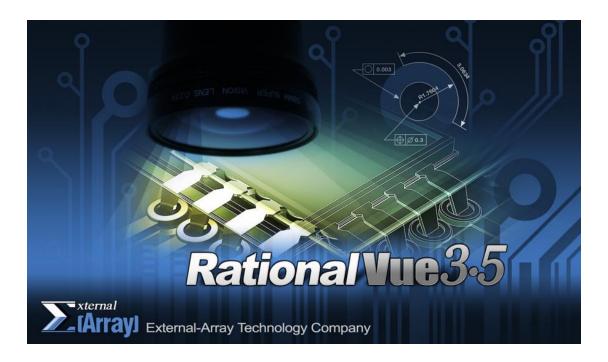
# **Quick Manual of RationalVue**

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## Welcome RationalVue





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## **1. RationalVue Installation & Configuration**

## **1.1 RationalVue Installation**

Insert the RationalVue installation CD to CD ROM Click RationalVue-Setup file to start the installation

Click the "I agree" to accept the software license agreement

The destination folder: If you do not use the default path, select or type a new path and folder. If you choice the default path and folder, click "OK"

Click "Install" to complete the installation

## **1.2 Configuration**

🔏 SystemConfig	×
Machine	Options
Controller: Offline $\checkmark$	Joystick: None $\checkmark$
Stablize Time(ms): 200	AutoLens: Manual $\checkmark$
Minimum Z Scale: -200	Port:
	TouchProbe: Disable ~
Camera	Sensor
Capture Card: Offline 🗸	PtLnSensor: None ~
Port: 0	Port:
	Stablize Time(ms):
Language	Lamp
UI Language: English $\lor$	Lamp: Manual $\checkmark$
Output Language: English V	
Error Map	ОК
EM	Cancel
EM1	

Machine (Machine Setu	ıp)	Options (Options)	
Controller(Controller)	Controller and counter card selection	Joystick	DirectInput/JT/ZT
Stablize Time (ms)	Machine stability time, in milliseconds	Autolens	Manual / Auto /Pomeas
Minmum Z Scale	Minimum Z Scale	TouchProbe	Activation / deactivation
Camera (Camera & Vid	leo)	Sensor	

Capture Card	Camera & Video card selection	PtLnsensor			
Port	Video card Port				
Standard	Nts and Pal System setting				
Language		Lamp (Lamp)			
UI Language		Lamp	Lamp		
Output language		Bottom	UWC6001/UWC4000		
			Selection		
		CoAxis	UWC4000 Coaxial		
			optical control		
ErrorMap (Error Compensation)					
EM: Error Compensation	on specified file path (supports	21 Error Compensation	or support plane array		
compensation)					
EM1: Error Compensat	EM1: Error Compensation specified file path (supports 21 Error Compensation or support plane array				
compensation)					

## **1.3 Software Dongle installation**

Plug the dongle, install the software lock driving

The user must install Dong (also called code clock) first to run RationalVue.



Insert the Dongle into USB port and operating system will identify new hardware automatically:



Prompt1: Found new hardware

Prompt2: identify the type of new hardware

Prompt3: new hardware has been installed and can be used.

Once the system pops up "new hardware has been installed and can be used." RationalVue can be

started.

#### Note:

Please do not close the computer power during installation.

If the dongle is inserted into another USB port, and the RationalVue has never been inserted in that port, the setup wizard will rerun the dongle and this process is normal.

When RationalVue is running, please do not pull out the dongle, otherwise unexpected errors will occur.

### **1.4 Software Licensing Description**

#### Software Numbering:

Software's Numbering, on the software's numbering packaging, engraved with AKE \*\*\*\* laser tag.

#### Authorized:

Any RationalVue software sold by the External-Array Software, Inc., are equipped with a formal software authorization, covered with External-Array Software, Inc.'s seal.

We will provide a formal authorization to External-Array Software, Inc.'s partners, please connect our partners to request software authorization.

For details, consult the External-Array Software, Inc's service hotline 010-64787138; 647887139; 84785189; 84785190. Email: <u>info@external-array.com.cn</u>

#### **Authorization Name:**

Abou	ıt Rat	ionalVue		$\times$
		RationalVue Version : 3.5		
		External-Array Technology Company		
		Copyright (C) 2019, External-Array Te	echnology Company. All rights reserved	
		www.external-array.com		
	Thi	s product is licensed		
		爱科腾瑞科技(北京)有限公司-19-	VDEMO-2794	
		Release Type : FOR DEMONSTRATIO	N ONLY	
		Release Date : 07-02-2012		
		SMA Subscription : January, 2020		
		Network Server not enabled		
		Product ID :		
		Optional	SPC Module: Enabled	
	Akr	owledgement		
		ortion of the code are contributed by:	Andrei, Stcherbatchenko	
		ning: Unauthorized reproduction or d ram is prohibited.	istribution of this OK	)

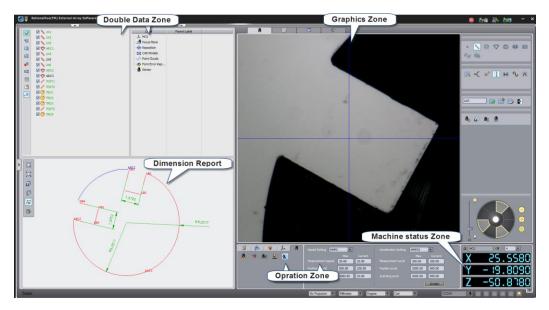
Above picture: Authorization for "External-Array Software, Inc." the version type is "demo", indicating that this dongle is copyrighted by our company / External-Array Software, Inc., the software locks only for DEMO Demos and it's not for sale.

Official sales of software dongle authorization, in the following example;

关于	Ratio	nalVue			×
		RationalVue 版本:1.5.2			
	2	External-Array Software, Inc.			
		Copyright (C) 2011, External-Array S	oftware, Inc. All rights reserv	ed	
		www.external-array.com.cn			
	「本」	<b>≃品授</b> 权给			
		Emirates Airlines-C5262			
		版本类型:CNC 机器			
		发布日期 : 07-02-2012 升级订阅 : 一月, 2015			
		网络服务端未激活			
		产品编号:			
	-				
	ÿ ⇒	M B分程序代码参考于:	Andrei, Stcherbatchenko		
	A	ͷͶͱϼϫϭͺͿͺ	Andrei, Staterbatateriko		
Į	警告:	严禁非法复制或传播此程序.		确认	ר
				U ROH BAC	

This software is licensed to represent: "Emirates Airlines" company. Version types are: CNC machine

#### 2. Interface Introduction



Double Data Zone: Store measurement data, construction data, calculated result, program, tolerance data, coordinate data

Graphics Zone: Can achievement workpiece check, machine moves and measurement, even can complete data output

Machine status Zone: The machine can be moved, check the position of the machine and check element data with element Form

Operation Zone : Complete machine probe construction, probe calibration, establish the coordinate, constructed elements and tolerances computing

Navigate Zone: To be completed the element definitions, machine navigation and navigation constructed

In addition with graphics area juxtaposed area have: Image measuring window, the graphics window, the output window, graphical reporting window and FormError window

## 3. Build Probe

## 3.1 Construction video probe

Imaging probes divided into automatic zoom and manual zoom, the following were introduced the way to build these two kind of probe.

Construction of automatic zoom lens (Auto Zoom)

Select "Sensor"



Select "Build Sensor"

A)	<b>W</b>	7.	Ö
78 8		Ł	
	1 1 1 1 1 1		

Check PH10VIP in build sensor area.

