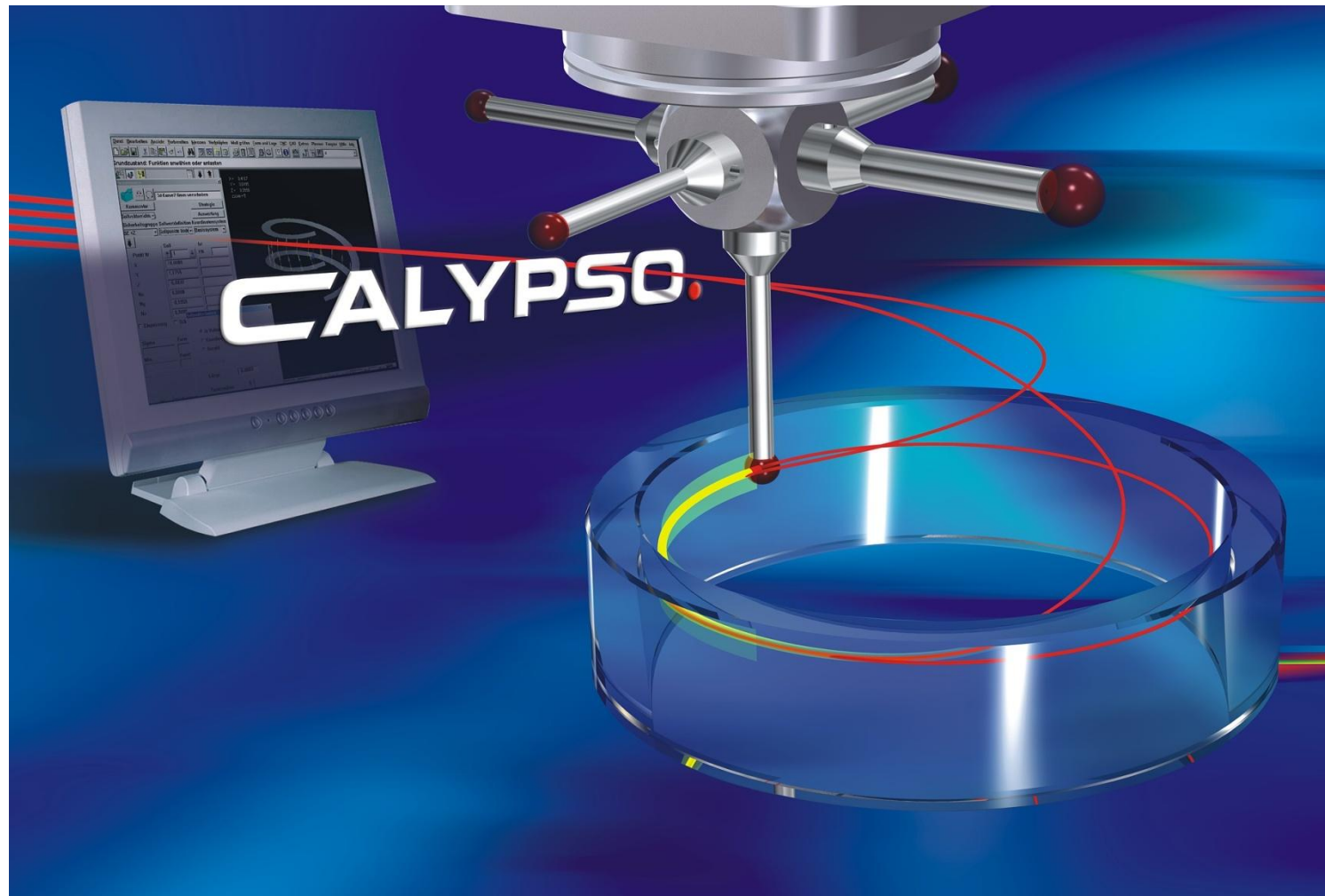


Calypso PCM Overview



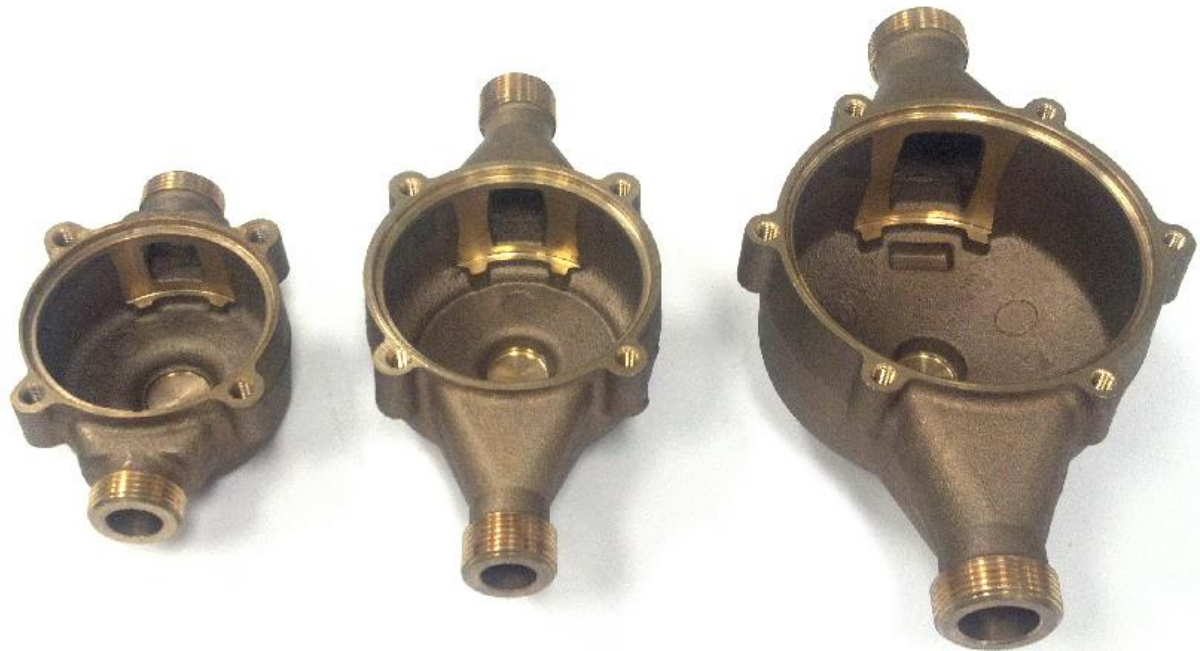




Calypso with PCM (Parameter Coded Measurements) allows for “Family of Part” programming.

