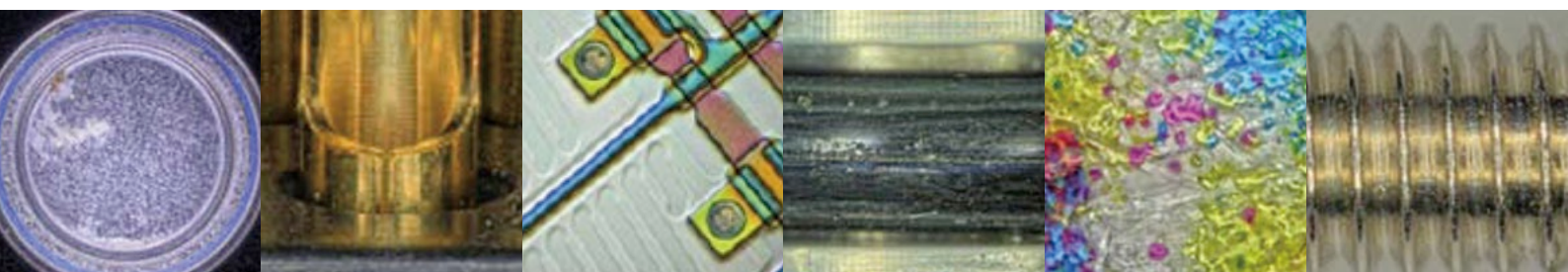
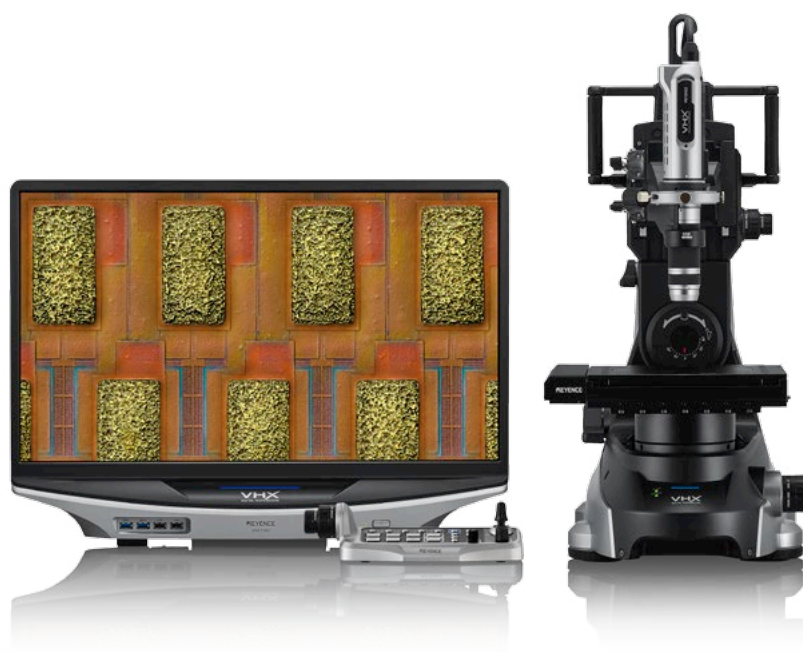


12 Industries

**The Latest Observations
and Applications**

 **Compilation**

Digital Microscope



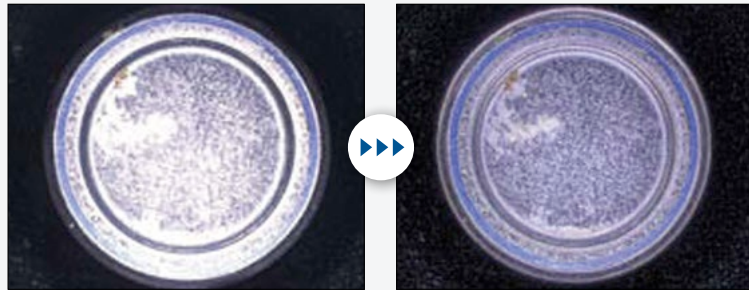
1 Applications for the Battery Industry

World's first

Comparison using the HDR (High Dynamic Range) feature 16 bit colour and texture

Example: Battery

[20×



Conventional [8 bit]

HDR [16 bit]

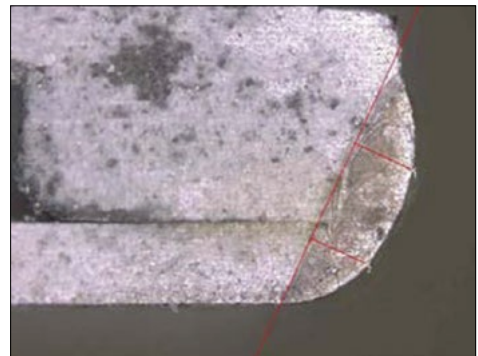
■ Measurement of Battery Weld Penetration

Evaluating the amount of weld penetration is a common application when examining metal materials. Provide high-resolution images and measurements, even when the welded surface is uneven.

VHX Series Characteristics

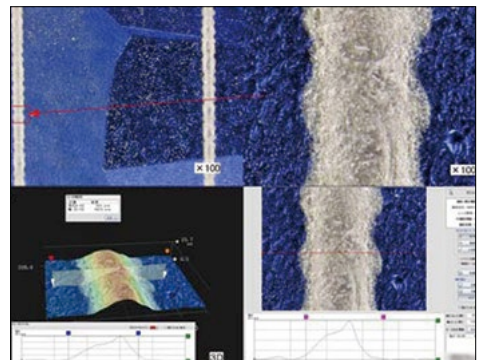
■ 2D Measurement Functions

Measure size, distance, angle, radius/diameter, etc. with just a click of the mouse. Area and perimeter data can automatically be extracted for particle analysis.



