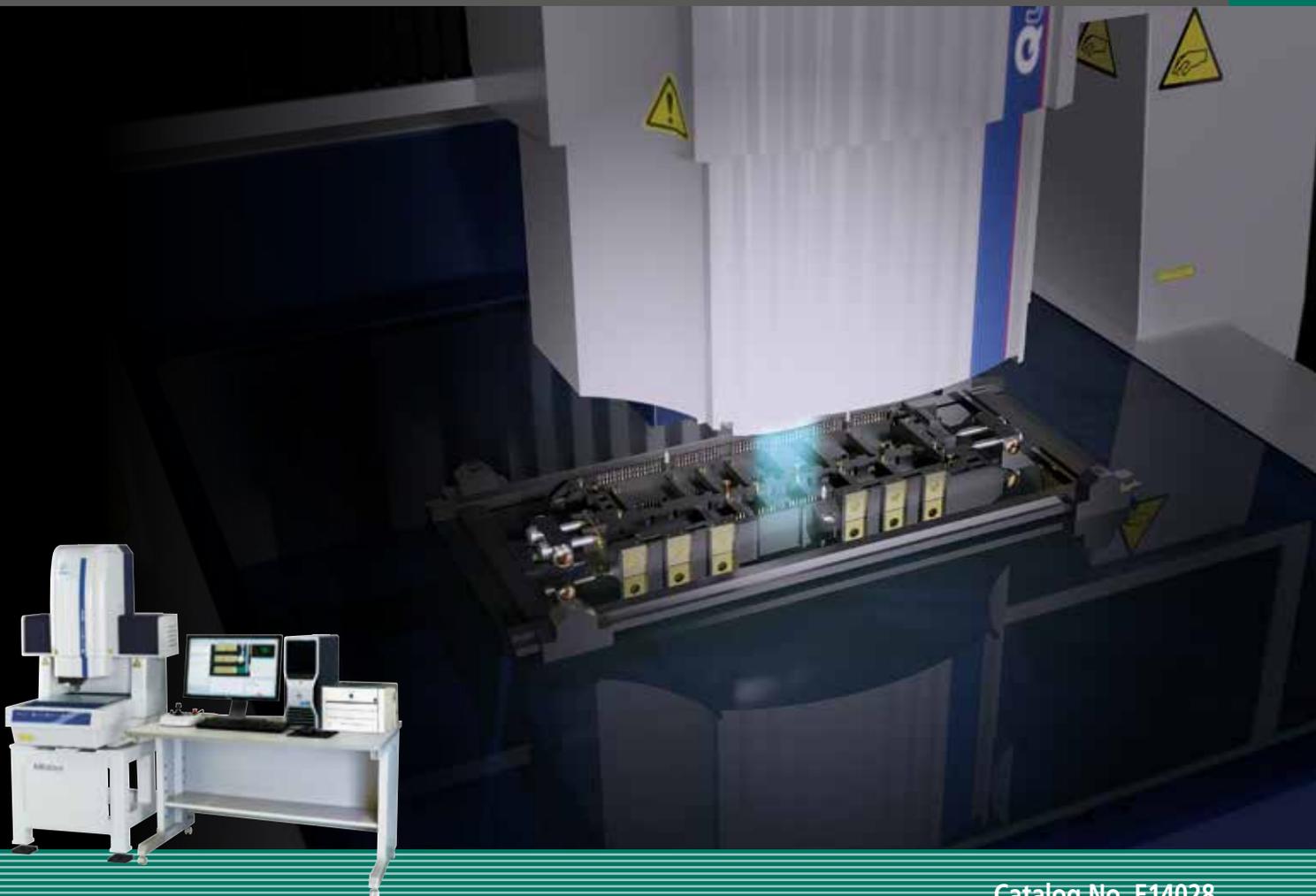


CNC Vision Measuring System Quick Vision Series



Evolutionary Advance

Highly Advanced Non-contact Measurement Technologies

Well-designed main unit structure for high-accuracy measurement and auto focus function.

Integration of such high-performance technologies has made 3D non-contact measurement real.

The Quick Vision Series, our CNC vision measuring machine family, never stops evolving.

Captures magnified images through optical lenses.

Detects edges using vision measurement technology.

Measures object dimensions without making contact.

- Measures an object's microscopic features in a magnified image
You can capture the magnified image of an object through the optical lens system. It is effective for measurement of small, thin objects such as electronic parts, semiconductor parts, precision parts and medical device parts.
- Non-contact measurement prevents damage, deformation and contamination of the object
The non-contact measurement eliminates the risk of damage to objects. It is effective for measurement of electronic parts and semiconductor parts requiring cleanliness, soft objects such as plastic molded parts, and thin press-molded parts.
- High-speed multiple point measurement
Our honed image processing technology and high-speed stage control function deliver high-throughput measurement. It is effective for process control of an object with many measurement points or mass-produced objects.
- High-accuracy non-contact height measurement
High-performance image auto focus and a non-contact displacement sensor enable high-accuracy non-contact height measurement.

MEDICAL

— Three unique Mitutoyo features supporting high reliability 《Medical》

Ultra-small Medical devices requiring high accuracy

Medical devices directly affect people's health and life. Therefore, their every part requires strict adherence to demanding accuracy specifications. The lens and forceps of an endoscope, for example, are installed in a tip with a minimum diameter of 3 mm. With a maximum of 4,300X magnification, various types of auto focus, and high resolution enabling edge detection, the Quick Vision Series helps you measure objects without making contact in applications that require accuracy at the most minute level. Its improved repeatability and technical measurement capabilities have been proven equivalent to those of the global standard.

To respond to the demands of emergency medical care, medical devices need to satisfy more requirements. Through improving our measurement technologies in the manufacture of medical devices, Mitutoyo is committed to contributing to medical technology advancement.



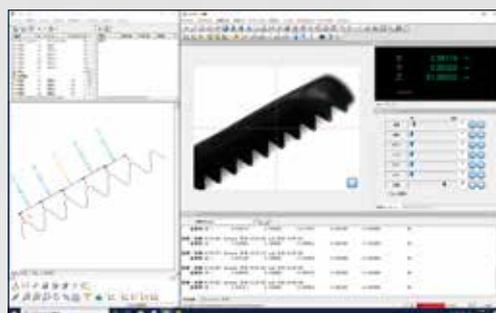
Example of measuring a valve used in medical equipment





Optimized optical system for ultra-small dimension measurement

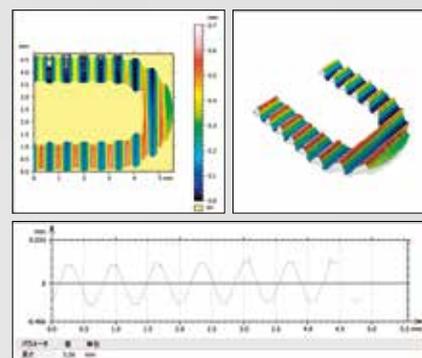
Through combining ten different objective lenses with the built-in imaging lens, a maximum of 150X optical magnification (4,300X total on-monitor magnification) can be achieved. This enables measurement of ultra-small parts, such as medical device components.



Example of image measurement of medical forceps

High-accuracy 3D measurement

High-accuracy height measurement using single-focus high-resolution images and PFF (Point From Focus) enable 3D capturing of the object shape, thereby expanding the scope of measurement.



3D analysis of the shape captured by PFF MCubeMap

AUTOMOBILE

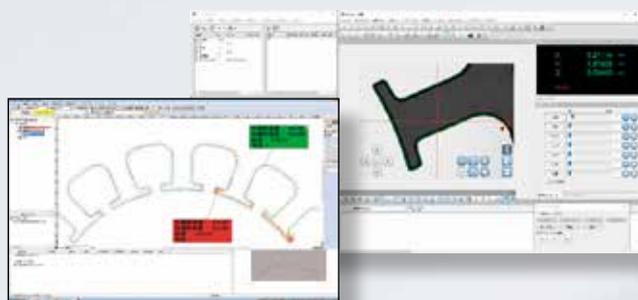
— Three unique Mitutoyo features supporting high reliability 《Automobile》

Cutting-edge

Flexible measurement of new parts for electric vehicles

With increasing demand for reducing greenhouse gas emissions, automobile production is shifting from gas and diesel vehicles to electric vehicles, causing the key automobile parts to become motors, batteries and semiconductors at an increasingly rapid rate.

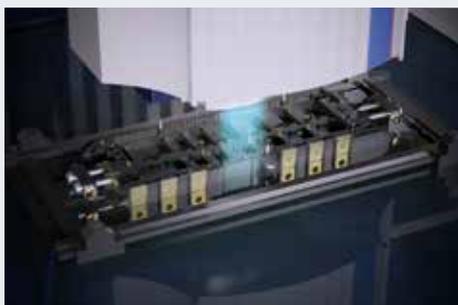
The Quick Vision Series is optimal for use in the manufacturing processes of, for example, pre-stacking motor core parts that are thin and difficult to touch for measurement, fuel cell separators that have minute surface irregularities and require very-low-speed measurement, and semiconductor parts of inverters that require high-speed measurement of microscopic features.



Example of comparison of measurement results with design values

Meeting the rigorous quality control standards of the automobile industry

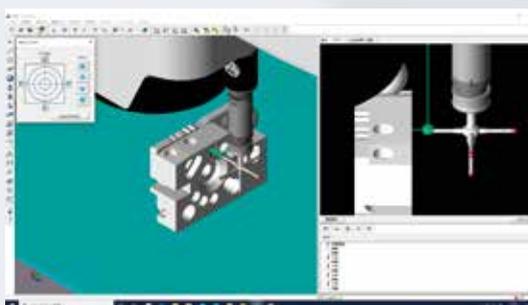
Introduction of CASE technologies will drive the demand for electronic and semiconductor parts in the automobile industry. Quick Vision helps quality control within the automobile industry by providing both contact and non-contact technologies.



Example of measuring an engine control unit

Offline teaching from a 3D CAD model

In addition to the existing function for creating programs from 3D CAD model images, we have developed offline programming. This makes it possible to create a program offline from an image or with a touch probe. This means you can increase up-time of the QV main unit and shorten production lead times.



