KEYENCE

Wide-Area 3D Measurement System

VR-3000 Series

3D SURFACE MEASUREMENTS IN AS LITTLE AS 4 SECONDS

ONE-SHOT 3D MEASUREMENT

JUST PLACE AND CLICK TO COLLECT 3D DATA

Wide-Area 3D Measurement System
VR-3000 Series

Measure an entire area in as little as four seconds with 0.1 µm vertical resolution

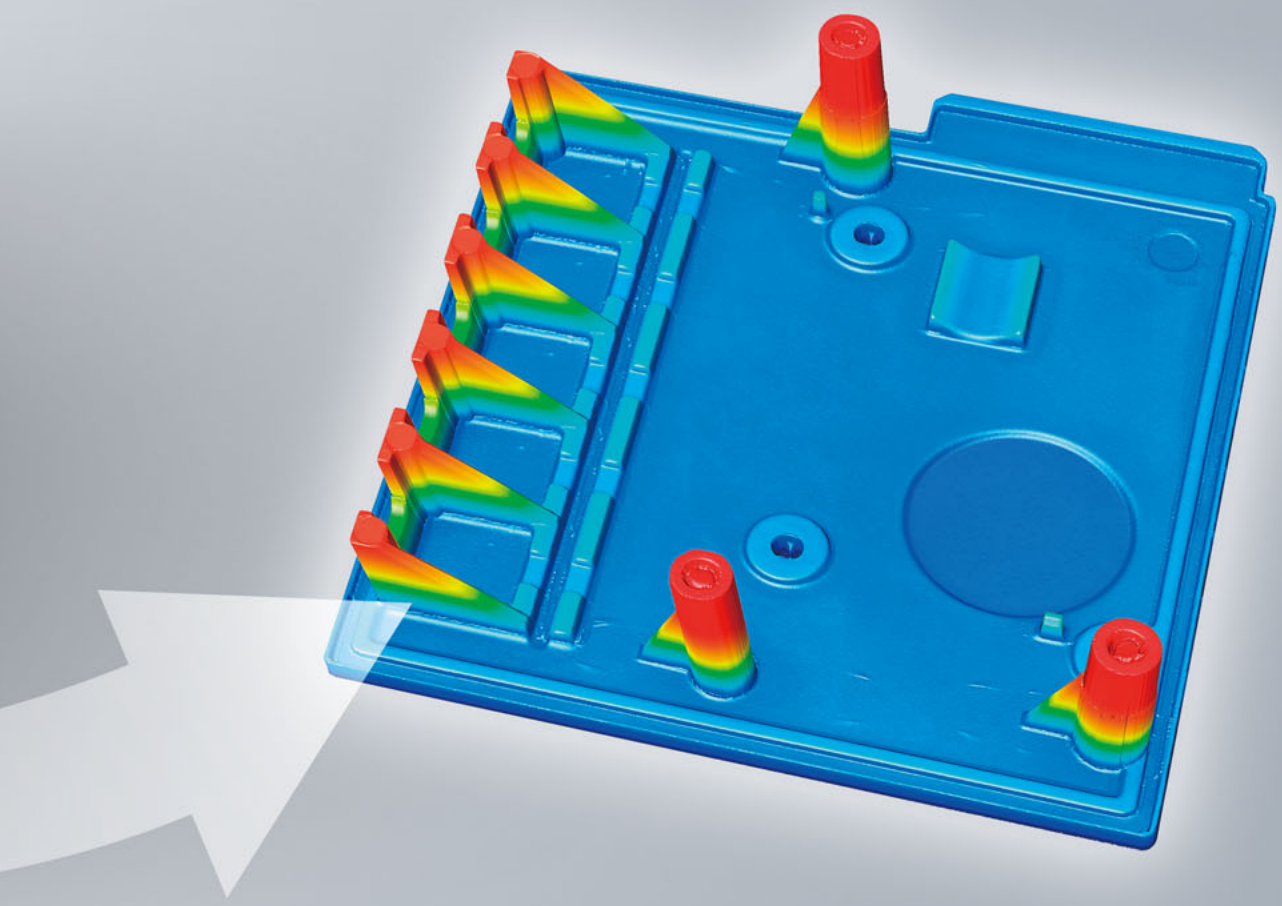
1 Quick, accurate 3D measurements

Analyze form, contour, and roughness with 780,000 data points in a single image

2 Complete 3D surface analysis

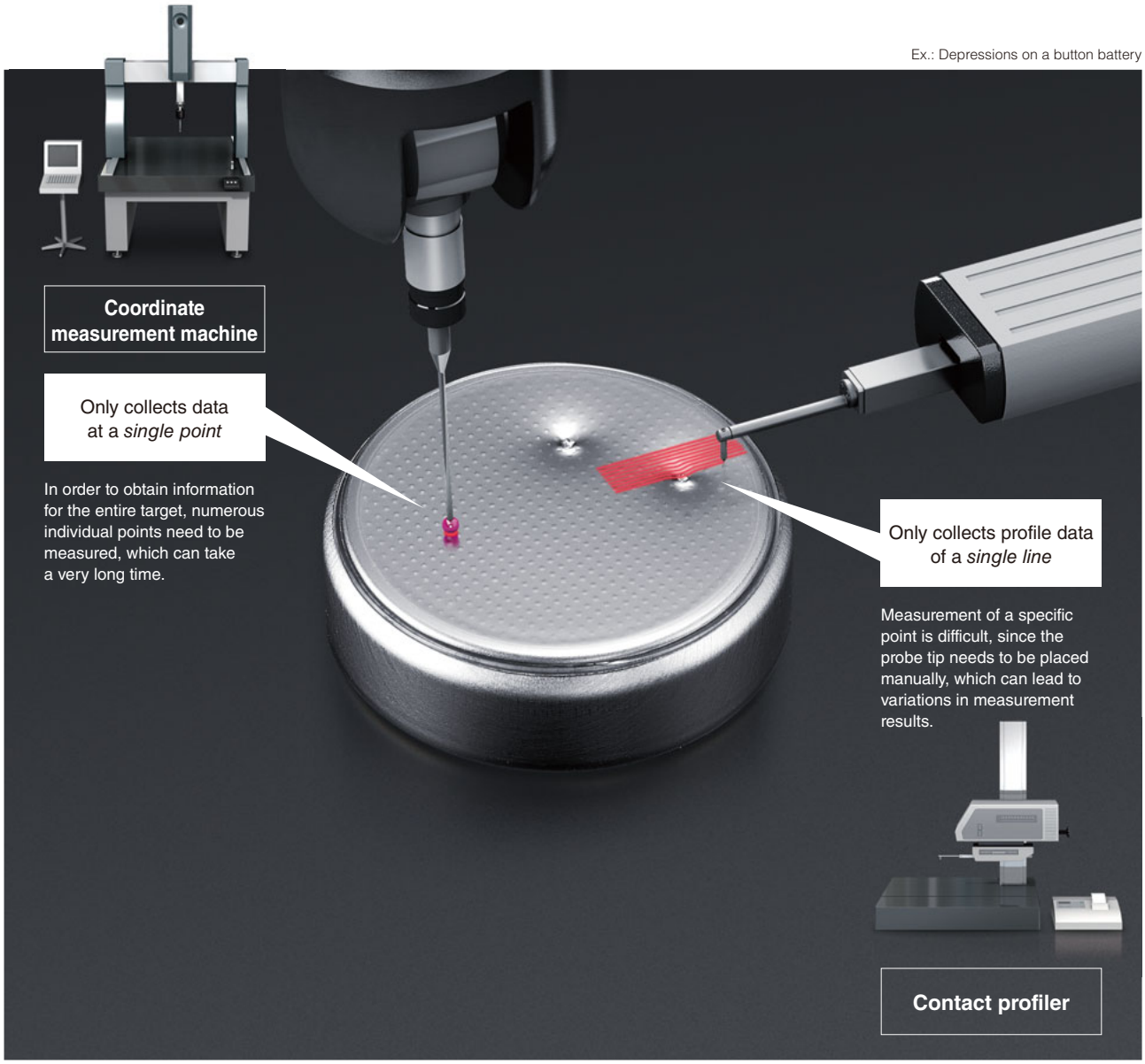
XYZ traceable measurements compliant with international standards

3 Unmatched measurement precision



Conventional Measuring Instruments

Ex.: Depressions on a button battery

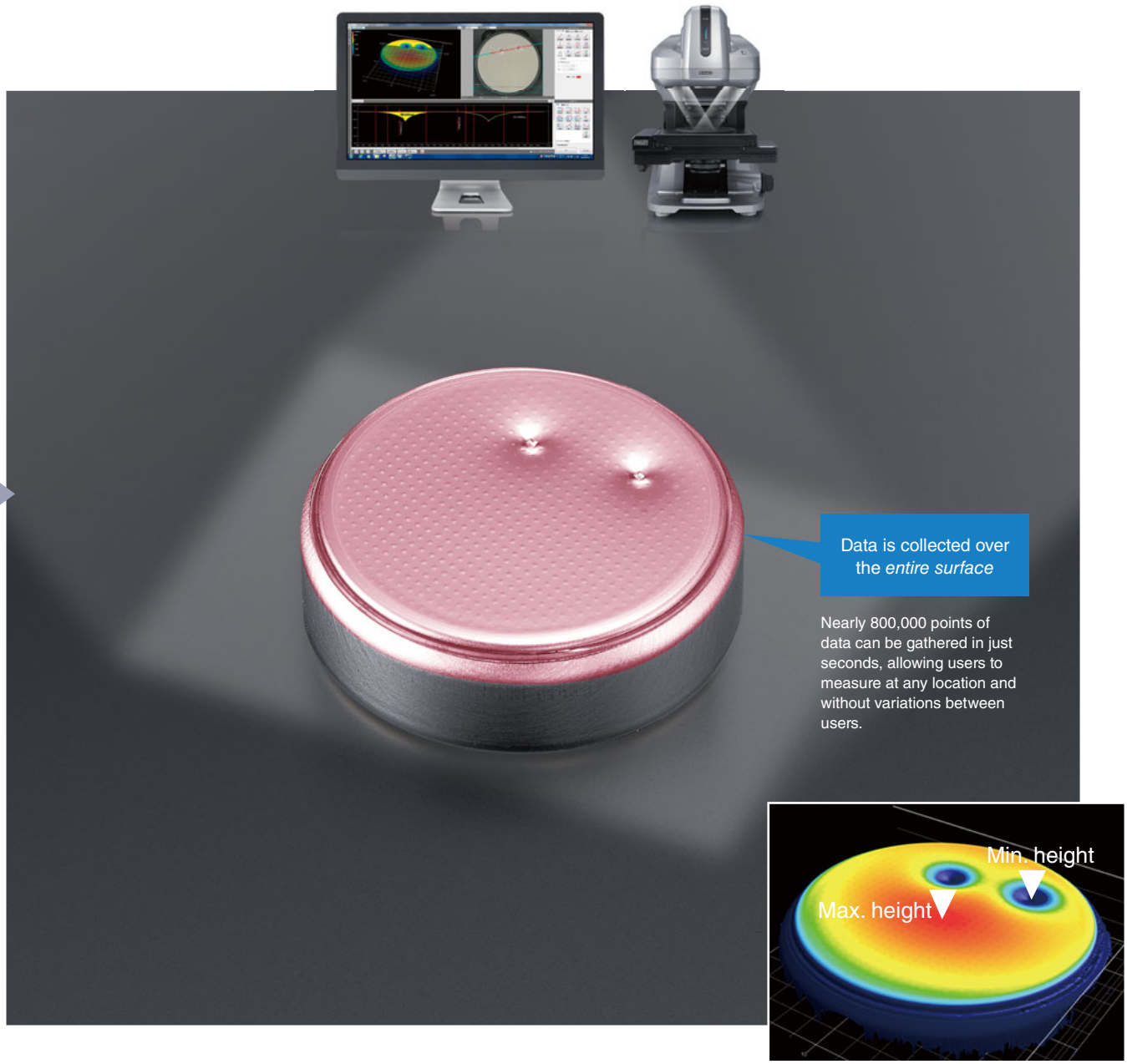


When measuring only points and lines

Typical measurement systems only provide measurement data on the areas that they are able to contact with a probe tip. Measuring specific locations by simply eying where to put the probe makes the results unreliable.

- ✕ *Measurement of specific areas is difficult*
- ✕ *Measurements take a long time*
- ✕ *Measurement results vary from person to person*

Wide-Area 3D Measurement System



Data is collected over the *entire surface*

Nearly 800,000 points of data can be gathered in just seconds, allowing users to measure at any location and without variations between users.

Non-contact surface scanning

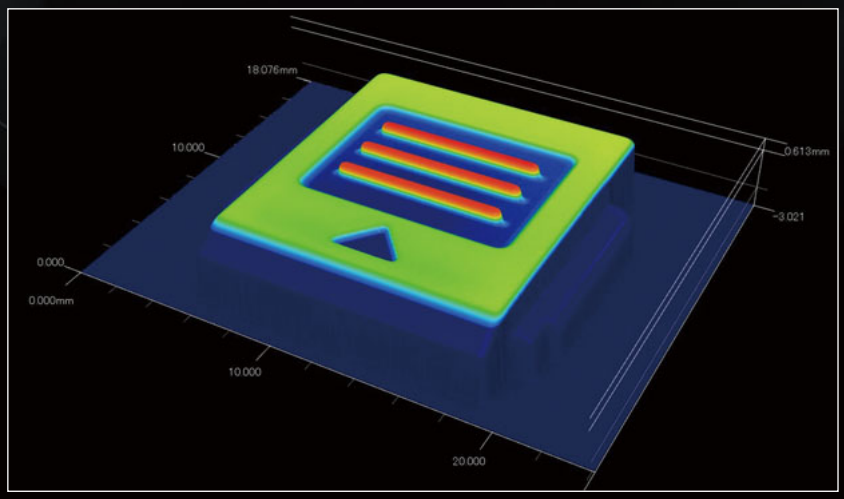
The VR-3000 Wide-Area 3D Measurement System quickly scans the entire topography of a surface so that reliable measurements can be made at any point on an object.

- ✓ *Max and min heights can be reliably measured*
- ✓ *Scans in as little as 4 seconds*
- ✓ *Repeatable and reproducible measurement results*

1 Quick, accurate 3D measurements

Just click!