This means that one Calypso program can measure an entire catalog of similar parts with varying size or complexity.

Logic can be included with a basic inspection plan to load individual measurement parameters based on part geometry.

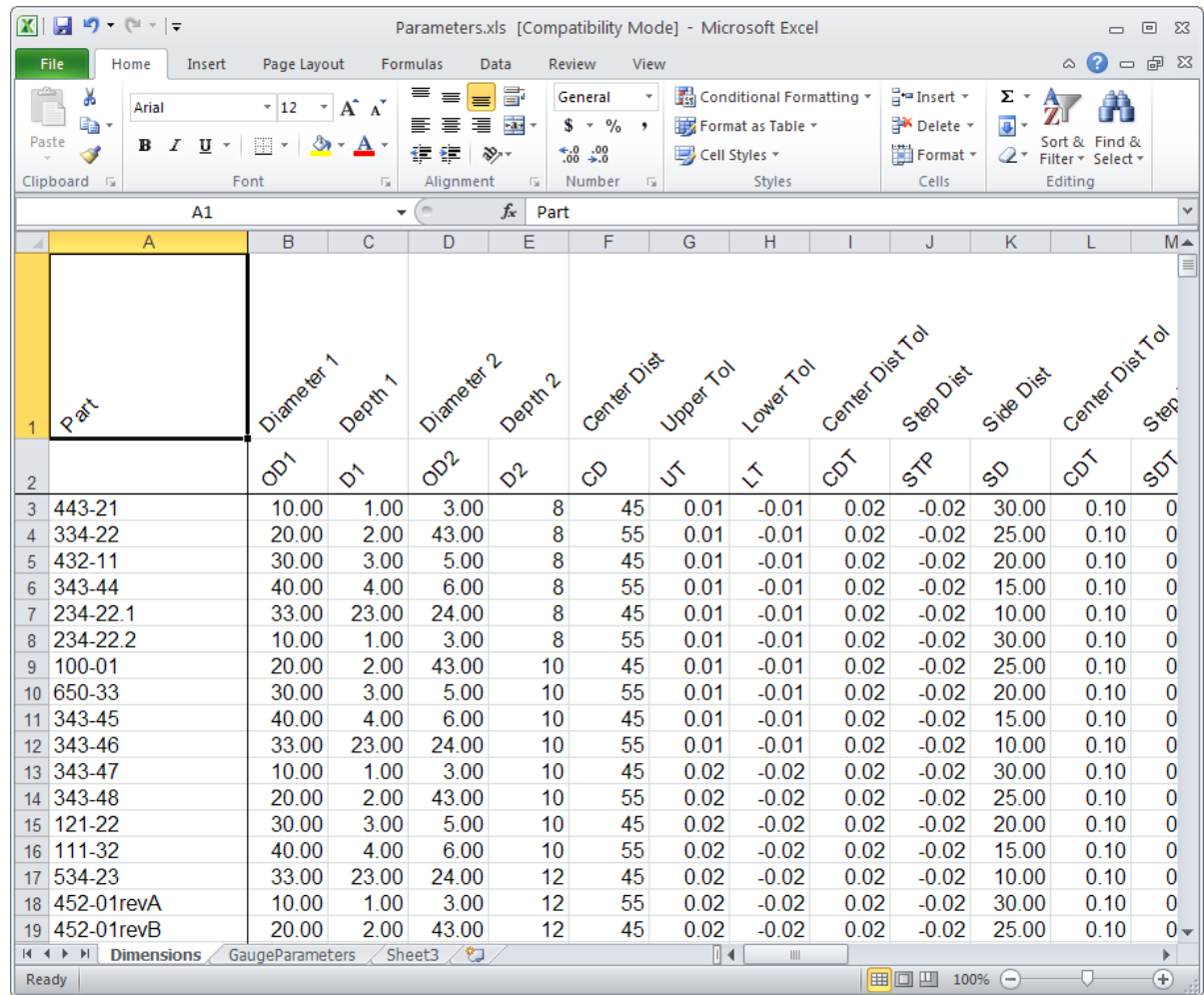


Excel Sheet containing Part Parameters

Utilizing PCM, family of part data stored in an excel sheet can be read into a Calypso Measurement Plan.

In a case like this, an operator will select the part number at the beginning of the run, and the excel sheet will be read to determine the parameters for the indicated part.

These parameters are then converted to a PCM file that is read into Calypso. The program is automatically modified to measure the part based upon the new parameter data.



