Cognex In-Sight 2000 Training

Provided by

KENDALL ELECTRIC

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Introduction:

The In-Sight 2000 is a vision sensor, capable of providing a pass/fail output from the inspection of a part. It is easier to use than a full vision system but has capabilities beyond a basic photosensor or proximity sensor, or even an array of sensors. It uses the same software used for programming a Cognex In-Sight vision system, so you don’t need to learn a separate software to configure it.

You will learn about the In-Sight 2000, its components, interchangeable parts, configuring an IP address, connecting to the IS2000 and programming an inspection. This document will also serve as a reference for the primary functionality of EasyBuilder and the stepwise process for building an inspection.

In the first lab you will be guided in each step, which will be explained in detail. After that you can use your own parts (if you brought some) to create an inspection for your application or use our parts and create an inspection according to set criteria.
Connecting to the IS2000

Once you have installed the software you can communicate to the In-Sight 2000. As it communicates over Ethernet TCP/IP you will need to provide it with an IP address so that it will communicate to your computer. As a default all In-Sight systems are configured as DHCP (Dynamic Host Configuration Protocol) so out of the box it is expecting to be "served" an IP address. If your computer does not have DHCP Server software on it (most computers don’t) then you need to assign the In-Sight 2000 and your computer static IP addresses. This section will show you how to do that. Launch In-Sight Explorer version 5.2.3 from the icon on your desk top if it is not already open. When it opens you will see at the left side a pane labeled Application Steps and the first step is Get Connected; place your cursor on this step and click the mouse to select it (if it is not already highlighted) (Fig. 1).

![Application Steps - Get Connected](image_url)

Fig. 1: Application Steps - Get Connected
When this step is selected the pane just below it will appear as seen in Fig. 2. Any In-Sight system that is on the same subnet as the computer will appear here. If you have obtained an offline programming key, the name of your computer will appear in this pane followed by local emulator. This means that you can work with the software without being connected to an In-Sight vision system.

![Select an In-Sight Sensor or Emulator](image)

**Fig. 2: Connected Systems**

The **Connect** button will establish a connection to the system selected in the list. The **Disconnect** button will cause the software to be disconnected from the system to which it is currently connected. The **Refresh** button will refresh the list of systems in the left side of the pane that are currently on the same subnet as the computer. The **Add** button will launch a dialog to assign an IP address to a system not on the same subnet as the computer. The **Emulator** button allows you to select which system you would like to emulate if using the offline programming functionality.

Click the **Add** button to launch the **Add Sensor** dialog (Fig. 3 on next page).
The connected In-Sight 2000 should have been discovered and displayed in the list of devices. Click on the line that shows the unit to select it. From this dialog you can change the name of the unit if you desire. Notice that at this point the setting of the IP address is selected as DHCP. Click on the radio button next to **Use The Following Network Settings**. When you do this the entry fields and button below it become active (no longer grayed out). If you know the subnet of your computer and what address you would like to use and the subnet mask you can enter those into the appropriate fields. An easier method is to click the **Copy PC Network Settings** button. This will use the settings of the Ethernet network adapter in your computer to assign an appropriate IP address and the subnet mask to your In-Sight 2000. This assumes that your computers Ethernet network adapter is not set to DHCP.

From this dialog you can also reset the administrative logon password (if it had been set and forgotten) and reset the entire system to factory defaults; all system settings except for the IP address will be reset.
Click **Apply** at the bottom of the dialog; when you do this another dialog (Fig. 4) will appear, warning you of the changes about to take place. Click **OK** at the bottom of the message box to continue with changing the IP Address. When the process has finished another message box will appear noting the success of the change; click **OK** at the bottom of this dialog as well. Click **Close** at the bottom of the **Add Sensor/Device to Network** dialog.

![Add Sensor/Device to Network](image)

**Fig. 4: Add Sensor Message Box**

When the dialog closes you should now see your In-Sight 2000 listed in the pane showing In-Sight systems on your subnet (Fig. 2 on page 3). Click on it to select it and click the **Connect** button. You will see the software appearance change while attempting to connect to the In-Sight 2000 and after several seconds you will then see that it is connected. You are ready to move to the next application step.
Set Up Image

Click on the **Set Up Image** application step button (Fig 5). When you do this the pane at the bottom will change to show the image acquisition settings.

