

VMS™ and Elements®

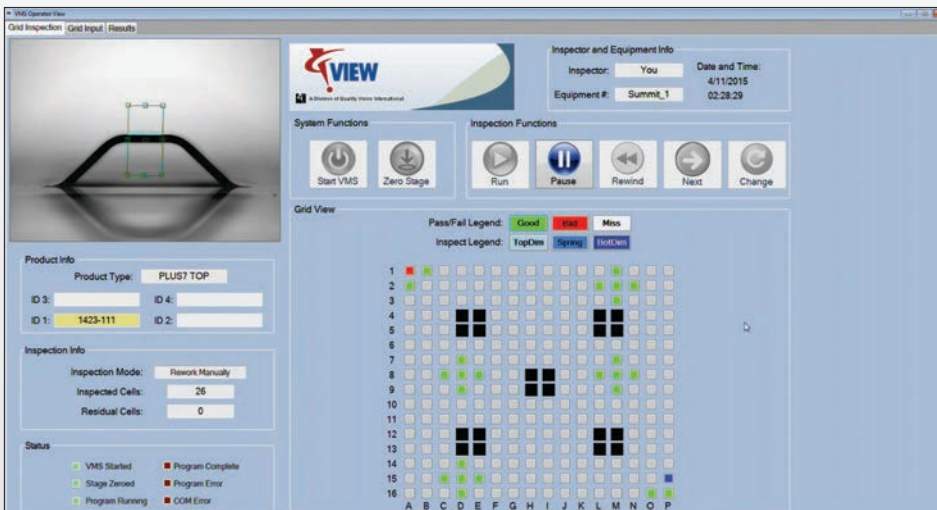
High Performance

The VIEW Software Difference

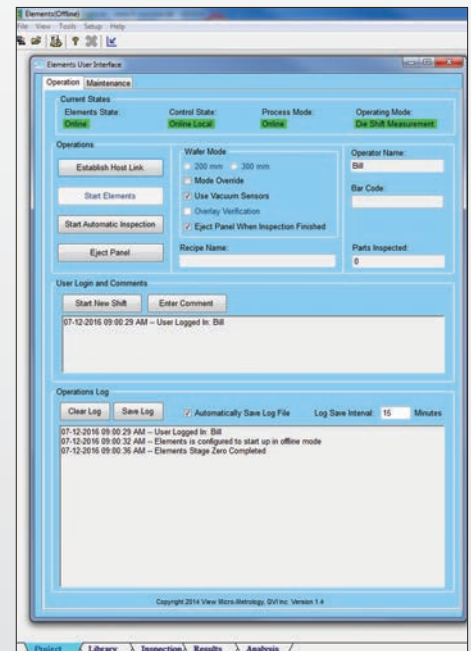
VIEW™ Micro-Metrology solves the most demanding high volume, production-oriented metrology challenges. VIEW's advanced metrology software packages, VMS and Elements, are designed to be adaptable and open environments capable of addressing the individual needs of each measurement application. These proprietary software tools, backed by a staff of developers and metrology specialists, offer you a made-to-measure metrology solution for your manufacturing control requirements.

VMS is a development environment designed to give the user access to powerful and flexible functionality in order to create customizable measurement routines all without sacrificing ease-of-use. This is done by providing an advanced video metrology tool set designed for stand-alone metrology applications as well as integration into high volume production settings. VMS is the clear choice for demanding metrology requirements with complex dimensions in high volume manufacturing.

Elements is designed around a CAD-to-measure paradigm that uses 2D CAD models or placement files to generate inspections and routines with ease. Through the use of the imported CAD data and model-based, rule-centric programming, setting up routines to measure tens of thousands of features is quick and easy. The inspection is then automatically optimized to ensure the measurement data is gathered as quickly as possible. The Elements advantage lies in handling vast numbers of discrete features quickly and efficiently.



Custom User Interface Feature in VMS



External Remote Control User Interface for Elements

Production environments demand simplified user interfaces for ease of use, automation, access control, remote control, and the handling of data. Custom user interfaces infinitely extend the capabilities of VMS and Elements to suit the individual needs of any application.

Powerful Image Processing

VIEW's pioneering work in digital image processing has led to the development of a suite of edge detection and area processing functions that are perfectly suited for automated metrology, feature analysis and flaw detection.

