

Delta PVS 2.0 Machine Vision Software Operating Manual Version 2.4.4

Dated: 19 Oct 2018



Introduction

PVS 2.0 is image processing software for the machine vision industry. The software platform has been designed to allow engineers or non-programmers to be able to create a solution for any specific requirement without having the need to learn the actual programming skills in the shortest time. When integrated to the appropriate hardware, it offers a complete machine vision solution for any industrial automation's applications.

As the cost of labor is getting higher, it is a big challenge for companies to retain their staff in the long term. It is also difficult to find good replacement too. Machine vision is a complex product as it is largely dependent on the skills & experience of the programmer s to write the entire software for the solution. No one programmer is the same and thus the process in writing the program will never be the same. There will also be the frustration of trying to do software debugging which is very challenging & time consuming when the application is complicated. Business owners are frustrated on the lack of software continuity once the programmer quits the company and no one will be able to take over easily, and this will result in the need to re-write the program. PVS platform is designed to overcome the concerns of software continuity and helping to modularize the tools, when needed.

PVS platform allows flexibility in creating many different functions while it does not take too much effort to learn the usage. With the use of the Halcon library for the main inspection tools, the software offers superior & high performance with simple graphical user interfaces (GUIs)

The user can select the number of cameras, and followed by the type of camera, frame grabber or I/Os, integrated to the PVS within a working menu. Each of the cameras will be running independently & will be running simultaneously. The PVS platform will then launched a user-interface page which can be easily modified, including the change of the company; s logo. The user can access to the configuration page for each camera to build up independent viz extension application program recipes.

With the wide suite of software tools, PVS software covers applications including 1D/2D code reading, OCR/OCV, Filtering, Blob analysis, Robot Guidance, Measurement, Color, etc. The PVS software does not have any limitation to any new tools to be included to its platform, as new functions or application tools can be created easily using Halcon, OpenCV or any 3rd party library, thus adding new features and unlimited possibilities to the software. The configuration page will allow the user to drag & drop required function tools easily into the program editor to build up the final program recipes. The PVS platform provides an opportunity for apps developer to create applications modules for a diverse industries' requirements.



System Requirement

The following table specifies the minimum system requirement for PVS 2.0 software. In order to optimize the performance, it is preferable to use the hardware better than what is recommended below.

S/N	Description	Specifications
1	Operating System	Windows 7 / 8 / 10 (64 or 32 bits)
2	CPU	1.9GHz or faster
3	Memory (RAM)	Minimum 2 GB
4	Storage	64 GB free space
5	Graphic Display	Minimum resolution of 1280 x 800 pixels
6	Licensing	USB security dongle

Preparation for Setup:

- Make sure that the system system's date & time are set correctly.
- Make sure that there is sufficient storage space where you want to install the application.
- Make sure that your operating system version is up to date and the drivers for your cameras installed.



Installing PVS 2.0

Steps to install PVS 2.0

- 1. Download the PVS software and patch from the links or CD provided.
- 2. Uninstall the **older version** of the PVS software if you have installed it before.
- 3. Install the updated version of the PVS software which you have downloaded.
- 4. You may require to disable the firewall or the anti-virus of your computer if you are not able to install the software successfully.
- 5. **Right-clicked and run as administrator** for the PVSSoft2.x.x Patch (e.g. 2.0.0.1)
- 6. Copy and paste the PVS monthly demo license to this path: C:\Program Files\MVTec\HALCON-13.0\license
- 7. PVS software is ready to be used.



Licensing

All **PVS 2.0** licenses are bound to a dongle together with 2 corresponding files (.dat & lic files).

Place the license files into the specific directory as the following:

Runtime License:

Step 1: e.g: Copy the 9-41459c50.lic to this path: C:\ProgramData\Delta Industrial Automation\PVSSoft2\license Step 2: e.g: Copy the 9-41459c50.dat to this path: C:\Program Files\MVTec\HALCON-13.0\license



Hardware Configurator

Hardware Configurator

PVS 2.0 software supports a wide variety brands of cameras and IOs module.

🛕 硬件配置			-	×
影像输入頻道 (VIC)	数字 IO (DIO)	解说		
Pylon(GigE_USB3)	Offline			^ 5
EUMutiCam_MONO_DECA EUMutiCam_MONO_DECA_OPT1 EUMutiCam_MONO_DECA_OPT1 EUMutiCam_MONO_SLOW Fairsion GigEVision2 HikVision(GigE_USB3) DS(GigE_USB3) PixeLINKSDK [Mon(GigE_USB3) SmartX-WAN ¥	Dffine Camera Adlink, PCIDask Adlink, USBDask Advantech, PCI1730 Advantech, PCI1750 ControlX-WRB JS_DI032168 LEX_DI0			ية الم يت
光源控制 (LTC)	机械手臂 (RA)			
Offline	Offline			
Offline CCS_Serial CCS_TCP	Offine Deta_SCARA			ين ال ال ال
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			采用	関閉

Video Input Channel: The user can select the brand of cameras to be used. Digital IO: The user can select the brand of digital IO used. Lighting Control (LTC): The user can select the brand of digital IO used. Robot ARM: The user can select the brand of robot arm to be used.



Hardware Supported

List of brands of camera supported:

- Basler (GigE_USB3)
- Baumer
- Dahua (GigE)
- DVP
- GenlCam
- GigEVision
- IDS(GigE_US3)
- PixeLINKSDK
- Pylon (GigE_US3)
- SmartX-WAN
- SmartX-WRW
- TagyeCam (USB3)
- USB3Vision

List of IO module supported:

- Camera
- Adlink PCI Dask
- Adlink USB Dask
- Advantech_PCI1730
- Advantech_PCI1750
- JS DIO3216B
- ControlX-WRB

List of brands of Lighting Control supported:

- CCS_Serial
- CCS_TCP

List of Robot Arm supported:

Delta_SCARA

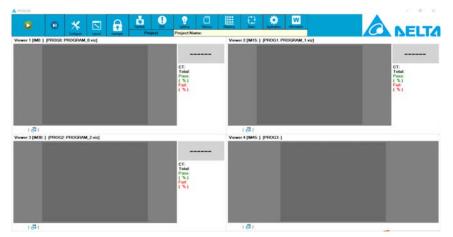


User Interface

User Interface

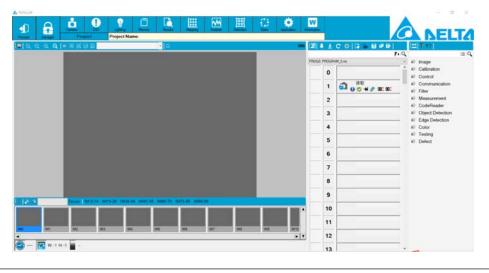
The Graphical User Interface is the interface between the user and PVS 2.0.

When the PVS software is launched, the user will be brought into a Process Menu as shown in the below picture.



After user has login the password, he/she is able to access the toolbars on the top panel.

And click the button to access to the Configuration Menu as shown in the picture below.





Process Menu

When the PVS 2.0 software is launched, the user will be brought into a GUI within the process mode.

When the security dongle is not inserted to the USB interface on the computer, the PVS will run on a demo mode for 60mins which will be shown on the bottom left side of the monitor screen. When the demo session expires at 60mins, the application will automatically shut down. User will have to relaunch the PVS software again to continue.

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							-						
							CT: Total Pass: (%) Fail (%)						GT: Totat Pass (%) Fat (%)
i 🔂 i KMI C 1	1 (PROG2	PROGRAM	(2.viz)				-			(INHS:)	(PROG3: J		
	:] (PROG2	PROGRAM	(2.944)				GT: Totat Pass (%) Fait (%)				(PROG3-)		

a. Run/Stop _____: To control the viz program to start or stop execution.

b. Run Once 💾 : To execute the viz program in a single run or cycle.

c. Configuration Mode 📩 : To access into the Configuration Menu where user create their inspection program (viz).

d. Login 💷 : To login and logout for the software.

e. Camera Setting . To configure the selected cameras index and parameters.

f. Digital IO 🔛 : To diagnose the selected IO status.

g. Lighting 💒: To configure the selected lighting parameters.

h. Memory _____: To display the Global Memory data (value, point & string).

i. Mapping : Transform image coordinates to world coordinates.

j. Reset Static 👻 : For resetting the static variable created in the viz program.

k. Application Setting 🚨 : To configure all the parameters in the software.

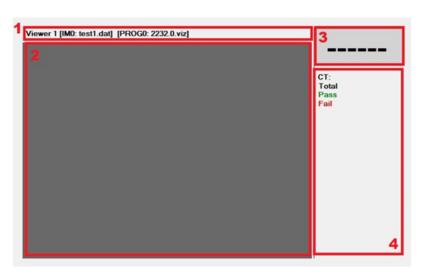


Login into the system:

To access into the system, the user will have to press the 🛄 button to enter the password code for the operator, engineer, and manager or administrator level. Each level will allow the access to different function tools within the process page.

🛕 Log in - View	Log in - Viewer		×
USERNAME	viewer		\sim
PASSWORD			
		Lani	
		Log i	
		Logi	 F

Viewer:

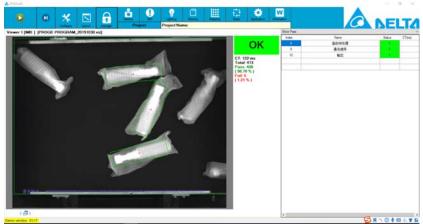


(1) To show Viewer name, IM and Program name used for this viewer

- [IM0: test.dat]: test.dat is the mapping file
- [PROG0: 22320.viz]: 22320.viz is the program file.
- (2) To display inspection image
- (3) To display the inspection overall result
- (4) To display the inspection result

Double-click on the viewer to display the picture as shown below





At the program tool bar as highlighted red, it shows the inspection result and individual tool cycle time.

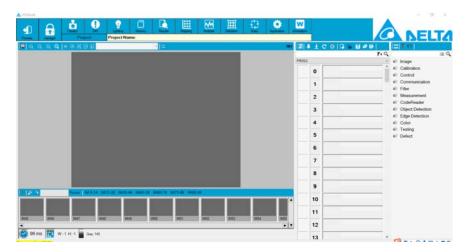
Double-click on the individual tools content where it shows that particular tool menu which allow user to edit the parameter.



Configuration Menu

To access into this menu, the user has to click the 📩 button.

At this menu, user is allowed to create or edit his/her inspection program. It is using drag and drop concept from the tool's menu at the right side into the program editor.



The Program Editor shows the PVS 2.0 command list of your inspection program. The commands will be sequential processed. There can only be one command per line. It is recommended to use empty lines between commands to get a better overview in the program editor. You can add new empty lines later, if you need them. Commands can be easily put in this list by dragging them out of the command set and dropping them in their new position in the program editor. A new dialog will appear to modify the command for your use. Commands can be updated by clicking with the right mouse button on it and choosing "Quick edit".



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nemper Project Name: Z 3 4 5	MATCOL RAR	
dedikaan	ALATCOLL BAD	
	PR053	#i image
	0	 Calibration Control
	1	 KP Communication KP Filter
	2	# Measurement # CodeReader
	3	#P Object Detection #P Edge Detection
	4	Color Testing
	5	# Defect
	6	6
	7	1000
	8	
Formi IMI-5-14 IMI5-25 IMI5-44 IM45-56 IM40-74 IM75-88 IM40-99	9	
	10	
National Activity and Activity	11	
	12	
Ims 🙀 W-1H-1 🚪 Gey 145	13	

(1): Return back to Process Menu

(2): Result Viewer: To view all the results e.g. Long, Double, String etc. of the tools used in the Program Editor.

(3): Mapping: Transform image coordinates to world coordinates.

(4): Distortion Correction: Correct the deformation of the images caused by the optical used.

(5): Image Analysis: To extract the key information from the images to display as histogram or profile to allow user to have some idea of the image thresholding value.

(6): Toolbox: The commands that is developed for user to drag and drop into the program editor to create the inspection program.



ToolBox

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8		Calibration	8	cenary viz	G object_locate
9	FAIL	Communication	9	FAIL ♥ ♥ ♥ ♥ 00:00:	G CirGroup
10	A . Text	Measurement	10	A . Text	
11		Object Detection Edge Detection	11		
12		Color	12		· · · · · · · · · · · · · · · · · · ·
13		I Defect	13		
14			14		
15			15		
16	Program Editor	Tool Box	16		
17			17		
18			18		
19			19		
20			20		

The commands at the Toolbox that is developed for user to drag and drop into the program editor to create the inspection program.



I click to get the information of this tool.



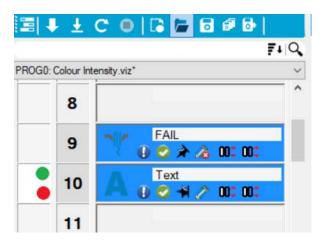
- ➔ Disable the tool ping function.
- Enable the tool ping function.
- In the tool overlay during inspection.
- 🔯 Disable the tool overlay during inspection.
- logical sector is pass. It is pass.
- 🔏 Display the tool overlay when the tool result is failed.



Creating grouping of commands used in the Program Editor:

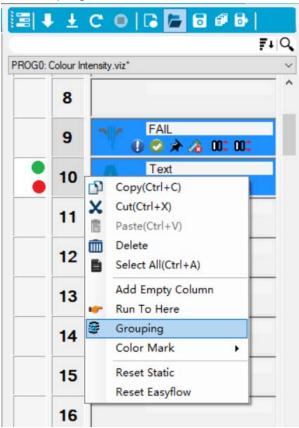
Step 1:

When the inspection program is completed. Select and highlight those Tools which you would like to grouping.



Step 2:

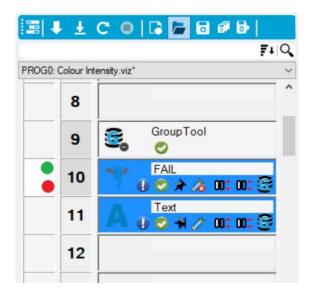
Right-click to select "Grouping"





Step 3:

Selected tools will be grouped accordingly. User can enter a name for this created group.



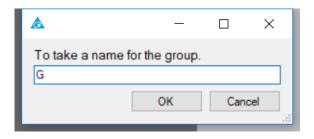
Step 4:

Right-click on the Grouping Icon and then select "Save group". This apply for the grouping features like the Ungrouping, Copy group & Delete group.

9	GroupTool	
• •	Ungrouping	
10	Copy group	
11	Save group	0: 3

Step 5:

To create a name for the group. The software is unable to have duplicate naming for grouping.





After the above steps. user will able to see and use the grouping tool in the toolbox. User can drag this grouping tool into your inspection program.





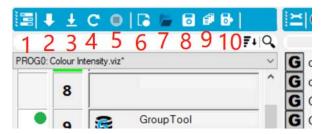
Toolbar

1. Viewer tools' bar (Located at top left horizontal side of configuration mode)



- A Viewer tab window
- b Zoom in image
- c Zoom out image
- d Fit image to screen
- e 1:1 ratio aspect
- f Live image
- g Cross line
- h Camera focus
- I Camera list
- j Crop

2. Cyclic / File management tools' bar (Located at top right horizontal side of configuration mode)

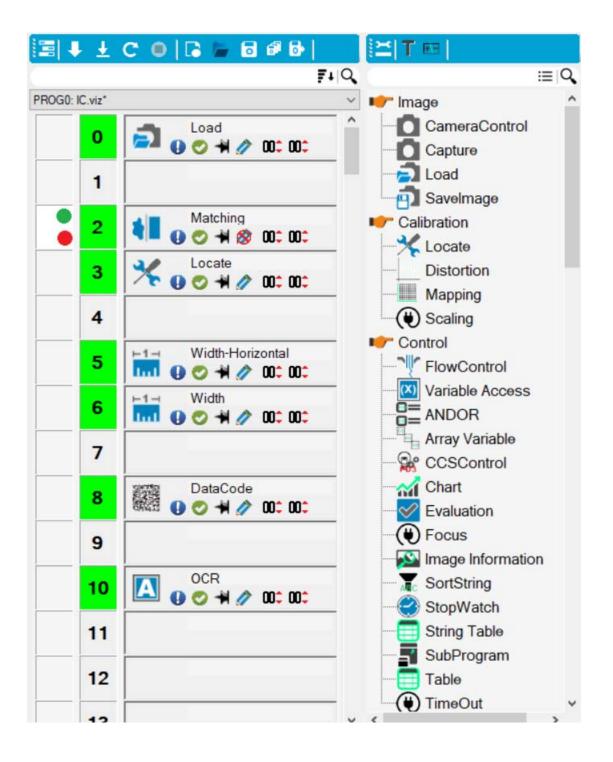


- 1. Program tab window
- 2. Run once
- 3. Run one step
- 4. Continuous cycle
- 5. Stop
- 6. Create new viz recipe file
- 7. Open viz recipe file
- 8. Save current viz recipe file
- 9. Save all viz recipe file
- 10. Save as



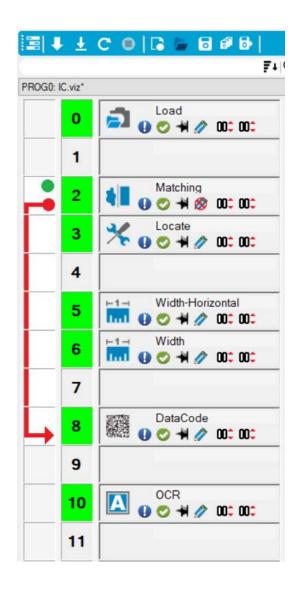
Program Editor

The below picture shown is the Program Editor (Displays inspection procedure of .viz recipe file). This is table where user create the inspection program by drag and drop the commands from the tool table.





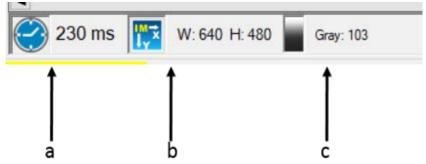
EasyFlow



The easyflow set jump condition to another tool/column for Pass/Fail result.

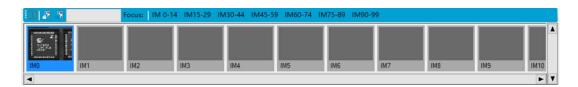


Cycle Time / Coordinates / Gray scale



- a Reflects the total cycle time for the entire process of the .viz recipe within the program editor
- b Identify the XY (image or world) coordinates of the current mouse cursor location, of which the 0,0-default position is located at the top left corner of the image before calibration.
- C Identify the gray value of the current mouse cursor location. If a color camera is used, the value will be in RGB.

Image Memory



- Click ²² to save the image from IM
- Click 🔽 to load the image to IM
- Focus is display percentage of camera focus.
- IM selection is changing the row of image memory windows.



Memory Menu

Memory Menu

To display the Global Memory data where the tools results like the value or point or string used in the inspection program, are saved in this memory. This allows IPC, PLC and internal viz program to access this data.