Measurements in as little as 4 seconds

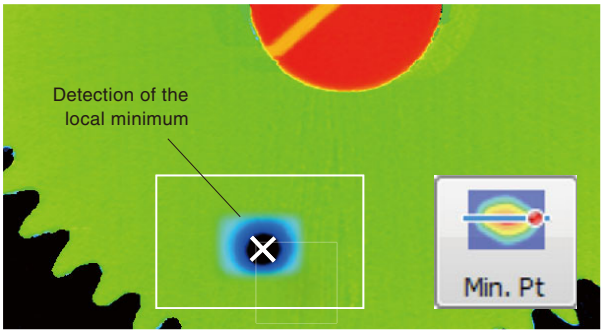


Anyone Can Measure Quickly and Accurately

Highly-reproducible measurements with 0.1 µm z-resolution in as little as 4 seconds

Fast measurement with no need to worry about probe placement

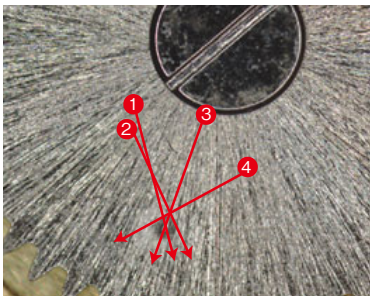
With conventional profile measurement systems, a user may spend a lot of time positioning the probe tip to touch the correct area of the target. The VR-3000 Series makes it simple by only requiring that the user place the sample on the stage, and then click the Measure button to collect data in as little as four seconds.



Scans the entire surface to ensure that no data is missed

With the VR-3000 Series, 3D information for the entire surface is obtained with a single scan. Users can see the overall shape of the target, including the highest and lowest points, without having to re-scan the surface or guess-and-check as to whether the correct location has been measured.

With conventional profile measurement systems, set up and measurement is time-consuming.



Dent measurements
Precise positioning is difficult.

Various adjustments are required, such as selection of the sample type, stylus tip, and measurement parameters. In addition, it's nearly impossible to tell whether measurement of the designated point has been performed.

User-caused errors are frequent.

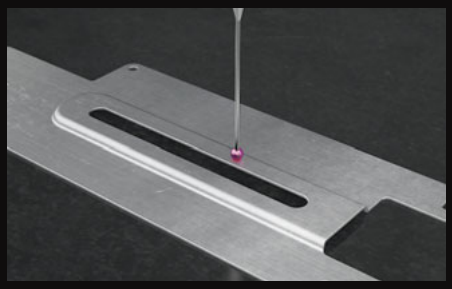
Extensive training is required.

Difficult to reproduce results.

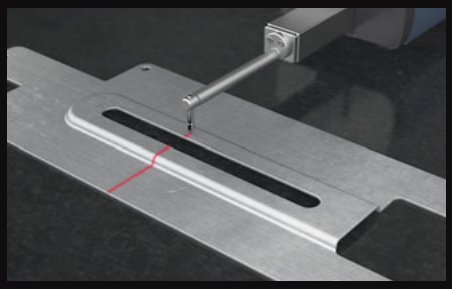
Measure the entire surface, not just points or lines

With a CMM or contact profiler, it's necessary to measure several places in order to try to understand the shape of the surface.

With a coordinate-measuring machine…
measurement is performed at a **point**



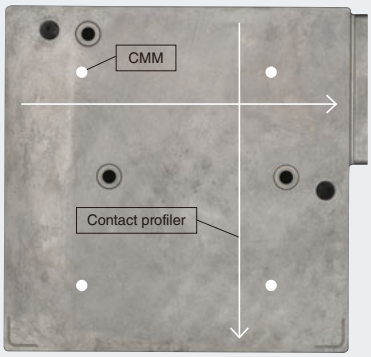
With a profile measuring instrument…
measurement is performed in a **line**



Visualize Your Surface Like Never Before

Measure the entire surface and analyze the overall shape

Conventional measurement devices

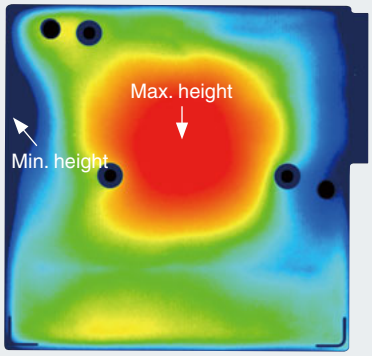


When measuring with points and lines…

With point and line measurements, it's hard to know where to measure when trying to find the difference between the highest point and the lowest point.

- No way to see the highest or lowest points
- Difficult to measure exact locations

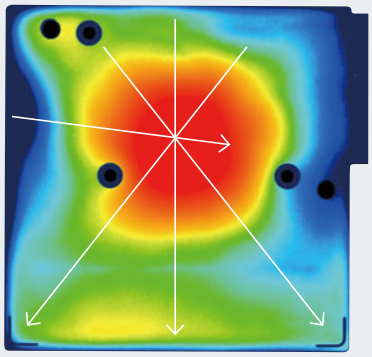
VR-3000 Series



With one-shot 3D measurement

One-shot measurement of the entire surface is performed, making it possible to see a target's overall shape and waviness.

- See highest and lowest points at a glance
- Quickly obtain the overall shape



Measure any location after just one scan

Because the VR-3000 Series shows the overall shape of a target, including the highest and lowest points, measurement can be done for any targeted area. The surface data obtained can also be reanalyzed and measured at any point in the future.

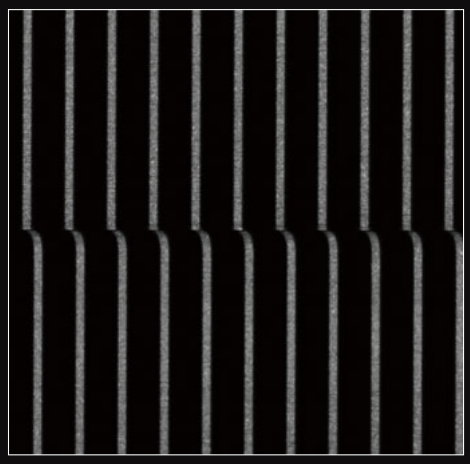
Non-Contact, High-Accuracy Measurement

Measurement principle

Light-section method

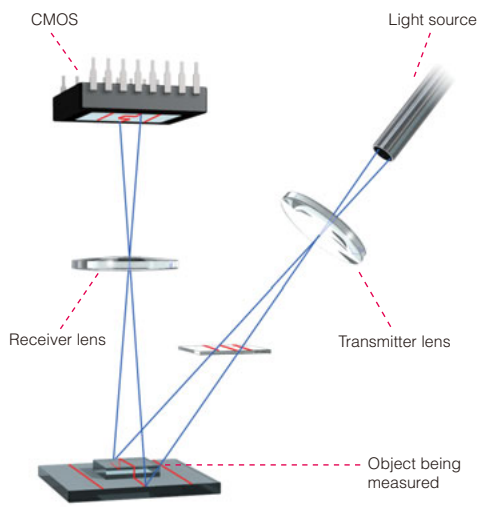
Triangulation measurement of height differences using structured illumination

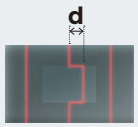
Patterned light is emitted from the transmitter lens and projected onto the surface of the object. When the reflected light is viewed from a different angle using the receiver lens, the light appears banded and bent due to the height changes on the object's surface. A CMOS camera is used to capture the reflected light, and based on triangulation, the height and position can be calculated.



Highly-efficient measurement algorithms

Accurate, repeatable, and traceable results





Calculating height

Changes in height will cause the patterned light to appear bent at each height change. The amount of the bend, or '**d**' in the image to the left, is used to calculate the height.

One-shot 3D Algorithm

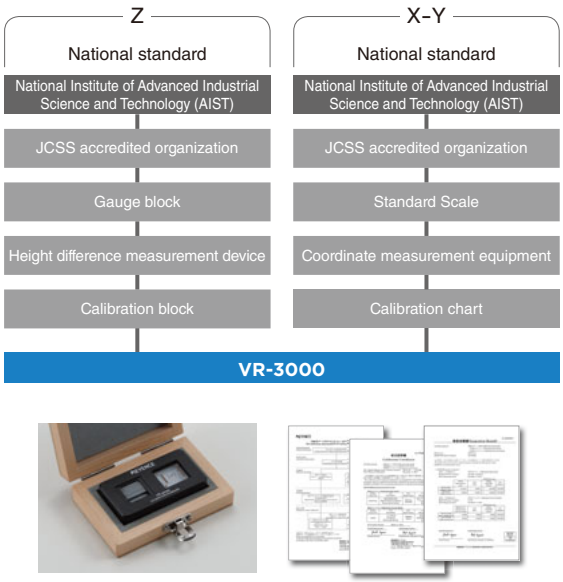
We combined our TMT one-shot algorithm for high-accuracy, true color measurements with our high resolution 3D technology to create the world's first algorithm for instant 3D measurement.

TMT (Telecentric Multi-Triangulation) Algorithm

By using three, double-telecentric lenses with the multi-triangulation technology of our displacement gauges, we have created a unique algorithm for quick and accurate 3D measurement.

Real color 3D Technology

Red, green, and blue light from a dedicated lighting unit are captured by a new high-accuracy CMOS sensor. Images captured separately with each light color are compiled to create a full color image. This process produces vivid and detailed images that cannot be obtained with a standard color camera and white-light illumination.



XYZ Traceability

The measurement results, obtained using the world's first algorithm of its type, are traceable according to international standards, so users can obtain highly-reliable measurements.

Calibration

An inspection report and calibration gauge with calibration certificate are standard items included with each system. The gauge uses the same reference scale used by JCSS certified operators. Instead of hiring a technician to perform calibration, users can easily do it themselves on-site.

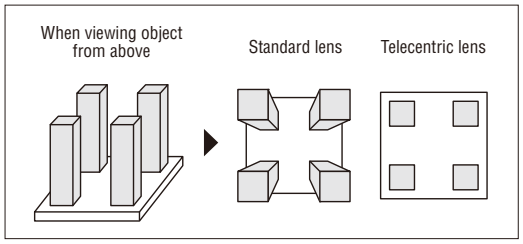
Technology designed for high-precision

Sophisticated optics and hardware

Three, Double-telecentric Lenses

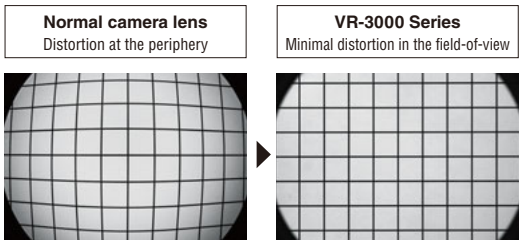
To achieve high-accuracy 3D measurement, it is crucial that the transmitter and receiver lenses are made in such a way to minimize distortion, and that changes in the distance between the object and lens do not alter the size of the image. The VR-3000 contains a total of three wide telecentric lenses, used in combination with the industry's largest CMOS. The advanced optical design allows high-accuracy one-shot 3D measurement of areas up to 3 cm 1.18".

Telecentric Lenses Improve Accuracy



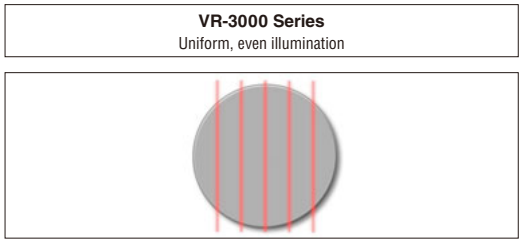
Feature size is unchanged as the lens moves through focus

When measuring objects with height differences, it is important that the field-of-view remains constant as the lens moves in the Z direction. By using a telecentric lens, the VR-3000 can accurately measure height differences up to ±5 mm ±0.20" at one time.



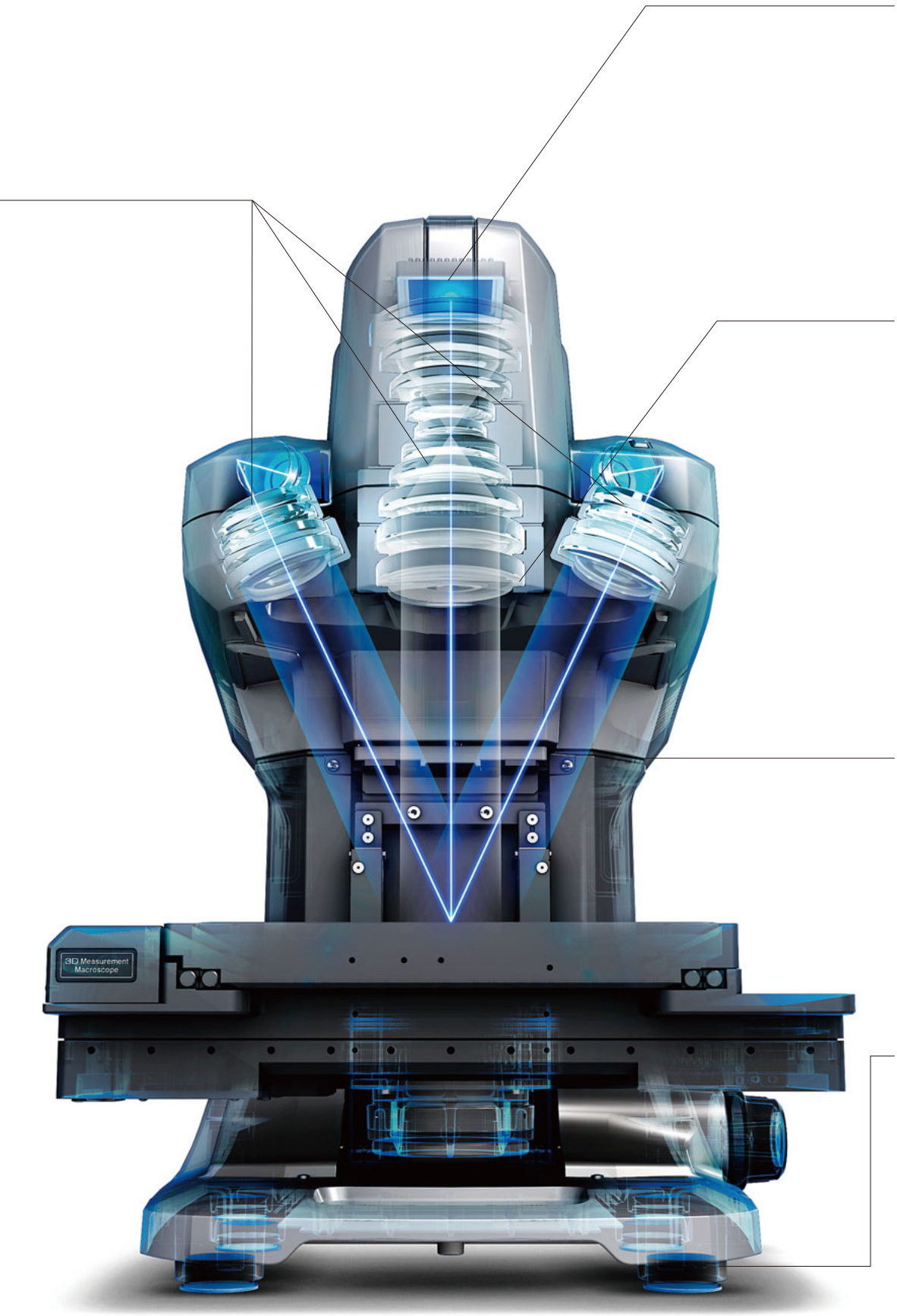
Minimizes distortion at the periphery

When measuring a wide area, stretching 30 mm 1.18" diagonally, in one shot, telecentric lenses will result in minimal distortion throughout the entire field-of-view. Telecentric lenses also provide clearer, sharper, and more accurate image details.