Renishaw系列	🛛 🗹 Renisha	🗤 🗹 其他	1	
名称	▲ 长度△	球直径△	数字	
➡ 定制测头				
- AM1	15.50		A-1026-0320	
🔲 AM2	10.00		A-1036-0080	
МСР	54.70		A-1311-0096	
PH10VIP	50.00	30.00	Video Probe	
PH5	32.50		A-1045-1883	
- PH5(FT)	64.00		A-1045-1883	
- PH5(LT)	64.00		A-1045-1883	
- PH5(RR)	64.00		A-1045-1883	
- PH5(RT)	64.00		A-1045-1883	
PH6	28.00		A-1046-5097	
PH6M	40.00		A-1074-0020	
- <b>T</b> P1	46.06		A-1041-7540	
TP800	120.00		V-0000-0001	

#### Add Sensor

Change label, according to user's habit

Select the lens type to "Automatic", and set the rotation multiples Add sensor



#### **Construction manual zoom lens**

There has only one different between construction manual zoom lens and automatic zoom lens is the last step, "adding probe".

Change label, according to user's habit

Select the lens type to "manual"

Add probe

Calibration Form Error 0.010000 Shape Type None Dz 0.0000 Update Sensor Mount Add Sensor		Label 0.7x Shaft Direction -7 C on Form Error Orientation Y C 0.010000 Shape Type Non	Dir • Dy 0.0000 Dir • Dz 0.0000 3	
---	--	---	--------------------------------------	--

Note: Manual zoom lens need to add more than one probe, such as continue to add 1.5 times, 2.0 times, 2.5 times ...,

### **3.2** Construction touch probe

Select "Coordinate and Sensor"

Select "Build Sensor"

Select in sequence in "Build Sensor" area, PH6, TP20, the probe with diameter of 2mm and length of 20mm as sample below:

Select PH6 seat

Select TP20 model

	Name	▲ Length △	Ball Diam	Number
	Custom Sensor			
	- AM1	15.50		A-1026-0320
WISH -	- AM2	10.00		A-1036-0080
and the second sec	- CCD	40.00	20.00	Video Probe
2 o 2	🖲 MCP	54.70		A-1311-0096
	PH5	32.50		A-1045-1883
	- PH5(FT)	64.00		A-1045-1883
	PH5(LT)	64.00		A-1045-1883
	- PH5(RR)	64.00		A-1045-1883
	- PH5(RT)	64.00		A-1045-1883
	🖻 🗹 PH6	28.00		A-1046-5097
	0310TTT	54.00		custom
	- PE1	50.00		A-1047-1534
T F	PE2	100.00		A-1047-1535
	PE3	200.00		A-1047-1536
	PEL1	50.00		A-1047-3484
	PEL2	100.00		A-1047-3485
	PEL3	200.00		A-1047-3486
	(2) PEL4	300.00		A-1047-3486
	TP2 5-Way	38.00		A-1042-1890
	🕀 🗹 TP20	38.00	NI	A-1371-0168
	A-5003-1218	35.50	2.0	A-5003-1218
	A-5003-1345	20.00	0.5	A-5003-1345
	A-5003-2289	100.00	4.0	A-5003-2289
	A-5003-2290	100.00	5.0	A-5003-2290
	A-5003-2291	100.00	6.0	A-5003-2291
	GF40E	40.00		A-5003-2280
	GF504R	50.00	4.0	A-5003-2285
	GF505R	50.00	5.0	A-5003-2286
	GF506R	50.00	6.0	A-5003-2287
	GF50E	50.00		A-5003-2281

Select the probe with diameter of 2mm and length of 20mm

	Renishav Series 💌 🗸	Renishav	v 🗹 Othe	rs
		△ Length △	Ball Diam	Number
	A-5003-1218	35.50	1.0	A-5003-1218
ANS 42	- A-5003-1325	10.00		A-5003-1325
	- A-5003-4788	7.50		A-5003-4788
	A-5003-4011	7.50		A-5003-4011
	A-5004-2018	10.00	1.0	A-5004-2018
	PS23R	20.00		A-5000-7808
	PS9R	10.00	1.0	A-5000-7806
	D PS51R	27.00	1.0	A-5000-8663
	PS48R	20.00	1.0	A-5003-0033
1 [	D PS24R	10.00	1.5	A-5000-7802
	PS49R	20.00	1.5	A-5003-0034
	- PS18R	11.00	1.5	M-5000-4152
	PS52R	30.00	1.5	A-5003-0035
	A-5003-1219	15.80	1.5	A-5003-1219
	- PS45R	15.00	1.5	A-5000-8877
	PS70R	40.00	2.0	A-5003-0074
2 4	A-5003-1228	16.00	2.0	A-5003-1228
	✓ PS7R	20.00	2.0	A-5000-3626
the second se	A-5000-3609	16.50	2.0	A-5000-3609
	PS2R	20.00	2.0	A-5000-3603
	PS6R	20.00	2.0	A-5000-7629
	A-5003-3822	20.00	2.0	A-5003-3822
	WZ-15-2	15.00	2.0	lard Renishaw
Ч	PS53R	30.00	2.0	A-5003-0036
	- A-5004-1017	20.00	2.0	A-5004-1017
	- PS8R	10.00	2.0	A-5000-7807
	PS58R	40.00	2.0	A-5003-0037
•	- PS35R	20.00	2.0	A-5000-7812
	PS26R	10.00	2.5	A-5000-7803
	D PS54R	30.00	2.5	A-5003-0038

#### Add probe

Change the tag name

Add probe

B ild Sensor	Sensor mount	Offset:	
Sensor Label ROOTSN2	Shaft Direction -Z D	ir Dx 0.0000	
Calibration Form Error tolerance	Orientation -Y Di Shape Type None	r V Dz 0.0000	
0.010000			2
	Update Sensor Mo	ount	Add Sensor

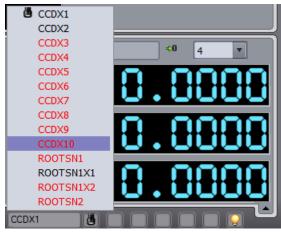
## 4. Sensor Calibration

The sensor calibration is calibrated from left to right in sequence, XY scale calibrate and CCD auto calibrate only need CX1 to do calibrate.



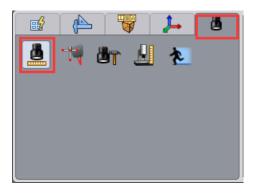
## 4.1 XY scale calibrate

Select the probe with maximum magnification to find the clearest focus plane.

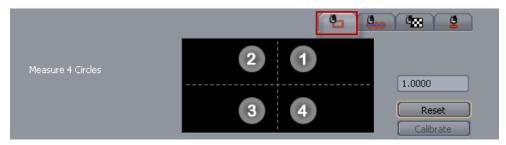


Switch to CX1

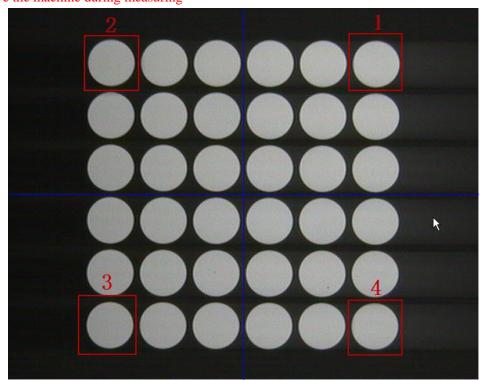
Select "Sensor", Select "CCD Calibrate"



#### Select XY Scale Calibrate panel

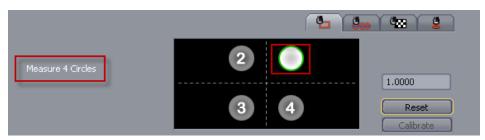


Select one group of array on calibrate glasses, measuring 4 circles in sequence according to the graphic. See as below

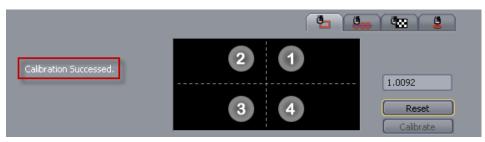


Note: Measuring isometric 4 rounds, and round regardless of the magnitude, please do not move the machine during measuring

The corresponding circle comes into measure condition during meauring.

