



ZEISS Smartzoom 5
Digital Microscope



Trusted Data to Support Decisions in the Industrial Quality Lab

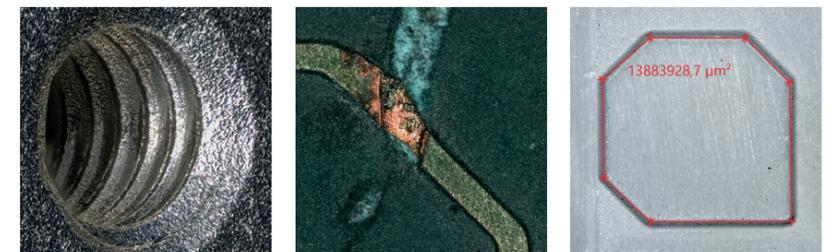
Count on ZEISS Smartzoom 5 to deliver repeatable inspection and documentation workflows—from part to part, operator to operator, and even lab to lab.



Demand for data can surge suddenly if production anomalies cause quality concerns, or if parts get returned from the field. Your optical inspection and documentation work can get backlogged and parts may pile up in the materials laboratory. You feel the urgency to get those parts turned around quickly so it is “all hands on deck.” And now you must rely on the assurance from your quality engineers that optical inspection data is not affected by operational differences, like the experience of an expert versus a novice user.

This is where ZEISS Smartzoom 5 comes to the rescue. We know how microscope settings can alter an image’s appearance, so we’ve engineered every aspect of Smartzoom 5 to meet your highest standards for repeatable optical inspection and documentation.

With Smartzoom 5, you can have confidence that your quality engineers are acquiring optical inspection data that is not affected by executional variations. And not just from part to part for production batch processing, but also from operator to operator, or even from facility to facility. With Smartzoom 5 in your inspection workflow, investigative recipes can be followed for each part, so you can make correct quality assessments.





The Tolerance for Uncertainty is Zero.

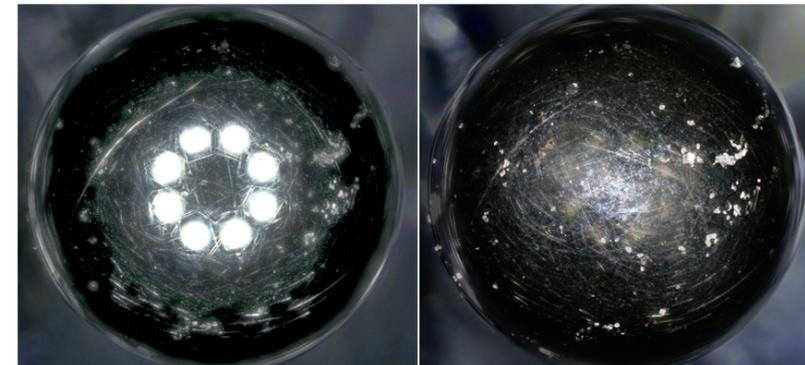
Go digital to overcome classical light microscopy challenges and have confidence in your data.

Enhanced Depth of Field (EDoF)

Depth of field is inherently limited in light microscopy. Smartzoom 5 overcomes this with the ability to acquire a series of images at different focus settings, then processing and reconstructing a final extended depth of field or 3D image. Telecentric objectives ensure that these images are free from distortion in the third dimension, providing a clear view for inspection and documentation of 3D surfaces or surface profiles.



Airbag fabric; left: without EDoF; right with EDoF



Ball of a ball bearing; left: without Glare Removal; right with Glare Removal

Smart Illumination

Another challenge for light microscopy is the suppression of reflections from highly reflective surfaces. Smartzoom 5 features segmented LED ring light and coaxial lighting for all objectives – plus smart software features such as Best Image and Glare Removal – all to assist the operator in choosing, and repeating, the best possible illumination conditions.

Microscopy for non-microscopists

Because we understand that quality engineers may not be trained microscopists, we gave Smartzoom 5 several interface choices – touchscreen, touchpad or mouse and controller – so each user is comfortable with operation. The graphical user interface is laid-out with the typical optical inspection and documentation workflow in mind: placing parts on the stage, navigation aided by an overview image, selecting illumination, choosing data to be acquired, then saving the workflow, including the system settings for each acquisition. This assures that parts are inspected with the exact same settings, even when inspection is performed by a different operator or a different lab!