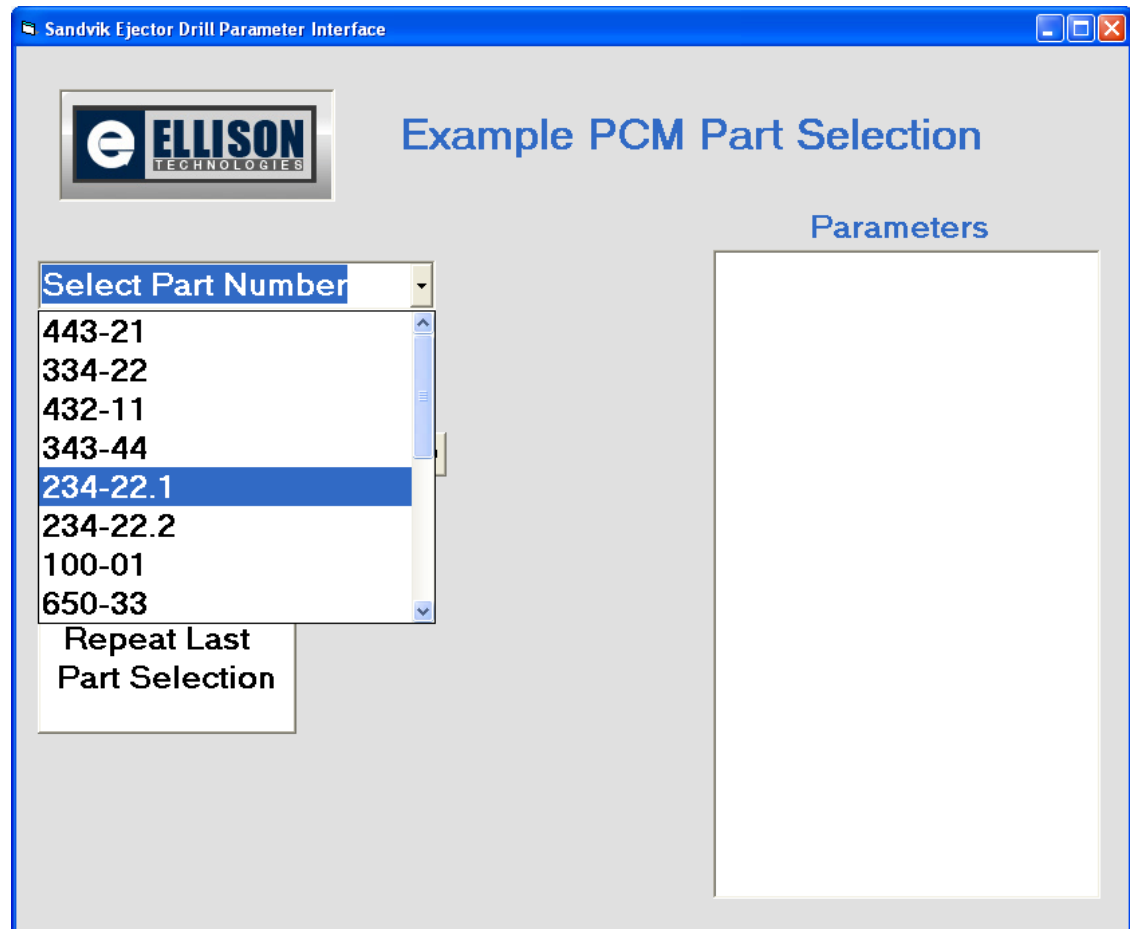
Part	Diameter 1	Depth 1	Diameter 2	Depth 2	Center Dist	Upper Tol	Lower Tol	Center Dist Tol	Step Dist	Side Dist	Center Dist Tol	Step
	OD1	D1	OD2	D2	CD	UT	LT	CDT	STP	SD	CDT	SDT
443-21	10.00	1.00	3.00	8	45	0.01	-0.01	0.02	-0.02	30.00	0.10	0
334-22	20.00	2.00	43.00	8	55	0.01	-0.01	0.02	-0.02	25.00	0.10	0
432-11	30.00	3.00	5.00	8	45	0.01	-0.01	0.02	-0.02	20.00	0.10	0
343-44	40.00	4.00	6.00	8	55	0.01	-0.01	0.02	-0.02	15.00	0.10	0
234-22.1	33.00	23.00	24.00	8	45	0.01	-0.01	0.02	-0.02	10.00	0.10	0
234-22.2	10.00	1.00	3.00	8	55	0.01	-0.01	0.02	-0.02	30.00	0.10	0
100-01	20.00	2.00	43.00	10	45	0.01	-0.01	0.02	-0.02	25.00	0.10	0
650-33	30.00	3.00	5.00	10	55	0.01	-0.01	0.02	-0.02	20.00	0.10	0
343-45	40.00	4.00	6.00	10	45	0.01	-0.01	0.02	-0.02	15.00	0.10	0
343-46	33.00	23.00	24.00	10	55	0.01	-0.01	0.02	-0.02	10.00	0.10	0
343-47	10.00	1.00	3.00	10	45	0.02	-0.02	0.02	-0.02	30.00	0.10	0
343-48	20.00	2.00	43.00	10	55	0.02	-0.02	0.02	-0.02	25.00	0.10	0
121-22	30.00	3.00	5.00	10	45	0.02	-0.02	0.02	-0.02	20.00	0.10	0
111-32	40.00	4.00	6.00	10	55	0.02	-0.02	0.02	-0.02	15.00	0.10	0
534-23	33.00	23.00	24.00	12	45	0.02	-0.02	0.02	-0.02	10.00	0.10	0
452-01revA	10.00	1.00	3.00	12	55	0.02	-0.02	0.02	-0.02	30.00	0.10	0
452-01revB	20.00	2.00	43.00	12	45	0.02	-0.02	0.02	-0.02	25.00	0.10	0

Operator interface to choose a part at beginning of program run

Utilizing PCM, family of part data stored in an excel sheet can be read into a Calypso Measurement Plan.

In a case like this, an operator will select the part number at the beginning of the run, and the excel sheet will be read to determine the parameters for the indicated part.

These parameters are then converted to a PCM file that is read into Calypso. The program is automatically modified to measure the part based upon the new parameter data.

