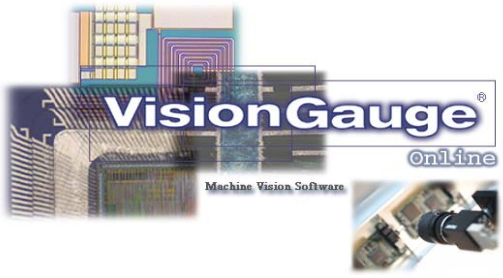


VisionGauge® OnLine

Motorized Stage Configuration Spec Sheet

VISIONx INC.

www.visionxinc.com

Powerful & Easy to Use

VisionGauge® OnLine is a powerful and easy-to-use machine vision software for automated inspection, high accuracy measurement and data collection, both in-process and off-line. It can be used to carry out a wide range of automated tasks including:

- Image Capture, Manipulation and Processing
- Image Registration and Alignment
- Pattern Matching
- Inspection and Verification
- High-Accuracy Measurement
- 3D LASER Profiling
- Image Analysis (including Blob Analysis)
- Optical Character Recognition & Verification
- Defect Detection
- Assembly Verification
- Color Verification and Analysis
- Present/Absence Detection
- Object Counting & Sizing
- Documentation
- Data and Statistics Collection
- Pass / Fail Testing
- Automated Optical Inspection (AOI)
- Reading data input channels and carrying out various I/O tasks
- Etc…

VisionGauge® OnLine runs under Windows 95™ / 98™ / NT™ / 2000™ / XP™ / Vista™. It is very competitively priced and can be supplied as a complete, ready-to-run machine vision system, or as a board level and software product.

User-Friendly

- Complete and easy-to-use “F1 Help”
- Clear and concise documentation
- Comes with a demo CD with tutorials
- Also includes many sample programs that you can use, adapt and modify to solve your specific application

Intuitive Interface

- Simple and intuitive graphical user interface (i.e. full Windows ™ “look and feel”)
- VisionGauge® OnLine’s user interface is completely configurable: configurations and customized preferences can be saved to disk and automatically reloaded on startup
- Very easy to set up, program and operate

Supports a Wide Range of Video Sources

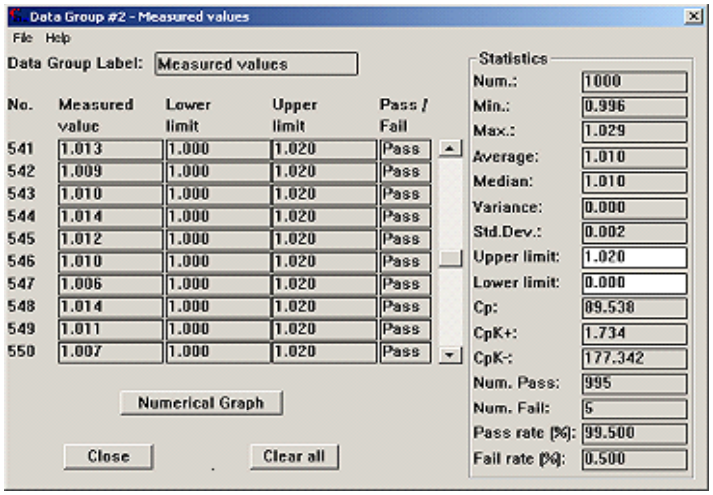
- Supports both standard and non-standard analog cameras
- Supports a wide range of digital cameras
- Supports both high-speed and high-resolution cameras
- All camera functions (i.e. exposure, gain, etc…) can be controlled directly from within VisionGauge® OnLine. Preset values can also automatically be loaded on startup
- Supports both color and grayscale cameras
- Fully supports DirectX / DirectShow (i.e. FireWire™ / IEEE 1394 / USB) video capture devices
- Built-in support for very large images
- Can also display oversized images all at once (i.e. scaled to fill the screen)
- User selectable image resolution (i.e. full, half, third, quarter, fifth…) to easily work with very high resolution images

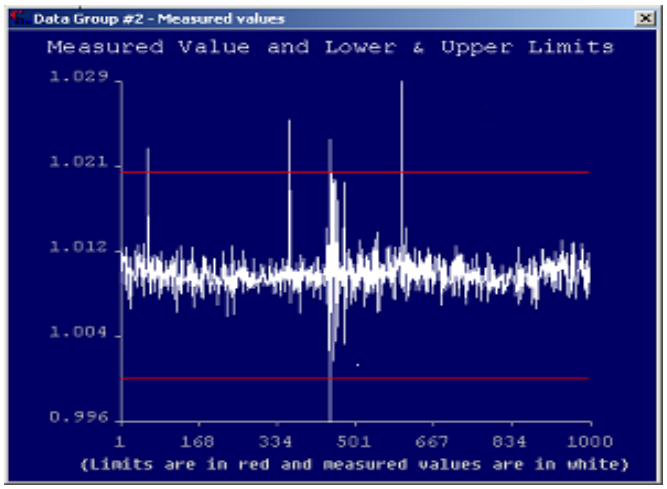
Very Easy to Program

- VisionGauge® OnLine is very easy to program (simply point and click)
- All of the different tools provide immediate visual feedback & draw the results directly on-screen
- You can create different programs (i.e. “recipes”) for different parts, applications & requirements
- Programs can be saved to disc and read-in later on
- There is no limit on the number of programs that you can save to disk

