CNC Vision Measuring System

QUICK VISION

Catalog No. E4317-363

Mitutoyo

Quick Vision Series Evolving Toward Providing True Solutions

With sophisticated edge detection capabilities, an illumination wizard and advanced, user-friendly software the Quick Vision Series satisfies the demand for compactness, high accuracy and high throughput in the field of non-contact dimension measurement.

Continuous Evolution

Mitutoyo has marketed CNC vision measuring machines, including the Quick Vision Series, since the mid-1980s and is proud of its superb delivery record in Japan.

Today, measurement professionals are becoming more and more sophisticated, demanding higher accuracy, compactness and a smaller footprint. Mitutoyo has recently relaunched the Quick Vision Series, which already has a good reputation, to address such demands. The new Quick Vision Series highly integrates the advanced optical, sensing, software and vision measuring technologies which Mitutoyo has developed to help customers solve the challenges they face.

Traceability

Mitutoyo provides calibration services as the only domestic company accredited in three length fields (laser sources, end standards, and line standards).
Also, being the manufacturer of the most comprehensive range of precision measuring instruments available, Mitutoyo provides a number of measuring instruments traceable to national standards, such as coordinate measuring machines, optical measuring instruments, and form measuring instruments, as well as vision measuring machines.

Production of linear scales

Iodine absorption stabilized He-Ne (633 nm) laser for length measurement

Optical

The optical system employed in the Quick Vision Series is based on optical technology that Mitutoyo has accumulated over many years.
This is a practically ideal optical system where the image is flat across the entire view field with little flare.

Design and production of lenses

Software

Knowledge-Based Software to Control Quick Vision

QVPAK is a constantly evolving software package.
In combination with various other applications, QVPAK delivers multi-functional analysis along with high-speed processing and simple operation.

Kawasaki Research and Development Center

Laser Beam Safety Precautions

This machine uses a low-power Laser beam which conforms to the provisions of CLASS 2 (visible light) of JIS C6802 "Safety of laser products" for measurement. The CLASS 2 warning/ description label as shown at right is attached to the main unit.

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QUICK VISION

Lineup

	CCD camera		Variable magnification unit			Illumination unit		Coaxial laser auto focus LAF
	Monochrome	Color	Power turret 1X-2X-4X	Power turret 1X-2X-6X	Power zoom	High-brightness LED	Halogen	
QV-ELF PT/PRO	●			●			●*	○
QV-APEX PRO	●			●		●		○
QV-APEX PRO2	●				●		●	
QV-APEX PRO3		●		●			●	○
QV-HYPER PRO	●			●		●		○
QV-STREAM PLUS PRO5	●		●			●		○
QV-STREAM PLUS PRO	●			●		●		○

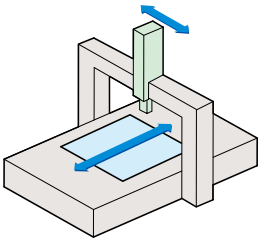
● : Standard function ○ : Factory-set option * : White LEDs are used for the programmable ring light (PRL) in PRO models.
Contact Mitutoyo if a combination other than the above is desired.

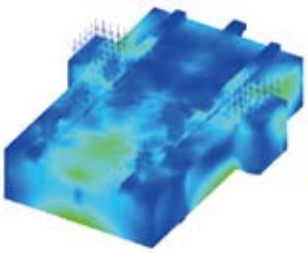
Body Structure Enables High Precision
New Optical System and High-Brightness Illumination

Fixed Bridge and Table Configuration

The bridge and table guideways forming the X and Y axes are connected by a rigid body highly resistant to geometrical deformation. This means the accuracy of each axis is largely unaffected by the other's movement, making this configuration ideal for high-precision machinery.

Structural design is optimized through the use of finite element method (FEM) analysis. This results in maximum rigidity for minimum weight, minimizing deformations due to loading and guaranteeing excellent geometrical accuracy at all times.





FEM analysis helps ensure maximum stiffness in the body structure

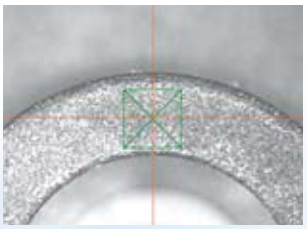
High Performance Multi-Auto Focus

- **Improved accuracy**

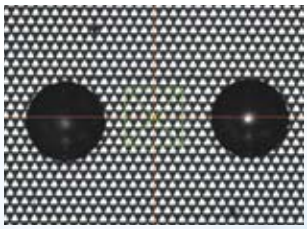
  Z-axis measuring accuracy E_{1Z} has been significantly improved by the image auto focus:
  · **QV-APEX** / **QV-STREAM PLUS** : (1.5+4L/1000)µm
  · **QV-HYPER** : (1.5+2L/1000)µm

- **Image multi-auto focus**

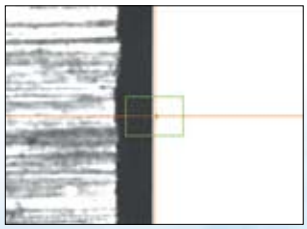
  The optimal focus can be selected for each surface texture and measured feature, realizing high reproducibility and reliable edge detection.



Surface focus
The height of an area of arbitrary size on the workpiece surface can be measured via image focus. This system has the advantage that measurements can be taken from resin-molded surfaces and machined surfaces with little effect due to surface roughness.



Pattern focus
Low-contrast transparent objects and mirrored surfaces can be brought into focus by the use of pattern focus, which projects a pattern onto the object surface. It is effective for measuring the height of resists on a printed circuit board or polyimide surfaces.

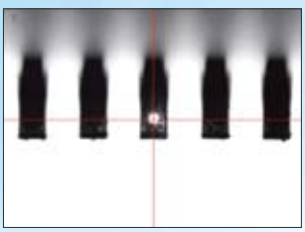


Edge focus
This vision focus (edge focus) system assures focusing even on edges.

- **Laser auto focus (LAF)**

  Mitutoyo offers models featuring the LAF system which enables high-speed focusing. This system allows focusing at 20 mm/second and thus is optimal for high-speed height measurement. Measurement efficiency is greatly increased when there are many measurement points such as when measuring the heights of connector terminals, for example.

  *Factory-installed option



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New Optical System Improves Brightness and Resolution

The optical system has stepped up a level, realizing clearer vision and higher edge detection capability.

- **Finer resolution**

  The new design has increased the numerical aperture (NA) of the standard 2.5X lens from a conventional 0.14 to an amazing 0.21, greatly improving brightness and resolution in the process. The high NA and low distortion ensures high accuracy on the screen. In addition, the working distance has increased from the conventional 34 mm to 40.6 mm, thereby improving usability as well.

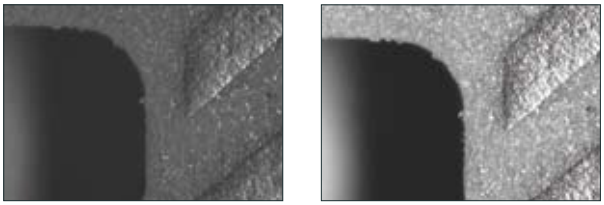
- **Higher brightness**

  The LED illumination models are equipped with the latest high-brightness LED elements, not only improving the optical system but also increasing the brightness by practically doubling the illumination of the CCD.

- **Reduced flare**

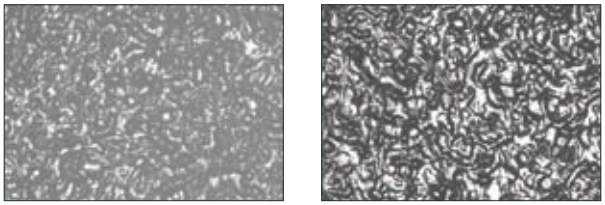
  Flare has been significantly reduced by redesigning the optical system of the objective lens and the variable magnification unit (PPT).

Ceramic packages



Conventional QV　　**New QV**

Resin surfaces



Conventional QV　　**New QV**

Rich Lineup Covering a Broad Measuring Range

The QV Series can satisfy various needs with a diverse lineup which includes a compact model, a large-range model, and high-accuracy specification models.

QV-ELF

202 size : 200 × 250 × 100 mm

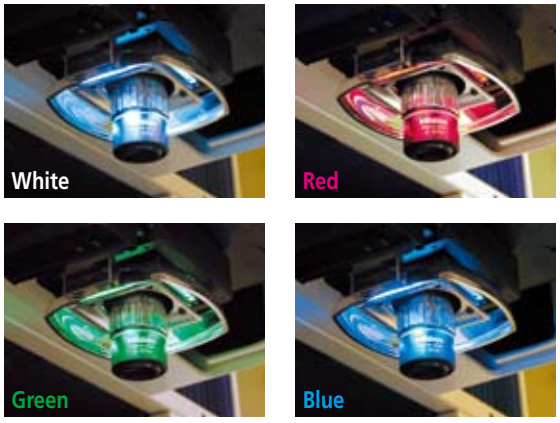
QV-APEX/QV-HYPER/QV-STREAM PLUS

302 size : 300 × 200 × 200 mm
404 size : 400 × 400 × 250 mm
606 size : 600 × 650 × 250 mm

Advanced Illumination and Wide-Range Variable Magnification Units Support Reliable Edge Detection and Automatic Measurement

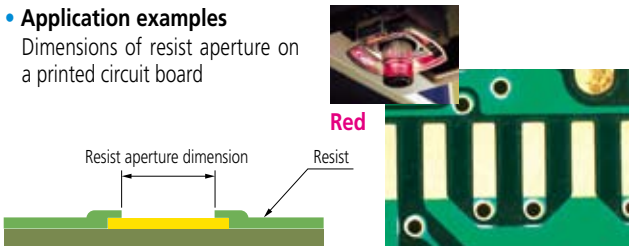
RGB Color LED Illumination Increases Throughput

Changing illumination color among red, green, blue, and white (synthesized) allows detection of edges which could not be measured with conventional white light.

