OLYMPUS®

Your Vision, Our Future

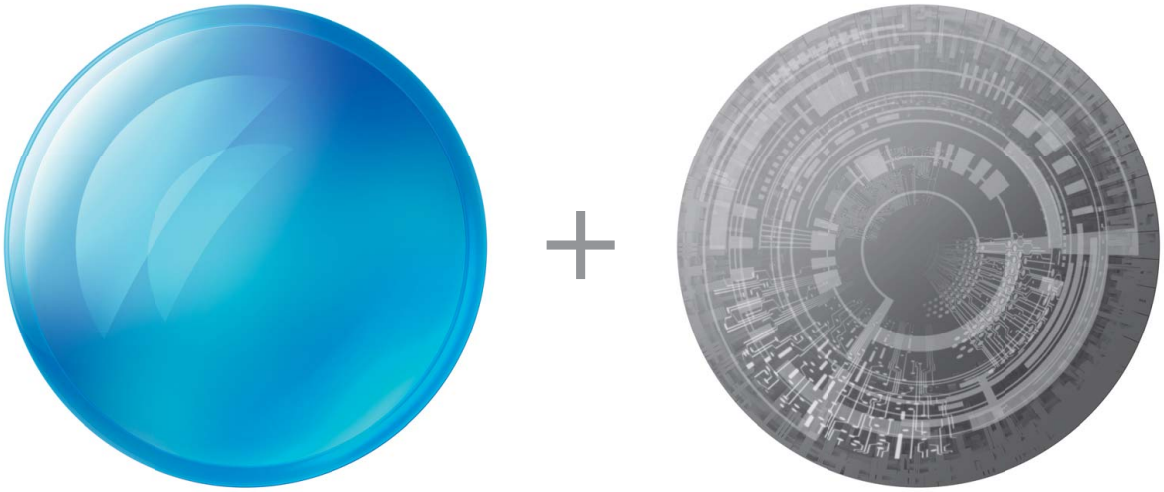
Digital Microscope

DSX Solutions

Discover Another Dimension

NEW

For All Conventional Microscope Users, This Is an Olympus Proposal for the Next Generation of Microscopes.



Optical + Digital

Olympus introduced the world to a new dimension in industrial microscopy with the DSX Series digital microscope system. Today, with the unique combination of time-tested Olympus optics and today's newest digital imaging technology, the Olympus DSX Series sets a new standard in industrial microscopes.The Olympus DSX Series digital microscopes allow even first-time users to immediately produce superior images and highly reliable results, thanks to even more advanced features and an even simpler interface. No matter how big the challenge, DSX delivers the solution.

Common Microscope Challenges. Extraordinary Solutions.

Light microscope

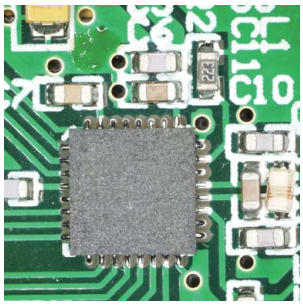
Digital microscope

01 Low Contrast or Halation

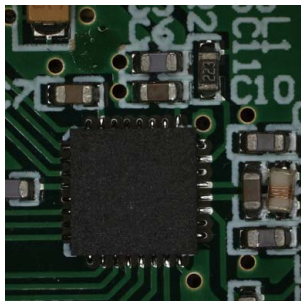
Challenge

In low-contrast, low-dynamic-range conditions, we find it almost impossible to achieve the clear images necessary to extract needed sample information unless we make complex illumination adjustments.

In many imaging cases, a sample with low contrast cannot be clearly observed. In addition, there are some parts that are too shiny or too dark on the sample image, due to the material, texture or color, which can make it difficult to clearly observe sample surface conditions. To eliminate this, illumination needs to be carefully adjusted, which can require considerable time.



Mounted substrate: Halation



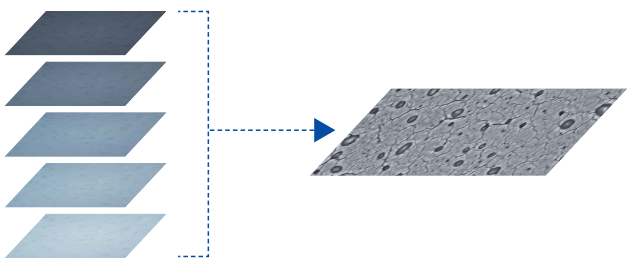
Mounted substrate: Lack of brightness

Coated paper: Low contrast

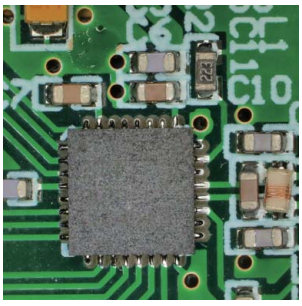
Solution

A combination of very-high-quality optics and advanced digital image processing optimizes images without complex adjustment.

