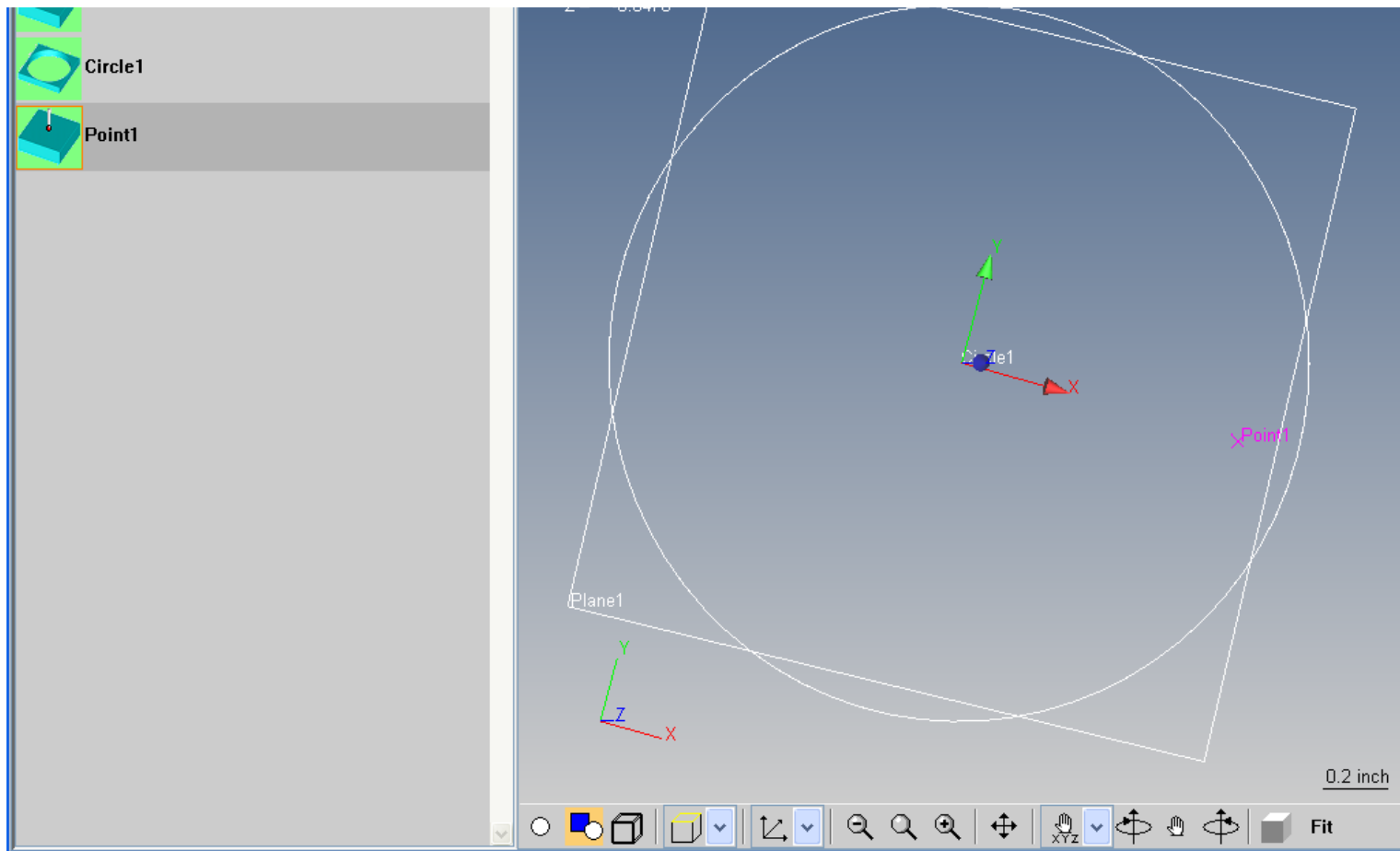


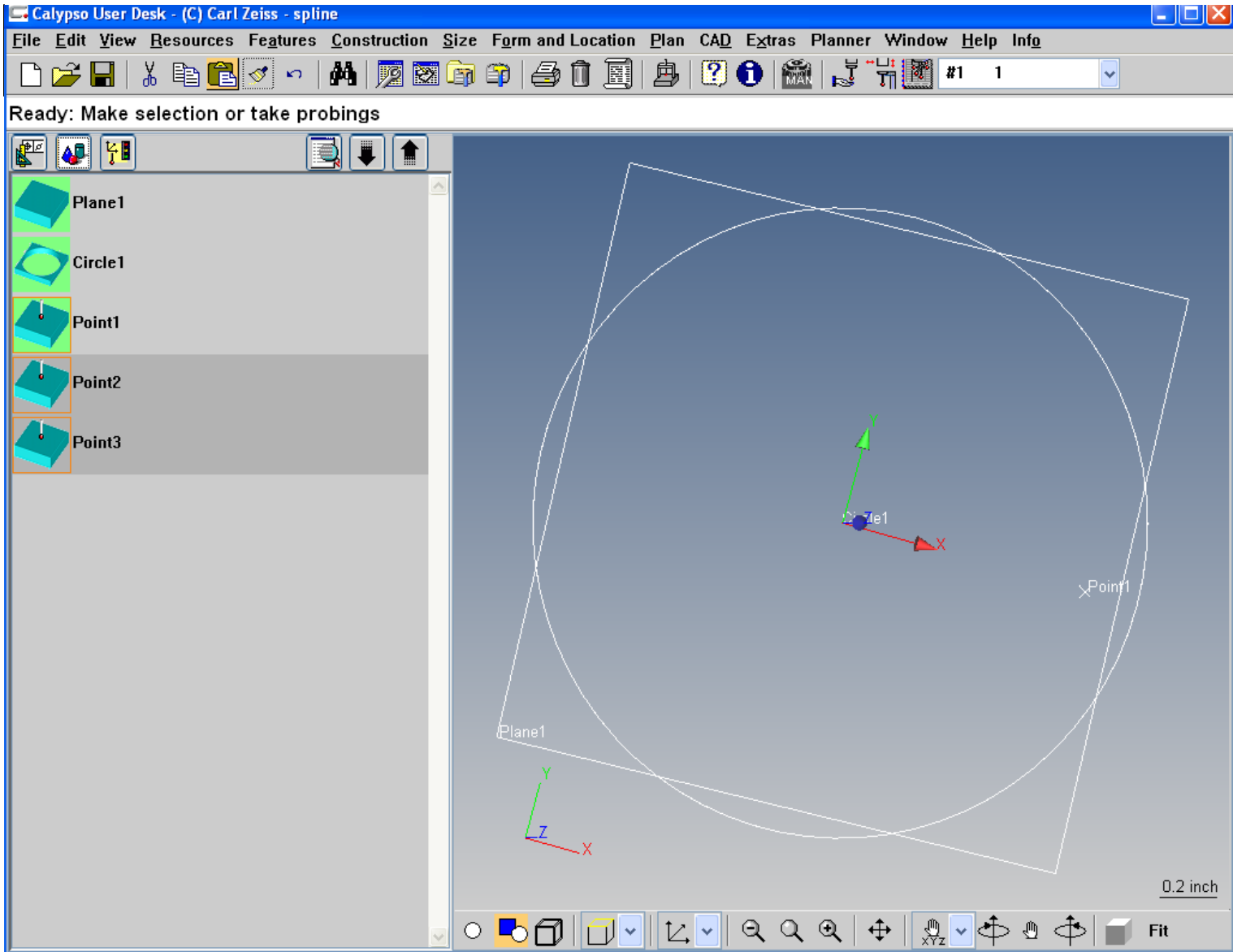
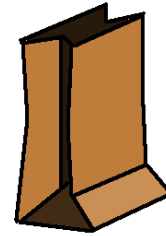
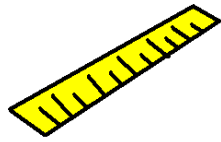
One MUST work...

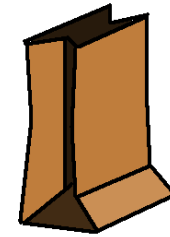
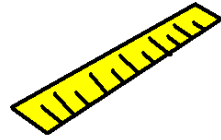




Copy and Paste Point 1 twice







Change the Y value to +/- a little.

Features Point2

Comment	Projection	Strategy
	None	Evaluation

Clearance Group Nominal Definition Alignment

CP +Z Options Base Alignment

Tolerance For:	Nominal	Actual
<input type="checkbox"/> X	0.9120	
<input type="checkbox"/> Y	0.1000	