Offline teaching from a 3D CAD model



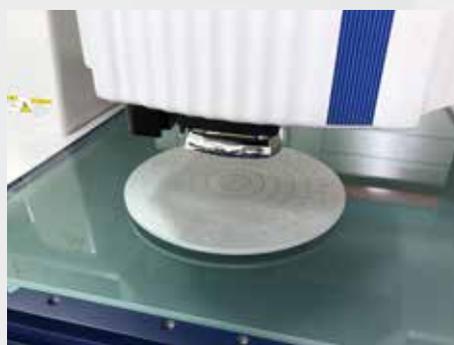
ELECTRONIC PARTS

— Three unique Mitutoyo features supporting high reliability 《Semiconductor》

Full automation

Continuous measurement during mass production

The shift of production to electric vehicles, expansion of services promoted by commercialized 5G, and recovery of capital investment in data centers are all boosting signs of recovery in the semiconductor market. The market is expected to show more growth and be ready for mass production to meet increasing demand. QV STREAM PLUS of the Quick Vision Series synchronizes main unit operation with the strobe of the camera used for measuring and thus enables high-speed measurements to enhance the productivity of semiconductor manufacturing. For example, the stage keeps moving without stopping while the system measures many pores on the showerhead to check for dimensional errors or foreign substances, which can significantly reduce the takt time.



See video from here



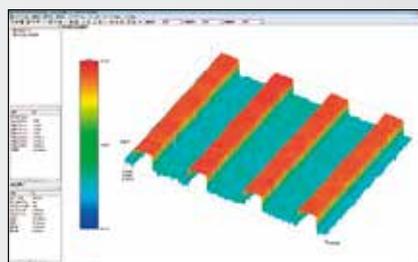
Preventing nonconformities during mass production

Continuous measurement by QV STREAM PLUS and quick focusing by TAF can deliver high-speed measurement. You can prevent nonconforming final products by increasing the number of features to measure.



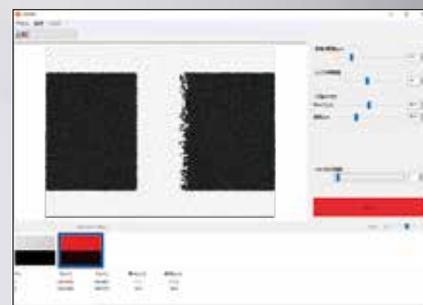
3D measurement with multiple sensors

Surface texture and cross-section texture can be analyzed by combining vision measurement, the non-contact displacement sensor, PFF (Point From Focus), and WLI (White Light Interferometer).



Flaw Inspection Software DDPAK

DDPAK, the flaw inspection software, allows for use of the flaw inspection function to detect contaminants, burrs, cracks, etc., in addition to dimension measurement. You can find flaws that cannot be detected by typical dimension measurement.





TECHNOLOGY

Rich functionality supporting various kinds of measurement

The Quick Vision Series has realized high-level integration of the measurement technologies that Mitutoyo has built up over the years. By combining the standard objective lenses, special software (QVPAK), and various optional components, it provides a wide range of functions to support various kinds of measurement. While meeting the growing requirements of measurement environments, it continues to improve these functions to strongly support you in solving your challenges.

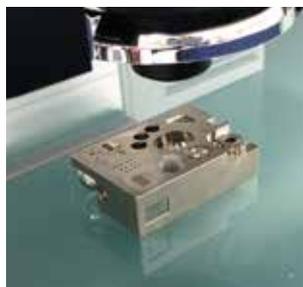
1 Measuring a tridimensional object without moving it Touch Trigger Probe

By also using the touch trigger probe, the system can capture a tridimensional object by measuring its sides at a given height without rotating it, which was difficult to do in the past.



2 Various image processing functions Vision measurement

A magnified image captured through the optical lens is displayed on a PC screen. Various functions including edge detection and auto focus can be used for dimension measurement (common to all models).



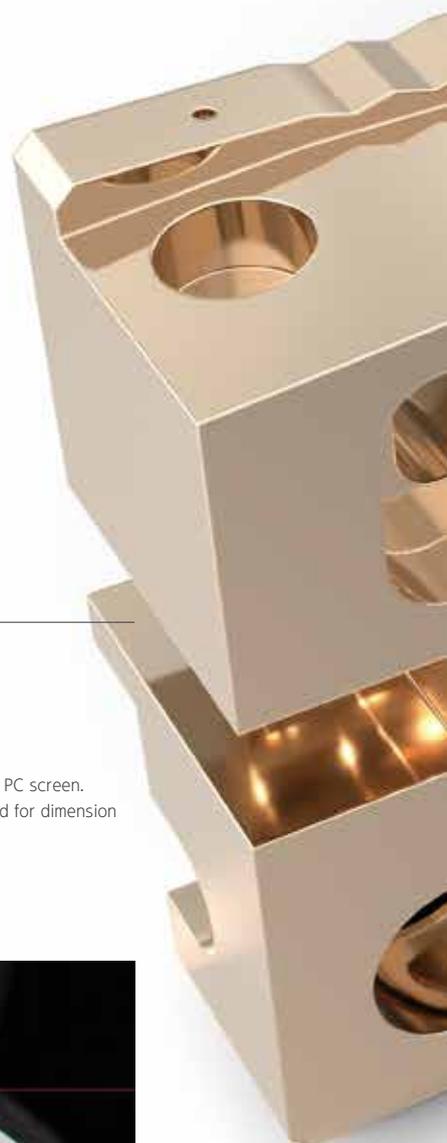
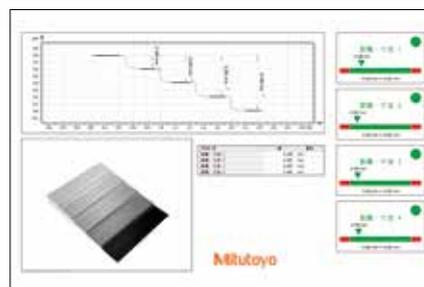
3 Non-contact measurement of an acute angle and transparent object CPS Probe

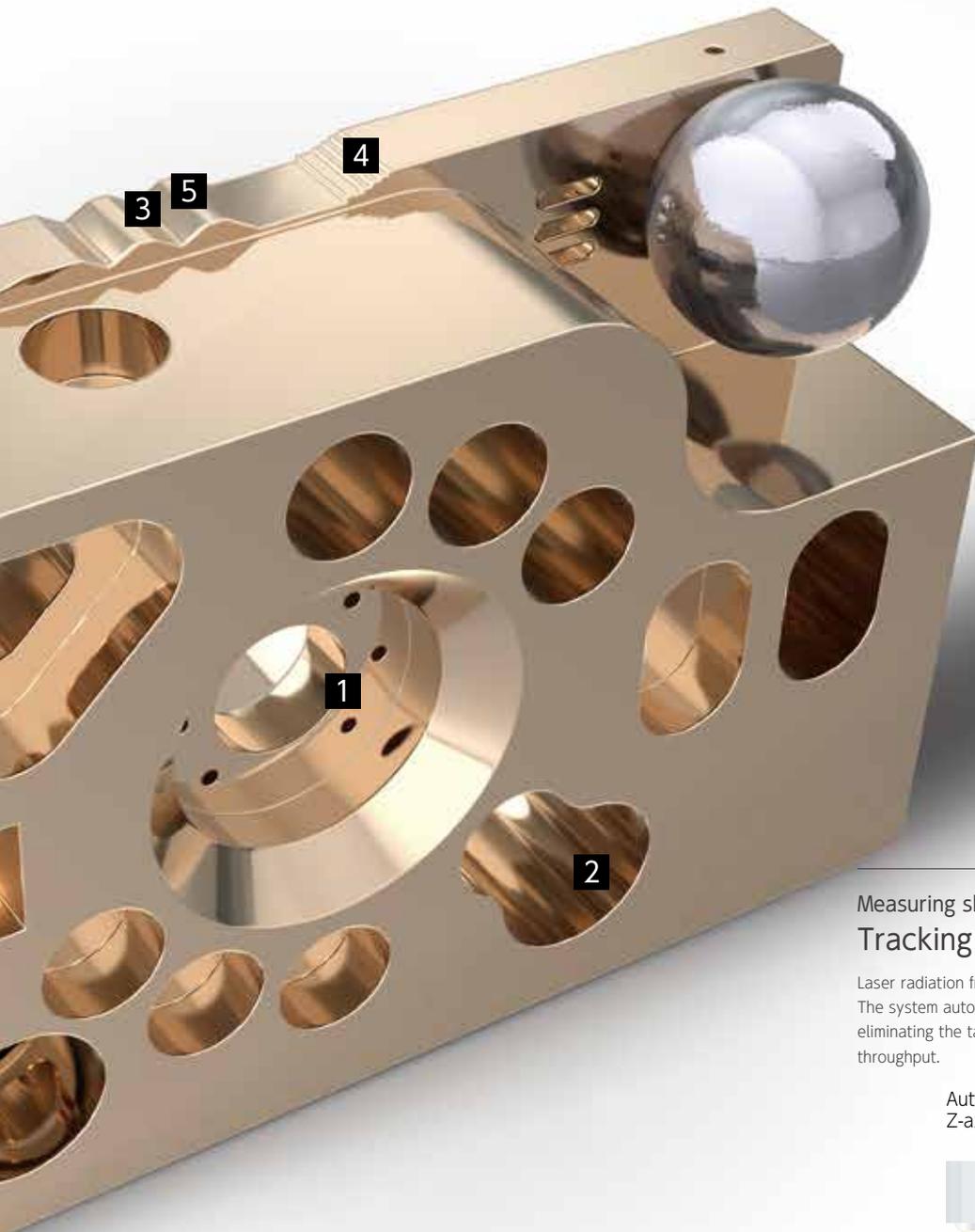
Differences in the focal length of the white light source are used to measure an acute angle. On the other hand, thickness of a thin, transparent object is measured by simultaneous detection of surface heights at two points on the object.