Mem	ory				>
Value	Point	String			
Loc	ation(Ind	ex)	Value(Hex)	Value(Dec)	-
	0D0 (0)		0000	0	
1	0D1 (1)		0000	0	
1	0D2 (2)		0000	0	
1	0D3 (3)		0000	0	
1	0D4 (4)		0000	0	
1	0D5 (5)		0000	0	
1	0D6 (6)		0000	0	
1	0D7 (7)		0000	0	=
1	0D8 (8)		0000	0	
1	0D9 (9)		0000	0	
10	DDA (10)	0000	0	
10	DDB (11)	0000	0	
10	DDC (12)	0000	0	
10	DD (13)	0000	0	
10	DE (14)	0000	0	
10	DF (15)	0000	0	
10	DEO (16))	0000	0	
10	DE1 (17,)	0000	0	
10	DE2 (18))	0000	0	
10	0E3 (19))	0000	0	
10	0E4 (20))	0000	0	
10	DE5 (21))	0000	0	

The **Variable Access** command is used to perform this feature to save the data like value, point or string into the desired memory.

۵				?	×
V	ariabl	e Acce	SS		
Options Create Put value into variable Put pickup into variable Arithmetic Put value into memory Put memory into value	Index 0		Jex		
			ОК	Cano	el

Put value into memory:

- **Index:** To save the parameter (Long, Double, string, Point) into the memory location of a selected command.
- From Pickup list: To select the desired result to save into the memory.
- Wait Status: When this option is checked, it will wait until the specific memory is cleared before it saves the new data in.



Options	index	0
Create Put value into variable	Туре	Long ·
Put pickup into variable	()pe	away .
Attmetic		
Put value into memory		
Put memory into value		
		 wat status dear after take

Put memory into value:

- **Index:** To get the parameter (Long, Double, string, Point) from the selected memory location and input into a value.
- **Type:** To set the format type of value after getting from memory.
- **Clear after take:** To clear the memory index after getting the result, to allow the next parameter to save into the memory index.

Connection Monitor

To click C (as shown in picture) to call the dialog. To display commands from Modbus TCP, RTU, ASCII and ControlLan(TCP, UDP).

Memory		С	X Viewer 1 [IM0:] [PROG0: memo test 2 viz]	
Value Point String	9		Connection Monitor -	
Location(Index)	Value(Hex)	Value(Dec)		
10D0 (0)	0000	0	[R_ModbusTCP/IP2018_9_24_12_2] 00000000006010310040001 [S_ModbusTCP/IP2018_9_24_12_2] 00000000005010302	^
10D1 (1)	0000	0	[R_ModbusTCP/IP2018_9_24_12_2] 000000000000000010310040001	
10D2 (2)	0000	0	[S_ModbusTCP/IP2018_9_24_12_2] 000000000000010302	
10D3 (3)	0000	0	[R_ModbusTCP/IP2018_9_24_12_2] 000000000006010310040001	
10D4 (4)	0000	0	[S_ModbusTCP/IP2018_9_24_12_2] 00000000005010302	
10D5 (5)	0000	0	[R_ModbusTCP/IP2018_9_24_12_2] 00000000006010310040001	
10D6 (6)	0000	0	[S_ModbusTCP/IP2018_9_24_12_2] 000000000005010302	
10D7 (7)	0000	0	[R_ModbusTCP/IP2018_9_24_12_2] 0000000000000010310040001 [S_ModbusTCP/IP2018_9_24_12_2] 000000000005010302	
10D8 (8)	0000	0		
10D9 (9)	0000	0		
10DA (10)	0000	0		
10DB (11)	0000	0		
10DC (12)	0000	0		
10DD (13)	0000	0		
10DE (14)	0000	0		
10DF (15)	0000	0		
10E0 (16)	0000	0		
10E1 (17)	0000	0		
10E2 (18)	0000	0		· ·
10E3 (19)	0000	0	Clear	Save
10E4 (20)	0000	0		
1055 (01)	0000	0		



Camera Setting

At this Camera Setting Menu, user can change the parameters for the cameras shutter, gain and AIO under the Parameter tab. Under the Assignment tab, user can arrange the sequence of the cameras accordingly.

Name				Assignment Parameter		
	MAC/Serial No.	Status	^	MAC/Serial No.	21438202	
acA640-120gm	21438202	Connected		Name	acA640-120gm	
				Distort Correction		_
	4	1		Capture Mode	Hardware Trigger	•
				Parallel	Off	•
				GainAuto	Off	
			Ξ	GainSelector	AL	•
	_			GainRaw	433	
	-			BlackLevelSelector	A	•
	-			BlackLevelRaw	64	
				GammaEnable	0	
				GammaSelector	User	•
	-		-	Gamma	1	
	-			DigitalShift	4	
				Width	640	
		1	-	Height	480	
					E Capture Mode Parallel GainAuto GanSelector GanRaw BackLevelSelector BackLevelRaw GammaEnable Gamma DigitalShift Width	E Capture Mode Hardware Trigger Parallel Off GainAuto Off GainAuto Off GainSelector Al GainRew 433 BlockLevelSelector Al BlockLevelSelector Al BlockLevelSelector Al GammaEnable 0 GammaSelector User Gamma 1 DigtalShift 4 Width 640

Click on your cameras name and the camera properties pane will open in the viewer as shown above.

You can use the selections in the camera properties pane to adjust all of the cameras settings such as gain, black level, and exposure.

You can adjust image quality with regard to these criteria by choosing appropriate settings. However, the "best" image quality will partly depend on the specific requirements of your application and therefore no generally applicable "best" setting can be recommended.

The adjustments will involve the following:

- adjusting the brightness of the illumination
- adjusting the focus
- setting the lens aperture
- setting the black level
- setting the shutter
- setting the gain
- adjusting white balance.

In addition, the quality of an image will be affected by other factors, e.g., by the choice of the lens. We recommend carrying out all fine adjustments using the illumination that you want to use in your actual application.



Focus:

You will obtain a focused image only if the lens is screwed into the lens adapter of the camera as far as it will go and if the glass surfaces are clean. The object to be imaged must be within the range of focus of the lens. You can obtain a focused image by turning the focal ring on the lens.

Depth of Focus:

If the objects you want to image are located at different distances from the camera, you must consider depth of focus. The depth of focus must be sufficiently deep to allow all objects to appear focused in the image. You can change the depth of focus by turning the aperture ring on the lens. Closing the lens aperture (turning the aperture ring to higher f-numbers) increases the depth of focus and vice versa.

Note that closing the aperture decreases the amount of light reaching the camerai s sensor and

therefore results in a darker image.

Brightness:

Among the factors determining the brightness of an image are the intensity of the illumination, the setting of the lens aperture, and the settings for black level, exposure time, and gain.

We recommend that you choose bright illumination if possible, but avoid excessive intensity. This will prevent you from needing to operate the camera using extreme camera settings. A bright but not excessively bright illumination is of central importance to achieving good image quality.
In images acquired from CCD sensors, excessive brightness will cause artifacts such as smear (white stripes in the image) and blooming (local over-saturation that destroys contrast). You can decrease the proneness for smear and blooming by choosing a diffuse and less intense illumination.
If illumination of sufficient brightness is not available, you can select a lens that is optimized for light utilization.

- Opening the lens aperture will allow more light to reach the camera sensor and will therefore increase the brightness of the image. Note that opening the lens aperture also increases the effects of optical aberrations. This cause image distortions and the intensity of light decreases towards the edges of the sensor(vignette). In addition, the depth of focus decreases.

- Change the brightness of the image by changing the camera black level setting normally, you should increase the black level setting only as far as is necessary to make detail

visible in the darkest portions of an image. (This is equivalent to avoiding the clipping of the low ray values of noise.)

Note that high brightness settings will prevent high contrast. We recommend not using rightness settings above 64 when the camera is set for any output format that is greater than 8 bits per pixel.



- Increase the brightness of the image by increasing the cameras exposure time setting. With this method, brightness is increased by increasing the number of photons collected for pixel readout. Note that increasing the exposure time setting may decrease the acquisition frame rate. If you re acquiring images of moving objects, increasing the exposure time setting may increase motion blur.

- Increase gain will also increase image brightness. Note unless your application requires extreme contrast, you should make sure that detail remains visible in the brightest portions of the image when increasing gain. Note also that noise is increased but increasing gain.

Exposure Time:

The exposure time setting determines the time interval during which the sensor is exposed to light.

Choose an exposure time setting that takes account of whether you want to acquire images of still or moving objects.

- If the object is not moving, you can choose a high exposure time setting (i.e., a long exposure interval).

Note at high exposure time settings may reduce the cameras maximum allowed acquisition frame rate and may cause artifacts to appear in the image.

- If the object is moving, choose a low exposure time setting to prevent motion blur.

Gain:

Gain amplifies each pixel readout by a certain factor. Accordingly, signal and noise are both

amplified.

Note that it is not possible to improve the signal-to-noise ratio by increasing gain.

- You can increase the contrast in the image by increasing the cameras gain setting.

- Increasing gain will increase the image brightness.

Unless your application requires extreme contrast, make sure that detail remains visible in the brightest portions of the image when increasing gain. Note also that noise is increased by increasing gain.

- Set the gain only as high as is necessary.



Digital IO

Digital IO

The digital In-/Output display shows all digital in-/output interfaces that are embedded into the system. Depending on the available interfaces, all virtual LEDs will be displayed. Those displays reflect the real in-/outputs and their conditions. You also can simulate the digital I/O in offline mode without IO connected.

🛕 Digital IO	×
DIO Brand: Offi DIO Modules:	ine
Input	Output
4 5 6 7	4 5 6 7
8 9 10 11	8 9 10 11
• • • • • 12 13 14 15	• • • • 12 13 14 15
Reset	

List of IO module supported:

- Adlink PCI Dask
- Adlink USB Dask
- Advantech_PCI
- JS DIO3216B
- ControlX-WRB



Result Viewer

Result Viewer

To view all the results e.g. Long, Double, String etc. of the tools used in the Program Editor.

🛕 Result Viewer		
i (+ (-		
TotalRes Long		

To view all the results e.g. Long, Double, String etc. of the tools used in the Program Editor.

- TotalRes: The final result (1/0) of that individual command used
- Long: The value of a command used e.g. Count Object command "C number of objects detected
- Double: A decimal value of a command used e.g. angle "C where the measurement angle value is 38.54
- String: A result string of a command used e.g. DataCode "C the decoded result as shown in the picture above
- Point: A point result of a X & Y coordinate used in a command e.g. Matching
- Circle: The radius and X & Y coordinate result of a circle command used
- Line: The X & Y coordinates of the 2 points that form a line.

Туре	Range	Comment
TotalRes	0-1	The toolj ⁻ s results(Pass/Fail)
Long	2147483647 ~ -2147483648	The value is Integer
Double	1.79769e+308 ~ 2.22507e-308	The value is float
String		The value is string
Point	Px, Py	Point (2 float value)
Circle	Cx,Cy,Cr	Circle (1 point and 1 float value)
Line	Lx1, Ly1, Lx2, Ly2	Line (2 points)



Robot Control

To control the robot arm position and automatically do the calibration. For now, support Delta SCARA robot arm only.

Robot	Brand: Delta_S	SCARA			
Control	Jog Calibration	n	Index	Х	Y
	ServoOff				
	ServoOn				
	Reset Alarm				
	Go Home				
			Index	u	v

a. Control:

The robot arm control operations.

b. Jog:

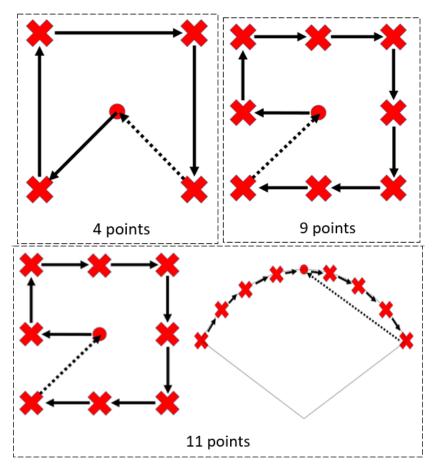
To move the robot arm position operations.

c. Calibration:

Two methods to find the target:

- 1. Blob: To see the tool Countobject how to use it.
- 2.Matching: To see the tool Matching how to use it.





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Configure Mapping

🛦 Mapping	? ×
set calibration	initial parameters
Results Image Coordinate	World Coordinate
Auto Plate 🗸 🗸	Auto 🗸
Size(W x H) 3 🗘 x 3 🗘	dx: 1 dy: 1
Auto manual	
Object color Dark ~	
	Agorthm
	planar_analytic 9 points + N points
No. u v	No. Wx Wy
Remove	Remove
	earch Save Close

1.Live the camera with a target glass as the picture above shown and ensure target is upright.

2.Disable live image and click is icon and the above menu will appear.

Image Coordinate: Calibration method

- Auto Plate: Select this option when the above picture_i s target glass is placed and select Auto option at the World Coordinate with dx & dy value entered. It will then perform automatically do a calculation to transform the image coordinates into world coordinates.
- **Checker Board:** Select this option when the above picture; s target glass is placed and select Auto option at the World Coordinate with dx & dy value entered. It will then perform automatically do a calculation to transform the image coordinates into world coordinates.
- **Point Matrix:** Select this option when the above picture; s target glass is placed and select Auto option at the World Coordinate with dx & dy value entered. It will then perform automatically do a calculation to transform the image coordinates into world coordinates.
- **Manual:** When this option is selected, it is to perform a mapping between the vision and robot. Right-clicked on the display which is highlighted orange. A red cross line will after right-clicked. (Min. need 3 points). Then select Manual at the World Coordinate where user can enter the robot arm position accordingly after index to the selected individual cross line.
- Load from file: Option to allow user to load a file containing details of the world coordinate of the calibration glass.
- Clear: To delete all the data in this menu.

World Coordinate:

• **Auto:** Perform automatically do a calculation to transform the image coordinates into world coordinates.



- **Manual:** Allow user to manually enter the world coordinates corresponding to the image coordinates.
- Load from file: Option to allow user to load a file containing details of the world coordinate of the calibration glass.
- **Clear:** To delete all the data in this menu.

Algorithm:

Methods supported for perspective cameras:

Method	When to use	Minimum number of point correspondences
analytic	Default method for general cases	4
iterative	If only three- or four-point correspondences are used or if the world points are close to being planar	3
planar_analytic	If the world points lie in a horizontal plane (WorldZ = 0)	4

Methods supported for telecentric cameras:

Method	When to use	Minimum number of point correspondences
telecentric	Default method for general cases	4
telecentric_robust	For very ill-posed point configurations where quality has an unlikely large value	4
telecentric_planar'	If the world points lie in a horizontal plane (WorldZ = 0)	3
telecentric_planar_robust	For very ill-posed point configurations where the world points lie in a horizontal plane (WorldZ = 0) and quality has an unlikely large value	3

dx & dy: Distance between each point matrix (x and y in world coordinate values).

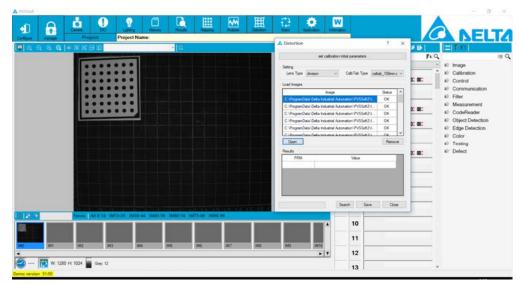
Search: Click the Search button where the software will automatically search all point matrixes from the field of view. The image & world coordinates will be computed automatically onto the 2 result tables.

Save: Data computed on the 2 result tables can be saved into a file with a desired path location and name. This file can be used when loaded into the mapping function of the calibration command.



Distortion Correction

Distortion Correction



This Distortion command corrects image distortion which occurs either by perspective error or by the lens aberration of the lenses used.

The main part of this distortion process consists of acquiring images of the calibration plates in different position and orientations relative to the vision system. These images at different position and orientations (especially the 4 corners) using the calibration plate must cover the complete field of view. Calibration results and accuracy will improve when more images are used in the calculation.

Need to acquire and save images of the calibration plates in different position and orientations relative to the vision system setup.

Load Image: Load the saved images of the calibration plates in different position and orientations relative to the vision system setup.

Lens Type: Option to select division, polynomial, tele-centric division & tele-centric polynomial

Calb Tab Type: Option to select based on the calibration size.

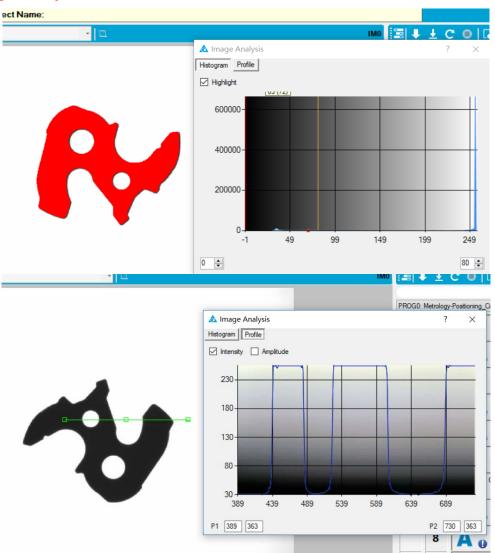
Search: Click the Search button where the software will automatically compute the distortion calculations basing on those saved images with the calibration plates in different position and orientations relative to the vision system setup.

Save: Data computed can be saved into a file with a desired path location and name. This file can be used when loaded into the distortion function of the calibration command.



Image Analysis

Image Analysis



To extract the key information from the images to display as histogram or profile to allow user to analysis the image.

Histogram shows very gray value, the number of pixels which have a value. This tool is especially useful to check the saturation of the image.

For measuring using amplitude, a one-dimensional gray profile is extracted. An edge is detected at a position where the gray value changes very quickly. This parameter is the minimum amplitude gradient (the steepness) required to accept an edge.



Application Setting

Application Setting

To configure the parameter for the PVS 2.0 software.

Application							?		×
Assignment Assig	nment2 Syst	em C				Lan Update	User	Lan	• •
			P	roject					
Name	3Car	nare	_					,	
	-		Pr	ogram					2
Name	Destination					file (*viz)			_
PROG0	Viewer 1		-			dustrial Autom			
PROG1	Viewer 2		-			dustrial Autom			_
PROG2	Viewer 3	~ C	:\Prog	ramData	\Delta In	dustrial Autom	ation\PV	SSoft2	
			Vi	iewer					5
Name	Source	IN	Λ	Tot	al	ОК		NG	
Viewer 1	PROG0	0	\sim	0		0		0	
Viewer 2	PROG1	15	\sim	0		0		0	
Viewer 3	PROG2	30	\sim	0		0		0	
Viewer 4		45	\sim	0		0		0	
						Apply		Close	
		_		_	_		_	_	



Assignment

To assign the viewer and inspection program for the PVS 2.0 software.

	Setting						?	>		
Assignment Assig	nment2	System	Comn	nunication	ControlLan	Update	User	Lan 4		
				Project						
Name	3	Camare								
			F	rogram	1				Ś	
Name	Destin	ation		file (*viz)						
PROG0	Viewer	1 ~	C:\ProgramData\Delta Industrial Automation\PVSSoft2\							
PROG1	Viewer	2 ~	C:\Pn	ogramData	Delta Industr	ial Automa	tion\PV	SSoft2\.		
PROG2	Viewer	3 ~	C:\Pn	ogramData	Delta Industr	ial Automa	tion\PV	SSoft2\.		
			,	Viewer					Ś	
Name	Source	e	IM	Tota	al	ОК		NG		
Viewer 1	PROG	0 0	~	0		0		0		
Viewer 2	PROG	1 15	~	0		0		0		
	PROG	2 30	~	0		0		0		
Viewer 3	FROG									
Viewer 3 Viewer 4	rhod	45	~	0		0		0		
	Phote	45	~	0		0		0		
	Phot	45	V	0		0		0		
	Phot	45	~	0		0		0		
	rhou	45		0		0		0		
	Thou	45		0		0		0		
	rhou	45		0		0		0		
		45		0		0		0		

is clear to all settings. For program, to clear files. For Viewer, to clear results counter.