<input type="checkbox"/> Z	-0.0476	
i	-1.0000	
j	0.0000	
k	0.0000	

Sigma	Form	Points
Min	Point no	Point no Max

OK Reset

Features Point3

Comment	Projection	Strategy
	None	Evaluation

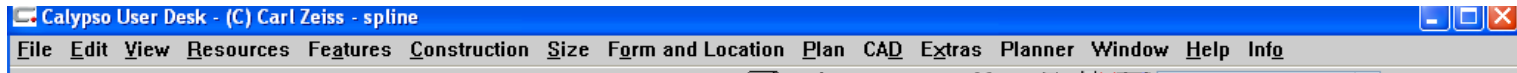
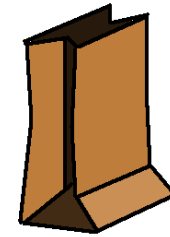
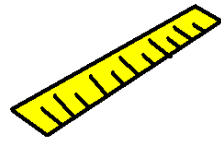
Clearance Group Nominal Definition Alignment

CP +Z Options Base Alignment

Tolerance For:	Nominal	Actual
<input type="checkbox"/> X	0.9120	
<input type="checkbox"/> Y	-0.1000	
<input type="checkbox"/> Z	-0.0476	
i	-1.0000	
j	0.0000	
k	0.0000	