4 Capturing microscopic features of a 3D object using white light interference White Light Interferometer

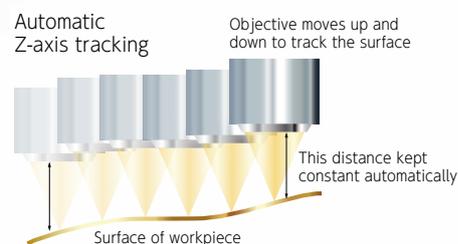
Using the white light interference that occurs between the system and the object, the system performs high-accuracy 3D measurement for surface texture analysis (roughness, etc.) and shape measurement (irregularities of several μm) in a minute area.





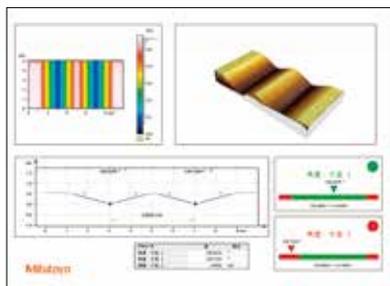
Measuring shapes of all kinds of objects Tracking Auto Focus (TAF)

Laser radiation from the objective lens enables automatic focusing. The system automatically keeps the object in focus according to its shape, eliminating the task of focus adjustment and increasing measurement throughput.



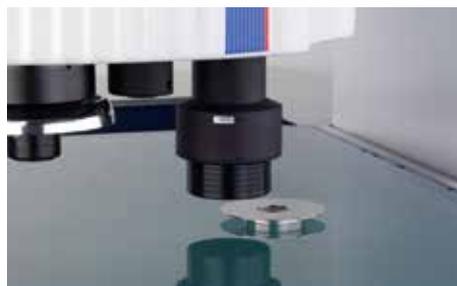
5 3D measurement with multiple cross-section images PFF (Point From Focus)

Scanning the object by raising the objective lens can capture multiple cross-section images (image contrasts) at different heights. You can obtain 3D shape data from such images.



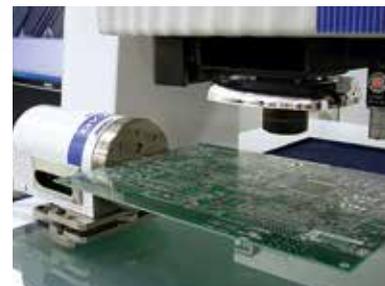
High-speed non-contact measurement of minute height difference and curved shape Laser Probe

The laser confocal method that is less affected by the color of the object has been adopted. The sensor scans the object to capture the surface shape data in a non-contact manner.



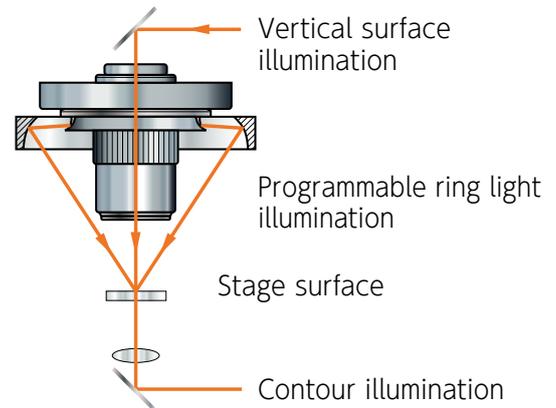
Simple measurement procedure QV Index

The indexing table turns the object to enable automatic measurement of multiple surfaces in a single setup.



Highly Functional Illumination Unit

- QV-PROs use LEDs for all of their light sources: contour, vertical surface, and programmable ring light.
- Lighting uniformity has been achieved at a high level, which leads to excellent part program compatibility between multiple QVs.
- LED light sources have excellent responsiveness, which improves measurement throughput.
- LED light sources have longer lives than halogen types, which reduces illumination fluctuations and thereby minimizes any errors caused by changes in light intensity.

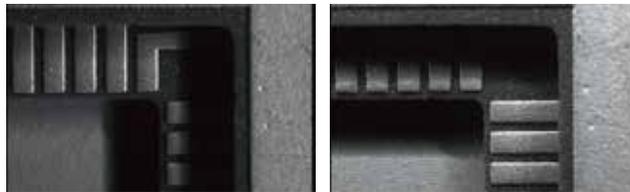


Vertical surface illumination Programmable ring light illumination Contour illumination

Programmable Ring Light (PRL)

Changing the positions of the two curved mirrors sets the ring light's obliquity to any chosen value between 30° and 80°. This is effective for enhancing the edges of inclined surfaces or very small steps.

Furthermore, the PRL light's illumination can be controlled independently in every direction, front and back, right and left. This makes it possible to configure highly variable lighting settings to match measurement locations.

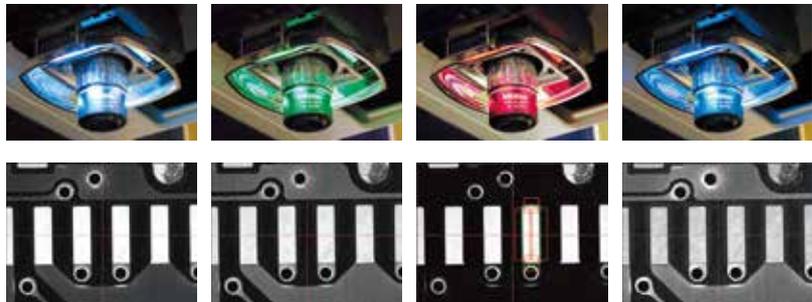


White LED model/Color LED model

QV Apex and Hyper QV are available as a white LED model or color LED model.

The color LED model emphasizes edge contrast between different colors of the object, for example between copper track and plated parts on a printed circuit board. It provides high reproducibility in edge detection.

The picture shows a color LED model demonstrating the contrast-enhancing effects of colored illumination.



Synthesized white Green Red Blue

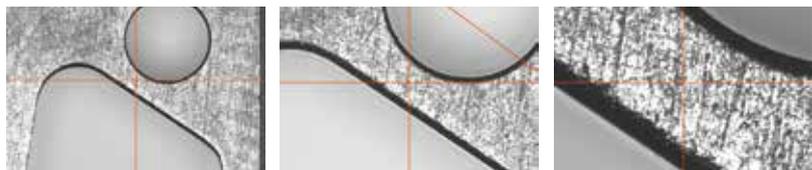
Programmable Power Turret

The QV's programmable power turret has excellent magnification repeatability which makes it suited to highly accurate measurements. The standard specification permits three steps of magnification: 1X, 2X and 6X*.

The rich lineup of objectives contains lenses with magnifications ranging from 0.5X to 25X, which makes it possible to select the optimal optical system to match the measurement target. It is possible to install additional objectives after purchase of main unit.

* The customized specification permits three or four steps of magnification: 1X, 2X and 4X; or 1X, 2X, 4X and 6X.

When using QV-HR1X



Turret 1X Field of view: 6.27×4.70 mm Turret 2X Field of view: 3.13×2.35 mm Turret 6X Field of view: 1.04×0.78 mm

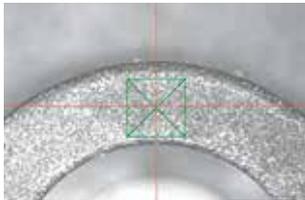
When using QV-HR10X



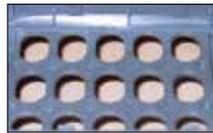
Turret 1X Field of view: 0.62×0.47 mm Turret 2X Field of view: 0.31×0.23 mm Turret 6X Field of view: 0.10×0.07 mm

High-Performance Multi-Auto Focus

The QV Series is equipped with a high-performance image auto focus function as standard. Image auto focus is used to guarantee accuracy. Thanks to the availability of various auto focus tools, the optimal focus for each surface texture and measured feature can be selected, which makes it possible to perform highly reliable height measurements. Furthermore, auto focus operates at high speed, which increases total measurement throughput.

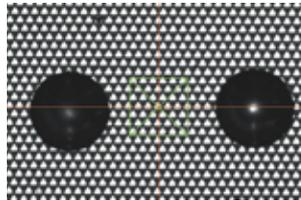


Plastic-molded product



Surface focus

Image auto focus can be used to measure the height of a chosen area, which makes it possible to perform stable height measurements that are minimally affected by the roughness of machined surfaces and other similar surfaces.

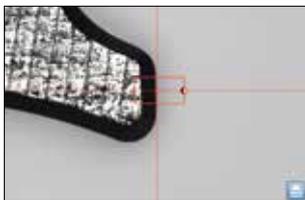


IC package



Pattern focus

Auto focus can be performed on low-contrast transparent objects, such as film, glass and mirrored surfaces by projecting onto the object surface a pattern placed within the light path.

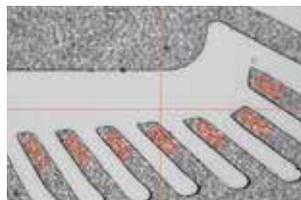


Chamfered part of a machined surface



Edge focus

Edge focus is suited to focusing edges that have been chamfered or that have a corner radius. Using this focus tool prior to performing edge detection improves edge detection reproducibility.

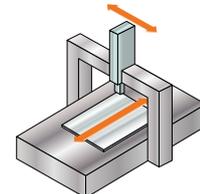


Multi-point auto focus

Multi-point auto focus can be used to set multiple focus positions, sizes, and angles to arbitrary values. This tool can be used to obtain multiple sets of height information with a single focus operation, which makes it possible to perform highly efficient height and flatness measurements.

Well-designed structure for high-accuracy measurement

Y-axis table moving mechanism with fixed bridge has been adopted to the basic structure of main unit. Structural deformation caused by movement along each axis has been minimized, which ensures that the Quick Vision Series can be used to perform highly accurate measurements with minimal spatial coordinate distortions.



What is true traceability?

Adopting reference instruments traceable to the national standard

To build customer trust, we adhere to traceability to the national standard.

- Mitutoyo's calibration artifacts and instruments that are used to establish machine accuracy specifications are maintained in a continuous chain of traceability to national dimensional standards. This is our customers' assurance of reliable measurement.
- Our calibration service provider is JCSS certified by IAJapan, which is a certifying body internationally accredited by ILAC in accordance with MRA (Mutual Recognition Arrangement). It has been qualified for measurement techniques equivalent to those of international calibration organizations.