![Fig 5: Application Steps - Set Up Image](image)

**Fig 5: Application Steps - Set Up Image**

![Fig 6: Image Acquisition Settings](image)

**Fig 6: Image Acquisition Settings**
There are multiple sections to this pane which will be explained in more detail.

Fig. 7: Acquire/Load Image

The first section (Fig. 7) is for image acquisition. Pressing the **Trigger** button will acquire a single image. Pressing the **Live Video** button will acquire images as fast as possible without doing any processing or inspection of the image. Clicking the **Load Images from PC** button will open a navigation dialog to allow navigation to a folder that contains images. Typically you would want these to be images saved from your system as they will have been illuminated by your system in a manner you intended.

Fig. 8: Trigger

The next section (Fig. 8) selects how the system will be triggered when inspections are running. There are four selections for trigger type. **Camera** is the setting if the dedicated trigger input is being used to acquire images at runtime. The **Delay** control is active in this mode and allows for a delay between the receipt of the trigger signal and the start of acquisition; **Interval** is disabled. **Continuous** will capture images as fast as possible while performing the inspection, setting the I/O and performing communications. The **Interval** control sets a time between acquisitions to reduce the possibility of an acquisition being lost. The **Delay** control is disabled for this trigger type. The **Manual** trigger type allows the In-Sight 2000 to be triggered from In-Sight Explorer software. Both **Delay** and **Interval** are disabled for this type. Selecting **Real Time Ethernet** allows triggering via an Ethernet industrial protocol.
The next section (Fig. 9) configures the intensity of the light and the exposure settings.

First the exposure time can be set to a defined exposure time (Manual Exposure) or to a variable exposure time (Auto Exposure). The latter has two ways of calculating the exposure time and these are defined in the help files.

**Target Brightness** is used when Auto Exposure is selected and sets a desired average brightness level for the resulting image; the range is from 0 to 100.

The **Exposure Region** sets the region of the image over which the calculated automatic exposure levels are based.

The **Light Intensity** control sets the relative percentage of output from the integrated light; the range is from 0 to 100.

The **Exposure (msec)** control sets the exposure time in milliseconds. This setting and the **Light Intensity** setting control the image brightness when using Manual Exposure.

The **Optimal Exposure** control computes an exposure time based on the **Light Intensity** and **Target Brightness** settings when using Manual Exposure.

The **Light Control Mode** control sets the integrated light to either be strobed on during the exposure time or disables the integrated light.

When deciding on settings it is typically advised that the brightest area of the image be about ninety percent of full value. When an area is saturated (at full white value) information about the size of dark objects in that region is less accurate and typically provides no advantage in the efficacy of the tools. Since each part and application are different this may not always be possible, so this is a general guideline.
The final section of this pane controls the size of the image that is captured (Fig. 10). The upper control in this section will set the number of rows that are captured in each image. This can be useful if the part does not move much in the field of view and cycle time must be reduced. When only a portion of the rows are captured, the acquisition time is reduced which decreases the cycle time.

The other control, **Image Magnification Mode** reduces the size of the field of view by fifty percent so that a smaller portion of what was in the field of view is imaged, while retaining the resolution of the image. It provides the effect of doubling the focal length of the lens. The image on the left (Fig. 11 left) shows the image with an 8mm focal length lens and a working distance of six inches. The image on the right (Fig. 11 right) shows the same setup with **Image Magnification Mode** enabled. Both images are 640 by 480 pixels.
Poker Chip Lab

The first lab uses Cognex poker chips; each lab station should have a few of these chips. When developing an inspection you would follow the **Application Steps** from top to bottom to create a complete, fully functional inspection.

You have already finished the **Get Connected** step and learned about the **Set Up Image** step, so now you can complete this step for your part. Set up your image to appear similar to the left image in Fig. 11 with the same side facing up. In setting the exposure time for this part you may notice that the area in the center of the chip is a highly reflective material. Adjusting the exposure settings for this part such that the brightest area is at about ninety percent of full value leaves the image a bit darker than desired. For this lab you will use the **Manual Exposure** mode, set the **Target Brightness** to 50 and the **Light Intensity** to 70 and then click the **Compute** button. Your exposure time should probably be around 0.2 to 0.3 milliseconds but it may vary more depending on the ambient light.

