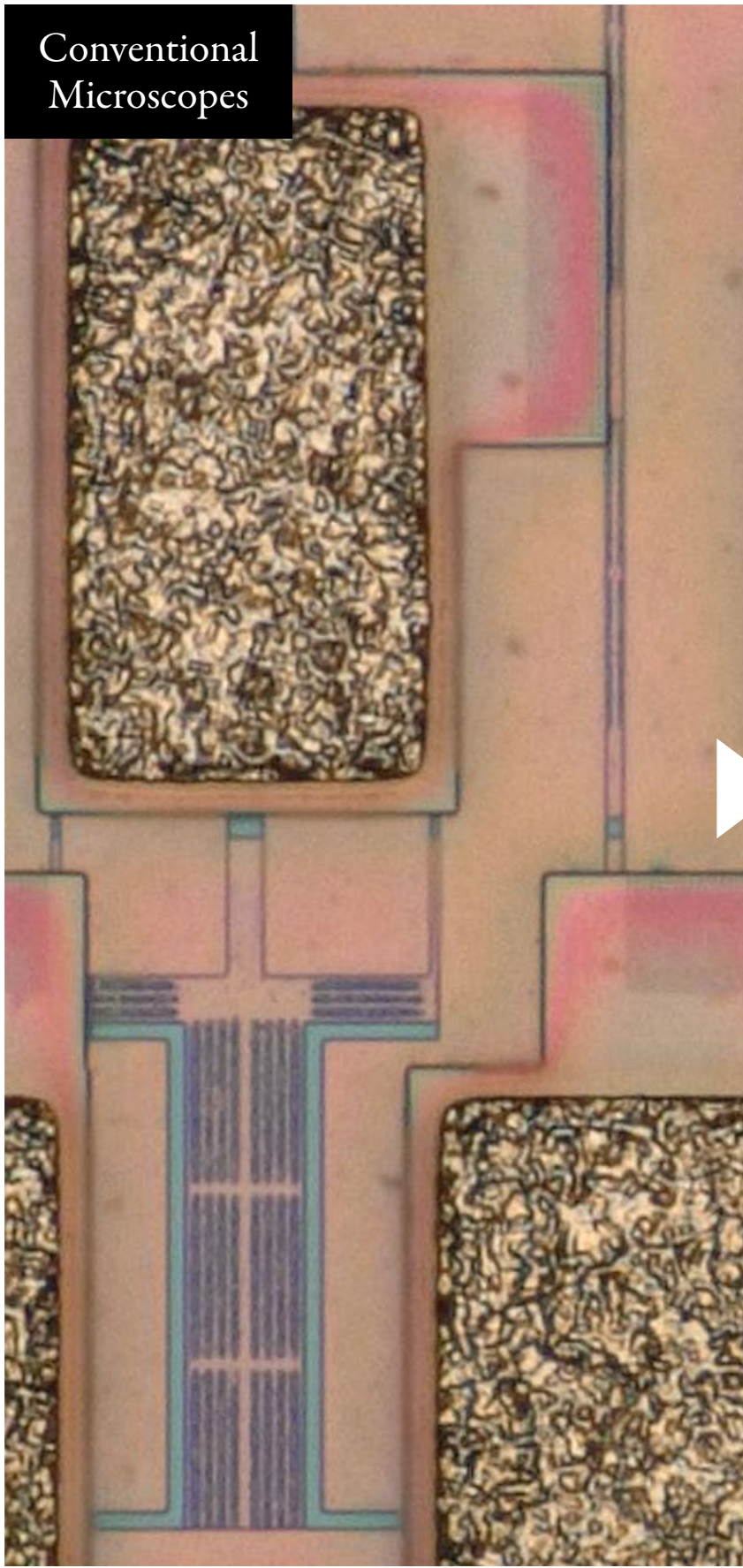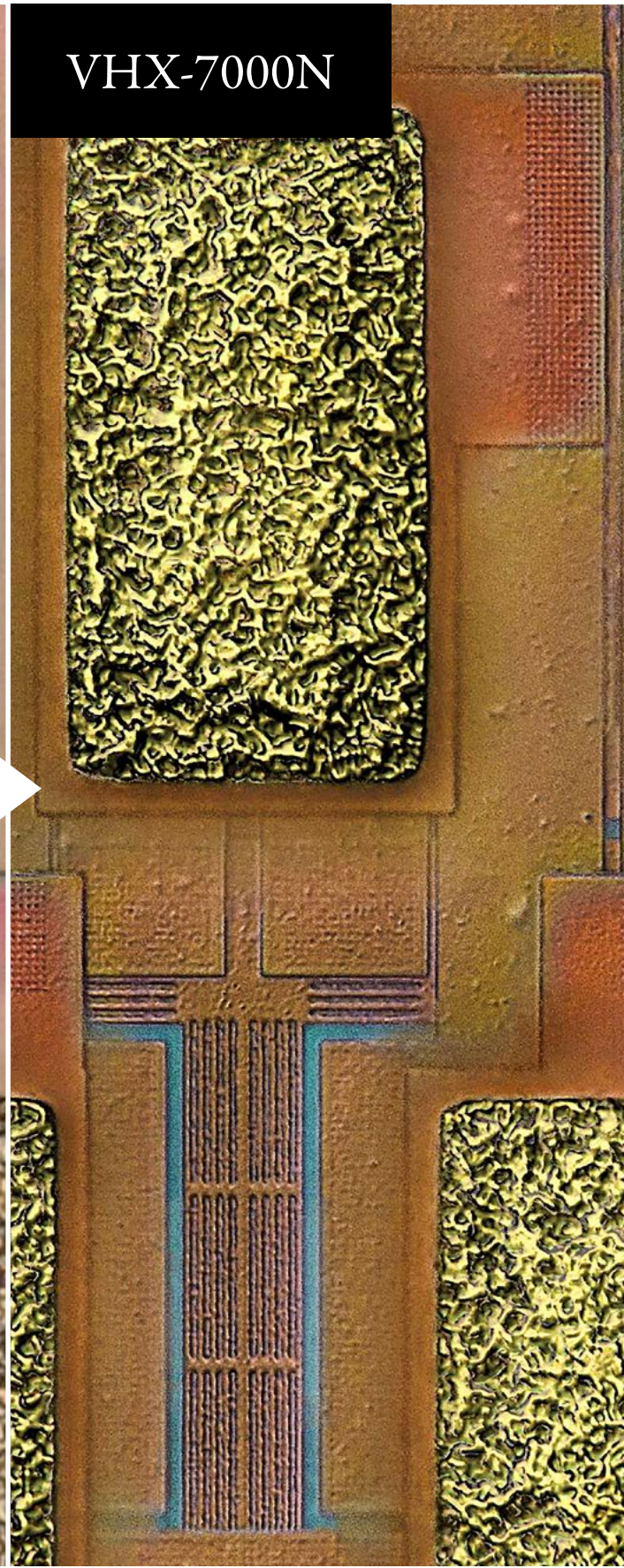# KEYENCE

Digital Microscope
VHX-7000 Series

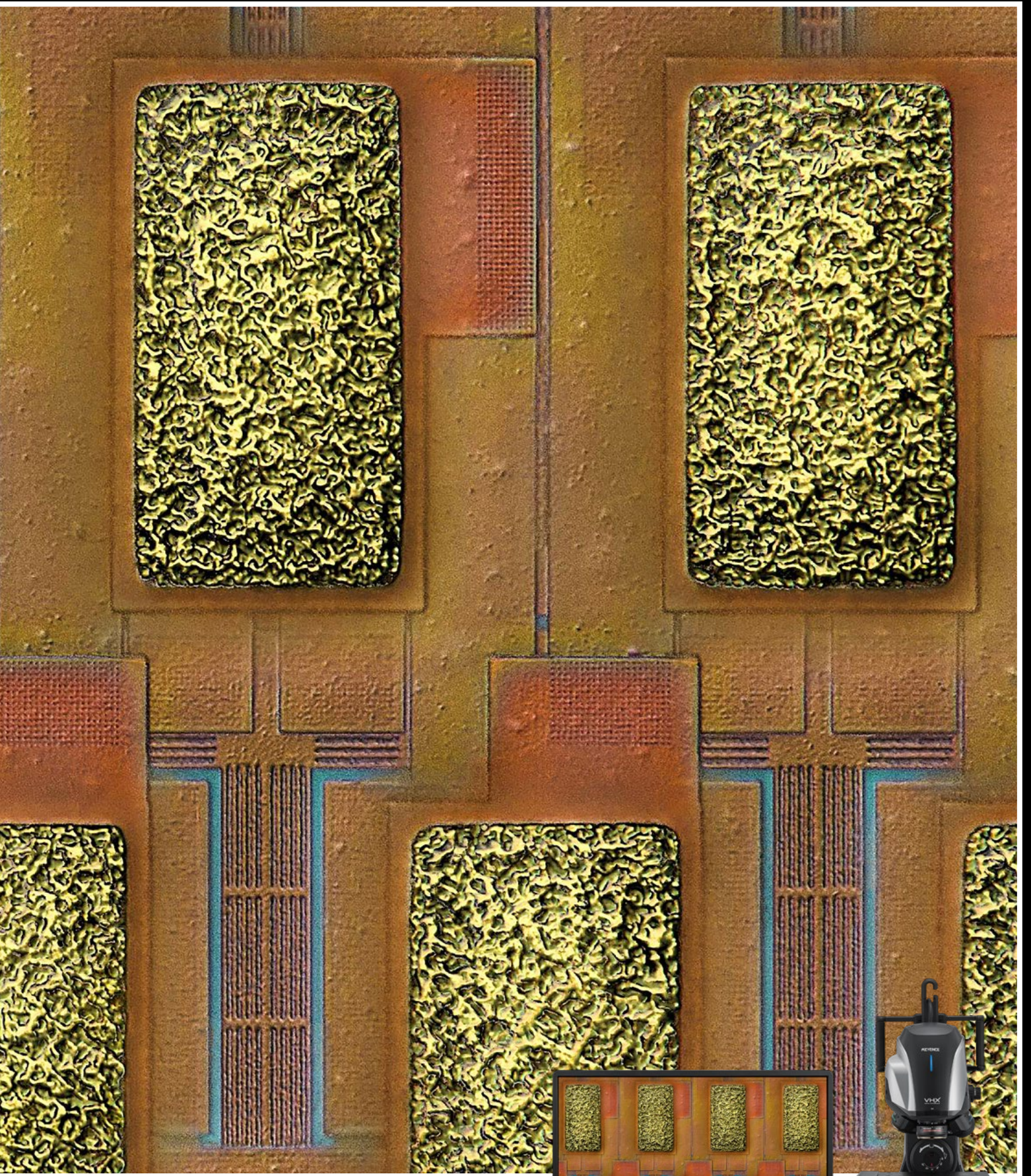# The World's First
4K Ultra-High Accuracy Microscope

Conventional Microscopes

VHX-7000N

THE NEXT ERA OF DIGITAL MICROSCOPY

Digital Microscope
VHX-7000 Series

3

Digital Microscope History

1990 –

VH-6000

VH-6300

VH-7000

VH-8000

VHX-100

VHX-200

2nd Generation

Introduction of 3D Observation

1st Generation

New design eliminates eye pieces

VHX
DIGITAL MICROSCOPE

Adopted by over 20,000 companies worldwide

VHX microscopes make observation simple and easy. KEYENCE has developed our new model to meet the needs of our customers. With the goal of developing the ideal digital microscope, we will continue to pursue the advancement of microscope technology.

5th Generation

NEW **VHX-7000N**

The World's First
4K Ultra-High Accuracy Microscope

4K
FI HEAD

VHX-500

VHX-600

VHX-900

VHX-1000

VHX-2000

4th Generation

Introduction of advanced
focus and lighting techniques

VHX-5000

VHX-6000

3rd Generation

Introduction of
high dynamic range
(16-bit color gradation)

VIEW

CAPTURE

MEASURE

Observation with an optimal balance of brightness and clarity

The VHX Series has a depth of field that is 20 times greater than conventional optical microscopes. KEYENCE designs the lenses, cameras and graphic engine in-house, enabling observation with an optimal balance of depth and brightness. Even novice users can capture high resolution images with ease.
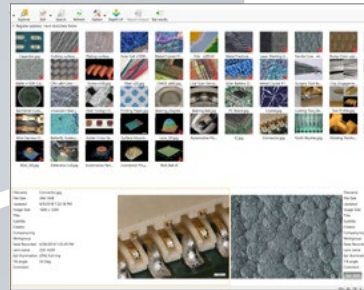
Large depth of field
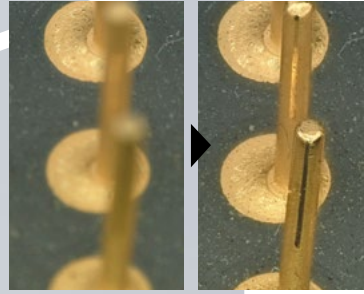
Hand-held observation

Images can be saved and shared easily

With a 1 TB hard drive, images are easily saved locally. Images can be shared over LAN or a USB drive. Reports can be automatically created and shared.
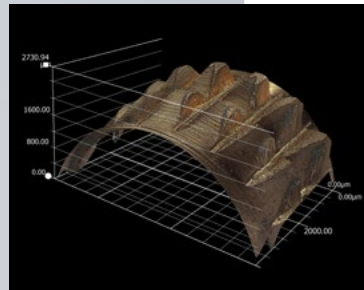
Easily save and recall images

Automatically generate reports

Perform a wide variety of measurements with just one device

Easily perform 2D and 3D measurements. Roughness, contamination, grain size, and other measurements can be performed with one tool.

3D measurement

Contamination analysis
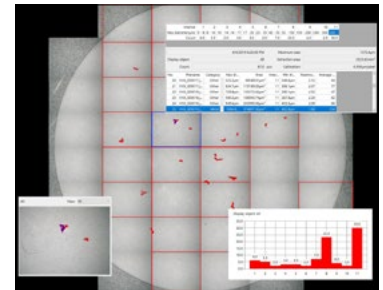
The VHX Series offers observation that exceeds conventional imaging tools. With advanced measurement capabilities, this system enables a variety of analyses. Expanded memory capacity allows for storage of millions of images. Its easy-to-use interface can be used effectively by expert and novice users. The VHX Series is equipped with all of the features needed to enhance your analysis.

View, capture and measure with an all-in-one system

4K monitor

Easier Operation and Higher Resolution Images

The VHX-7000N represents a new era of digital microscopy

Delivering images that rival an SEM

Optical Shadow Effect Mode: See page 10

Optical Shadow Effect Mode makes subtle contours stand out and enhances uneven surfaces and stains with the push of a button.

4K
FI HEAD

Newly developed imaging engine NEO REMAX

4K CMOS image sensor

500x to 2500x

2500x to 6000x

HR lens & Motorized revolver

100x to 500x

20x to 100x

Focus view camera

Highest definition in the history of microscopes

4K Fully-Integrated Head: See page 12

With a 4K CMOS image sensor and a newly-developed optical system, this VHX Series combines a large depth of field with high resolution to deliver a new level of observation.

Even novice users can capture optimal images

Advanced Operability: See page 14

The focus view feature paired with the motorized stage make focusing intuitive, and magnification can be changed by operating the handheld controller.

Optical Shadow Effect Mode

Delivering images that rival an SEM

By combining a 4K CMOS image sensor with new illumination techniques,

KEYENCE has achieved a new way to observe samples.
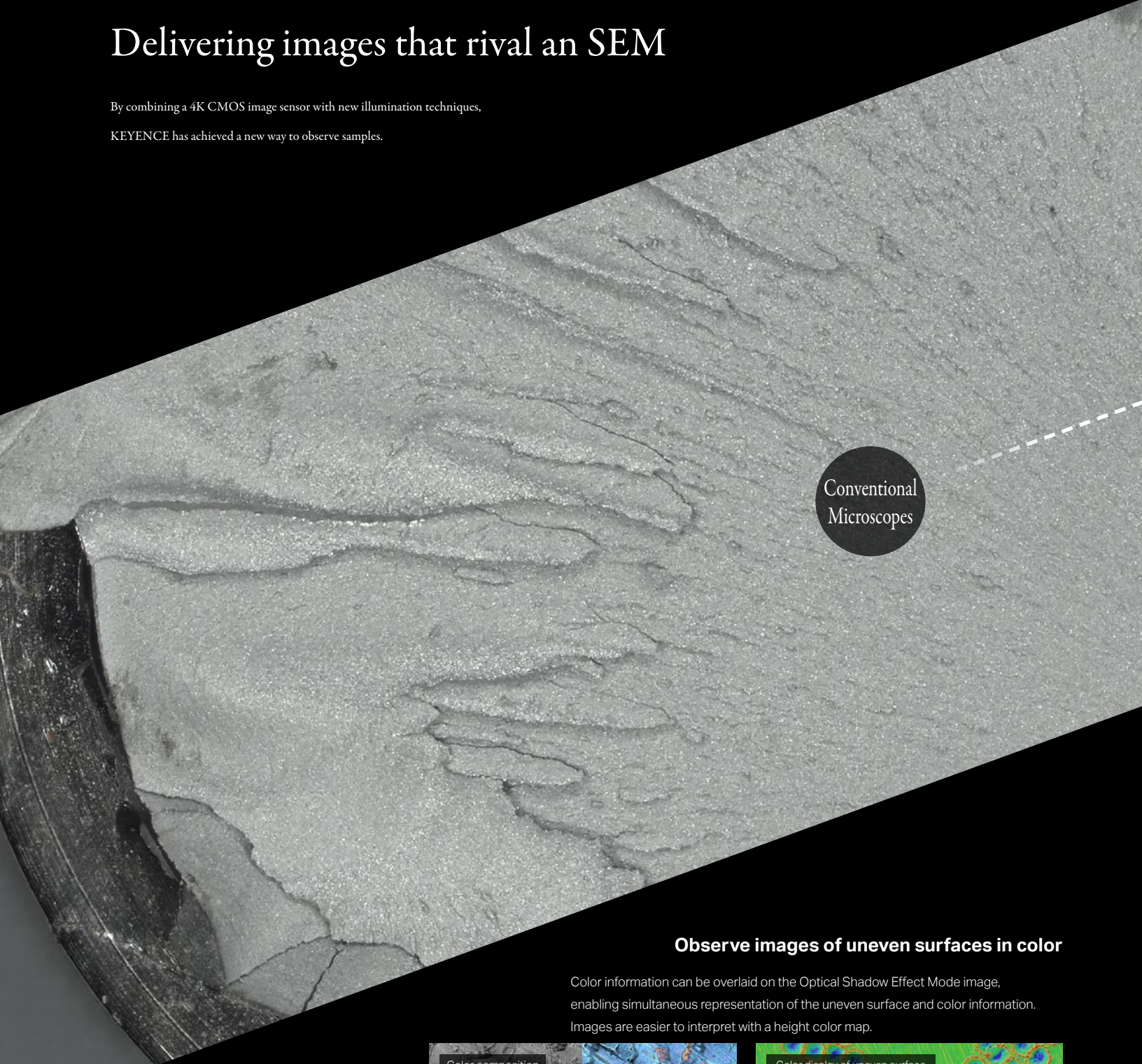
Conventional
Microscopes

Observe images of uneven surfaces in color

Color information can be overlaid on the Optical Shadow Effect Mode image,
enabling simultaneous representation of the uneven surface and color information.
Images are easier to interpret with a height color map.