Viewer 1 [IM0: test1.dat] [PROG0: 2232.0.viz]	OK	Viewer 2 [M1:] [PROG1: 2.0 viz]	OK
REM = 3.7580 E = 2.7474	CT: 61 ms Tota: 6 Pans: 6 (00%) Pant: 0 (0%)		CT: 9 ms Total: 6 Total: 6 (100%) Paul: 0 (0%) Faul: 0 (0%)
Annuel 3 (MZ -) (PRIGGZ - 3.0 HZ)	1 0K 1 1 1 1 1 1 1 1 1 1 1 1 1	Viewer 4 (MG.). (PROGS.)	CT Trail Pass Fiel
	3		

How to use assignment:

Assignment	Mapping Syste	m Commun	icatio	n	ControlLan	Update	Language					
Program												
Index	Name	Destinati	on		fi	Clear						
0	PROG0	Viewer 1	C:\Users\mi		:\Users\ming	xuan.wen	q∖Deskt					
1	PROG1	Viewer 2	- C		:\Users\ming	xuan.wen	g\Deskt					
2	PROG2	Viewer 3	-	C	:\Users\ming	xuan.wen	g\Deskt					
3	PROG3	Viewer 4	-									
			_									
			Clea	r All								
Viewer												
Index	Name	Source	I	1	Total	ОК	NG	Clear				
0	Viewer 1	PROG0	0	-	6	6	0					
1	Viewer 2	PROG1	1	-	6	6	0					
2	Viewer 3	PROG2	2	•	6	6	0					
3	Viewer 4	PROG3	3	-	0	0	0					
			Clea	r All								
					[Apply		Close				
					C							

- Destination is the program to display the inspection image & result to the respective viewer as defined in the selection provided.
- PROG1 with the Destination selected as Viewer 2 highlighted green will has the image and result display on Viewer 2.
- User is allowed to modify the inspection result and images basing on the destination selected.



n 1940: west dad 19900 1944 - 3.7589 19 - 2.7474	22 22 22 0 Wel	1	OK CT: 61 ms Total: 6 Press: 6 (100%) Press: 6 (100%)		Viewer 2 (M1	PRIGG: 2.0 vid			CT: 9 ms Totat: 6 Prant: 6 (PDFs) Frait - 6 (PDS)
ar Jac proce the			OK CT: 23 ms Total 6 (mms) Fait 0 (ms)	•	Viewer 4 (NO	. 1 laasoors 1			CT: Todas Fad
A	Assignment Program Index 0 1 2 3		Destina Destina Viewer 1 Viewer 2 Viewer 3 Viewer 4	tion C: C: C: C:	\Users\mir \Users\mir	file (*viz) igxuan.wen igxuan.wen	g\Deskt g\Deskt	Clear	
		_	-	Clear All		-			
	Viewer								
	Index	Name	Source	IM	Total	ОК	NG	Clear	
	0	Viewer 1	PROG0	0 🔻	6	6	0		
	1	Viewer 2	PROG1	1 🔻	6	6	0		
	2	Viewer 3	PROG2	2 🔫	6	6	0		
	3	Viewer 4	PROG3	3 -	0	0	0		
				a					
				Clear All	_	_	_		
		_		Clear All	_	Apply		Close	

- User can modify the Viewer corresponding to the Image Memory (IM).
- The default is where Viewer1 to IM0, Viewer2 to IM1, Viewer3 to IM2 etc.



Mapping

Assignment 2

ssignment	Assignment2	System	Communication	ControlLan	Update Use	r Lan	• •
			Mapping	1			
IM	file	name (*d	at)	ScalX	ScalY	Clear	^
0				1	1		
1				1	1		
2				1	1		
3				1	1		
4				1	1		
5				1	1		
6				1	1		
7				1	1		
8				1	1		
9				1	1		
10				1	1		
11				1	1		
12				1	1		
13				1	1		
14				1	1		
15				1	1		
16				1	1		
17				1	1		
18				1	1		
19				1	1		
20				1	1		
21				1	1		×

To load the pre-teached or saved mapping from different layer. The dat file is created by calibration mapping to see the <u>Configure Mapping</u> to show the more information on calibration mapping.



System

System

To system parameter for the PVS 2.0 software.

🛕 Applic	ation Setting	J				?		X
Assignment	Assignment2	System	Communication	ControlLan	Update	User	Lan	• •
			Program Se	tting				
Prog	ram Qty.	3						+
Prog	ram Col.	170						-
Vier	wer Qty.	4						-
Au	to Run	0						
Stop Ir	mmediately	1						 ▲ ▲ ▲
То	ol Error	Product	tion					\sim
Cyc	de Time	Image p	process only					\sim
			Memory/ Mo	dbus				
Men	nory Qty.	60						÷
He	х. Туре	Integer	(16 bits)					\sim
			System Set	ting				
D	ecimal	4						▲ ▼
Res	ult Table	Show p	in tool					\sim
То	ol level	Expert						\sim
Cam	era Level	Beginne	er					\sim
(Guide	0						-
								_
			System Rep	oort				
Aut	o Save	0					÷ 5	
				_				
					Apply		Close	

Program Setting:

- ✓ Program Qty.: To set the number of inspection program. (Max. 6)
- ✓ Program Col.: Preset the number of inspection lines.
- Solution Viewer Qty.: Number of the Viewer at the Process Menu (Max.9)
- Auto Run: Automatically load the selected viz program after software is initialized.
- Stop Immediately: To stop process at once (1) or stop process after one cycle (0), or stop process after one cycle without count (-1).
- Sol Error: To ignore or stop immediately, when tool is error.
- Cycle Time: Display timing for Image Capture + Image Processing or display timing for Image Processing or Image Capture + Image Processing (us)



Memory / Modbus:

- Memory Qty.: Number of memories assigned for saving value, point and string.
- 🖉 Hexadecimal. Type:

Integer(16bit) Integer(32bit) Floating Point

System Setting:

- Becimal: To set the number of decimal points for tools result.

Show all tools used in the inspection program at the Process menu

Tools that is PING to be shown at the Process menu.

- Solution Tool level: Display the plugin tools according to level.
- Sector Camera level: Display the camera parameters according to level.
- Suide: Switch the software to guide mode.
- Scostom UI: Not available.

System Report:

- System report: To save the log of the software events happening.
- Solution User also can press **F10** to open the dialog.
- Solution User can monitor the system report to know the software events.

System	n Report Cear	Save		X
Index	Time	Status	Message	
	2017_9_18_13_59_21_580	Info	Icense type: DEMO	
1	2017_9_18_13_59_22_707	Info	Canera status: Baler(DgE_USB)	
2	2017_9_18_13_59_22_707	Wam	Cannot found camera: ac/A2500 60um(20221431)	
3	2017_9_18_13_59_22_817	Info	DID status: Office	
- 4	2017_9_18_13_59_23_450	Info	EVO_Access/Vatable dl loading.	
5	2017_9_18_13_59_23_531	Success	(D-1006) EVO_Access/Vanishin dl loaded	
6	2017_9_18_13_59_23_532	Info	EVO_Advance/Rev dl loading.	
7	2017_9_18_13_59_23_641	Success	10-30007) EVO_AdvanceFitter dt kaded	
8	2017_9_18_13_59_23_641	Info	EVO_ANDOR dl loading.	Π.

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Communication



To setup standard protocol Modbus, when choose system is Slave, the system cannot be Poll. Below is when user set system is Slave.

Assignment	Assignment2	System	Communication	ControlLan	Update	User L	an 🖣	•
Slave							~	
Serial T	CP Viz buffe	r						
			COM Por	t				
	Enabled	0					-	
	Mode	ASCII	- 7, N, 2				\sim	
0	2							
Name	BaudRate	DataBits	FlowControl	Parity	Stop Bits	TimeOu	t	
COM4		7 ~		∨ no ∨				
								ASCII - User define
								ASCII - 7, N, 2
								ASCII - 7, E, 1
								ASCII - 7, 0, 1
								ASCII - 8, N, 2
								ASCII - 8, E, 1
								ASCII - 8, 0, 1
								RTU - User define
								RTU - 8, N, 2
					Analy	0	ose	RTU - 8, E, 1
					Apply	u	use	RTU - 8, 0, 1

Serial: User can add the number of serial COM by changing the setting in this page as shown the above pictures.



is add new serial COM handle.

s remove serial COM handle.

signmen						ControlLan		Lan	
lave									~
Serial	TCP	Viz buffer							
				тс	P				
	Enabled	ł	1					-	-
0	-								
		Port				Tim	eOut	 1	1
		3000		10	0000				L
								185	
									l



TCP: User can add the number TCP ports by changing the setting in this page as shown the above pictures.



is add new TCP port handle.

I is remove TCP port handle.

ssignment Mapping	System Communication	ControlLan	Update	language	
Slave Serial TCP Viz bu	ffer				
Location	F	ile Name		Clea	r
PROG0: 1060					
PROG0: 1061					
PROG0: 1062					
PROG0: 1063					
PROG0: 1064					
PROG1: 1065					
PROG1: 1066					
PROG1: 1067					
PROG1: 1068					
PROG1: 1069					
PROG2: 106A					
PROG2: 106B					
PROG2: 106C					
PROG2: 106D					
PROG2: 106E					
PROG3: 106F					
PROG3: 1070					
PROG3: 1071					
PROG3: 1072					
PROG3: 1073					
		(Apply		lose

Viz Buffer: User can setup the viz program to use Modbus communication to change the program in this page as shown the above pictures.

	Location	Support code	Function
100	0H(4096)	03H, 06H	Run
	1001H(4097)	06H	Once
	1002H(4098)	06H	Stop
	1028H ~ 102DH(4136 ~ 4141)	06H	Reset Results count
	102EH (4142)	06H	Reset Static
	1060H ~ 107DH(4192 ~ 4221)	06H	Load viz
	10ACH ~ 10B7H(4268 ~ 4279)	03H	Total count(32bit)
	10B8H ~ 10C3H(4280 ~ 4291)	03H	Pass count(32bit)
	10C4H ~ 10CFH(4292 ~ 4303)	03H	Fail count(32bit)
	10D0H ~ memory qty.	03H, 06H, 10H	Memory



Slave mode can support modbus protocol ASCII, RTU and TCP standard:

1. Modbus_ASCII:

Read 03:

Send:

:	01	03	1010	0002	DA	CR CL
Head	Slave Address	Function	Starting Address	No. of Points	Error Check	

Feedback:

:	01	03	04	0010	0015	D8	CR CL
Head	Slave Address	Function	Byte Count	Data1	Data2	Error Check	

Write 06:

Send:

:	01	06	1000	0001	E8	CR CL
Head	Slave Address	Function	Starting Address	Data	Error Check	

Feedback:

:	01	06	1000	0001	E8	CR CL
Head	Slave Address	Function	Starting Address	Data	Error Check	

Write 10:

Send:

:	01	10	1070	0002	04	0060	0015	F4	CR CL
Head	Slave Address	Function	Starting Address	No. of Registers	Byte Count	Data1	Data2	Error Check	

Feedback:

:	01	10	1070	0002	6D	CR CL
Head	Slave Address	Function	Starting Address	No. of Registers	Error Check	



Read 03:

Send:

N.A.	01	03	10D0	0001	8133	CR CL
Head	Slave Address	Function	Starting Address	No. of Points	Error Check	

Feedback:

N.A.	01	03	02	000C	4100	CR CL
Head	Slave Address	Function	Byte Count	Data1	Error Check	

Write 06:

Send:

N.A.	01	06	10D0	007B	CCD0	CR CL
Head	Slave Address	Function	Starting Address	Data	Error Check	

Feedback:

N.A.	01	06	10D0	007B	CC D0	CR CL
Head	Slave Address	Function	Starting Address	Data	Error Check	

Write 10:

Send:

N.A.	01	10	10D0	0002	04	007B	01C8	432C	CR CL
Head	Slave Address	Function	Starting Address	No. of Registers	Byte Count	Data1	Data2	Error Check	

Feedback:

	N.A.	01	10	10D0	0002	44F1	CR CL
ſ	Head	Slave	Function	Starting	No. of	Error	
		Address		Address	Registers	Check	



3. Modbus_TCP:

Read 03:

Send:

00 00 00 00 00 06 01 03 10 D0 00 02

Feedback:

00 00 00 00 00 07 01 03 04 00 01 00 01

Write 06:

Send:

00 00 00 00 00 06 01 06 10 D0 00 00

Feedback:

00 00 00 00 00 06 01 06 10 D0 00

Write 10:

Send:

00 00 00 00 00 0B 01 10 10 D0 00 02 04 00 01 00 01

Feedback:

00 00 00 00 00 0B 01 10 10 D0 00 02

4. Error Code: (TCP, RTU, ASCII)

1. Wrong data length:

01860C6D, 01860E6E

2. Wrong location:

01860277

3.mProgram is running, cannot do the command:

01860673

4. Not support code:

01860178

5. System not ready:

01860673



ControlLan

This is a custom communication format used by PVS to communicate where 3rd party software sends instruction via UDP or TCP.

DIO: Use output state to represent the software is run (1) or stop (0). Enabled is 1, the last output line is used by to represent the state.

Assignment	Assignment2	System	Communication	ControlLan	Update	User	Lan	4 4
			TCP					
En	abled	1						-
	Port	4557						+
			UDP					
En	abled	0						+
	Port	4660	660					+
			DIO					
En	abled	0						÷
								المشما
			Protoco	1				
Stop Tool Dialog Login Dialog Cam Setting I/O Dialog Application UI Setting I Info Dialog Load Progra Get Parame Get Memory Get Total c Get Pass c	g Dialog Dialog am(*.viz) eter y value y value ount	8						~
			Syntax					
					Apply		Close	9

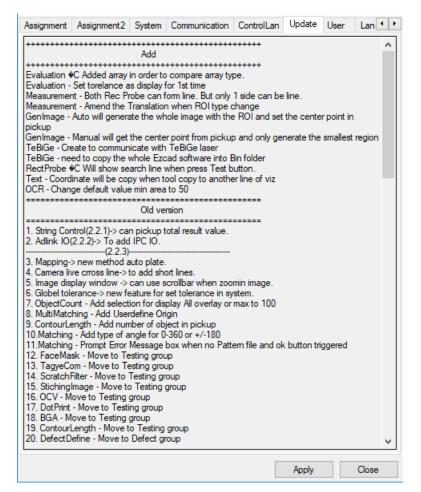


Function	Protocol	Example
Run	001	001
Once	002	002
Stop	003	003
Dialog	004; ;	004;PROG1;DataCode
Login	005	005
Camera setting	006	006
IO setting DIO	007	007
App setting	008	008
Info	009	009
Load viz	011;;	011;PROG1;C:\ProgramData\PVS2\Program\IC.viz
Get parameter	012;;;;;	012;PROG1;Width;NumofSide;long
Set parameter	013;;;;;;	013;PROG1;Width;NumofSide;long;2
Get memory	014;;	014;0;long
Set memory	015;;;;	015;0;long;1
Password	Not available	Not available
Get total count	017;	017;PROG1
Get pass count	018;	018;PROG1
Get fail count	019;	019;PROG1
Reset result count	020;	020;PROG1
Reset static	021	021
Get user level	022	022
Camera status	023	023
Save all program	024	024
Mapping	027	027
LiveCam	030	030
Load vpj	031;	031;C:\ProgramData\PVS2\Program\2D DataCode.vpj
Lighting setting	032	032
Ping	999	999



Update

Update



New added applications or information for the new version PVS 2 will be stated and explained here.



User

User

Assignment Assignmer	nt2 System	Communication	ControlLan	Update	User	Lan 🔹
Change Password						
	Show cha	aracters				
Run Stop						
Once						
Close Software Configure						
Memory						
Camera						
Static						
 Application Mapping 						
Distortion						
Analysis Detail						
Open Dialog						
ProgramEdit						

Administrator can authorise to enable or disable the application functions.



Language

Allow user to change the language type for the software.

lasignment	Mapping System Communication ControlLan Update Impurson Currrent language -> English
Option	
	English
	简体中文
	繁體中文
	Apply Dos



Inspection Tools/Command

This chapter provides detailed information of the graphical user interface of the inbuild commands/inspection tools.



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Image

Topic on Image Capture, Loading Image and Saving Image.



Camera Control

Camera				
[0] Emp	ty			~
_ .				
	mic param	neter s	etting	
Parame	ter			
Name				
Value	0			

The Camera Control command is used to change the parameter of channealled camera directly.

Camera: To determine which camera is channelled to this camera control command.

Dynamic parameter setting: Refer to the process of choosing and load a complete parameter file anywhere in the computer.

Parameter

- Name: Name the shutter paratemer with your own reference
- Value: Set the value for the shutter parameter



Capture Capture

Camera		
[0] Empty		
[0]Same wit	h camera setting	

The Capture command is used for capture images from the camera.

Camera: Camera index to determine which camera is channelled to this image capturing command. It will capture an image with the selected cameras at the Hardware Configurator software.

Capture mode:

[0] Same with camera setting: The camera will follow the capture mode with camera setting.

- [1] free run: To force the camera to free run mode.
- [2] Asynchronus: To force the camera to Asynchronus mode.
- [3] Hardware Trigger: To force the camera to Hardware Trigger mode.



Load

<u>う</u> Load

	Load
Option	File
	OK Cancel

The Load command is used to load images from the desired directory to allow offline testing purposes.

Option:

- Fixed: When choosing this option, a name and storage location of an image can be assigned by the file selection button.
- Cyclic: When choosing this option, the entire selected folder of the location is activated. All images in the selected folder are loaded sequential.

File: Displays of the current file location and name.



Savelmage

Savelmage

	5	Save
Option	Cyclic type	Setting
Fixed	Timestamp	Folder name
Ocyclic	Counter	
Pickup	1	File name
		Pickup
		Cyclic type
		e bmp jpeg
		i with overlay
		OK Cancel

The SaveImage command is used to save the current acquired images into a desired directory in bmp or jpeg format.

Option:

- Fixed: When choosing this option, a name and storage location of an image can be saved and assigned by the file selection button.
- Cyclic: When choosing this option, all images are saved in the selected folder in sequential.
- Bickup: Able to save the file name basing on the inspection result.
- File Name / Pickup: To pick up the inspection result and save the image file name basing on the pick-up result.

Cyclic type:

- Timestamp: To save the images according to the filename_date_time. E.g.: Test_2017_7_6_14_31_14_684. Need to select the Cyclic option for his feature, enter a name under the File Name text and specific/open a folder name for saving the images.
- Counter: To save the images according to the internal counter. E.g.: Test_00001. Need to select the Cyclic option for his feature, enter a name under the File Name text and specific/open a folder name for saving the images.

Setting:

- Section and name: Displays of the current file location and name.
- Bmp/Jpeg: Image format to be saved. (bmp is original image size where else jpeg is compressed image)
- With Overlay: To save the images with overlay used in the inspection program created.



Topic on Locate and Mapping.



Locate

XLocate

Туре	Rotational direction
Point - Angle	Ounter-Clockwise
2 Points	Clockwise
💿 Single 💿 Array	
New origin	
	Pickup
Rotation	
	Pickup
	OK Cance

The Locate command is used for position tracking in X and Y direction as well as rotation position.