The next **Application Step** is the **Locate Part** step; click on this step (Fig. 12).
When you click on this step the pane at the bottom will change to expose a list of tools (Fig. 13) that can be used to locate your part. In your system there are four tools that can be used for locating a part; in the other two models (lower cost and lower capability) of In-Sight 2000 only the **Pattern** tool is available. To the right of the list is a description of what the tool does and how to proceed adding it to your inspection.

For this lab you will use the **Pattern** tool so click on **Pattern** to select it and then click the **Add** button at the top right of this list. When you do this two rectangles will appear on the image; these are the **Model** region and the **Search** region of the **Pattern** tool (Fig. 14 on next page).
The **Model** region appears pink, which signifies it is selected for editing. If the cursor is placed inside the rectangle it will appear as a white cross with arrowheads at each point. If you click and hold the left mouse button, the rectangle can be dragged to its desired location. If you place the cursor on an edge or a corner of the rectangle it will appear as a white line with arrowheads at each end. If you click and hold the left mouse button, the rectangle can be resized in one direction (if on a side) or in two directions (if on a corner) by dragging. At the middle of the bottom edge of the rectangle is an arc with an arrowhead at one end. By placing the cursor over this graphic it will appear as a hand with the index finger extended. When the cursor appears as the hand, click and hold the left mouse button to rotate the region by dragging it one way or the other. Move, resize and rotate (if necessary) the **Model** region to match the image on the next page (Fig. 15).
Placing the Model region close around the graphic on the chip allows defining edges to be trained while disregarding a significant amount of the background that could also contain significant variations. When choosing a pattern to use as a fixturing point you want something that would normally be present, is fairly unique and not too symmetrical, so that orientation of the found pattern is consistent and repeatable. The graphic that has been chosen meets those criteria.
Placing your cursor on the edge of the **Search** region and clicking the left mouse button will make it appear pink and the **Model** region will appear green (Fig. 16). At this point you could move and resize the **Search** region as you did with the **Model** region; the size and location of the **Search** region would be determined by the expected range of movement of the part in the field of view. Since you will be moving this part in the field of view by hand you can leave the **Search** region at its default size and location.
When the **Model** and **Search** regions have been set as desired, click the **OK** button in the **Directions** pane (Fig. 17) at the bottom of the window to accept the changes and finish adding the tool. When you click **OK** the tool will appear in the **Results** tab of the palette (Fig. 18) on the right side of the window and the **Edit Tool** pane (Fig. 19), containing settings for the tool, will appear in the bottom of the window.
On the right side of the Edit Tool pane are several entry fields and a control to retrain the Model should that be necessary. First you can assign a Name to the tool; while this is not required, as the software gives it a default name, it is a good practice to provide a descriptive name. This allows someone who is looking at the program to have an understanding of the function of this tool in the inspection. Consider changing the Name of this tool to LocatePart.

The next control allows you to select if the tool is Enabled. The choices in this drop list are Enabled, Disabled, and Input 0. Normally the tools you add to the inspection would be enabled as you need them to perform some function in the inspection. So why would you disable a tool? This can be useful in troubleshooting the inspection, to determine how a specific tool might be affecting the overall result. Selecting Input 0 would enable the tool only when Input 0 is active. Perhaps you have two similar parts with one feature difference and a specific tool or tools are only needed for inspection of this different feature. This allows you to create one program that will inspect both parts and only enable the extra tool or tools to inspect the part with the feature difference.

There is also an entry field for providing a Description of the tool’s function. Again this is not required but documenting your work helps others understand what you have done and perhaps helps you to remember why this tool was part of the inspection, when you look at it for the first time six months after you originally created the program. Develop the habit of documenting your work.

On the far right side of the pane is an image of your Model with a button below it labeled Model Region. If you decide at some later point that you need to retrain the Model, you can click this button. When you do this the Model region will appear in the image and can be edited in the manner used when the tool was created. The button label will also change to Train, so that when you finish editing the region you again click the button and the new model will be accepted; the image of the new model will replace the image of the old model.