Color composition

Color display of uneven surface
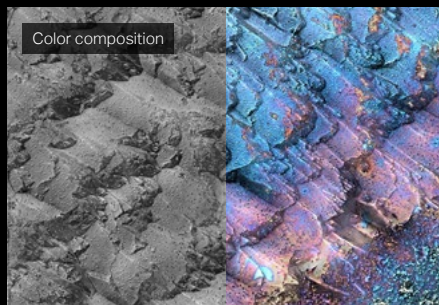
Metal crystals (1500x)
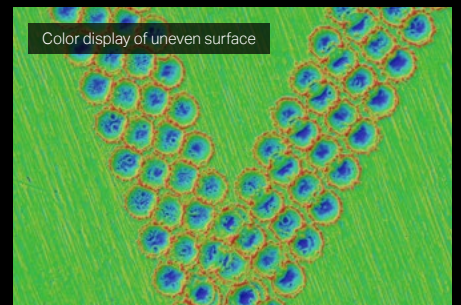
Laser printing (1000x)
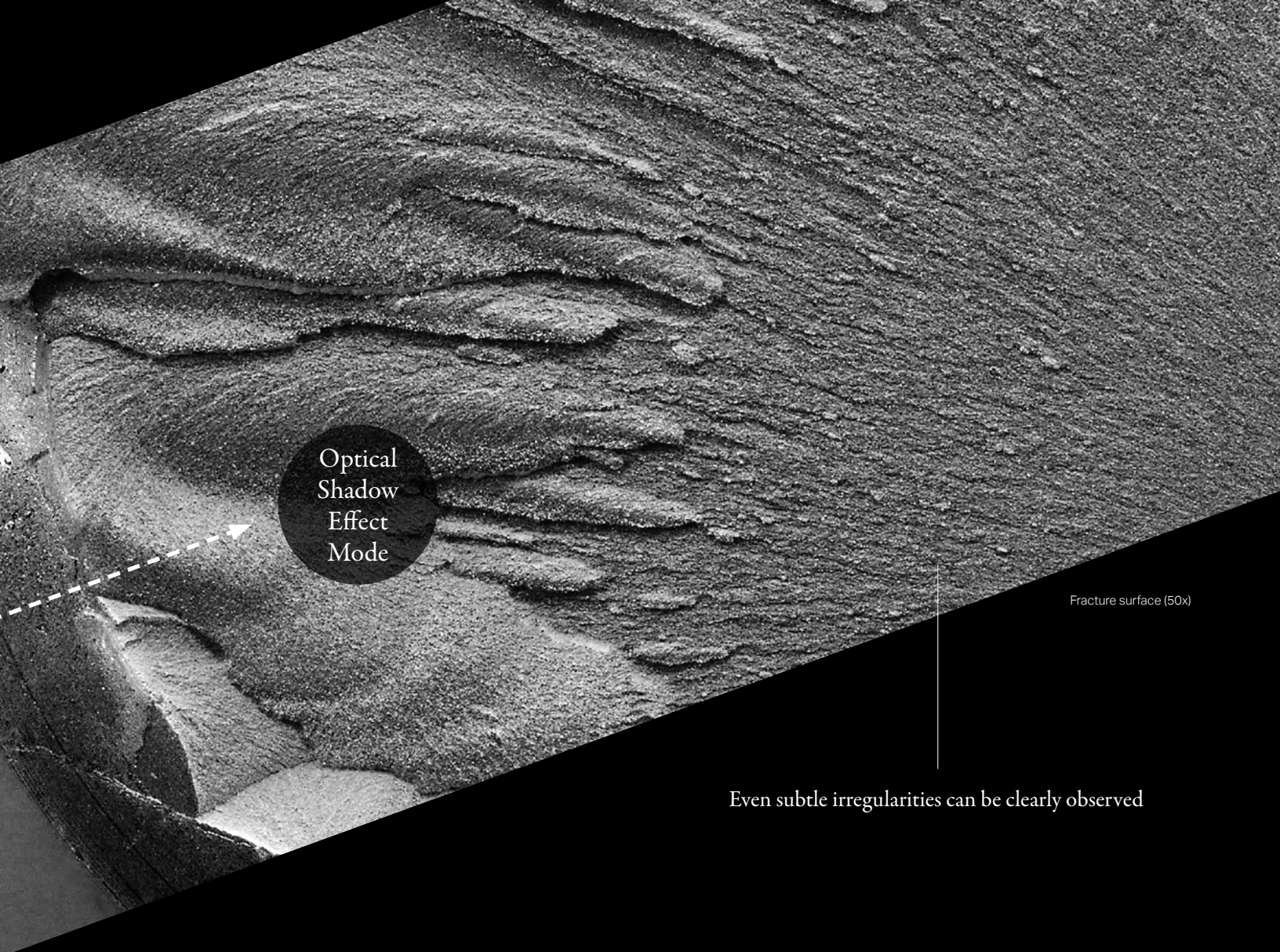
Optical
Shadow
Effect
Mode

Fracture surface (50x)

Even subtle irregularities can be clearly observed

Multi-directional lighting variation method

Varied illumination allows users to detect subtle irregularities on a sample.

Illumination from the left

Illumination

Illumination from the right

Illumination

Optical Shadow Effect Mode image
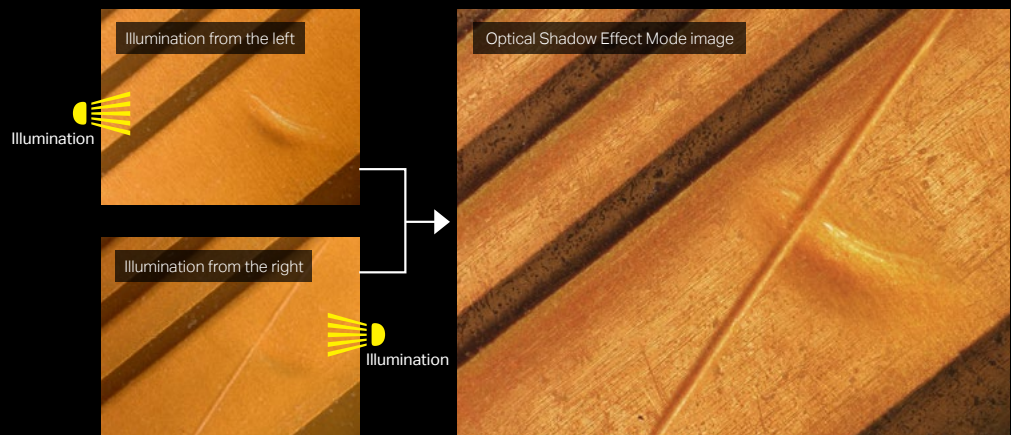
*The image above is an illustration showing the Optical Shadow Effect Mode principle.

A new Fully-Integrated Head offering
the highest picture quality
in the VHX Series

Newly developed
imaging engine
NEO REMAX

4K CMOS
image sensor

High-NA (0.9)
HR lens

Motorized revolver

Highest definition in the history of digital microscopes

Thanks to a 4K CMOS image sensor and a newly developed optical system, the VHX-7000N combines a large depth of field with high resolution. A wide range of observation modes—including Bright-field, Dark-field, Polarized Light, Differential Interference Contrast (DIC) and more—are covered, enabling automatic handling of all sorts of targets.

4K
FI HEAD

4K CMOS image sensor delivers highest resolution

The 4K CMOS image sensor ensures high resolution and low noise. This mobilizes the full image-capture power of the 4K monitor and High resolution lens, enabling high-resolution observation.

4000 pixels

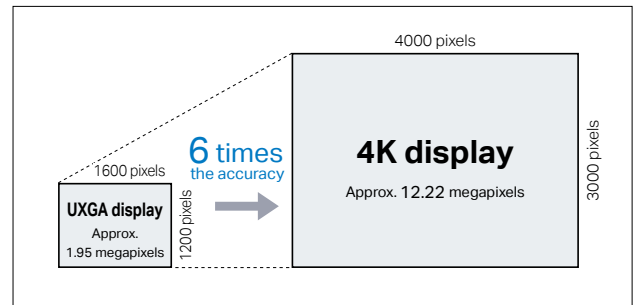1600 pixels

6 times the accuracy

4K display
Approx. 12.22 megapixels

3000 pixels

UXGA display
Approx. 1.95 megapixels

1200 pixels

High-resolution (NA 0.9) HR lens

Combining resolution high enough to support 4K image quality with a large depth of field, these new dedicated lenses for digital microscopes push the envelope of optical performance.

100× to 500×

2500× to 6000×

20× to 100×

500× to 2500×

Automatic zoom from 20× to 6000×

Observation can be carried out automatically at magnifications from 20× to 6000× without changing the lens. Magnification-switching can also be carried out quickly using either the mouse or the handheld controller.

Magnification is changed automatically

Low magnification

High magnification
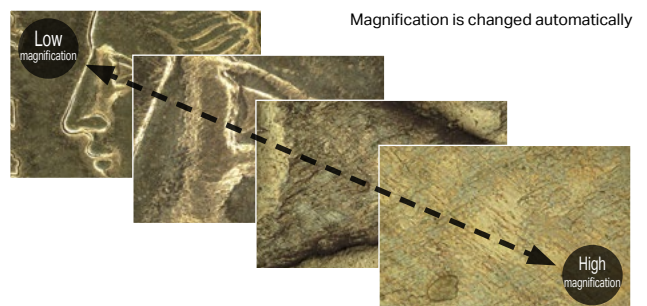
Controls are now even simpler and more convenient to operate

High-speed auto-focus stage

Focus view camera

Motorized eucentric stage

Full-control system enables even novice users to capture optimal images

The user simply places the target on the stage, and everything else – including alignment, focus adjustment, magnification switching and so on – is fully automatic.

Even first-time users can perform observation perfectly on the desired area, with no stress at all.

All the controls are at your fingertips

Building on the high operability of previous models, this new VHX Series delivers intuitive focus adjustment using Focus View and a motorized stage. Additionally, magnification switching can now be performed using the handheld controller or the mouse.

The Focus View function enables easy focus adjustment, viewed from the side

This is the first model to feature the Focus View function, which enables simultaneous viewing of the lens and the target. Thanks to the intuitive software interface, focusing can be carried out easily with just a click.
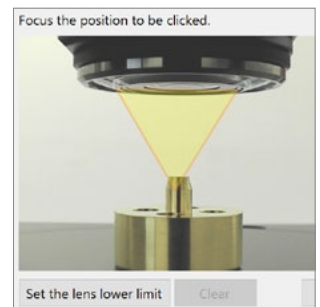
Automatic multi-point capture and measurement available

Using the Auto-Measurement Teaching function, repeated measurements can be performed automatically on identically-shaped samples. Not only XYZ coordinates, but also magnification and lighting settings are reproduced automatically.
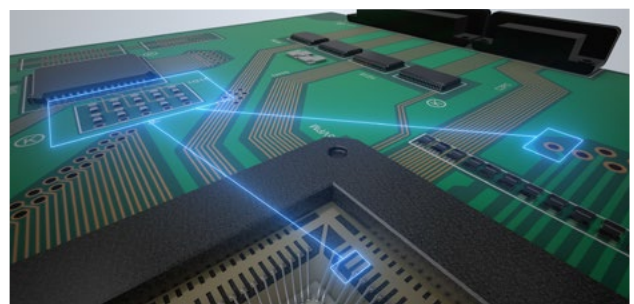
Lighting and Observation Functions

Optimal lighting patterns are captured automatically

Polished metal surface (1000x)

Normal image

Omnidirectional lighting data is captured automatically

Multi-lighting

With the Multi-lighting function, omnidirectional lighting data is captured the click of a button. The image most suitable for observation can then be selected from among this data.

This eliminates the need to endlessly adjust the lighting settings in order to obtain a clear image.

Lighting can be changed flexibly even after recording

The lighting data is retained with the saved image. The lighting can be changed by using the mouse to move the lighting icon.

Multi-lighting

Lighting can be changed even after saving the image to a PC
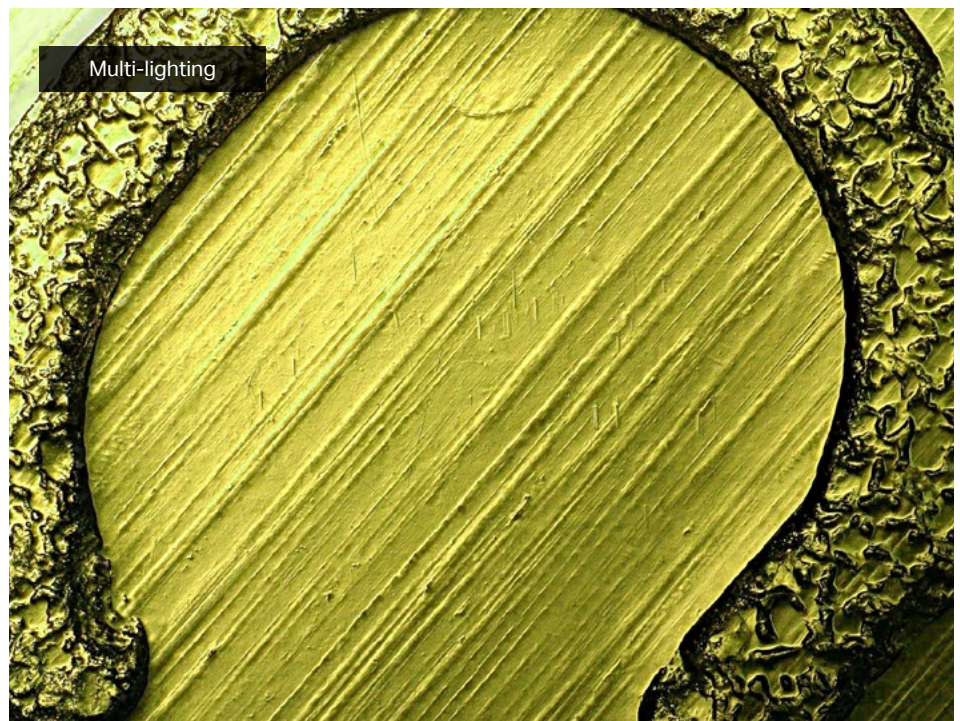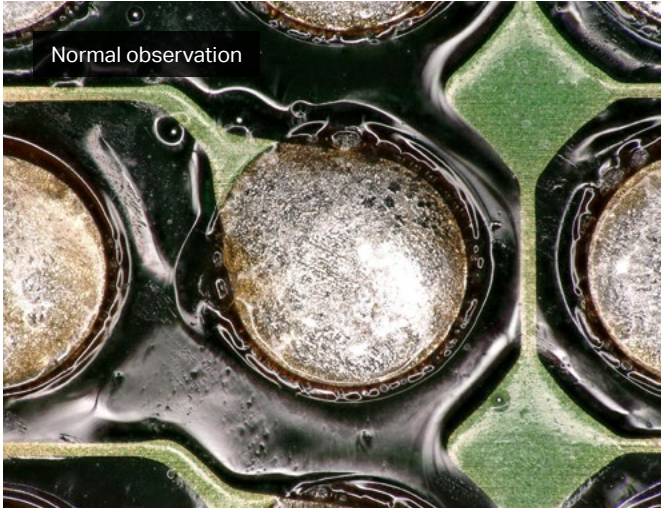
Normal observation

Ring removal

Ring removal

Eliminating glare

By capturing multiple images with different lighting, an image free of glare can be obtained. It has historically been difficult to remove the ring-shaped reflections that can appear on the target surface.