Meet your Objectives.

ZEISS optics precisely match the applications for the digital microscope.

Changing objectives on Smartzoom 5 is as easy and fast as changing a lens on a SLR camera. Operators can be assured that the system will recognize the new objective lens and retain magnification calibration throughout the inspection workflow.

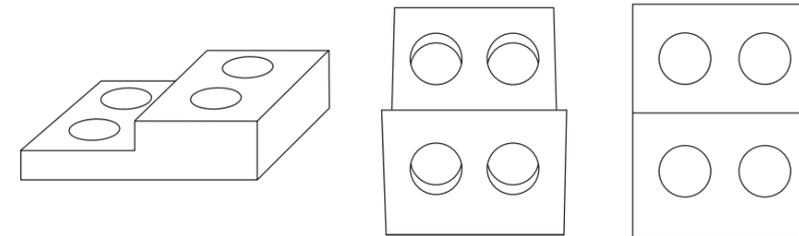
Continuous magnification calibration

Better still, while traditional zoom objectives are calibrated for preset, click-stop magnifications only, Smartzoom 5 objectives are calibrated across the entire zoom range, so operators can zoom into any feature with confidence that the calibration remains accurate. Repeatability is further enhanced with software-assisted placement of measurement points across edges (the "snap to" automated edge detection function).



Telecentric optics assure distortion-free 3D images

Repeatable acquisition of 3D images, with exact placement of measurements in a surface profile, requires telecentric objectives. This means that images will scale correctly in the Z-direction due to the parallel and vertical beam paths produced by a telecentric objective. On Smartzoom, this means 3D images will be free of distortions in the third dimension and measurement excursions that can occur due to slightly different focus settings will be minimized.



Center:
A standard, non-telecentric lens results in a distortion of perspectives.

Right:
A telecentric lens ensures that the perspectives remain undistorted.





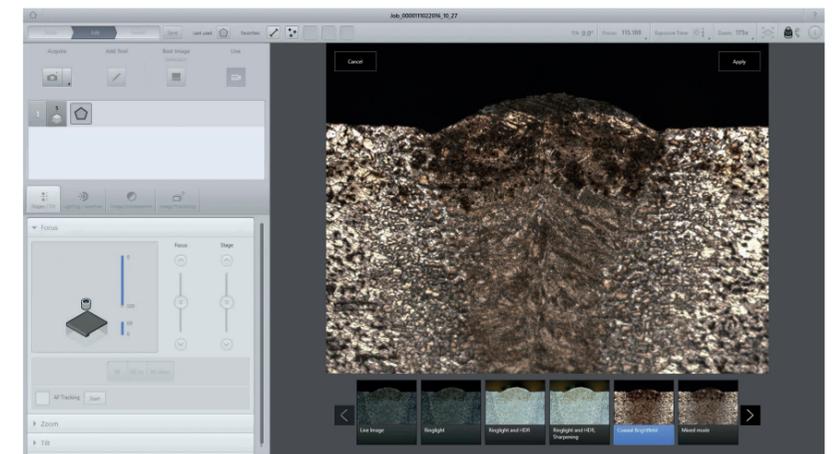
Be Enlightened.

Smartzoom 5 has simplified illumination—even for the most reflective surfaces.