■ Solar Cell Busbar Analysis

Evaluate electrodes on a solar panel in both 2D and 3D. Check for defects on the two-dimensional image and then quickly measure and profile on the three-dimensional image.



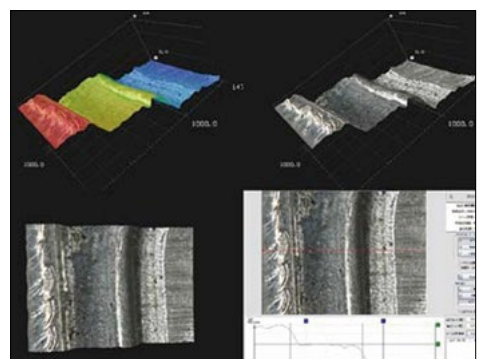
■ Battery Case Analysis

Image complex surfaces such as battery casings, typically difficult due to depth-of-field limitations, and ensure that they fall within required specifications.

VHX Series Characteristics

■ 3D Observation & Measurement Function

Easily display surface topography with a 3D image and perform quantitative analysis using a variety of measurement tools (profile, volume, angle, etc).



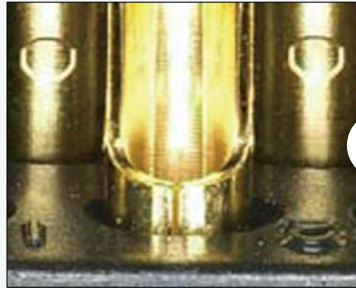
2 Applications for Cable and Connector Industries

World's first

Comparison using the HDR (High Dynamic Range) feature 16 bit colour and texture

Example: Connector

[100×



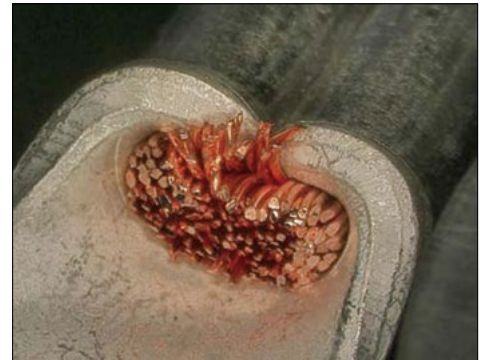
Conventional [8 bit]



HDR [16 bit]

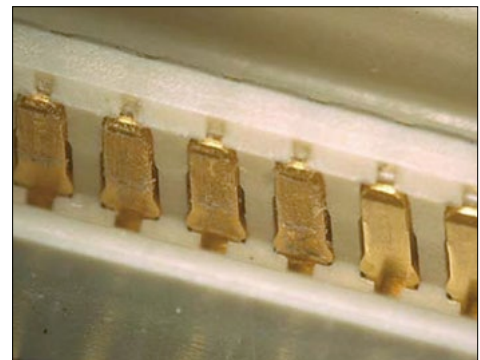
■ Examination of Wire After Swaging

Even highly-reflective targets, like connectors or wires, can be clearly imaged without being affected by glare. The large depth-of-field of the digital microscope allows for the entire sample to be captured clearly.



■ Evaluation of Plated Surfaces

Prevent connection failures from resist residues and plating defects by examining connectors with even, glare-free illumination.



■ VHX Series Characteristics

■ Glare Removal Function

This function allows you to observe highly-reflective objects without interference from glare and even works in conjunction with the 3D image display.

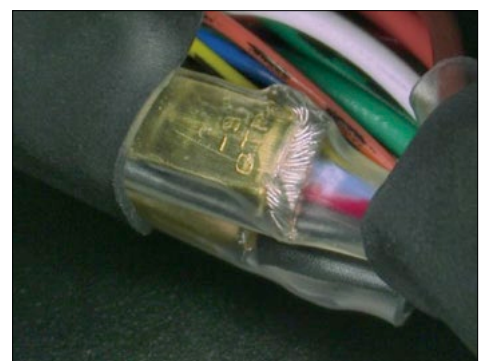
■ Analysis of Connector Cables for Defects

Verify cable quality by scanning the length for damage to the sheathing and for possible points of shorting. Capture and catalogue images for easy documentation.

■ VHX Series Characteristics

■ Large Depth of Field

Focus on targets with large variations in surface topography, even at high magnification and with the lens tilted. Dramatically reduce the amount of time needed to identify and analyse defects.

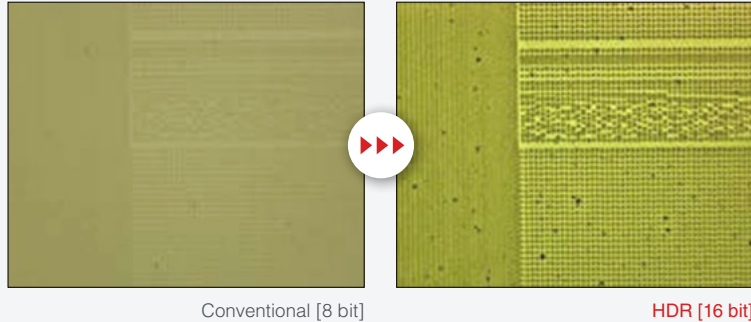


3 Applications for Semiconductor, Device and Media Industries

World's first

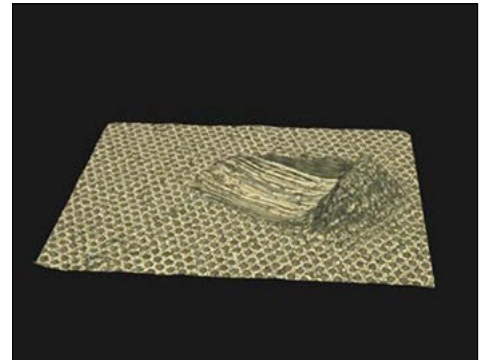
Comparison using the HDR (High Dynamic Range) feature
16 bit colour and texture