With the exception of the ability to retrain a Model these controls will be available on all of the tools.
On the left side of the Edit Tool pane (Fig. 21) are settings that relate to the manner in which the tool functions.

In the upper left of this pane is an indicator that signifies if this tool passes or fails which is based on the tool settings and the runtime image.

Below the Pass/Fail indicator is a control to adjust the Rotation Tolerance of the found pattern. This control sets how much the pattern can be rotated from its trained position before the match score is affected. The default value is plus and minus 45 degrees and the range is from zero degrees to plus and minus 180 degrees. Adjustment of the control can be made by placing the cursor on the box above either numeric value, clicking and holding the left mouse button and dragging it to the desired angle; both positive and negative values will be affected equally. Additional ways to adjust the control include entering a numerical value into either of the boxes showing a value; both values will be affected equally. If you enter a positive value into the box for the negative value both will go to zero, so make sure to include the sign. For fine adjustment you can click either of the boxes above the numeric values and use the right and left arrow keys on your keyboard to increase or decrease the value. Regardless of which method is used, the image above either control rotates to the appropriate angle.

Below this control is the Part Finding Meter. The vertical bar with the numeric value beneath it is the pass/fail threshold; a match score greater than or equal to this value indicates the tool passes and score less than this value indicates the tool fails. Setting this value can be done in the same manner as adjustment of the Rotation Tolerance. The green bars show the current magnitude of the match score. If you hover over the control, a numeric value of the match score will be displayed. Setting the threshold value should reflect what you are attempting to do. If you are trying to locate a part you will want to keep this relatively low so that you include a wider range of possibilities.

There are two buttons in the lower left corner. The one labeled “1” allows for a scale variance of plus and minus ten percent before the match score is affected. The one labeled “2” opens a control for setting a timeout period for the tool. The Execution Time in milliseconds for the tool is shown in the lower right corner.
For this lab leave the threshold at 50 and set the Rotation Tolerance to 180. Test your part location tool by placing the In-Sight 2000 into Repeating Trigger mode and moving and rotating the part within the field of view to assure that the part is found. If it is not properly located please ask for help. Place the part in approximately the same position as when you originally added the part locating tool. Turn off Repeating Trigger mode.

Now that the part can be located in the field of view the next step is to inspect it to make sure that the correct side of the chip is facing up. On one side of the chip there is a horseshoe and two stacks of chips; the other side has a pair of dice and one stack of chips. We will use both of these features to insure the side with the horseshoe is facing up. Click on the Inspect Part step in the Application Steps pane (Fig. 22).

![Fig. 22: Application Steps - Inspect Part](image-url)
When this step is selected the **Add Tool** pane at the bottom of the window will appear showing the various tools available. The tools are grouped according to what they do and if you expand each group you would see the following (Fig. 23). The **Presence/Absence Tools** detect the presence of one object. The **Measurement Tools** determine if a distance, size or angle are within acceptable limits. The **Counting Tools** determine if the number of a type of object found in a region is within acceptable limits. The **Math & Logic Tools** allow you to create basic logic from tool outputs to drive digital outputs.

![Fig. 23: Inspect Part - Available Tools](image)

The first inspection tool to be added is a **Pattern** tool from the **Presence/Absence Tools** group to find the horseshoe on the poker chip. This will function in the same manner as the tool used to locate the part in the field of view. Select **Pattern** and click the **Add** button (Fig. 24).

![Fig. 24: Inspect Part - Add Tool Pane](image)
The Model and Search regions can be moved and sized, as done with the pattern tool for locating the part, so that they appear similar to the image above (Fig. 25). Notice now that the search region is much smaller than was used for locating the part. With such a small search region how will the horseshoe be found? Click the OK button in the Directions pane to accept adding the tool.