Type:

- Sector Point-Angle: Based on a point and an angle to locate the object position.
- Z **Points:** Based on 2 points to locate the object position.

Single: Only pick up one coordinate result.

Array: Pick up an array coordinate result within a command. The particular command usually will find at 2 or more coordinate result, e.g. Matching or Count Object command. This array option is selected when using the looping concept in the viz program.

New Origin: A new origin of the X & Y can be defined. The X & Y coordinates are updated with a completely new starting point of the coordinate system basing on the new reference origin from the image.

Rotation: With this option, a new coordinate origin is defined with turning position traced by an angle with respect to the selected reference.

Pickup: The Pickup refers to the process of choosing the result value generated by a command / function anywhere in the inspection program. The Pickup is a global data structure which uses the result values of the different commands into their position and stores them. This allows the user to have a specific access to the result and is not dependent on any possible shifts in the program.

Rotational direction: To set the rotational direction of the coordinate result.



Distortion

Dist	ortion	
	ОК	Cancel

This Distortion command corrects image distortion which occurs either by perspective error or by the lens aberration of the lenses used.



Mapping

Mapping

Data • Pick up		O Manual	
		<u> </u>	Select
File			
Pick up		🔘 Manual	
			Select
mage Size			
Pick up		O Manual	
Width			Save
Height			Save
Description			
[WorldCoordinate WorldCoordinate		[ImageCoordinate ImageCoordinate	
WorldCoordinate WorldCoordinate	0 Y=123.456	ImageCoordinate ImageCoordinate	0 Y=123.456
WorldCoordinate WorldCoordinate	1_X=123.456 1_Y=123.456	ImageCoordinate	1_X=123.456 1_Y=123.456
		nerate the mapping file	

The Mapping command uses a saved reference file on a projection map which describes the mapping conversion between the image plane and the measured plane in a world coordinate system.



Control

Topic on Flow Control, Variable Access, ANDOR, Array Variable, CCS, CCS Control, Chart, Evaluation, Image Information, Stop Watch, SubProgram and Table.





FlowControl

Selection Set Mark Jump to Mark Loop End Program End Loop Set Result "OK" Set Result "NOK"	Set up Mark Result OK NOK Aways
---	--

The Flow Control command provides several options to influence sequential flow of the inspection program.

Selection:

- Set Mark: Create a new node or mark in a viz program. A Mark is a unique label within the program where the mark name can be defined by user.
- Jump to Mark: A conditional jump to a pre-assign selected available Mark. Executes a conditional jump to a selected mark basing on the inspection tools result.
- Jump to Mark (OK): Jump to selected Mark if reference result is OK. Jump accordingly basing on the total result of the commands used or based on the selected command result.
- Jump to Mark (NOK): Jump to selected Mark if reference result is NOK. Jump accordingly basing on the total result of the commands used or based on the selected command result.
- Loop: Perform a loop with a defined number of cycles at the selected mark before proceeding to next command or action. Able to the set the number of looping manually under the Times textbox or loop the number of times basing on the pick up from the memory (result).
- End Program: Define termination point of an inspection program. Program will start again at the beginning.
- **End Loop:** Define a loop termination point of a mark. Program will start again after the looping process is completed.
- Set Result OK/NOK: To allow the user to set/force the viz program to be inspection result.



Variable Access

V	ariable Access	? ×		ariable /	Access	?	>
Options Create Put value into variable Put pickup into variable Anthmetic Put value into memory Put value into value	Name type Value Value Point Une String Option Static variable		Options Create Put value into variable Put pickup into variable Arithmetic Put value into memory Put memory into value	type Value Point Line String	Pickup Variable	PICKUP	

The Variable Access command deals with the system variable like in a programming language with the instruction to access the variable. It is able to establish and save variables and read them or calculate with them. These variables are stored in registers which are available for commands or functions to be used.

Create: A variable of the selected type of variable will be created. The user can define the variable name and select the variable type (value, point, line, string). It also has an option to create a static variable.

▲ ? ×	< 🔺 ? >	×
Options Options Oreate Pickup Variable Put value into variable Point Arthmetic Point Put value into memory String Put memory into value Pickup Result PicKUP PicKUP	Options Value Create Value Put value into variable Value Put pickup into variable Point Arthmetic Point Put value into memory Put memory into value Put memory into value Imanual Bernert 1 PICKUP Gravel Save in variable	
OK Cancel	OK Cancel	

Put value into variable: Defined value, point, line or string to be input into the variable created.

Put pickup into variable: Selected the command result (value, point, line, string) to be input into the variable created.

Arithmetic:

- Allow user to do Addition, Subtraction, Multiplication, Division basing on the result: value or point
- Value: To manually enter the value to do mathematically calculation after checking the manual option or pick up the particular command result.



- Point: To manually enter the point to do mathematically calculation after checking the manual option or pick up the particular command result.
- Save in variable: To save the calculated value or point as reference to be used in the viz program.

٨			?	×	۵			?	×
Options Create Put value into variable Put pickup into variable Arithmetic Put value into memory Put memory into value	Index Type	O Constant Sector Sec		×	Options Create Put value into variable Put pickup into variable Anthmetic Put value into memory Put memory into value	Index Type	0 follow loop index Long wait status clear after take		
		ОК	Can	cel			ОК	Cance	el

Put value into memory:

- Index: To save the parameter (Long, Double, string, Point) into the memory location of a selected command.
- From Pickup list: To select the desired result to save into the memory.
- ✓ Wait Status: When this option is checked, it will wait until the specific memory is cleared before it saves the new data in.

Put memory into value:

- Solution Index: To get the parameter (Long, Double, string, Point) from the selected memory location and input into a value.
- **Type:** To set the format type of value after getting from memory.
- Clear after take: To clear the memory index after getting the result, to allow the next parameter to save into the memory index.



				-	
		AN	ID / OR		
Pickup 6;41;1;TotalF	les	Sele	ect		
	1				
Output Data					
Syntax	Pickup<6;5882;3;TotalRes> A	ND Pickup<6;41;1;TotalRe	1 5>		

The AND / OR command is a basic scripting to set "and" & "or" condition for different commands result.

Pickup: To select the particular command result. The syntax will be shown after selecting.

Syntax: Manually enter "Pickup" with "< >" and then copy the syntax from the pickup textbox and paste between the "< >" as shown in the above picture.



Evaluation

Evaluation Result to be compare Tolerance / Reference Check long Check double Check Point Check string PICKUP PickUp PickUp PickUp	Evaluation Result to be compare Tolerance / Reference Tolerance Save in Pickup Nominal Value +
Array PICKUP	Tolerance
	0.0000 🗢 10000.0000 💠 10000.0000 💠
OK Cancel	OK Cancel
Result to be compare Toleran Sytax : ('=Num;^=Any;#=Char) Tolerance Reference string () manual	Compare All

The Evaluation command is to compare the result (long, double or string) of a command with desired reference or tolerance range.

Result to be compare:

Pickup: To select the particular command result; long, double or string to be compared.

Tolerance / Reference:

Nominal value: Manually enter the value in long or double to be compared with the pickup result. State conditional acceptance of the inspected result.

Reference string: Manually enter the string or picked reference string to be compared with the pickup result.



Image Information

Mage Information

	- 🗆 🗙	x 🔺 – 🗈 🗴
Image Informati	on	Image Information
ROI Setting Tolerance		ROI Setting Tolerance
		Mode Threshold
Complete Configuration Circle Rectangle Load Mask	~	Average Gray Value Deviation Image Format Highlight
Test OK	Cancel	Test OK Cancel
A	- 🗆 X	× 🔺 – – ×
Image Informati	on	Image Information
ROI Setting Tolerance		ROI Setting Tolerance
Mode Information Average Gray Value Deviation Information Only Apply to Complete Image Image	je	☐ Save in Pickup + - Nominal Value :
Format		

The Image Information command is to determine or computed the various image information of that image.

ROI:

To set the region of interest of this command. **Setting:**

Mode:

- Average Gray Value:
- ∠ Deviation:
- ∠ Image Format:

Tolerance: Manually enter the value in long or double to be compared with the result. State conditional acceptance of the inspected result.







Stop Watch command allows a fixed defined waiting duration or condition to wait for an action from the operator.

Mode:

- Wait for time: The execution of the program stops for a defined waiting duration with value in milliseconds or microseconds(optional). To allow use pickup value.
- ✓ Wait for key: The execution of the program stops until the user pushes a button on the keyboard.
- ✓ Timestamp: To get the CPU_i s date_time (e.g. 2017_7_6-17_4_38_193). To allow delay by day or month.
- Reset timer: To reset timer.
- Read timer: To get how many time from reset timer to read timer.



Array Variable

Options Create Put value into variable Put pickup into variable Put value into memory Put memory into value	Name type Value Value Point Line Option Static variable
--	---

The Array variable command is collect a group of data structure which consisting of elements (values or variables).

Create: A variable of the selected type of variable will be created. The user can define the variable name and select the variable type (value, point, line, string). It also has an option to create a static variable.



Options Create Put value into variable Put pickup into variable Put value into memory Put walue into memory Put memory into value	type Value Point Line	Pickup Variable PICKUP Value 0
	Number of Ar	OK Cancel
Options O Create O Put value into variable	type Value Point Line	Pickup Variable PICKUP
 Put pickup into variable Put value into memory Put memory into value 		Pickup Result PICKUP

Put value into variable: Defined value, point, line to be input into the array variable created.

Put pickup into variable: Selected the command result (value, point, line) to be input into the array variable created.



Options Create	Index	0		÷
O Create Put value into variable		-		•
Put pickup into variable				
Put value into memory	Туре	Long		~
Put memory into value				
				PICKUP
			OK	Cancel
		Veriek		
Quitana (Ana	variab	le	
Options	Index	0		1.4
) Create	Index	U		÷
 Create Put value into variable 	Range			÷
			ake	÷
 Put value into variable 	Range	1	ake	
 Put value into variable Put pickup into variable Put value into memory 		1	ake	
 Put value into variable Put pickup into variable Put value into memory 	Range	1	ake	
 Put value into variable Put pickup into variable Put value into memory 	Range	1	ake	
 Put value into variable Put pickup into variable Put value into memory 	Range	1	ake	
 Put value into variable Put pickup into variable 	Range	1	ake	
 Put value into variable Put pickup into variable Put value into memory 	Range	1	ake	

Put value into memory:

- Index: To save the parameter (Long, Double, Point) into the memory location of a selected command(by sequence).
- From Pickup list: To select the desired result to save into the memory.
- **Wait Status:** When this option is checked, it will wait until the specific memory is cleared before it saves the new data in.

Put memory into value:

Index: To get the parameter (Long, Double, Point) from the selected memory location(by sequence)and input into a value.



- Range: To set number of data you want to take.
- **Type:** To set the format type of value after getting from memory.
- Clear after take: To clear the memory index after getting the result, to allow the next parameter to save into the memory index.



CCS Control

CCS Contr	ol
Light intensity	~
Setting	
Channel 1	~
	128
ОК	Cancel

This CCS Control application command to control the lightning.

Setting: Adjust the light intensity from 0 to 255 (dark to bright), able to select the lightning mode and turn on and off of the light.



Chart

M Chart

Chart Name		
Chart ID 0		÷
Chart Data		•
	PIC	CKUP

Chart command to create a chart for the program.

Chart Nama: Enter the desired name for the chart.

Chart ID: Set the ID for chart.

Chart Data: Pickup the parameter data from program for the chart.



SubProgram

SubProgram

SubProgram				
File Name				
		Load		
	ОК	Cancel		

SubProgram application is command to Load Program in a new program.



Table

Table Name	
Table ID	
0	
Table Data	
	 PIC
	PIC

This Table application command to create a Table for program.

Table name: Enter the desired name for the table.

 Table ID: Set the table ID.

Table data: Pickup the parameter data for table.



Topic on Digtal Output/Input, AutoCOM, Communication, String Control, Image Transfer, Ini Access, Modbus COM and Text.



SetOutput

SetOutput

Set Output				
Setup Line State		Result OK NOK		
Pulse	0 🐑 ms	Cancel		

All digital I/O output connected to the system are able to be activated.

Setup:

- Line: Select a output index (addressed by 0..N-1 when N-1 is the total number of outputs).
- State: Setting the output to the target condition (e.g. High=1 & Low=0).
- Bulse: Set the output ON for the duration set.

Result:

- Result (OK): Output will be set if the total result is OK (for good part).
- Result (NOK): Output will be set if the total result is NOK (for NG part).





ReadInput

ReadInput

Read Input
Setup Line 0 🐳 State 0 🐳
Mode level-triggered wait for state
OK Cancel

A digital I/O input is checked for the expected condition. The I/O input can be accessed by the line index.

Setup:

- Line: Select a sequential input index (beginning with 0 for the first I/O input).
- State: Comparing the input with the target I/O condition (e.g. High=1 & Low=0).

Mode:

- Level-triggered: When selected, the I/O announces if the target condition is reached.
- **Wait for state:** When selected, the I/O announces if the signal changes from the current condition to the target condition.



X
AutoCom
Start of Text (HEX)
Separator (HEX)
End of Text (HEX)
Setting Show + for positive value
Fix Length 8 Length (include +/- and decimal)
Data Mode Output Interfer (Data) ~
String
O Hex
No. Pick Up Long V
Pickup
Delete
Test OK Cancel

The AutoCom command allows to append multiple data into user preference order and format

Start of Text (HEX):

 \swarrow HEX code which will be append on the start of the data. Separator (HEX):

HEX code which will be append to separate the data.End of Text (HEX):



Be HEX code which will be append on the end of the data.

Setting:

- Show + for positive value : Append additional + symbol for positive value.
- Fix Length : Fix each output data into same length which included +/symbol.

Data Mode:

Sonverting the Pickup data into the format.

Output Data Type:

- String: Data output in string type of pickup (consist of alphabet, numbers, symbols and special characters).
- Best Hex: Data output in Hex code.

Data:

- Sc Long: Pickup Long type of data.
- Source Double: Pickup Double type of data.
- Se Point: Pickup Point type of data.
- Solution Total Result: Pickup Total Result type of data.
- Sc Long Array: Pickup Long Array type of data.
- Souble Array: Pickup Double Array type of data.
- Se Point Array: Pickup Point Array type of data.



Communication

Script

٨							×
			Script				
Pickup Long ~				Output Type String OL	ong 🔿 Double	O Point	
Output Data	1						^
							~
Syntax							~
	Te	st	ОК		Cancel	Show Syntax	

The Communication command allows simple calculation, scripting or special data arrangements.

Pickup:

- Bickup: Show pickup script of selected tool results.
- Select: Pop-up pickup list window for selection.

Output Type:

- String: Data output in string type of pickup (consist of alphabet, numbers, symbols and special characters).
- **Long:** Data output in long type of pickup (numbers only without decimals).
- **Double:** Data output in double type of pickup (numbers only with decimals).
- Point: Data output in point type with X & Y coordinates of pickup (numbers only with decimals).

Output Data (Window):

Solution results.

Syntax (Window):

Syntax: Allow scripting text, syntax and calculations.

Show Syntax:



Show Syntax: Display sample and syntax available for scripting / calculations as shown below.

▲		- 🗆	×
	Script		
Pickup Long ~	Select Output Type Select String Long Double	O Point	
Output Data	Pickup < pickup info> Str(Data, NumofDecimal, OutDataLen, FillChar, Fill SinR(radian) SinD(degree) CosR(radian) TanR(radian) TanR(radian) TanR(radian) ASinr(radian) ASinr(radian) ACosr(radian) ACosr(radian) ACosr(radian) ATanr(radian) ATanr(degree) abs(value)	Loc) 0=backw	ards ^
Syntax	Getstacky, StringArr, StringFind) Sqt(value) TimL(Data, length) TimR(Data, length) TimR(Data, length) Minus(value1valueN) Mult(value1valueN) Divide(value1valueN) Divide(value1valueN) Bound(value), Rad(value) Deg(value) Mod(value1.value2) Pow(value1.value2) Pow(value1.value2)		~
	Test OK Cancel	Hide Synta	x

Example Syntax:

Pickup of single data

Syntax (commands)	Examples	Results
Pickup<>	Pickup<01,00,Number_Of_Object,(LONG),>	2

 "01,00,Number_Of_Object,(LONG)," is script from selected pickup list (single data) tool.

Pickup of array data

Syntax (commands)	Examples	Results	
PickArray<>	PickArray<01,00,CenterPoint,(PointARRAY), [a b 3]> <u>Original:</u> 134.4124/80.0751, 197.1047/125.4446,	<u>Final:</u> 134.412 <mark>a</mark> 80.075b 197.104 <mark>a</mark> 125.444b	
 "01,00,CenterPoint,(PointARRAY), [a b 3]" is script from selected pickup list (array data) tool; "a" is separater between single data; 			

- "a" is separator between single data;



- "b" is separator between array data;
- "3" is number of decimals.

Convert to string data

Syntax (commands)	Examples	Results
Str()	Str(Pickup,3,10,x,0) <u>Original:</u> 148.1283	<u>Final:</u> 148.128xxx

- "Pickup" is data script pickup;
- "3" is number of decimals;
- "10" is total string length;
- "x" is fill character if data length is insufficient;
- "0" is fill characters after the string (whereas "1" is fill characters before the string).

Trigonometric functions (Part 1 of 4)

Syntax (commands)	Examples	Results
SinR()	SinR(10)	-0.544021
CosR()	CosR(10)	-0.839072
TanR()	TanR(10)	0.648361

- Trigonometric function where "10" is angle in Radians.

Trigonometric functions (Part 2 of 4)

Syntax (commands)	Examples	Results
SinD()	SinD(20)	0.342020
CosD()	CosD(20)	0.939693
TanD()	TanD(<mark>20</mark>)	0.363970

- Trigonometric function where "20" is angle in Degrees.

Trigonometric functions (Part 3 of 4)

Syntax (commands)	Examples	Results
ASinr()	ASinr(<mark>0.1</mark>)	0.100167
ACosr()	ACosr(0.1)	1.470629



ATanr()	ATanr(<mark>0.1</mark>)	0.099669
---------	---------------------------	----------

- Inverse trigonometric function where "0.1" is Radians value.

Trigonometric functions (Part 4 of 4)

Syntax (commands)	Examples	Results
ASind()	ASind(<mark>30</mark>)	0.551069
ACosd()	ACosr(<mark>30</mark>)	1.019727
ATand()	ATanr(<mark>30</mark>)	0.482348

Inverse trigonometric function where "30" is Degrees value.

Convert value to positive number (absolute)

Syntax (commands)	Examples	Results
abs()	abs(-5)	5.000000

- "-5" is value before conversion.

Extract specific string data from selected string array

Syntax (commands)	Examples	Results
Getstr()	Getstr(PickArray,12345)	

- "01,00,Decoded Code,(STRINGARRAY)" is value before conversion.

Mathematics calculations (Part 1 of 7)

Syntax (commands)	Examples	Results
Sqrt()	Sqrt(<mark>9</mark>)	3.000000
SQR()	SQR(<mark>5</mark>)	25.000000

- "9" is value before square root,

- "5" is value before square.

Mathematics calculations (Part 2 of 7)

Syntax (commands)	Examples	Results
Plus()	Plus(<mark>2,2,2</mark>)	6.000000
Minus()	Minus(<mark>3,3,3</mark>)	-3.000000



Mult()	Mult(4,4,4)	64.000000
Divide()	Divide(5,5,5)	0.200000

- "2" is value before addition,
- "3" is value before subtraction,
- "4" is value before multiplication,
- "5" is value before division.