With the VHX-7000N, these rings can be removed at the click of a button.
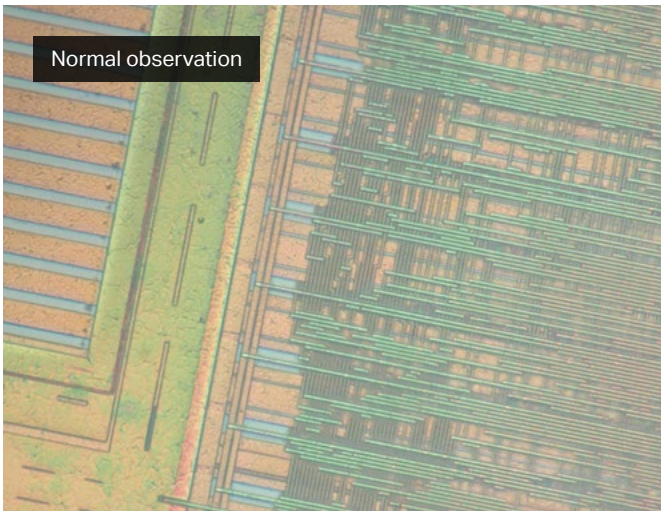
Normal observation
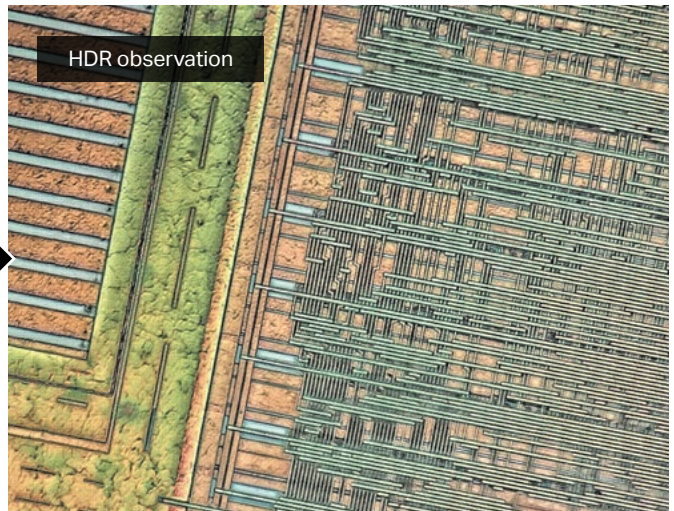
HDR observation

HDR observation

Enhanced Color and Contrast

The High Dynamic Range (HDR) imaging function captures multiple images at varying shutter speeds to obtain an image with high color gradation. This enables observation at previously unattainable levels of accuracy and contrast.

Depth Composition and Image Stitching

Always view your target fully in focus

Fully focused imaging
anywhere on your sample

Real-time composition interface

On an overall image of the target, simply click on the area you wish to view. The stage will then automatically move to the selected location, and depth composition will be carried out until the area is in focus. All the manual adjustments required in conventional systems have been eliminated, dramatically reducing the time and effort required for observation.
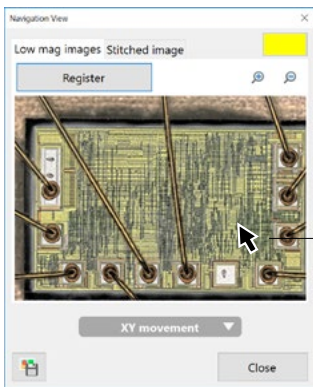
In the Navigation window
(wide field, low magnification),
click on the area you want to view

Fully focused image
wherever you look

The real-time composition interface will automatically and instantly bring any area into focus

Stage moves on X and Y axes
The stage moves to align itself with the area you clicked on the interface screen.

▼

Lens moves on Z axis
Depth data collected for fully focused imaging.

▼

Depth compositing
A fully-focused image is created

18
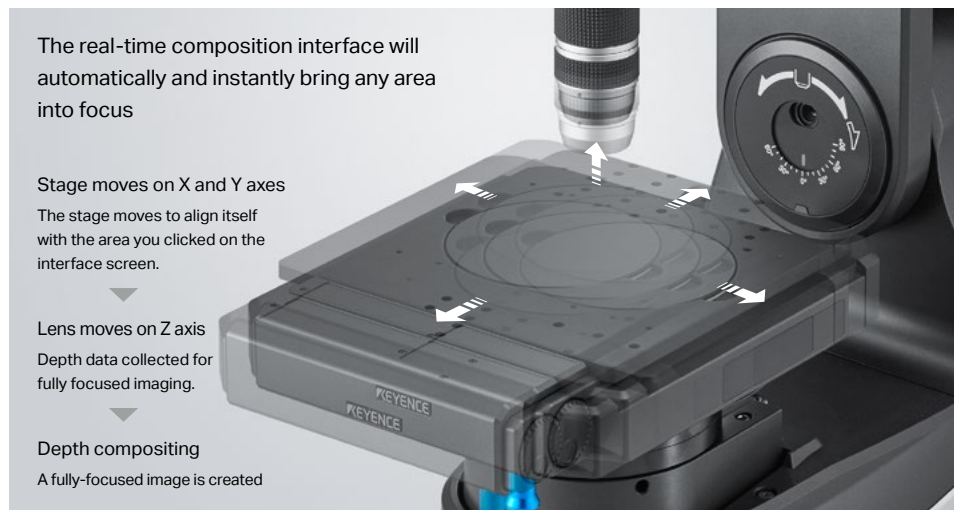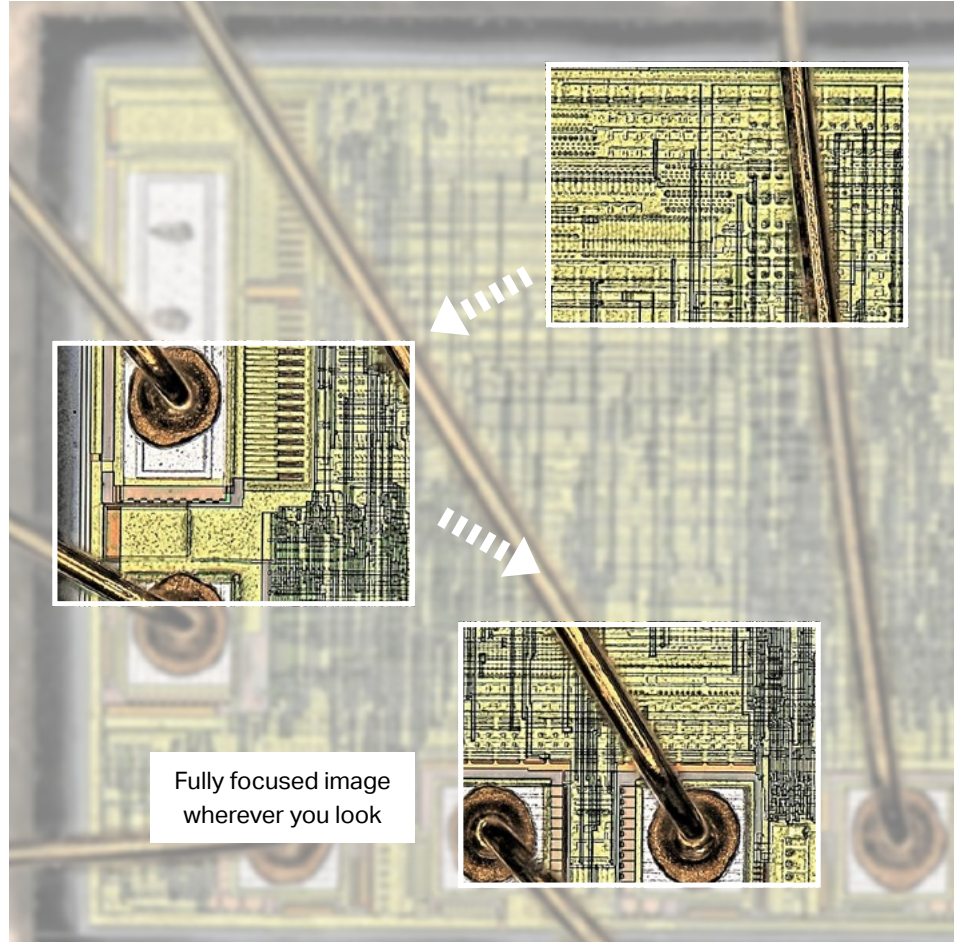
> High-magnification observation range is now 800 times larger

High-speed image stitching (with up to 6 times more data than conventional systems)

When you press the Image Stitching button, the image is automatically stitched together. Stitching can be performed quickly over large areas, and can be used to create a high-resolution image of a wide area. Image stitching can handle up to 50 thousand pixels vertically by 50 thousand pixels horizontally.

BGA (100x)

Up to 50,000 pixels

Up to 50,000 pixels

Conventional field of view

1536 pixels

2048 pixels
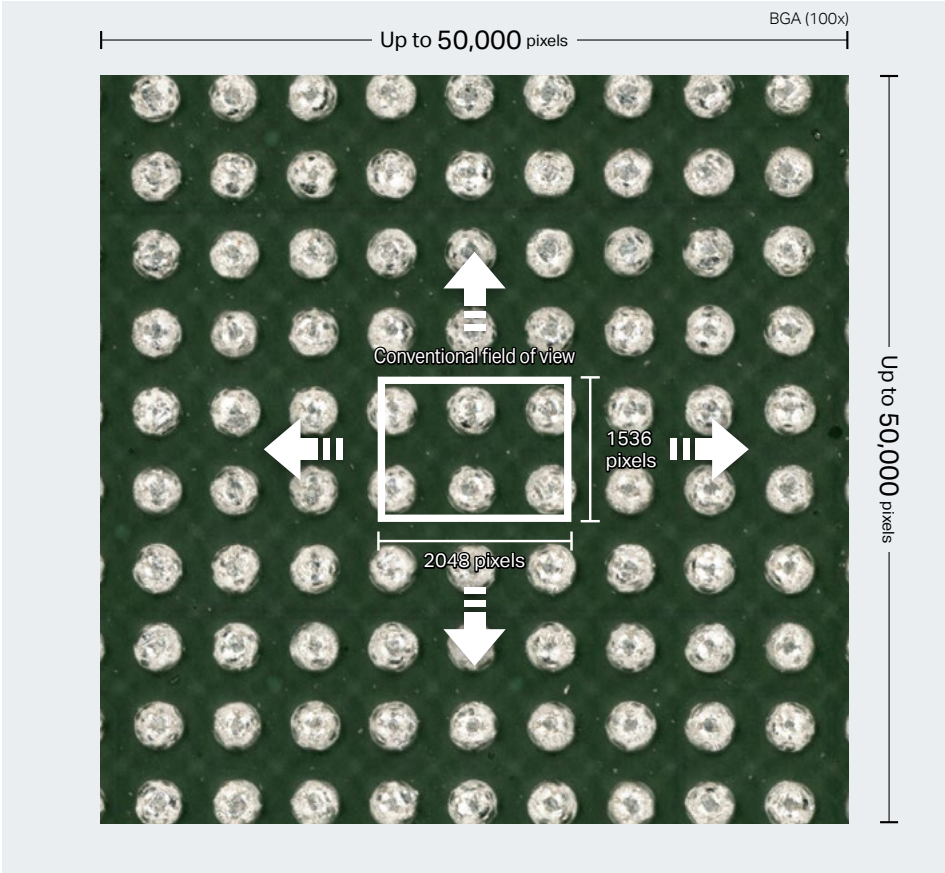
3D image stitching

By capturing multiple images while the stage is moving, 3D data capture and stitching can be performed simultaneously. This makes it possible to view and analyze the overall contours of the target. Surface irregularities can also be measured.

Seamless stitching is possible

In the stitching process, conventional methods can have brightness variations across the resulting image. The VHX Series auto correction eliminates this variation for uniform lighting across the image.

3D profile measurement

Conventional image

Image using Auto Correct
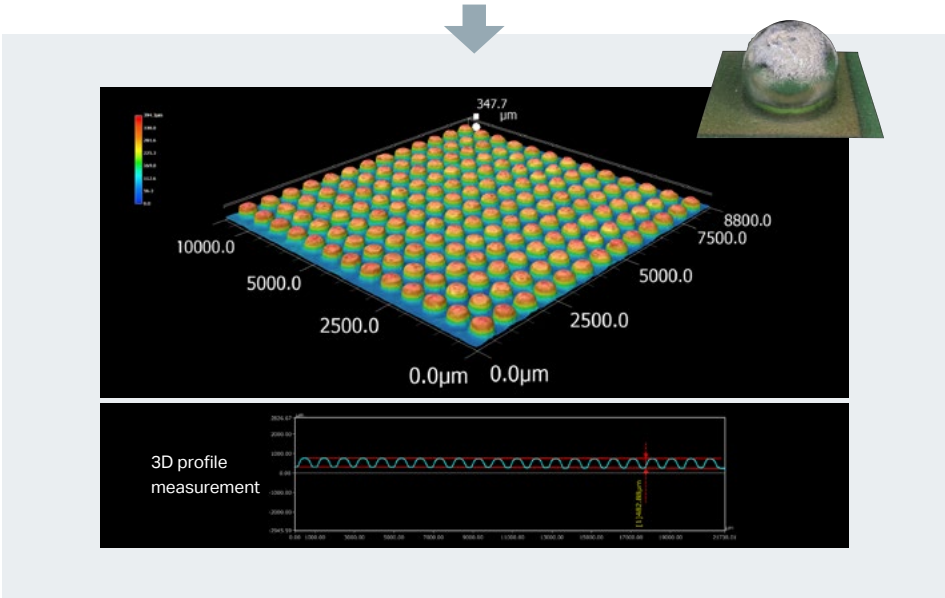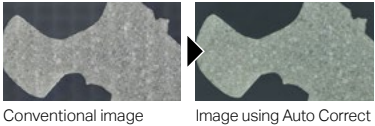
Recording Function

Capture parameters are stored with the image

Data can be recorded at the touch of a button and shared instantly

Saving data

Your measurement data is safe, no matter how much time passes, because you can save not only images, but also the measurement results, observation conditions and other data from when the images were captured. Also, by connecting your VHX system to a network, you can share data throughout your company, making the system even more useful.

Report function

You can install Excel on your VHX system, just like on a PC. By setting up templates in advance, you can easily convert observed images and measurement results into reports.
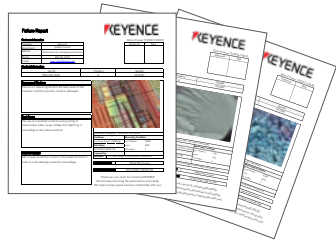
Reproduction of image capture settings

Image capture settings can be reproduced by simply selecting the image from an album. Observation can be carried out again under the same conditions, and the results will be consistent, even if it is performed by a different person at a later date.

Don't just save the image: save the capture settings

| Images | Video | Measured values | Settings |

Network

Other factories   Overseas offices
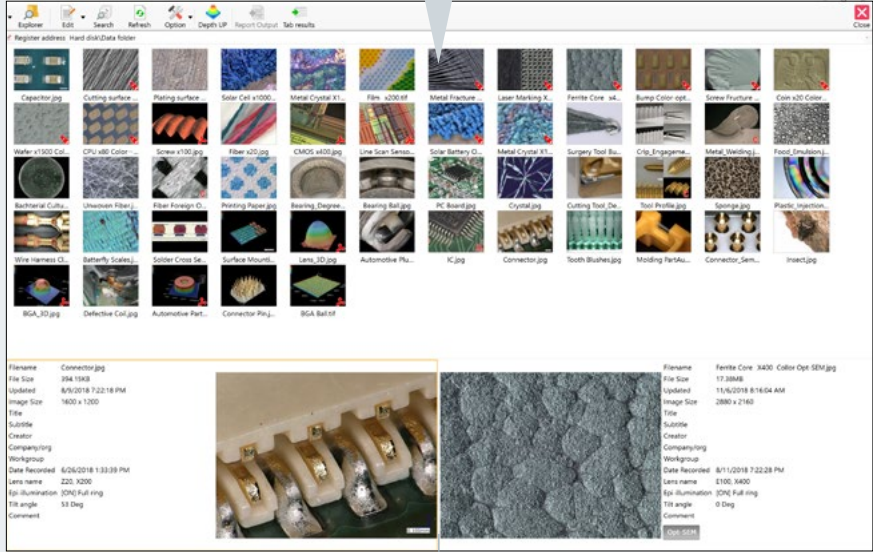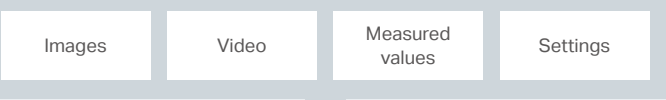
Settings used at the time of image capture can also be recorded for easy reproduction at a later date

Before reproduction   After reproduction
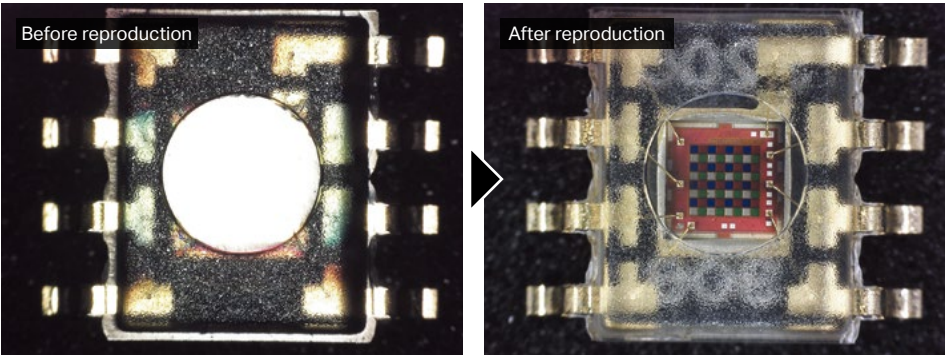
| Lens magnification | Shutter speed | Gain | Light shift | Edge enhancement | White balance | Light adjustment conditions |

> Even the measurement magnification is automatically recorded

Automatic magnification recognition

Magnification must be accounted for when making measurements, so the magnification needs to be selected correctly at the time of observation. To eliminate selection errors, the VHX system recognizes the magnification automatically. It also identifies the lens connected, and increases measurement accuracy with our calibrated lens.

