

OLYMPUS

Your Vision, Our Future

Materials Science Imaging Software
analySIS Inspector Series
analySIS Family

System Solution for Automated Residue Analysis



Cleanliness - a sign of quality

Material contamination by the tiniest particles has become a focus of modern quality assurance.

Initially it was the pharmaceuticals and semiconductor industry who have been occupied with material contamination in the thousandth millimeter range. However, as functional density of parts/components has increased and the expectations on production sequences and quality have grown, this topic has also caught the eye of the automobile and aircraft industry along with their supplier industries. Tough global competition has made identifying contamination sources and subsequent elimination a decisive competitive advantage. The extremely rigorous demands of national, international or company-own standards clearly demonstrate just how critically important the cleanliness level has become - one tremendously important step in the whole value-creating production process.

In the spotlight: contamination residues

Due to the speedily increasing demands on cleanliness of components, modules, oils and fuels, documented technical cleanliness has become enormously significant. Cleanliness has become an important, frequently decisive and functional quality aspect. In principle, every production process and every product has specific cleanliness requirements. This is not really very surprising as cleanliness is a factor which clearly affects the life span and functionality of technical parts. Any time hard, solid particles turn up in oils or fuels in high concentration, for example, these can lead to immediate damage to motor components or hydraulic and lubrication systems. The degree of damage depends, among other things, on the material and size of the contaminant particles as well as the operating pressure. The same applies to the parts themselves having contaminant residues. Particularly in the production of precision parts and products in fine-mechanical and micromechanical ranges, rigorous requirements govern the permissible amount of minimum residue contamination. Such systems are usually used in sensitive areas of the shipping, aviation and aerospace industries, as well as in the automotive industry and in medical technologies.

Due to the increasing functional density of parts and components, the damage caused by any possible contaminant residues can have catastrophic consequences and in extreme cases, lead to a total system breakdown. Filter analysis is used, for example, for determining the contamination of lubricants, hydraulic fluids, fuels, soot particles in diesel emissions and for monitoring the cleanliness of engine blocks, transmissions, camshafts and crankshafts.

Microscopic residue analysis

Microscope-based residue analysis is a method for determining the degree of contamination of components or system parts down to a few μm . This analysis means particles can be quantified and then classified in compliance with the relevant standards. The analysis usually takes three steps.

The object is first cleansed with a rinsing fluid. This is then filtered and the retained residues optically quantified. The particle count can range from just a few all the way up to several million particles.

The Olympus microscope-based system solution, the analySIS Filter Inspector, offers fully automatic, standard-compliant and reproducible optical analysis, classification and documentation of residues on filter media. The system consists of the microscope, digital camera, motor stage with insertion plate and special filter holder along with a PC, controller and filter inspection software. It is optimized for providing speedy analysis even at high resolutions, intuitive user-friendly operation, and great flexibility for facilitating multiple filter analysis.

analySIS Filter Inspector - Hardware Components



The analySIS Filter Inspector is built on the highly flexible Olympus 'optical bench' microscopy concept, enabling each system to be exactly right for every requirement. Every component is made to the highest standards and ready for use in any task.

A The frames

Microscopes of the Olympus MX, BX2M and SZX2 series are the microscopes of choice for the analySIS Filter Inspector series. This includes the extraordinary optical performance and their logical structure. They all offer properties which meet the standard requirements for automated residue analysis: eg, these standards require a resolution equal to 1/10 of the size of the smallest particles.