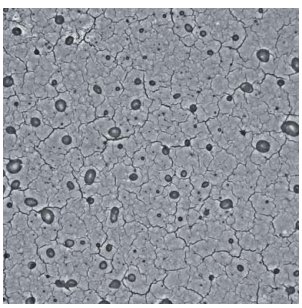
With its HDR (High Dynamic Range) function, DSX enables clear observation of surface conditions that are normally difficult to observe using a light microscope. HDR combines several images taken at different exposures, enabling clear observation, even with low-contrast images. With HDR, samples that previously may have required multiple pieces of equipment for precise observation can be clearly observed with a single system.



Combined images



Mounted substrate: HDR



Coated paper: HDR

02 Narrow Field of View

Challenge

When the inspection area of the sample is very large, we cannot create an image of the whole area and still maintain high resolution and detail.

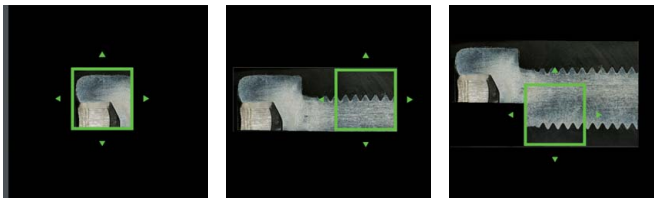
Just one piece of a magnified image cannot tell us enough about the quality of machined parts. On the other hand, with conventional microscopes, it is difficult to view the entire sample at high resolution. As magnification is increased, the observation field becomes narrower, and it becomes very hard to obtain an overall image of the sample.

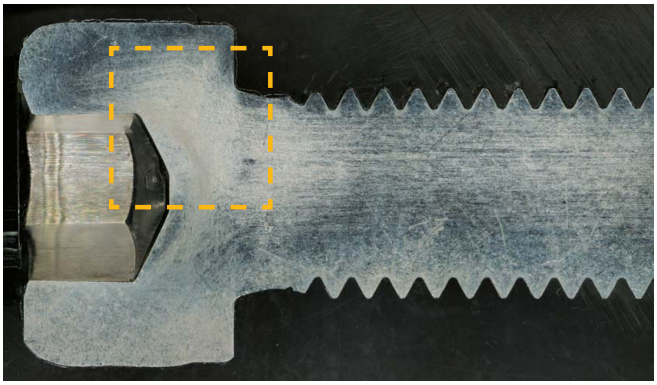
Metal flow analysis

Solution

With DSX, there is no “outside the field of view.” With its high-quality panoramic imaging, it automatically stitches images seamlessly into one as the stage moves.

As the stage moves, the system automatically stitches images into a large single field of view, in real time. Where conventional microscopes reduce field area with increases in magnification, DSX’s panoramic view function maintains the original field while delivering close-up clarity — in 2D, 3D, extended focus.





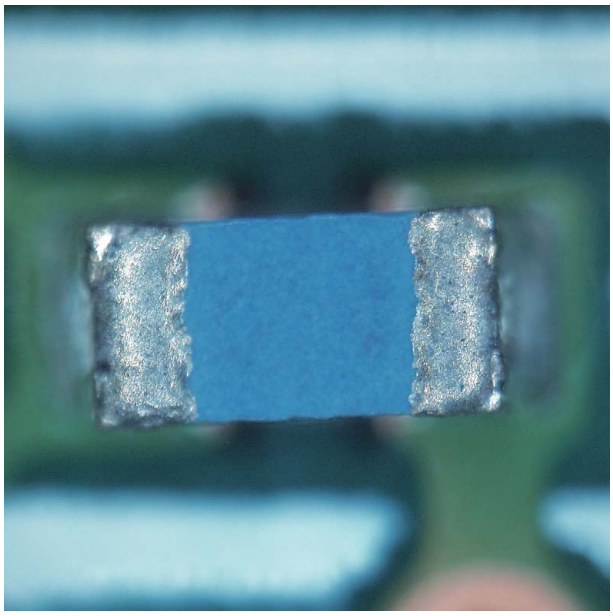
Metal flow analysis: Stitched image

03 Unclear Focus on Uneven Surfaces

Challenge

When our sample surfaces are considerably uneven and certain parts of the image are often out of focus.

With conventional microscopes, the more the operator increases the magnification, the shallower the depth of focus becomes, making it more difficult to achieve clear focus on the entire sample.