Sigma	Form	Points
Min	Point no	Point no Max

OK Reset



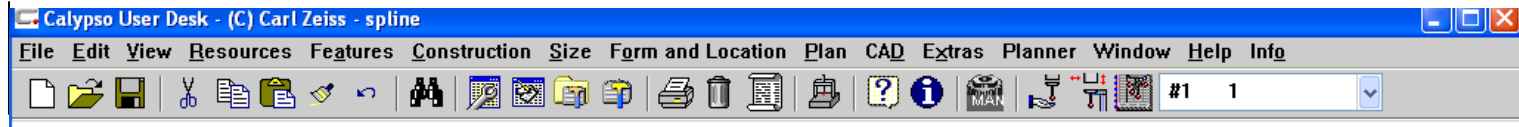
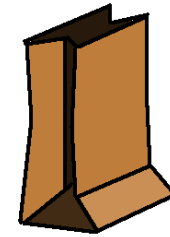
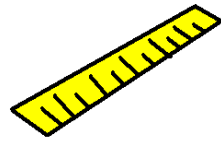
Using MAX Feature since an ID spline

The screenshot shows the 'Features' dialog box for 'Maximum Feature1' in the Calypso software. The dialog box is divided into several sections:

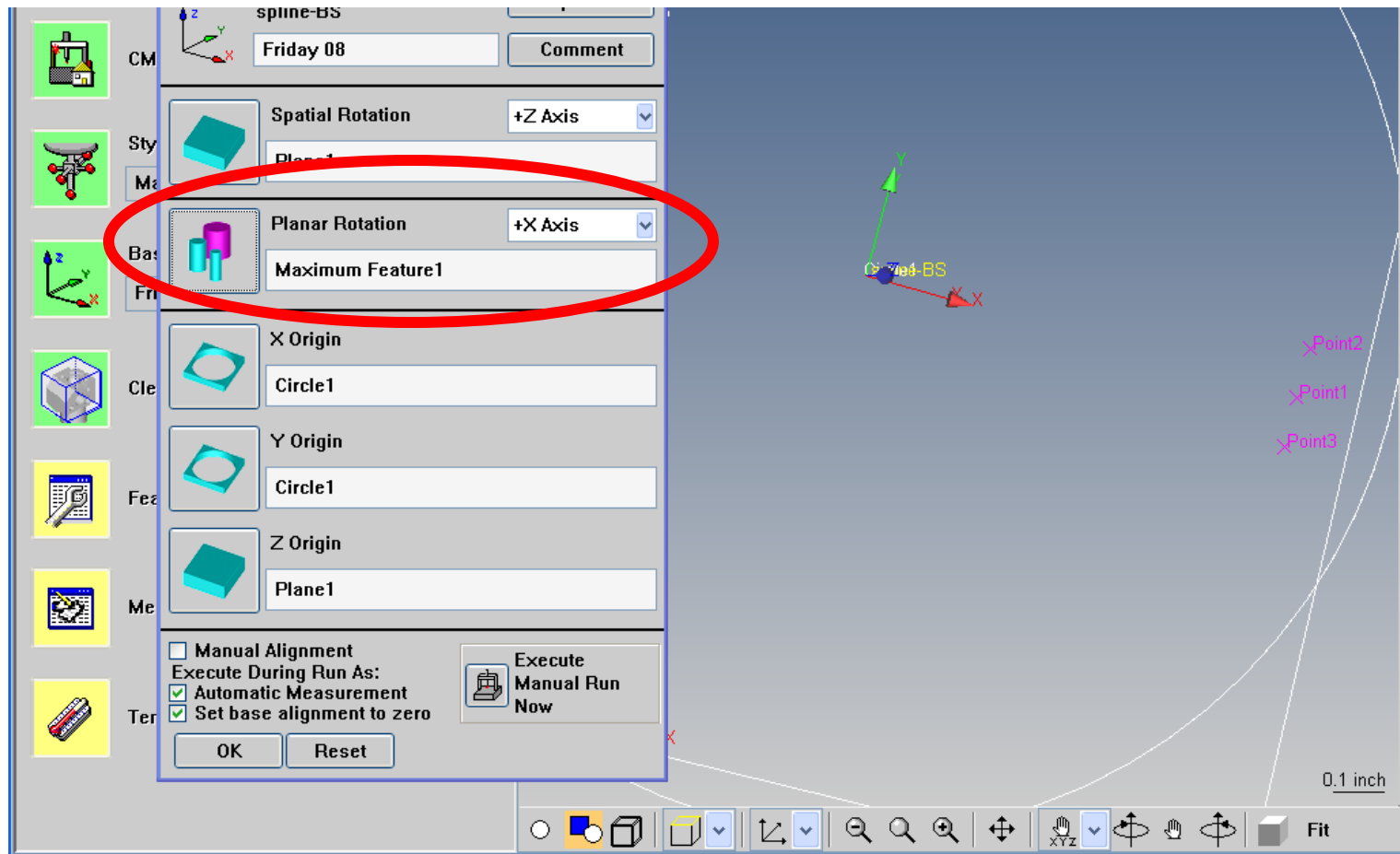
- Alignment:** Set to 'Base Alignment'.
- Select existing Features:** A list containing 'Point1', 'Point2', and 'Point3'.
- Tolerance For:** A table with columns for 'Nominal' and 'Actual' values.