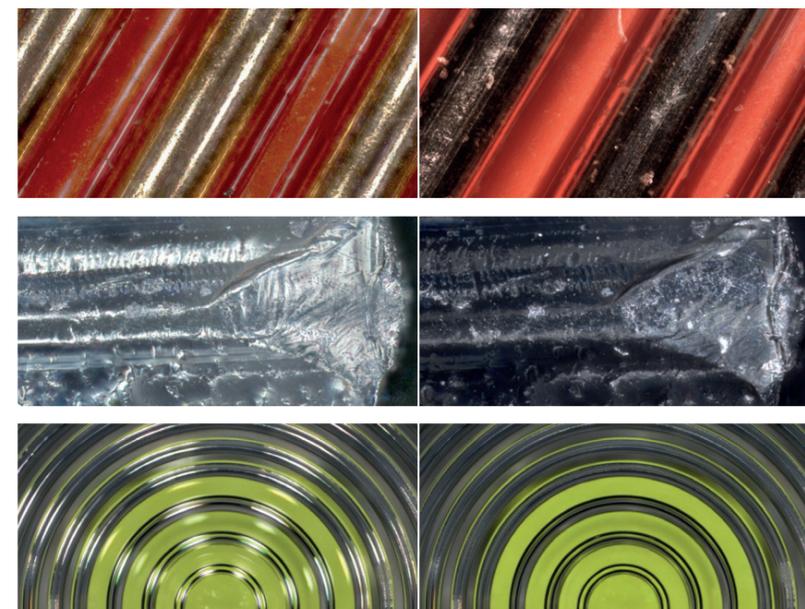
All Smartzoom 5 objectives are equipped with 8 LED light sources arranged around the final lens, switchable in 4 segments. All objectives support coaxial lighting; mixing of ring and coaxial light is possible throughout the entire magnification range. With Smartzoom 5's objective encoding, users can store and recall the exact illumination setting to ensure repeatable, uniform acquisition of inspection data.

Best Image Preview

The Best Image functionality generates image previews showing different illumination settings: segmented ring light, coaxial light, and a mix of segmented ring and coaxial light—with or without HDR and image sharpness enhancement. Select the image that best reveals the attributes of the subject part—it's that easy. Even better, simply recall the exact same preferred lighting settings for inspection and documentation of the next part in the batch, or when you are the next operator in the line.



Best Image preview of a welding seam (Coaxial Brightfield illumination to be applied)



Examples of applied Glare Removal (right)
Top: coil wire; Middle: damaged plastic; Bottom: LED lens

Glare Removal: the repeatable alternative to a polarization filter

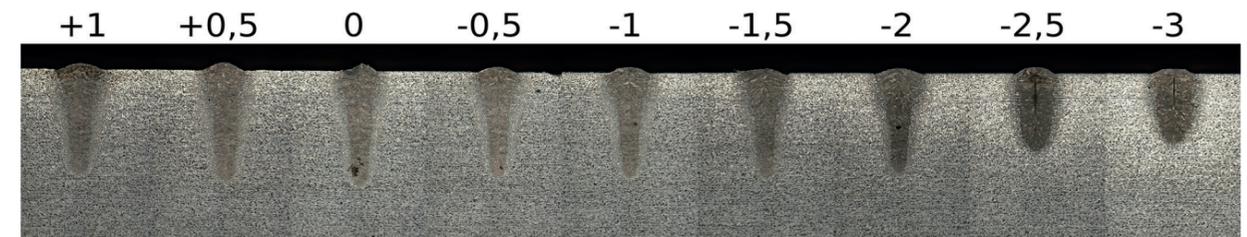
Polarization filters are traditionally used to suppress reflections from metallic surfaces, yet each operator may use slightly different polarization angles, possibly resulting in contrast differences that lead to measurement excursions. Smartzoom 5 employs a unique Glare Removal feature to detect the contrast obtained from all four LED ring light segments, and combines the information to remove reflections from the image. Because it's operated by software, it is applied consistently, thus contributing to repeatability of results.



Set, Inspect, and Repeat.

The best inspection workflows are only as good as their ability to be executed identically for every part in the batch.

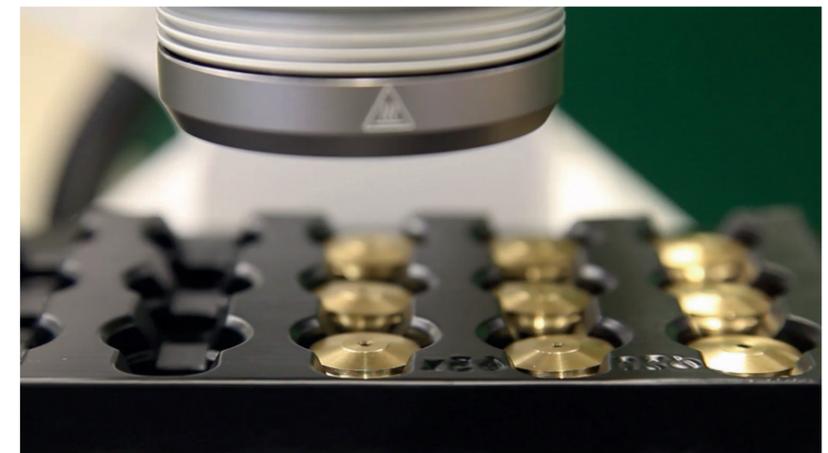
By now, we hope we have convinced you that Smartzoom 5 is purposefully packed with features that deliver overriding value as the most repeatable optical inspection and documentation solution for industrial quality labs. But there is one more feature to be discussed, one which takes the sum of the individual features and puts them into a single feature for the ultimate assurance of workflow repeatability: Job Mode.