Transmitter lens provide uniform illumination

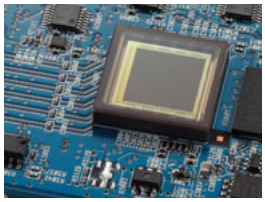
With a telecentric lens, the target is illuminated evenly throughout the entire measurement range. This allows for high-accuracy measurement of the target no matter where it is placed.



Accurate Imaging

High-accuracy CMOS sensor

The industry's largest high-accuracy CMOS is used, allowing data to be obtained with minimal noise for high-resolution image capture.



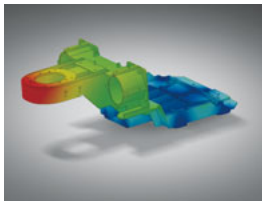
Real color light unit

The VR-3000 has a light source that emits red, green, and blue light for true color reproduction. The combination of an optical system and optical fibers minimizes inaccuracies when composing the color.

No Vibration Isolation Required

Designed to withstand large amounts of vibration

Strength analysis was used to create a highly-rigid frame and remove the need for vibration isolation equipment, such as an air table. The image below is a diagram of the strength analysis on the structure of the system.

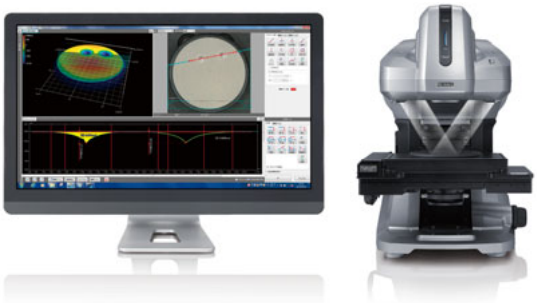


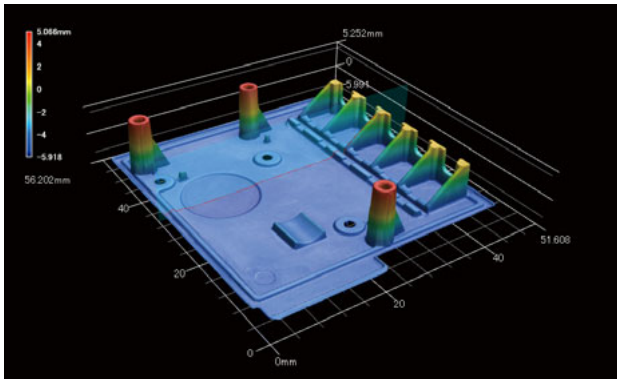
Specially designed vibration-proof rubber

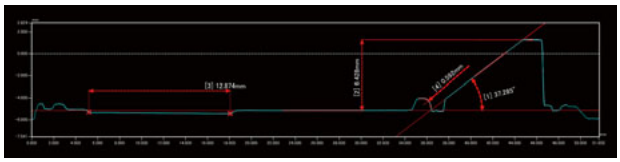
The VR-3000 is equipped with vibration-proof rubber with over four times the vibration prevention of conventional materials. The material absorbs a wide range of vibration, from low to high frequencies, allowing for stable imaging and measurement even at high magnifications.

Numerous measurement and analysis functions

From shape and roughness to volume and 2D measurements



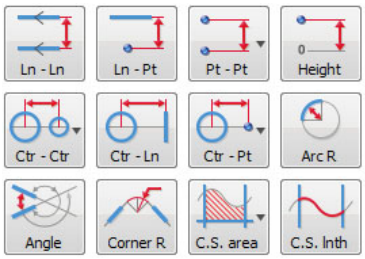




Height/width/angle/radius measurement

Profile measurement

Measurements such as height, width, cross-sectional area, angle, and radius can be made by simply pointing and clicking across the desired area. Up to 12 different types of measurements can be performed.

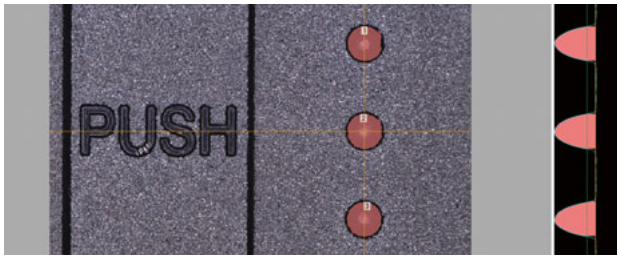


	Measured value
Height difference	-0.001
Max. height	0.092
Min. height	-0.054
Max.-Min.	0.146

Height difference/planarity measurement

Measure average height difference

Height differences between two surfaces can be measured using 780,000 data points. The surface data can also be used for performing planarity measurements.



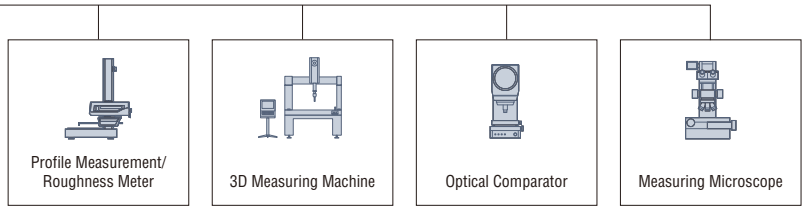
	Volume	C.S. area	Surface area	Surface area/C.S. area	Area ratio	Average height	Max. height	Perimeter	Horz. Feret	Vert. Feret	Circle equivalent dia	Circularity
	mm³	mm²	mm²		%	mm	mm	mm	mm	mm	mm	
Total	1.333	3.950	4.999	3.796	1.081	1.013	1.439	12.729	3.836	3.931	3.885	2.892
Max.	0.446	1.320	1.669	1.267	0.361	0.338	0.481	4.257	1.295	1.318	1.296	0.969
Min.	0.442	1.314	1.665	1.265	0.360	0.336	0.479	4.223	1.271	1.295	1.293	0.958
Ave.	0.444	1.317	1.666	1.265	0.360	0.338	0.480	4.243	1.279	1.310	1.295	0.964
Std. Dv.	0.002	0.002	0.002	0.001	0.001	0.001	0.001	0.014	0.011	0.011	0.001	0.004
3 Sigma	0.006	0.007	0.006	0.003	0.002	0.003	0.003	0.043	0.033	0.033	0.003	0.013
1	0.442	1.314	1.665	1.267	0.360	0.336	0.479	4.223	1.271	1.295	1.293	0.964
2	0.446	1.320	1.669	1.265	0.361	0.338	0.481	4.257	1.271	1.318	1.296	0.958
3	0.446	1.317	1.665	1.265	0.360	0.338	0.480	4.249	1.295	1.318	1.295	0.969

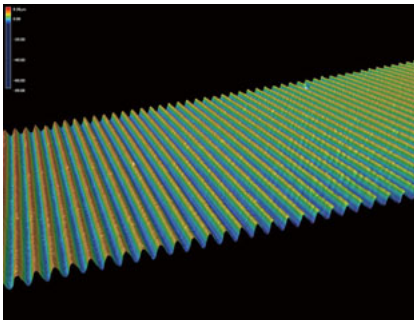
Volume/area/counting

Measure volume and surface area

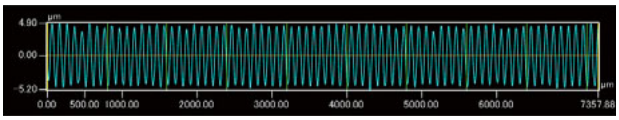
Using height data, a target's volume, area, and the XY dimensions of a specified height can be measured. Counting can also be performed simultaneously.

Support for a wide range of measurements, from 2D to 3D





No.	Measurement name	Measured value	Unit
1	Evaluation length	7809.51	µm
2	Sampling length	800.00	µm
3	Rp	4.85	µm
4	Rv	4.86	µm
5	Rz	9.72	µm
6	Rc	9.06	µm
7	Rt	75.75	µm
8	Ra	2.91	µm
9	Rq	3.23	µm
10	Rsk	-0.01	
11	Rku	1.51	
12	RSm	99.85	µm
13	RΔq	0.21	
14	Rz/JIS	9.29	µm



Curvature, line roughness (ISO 4287: 1997), surface roughness (ISO 25178)

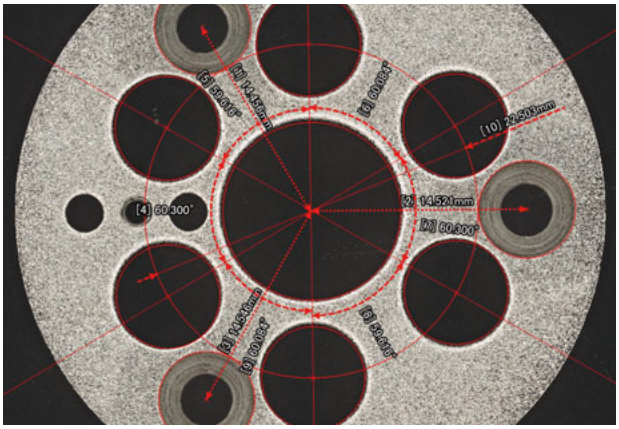
Line roughness

Calculate typical roughness parameters, such as Ra, Rz, etc. With several measurement options available, even measurements that are difficult to perform with contact profilers, like those on circularly-shaped parts, can be done.

	Sq	Ssk	Sku	Sp	Sv	Sz	Sa
	um			um	um	um	um
Area1	1.25	-1.90	7.96	2.42	6.64	9.05	0.85
Area2	1.03	0.96	3.34	3.48	1.77	5.24	0.83
Area3	1.66	-1.51	5.22	3.60	8.64	12.22	1.23
Max.	1.66	0.96	7.96	3.60	8.64	12.24	1.23
Min.	1.03	-1.90	3.34	2.42	1.77	5.24	0.83
Ave.	1.31	-0.82	5.51	3.16	5.68	8.85	0.97
Std. DV	0.26	1.27	1.90	0.53	2.89	2.86	0.18

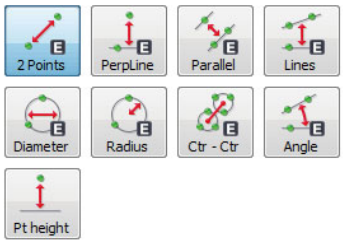
Surface roughness

Measure surface roughness in accordance with ISO 25178. These measurements evaluate data over an area, giving more reliable roughness results by taking into account more data points.



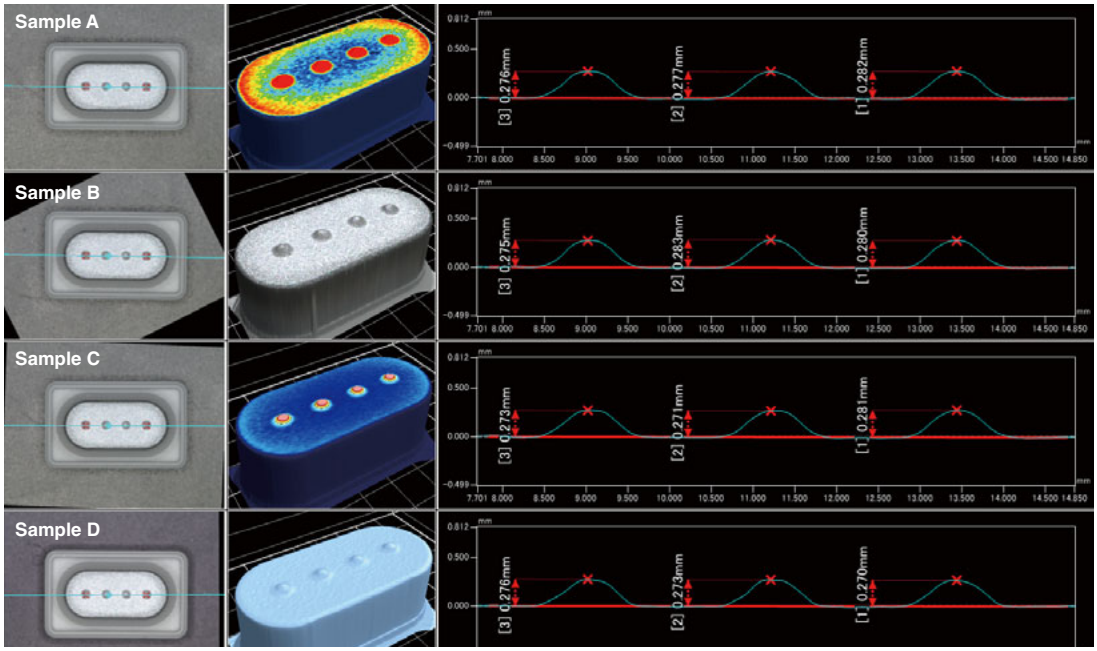
2D measurement

Various 2D measurements are available including distances between points, lines, and circles, diameter, and angle. Users can also measure the height at specific points on the image by just clicking the location on-screen.