Fig. 25: Inspect Part - Pattern Regions
At the right side of the **Edit Tool** pane (Fig. 26) we see the same controls that we saw in the same section of the pane for the part location tool but we also see an extra control, labeled **Fixture**. EasyBuilder automatically uses location information from the first part location tool added, to fixture other tools to the appropriate section of the part (this is why the search region can be kept small). As the part moves and rotates, the fixtured tools keep their relative position. If you don’t want to fixture your tool to the part location tool, click the pushpin icon next to the drop list to turn off this functionality. If you had added a second part location tool to the program you could select it from the drop list and the tool would be fixtured based on the second part location tool. Consider naming this tool **Horseshoe**.

![Fig. 26: Inspect Part - Pattern Settings](image)

At the left side of the **Edit Tool** pane (Fig. 27) we see the same controls present in the same section of the pane for the part location tool and again we see an extra control. It is to the left of the control for allowing a variation in scale and it looks like the graphic associated with a normally closed contact. Clicking this tool inverts the tool, so rather than looking for the presence of a pattern and passing if it meets the selection criteria, it now looks for the pattern to be absent and the tool passes when the pattern is not found. Notice that the **Rotation Tolerance** has been set to zero. Since this tool is fixtured, as the part rotates so will this tool’s search region. As long as the horseshoe keeps the same relative orientation it will be found. If it were upside down perhaps, then with these settings the horseshoe would not be found. You can leave the threshold at 50.
Before doing any testing you will add another tool; this time you will go back to the Add Tool pane and from the Absence/Presence Tools group you will select Pixel Count and click the Add button (Fig. 28).

This time there will only be one region in the image. Move and resize it to appear like the image below (Fig. 29). Click the OK button in the Directions pane to accept adding the tool.
The right side of the settings pane for the pixel count tool has similar controls to the Pattern tool (without the image of the Model and the Model Region button). Consider naming this tool Chip Stacks. The left side of the settings pane (Fig. 30) appears differently. By default when the tool is inserted, its automatic settings are initiated for ease of use, which explains why the controls are already set and the tool indicates a passing condition. The Pass/Fail indicator is present as it will be on all tools.

The Pixel Selector control specifies which pixels are counted. This tool works in gray scale rather than as a binary tool. That means instead of having one threshold to determine which pixels are considered white or black, there are two thresholds; those pixels whose intensities are within the designated range are counted and those whose intensity falls outside of the range are not counted. The yellow horizontal bar on this control shows which pixels are counted. In this case it is acting as a binary tool; pixels whose intensity is between zero and 165 are counted and those whose intensity is greater than 165 are not counted. The button at the right end of this control (labeled “1”) inverts the selected pixels. Pressing this button would count the pixels outside the selected range and ignore the pixels within the range.

The Pixel Count Meter and Pass Range control specifies the minimum and maximum pixel counts for pass/fail determination. The yellow bar shows the current count and if you hover over the control a numerical value for the result is shown.

The Auto buttons on the left side of each control will automatically set the values based on the current image. The level controls for either can be manually adjusted as was done for the acceptance angle of the part locating tool (reference page 18).

You have finished adding the tools for the desired inspection so now you can test your application. Move and rotate the chip to assure that the tools follow the part and inspect it correctly. Turn the chip over to confirm that the inspection now fails. Try other chips to confirm that the inspection works for them in the intended manner. If the inspection does not work for all cases, make changes to the settings to insure that it does. Ask for help if you can not make it work properly.
For the purposes of the lab you have finished once you are satisfied with your results. In your process on the plant floor you would not be finished yet as you have not fully commissioned the system. The rest of this manual will serve as a reference for the rest of the application steps. Click on the next application step, **Inputs** (Fig. 31).

![Application Steps - Inputs](image)

**Fig. 31: Application Steps - Inputs**
The pane at the bottom of the window will change. Settings for the one programmable input will appear in this pane. The In-Sight 2000 has one dedicated trigger input for initiating an inspection and one other input that can be configured from a small choice of options. A name can be assigned to the input line. The **Signal Type** droplist sets the function of the input. The **Edge Type** droplist sets whether the function occurs on the rising or falling edge of the input; it is only enabled when **Reset Counters** or **Job Change (Pulsed)** are selected. The **Force Input** droplist allows a configured input line to be forced on without the input being present when **On** is selected. When done testing the input set the **Force Input** droplist to **Off** or **None**.