Example:
DVD pit
[3000×



3D Profile of Probe Mark

Observe the size and depth of a pit after a probe tip contacts the surface.



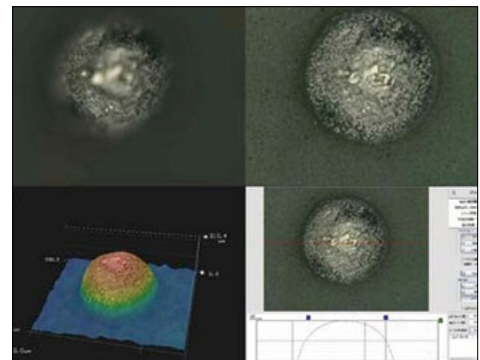
CSP Inspection

Although usually very hard to image due to their spherical shape, solder balls can be accurately examined by constructing a fully-focused image and 3D model with a digital microscope. Profile BGAs to ensure a uniform height and use the glare removal function to check for cracks and voids.

VHX Series Characteristics

3D Observation & Measuring Function

Easily display surface topography with a 3D image and perform quantitative analysis using a variety of measurement tools (profile, volume, angle, etc).



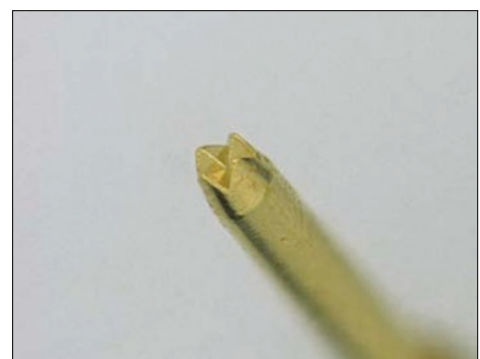
Observation of Probe Pins

Look for pin wear and deformation to prevent damage to electronics during the testing phase. Conversely, areas that have been tested and probed can be examined for potential damage.

VHX Series Characteristics

Large Depth of Field

Focus on targets with large variations in surface topography, even at high magnification and with the lens tilted. Dramatically reduce the amount of time needed to identify and analyse defects.

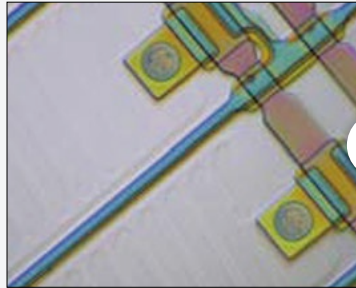


4 Applications for Liquid Crystal/PDP Industries

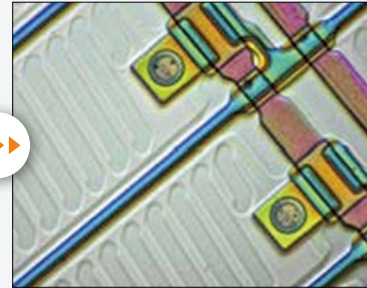
World's first

Comparison using the HDR (High Dynamic Range) feature 16 bit colour and texture

Example:
TFT
[3000×



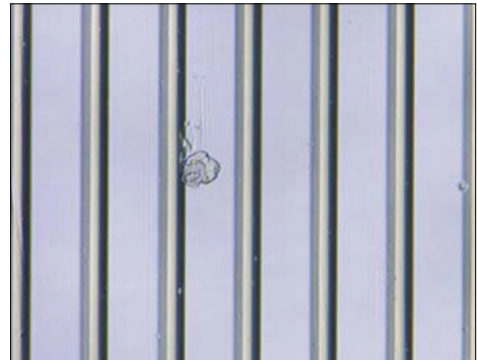
Conventional [8 bit]



HDR [16 bit]

■ Observation of Foreign Material on Light Guide Plate

Provide a sharply-outlined image even when viewing nearly transparent objects such as a light guide plate with foreign substances on it.



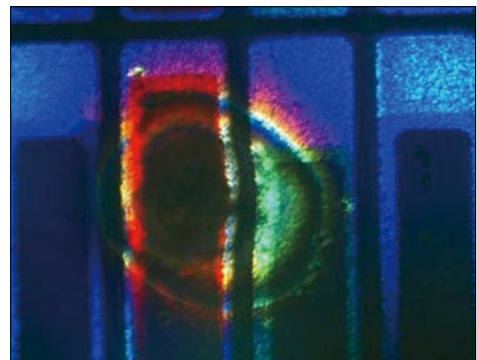
■ VHX Series Characteristics

■ Light-shift Function

Switching to partial illumination allows for a clear observation by enhancing the differences between projections and depressions.

■ Analysis of Colour Filters for Defects

View defects in filters and films by using polarised and transmitted illumination. Differential Interference Contrast (DIC) is also available to bring out features on transparent and low contrast samples.