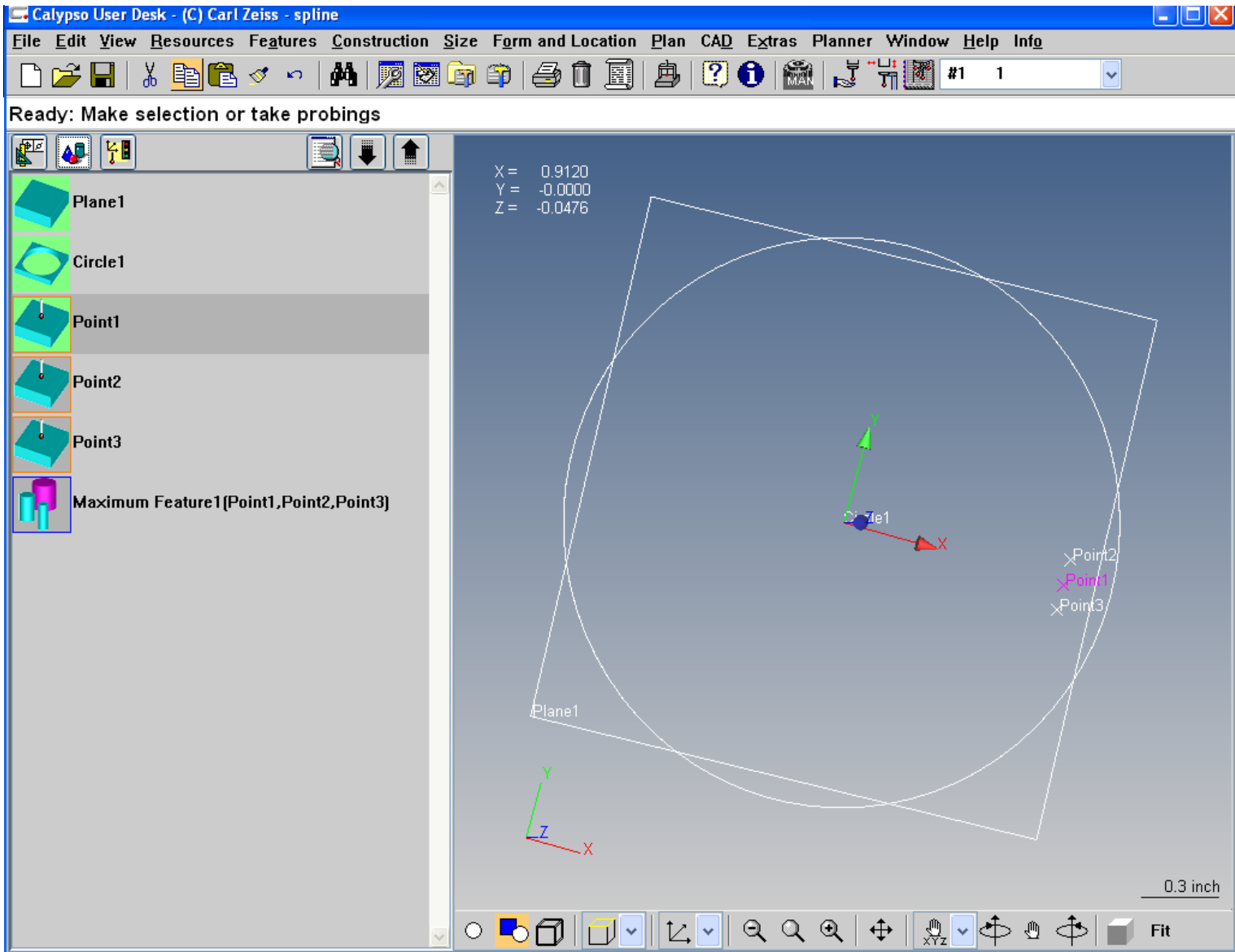
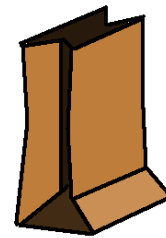
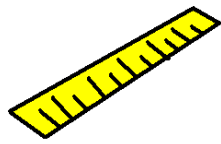
Tolerance For:	Nominal	Actual
<input type="checkbox"/> X	0.9120	
<input type="checkbox"/> Y	-0.0000	
<input type="checkbox"/> Z	-0.0476	
i	-1.0000	
j	0.0000	
k	0.0000	

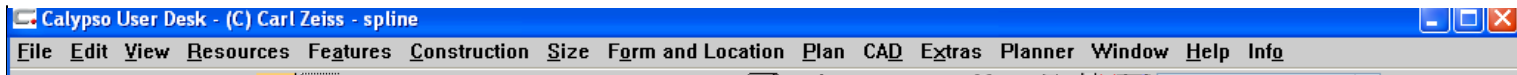
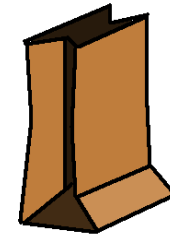
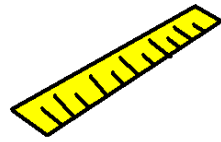
The background shows a 3D model of a part with a circle and three points (Point1, Point2, Point3) defined. The scale is 0.1 inch.