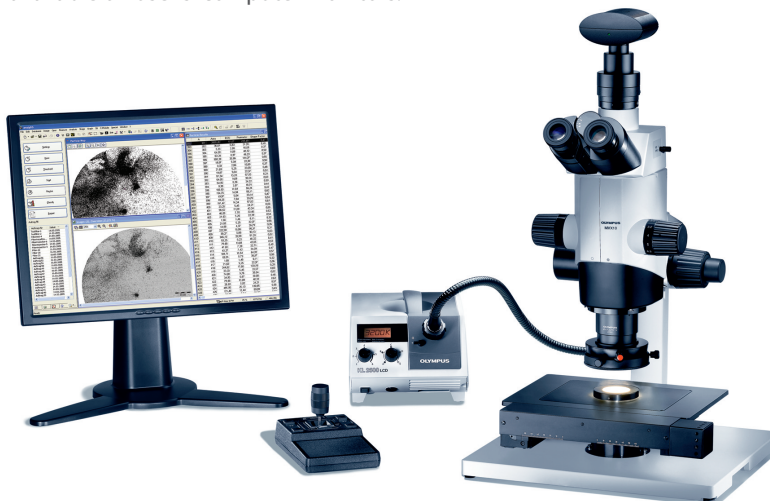
In addition, numerous motorized components and the unique modular, ergonomic design ensure maximum efficiency. Furthermore, the microscopes of the Olympus MX BX2M and SZX2 series can be expanded according to the customer's needs and requirements via our many optimal components. Each motorized component can be directly controlled, monitored and automated using the software.

B Objectives

The objectives used with the analySIS Filter Inspector system are from the advanced Olympus UIS2 series, offering excellent transmission across the entire spectrum. All objectives are plan-corrected and offer optimized contrast. The Olympus UIS2 aims to be the world's premium quality objective lens with a broad selection of magnifications and numerous features for a wide range of applications. The unique wavefront aberration control and neutral color reproduction provide even greater optimization of key image performance - for direct eye viewing and digital imaging. The UIS2 objective lens series provides the optimal image for every kind of imaging.

C Illumination

Standards require homogeneous illumination for all magnifications. The microscopes used in the analySIS Filter Inspector system come with the 100 Watt halogen light source. This light source provides high-fidelity bright light observation and can be polarized using the correct filters. The stability and quality of the light provided by these illumination systems coupled with the imaging camera produce unmatched image reproduction. This makes the image quality of high-end microscope optics conveniently available on user's computer monitors.



A Frames

Frames from the Olympus BX2M series or the SZX2 series, like the SZX10, are also microscopes of choice for the analySIS Filter Inspector.



B Objectives

The advanced UIS2 objectives used in the analySIS Filter offering excellent transmission across the entire spectrum.



C Illumination

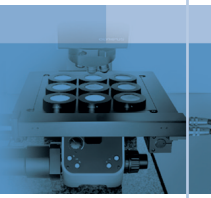
The 100 W light source provide homogeneous illumination for all magnifications and high-fidelity bright light observation.



C analySIS Filter Inspector

The analySIS Filter Inspector is built on the highly flexible Olympus 'optical bench' microscopy concept, enabling each system to be exactly right for every requirement

analySIS Filter Inspector - Hardware Components



D XC10

The Peltier-cooled XC10 digital color camera is one of the cameras of choice for the analySIS Inspector system.



D XM10

The analySIS Inspector can also be equipped with the XM10, a Peltier-cooled monochrome camera.



E Filter insert

The highly precise motorized XYZ stage provides superb accuracy and reproducibility. Olympus offers a stage insert which can have up to 9 filters mounted on it simultaneously.



D Digital camera

The Peltier-cooled XC10 digital camera or the Peltier-cooled XM10 monochrome camera are the cameras of choice for the analySIS Filter Inspector. Both offer the features a system for automated residue analysis needs: high resolution, fast frame rates, high sensitivity, an excellent signal-to-noise ratio, broad dynamic range and superior image quality. According to the relevant standards, the smallest particle must equal 10 pixels. With a 1376 x 1032 pixel CCD chip and 14-bit analog-digital conversion for each channel, both cameras meet this requirement. In combination with the Peltier-cooling, the superior properties of the CCD chip ensure images that are rich in detail and contrast and that have extraordinarily low noise.

High-power control

In order to meet the high demands on the analySIS Filter Inspection system, the workstation has been equipped to provide optimal speed, reliability and performance. A premium specification PC-based workstation provides all the power required for complex control and processing of both microscope and analysis functions. The large, high-resolution monitor is driven by a dedicated graphic board and a multiformat DVD burner provides easy-to-use optical storage.

E Motorized stage and stage controller

To fulfill the rigorous accuracy that standards require, the analySIS Filter Inspector comes with a highly precise motorized XYZ stage. The stage provides the system with superb accuracy and reproducibility within the range of even the smallest particles. A dedicated stage controller board ensures optimal performance. The stage scans the complete filter and assures reliable relocation of positions. The complete integration of the motorized stage with the software offers flexible focus solutions.