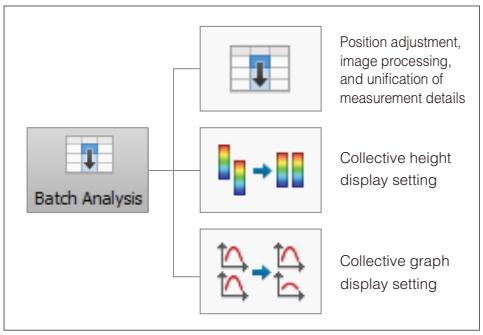


Compare and differentiate between multiple samples simultaneously

Multi-file analysis function

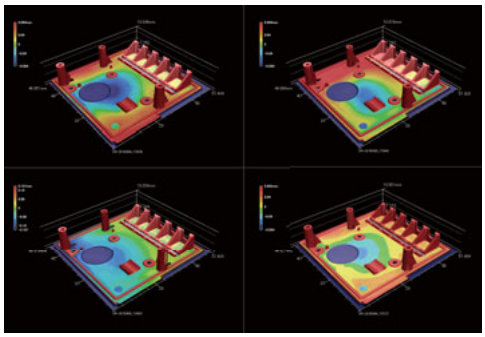


Measurements including cross-section, volume, area, planarity, and roughness can be performed on several files simultaneously and under the same measurement conditions. For example, users are able to see changes in topography or shape between prototypes that were made under different manufacturing conditions or to visualize and measure surface wear over time. This greatly reduces the number of operations and process time required for measurement and prevents mistakes from occurring due to changes in measurement conditions.



Batch analysis of multiple files: Auto Arrange function

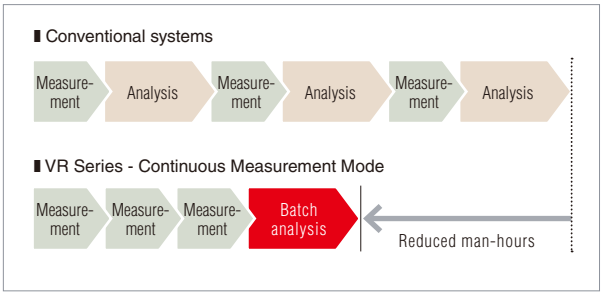
Auto Arrange makes it possible to batch process all the data through a single operation, reducing analysis time and preventing measurement errors.



Quickly compare topography: 3D List Display function

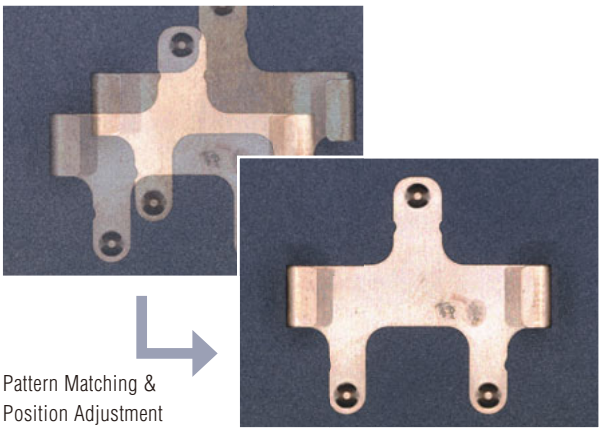
Visually compare 3D images from multiple samples side-by-side for easier understanding and explanation of surface changes or differences.

Advanced support functions for improved analysis



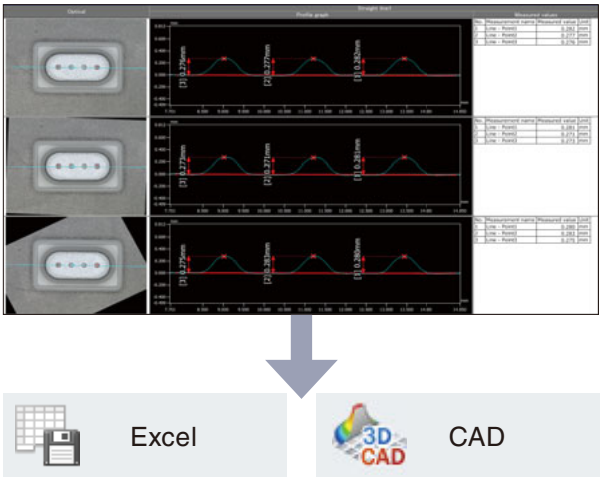
Efficient data collection: Continuous Measurement Mode

The VR-3000 Series incorporates a continuous measurement mode that captures data in a more streamlined process. Measurement can be done without moving between software, allowing work to be performed with greater efficiency.



High reproducibility: Position Adjustment & Pattern Matching

A semi-transparent master image is displayed on-screen to be used as a reference for position alignment. Simply place the object near the reference image and click a button to perform automatic positioning. Additionally, small changes in alignment can be corrected through the use of highly-accurate pattern matching.



Output and analyze data post-process: Excel Data Output/CAD Output

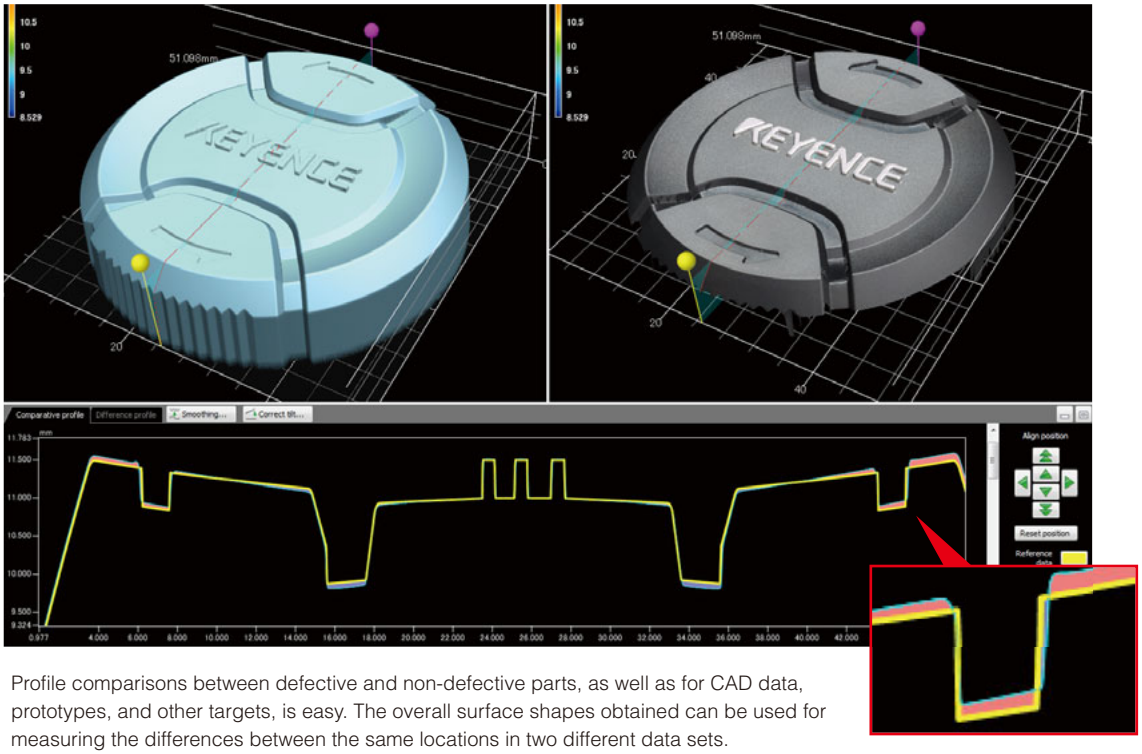
Data collected by the VR can be output directly to Excel exactly as it appears on the screen. In addition, all measurement results can be exported to CAD, including STL, STEP, and ASCII file types, giving you a wide variety of options in how the data can be utilized.

Visualization and quantification of surface shape differences

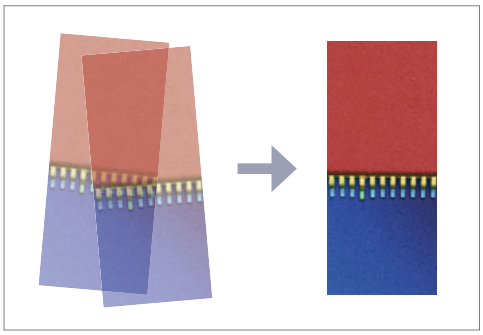
Profile comparison measurement function

3D CAD data

VR Series measurement data

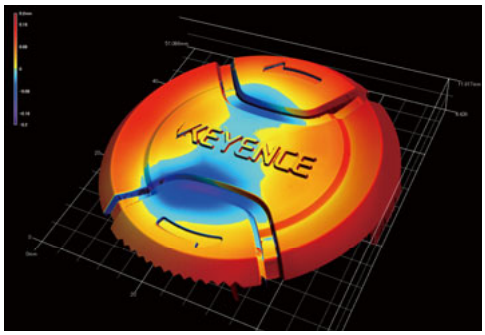


Profile comparisons between defective and non-defective parts, as well as for CAD data, prototypes, and other targets, is easy. The overall surface shapes obtained can be used for measuring the differences between the same locations in two different data sets.



No complex settings: Auto Position Adjustment function

3D position adjustment for tilting and height misalignment is done automatically by taking into account various elements, including reference planes.



Visualization of shape differences: [Subtraction] Color Display function

Two objects can be overlaid, and areas higher than the reference are displayed in red while lower areas are displayed in blue. This makes it possible to check differences visually.

* VR-H2P software module is required for the data comparison function, and VR-H2CA software module is required for CAD comparisons.

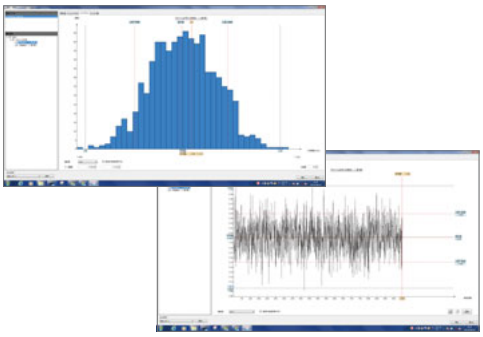
Quick and easy 3D shape inspection

Pass/Fail judgment function

Based on registered tolerances, pass/fail (OK/NG) judgment can be made as soon as measurements are taken. This saves inspection time in various quality and analysis applications such as setting prototype conditions or performing acceptance inspections.

Easy configuration of program settings: Program Settings function

Configuring program settings is simple. No special training is required. Registered inspection setting files can also be used in other systems.

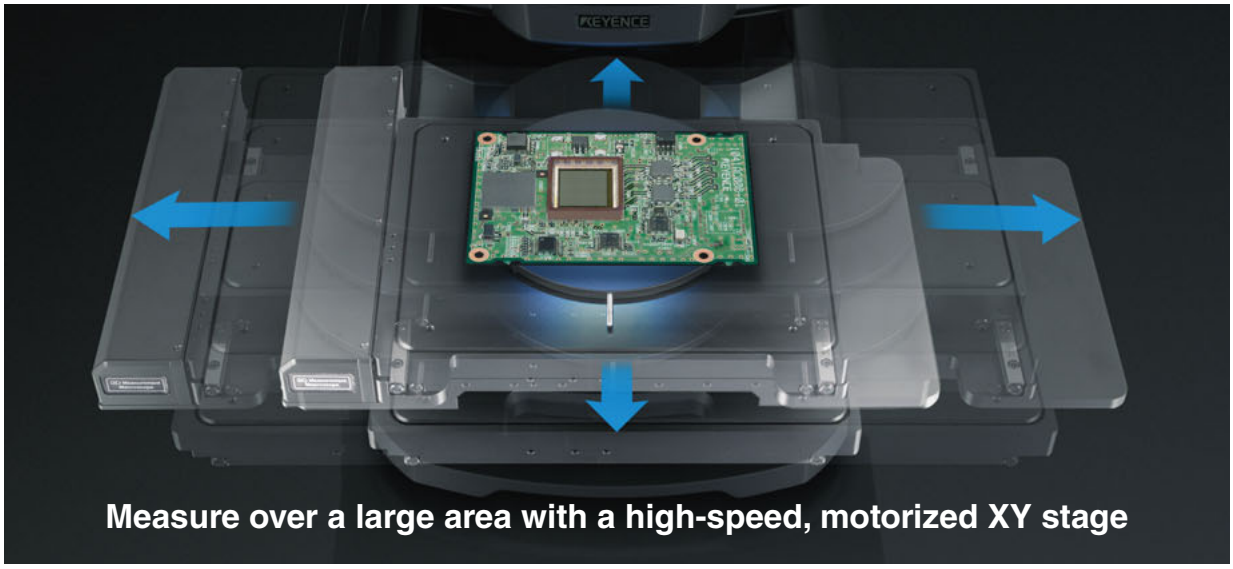


Efficient management of measurement results: Statistical Analysis function

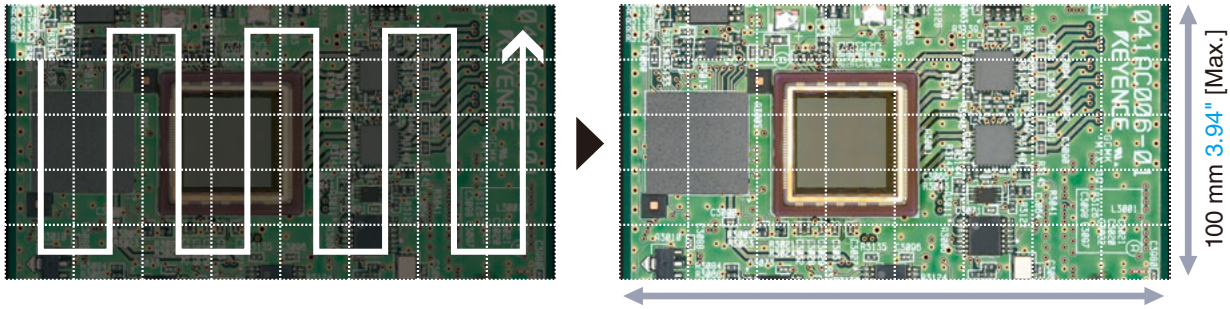
Measurement results are automatically stored in the database, and trend graphs and histograms are automatically created. Reports to be submitted to relevant parties can also be created automatically, minimizing the time required for various operations following inspection.