Automatically Collect Images, Data & Compute Statistics

- Collect data & compute statistics automatically
- Statistics include: number of values, minimum, maximum, range, average, median, variance, standard deviation, Cp, Cpk+, Cpk-, number of pass, number of fail and fail rate
- Results can selectively be sent to Data Groups: collect the results of only pass or fail operations or collect all results
- Output and save the data & statistics to external files
- Chart-out the data & statistics continuously, in real-time. View both numerical and Pass / Fail charts
- You can also automatically send data to Excel, at user-defined book / sheet / row / column locations
- You can automatically send a Data Group's contents to a COM port during the program's execution
- Collect and review images associated with individual results
- Setup multiple groups of data, each with their own statistics & charts
- Programs can also include instructions to automatically save images to disk, either with or without a time/date stamp, based on the results of various operations (this can be very useful for documentation purposes)
- Use intuitive "Results Variables" to combine the results of multiple operations into a single Pass / Fail result

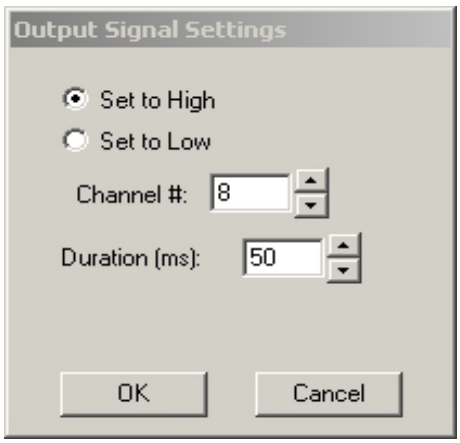




- Results can also simply be sent to generic ASCII data files
- Data files can automatically be opened and closed during program's execution

Very Easy to Interface to External Machinery, Equipment & Devices

- VisionGauge® OnLine has a number of powerful and easy to use tools to synchronize and interface VisionGauge® OnLine with external machinery, equipment and devices. VisionGauge® OnLine is extremely flexible in this respect
- Basic configurations of VisionGauge® OnLine support 24 Input / Output channels. This number can then be increased in increments of 24 channels, with no upper limit
- VisionGauge® OnLine also supports RS-232 serial data communication (with user-specific communication parameters), for both input & output of data
- Not only is VisionGauge® OnLine very flexible in terms of signal type, but also in terms of signal timings, delays and durations. This further enhances VisionGauge® OnLine ability to interface to just about any external device
- VisionGauge® OnLine can combine the result of multiple operations to produce a single output signal. These operations don't need to be of the same nature (i.e. pattern matching, color verification, measurement, etc.). With VisionGauge® OnLine any number and any type of operations can be combined using AND / OR Boolean logic operators



Powerful & Unique SmartCapture™ Tool

- VisionGauge® OnLine's proprietary SmartCapture™ tool is able to automatically detect the part's presence. It waits for the part to be in position under the camera before carrying out an image capture operation
- VisionGauge® OnLine's SmartCapture™ tool is a simple way to interface with existing production lines and materials-handling installations

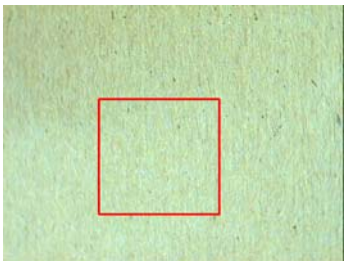


Image 1
There is no part
in the field-of-view

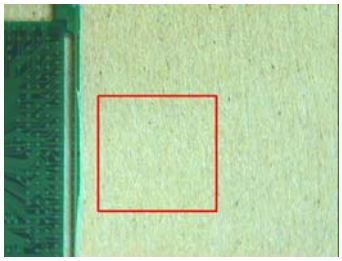


Image 2
The part is starting to move
into the field-of-view

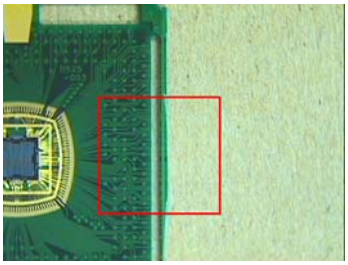


Image 3
The part is continuing
to move forward

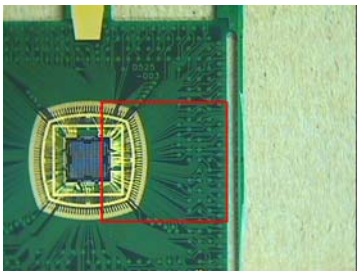


Image 4
The part is almost in position...