Note: The chart on the right shows an outline of traceability for the vision measuring machine.



Capable of Supporting ISO10360-7 Guaranteed Accuracy

Some models in the Quick Vision Series support the ISO10360-7: 2011 guaranteed accuracy specifications.

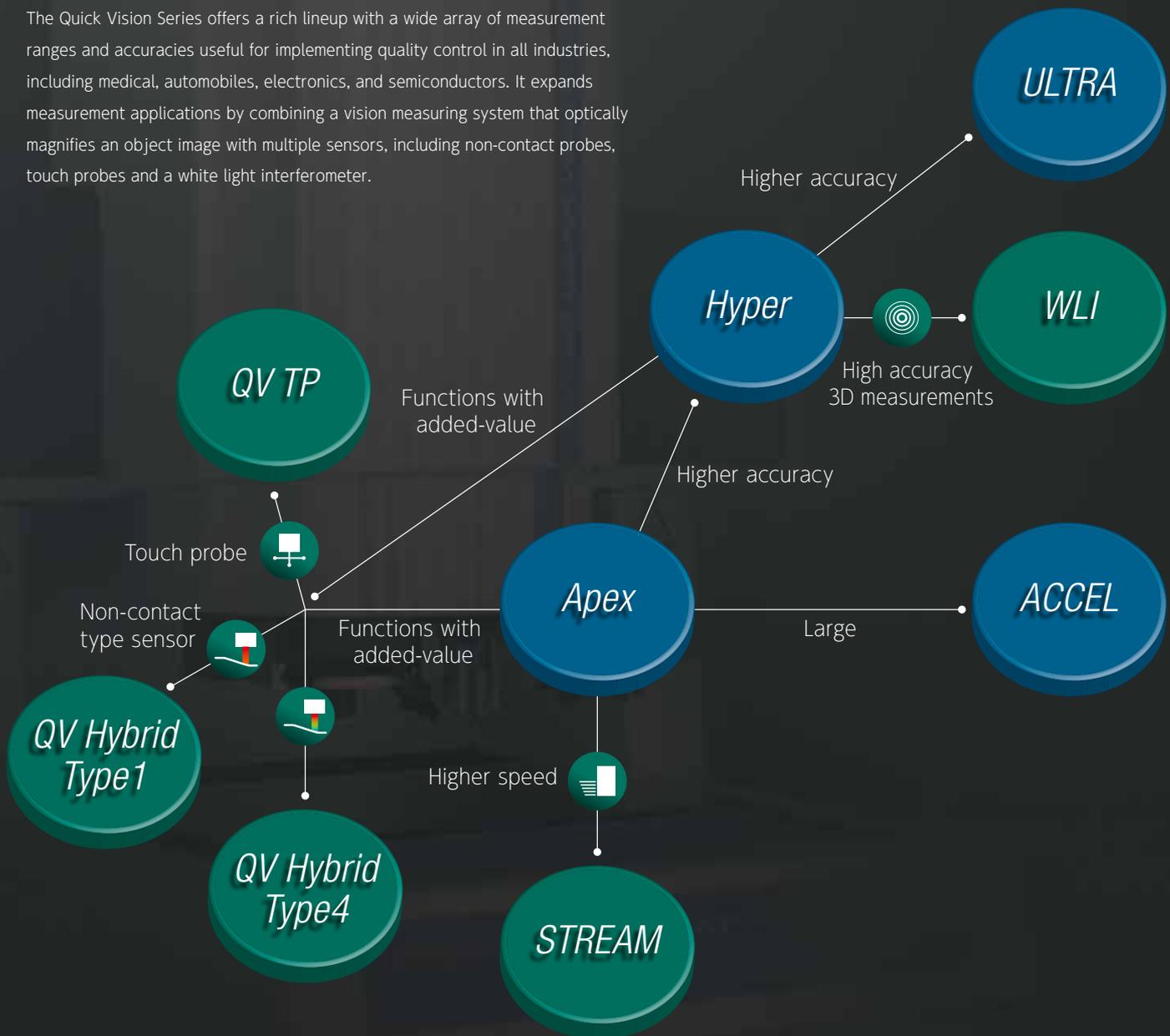
Guaranteed accuracies

- Length measurement error E_L, MPE
- Probing error P_{F2D}, MPE

LINE-UP

A wide array of variations and systems available to broaden measurement applications and improve quality control.

The Quick Vision Series offers a rich lineup with a wide array of measurement ranges and accuracies useful for implementing quality control in all industries, including medical, automobiles, electronics, and semiconductors. It expands measurement applications by combining a vision measuring system that optically magnifies an object image with multiple sensors, including non-contact probes, touch probes and a white light interferometer.





Available



Special order



Not available

QV Apex

Standard CNC Vision Measuring System



- QV Series standard models range in size from compact to large.
- We offer a model with tracking auto focus that can quickly focus on the object and thus improve throughput significantly.
- There are a general-purpose model with white LED light and an enhanced edge detection model with RGB color LEDs.



QV Apex 302

Model	QV Apex 302			QV Apex 404			QV Apex 606			
Order No.	QV-X302P1L-D	QV-X302T1L-D	QV-X302P1C-D	QV-X404P1L-D	QV-X404T1L-D	QV-X404P1C-D	QV-X606P1L-D	QV-X606T1L-D	QV-X606P1C-D	
Measuring range	300×200×200 mm			400×400×250 mm			600×650×250 mm			
Observation unit*1	Programmable power turret 1X-2X-6X									
Tracking Auto Focus device	—	✓	—	—	✓	—	—	✓	—	
Illumination unit	Contour illumination	White LED			White LED			White LED		
	Vertical surface illumination	White LED	Color LED	—	White LED	Color LED	—	White LED	Color LED	
	PRL	White LED	Color LED	—	White LED	Color LED	—	White LED	Color LED	
Resolution of scale	0.1 μm									
Vision measuring accuracy*2	E _{1x} , E _{1y}	—			(1.5 + 3L/1000) μm			—		
	E _{1z}	—			(1.5 + 4L/1000) μm			—		
	E _{2xy}	—			(2.0 + 4L/1000) μm			—		
LAF Repeatability	—	σ≤0.8 μm	—	—	σ≤0.8 μm	—	—	σ≤0.8 μm	—	
Model with touch probe	QVT1-X302P1L-D	QVT1-X302T1L-D	QVT1-X302P1C-D	QVT1-X404P1L-D	QVT1-X404T1L-D	QVT1-X404P1C-D	QVT1-X606P1L-D	QVT1-X606T1L-D	QVT1-X606P1C-D	
TP measuring accuracy*2	E _{1x} , E _{1y} , E _{1z} (1.8 + 3L/1000) μm									

*1 Programmable power turret 1X-2X-4X model and 1X-2X-4X-6X model are available to special order. *2 Determined by Mitutoyo's inspection method.

Hyper QV

High-accuracy CNC Vision Measuring System



- The Hyper QV is a highly accurate model that is equipped with a high-resolution/accuracy scale.
- We offer a model with tracking auto focus that can quickly focus on the object and thus improve throughput significantly.
- There are a general-purpose model with white LED light and an enhanced edge detection model with RGB color LEDs.
- This model is standard-equipped with an automatic temperature compensation function that uses a temperature sensor on the main unit of the measuring machine and a temperature sensor for the workpiece.



Hyper QV 404

Model	Hyper QV 302			Hyper QV 404			Hyper QV 606			
Order No.	QV-H302P1L-D	QV-H302T1L-D	QV-H302P1C-D	QV-H404P1L-D	QV-H404T1L-D	QV-H404P1C-D	QV-H606P1L-D	QV-H606T1L-D	QV-H606P1C-D	
Measuring range	300×200×200 mm			400×400×250 mm			600×650×250 mm			
Observation unit*1	Programmable power turret 1X-2X-6X									
Tracking Auto Focus device	—	✓	—	—	✓	—	—	✓	—	
Illumination unit	Contour illumination	White LED			White LED			White LED		
	Vertical surface illumination	White LED	Color LED	—	White LED	Color LED	—	White LED	Color LED	
	PRL	White LED	Color LED	—	White LED	Color LED	—	White LED	Color LED	
Resolution of scale	0.02 μm									
Vision measuring accuracy*2	E _{1x} , E _{1y}	—			(0.8 + 2L/1000) μm			—		
	E _{1z}	—			(1.5 + 2L/1000) μm			—		
	E _{2xy}	—			(1.4 + 3L/1000) μm			—		
LAF Repeatability	—	σ≤0.8 μm	—	—	σ≤0.8 μm	—	—	σ≤0.8 μm	—	
Models with touch probe	QVT1-H302P1L-D	QVT1-H302T1L-D	QVT1-H302P1C-D	QVT1-H404P1L-D	QVT1-H404T1L-D	QVT1-H404P1C-D	QVT1-H606P1L-D	QVT1-H606T1L-D	QVT1-H606P1C-D	
TP measuring accuracy*2	E _{1x} , E _{1y} , E _{1z} (1.7 + 3L/1000) μm									

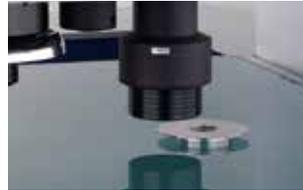
*1 Programmable power turret 1X-2X-4X model and 1X-2X-4X-6X model are available to special order. *2 Determined by Mitutoyo's inspection method.

QV HYBRID TYPE 1

Non-contact Laser Probe-equipped CNC Vision Measuring System



- This complex system with a non-contact displacement sensor has a scanning function that enables measurement of minute height differences and 3D shapes.
- The double-pinhole technique has been adopted as the detection method of the displacement sensor. It is less directional compared with the knife-edge and triangulation techniques.
- The small laser spot with diameter of about 2 μm makes it possible to measure minute shapes.