Measure form and contour over a wide area

Image stitching function

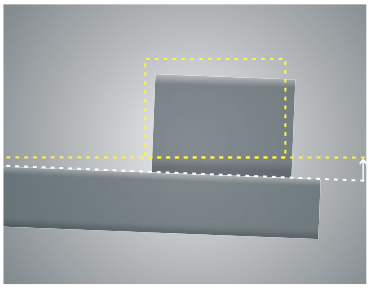


Measure over a large area with a high-speed, motorized XY stage



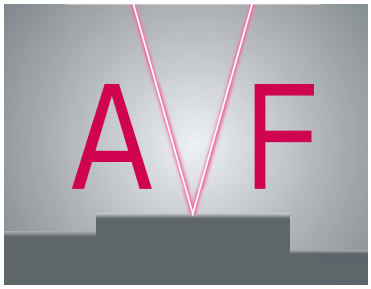
High-speed image stitching process

Precision measurement is ensured even on a stitched image.



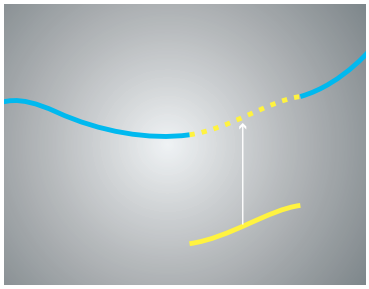
Incline correction

Stage inclination caused by the weight of an object can be accurately corrected using a built-in stage sensor.



Auto Focus mode

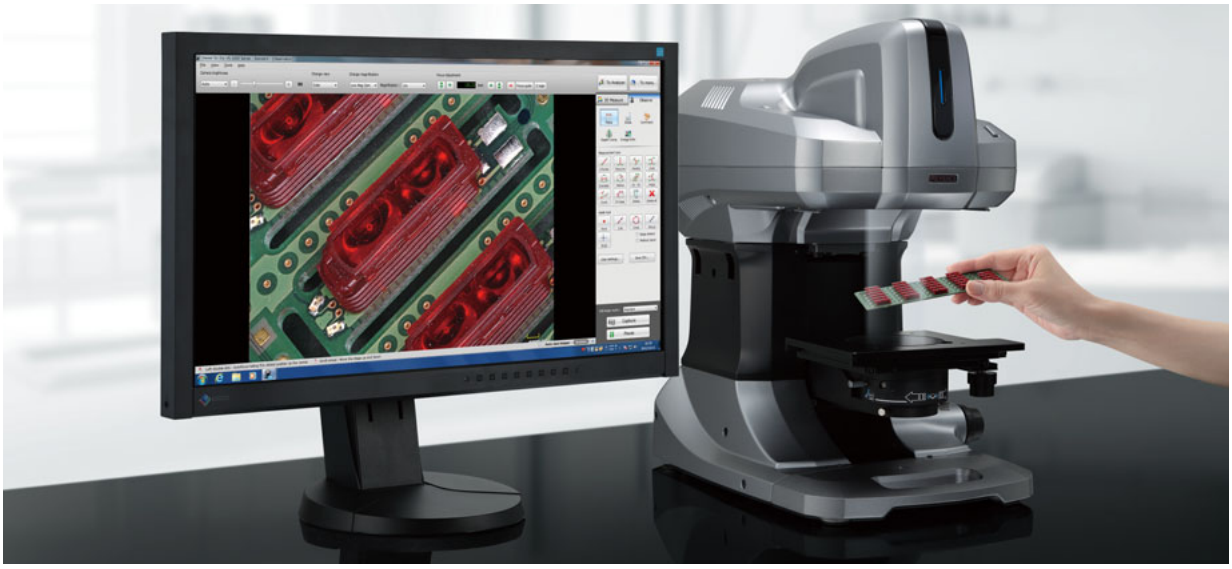
The VR-3000 implements an Auto Focus function that is able to automatically adjust for changes in an objects height when stitching in the XY directions.

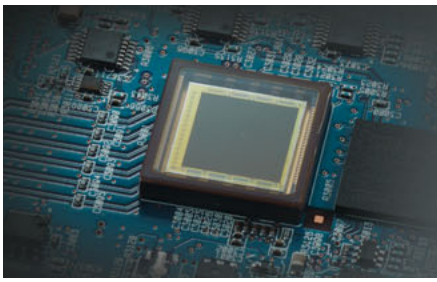


Data recapture

If any area is not originally captured when stitching, it is possible to re-scan only those specific locations, without having to re-scan the entire part again.

Functions as both a 3D measurement system and microscope





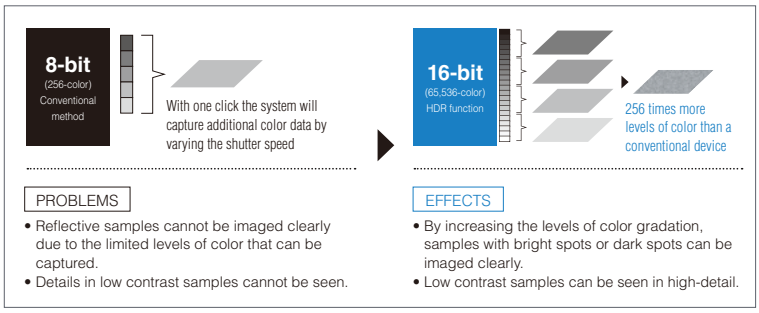
9 megapixel
3 CMOS camera

Red, green, and blue data are obtained for each pixel, allowing for clear observation with excellent color reproduction.

High-definition imaging

9 megapixel 3 CMOS camera

Samples can be imaged under magnifications ranging from 12× to 160×. High resolution images of up to 9 megapixels can be captured and saved by simply pushing the Capture button.

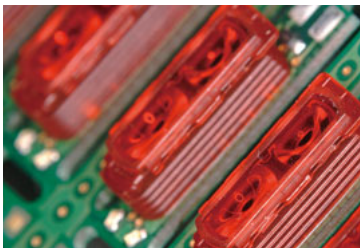


See more details than conventional systems

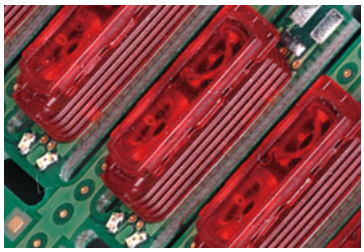
HDR High Dynamic Range

16-bit HDR function

The VR-3000 is able to capture up to 16 bits of red, green, and blue color data to perform significantly more accurate imaging of a sample than what can be captured with traditional 8-bit devices.



Conventional microscopes



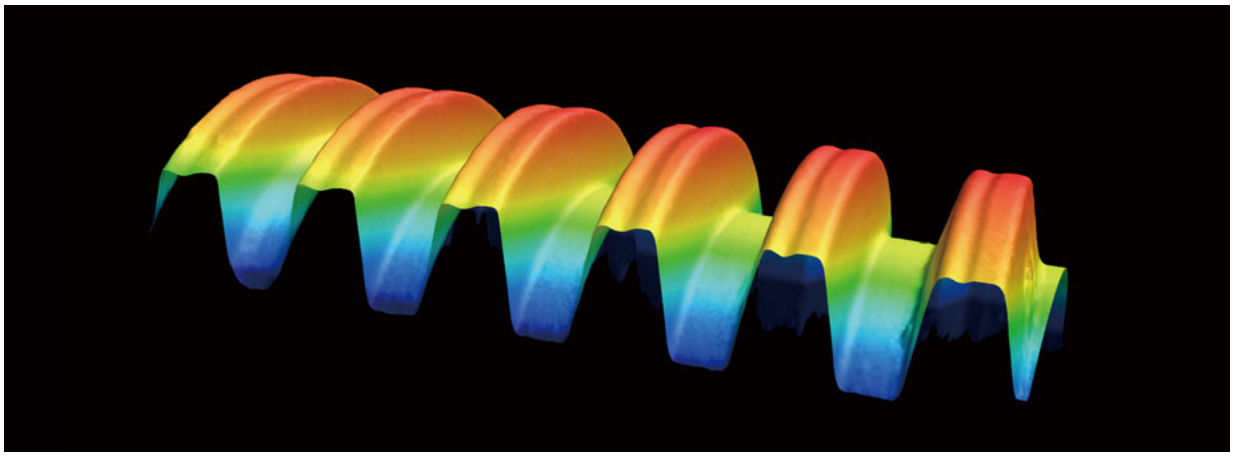
VR-3000 Series

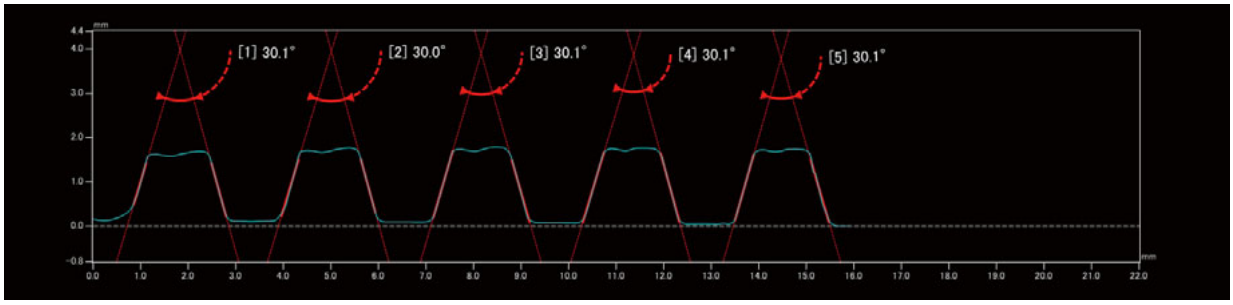
PCB (12×)

Built-in depth composition function

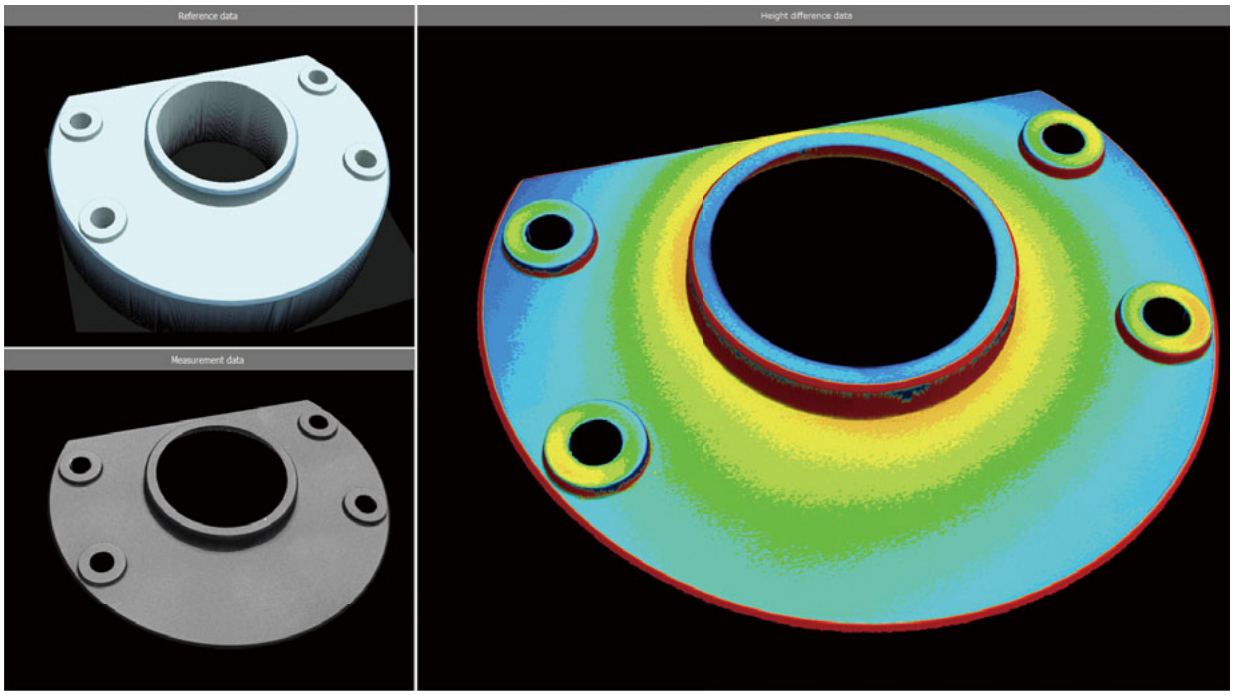
When analyzing samples with a large change in height, or when increasing the magnification, the depth-of-field can become limited. The VR-3000's telecentric lenses and depth composition function make it possible to adjust the image so that the entire surface is in focus.