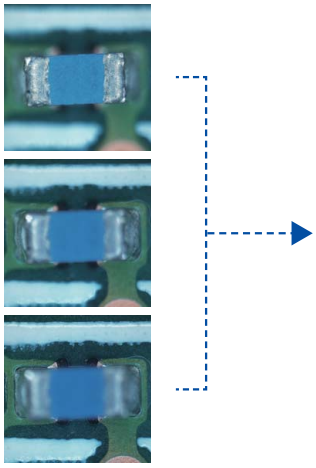


Condenser

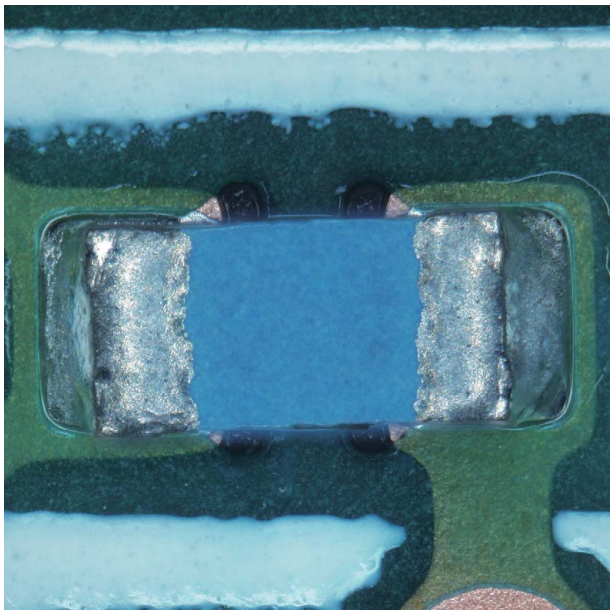
Solution

DSX offers Extended Focal Image, which gives a clear, in-focus image of a sample with one click, regardless of how uneven the surface is.

During Extended Focal Image, several images are taken while the point of focus is moved up. In turn, areas where the sample is in focus are combined into one clean image, allowing the precise inspection of uneven surfaces.



Synthesis procedure



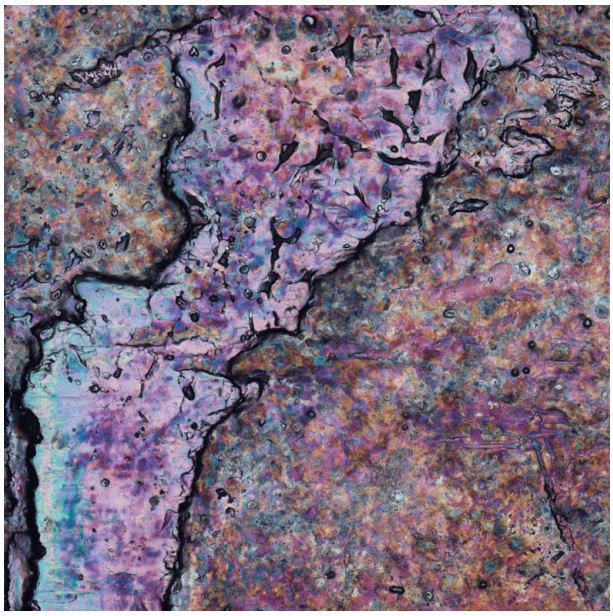
Condenser: Extended Focal Image

04 Flat Image of a 3D Sample

Challenge

With a flat image of a 3D sample, it is impossible to characterize or measure height differences.

Using a light microscope, it is difficult to determine the exact features of a three-dimensional sample based on a 2D image. In many cases, the operator has no alternative but to make their best estimate as to height differences in a sample or whether sample unevenness is concave or convex.

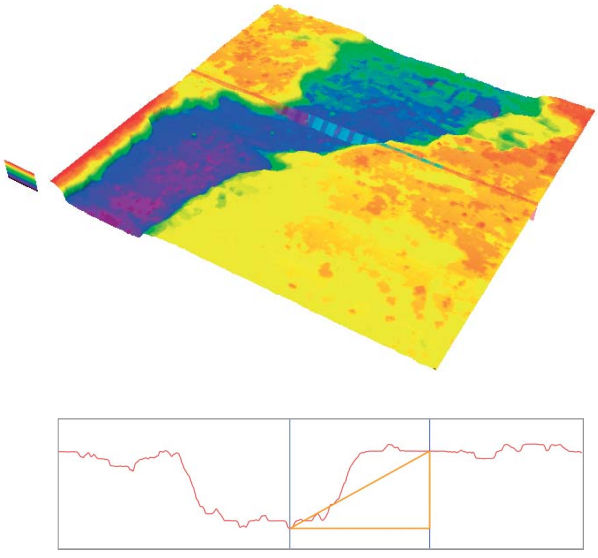


Flow lines on die casting

Solution

One click and DSX shows sample images in three dimensions, so the sample can be examined from any angle and observed as it actually is.

With detailed 3D images, sample features or unevenness can be viewed and measured. Height differences and volume can also be measured, making it easier to accurately analyze the sample. 3D imaging is simple and fast, with improved capturing speed.



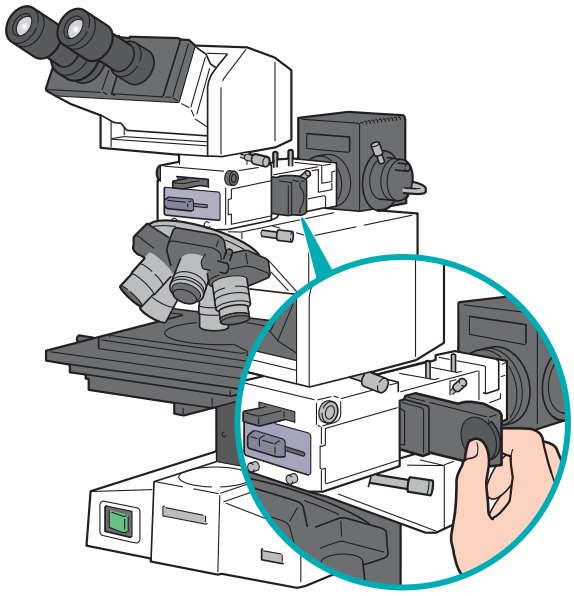
Flow lines on die casting: 3D image

05 Complex Microscope Setting

Challenge

We find that our less-experienced operators cannot carry out advanced, complicated operations.