■ VHX Series Characteristics

■ Transmitted + Polarised Lighting

Clearly display features that are difficult to image with normal reflected lighting. Polarisation removes glare caused by films and highlights stresses in materials.

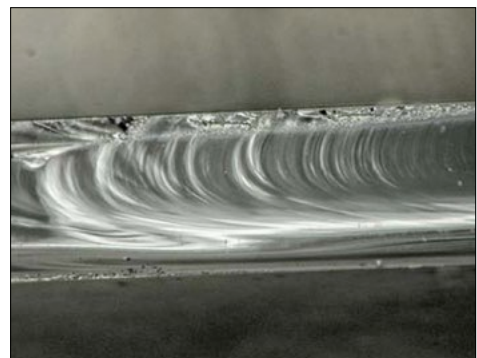
■ Analysis of Beach Marks on Fractured Glass

Regardless of material (glass, ceramic, metal, etc), observe fractured samples with high contrast and balanced illumination using the High Dynamic Range (HDR) function.

■ VHX Series Characteristics

■ 16-bit High Dynamic Range

Capture a 16-bit image using the HDR function to drastically increase contrast while removing glare and dark spots. Colour gradation is increased from 256 levels to over 65,000. This can be used in conjunction with 3D imaging.



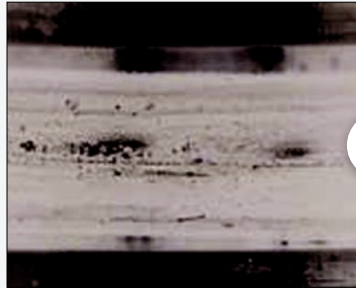
5 Applications for Chemical, Resin and Materials Industries

World's first

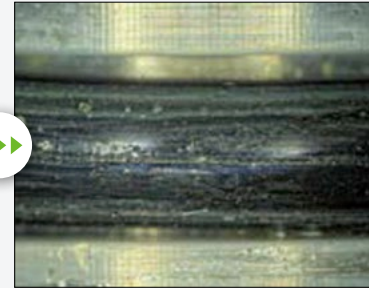
Comparison using the HDR (High Dynamic Range) feature
16 bit colour and texture

Example: Rubber O-ring

[100×



Conventional [8 bit]



HDR [16 bit]

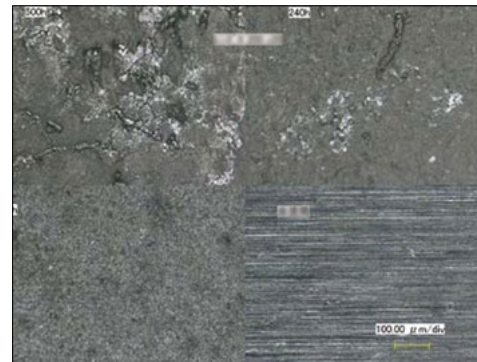
Monitor Stress Test on Rubber

The split-screen function enables comparative surface observation on a single screen. Time-elapsed observation is also possible by saving the image at fixed intervals.

VHX Series Characteristics

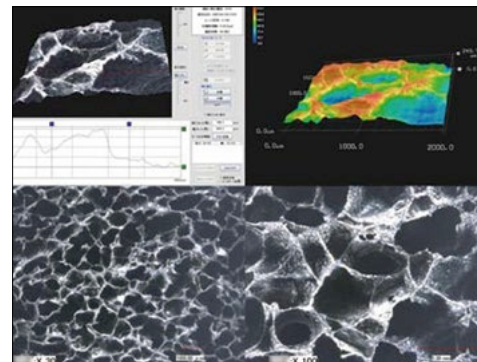
Screen Split Function

Capture multiple images within a single screen to quickly perform comparisons between samples and provide easy-to-understand documentation.



Observation of Urethane Foam

Get a better understanding of cell shape and structure by viewing a 3D image of urethane foam. The large depth-of-field also allows for more accurate measurement and characterisation of complex shapes.



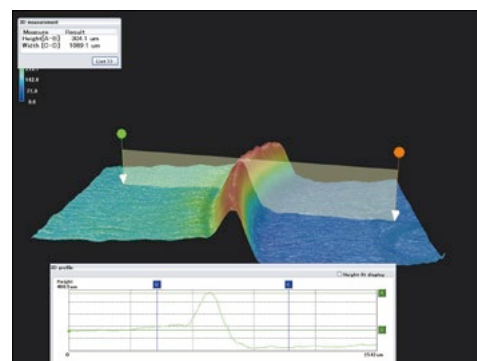
Observation of Resin Burrs

Usually determined by simply "feeling" the surface of a sample, demands for quantification and documentation of burr height are becoming increasingly frequent. Display and profile the burr in 3D and check to see if it falls within given tolerances.

VHX Series Characteristics

3D Observation & Measurement Function

Easily display surface topography with a 3D image and perform quantitative analysis using a variety of measurement tools (profile, volume, angle, etc).



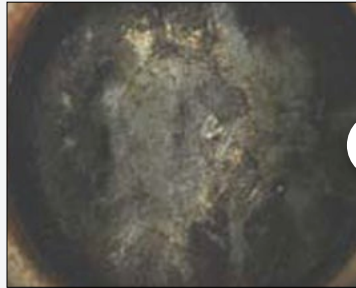
6 Applications for Electronics Industry

World's first

Comparison using the HDR (High Dynamic Range) feature 16 bit colour and texture

Example: Contact

[100×



Conventional [8 bit]



HDR [16 bit]

■ Observation of Tin Whisker

Many times, an SEM is needed in order to view micro whiskers. However, the vacuuming process of these systems can often times cause the removal of the whisker. The VHX Digital Microscope can observe a target in its natural state, without the need for preprocessing or sample prep.

