

*PPT VISION, Inc.*

# **IMPACT**

## **Tool and Control**

## **Quick Reference Guide**

**IMPACT Software Release 8.5**



### Vision System Objects



**System** – provides program access to Vision System properties such as system time, CPU temperature, Available RAM, etc...



**Camera** – provides program access to camera properties such as gain, offset, shutter speed, scan settings, etc...



**File Camera** – provides program access to the number of active images in the File Camera.



**System Log** – provides program access to the most recent System Log entry.



**File Manager** – provides program access to the Display Tab Program Filter name and the amount of Flash memory available on the vision device.



**Modbus Server** – the communication server for vision device communication with other Modbus devices on the network.



**AB PCCC Server** – the communication server for vision device communication with other devices on the network using Programmable Controller Communication Commands (PCCC).

### Programming Tools



**Basic** – performs logical and mathematical calculations using the Basic programming language. The program results are available for display and to link to other tools.



**Branch** – chooses a true or false execution path by evaluating a user-defined expression.



**Break** – forces an end to loop processing or aborts the task if placed outside a loop.



**Call Task** – runs the called task and then returns to the calling task.



**Counted Loop** – loops a user-specified number of times. The starting and step-increment values may also be defined.



**Counter** – increments a count value then resets at a user-defined count limit.



**Delay** – delays task execution a user-defined number of milliseconds.



**Event Scheduler** – provides a user-definable delay period prior to initiating a system event. That event can then be used to trigger a task.



**Group** – provides a way to group and organize tools. Group tools may be placed within Group tools.



**List Loop** – loops through elements of a list to provide access to each element in the list.



**List Sorter** – sorts elements of a list into a user-defined order.



**Multiple Branch** – chooses multiple true or false execution paths based on the evaluation of a user-defined expression.



**Pass Fail** – chooses a true or false execution path based on the pass or fail status of tools.



**Reset** – Resets another tool’s pass, fail, or run counts when it runs.



**Train** – Trains another tool when it runs. Provides a way to train a tool from a control panel.

### Data Tools



**Data Instance** – The inputs and outputs of this tool vary depending on the data type selected and each data type has a specific set of data. Use the Data Instance tool if you want to access the data elements of another tool individually.



**Data Set** – accesses data elements of a tool and “pushes” this data to other tools.



**Data Transfer** – “pushes” data to CPM control panels. Multiple data elements of any type may be defined and/or linked into the tool. All data is sent to the control panels each time the tool runs.



**EtherNet/IP Data** – receives data from other devices that communicate via EtherNet/IP protocol.



**EtherNet/IP Message** – creates a message for setting or requesting data on another Ethernet/IP device.



**EtherNet/IP Read Assembly** – reads a reserved data area (called a static assembly) on the vision device. Other EtherNet/IP devices can write data to this area.



**EtherNet/IP Write Assembly** – writes to a reserved data area (called a static assembly) on the vision device. Other EtherNet/IP devices can read data from this area.



**Serial Port Out** – sends a string out the vision device’s serial port.



**TCP/IP Out** – sends a string out the vision device’s Ethernet port.

### Image Processing Tools



**Adaptive Template** – matches greyscale gradients of the inspected image and the trained image and creates an output image.



**Average Gradient** – measures edge sharpness within an ROI. The higher the gradient, the more sharply focused the edge. The output value is between 0 and 100.



**Average Intensity** – measures the intensity of pixels within one or more ROIs. Average greyscale levels are compared to tolerances to determine ROI and tool pass or fail.



**Blob** – finds randomly oriented or amorphously shaped objects in the image and provides a blob list output.



**Blob Filter** – filters a list of blobs from the Blob Tool for features such as size and shape.



**Circular Pattern Find** – reports the rotational origin of rotating objects, such as coins or snap rings, using a search model and region.



**Clip ROI** – clips the region of interest to insure it remains on the screen.



**Contour Pattern Find** – creates a model based on detected edges in a user-selected part of an image, then provides a best-match score and the x-y coordinates of the model’s origin as an output.



**Contrast** – checks the pixels within an ROI and provides the percentage or area of pixels that are outside and inside a range based on user-defined parameters.