The following describes the various **Signal Types**.

The **User Data** allows a location or inspection tool (or tools) to be enabled or disabled based on the input. This feature needs to be set in the settings pane of the desired tool or tools using the **Enabled** droplist.

Selecting **Reset Counters** will reset the various inspection statistics counters to zero when the input is present.

The **Online/Offline** selection allows turning on or off the inspection process from **Input 0**. When **Online** an inspection can be initiated and the outputs and communications set according to the results of the inspection. When **Offline**, an inspection can be initiated but the outputs and communications will not be set according to the results of the inspection.

The last option **Job Change (pulsed)** lets the input select which job (inspection program) is loaded into RAM so that it is the current inspection job. This requires that the job names stored in the In-Sight 2000 have a numerical prefix (0 to 31) so that a pulse train, of specific structure, can select the appropriate job. See the help files for the specific structure of the pulse train.

When you select another application step, the changes made are automatically saved in the vision system (not in the job file).
The next step is configuring the outputs. Click on the Outputs step (Fig. 33).

Fig. 33: Application Steps - Outputs
When the Output application step is selected the output settings pane will appear at the bottom of the window. The In-Sight 2000 has four digital outputs and two LED’s on the body of the unit that can be configured. Each output can be given a name. Each output can be assigned a **Signal Type** of which there are multiple types too numerous to explain here; see the help files for a description of the possibilities. Setting the **Signal Type** to **Job Result** allows the output to be assigned to the result of the job or of a specific tool.

The **Force Output** can be used to test an output from the In-Sight 2000. The point must be configured to a specific function and from the drop list choose **On** to force the output on. When you are finished testing the output select **Off** or **None** from the list. Clicking the **Details…** button on the far right opens a dialog (Fig. 35) for determining how the output will function.

By default an output will hold the last state it was in until it is changed. If the output is turned on by the job passing it will stay on until the job fails; this could encompass multiple inspections. In the **Details** dialog the output can be set to a pulse with the pulse length set by the user. Now if the output is set by the job passing it will pulse on for the user set time and then turn off. From this dialog you can also delay the setting of the output by a certain number of triggers of the vision system or by a specific time.
Digital I/O is one way to control the In-Sight 2000 though it is not the only way. In-Sight systems can communicate over a number of industrial protocols including EtherNet/IP and Profinet. Control of the system and results from the system can be performed using industrial protocols so that no digital I/O is necessary. How the In-Sight 2000 is controlled will depend on your application. Additionally both communications and digital I/O can be used concurrently to best tailor the application to your situation. Click on the **Communication** step (Fig. 36).

![Application Steps - Communication](image)

**Fig. 36: Application Steps - Communication**
When the **Communication** step is selected the pane at the bottom will change (Fig. 37). This pane allows you to select and configure various communications paths. The **EasyView** selection allows configuration of the way data will appear on a VisionView panel if one is being used. If communications to a PLC/PAC or other industrial protocol gateway are to be configured click the **Add Device** button.

![Fig. 37: Communication - Add Device](image)

When the **Add Device** button is clicked you will have a series of selection droplists to specify the controller and protocol. The first droplist is the **Device** (Fig. 38). Your choices are **None**, **PLC/Motion Controller** and **Other**. Selecting either of the latter two will produce another droplist (Fig. 39 on next page).

![Fig. 38: Device Selection](image)
Each of the controller manufacturers has protocols they support. **Mitsubishi** supports SLMP (a feature of CC-Link). **Omron** and **Rockwell Automation** both support **EtherNet/IP** and **Siemens** supports **ProfiNet**. Selecting **Other** offers the same choice of protocols listed above but the controller would come from some other manufacturer. Selecting one of these choices produces the last droplist (Fig. 40). The **Protocol** selection may be made automatically or it may need to be chosen based on the **Manufacturer** selected. If only one protocol is possible the selection will be automatic. For this example **Rockwell Automation** and **EtherNet/IP** have been chosen. To accept the choices click **OK**. The appropriate protocol would need to have previously been enabled (**Get Connected** step, **Sensor** menu, **Network Settings** option).
When the OK button is clicked a pane for setting the input and output data will appear with a tab for each of input data and output data (Fig. 41). Clicking the Add button at the lower left will open a dialog from which data can be selected (Fig. 42).