On the one hand, there's a semi-automatic solution using the motorized focus drive in conjunction with the focus map with a nearly unlimited number of focus points if necessary. On the other hand, there's the fully automatic approach using hardware autofocus: ie, for BX 61, MX 61 as a high-end solution. Camera and stage must be aligned parallel to the direction the stage moves. If this is not the case, individual images in the overview image will appear twisted with respect to one another.

Filter insert

The analySIS Filter Inspector comes with a dedicated stage insert. This facilitates fast and precise filter positioning. The round component stretches the filter with 3 screws and clips itself into the rectangular stage insert. The analySIS Filter Inspector also offers a special multi-filter holder. With this device, sample mountings of several filters can be applied for doing serial inspections. Olympus offers an insert which can have up to 9 filters mounted on it simultaneously. The analysis is then conducted and evaluated automatically providing considerable time savings compared with filter analysis using just one filter holder.

analySIS Filter Inspector - Software Features

The analySIS Filter Inspector software is user-friendly and guides the user step-by-step through the entire analysis procedure. As do all products of the analySIS Inspector series, the analySIS Filter Inspector software offers intuitive usability with its large-button concept and enormous flexibility. The analySIS Filter Inspector's user interface is also intuitive. After system setup, a complete filter scan can be done in just three clicks of the mouse: 1) define a new scan, 2) define the thresholds of the particles to be detected, and 3) start the process.

The entire filter will be scanned in just a few minutes and documented with a mouse click according to your templates. Then the particle scan can be revised using extensive tools. Earlier scans can be re-classified using new standards.

The Olympus analySIS Inspector series is a family of powerful scan engines for detecting all kinds of particles. The analySIS Filter Inspector is the solution for handling residue analysis and cleanliness measurements. The analySIS Inclusion Inspector is for rating non-metallic inclusions in steel.

The Inspector series has a workflow-oriented GUI (Graphical User Interface) for all series products. Large buttons with self-explaining captions, located on the left-hand side guide the user through the whole process. This guarantees that routine work can be done with a few mouse clicks on those buttons without any tedious setup required.

Although it is easy-to-use for everybody, the concept of the Olympus Inspection Series is also flexible enough for executing complex tasks as well.

Adapted to the filter inspection workflows

A The intuitive user interface of the analySIS Filter Inspector matches the workflow of a typical filter inspection. The GUI is user-friendly, easy-to-learn and mirrors actual lab workflows. Furthermore, the GUI is optimized for graphical display of cleanliness codes. Settings and routine user handling are kept distinctly separate by the software. The Filter Inspector control bar is located on the left. When the Filter Inspector is opened, the document area shows the image window only where all images and the live image in particular are displayed. The remaining space in the document area is reserved for the filter inspection results.

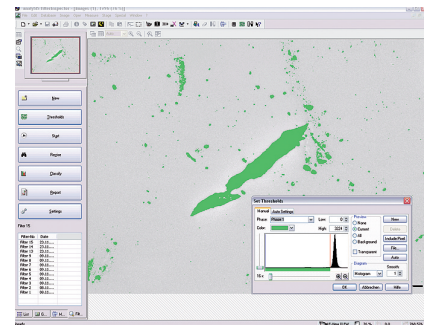
B The process flow of a filter inspection is determined by the buttons in the Filter Inspector control bar. When the system is correctly configured, a filter is investigated in three steps. The analySIS Filter Inspector comes with two sets of large buttons: one set for the scan, and the other for scan revision. Both go from top to bottom. The Scan button bar offers everything needed for the scan. Just a few clicks of the mouse are then necessary to complete full filter evaluation. The Revision button bar offers all functions for revising scan results.

Overall system settings

All base settings of sub tasks are wizard-controlled: scan path, scan area, definition of tilt compensation or focus map, standard selection, analysis, evaluation, archiving, selection of a report template, etc. These settings can be saved to a profile and password-protected if so desired. Only the administrator is able to reconfigure the setup. Users can then only work according to their user-profile.

