OLYMPUS DSX-100 DIGITAL MICROSCOPE

The Olympus DSX-100 is a high-end, completely motorized digital microscope system engineered to deliver superior image quality and accurate 3D measurement without the need for destructive sample preparation. Its unique features make it an essential tool for material science, quality control, failure analysis, and R&D.

Instrument Capabilities

- **Fully Automated Optical Zoom:** 10X to 7000X magnification range (depending on lens) with seamless, continuous optical and digital zoom.
  BENEFIT: Allows observation from macroscopic overviews to microscopic fine detail without changing lenses.
- **Complete 3D Measurement:** Dedicated software and motorized Z-axis capture elevation data to generate highly accurate 3D models of the sample surface.
  BENEFIT: Enables precise roughness analysis, volume measurement, and profile analysis essential for quality control and failure analysis.
- **Automatic Image Stitching (Panorama):** The system automatically captures and seamlessly merges multiple fields of view into one high-resolution panoramic image. BENEFIT: Allows documentation and measurement of large sample areas (macro-to-micro) while retaining the highest optical resolution.

- **High Dynamic Range:** Captures multiple images at varying exposure levels and combines them to produce a single image with perfect lighting.
  BENEFIT: Eliminates glare and blocked shadows, ensuring accurate color and detail representation on highly reflective or multi-toned samples (e.g., polished metals, PCBs).
- **Freedom of Observation:** Built-in 6-way lighting options (directional, ring, coaxial, polarized, etc.) and a tilting/rotating sample stage.
  BENEFIT: Eliminates guesswork. Users can freely change observation angle and lighting to find optimal conditions for any surface texture.
- Telecentric Optical System: Unlike traditional microscopes, the DSX-100 maintains constant magnification regardless of the focus distance.
  BENEFIT: Ensures measurement accuracy and repeatability, even on uneven or tilted samples.

Surface Roughness Measurement for Stainless Steel / Micro surface roughness measurement using a laser microscope

Ripple Marks Formed in Die-Casting / 3D shape measurement using a laser microscope

Surface profile evaluation for thermal spraying / Surface roughness measurement using a laser microscope

Detecting flaws in heat-treated aluminum alloy parts / Various microscopy techniques using digital microscopes

Quality management in working with extra-fine tubes / Surface roughness analysis of a micro area using a laser microscope

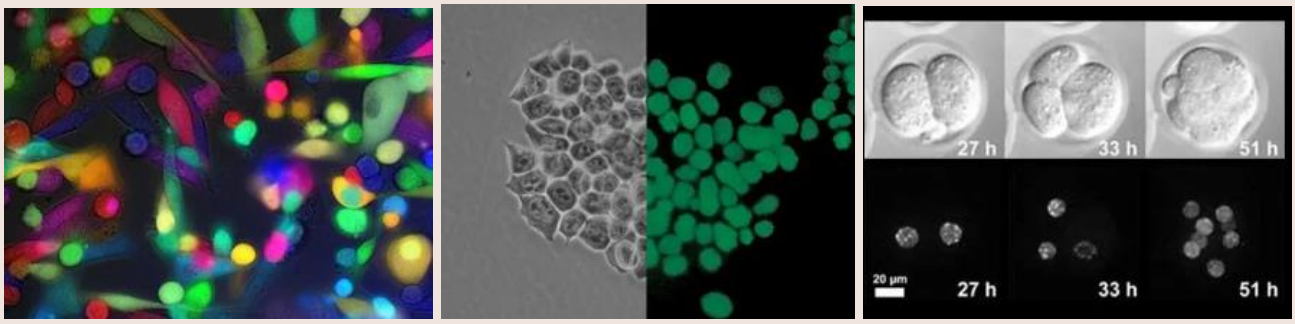
Sample Types & Versatility

- **Materials Science:**
  SAMPLE TYPES: Metals, Ceramics, Polymers, Composites, Welds, Coatings
  CAPABILITY: Non-contact measurement of surface finish and layer thickness.
- **Electronics & PCBs:**
  SAMPLE TYPES: Semiconductor wafers, Connectors, Solder joints, Micro-electromechanical systems (MEMS)
  CAPABILITY: Precise alignment and inspection of micro-components in 3D.
- **Failure Analysis:**
  SAMPLE TYPES: Fractured surfaces, Corroded parts, Wear marks, Contaminants. CAPABILITY: High-resolution observation of fracture origins and defect morphology.
- **Quality Control:**
  SAMPLE TYPES: Tools, Molds, Stamped parts, Powder metallurgy components
  CAPABILITY: Rapid and reproducible pass/fail criteria for dimensional and surface inspection.