Automotive/Metal/Tooling

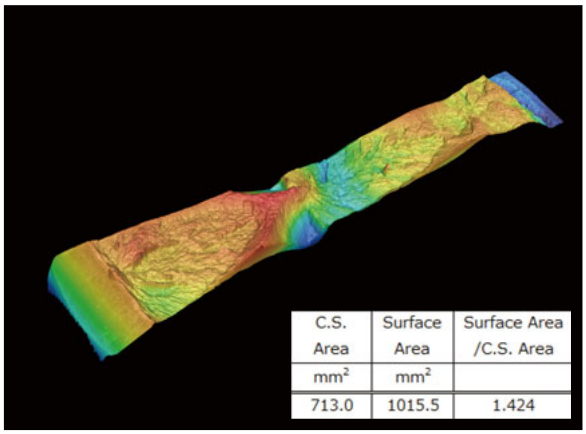




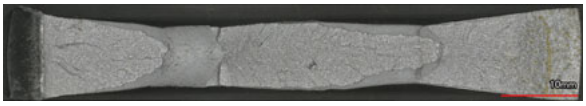
Trapezoidal screw (screw threading and angle)



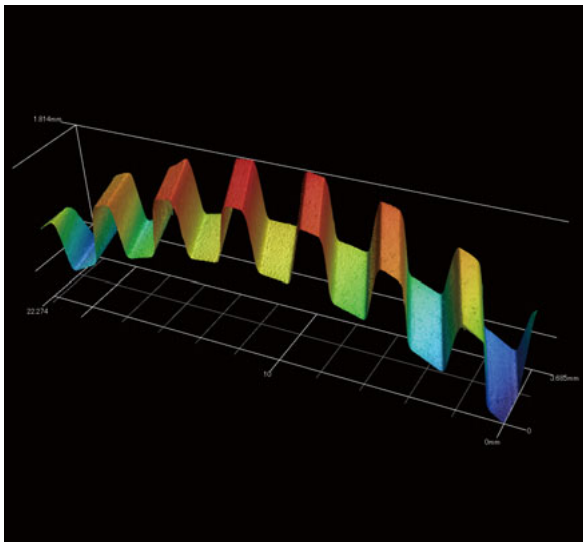
Metal retaining material (compared with 3D-CAD data)



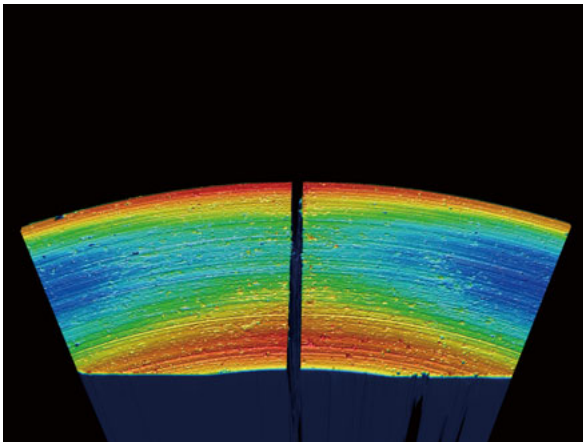
C.S. Area	Surface Area	Surface Area /C.S. Area
mm^2	mm^2	
713.0	1015.5	1.424



Ductile metal fracture surface (surface area/sectional area)

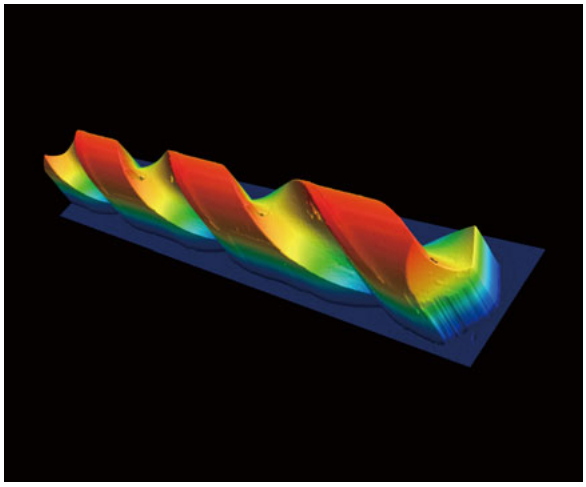


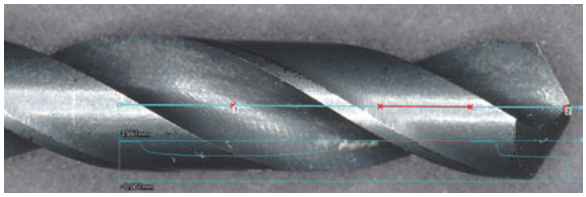
Gear (shape)

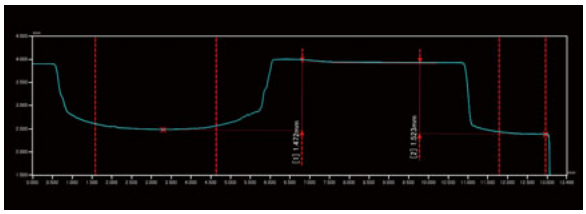


Area	Height Difference	Max. Height	Min. Height	Max.-Min.
Unit	mm	mm	mm	mm
Brake surface	-0.234	0.085	-5.478	5.563

Brake pads (planarity)

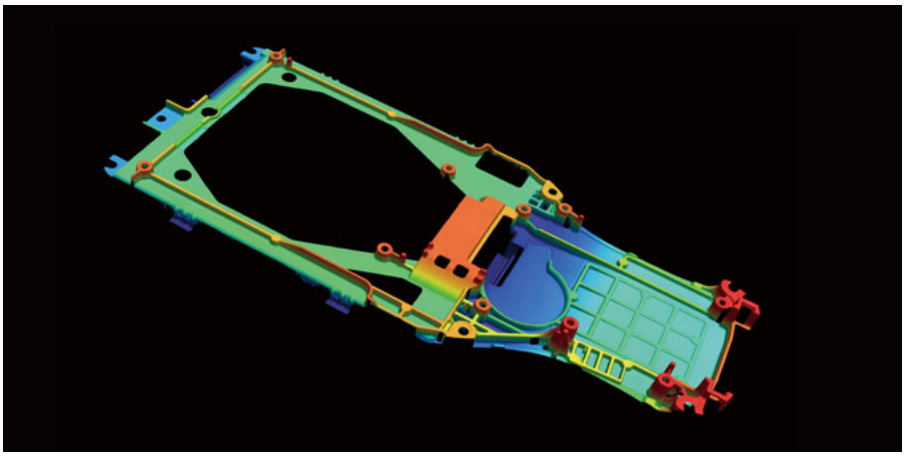




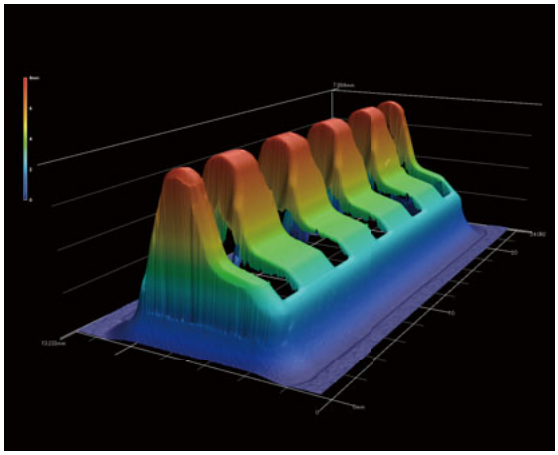


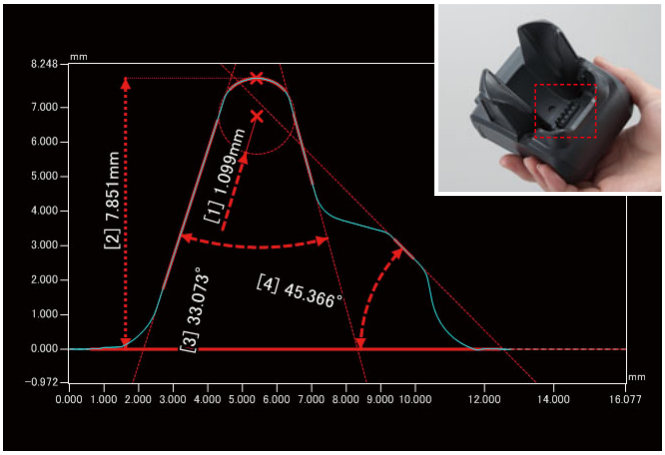
Tool blade edge (shape)

Electrical/Electronics

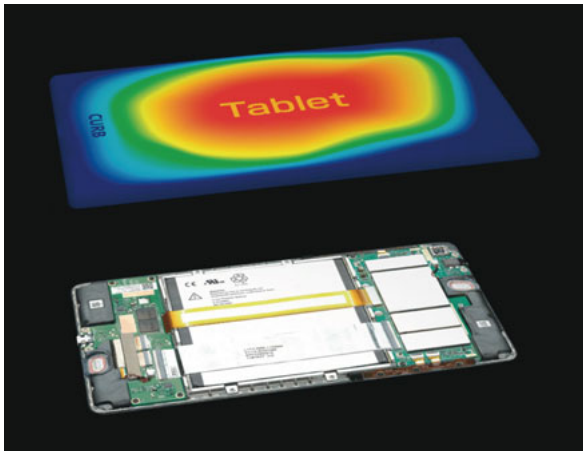


Handy terminal (frame warpage)

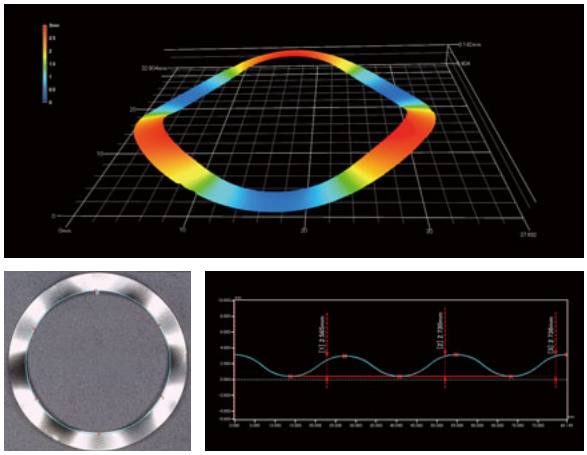




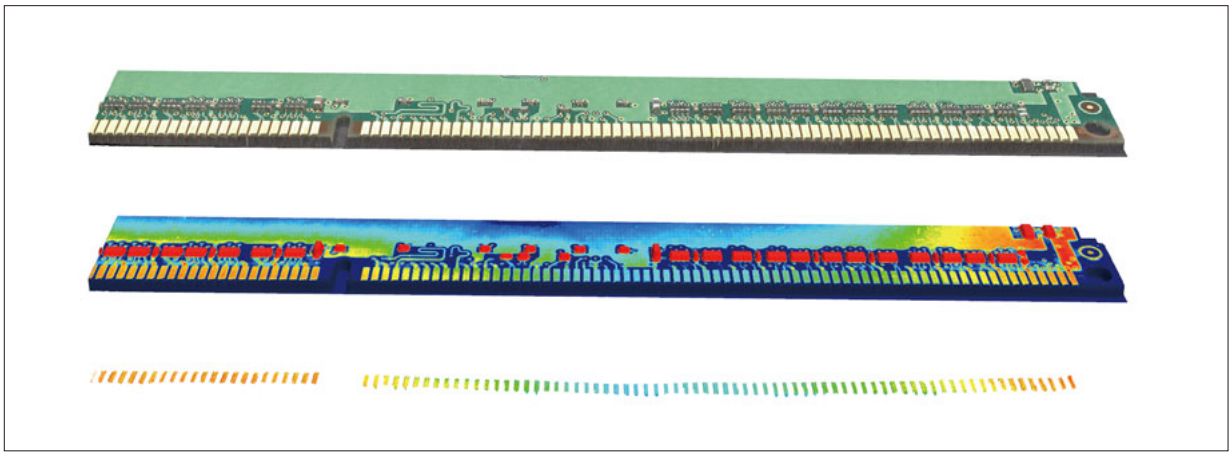
Handy terminal charging stand (shape)



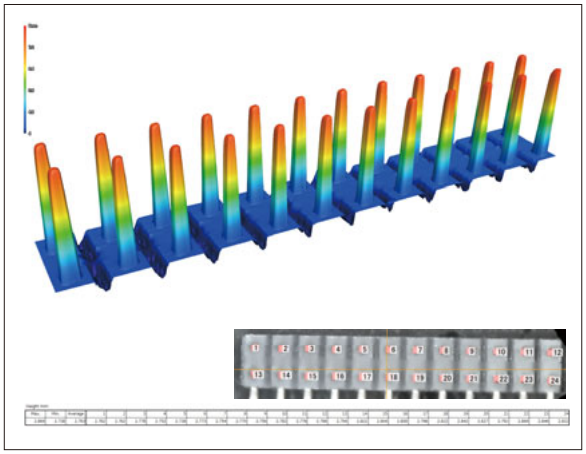
7-inch tablet (case waviness)



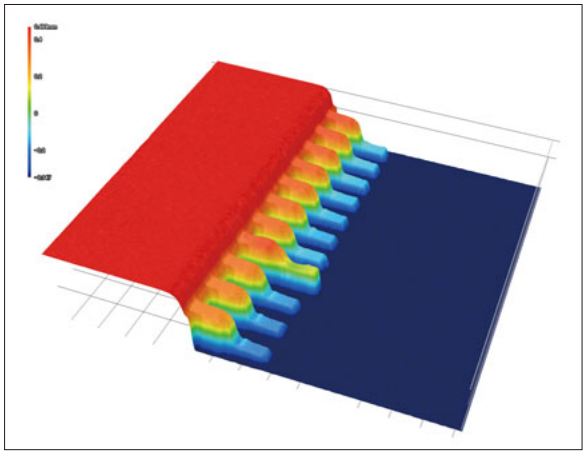
Wave washer (height difference)



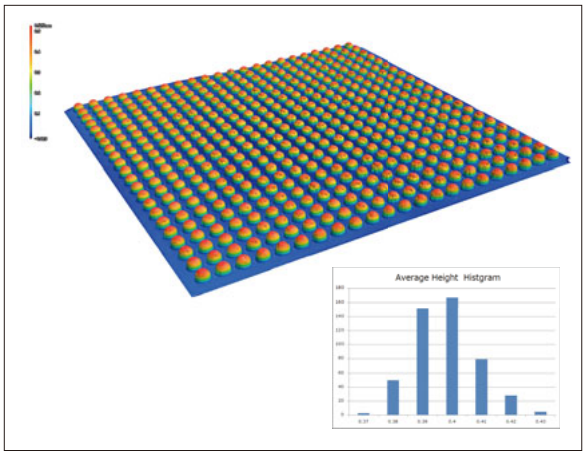
PCB (appearance, overall curvature, plating waviness)



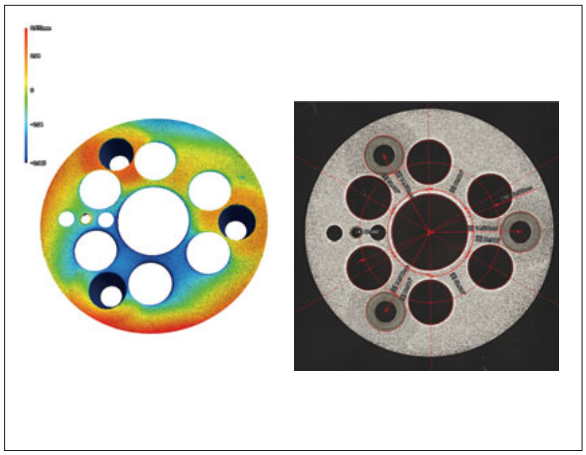
Connector pins (pin height)