Automatic recognition

Lens connection

Lens type

Observation magnification

One-push calibration

Simply installing a dedicated scale and performing a one-click operation automatically calibrates each lens.
This operation is simple and can be carried out correctly even by novice users, ensuring accurate calibration.
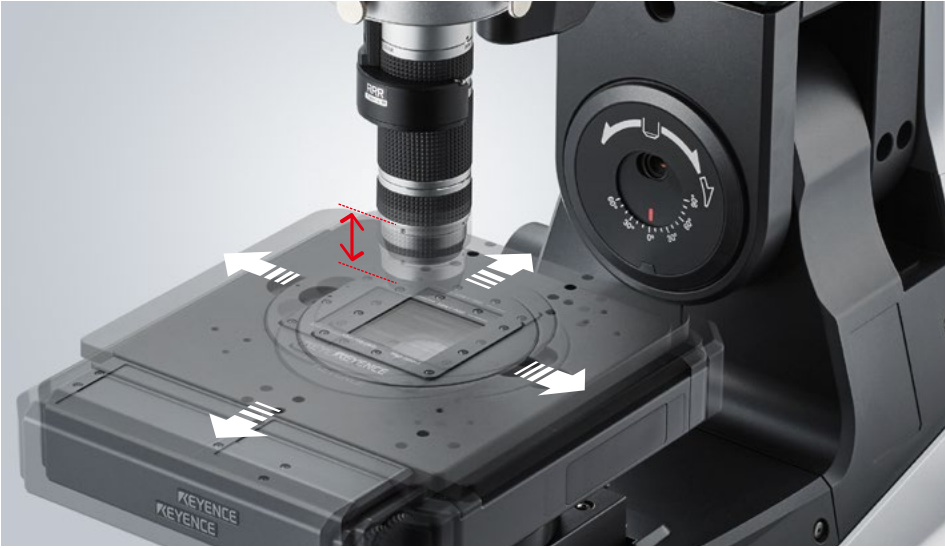
Traceability

Certification is available for our dedicated calibration scale, providing confidence in your operation.

National Institute of Advanced Industrial Science and Technology

JCSS accredited manufacturer

Reference scale

Coordinate measuring device

Calibration scale **OP-88592**

Rock flakes (80×)

Drill bit (50×)

Residual stress on plastic (20×)

Metal structure (800×)

Sensor (80×)

CMOS chip (400×)

Switch (30×)
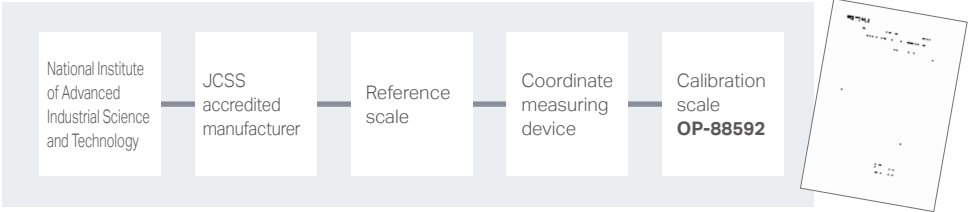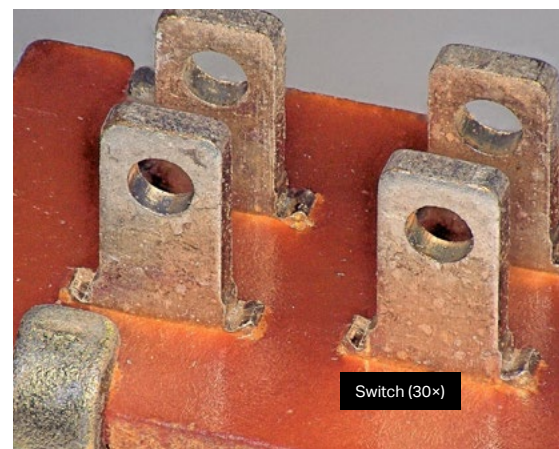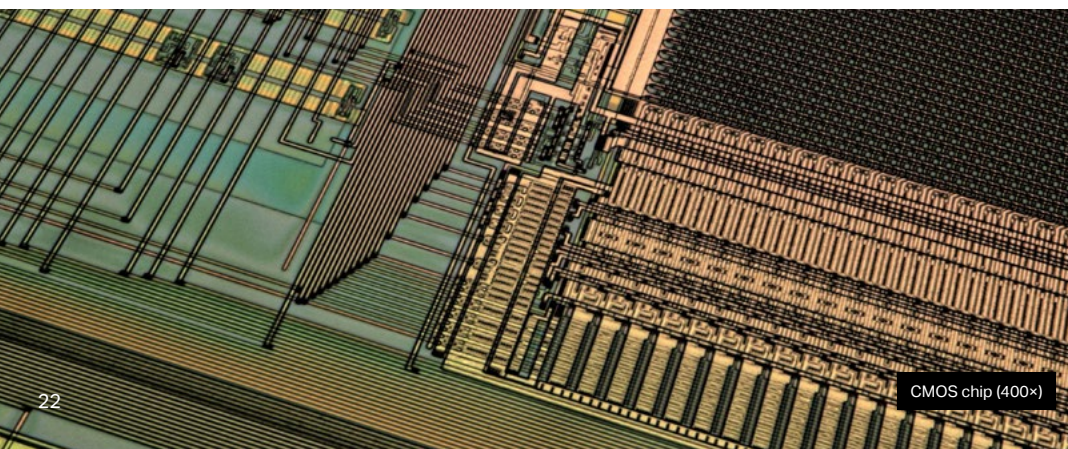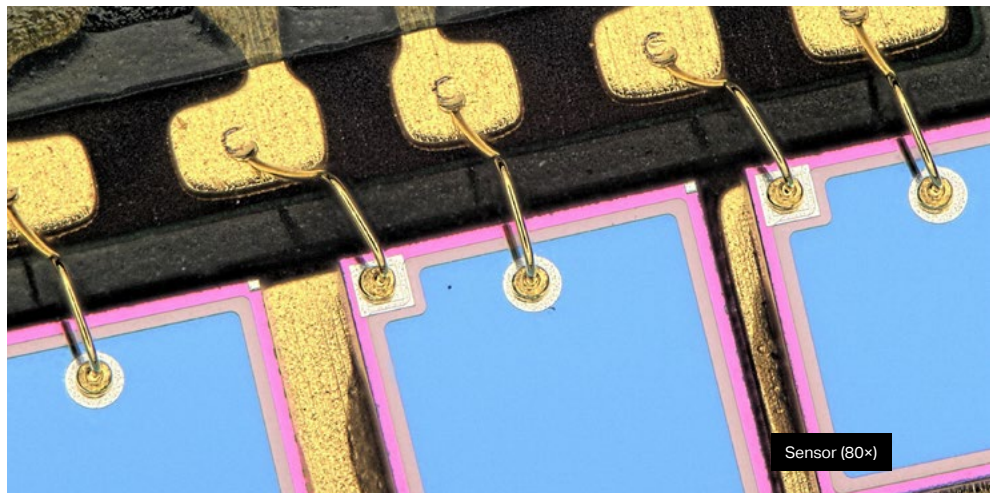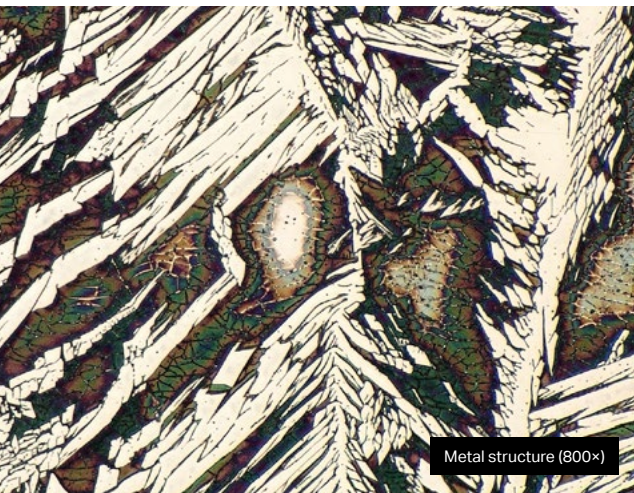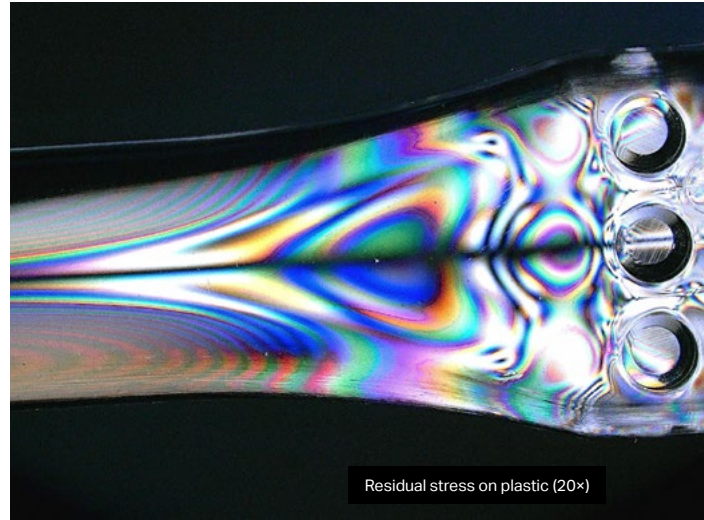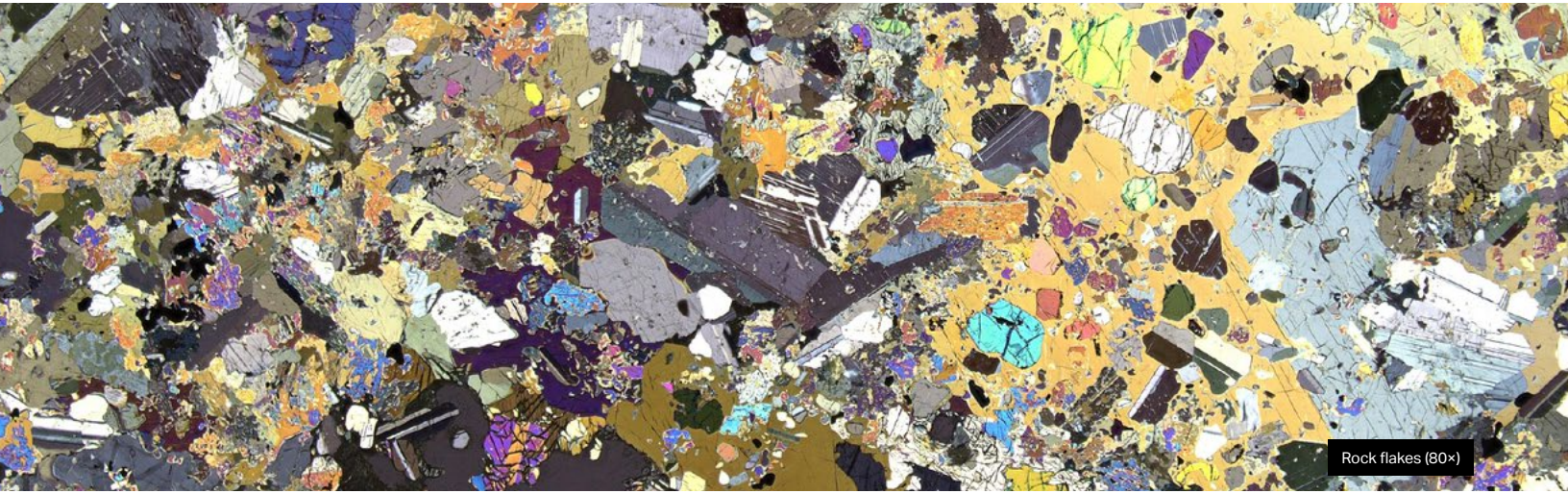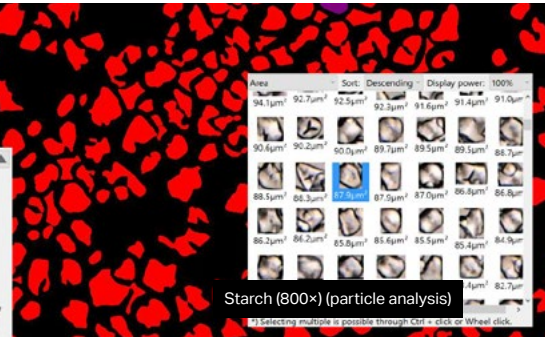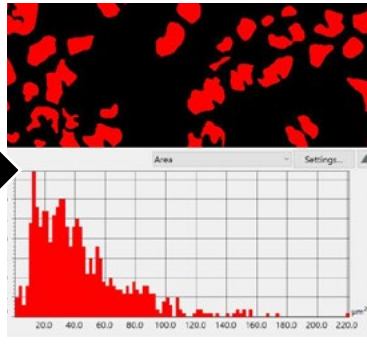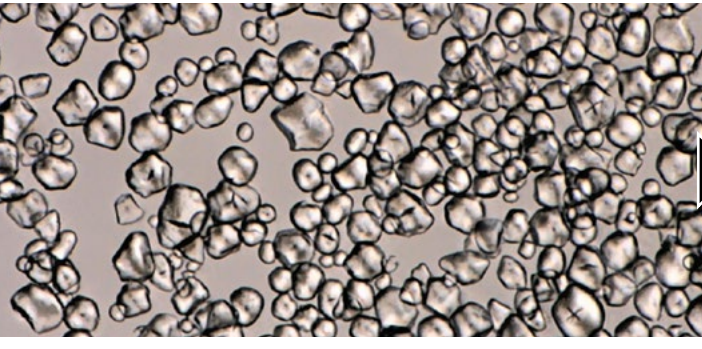
Starch (800×) (particle analysis)
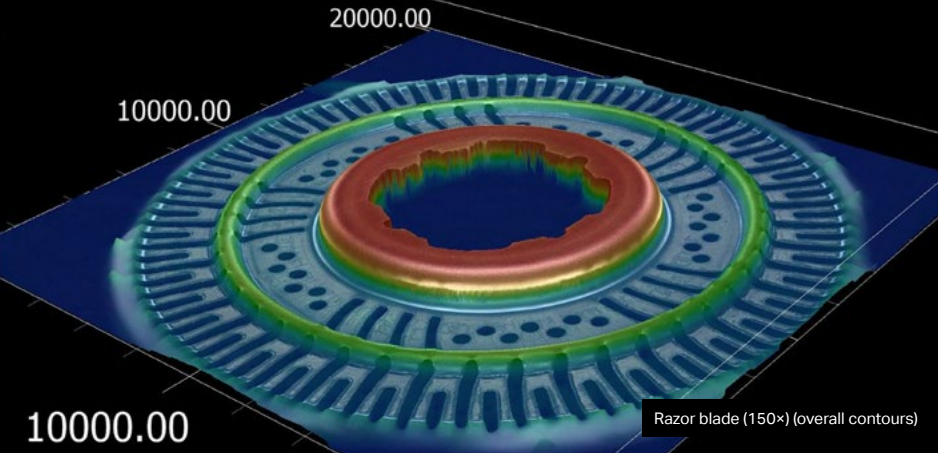
Razor blade (150×) (overall contours)
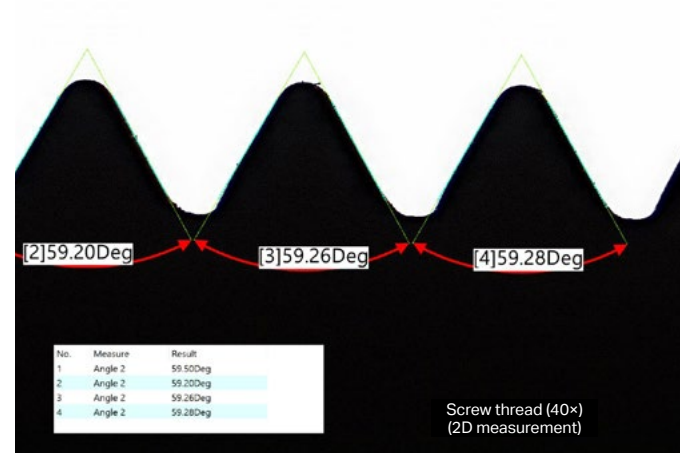
Screw thread (40×) (2D measurement)
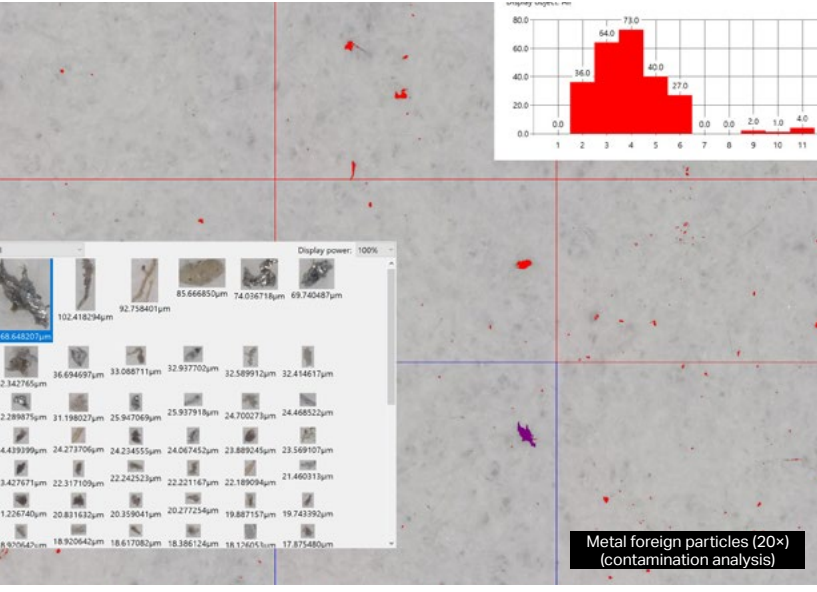
Metal foreign particles (20×) (contamination analysis)
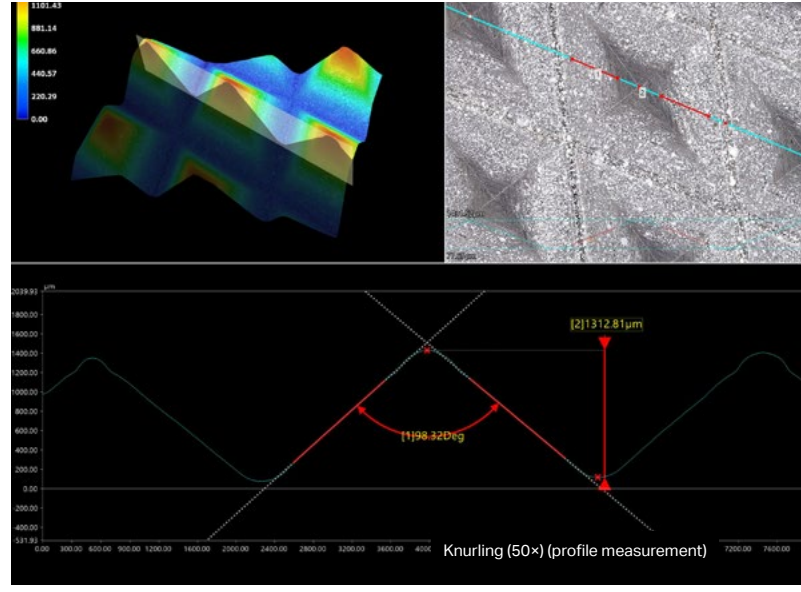
Knurling (50×) (profile measurement)
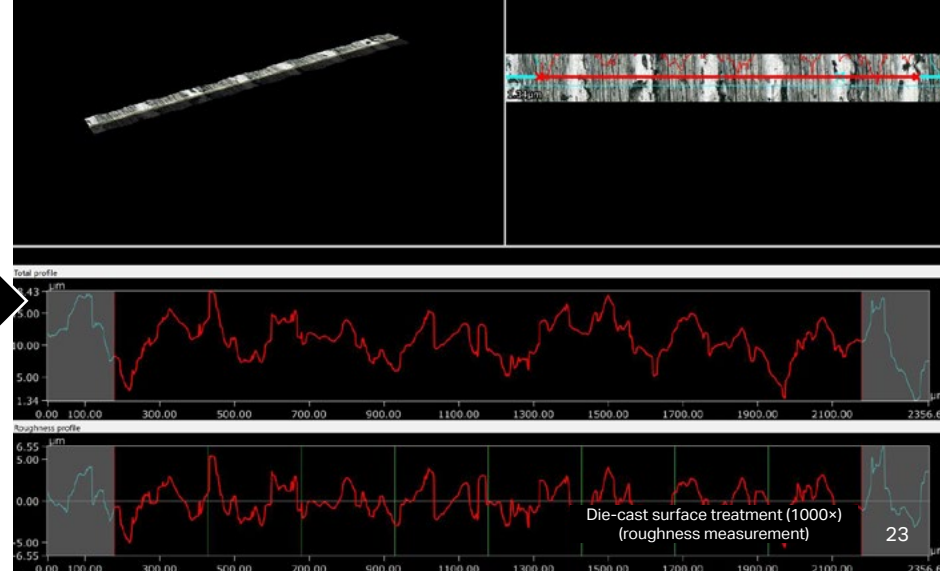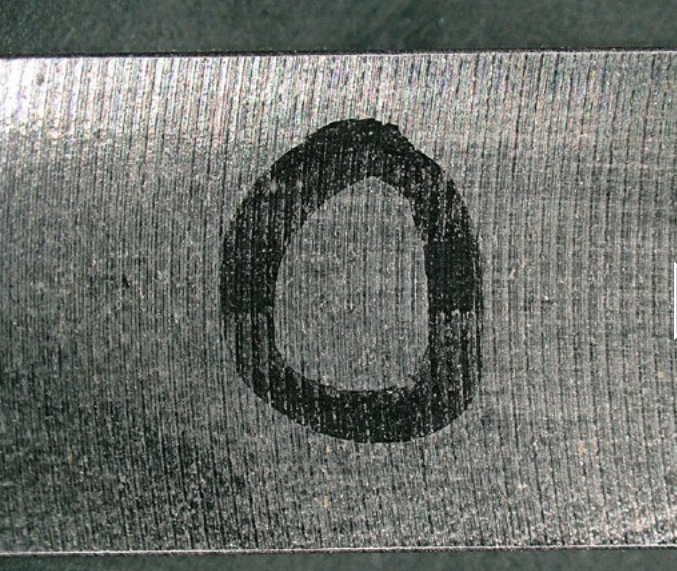
Die-cast surface treatment (1000×) (roughness measurement)

