



Machine Vision Consulting
Inspiring Vision Across Industry

VisionGuard™ Protected-Access and Change-Tracking Interface

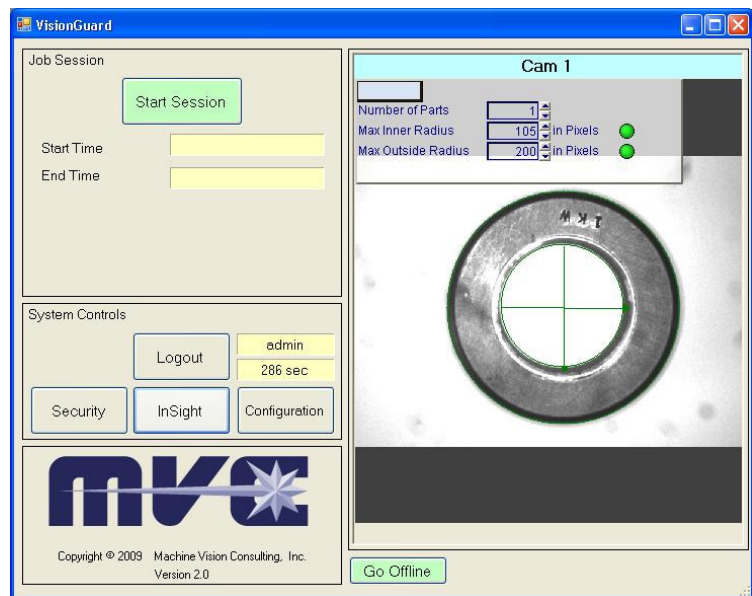


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Executive Summary

MVC has developed a wide variety of turn-key solutions based on its extensive machine vision experience and expertise. This document will discuss **VisionGuard™**; a product developed and offered by MVC that provides important interface capabilities for the Cognex® In-Sight® Vision Sensors. Clients that manufacture pharmaceutical or medical products must often validate a production machine or an entire manufacturing line so that the line conforms to the requirements in the FDA's 21CFR Part 11 guidelines for gCMP, controlled access, and the ability to archive any changes made to the vision system programming. Clients with multiple In-Sight® Vision Sensors in an industrial environment may require and benefit from enhanced access control and change tracking capabilities.

VisionGuard™ provides a protected-access front-end interface for Cognex's® In-Sight® Vision Sensors, providing the features needed to allow a client to validate an In-Sight®-based vision system.

VisionGuard™ provides:

- Support for up to 8 Cognex® In-Sight® Vision Sensors
- Multiple log-in capability, with passwords and specific permissions that can be set for multiple access levels and user groups.
- Event tracking of any log-ins or log-outs from VisionGuard™.
 - Who and When?
- Event tracking of the Start and End times of each Inspection Session and inspected part changes.
- Event tracking of any changes made to the In-Sight® job file.
 - Who was logged in when the change was made?
 - When was the change made?
 - What was changed, what was it changed from, and what was it changed to?
- Reporting of all In-Sight® and VisionGuard™ events in a secure PDF document.

The In-Sight® Vision Sensors and the In-Sight® Explorer interface, as they arrive from Cognex®, do not provide these features. VisionGuard™ directly addresses these shortcomings.

Machine Vision Consulting, Inc. is based in Massachusetts, with a lab building in Westborough, MA. MVC is focused on the integration of machine vision technology to provide automated inspection and process control during manufacturing and packaging in a wide variety of industries.

- **End users** come to MVC for turnkey machine vision solutions.
- **Machine builders and automation integrators** work with MVC to develop the machine vision portion of their overall assembly, processing, handling, coding, or packaging solutions.
- **OEM's** of packaging systems, code printers, robotics, semiconductor testing systems, and other process systems work with MVC as an extension of their engineering organizations to design, install, and support machine vision system options.

MVC's engineers are based in Massachusetts, New York, North Carolina, Ohio, Oregon, and Arizona.

As the vision industry has matured with easier-to-use products, one thing remains the same - *vision projects are inherently complex*. The development and deployment of a vision system requires a team of experienced vision engineers that can avoid potential problems that arise when combining high technology from multiple domains (i.e. PLC communications, robotics, vision architecture, real world lighting and optics, motion control, sensors, rejecters, human intervention, and controls).



Introduction to VisionGuard™

VisionGuard™ provides a powerful and rich user environment that provides the means to address pharmaceutical, medical, and industrial validation requirements, providing improved access control and In-Sight® event and application change traceability.

VisionGuard™ provides a custom interface for up to 8 Cognex® In-Sight® Vision Sensors. VisionGuard™ provides the logging and reporting of all Vision Sensor activities and spreadsheet changes to allow the In-Sight® sensors to be part of a validated installation.

While Machine Vision Consulting does not provide validation services, clients that require validated installations can use VisionGuard™ to provide many of the controls that are required to allow an In-Sight® Vision Sensor to be part of a validated solution.

Why Can't the In-Sight® Be Validated Without VisionGuard™?

The In-Sight® Vision Sensors, as provided by Cognex®, do not provide certain features that are needed to permit an In-Sight® Vision Sensor to be part of a properly validated system. VisionGuard™ addresses the following In-Sight® Explorer shortcomings:

In-Sight® Explorer's Default Log-In Capabilities

In-Sight® Explorer provides the means to specify multiple log-in passwords, but only provides the means to specify one of three available levels of access for each password. Within each level, individual function permissions are not available; all of the capabilities provided are contained within the noted permission levels.