Mathematics calculations (Part 3 of 7)

Syntax (commands)	Examples	Results
Round()	Round(6.789)	7.000000
Floor()	Floor(123.987)	123.000000

- "6.789" is value before rounding Up to whole number,

- "123.987" is value before rounding Down to whole number.

Mathematics calculations (Part 4 of 7)

Syntax (commands)	Examples	Results
Rad()	Rad(10)	0.174533
Deg()	Deg(<mark>5</mark>)	286.479140

- "10" is angle in Degrees to be converted to Radians,

- "5" is angle in Radian to be converted to Degrees.

Mathematics calculations (Part 5 of 7)

Syntax (commands)	Examples	Results
Mod()	Mod(10,3)	1.000000

- Finds remainder after division between 2 values,

- "10" is main value to be divided,
- "3" is dividing value.

Mathematics calculations (Part 6 of 7)

Syntax (commands)	Examples	Results
Pow()	Pow(5,2)	25.000000

- Value to the power of function,
- "5" is main value,



Mathematics calculations (Part 7 of 7)

Syntax (commands)	Examples	Results
Min()	Min(10,5,30,3)	3.000000
Max()	Max(10,5,30,3)	30.000000
Avg()	Avg(10,5,30,3)	12.000000

- Finds and return Minimum, Maximum or Average value,

- "10", "5", "30", "3" are value to be compare.

Time function

Syntax (commands)	Examples	Results
Time()	Time()	2017_04_06_ 12_33_03_82 4

- Returns current time in YYYY_MM_DD_hh_mm_ss_sss

Data trim

Syntax (commands)	Examples	Results
TrimL()	TrimL(abcde,4)	Abcd
TrimR()	TrimR(vwxyz,3)	Xyz
LTrim()	LTrim(<mark>fghij,2</mark>)	Hij
RTrim()	RTrim(<mark>qrstu,1</mark>)	Qrst

- "abcde" is data before trimming,
- "4" is length of data starting from Left after trimming,
- "vwxyz" is data before trimming,
- "3" is length of data starting from Right after trimming,
- "fghij" is data before trimming,
- "2" is length of data to trim from Left,
- "qrstu" is data before trimming,
- "1" is length of data to trim from Right.

Data sorting

Syntax Examples Results	Jyniax
-------------------------	--------



s)		
Sort()	Sort(PickArray,[/ , 0 1 0]) <u>Original:</u> 107.1333/52.2228, 396.4163/80.1496, 212.4862/168.9366, 456.4062/257.5171, 135.8728/258.2039,	<u>Final:</u> 107.1333/52.2228, 135.8728/258.2039, 212.4862/168.9366, 396.4163/80.1496, 456.4062/257.5171,

- "PickArray" is data for sorting,
- "/" is splitting characters between data,
- "," is splitting characters between array,
- "0" is sorting by ascending (whereas "1" is sorting by descending),
- "1" represent data is Point type (whereas "0" represent data is Value type),
- "0" is sorting by X direction (whereas "1" is sorting by Y direction).

Data characters replace

Syntax (commands)	Examples	Results
Repl()	Repl(PickArray,/,x) <u>Original:</u> 107.3233/52.0798, 212.6762/168.7936,	<u>Final:</u> 107.3233x52 .0798,212.67 62x168.7936 ,

- "PickArray" is original data before replacement,
- "/" is character to be replaced,

"x" is character replaced with.

Create special characters

Syntax (commands)	Examples	Results
Chr()	Chr(<mark>35</mark>)	#

- "35" is ASCII character decimal code as shown in table below.



Dec HxOct Char	Dec Hx Oct Html Chr	Dec Hx Oct Html Chr Dec Hx Oct Html Chr
0 0 000 NUL (null)	32 20 040 Space	64 40 100 «#64; 0 96 60 140 «#96; `
1 1 001 SOH (start of heading)	33 21 041 ! !	65 41 101 «#65; A 97 61 141 «#97; a
2 2 002 STX (start of text)	34 22 042 ""	66 42 102 «#66; B 98 62 142 «#98; b
3 3 003 ETX (end of text)	35 23 043 «#35; #	67 43 103 «#67; C 99 63 143 «#99; C
4 4 004 EOT (end of transmission)	36 24 044 \$ \$	68 44 104 «#68; D 100 64 144 «#100; d
5 5 005 ENQ (enquiry)	37 25 045 % 🗞	69 45 105 «#69; E 101 65 145 «#101; e
6 6 006 <mark>ACK</mark> (acknowledge)	38 26 046 & <u>«</u>	70 46 106 «#70; F 102 66 146 «#102; f
7 7 007 <mark>BEL</mark> (bell)	39 27 047 ' '	71 47 107 «#71; G 103 67 147 «#103; g
8 8 010 <mark>BS</mark> (backspace)	40 28 050 «#40; (72 48 110 «#72; H 104 68 150 «#104; h
9 9 011 TAB (horizontal tab)	41 29 051))	73 49 111 «#73; I 105 69 151 «#105; i
10 A 012 LF (NL line feed, new line)		74 4A 112 «#74; J 106 6A 152 «#106; j
ll B Ol3 VT (vertical tab)	43 2B 053 + +	75 4B 113 «#75; K 107 6B 153 «#107; k
12 C 014 FF (NP form feed, new page)	44 2C 054 , ,	76 4C 114 «#76; L 108 6C 154 «#108; l
13 D 015 CR (carriage return)	45 2D 055 - -	77 4D 115 «#77; M 109 6D 155 «#109; m
14 E 016 <mark>S0</mark> (shift out)	46 2E 056 . .	78 4E 116 N N 110 6E 156 n n
15 F 017 <mark>SI</mark> (shift in)	47 2F 057 / /	79 4F 117 O 0 111 6F 157 o 0
16 10 020 DLE (data link escape) 📃 🔪	48 30 060 «#48; 0	80 50 120 «#80; P 112 70 160 «#112; P
17 11 021 DC1 (device control 1)	49 31 061 «#49; 1	81 51 121 Q Q 113 71 161 q q
18 12 022 DC2 (device control 2)	50 32 062 2 <mark>2</mark>	82 52 122 R R 114 72 162 r r
19 13 023 DC3 (device control 3)	51 33 063 3 3	83 53 123 S <mark>5</mark> 115 73 163 s <mark>8</mark>
20 14 024 DC4 (device control 4)	52 34 064 4 4	84 54 124 T T 116 74 164 t t
21 15 025 NAK (negative acknowledge)	53 35 065 5 <mark>5</mark>	85 55 125 U U 117 75 165 u u
22 16 026 SYN (synchronous idle)	54 36 066 66	86 56 126 V V 118 76 166 v V
23 17 027 ETB (end of trans. block)	55 37 067 7 <mark>7</mark>	87 57 127 W 🛛 119 77 167 w 🗤 👘
24 18 030 CAN (cancel)	56 38 070 8 <mark>8</mark>	88 58 130 X X 120 78 170 x X
25 19 031 EM (end of medium)	57 39 071 9 9	89 59 131 «#89; Y 121 79 171 «#121; Y
26 1A 032 <mark>SUB</mark> (substitute)	58 3A 072 : :	90 5A 132 Z Z 122 7A 172 z Z
27 1B 033 <mark>ESC</mark> (escape)	59 3B 073 ; ;	91 5B 133 [[123 7B 173 { {
28 1C 034 <mark>FS</mark> (file separator)	60 3C 074 < <	92 5C 134 \ \ 124 7C 174
29 1D 035 <mark>GS</mark> (group separator)	61 3D 075 = =	93 5D 135]] 125 7D 175 } }
30 1E 036 <mark>RS</mark> (record separator)	62 3E 076 >>	94 5E 136 «#94; ^ 126 7E 176 «#126; ~
31 1F 037 <mark>US</mark> (unit separator)	63 3F 077 ? ?	95 5F 137 «#95; _ 127 7F 177 «#127; DEL
		Sauraa , umm Laalan Tablaa san

Source: www.LookupTables.com

reference: https://www.asciitable.com/



String Control

String Control

۵		?	×
	String Control		
Initialization	Pickup from memory	Pick Up	
Append	Setting		
 Send Receive 	Text		
	Single Value		
	Multi-Value		
Separator No ~	Number of digits Empty fill Image: Number of digits Empty fill Image: Number of digits Image: Number of digits Image: Number of digits Image: Numer of digits		
	ОК	Cancel	

The String Control command: Append feature allows to add value and string of a result to a new result.

Pickup from memory: To pickup the process of choosing the result value generated by a command anywhere in the viz program for adding more data like value or string accordingly.

Setting:

- Text: When this checkbox is enabled, it is for entering any text string to add to the result pickup from the memory.
- Single Value: When this checkbox is enabled, it is to pick up an inspected result of long, double or string to add to the result pickup from the memory.
- Multi-Value: To pick up an array of values of a tool for appending purposes.



Separator: Space (" "); semicolon(";"), slash("/"); underscore("_"); hyphen("-"); asterisk("*"); comma($_i$ ®,"); point($_i$ ®.") will be included to separator data at end of each string.

Number of digits: number of characters to be input in this string.

Empty fill: the characters to be filled in this string accordingly. e.g. "X"

Forward/ Backward: To fill the enter character e.g. "X" at the start of the string or at the end of the string.

۵	? ×	
 Initialization Options Append Send Receive 	Setting Setting Pickup Filename Setial Overwrite	
	O Senal O UDP O TCP	
Separator No ~	Decode Type Integer ∨ Digits 16 bit ∨ Decimal 0 ♀ high ∨	
	OK Cancel	

This String Control: Send/Receive command allows a global string buffer to be filled with a string which is then transferred/received to an indicated target or destination.

Pickup from memory: The Pickup refers to the process of choosing the result value generated by a command / function anywhere in the inspection program. The Pickup is a global data structure which uses the result values of

- 91 -



the different commands into their position and stores them. This allows the user to have a specific access to the result and is not dependent on any possible shifts in the program.

Destination:

Solution To File: Save data string into a txt file with a desired path location with a file name.

Pickup filename: to pickup a string result as your file name.

- **RS232:** Data string will be transmitted via defined RS232 communication.
- UDP or TCP: Data string will be transmitted via defined Ethernet using a defined port to an IP address with UDP or TCP. On the target system, the same port number has to be used for reading and sending.

Separator: Space (" ") ; semicolon(";"), slash("/"); underscore("_"); hyphen("-"); asterisk("*"); comma($i^{\mathbb{R}}$,"); point($i^{\mathbb{R}}$.") will be included to separator data at end of each string.

Decode:

This function is used by modbus protocal (Read Code 03)to decode feedback data to get the value.

- *≤* **Type:** the modbus protocal value type.
- **Digits:** the modbus protocal one of the data value is 16 or 32 bit.
- Solution Decimal: the value decimal.
- Low/High: the modbus protocal one of the data position.



Ini Access

🕅 Ini Access

		_		\times
	INI File			
	File			
Write	Load from Pickup	ОМ	anual	
O Read			Select File	
O Delete				
	 Section Load from Pickup 	Ом	anual	
			Select	
			Jeieci	
	Entry Load from Pickup	ОМ	anual	
				_
			Select	
	Data	<u> </u>		
	 Load from Pickup Long 	ОМ	anual	
	Long			×
			Select	
	Test OK		Cancel	

The Ini Access command has the options to write, read or delete the result of a command into desired ini file. This data can be read for in the program to be used within the inspection program.



ModbusCom

ModbusCom

Function	0		Function Write (06 / 10]
	Read (03)	•	Function Write (06 / 10)) -
Location			Location	
Modbus Address		0 🚖	Modbus Address	0 🗘
Slave Address		0 🚖	Slave Address	0 🔤
Data quantity		1		
Setting			Setting	
ata Mode Outp	ut Interger (Data * 100)	•	Data Mode Output Interger (Data	• 100) 👻
Output Data Type			Output Data Type Number o	
	16 bits 16		RTU	
RTU •	32 bits			
RTU •	32 bts		Data	
RTU •	32 bits		Data No. PickUp	Long
RTU •	32 bits			Long 👻 Pickup
RTU	32 bits			

The Modbus Com command to allow two or more entities of a communication system to transmit data information via any kind of measurement.

Code:

∠ Function : Read (03) or Write (06 / 10).

Location:

- Modbus Address : Data address on another side.
- Slave Address : PLC location address on another side.
- Bata Quantity : Number of Data to be read. (Only for Read function)

Data Mode:

Converting the Pickup data into the format.

Output Data Type:

- **RTU:** Data output in RTU protocol format.
- S Ascii: Data output in Ascii protocol format.
- **Ethernet:** Data output in Ethernet protocol format.

Number of bits:

16 bit: Data output in 16 bit format.



32 bit: Data output in 32 bit format.

Arrangement:

- **Low:** Data output in Low High format.
- High: Data output in High Low format.

Data:

- Solution Long: Pickup Long type of data.
- Source Double: Pickup Double type of data.
- Se **Point:** Pickup Point type of data.
- Solution Total Result: Pickup Total Result type of data.
- Sc Long Array: Pickup Long Array type of data.
- Source Strain Double Array type of data.
- Solution Point Array: Pickup Point Array type of data.



Mitsubishi

PLC Mitsubishi

ata Con						
Code Function		Write				~
Landia						
Location					0	
Data Addre					0	÷
Data Type					D	~
Setting						
-						
Data Mode	Outpu	ut Interger (Data)			~
Data Mode Number o		ut Interger (Data)	Feedback		~
Number of 16 bit	of bits s	ut Interger (Data)	Feedback Integer		~
- Number o	of bits s	ut Interger (Data)			~
Number of 16 bit	of bits s	ut Interger (Data)			~
Number of 16 bit	of bits s	ut Interger (Data)			~
Number of 16 bit 32 bit Data	of bits s)			V V Long V Pickup
Number of 16 bit 32 bit Data	of bits s)			
Number of 16 bit 32 bit Data	of bits s)			



IP 127.0.0.1		
Port 9001		
Serial Enabled		
Setting		
Serial Port	COM 1	~
BaudRate	4800	~
Parity	none	~
DataBits	8	~
FlowControl	none	~
StopBits	1	~

The Mitsubish command (MC protocol, format 5) to allow two or more entities of a communication system to transmit data information via any kind of measurement.

Code:

K Function : Read (03) or Write (06 / 10).

Location:

- Modbus Address : Data address on another side.
- Slave Address : PLC location address on another side.
- Bata Quantity : Number of Data to be read. (Only for Read function)

Data Mode:

Sonverting the Pickup data into the format.

Output Data Type:



- **RTU:** Data output in RTU protocol format.
- S Ascii: Data output in Ascii protocol format.
- **Ethernet:** Data output in Ethernet protocol format.

Number of bits:

- **16 bit:** Data output in 16 bit format.
- **32 bit:** Data output in 32 bit format.

Arrangement:

- **Low:** Data output in Low High format.
- High: Data output in High Low format.

Data:

- Sc Long: Pickup Long type of data.
- Source Double: Pickup Double type of data.
- Se **Point:** Pickup Point type of data.
- Solution Total Result: Pickup Total Result type of data.
- Solution Strageneity Constraints and Strageneity Strag
- Source Strain Double Array type of data.
- Sector Point Array: Pickup Point Array type of data.

Connection:

- STCP/IP: To use TCP to send data.
- Serial: To use Serial to send data.



Text



Text		
Text		
PICKUP	_	
Total Result	PickU	lp -
Point X 100 Y 100 Reset	Font si	
Used World Coordinate	4	÷
Color Standard Good Bad		
O From result	PickU	P
ОК	Cano	el

Display a text overlay on the viewer image with text, points, values or string.

Text: Enter and include desired text to be displayed.

Pickup: The Pickup refers to the process of choosing the result value generated by a command / function anywhere in the inspection program. The Pickup is a global data structure which uses the result values of the different commands into their position and stores them. This allows the user to have a specific access to the result and is not dependent on any possible shifts in the program.

Point: The position / location of the text overlay which can be determined either by direct numerical entry or by mouse click on the position / location of the display viewer.

Font Size: Direct numerical input of the font size for the text overlay display.

Colour: Determine the colour condition of the text.



ControlLan Send



	ControlLan Send
UDP	~
Text	
	PICKUP
	OK Cancel

This ControlLan Send command is to send data to PC or server by UDP/TCP protocal.

Text: Enter and include desired text to be displayed.

Pickup: Pickup refers to the process of choosing the result value generated by a command / function anywhere in the inspection program.



Topic on Advanced Filter, Basic Filter, Fill Hole, Mask and Zoom.



Advanced Filter

AdvancedFilter

Filter Type	nthmetic		•
 Addition Division Multiplication Subtraction 	G=(g1+g2)*Muit (-255 ~ 255)	0.5 🔹 + Add (-512∼)	0
	g1(IM) 0	g2(IM) g2(IM)	1

Arithmetic Filter:

Addition: Combine 2 images (add each other) or adding a constant grey value to an image. Added values will not be larger than 255.

Division: Combine 2 images (division by each other) or divide by a constant grey value to an image. Divided values will not be smaller than 0.

Multiplication: Combine 2 images (multiple by each other) or multiply by a constant grey value. Multiplied values will not be larger than 255.

Subtraction: Combine 2 images (subtract each other) or subtract by a constant grey value. Subtracted values will not be smaller than 0.



ROI Setting	AdvanceFilter		
Filter Type Int	ensity	•	
Bnary	One Threshold	•	
 Invert Power Law Histo-Equalization Shading correction 	Auto		
	Threshold 128	÷	
	Test OK	Cancel	

Intensity Filter:

Binary: Binaries the image with the selected threshold value (selected threshold value will be replaced by 0 whereas the remaining will be replaced by 255).

Invert: Inverts the greyscale value of an image.

Power Law: Alter the image by encoding or decoding its gamma value.

Histo-Equalization: Contrast adjustment of the image histogram.

Shading Correction: To compensation non-uniform illumination or non-uniform camera sensitivity.



R01 Setting	AdvanceFilter		
Filter Type	Spatial •		
SharpenMeanMedian	Expert Filter Size 3x 3		
Gauss			
	Test OK Cancel		

Spatial Filter:

Sharpen: Enhances the contrast in the image by emphasizing high frequency areas of the image edges and corners, resulting sharper images appearance.

Mean: Smooths the image by averaging and carries out a linear smoothing with the grey value of the source image.

Median: Compute a median filter with various square or circular masks.

Gauss: Smooths the image using the discrete Gaussian function. The smoothing effect increases with increasing filter size.



ROI Setting	AdvanceFilter
Filter Type	Morphological +
Erosion	Rectangle
Ollation	Expert
Opening	
Closing	Size 3x3
TopHat Black	
TopHat White	
	Test OK Cancel

Morphological Filter:

Erosion: Erode a region of an image or the complete image where it boundary gets smoothed and also reduced.

Dilation: Dilate a region of an image or the complete image where it boundary gets smoothed and also enlarged.

Opening: Combination of Erosion and Dilation filters. Denote dilation and erosion respectively.

Closing: Combination of Dilation and Erosion filters. Denote erosion and dilation respectively.

Top Hat Black: Extracts small black elements and details from the given image. This is used for feature extraction, background equalization and image enhancement.

Top Hat White: Extracts small white elements and details from the given image. This is used for feature extraction, background equalization and image enhancement.