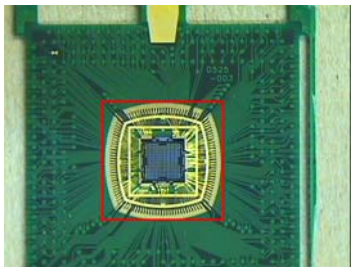


Image 5
The part is in position.

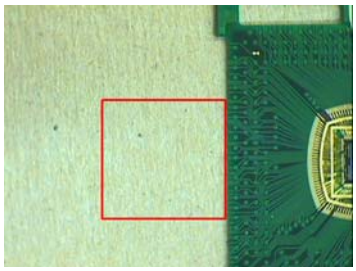
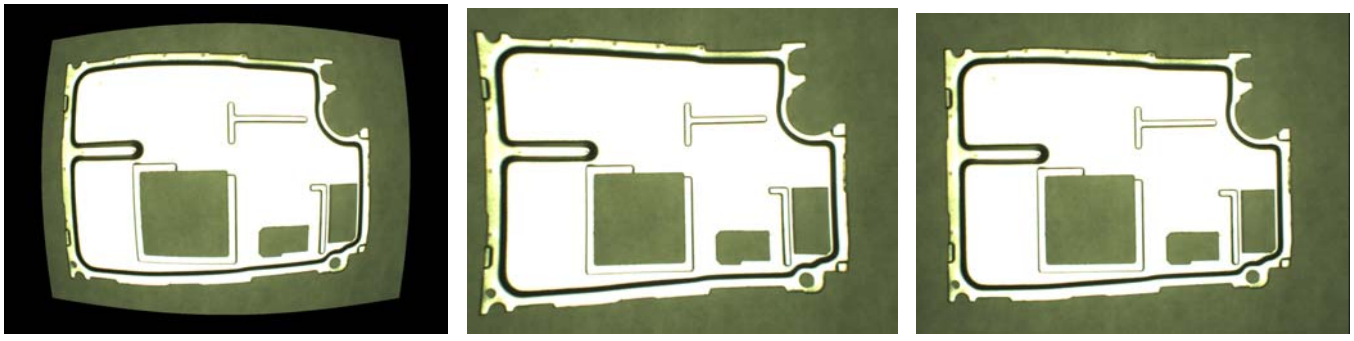


Image 6
Wait for the next part...

Automatic, High Accuracy, Real-Time (.e. "On-The-Fly") Distortion Correction

- VisionGauge® OnLine has an advanced and unique tool for fully automated, high-accuracy, real-time distortion correction
- The Distortion Correction tool corrects both "pincushion distortion" as well as "barrel distortion"
- The Distortion Correction tool is highly optimized which allows it to perform optimally even with a live vision stream
- The Distortion Correction tool is hardware independent and easy to calibrate



Two forms of optical distortion: pincushion distortion (left image) and barrel distortion (center image).
The right image is distortion-corrected (automatically, and in real-time)

Image Alignment & Registration

- VisionGauge® OnLine has a powerful "alignment" tool that allows you to correct for sample translation & rotation (i.e. mis-registration)
- This tool is very easy to use: simply point & click to identify regions of Interest (ROIs) with the features that you want to use for registration (i.e. "fiducials")
- There are absolutely no constraints of any kind as to the features that you select for registration.
- Different parameters are available to allow you to optimize calculations
- Use the "edge viewer" tool to see the pattern image's edge map

- All of the individual VisionGauge® OnLine tools also support registration correction, using the displacement of either a single datum (i.e. translation-only correction) or of two datums (i.e. translation-rotation correction)

Flexible Image Capture Tool

VisionGauge® OnLine's flexible image capture tool allows you to capture an image from the camera:

- Right away
- At a precise moment in time
- When a trigger occurs
- Upon user input

You can also read-in images from files and file sequences

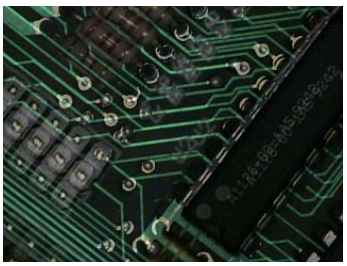
Built-in Multi-Camera Support

- There is no limit on the number of cameras that VisionGauge® OnLine can support
- Super fast switching between video sources