In-Sight® Explorer's Default Event Logging

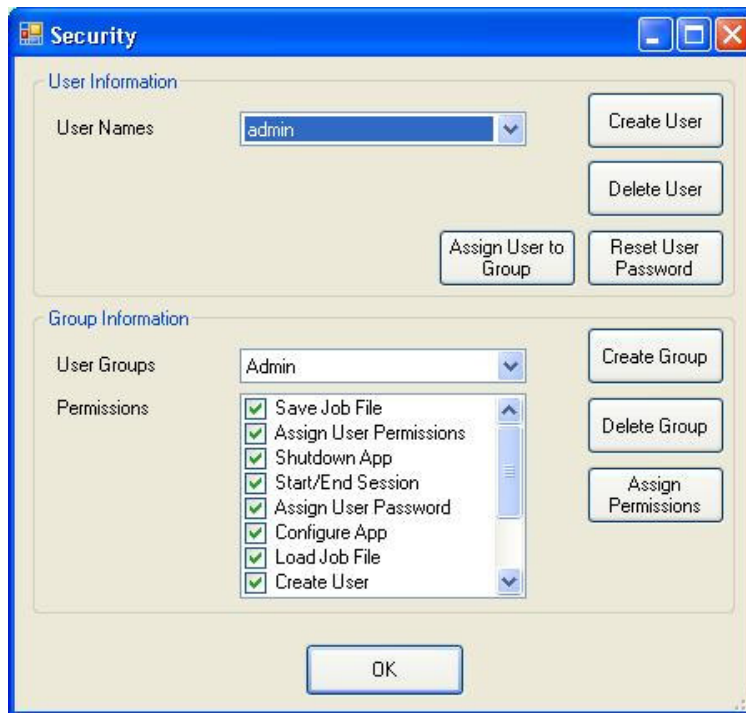
The In-Sight® Explorer software also does not provide the means to provide any event logging that may be required to track who is logged in during the production process and to record any changes made to the In-Sight® job file. In its factory form, log-ins, log-outs, and changes made to the In-Sight® job after installation will not result in an audit trail when using In-Sight® Explorer, as required for the validation process.

VisionGuard™ Feature and Window Descriptions

Setting Log-In Permissions in VisionGuard™

VisionGuard™ allows the client to establish any number of levels or groups of password-protected access. What sets VisionGuard™ apart from the standard In-Sight® security interface are the abilities to create multiple users within each group access level, to assign each user a unique password, and to create any number of groups. Each group level is then assigned individual feature access permissions specific to the needs of that group.

Unlike the standard In-Sight® security interface that is limited to 3 user levels and lumps together access permissions, VisionGuard's™ protected-access provides a much higher level of flexibility and customizability.



Security Window Used to Create Users and Assign Permissions

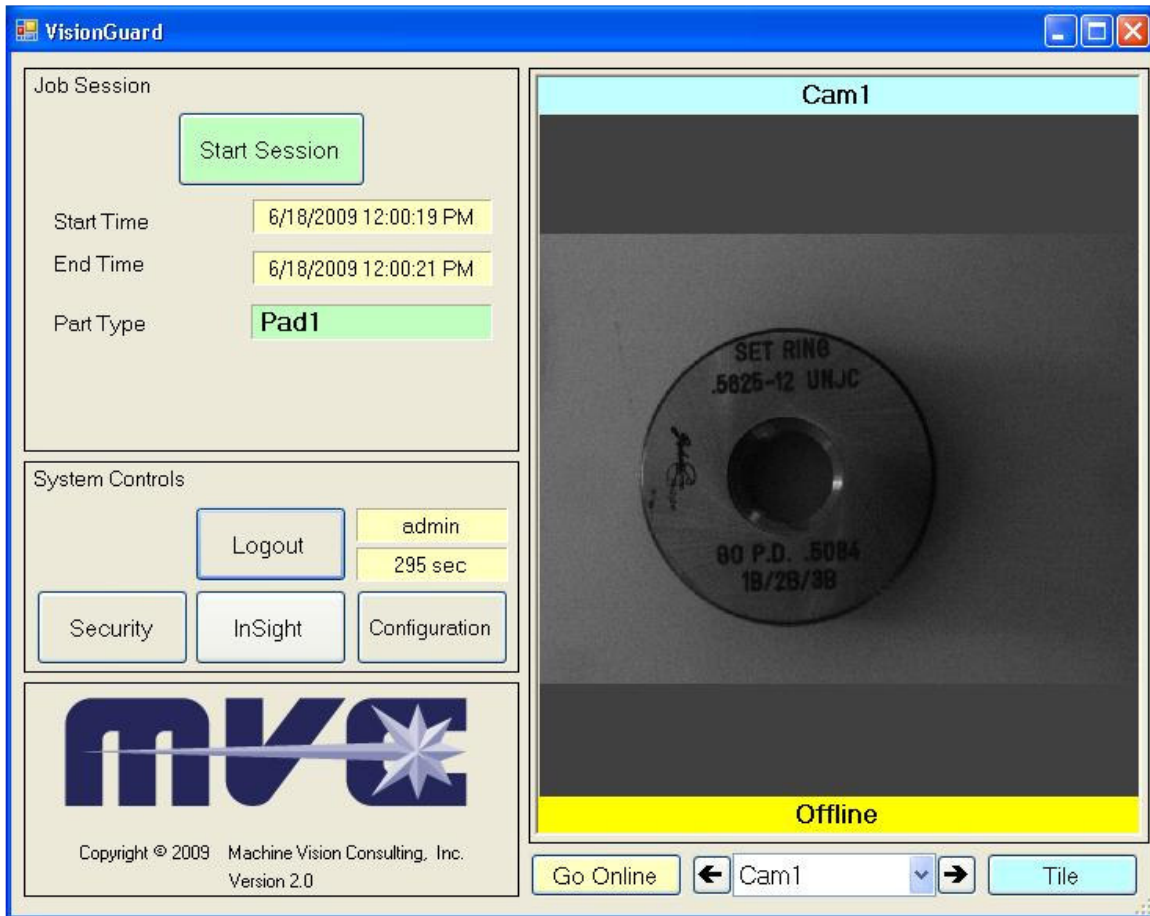
The “Permissions” section of the interface provides the individual permissions that are standard for In-Sight[®], as well as additional individual permissions provided by VisionGuard[™].