Primary Applications

The DSX-100's combination of high resolution, measurement accuracy, and operational simplicity makes it indispensable for:

- Quantitative 3D Roughness Measurement: Measuring surface parameters (Ra, Rq, Rz, etc.) in a non-contact manner.
- Volumetric Analysis: Calculating the volume of specific features like corrosion pits, cavities, or powder mounds.
- Grain Boundary Analysis: Automated measurement and analysis of grain size in metallurgical samples.
- Profile and Height Measurement: Generating cross-sectional profiles and measuring the height difference between any two points on a surface (e.g., step height).
- Non-Destructive Inspection: Performing root cause analysis on sensitive finished products without cutting or damaging the sample.
- Measurement of Critical Dimensions: Highly accurate measurement of lengths, areas, angles, and pitches on complex geometries.



Featured Research Publications Utilizing the DSX Series

This instrument has been crucial in numerous high-impact academic and industrial research projects, demonstrating its reliability and accuracy in advanced material characterization:

1. Forensic and Defect Analysis (Abertay University): The DSX-100's tilting capability and Extended Focal Image (EFI) tool were used to effectively analyze complex forensic samples, including latent fingerprints on metal and detailed observation of logos on pharmaceutical tablets, which were otherwise difficult to distinguish.
2. Abrasive Tool Analysis (Tribology): Research involving the assessment of active surfaces of ceramic grinding wheels utilized the DSX-500 microscope for high-resolution measurements and surface micro-discontinuity analysis, confirming the potential of opto-digital microscopy in detailed material diagnostics.
3. Automotive Component Inspection: The system is widely cited in industrial applications for inspecting critical dimensions and surface defects on parts like pistons and connecting rods, utilizing the auto-stitching and high-magnification objectives to detect subtle burrs and measure metal flow.
4. Glass and Electronics Defect Detection: The DSX series has been employed for non-destructive glass defect analysis (identifying scratches, bubbles, and stress fractures) and for inspecting tiny manufacturing defects on semiconductor wafers and multilayer ceramic condensers with sub-micron accuracy

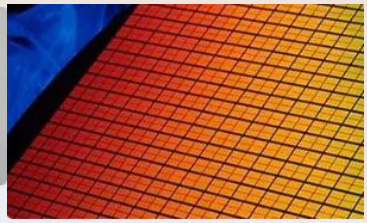
Operating Excellence

The DSX-100 features intuitive, guided software that allows even novice users to achieve expert results quickly. The system ensures the collected data is always highly reliable and repeatable, making it a critical asset for both research and industrial collaboration.

References

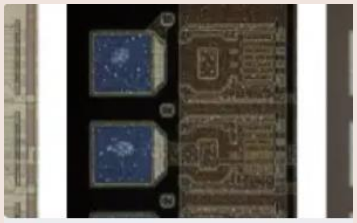
- Olympus DSX-100 Product Page: https://evidentscientific.com/en/products/digital/dsx1000
- https://evidentscientific.com/en/applications
- https://evidentscientific.com/en/solutions/life-science-research
- https://evidentscientific.com/en/solutions/clinical
- https://evidentscientific.com/en/solutions/electronics
- https://evidentscientific.com/en/solutions/energy
- https://evidentscientific.com/en/solutions/aerospace
- https://evidentscientific.com/en/solutions/railway

Surface Roughness of Ceramic Parts for Textile Manufacturing Machines / Surface roughness measurement of a micro-sized area using a laser microscope



Microscope Solutions for Semiconductor Manufacturing

Microscope Solutions for PCB Manufacturing



Mix Observation Methods to See More in Your Wafer Defect Inspection