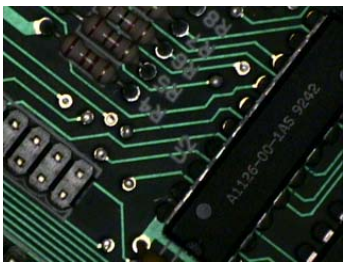
Image Manipulation, Processing, Enhancements & Correction

VisionGauge® OnLine has a wide selection of image manipulation & processing tools for image enhancement & correction, including:

- "Flip" top-to-bottom or left-to-right
- "Rotate" clockwise or counter-clockwise
- Correct uneven illumination
- Adjust brightness and/or contrast
- Remove image noise
- VisionGauge® OnLine also has a unique interlace offset correction tool that allows you to remove "motion blur" and similar interlace offset error



Before (shows motion blur)

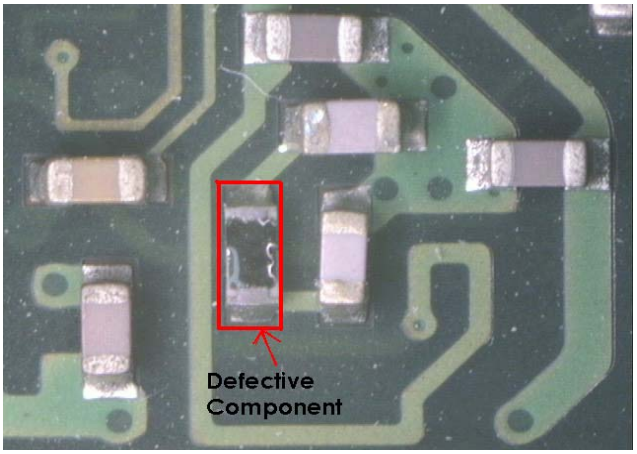


After (much clearer!)

Interlace Offset Correction

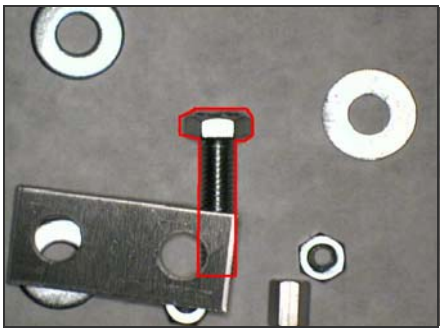
Correlation-Based Pattern Matching

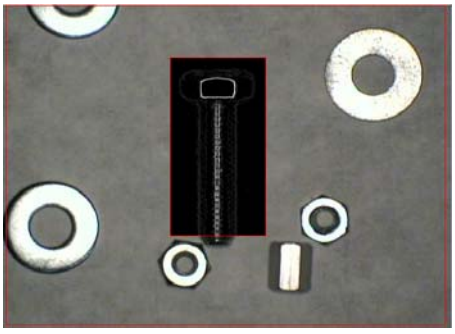
- This tool carries out pattern matching using a highly-optimized form of the well-established normalized grayscale correlation algorithm
- VisionGauge® OnLine's correlation-based pattern matching tool is very robust in the presence of variations in light intensity
- This tool is extremely accurate, fast & robust
- You can optimize the calculation parameters and select an appropriate match threshold
- You can use the information about the displacement of patterns to carry out registration (i.e. translation-only or translation-and-rotation) in any of the other tools
- Also supports "manual assist" with the possibility of operator override



Advanced Feature-Based Pattern Matching

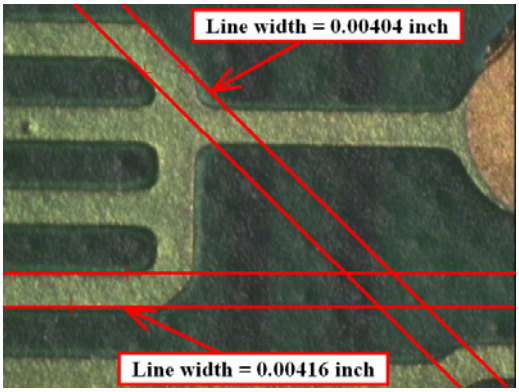
- VisionGauge® OnLine's feature-based pattern matching tool uses advanced proprietary technology. It is rotationally invariant (i.e. the pattern can have any orientation) and can deal with both partial occlusion and variable illumination conditions
- VisionGauge® OnLine's feature-based pattern matching tool imposes no constraints of any kind as to the pattern (i.e. the tool works with any pattern that you define)
- This tool is extremely fast, robust and accurate. You can optimize the calculation parameters and select an appropriate match threshold
- Use the "edge viewer" tool to see the pattern image's edge map
- Parameters can also be set to be able to deal with "negative images"
- You can use the information about the displacement of patterns to carry out registration (i.e. translation-only or translation-and-rotation) in any of the other tools
- Also supports "manual assist" with the possibility of operator override