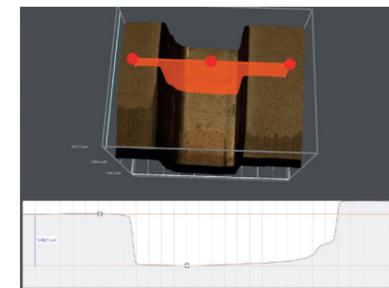
Easy and efficient analysis of laser welding process parameters based on pre-defined Job Mode settings

Job Mode

A typical quality inspection workflow is likely to include images or measurement data from different locations on the part, with the same magnification and lighting conditions applied to multiple similar parts in a production batch. The sequence of acquisition parameters, together with the instrument settings at each acquisition, can be saved as a "job" by the laboratory manager, system supervisor or an experienced user. This makes it easy for less experienced operators to retrieve and execute the predefined inspection workflow, without worry about relocating the exact same regions of interest, focus or illumination settings. Job Mode gives you further assurance that any quality observation anomalies are real, instead of being caused by operator error, the differences between operator experience levels, or even unique lab protocols.



Semiautomatic processing of a production batch inspection job



3D profile measurement that can be performed in the course of a Job Mode workflow

Benefit from Smartzoom 5's Many Talents.

Smartzoom 5 contributions to the industrial quality lab extend beyond optical microscopy alone.

Initially developed as a turnkey solution for optical inspection and documentation, Smartzoom 5 has rapidly evolved into a multi-purpose digital light microscope able to perform a wide range of microscopy applications in the industrial quality laboratory.

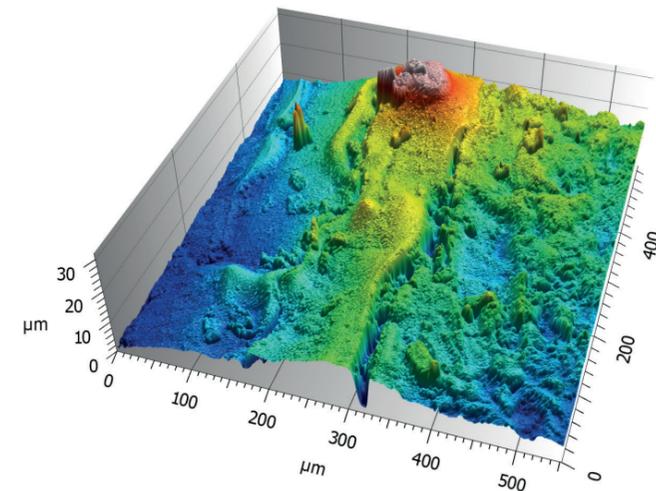


Grain size analysis in ZEISS ZEN core

Metallography / Fractography

Change to the 10x/0.6 objective and your Smartzoom 5 is ready for metallography. Use your choice of ZEN core's Grains, Multiphase, Layer Thickness and Graphite modules to extract quantitative metallographic information from the Smartzoom 5 images.

This Smartzoom 5 objective was specifically designed to meet the optical requirements for metallography applications, which require higher magnification and optical resolution than what is typical for optical inspection and documentation tasks. The 10x/0.6 objective replicates the common design attributes of the other Smartzoom objectives, such as telecentricity, encoding, long working distance, continuous zoom magnification calibration, and integrated emergency stop.



Advanced Surface Imaging and Analysis

ConfoMap is ZEISS' advanced surface imaging and analysis software for 3D datasets. Based on MountainsMap® software from DigitalSurf, ConfoMap features analysis tools for 2D profiles and 3D surfaces, to facilitate the assessment of friction and wear of functional surfaces. The roughness and waviness components of a surface are separated using the latest ISO advanced filtering techniques; 3D surface texture parameters are calculated in accordance with ISO standards. ConfoMap is easy to use – even for complex surface analyses – and works with all ZEISS confocal, wide field and digital microscopes.