23

Measurement Functions

Measure as you view

A variety of easy, accurate measurement functions

2D measurement

Using simple mouse operations, a wide range of measurements – including distance between 2 points, angle, diameter, parallel lines, area and so on – can be performed on the screen in real time. Once the image has been saved, additional features can be measured at a later time. With free communication software, anyone can use the measurement functions with ease on their own PC.
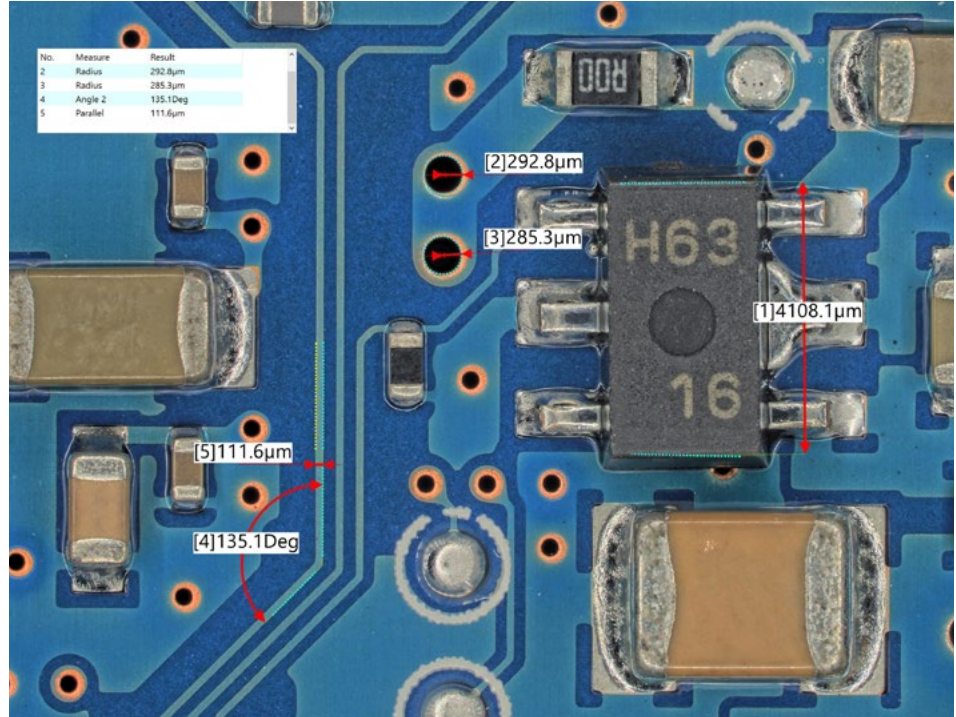
Wide variety of measurement tools

18 basic measurements plus 11 advanced measurement tools are provided.
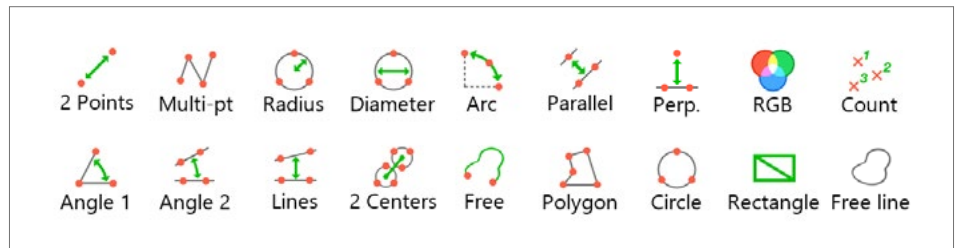
Automatic edge detection eliminates human error

In a conventional system, the user has to determine the edge alignment, and each individual will do it slightly differently. The VHX-7000N uses the latest automatic edge detection function to eliminate variation in manual measurements. The shape is identified using contrast allowing for consistent measurements between individuals.

About 100 points are detected automatically

Shape is identified from detected points using least-squares method
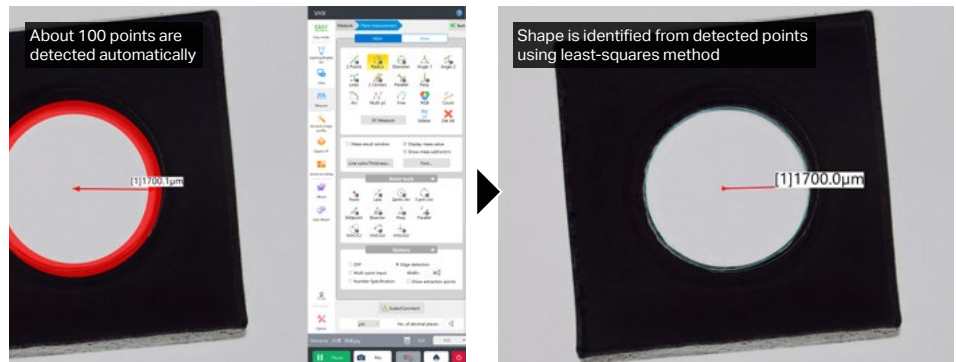
Easy measurement of everything from 3D contours to surface roughness

3D measurement

Even when the target has an uneven surface, a fully-focused image is obtained instantly, composed from multiple images with varying focus positions. Additionally, 3D display can be used to observe surface contours.

Contour analysis

[2]223.51µm

[1]95.40Deg

Roughness analysis
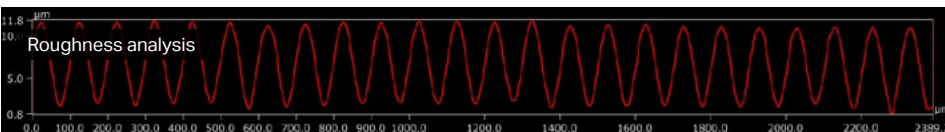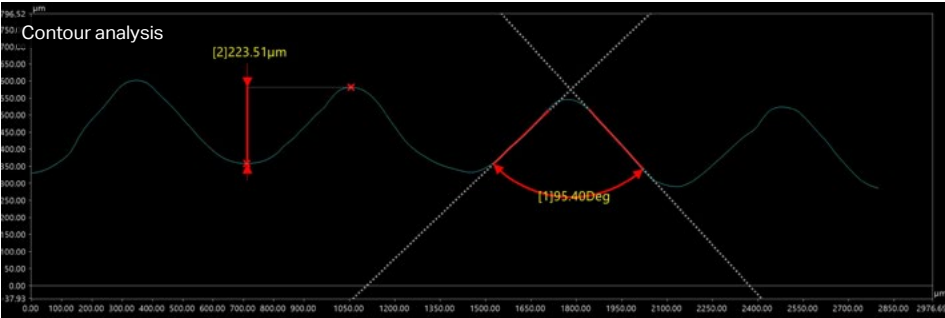
Screw thread (100x)

High-accuracy conversion to 3D using KEYENCE's Accurate D.F.D. 2.0 method

By estimating height based on subtle variations in texture, a 3D image is constructed. KEYENCE's noise elimination software allows for accurate shape production.

Conventional image

Image using Accurate D.F.D. 2.0
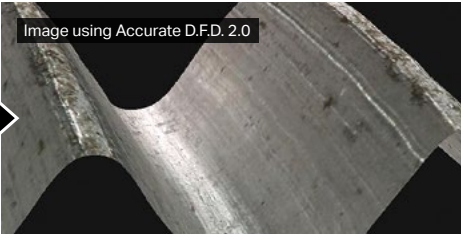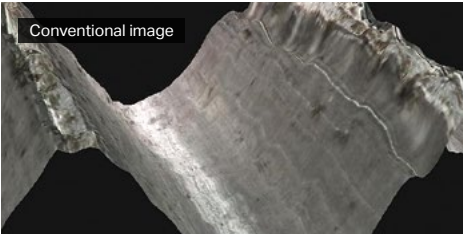
Bolt

Auto Adjust function allows depth composition even when imaging at an angle

When images are captured, the Auto Adjust function automatically compensates for the edge displacement and vibration that can occur during image capture. The system then goes on to construct a highly-comprehensive, fully-focused image. The composition can include images captured from an angle.

Conventional image

Image using Auto Adjust function
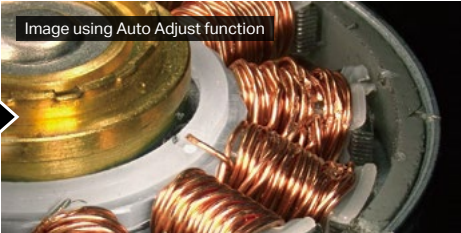
Coil (20x)

Measurement Functions

Full automation ensures that even novice users can perform complex measurement correctly

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Contamination analysis compliant with ISO 16232 and VDA 19

Contamination analysis

The VHX-7000 Series enables you to carry out contamination analysis compliant with the ISO 16232 and VDA 19 cleanliness inspection standards covering the automotive industry. Large depth-of-field images captured at high resolution using the VHX-7000N can be analyzed, enabling accurate measurement, even when the target has an uneven surface.
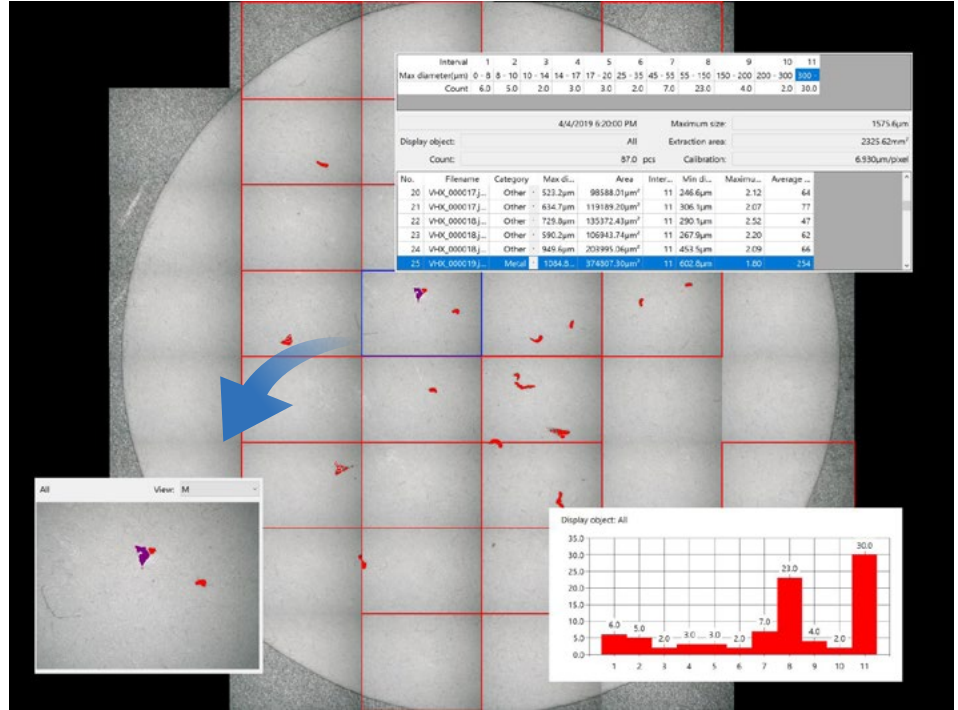
Membrane filter (50x)

Detailed Analysis mode

When a particular contamination area is selected on an image of the whole filter, the stage automatically moves to that area. The magnification can be increased instantly to allow detailed observation, simplifying the process of identifying foreign particles and making the operation more efficient. This mode can also be used for depth composition and 3D height measurement.
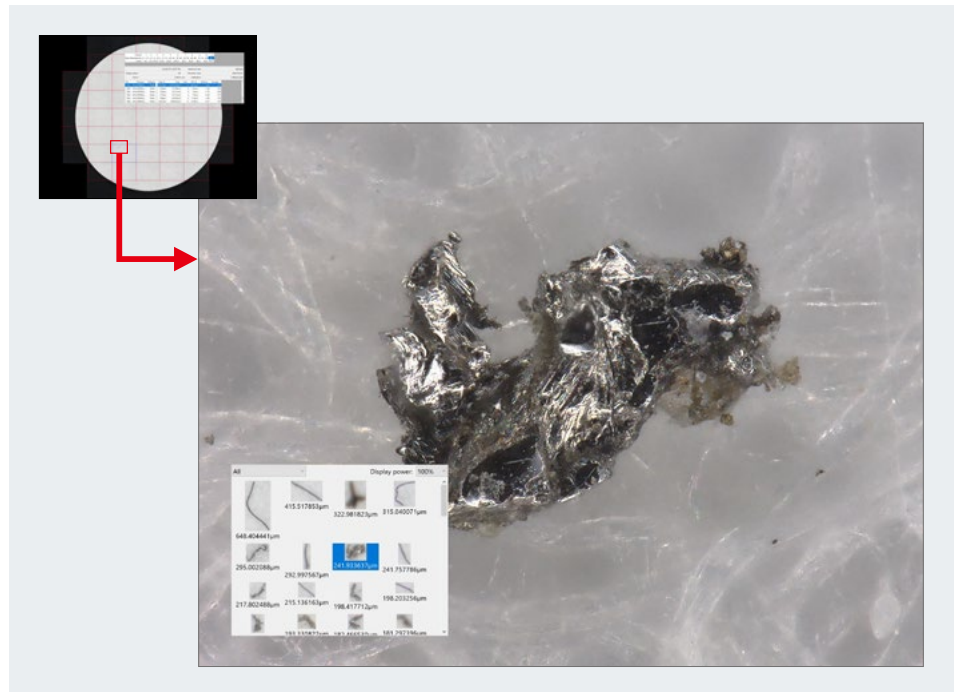
Grain Size Measurement and Analysis

Calculate grain size for any sample completely to ASTM standards, and automatically save the results or easily export the data into a report. Our latest software offers quick and automatic analysis that eliminates the user's need to manually count grains or perform 'Chart Comparisons'. Users can also save their workflow for fast and repeatable measurements.