AdvanceFilter		
Filter Type	Edge 👻	
 Sobel Robert Canny 	Filter type X and Y	
 Laplace High Pass 	Filter Size 3	
	Test OK Cancel	

Edge Filter:

Sobel: Detect and filter the edges (amplitude and direction) of the images.

Robert: Detect and filter the edges of the images.

Canny: Detect and filter the edges of the images.

Laplace: Calculate the Laplace operator by using finite differences.

High Pass: Extract high frequency components in an image by applying a linear filter.



ROI Setting	
Filter Type	Edract
Threshold	Threshold
 Contour Circle 	0 🔶 128 🔶
	Expert
	Result Target Remove
	C Keep Background 0

Extract Filter:

Threshold: Extract the image region by the selected threshold areas / ranges.

Contour: Extract the image region by the contour of a reference object shape.

Circle: Extract the image region by a circular defined size and location.



	AdvanceFilter			
ROI Setting				
Filter Type Others	•			
 Mirror Rotate Conversion Copy Image Region Area Gray Value Define 	Left right 🔻			
	Test OK Cancel			

Others Filter:

Mirror: Mirror an image by its horizontal or vertical axis.

Rotate: Rotate an image based on a defined angle.

Conversion: Convert a RGB image to a greyscale image.

Copy Image Region: Copy a defined image region from the source image.

Area Grey Value Define: Define an image region with the desired grey value.



BasicFilter

BasicFilter

Filter 1	Setting			
Off Off				
Gauss Erosion Dilation Mean Median Range Mirror Rotate Inversior	1			
Off				
Filter 4 Off		 	 	
Filter 5 Off				

The Basic Filter command allow up to 5 different filter combinations within a single command and 9 different filter types selection.

Gauss: Smooths the image using the discrete Gaussian function. The smoothing effect increases with increasing filter size.

Erosion: Erode a region of an image or the complete image where it boundary gets smoothed and also reduced.

Dilation: Dilate a region of an image or the complete image where it boundary gets smoothed and also enlarged.

Mean: Smooths the image by averaging and carries out a linear smoothing with the grey value of the source image.

Median: Compute a median filter with various square or circular masks.

Range: Perform highlighting and outlining contour edges.



Mirror: Mirror an image by its horizontal or vertical axis.

Rotate: Rotate an image based on a defined angle.

Invert: Inverts the greyscale value of an image.

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PVS 2.0 Operating Manual	
FillHole	
Fill Hole	
Fill Holes	
ROI Setting	
Threshold	
0 😓 128 🌩	
Highlight	
Area Filter	
○ Fill up	
Fill Color : 0 🚔	
Test OK Cancel	

The Fill Hole command is filled up the desired area with a desired colour basing on the threshold set.

Threshold: To define the image region by the selected threshold areas / ranges.

Area Filter:

- **Fill up:** To enable fill up hole feature basing on the search region.
- Area: Define minimum and maximum area size of detected objects. Values outside this range will be ignored.

Fill Colour: To set the gray value to be filled up basing on the area enter.



Masking



C:\Program File Grab New Threshold	Edit Threshold	Edit Manual	LS
Inreshold			
0 🕀			255 🜩
· ·			

The Mask command is a masking tool which uses a pre-configured area to be ignored during the inspection.

Reference:

- Sector Grab Reference: Define a teach reference image as masking reference.
- **Edit:** Define areas within the teach reference image to be ignored during inspection.
- **L:** Load a pre-configured teach reference image.
- S: Save the current teach reference image.
- Solution Invert: To invert the masking reference result.
- Sill Colour: To fill the desired grey value colour of the masking result.



Zoom

Q Zoom

Base on Factor Base on Size			
ScaleX	1.0	÷.	
ScaleY	1.0	A V	

This zoom command to zoom large the region of interest base on factor or base on size.



Stitching1mage

StitchingI mage

Comple	Image 2 te	~
	-	
	Test O	KCancel
	Stitching In	nade
IOI Se	etting	
Image Men	nory Image Memory Image 2	1
Manual	۲	Pickup
Offset		Pickup

This StitchingImage command to Stitch two images together into one image.



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Your Ulitmate Choice for Machine Vision Software - PVS 2.0 Measurement

Topic on Angle, Area Check, Distance, Measurement and Width.





	A	ngle	/	Angle
ROI	etting Tolerance		ROI Setting Tolerance	
Line1 L	ine2		Line1 Line2	
Find New	Line	•	Edge Selection Ught -> Dark	Result points First
Rectan	gle		O Dark -> Light	⊖ Last
X1	100	Y1 200	Expert	
X2	200	Y2 200		
Width	50			
			Determine	Result
		Reset	Counterclockwise	+/- 180
			O Clockwise	0 - 360
	Test	OK Cancel	Test	OK Cancel

The Angle command measures the angle of 2 straight lines formed by 2 rectangular probes.

Line 1 / Line 2: Define the parameters to detect each line and measures the angle accordingly.

Find New Line: Create new line using the defined parameter settings for measurement of the angle.

Pickup: The Pickup refers to the process of choosing the result value generated by a command / function anywhere in the inspection program. The Pickup is a global data structure which uses the result values of the different commands into their position and stores them. This allows the user to have a specific access to the result and is not dependent on any possible shifts in the program.

X / Y Axis: Measure angle with respect to the selected X / Y axis.

Edge Selection:

- **Light -> Dark**: The greyscale colour for the object in demand is set to Ø dark which is defined according to the arrow of the search region.
- Dark -> Light: The greyscale colour for the object in demand is set to Z bright which is defined according to the arrow of the search region.

Result Points:

- **First**: First point of the extracted edge points is returned. Z
- Last: Last point of the extracted edge points is returned. Z

Expert:

- Denoise: Sigma of the Gaussian functions for smoothing. Ľ
- **Amplitude:** Minimum edge amplitude changes between edges.

- 115 -

Number of point (>2): Define number of detected points to be used Ø within the probe to improve processing time.



Determine: Determine the angle calculated via clockwise or counterclockwise.

Result: To choose the angle result range at +/- 180 or 0-360.

Tolerance: State conditional acceptance of the inspected result.



Area Check

Area Check

	Area Check
Threshold	
0 🐳 🗐 Highlight	128
Test	OK Cancel

The Area Check command measures a desired area basing on the threshold selected.

Threshold: To set the desired threshold to measure the area.

Tolerance: State conditional acceptance of the inspected result.



Distance

lu.	Distance

ype Setting Tolerance		Type Setting Tolerance
Measurement Type Point to Point Point	Point to Line PickUp Array	Distance Type © Direct © Axially parallel in X © Axially parallel in Y
Point -1:	PickUp 🔲 Array	
Test	OK Cancel	Test OK Cancel

The Distance command is to measure distance between 2 points or a point to a line that are detected using rectangular or circular probe.

Measurement Type:

- Selected point: Measure the distance between 2 selected points.
- Point to Line: Measure the distance between a selected point and a selected line.

Pickup: The Pickup refers to the process of choosing the result value generated by a command / function anywhere in the inspection program. The Pickup is a global data structure which uses the result values of the different commands into their position and stores them. This allows the user to have a specific access to the result and is not dependent on any possible shifts in the program.

Array: To measure multi-points at a single command with multi points detect.

Distance Type:

- Solution Direct: Measure the shortest distance between the selected pickup.
- Axially parallel in X/Y: Measure the distance with respect to the selected axis.

Edge Selection:

- Light -> Dark: The greyscale colour for the object in demand is set to dark which is defined according to the arrow of the search region.
- Dark -> Light: The greyscale colour for the object in demand is set to bright which is defined according to the arrow of the search region.

Tolerance: State conditional acceptance of the inspected result.



Measurement

Measurement

and the second	ing Tolerance		ROI Setting Tolerance	
From To Rectangle		•	From To Edge Selection Edge Sele Ught -> Dark @ First Dark -> Light Last	ict 📃 Expert
X1 X2		Y1 200	Result Point	
Width		12 200	Fint Midde Las	
	Res	et	Result Type Point -> Point X Direction Y Direction	Result Absolute value Convert signs

The Measurement command is to measure distance between 2 points or a point to a line that are detected using rectangular probe.

Edge Selection:

- Light -> Dark: The greyscale colour for the object in demand is set to dark which is defined according to the arrow of the search region.
- Dark -> Light: The greyscale colour for the object in demand is set to bright which is defined according to the arrow of the search region.

Result Points:

- **Middle**: Middle point of the extracted edge points is returned.
- Signal First: First point of the extracted edge points is returned.
- **Last**: Last point of the extracted edge points is returned.

Edge Select:

- **First**: First point of the extracted edge points is returned.
- **Last**: Last point of the extracted edge points is returned.
- **Best Fit Line**: Option to form detected points into a straight line when selected.

Expert:

- Sigma: Sigma of the Gaussian functions for smoothing.
- Threshold: Minimum edge amplitude changes between edges.
- Number of point (>2): Define number of detected points to be used within the probe to improve processing time.

Result Type:

- Boint to Point: Measure the distance basing on the 2 points detected.
- **X Direction:** Measure the distance with respect to the X axis.
- Solution: Measure the distance with respect to the Y axis.



Width

Width

Width	Width
ROI Setting Tolerance	ROI Setting Tolerance
Sigma (0.4 ~ 100) 25 - Threshold (1 ~ 255) 20 -	Save Width Postion Width
Edge Selection	Nominal Value : 0.0000 0 10000.00 0 10000.00
Light -> Dark	Save Pitch Position
Number of Side 1 + Number of Pin 3 + Width 30 + Height 20 + Gap 30.00 +	Ptch Nominal Value : 0.0000 - 10000.0(- 10000.0 -
Oheck Width Oheck Tip to Tip Oheck Ptch Ptch Selection Edge Orenter	Save Tipto Tip Position Tip to Tip Nominal Value : 0.0000 (10000.0) (100000.0) (10000.0) (10000.0) (1000
Test OK Cancel	Test OK Cancel

The Width command is to measure distance like width, pitch tip to tip of parts with regular distance apart. This tool is useful for measurement in the connectors industry.

Number of Side: To determine the number of side of the part to be measured. (max. 2 sides)

Number of Pin: To defined the number of pins to be measured of on each side.

Width: To determine the width of each ROI.

Height: To determine the height of each ROI.

Sigma: Sigma of the Gaussian functions for smoothing.

Threshold: Minimum edge amplitude changes between edges.

Edge Selection:

- Light -> Dark: The greyscale color for the object in demand is set to dark which is defined according to the arrow of the search region.
- Dark -> Light: The greyscale color for the object in demand is set to bright which is defined according to the arrow of the search region.

Check Width: To measure each width of the pins.

Check Tip to Tip: To measure each tip to tip distance of the pins.

Check Pitch: To measure each pitch of the pins.

Pitch Selection: Sigma of the Gaussian functions for smoothing.

Edge or Center: To determine the edge width of the pin to pin of the or the center width of each pin.

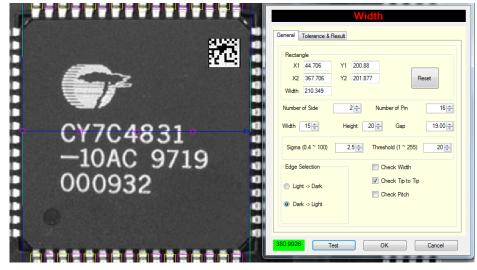
Tolerance: State conditional acceptance of the inspected result.



Above picture is measuring the width of each pin.



Above picture is measuring the pitch of each pin either from the edge or center.



Above picture is measuring the distance of each pin tip.



Topic on Barcode, Datacode and OCR.



Barcode

Barcode

	Barcode	Barcode
ROI Setting S	Sorting Backup	ROI Setting Backup
Code Type	Processing ~	Enable
All	Barcode Parameter	Data
2/5 Industrial	Expert	Add
2/5 Interleaved	Min. Element pixels [1.0 ~ 9999] : 2.0 🚔	No. PickUp Delete
🔵 Code 39		
Code 93	Max. Element pixels [1.0 ~ 9999] : 18.0 🜩	
Code 128	Element Orientation [-180 ~ 180] : 0 🚖	
🔵 EAN - 8	Orientation Tolerance [0 ~ 90] : 90 🜩	
🔵 EAN - 13		
PharmaCode	Max. Number of Scanlines [0 ~ 100] : 0	
Check Norm		
Check Code Leng	th :	
Code Content :		
Test	OK Cancel	Test OK Cancel
	ROI Setting Sorting Bac Text ☑ Text (SendString) ☑ Display Text	
	Test OK	Cancel
ha Dara	de command is used t	a dagada baraadaa and canarat

The Barcode command is used to decode barcodes. and generate results describing the barcode data.

Code Type: Define the barcode type for reading and decoding.

Processing/Training: Allow user to train the command based on the image_i s environment condition to improve the decoding speed.



	Min. Element	Define minimal size of barcode
	pixels	elements.
	Max. Element	Define maximal size of barcode
	pixels	elements.
	Element	Define expected barcode
Expert	Orientation	orientation or rotation.
	Orientation	Define orientation / rotation
	Tolerance	tolerance of the element
	Tolerance	orientation.
	Max. Number c	of Define the number of detection
	Scanlines	lines for decoding.

Result:

- Scheck Code Length: Check the length of the decode barcode.
- Code Content: Compare the decoded barcode with a defined reference.

Sorting: Enable to read the barcodes in desired arranggement.

Text:

- **Text (SendString):** Save decoded barcode results in result viewer.
- Solution Display Text: Display decoded result on image as overlay.

The idea of bar code reading is quite easy. You initialize the barcode tool and then execute it for reading bar codes. Within this, you specify the desired bar code type.

The result of the reading is a region that contains the bar code and the decoded string. No advanced experience in programming or image processing is required. Bar code reading can be sped up by using a region of interest. The more the region in which the code is searched can be restricted, the faster and more robust the search will be.



Datacode



Datacode	Datacode
ROI Setting Display & Backup	ROI Setting Display & Backup
Codetype Processing ● DMC Recognition Type ● QR ● Basic ● Micro QR	Result Image: Text (Send String) Image: Display text
Expert Setting	Quality infomation ISO_IEC_155415 (Send String)
	Display ISO_IEC_15415 AIM_DPM_1_2006 (Send String)
Setting Number of Code 1 + Timeout (ms) 100 + Proc Time 0 +	Display AIM_DPM_1_2006
Test OK Cancel	Test OK Cancel

The Datacode command currently supports Data Matrix (ECC200), QR Code and PDF417, and it is able to read multiple codes of the same type within a single image. apart from reading the ecoded data, it can alos provide geometric features and feedback for process control. Note: Possible reasons why a symbol might not be detected at all include severely damaged or distorted finder patterns, inadequate quiet zones around the symbol or strong curvature of the surface. Code Type: Define the 2D code type for reading and decoding with option of DMC, QR & Micro QR.

Processing/Training: Allow user to train the command based on the image_i s environment condition to improve the decoding speed.

	Mirrored Type	Define whether if code might be mirrored.				
	Polarity Type	Define the polarity of the code within the image.				
Eveert	Shape Type	Define module shape of code.				
Expert	Module Size Define minimal and maximal pixel size of modules.					
	Symbol Rows	Define minimal and maximal number of rows in symbol.				
	Symbol Cols	Define minimal and maximal number of columns in symbol.				

Multi DataCode:



- Number of code: Define the maximum number of codes available in the image.
- Timeout (ms): Define the timeout on this tool to ignore current decoding process and continue with remaining commands in the inspection process.
- Proc Time: Define the time taken to process and handle the datacodes.

X/Y Theta: Enable calculation of code location and angle with a defined angle reference.

Reference Angle: Define a reference angle of the detected code.

Result:

- **Text (SendString):** Save decoded Datacode results in result viewer.
- Solution Display Text: Display decoded Datacode on image as overlay.

Quality Information: Select options to check and display printing quality information of the Datacode based on international standards.

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				C:\Program Files\WIZER2\WIZER2.0.0
				Grab Reference Edit AngleRange 5 (\$ MinCorr 0.8 (\$
				Load Save
x	50	Y	50	Used WorldCoordinate
w	200	н	200	Reset

The OCR command is used to read characters from a defined library or manual teach font library. In this command, there is a matching feature to look for a pre-configured contour pattern in the search form for positioning purposes for the OCR search region to read the characters. The OCR is performed in two major steps: First, the symbol regions need to be extracted from the image. This requires to find segmentation parameters which allow a robust extraction of all symbols in varying images and is usually the most demanding part of the configuration.

Then, the symbols are read using an OCR font, i.e. each symbol region is assigned a logical symbol name. You can choose from the list of stock OCR fonts, or create your own OCR font. To create your own OCR font, you must train it using a trainfile containing samples of the symbols to read.

Matching:

Grab Reference: To teach the command to match basing on the reference.
Edit: To allow user to delete certain portion of the grab reference where it will not match during inspection.
Load: To load the grab reference after saving it.
Save: To save the grab reference after teaching it.
Min. Corr: Minimum score where command match basing the reference

image.



AngleRange: To limit the search area for rotating objects by a maximum and a minimum angle. In this case the increment indicates the noise for the search.

OCF	2
ROI Inspection setting Display & Back	kup
General Setting Setup Font Libraries Pa	rameter
Polarity Type Dark on Light 👻	Advanced Dotted Slanted Jointed Rotation Correction
Pixel Area Min 1 🚖 Max 1001 🜩	Ignore Boundary Objects Upper Case Only
Test OK	Cancel

Inspection Setting: General Setting:

Polarity Type: Define the polarity of the characters within the image.

Advanced:

Dotted: Select if characters are dot print.

Slanted: Select if characters are minor slanted.

Jointed: Select if characters are jointed or merged.

Rotation Correction: Select if characters are not upright and enables slight rotation correction in the search region.

Pixel Area: Define the minimum and maximum pixel size of a character to be detected. Values outside this range will be ignored.

Area:

Ignore Boundary Objects: Ignore detected objects or characters which are in direct contact onto the search region.

Upper Case Only: Enable detection of upper case characters only.



		P Font Libraries Pa	rameter		
Character Seg Mode		ion ine Character Size			
Auto	х	50	Y	50	
Manual	w	200	н	200	
		hreshold eshold			
	0	🐨 Highlight			128 🜩

Inspection Setting: Setup

Mode: Selection of inspection methods.

Auto: Read characters automatically basing on the software default configuration.

Manual: Read characters manually basing on the user defined setting on the character size and stroke width.

Define Character Size: Define maximum possible width and height of the largest available character in the image.

Stroke Width: Define thickness of a character stroke.

Pixel Area: Define the minimum and maximum pixel size of a character to be detected. Values outside this range will be ignored.



Seneral Setting S	Fort Libraries	Parameter
Default	Standard Fonts	Industrial *
e cours	Reference Form	Industrial
Create New Fonts	Format	Industrial_A-Z+ DotPint_0-9 DotPint_0-9A-Z DotPint_0-9+ Document_0-9 Document_0-9 Document_0-9A-Z Document_A-Z+ OCRA OCR8 Phama Phama_0-9 Phama_0-9+ Phama_0-9A-Z MCR SEMI

Inspection Setting: Font Libraries

Teach:

- Select character recognition from standard available font libraries.
- Source Load Fonts: Load a user pre-teached font library.
- Scenter Create New Fonts: Create and teach a new user font library.

Standard Fonts: Select character recognition from a list of available font_i s library.

Reference Format: Define an expected characters types during inspection to improve recognition accuracy (especially between the characters "O" and "0").