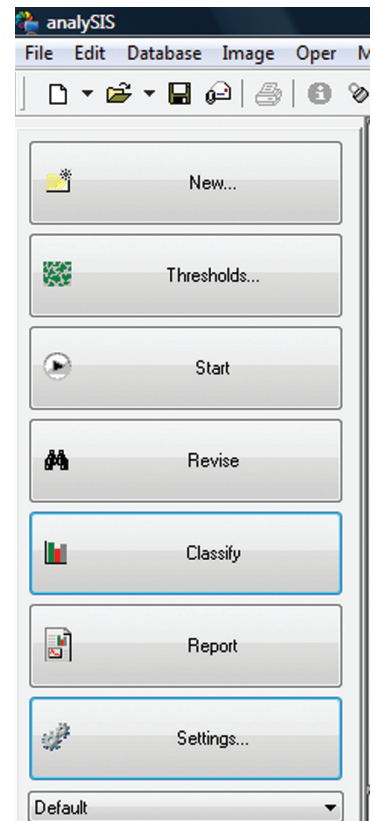
The analySIS Filter Inspector software allows fine tuning via a general settings dialog. Further modification is not needed once the setup has been defined. The settings offer adjustment of the following:

A The intuitive user interface of the analySIS Filter Inspector matches the workflow of a typical filter inspections.

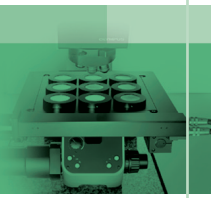


B Big button control bar

The process flow of the whole filter inspection is determined by the buttons in the control bar of the system.

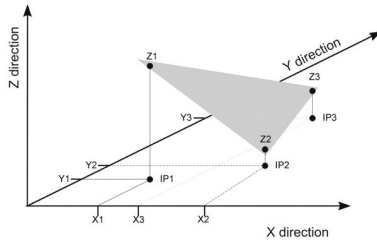


analySIS Filter Inspector - Software Features



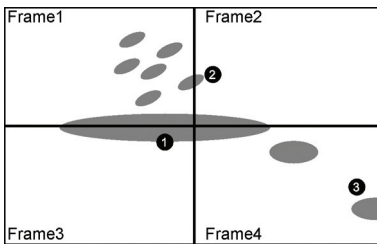
D Tilt compensation

3 points with planar regression, suited for polished metallic samples



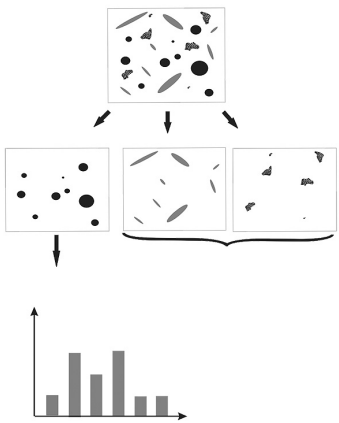
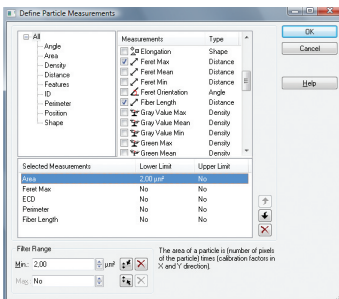
E Frame-independent detection

This method guarantees full reconstruction of particles at the image border.



F Measurement parameters

The analySIS Filter Inspector includes a huge list of measurement parameters for the frame-independent particle analysis.



Minimal particle area

This saves memory. Particles smaller than considered in the standard are to be ignored during detection.

Preview

This function enables actually viewing the threshold settings while scanning. This is an ideal monitoring tool. Disabling this function may increase the acquisition rate for low performance systems.

Report templates

Report templates can be combined with standards. Enabling a combination will generate the respective report when "Report" is pressed on the main button bar.

D Flexible focus solutions

A precisely focused image is essential for the whole workflow process. The analySIS Filter Inspector offers a flexible focus solutions. The tilt correction uses 3 points with a planar regression and is suited for polished metallic samples.

Speedy detection

analySIS Filter Inspection is optimized for speed, a high number of particles and for accuracy. The system can scan and analyze the sample at 5 images per second, including stage movement and detection. A simple batch administration of multiple filters means larger jobs can be analyzed as well.