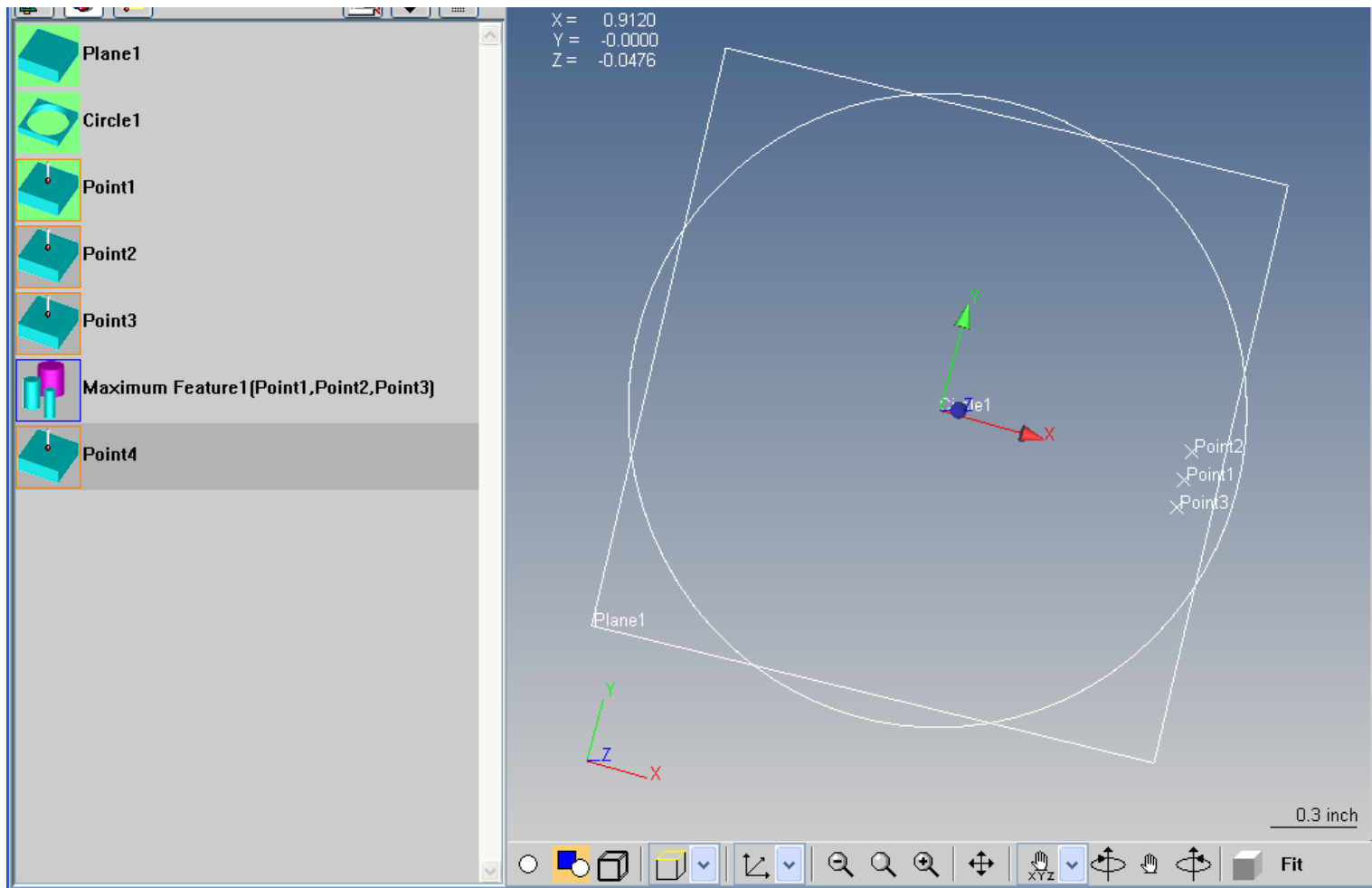
Change Alignment to Max Feature for Planar

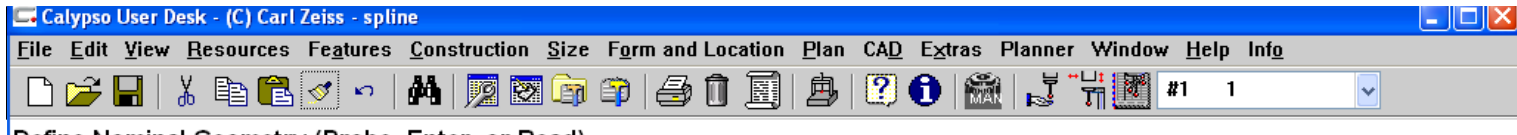
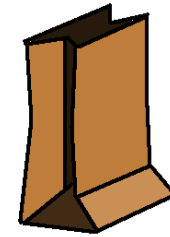
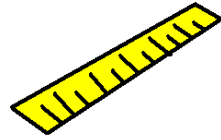