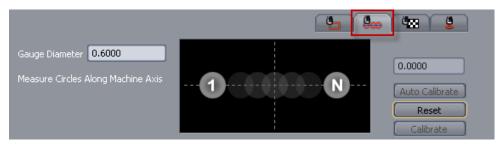


Click "Calibrate" to complete XY scale calibrate.



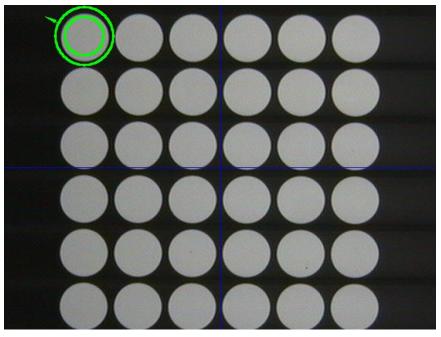
## 4.2 CCD Auto Calibrate

#### Select "CCD Auto Calibrate" panel

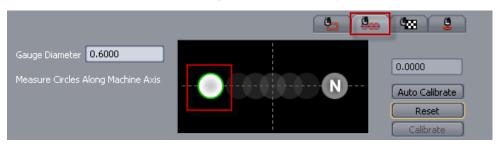


Select a circle with diameter of 0.6mm, Use of automatic identification tools or circle measurement tool

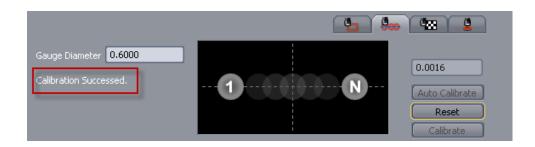
NOTE: The default is 0.6mm, also could select other diameters, but need to change the gauge diameter and then calibrate.



The first measured circle on calibrate panel becomes to bright at this time.



Select "Auto Calibrate", the software will complete calibration automatically.



## **4.3 Distortion Calibration**

If customers use a large field of view wide-angle zoom lens, you need to calibrate this, if not you can skip.

Select the lens distortion calibration panel

					<b>1 1</b>	
Sensor Label	CCDX1	Meas	ure First Gauge	Circle		
Standard Dist:	0.5000	K1:	0.000000	⊂1:	0.000000	(Auto Calibrate )
Row:		K2:	0.000000	C2:	0.000000	Reset
Column:		BS:	0.000000		inable	ReLoad

Once the parameters are set, according to the figure suggests that the center of the image area measuring first round.

Distortion Calibration			
Sensor Label	CCDX1	Measure First Gauge Circle	
Standard Dist:	1.233	K1: 0.000000 C1: 0.000000 Auto Calibrate	
	2	K2: 0.000000 C2: 0.000000 Reset	
Column:	3	BS: 0.000000 Enable ReLoad	

Press the figure prompted to measure the first round of a circle to the right. Click "Auto Calibrate", complete calibrate.

Distortion Calibration						
Sensor Label	CCDX1	Calib	ration Successe	d.		
Standard Dist:	1.233	K1:	0.001074	C1:	-0.029101	Auto Calibrate
Row:	2	K2:	0.000806	C2:	0.027631	Reset
Column:	3	BS:	115.451008	🗹 Er	nable	ReLoad

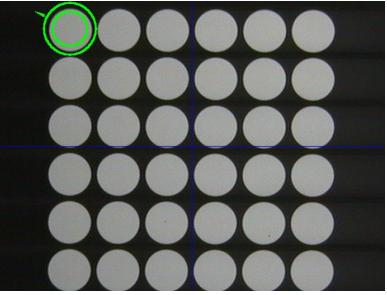
## 4.4 CCD Calibration and Concentricity Calibration

Select "CCD Calibrate" panel.

	9 <sub>00</sub> 9 <sub>00</sub> 9
Sensor Label CCDX1 Gauge Diameter 0.6000	3 2 Update Gauge
1.0000 🔗	4 5 Auto Calibrate Calibrate

Select a circle with diameter of 0.6mm ( also can select others, but need to change the gauge diameter), select circle tool to measure.

(Note: when calibrate the first lens that need to select "Update Gauge", do not need to select for afterwards magnification. For CNC lens, next version will change to auto calibrate.)



At this time, the first measured circle becomes bright.

Sensor Label CCDX1 Gauge Diameter 0.6000	3 2 Update Gauge Static Calibration
1.0000 🔗	4 5 Reset Calibrate

Mouse click "Auto Calibrate", the software will complete CCD Calibrate automaticaly. RationalVue Software can be used normally after active other magnification and complete calibration one by one.

## 4.5 Composite Calibration

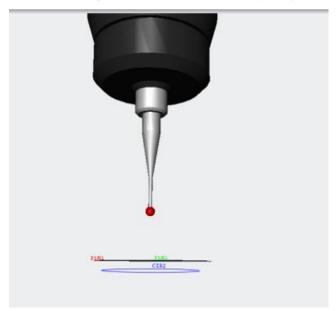
The purpose of composite calibration is calibrated the diameter of touch probe , offset of probe and video sensor.

Use video sensor to measure Cir1 on ring gauge.

Switch the touch probe to measure Pln1 on ring gauge.



Use touch probe to measure Cir2 on ring gauge.



Project Cir2 to the Pln1

Construct projection fe	atures		
Project Feature 🔘	CIR2	]	Result feature
On to 💋 🚺	PLN1	]	PT PROJ1     CIR_PROJ1
Nom Feature			
÷		Preview Add Result	
Composite Calibratio	on		
Calib Sensor Name:	ROOTSN1	]	
Calib Feature:	CIR_PROJ2	Probe measuring	and projection circle
Gage Feature:	O CIR2	Image measuring (	circle
			Calibrate

## 5. Feature Measuring

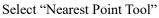
## 5.1 Image Measure

#### Point

Automatic measure point

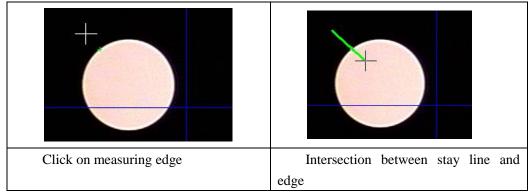
Select "Point"







Mouse click to measure the edge and intersection betweent stay line and edge.



Right click to complete measurement.

#### Manual measure point

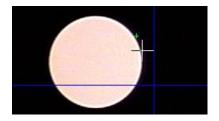
Select "Point"



Select "Crosshair Tool"



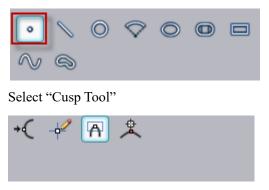
Start to measure by click



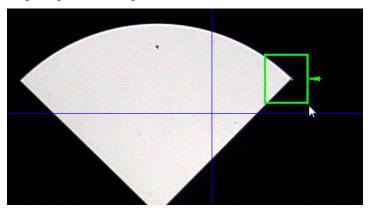
Right click to complete measurement.

#### Cusp

Select "Point"

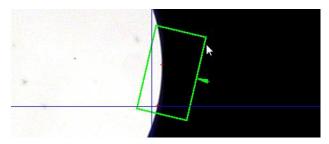


Select measuring position on image and notice the measuring direction. The direction of following sample is from right to left.



Right click to complete measurement.

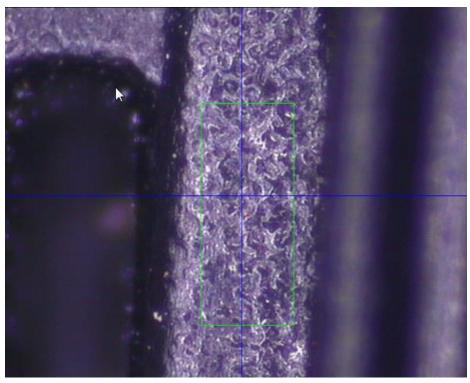
Hold on the Shift key to select, the software will get points in the direction of the nearest part of the coordinate system it can be used to calculate the maximum or minimum point, but also to ensure the repeatability.