E Frame-independent detection

Standards dictate that a residue-analysis system must be able to reassemble images without any gap or overlaps. This means that the total effective filtration area must be analyzed and taken into account. Such a multiple image analysis ensures full reconstruction of particles at image borders. The analySIS Filter Inspector can analyze particles just a few microns in size up to particles the size of the entire filter. Thanks to the frame-independent detection of the analySIS Filter Inspector, particle analysis is not restricted to a single image. It continues across the border from one image to another. Adjacent images are reassembled without gaps or overlaps. This frame-independent particle detection guarantees full reconstruction of particles at the image border. Particles are counted and analyzed only once. This is why particles that may be the same size as the filter itself are quantified accurately-even at the micrometer level.

F Particle detection and analysis

One of the analySIS Filter Inspector software's core functions is the detection, measurement and evaluation of particles on the filter. This analysis is a very complex process requiring numerous steps ranging from the control of the microscope stage, acquiring the image, and the actual particle analysis. The analySIS Filter Inspector automatically scans the filter, classifies in accordance with all established and selected standards, generates a report for documentation and includes a database for archiving purposes.

Before the system can find and measure the particles, the particles have to be defined. Therefore the user has to select the gray value threshold for the particle measurements. This is easily done via the Threshold button on the large buttoned control bar. Preview functions, online histogram, and numerical input are available to define a suitable intensity value range before each particle detection. It is recommended to monitor the gray level threshold setting at several points of the effective area because the standards require it. Measurement parameters are quantities measured of the particles detected.

analySIS Filter Inspector - Software Features



G Classification

Particle results can be classified according to a wide range of standards: VDA 19 (ISO 16232-10), ISO 4406-87, ISO 4406-99, ISO 4407-91, NF-E-48-651, NF-E-48-655 and SS 2687. They can all be customized. The analySIS Filter Inspector also allows classification of many standards simultaneously. An easy-to-use formula editor offers definition of company-defined and user-defined standards.

Archiving

The analysis Filter Inspector software automatically archives all inspection results directly into the integrated system database. Any filters archived in the database can be reexamined with regard to newly established standards.

H Reporting

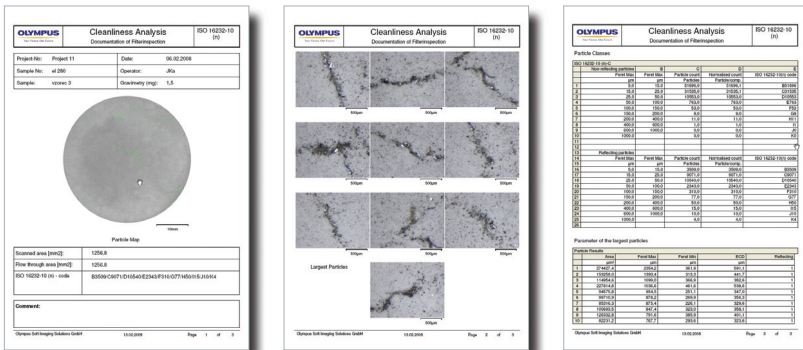
Once the filter inspection is done, analySIS Filter Inspector automatically generates a report with all the relevant measurement results for the standard selected. A standard report has three pages. The first page has the data that user entered for the filter inspection along with the particle map (overview map). The second page has the particle size and the parameters of the largest particle. The third and final page shows an overview of the largest particle.

I Revision of particle analysis

Particle scans can be revised using an extensive array of tools. The revision tools mean that earlier scans can be reclassified according to new(-er) standards. A giant revision mode allows viewing single particles in the "inspection map" and the "live image" at the same time. The stage will track any particle the user has selected in the result sheet. The revision mode enables users to separate, delete and draw particles. All revision functions are no-risk operations because they can be undone.

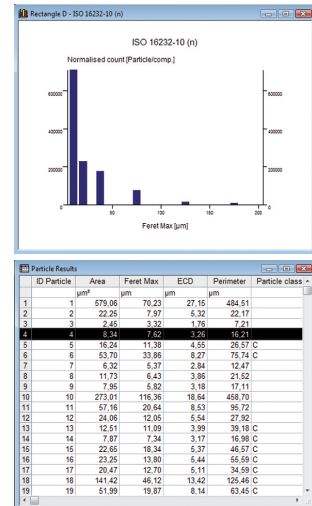
H Reporting

The report templates are predefined by the standard or can be easily adapted to individual tastes and needs.