Separate permissions have been created to:

- Save and load In-Sight[®] job files
- Create and assign users, passwords, and group permissions
- Shut down the application
- Start and End an inspection session
- Access the In-Sight[®] spreadsheet to configure the application
- Modify and control the In-Sight[®] unit
- Select the part to be inspected



Main Window



Example of VisionGuard's™ Interface after Log-In

The window above shows an example of what may appear after the user is logged in as an Administrator. In this case, all permissions are provided and all of the control buttons in the interface are displayed and available for use. The interface also shows the starting and ending time of the last inspection session and the part that was inspected. It shows the "Offline" status of the In-Sight® Vision Sensor in this example. This window also shows the status of the timer that is set for automatic log-out, showing the user that is logged in and the number of seconds remaining before automatic log-out.

The buttons that contain additional interface options are available if the appropriate levels of permission are enabled. Otherwise, some of these display buttons may be hidden, such as when an Operator is logged in.

Display Window

The video display window within VisionGuard™ will show a Single In-Sight® image if a single camera is used. If multiple In-Sight® vision sensors are connected, the user can display a tiled view of the connected vision sensors or select a single vision sensor to be viewed. Up to 8 In-Sight units can be controlled by VisionGuard™. The name of the In-Sight® unit selected will be shown at the top of its display window.

System Controls – Vision Sensor Display and Status Controls

Timer

The Timer displays the name of the logged-in user, as well as a count-down timer that counts down the number of seconds remaining to an automatic log-out. This is a safety feature that detects inactivity within VisionGuard™ and logs out the user when it reaches 0 seconds. The amount of time provided by this timer can be set within the Configuration tab. The timer resets each time there is user activity within VisionGuard™.

InSight Button

When the “InSight” button is pressed, the following window will appear when the In-Sight® Vision Sensor is in an Offline mode:



InSight Controls Window in the Offline Mode

Within the “InSight Controls” window, the user can select the In-Sight® unit that will be controlled or modified using the drop-down list of connected In-Sight® Vision Sensors shown next to “InSight Name” at the top of this window.

Using the buttons shown, VisionGuard™ can instruct the selected In-Sight® Vision Sensor as follows:

- The Online/Offline status of the selected In-Sight® can be controlled.
- “Show Custom View” will overlay the custom view in the selected In-Sight® Vision Sensor’s display.
- “Show Grid” will overlay the spreadsheet view in the selected In-Sight® Vision Sensor’s display.
- In the Offline mode, pressing the “Manual Trigger” button will allow the selected In-Sight® unit to acquire a single image.
 - The contents of the spreadsheet will run and the display will be updated.
 - The In-Sight® IO will not be active when in the Offline mode.



- In the Offline mode, the “Live Mode” button will cause the In-Sight[®] display window to display a live image.
- Save the currently-displayed In-Sight[®] Vision Sensor image as a bitmap into a folder created in the “Configuration” window or a folder created during the “Save Current Image” process.
 - A standard “Save File” window will appear.
- Load an existing Job File into the selected In-Sight[®] Vision Sensor.
 - This file can be loaded from the Vision Sensor or from the PC.
- Save a Job File that has been modified under either the same Job File name or a new Job File name.
 - This file can be saved to the Vision Sensor or to the PC.