**Correlation Pattern Find** – finds image patterns using a general-purpose correlation based pattern find. It will find one or more instances of a predefined model image in a rectangular search region. It can find the model at any angle of rotation.



**Extreme Difference** – detects areas that are brighter or darker than the background.



**Greyscale Template** – creates a template of an image then compares that template to the snapped image. A “difference blob” is created of the differences between the template and the inspected image.



**Image Stitching with Origins** – combines (stitches) several smaller images into one large image using the images’ origins. For example, you can take several images of sections of a large connector and stitch them together to produce and inspect the whole connector image.



**Image Stitching with Points** – combines (stitches) several smaller images into one large image using a list of common points. For example, if you have a large connector you can take several images of it and stitch them together to inspect the whole connector.



**Line Find** – locates a line along an edge and reports the line length and angle along with straightness and gap lengths



**Line Profile** – provides a list of the greyscale values of pixels along a Line ROI.



**Multiple Image Stitch** – semi-automatically combines (stitches) any number of images into one large image.



**Multiple ROI Contrast** – checks the pixels within multiple ROIs and provides the percentage or area of pixels that are outside and inside a range based on user-defined parameters.



**Origin** – uses from one to three line ROIs to locate an area on an image. This origin can be linked to other tools for image orientation.



**Spot Find** – finds the maximum or minimum average greyscale level within a user-defined area in an image then locates objects or features by detecting uniformly bright or dark objects.

## Measurement Tools



**Bump Find** – finds bulges in polygon boundaries which indicate defects.



**Circle Edge Refinement** – locates a curved edge.



**Circle Gauge** – finds and measures a circle by radially searching for edge points and then finding the best fit circle to those points.



**Edge Point Find** – finds edges along a line ROI.



**Grid Statistics** – provides extensive statistics about a series of points in a grid pattern.



**Lead Statistics** – provides extensive statistics about the pitch, width, and length of part leads.



**Line Gauge** – finds the distance between two points using a single line ROI.



**Line Gauge Datum Line** – finds the distance between a point and a line using a single line ROI.



**Line Gauge Dual ROI** – finds the distance between two points using two line ROIs.



**Linear Regression** – creates a line from a list of points. Points that lie too far from the line can optionally be ignored.



**Midpoint** – calculates the midpoint between two input points and provides its x-y coordinates as an output.



**Multiple Point to Point Measurement** – measures the distance between multiple points in a point list.



**Peak Valley Find** – locates and counts direction changes along the edge of an object.



**Point Match** – compares a list of ideal points with a list of input points and provides a list of extra and missing points.



**Point-to-Line Measurement** – measures the distance between a point and a line.



**Point-to-Point Measurement** – measures the distance between two points.



**Subpixel Edge Extractor** – finds the edge points along the edge of an arbitrary shape using subpixel accuracy.



**Wide Edge Point Find** – finds edges along a wide line ROI.

## Readers



**Barcode** – decodes seventeen different barcode types including UPC-A, UPC-E, EAN-8, EAN-13, JAN-8, JAN-13, Code 128, GS1-128 (UCC/EAN-128), Code 39, Code 39 Full ASCII, Code93, Interleaved 2 of 5, Codabar, GS1 Databar Omnidirectional (RSS), GS1 Databar Limited (RSS), GS1 Databar Expanded (RSS), Pharmacode (one-track)



**Character Contour Match** – measures character defects by comparing an imaged character to a trained model.



**Data Matrix** – reads ECC 200 Data Matrix symbols. It can read all six AIM specified encoding schemes and all thirty data matrix sizes, including rectangles.



**OCR** – reads characters or patterns by finding the best matching character from a trained library or string, within a minimum match score. If the tool finds no matching character, a user-defined substitution character is substituted.

**Device Tools**



**Camera Trigger** – snaps a camera image and allows the configuration of one to three strobe widths and a new image ID. Original settings may be restored after the tool runs, if desired.



**Device Settings** – sets camera and strobe settings on the vision device when the tool executes.



**Discrete Input** – reads the vision device’s polled input lines. The input lines are read only when the tool executes.



**Discrete Output** – controls the IMPACT vision device’s outputs.



**Offline** – places the currently connected vision device offline. If the device is already offline, no action is taken.



