OLYMPUS®

Your Vision, Our Future

Technical Cleanliness Inspection System

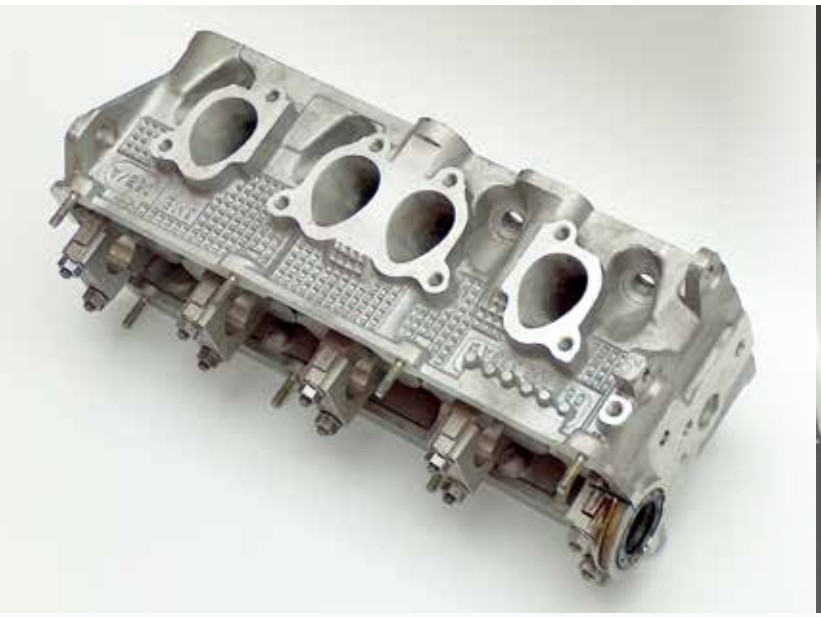
CIX90

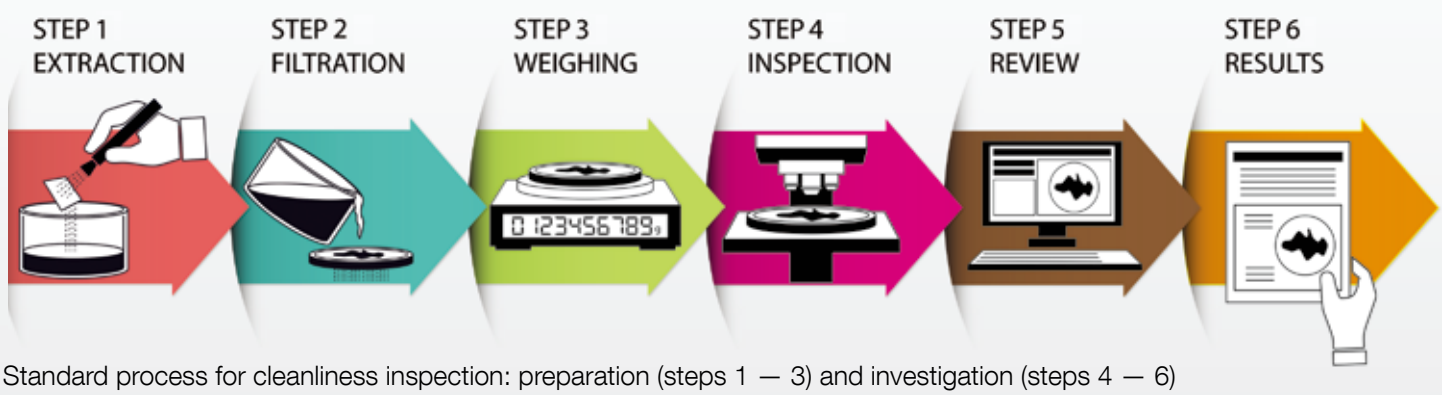
OLYMPUS CIX series

Turnkey Solution for Technical Cleanliness Inspection

NEW

Simplify Your Technical Cleanliness





Standard process for cleanliness inspection: preparation (steps 1 — 3) and investigation (steps 4 — 6)

The cleanliness of components and parts is at the center of the manufacturing process. Manufactured components must be free of contaminants to help ensure a high-quality finished product. Increasingly, the automotive and aerospace industries are publishing cleanliness tolerances highlighting the role that technical cleanliness plays in validating the manufacturing process. Quality control, process management, and manufacturing departments take samples from the production line and rely on particle extraction through filter membranes to quantify contaminants that impact the performance, lifetime, and reliability of final products.