Image Acquisition

Processing at Native Resolution – VIEW image processing uses the full native pixel resolution of the video camera – 5 megapixels or higher. There is no binning or pixel packing and no resultant loss of image resolution.

VIEW Edge offers unparalleled flexibility to identify precise edge locations from within a complex scene. Parameters can be tuned to optimize edge detection based on illumination, feature density, depth of field, contrast, sharpness, and hue.

Area Multi-Focus (AMF) creates a high resolution 3D data set from a normal autofocus pass, offering a high throughput alternative to laser surface scanning.

Extended Depth of Field Image (EDFI) – An extended depth of field image can also be created from a normal autofocus pass. This creates a 2D image from a 3D part where all surfaces throughout the pass are in focus.

Continuous Image Capture (CiC) synchronizes illumination with camera frame acquisition and stage movement to acquire video images while XY stages are in motion

Image Filtering

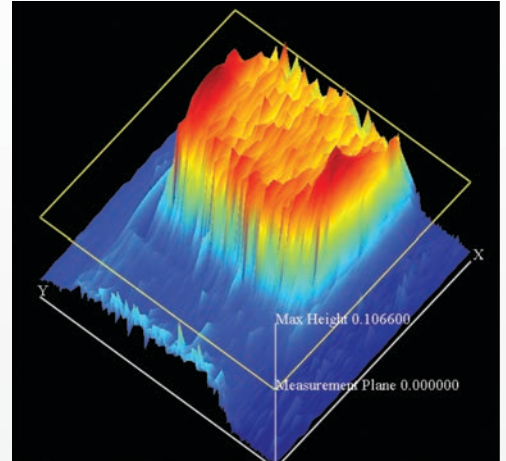
VIEW software offers a variety of image filters for erosion, dilation, smoothing and contrast. Edge tools employ smoothing and outlier removal for reliable and accurate edge processing.

Image Analysis

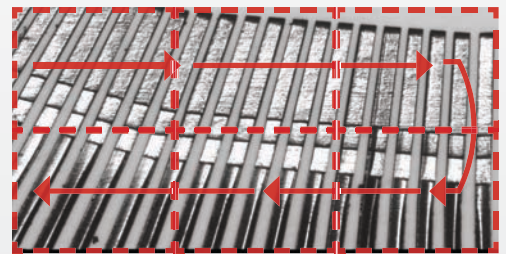
VIEW provides a library of tools for convenient image display and analysis. Native Video® processing capability allows saved images to be measured using the same analysis tools as live images. Remeasure archived part images, or import and measure images from SEMs or other imaging tools.

Defect Detection

VIEW's image processing capability allows for the detection of defects. VIEW software can detect anomalies on a part based on size, shape, or color. These defects can be classified to determine whether a part has failed based on pre-defined criteria. VMS also has the ability to mask images which allows for the comparison of two images. By masking a golden part and comparing the mask to other parts, defects can be readily identified.



Area Multi-Focus (AMF)



Stage motion path for continuous image capture



Defect detection

The VMS Experience

VMS combines the best of both worlds – with a complete tool box for standard feature-based measurements and a dedicated automation scripting environment that allows complete development of custom measurement routines to suit the production requirements.

For the metrologist, the feature rich editing mode provides the functionality and flexibility to design robust, accurate, and repeatable metrology applications for the most complex parts.

For the production engineer, the run-time interface allows creation of custom shop floor controls that display only those options and displays needed by the operators. VIEW's custom run-time user interface blends picture or barcode-based part ID, program launch, automatic data handling, and SPC.

The VMS development environment and simple run-time operation combine uncompromising programmability with performance-optimized ease of operation.