Display Modes

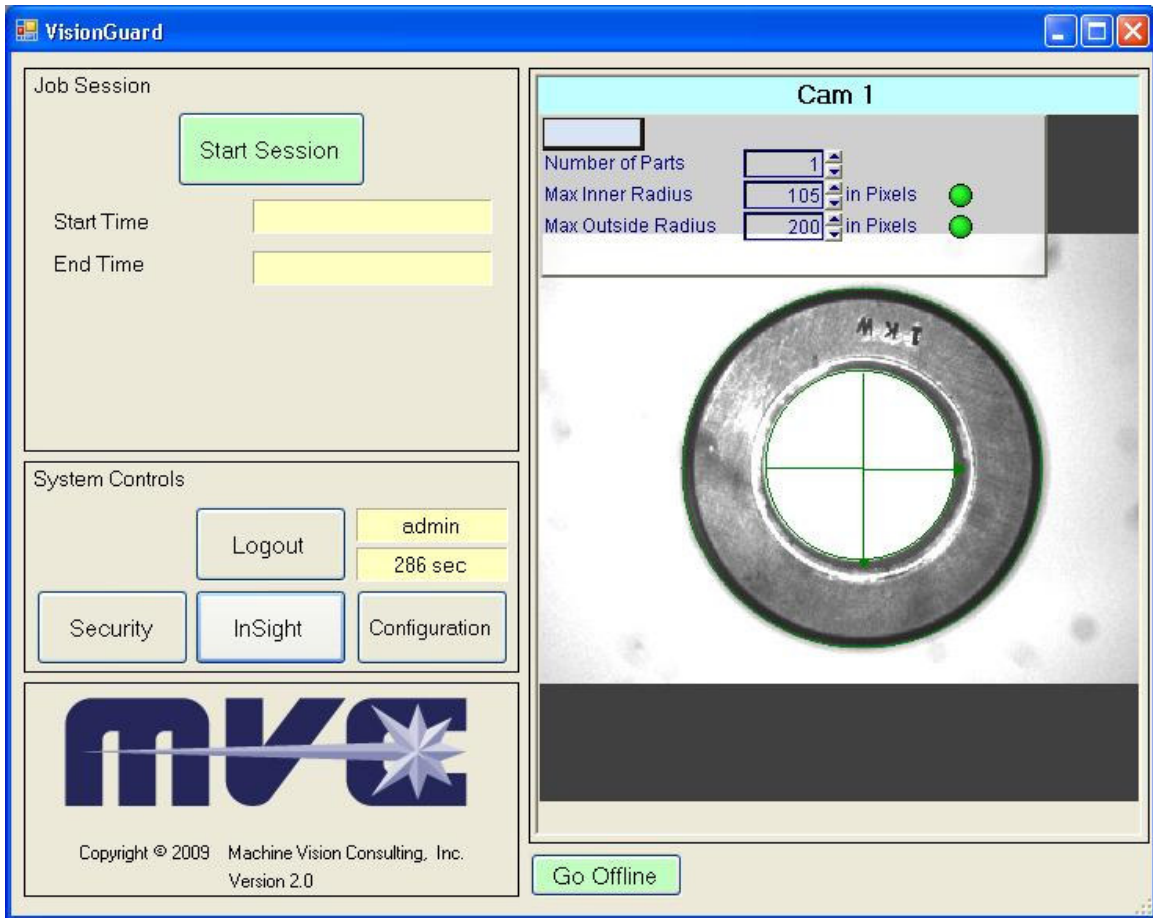
The user can select the In-Sight[®] view that will be presented in the main VisionGuard[™] display for the selected In-Sight[®] Vision Sensor from within the “InSight Controls” window. The VisionGuard[™] Vision Sensor view can:

- Contain no overlay
- Display the Custom View
- Display the In-Sight[®] spreadsheet grid (not available when Online)



Show Custom View

The Custom view of the selected In-Sight[®] unit can be displayed, as shown below:



Custom View Shown Within the VisionGuard™ Main Window

The Custom View must be configured using In-Sight[®] Explorer. Note that any controls and adjustments brought out in the Custom View are fully accessible and changeable within the VisionGuard™ interface if the appropriate permissions have been granted to the user. Events will be created in the Event Log for any changes made to the Custom View within VisionGuard™.