The OLYMPUS CIX90 technical cleanliness inspection system is a dedicated, turnkey solution for manufacturers who maintain high quality standards for the cleanliness of manufactured components. The OLYMPUS CIX90 system makes it easy to quickly acquire, process, and document technical cleanliness inspection data to comply with international standards. The system is intuitively designed to guide users through each step of the process so that even novice inspectors can acquire important cleanliness data quickly and easily.

A Complete Solution to Cleanliness Process Control

Reliable

High-resolution optics, precise, durable components, and seamlessly integrated software and hardware provide reproducible imaging conditions, high-performance inspections, and repeatable results.

Intuitive

Dedicated, easy-to-use workflows minimize user action and guarantees reliable data — independently of the operator and education level.

Fast

Detect reflecting and non-reflecting particles in one scan using a patented polarization method to improve throughput by a factor of two.

Compliant

Measurements and reports are performed according to the methodologies set forth in international standards.

Simple and Reliable

Each component of the OLYMPUS CIX90 system is optimized for accuracy, reproducibility, repeatability, and seamless integration for reliable data in a high-throughput system. Leading-edge optics and imaging sensor are combined with an intuitive software workflow and integrated calibration and maintenance tools to help ensure that you're using the correct settings.

Camera Cover

Protects against misalignment of the sensitive, fast color camera.

Detection Unit

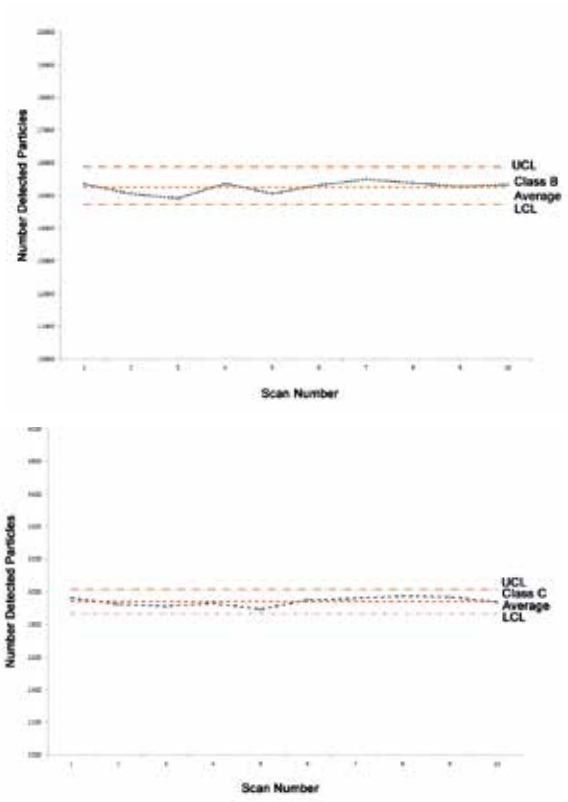
Covers the reflecting / non-reflecting particle analyzer.

Stage / Stage Insert

The stage provides accurate and reproducible positioning and improved focus drive durability. The stage insert maintains a secured membrane position and features an additional insert for the integrated calibration tool.

Reproducibility and Repeatability

The OLYMPUS CIX90 system is easy to use, so even inexperienced inspectors can acquire accurate and reliable data. Preconfigured, optimized hardware and dedicated system solutions help ensure that your settings are correct for accurate and repeatable inspection results.



High reproducibility: The diagram illustrates the variance of results for a validation sample run through the system ten times, illustrating the system's precision.