Live Image Window

Measurement Steps Window

```
AlignOffset = 0.0 - round(GrndLocs() Y) mod (skipIntersections * round(spacing) * 1.0)
Align Define 'PC51'
  live_video()
  Measure Point 'Start'
  get_light_settings(L1)
  If lightType Then
    Set Light Values 'L1'
  Else
    Set Light Values 'L1'
  End If
  Pix = get_pix_size()
  Calc 'Lens Point Size' = find(Pix, 'Lenses') * mm * nll
  Calc 'All units are in millimeters' = nll * nll
  get_info_lens(L1.LENS, L1.ZOOM, lensInfo)
  CalcDist = lensInfo(1) * 100
  If useIIRAlign Then
    Measure Point 'AutoFocus'
    Start.Z = AutoFocus.Z
  Else
    End If
  Define Align 'PC5 'PC51' Using Start
  Align Use 'PC51' As Default G0
  If CoPlane = 0 Then
    ' Automatically decide what polarity line finders should use
    finderPos = 1
    finderPos = round(get_image_size(1) / 2 * 0.7)
    findWidth = round(get_image_size(1) * 0.1)
    findLength = round(get_image_size(0) * 0.1)
    Measure Line 'L1'
    Measure Line 'L2'
    Measure Line 'L3'
    Measure Line 'L4'
    If L1.PDS.X < L2.PDS.X Then
      Falling Edge
      Polarity = 1
    Else
      Rising Edge
      Polarity = 0
    End If
  End If
```

Feature Window

Functions & Structure Components

Function Category	Function List
Algorithms	calc_3Dy_pos
Coordinate Transformation	calc_3Dy_pos
String	calc_center
User & General Input/Output	calc_center_x
File Input/Output	calc_center_y
Image Acquisition	calc_ports_volume_X
Image Processing	calc_volume_X
Error Handling	calibrate_lens
Date/Time	change_image_resolution_X
Statistics	chop
Calibration	chop
Laser	chop
Analysis	chop
Stage and Lights	chop
Miscellaneous	chop

2D Edge Finder

Position
Center X: -104 Center Y: 90
Length: 148 Width: 1352
Angle: 270

Pixel Based Finder Real Unit Finder

Edge
Select: 1st Last Strongest
Polarity: Rising Falling Both

Save Points In
Feature:
 Add Replace

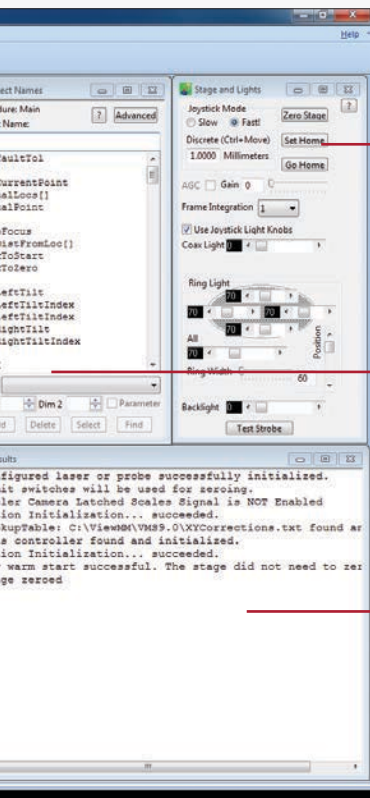
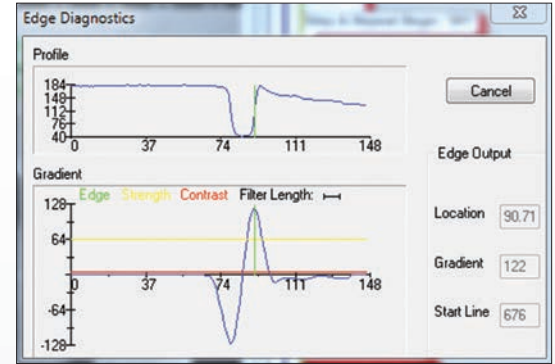
VMS Functions:

VMS provides full access to data structures and utilizes variables, expressions, loops, logic, file I/O, advanced image processing, and custom alignments to solve the world's most demanding metrology applications.

VMS also offers robust exception handling, advanced feature constructions, customized output, and control of process automation tooling via digital I/O.