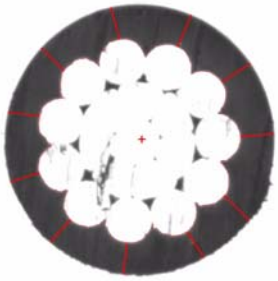




Extensive Set of Sub-Pixel Accurate Measurement Tools

- VisionGauge® OnLine can be used to carry out a very wide range of high-accuracy measurements
- VisionGauge® OnLine has a broad toolkit of fully automated measurement tools (i.e. point-to-point distance, horizontal & vertical distance, radius, diameter, line / trace width, angle, advanced marker-to-marker measurements, etc…)
- Measure to and from Datums and arbitrary user-defined patterns and features
- All of VisionGauge® OnLine's measurement tools are based on our advanced, proprietary edge-detection technology and carry out measurements to super-fine sub-pixel accuracy
- VisionGauge® OnLine also has advanced measurement tools that can take into account edge direction & "strength". These unique tools are especially useful to find the correct edge in "noisy" areas or in areas where many edges are close to each other. In these areas, other less advanced edge detectors could "get confused" and lock onto the wrong edge. VisionGauge® OnLine always finds the right edge and produces correct and accurate measurements automatically.
- VisionGauge® OnLine is easy to calibrate and calibrations can be saved to disk and recalled
- VisionGauge® OnLine supports a wide range of measurement units including inches, mils (i.e. 0.001in), microns and millimeters. Angular measurement units include degrees and radians.
- Minimum & maximum tolerances are easy to setup
- VisionGauge® OnLine also has quick gauging tools for easy & fast on-screen measurements
- You can save the location of any "marker" (i.e. measurement object) and use it in any subsequent operation (e.g.: registration, measurements, etc…)



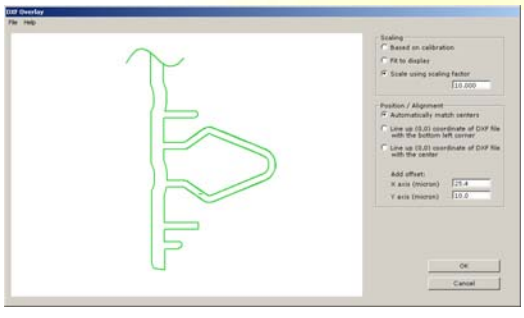


Live Image Overlays with Support for DXF Format CAD Files

VisionGauge® OnLine's Live Image Overlay tool allows you to superimpose drawings and various geometric elements over your camera's live video stream. VisionGauge® OnLine's Live Image Overlay tool is the ultimate "digital video comparator".

VisionGauge® OnLine's Live Image Overlay tool includes a Live Image Overlay Builder that allows you to create drawings as well as a wide range of geometric constructs (i.e. lines, crosshairs, bulls-eyes as well as calibrated grids, circles and angles, etc…). VisionGauge® OnLine's Live Image Overlay Builder supports multi-colored live image overlays and is perfectly suited for a wide range of part alignment and tolerance verification applications.

VisionGauge® OnLine's Live Image Overlay tool also supports DXF-format CAD files. When you read a DXF file into the Live Image Overlay Builder, VisionGauge® OnLine can automatically scale the drawing to match up with the system optical calibration. This means that if the item measures one inch in the CAD drawing, it will appear on the screen as a one-inch object under the camera. VisionGauge® OnLine also supports a number of other scaling and drawing offset settings. This is the perfect tool to use when comparing a part against its CAD drawing: VisionGauge® OnLine scales the CAD drawing appropriately and draws it "on top of the part"! VisionGauge® OnLine's Live Image Overlay Builder with DXF-format CAD file support allows you to quickly and accurately determine how well a part matches up with its CAD file definition.



Fast & Reliable Counting & Sizing Tool

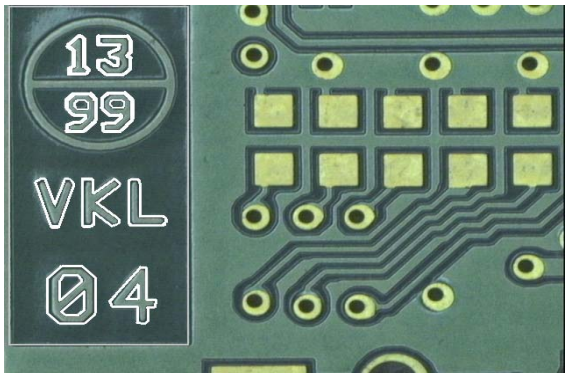
- VisionGauge® OnLine's counting & sizing tool carries out automated "Blob Analysis" calculations
- This tool is perfect for quickly and accurately identifying, counting measuring and characterizing objects with arbitrary shapes
- This tool is fast, easy to use and very versatile
- You can setup a Region of Interest (ROI) to select only a portion of the image
- You can select the channel used by this tool (i.e. red, green, blue, luminance, intensity, hue or saturation)
- You can instruct the tool to only consider objects within a user-defined size range
- You can instruct this tool to disregard objects touching any of the ROI's 4 borders (i.e. top, bottom, left & right)
- You can instruct the tool to disregard certain specific objects selected by the user
- This tool allows you to compute the object area distribution, the minimum and maximum object areas, the number of objects, the area percentage, the average and median object areas as well as the total object area