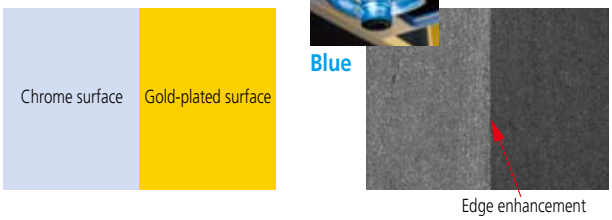


- **Application examples**

Dimensions of resist aperture on a printed circuit board



Boundary between chrome and gold-plated surfaces

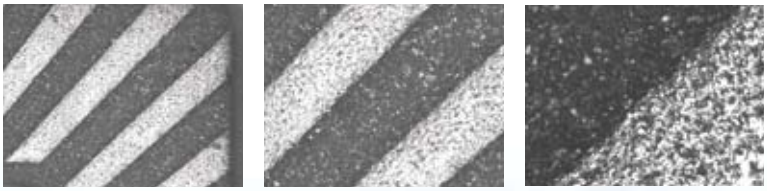


Variable Magnification Unit Covers a Wide Range

- **Programmable power turret (PPT) specifications**
  PRO/PRO3/PRO5 models

The tube lens allows provides three magnification levels with the same objective lens.
Replacing objective lenses allows a wide range of magnification to support a variety of measurements.

Images observed with the objective lens QV-HR2.5 and PRO



1X tube lens
View field: 2.5 × 1.88 mm

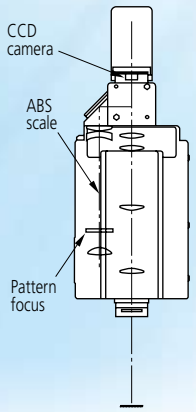
2X tube lens
View field: 1.25 × 0.94 mm

6X tube lens
View field: 0.41 × 0.31 mm

- **Programmable power zoom specifications**
  PRO2 model

PRO2 is equipped with a 15-step, 15X programmable power zoom lens. Feedback of the lens position via an ABS scale allows high magnification reproducibility from 16X to 240X. The minimum magnification of 16X, which provides a widefield view of an entire object, is ideal when operability takes priority.

16X 40X 112X 240X



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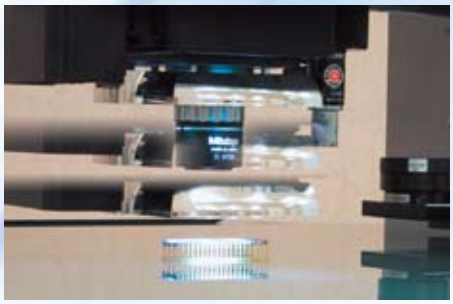
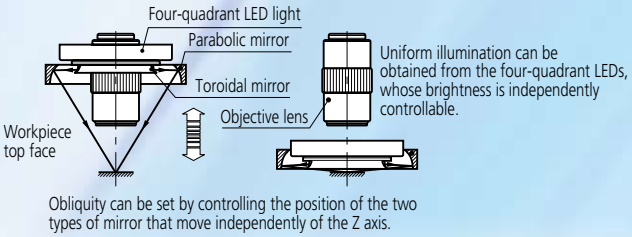
Programmable Ring Light (PRL)

Fine control of obliquity and direction provides illumination optimal for measurement. Obliquity* can be arbitrarily set in the range from 30° to 80°. This type of illumination is effective for enhancing the edge of inclined surfaces or very small steps.

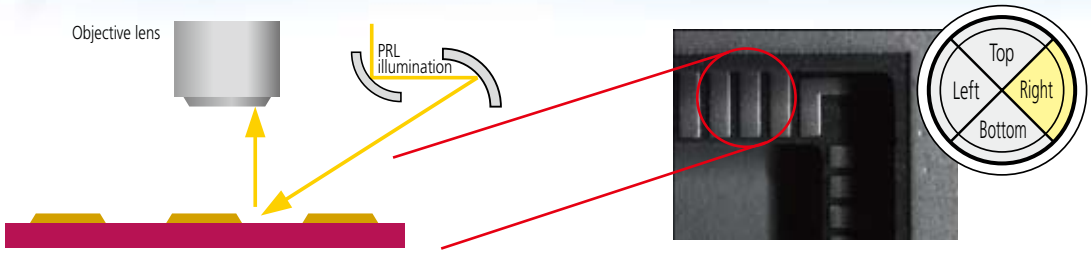
Illumination can be controlled independently in every direction, back and forth, right and left. Measurement with edge enhancement is possible by forming a shadow by lighting from only one direction.

*35° to 80° in the case of QV-STREAM PLUS





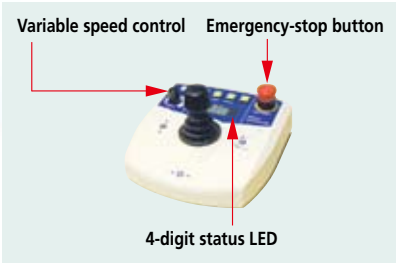
Obliquity can be set by controlling the position of the two types of mirror that move independently of the Z axis.



Measuring the top and bottom widths of metallization patterns on an IC package

Multi-function Control Box

This multi-function control box has been developed for maximum ease of use.



Compact Vision Measuring Machine
Quick Vision ELF

QV-ELF

QV-ELF202PRO

QV-ELF

- Controller-integrated compact design. Light and small-footprint characteristics allow installation in an office.
- The edge detection capability as well as the functions and performance of measurement software QVPAK are as powerful as the higher model QV-APEX, surpassing the conventional image of a compact model.
- Many functions in a small body. The PT machine equipped with a programmable power turret (PPT) and the PRO machine equipped with the programmable ring light (PRL) are also available.
  The laser auto focus (LAF) option can also be selected.

Specifications

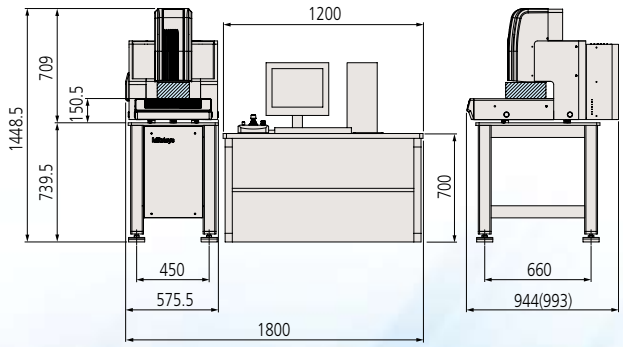
Model No.		QV-ELF202	
Optical system		PT machine	PRO machine
Code No.	Standard model	363-101	363-102
	LAF model	363-103	363-104
Measuring range (X x Y x Z)		200 x 250 x 100mm	
Variable magnification unit		PPT 6X	
Resolution / scale unit		0.1µm / reflective-type linear encoder	
CCD camera		B & W	
Illumination unit	Vertical reflected / contour	Halogen	
	Ring	Halogen	—
	PRL	—	White LED
Measuring accuracy	E1X / Y axes	(2+3L / 1000) µm	
	E1Z axis	(4+5L / 1000) µm	
LAF repeatability*1		σ : 0.4µm	
Stage glass size		269 x 311mm	
Maximum stage loading		10kg	
Dimensions of main unit		576 x 944 (993) *2 x 1449mm	
Mass of main unit (including mounting stand)		195kg	

*1: Applicable to the LAF model only. *2: The dimensions in parentheses are for the LAF model.
Remarks: The measuring accuracy is evaluated according to a Mitutoyo inspection method. "L" indicates an arbitrary measuring length (unit: mm).
The accuracy is guaranteed under the following optical conditions: (QV-HR2.5X or QV-SL2.5X) + tube lens 1X.

Note: This machine incorporates a startup system (relocation detection system), which disables operation when an unexpected vibration is applied or the machine is relocated.
Be sure to contact your nearest Mitutoyo prior to relocating this machine after initial installation.

External Dimensions

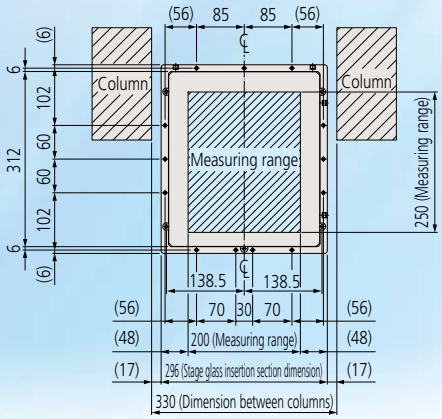
Unit: mm



The dimensions in parentheses are for the LAF model.

Dimensions of Measuring Table

Unit: mm



QV-APEX

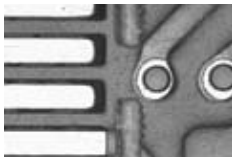
QV-APEX302PRO with 20-inch LCD monitor.