Advanced Dimensional Measurement

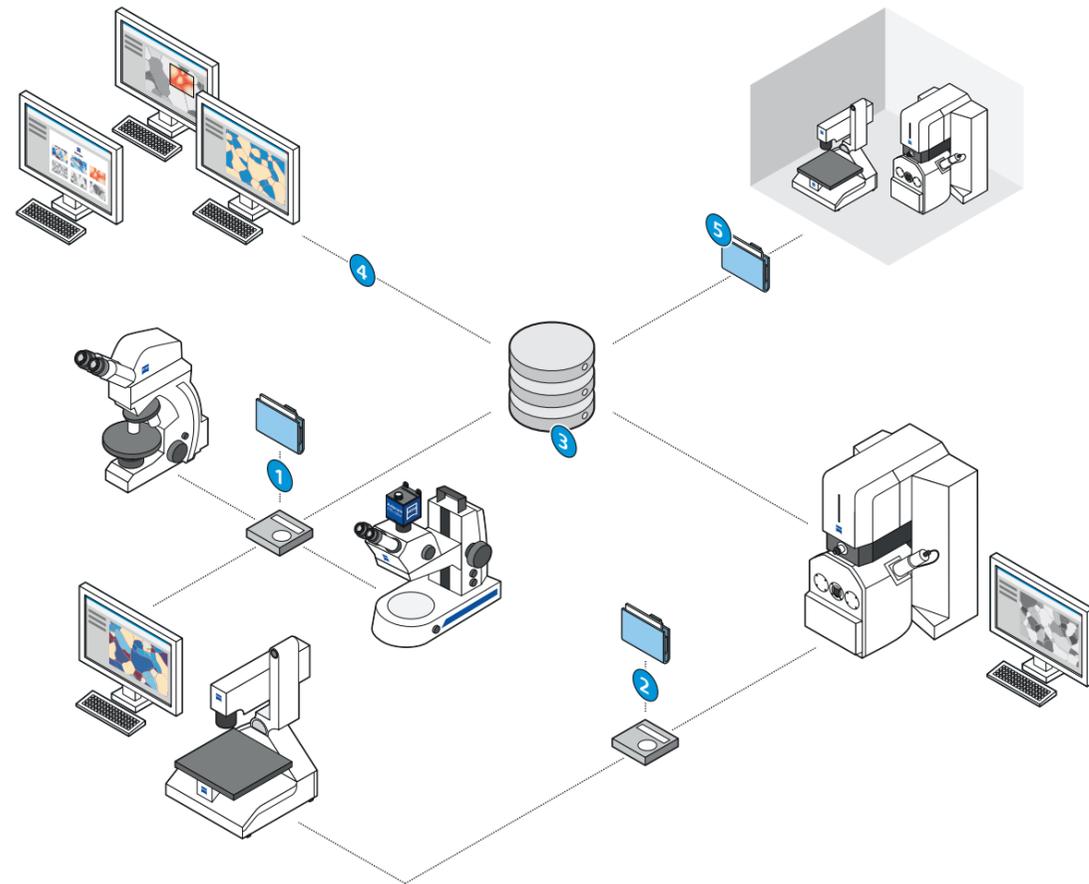
Import Smartzoom 5 images to NEO pixel, the ZEISS 2D measurement software also used on the ZEISS O-Select digital profile projector. NEO pixel detects edges automatically, in both reflected and transmitted light images, so you can “click and pick” dimensional properties identified by the software. This is recommended for parts and components with structures of 5 mm and below that are too small to be measured accurately by digital profile projectors. Smartzoom 5 is calibrated for magnification throughout the entire zoom range, and can be ordered with a calibration certificate. Measured Length Deviation is specified as <0.5% of the measured length.



Plays Well with Others.

Benefit from multi-modal workflow automation and correlative microscopy.

In industrial quality assurance, as well as in failure analysis, a thorough assessment may require data acquired from other inspection or analysis modalities to get to the root of a problem. The power of the multi-modal workflow, where a part moves from instrument to instrument, is in the acquisition of complementary data that provides a broader perspective to the problem. This is where Smartzoom 5 excels, by “playing well with others”.