#### Foucus measure point



Adjust focus range with left button



Start to focus by click



Right click to complete measurement.

### Line

#### **Direct Measurement**

Select "Line"



Click mouse left start to measure.

-		 6

Right click to complete measurement.

#### Add Direction Control measurement

Select "Line"



Click mouse left start to measure and press "Shift" which can use direction judgment.

	1		
-			
		-	

Right click to complete measurement.

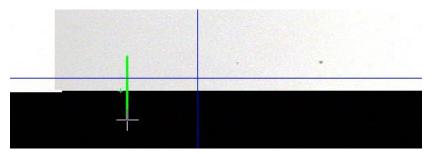
#### Subsection measurement

Select "Line"

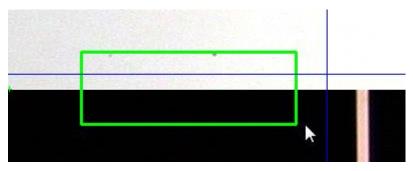


Select measuring tools that need to use, which could be edge point, line, curve scan, etc. Using edge point and line tool as sample below:

1) Use edge point start to measure.



2) Move machine and use line tool to measure

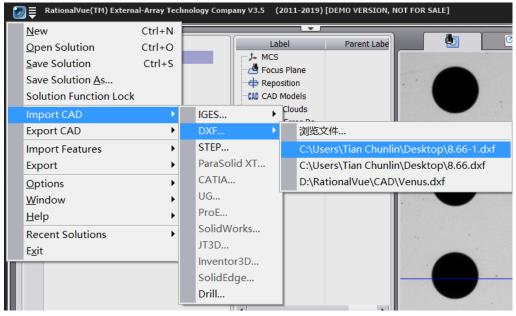


Right click to complete measurement

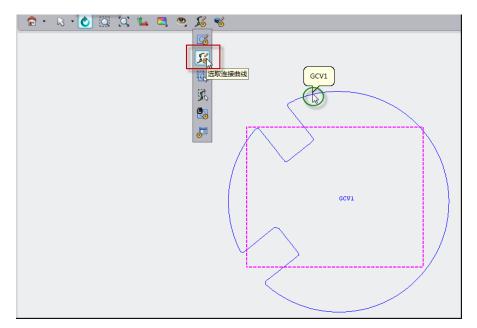
Note: measurement method for circles is similar with line which could select edge point, arc, circle and curve measure tool.

#### Curve profile measuring

Import nominal curve



Select nominal curve



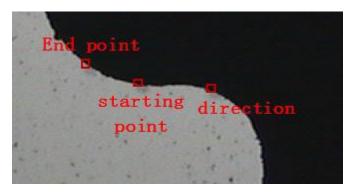
Drag the nominal curve drop onto measuring label



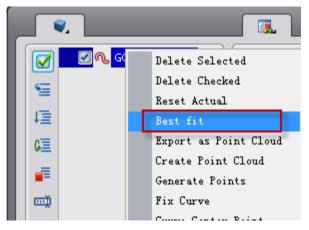
Select "Curve Tool"



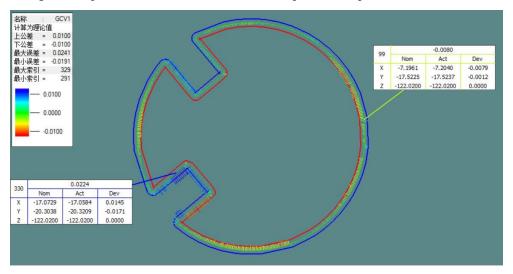
Complete curve measurement by mouse click start point, direction point and end point.



Right click Curve and select "Best fit" in program area.



Drag and drop onto "FormError" window to complete curve profile evaluation.



## **5.2 Probe Measure**

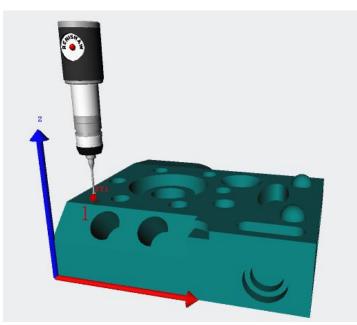
Active touch probe, and measurement of point, line, circle, plane, cylinder, cone, sphere, curve, surface can be completed by joystick.

Point

Select "Point"



Move machine to measure one point



Click "Accept" to complete point measurement

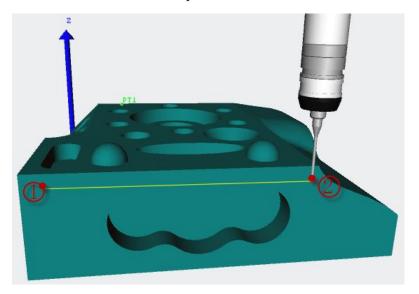


#### Line

Select "Line"



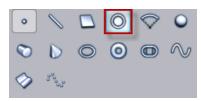
Move machine to measure two points



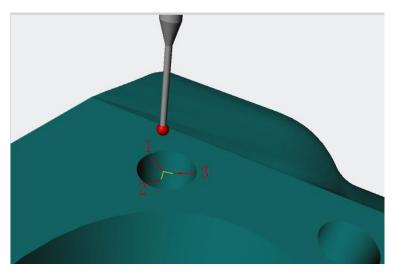
Click "Accept" to complete line measurement



#### **Circle** Select "Circle"



Move machine to measure circle



Click "Accept" to complete circle measurement

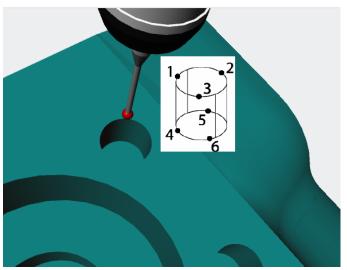


## Cylinder

Select "Cylinder"



Move machine to measure a cylinder



### Click "Accept" to complete cylinder measurement

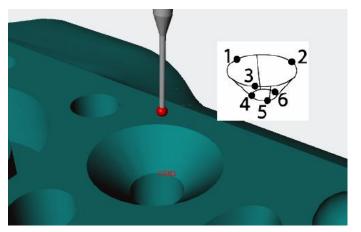


#### Cone

Select "Cone"



Move machine to measure a cone



Click "Accept" to complete cone measurement



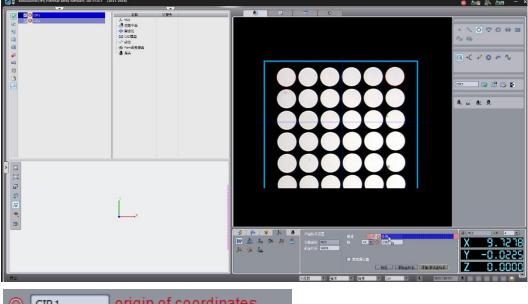
## 6. Coordinate System

## 6.1 Coordinate 2D Setup

Coordinate setup supports circle & circle, circle & line and line & line

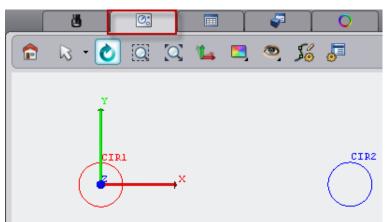
#### Circle & circle

Measure two circles which have created coordinate. Drag two circles drop onto coordinate 2D Setup area.





Preview the coordinate.



The user can preview establishment details of coordinate in CAD window.