QV-APEX

- QV series standard model ranging in size from compact to large.
- The PRO machine is equipped with RGB color LED illumination, a programmable power turret (PPT) and a programmable ring light (PRL) as standard. The laser auto focus (LAF) option is also available.
- The lineup, including the PRO2 zooming machine and PRO3 with a color CCD, can satisfy a wide range of needs.
- The traverse speed in the X and Y axes reaches 400 mm/second in the QV-APEX404/606. This greatly contributes to throughput improvement, particularly for workpieces that involve a large range of travel.

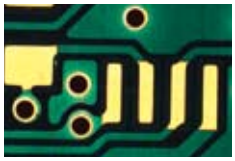
Images observed with the PRO model

Pressed part

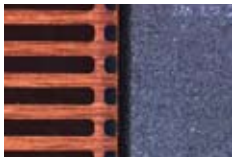


Printed circuit board

Vision observed with the PRO3 model equipped with the color CCD



Printed circuit board



Lead of QFP package

Specifications

Model No.		QV-APEX302			QV-APEX404			QV-APEX606		
Optical system		PRO	PRO2	PRO3	PRO	PRO2	PRO3	PRO	PRO2	PRO3
Code No.	Standard model	363-111	363-112	363-113	363-131	363-132	363-133	363-151	363-152	363-153
	LAF model	363-117	—	—*1	363-137	—	—*1	363-157	—	—*1
Measuring range (X × Y × Z)		300 × 200 × 200mm			400 × 400 × 250mm			600 × 650 × 250mm		
Variable magnification unit		PPT 6X	Zoom	PPT 6X	PPT 6X	Zoom	PPT 6X	PPT 6X	Zoom	PPT 6X
Resolution / scale unit		0.1µm / reflective-type linear encoder								
CCD camera		B & W		3CCD color	B & W		3CCD color	B & W		3CCD color
Illumination unit	Vertical reflected	Color LED	Halogen		Color LED	Halogen		Color LED	Halogen	
	Contour	White LED	Halogen		White LED	Halogen		White LED	Halogen	
	Ring	—	—*1	—	—	—*1	—	—	—*1	—
	PRL	Color LED	Halogen		Color LED	Halogen		Color LED	Halogen	
Measuring accuracy	E_1X/Y axes	(1.5+3L / 1000) µm								
	E_1Z axis	PRO and PRO3: (1.5+4L / 1000) µm PRO2: (4+5L / 1000) µm								
	E_2X-Y plane	PRO and PRO3: (2+4L / 1000) µm PRO2: (2.5+4L / 1000) µm								
LAF repeatability*2		σ : 0.4µm	—	—*1	σ : 0.4µm	—	—*1	σ : 0.4µm	—	—*1
Stage glass size		399 × 271mm			493 × 551mm			697 × 758mm		
Maximum stage loading		20kg			40kg			50kg		
Dimensions of main unit		859 × 951 × 1609mm			1027 × 1407 × 1778mm			1309 × 1985 × 1794mm		
Mass of main unit (including mounting stand)		360kg			579kg			1450kg		

*1: On special order *2: Applicable to the LAF model only.

Remark: Halogen illumination is available for the PRO machine, on special order. The measuring accuracy is evaluated according to a Mitutoyo inspection method. "L" indicates an arbitrary measuring length (unit: mm). Accuracy is guaranteed under the following optical conditions: (QV-HR2.5X or QV-SL2.5X) + tube lens 1X for PRO and PRO3 and 3X for PRO2.

Note: This machine incorporates a startup system (relocation detection system), which disables operation when an unexpected vibration is applied or the machine is relocated. Be sure to contact your nearest Mitutoyo prior to relocating this machine after initial installation.

High Accuracy Vision Measuring Machine
Quick Vision

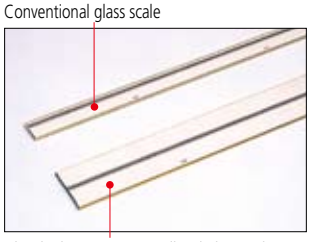
QV-HYPER

QV-HYPER404PRO with 20-inch LCD monitor.

QV-HYPER

- A choice of measuring range similar to the QV-APEX combined with high accuracy means that a machine ideally suited to the workpiece can be selected.
- QV-HYPER is equipped with RGB color LED illumination, a programmable power turret (PPT), and a programmable ring light (PRL) as standard.
  The laser auto focus (LAF) option is also available.
- A low-expansion glass scale with a linear thermal expansion coefficient of only (0 ±0.02) × 10^{-6}/K helps provide the exceptional accuracy specification.
  Errors due to temperature fluctuation have been minimized.
  The ultra-precise vision measuring machine ULTRA QV and ultra-high accuracy coordinate measuring machine LEGEX are also equipped with this low-expansion glass scale.

Conventional glass scale



Ultra-high accuracy crystallized glass scale

Specifications

Model No.		QV-HYPER302	QV-HYPER404	QV-HYPER606
Optical system		PRO		
Code No.	Standard model	363-114	363-134	363-154
	LAF model	363-118	363-138	363-158
Measuring range (X × Y × Z)		300 × 200 × 200mm	400 × 400 × 250mm	600 × 650 × 250mm
Variable magnification unit		PPT 6X		
Resolution / scale unit		0.02µm / reflective-type linear encoder*1		
CCD camera		B & W		
Measuring accuracy	E_1X / Y axes	(0.8+2L / 1000) µm		
	E_1Z axis	(1.5+2L / 1000) µm		
	E_2X-Y plane	(1.4+3L / 1000) µm		
LAF repeatability*2		σ : 0.4µm		
Mass of main unit (including mounting stand)		15kg	30kg	40kg

*1: Low-expansion glass scale: (0 ±0.02) × 10^{-6}/K
*2: Applicable to the LAF model only.

Remark: Halogen illumination is available for the PRO machine, on special order. The measuring accuracy is evaluated according to a Mitutoyo inspection method. For other specifications, refer to the QV-APEX specifications.
The accuracy is guaranteed under the following optical conditions: (QV-HR2.5X or QV-SL2.5X) + tube lens 1X.

Note: This machine incorporates a startup system (relocation detection system), which disables operation when an unexpected vibration is applied or the machine is relocated. Be sure to contact your nearest Mitutoyo prior to relocating this machine after initial installation.

Mitutoyo

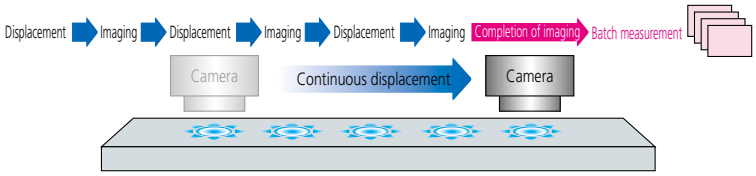
Non-Stop Vision Measuring Machine
Quick Vision

QV-STREAM PLUS

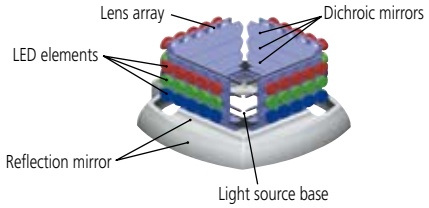
QV-STREAM PLUS606PRO.

QV-STREAM PLUS

- A choice of measuring range similar to the QV-APEX means that a machine suited to the workpiece can be selected.
- An innovative method of acquiring images without stopping the stage has tremendously improved throughput. Conventional vision measuring machines repeat the displacement, stop, measurement and displacement cycle, which is a fundamental limitation on productivity. In contrast, the QV-STREAM PLUS realizes non-stop vision measurement (stream mode) by eliminating acceleration/deceleration and stop time, consequently reducing the overall measurement time needed.



- Mitutoyo has developed a strobe illumination method using high-brightness LEDs to realize non-stop vision measurement. The LED-strobe is turned on for such a short time when the target area reaches the measurement point that the image does not blur. This highly efficient method also uses the lens array to enhance the directional characteristics of the illumination.



Specifications

Model No.		QV-STREAM PLUS302		QV-STREAM PLUS404		QV-STREAM PLUS606	
Optical system		PRO5	PRO	PRO5	PRO	PRO5	PRO
Code No.	Standard model	363-115	363-116	363-135	363-136	363-155	363-156
	LAF model	363-119	363-120	363-139	363-140	363-159	363-160
Measuring range (X × Y × Z)		300 × 200 × 200mm		400 × 400 × 250mm		600 × 650 × 250mm	
Variable magnification unit		PPT 4X	PPT 6X	PPT 4X	PPT 6X	PPT 4X	PPT 6X
Resolution / scale unit		0.1µm / reflective-type linear encoder					
CCD camera		B & W					
Illumination unit*1	Vertical reflected	High-brightness LEDs (RGB and white during constant illumination and Cyan during strobe illumination)					
	Contour*2	High-brightness LED blue					
	PRL	High-brightness LEDs (RGB and white during constant illumination and Cyan during strobe illumination)					
Measuring accuracy	E_1X / Y axes	(1.5+3L/1000) µm					
	E_1Z axis	(1.5+4L/1000) µm					
	E_2X-Y plane	(2+4L/1000) µm					
LAF repeatability*3		σ : 0.4µm					

*1: Only one of the illumination functions (vertical reflected, contour or PRL) can be set in the STREAM mode. If the PRL illumination is selected, either all lights (four directions) or one direction can be used.
*2: The Z-axis measuring range is 50 mm when the contour illumination is used in the STREAM mode.
*3: Applicable to the LAF model only.