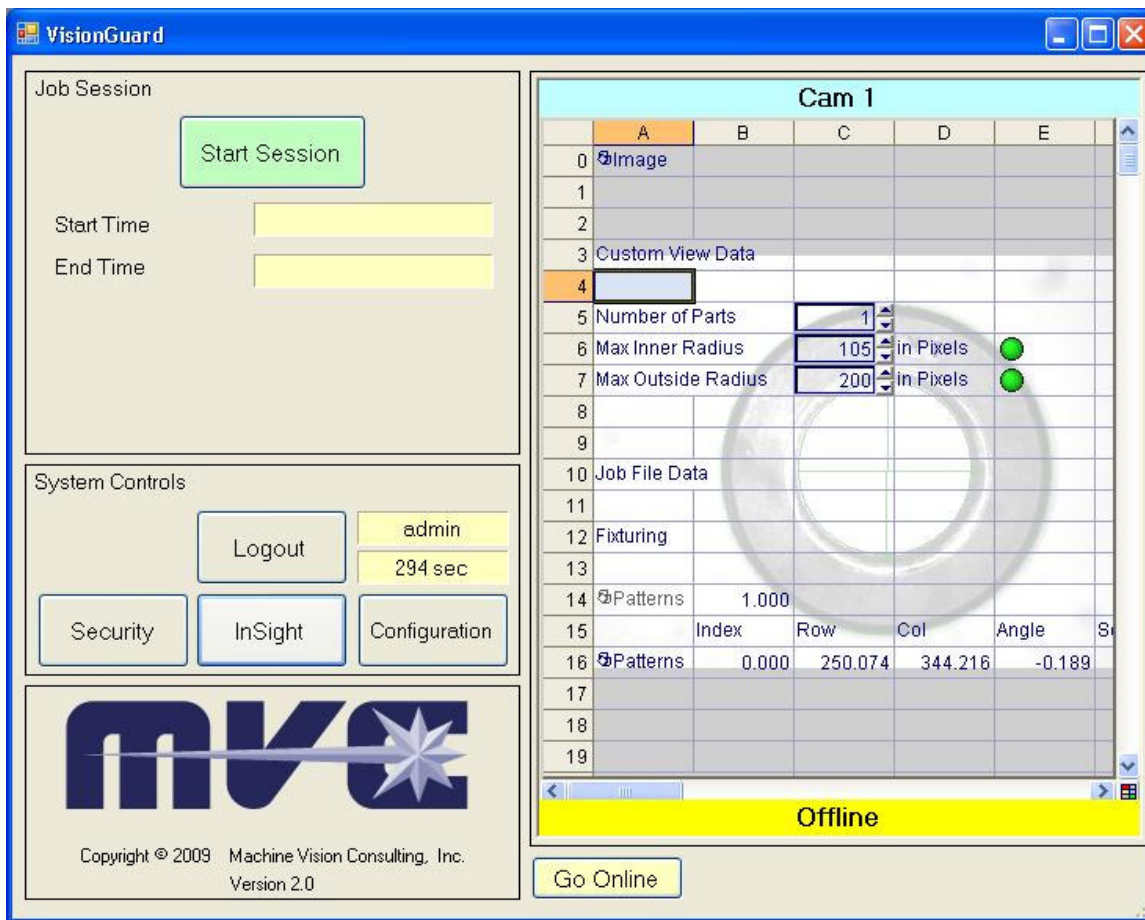


Show Grid

If the “Show Grid” button is pressed, the VisionGuard™ display will show the In-Sight® spreadsheet. When the spreadsheet grid is shown, access to make changes and modifications within existing tools and controls in the spreadsheet is granted if the user that is logged in has the appropriate permissions.

Any changes made to the spreadsheet will create an event that will be recorded in the Event Log. For vision tool changes, the Event Log will record: who is logged in, the time and date, the cell that is changed, the original cell data, and the new cell data.

Although any existing vision tools, functions, or controls within the spreadsheet can be accessed and changed using the VisionGuard™ application, new functions that do not already exist in the spreadsheet cannot be created using VisionGuard™. Any vision tools or functions that do not already exist must be created using In-Sight® Explorer.

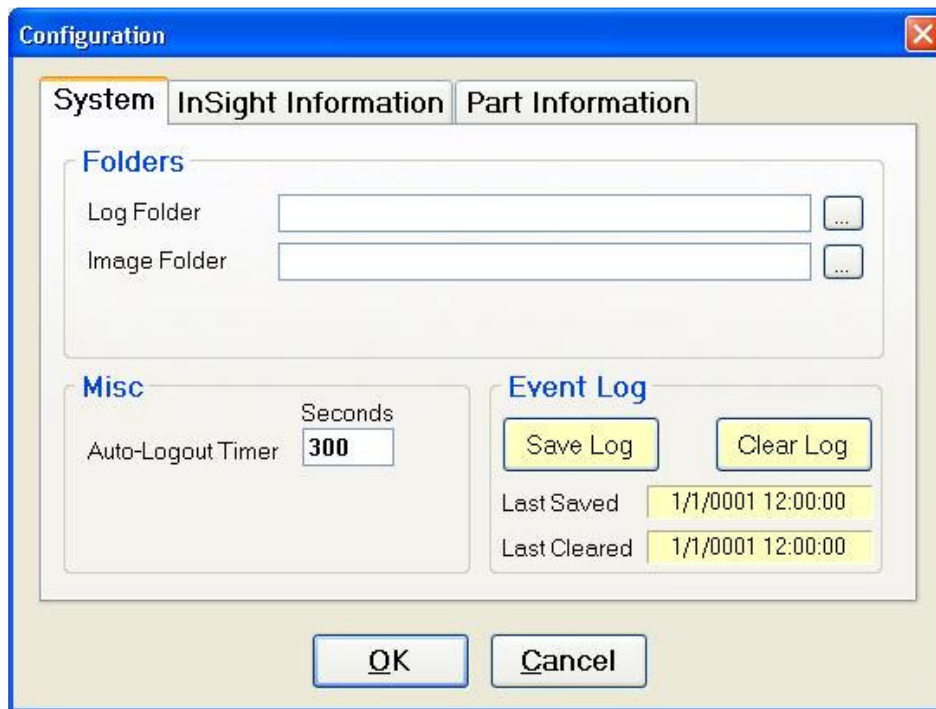


In-Sight® Spreadsheet Shown in the VisionGuard™ Main Window

The In-Sight® spreadsheet is only accessible for viewing and for making modifications when the In-Sight® Vision Sensors are in the “Offline” mode.

VisionGuard™ Configuration

Pressing the “Configuration” button on the main VisionGuard™ interface brings up the window below:



Configuration Window – System Tab

System Tab – Folder, Auto Log-Out, and Event Log Control

The System tab allows the user to select:

- The folder into which Event Log reports are saved.
- The folder into which any Saved images are stored.
- The number of seconds the Auto-Logout Timer will use.
 - This controls an automatic log-out function that reverts to the main VisionGuard™ log-in window after a period of inactivity that exceeds the time allotted.
 - This timer resets when activity is detected.
- The Event Log can be saved, automatically creating the PDF document of recorded events.
- The Event Log on the PC can be cleared; this is optional.
- The date and time of the last Event Log save and clear is recorded here.



InSight Information Tab – Adding Vision Sensors to the Network

This tab contains items used to configure the attached In-Sight[®] Vision Sensors.

In-Sight[®] Name

This drop-down list contains the names of the attached In-Sight[®] units. Pressing the Rename In-Sight[®] button allows the user to change the name of the selected In-Sight[®] Vision Sensor.

Startup Job

This drop-down list contains the names of all of the jobs that are stored in the selected In-Sight[®] Vision Sensor. The user can select a Startup Job. In this drop-down list, there is a “None” to be used if no Startup Job is to be selected.

Note that the “Startup Job” only loads when the power is cycled on the In-Sight[®] Vision Sensor. If the power is not cycled, the In-Sight[®] Vision Sensor will use the last Job File that was loaded.