IC (lead float)



BGA (fluctuations in height)



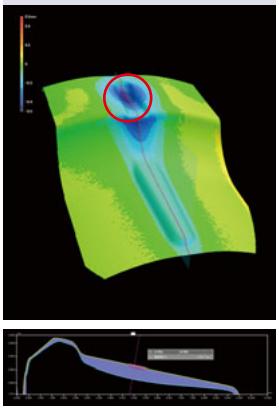
Metal components (waviness, 2D measurements)

Chemical/Plastic

Rubber handle (Defect analysis)

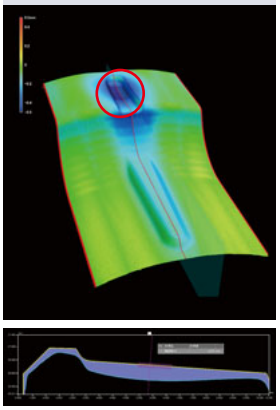
Defective (NG) product

Comparison (OK and NG products)

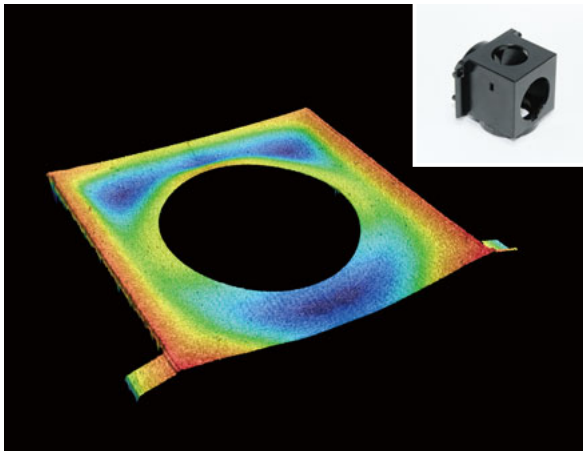


Comparative measurement function

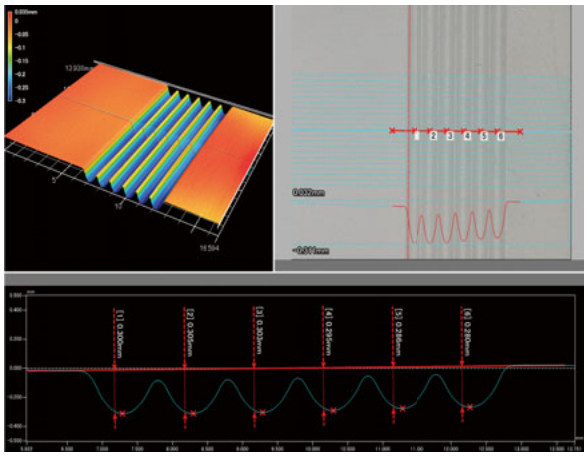
Comparison (CAD and NG products)



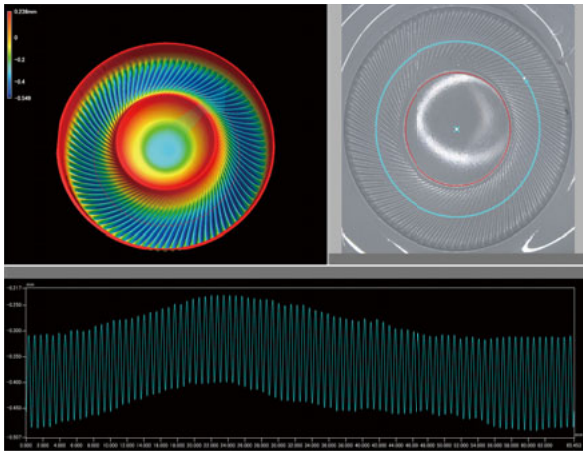
3D-CAD comparative measurement function



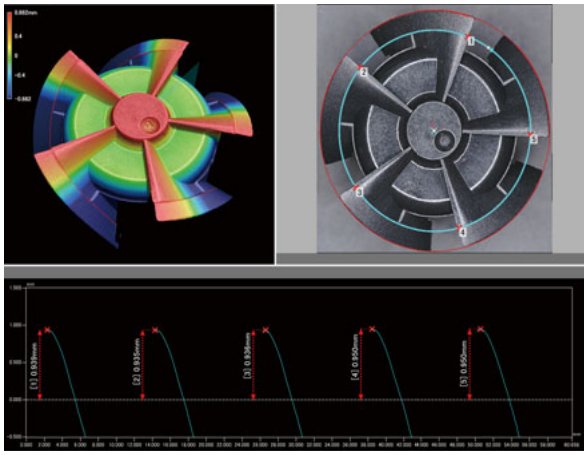
Optical component (resin mold sink marks)



Plastic case (average groove depth)

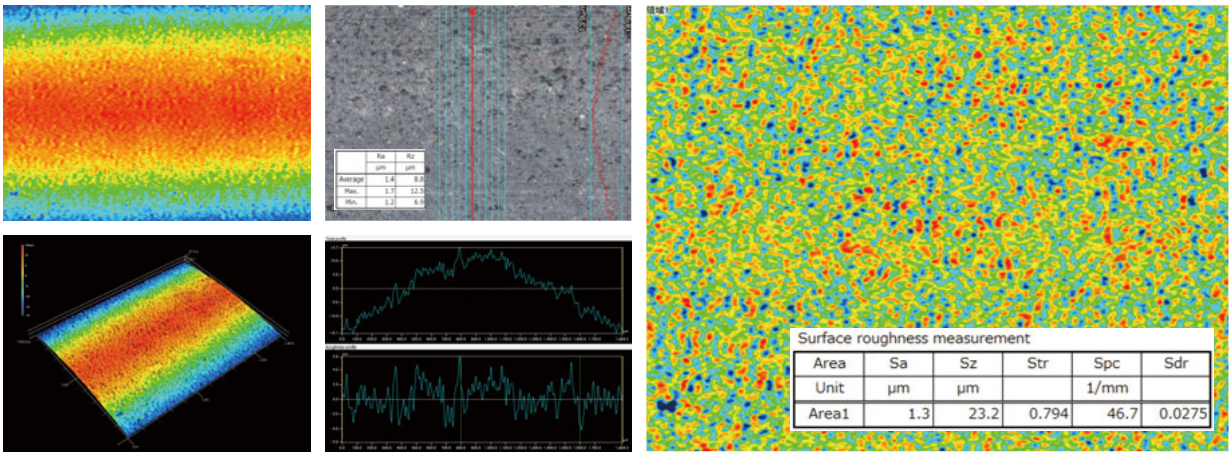


Diaphragm (shape, distortion)

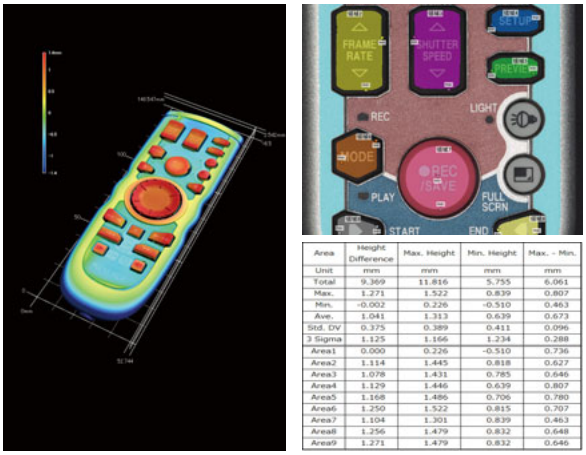


Fan (height from reference)

Other

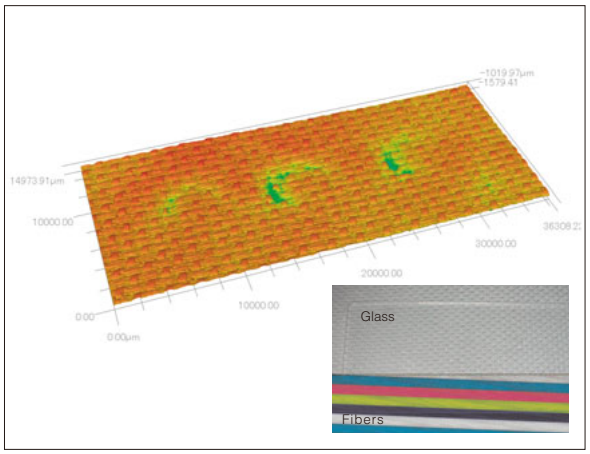


Weather-stripping (line roughness, surface roughness)

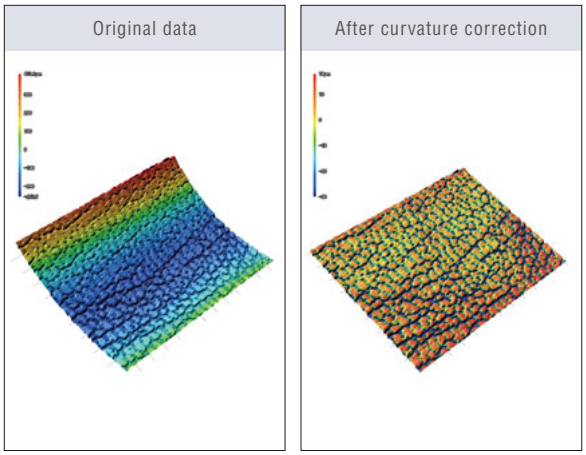


Area	Height Difference	Max. Height	Min. Height	Max. - Min.
Unit	mm	mm	mm	mm
Total	9.369	11.816	5.755	6.061
Max.	1.271	1.522	0.839	0.807
Min.	-0.002	0.226	-0.510	0.463
Ave.	1.041	1.313	0.639	0.673
Std. DV	0.375	0.389	0.411	0.096
3 Sigma	1.125	1.166	1.234	0.288
Area1	0.000	0.226	-0.510	0.736
Area2	1.114	1.445	0.818	0.627
Area3	1.078	1.431	0.785	0.646
Area4	1.129	1.446	0.639	0.807
Area5	1.168	1.486	0.706	0.780
Area6	1.250	1.522	0.815	0.707
Area7	1.104	1.301	0.839	0.463
Area8	1.256	1.479	0.832	0.648
Area9	1.271	1.479	0.832	0.646

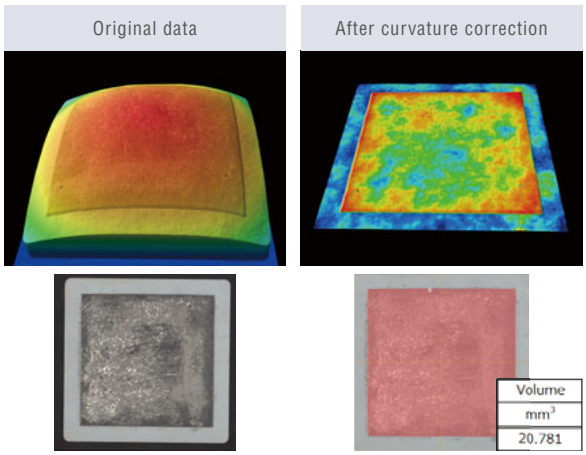
Handheld controller (button height)



Dents formed between fibers
(Measured while fibers are being pressed with a glass plate.)



Grain (overall grain depth)



SOFC (solid oxide fuel cell) (volume)

High-end model with motorized XY stage

VR-3200

- XY-axis motorized control
- Z-axis motorized control
- Color imaging
- Wide-field/ high-magnification camera

Standard model with color/high-magnification imaging capabilities

VR-3100

- XY-axis manual control
- Z-axis motorized control
- Color imaging
- Wide-field/ high-magnification camera

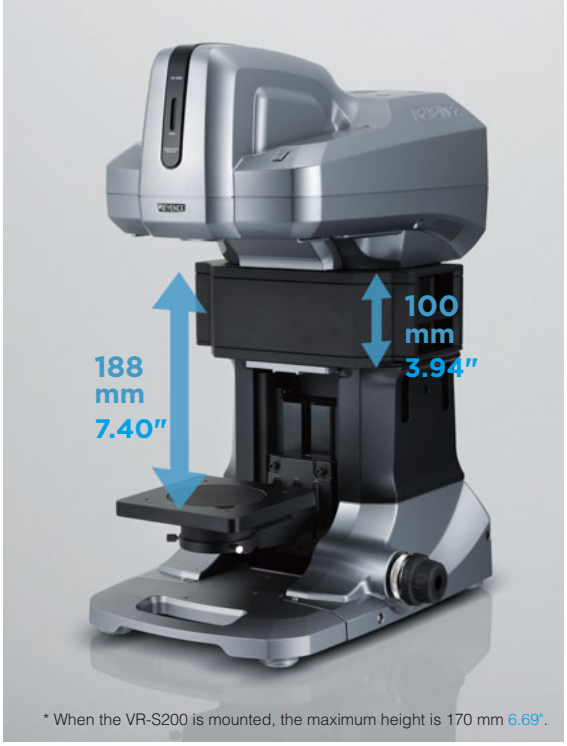
Basic model

VR-3050

- Z-axis manual control
- Wide-field camera

OP-87708 100 mm 3.94" Spacer

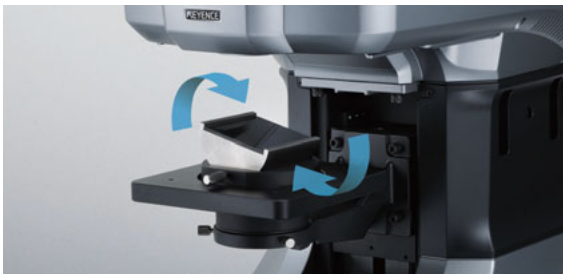
Inserting this 100 mm 3.94" high spacer between the measurement unit and the base allows you to measure objects up to 188 mm 7.40" * in height. This extra space can be also used for setting a heated stage or custom fixture.