Advanced Edge Processing Tools

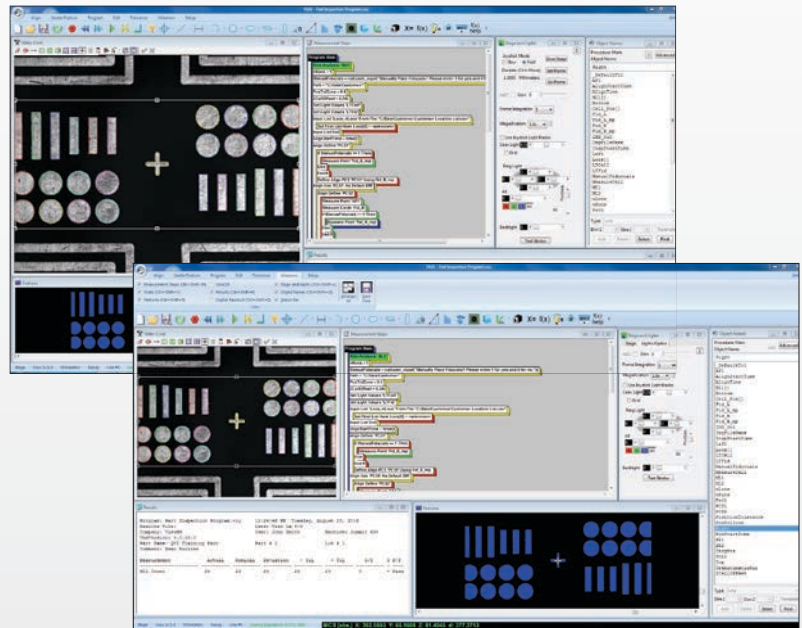
Multi-function tools such as Blob and Centroid enable flaw detection and feature presence or absence checking, in addition to dimensional measurements and feature centering. The Edge Diagnostics window shows detailed information about edge finding, thresholds, and profiles that are useful for optimizing edge performance in all situations.