■ VHX Series Characteristics

■ 2D Measurement Functions

Measure size, distance, angle, radius/diameter, etc. with just a click of the mouse. Area and perimeter data can automatically be extracted for particle analysis.



■ Observation of Filament Shape

Using lenses designed to have a long working-distance and large depth-of-field, objects such as filaments can be clearly observed, even when viewing through glass.

■ VHX Series Characteristics

■ Large Depth of Field

Focus on targets with large variations in surface topography, even at high magnification and with the lens tilted. Dramatically reduce the amount of time needed to identify and analyse defects.



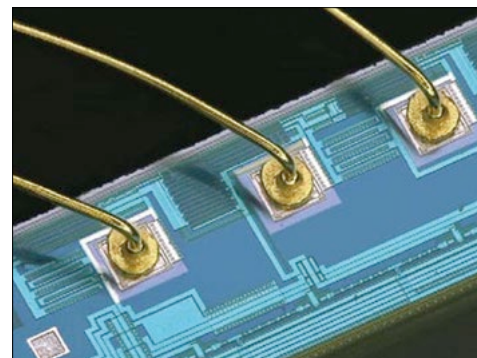
■ Observation of Wire Bonding

Properly analysing wire bonds requires inspecting the electronic device at an angle. This requires a system that can easily tilt around the sample while still being able to capture a fully-focused, glare-free image.

■ VHX Series Characteristics

■ Depth Composition Function

Capture a fully-focused image, even at high-magnification and with the lens tilted. Scan through the various focal points on a sample and then have them combined into a single image, greatly reducing analysis time.



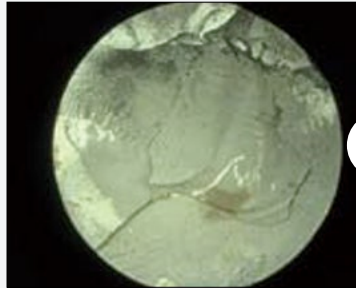
7 Applications for Metal, Automotive and Aerospace Industries

World's first

Comparison using the HDR (High Dynamic Range) feature
16 bit colour and texture

Example: Fractured surface

[20×



Conventional [8 bit]



HDR [16 bit]

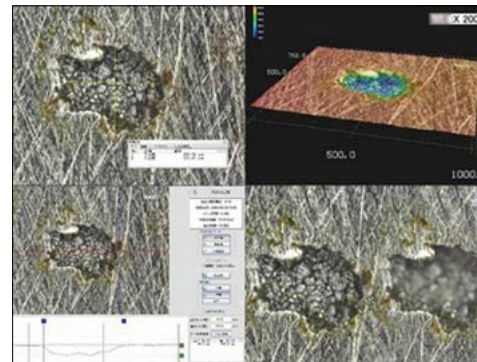
■ Analysis of Pores in Sintered Alloy

Perform 3D observation and analysis of pores to calculate both depth and surface area information.

■ VHX Series Characteristics

■ 3D Observation & Measurement Function

Easily display surface topography with a 3D image and perform quantitative analysis using a variety of measurement tools (profile, volume, angle, etc).



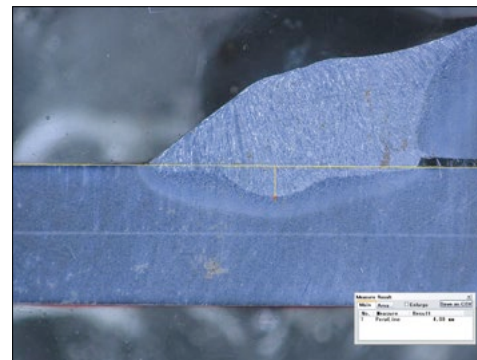
■ Measurement of Weld Penetration

With the ability to quickly switch between dark-field and bright-field illumination, even cross-sectional surfaces can be imaged and measured with ease. Both images and measurements can be saved and catalogued for future use.

■ VHX Series Characteristics

■ 2D Measurement Functions

Measure size, distance, angle, radius/diameter, etc. with just a click of the mouse. Area and perimeter data can automatically be extracted for particle analysis.



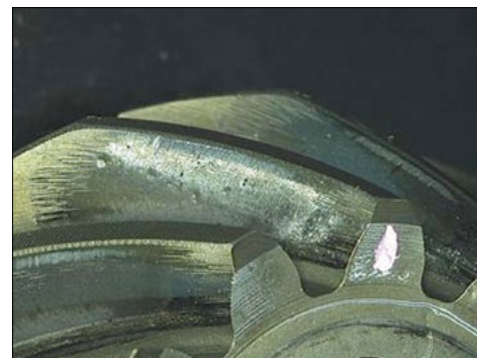
■ Observation of Gears

Observe gears entirely in focus to examine fractures, corrosion and surface wear. Typical optical microscopes are unable to obtain full-focus due to their shallow depth-of-field and difficulty with viewing reflective objects.

■ VHX Series Characteristics

■ Large Depth of Field

Focus on targets with large variations in surface topography, even at high magnification and with the lens tilted. Dramatically reduce the amount of time needed to identify and analyse defects.