QV Hybrid Type1 Apex 404

Model	QVH1 302	QVH1 404	QVH1 606	QVH1 302	QVH1 404	QVH1 606	
	Apex			Hyper			
Order No.	QVH1-X302P1L-D	QVH1-X404P1L-D	QVH1-X606P1L-D	QVH1-H302P1L-D	QVH1-H404P1L-D	QVH1-H606P1L-D	
Measuring range by vision probe	300×200×200 mm	400×400×250 mm	600×650×250 mm	Same as Apex			
Measuring range by displacement sensor	180×200×200 mm	280×400×250 mm	480×650×250 mm	Same as Apex			
Observation unit*1	Programmable power turret 1X-2X-6X						
Illumination unit	Contour illumination	White LED					
	Vertical surface illumination						
	PRL						
Resolution of scale	0.1 μm			0.02 μm			
Vision measuring accuracy*2	E _{ix} , E _{iy}	(1.5 + 3L/1000) μm			(0.8 + 2L/1000) μm		
	E _{iz}	(1.5 + 4L/1000) μm			(1.5 + 2L/1000) μm		
	E _{zxy}	(2.0 + 4L/1000) μm			(1.4 + 3L/1000) μm		
Displacement sensor measuring accuracy	E _{iz}	(1.5 + 4L/1000) μm			(1.5 + 2L/1000) μm		

*1 Programmable power turret 1X-2X-4X model and 1X-2X-4X-6X model are available to special order. *2 Determined by Mitutoyo's inspection method.

QV HYBRID TYPE 4

Non-contact Laser Probe-equipped CNC Vision Measuring System



- This complex system with a non-contact displacement sensor has a scanning function that enables measurement of minute height differences and 3D shapes.
- The non-contact displacement sensor (CRS probe) uses the wavelength confocal method.
- The LED used as the light source of the displacement sensor has an auto-brightness control function that enables seamless measurement of materials with different reflectivity.



Hyper QV Hybrid Type4 606

Model	QVH4A 302		QVH4A 404		QVH4A 606		Hyper QVH4A		
	Apex	STREAM PLUS	Apex	STREAM PLUS	Apex	STREAM PLUS	302	404	606
Order No.	QVH4A-X302P1L-D	QVH4A-X302P1S-D	QVH4A-X404P1L-D	QVH4A-X404P1S-D	QVH4A-X606P1L-D	QVH4A-X606P1S-D	QVH4A-H302P1L-D	QVH4A-H404P1L-D	QVH4A-H606P1L-D
Measuring range by vision probe	300×200×200 mm		400×400×250 mm		600×650×250 mm		Same as Apex		
Measuring range by displacement sensor	176×200×200 mm		276×400×250 mm		476×650×250 mm		Same as Apex		
Observation unit*1	Programmable power turret 1X-2X-6X								
STREAM function	-	✓	-	✓	-	✓	-		
Illumination unit	Contour illumination	Blue LED	White LED	Blue LED	White LED	Blue LED	White LED		
	Vertical surface illumination	Color LED		Color LED		Color LED			
	PRL								
Resolution of scale	0.1 μm						0.02 μm		
Vision measuring accuracy*2	E _{ix} , E _{iy}	(1.5 + 3L/1000) μm				(0.8 + 2L/1000) μm			
	E _{iz}	(1.5 + 4L/1000) μm				(1.5 + 2L/1000) μm			
	E _{zxy}	(2.0 + 4L/1000) μm				(1.4 + 3L/1000) μm			
Displacement sensor measuring accuracy	E _{iz}	(1.5 + 4L/1000) μm				(1.5 + 2L/1000) μm			

*1 Programmable power turret 1X-2X-4X model and 1X-2X-4X-6X model are available to special order. *2 Determined by Mitutoyo's inspection method.

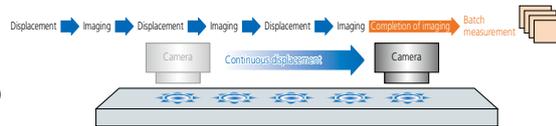
QV STREAM PLUS

Non-stop CNC Vision Measuring System



● The main unit operation and the strobe light are synchronized to enable vision measurement without stopping the stage. As it is unnecessary to increase or decrease the stage speed, measurement becomes 5X faster than conventional models depending on the object type. (Compared with our conventional models.)

● The model with tracking auto focus performs continuous measurement by adapting to height differences, thus reducing the measurement time significantly.



QV STREAM PLUS 606

Model	QV STREAM PLUS 302		QV STREAM PLUS 404		QV STREAM PLUS 606	
Order No.	QV-X302P15-D	QV-X302T15-D	QV-X404P15-D	QV-X404T15-D	QV-X606P15-D	QV-X606T15-D
Measuring range	300×200×200 mm		400×400×250 mm		600×650×250 mm	
Observation unit*1	Programmable power turret 1X-2X-6X					
Tracking Auto Focus device	-	✓	-	✓	-	✓
Illumination unit	Contour illumination		Blue LED			
	Vertical surface illumination		Color LED			
	PRL		Color LED			
Resolution of scale	0.1 μm					
Vision measuring accuracy*2	E _{1x} , E _{1y}		(1.5 + 3L/1000) μm			
	E _{1z}		(1.5 + 4L/1000) μm			
	E _{2xy}		(2.0 + 4L/1000) μm			
LAF Repeatability	-	σ≤0.8 μm	-	σ≤0.8 μm	-	σ≤0.8 μm

*1 Programmable power turret 1X-2X-4X model and 1X-2X-4X-6X model are available to special order. *2 Determined by Mitutoyo's inspection method.

Hyper QV WLI

Non-contact 3D Measuring System



● Hyper QV WLI is a high-accuracy complex 3D measurement system consisting of QV and a white light interferometer.

● You can perform 3D surface texture analysis and 3D roughness analysis from 3D data captured by the WLI optical system. You can also perform dimension measurement and cross-section measurement at a specific height using the 3D data.



Hyper QV WLI 606

Model	Hyper QV WLI 302		Hyper QV WLI 404		Hyper QV WLI 606	
Order No.	QVW-H302P1L-D	QVW-H302T1L-D	QVW-H404P1L-D	QVW-H404T1L-D	QVW-H606P1L-D	QVW-H606T1L-D
Measuring range	Vision measurement	300×200×190 mm	400×400×240 mm	400×400×240 mm	600×650×220 mm	600×650×220 mm
	WLI measurement	215×200×190 mm	315×400×240 mm	315×400×240 mm	515×650×220 mm	515×650×220 mm
Observation unit*1	Programmable power turret 1X-2X-6X					
Illumination unit	Contour illumination		White LED			
	Vertical surface illumination		White LED			
	PRL		White LED			
	WLI optical head		Halogen			
Resolution of scale	0.01 μm					
Vision measuring accuracy*2	E _{1x} , E _{1y}		(0.8 + 2L/1000) μm			
	E _{1z}		(1.5 + 2L/1000) μm			
	E _{2xy}		(1.4 + 3L/1000) μm			
WLI Z-axis scanning range (max)	QV WLI A-5X, QV WLI A-10X: 6.3 mm, QV WLI A-25X: 3.2 mm, QV WLI A-50X: 1.0 mm					
WLI Z-axis repeatability*2	2σ≤0.08 μm					

*1 Programmable power turret 1X-2X-4X model and 1X-2X-4X-6X model are available to special order. *2 Determined by Mitutoyo's inspection method.

QV ACCEL

CNC Vision Measuring System



- This is a vision measuring machine with moving-bridge type main unit structure suitable for measuring large objects.
- As the stage is immobile on the moving-bridge structure, you can use a simple method to fix a workpiece, which is suitable for measuring small, thin objects.
- QV ACCEL 1212 (range: 1250×1250×100 mm) and QV ACCEL 1517 (range: 1500×1750×100 mm) are available to special order.



QV ACCEL 808

Model		QV ACCEL 808	QV ACCEL 1010
Order No.		QV-A808P1L-D	QV-A1010P1L-D
Measuring range		800×800×150 mm	1000×1000×150 mm
Observation unit*1		Programmable power turret 1X-2X-6X	
Illumination unit	Contour illumination	White LED	
	Vertical surface illumination	White LED	
	PRL	White LED	
Resolution of scale		0.1 μm	
Vision measuring accuracy*2	E _{1x} , E _{1y}	(1.5 + 3L/1000) μm	
	E _{1z}	(1.5 + 4L/1000) μm	
	E _{2xy}	(2.5 + 4L/1000) μm	
Repeatability*2	Short dimension	3σ=0.2 μm	
	Long dimension	X, Y axis	3σ=0.7 μm

*1 Programmable power turret 1X-2X-4X model and 1X-2X-4X-6X model are available to special order.

*2 Determined by Mitutoyo's inspection method. Short dimension=Repeatability within a single screen; Long dimension=Repeatability over several screen movements.

ULTRA QV

Ultra-high Accuracy CNC Vision Measuring System



- Ultra-high accuracy CNC vision measuring machine with measuring accuracy of E_{1xy} (0.25 + L/1000) μm.
- Our proprietary high-resolution (0.01 μm) and high-accuracy low-expansion glass scales are used on the X, Y and Z axes.
- The high-rigidity Y-axis table moving mechanism with fixed bridge has been adopted. The base is made of high stability granite.



ULTRA QV404

Model		ULTRA QV404	
Order No.		QV-U404P1N-D	QV-U404T1N-D
Measuring range		400×400×200 mm	
Observation unit*1		Programmable power turret 1X-2X-6X	
Tracking Auto Focus device		-	✓
Illumination unit	Contour illumination	Halogen	
	Vertical surface illumination	Halogen	
	PRL	Halogen	
Resolution of scale		0.01 μm	
Vision measuring accuracy*2	E _{1x} , E _{1y}	(0.25 + L/1000) μm	
	E _{1z} (50 mm stroke)	(1.0 + 2L/1000) μm	
	E _{1z} (Full stroke)	(1.5 + 2L/1000) μm	
	E _{2xy}	(0.5 + 2L/1000) μm	
LAF Repeatability		-	σ≤0.8 μm

*1 Programmable power turret 1X-2X-4X model and 1X-2X-4X-6X model are available to special order. *2 Determined by Mitutoyo's inspection method.