**Online** – places the currently connected vision device online. If the device is already online, no action is taken.

**Image Filtering Tools**



**Average Filter** – smoothes the average pixel greyscale level values in an image and provides that processed image as an output. The smoothing is done within a defined filter area of pixels that is moved progressively throughout the ROI.



**Binary Image Filter** – creates a binary (black and white) output image from an input image with varying greyscale level values.



**Change Image Calibration** – replaces the calibration data of an image with calibration data that is stored in the tool.



**Deslant Image** – corrects the slant frequently seen with dot matrix printed characters. Primarily used with the OCR tool.



**Edge Enhancement** – enhances edges within an image to produce an output.



**Gaussian Filter** – filters pixel greyscale levels within an ROI to smooth an image. A filter area is defined and used to sequentially process an area that size within the ROI. Pixels at the center of the filter area are weighted more than those further away (a Gaussian curve).



**Image Math** – performs up to ten image math operations like AND, OR, and Subtract on the pixel greyscale level values in two images to produce an output image of the operation results.



**Image Sampling** – produces a reduced resolution image by sampling a user-defined number of pixels. For example, you can produce an image of one-half resolution by sampling every other pixel.



**Light Leveling** – corrects for uneven lighting in an image by applying an average greyscale level calculated from a user-defined area.



**Linear Morphology Close** – removes small noise from an image, like the Morphology Close tool, but this tool retains thin lines in the image during the process.



**Linear Morphology Open** – removes small noise in an image, like the Morphology Open tool, but this tool keeps thin lines in the image during the process.



**Median Filter** – removes random noise from an image. The edges are not softened like the Gaussian filter. This tool is slower than the Gaussian and Average filters.



**Morphology Close** – performs a morphological close (dilate followed by erode) operation on the white parts of an image. This makes it useful for removing small black noise from an image or to connect white areas together.



**Morphology Dilate** – performs a standard dilation operation on the white parts of an image.



**Morphology Erode** – performs a standard erosion operation on the white parts of an image.



**Morphology Open** – performs a morphological open (erode follow by dilate) operation on the white parts of an image. It uses a 3x3 pixel operation and 8-connectedness.



**New Image** – creates a new image of a specified size and fills it with a specified greyscale level.



**Pixel Fill** – fills portions of a greyscale image with a specified greyscale level.



**Polygon Smoothing** – smoothes jagged polygon boundary edges caused by pixilation from image noise and blob thresholds. Use this tool for preprocessing before using boundary analysis tools.



**Undistort Image** – removes perspective and radial distortion from an image. Removing distortion should only be necessary for tools that use pixel-level models (Correlation Pattern Find, Greyscale Template, and OCR).



**Unwrap** – unwraps a curved image within an arc-shaped region for OCR processing.



**X-Y Projection** – finds the average intensity of the X or Y ROI dimension and “magnifies” it for viewing, editing, or image processing.

### Vision Program Tools



**Load Vision Program** – loads the named vision program file into vision device memory.



**Save Vision Program** – saves a vision program using a different program file name and task name.



**Unload Vision Program** – unloads the named program from the vision device. If the program is not currently loaded, no action will be taken.

### Color Image Processing Tools



**Color Blob** – finds randomly oriented or amorphously shaped colored objects within a color range.



**Color Checker** – compares an image color with a trained color and provides a color difference value



**Color Image Sampling** – samples user-defined number of pixels in a color image to provide a reduced resolution image.

**Images Controls**



**Histogram** – displays the histogram of an ROI’s greyscale values.



**Image Display** – displays an image linked from a VPM task. The image may be from a file or real camera.



**Arc ROI** – displays an Arc ROI on the displayed image.



**Blob List** – displays a list of Blob ROIs on the displayed image.



**Contour Model** – displays a Contour Model ROI on the displayed image.



**Correlation Model** – displays a Correlation Pattern ROI on the displayed image.



**Greyscale Template Model** – displays a Greyscale Template ROI on the displayed image.



**Line List** – displays multiple line ROIs on the displayed image.



**Line ROI** – displays a Line ROI on the displayed image.



**Origin** – displays an Origin ROI on the displayed image.



**Origin List** – displays an Origin List ROI on the displayed image.



**Point List** – displays a Point List ROI on the displayed image.



**Rectangle List** – displays a Rectangle List ROI on the displayed image.



**Rectangle ROI** – displays a Rectangle ROI on the displayed image



**Shape List** – displays a Shape List ROI on the displayed image.

**Input Controls**



**Button** – produces an action event when clicked. This event can be linked to another control or a VPM tool to cause an action. This can be used, for example, to start and stop updates, connect to the IMPACT device, or put the device online and offline.