- This tool also allows you to obtain specific information about individual objects (i.e. object area, equivalent radius and diameter, perimeter, X- and Y-axis projections and X and Y centroid position)
- Use the " Preview mode" to work interactively with the Counting & Sizing Tool and see your results updated continuously, as you work
- The counting and sizing tool can also be used for manual operations

Highly Flexible Optical Character Recognition (OCR)

VisionGauge® OnLine's powerful OCR tool:

- Supports user-defined character & symbol libraries
- Includes advanced "Automatic Parsing" technology
- Includes a proprietary "Character Splitting" algorithm to reliably deal with print imperfections (i.e. smears, etc...)
- Includes a "Character Library Editor " to view and modify existing character libraries
- Is "trainable"
- Is multi-lingual



Prevent Unwanted Program & System Modifications Using Password Protection

VisionGauge® OnLine includes built-in & easy-to-use password protection. This way, users with "supervisor" privileges have full access and can create, edit & delete programs and setups. Users with "operator" privileges can only read-in & run programs.

Send and Exchange Data Effortlessly with Other Applications

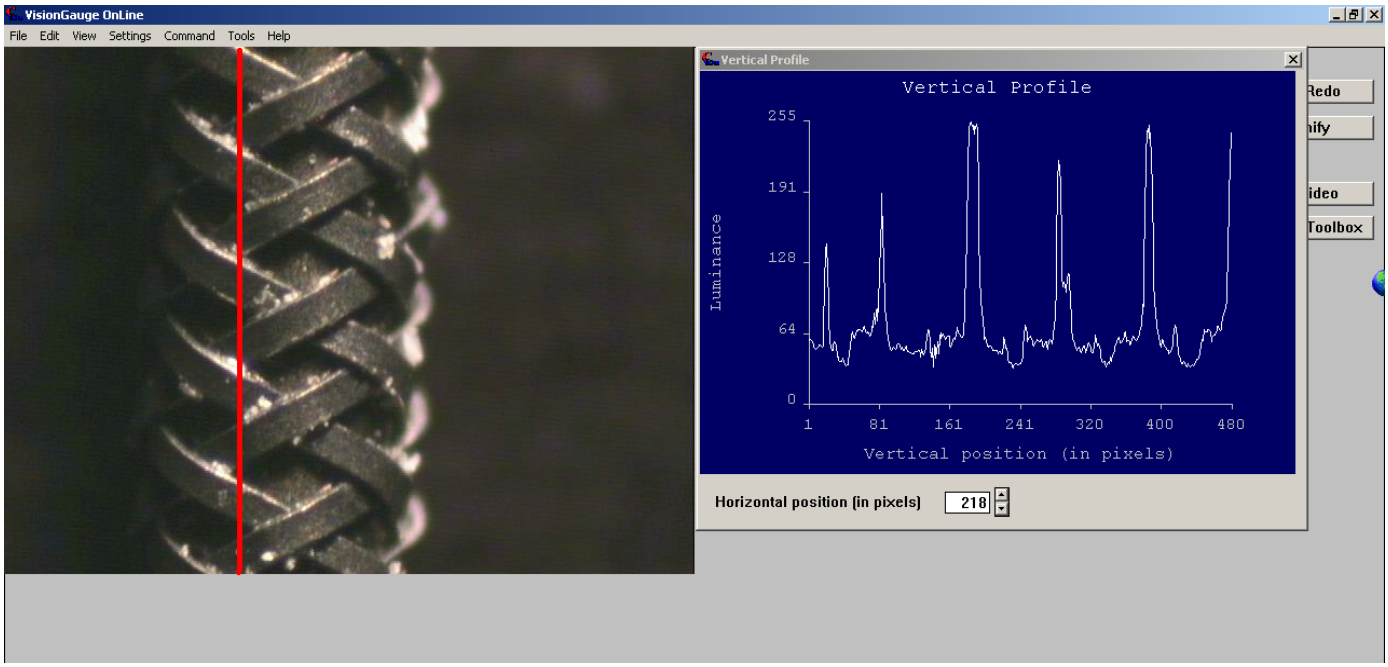
VisionGauge® OnLine fully supports many data exchange mechanisms, including Dynamic Data Exchange (DDE), allowing you to automatically transfer any data into other DDE compliant applications such as Microsoft Excel™ and Access™. With a DDE link, two applications communicate with each other, exchange data effortlessly and work together seamlessly as one.