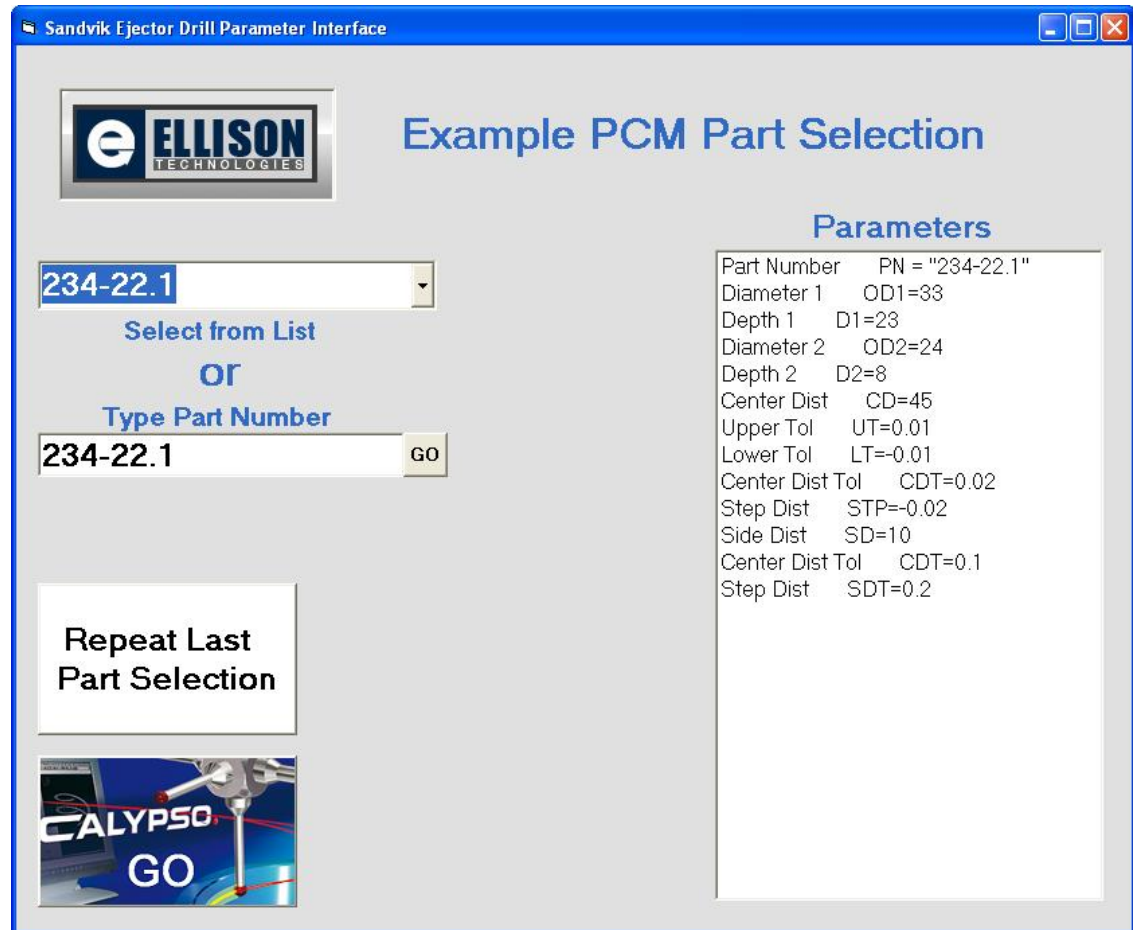


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Sandvik Ejector Drill Parameter Interface

 Example PCM Part Selection

Parameters

Part Number	PN = "234-22.1"
Diameter 1	OD1=33
Depth 1	D1=23
Diameter 2	OD2=24
Depth 2	D2=8
Center Dist	CD=45
Upper Tol	UT=0.01
Lower Tol	LT=-0.01
Center Dist Tol	CDT=0.02
Step Dist	STP=-0.02
Side Dist	SD=10
Center Dist Tol	CDT=0.1
Step Dist	SDT=0.2

234-22.1


Select from List

OR

Type Part Number

234-22.1 GO

Repeat Last Part Selection

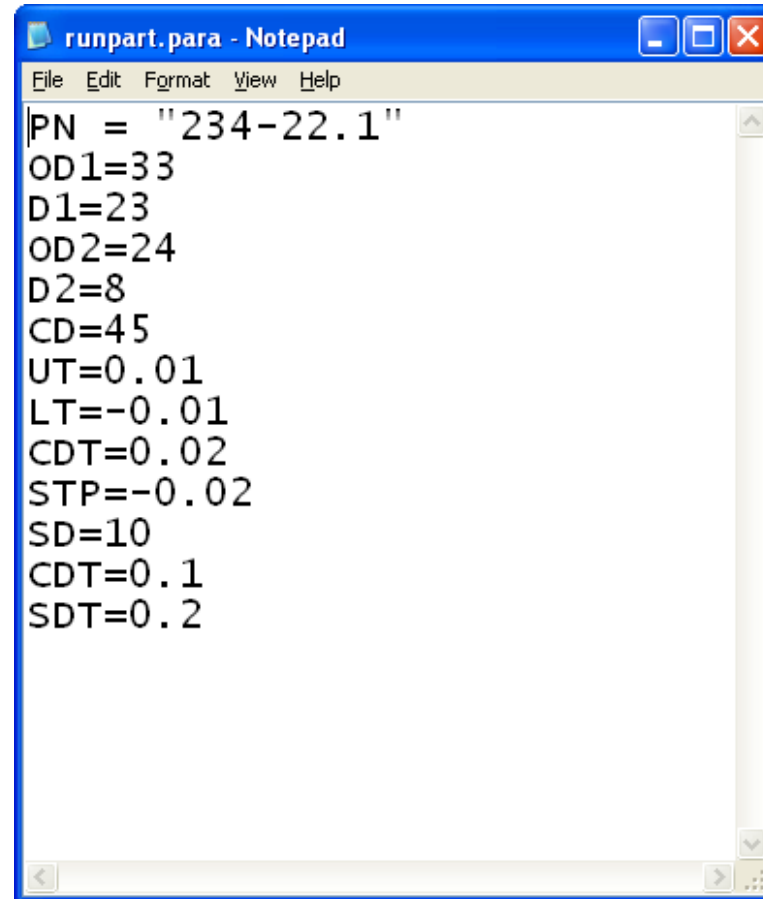


A PCM file that is read into Calypso developed from the Excel Spreadsheet

Utilizing PCM, family of part data stored in an excel sheet can be read into a Calypso Measurement Plan.

In a case like this, an operator will select the part number at the beginning of the run, and the excel sheet will be read to determine the parameters for the indicated part.

These parameters are then converted to a PCM file that is read into Calypso. The program is automatically modified to measure the part based upon the new parameter data.