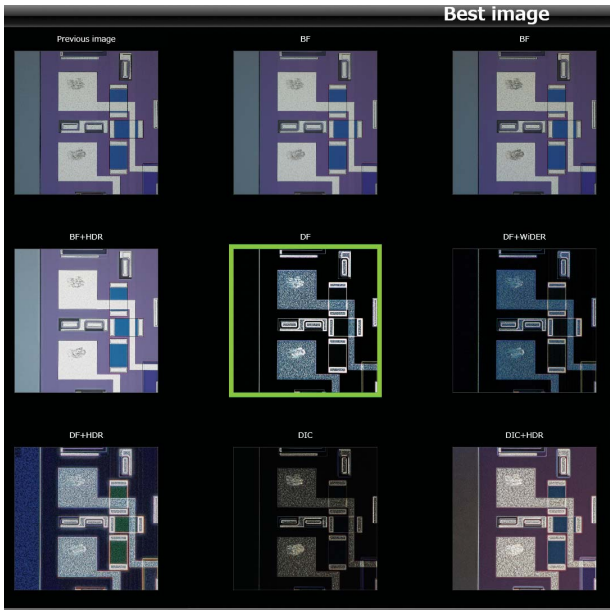
With traditional light microscopes, switching between observation modes can require a variety of complicated operations and adjustments. Without considerable knowledge and experience, it can be difficult to ascertain the specific image characteristics one needs for the task at hand. Changing the observation mode can often require adjustment of aperture stop and illumination, the insertion of special filters, etc.



Solution

With DSX, there is no operation mode setting. The microscope automatically proposes several possible images in several observation modes; all the operator needs to do is select the optimal image.

DSX has changed the microscope operation flow dramatically. Setting the observation mode is no longer required. Select an optimal image from the list of candidates captured, then DSX will adjust the observation mode automatically, in line with the selection.



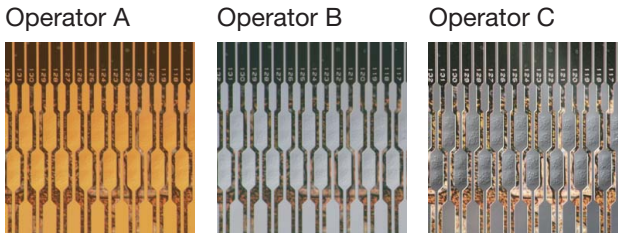
Best image

06 Issue of Reproducibility among Multiple Operators

Challenge

With multiple operators making the same measurement, we have difficulty achieving reliable, reproducible results from different people.

With conventional microscopes that require many fine adjustments and settings, it can be difficult for multiple users to conduct observations under the same conditions. Observation conditions may vary depending on the operator and their particular method, which can cause major differences in the images observed. This can cause problems when conducting R&D, QA/QC, or material testing. In addition, if a digital camera is mounted to a microscope but the microscope is not linked to image processing software, image-processing can take multiple time-consuming steps. The microscope and software are operated separately. Moreover, if the magnification settings of the software are not correct, measurements may be conducted with incorrect calibration values from user to user.

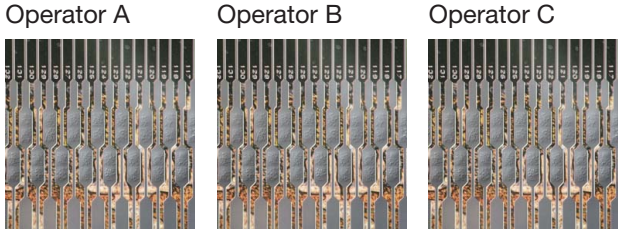


FPC ACF bonding

Solution

DSX optics, hardware, and software are engineered to work as one, thereby preventing human errors.

DSX is fully digital so that all image acquisition and observation conditions, including stage coordinates, observation method, calibration data applying, etc., can be saved and recalled at any time. Any operator can easily repeat any inspection and measurement method, ensuring observation under the exactly same conditions and settings. All image capture conditions can be recalled with one simple click. With DSX, all operations are simply and speedily controlled by software that operates seamlessly with the system's mainframe. Once the sample is placed on the stage, all operations can be easily controlled via software, from focusing and searching for an observation point, to adjusting magnification and illumination, to changing the observation mode.



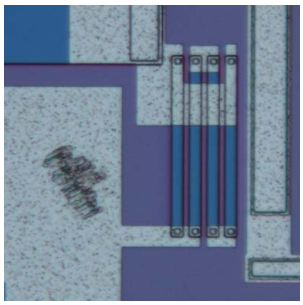
FPC ACF bonding

07 Low-Quality Microscope Image

Challenge

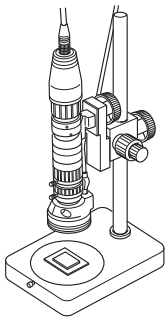
The low-resolution optics and unstable frame of our digital microscope prevent it from providing the high resolution images we need.