8 Applications for Food and Pharmaceutical Industries

World's first

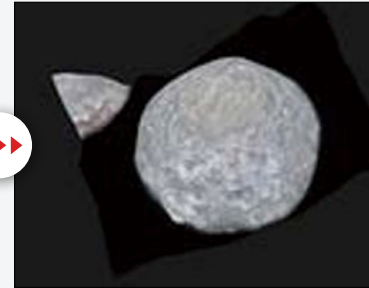
Comparison using the HDR (High Dynamic Range) feature
16 bit colour and texture

Example: Active pharmaceutical ingredients

[1000×



Conventional [8 bit]



HDR [16 bit]

■ Observing the Inner Layer of Bread

The large depth-of-field and versatile illumination of the VHX allows for clear inspection and measurement of the bread pores - a key factor in determining its texture.

■ VHX Series Characteristics

■ 2D Measurement Functions

Measure size, distance, angle, radius/diameter, etc. with just a click of the mouse. Area and perimeter data can automatically be extracted for particle analysis.



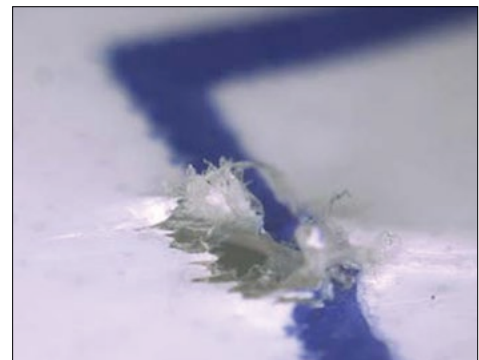
■ Observation of Packaging for Breaks/Tears

You can analyse and observe returned products, from any angle, in sharp focus. That allows you to trace the cause of the defect early on and take measures to prevent them in the future.

■ VHX Series Characteristics

■ Large Depth of Field

Focus on targets with large variations in surface topography, even at high magnification and with the lens tilted. Dramatically reduce the amount of time needed to identify and analyse defects.



■ Measurement of Hair Surface and Shape

By checking the shape of a hair's surface, you can analyse the effects of particular products after they've been applied and compare them to improve product quality.

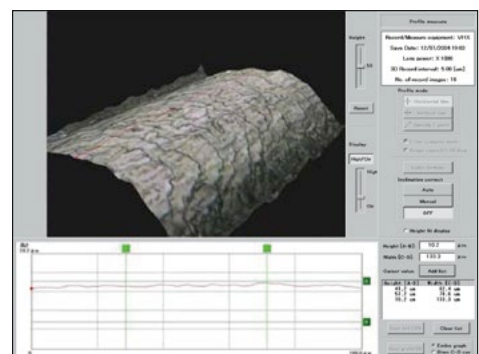
■ VHX Series Characteristics

■ 3D Observation & Measurement Function

Easily display surface topography with a 3D image and perform quantitative analysis using a variety of measurement tools (profile, volume, angle, etc).

■ Glare Removal Function

This function allows you to observe highly-reflective objects without interference from glare and even works in conjunction with the 3D image display.



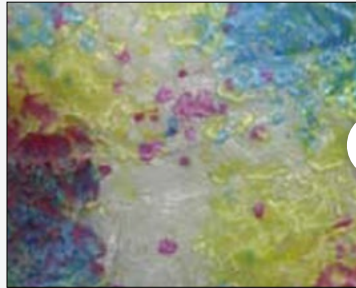
9 Applications for Print Industry

World's first

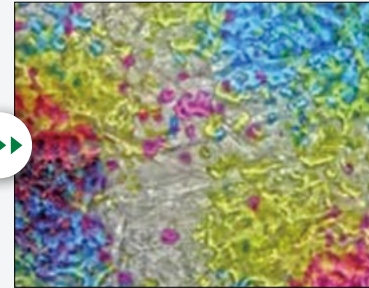
Comparison using the HDR (High Dynamic Range) feature 16 bit colour and texture

Example: Laser printing

[1000×



Conventional [8 bit]



HDR [16 bit]

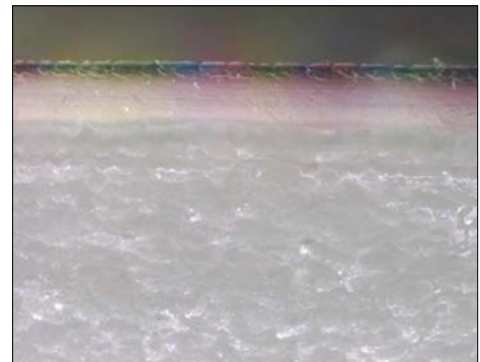
■ Observation of Ink Penetration

Evaluate the cross-section of a piece of paper to quantify the amount of ink penetration. A high-resolution imaging mode provides for a more accurate measurement of the ink depth and can be saved and compared with previous data.

■ VHX Series Characteristics

■ Large Depth of Field

Focus on targets with large variations in surface topography, even at high magnification and with the lens tilted. Dramatically reduce the amount of time needed to identify and analyse defects.



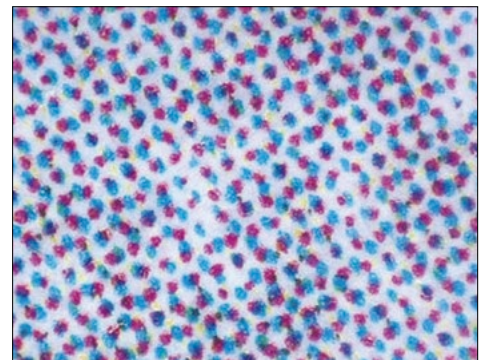
■ Observation of Printing Dots

Evaluate print quality to help improve printer and ink development. Effortlessly inspect ink dot distribution and measure the area of each corresponding colour. Cross-sectional analysis can reveal ink penetration as well.