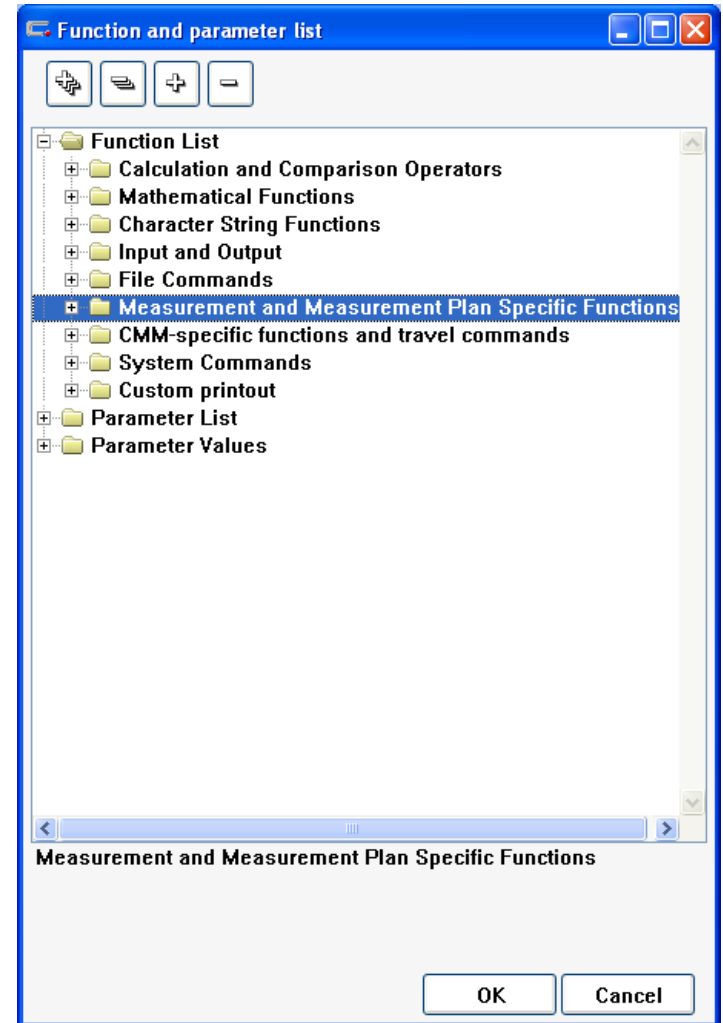
A screenshot of a Notepad window titled 'runpart.para - Notepad'. The window contains a list of parameters for a measurement plan, such as part number, diameters, and tolerances.

```
runpart.para - Notepad
File Edit Format View Help
PN = "234-22.1"
OD1=33
D1=23
OD2=24
D2=8
CD=45
UT=0.01
LT=-0.01
CDT=0.02
STP=-0.02
SD=10
CDT=0.1
SDT=0.2
```

With PCM, although developed primarily for “Families of Parts”, the functionality is nearly endless, allowing for complete customization of your Calypso Program.

A total of over 150 PCM commands are available for use including:

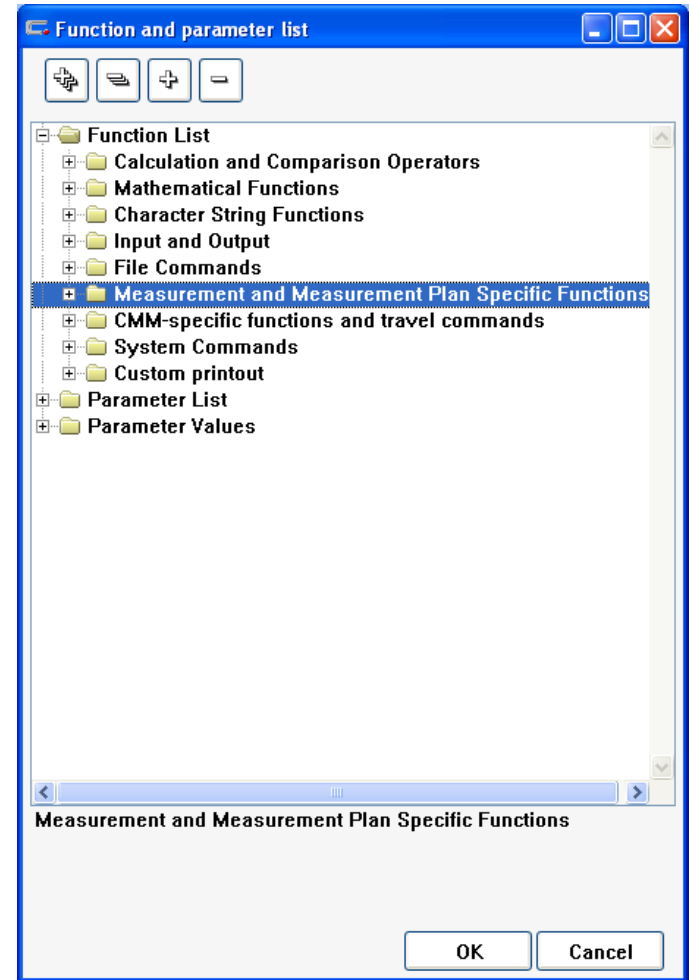
- Mathematical Functions including comparison operators and full trigonometry calculations
- Character String Functions including functionality to parse long input strings
- Input/Output commands to display messages to operators and many different options to inquire input from operators at runtime
- File Commands to read from and write to external files



With PCM, although developed primarily for “Families of Parts”, the functionality is nearly endless, allowing for complete customization of your Calypso Program.