Smartzoom 5 in a laboratory environment connected by ZEISS ZEN core:

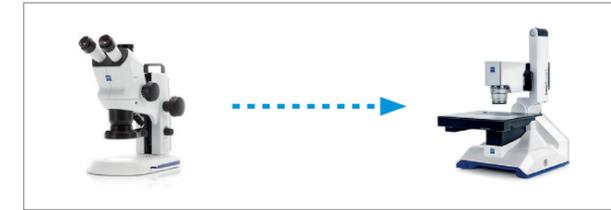
- 1) Shuttle & Find between Smartzoom 5 and other light microscopes
- 2) Shuttle & Find between Smartzoom 5 and ZEISS EVO scanning electron microscope
- 3) Central data management enabled by ZEN Data Storage
- 4) ZEN Connect: image processing, analysis, and reporting on separate office workstations
- 5) Exchange of images and analysis data, instrument presets, workflow templates, and reporting data between laboratories and locations

Shuttle & Find

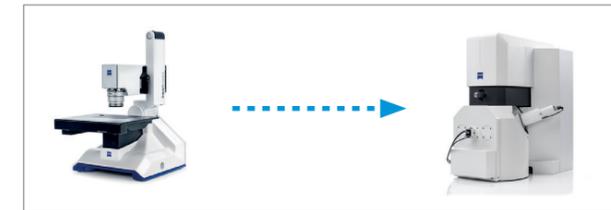
Shuttle & Find streamlines multi-modal workflows with fast, semi-automated relocation of regions of interest, automatic data storage from multiple modalities to a single project folder, and allows overlay of imaging and elemental chemistry data from multiple modalities.

Multimodal data acquisition is reality already for some quality laboratories, and near future for others. In any case, Smartzoom 5 is ready for integration in correlative microscopy or analytical workflows.

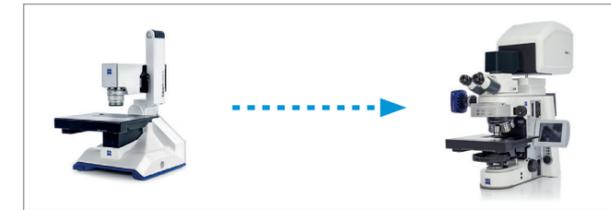
Popular Multimodal Workflows:



Quick optical inspection by stereo microscope, like ZEISS Stemi 305 or 508, followed by detailed optical inspection and documentation with Smartzoom 5



Optical inspection and documentation by Smartzoom 5, followed by elemental analysis with ZEISS EVO scanning electron microscope



Optical inspection and documentation by Smartzoom 5, followed by detailed surface analysis with a laser scanning microscope such as LSM 900

Image Analysis, Reporting and Archiving

ZEISS ZEN core is our connected laboratory software solution, with modules that deliver image analysis, data reporting and archive solutions for Smartzoom 5 and the other ZEISS Industrial Microscopy Solutions.

A single file format – the ZEISS .czi format – means ZEN core can process data from multiple ZEISS microscopy platforms.

ZEN Intellesis software segments images with the help of machine learning algorithms—rather than relying on grey level thresholding that can contribute to inaccurate segmentation.

ZEN Connect enables the visualization and reporting of data from multiple modalities, different laboratories, or even different locations, in a single correlative microscopy workspace.

Finally, ZEN Data Storage provides a solution for image data management, not only for ZEISS images, but also for images acquired from other sources.

Get more Answers.

Connect with other solutions in the ZEISS QA portfolio.



Scanning Electron Microscopy

ZEISS EVO

Designed for routine inspection and analysis applications such as advanced surface inspection, elemental or particle analysis, EVO excels at offering an operational concept that appeals also to engineers who are not SEM experts. It delivers high quality data, especially for non-conductive parts that cannot be coated with a conductive layer due to a requirement for subsequent inspection in a multi-modal workflow.