Many digital microscopes provide ease of use but do not deliver the same high resolution as an light microscope. In fact, many users divide their microscope usage between the two depending on their application. This wastes large amounts of time and does not allow continuity of observation between digital and optical images. In addition, when conducting observations at a high magnification using some digital microscopes, the impact of vibration can cause blurring. In many cases, this can make it impossible to observe fine sample details.



IC chip (Objective lens NA 0.4)

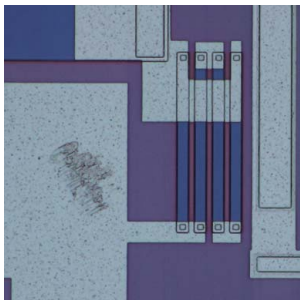
Bainite (Objective lens NA 0.4)



Solution

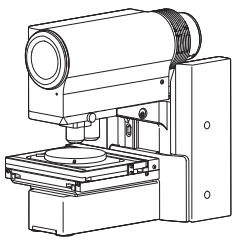
DSX's advanced optics and stable frame assure both high-quality images and easy operation.

Thanks to DSX's objective lenses, which combine high NA, long working distances, and unprecedented evenness of light intensity, glare is minimized and color reproduction is real. Flare and distortion are eliminated, unlike with other digital microscopes. Every sample is reproduced with stunning accuracy. The Full HD CCD and advanced digital processing of DSX display exactly what our high-quality optics reveal. DSX features a sturdy, high-rigidity frame with a low center of gravity, specifically designed to absorb the impact of vibrations. DSX software is also equipped with an anti-vibration function, realizing stable observation at magnifications as high as 9000x.



IC chip (Objective lens NA 0.8)

Bainite (Objective lens NA 0.8)



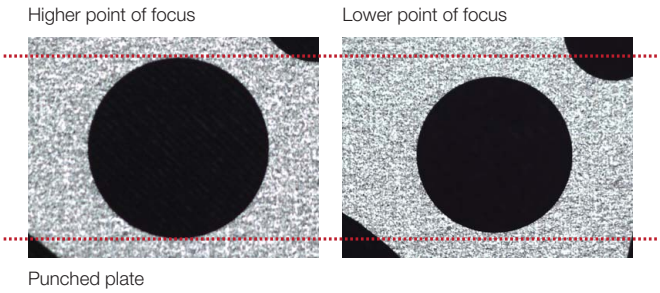
08 Unreliable Measurement

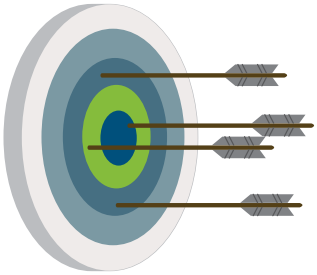
Challenge

We are never confident that images taken by older model digital microscopes are accurate enough to guarantee measurement.

Digital microscopes offer significant depth of focus. Depending on the point of focus, however, the size of the captured image may vary. If the point of focus varies even slightly under the same magnification, then variation in measurement results can occur. Because of this, an outdated digital microscope generates some uncertainty. No clear guarantees are given regarding the reliability of such digital microscopes. Operators, therefore, have no way of being sure about the scope of error of the equipment they are using.

Non-telecentric



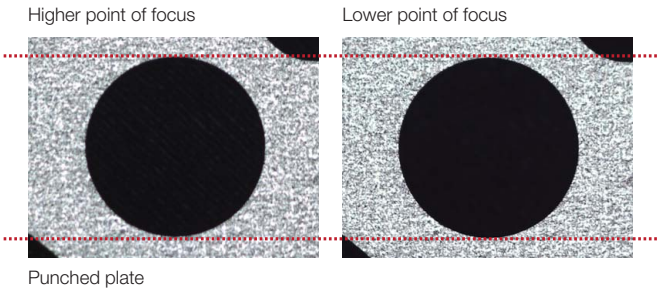


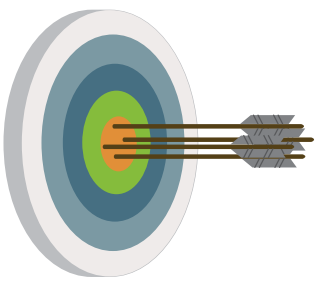
Solution

The precision of DSX digital microscopes is guaranteed because they are designed and engineered for accurate measurement and most factors that cause uncertainty have been eliminated.

DSX uses the same telecentric optics utilized in measuring instruments, eliminating variation in measurement results. Even if the point of focus is changed, there is no change in the size of the target of observation. As a result, DSX guarantees accuracy and repeatability of magnification in the XY direction, with measurement accuracy at ±3% and measurement repeatability at 3 n-1=±2%. Reliable measurement results based on a clear traceability diagram are available.