The screenshot shows a 'Configuration' dialog box with three tabs: 'System', 'InSight Information', and 'Part Information'. The 'InSight Information' tab is active. It contains a section titled 'InSight' with the following fields and controls:

- InSight Name:** A drop-down menu showing 'Cam1'.
- Startup Job:** A drop-down menu showing 'JG Test.job'.
- Host Name:** A text box containing 'is5100_01069'.
- IP Address:** A text box containing '192.168.0.251'.
- User:** A text box containing 'admin'.
- Password:** An empty text box.

On the right side of the 'InSight' section, there are four buttons: 'New InSight', 'Delete InSight', 'Rename InSight', and 'Scan Network' (which is highlighted in green). At the bottom of the dialog are 'OK' and 'Cancel' buttons.

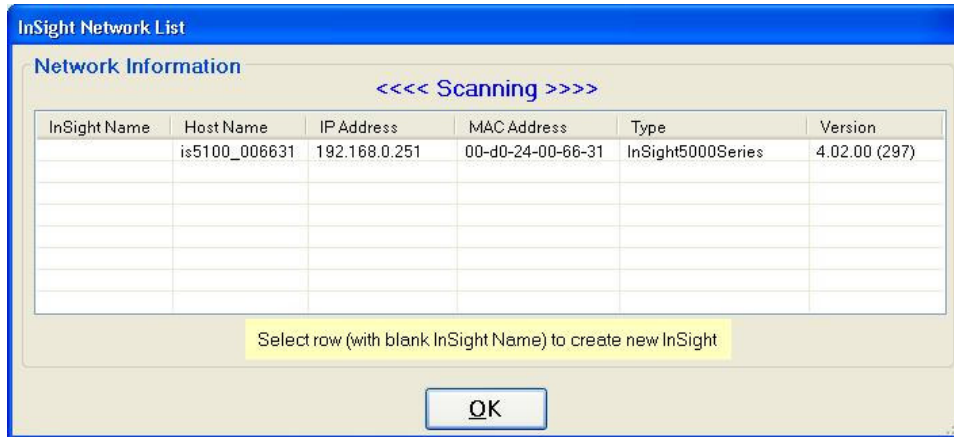
Configuration Window – InSight Information Tab

User & Password

If it exists, the User and Password information used within In-Sight[®] Explorer must be entered here to allow VisionGuard[™] to access and control the selected In-Sight[®] Vision Sensor. If no passwords are used in In-Sight[®] Explorer to control access, the user runs the risk of a user circumventing VisionGuard[™] and logging into the In-Sight[®] Vision Sensor using In-Sight[®] Explorer. These In-Sight[®] passwords are separate from the Users, Passwords, and Permissions created within the VisionGuard[™] Security window.

Scan Network Button

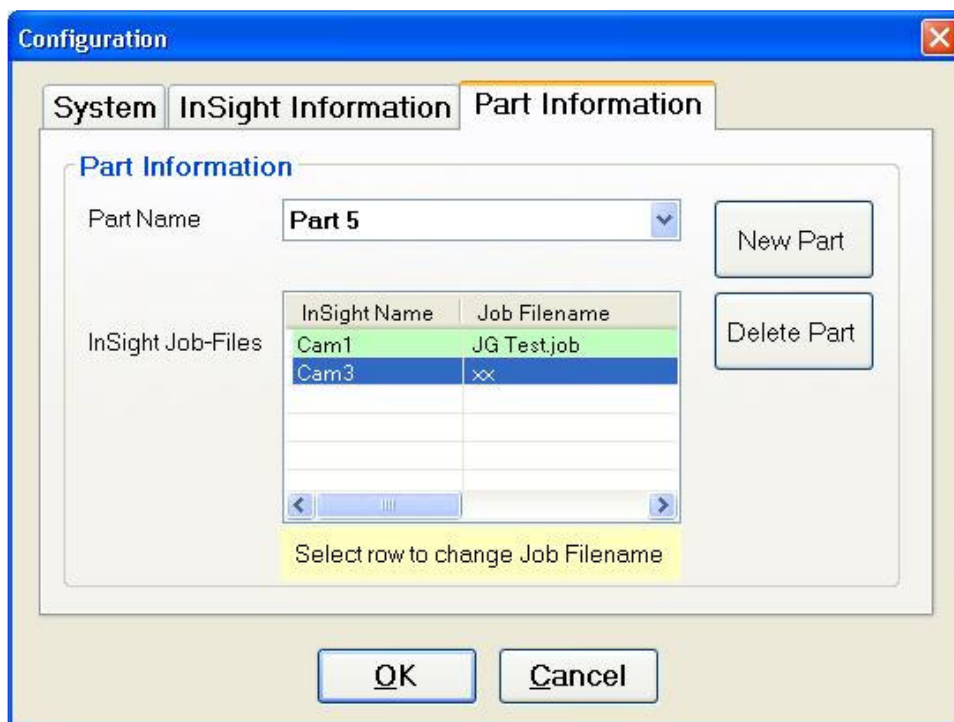
Pressing this button enables VisionGuard[™] to scan the attached network, automatically detecting any connected In-Sight[®] Vision Sensors and adding them to the drop-down list of detected In-Sight[®] Vision Sensors when they are selected in the “Scan Network” window.



Scan Network Window

Part Information Tab – Automatic Job Loading on Multiple Vision Sensors

This tab provides unique capabilities within VisionGuard™. A part to be inspected is created within this tab and can then be selected in the drop-down Part Name list. When the “Start Session” button is pressed in the main interface screen, the user will select the part to be inspected. The job file on each Vision Sensor that needs to be loaded for the selected part will then be automatically loaded by VisionGuard™ onto each connected Vision Sensor.