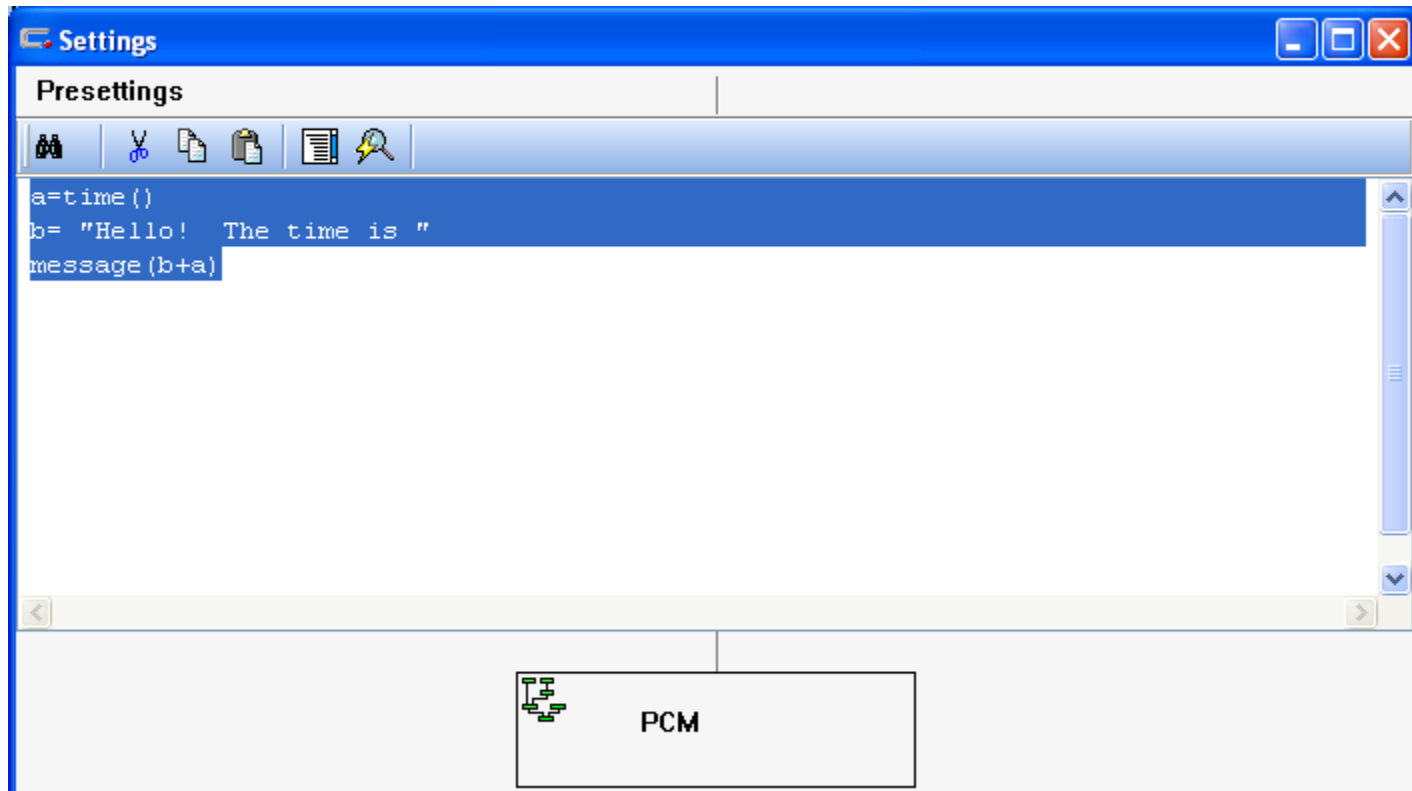
A total of over 150 PCM commands are available for use including:

- Measurement Specific Functions which provide access to individual properties of measured features, stylus systems, and alignments
- CMM-Specific Functions including the ability to terminate an inspection or position the CMM at given coordinates
- System Commands that give access to items like time and time and date, as well as the ability to run external programs (.bat and .exe files)
- Custom Printout commands give access to the printout and allows for setting and testing report header information



PCM code is very similar to many mainstream programming languages.

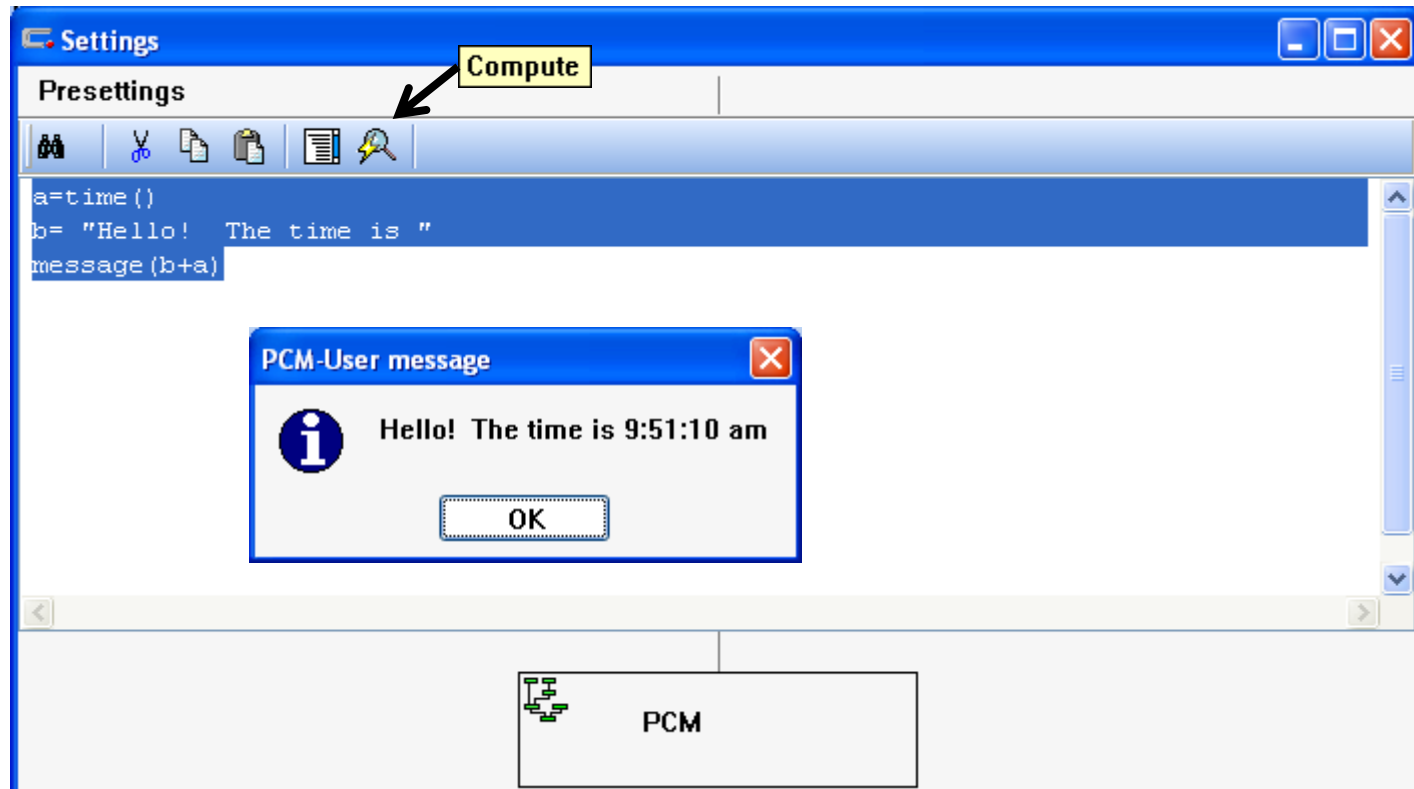
For Example, someone familiar with Macro programming in Excel will be able to easily apply their knowledge to PCM.