Particle analysis   Starch (400x)
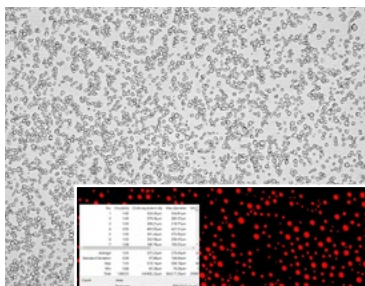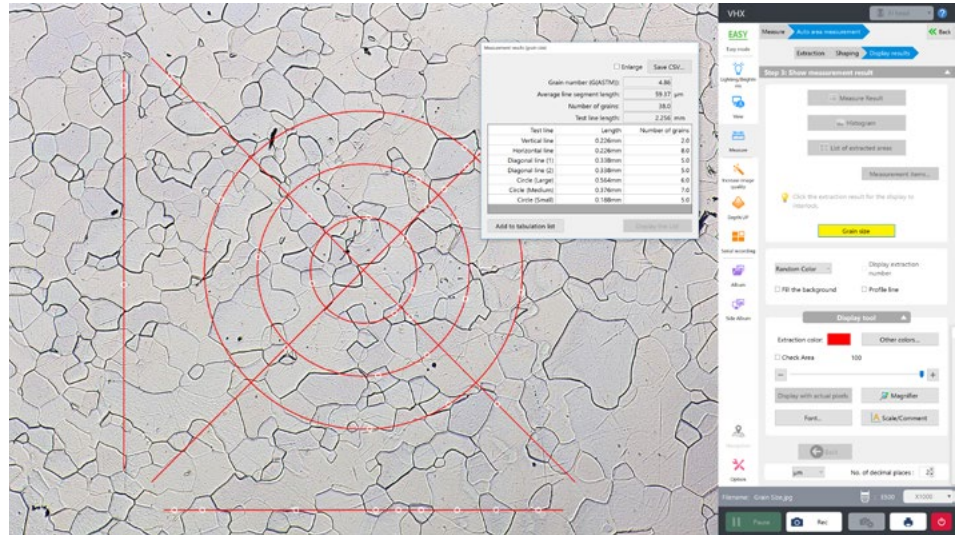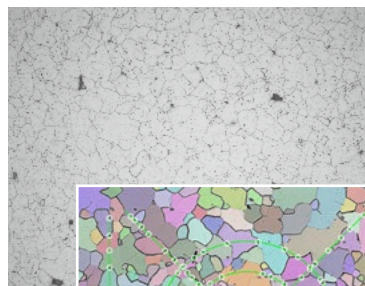
Crystal grain size measurement   Metal structure (800x)
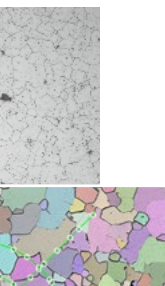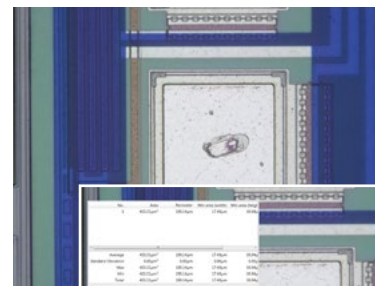
Maximum area measurement   Probe mark (1000x)

Advanced image analysis is fully automatic

Automatic area measurement/count

In an easy operation, area measurements and counts can be carried out within a specified range on the target. Targets that are not required can be excluded, and overlapping targets can be separated. Even when performed by novice users, the operation will still yield highly accurate analysis results.

Free-angle observation system with XYZ motorized stage
VHX-S750E

Adjustment mechanisms allow easy field-of-view alignment, rotation, and oblique axis motion. Eucentric design ensures that the target stays centered in the field of view, even if the lens is tilted or rotated.

0°

45°

15° 0°
30° 15°
45° 45°
60° 45°

Easy to adjust

60°

Cable holder
Eliminates vibration by securing cable. Also reduces abrasion and wear.

75°

90°

90°

120°

0°

High-stability frame

90°

Vibration-proof rubber

60°
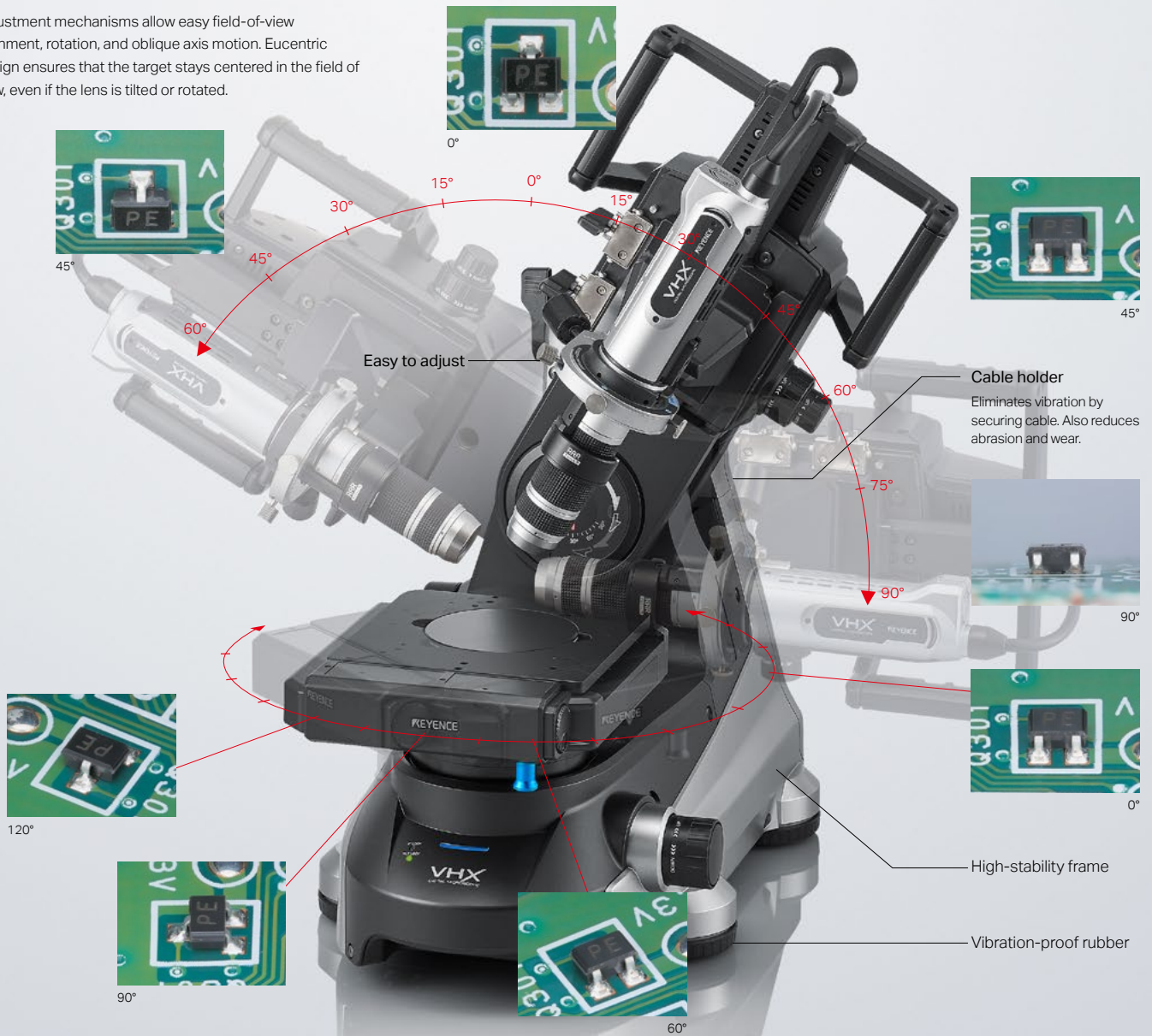
LED-transmitted illumination

LED-transmitted illumination is provided as standard, enabling clear observation throughout the range from low to high magnification.

Rotation sensor

The built-in rotation sensor identifies the rotation position from the stage. Even when rotated, the stage moves in the direction shown on the screen.

Handheld controller

The handheld controller makes it easy to move the stage on the XY axes and on the Z axis.

28
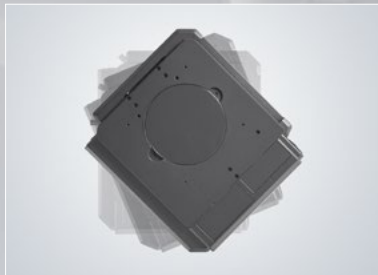
100 × 100 mm 3.94" × 3.94" large XYZ motorized stage
VHX-S770E

To meet the need for larger observation ranges and to accommodate large samples, we have released a 100 ×100 mm 3.94" × 3.94" large XYZ motorized stage.

In response to customer requests, this system is now compatible with several special large-scale stages.

*The special stages shown below are not KEYENCE products.

XY measurement system compliant with traceability standards
VH-M100E

This XY measurement system ensures highly reliable measurements based on a traceability system underpinned by Japan's national standards. Additionally, the manual stage can be moved to extend the measurement range beyond the maximum 100 × 100 mm 3.94" × 3.94" field of view.

Display unit
OP-84483

This is useful when the travel range cannot be viewed on the main unit screen.

Backlighting unit
OP-84484

Clearly projects the edges of the target.

Measurement module delivering even greater ease of use
VHX-H3M3

Wide range of measurements

Includes distance between 2 points, radius, angle and other measurements.

Real-time screen display

Displays XYZ measurement results on the monitor in real time.
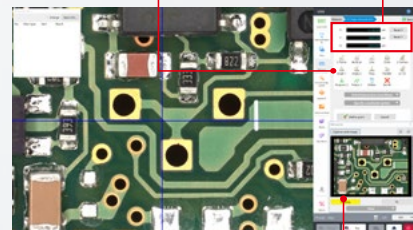
Wide-area image capture

A wide-area image, captured at low magnification and recorded, can be used as a reference when navigating at high magnification, allowing the measurement points to be tracked across the entire image.

KEYENCE optical lenses are continuously evolving

VHX-7100

Fully-Integrated camera and high-resolution lenses deliver the highest image quality at magnifications from 20 to 6000×

Fully-Integrated (FI) Head VHX-7100

With four dedicated objective lenses and built-in lighting (motorized aperture), this unit combines high (NA 0.9) resolution with a large depth of field and is designed for even more outstanding operability.

| Bright-field | Dark-field | Mixed Lighting | Polarized Light | DIC |

High-Resolution (HR) Lenses

VHX-E20

VHX-E100

VHX-E500

VHX-E2500

High-Resolution, Low-Magnification Objective Lens
VHX-E20   20 ▶ 100

Model		VHX-E20					
Magnification		20×	30×	40×	50×	80×	100×
Image capture range (mm inch)	H (Horizontal)	15.24 0.60"	10.16 0.40"	7.62 0.30"	6.10 0.24"	3.81 0.15"	3.05 0.12"
	V (Vertical)	11.4 0.45"	7.6 0.30"	5.7 0.22"	4.56 0.18"	2.85 0.11"	2.28 0.09"
	D (Diagonal)	19.05 0.75"	12.7 0.50"	9.53 0.38"	7.62 0.30"	4.76 0.19"	3.81 0.15"
Observation distance (mm inch)		30 (22.9[*1]) 1.18" (0.90")					

*1 When OP-88323 is mounted

High-Resolution, Medium-Magnification Objective Lens
VHX-E100   100 ▶ 500

Model		VHX-E100					
Magnification		100×	150×	200×	300×	400×	500×
Image capture range (mm inch)	H (Horizontal)	3.05 0.12"	2.03 0.08"	1.52 0.06"	1.02 0.04"	0.76 0.030"	0.61 0.024"
	V (Vertical)	2.28 0.09"	1.52 0.06"	1.14 0.04"	0.76 0.030"	0.57 0.022"	0.46 0.018"
	D (Diagonal)	3.81 0.15"	2.54 0.10"	1.91 0.08"	1.27 0.05"	0.95 0.037"	0.76 0.030"
Observation distance (mm inch)		24 0.94"					

High-Resolution, High-Magnification Objective Lens
VHX-E500   500 ▶ 2500

Model		VHX-E500					
Magnification		500×	700×	1000×	1500×	2000×	2500×
Image capture range (mm inch)	H (Horizontal)	0.61 0.024"	0.44 0.017"	0.31 0.012"	0.20 0.008"	0.16 0.006"	0.12 0.005"
	V (Vertical)	0.46 0.018"	0.33 0.013"	0.23 0.009"	0.15 0.006"	0.11 0.004"	0.09 0.0035"
	D (Diagonal)	0.76 0.030"	0.54 0.021"	0.38 0.015"	0.25 0.010"	0.19 0.007"	0.15 0.006"
Observation distance (mm inch)		6 0.24"					

High-Resolution, Highest-Magnification Objective Lens
VHX-E2500   2500 ▶ 6000

Model		VHX-E2500			
Magnification		2500×	4000×	5000×	6000×
Image capture range (mm inch)	H (Horizontal)	0.12 0.005"	0.08 0.0031"	0.06 0.0024"	0.05 0.0020"
	V (Vertical)	0.09 0.0035"	0.06 0.0024"	0.05 0.0020"	0.04 0.0016"
	D (Diagonal)	0.15 0.006"	0.1 0.004"	0.08 0.0031"	0.06 0.0024"
Observation distance (mm inch)		1 0.04"			

Dual-Objective Zoom Lens VH-ZST   20 ▶ 2000

Allows observation at magnifications from 20× to 2000× without changing lenses

Covers a wide magnification range without the need to change lenses. Observation can be tailored to the target using mixed lighting with main-unit control, or versatile lighting using various optical adapters.

Model		VH-ZST [*2]					
Magnification[*1]		20×	100×	200×	500×	1000×	2000×
Image capture range (mm inch)	H (Horizontal)	15.24 0.60"	3.05 0.12"	1.52 0.06"	0.61 0.024"	0.30 0.012"	0.15 0.006"
	V (Vertical)	11.4 0.45"	2.28 0.09"	1.14 0.04"	0.46 0.018"	0.23 0.009"	0.11 0.004"
	D (Diagonal)	19.05 0.75"	3.81 0.15"	1.91 0.08"	0.76 0.030"	0.38 0.015"	0.19 0.007"
Observation distance (mm inch)		15 0.59"					

*1 Magnification with a 1/2-inch CCD camera on a 15-inch monitor
*2 Because of the flared shape, coaxial illumination undergoes circular polarization.

| Bright-field | Dark-field | Mixed Lighting | Polarized Light |

Long-Working-Distance, High-Performance Zoom Lens VH-Z50L/Z50T   50 ▶ 500

Long-range lens with observation distance of 85 mm 3.35"

Perform observation at high magnification further away from the target. We created a long-range lens that enables observation on areas that were previously inaccessible.

Model		VH-Z50L/Z50T					
Magnification[*]		50×	100×	200×	300×	400×	500×
Image capture range (mm inch)	H (Horizontal)	6.09 0.24"	3.05 0.12"	1.53 0.06"	1.02 0.04"	0.76 0.030"	0.61 0.024"
	V (Vertical)	4.57 0.18"	2.28 0.09"	1.14 0.04"	0.76 0.030"	0.57 0.022"	0.46 0.018"
	D (Diagonal)	7.62 0.30"	3.81 0.15"	1.90 0.07"	1.27 0.05"	0.95 0.037"	0.76 0.030"
Observation distance (mm inch)		85 3.35"					

*Magnification with a 1/2-inch CCD camera on a 15-inch monitor

High-Performance, Low-Range Zoom Lens VH-Z00R/Z00T

0.1 ▶ 50

Handles everything from an entire-target image to enlarged detail

With a magnification range from 0.1× to 50×, this lens allows observation of anything from an entire-target image to enlarged detail. Featuring click-style magnification adjustment, an aperture mechanism, and an observation distance upwards of 95 mm 3.74", this macro lens delivers high performance and excellent operability.

Model		VH-Z00R/Z00T						
Magnification[*]		0.1×	0.5×	1×	5×	10×	30×	50×
Image capture range (mm inch)	H (Horizontal)	3200 125.98"	640 25.20"	320 12.60"	61 2.40"	30.5 1.20"	10.2 0.40"	6.1 0.24"
	V (Vertical)	2400 94.49"	480 18.90"	240 9.45"	45.5 1.79"	22.8 0.90"	7.6 0.30"	4.6 0.18"
	D (Diagonal)	4000 157.48"	800 31.50"	400 15.75"	76.2 3.00"	38.1 1.50"	12.7 0.50"	7.6 0.30"
Observation distance (mm inch)		Approx. 7700 303.15"	Approx. 1500 59.06"	Approx. 720 28.35"	95 3.74"			

*Magnification with a 1/2-inch CCD camera on a 15-inch monitor

Ultra-Small, High-Performance Zoom Lens VH-Z20R/Z20T

20 ▶ 200

Delivers high resolution

Delivers high-resolution observation at magnifications of 20× to 200×, making it ideal for general-purpose use.