Control Window

Variables Window

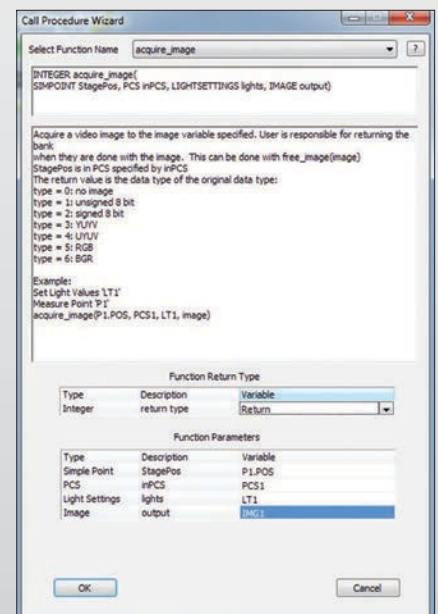
Results Window



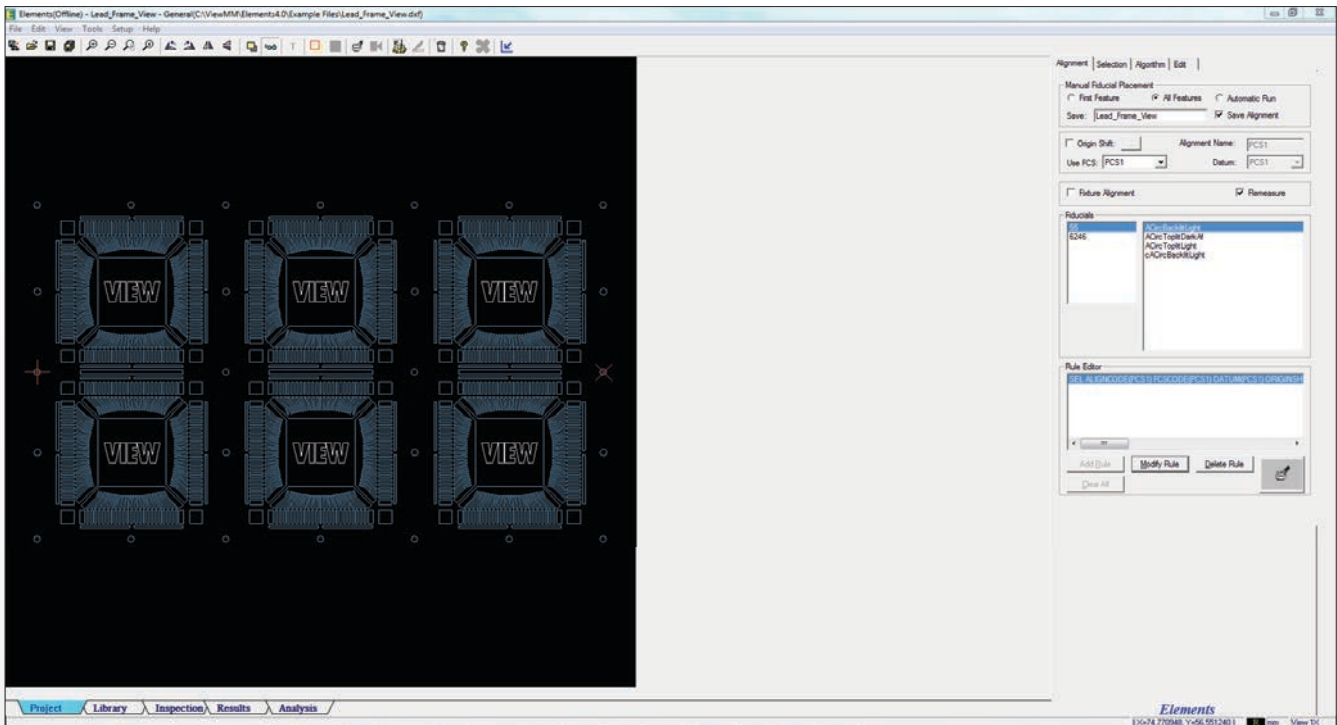
Display windows are configurable

Advanced Functions Made Easy

Built-in wizards take the guesswork out of setting up sub-routines. For example, the Call Procedure Wizard combines the Help text and drop down menus for each of the function's arguments. The Image Acquisition dialog allows the user to quickly acquire images of any type including normal video images, AMF data sets, Extended Depth of Field Images (EDFI), and stitched versions of video and AMF images.



VIEW Elements – Library-Based CAD to Measure Software

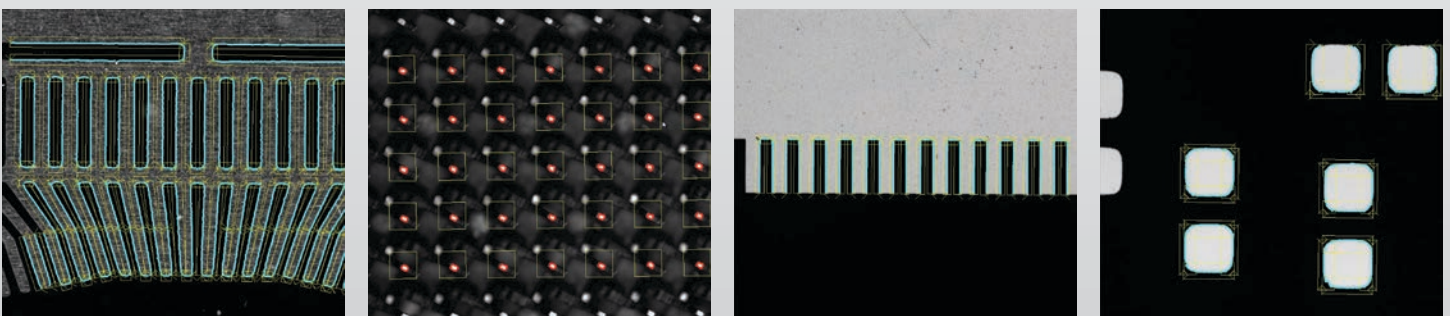


Elements presents a practical alternative to traditional feature-based routines by combining CAD design rules with intelligent selection and inspection rules. Elements is particularly well-suited for applications with a large density of similar features (e.g., wafer gas distribution plates) or for applications with components that have a high variety of placement configurations (e.g., pick-and-place machine calibration, circuit boards, and stencils). With Elements, simply import the CAD model, assign inspection rules to each feature type, and press Inspect.

Elements For Your Measurement Needs

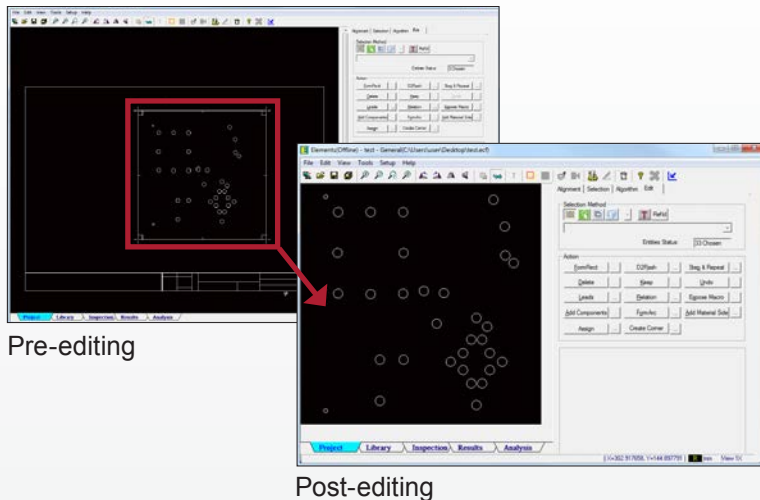
Elements excels at measurement of electronic assemblies, printed circuits, photo and chemically etched patterns, water jet and EDM parts, ultrasonic milled parts, lead-frames, stencils, and component placement.