OPTIONS



QV Objectives

QV objectives

Objective	QV-SL0.5X*	QV-HR1X	QV-SL1X	QV-HR2.5X	QV-SL2.5X	QV-HR5X	QV-5X	QV-HR10X*	QV-10X*	QV-25X*
Order No.	02AKT199	02AKT250	02ALA150	02AKT300	02ALA170	02AWD010	02ALA420	02AKT650	02ALG010	02ALG020
Set of objectives that support PFF	—	—	—	02AKX895	—	—	02AKX900	02AKX905	—	02AKX910
Working distance	30.5 mm	40.6 mm	52.5 mm	40.6 mm	60.0 mm	20.0 mm	33.5 mm	20.0 mm	30.5 mm	13.0 mm
Field of view (H)×(V)	mm	Turret 1X	12.54×9.4	6.27×4.7	2.49×1.86	1.24×0.93	0.62×0.47	0.25×0.18	0.12×0.09	0.04×0.03
		Turret 2X	6.27×4.7	3.13×2.35	1.24×0.93	0.62×0.47	0.31×0.23	0.10×0.07	0.04×0.03	0.04×0.03
		Turret 6X	2.09×1.56	1.04×0.78	0.41×0.31	0.20×0.15	0.10×0.07	0.04×0.03	0.04×0.03	0.04×0.03

* When the QV-SL0.5X, QV-HR10X, QV-10X, or QV-25X objective is used, some limitations, such as the illumination being insufficient depending on the workpiece, may occur.

Overall magnification with objective/turret combinations

Monitor magnification ^{*1}	15X	29X	58X	72X	87X	144X	173X	290X	430X	580X	720X	870X	1440X	1730X	4300X
Field of view [mm]	12.54×9.40	6.27×4.70	3.13×2.35	2.49×1.86	2.09×1.56	1.24×0.93	1.04×0.78	0.62×0.47	0.41×0.31	0.31×0.23	0.25×0.18	0.20×0.15	0.12×0.09	0.10×0.07	0.04×0.03
0.5X objective	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
1X objective	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
2.5X objective	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
5X objective	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
10X objective ^{*2}	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
25X objective ^{*2}	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

*1 The monitor magnification is a reference value when an image is displayed at 1X screen magnification on a 22-inch wide LCD monitor. QVPAK version 10 or later supports changing of video window size.

*2 When using a 10X or 25X objective lens in conjunction with a 2X or 6X power turret, brightness illumination may be insufficient depending on the workpiece.

Calibration Chart and QV Compensation Chart

Calibration chart

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



Note: There are limitations on the function, depending on the lens. For details, contact your Mitutoyo sales office.

QV compensation chart

This glass chart is used to perform compensation for distortions within the screen caused by the optical system, and auto focus compensation, which reduces auto focus variations that are caused by differences between the workpiece pattern and texture.

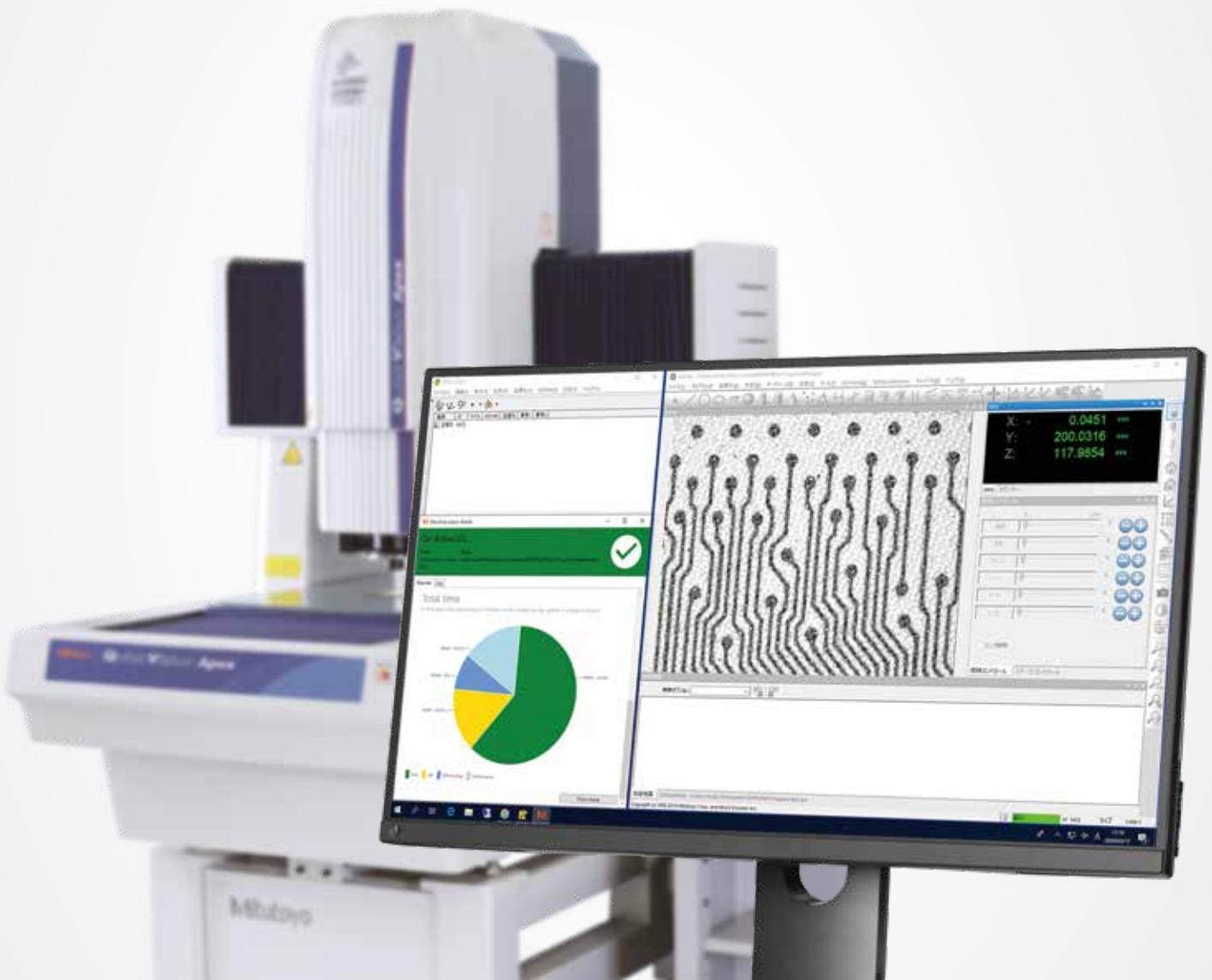


Note: There are limitations on the function, depending on the lens. For details, contact your Mitutoyo sales office.

SOFTWARE

Application software that offers both functionality and operability

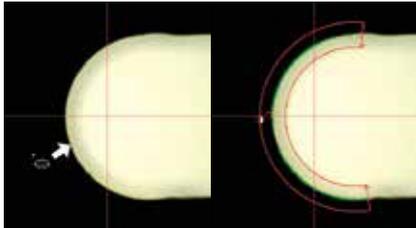
In addition to high-performance vision measuring functions, we offer a wide range of software applications such as shape analysis using a non-contact displacement sensor and automatic creation of measurement programs. From simple to complex measurements, our lineup can resolve any measurement issues that our customers may encounter.



A rich choice of measuring functions

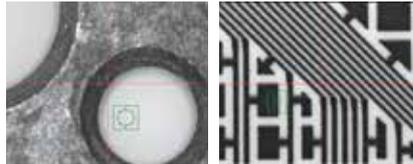
1 One-click Tool

Whatever your proficiency level, this function enables you to perform high-accuracy measurements by simply selecting the measurement item (circle, line, etc.) and clicking the edge to measure once. The abnormal point removing function automatically removes traces of burrs and contaminants.



2 AI Illumination Tools

There are two tools: the dual area contrast tool, which can adjust the light intensity to the optimal value at procedure creation time, and the brightness tool, which automatically compensates the light intensity at program creation time. These tools stabilize the light intensity during repeat measurements, which increases edge detection repeatability and reduces the occurrence of edge detection errors caused by light intensity fluctuations.

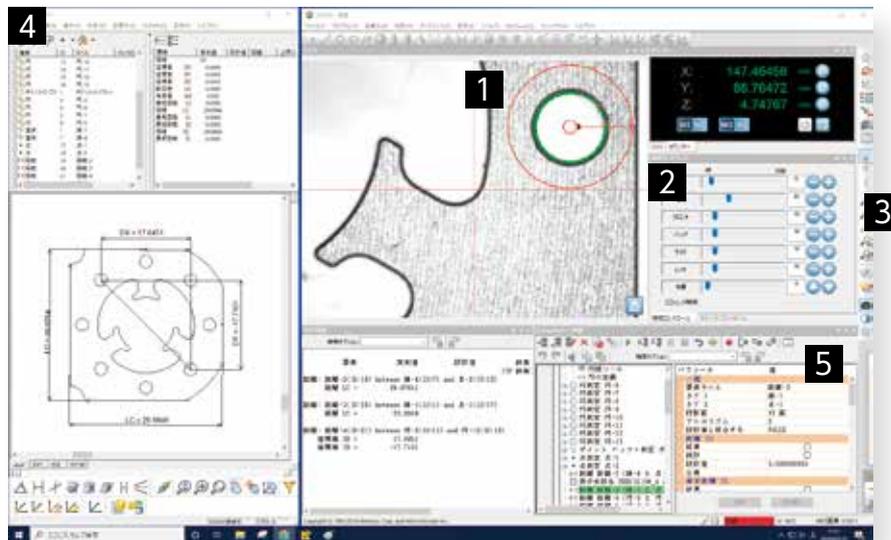
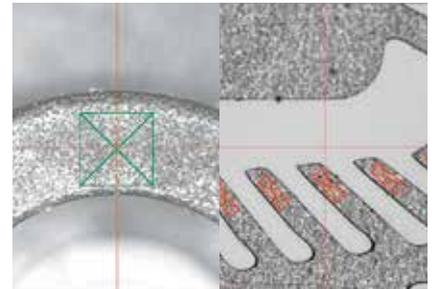


Brightness Tool

Dual Area Contrast Tool

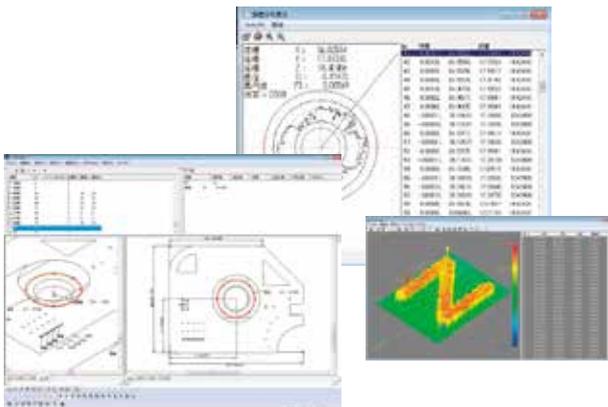
3 Multi-point Auto Focus

You can subdivide an auto focus tool or set up multiple auto focus tools at desired sizes, positions and angles.