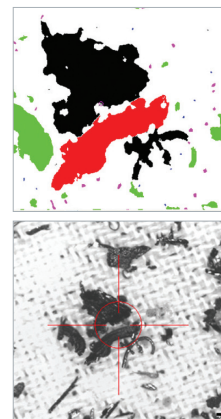
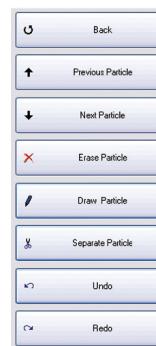
G Various output documents

Output files like e.g. a diagram about the cleanliness and a sheet with the particle analysis results are displayed automatically.



I Revision of particle analysis

For the revision of particle scans the analySIS Filter Inspector offers an extensive array of tools.

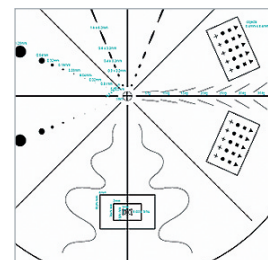


Residue analysis of oils and fuels

Residue analysis has become a real buzzword with petrochemical products. The Fuel Technology Centre of the SGS Group, as a certified and accredited service partner, has also recently begun offering microscope-based residue analysis for investigating just how clean oils and components are - all within the framework of neutral and independent quality analysis of oils and fuels.

Prevention instead of recall

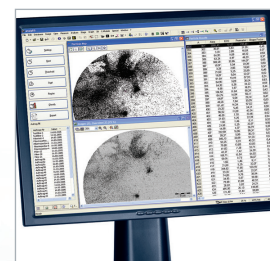
In the automobile sector, customer expectations (longlasting products, performance, fuel efficiency, etc.) lead to increasing component complexity and networking. This, in turn, generates more extensive inspection and analysis requirements. Anyone saving at the wrong end here risks expensive recall campaigns and damage to their reputation. The important thing is to follow the motto "Prevention instead of recall".



Established standards

The mandatory regulations for characterizing contamination are defined in corresponding standards for the respective branches of industry. The analySIS Filter Inspector offers the option of adding standards and detection instructions with respect to the following standards thus far:

- VDA 19 (ISO 16232-10)
- ISO 4406-87
- ISO 4406-99
- ISO 4407-91
- NF-E-48-651
- NF-E-48-655
- SS 2687.
- DAF 2005 04.
- STD 107-0002.
- USP 788.



Company and industrial standards

One of the distinctive features of the analySIS Filter Inspector system is that it can be retrofitted to comply with additional standards. Within the analySIS Filter Inspector it is possible to adapt or arbitrarily define other classification rules that are given e.g. via a standard or internal company-standards. These standards can be applied to previously conducted filter analyses.



The analySIS Filter Inspector provides fully automatic standards-compliant and reproducible optical analysis, classification and documentation of residues on circular filters. SGS positions this microscope-based system-solution on a vibration-free stage and under a laminar flow hood.

analySIS Inclusion Inspector

A B Non-metallic inclusions in steel are the cause of dangerous and serious material defects such as brittleness and a wide variety of crack formations. Non-metallic inclusions are sulphidic or oxidic in composition and are due to the melting process. All steels contain non-metallic inclusions to a greater or lesser extent. The type and appearance of these non-metallic inclusions depends on factors such as the type of steel, melting process and the extent of shaping involved getting the ingot or casting strand into a finished product. It is particularly important to determine how pure the steel is. This provides information on the extent of sulphidic and oxidic non-metallic inclusions present.

Detecting inclusions no matter what the field of view

analySIS Inclusion Inspector, consisting of a microscope, digital camera, motor stage with controller and analysis software is a comprehensive system for analysis and documentation of non-metallic inclusion distribution. The analysis of non-metallic inclusions can be conducted no matter what size the field of view is. An inclusion that takes up multiple fields of view is automatically reconstructed as a single particle. Classification distinguishes between sulphidic and oxidic inclusions and the latter distinguishes between dissolved, striped and spheroidal oxides. Inclusion classification is compliant with ASTM E45, DIN 50602 and JIS G-0555. The range of standards available can be extended via classification sheets which may be edited. This means that other national and international standards as well as company-own standards can be realized.