**Check Box** – produces a variety of events when selected or unselected. The event can be linked to another control or a VPM tool to cause an action.



**Drop List Selector** – allow you to select an item from a list. For example, from a list of pre-defined or linked VPM tool inspection parameters.



**Font Library** – displays and manipulates the VPM OCR tool’s font library.



**Character Contour Library** – displays and manipulates the VPM Character Contour Match tool’s verification library.



**Numeric Entry** – lets you enter integer or real numbers on the control panel. These values can be linked to VPM tools or other controls.



**Password** –defines a User ID and password to limit access to controls and control panels. For example, this control’s Logged On property can be linked to another control’s Visible or Enabled property to limit access to it.



**Radio Button** – makes choices on a control panel. When two or more radio buttons are in a group, selection is automatically limited to one button at a time.



**Radio Button Group** – groups Radio Buttons so selection is automatically limited to one button in the group at a time.



**Range** – allows you to enter the start and end values of a Range1D and Tolerance input data types in a VPM tool.



**Range Scroll** – displays and adjusts a range of values with a scroll bar. For use with VPM tools that have a Range1D data type.



**Slider** – varies a value when a slider is moved on the control panel. You can define the size, orientation, and major and minor tick spacing for the best presentation.



**Table** – displays and/or edits a two-dimensional table of data.



**Text Entry** – enters text on the control panel. The entered text can then be linked to a vision program or another control panel.



**Toggle Button** – changes state from Selected to Unselected each time it’s pressed. This Action event can be used, for example, to start and stop updates, connect and disconnect the vision device, or put the vision device online and offline.



**Tolerance** – displays and adjusts tolerance values with a step button. For use with VPM tools that have a Tolerance data type.

**Display Controls**



**Chart** – creates five different types of charts to display inspection result values on a control panel.



**Frame** – groups controls in the Control Panel Tree and the Control Panel. This allows you to move and set some of the properties of all the controls within the Frame at one time.



**Graphic Display** – displays a graphic image on a control panel. For instance, you could display a company logo, or an icon that represents an operation or machine.



**Indicator Light** – shows a user-defined color indication of its current state. Use this control to indicate other control’s current status.



**Numeric Display** – displays numbers on the control panel.



**Rich Text** – displays formatted text on the control panel. You can format text (including font type and size), change the text pane color, and insert images.



**Scrolling Table** – displays user defined controls in grid format where only one row or column is updated and extra rows or columns are scrolled off the table when new ones are added.



**Tab** – when used with the Tab Group control, combines controls into an area that is selectable by the operator. The Tab Group control must be selected in the Control Palette to add this control.



**Tab Group** – when used with the Tab control, combines controls into an area that is selectable by the operator.



**Text Display** – displays text on the control panel.



**Xbar-R Chart** –graphs statistical information on the control panel. It will show both the mean value (XBar) and the range (R) of a data set.

### General Controls



**Basic Interpreter** – performs logical and mathematical calculations based on a set of user-written statements using the Basic programming language. The program results are available to link to other controls.



**Execute Command** – executes a system command. For example, you can run another application from the control panel.



**Impact Connector** – connects the control panel to an IMPACT device. Vision programs, tasks, and tool data are linked to this control, then linked to properties, methods, and events in other controls.



**Load Image** – loads an image from a file on the client into an Image Display control.



**Load Vision Program** – loads a vision program file onto the connected IMPACT device.



**Save Vision Program** – saves a loaded vision program file on the connected IMPACT device.



**Scriptor** – used to write Java-based control panel commands and apply them to a running control panel application.



**TCP-IP Logger** – receives data from a vision program TCP/IP Out tool and writes it to a text file.



**Timer** – counts elapsed time during Run mode. It can be set to repeat the time interval.