Remark: The measurement accuracy is evaluated according to a Mitutoyo inspection method. For other specifications, refer to the QV-APEX specifications.
Accuracy is guaranteed under the following optical conditions: (QV-HR2.5X or QV-SL2.5X) + tube lens 1X.

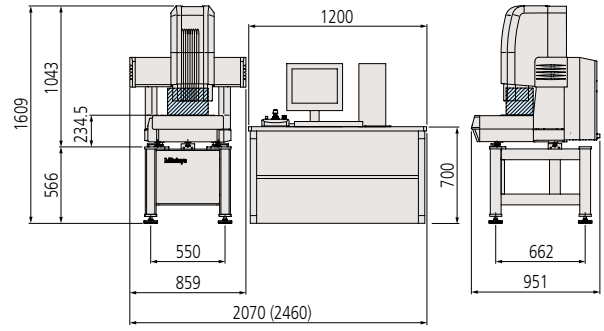
Note: This machine incorporates a startup system (relocation detection system), which disables operation when an unexpected vibration is applied or the machine is relocated. Be sure to contact your nearest Mitutoyo prior to relocating this machine after initial installation.

External Dimensions and Dimensions of Measuring Tables

External Dimensions

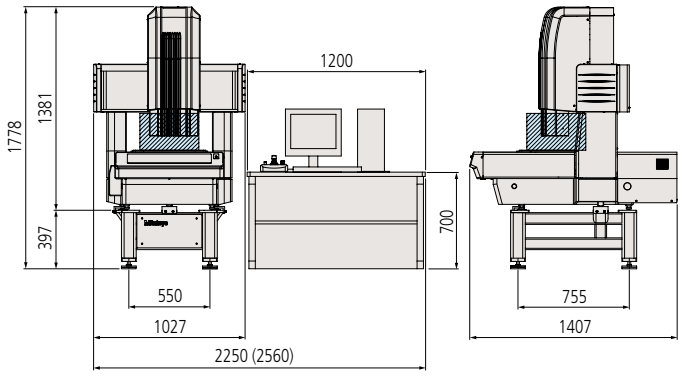
Unit: mm

QV-302



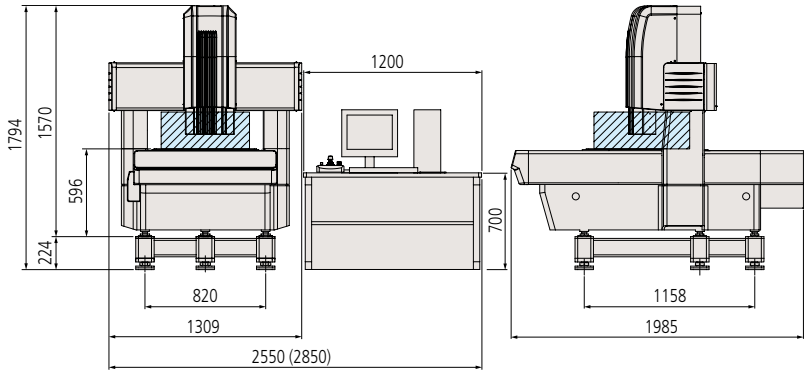
The dimensions in parentheses are for PRO2, PRO3, and QV-STREAM PLUS machines.

QV-404



The dimensions in parentheses are for PRO2, PRO3, and QV-STREAM PLUS machines.

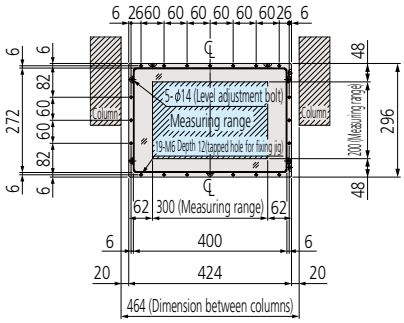
QV-606

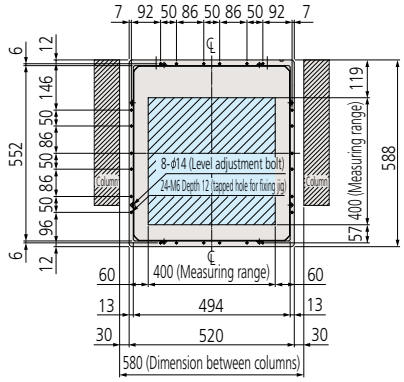


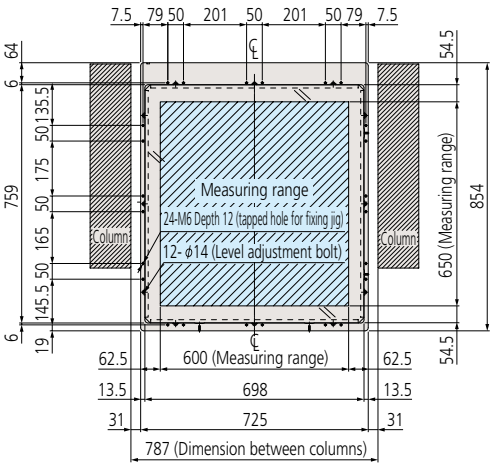
The dimensions in parentheses are for PRO2, PRO3, and QV-STREAM PLUS machines.

Dimensions of Measuring Table

Unit: mm







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Optional Hardware

QV Objective Lenses

Objective lens	Code No.	PPT magnification	Monitor magnification	View field (mm)	Working distance*1 (mm)
QV-SL0.5X*2	02AKT199	1X	16X	12.54×9.4	30.5
		2X	32X	6.27×4.7	
		6X (4X)	96X (64X)	2.09×1.56 (3.13×2.35)	
QV-1X	02ALA400	1X	32X	6.27×4.7	34
		2X	64X	3.13×2.35	
QV-SL1X	02ALA150	6X (4X)	192X (128X)	1.04×0.78 (1.56×1.17)	52.5
QV-HR2.5X	02AKT300	1X	80X	2.5×1.88	40.6
		2X	160X	1.25×0.94	
QV-SL2.5X	02ALA170	6X (4X)	480X (320X)	0.41×0.31 (0.62×0.47)	60
QV-5X	02ALA420	1X	160X	1.25×0.94	33.5
		2X	320X	0.62×0.47	
		6X (4X)	960X (640X)	0.20×0.15 (0.31×0.23)	
QV-10X*2	02ALG010	1X	320X	0.62×0.47	30.5
		2X	640X	0.31×0.23	
		6X (4X)	1920X (1280X)	0.10×0.07 (0.15×0.11)	
QV-25X*2*3	02ALG020	1X	800X	0.25×0.18	13
		2X	1600X	0.12×0.09	
		6X (4X)	4800X (3200X)	0.04×0.03 (0.06×0.04)	

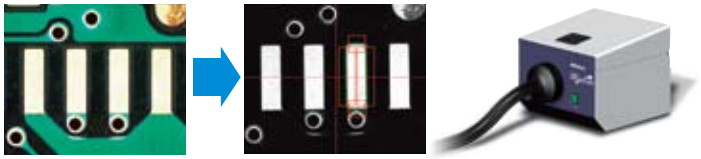
Clear high-performance QV objective lenses

The list on the left is for PRO machines. The monitor magnification assumes 15-inch LCD specifications. The values in parentheses are for the QV-STREAM PLUS PRO5 model.

*1: The PRL illumination area is a function of the working distance, depending on the position of the PRL.
*2: Insufficient illumination and other restrictions may apply to some workpieces.
*3: The usable position for PRL is restricted.

RGB Color Filtering Unit

The color filtering function can be added to the vertical reflected illumination or programmable ring light in Quick Vision models that use a halogen light source. This function enhances the visibility of low-reflection surfaces on colored workpieces, facilitating edge detection. This function can also be retrofitted to a conventional Quick Vision. In addition, a yellow filter enables vision measurement in the yellow light region, which provides high sensitivity.



Red filter used

Calibration Chart

A calibration chart is used to compensate for the pixel size of the CCD chip, autofocus accuracy and the optical axis offset at each magnification of the variable magnification unit (PPT).

QV Index Head

Item	Specifications
Workpiece size	ø140mm (Max)
Workpiece mass	2kg (Max)
Resolution	0.1°
Rotational positioning accuracy	±0.5°
Rotational speed	10 rpm
Power supply	AC100V 80W

Temperature Compensation

QV-APEX/QV-HYPER/QV-STREAM PLUS

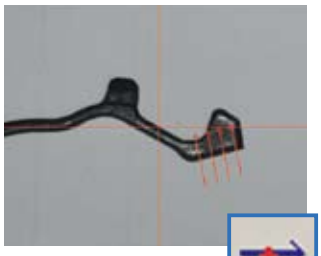
Even if measurements are made at a non-standard ambient temperature, 23°C say, the output data is fully compensated to give the same result as if measurements were made at the standard reference temperature of 20°C. Compensation is enabled by inputting the linear thermal expansion coefficient of the workpiece and by taking readings from temperature sensors located on each axis scale and on the workpiece itself.

Software

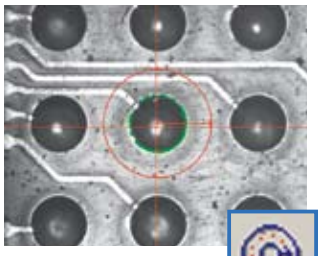
More Powerful, Friendly Software: QVPAK Version 7 (Compatible with Windows XP)

Multifunction

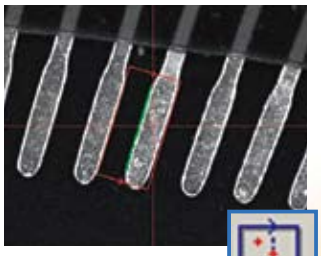
Ease of Operation



One-Click Point Tool
This is a basic tool for capturing one point.