Elements is most often used for high-speed 2D metrology of densely spaced individual components where part-family design rules can be applied across multiple projects. Once alignment and inspection rules are defined, generating a routine from Elements is virtually instantaneous.



Simple-to-use Features

Elements is smart and fast. It optimizes the inspection sequence, enabling thousands of features to be measured in minutes. Elements is also used to enable CAD-to-measure translation for entire families of similar parts.

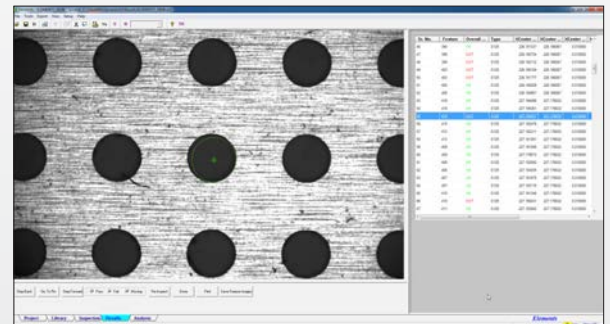


Pre-editing

Post-editing

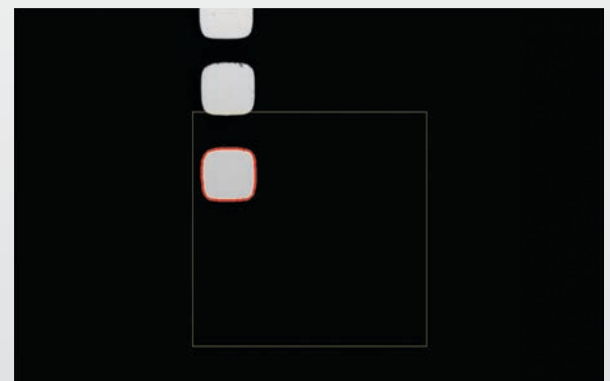
Advanced Review Mode

Advanced review mode in Elements allows the user to visually inspect specific features in real time after a run has been completed. The user is able to sort the results by passed, failed, or missed features and then go to any desired feature. Once at the feature, Elements will display an overlay of the CAD nominal, allowing the user to compare the CAD to the actual feature. This gives the user a simple and intuitive way to check how a feature is out of tolerance or if the feature was obstructed in any way.



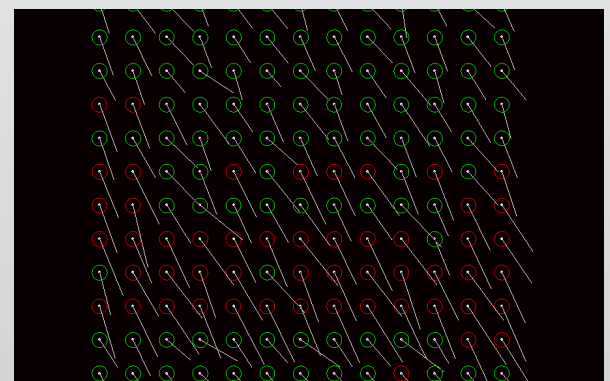
Coarse Alignment Feature

The coarse alignment feature in Elements allows the positioning of finders to be updated in real time for more accurate measurements. Elements will place a larger blob finder over the feature to find its rough location in order to place a more accurate finder such as a circle at that location. In addition to more accurate measurements, this allows for measurement of features that deviate significantly from the CAD file.



Analysis Tools

Elements has built-in Analysis tools that allow you to quickly and easily analyze large data trends. These tools include location scatter plots, histograms of dimensional values, and whisker plots showing deviation from nominal.