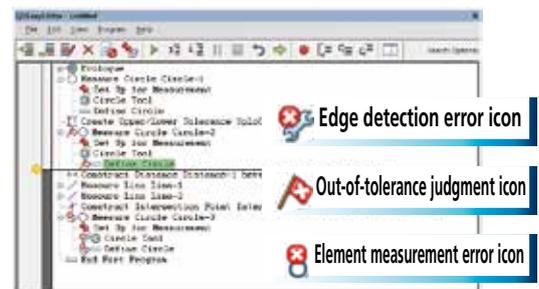
4 QV Graphics

Not only can this feature be used for reports of measurement results but also high-level calculations such as calculations between elements and PCD measurements can be performed by selecting diagrams with the mouse. In addition, effective use of the graphics function makes it possible to easily edit part programs and is also useful in checking the coordinate system of the current workpiece and in checking for any forgotten measurements.



5 QV EasyEditor

QV EasyEditor records and allows you to easily edit the details of the operator's operation. The program list displays error icons for you to quickly find the parts to correct.



Edge detection error icon

Out-of-tolerance judgment icon

Element measurement error icon

OPTIONAL SOFTWARE

FORMTRACEPAK-AP

Form Evaluation and Analysis Software

FORMTRACEPAK-AP performs tolerancing and form analysis from data obtained with the QV's auto trace tool, non-contact displacement sensor, HQV WLI, and PFF.

Contour Tolerancing Function

- Design data creation
CAD data conversion, master workpiece conversion, function specification, text file conversion, and aspherical surface design value creation
- Tolerancing
Normal vector direction tolerancing, axial direction tolerancing, and best-fit tolerancing

Microscopic Form Analysis

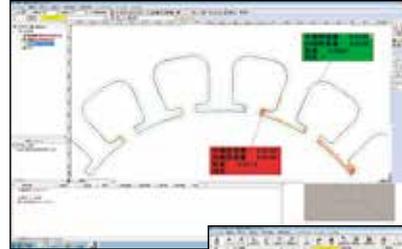
- Analyzed items: point measurement, line measurement, circle measurement, distance measurement, intersection measurement, angle measurement, origin setting, and axial rotation
- Calculated items: maximum, minimum, average, standard deviation, and area

Report Creation Function

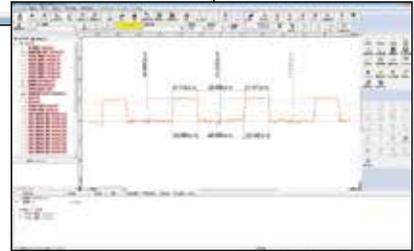
- Measurement result, error graph, and error developed view

Other Functions

- Recording and executing analysis procedures
- External output function:
CSV, text or DXF/IGES format output



Tolerancing example

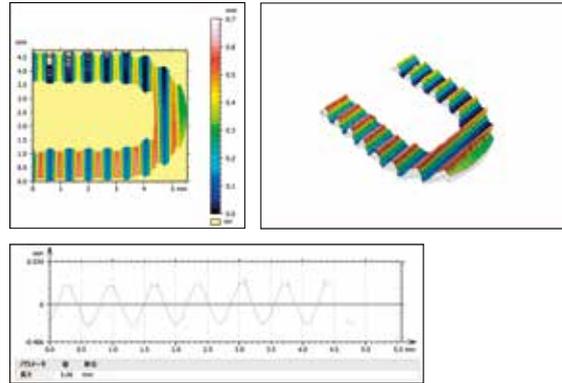


Example of using HQV WLI to perform line and space and conductor thickness measurements on a printed circuit board

MCubeMap

3D Surface Property Analyzing Software

3D data captured by QV WLI can be analyzed according to parameters compliant with JIS B681-2: 2018 (ISO25178-6: 2010), including Sa, Sq and other height parameters and 3D roughness parameters related to space, complexity and functionality. You can also analyze 2D shapes and measure volumes from the 3D data captured by PFF or QV Hybrid.



3D analysis of the above shape captured by PFF

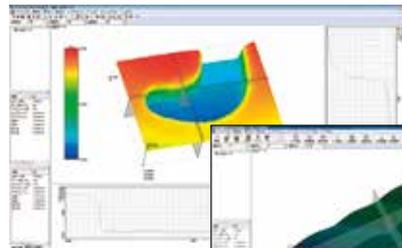
FORMTRACEPAK-PRO

Form Evaluation and Analysis Software

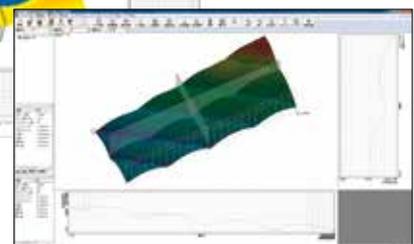
3D data captured by QV WLI can be analyzed for 3D surface roughness and surface texture. You can also analyze the displayed 3D shape information captured by the non-contact displacement sensor of PFF or QV Hybrid.

Main Functions

- **3D display**
Wire frame, shading, contour line, contour line filling
- **Trend compensation and filter processing**
Trend compensation using flat surfaces, spherical surfaces, cylindrical surfaces, and polyhedrons
1D and 2D digital filters for each profile
- **Digitization of a rich variety of surface textures**
Relative load curves and area distribution curves can be used to evaluate wear and oil accumulation areas.
Spectral analysis, cutoff area and volume analysis, angle of inclination calculations at peaks and valleys, and histogram calculations of numbers of valleys can be performed.
- **Function for extracting features from measurement data**
Extraction of a chosen cross section, slope enhancement, and simultaneous analysis of the peaks and valleys of the cutoff surface can be performed.



Example of using PFF to measure a molded component



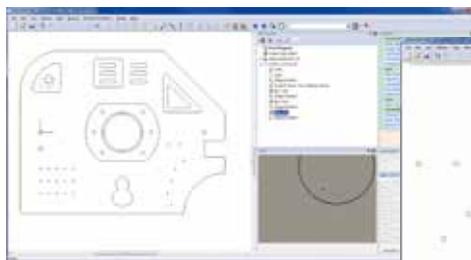
Example of using QVH4 to perform acrylic lens array measurements

EASYPAG - PRO DXF IGES GERBER data

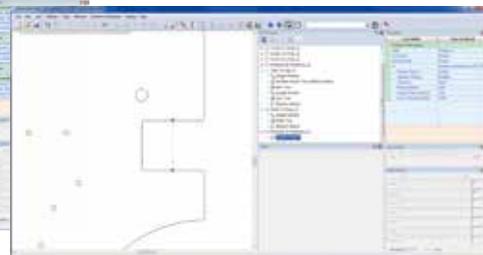
Offline Teaching Software

EASYPAG-PRO can use 2D CAD data to create QVPAK part programs in an offline manner.

This reduces the number of man-hours required to create part programs, which results in a decrease in lead time.



Offline teaching operation display

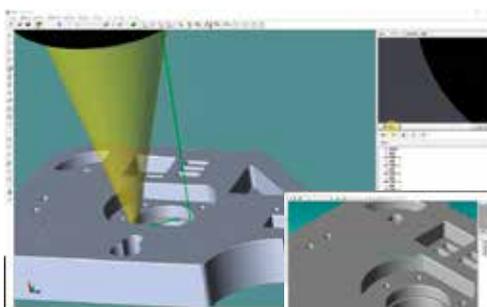


Line-to-arbitrary point distance measurement

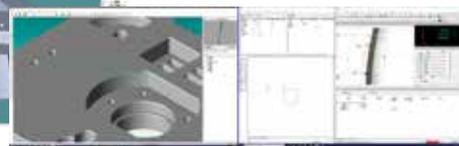
QV3DCAD

Creates a QV PAK part program from a 3D CAD model.

The current version supports two modes: the online mode that allows you to teach while monitoring the actual workpiece by synchronizing the software with the QV system, and the offline mode that allows you to create a part program on a PC not connected to the main unit.



Offline teaching mode

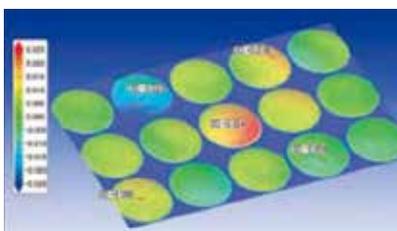


Online teaching mode

MSURF-I

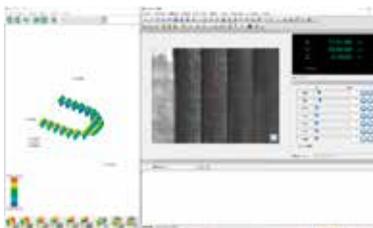
Compares the 3D data captured by QV Hybrid, QV WLI and PFF with the design data of the 3D CAD model, etc.

Note: A separate PC is necessary for MSURF-I analysis.



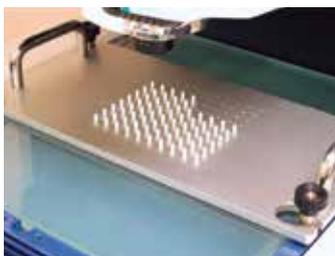
QV3DPAK

QV3DPAK is a software application that composes 3D forms from PFF (Point From Focus) or WLI (White Light Interferometer) data.