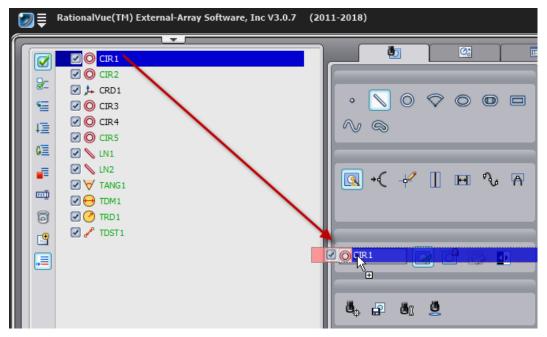
Add/Active coordinate to complete coordinate setup.

Coordinate 2D Setup	Datum 🔘 CIR1
Cur Crd MCS	Axis +X 🔻 🔘 CIR2
New Crd CRD1	
	Nominals update
	Preview Add Crd Add/Active Crd

#### Measuring other features

The operations of run program

When the work piece was moving, user needs to manual setup coordinate again which drag circles drop onto measuring label.



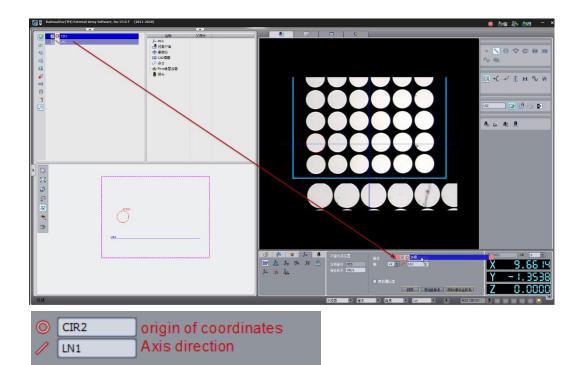
Then measure this circle manually.

The operations of the second circle were same as above.

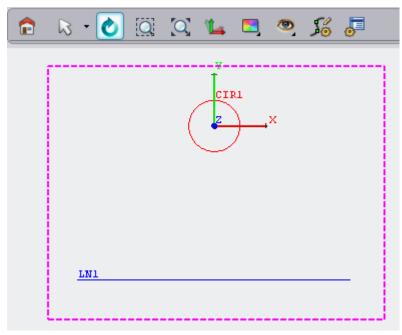
Start to run program from coordinate that can be measured.

#### **Circle & Line**

Measuring circle and line which has created coordinate Drag circle and line drop onto coordinate 2D Setup area



Preview the coordinate



The user can preview establishment details of coordinate in CAD window

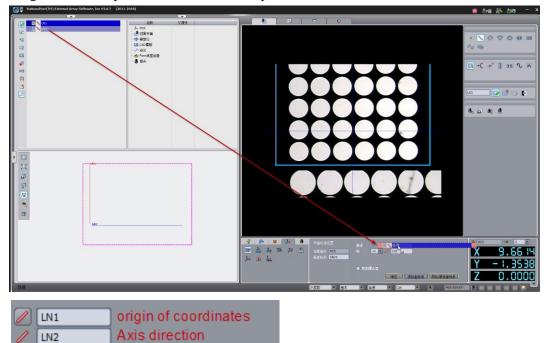
Add/Active coordinate to complete coordinate setup

Coordinate 2D Setup	Datum O CIR1
Cur Crd MCS	Axis +X 🔻 🥢 LN1
New Crd CRD1	
	Nominals update
	Preview Add Crd Add/Active Crd

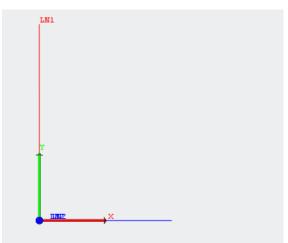
Note: Please notice the direction of line during run program measuring. When manual setup coordinate afterwards to measure line which need according to previously coordinate setup method to complete measurement.

#### Line & line

Measuring two lines which have created coordinate. Drag two lines drop onto coordinate 2D Setup area.



Preview the coordinate

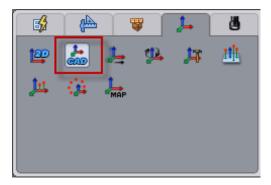


The user can preview establishment details of coordinate in CAD window. Add/Active coordinate to complete coordinate setup.

Coordinate 2D Setup	Datum 🥖 LN1
Cur Crd MCS	Axis +X 🔻 🧪 LN2
New Crd CRD1	
	Nominals update
	Preview Add Crd Add/Active Crd

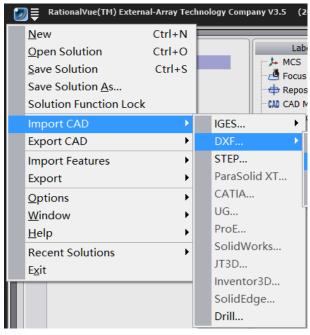
#### **CAD** Alignment

CAD alignment includes circle & circle alignment, circle & line alignment, line & line alignment.

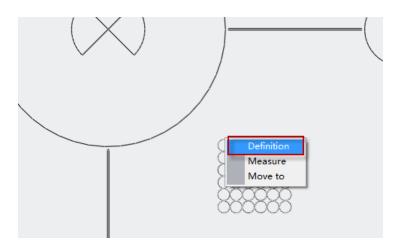


Circle & circle CAD alignment as sample below (Circle & line and line & line are similar, what need to note is the direction of line.)

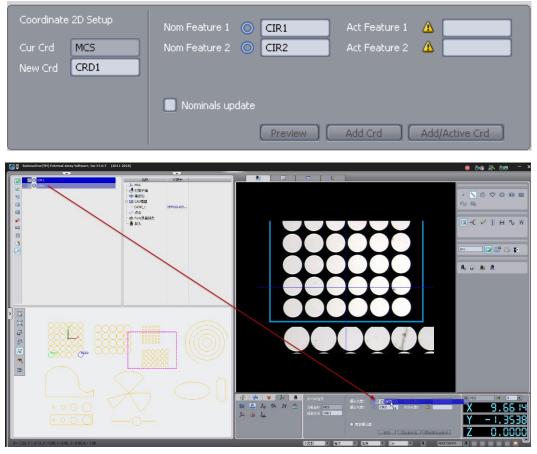
#### Import CAD



Select nominal circle on CAD, then select define on CAD to define a feature with left button.



Drag and drop 2 defined circles onto CAD alignment area.



Measuring two relevant circles in image measurement zone.

Note that circle label can not accordance with nominal circle during measuring. Otherwise coordinate will have some errors.



CIR1 and CIR2 were defined when selecting nominal circle. It shouldn't be CIR1 and CIR2 here in actual measuring.

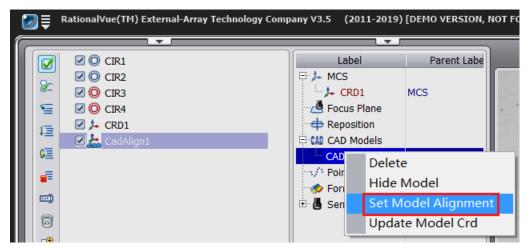
Drag and drop actual feature onto CAD Alignment zone.

Rational/ue(TH) External-Array Software, Inc V3.0.7 (2011-2018)		😑 💩 🛞 💩 - 🗡
Y -1.900 Z O Cost Z O Cost		
		ания налия налияны (доржены) Z 0.0000
Coordinate 2D Setup Cur Crd MCS New Crd CRD1	Nom Feature 1 O CIR1	Act Feature 1 O CIR3 Act Feature 2 O CIR4
	Nominals update	Add Crd Add/Active Crd

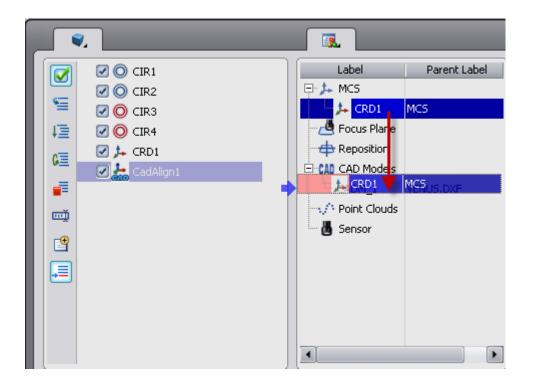
Add/Active coordinate

Add/Active Crd

#### CAD Alignment



The figure is a model aligned with the right set, it also coordinates can be dropped onto CAD label name, complete the CAD alignment.