C Chemical Origins

Different types of inclusions can be distinguished by their color and shape:

- Sulfide: gray + elongated elliptic strings
- Alumina: black broken chains of particles in a row
- Silicate: black + elongated strings, often broken at their ends
- Globular oxide: black and rigid, single globular particles,
- Nitride: light orange or light brown clusters of few particles.



A

B

OLYMPUS		Non metallic Inclusion counting DIN 50602																
Order No.	Blz 2001 / 12227	Sample No.	12227															
Qty	4571	Lot No.	2001/CH7-10															
Size	20 x 25	Sample name	240574753,11															
Comments																		
	0	0.05	1	0.15	2	0.25	3	0.35	4	0.45	5	0.55	6	0.65	7	0.75	8	0.85
SS 0	14																	
SS 1	2																	
OA 2																		
OA 3																		
OA 4	1		5		2													
OS 5																		
OS 6																		
OS 7	14		20		5		1											
OS 8	100		20		20		1		4									
	K0	K1	K2	K3	K4	K5	K6	K7	K8									
Oxidiz	103.01	182.74	248.89	284.17	302.29	317.17	328.28	336.00	341.00	344.00								
Sulfide	111.12	191.26	102.87	79.36	68.03	48.67	42.68	38.06	33.00	28.00								
Total	194.76	364.93	376.76	373.53	350.86	335.83	328.96	324.06	319.00	312.00								

C

A) Sulfide

B

B) Alumina

C

C) Silicate

D

D) Globular Oxide

analySIS Inclusion Inspector



D XM10

The analySIS Inspector can also be equipped with the XM10, a Peltier-cooled monochrome camera.



E XC10

The Peltier-cooled XC10 digital color camera is one of the cameras of choice for the analySIS Inspector system.



XM10

D The XM10 offers all of the properties required to provide dependable microscopy images: high resolution, extremely fine sensitivity, a cooled CCD chip, variable exposure times and an optional external trigger function.

The XM10 makes a great addition to any microscopy system not only because of its great features, but also since it is easy to integrate using a standard C-mount adaptor to connect to the microscope and the high-speed data transfer and power capabilities of the FireWire[®] interface.

The XM10 is fully supported by the Olympus imaging software families, ensuring that whatever the application, the information is not only fully collected, but also properly analysed, processed and displayed.

XC10

E With an excellent image quality, high sensitivity and long integration times, the XC10 Peltier-cooled color camera offers every user a flexible general-purpose imaging set-up. The XC10 supports the Olympus True Color (OTC) technology for color fidelity.

The high sensitivity of the XC10 is the result of a large pixel size of 6.45 x 6.45 μm . This defines the camera's ability to be a well-equipped all-rounder; not only perfect for colour imaging, but also to meet high expectations in sensitive fluorescence applications. The Peltier-cooled CCD maintains a temperature of 10° (at 25°C ambient temperature), enabling this multifunctional camera to provide colour and black and white images that are rich in detail and contrast with extraordinarily low background noise. Also adding to the XC10's appeal is the extensive exposure time range (100 μs - 160s), ensuring that both strong and weak signals are captured with equal fidelity.

With the ease of both C-mount optical coupling and FireWire™, data and power connectivity, integrating the XC10 into your imaging system is easy.

Black-and-white cameras

	XM10
Image sensor	Monochrome CCD
Sensor type	Sony ICX 285 AL
Sensor size	2/3 inches
Resolution (max.)	1,376 x 1,032 pixels
Pixel size	6.45 μm x 6.45 μm
Binning	2x, 4x, 8x
Readout speed	24.5 MHz
ADC* ¹	14 bit
Exposure time	0.1 ms–160 s
Live frame rates* ²	25 fps at 688 x 516 50 fps at 344 x 258 25 fps at 172 x 129 80 fps at 172 x 129 pixels
Cooling system	Peltier 10 °C at 25 °C ambient
Readout noise	<10 e ⁻
External trigger	Optional
Data transfer	FireWire™ IEEE 1394a
OTC support* ³	Yes
Partial readout	Yes
Remarks	–