Configuration Window – Part Information Tab



The section of the tab called “In Sight Job-Files” will display the attached In-Sight® Vision Sensors and the Job File associated with the selected part. The job file to be loaded can be changed by the user by selecting the appropriate row and then selecting the job file to be loaded from a drop-down list.

This capability means that the specific job files for each part will be automatically loaded onto each attached In-Sight® Vision Sensor when that part is selected upon pressing the “Start Session” button. There will be no need to manually load the appropriate job files for each part to be inspected.

For example, if there are 4 In-Sight® Vision Sensors being controlled by VisionGuard™, the job file required for each when a particular part is to be inspected will be automatically loaded onto each Vision Sensor just by selecting the part to be inspected after pressing the “Start Session” button.

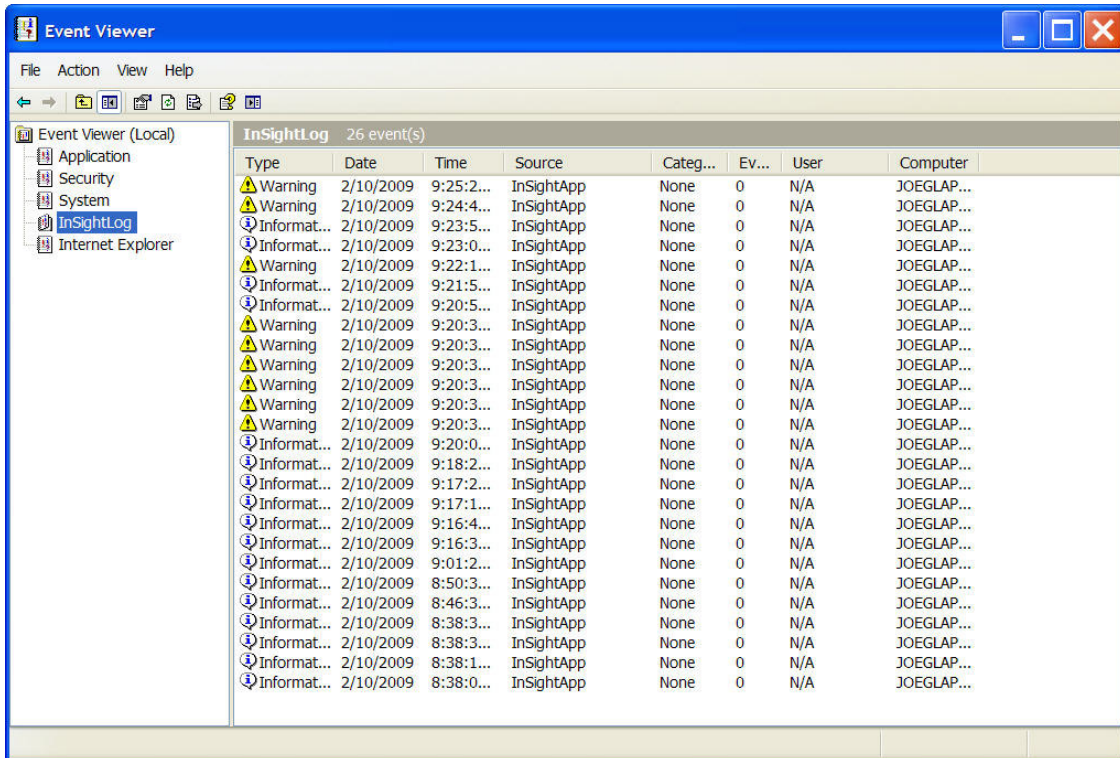
New Part Button

Pressing this button creates a new part that can be named by the user. When this part is created or selected in the drop-down list, the attached In-Sight® Vision Sensors will be listed and the job files associated with that part can be entered.



Event Tracking

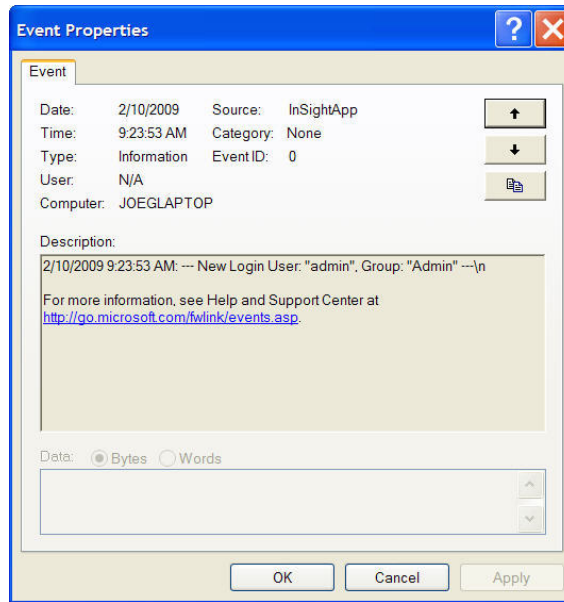
The event tracking capability of VisionGuard™ makes use of the Event Viewer contained within the Windows™ XP™ operating system. Every key event, such as log-in, log-out, job change, part change, inspection session start and end, and all changes made to the In-Sight® Custom View settings or the spreadsheet settings are recorded to the Event Log. This log provides the traceability, history, and documentation trail that aids in validation.