Excellent Optical Quality

Olympus' high-quality UIS2 objectives help ensure the best optical performance for excellent measurement and analysis accuracy. A dedicated light source maintains a consistent color temperature optimized for cleanliness inspection.

Microscope

Equipped with the best optical components, like Olympus UIS2 objectives, the cover protects the optical path alignment and motorized nosepiece.

Software

Easy-to-use with intuitive workflows, the software enables detection of reflecting and non-reflecting particles in a single scan, supporting international standards and one-click reporting.

High-Performance Workstation

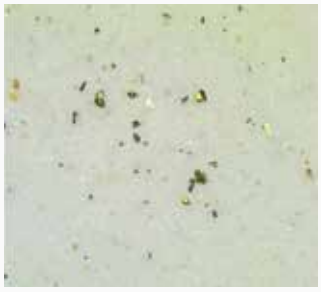
The rugged industrial workstation is equipped with a touch-screen monitor.

Accurate Data

Reproducibility has been optimized by eliminating moving parts from the illumination light path, maximizing automatic functionality, and creating intuitive workflows that limit potential operator errors. The integrated calibration slide helps maintain regular system verification.

Fast Speed

A patented illuminator helps differentiate between reflecting and non-reflecting particles in a single scan, reducing inspection time by a factor of 2.

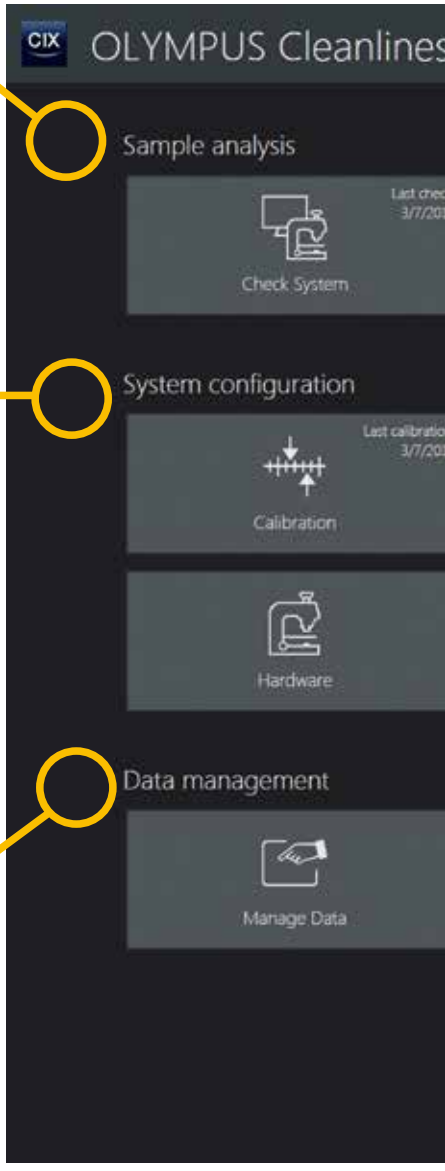


Software Guidance at Every Step

The OLYMPUS CIX90 system delivers enhanced performance and productivity through the entire inspection process. The software provides inspectors with step-by-step guidance through the complete cleanliness inspection workflow. This minimizes inspection and process time as well as user setting or handling errors for improved productivity and reduced cycle time.

Sample Analysis

The sample analysis section contains all of the functions associated with analyzing a sample and checking the results including sample inspection, detection, and classification.



System Configuration

The OLYMPUS CIX90 system is already configured and calibrated when it is delivered but can be easily modified and customized to your applications and requirements.

New User Interface

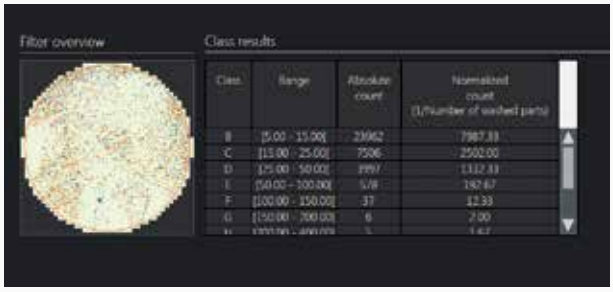
The OLYMPUS CIX90 system is designed to make cleanliness inspection easy for inspectors of every experience level. The system's workflow is based on just three steps: inspect sample, review results, and create report. The software guides users through the inspection process following international standards and maximizes the microscope's automated functions reducing the number of adjustments users need to make to the system.