Sample example and symbol representations: Inspected Characters: 15MAR2016-E Format to be entered: (**###20**@#)

Symbols:	Representations:	Possible recognized characters:
(Start of line	- NA -
)	End of line	- NA -
*	Numbers	0~9
@	Symbols (Vary between font libraries)	- NA -
#	Alphabets	A ~ Z a ~ z



OI Inspection setting Display & Backup	OCR
General Setting Setup Fort Libraries Parameter	R01 Inspection setting Display & Backup
 ✓ Parameters Mnimum Score 60 ↔ No. of Lines 1 ↔ No. of Characters 1 ↔ Check No. of Lines Check No. of Characters ✓ Reference String eg.(***###**^AB12) where **Number, #*Alphabet, **Any Character, A*A,B*B,1=1,2*2 	✓ Display Result String Manu ▼ 100 Y 100 Drawn ✓ Display Result String Fort Size 16 ⊕ ✓ Display Result Pattern Result Image Memory 5 ⊕
Test OK Cancel	Test OK Cancel

Inspection Setting: Parameter and Results

Parameters:

Minimum Score: Accepted characters with minimum recognition score with respect to its selected font libraries.

No. of Lines: Define the expected number of character lines within the search region.

No. of Characters: Define the expected number of characters within the search region.

Reference String: Compares reference string with recognized string and return command result.

Result:

- Display Result String: Display character string result on image as overlay.
- Display Result Pattern: Display each characteris segmentation results.

Manual/Draw: Define location to display character string result on image.

Font Size: Define font size of character string displayed on image.

Result Image Memory: Define desired image memory to display results.



OCV
ROI Setting
Reference
C:\Program Files\WIZER2\WIZER2.2.9\bin\data\Ir L S Grab Reference Edit
Threshold
Highlight
Min. Corr 0.8 → Abs Threshold 10 → Var Threshold 2.0 →
Edge Parameter Alpha : 1.0 + Low : 10 + High : 80 + MinArea : 1 + MaxArea : 100000000 + 100000000 + 100000000 + 100000000 + 100000000 + 100000000 + 100000000 + 100000000 + 100000000 + 100000000 + 100000000 + 100000000 + 100000000 + 100000000 + 100000000 + 100000000 + 1000000000 + 1000000000 + 1000000000 + 1000000000 + 1000000000 + 1000000000 + 1000000000 + 1000000000 + 10000000000 + 1000000000 + 1000000000 + 1000000000 + 1000000000 + 1000000000 + 1000000000 + 1000000000 + 1000000000 + 1000000000 + 10000000000000 + 10000000000000000000 + 1000000000 + 1000000000 + 1000000000 + 1000000000 + 10000000000 + 1000000000 + 1000000000 + 1000000000 + 1000000000 + 1000000000 + 1000000000 + 1000000000 + 1000000000 + 1000000000 + 10000000000 + 1000000000 + 10000000000 + 10000000000 + 10000000000 + 1000000000000000 + 100000000000000 + 10000000000000000000000000000000+
Test OK Cancel

OCV command to check the quality of signs regarding brightness and legibility or the general existence of an imprint with respect to its position.

Grab Reference: To teach the command to match basing on the reference. **Edit:** To allow user to delete certain portion of the grab reference where it will not match during inspection.

L: To load the grab reference after saving it.

S: To save the grab reference after teaching it.

You can choose a threshold that all the pixels belonging to the object.

Min. Correlation Value: Minimum score where command match basing the reference image.

Edge Parameter: Adjust the parameter details where command match basing the reference image.

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Topic on Circle, Contour, EdgeAlignment, FreeEdgeAlignment, Point, RectProbe and StraightLine.



Circle

	С	ircle		C	ircle
pe Setti	ng Display & E	Backup Tolera	ince	Type Setting Display & Ba	ckup Tolerance
nd Circle nd Circle Point			•	Edge Selection Light -> Dark) Dark -> Light	
	100	Y	100	Back Light Front Light	Determine Diameter Radius
nner Radius	50	Outer Radius	150	Parameter	Roundness
Start Angle	0	End Angle	360		
		Reset			

The Circle command is used to detect edges which might form a circle and return its diameter or radius values. Ability to get 3 points detected to form a circle.

Edge Selection:

- Light -> Dark: The greyscale colour for the object in demand is set to dark which is defined according to the arrow of the search region.
- Dark -> Light: The greyscale colour for the object in demand is set to bright which is defined according to the arrow of the search region.

Result Points:

- Similar First point of the extracted edge points is returned.
- **Last**: Last point of the extracted edge points is returned.

Lighting: Define lightinhg set up as back light or front light.

Determine: Define measured value and reflect as diameter or radius.

Parameter:

- Sigma: Sigma of the Gaussian functions for smoothing.
- Sc Threshold: Minimum edge amplitude changes between edges.
- Number of point (>2): Define number of detected points to be used within the probe to improve processing time.

Roundness: Return roundness value of detected circle.



Save Point	
Min Dist	Max Dist
Optimize Result	
Enable	Percentage (5 ~ 50) 5 🜩

SavePoint: To save the minimum or maximum measured distance to be pick up.

Optimize Result:

Tolerance: State conditional acceptance of the inspected result.



Contour

۲	Contour
	Contour

ROI Setting Backup	ROI Setting Backup		
Threshold	Store in String XY Separator Separator between Data		
0 🔅 128 🔅	Interval Display Disable display original contour		
Image: Weight of the state of the			
Test OK Cancel	Test OK Cancel		

The Contour command is used to detect edges which return its X & Y coordinates of which points detect.

Setting:

Highlight: To set the threshold of the object to detect the contour outline. **Area:**

- Filter: To define the area of the object to be detectedOffset:
 - Solution Offset value: To define the offset value of the contour points detected.

Setting:

Store in String: To save all the contour points into string for pickup.

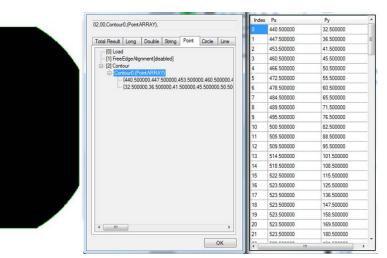
XY Separator: The separator e.g. "," or "/" to be used for the X & Y coordinates. (e.g. "X, Y" or "X/Y)

Separator between Data: The separator e.g. "," or "/" to be used for the 2 or more X & Y coordinates. (X1, X1 / X2, Y2)

Interval: To get only the contour points of the XY coordinates at an interval value.

Disable display original contour: Not to display the overlay of the contour points during inspection. Disable this feature will speed up the inspection time of this command.





The XY coordinates of the edge detected at object contour is basing threshold value of the object .



EdgeAlignment

EdgeAlignment

2 Side 2 Side 3 Side 4 Side					
X2 Width	200	Y2 200 Reset	Parameter Probe gap to center Probe per side Probe width I Offset to same ed	ige Probe Offset	50 ¢

The EdgeAlignment command is used to detect edges using fixed defined search region which return its X & Y coordinates of which intersection points detect.

<u>ROI:</u>

To set the region of interest of this command.

2/3/4 Side: To determine the number of probes to use for this command.

General Setting:

Parameter:

- Probe gap to centre: To define the probes position with respect to centre of the number of probes used.
- Service Probe per side: To define number of probes region used per side.
- **Probe width:** To define the width of probe region.
- ✓ Offset to same edge:
- ✓ Probe offset:



ROI General Setting Setting Global Setting Probe1 Probe2 Probe3	
Parameter Sigma (0.4 ~ 100) Threshold (1 ~ 255)	2.5 ÷
Edge Selection Ught -> Dark	⑦ Dark → Light
Number of points All Set limit	Edge Select Finst Last

Setting:

Global Setting: Enable to have the setting for the probes used.

Parameter:

- Sigma: Sigma of the Gaussian functions for smoothing.
- **Threshold**: Minimum edge amplitude changes between edges.

Edge Selection:

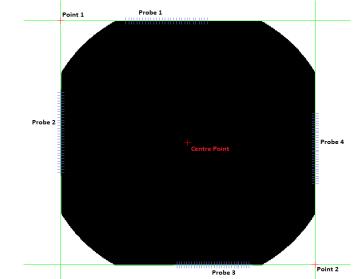
- Light -> Dark: The greyscale colour for the object in demand is set to dark which is defined according to the arrow of the search region.
- Dark -> Light: The greyscale colour for the object in demand is set to bright which is defined according to the arrow of the search region.

Edge Select:

- **First**: First point of the extracted edge points is returned.
- **Last**: Last point of the extracted edge points is returned.

Number of point: Define number of detected points to be used within the probe to improve processing time.





Detecting (searching) the object edges to correct the position. One or two probes or four probes can be used. It has a feature to set 1 probe or 2 probes at per probe searching region. This tool detects the positions (Point 1 & 2) basing on the intersection lines of the edge detected. The coordinates of the midpoint between these point 1 and 2 is detemined.



EdgeCounter

EdgeCounter

ROI Setting Tolerance Parameter	
Sigma (0.4 ~ 100)	2.5 🜩
Threshold (1 ~ 255)	20 💼
Edge Selection ② Light -> Dark	Light 💿 All

The EdgeCounter command is used to detect numbers of points or edges.

Setting:

Parameter:

- Sigma: Sigma of the Gaussian functions for smoothing.
- **Threshold**: Minimum edge amplitude changes between edges.

Edge Selection:

- Light -> Dark: The greyscale colour for the object in demand is set to dark which is defined according to the arrow of the search region.
- Dark -> Light: The greyscale colour for the object in demand is set to bright which is defined according to the arrow of the search region.



FreeEdgeAlignment

FreeEdgeAlignment

2 Side	ieneral Setting Sett		•	ROI General Setting Setting
X2	100	Y1 200 Y2 200 Reset		Number of Probe Probe per side
	Test	ок	Cancel	Test OK Cancel

The FreeEdgeAlignment command is used to detect edges using freestyle defined search region which return its X & Y coordinates of which intersection points detect.

ROI:

To set the region of interest of this command.

2/4 Side: To determine the number of probes to use for this command.

General Setting:

Number of Probe:

Probe per side: To determine the number of probes of each side to use for this command.



ROI General Setting Setting
Global Setting
Probe1 Probe2 Probe3 Probe4
Parameter 2.5 ÷ Sigma (0.4 ~ 100) 2.5 ÷ Threshold (1 ~ 255) 20 ÷
Edge Selection G Light -> Dark Dark
Number of points Edge Select
All Set limit 30 First Last
Test OK Cancel

Setting:

Global Setting: Enable to have the setting for the probes used.

Parameter:

- Sigma: Sigma of the Gaussian functions for smoothing.
- **Threshold**: Minimum edge amplitude changes between edges.

Edge Selection:

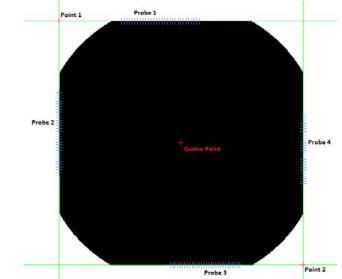
- Light -> Dark: The greyscale colour for the object in demand is set to dark which is defined according to the arrow of the search region.
- Dark -> Light: The greyscale colour for the object in demand is set to bright which is defined according to the arrow of the search region.

Edge Select:

- Signal First: First point of the extracted edge points is returned.
- **Last**: Last point of the extracted edge points is returned.

Number of point: Define number of detected points to be used within the probe to improve processing time.





Detecting (searching) the object edges to correct the position. One or two probes or four probes can be used. It has a feature to set 1 probe or 2 probes at per probe searching region. This tool detects the positions (Point 1 & 2) basing on the intersection lines of the edge detected. The coordinates of the midpoint between these point 1 and 2 is detemined.



Point

Point	
Point	Point
Create	Value to Point ~
Point X 100 Y 100 Reset Use world coordinate	Create Interception of two lines Middle point between 2 points Image center Transformation image coordinate to world coordinate Transformation world coordinate to image coordinate Point to Value Value to Point Long S865;Number_Of_Object PICKUP
OK Cancel	OK Cancel

The Point command allow user to define the points in the image area in different ways

Create: The point can be defined either by direct number input or by moving the cursor in the Camera Viewer (by the configuration button).

Interception of the two lines: Two straight lines are determined and the intersection point of both of them is defined as the new point.

Middle point between 2 points: The middle point between two selected points is defined.

Image Center: The image center is determined as new point.

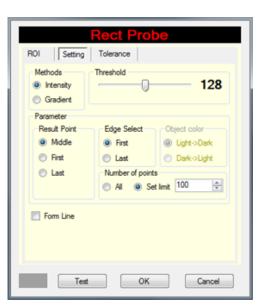
Transformation image coordinate to world coordinate: The point coordinates are transformed from image coordinates into world coordinates.

Transformation world coordinate to image coordinate: The point coordinates are transformed from world coordinates into image coordinates.

Point to Value: The X-value and the Y-value of the point are successively entered into the value register.

Value to point: The value register are successively entered into the X-value and Y-value of the point.





The Rect Probe command is to find the edges of the inspected part.

The Rect Probe is to extract the object edges from the edge amplitude image; applying threshold to select pixels with a high edge amplitude. The result of this step is a region that contains all edge points.

Methods:

- Solution Intensity: To detect the edges basing on the grey value.
- **Gradient:** To detect the edges basing on the amplitude value.

Result Point:

- Middle: The middle of the extracted edge points is returned.
- Signal First: The first of the extracted edge points is returned.
- **Last**: The last of the extracted edge points is returned.

Object Color:

- Light -> Dark: The color for the object in demand is set to dark.
- **Dark -> Light:** The color for the object in demand is set to bright.

Edge Select:

- First: First point of the extracted edge points is returned.
- **Last**: Last point of the extracted edge points is returned.

Number of points: To define the number of points the probe will find.

Best Fit Line: Option to form a straight line when the edges are detected.

Tolerance: stating the conditional acceptance of the inspected result.



StraightLine

StraightLine

Function	ight Line
2 points to fit line	•
2 points to fit line Perpendicular line Parallel line	
Point 2	PICKUP
	OK Cancel

The Straight-Line command is based on the points detected using Rect Probe where a straight line will be computed.

2 points to fit line: A straight line, which fits either through two points taken from the point register or two points determined by the pick-up list, is defined.

Perpendicular Line: Determines a perpendicular straight line to an existing straight line and a point.

Parallel Line: Determines a parallel straight line to an existing straight line and a point.



Topic on Color Extract, Color Intensity and White Balance.



Color Extract

ColorExtract

Color Extract			Color I	Extract
ROI Setting Display		ROI	Setting Display	
Display RGB Channel Image				
R Channel	IM 1 🕀	Manu	al 👻 X 100	Y 100 Draw
📝 G Channel	IM 2 🌩			orld Coordinate
B Channel	IM 3 🜩	Fort Si	ze	20
min, max and average values of RGB channel				
Test OK	Cancel		Test	OK Cancel

The Color Extract command is to extract the red or green or blue channels from the color image to fade out pixels for unwanted channels (e.g. red and green), leaving on the selected channel & intensity (e.g. blue) for further image processing.

Setting:

Display RGB Channel Image:

- **R Channel**: Extract the red channel of the color image.
- **G Channel**: Extract the green channel of the color image.
- B Channel: Extract the blue channel of the color image.

Min., Max. and average values of RGB channel: The parameter for

Display:

To position the inspection result of this command and setting the font size.

The idea of color processing is to take advantage of the additional information encoded in color or multispectral images. Processing color images can simplify many machine vision tasks and provide solutions to certain problems that are simply not possible in gray value images. First, the individual channels of a color image can be processed using standard methods like blob analysis. In this approach the channels of the original image have to be decomposed first.

An RGB image is acquired where the image is split into its channels. The red and green and blue channels are subtracted. The purpose of this process is to fade out pixels with high values in the other channels, leaving pure selected (e.g. blue) pixels only. Using threshold, the blue pixels with a certain intensity are selected.



Color Intensity

ColorIntensity

Hue					
0	1				360 🌩
Saturation			_		_
0.000	1				1.000 🚖
Intensity					_
0.000	2				1.000 ≑
Display	Color 0	н 📕 и	10	Color	
	uit in Grey Imag			Size	5 🚖 Pick Color

The Color Intensity command is to evaluate the number of pixels in the selected color range. It is defined by hue, saturation and the intensity range.

Setting:

Hue: The color range can be limited either by numerical values or by using the color picker to define the color selection form.

Saturation: To determine the color saturation. It can be adjusted either by direct value input or by color selection form.

Intensity: To determine the color brightness. It can be adjusted either by direct value input or by color selection form.

Color Picker: By clicking with the mouse on the eyedropper the cursor can be moved over the Camera Viewer and then can be clicked into the area of the desired color. With the pull-down option an environment of N pixels can be defined for the color characteristic extraction.

Display: If this option is active, the pixels matching the criteria will be displayed in color in the configured image memory (IM).

Tolerance: State conditional acceptance of the inspected result.

The idea of color processing is to take advantage of the additional information encoded in color or multispectral images. Processing color images can simplify many machine vision tasks and provide solutions to certain problems that are simply not possible in gray value images. First, the individual



channels of a color image can be processed using standard methods like blob analysis. In this approach the channels of the original image have to be decomposed first.

An RGB image is acquired where the user need to set the color hue to be detected basing on the saturation and intensity of the objects to be detected. The task is to specify the object color by using the Color Picker to pick the color for detection.



WhiteBalance

WhiteBalance

ROI Setting Tolerance	ROI Setting Tolerance
Training Apply ROI Complete Complete Configuration Circle Rectangle	Mode
	Training Training Inspect
Test OK Cancel	Test OK Cancel

The White Balance command is to adjust the offset color reference data for color camera.

<u>ROI:</u>

Training: To set the region of interest for training.

Apply: To set the region of interest for apply this command.

Setting:

Training: Allow user to train the command based on the image_i s environment condition

Inspect: Allow user to inspect the image's environment condition.

Tolerance: State conditional acceptance of the inspected result.



Topic on Contour Lenght, Image Transfer, OCV, Stitching Imageand TagyeCom.



ContourLength

🕐 Contour Length

	С	ontou	<mark>ur Leng</mark>	th	
ROI	Setting To	olerance			
Sigma	1.5 🜲	Low	1.0 💂	Hi	8.0 🜩
Dark					~
	Tes	t	OK		Cancel

The Contour Length command to measure the length of the contour pattern.

Sigma: Sigma of the Gaussian functions for smoothing.



ImageTransfer



IP Address		
Port		
Mode		
🖲 Bmp	O Jpeg	

The image transfer command to transfer images in BMP or Jpeg format.



This Tagye Com command to connect and control for Tagye camera.

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 \sim



Topic on Correlation, Count Object, Deform Matching, Matching and MultiMatching.



Correlation



Correlation	Correlation
ROI Setting Display & Backup Tolerance	ROI Setting Display & Backup Tolerance
	Display
	Position
	Angle
	Correlation Value
	Pattern
	Save in pickup list
	Position
C:\Program Files\WIZER2\WIZER2.2.9\bin\data\lr L S	Angle
Grab Reference	Correlation Value
Angle	Find Objects
Start 0 Range 360 Auto Scale	Min. correlation value [0 ~ 1.0]: 0.80 🜩
	Overlap [0 ~ 1.0]:
	Max. Number: 1
Specify Origin X 100 Y 100 Draw	
Timeout (ms) 1000 Proc Time 0	
Test OK Cancel	Test OK Cancel

The Correlation command looks for an already configured gray pattern in the search form. If it detects the pattern its position is reported. The correlation with the configured pattern is evaluated.