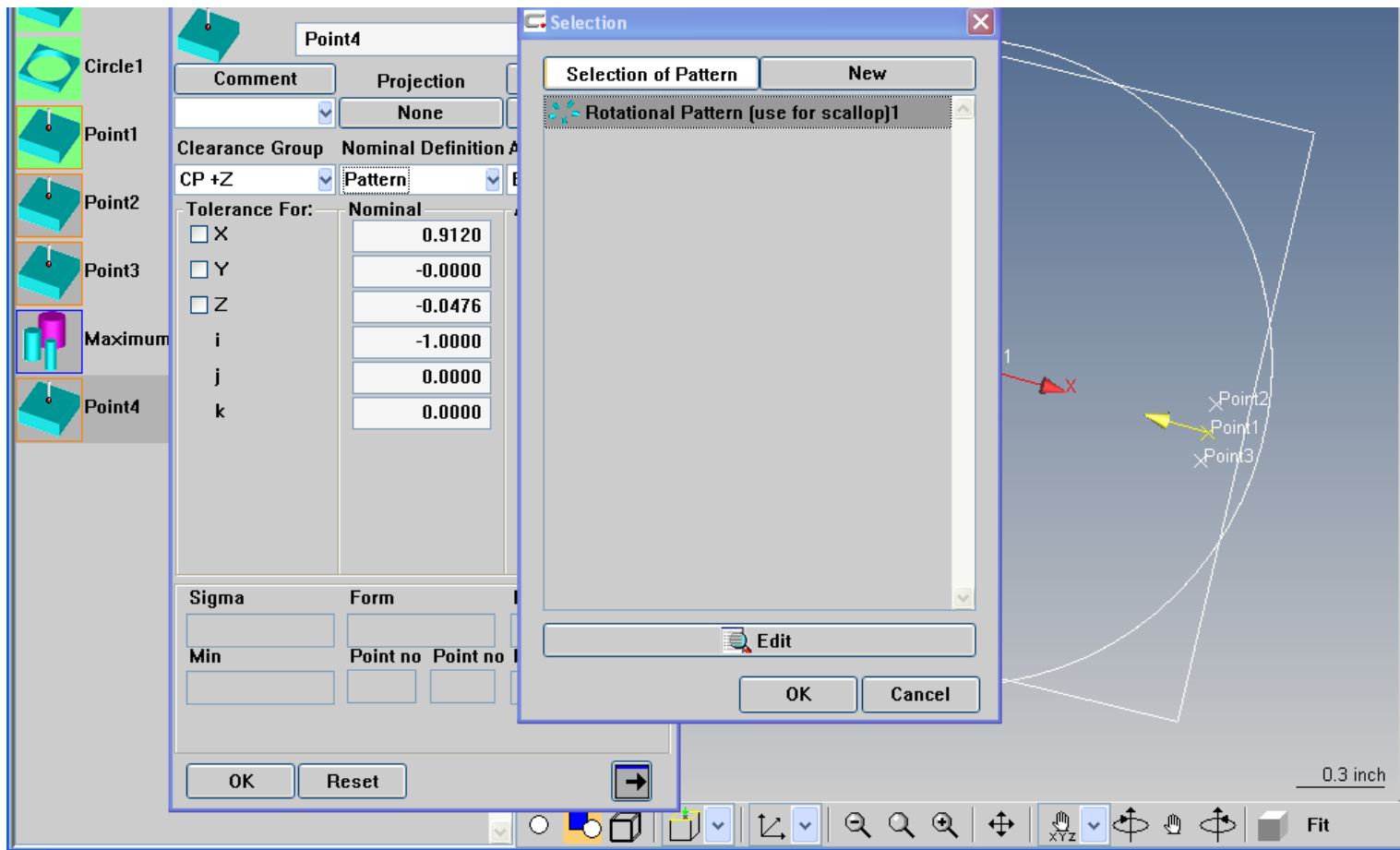


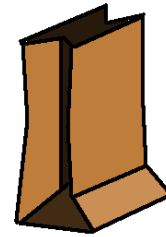
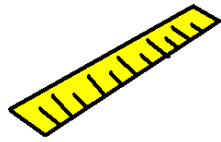
Copy and Paste POINT 1! $Y=0!$





Apply appropriate Pattern to the copied Point 1





Calypso User Desk - (C) Carl Zeiss - spline

File Edit View Resources Features Construction Size Form and Location Plan CAD Extras Planner Window Help Info