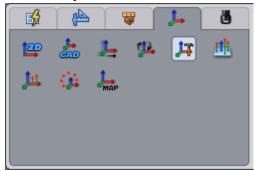
### 6.2 Coordinate 3D Setup

RationalVue 3D coordinate is "Quick 3-2-1" coordinate setup which supports coordinate setup through by plane & plane & plane & plane & line, plane & line & line, plane & line & point.

Note: line feature could be line, cylinder or cone.

Point feature could be circle, arc, sphere, slot, ellipse or point.

Select "Create Coordinate" in "Coordinate and Sensor" of Operation Toolbar, select estabilsh the coordinate system.



The interface of Coordinate 3-2-1 Setup as below

Coordinate 3-2-1 Setup	+Z Dir 🔻 🥖 PLN1 Z Value 🇰 0
Cur Crd MCS	+X Dir 🔻 🥢 LN3 Y Value 🗰 0
New Crd CRD1	X Origin feature • PT1 X Value 🗰 0
	Nominals update Preview Add Crd Add/Active Crd

Feature import of axis control window:

The feature in the first import window controls direction and position of primary axis which accepts drag and drop of feature that can be simplified as plane. The feature in the second import window controls direction and position of secondary axis which accepts drag and drop of feature that can be simplified as line. The feature in the third import window controls direction and position of third axis which accepts drag and drop of feature that can be simplified as plane.



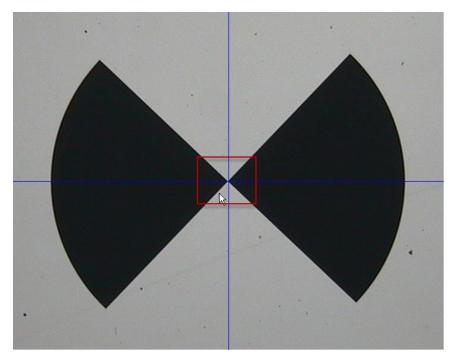
## 6.3 Image Navigate

Take picture Load picture

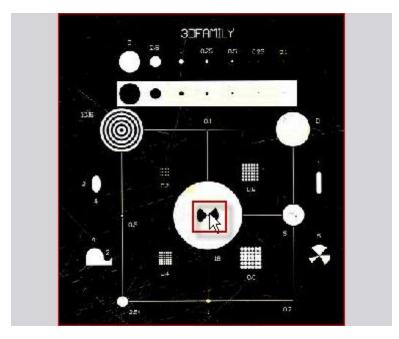
1		
	Load Picture Scan Picture	

Select detect snapshot and then right click "Load Picture". **Note:** When the picture was just loading in, border of picture is red.

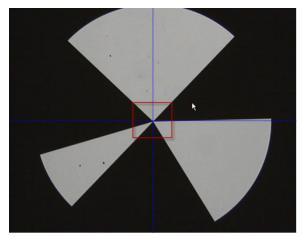
Get locate point that easy to find and move it to crosshair.



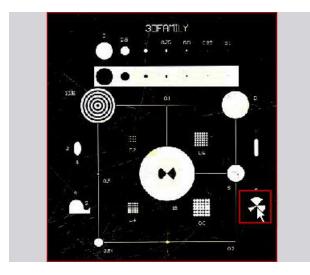
Click on the picture with right button



Find another position, same operation as above.



Click with middle button



Complete picture location by above operations

Middle click on picture, the machine will move to corresponding position automatically.

# 7. Tolerance Evaluation

### 7.1 Traditional Tolerance Evaluation

Tol 🖑 TPOS2D2 Feat O CIR1	<ul> <li>✓ LN1</li> <li>✓ LN2</li> <li>✓ PLN1</li> <li>✓ LN3</li> <li>✓ PT1</li> <li>✓ CIR1</li> </ul>	0.000536 In Tol 0.000000
Datum1 🔺 🗾	None V A Dimension	Pos2D V
Datum3 A		Define Tol

Drag and drop features from program data area onto "Feat" in tolerance window.

Setup relevant tolerance zone (or up and low tolerance), and drag & drop reference feature onto "reference feature" formula bar. Evaluate result was displayed in "Actual". If result is not out of tolerance, "Deviation" will display "In Tol" (which means the result is within tolerance range). Otherwise, "Deviation" will display the actual value.

]
]
]

Click "Accept" to complete tolerance evaluation. The result will be saved in tolerance data area. Tolerance evaluation operation of distance and diameter as sample below:

### Distance

Distance can evaluate distance of between any two features, such as circle & circle, circle & line, line & line, circle & plane, plane & plane, point & line, and point & plane etc.

Drag and drop circl and line from program data onto "Feat" in distance tolerance operation window.

	🖌 🚫 LN1			
	🗹 📏 LN2			
5	🗹 🔼 PLN1			
恒	🗹 📏 LN3			
G =	Image: PT1			
v=	CIR1			
TDISTB1		0.01	Actual	2.260911
Feat. 🔘 CIR1 🔍	Up Tol 🛛 🚺	0.01	Deviation	In Tol
Feat2 🏓 LN1 🔹	Eval Method 🛛	VG 🔻		
Nominal 2.260793	Distance type 🛛	T2PT 💌		
	ISO Tol 🛛 🛛	lone 🔻		
Use evaluated nom dist	Define type 🛛 🛛	IOMINL 🔻	Accept	Define Tol

Change the up and low tolerance

Click "Accept" to complete distance evaluation

#### Diameter

Drag and drop circle diameter tolerance from program data onto "Feat" in distance tolerance operation window.

		C≣ †≣					
Tol	⊖ TDIAM1	-	Low Iol	-0.01	Actual	0.999435	
Feat	O CIR1	K	Up Tol	0.01	Deviation	In Tol	
			Method	None			
			Eval Axis	None			
			ISO Tol	None			
					Accept	Define Tol	

Change the up and low tolerance

Click "Accept" to complete distance evaluation

# 7.2 Quick Tolerance Evaluation

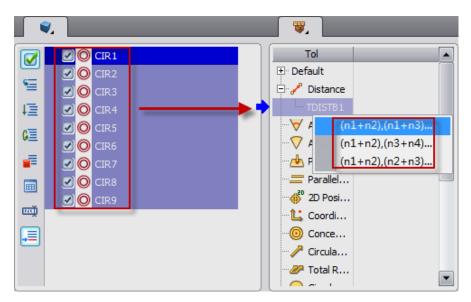
Quick distance and diameter tolerance evaluation as sample below

#### Distance

]	Define distance tolerance			
	Tol 🥓 TDISTB1 💌	Low Tol	-0.01	Actual
	Feat1 🛕 💌	Up Tol	0.01	Deviation
	Feat2 🛕 🔽 🔻	Eval Method	AVG 🔻	
	Nominal	Distance type	PT2PT	
		ISO Tol	None	
	Use evaluated nom dist	Define type	NOMINL	Accept Define Tol



Drag the features which need to evaluate drop onto distance tolerance label



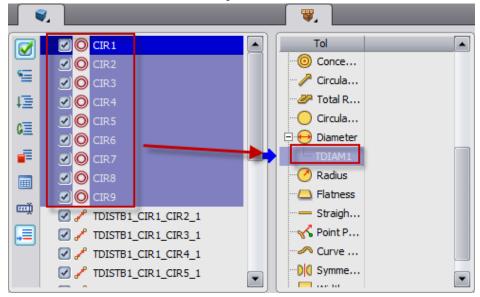
Select calculation way to complete distance tolerance evaluation quickly.