Powerful Settings Toolbox

- VisionGauge® OnLine's Settings Toolbox allows you to load multiple preset calibrations, illumination and camera commands. You can also specify an evocative label for each of these preset configurations. You can then recall the appropriate settings with the push of a single button.
- The contents of the Settings Toolbox are automatically carried over from session to session.
- The contents of the Settings Toolbox can be password protected.

Wide Range of Tools to Simplify Program Setup

- VisionGauge® OnLine has a wide range of useful tools that make it very easy to setup a program. These tools give you immediate feedback and help you quickly determine optimal parameters
- Horizontal & vertical profile tools display values across the entire image
- VisionGauge® OnLine's pixel viewer displays the full pixel data as you move the mouse pointer across the image
- VisionGuage® OnLine's focus meter tool allows you to objectively determine how well an image is focused
- View the image's edge map



Highly Optimized Tools for Maximum Performance

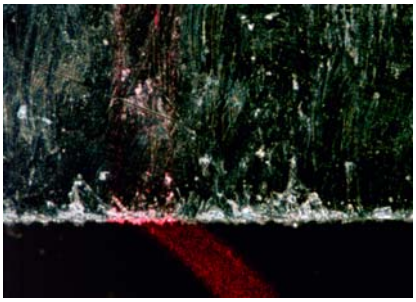
- Highly optimized algorithms for fast execution
- Built-in automatic support for multi-processor computers
- Built-in automatic support for hyper-threading processors
- Built-in automatic support for concurrent execution of certain operations to dramatically increase performance
- VisionGauge® OnLine also has a built-in high-accuracy timer that you can use to monitor and ensure system performance

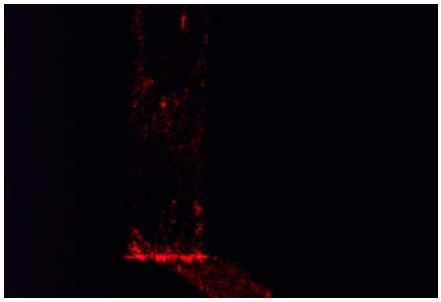
Flexible Program Flow Control

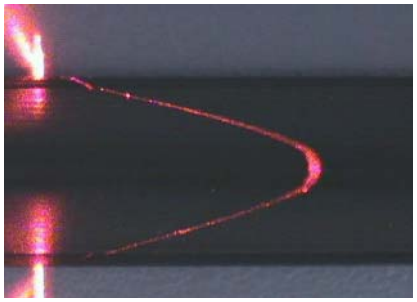
- VisionGauge® OnLine has a flexible and easy-to-use "Jump" tool to control the program flow based on the results of various operations
- Appropriate user-defined messages and instructions can also be displayed to the operator during the program's execution

Integrated High-Accuracy LASER Profiling for Automated 3D Measurements

- VisionGauge® OnLine can carry out very accurate height & depth measurement using its automated 3D LASER profiling tool
- Advanced "profile bell-curve fitting tool" automatically locates the center position of the LASER line, to provide maximum accuracy and repeatability
- Automatically control the LASER (On, Off and Intensity) from within VisionGauge® OnLine
- Many different LASER module configurations are available to suit individual application requirements



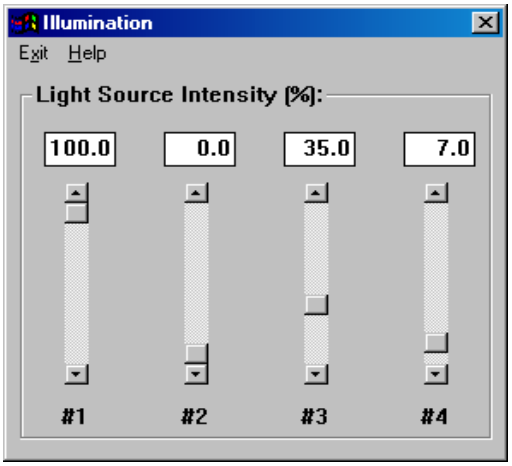




Support for Motorized Zoom and/or Focus, Computer-Controlled Illumination, etc…

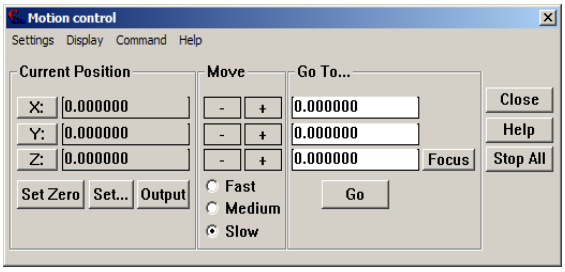
VisionGauge® OnLine's programmable, computer-controlled illumination tool can control up to eight light sources