Telecentric





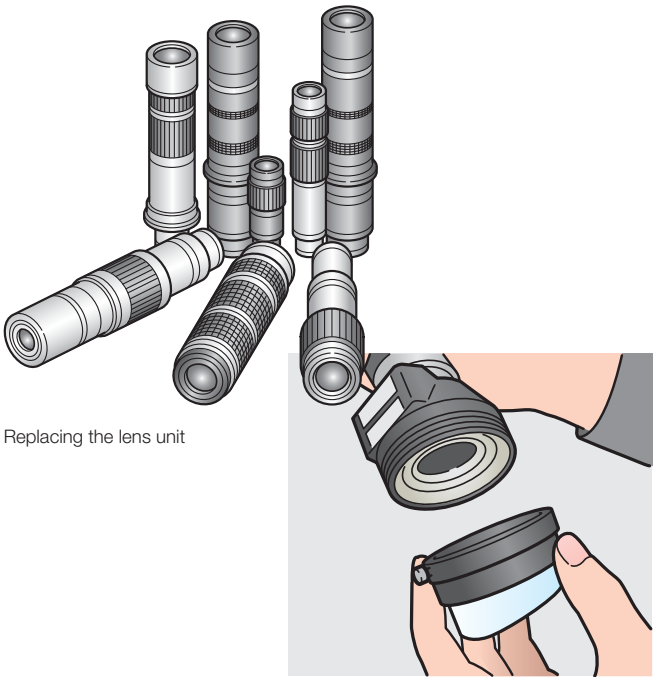
Accuracy + Repeatability

09 Complicated Observation Mode Setting

Challenge

As different observation modes require different lenses, we waste considerable time and effort changing them.

Digital microscopes require time-consuming lens replacement in accordance with the illumination method. Every time the lens is changed, it is also necessary to remove and reattach the camera and cables, which takes even more time and effort.

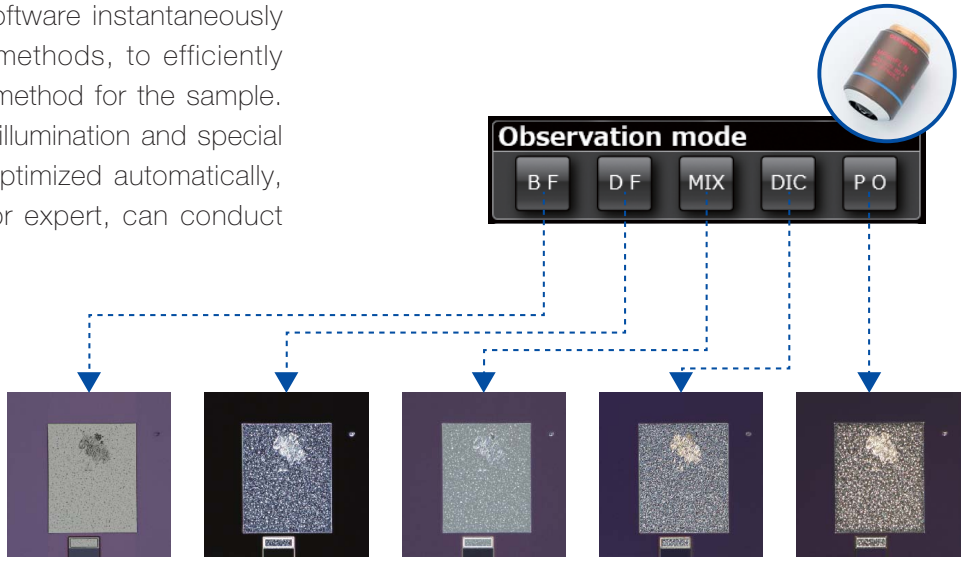


Replacing the lens unit

Solution

With DSX, a single click changes the observation mode, so any operator, beginner or expert, can achieve the same levels of operation.

By simply clicking on an icon, software instantaneously switches between observation methods, to efficiently find the appropriate observation method for the sample. Adjustment of the aperture stop, illumination and special filters to the best conditions is optimized automatically, so that any operator, beginner or expert, can conduct appropriate observations.



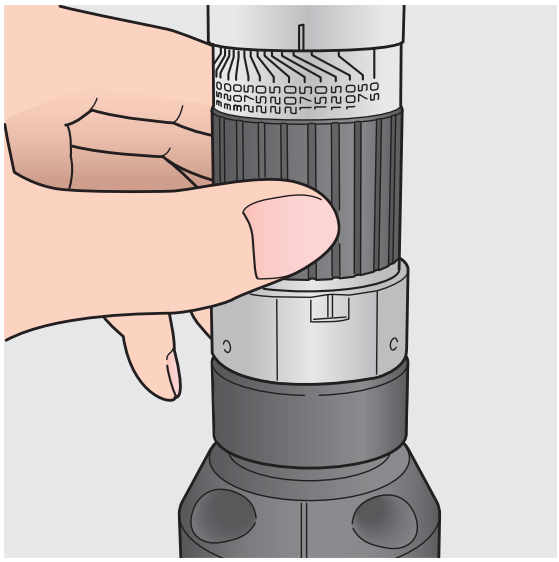
Bright-field | Dark-field | MIX (BF and DF combined) | Differential Interference Contrast | Bright-field

10 Manual Calibration Setting

Challenge

Our digital microscope requires manual calibration of magnification for each image and set of measurements. Without hand calibration, the measurements would not be correct.