Grab Reference: To teach the command to match basing on the reference. **Edit:** To allow user to delete certain portion of the grab reference where it will not match during inspection.

L: To load the grab reference after saving it.

S: To save the grab reference after teaching it.

Angle:

Start / Range: To limit the search area for rotating objects by a maximum and a minimum angle. In this case the increment indicates the noise for the search. **Auto Scale (Step):** To finds in comparison with the reference image, highly enlarged/ highly downsized objects. The user can define which minimal/ maximal scaling should be found in the image.

Specify Origin: Set the origin manually to the reference picture grabbed by the user.

Timeout (ms): Define the timeout for this command.

Proc Time: Define the time taken to process and handle for this command.

Find Objects:

Min. Correlation Value: Minimum score where command match basing the reference image.

Overlap: the permissible range of overlapping during inspection. **Max Number:** The number of part to match during inspection.



Display: To display result basing on the selected check.

Save in pickup list: Allow user to pick up this information.

Find Objects:

Min. Correlation Value: Minimum score where command match basing the reference image.

Overlap: the permissible range of overlapping during inspection.

Max Number: The number of part to match during inspection.

Tolerance: stating the conditional acceptance of the inspected result.

With the "Grab Reference", the so called template is created. The template contains the relevant information to describe the object of interest.

If the objects's rotation may vary in the search images, you can specify the allowed range of angles and angle steps the object at which the model is created. We recomend to limit the allowed range of rotation as much as possible in order to speed up the search process and minimize the required memory.

For "Scale", you can specify the allowed scale with the parameter to locate the object. Again, we recomend to limit the allowed range of scale as much as possible in order to speed up the search process and minimize the required memory. It is recommended to used the default determined scale as it is suitable for most application.

With parameter "Min.Correlaton Value" (Score), yo can determine how much of the object or more precisely: of the model must be visible. When comparing a part of a search image with the model, the matching process calculates the so-called score, which is a measure of how many model points could be matched to points in the search image. A model point may be "invisible" and thus not matched because of multiple reasons:

- Parts of the objects's template are occluded.
- Parts of the template have a constrast lower than specificed in the parameter entered.
- The polarity of the template changes globally or locally.
- The object is deformed, parts of the contour may be visible but appear at an incorrect position and therefore do not fit the model.

Recommendation: The higher MinScore, the faster the search!



To search for multiple object, all you have to do to search more same objects is to set the parameter "Max Number" accordingly. It will automatically search the objects within the search region.

The parameter "Overlap" lets you specify how much 2 matches may overlap (as a fraction). To speed up the matching as far as possible, the overlap is calulated not for the models but for their smallest surrounding rectangle.

Restricting the Search Space:

An important concept in the context of finding objects is that of the so-called search space. Quite literally, this term specifies where to search for the object. However, this space encompasses not only the 2 dimensions of the image, but also other parameters like the possible range of scales and orientations or the question of how much of the object must be visible. The more you can restrict the search space, the faster the search will be.



CountObject



VI Setting Backup Tolerance	ROI Setting Backup Tolerance
Preshold	Amount
	Display All Overlay
0 💠	Save limited number
Hghight	Maximum objects 10 🚖
Ignore Boundary Objects 😨 Object borders 😨 Point of balance	Save
iter Area Filter Width Filter Height Filter Roundness Filter Angle	Width, Height in pickup
V Display	Point in pickup
	Angle in pickup
V Fiter	

The Count Objects command is a very universally applicable command. It is based on the fact that the image contains various regions of brightness, which are separated clearly from each other. In an image, the pixels of the relevant objects (also called foreground) can be identified by thier gray value.

This command is to classify pixels according to their gray value. You can choose a threshold that all the pixels belonging to the object. There are varoius features like Area, Width or Height etc. to be calculated and with the numeric results which can then be further evaluated.

The results can evaluated by the formulating conditions for the features by specifying values in the Min and Max in each mode. Those features which their condition in green(OK), the others in red(NG). If at least features is not okay, the overall result result for this command is determined as Fail.

For example: if you want to find only objects with a surface around 1400 pixels then you indicate in the object filter the min. value with 1300 and the max. value with 1500. Thus the fluctuations on the surface caused by changing the lighting can be balanced and only objects with the desired size is indicated. In order to use the filter it is important that the filter is activated.

Ignore Boundary object: If this flag is active, objects, whose object color is identical with the window border, are deleted.

Object Borders: Marks the bounding box. **Point of balance:** Marks the point of balance of an object.



Display: Display the object areas result.

Filter: If active only objects, whose area is between these two values, are output.

Filter Width:

Display: Display the object width result.

Filter: If width is active, only object whose width lies between the min. and max. are output.

Filter Height:

Display: Display the object height result. **Filter:** If height is active, only object whose height lies between the min. and max. are output.

Filter Roundness:

Display: Display the object roundness result. **Filter:** If roundness is active, only object whose roundness lies between the min. and max. are output.

Filter Distance:

Display: Display the object distance result. **Filter:** If distance is active, only object whose distance lies between the min. and max. are output.

Filter Angle:

Display: Display the object angle result. **Filter:** If angle is active, only object whose angle lies between the min. and max. are output.

Filter Excentricity:

Display: Display the object excentricity result.

Filter: If excentricity is active, only object whose excentricity lies between the min. and max. are output.

Backup:

Since the object command is not defined in the number of produced objects, it can be specified by this option how many objects are transferred e.g. to the point list.

Display All Overlay: Able to display out the object which overlayed by other object.

Maximum objects: Here the number of object-results, which should be saved, is provided.

Save: Here the user can select, where the object-results should be saved, e.g. in the pickup.

Order & Sort By: Here it can be determined, how the objects should be sorted and in which order.

Tolerance: stating the conditional acceptance of the inspected result.



Deform Matching

Deform Matching

	eformabl		ching
ROI Setting	Display & Backu	up Tolerar	nce
	_		
	WIZER2\WIZER2	2 9\bin\dətə	\Image\pa L S
Grab Reference			
	ce Edit	Seele	
Angle	Range 360 🜩	Scale 0.00 0.99	to 1.01 ≠ 2.00
Angle			Speed vs.
Angle Start 0 🜩 F	Range 360 丈		Speed vs. Savety(0: safe but slow; 10: fast but
Angle Start 0 - F Find Objects	Range 360 ≑ alue [0 ~ 1.0]:	0.00 0.99	Speed vs. Savetv(0; safe but
Angle Start 0 🖨 F Find Objects Min. correlation va	Range 360 ≑ alue [0 ~ 1.0]:	0.00 0.99	Speed vs. Savety(0: safe but slow: 10: fast but matches may be
Angle Start 0 = F Find Objects Min. correlation va Overlap [0 ~ 1.0]:	Range 360 ≑ alue [0 ~ 1.0]:	0.00 0.99 0.80 • 0.5 •	Speed vs. Savety(0: safe but slow: 10: fast but matches may be missed)

The deform matching command match for an already configured gray pattern in the search form. If it detects the deform its position is reported. The deformation with the configured pattern is evaluated.

Grab Reference: To teach the command to match basing on the reference. **Edit:** To allow user to delete certain portion of the grab reference where it will not match during inspection.

- L: To load the grab reference after saving it.
- **S:** To save the grab reference after teaching it.

Angle: To limit the search area for rotating objects by a maximum and a minimum angle. In this case the increment indicates the noise for the search.

Scale: To finds in comparison with the reference image, highly enlarged/ highly downsized objects. The user can define which minimal/ maximal scaling should be found in the image.



Find Objects:

- Min. Correlation Value: Minimum score where command match basing the reference image.
- Solution Overlap: the permissible range of overlapping during inspection.
- **Max Number:** The number of part to match during inspection.

ROI Setting Display & Backup Tolerance
Display Position
Correlation Value
Pattern
Save in pickup list
Correlation Value
Test OK Cancel

Display: To display result basing on the selected check.

Save in pickup list: Allow user to pick up this information.

Tolerance: stating the conditional acceptance of the inspected result.



Matching

Matching

Matching
ROI Setting Sort Backup Tolerance
C:\Program Files\WIZER2\WIZER2.2.9\bin\data\Image\ L S
Grab Reference Edit
Contrast
Angle Scale Start 0 ⇒ Range 360 ⇒ 0.00 0.99 ⇒ to 1.01 ⇒ 2.00
Deform Polarity Max Deform 0 V Use Polarity V
Specify Origin X 100 Y 100 Draw
Test OK Cancel

The Matching command looks for an already configured contour pattern in the search form. If it detects the pattern its position is reported. The contour with the configured pattern is evaluated.

Setting:

Grab Reference: To teach the command to match basing on the reference. **Edit:** To allow user to delete certain portion of the grab reference where it will not match during inspection.

L: To load the grab reference after saving it.

S: To save the grab reference after teaching it.

Angle: To limit the search area for rotating objects by a maximum and a minimum angle. In this case the increment indicates the noise for the search.

Scale: To finds in comparison with the reference image, highly enlarged/ highly downsized objects. The user can define which minimal/ maximal scaling should be found in the image.



Deform: Define the maximum deform in the command.

Polarity: Can be set to use or ignore the polarity in command.

Specify Origin: Set the origin manually to the reference picture grabbed by the user.

Speed: Determine the matching speed.

	Matching
ROI Set	ting Sort Backup Tolerance
Sorting	
Active	
Order	
Ascent	nding O Descending
Sort By	
• x	
ΟY	
	Test OK Cancel



Matching					
ROI Setting Sort Backup Tolerance					
Display Position			Save in pic		
Angle			Angle		
Correlation Value			Correlation Value		
Pattern			Scale		
Scal	le				
	-	ue [0 ~ 1.0]:		0.80 \$	Speed vs. Savety(0: safe but slow; 10: fast but matches may be missed)
Max. Number:			1	8	
Angle					
0 - 360 Degree					
		Test		ОК	Cancel

Order & Sort By: Here it can be determined, how the objects should be sorted and in which order.

Display: To display result basing on the selected check.

Save in pickup list: Allow user to pick up this information.

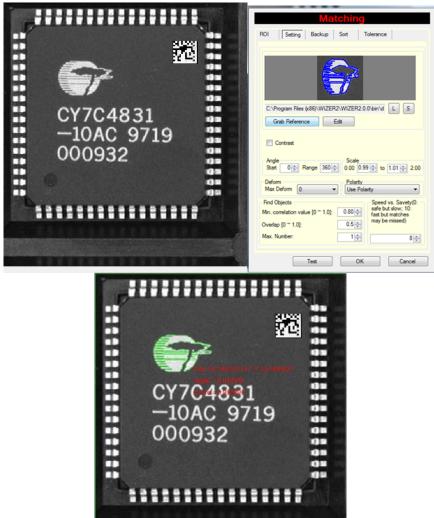
Find Objects:

- Min. Correlation Value: Minimum score where command match basing the reference image.
- Solution Overlap: the permissible range of overlapping during inspection.
- **Max Number:** The number of part to match during inspection.

Angle: To choose the angle result range at +/- 180 or 0-360.

Tolerance: stating the conditional acceptance of the inspected result.





With the "Grab Reference", the so called model is created. The model contains the relevant information to describe the object of interest where you can use the "Edit" to remove the unwanted noise or reference.

If the objects's rotation may vary in te search images, you can specify the allowed range of angles and angle steps the object at which the model is created. We recomend to limit the allowed range of rotation as much as possible in order to speed up the search process and minimize the required memory.

For "Scale", you can specify the allowed scale with the parameter to locate the object. Again, we recomend to limit the allowed range of scale as much as possible in order to speed up the search process and minimize the required memory. It is recommended to used the default determined scale as it is suitable for most application.

With parameter "Min.Correlaton Value" (Score), yo can determine how much of the object or more precisely: of the model must be visible. When comparing



a part of a search image with the model, the matching process calculates the so-called score, which is a measure of how many model points could be matched to points in the search image. A model point may be "invisible" and thus not matched because of multiple reasons:

- Parts of the objects's contour are occluded.
- Parts of the contour have a constrast lower than specificed in the parameter entered.
- The polarity of the contour changes globally or locally.
- The object is deformed, parts of the contour may be visible but appear at an incorrect position and therefore do not fit the model.

Recommendation: The higher MinScore, the faster the search!

To search for multiple object, all you have to do to search more same objects is to set the parameter "Max Number" accordingly. It will automatically search the objects within the search region.

The parameter "Overlap" lets you specify how much 2 matches may overlap (as a fraction). To speed up the matching as far as possible, the overlap is calulated not for the models but for their smallest surrounding rectangle.

Restricting the Search Space:

An important concept in the context of finding objects is that of the so-called search space. Quite literally, this term specifies where to search for the object. However, this space encompasses not only the 2 dimensions of the image, but also other parameters like the possible range of scales and orientations or the question of how much of the object must be visible. The more you can restrict the search space, the faster the search will be.



MultiMatching

MultiMatching

MultiMatchin	g
ROI Setting Display & Backup Tolerance	Pattern Group
C:\Program Files\WIZER2\WIZER2.2.9\bin\data\lr L S Grab Reference Edit Delete Contrast Contrast Scale Angle Scale 0.00 0.99 \$to 1.01 \$to Deform Polarity V V Specify Origin X 100 Y 100 Draw	
Test OK	Cancel

The MultiMatching command looks for multi configured contour patterns in the search form in one time. If it detects the pattern its position is reported. The contour with the configured pattern is evaluated.

Grab Reference: To teach the command to match basing on the reference. **Edit:** To allow user to delete certain portion of the grab reference where it will not match during inspection.

- L: To load the grab reference after saving it.
- **S:** To save the grab reference after teaching it.

Angle: To limit the search area for rotating objects by a maximum and a minimum angle. In this case the increment indicates the noise for the search.



Scale: To finds in comparison with the reference image, highly enlarged/ highly downsized objects. The user can define which minimal/ maximal scaling should be found in the image.

Deform: Define the maximum deform in the command.

Polarity: Can be set to use or ignore the polarity in command.

Specify Origin: Set the origin manually to the reference picture grabbed by the user.

Pattern Group: Display the mutiple reference matches.

· · · · ·	MultiMatch	ing
ROI Setting Display & Bad Display Position ✓ Position ✓ Angle □ Scale ✓ Correlation Value ✓ Pattern Find Objects Min. correlation value [0 ~ 1.0]:	Save in pickup list Save in pickup list Position Angle Scale Correlation Value 0.80 + 0.5 +	Pattem Group
Overlap [0 ~ 1.0]: Max. Number: Angle (0 - 360 Degree	0.3 ▼ 0 ↓ 8 ↓ ○ + / - 180 Degree	
Test	ок	Cancel

Display: To display result basing on the selected check.

Save in pickup list: Allow user to pick up this information.

Find Objects:



- Min. Correlation Value: Minimum score where command match basing the reference image.
- Solution Overlap: the permissible range of overlapping during inspection.
- **Max Number:** The number of part to match during inspection.

Angle: To choose the angle result range at +/- 180 or 0-360.

Tolerance: stating the conditional acceptance of the inspected result.



Topic on Defect Circle, Defect Define and Defect Straight Line.



DefectCircle

DefectCircle
ROI Setting Tolerance
Edge Selection Light -> Dark
Parameter
Sigma (0.4 ~ 100) 2.5 🚔
Threshold (1 ~ 255) 20 (
Offset (+/-) 30.0
Test OK Cancel

The DefectCircle command is used to aid in detecting burr on circular object after some filtering commands.

Setting:

Parameter:

- Sigma: Sigma of the Gaussian functions for smoothing.
- **Threshold**: Minimum edge amplitude changes between edges.

Edge Selection:

- Light -> Dark: The greyscale colour for the object in demand is set to dark which is defined according to the arrow of the search region.
- Dark -> Light: The greyscale colour for the object in demand is set to bright which is defined according to the arrow of the search region.

Offset (+/-): To define an offset value basing on the average points detected, to detect the defect. (value is in pixel format)

Tolerance: stating the conditional acceptance of the inspected result.



DefectDefine

DefectDefine

ROI Setting Display	Tolerance
Mode Co O Auto O Manual	lor Selection
Defect Type Scratch O Dot	ark on light V
Scratch Max. length of the gap: Max. length of the scale:	50
Max. shift:	100
Max. angle: (0.0 < x <0.78) Result line length : Min. 100	0.6 Max. 99999
Test	OK Cancel

With the Defect Define command, it aids in detecting scratch or dots after some filtering commands.

Mode: To select the mode of detection.

Auto: To detect the scratches or dot automatically basing on the software default configuration.

Manual: To detect the scratches or dot manually basing on the threshold set.

Defect Type: To detect scratches or dots.

Scratch:

Max. length of the gap: The maximum accepted absolute distance between two contours. The gap is measured along the regression line of the reference contours. Thus, it is the length of the projection of the gap between the two contours onto the regression line of the reference contour.

Max. length of the scale: The maximum accepted relative distance between the two contours. The relative distance is calculated by dividing the distance by the length b of the reference contour.

Max. shift: The maximum distance of the second contour from the regression line of the reference contour. This distance is measured perpendicular to the regression line of the reference contour.



Max angle: The maximum angle (in radians) between the regression lines of the two contours.

Result line length: The minimum and maximum value of the line to be detected.

Line:

Result line size: The minimum and maximum size of the dot to be detected.

DefectDefine
ROI Setting Display Tolerance
Disable ROI display
Test OK Cancel

Display: Optional to enable or disable ROI display.

Tolerance: stating the conditional acceptance of the inspected result.

With the Defect Define command, it aids in detecting scratch or dots after some filtering commands.

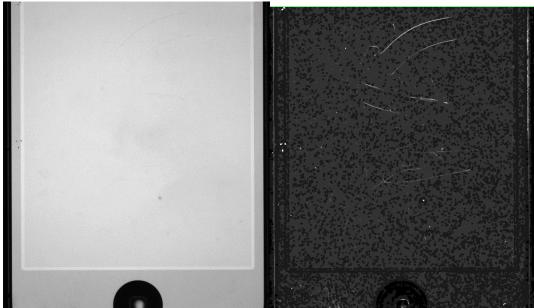
Mode: To select the mode of detection.

Auto: To detect the scratches or dot automatically basing on the software default configuration.

Manual: To detect the scratches or dot manually basing on the threshold set.

Defect Type: To detect scratches or dots.





Orginal image after Advanced Filter processing.



The result to detect the lines after image pre-processing using DefectDefine command.



DefectStraightLine

DefectStraightLine

DefectStraightLine
ROI Setting Tolerance
Edge Selection
Offset (+/-) 30.0 ←
Parameter
Sigma (0.4 ~ 100) 2.5 🚔
Threshold (1 ~ 255) 20 🚍
Test OK Cancel

The DefectStraightline command is used to aid in detecting burr on straight object after some filtering commands.

Setting:

Parameter:

- Sigma: Sigma of the Gaussian functions for smoothing.
- Sc Threshold: Minimum edge amplitude changes between edges.

Edge Selection:

- Light -> Dark: The greyscale colour for the object in demand is set to dark which is defined according to the arrow of the search region.
- Dark -> Light: The greyscale colour for the object in demand is set to bright which is defined according to the arrow of the search region.

Offset (+/-): To define an offset value basing on the average points detected, to detect the defect. (value is in pixel format)

Tolerance: stating the conditional acceptance of the inspected result.