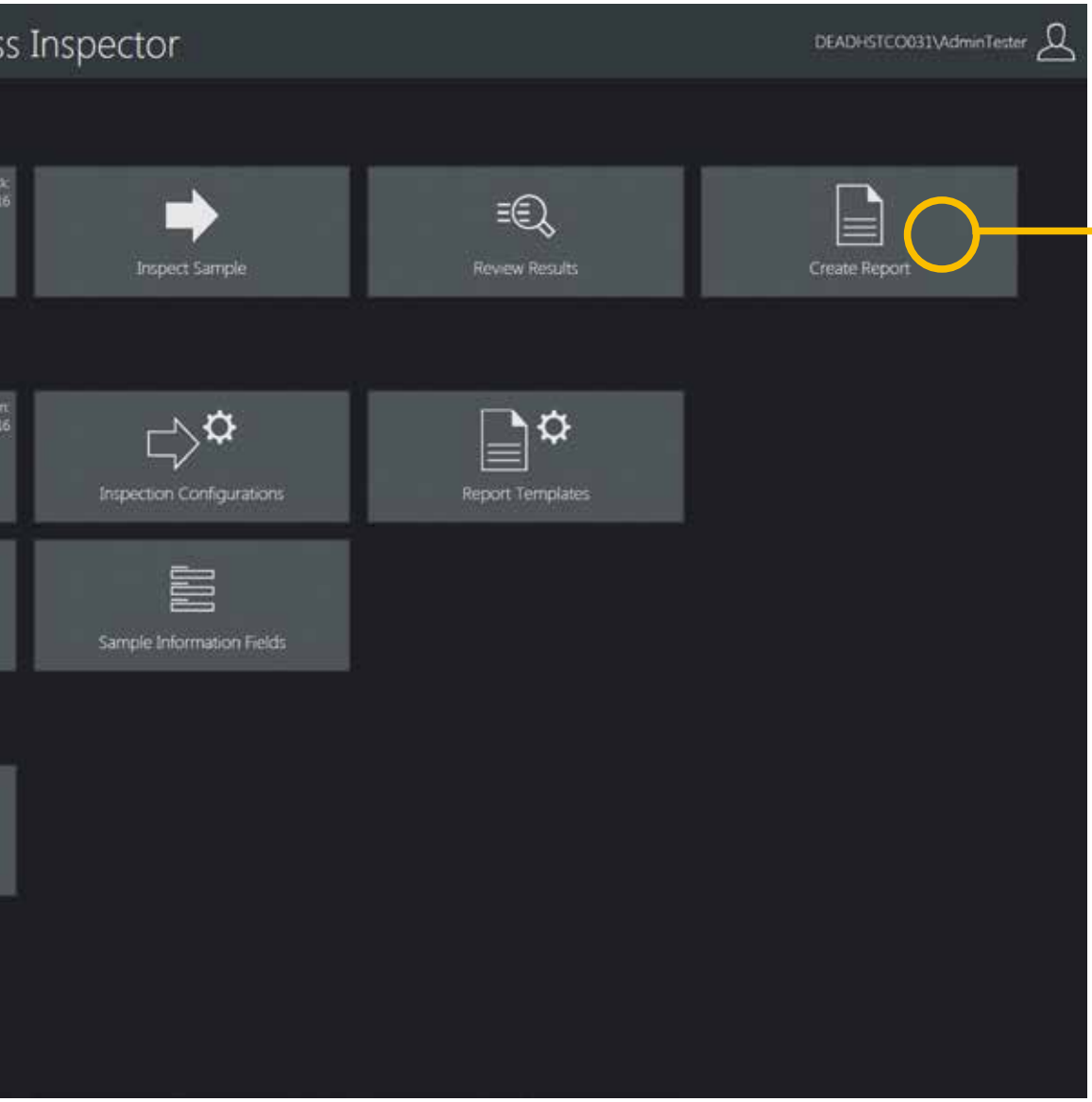
Data Management

The data management section is where users can access sample data and reports.