■ VHX Series Characteristics

■ Vivid & Sharp Image Mode

Enables you to image objects with low contrast and definition, allowing for clearer observation with more vibrant colours.



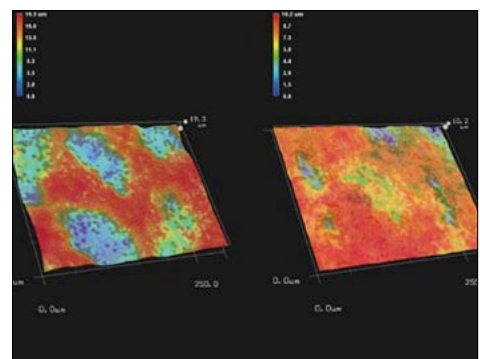
■ Comparison of Ink Jet Surface Uniformity

Generate a 3D image of the surface of paper to gauge the level of ink adherence and penetration, while checking for colour and layer uniformity.

■ VHX Series Characteristics

■ 3D Observation & Measuring Function

Easily display surface topography with a 3D image and perform quantitative analysis using a variety of measurement tools (profile, volume, angle, etc).



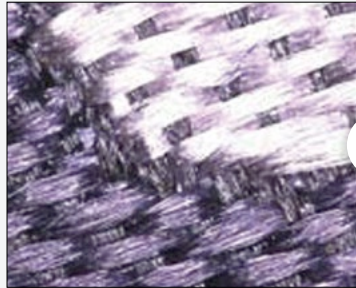
10 Applications for Paper and Textile Industries

World's first

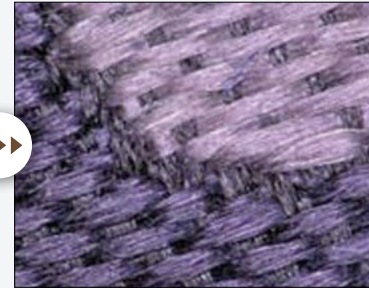
Comparison using the HDR (High Dynamic Range) feature
16 bit colour and texture

Example: Textile

[100×



Conventional [8 bit]



HDR [16 bit]

■ Measurement of Surface Profile on Embossed Napkin

The texture of paper products can be a factor in determining its quality for consumers. Inspect and measure the paper fibres and texture, or the mould used to make the product, to ensure it meets specification.

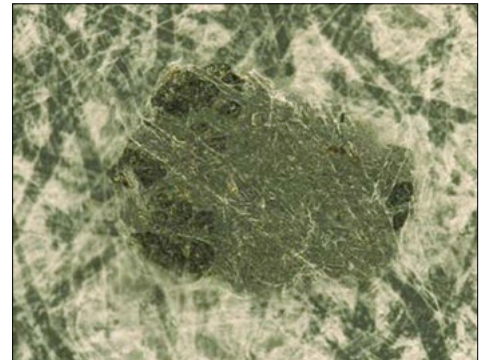
VHX Series Characteristics

■ 3D Observation & Measurement Function

Easily display surface topography with a 3D image and perform quantitative analysis using a variety of measurement tools (profile, volume, angle, etc).

■ Glare Removal Function

This function allows you to observe highly-reflective objects without interference from glare and even works in conjunction with the 3D image display.



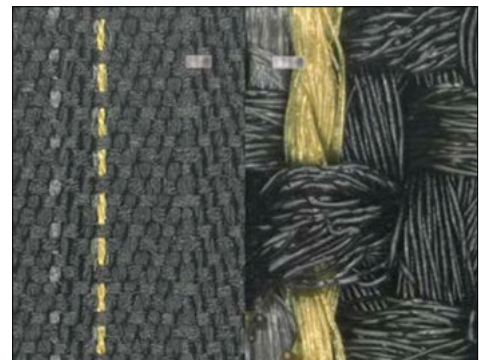
■ Surface Condition of Textiles

Perform overall and magnified inspection of target samples to quickly check for defects and eliminate them in advance. Combined with the Split Screen function, you can easily compare images of different samples.

VHX Series Characteristics

■ Large Depth of Field

Focus on targets with large variations in surface topography, even at high magnification and with the lens tilted. Dramatically reduce the amount of time needed to identify and analyse defects.



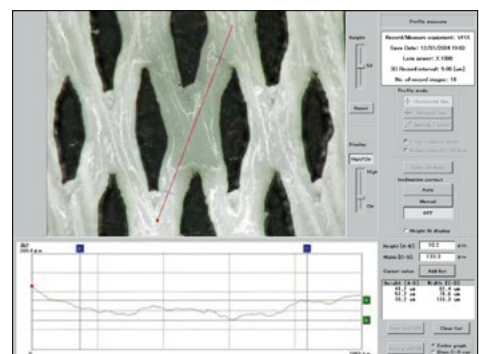
■ Observation of Foreign Substances on Paper

It is important to accurately identify foreign contaminants when inspecting paper, so that the cause of the defect can be traced when handling product claims.

VHX Series Characteristics

■ Adjustable Light Function

Depending on the material being viewed, normal ring lighting may not bring out certain surface features. The VHX is able to freely adjust the angle of illumination, picking up even minor surface characteristics.