Model		VH-Z20R/Z20T					
Magnification[*1]		20×	30×	50×	100×	150×	200×
Image capture range (mm inch)	H (Horizontal)	15.24 0.60"	10.16 0.40"	6.10 0.24"	3.05 0.12"	2.03 0.08"	1.52 0.06"
	V (Vertical)	11.40 0.45"	7.60 0.30"	4.56 0.18"	2.28 0.09"	1.52 0.06"	1.14 0.04"
	D (Diagonal)	19.05 0.75"	12.70 0.50"	7.62 0.30"	3.81 0.15"	2.54 0.10"	1.91 0.08"
Depth of field (mm inch)[*2]		34 1.34"	15.5 0.61"	6.0 0.24"	1.6 0.06"	0.74 0.029"	0.44 0.017"
Observation distance (mm inch)		25.5 1.00"					

*1 Magnification with a 1/2-inch CCD camera on a 15-inch monitor
*2 Number when depth of field is prioritized. Depth will vary according to aperture ring.

Wide-Range Zoom Lens VH-Z100R/Z100T

100 ▶ 1000

Combines high resolution with outstandingly large depth of field

A lens that offers magnified observation with high resolution, combined with a large depth of field. These contradictory needs are met by this innovative zoom lens.

Model		VH-Z100R/Z100T					
Magnification[*1]		100×	200×	300×	500×	700×	1000×
Image capture range (mm inch)	H (Horizontal)	3.05 0.12"	1.53 0.06"	1.02 0.04"	0.61 0.024"	0.44 0.017"	0.30 0.012"
	V (Vertical)	2.28 0.09"	1.14 0.04"	0.76 0.030"	0.46 0.018"	0.33 0.013"	0.23 0.009"
	D (Diagonal)	3.81 0.15"	1.90 0.07"	1.27 0.05"	0.76 0.030"	0.54 0.021"	0.38 0.015"
Observation distance (mm inch)		25 (20[*2]) 0.98" (0.79")					

*1 Magnification with a 1/2-inch CCD camera on a 15-inch monitor
*2 With triple illumination adapter mounted

Dual-Light High-Magnification Zoom Lens VH-Z250R/Z250T

250 ▶ 2500

Switching between coaxial and ring illumination takes just one touch of a button

Allows illumination to be selected to suit the target, and enables darkfield observation at magnifications up to 2500×. Surface condition, coloring, and other factors can be observed clearly.

Model		VH-Z250R/Z250T						
Magnification[*]		250×	300×	500×	1000×	1500×	2000×	2500×
Image capture range (mm inch)	H (Horizontal)	1.22 0.05"	1.02 0.04"	0.61 0.024"	0.31 0.012"	0.2 0.008"	0.15 0.006"	0.12 0.005"
	V (Vertical)	0.92 0.036"	0.76 0.030"	0.46 0.018"	0.23 0.009"	0.15 0.006"	0.11 0.004"	0.09 0.0035"
	D (Diagonal)	1.52 0.06"	1.27 0.05"	0.76 0.030"	0.38 0.015"	0.25 0.010"	0.19 0.007"	0.15 0.006"
Observation distance (mm inch)		6.5 0.26"						

*Magnification with a 1/2-inch CCD camera on a 15-inch monitor

Bright-field   Dark-field

High-Resolution Zoom Lens VH-Z500R/Z500T

500 ▶ 5000

Observation distance of 4.4 mm 0.17" throughout magnification range of 500× to 5000×

Delivers high resolution and enables observation at up to 5000×. With its intelligent approach to 3D display, this zoom lens defies the conventional wisdom of microscope observation.

Model		VH-Z500R/Z500T				
Magnification[*]		500×	1000×	2000×	3000×	5000×
Image capture range (μm)	H (Horizontal)	610	305	152	102	61
	V (Vertical)	457	229	114	76	46
	D (Diagonal)	762	381	191	127	76
Observation distance (mm inch)		4.4 0.17"				

*Magnification with a 1/2-inch CCD camera on a 15-inch monitor

TRIPLE R-compliant lenses are fitted with automatic lens- and magnification-recognition units.

Advanced Microscope Functions in an Easy-to-Use Package.

Base model
VHX-970FN

Functions for viewing, capturing, and measuring
are easy to use, so that even novice users can
operate the VHX-970FN.

Large Depth of Field

Provides 20 times the depth of field compared with optical microscopes.

Free-Angle Observation

Tilt and adjust the position of the lens and camera to easily view an object from any angle.

View, Capture, and Measure with Just One Device

By integrating the optics, camera, electronics, and software, users can perform complete inspection and analysis with a single device.

Depth Composition and 3D Display Functions

Capture fully focused images, even for targets with uneven surfaces.

Free-angle observation system
VH-S30F/S30B

Easy Adjustment

Easy X-Y stage movement and rotation. Our eucentric design ensures that the target stays centered in the field of view even if the lens unit is tilted or rotated.

Quick Setup Marks

The lens setting positions, which vary between lenses, are indicated by guide marks. This enables quick lens changes.

Cable Holder

Eliminates vibration transmitted from the cable. Also secures cable, decreasing abrasion and wear on cable.

Vibration-Proof Rubber

Absorbs low-to-high frequency vibrations, so users can perform stable imaging at all magnifications.

High-Stability Frame

The die-cast main body provides a high-rigidity structure with a low center of gravity that allows for highly stable observations.

0°
15°
0°
30°
15°
45°
30°
45°
60°
Easy to adjust
45°
45°
60°
75°
90°
90°
120°
0°
90°
High-stability frame
60°
Vibration-proof rubber

Focus on the lowest area …

Depth Composition and 3D Display Functions

Capture a fully focused image and 3D display in seconds to gain a more complete understanding of an object or surface.
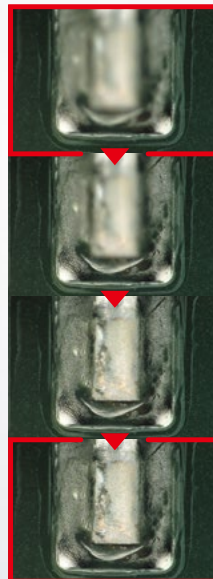
"Depth composition" completed
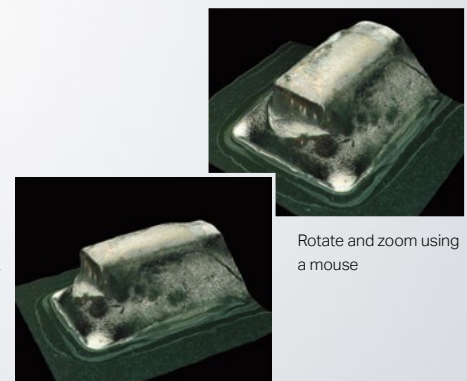
3D display

Rotate and zoom using a mouse

Elemental Analysis with the VHX Series Digital Microscope

Step 1

Magnified observation

Laser-based
Elemental Analyzer
EA-300 Series NEW

Digital Microscope
VHX Series

▎Instant elemental analysis

No pre-processing or vacuum required
Ultra-high-speed LIBS analysis   NEW

Automatically identify materials
AI-Suggest   WORLD'S FIRST

Step 2

One-click elemental analysis

⌛ Start analysis

[Analysis result]
Stainless steel

[Detected elements]

Fe (Iron): 72.5%

Cr (Chromium): 18.9%

Ni (Nickel): 8.6%
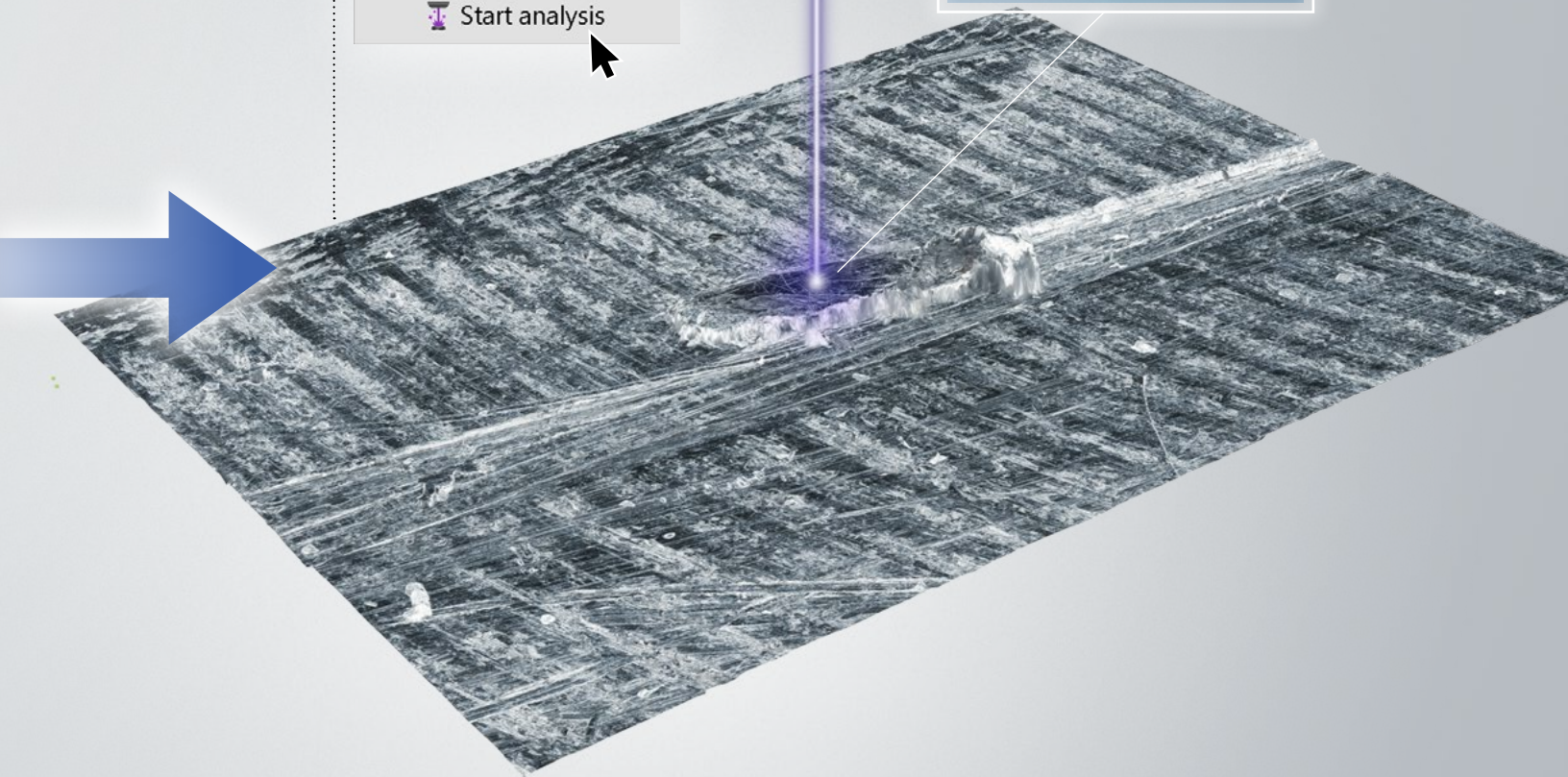
Seamless transition from magnified observation to elemental analysis

Simple attachment to microscope

Observation and elemental analysis unit   WORLD'S FIRST

One-click access to elemental analysis

Field of view alignment function   NEW
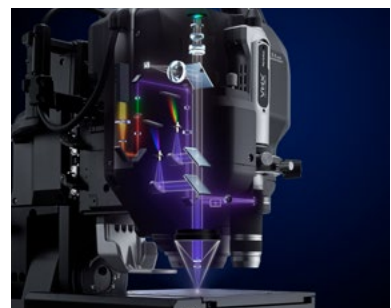
System Configuration Diagram
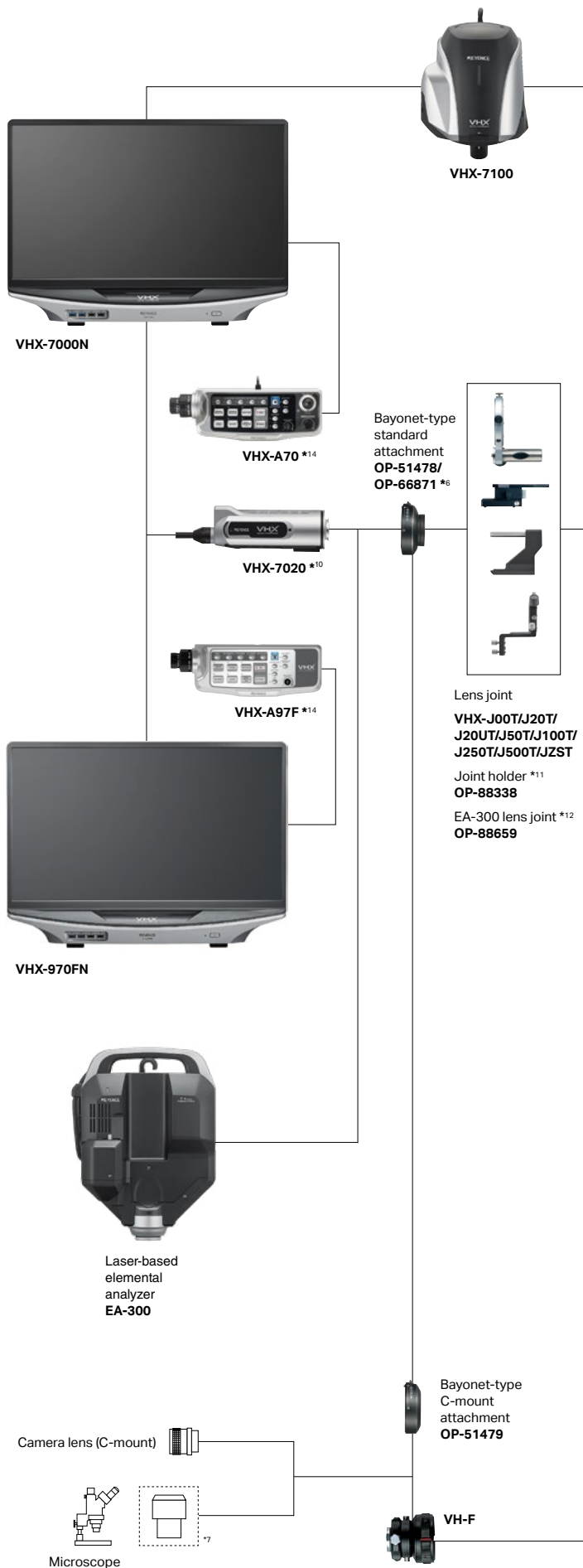
High-resolution telecentric lens

20× to 100×
High-resolution low-magnification objective lens
VHX-E20

100× to 500×
High-resolution medium-magnification objective lens
VHX-E100

500× to 2500×
High-resolution high-magnification objective lens
VHX-E500

2500× to 6000×
High-resolution maximum-magnification objective lens
VHX-E2500

VHX-7100

VHX-7000N

VHX-A70 *14

Bayonet-type standard attachment
OP-51478/ OP-66871 *6

VHX-7020 *10

VHX-A97F *14

Lens joint
VHX-J00T/J20T/ J20UT/J50T/J100T/ J250T/J500T/JZST

Joint holder *11
OP-88338

EA-300 lens joint *12
OP-88659

VHX-970FN

Laser-based elemental analyzer
EA-300

Real Zoom (RZ) lens *1

20× to 2000×
Dual-objective zoom lens
VH-ZST
EA-compatible

500× to 5000×
High-resolution zoom lens
VH-Z500R/Z500T

250× to 2500×
Dual-light high-magnification zoom lens
VH-Z250R/Z250T

100× to 1000×
Wide-range zoom lens
VH-Z100R/Z100T
EA-compatible

100× to 1000×
Universal zoom lens (100× to 1000×)
VH-Z100UT
EA-compatible

20× to 200×
Universal zoom lens (20× to 200×)
VH-Z20UT

20× to 200×
Ultra-small, high-performance zoom lens
VH-Z20R/Z20T
EA-compatible

0.1× to 50×
High-performance, low-range zoom lens
VH-Z00R/Z00T
EA-compatible

50× to 500×
Long-working-distance, high-performance zoom lens
VH-Z50L/Z50T

Borescope lens *4

VH-BA

VH-B55

VH-B18　　**VH-B27**

Bayonet-type C-mount attachment
OP-51479

Camera lens (C-mount)

Microscope

*7

VH-F

Fiberscope *5

VH-F61A　　**VH-F111A**

Low-magnification
diffuse adapter
OP-88588

Medium-magnification
diffuse adapter
OP-88589

Coaxial polarizing filter set
OP-88323

Differential interference
filter for low-magnification
objective lens
OP-88324

Differential interference
filter for medium-, high- and
maximum-magnification
objective lens
OP-88325

ZST adjustable adapter
OP-87796

Polarizing illumination adapter
OP-51649

Contact adapter
OP-81880

Polarizing light
attachment
OP-72407 *8

Polarizing filter
OP-87800 *8

Polarizing illumination adapter
OP-72405 *2

Polarizing illumination adapter
OP-72406

SCP filter set
OP-87821

Ring
illumination unit
for Z100/
Z100U/Z20U
OP-88164

Darkfield illumination adapter
OP-72402

Adjustable illumination adapter
OP-72404

Wide-area illumination adapter
OP-87298 *3

Diffuse illumination adapter
OP-87299

DIC prism set
OP-86943

DIC prism and
filter set
OP-87297

Adjustable illumination adapter
VH-K20

Super-diffuse illumination adapter
OP-42305

Polarizing illumination adapter
OP-87429

Non-contact diffusion adapter
OP-35414

Multi-diffuse adapter
OP-35469

Coaxial illumination adapter
OP-35416

Non-reflective illumination ring
OP-32009

Diffuse illumination adapter
971929

Polarizing light
attachment
OP-72407 *9

Polarizing filter
OP-87800 *9

Z50 ring illumination
unit
OP-88135

Polarizing illumination adapter
971930

Polarizing illumination adapter
OP-72406

▌Stage

Free-angle
observation system
VHX-S750E EA-compatible

(XYZ motorized stage,
Z motorized focus)

Large free-angle
observation system
VHX-S770E EA-compatible

(XYZ motorized stage,
Z motorized focus)

Free-angle
observation system
VHX-S700 EA-compatible

(Z motorized focus)

Free-angle
observation system
VHX-S660E (Large XYZ motorized)
VHX-S650E (XYZ motorized)
VHX-S600E (Z motorized)

Free-angle
observation system
VH-S300 (manual)

Free-angle
observation system
VH-S30F/S30B

VH lens mounting stand
OP-25539
XY stage
OP-22124

XY measurement system
VH-M100E

Z-axis motorized stage
VHX-S700F/S600F
(Z motorized, head only)

Vibration-resistant
high-magnification
observation system
VH-S5

▌Modules, etc.