* When the VR-S200 is mounted, the maximum height is 170 mm 6.69".

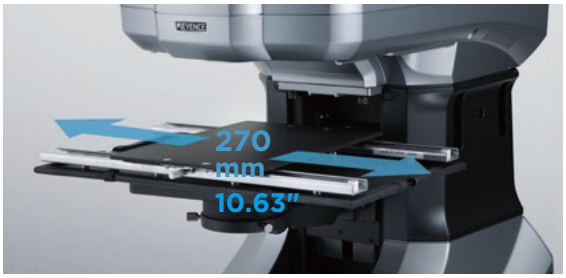
OP-87709 Tilt stage

This stage allows users to observe and measure objects from an angle without having to manipulate the object by hand. The stage is designed so that the sample securely adheres to the stage when positioned at an angle.



OP-87717 Manual slider for image stitching

The manual slider allows measurement of a wider field, up to 270 mm 10.63", when used together with the Stitching Module (optional).

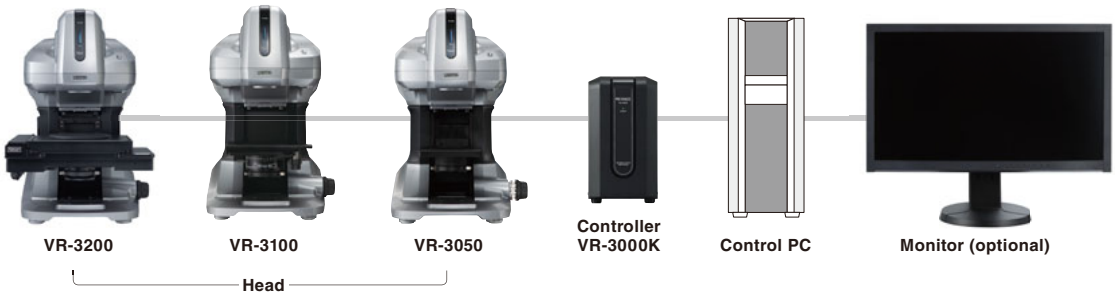


VR-S200 Motorized XY stage

Fully-motorized XY control using the mouse. Combined with the Stitching Module (optional), this stage enables the system to perform image stitching with higher speed and accuracy.

Custom stages

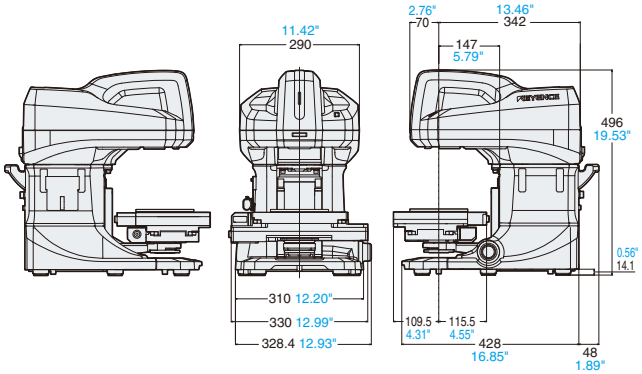
KEYENCE offers a variety of large-sized or special stages to meet your needs. Contact us for more details.



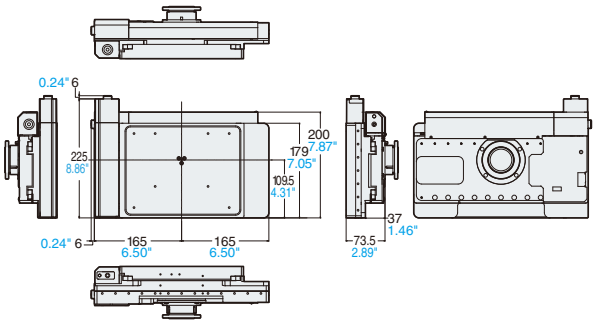
Model	Controller	VR-3000K		
	Head	VR-3200	VR-3100	VR-3050
Motorized XY stage	VR-S200	Standard	Optional	Optional
XYθ stage	OP-87715	—	Standard	Optional
Manual slider for stitching	OP-87717	—	Optional	Optional
100 mm 3.94" spacer	OP-87708	Optional	Optional	Optional
Tilt stage	OP-87709	Standard	Standard	Optional
Calibration standard	OP-87710	Standard	Standard	Standard
Viewer software	VR-H2VE	Required	Required	Required
Analyzer software	VR-H2AE	Required	Required	Required
Stitching module	VR-H2J	Optional	Optional	Optional
Comparative measurement module	VR-H2P	Optional	Optional	Optional
3D-CAD comparative module	VR-H2CA	Optional	Optional	Optional

Unit: mm inch

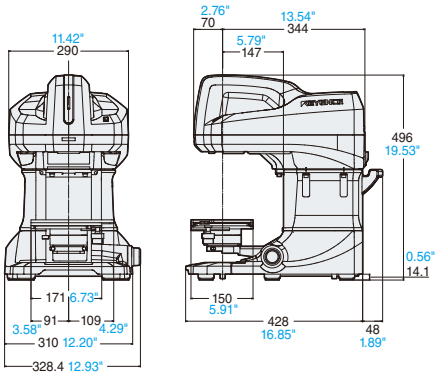
Head VR-3200



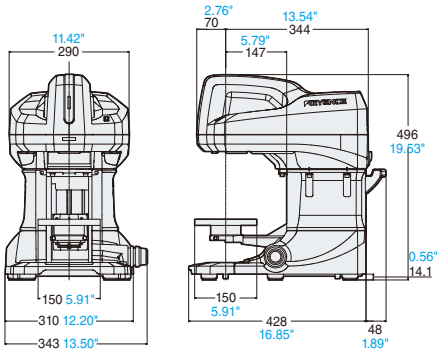
Motorized XY stage VR-S200



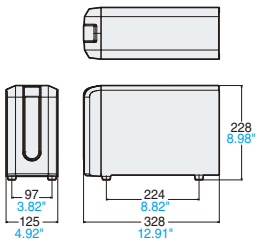
Head VR-3100

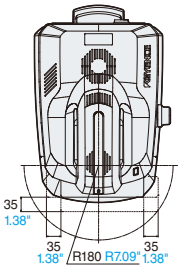


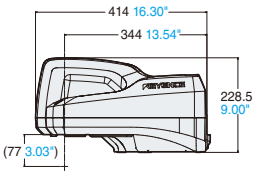
Head VR-3050

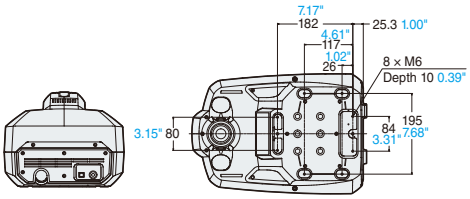


Controller VR-3000K









VR Head/Controller

Model	Controller	VR-3000K																			
	Head	VR-3200								VR-3100								VR-3050			
		Wide-field mode				High magnification mode				Wide-field mode				High magnification mode				Wide-field mode			
Magnification on a 15" monitor		12×	25×	38×	50×	40×	80×	120×	160×	12×	25×	38×	50×	40×	80×	120×	160×	12×	25×	38×	50×
Field-of-view	Horizontal (H): mm inch	24.0 0.94"	12.0 0.47"	8.0 0.31"	6.0 0.24"	7.6 0.30"	3.8 0.15"	2.5 0.10"	1.9 0.07"	24.0 0.94"	12.0 0.47"	8.0 0.31"	6.0 0.24"	7.6 0.30"	3.8 0.15"	2.5 0.10"	1.9 0.07"	24.0 0.94"	12.0 0.47"	8.0 0.31"	6.0 0.24"
	Vertical (V): mm inch	18.0 0.71"	9.0 0.35"	6.0 0.24"	4.5 0.18"	5.7 0.22"	2.9 0.11"	1.9 0.07"	1.4 0.06"	18.0 0.71"	9.0 0.35"	6.0 0.24"	4.5 0.18"	5.7 0.22"	2.9 0.11"	1.9 0.07"	1.4 0.06"	18.0 0.71"	9.0 0.35"	6.0 0.24"	4.5 0.18"
Zoom		1× to 4×																			
Measurable height *1		10 mm 0.39" (±5 mm ±0.20")				1 mm 0.04" (±0.5 mm ±0.02")				10 mm 0.39" (±5 mm ±0.20")				1 mm 0.04" (±0.5 mm ±0.02")				10 mm 0.39" (±5 mm ±0.20")			
Standard scale *2		0.1 µm																0.5 µm			
Repeatability (σ) *3	Height measurement	0.5 µm																			
	Width measurement	1 µm				0.5 µm				1 µm				0.5 µm				1 µm			
Measurement accuracy *3	Height measurement	±3 µm																			
	Width measurement	±5 µm				±2 µm				±5 µm				±2 µm				±5 µm			
Stitching function *4		Full automatic (XY stage automatic control + auto focus) measurement								Manual (XY, Z)											
		Auto adjustment, Auto template analysis								–											
Stage	XY stroke	184 × 88 mm 7.24" x 3.46" (motorized)								70 mm 2.76" *5 (200 mm *6) (manual)											
	Z stroke	90 mm 3.54" (motorized)								90 mm 3.54" (motorized)								88 mm 3.46" (manual)			
	Rotation	±180° (sample rotating stage)								±90°(θ stage)								–			
	Tilt	±30° or more								±30° or more								–			
Working distance		75 mm 2.95"																			
Image receiving element		4 megapixel monochrome CMOS																			
Transmitter lens		Two, double-telecentric lenses																			
Receiver lens		Double-telecentric lens																			
Light sources	Observation light source	LED ring light (red, green, blue)																LED ring light (white)			
	Measurement light source	White LED																			
Image size		1024 × 768 pixels, 2048 × 1536 pixels																			
Data processing		Dedicated PC specified by KEYENCE (OS: Windows 7) *7																			
Power source	Supply voltage	100 to 240 VAC ±10%, 50/60 Hz																			
	Power consumption	150 VA																			
Environmental resistance	Ambient temperature for usage	15 to 30°C 59 to 86°F																			
	Relative humidity for usage	35 to 80% (no condensation)																			
Weight	Controller	3.8 kg																			
	Head *8	28.0 kg								22.5 kg								20.6 kg			

*1 Wide-field ±5 mm ±0.20" and high magnification ±0.5 mm ±0.02" around the focal point position. *2 Height measurement resolution.
*3 Value obtained using KEYENCE's specified standard gauge with measurement in KEYENCE's specified measurement mode (ambient temperature: 23±1°C 73.4±1.8°F). *4 The stitching module (VR-H2J) is required.
*5 The VR-3050 requires the XYθ stage (OP-87715). *6 When the OP-87717 manual slider for stitching used.
*7 Windows 7 Professional and Ultimate. *8 Weight of measurement unit: 10.8 kg

Motorized XY stage VR-S200

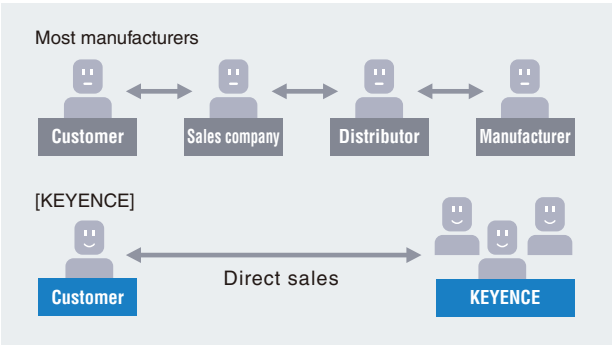
Travel speed	10 mm 0.39"/sec (max.)
Travel range	184 × 88 mm 7.24" × 3.46"
Stage size	Top surface: 215 × 165 mm 8.46" × 6.50" (rotary plate: ø140 mm ø5.51")
Weight	6.5 kg

* Optional item mountable on VR-3100 or VR-3050.

First-class customer support that only a direct service system can provide

KEYENCE employs a direct sales system that eliminates intermediaries, such as distributors and dealers, from our sales channel. Our experienced, highly-skilled sales engineers respond quickly to customers' inquiries, providing them with exceptional after-sales service and support.

KEYENCE also offers free on-site inspection services and provides equipment loans free of charge in the event of a failure. With this level of service, KEYENCE provides post-sales support you can rely on.



In addition to the "Getting Started Guide" provided with the product, a full color manual is also available.

KEYENCE

CALL TOLL FREE | TO CONTACT YOUR LOCAL OFFICE **1-888-KEYENCE** 1-888-539-3623

www.keyence.com

SAFETY INFORMATION
Please read the instruction manual carefully in order to safely operate any KEYENCE product.

CONTACT YOUR NEAREST OFFICE FOR RELEASE STATUS

KEYENCE CORPORATION OF AMERICA

Head Office 500 Park Boulevard, Suite 200, Itasca, IL 60143, U.S.A. **PHONE:** +1-201-930-0100 **FAX:** +1-855-539-0123 E-mail: keyence@keyence.com

AL Birmingham
AR Little Rock
AZ Phoenix
CA San Francisco
CA San Jose
CA Cupertino
CA Los Angeles
CA Irvine
CO Denver
FL Tampa
GA Atlanta
IA Iowa
IL Chicago
IN Indianapolis
KY Louisville
MA Boston
MI Detroit
MI Grand Rapids
MN Minneapolis
MO Kansas City
MO St. Louis
NJ Elmwood Park
NY Rochester
NC Charlotte
NC Raleigh
OH Cincinnati
OH Cleveland
OR Portland
PA Philadelphia
PA Pittsburgh
SC Greenville
TN Knoxville
TN Nashville
TX Austin
TX Dallas
WA Seattle
WI Milwaukee

KEYENCE CANADA INC.

Head Office PHONE: +1-905-366-7655 FAX: +1-905-366-1122 E-mail: keyencecanada@keyence.com
Montreal PHONE: +1-514-694-4740 FAX: +1-514-694-3206 Windsor PHONE: +1-905-366-7655 FAX: +1-905-366-1122

KEYENCE MEXICO S.A. DE C.V.

PHONE: +52-55-8850-0100 FAX: +52-81-8220-9097
E-mail: keyencemexico@keyence.com

KA1-1017

VR32-KA-C2-US 1018-3 611B46