### Diameter

Define diameter tolerance

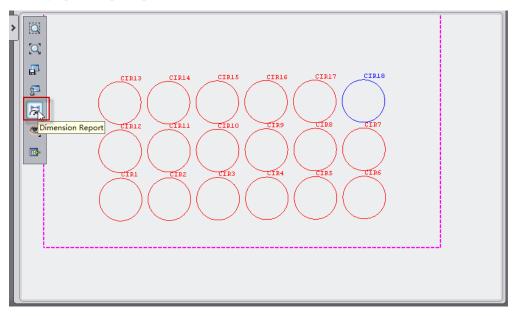
Tol	HTDIAM1	Low Tol	-0.01	Actual
Feat	▲ 🔹	Up Tol	0.01	Deviation
		Method	None	
		Eval Axis	None 💌	
		ISO Tol	None	
				Accept Define Tol

Drag the features which need to evaluate drop onto diamater tolerance label that batch evaluation of diameter tolerance can be completed.

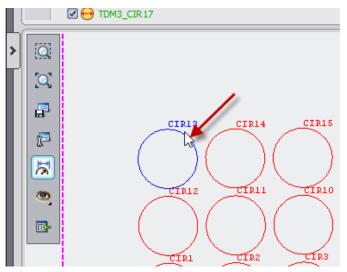


# 8. Graphic Label

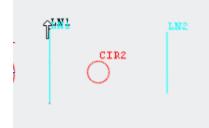
Select graphic output report window



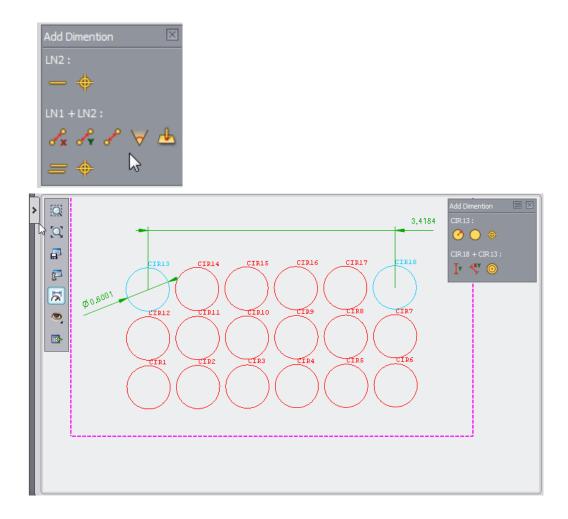
Click "Label"



Left click to select features need to label in graphic (feature color truns to light blue after selected)



Select tolerance of label dimension ( the above row is dimension of single feature, below is tolerance relationship of between two features)



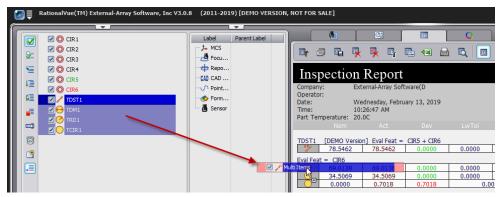
# 9. Data Output

# 9.1 Direct output feature or tolerance

Select output report window

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Inspec	Inspection Report							
Company:								
Date: Time: Part Temperat	Time: 10:11:57 AM							
	lom	Act						
TDST1 [DEM	10 Versio	n] Eval Feat =	CIR5 + CIR6		м	CS/MM/ANGDEC		
78.	5462	78.5462	0.0000	0.0000	0.0000			
Eval Feat = CIR6 MCS/MM/ANGDEC								
69.	0138	69.0138	0.0000	0.0000	0.0000			
34.	5069	34.5069	0.0000	0.0000	0.0000			
0.0	0000	0.7018	0.7018	0.00	000	0.7018		

Drag features drop onto output window



Feature property will automatic record whether to output, run program will export outputted features automatically.

						<b></b>		_		-	
		Par	Nom	Act	: U		🗹 🔘 CIR 1		Par	Nom	Act
		Lab			: U		🗹 📏 LN1		Label	CIR5	
S 🔤		X		-0.139826	- 11	5	O CIR2		X	16.482526	16.482526
	🗹 🔘 CIR2	Y	-6.078618	-6.079009			-		Y	-0.128188	-0.128188
1三	🗹 📏 LNB	Z	0.000000	0.000000		1重	🗹 📏 LN2		Z	0.000000	0.000000
GE	🗹 🔘 CIR3	R	1.249479	1.249619			🗹 🔘 CIR3	N	R	0.250293	0.250293
v=	🗹 📏 LN3	D		2.499237		G	IN3	63	D	0.500587	0.500587
	O CIR4	Тур			- 11	- E			Type	INNER	
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		For			- 11		🖸 🔘 CIR5		Form	0.006095	
m	CIR6	Out	put Yes		- 11		CIR6		Output	No	
<u>een</u>	CIR7					contin			οάφαι	140	_

### 9.2 Modify feature output

Select output setup



Setup output items of feature

	Section	Parameter	
	🖽 Device Definition		
	🗄 Format Definition		
I.	🕀 Report Option		
	Feature Definition		
ľ	🗄 Point		
l	🖽 EdgePt		
	🕀 Line		
ñ	🕀 Plane		
	Circle		
	🗹 X		
	🗹 Y		
	🖸 Z		
	🗹 D		
	- 🗖 I		
	- 🖸 J		
	— 🗆 к		
	FORM		
	DPOS		

### 9.3 Excel Export

Rational¥ue(TM) External-Array Software, Inc (2011-2015) Options Window Help Ψ. **.** Ö - 🖓 Label 🗹 🔘 CI 📑 📁 🖬 🖳 🖳 🖷 🖷 🖳 🔍 Parent Label 0 ٩ Reposition ŧ≣ Inspection Report GE Company: Operator: External-Array Software(DEMO).VISION.15.2748 CADM\_1
Point Clouds VENUS, DXF 1 Date: Wednesday, May 06, 2015 Time: ######### Part Temperature 20.0C шij 👗 Sensor **9**  
 MCS/MM/ANGDEC/CART/XYPLAN

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 UpTo1
 Trend

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Switch to Excel export panel in output window, drag and drop features from data area onto Excel export panel that output report of Excel format can be completed.

Run program export to Excel

In output setup, selected Excel in file option of Device definition. When feature property setup as "Output", Excel window will export automatically.

Section	Parameter
E Device Definition	
Ē <sup></sup> File	
Excel	Opened
🕀 🔲 Default	
🗉 🔲 Default DMIS	

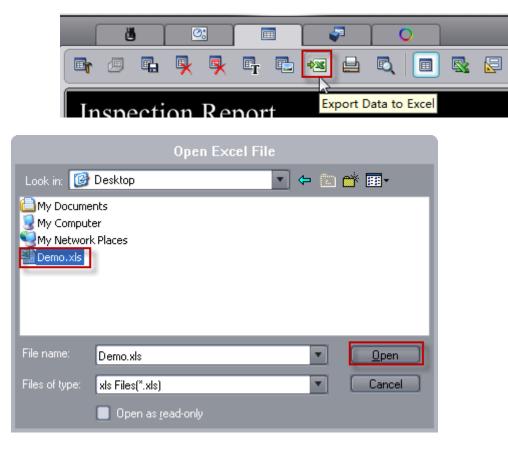
### 9.4 Outer Excel Export

After completion of the measurement data of multiple parts if you want to output to the same output report, selectable output external Excel file, output of the external Excel follows

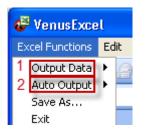
A user-defined output template

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4	Document name: First Article Inspection Request 3.At Supplier Facilities															
	Part No.: F.A NO.: Supplier Name:															
6	Date:									Sample						
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In the Output window, select the output data to Excel icon 🖼, and then open the previously defined EXCEL form.