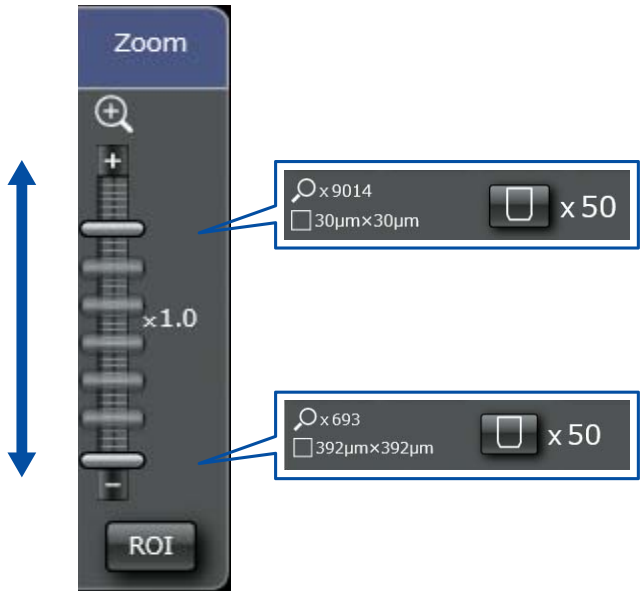
Many older digital microscope models require troublesome calibration settings to be performed every time the magnification is changed. If images or measurements are taken using incorrect calibration settings, the magnification indication and measurement values will also be incorrect, requiring that the whole process to be performed again.



Solution

**DSX automatically assesses changes in magnification and measurement settings,
so the risk of calibration error is eliminated.**

DSX offers automatic magnification recognition, with a motorized and coded zoom system and a coded nosepiece so the system always knows which objective is in use. The correct calibration setting is always used when measurement is performed on an image taken with DSX.

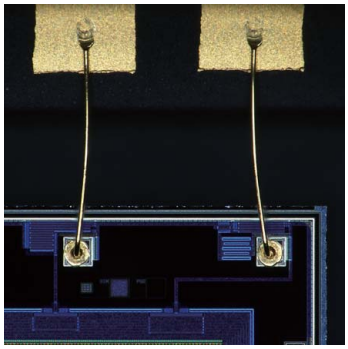


Applications

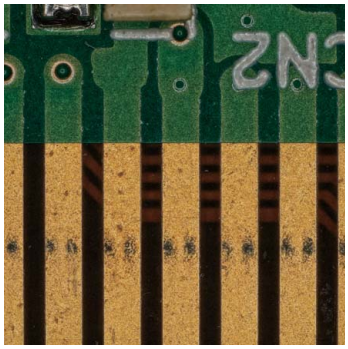
DSX110

Free-angle
Wide-zoom
Digital Microscope

Total magnification : 7X – 1,071X (On 23” monitor)
Actual field of view : 57,447 µm - 359 µm
Maximum sample size : X 100 mm, Y 100 mm, Z 80 mm, 1 kg
Observation mode : Ring light illumination, Transmitted light



Bonding wire



Multi-layer circuit board

Hard disk drive arm

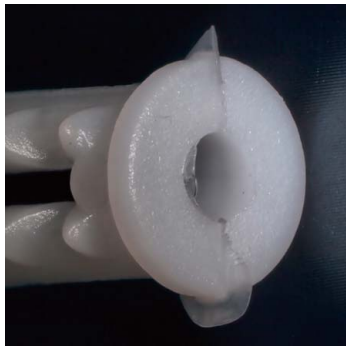
PGA

Cable

Gear

Fractured metal surface

Tool



Injection molding resin

Tablet

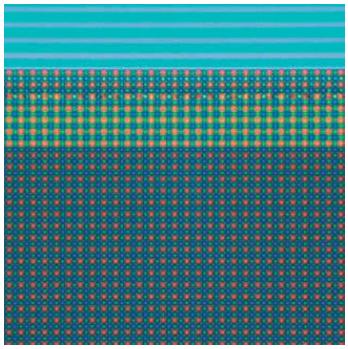
Implant

Cloth

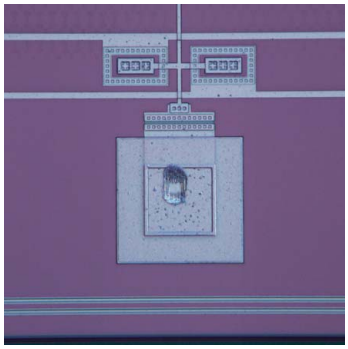
DSX510

Upright
High-resolution
Digital Microscope

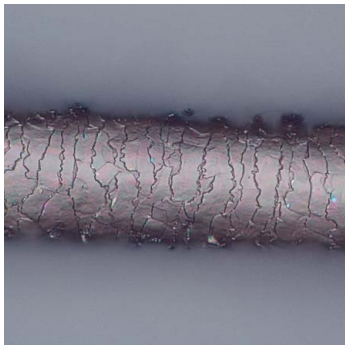
Total magnification : 17X – 9,014X (On 23” monitor)
Actual field of view : 22,181 µm – 42 µm
Maximum sample size : X 100 mm, Y 100 mm, Z 95 mm, 3 kg
Observation mode : BF, DF, MIX, DIC, PO, Transmitted light