QVPartManager

QVPartManager is the part program execution management software for multiple workpieces arranged on the QV stage.



Workpieces arranged on a dedicated fixture



QVPartManager screen

SMART FACTORY

From status management to preventive maintenance.
Kickstart your smart factory through visualization.

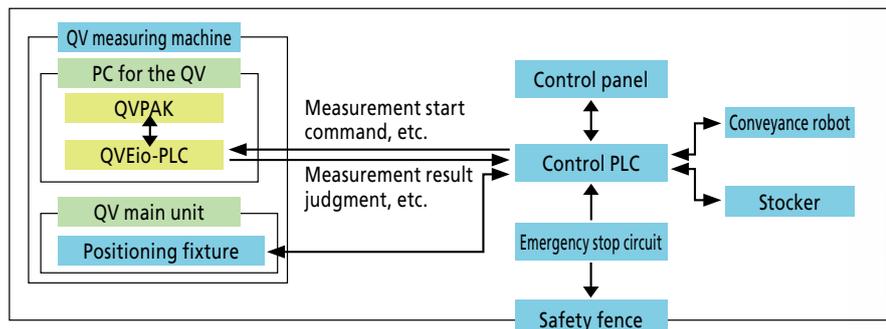
Mitutoyo has developed new features that use a network to centrally manage manufacturing process information. MeasurLink predicts defects by collecting and analyzing measuring machine data in real time. The status monitor (SMS: Smart Measuring System) that shows the operating status of the measuring machine also helps you improve productivity.



QVEio

IO application making the smart factory real

QVEio-PLC supported example





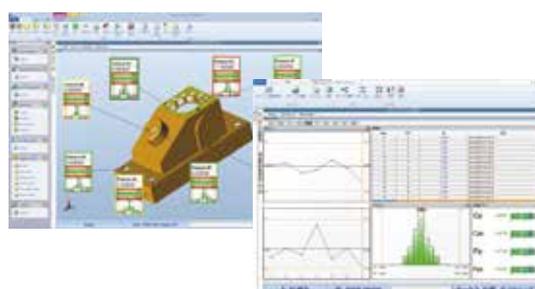
Status Monitor

Can remotely monitor measuring machines



MeasurLink

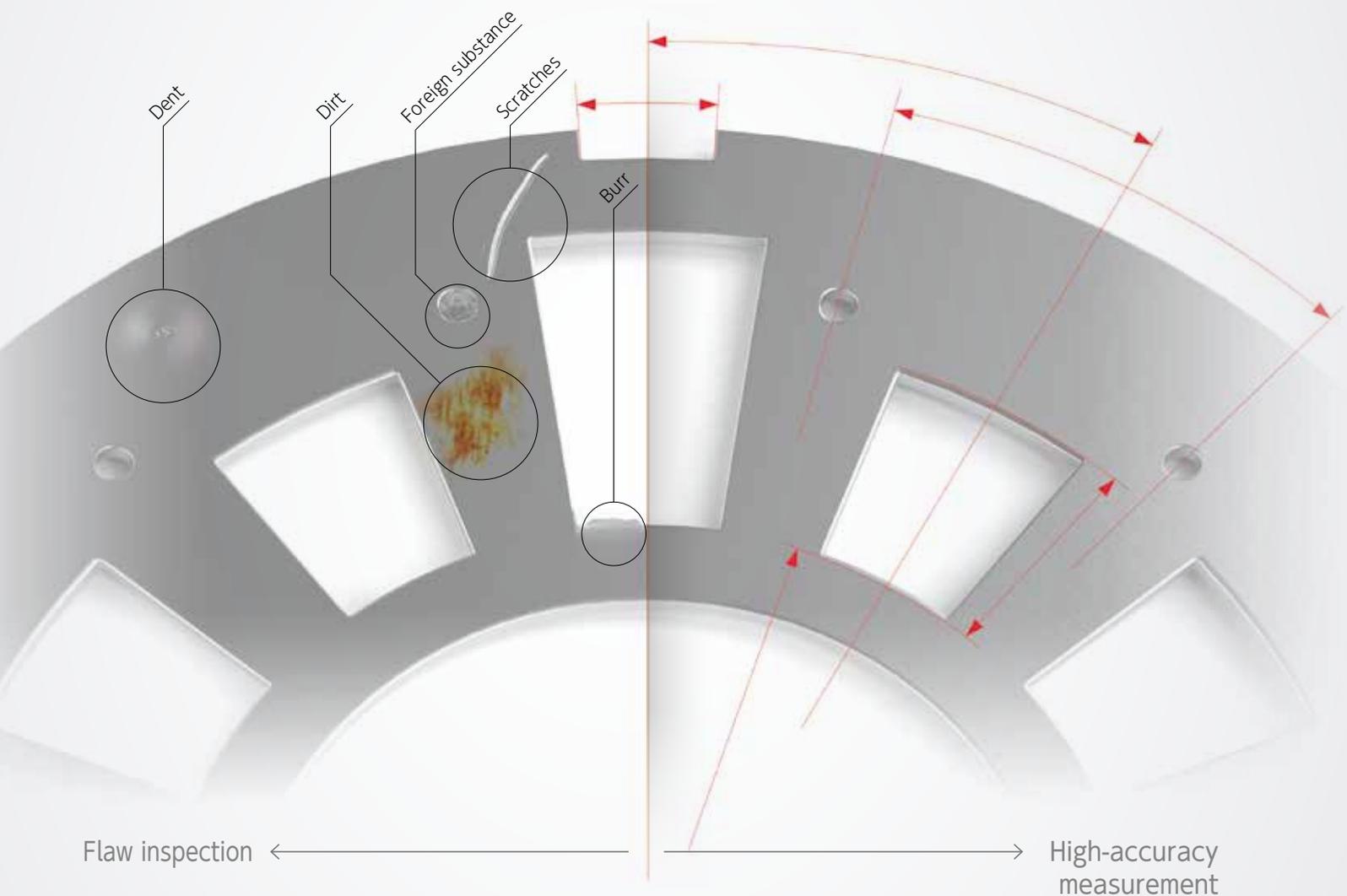
Reduces defective products by visualizing quality



INSPECTION

"DDPAK" - software for the Quick Vision Series that enables both flaw inspection and high-accuracy measurement

DDPAK is flaw inspection software for Quick Vision. Use it during measurement to inspect for flaws, such as contaminants, burrs and cracks while performing high-accuracy non-contact measurement at the same time.



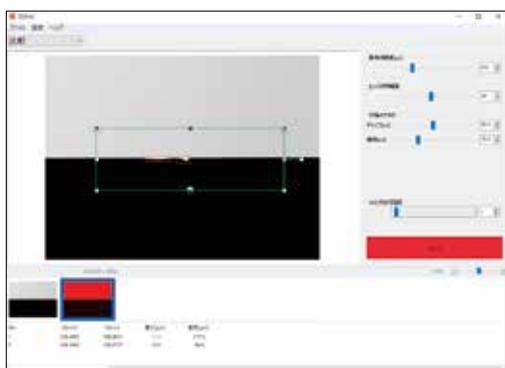
DDPAK

CNC Vision Measuring System Dedicated for Quick Vision

Flaw Inspection Software

■ Features

- Creates a seamless flaw inspection system that transfers the image data captured by the Quick Vision Series to DDPK, outputs the flaw coordinates and automatically saves the image.
- Measures the dimensions of a flaw and analyzes its shape. Analyzing the coordinate, size, depth, height and other statistics of a flaw can help analyze the cause, prevent recurrence, and improve the production process.
- You can add DDPK, the flaw inspection software, to your Quick Vision. Add the inspection feature to expand the applications of your Quick Vision.



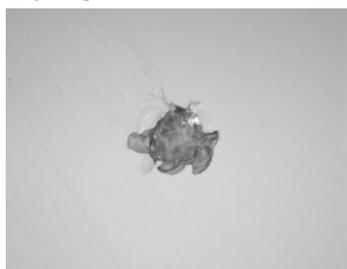
The image of the detected flaw turns red



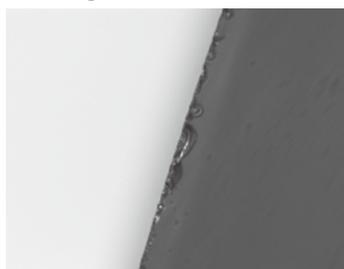
Chipped blade

■ Flaw detection example

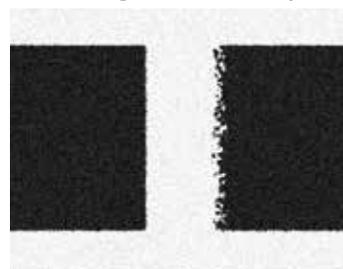
Chip on glass



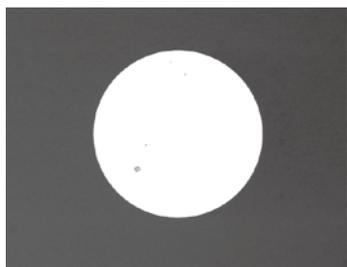
Cracked glass



Print blurring on an electronic part



Foreign substance in a pore



Scratched mirror-finished surface



Note: DDPK is available to special order. For details on supported workpieces and flaws, contact your local Mitutoyo sales office.



Whatever your challenges are, Mitutoyo supports you from start to finish.

Mitutoyo is not only a manufacturer of top quality measuring products but one that also offers qualified support for the lifetime of the equipment, backed up by comprehensive services that ensure your staff can make the very best use of the investment.

Apart from the basics of calibration and repair, Mitutoyo offers product and metrology training, as well as IT support for the sophisticated software used in modern measuring technology. We can also design, build, test and deliver bespoke measuring solutions and even, if deemed cost-effective, take your critical measurement challenges in-house on a sub-contract basis.



Find additional product literature and our product catalogue

<https://www.mitutoyo.co.jp/global.html>

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Mitutoyo

Mitutoyo Corporation

20-1, Sakado 1-Chome,
Takatsu-ku, Kawasaki-shi,
Kanagawa 213-8533, Japan
T +81 (0) 44 813-8230
F +81 (0) 44 813-8231
<https://www.mitutoyo.co.jp>