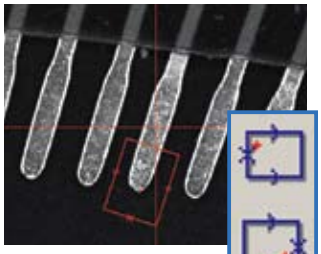


One-Click Circle Tool
This tool is appropriate for capturing a circle.

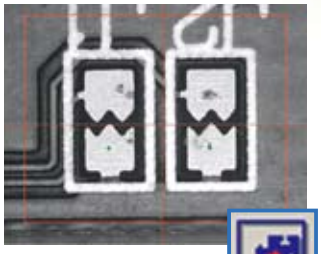


One-Click Line Tool
This tool is appropriate for capturing a line.

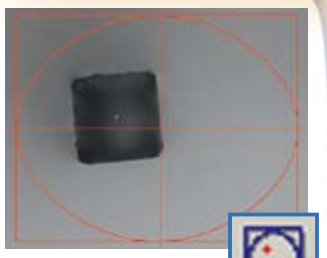
One-Click Arc Tool
This tool is appropriate for capturing an arc and the radius of a corner.



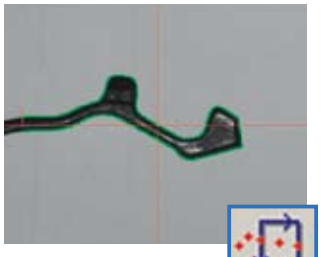
Maximum/Minimum Tool
This tool evaluates the maximum or minimum point within the range.



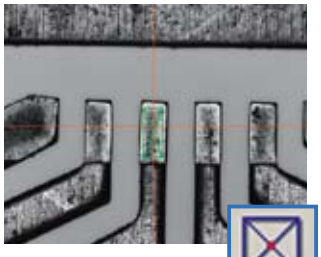
Pattern Search
This tool captures the position of a pattern that has been registered beforehand. It is optimal for positioning the alignment mark.



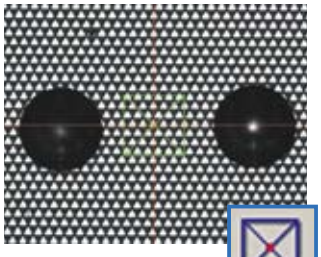
Area Centroid Tool
This tool evaluates the position of a feature's centroid. It is appropriate for positioning a different feature.



Auto Trace Tool
This is a form measuring tool that can autonomously track an unknown feature.



Surface Focus Tool
This is a general vision focusing tool.



Pattern Focus Tool
This focusing tool is optimal for transparent or low-contrast surfaces.

Edge Focus Tool
This is a tool for focusing on a beveled edge.

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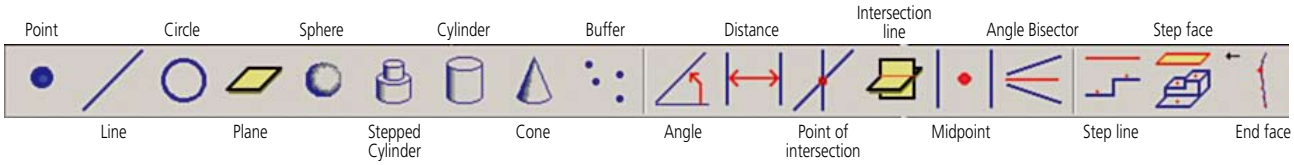
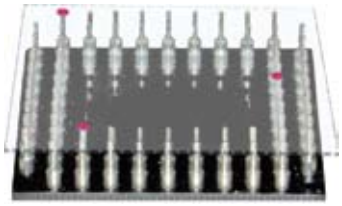
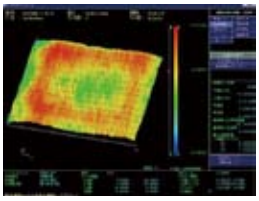
the standard in world metrology software
VISION

Calculation Functions



Seating plane measurement


Generation image on seating surface


MSHAPE-QV output display

Surface measurement

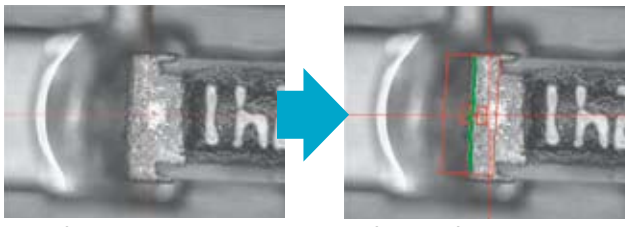
A seating surface (three-point combined surface) can be selected as a datum surface. The result of flatness based on three-point combination is regarded as a coplanarity value.

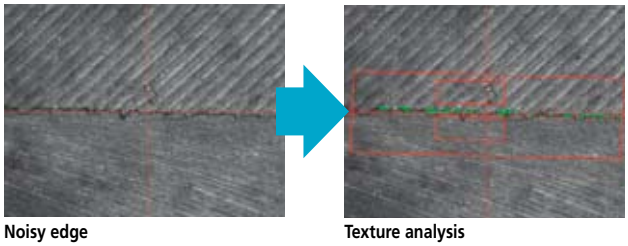
High-speed Processing

Application

Increase in Edge Detection Capability

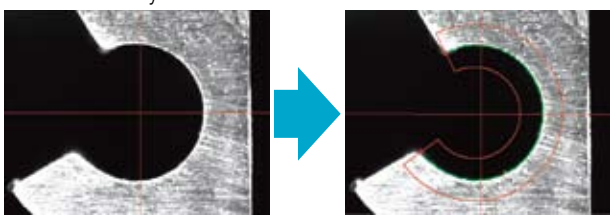
The capability of detecting a noisy edge has increased by analyzing modest changes in brightness and differences in texture on the target surface.


Noisy edge — Brightness analysis


Noisy edge — Texture analysis

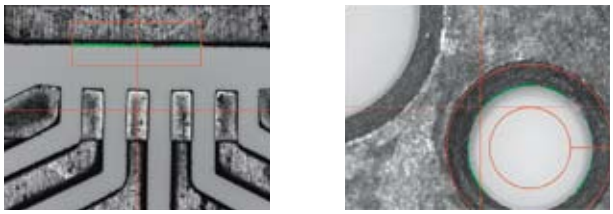
One-click Measuring Tool Set-up

The tool size, orientation, and threshold value of a measuring tool are automatically set with one click of the mouse.



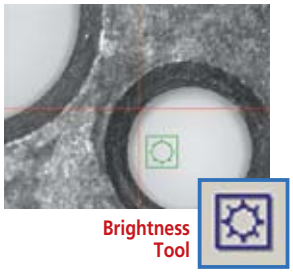
Removal of Abnormal Points

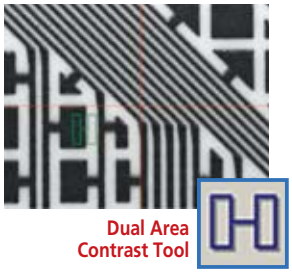
Abnormal points such as dust, burrs, and cracks are removed. The removal threshold detection level can be set arbitrarily.



AI Illumination Tool

This tool can automatically set the optimal light intensity adjustment and light intensity correction at procedure creation time, thereby increasing detection repeatability.

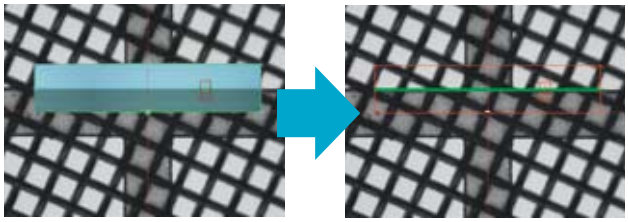

Brightness Tool


Dual Area Contrast Tool

Reinforced filter function

Stable edge detection is possible by reducing image noise. Median, average, Gaussian and morphologic settings are available.

Preview function features for confirming filter effect

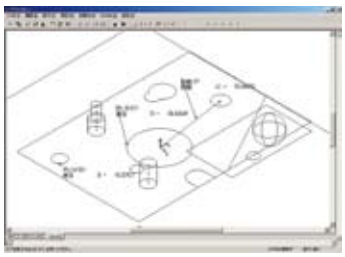


Software

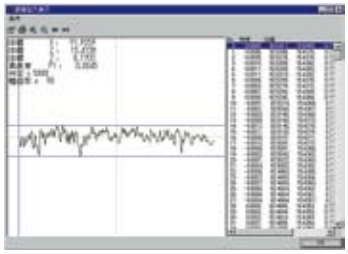
More Powerful, Friendly Software: QVPAK Version 7 (Compatible with Windows XP)

QV Graphics

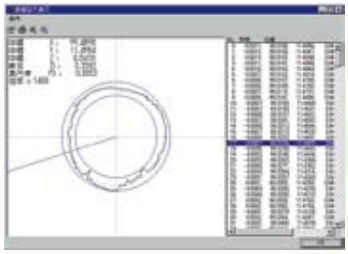
QVPAK is capable of 3D graphic display of measurement results, relationship of features (e.g. circle-to-circle distance calculation) from captured points and also the geometrical accuracy of circles, lines, planes and cylinders.