11 Applications for Tool Industry

World's first

Comparison using the HDR (High Dynamic Range) feature 16 bit colour and texture

Example: End mill

[10×]



Conventional [8 bit]



HDR [16 bit]

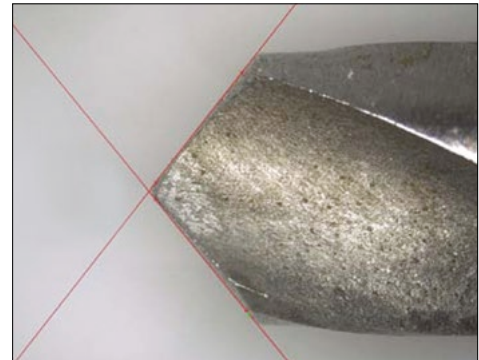
Measurement of a Tool

Capture a fully-focused image of the end of a drill bit and more accurately measure the angle of the tip.

VHX Series Characteristics

Large Depth of Field

Focus on targets with large variations in surface topography, even at high magnification and with the lens tilted. Dramatically reduce the amount of time needed to identify and analyse defects.



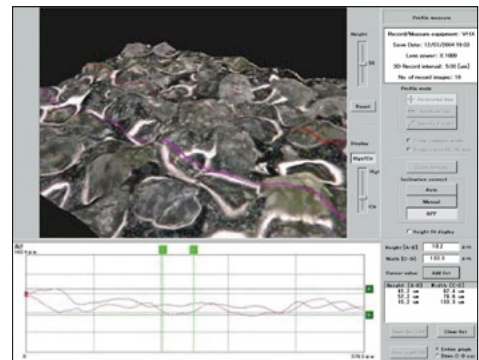
Surface Measurement of Whetstones

By checking shape of the surface in 3D, you are able to compare/judge the surface roughness of whetstones to improve the quality. Compare profiles and check for wear across different areas of the sample.

VHX Series Characteristics

3D Observation & Measuring Function

Easily display surface topography with a 3D image and perform quantitative analysis using a variety of measurement tools (profile, volume, angle, etc).



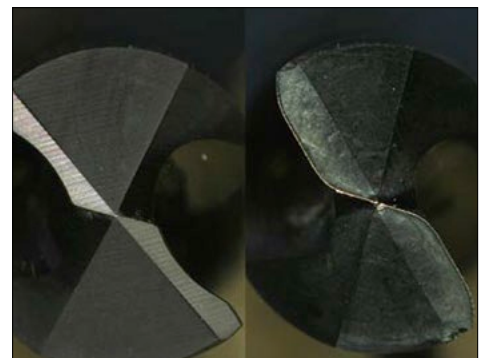
Tool Life Management

Constantly examine a tool as it's being used over its lifetime to determine wear patterns and find ways of preventing future product failures.

VHX Series Characteristics

Screen Split Function

Capture multiple images within a single screen to quickly perform comparisons between samples and provide easy-to-understand documentation.



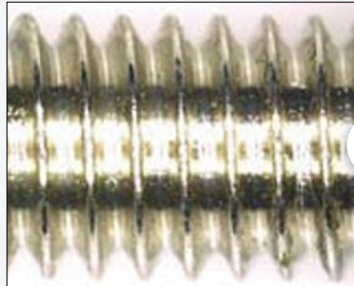
12 Applications for Screw Industry

World's first

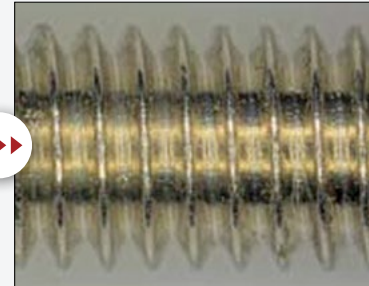
Comparison using the HDR (High Dynamic Range) feature 16 bit colour and texture

Example: Screw

[50×



Conventional [8 bit]



HDR [16 bit]

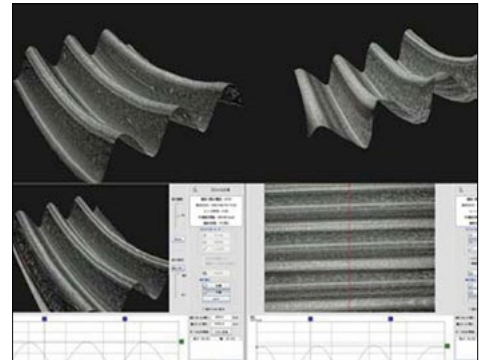
■ Inspection of a Screw

Examine and profile a 3D model of a screw to check for damage to the threads.

■ VHX Series Characteristics

■ 3D Observation & Measurement Function

Easily display surface topography with a 3D image and perform quantitative analysis using a variety of measurement tools (profile, volume, angle, etc).



■ Observation of Flow and Grain Structure

Capture high resolution images, even at low magnification, to allow for clear evaluation of metal flow. Also, image cross-sections of metal samples at a high-magnification to observe grain structure.

■ VHX Series Characteristics

■ Glare Removal Function

This function allows you to observe highly-reflective objects without interference from glare and even works in conjunction with the 3D image display.



■ Observation of Screws

Examine the overall integrity of metal samples by utilising the digital microscope's large depth-of-field and ability to evenly illuminate targets free of glare.

■ VHX Series Characteristics

■ Large Depth of Field

Focus on targets with large variations in surface topography, even at high magnification and with the lens tilted. Dramatically reduce the amount of time needed to identify and analyse defects.





Please visit: www.keyence.com



SAFETY INFORMATION

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

GLOBAL NETWORK

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BELGIUM
BRAZIL
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