A screenshot of a software window titled 'Settings'. The window has a blue title bar with standard Windows window controls (minimize, maximize, close). Below the title bar is a 'Presettings' section with a toolbar containing icons for help, copy, paste, print, and search. The main area of the window is a text editor with a blue background, containing the following code:

```
a=time()  
b= "Hello! The time is "  
message (b+a)
```

At the bottom of the window, there is a small icon of a green tree structure next to a box labeled 'PCM'.

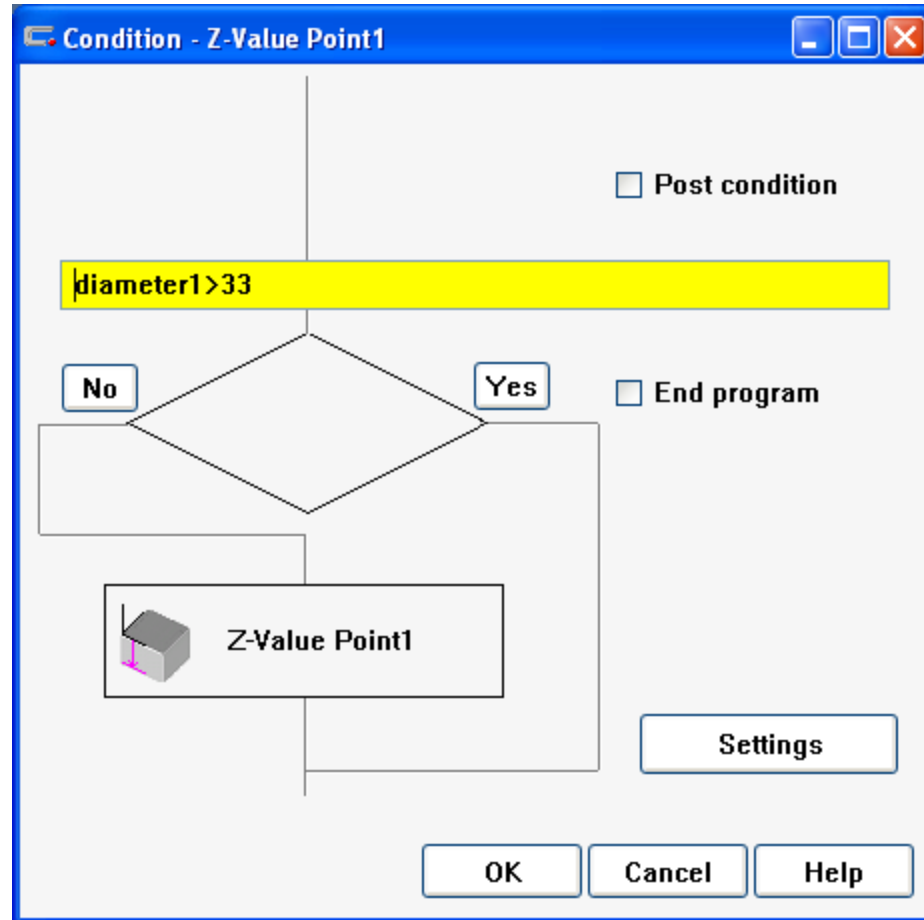
Code can be tested anytime with the “COMPUTE” function.



PCM can be used in “CONDITIONAL BRANCHING” to skip over portions of a program.

In this example, the Z-Value of Point1 will NOT be executed if “diameter1” is greater than 33.

The visual interface of conditional branching makes logic testing easy to understand.

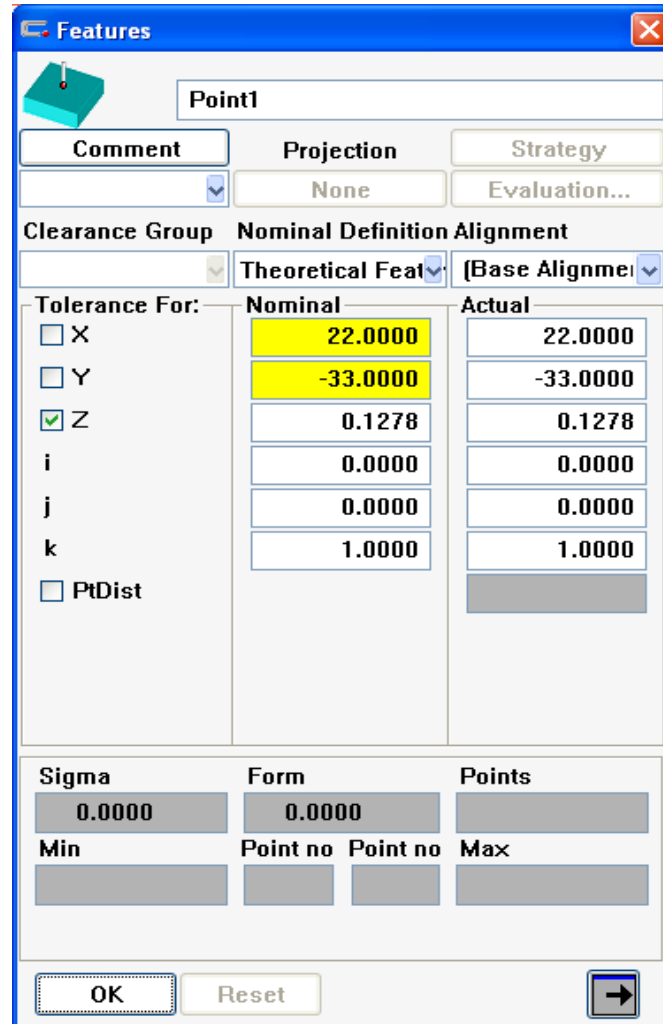


Inside of features, ANY number can be set to be a variable.

This includes, XYZ values, Scanning Speed, Number of Points, Diameters, anything!

It is easy to see what values have parameters – they are highlighted yellow.

Hovering the mouse over a yellow field will show what PCM variables are used.