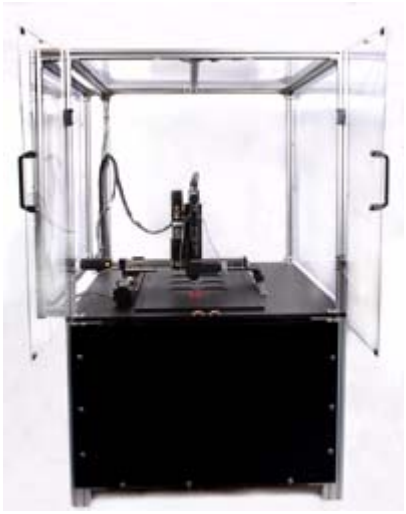
VisionGauge® OnLine supports programmable, motorized optics (i.e. power zoom and focus). VisionGauge® OnLine's motorized optics tool produces extremely accurate & repeatable results and greatly expands the range of applications that can be solved

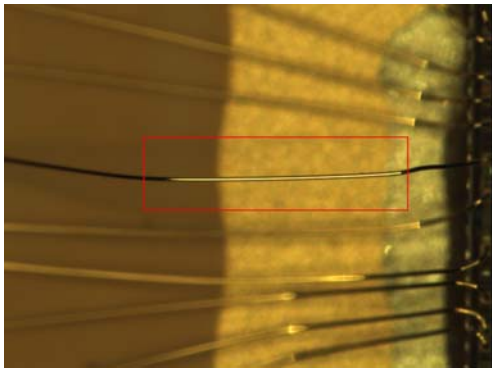


Fully Integrated & Very Flexible Multi-Axis Motor Control

- The Motorized Stage Configuration of VisionGauge® OnLine supports up to 20 axes of motion
- The position of each axis is continuously updated & displayed in real-time
- The Motion can be controlled manually or pre-programmed for fully-automated operation
- You can manually control the motion using either an external 3-speed joystick or VisionGauge® OnLine's on-screen joystick. All of the joystick's parameters (i.e. sensitivity, thresholds, etc…) and its calibration can be set directly from within VisionGauge® OnLine. You can also manually type-in target coordinates and displacements
- All of the commands that you need to control the motion are conveniently grouped in VisionGauge® OnLine's intuitive Motion Toolbox
- VisionGauge® Online is compatible with both single-ended and differential encoders
- VisionGauge® Online supports both stepper and servo motion. VisionGauge® Online is capable of both very accurate and very fast motion across either microscopic distances or very long travels
- VisionGauge® Online is able to operate in both open- or closed-loop mode
- "Zero out" individual axes or all axes at once
- All of the motion parameters (e.g. speed, acceleration, etc…) can be set individually for each axis using a simple and intuitive interface
- Output the current stage coordinates to an external ASCII data file
- Compensate for stage imprecisions using either Linear Error Correction (LEC) or Non-Linear Error Correction (NLEC). VisionGauge® OnLine also supports stage XY perpendicularity correction. Stage calibrations can be password-protected
- VisionGauge® Online's easy-to-use Skew Function allows you to compensate for part misalignment and to setup a coordinate system for each part.
- Motion Convergence criteria can be set individually for each axis.
- Motion operations can be included seamlessly within automatic programs with other inspection and measurement operations
- Along with point-to-point displacements, motion commands can include "scan" operations for automated 100% inspection of large areas
- VisionGauge® OnLine also has an "Offset" operator that allows you to replicate a 1-device inspection program over multiple devices, using a single "offset" instruction
- VisionGauge® OnLine also supports continuous motion devices (e.g. conveyors, etc…)
- VisionGauge® OnLine's powerful auto-focus tool is very fast and accurate. It operates "on the fly" and all of its parameters (speed, etc…) are adjustable. Furthermore, you can specify a region-of-interest for the auto-focus tool, to ensure that the system focuses in on the proper feature.







VisionGauge® OnLine's Auto-Focus tool allows you to focus in on a specific region-of-interest (ROI) within the image

Updates and Support

- We are continuously working to improve and enhance VisionGauge® OnLine. Incremental updates containing new features and enhancements are produced regularly.

- We offer VisionGauge® OnLine users continuing support through our renewable Annual Support and Update Program, which entitles you to receive free updates for a full year as well as unlimited support by telephone, fax, and e-mail. Every new license of VisionGauge® OnLine includes a full year membership to the VisionGauge® OnLine Annual Support and Update Program.

- Members of VisionGauge® OnLine Annual Support and Update Program can also subscribe to the VisionGauge® OnLine Users Newsletter to automatically be notified when new updates become available, and to receive other useful information.

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