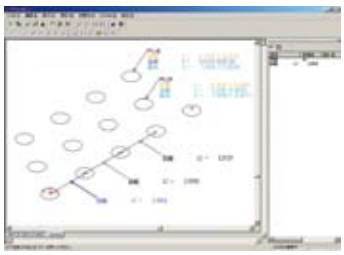
3-D graphic display



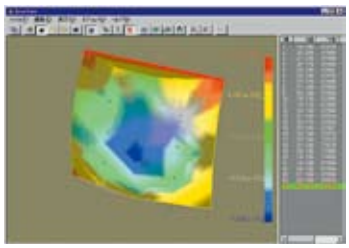
Geometrical accuracy: Line



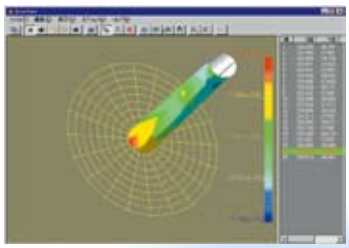
Geometrical accuracy: Circle



Measurement result display



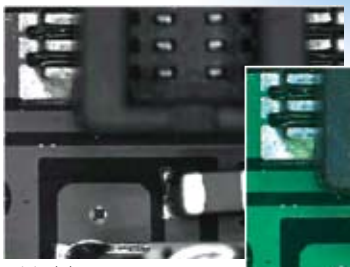
Geometrical accuracy: Plane



Geometrical accuracy: Cylinder

Image Composition and Color Viewer

This function combines multiple images of surfaces at different heights to create a composite image in focus over a wide range. It is also possible to create a pseudo color image with a B&W camera using the RGB color illumination.



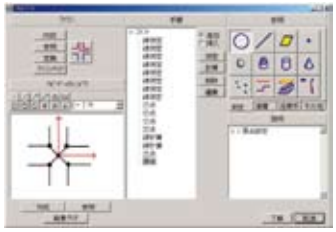
Original data

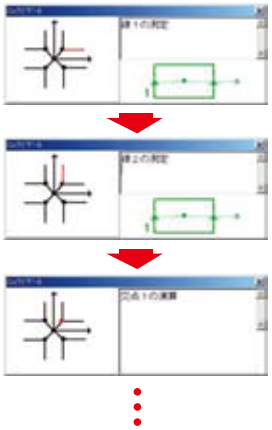
Image data after composition with the color viewer

QV Navigator 2

This function provides a navigated display of point capture and calculation procedure between features and a coordinate system setup pattern. It allows you to customize even a complicated pattern at will. Also, a Part Program can be created and stored along with workpiece images, thus making Repeat measurements easier.

User macro creation function





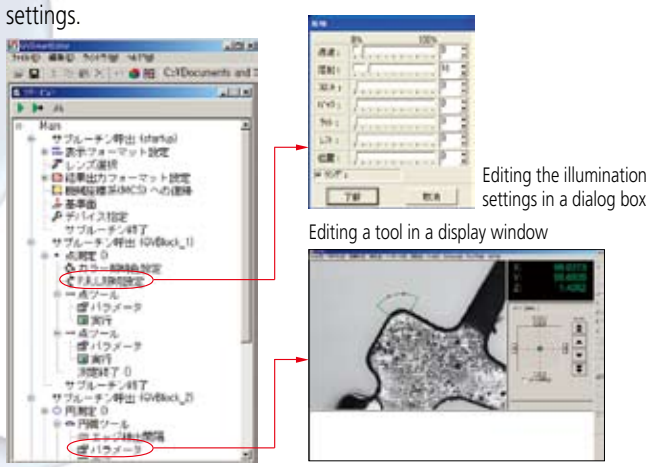
Part Program creation example

Mitutoyo

Ease of Operation

QV Smart Editor Function

This function displays a part program created by QVPAK in a tree structure using icons and titles. It has improved the ease of editing programs for factors such as illumination and edge detection settings.

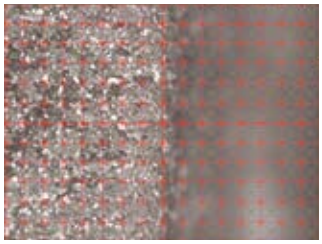


Editing the illumination settings in a dialog box

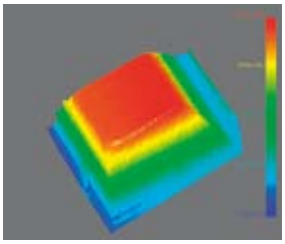
Editing a tool in a display window

Multi-point auto focus

Targeting the auto-focus tool (surface and pattern) on separate areas allows multiple heights to be measured. Maximum and minimum heights as well as the average height can be found.



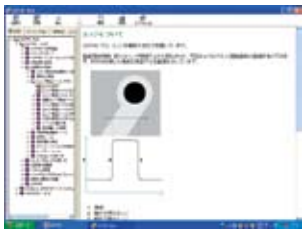
Example of batch measurement of 192 (16 x 12) points



Display example (QV graphics)

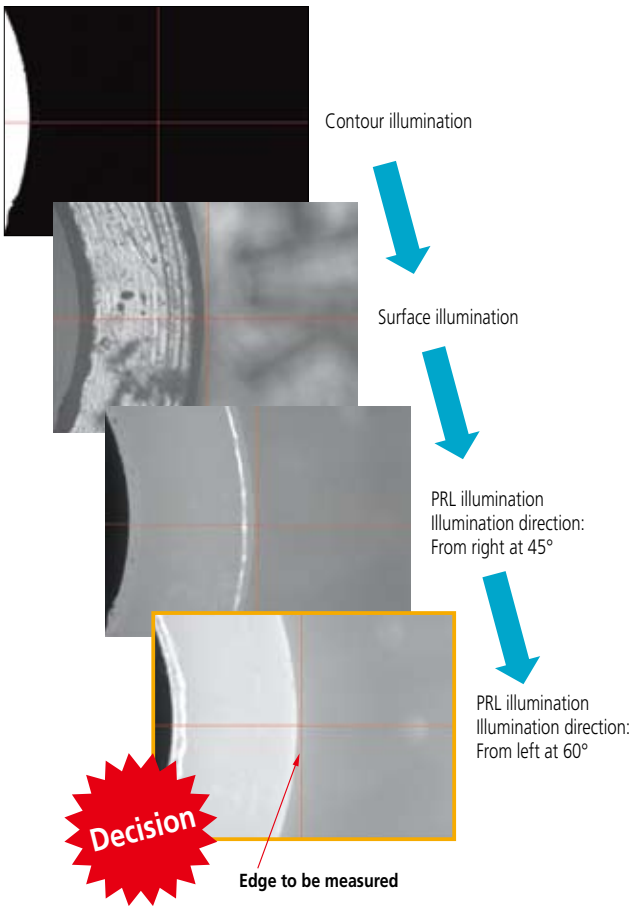
Help Function

The Help function has been enhanced by greater use of graphics. Searches can be easily made to give a quick solution to a user's query.



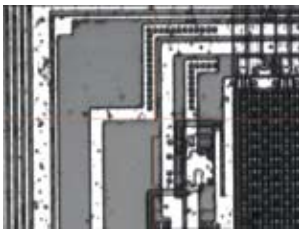
Illumination Wizard

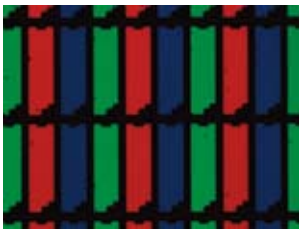
The AI Illumination tool has been further upgraded.
This tool automatically sets the optimal illumination conditions from among multiple combinations of illumination types such as contour illumination, surface illumination, and the illumination direction and angle of PRL illumination.



Saving Images in a File

Video images can be saved in TIFF format. Also, the images can be recalled and re-measured.



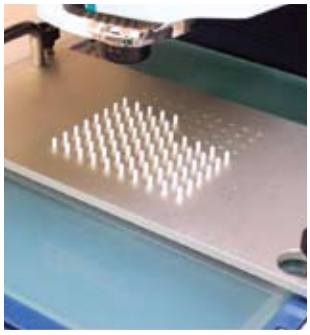


Optional Application Software

Automatic Measurement Management

QV Part Manager

QV Part Manager is the execution program management software for multiple workpieces arranged on the measuring table.

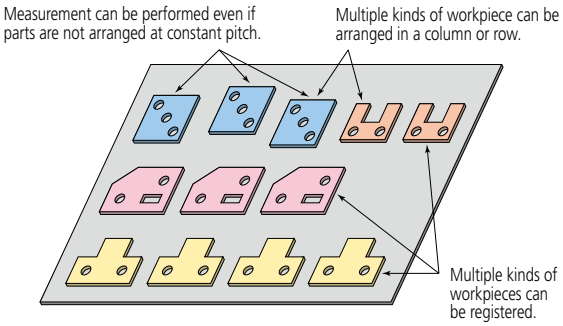


Workpieces arranged on a dedicated fixture.

QV part manager screen

Features

- Multiple types of workpiece can be handled.
- It is possible to create a mapped display of GO/NG judgment results and measurement status of each workpiece.
- This software provides the retry function and error pass function at the occurrence of out-of-tolerance or measurement error.
- File management and icon registration can be performed with simple operations.