Event Viewer within Windows™ XP™

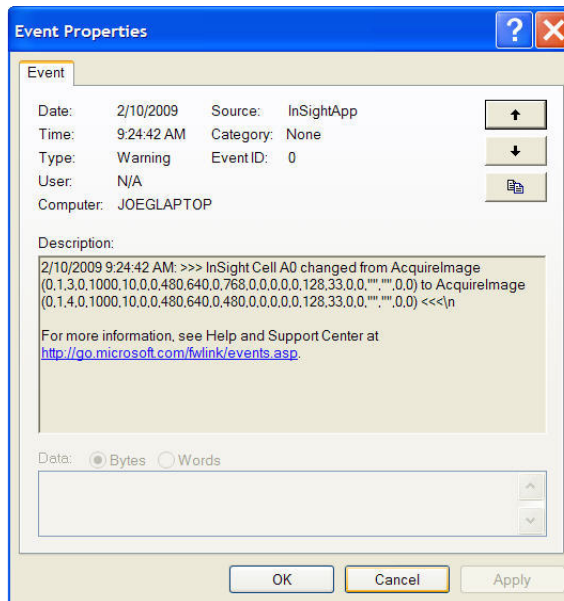


The Event Viewer will record an event when any user logs into or out of VisionGuard™:



Log-In Event within the Event Viewer

VisionGuard™ will create an event that records the logged-in user, the time, and the date of any changes made to the In-Sight® job file. The Event Viewer entry shows what cell was changed, what the original settings were in the cell, and the specific change that was made to the cell within the In-Sight® job file spreadsheet when it was accessed through VisionGuard's™ interface.



Spreadsheet Change Event within the Event Viewer



VisionGuard™ can create a PDF document of the Event Log that provides a record of all of the events that have been recorded in the Event Viewer within Windows™ XP™. The user can choose to clear the Event Log when this report is created.

EVENT LOG

Type	Time	User	Message
	6/3/2009 5:31:23 PM	admin	Log Reset
	6/3/2009 5:31:31 PM	admin	Configuration Exited
	6/3/2009 5:33:40 PM	admin	InSight Control Entered
		admin	InSight Control Exited
	6/3/2009 5:37:12 PM	phil	Session for part "Pad1" Started at 6/3/2009 5:37:12 PM
	6/3/2009 5:38:29 PM	phil	User: phil Logged Out
	6/4/2009 2:37:57 PM	admin	For part "Pad1", InSight "Cam1" Job-File set to "EasyView Test.job"
Warning	6/4/2009 2:50:32 PM	admin	InSight Cell D6 changed from 'YES to GetHigh(\$A\$6)
	6/4/2009 2:51:02 PM	admin	Session for part "Pad1" Stopped at 6/4/2009 2:51:02 PM
	6/18/2009 12:26:15 PM	admin	Event Log Saved to file "C:\Documents and Settings\Administrator\Desktop\Test Log.pdf"

Example of Event Log Items, Saved in a PDF Document

VisionGuard™ Configuration, Pricing, & Evaluation Period

Multiple In-Sight® Integration – For Use With Up To 8 In-Sight® Vision Sensors	Part Number MVC-VG-M	\$3,000.00 List Price
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A video description may be viewed or a copy VisionGuard™ may be downloaded from the MVC web site for evaluation at:

<http://www.machinevc.com/product-visionguard.php>

Users will have 15 days to evaluate the downloaded software at no charge. After the evaluation period, the user will be prompted to call MVC, purchase VisionGuard™, and receive an authorization code. The PC on which the authorization code is entered will be the PC that VisionGuard™ will be locked to. VisionGuard™ cannot be move to another PC once the authorization code is entered.

The user must call MVC at one of the phone numbers at the top of the registration window. Registration keys will be provided upon the purchase of VisionGuard™. The VisionGuard™ application must be active at the time the registration keys are provided.



VisionGuard™ Benefits

- VisionGuard™ provides the means to allow a client to validate an In-Sight® Vision Sensor as part of a medical, pharmaceutical, or industrial application.
- Multiple log-ins, passwords, and permissions are provided within VisionGuard™.
- Event logging is provided to create an audit trail for log-ins, log-outs, part changes, inspection session start and end times, Custom View changes, and In-Sight® job file changes.
- The VisionGuard™ interface is designed for ease-of-use and integration with new or existing In-Sight® installations.
- Automatic job loading on multiple In-Sight® Vision Sensors, based on the part selected, enhances system management.

Conclusions

The Cognex® In-Sight® Vision Sensor is a powerful inspection and identification solution. As it comes from the factory, though, the In-Sight® Explorer environment does not provide the features that are required to include the In-Sight® Vision Sensor as part of a validated automation application in a medical, pharmaceutical, or industrial environment.

VisionGuard™ provides the key features that the In-Sight® Vision Sensors must have in order to be included in a validated project.

MVC can provide additional customization of both the VisionGuard™ interface and the In-Sight® job to address application-specific issues and requirements as part of a custom project. Every application is different and may vary in any number of ways. MVC will work with its clients to customize key aspects of a custom solution to provide the best possible match with the requirements of the application.

MVC is focused on providing turn-key integration of machine vision technology to provide automated inspection and process control during the manufacturing and packaging processes in a wide variety of industries. MVC's standard products and custom solutions address client requirements in alphanumeric code verification, 2D Data Matrix™ code reading, gauging, closure inspection, label inspection, feature-presence and analysis, and in many other areas in which to apply machine vision technology.

Additional information on Machine Vision Consulting, Inc., its products, its capabilities, and its team can be found on its web site, www.machinevc.com.

Call Joe Gugliotti at 978-551-4160 or e-mail sales@machinevc.com to initiate a conversation on VisionGuard™ or other application of machine vision technology.