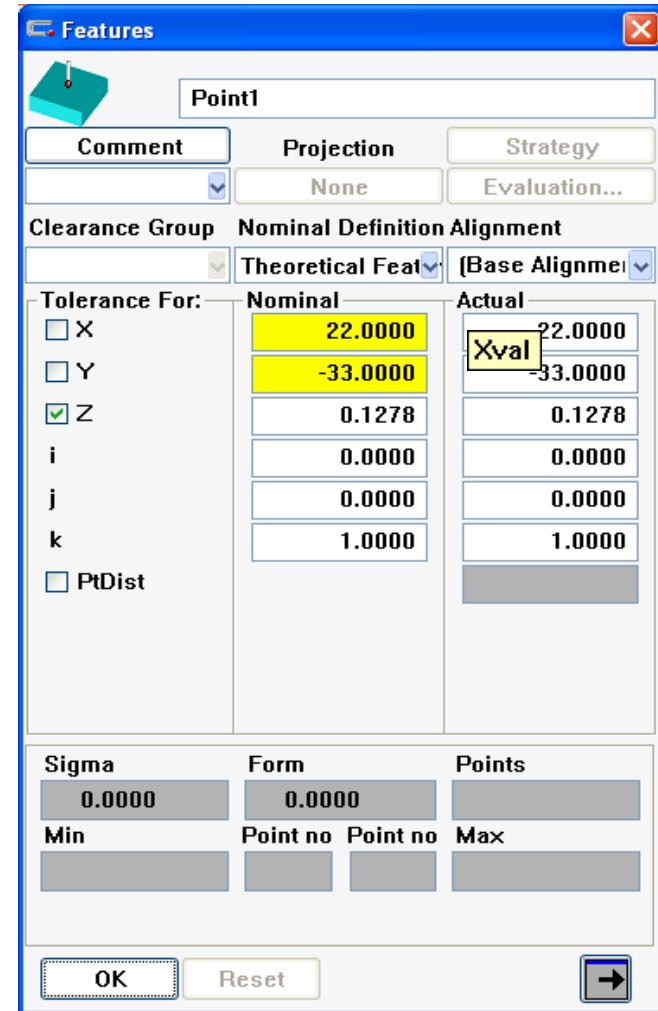
Features			
Point1			
Comment	Projection	Strategy	
	None	Evaluation...	
Clearance Group	Nominal Definition	Alignment	
	Theoretical Feat	(Base Alignment)	
Tolerance For:	Nominal	Actual	
<input type="checkbox"/> X	22.0000	22.0000	
<input type="checkbox"/> Y	-33.0000	-33.0000	
<input checked="" type="checkbox"/> Z	0.1278	0.1278	
i	0.0000	0.0000	
j	0.0000	0.0000	
k	1.0000	1.0000	
<input type="checkbox"/> PtDist			
Sigma	Form	Points	
0.0000	0.0000		
Min	Point no	Point no	Max
OK	Reset		

Inside of features,
ANY number can
be set to be a
variable.

This includes, XYZ
values, Scanning
Speed, Number of
Points, Diameters,
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Tolerance For:		Nominal	Actual
<input type="checkbox"/>	X	22.0000	22.0000
<input type="checkbox"/>	Y	-33.0000	-33.0000
<input checked="" type="checkbox"/>	Z	0.1278	0.1278
	i	0.0000	0.0000
	j	0.0000	0.0000
	k	1.0000	1.0000
<input type="checkbox"/>	PtDist		

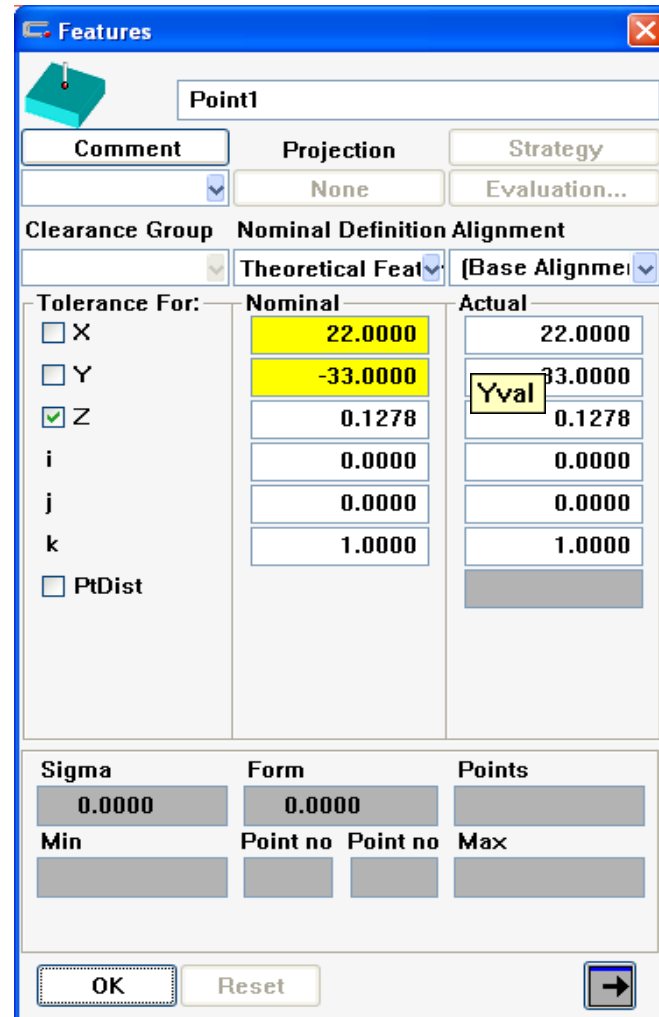
Sigma	Form	Points
0.0000	0.0000	
Min	Point no	Point no
		Max

Inside of features,
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variables are used.



Tolerance For:		Nominal	Actual
<input type="checkbox"/>	X	22.0000	22.0000
<input type="checkbox"/>	Y	-33.0000	33.0000
<input checked="" type="checkbox"/>	Z	0.1278	0.1278
	i	0.0000	0.0000
	j	0.0000	0.0000
	k	1.0000	1.0000
<input type="checkbox"/>	PtDist		

Sigma	Form	Points
0.0000	0.0000	
Min	Point no	Point no
		Max

If you have any specific questions about how PCM works, or would like confirmation that Calypso with PCM is a good solution to your measurement challenges, please contact us!



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