RationalVue output external EXCEL divided into two ways 1. Manually output; 2. Automatic output



### Manually output

🧬 VenusExce	al.		
Excel Functions	Ed	t View	Insert
Output Data	×	All Act	: Data
Auto Output			
Save As		- 1	2 <b>- B</b>
Exit			

This function is the way to extract the "Actual" from the output window. Output to External excel to the designated location.

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Nom Act	Dev LwTol UpTol Trend	
TDiam2 Eval Feat = CIR1 → 2.4992 2.4987	MCS/MM/ANGDEC -0.0005 0.0000 0.0000 -0.0005	l
TDiam3 Eval Feat = CR2 ⊖ 0.9999 0.9996	MCS/MM/ANGDEC -0.0003 0.0000 0.0000 -0.0003	
TDistb1 Eval Feat = CIR1 + CIR2	MCS/MM/ANGDEC	
5,3821 5,3823	0.0002 0.0000 0.0000 0.0002	
TDiam4 Eval Feat = CIR3	MCS/MM/ANGDEC	
0.7503 0.7496	-0.0007 0.0000 0.0000 -0.0007	
TDistb2 Eval Feat = CIR2 + CIR3	MCS/MM/ANGDEC	
5.0583 5.0577	-0.0005 0.0000 0.0000 -0.0005	
TDiam5 Eval Feat = CIR4	MCS/MM/ANGDEC	
0.5001 0.5004	0.0003 0.0000 0.0003	
TDistb3 Eval Feat = CIR3 + CIR4	MCS/MM/ANGDEC	
5.4543 5.4542	-0.0001 0.0000 0.0000 -0.0001	
TDiam6 Eval Feat = CR5 ⊖ 0.7497 0.7494	MCS/MM/ANGDEC -0.0003 0.0000 0.0000 -0.0003	
TAngb1 Eval Feat = LN1 + LN2 86,4892 89,7218	MCS/MM/ANGDEC 3.2325 0.0000 0.0000 3.2325	
•[		

Step

 $1\,)\,$  Open the special external Excel, through the output position that the mouse specify the starting cell

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4	Document name: First Article Inspection Request 3.At Supplier Facilities													
5	Part No.: F.A NO.: Supplier Name:													
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2) Select Excel Function-Output Data-All Act Data, set the output mode

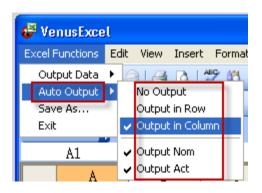
Cell output co	ntrol 🛛 🔀
C By Column	By Row
Count in Each Row/Colu	mn 🔻 2
ОК	Cancel

By Column: According to the column output By Row: According to the row output Count in Each Row/Column Row/Column Count

3) After setting the output mode, click OK, the actual data elements will be output to a user-specified location.

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#### Automatic output



# This function is set the output mode first and then run the program while the output data to the Excel spreadsheet

No Output: After selecting this item, the data is not automatically output

Output in Row: According to the column output

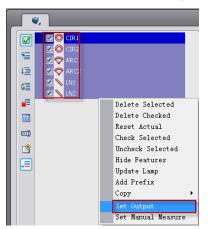
Output in Column: According to the row output

Output Nom: Output theoretical data and select the item, only the first time when you run the program you will output the theoretical data

Output Act: Output the actual data, every time you run the program, the software will output the data to the Excel form automatically.

#### Step:

1) Select the element to be outputted, click right to set output.



2) Open the special external Excel, through the output position that the mouse specify the starting cell

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4	Document name: First Article Inspection Request 3.At Supplier Facilities													
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3) Run the program, the next picture shows the specified location, according to the column output.

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4) The next picture shows the specified location, according to the row output.

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9	2					1.3010	1.3010					
10	3					0.0000	0.0000					
11	4					1.3858	1.3858					
12	5					0.0000	0.0000			~		

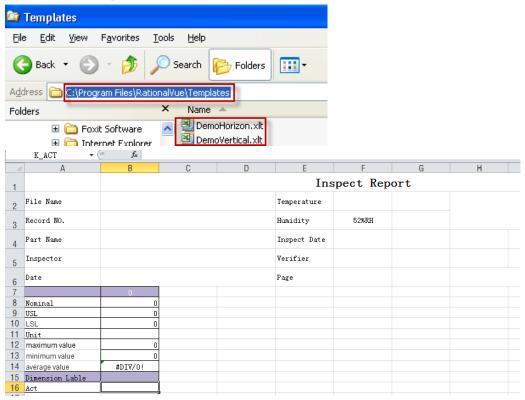
### 9.5 Customization of report output

RationalVue to provide customers with a complete output report and in accordance with the customer output reports to be customized output. The main support for Excel, PDF and TXT these three kinds of documents. The following Excel output example:

Customer customized report styles

Production report templates, report templates general format is \* .xltx (above office2007 version) or \* .xlt (Office2003 version)

Rational Vue software in the root directory C:  $\$  Program Files  $\$  Rational Vue  $\$  Templates, we have provided two examples



Before output in the program, add the output template

<ul> <li>✓ ○ CIR1</li> <li>✓ ○ CIR2</li> <li>✓ ○ CIR3</li> <li>✓ ○ LN1</li> <li>✓ ○ LN2</li> <li>✓ ○ ARC1</li> <li>✓ ○ ARC2</li> <li>✓ ○ ARC3</li> <li>✓ ○ LN3</li> <li>✓ ○ LN4</li> </ul>	Label     Output1       3     Output Type       Output File       Output File       Template File       C: Program Files \Rational Vue \Ter
Prompt 2 Output Macro Goto Control Command Define Feature	Foreground

 $Output \ template \ path \ is \ C: \ \ Program \ Files \ \ \ Rational Vue \ \ \ Templates \ \ \ \ Demo \ Horizon.xltx$ 

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	Α	В	С	D	E	F	G	Н	- I
1					Ins	spect Rep	ort		
2	File Name				Temperature	20.0C			
3	Record NO.				Humidity	52%RH			
4	Part Name				Inspect Date	y, September 2	6, 2013		
5	Inspector				Verifier				
6	Date		-		Page				
7	TDIA	11 [DEMO Ver	B1 [DEMO Ve:	32 [DEMO Ver	31 [DEMO Ve:	2 [DEMO Ver	3 [DEMO Ver	33 [DEMO Ve	4 [DEMO V
B	Nominal	0.8007	1.6901	0.845	89.0013	0.8012	0.8007	0.845	0.80
9	USL	0	0	0	0	0	0	0	
0	LSL	0	0	0	0	0	0	0	
1	Unit	MM/ANGDEC	MM/ANGDEC	MM/ANGDEC	MM/ANGDEC	MM/ANGDEC	MM/ANGDEC	MM/ANGDEC	MM/ANGDEC
2	maximum value	0.8008	1.6902	0.8451	89.1315	0.8012	0.8009	0.8454	0.8
3	minimum value	0.8008	1.6901	0.8451	89.1315	0.8012	0.8008	0.845	0.8
4	average value	0.8008	1.690175	0.8451	89.1315	0.8012	0.8008125	0.84505	0.80
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6		0.8008	1.6901	0.8451	89.1315	0.8012	0.8009	0.8454	0.80
7		0.8008	1.6901	0.8451	89.1315	0.8012	0.8008	0.845	0.8
8		0.8008	1.6902	0.8451	89.1315	0.8012	0.8008	0.845	0.8
9		0.8008	1.6902	0.8451	89.1315	0.8012	0.8008	0.845	0.8
0		0.8008	1.6902	0.8451	89.1315	0.8012	0.8008	0.845	0.8
1		0.8008	1.6902	0.8451	89.1315	0.8012	0.8008	0.845	0.8
2		0.8008	1.6902	0.8451	89.1315	0.8012	0.8008	0.845	0.8
23		0.8008	1.6902	0.8451	89.1315	0.8012	0.8008	0.845	0.8

### After the addition, continue to complete the calculation of tolerance Open the output template and then run the program, to complete the output data