Form Evaluation and Analysis

FORMPAK-QV

FORMPAK-QV performs tolerancing and form analysis from form data obtained with the QV Auto Trace tool and laser probe.

Contour Tolerancing Function

- Nominal data creation: CAD data conversion, master workpiece conversion, function specification, text file conversion and aspheric nominal value creation.
- Tolerancing: Tolerancing in the normal direction, tolerancing in the axial direction and best-fit tolerancing.
- Result display: Result list display, error graph, error developed view, error coordinate value display and analysis result display.

Detailed Contour Analysis

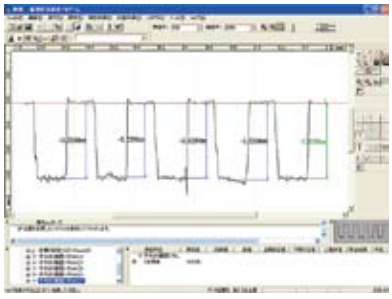
- Analysed features: Point, line, circle, distance, intersection point, angle, origin point and axial rotation.
- Calculated parameters Maximum, minimum and mean values, standard deviation and area.

Report Creation Function

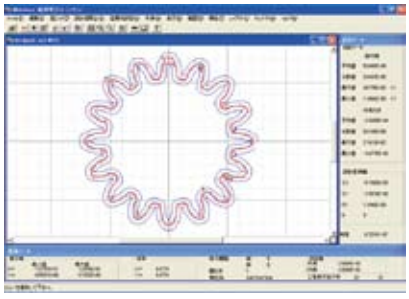
- Measurement result, error graph and error developed view.

Other Functions

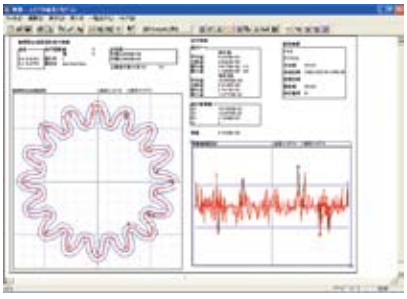
- Analysis procedure save/run
- External output function: CSV format output and ASCII output
- Fairug
- Quadratic curve fitting function
- Pseudo roughness analysis function



Detailed form analysis screen



Contour tolerancing screen



Layout edit screen

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Online Teaching

ICPAG

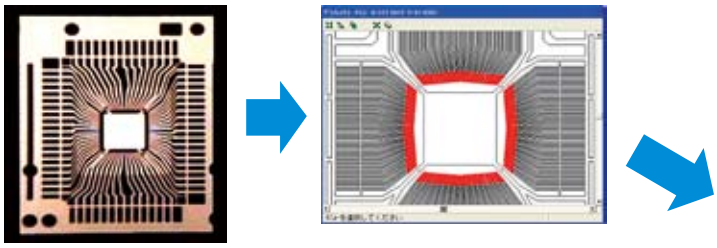
DXF IGES

ICPAG supports the measurement of IC packages and IC lead frames by enabling fast creation of measurement procedures.

Features

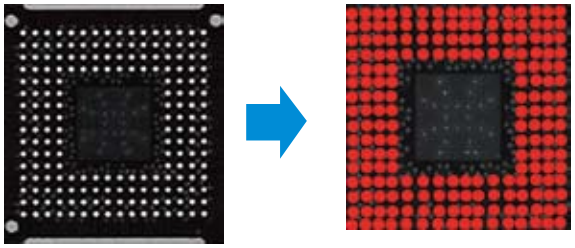
- Automatically generates measurement programs using CAD data and captured workpiece images.
- Supports dimension measurement by vision image capture and height measurement by laser scanning.
- Improves measurement throughput by automatically optimizing the measurement movement path.

IC lead frame



Automatic determination of measurement position using CAD data and captured workpiece images.

IC package



Automatic generation of measurement program for QV

Optional Application Software

Offline Teaching

EASYPAG

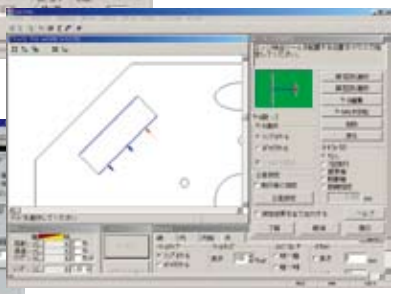
DXF IGES

EASYPAG creates measurement part programs for QVPAK using 2D CAD data. It reduces the number of man-hours for creating part programs, thus allowing a decrease in lead time.

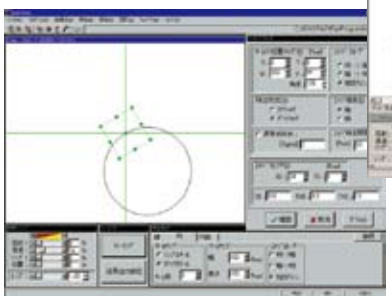
Features

- Batch specification and individual specification of forms allow easy program creation.
- Coordinate system setup and calculation between features including distance and angle can be easily performed in the Graphic window.
- An existing part program can be simply edited with the Smart Editor.
- Calculation functions such as the arbitrary point measurement, arbitrary circle measurement and pitch circle measurement have been enhanced.

Pitch circle measurement



Line-to-arbitrary point distance measurement



Tool Edit Screen

PAGPAK

DXF IGES CSV NC data EXCELLON data GERBER data

PAGPAK is the offline teaching software for creating QVPAK part programs using NC data, CAD data and Gerber data.

Features

- Appropriate for creating a part program that measures discrete holes such as those on a printed circuit board.
- The Repeat function is provided to be convenient for continuous measurement of identical forms.
- The Report function can make a best-fit correction of measured results and display GO/NG judgment by color, error direction, and scatter chart.

ODBPAK

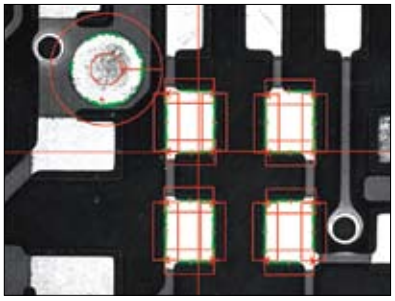
ODB++Data

Pads on a bare board can be automatically measured using ODB++ * * (CAD/CAM integrated data for a printed circuit board).

Functions

- Circular pad: Center and radius.
- Polygonal pad: Diagonal intersection point coordinate, peak coordinate, top-to-bottom width dimension, etc.
- Fiducial point measurement and coordinate system setup.
- Multi-plane processing: Rotational multi-plane, reverse multi-plane, and nested multi-plane.

*ODB++ is a standard developed by Valor Corporation.



Polygonal pad measurement example

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Measurement Support

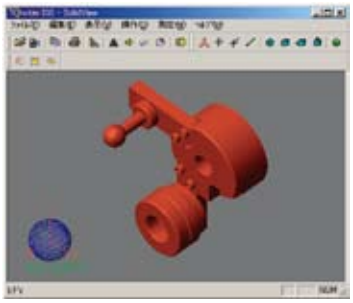
CAD Option DXF IGES

CAD Option displays CAD data on the Graphic window to enhance ease of measurement.

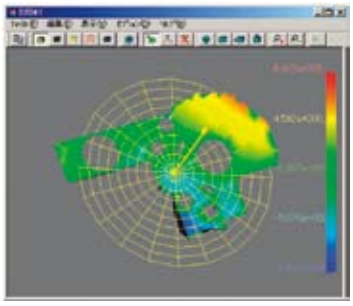
Functions

- The Navigation function for importing CAD data and the CAD data output function for exporting measurement results are provided.
- Nominal values do not need to be keyed in for tolerancing since nominal data information can be referenced from CAD data.
- The 3D CAD Import function is available for 3D CAD data display and flatness display area setup.

3D CAD Import function

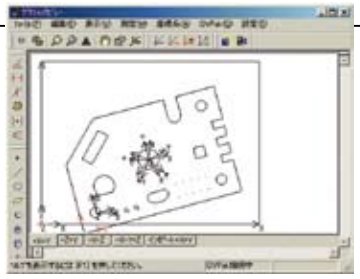


3D CAD data display

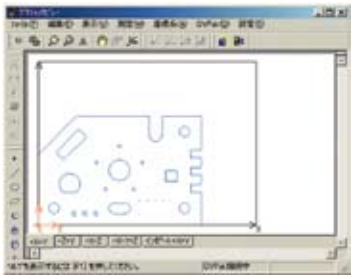


Flatness display using 3D CAD data

CAD Export function



Graphic display of measurement result



CAD data output display

Inspection Certificate Creation

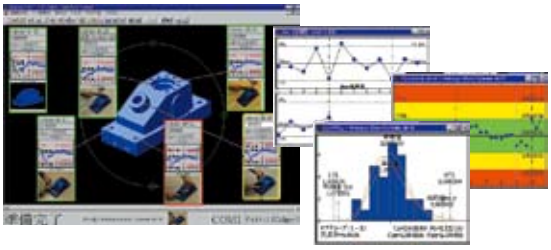
Measure Report-QV

Features

- This software package, which is based on the commercial spreadsheet Microsoft Excel, can easily customize an inspection certificate.
- Data from multiple instruments such as calipers and micrometers can be fetched in addition to Quick Vision data.

MeasurLink STATMeasure PLUS

Various statistical calculations can be performed on the measurement results. It is also possible to display control charts in real time.