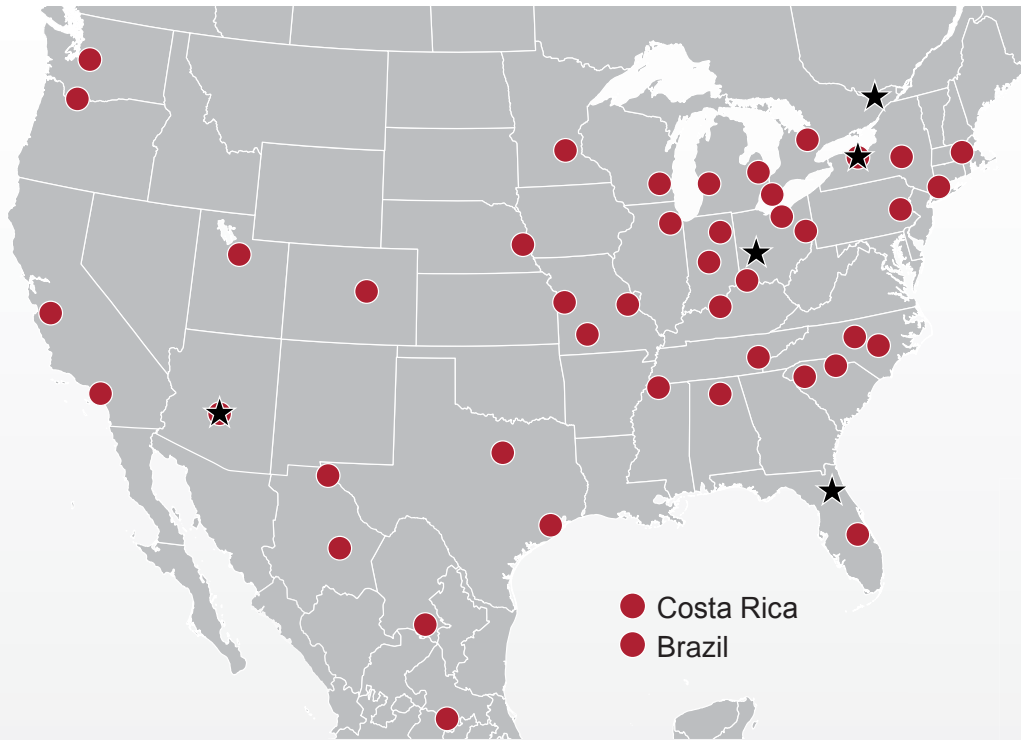


CAD Import and Editing

Elements can import a variety of 2D CAD file formats such as DXF or Gerber as well as CSV location lists as the basis for the measurement routine. Its powerful editing capabilities allow for the editing or removal of extraneous features in the CAD file. This tight integration of CAD into the measurement routine saves time and reduces errors in production settings.

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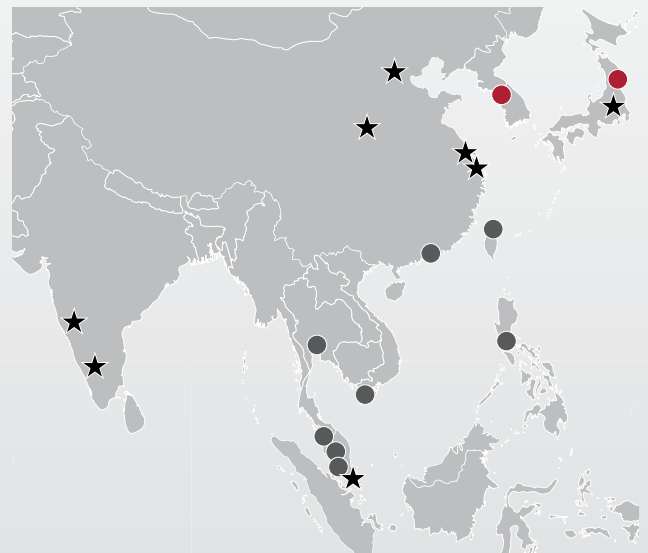
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VIEW, a division of Quality Vision International

1711 W 17th Street • Tempe, Arizona 85281-6229 • USA

Phone: (480) 295-3150 • (800) SOS-VIEW • Fax: (480) 889-9059

sales@viewmm.com • viewmm-service@qvii.com

www.viewmm.com