Surface and Roughness Analysis

ZEISS Smartproof 5

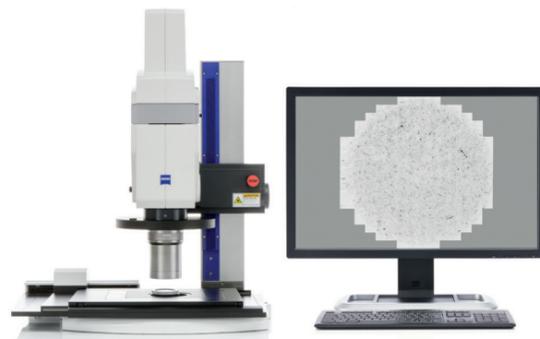
This digital confocal microscope delivers quantitative 3D imaging and roughness measurements for surface analysis investigations. Smartproof 5 is a turnkey and easy to use instrument that can be implemented with minimal training. Non-microscopist users can take advantage of guided workflows to produce fast, precise and repeatable results.



Optical 2D Measurements

ZEISS O-SELECT

O-SELECT is the digital profile projector for 2D optical metrology applications. Equally turnkey and as easy to use as Smartzoom 5, O-SELECT makes 2D optical measurements available with the touch of a single button.



Particle Analysis Solutions

For advanced analysis of technical cleanliness, ZEISS has a range of light and electron microscope particle analysis solutions to cover a wide range of particle sizes and types. CAPA Correlative Particle Analyzer combines light and electron microscopy for particle classifications that require understanding of both morphology and elemental composition.



3D X-ray Microscopy

ZEISS Xradia

XRM is the ZEISS non-destructive 3D imaging solution that performs X-ray computed tomography with imaging resolutions well below 1 micrometer. XRM is ideal for parts or assemblies that cannot be sectioned or dismantled for inspection of the internal materials and structures.



ZEISS Industrial Metrology Portfolio

If you need to include additional capabilities to meet your QA requirements, check out the dedicated ZEISS industrial metrology solutions which include a range of sensor, infrared and X-ray based inspection and metrology solutions.

www.zeiss.com/metrology

Easy on your OPEX

Enjoy the lowest upgradability costs throughout the CAPEX depreciation term and beyond.

It isn't enough for an instrument to be technically superior; it also must be the financially responsible choice.



The designers of Smartzoom 5 took this non-technical requirement to heart and created a system architecture that maintains compatibility with the frequent and continual computer hardware and software evolutions. Smartzoom 5 upgrades are delivered at regular intervals, and open interfaces allow you to add further utility, without the need to invest in expensive dedicated hardware upgrades.

The heart of the microscope – the imaging module – incorporates the basic microscope components such as coaxial lighting, objective interface, zoom engine and imaging sensor. This module connects via standard USB 3.0 cable to an off-the-shelf PC running the latest operating software. The system, therefore, can be upgraded – easily and inexpensively – to the next generation PC hardware and software, which is particularly important if your IT department mandates specific computing hardware to connect to your internal network(s).

Service and Support

for Your ZEISS Microscope System

ZEISS Moments are about passion. The same passion that drives us to support and accompany you and your ZEISS microscope over its life cycle makes sure that your work will lead systematically to success.

You Work Hard: We Make Sure Your Microscope Keeps Pace with You.

High imaging quality, reliable results and instrument availability are the parameters of your day-to-day working life. Your ZEISS microscope integrates seamlessly into this demanding workflow. It provides you with insights and results that you can trust: thorough, comprehensive and reproducible. With ZEISS Life Cycle Management we help you to keep your microscope in optimum condition to get these optimum results.

Life Cycle Management Comes with Your Microscope

Life Cycle Management from ZEISS backs up our solutions throughout the working life of your ZEISS microscope system. From the procurement phase onward, you can count on our support, starting with site surveys to optimize the location for your microscope system. Throughout the operational phase we will complement our service with support for relocations and upgrade opportunities that enhance or expand your possibilities. As soon as you think about replacing your long-serving microscope with a new one, we will take care of the disassembly and disposal of systems that are no longer needed. Rely on our service features: our employees analyse the status of your system and solve problems via remote maintenance or directly at your location.

From Expert to Expert

Never hesitate to ask our application specialists to support your specific tasks. And be sure to tap into our training sessions for any colleagues or employees who will be working with your ZEISS microscope.

Peace of Mind and Availability with Regular Maintenance

Your service plan is tailor-made for you. Make sure you take advantage of all the opportunities your ZEISS microscope system offers. Get optimized performance, instrument reliability and availability at predictable costs. Choose from different service levels of our Protect Service Plans, ranging from Protect preventive, via Protect advanced, to Protect premium. We look forward to discussing your ideal service plan personally.





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