Different data will be available for Input and Output. The available data will be dependent on what has been added to the inspection. The Input data contains various control parameters for the tools and the Output data is limited to pass or fail of each tool as well as various information about the Job and Acquisition. The data point is added by either selecting the point and clicking the OK button or double clicking on the point. When a point is selected it will be added to the appropriate pane with information about the data type, size and the current value. Configuring communications data is that easy.
In the Communication step you can also configure saving images from the system via FTP (File Transfer Protocol). From the first communications configuration pane (see Fig. 37 on page 30) select FTP. A new pane will appear in the bottom of the window with two tabs, Image and Settings. Click the Add button in the lower left corner of the Image tab to add an FTP Image connection (Fig. 43).

![Add FTP Image Connection](image1.png)

**Fig. 43: Add FTP Image Connection**

When the connection is added you will see information given about the connection. At the right side of this pane are the settings for the connection (Fig. 44).

![Write Image FTP Settings](image2.png)

**Fig. 44: Write Image FTP Settings**

These settings allow you to fully configure the name of the image, the image format, which images are saved, if inspection graphics are included, adding a time stamp and a counter, if desired.
On the **Settings** tab, two FTP connections can be defined (Fig. 45). These will set the path to the computer on which the FTP Server exists and provide access credentials for that computer. The **FTP Settings** button on the far right will open a dialog for defining the port and timeout settings along with allowing passive transfers over FTP.

In-Sight Explorer can function as an FTP Server so it can be used to test your image transfers. If this is being set up on the factory floor, using a third party FTP Server is suggested as it will provide more flexibility and more security options for the connection.
Now that the job has been configured, I/O and communications have been set, just a few more steps that cover some essential information of how the inspection runs must be covered. The next application step is setting the **Filmstrip**. The **Filmstrip** is a feature that allows saving images from a system during troubleshooting or setup of the inspection. Click the **Filmstrip** application step (Fig. 46).

![Application Steps - Filmstrip](image)
When the Filmstrip step is selected the pane at the bottom of the window changes (Fig. 47). The settings in this pane control which images are put into the queue (Pass/Fail/Pass and Fail), the size of the queue, the type of queue (Most Recent, First Only), the style of icon used to show which inspections pass and fail during runtime and a path where the images can be saved. Once these setting have been made and the system is set Online, images will be saved to the Filmstrip. While the system is Online the Filmstrip might appear like the image below (Fig. 48).

The images are not displayed as actual images in the filmstrip when the system in Online but as icons that represent which images pass and which fail. This is done to minimize the time used for this control so that the inspection can run faster. When the system is taken Offline the appearance changes (Fig. 49) which shows the actual images.

If an image in the filmstrip is selected it will appear in the image display with the tool graphics showing what tools pass or fail. Above the image display, a yellow bar will appear that says “Showing Queued Results” and the buttons at the right side of the filmstrip will become active. With these you can scroll through the images (backward and forward), save the images in the filmstrip to the folder setup in the settings pane or clear the filmstrip. Clicking the Continue button will return you to configuration mode. On the left side of the filmstrip are two buttons labeled PC and Sensor. If Sensor is selected you will be looking at images from the connected vision sensor and if PC is selected you will be looking at images in a user selected folder on the computer.
Now that you have tested your application, perhaps saved some test images, made any necessary changes to the job you are ready to deploy the system. Click on the **Save Job** application step (Fig. 50).

![Fig. 50: Application Steps - Save Job](image-url)
When the **Save Job** step is selected, the pane at the bottom of the window will change (Fig. 51).

![Save Job Settings](image)

**Fig. 51: Save Job Settings**

The first step would be to click the **Save As...** button as the job has not been previously saved. This will open a navigation dialog to allow you to navigate to where the job is to be saved. On the left side of the dialog you will see several icons of common places to save your job; at the bottom of this group of icons you will see one that says **In-Sight Sensors**. Click this icon and open your In-Sight 2000 from the list that appears; provide a name for the job in the appropriate field and click **Save** at the bottom. Up to this point the program you created has been stored in RAM in the vision system and by completing the above steps you have saved the job in flash memory. Had you not done this, the first time you cycled power on the system your job file would have been lost. It is also a good idea to save the job to your computer hard drive using the same method above (but navigating to a directory on your hard drive) so that if something happens to the job in the vision system you have a backup of the job.