Ready: Make selection or take probings

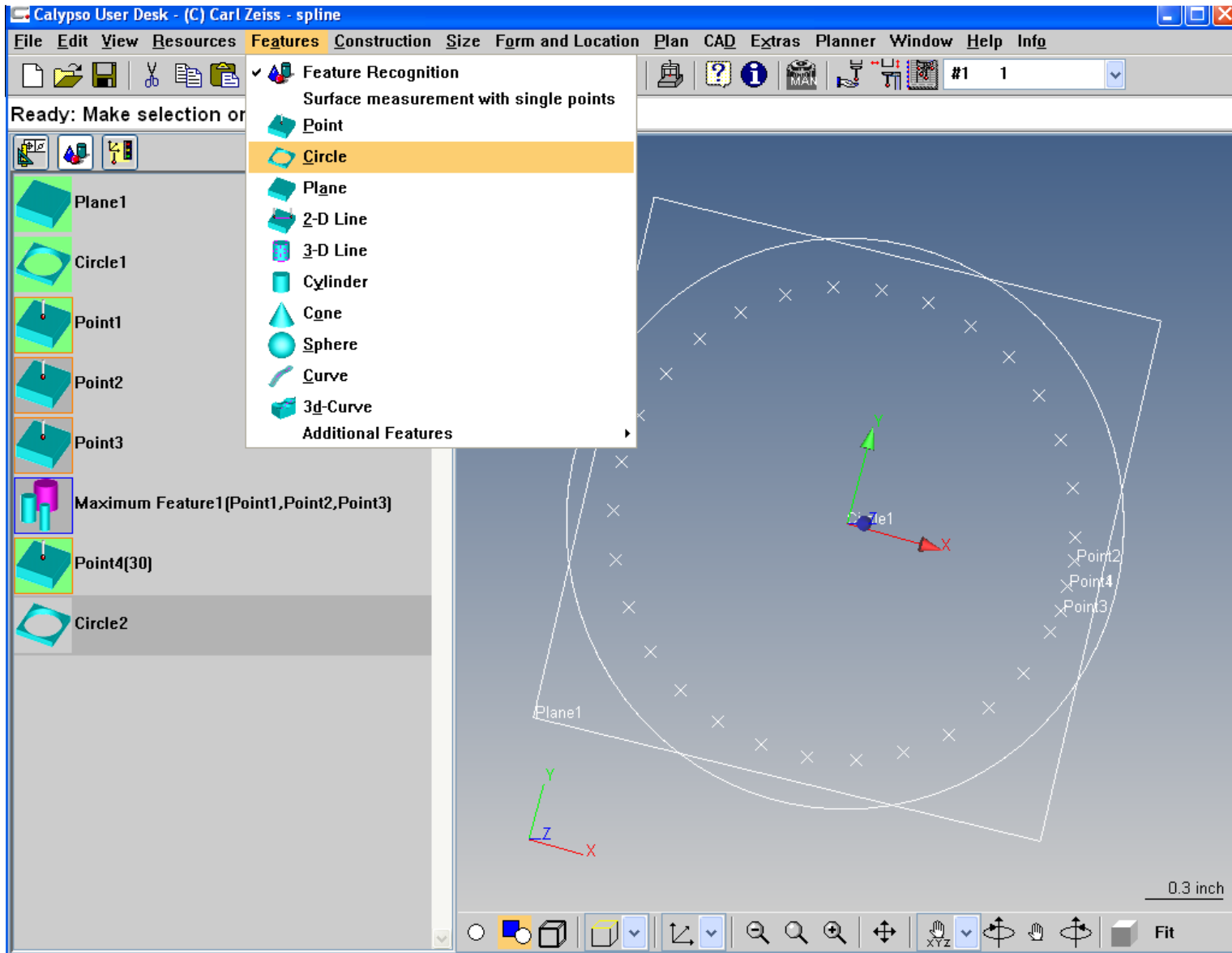
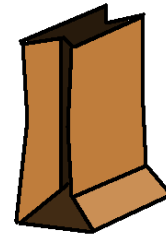
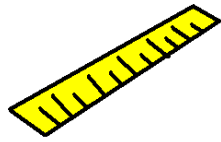
X = 0.9120
Y = -0.0000
Z = -0.0476

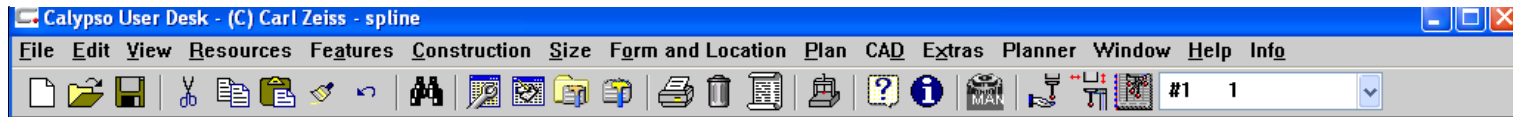
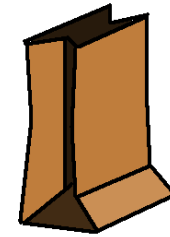
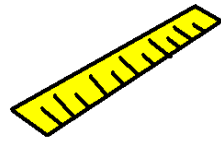
Plane1
Circle1
Point1
Point2
Point3
Maximum Feature1(Point1,Point2,Point3)
Point4(30)

Plane1
Point2
Point4
Point3

0.3 inch

Fit





Recall the Patterned Point into a Circle

The screenshot displays the 'Circle2' feature configuration panel in the Calypso software. The 'Nominal Definition' section is set to 'Recall'. The 'Elements' list on the right includes Plane1, Circle1, Point1, Point2, Point3, Maximum Feature1, and Point4(1-30). The 'Evaluation settings' section shows 'LSQ Feature' and 'No Filter' selected.

Tolerance For:	Nominal
<input type="checkbox"/> X	0.0000
<input type="checkbox"/> Y	0.0000
<input type="checkbox"/> Z	0.0000
<input type="checkbox"/> D	0.0000
A1- X/Z	0.0000
A2- Y/Z	0.0000
Space Axis	Z
Depth	0.0000
Start Angle	0.0000
Angle segment	360.0000

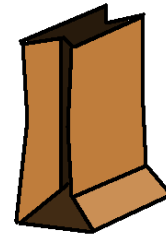
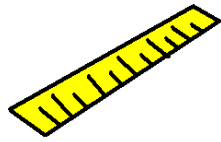
Elements

- Plane1
- Circle1
- Point1
- Point2
- Point3
- Maximum Feature1
- Point4(1-30)