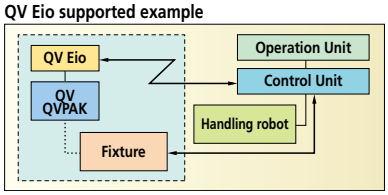


External Control

QV Eio

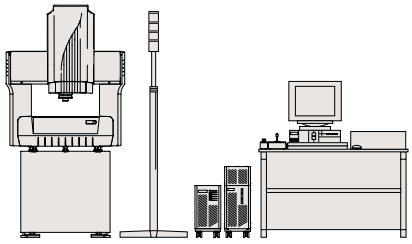
Can implement the external control interface between a PC and QVPAK.

QV Eio supported example



QV Eio-PC

QVPAK can be controlled from an external PC via RS-232C. QV status can be output using an external I/O board.



QV Eio-PC usage example (System using PATLITE)

QV-JMP Export

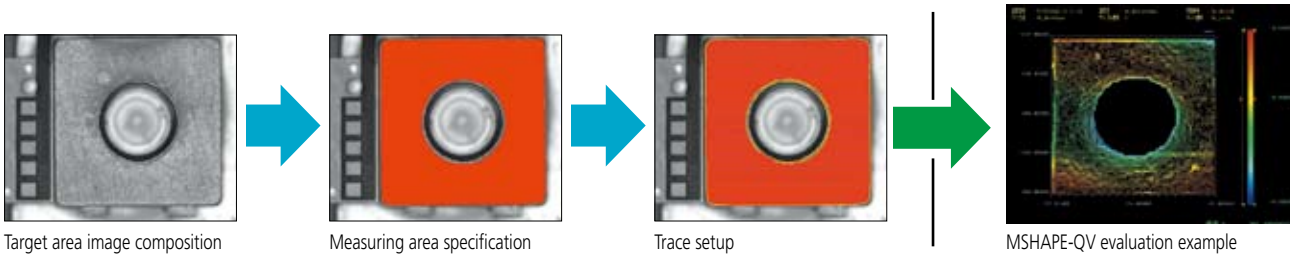
Outputs QVPAK measurement results to JMP in the SPC software.

Optional Application Software

Shape evaluation

QV Trace Maker

This is a program that can automatically create a scanning route for the laser probe based on vision information acquired by Quick Vision. Various routes can be created even if the measuring area is outside the viewing field. In combination with MSHAPE-QV the 3D form evaluation of complicated contours can be performed with ease.



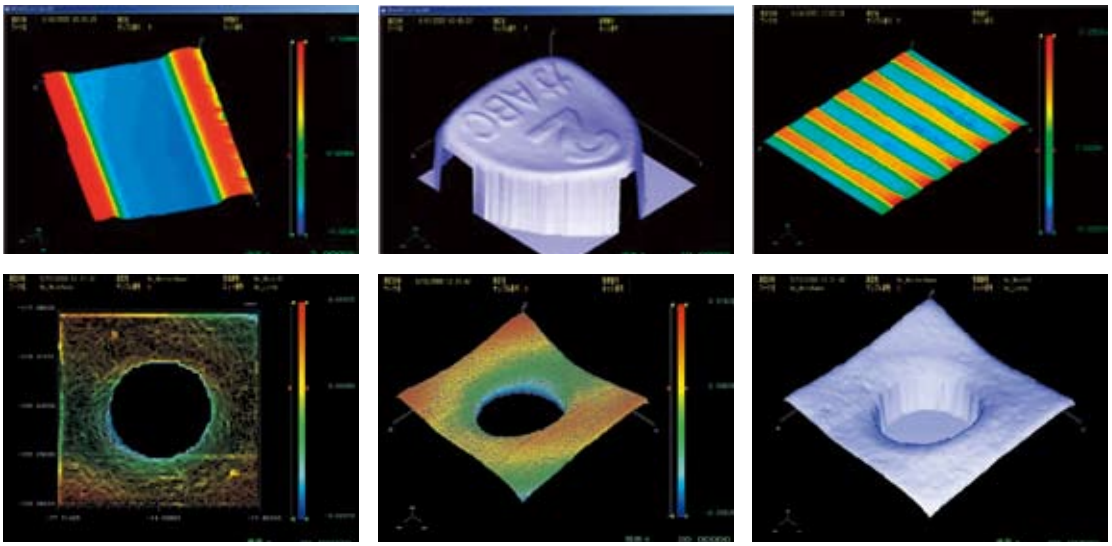
Target area image composition | Measuring area specification | Trace setup | MSHAPE-QV evaluation example

MSHAPE-QV

Performs curved-form analysis on data acquired with the laser probe.

Main Functions

Display types	• 2D/3D contour lines • 2D/3D unfiltered profile • Shadow graph
Form analysis	• Curved plane analysis • Unfiltered profile analysis, etc.



2D contour line display | 3D rendition of the 2D contour line display | Shadow graph

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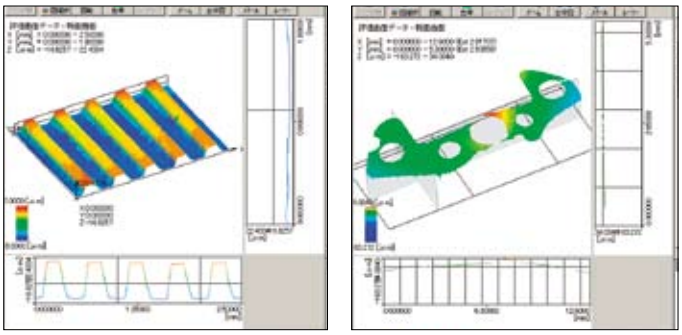
FORMTRACERAK-PRO

Main Functions

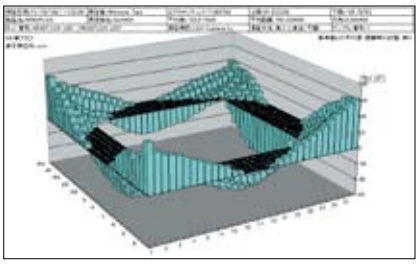
3D display	• Wire frame • Hatching • Shading • Contour line filling
Calculation	• Pseudo roughness analysis • Extraction of an arbitrary cross section • Calculation of cutoff volume



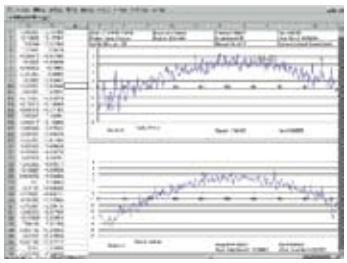
QV-Graph

Main Functions

Display forms	• 3D Bar chart • 3D Surface chart • 2D continuous cross-section graph



3D Bar chart



2D continuous cross-section graph

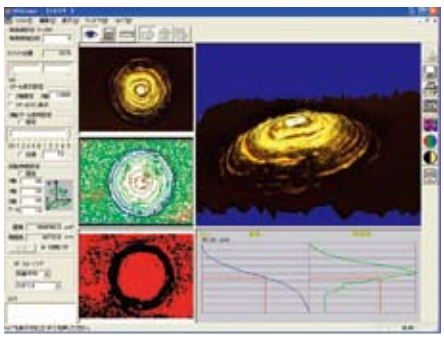
IC Package Measuring Program

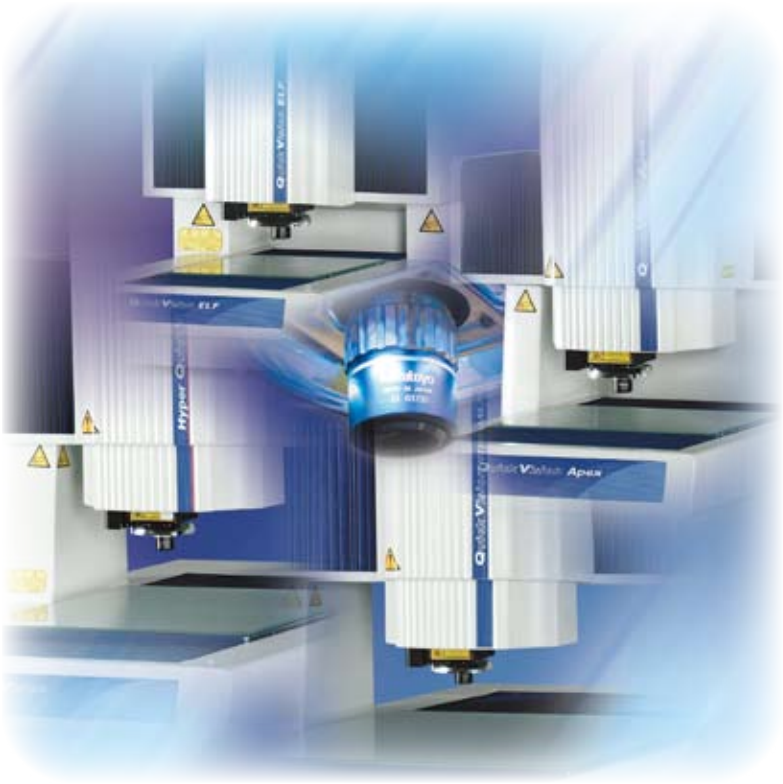
Main Functions

- BGA coplanarity measurement and ball height measurement
- 3D form measurement of IC package surface
- 2D cross-section measurement of IC package surface, etc.

VCPAC
-Vision generated Program for ease-of-operation

This program generates images from a focus sweep through the entire depth range of the workpiece. Can also enhance high-magnification microscope observation with a shallow depth of focus. Images are captured simply by pressing a button on the screen.





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