Also in this pane you can set a **Startup Job**; if you have more than one job in your In-Sight 2000 this would specify the job that would be loaded when the system power is cycled. It is always a good idea to specify a **Startup Job**, even if you only have one job. Below this control is a checkbox to **Start the Sensor in Online Mode**. With this checked the system will automatically start running inspections when its power is cycled; this way you do not have to manually set it **Online**. At the right side of the settings pane are two buttons, **Backup** and **Restore**. Clicking on **Backup** opens a navigation dialog to save all of the files on your vision system. This saves all job files, the file that contains your I/O settings, communication settings and any other system level settings into one file. If your In-Sight should be compromised you will have a backup of all of the necessary files and settings to **Restore** the vision system to the desired state. Clicking the **Restore** button will also open a navigation dialog to allow navigation to a folder on your computer where backups would have been saved in order to restore all job files and system settings to a vision system.
The final step is to run your job and inspect parts. Click the **Run Job** application step (Fig. 52).

![Fig. 52: Application Steps - Run Job](image)
When the **Run Job** application step is selected the pane at the bottom of the window will change. On the left side of the pane are some controls (Fig. 53) and on the right side of the pane are results (Fig. 54).

![Fig. 53: Run Job Settings](image)

In the section with the controls you can place the In-Sight 2000 **Online**, clear the results counters, print the current results table, and set what is visible in the results table and image. You also see the current inspection rate and the time taken for the current inspection.

![Fig. 54: Run Job Results](image)

In the results table the name of each tool is displayed, the result for the current image, the results counters, and the time taken for each tool to run in the current image.
If the **Options** button is clicked a dialog opens that allows customization of the results table and the image (Fig. 55).

![Fig. 55: Results Display Options](image)

On the left side of the dialog are various check boxes that specify what is displayed in the results table. On the right side, each of the tools in the job is shown followed by check boxes to show the tool and show the graphics. **Show Tool** determines if the tool is displayed in the results table. **Show Graphic** determines if the tool graphics are displayed in the image when the system is online. Your application is complete at this point.
In the inspection tools is a special tool that deserves its own explanation. Under the **Math and Logic Tools** group is one tool, **Logic** (Fig. 56). To insert the tool select it from the list and click the **Add** button.

![Fig. 56: Logic Tool](image1)

This tool allows creating logical statements using the outputs of the inspection tools that can be tied to discrete outputs or sent via communications. When the tool is added, the pane at the bottom of the window will change. On the right side of this pane are the normal controls that would be seen with any of the tools. On the left side of the pane is a list of the available tools and some buttons (Fig. 57). The entry field below the **Pass/Fail** indicator by default has a “1” in it to indicate the tool is passing. This is where a logical expression will be built.

![Fig. 57: Logic Tool Settings](image2)
Expanding the list of the available tools exposes a pass and fail output from each (Fig. 58). Selecting an output will enable the Insert button; clicking the Insert button will insert the selected output into the expression field. Alternately you can double click an output to insert it.

![Available Tool Outputs](image)

**Fig. 58: Available Tool Outputs**

When an output is inserted the AND and OR buttons will be enabled; the ( and the NOT buttons are already enabled. Clicking any of these buttons will insert the associated function into the expression. The Insert button will become again enabled, expecting that another output will be selected. In this manner you would build the desired expression for your application. An example of an expression for this application is seen below (Fig. 59).

```plaintext
ChipStacks.Pass && Horseshoe.Pass
```

**Fig. 59: Sample Logical Expression**
Now that you understand how to use the software and have been guided through one lab it is time to try one on your own. If you have brought in parts to test you can use those to solve an application on your own. If not then you can build on your existing poker chip lab; complete the following steps.

1) Count the number of chip stacks on a chip
2) Count the number of white notches on the rim of the chip.