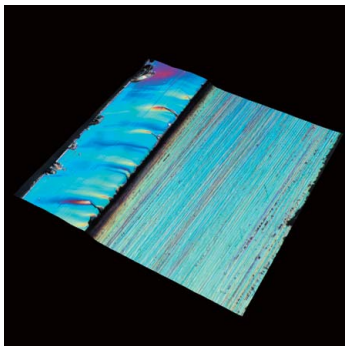
CCD



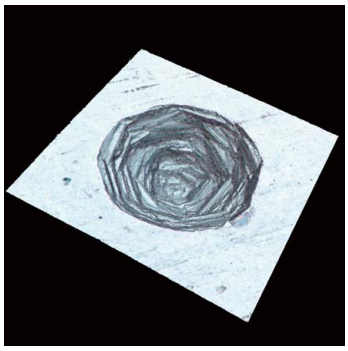
Electrode pad



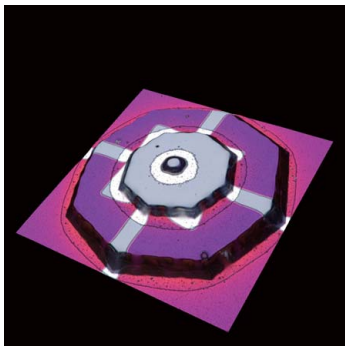
Hair



Diced surface of IC chip



Punch mark



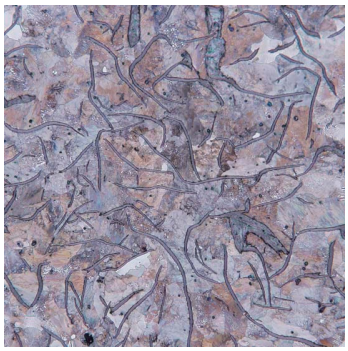
MEMS

DSX510i

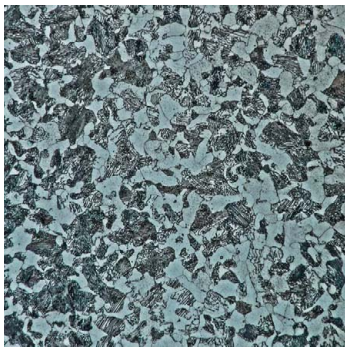
Inverted
High-resolution
Digital Microscope

Total magnification : 17X – 9,014X (On 23” monitor)
Actual field of view : 22,181 µm – 42 µm
Maximum sample size : X 50 mm, Y 25 mm, 1 kg
Observation mode : BF, DF, MIX, DIC, PO

Ferrite
(Martensite)

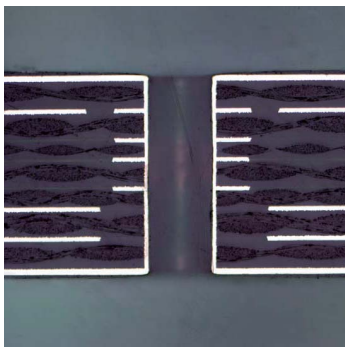


Cast iron

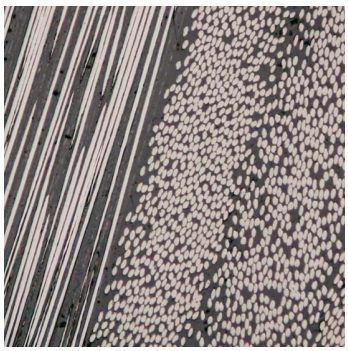


Carburized structure

Cross section of bump



Multilayer board



Glass fiber

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OLYMPUS

For enquiries - contact
www.olympus-ims.com/contact-us

OLYMPUS CORPORATION
Shinjuku Monolith, 2-3-1 Nishi-Shinjuku, Shinjuku-ku, Tokyo 163-0914, Japan

OLYMPUS EUROPA SE & CO. KG
Wendenstrasse 14-18, 20097 Hamburg, Germany

OLYMPUS SCIENTIFIC SOLUTIONS AMERICAS CORP.
48 Woerd Avenue, Waltham, MA 02453, U.S.A.

OLYMPUS (CHINA) CO., LTD.
10F, K. Wah Centre, 1010 Huai Hai Road (M), Xuhui District, Shanghai, 200031 P.R.C.

OLYMPUS KOREA CO., LTD.
8F Olympus Tower, 446 Bongeunsa-ro, Gangnam-gu, Seoul, 135-509 Korea

OLYMPUS SINGAPORE PTE LTD.
491B River Valley Road, #12-01/04 Valley Point Office Tower, Singapore 248373

N8600136-032015