Universal cameras

	XC 10
Image sensor	Color CCD
Sensor type	Sony ICX 285 AQ
Sensor size	2/3 inches
Resolution (max.)	1,376 x 1,032 pixels
Pixel size	6.45 μm x 6.45 μm
Binning	2x, 4x
Readout speed	20 MHz
ADC* ¹	3 x 12 bit
Exposure time	0.1 ms–160 s
Live frame rates* ²	12.4 fps at full resolution 22.9 fps at 2x binning 39.3 fps at 3x binning
Cooling system	Peltier 10 °C at 25 °C ambient
Readout noise	<10 e ⁻
External trigger	Optional
Data transfer	FireWire™ IEEE 1394a
OTC support* ³	Yes
Partial readout	Yes
Remarks	–

*¹ Analog Digital Conversion. Actual bit depth of the camera is depending on used software

*² Conditions for performance measurement: SC20: Pentium D, 3 GHz Hyperthreading at 1 ms exposure time. All other cameras: Dual Ahtlon AMD 2,6 GHz with ICC profiles at 1 ms exposure time

*³ Olympus True Color optimization algorithms



Function List



•		Particle Inspector	
	•	Filter Inspector	
		Image Acquisition	
	•	Camera interfaces	FireWire IEE 1394*, USB2*, Framegrabber*, TWAIN; (*specified)
		Olympus Camera Control	Special Tool window for Olympus cameras
•	•	Olympus True Color	
•	•	Image formats	*.tif, *.jpg, *.bmp, *.pcd, *.eps, *.png, etc.
•	•	Image types	Binary 8-bit gray, 8-bit color palette, 16-bit gray, true color (24-bit RGB)
•	•	Movie recorder	Making movies of single images or from the live image
•	•	Overlays	Use text, arrows, etc. for labelling (in live image too)
		Basic Image Processing and Measurement	
•	•	Intensity	Maximize and equalize contrast; modify gray values, etc.
•	•	Changing bit depth	8/16 bit, color 8/24 bit, binarize
•	•	Color modification	Color spaces: RGB, HSI, color separation, RGB Studio, etc.
•	•	Filters with preview function	Sharpen, Edge Enhance, Mean, Median, Sobel, Roberts, NxN,
•	•		Low pass, Rank, Differentiate x, Differentiate y, Connectivity, Sigma
•	•		DCE, Shading correction; Separator
•	•	Standard measurement	Count, Distances (vertical, horizontal, arbitrary), intensity profile
•	•	Result display	sheets, statistics, diagrams, classification
		Device Control	
•	•	Olympus microscopes	IX [®] , BX, AX, MX, SZX
•	•	Autofocus	Autofocus with external Z-drives
		Customization	
		Workflow assistant	Customized workflows with big buttons
		Special Setup	
•	•	DualScreen	Second monitor support
		NetCam	Internet live streaming
		Extended Measurement	
•		Extended measurement	Angle, polygon, size, shape, etc., Magic Wand
		Archiving & Documentation	
•	•	Database	Structured image database
•	•	Reports	Report generator
		Extended Acquisition	
•	•	Macro recorder	Scripts and playing back sequences
•		Multiple Image Alignment	Panorama image function
•	•	Motorized stage	Stage Navigator
•	•		Automated XY-scan
•		Extended Focal Imaging	Infinite depth of focus, Instant EFI
		Data Output	
•		Graph	Visualize, process and analyze diagrams
		Extended Image Processing and Measurement	
•		VoxelViewer/SliceViewer	Display and navigation through image stacks
•		3-D display	3D-Perspective, 3D Animation, Height lines, Texture
•	•	Image "pocket calculator "	Addition, subtraction, multiplication, division, and, or, XOR, absolute amount
•		Chain measurement	Chain measurement
•	•	Phase analysis	Phase percentages, absolute areas
•	•	ROI selection	Polygon, rectangle, virtual ROI, etc.
•		Particle detection	Number, position, size, shape
•		Morphological filters	Erosion, Dilation, Open, Close, Top Hat, Skeleton, etc.

The manufacturer reserves the right to make technical changes without prior notice.

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OLYMPUS SOFT IMAGING SOLUTIONS GMBH

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