Evaluation settings

- LSQ Feature
- No Filter
- No Constraint
- No Outlier

Scale: 0.3 inch



Calypso User Desk - (C) Carl Zeiss - spline

File Edit View Resources Features Construction Size Form and Location Plan CAD Extras Planner Window Help Info

Please Probe Point 1

Features

Circle2

Comment Projection Strategy

Circle None Evaluation

Clearance Group Nominal Definition Alignment

CP +Z Recall Base Alignment

Tolerance For:

	Nominal	Actual
X	-0.0000	0.0002
Y	0.0000	-0.0005
Z	-0.0476	-0.0471
D	1.8241	1.8137
A1- X/Z	0.0000	0.0000
A2- Y/Z	0.0000	0.0000

Space Axis Z Z

Depth 0.0000 0.0000

Start Angle 0.0000 0.0000

Angle segment 360.0000 360.0000

Sigma Form Points

0.0010	0.0035	30
Min	Point no	Point no
-0.0019	16	21
		Max
		0.0016

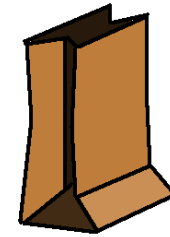
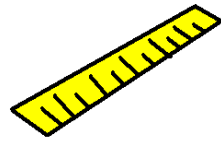
OK Reset

0.0000
0.0000
0.0476
1.8241

Point1
Point2
Point3
Point4

0.3 inch

Fit



Do a Circular Pitch on the Patterned Point

Select Feature

Circular Pitch1

Circular Pitch

Circular Pitch1

Comment

Feature 1

Point4(*)

Unit of the Angle Characteristics (fp Fp fu)

Arc Length [in]

Angle [°]

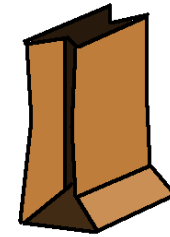
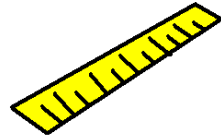
Tolerance Classes

Fine

	Upper Tolerance	Lower Tolerance
<input checked="" type="checkbox"/> Individual Pitch Error fp	0.0020	-0.0020
<input checked="" type="checkbox"/> Cumulative Pitch Error Fp	0.0020	-0.0020
<input checked="" type="checkbox"/> Pitch error fu	0.0020	-0.0020
<input checked="" type="checkbox"/> Fr Rad.Runout	0.0020	-0.0020
<input checked="" type="checkbox"/> Fre Roundness	0.0020	-0.0020

OK Reset

0.3 inch



Setup a Graphics Element for the Circular Pitch

Select Feature

Circular Pitch1

Graphics Element1

Graphics Element

Graphics Element1

Comment

Graphic

Allocation List:

	Characteristics	Single Templ	
1 ▶	Circular Pitch1	default	<input checked="" type="checkbox"/>

Add line Remove line

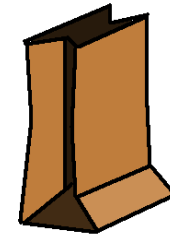
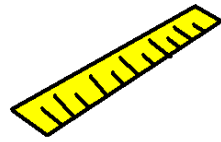
Graphics Form
CZ_Pitch_P.ptx

Orientation
 Portrait
 Landscape

Graphics Arrangement
Vertical

OK Reset

0.3 inch



Calculate your "over pin" diameter

Select Feature

- Circular Pitch1
- Graphics Element1
- Result Element1

Result Element

Result Element1 Comment

Fine

Nominal 0.0000

ISO286

Upper Tolerance 0.0020 None

Lower Tolerance -0.0020 None

Dimension

Length Angle Number

Calculate Formula

Formula

`getActual("Circle2").diameter+getProbe().diam`

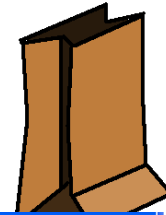
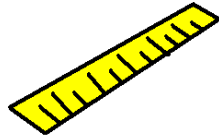
Result Input

Dialog Text

Actual 9.8137

OK Reset

0.3 inch

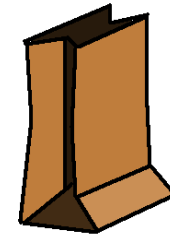
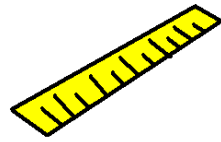


ZEISS Calypso

Measurement Plan spline Date September 10, 2008
 Drawing No. * drawingno * Time 4:53:45 pm
 Operator Master CMM Simulation

DONE!!!

Identifier	Lower Tol. [In]	Upper Tol. [In]	MinInd	Min Dev. [In]	MaxInd	Max Dev. [In]
Circular Pitch1 - fp	-0.0020	0.0020	12	-0.0007	14	0.0013
Circular Pitch1 - fp	-0.0020	0.0020	5	-0.0013	18	0.0016
Circular Pitch1 - fu	-0.0020	0.0020	15	-0.0014	13	0.0010
Circular Pitch1 - Fr	-0.0020	0.0020	14	-0.0026	20	0.0016
Circular Pitch1 - Fre	-0.0020	0.0020	14	-0.0022	19	0.0013



LUNCH 'N LEARN

+

Spline Measurements...

with Calypso!

Any Questions?