3D shape
measurement
module
VHX-H5M

XY measurement
module
VHX-H3M3

Camera port
expansion unit *13
OP-88662

Stand branch unit
OP-88590

Calibration scale
OP-88592

*1 VH-Z00T/Z20T/Z20UT/Z50T/Z100UT/Z100T/Z250T/Z500T/ZST TRIPLE'R-compatible lenses are fitted with automatic lens/zoom recognition units and connection recognition mounts. *2 For coaxial lighting, OP-72407 and OP-72406 are required. *3 Included as standard with the VH-Z20UT. *4 A real-bore cable (OP-87201) is required. *5 The dedicated light guide attachment (OP-88332) is required. *6 When the VH-Z00R or Z20R is used, the OP-66871 is required. *7 A C-mount adapter suitable for the microscope is required. *8 For the VH-Z100R, use the OP-72407. For the VH-Z100T/100UT, use the OP-87800. *9 For the VH-Z50L, use the OP-72407. For the VH-Z50T, use the OP-87800. *10 The illumination unit (OP-88329) is required to mount the VH-ZST, VH-Z500T, VH-Z250T, VH-Z100T/100UT, VH-Z20UT, or VH-Z50T onto the VHX-7020. *11 When mounting the RZ lens on the VHX-S700/S750E/S770E, the joint holder (OP-88338) is required. *12 When connecting the VH-Z00/Z100/Z100UT to the EA-300, the VH-Z00/Z100 spacer (OP-88661) is required. When connecting the VH-ZST, use the VH-ZST lens joint (OP-88660). *13 Required when using the EA-300/VHX-7100/VHX-7020 at the same time. *14 Models may vary according to the instrument language. (Japanese/English/German/Simplified Chinese/Traditional Chinese/French/Korean/Spanish/Thai/Italian/Czech/Hungarian/Polish)

Basic Functions: Controller

Model			VHX-7000N	VHX-970FN
Camera	Image receiving element	VHX-7020	1/1.8 inch, 3.19 megapixel CMOS image sensor Total pixels: 2064 (H) × 1554 (V); virtual pixels: 2048 (H) × 1536 (V)	1/1.8 inch, 3.19 megapixel CMOS image sensor Total pixels: 2064 (H) × 1554 (V); virtual pixels: 2048 (H) × 1536 (V)
	Scanning system		Progressive	Progressive
	Frame rate		50 fps (max.)	50 fps (max.)
	Resolution Standard		2048 (H) × 1536 (V)	2048 (H) × 1536 (V)
	Resolution High accuracy		6144 (H) × 4608 (V)[*1]	–
	High dynamic range		16-bit intensity range through RGB data from each pixel	–
	Gain		Manual, Preset	Manual, Preset
	Electronic shutter		Auto, Manual, 1/60, 1/120, 1/250, 1/500, 1/1000, 1/2000, 1/5000, 1/9000, 1/19,000	Auto, Manual, 1/60, 1/120, 1/250, 1/500, 1/1000, 1/2000, 1/5000, 1/9000, 1/19,000
	Supercharge shutter		Can be set in 0.01 s increments from 0.02 to 16 s	Can be set in 0.01 s increments from 0.02 to 16 s
	White balance		Push-set, Manual, Preset (2700K, 3200K, 5600K, 9000K)	Push-set, Manual, Preset (2700K, 3200K, 5600K, 9000K)
	Back-focus adjustment		Not required	Not required
	Built-in light source Type		High-intensity LED	High-intensity LED
	Built-in light source Service life		40 thousand hours (reference value)	40 thousand hours (reference value)
	Image receiving element	VHX-7100	1/1.7-inch, 12.22-megapixel CMOS image sensor; total pixels: 4168 (H) × 3062 (V); virtual pixels: 4024 (H) × 3036 (V)	–
	Scanning system		Progressive	
	Frame rate		30 fps (max.)	
	Resolution Fast		2048 (H) × 1536 (V)	
	Resolution Standard		2880 (H) × 2160 (V)	
	Resolution High-resolution (4K Mode OFF)		2880 (H) × 2160 (V)	
	Resolution High-resolution (4K Mode ON)		4000 (H) × 3000 (V)	
	Resolution High accuracy		12,000 (H) × 9000 (V)[*1]	
	High dynamic range		16-bit intensity range through RGB data from each pixel	
	Gain		Manual, Preset	
	Electronic shutter		Auto, Manual, 1/30, 1/60, 1/120, 1/250, 1/500, 1/1000, 1/2000, 1/5000, 1/9000, 1/19,000	
	Supercharge shutter		Can be set in 0.01 s increments from 0.03 to 4 s	
	White balance		Push-set, Manual, Preset (2700K, 3200K, 5600K, 9000K)	
	Back-focus adjustment		Not required	
	Built-in light source Type		High-intensity LED	
	Built-in light source Service life		40 thousand hours (reference value)	
LCD monitor	Size		Color LCD (IPS type), 27-inch[*5]	Color LCD (IPS type), 27-inch[*5]
	Screen size		596.736 (H) × 335.664 (V) mm 23.49" × 13.22"	596.736 (H) × 335.664 (V) mm 23.49" × 13.22"
	Pixel pitch		0.1554 mm (H) × 0.1554 mm (V) 0.006118" × 0.006118"	0.1554 mm (H) × 0.1554 mm (V) 0.006118" × 0.006118"
	Number of pixels		3840 (H) × 2160 (V)	3840 (H) × 2160 (V)
	Display colors		Approx. 1.07 billion colors[*2]	Approx. 1.07 billion colors[*2]
	Brightness		350 cd/m² (Center 1 Point, typical)	350 cd/m² (Center 1 Point, typical)
	Contrast ratio		1300:1 (typical)	1300:1 (typical)
	Viewing angle		±89° (typical, horizontal), ±89° (typical, vertical)	±89° (typical, horizontal), ±89° (typical, vertical)
Hard disk drive unit	Storage capacity		1 TB (including 350 GB reserved system space) Approx. 2.16 million images (when 3 megapixel images are compressed) to approx. 71.1 thousand images (when 3 megapixel images are not compressed)	1 TB (including 350 GB reserved system space) Approx. 2.16 million images (when 3 megapixel images are compressed) to approx. 71.1 thousand images (when 3 megapixel images are not compressed)
Image format			JPEG (with compression), TIFF (without compression)	JPEG (with compression), TIFF (without compression)
Observable image size			50 thousand (H) × 50 thousand (V) pixels (with stitching)	2048 (H) × 1536 (V) pixels
Video output	Output method		Display port: 3840 × 2160 pixels	Display port: 3840 × 2160 pixels
	Scanning frequency Special LCD monitor		132 kHz (H), 60 Hz (V)	132 kHz (H), 60 Hz (V)
	Scanning frequency External monitor		132 kHz (H), 60 Hz (V)	132 kHz (H), 60 Hz (V)
Input	Mouse input		USB mouse supported	USB mouse supported
	Keyboard input		USB keyboard supported	USB keyboard supported
Interface	LAN		RJ-45 (10BASE-T/100BASE-TX/1000BASE-T)	RJ-45 (10BASE-T/100BASE-TX/1000BASE-T)
	USB 2.0 series A		6 ports	6 ports
	USB 3.0 series A		2 ports	2 ports
Power supply	Power voltage		100 to 240 VAC ±10%, 50/60 Hz	100 to 240 VAC ±10%, 50/60 Hz
	Power consumption		430 VA	430 VA
Environmental resistance	Operating ambient temperature		+5 to 40°C +41 to 104 °F[*3]	+5 to 40°C +41 to 104 °F[*3]
	Operating ambient humidity		20 to 80% RH (no condensation)[*4]	20 to 80% RH (no condensation)[*4]
Weight	Controller		Approx. 12.0 kg 26.46 lb	Approx. 12.0 kg 26.46 lb
	Camera unit		Approx. 0.6 kg 21.16 oz (VHX-7020), approx. 5.0 kg 11.02 lb (VHX-7100)	Approx. 0.6 kg 21.16 oz (VHX-7020)
	Handheld controller		Approx. 0.45 kg 15.87 oz	Approx. 0.45 kg 15.87 oz
Dimensions (excluding the projected areas)			625 (W) × 460 (H) × 180 (D) mm 24.61" × 18.11" × 7.09" (when stored)	625 (W) × 460 (H) × 180 (D) mm 24.61" × 18.11" × 7.09" (when stored)

*1 When using the high-resolution function by means of the motorized stage shift. *2 8-bit + 2 FRC display *3 5 to 35°C 41 to 95 °F for hand-held observation with a standard camera *4 If the ambient operating temperature exceeds 40°C 104 °F, use the product under conditions where the relative humidity is not more than 70%. *5 The LCD monitor provided with this system has been manufactured using extremely advanced technology. In very rare cases, an unlit pixel (black spot) or a lit pixel (bright spot) may be present on the screen. However, this is not indicative of a fault.

Basic Functions: Stage

Model		VHX-S750E	VHX-S770E	VHX-S600E	VHX-S90F/VH-S30B
XYθ stage	XY stage: Motorized/Manual	Motorized	Motorized	Manual	Manual
	XY motorized stage motor	2-phase stepping motor	2-phase stepping motor	–	–
	XY motorized stage resolution	1 µm (typical)	1 µm (typical)	–	–
	XY motorized stage movement speed	10 mm 0.39"/sec (max)	20 mm 0.79"/sec (max)	–	–
	XY-stage movement range	±20 mm ±0.79"	±50 mm ±1.97"	±35 mm ±1.38"	X: ±37.5 mm ±1.48", Y: ±25 mm ±0.98"
	θ rotation angle	±90°	–	360°	360°
	XYθ stage size	Top surface: 171 × 168 mm 6.73" × 6.61" (center disk: ø100 ø3.94")	Top surface: 233 × 185 mm 9.17" × 7.28" (center disk: ø168 ø6.61")	Top surface: 198 × 150 mm 7.80" × 5.91" (center disk: ø136 ø5.35")	Top surface: 180 × 136 mm 7.09" × 5.35"
	Transmitted lighting	20x or higher	20x or higher	20x or higher	–
Focus Z axis	Z stage: Motorized/Manual	Motorized	Motorized	Motorized	Motorized
	Z motorized stage motor	5-phase stepper motor	5-phase stepper motor	5-phase stepper motor	2-phase stepper motor
	Z motorized stage resolution	0.1 µm (typical)	0.1 µm (typical)	0.1 µm (typical)	1 µm (typical)
	Z motorized stage travel speed	17 mm 0.67"/sec (max)	17 mm 0.67"/sec (max)	17 mm 0.67"/sec (max)	5 mm 0.19"/sec (max)
	Z stage travel range	49 mm 1.93"	49 mm 1.93"	49 mm 1.93"	Motorized: 29 mm 1.14" Manual: 33 mm 1.30"
Stage Z axis	Z stage: Motorized/Manual	Motorized	Motorized	Manual	Manual
	Z motorized stage motor	2-phase stepping motor	2-phase stepping motor	–	–
	Z motorized stage resolution	1 µm (typical)	1 µm (typical)	–	–
	Z motorized stage travel speed	10 mm 0.39"/sec (max)	10 mm 0.39"/sec (max)	–	–
	Z stage travel range	50 mm 1.97"	50 mm 1.97"	45 mm 1.77"	47 mm 1.85"
Side camera		Yes, VGA	Yes, VGA	No	No
Ratings	Power voltage	100 to 240 VAC ±10%, 50/60 Hz	100 to 240 VAC ±10%, 50/60 Hz	100 to 240 VAC ±10%, 50/60 Hz	DC 12 V
	Power consumption	130 VA	130 VA	50 VA	18 VA
Environmental resistance	Operating ambient temperature	+5 to 40°C +41 to 104 °F	+5 to 40°C +41 to 104 °F	+5 to 40°C +41 to 104 °F	+5 to 40°C +41 to 104 °F
	Operating ambient humidity	20 to 80% RH (no condensation)	20 to 80% RH (no condensation)	35 to 80% RH (no condensation)	35 to 80% RH (no condensation)
Weight		23.8 kg 52.47 lb	25.3 kg 55.78 lb	Approx. 17.2 kg 37.92 lb	Approx. 14.2 kg 31.31 lb
Load capacity		5 kg 11.02 lb	5 kg 11.02 lb	1 kg 2.20 lb	1 kg 2.20 lb

▌Other Functions

Model		VHX-7000N	VHX-970FN
Observation functions	Auto-focus function	Yes	Yes
	Focus view function	Yes	No
	Lighting switch function (uneven surface enhancement)	Yes (Full, Partial, Lateral, Dark-field, Bright-field, Mixed Lighting)	Yes (Full, Partial, Lateral, Dark-field, Bright-field, Mixed Lighting)
	Multi-lighting function	Yes	No
	Optical Shadow Effect Mode function	Yes	No
	Camera-shake correcting function	Yes	Yes
Display function	Full-screen display function	Yes	Yes
	Split-screen function	Functions for tiling screens horizontally, vertically, into quarters, into ninths, and interlocking display	Functions for tiling screens horizontally, vertically, into quarters, into ninths, and interlocking display
	Real-time digital zoom	1.0x to 10.0x	1.0x to 10.0x
	Comment display function	Yes	Yes
Image enhancement function	Glare removal function	Yes	Yes
	Ring-reflection removal function	Yes	No
	HDR function	Yes	No
	Fine-Shot function	Yes	Yes
Stitching function	2D image stitching	Yes	No
	3D image stitching	Yes	No
	Navigation function	Yes	No
3D function	Real-time depth composition function	Yes	No
	Quick composition & 3D function	Yes	Yes
	High-quality depth composition	Yes	Yes
	3D display function	Yes	Yes
	3D shape correction function	Yes (Slope/Sphere/Cylinder)	Yes (Slope/Sphere/Cylinder)
	3D comparison function	Yes (Combination/Comparison/Difference display mode)	Yes (Combination/Comparison/Difference display mode)
Recording function	Report output (Excel)	Yes	Yes
	Capture condition reproduction function	Yes	Yes
	Timer capture function	Yes	Yes
	Video recording/ playback function	Max speed: 50 FPS; *Video size when using VHX-7020 (2880 × 2160, 2048 × 1536, 800 × 600, 640 × 480)	Max. speed: 30 FPS; Video size (2048 × 1536, 800 × 600, 640 × 480)
Measuring functions	Distance, angle, radius, area etc.	Yes, various	Yes, various
	Automatic edge detection	Yes	Yes
	Scale display	Yes, various	Yes, various
	Automatic count, area measurement function	Yes (length/area can be measured using brightness/color extraction)	Yes (length/area can be measured using brightness/color extraction)
	Automatic area measurement	Yes	No
	Grain size analysis	Yes	No
	Contamination analysis	Yes	No
	One-click measurement	Yes	No
	Auto-measurement teaching	Yes	No
	Auto measurement	Yes	No
	Automatic lens/zoom recognition function (Triple 'R')	Yes	Yes
	Auto-calibration	Yes (numerical input not required)	Yes (numerical input not required)
	One-push calibration function	Yes (scale position adjustment not required)	No
	CSV storage	Yes	Yes
3D measurement function (VHX-H5M optional function)	3D profile measurement	Yes	Yes
	Point height measurement	Yes	Yes
	3D volume measurement	Yes	Yes
	Roughness measurement	Yes	Yes
Manual XY Measurement System (VHX-H3M3 optional function)	XY stage measurement	Yes	Yes
	Wide image display function	Yes	Yes
Utilities	Easy menu	Yes	Yes
	Space-saving single unit	Yes	Yes
	Foot switch compatibility	Yes	Yes
	User-specific setting memory	Yes	Yes
	System protection setting	Yes	Yes
	PC mode	Yes	Yes
	Network connection function	Yes (communication software, file sharing, FTP)	Yes (communication software, file sharing, FTP)
	Function guide	Yes	Yes
	Video help	Yes	Yes
PC software (available free of charge)	Communication software	Enables easy transmission of image data between VHX system and PC. (LAN)	Enables easy transmission of image data between VHX system and PC. (LAN)
	3D image playback software for the PC	Enables 3D images saved on VHX to be played back in 3D on the PC.	Enables 3D images saved on VHX to be played back in 3D on the PC.
	Optical Shadow Effect Mode playback software	Enables parameter adjustment on Optical Shadow Effect Mode images saved on the VHX system.	No
	Multi-lighting playback software	Multi-lighting images saved on the VHX can be played back later with the lighting direction changed.	No
	HDR playback, measurement, stitched image playback software	Enables HDR parameter adjustment, display of stitched images, measurement.	Enables measurement on the PC.
	One-click measurement compilation software	Enables one-click measurement result compilation and export to Excel.	No

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