The intuitive workflow is based on just three steps so cleanliness inspection is not only repeatable and reproducible but also easy for operators to carry out.

Inspect a Sample

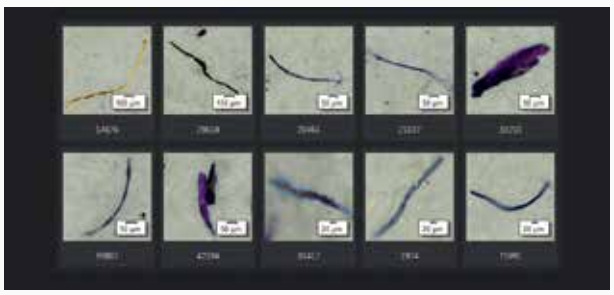




One-Click Reporting

Intuitive report creation makes it simple to produce reports that comply with international standards.

Review Results



Create Reports

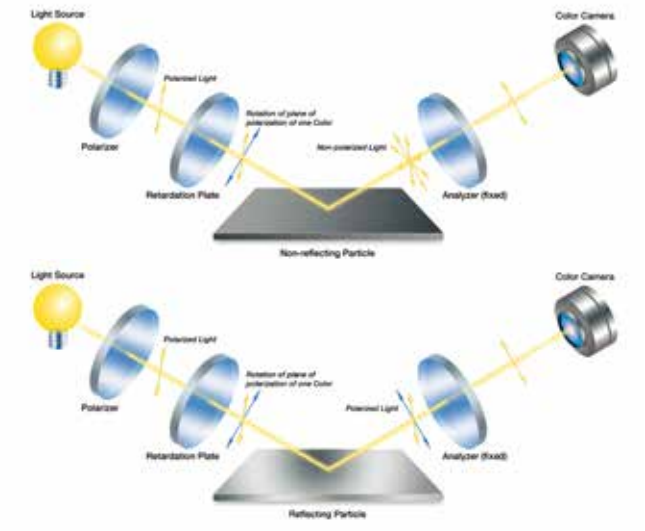
All the Information You Need in One Place

The OLYMPUS CIX90 system offers high-performance image acquisition and accurate live processing of particles and contaminants from 2.5 µm up to 42 mm. Large contaminants are reconstructed by stitching together all the images where the object is present. An image of the complete scanned filter membrane is automatically saved for reprocessing or recalculation.

A patented illuminator makes it possible to differentiate between reflecting and non-reflecting particles in one scan, reducing inspection time by a factor of 2. Contaminants are automatically analyzed during acquisition, displayed in the live and overview images, and sorted into size class bins defined by the selected standard. The OLYMPUS CIX90 system includes all major international standards currently in use by the automotive and aerospace industries and also gives you the flexibility to create and use your own company standards.

All-in-One Scan Solution

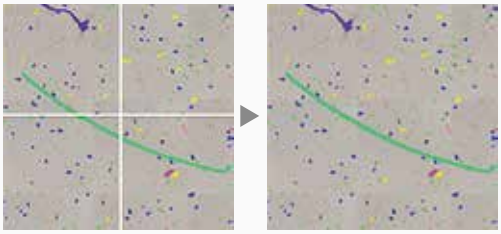
Metallic particles are hard and can be much more damaging to machined components, making them of special interest to inspectors. The OLYMPUS CIX90 system includes unique all-in-one scan technology for detecting both reflecting and non-reflecting objects in one scan. This patented polarization method is based on wavelength separation and color detection for accurate results.



Live Image

During the inspection process, all of the relevant data are displayed on a single screen, including live and overview images. Sample information and live results show the number of particles in each size class. The scanned membrane is automatically saved for reprocessing or recalculation.

Large Particles up to 42 mm



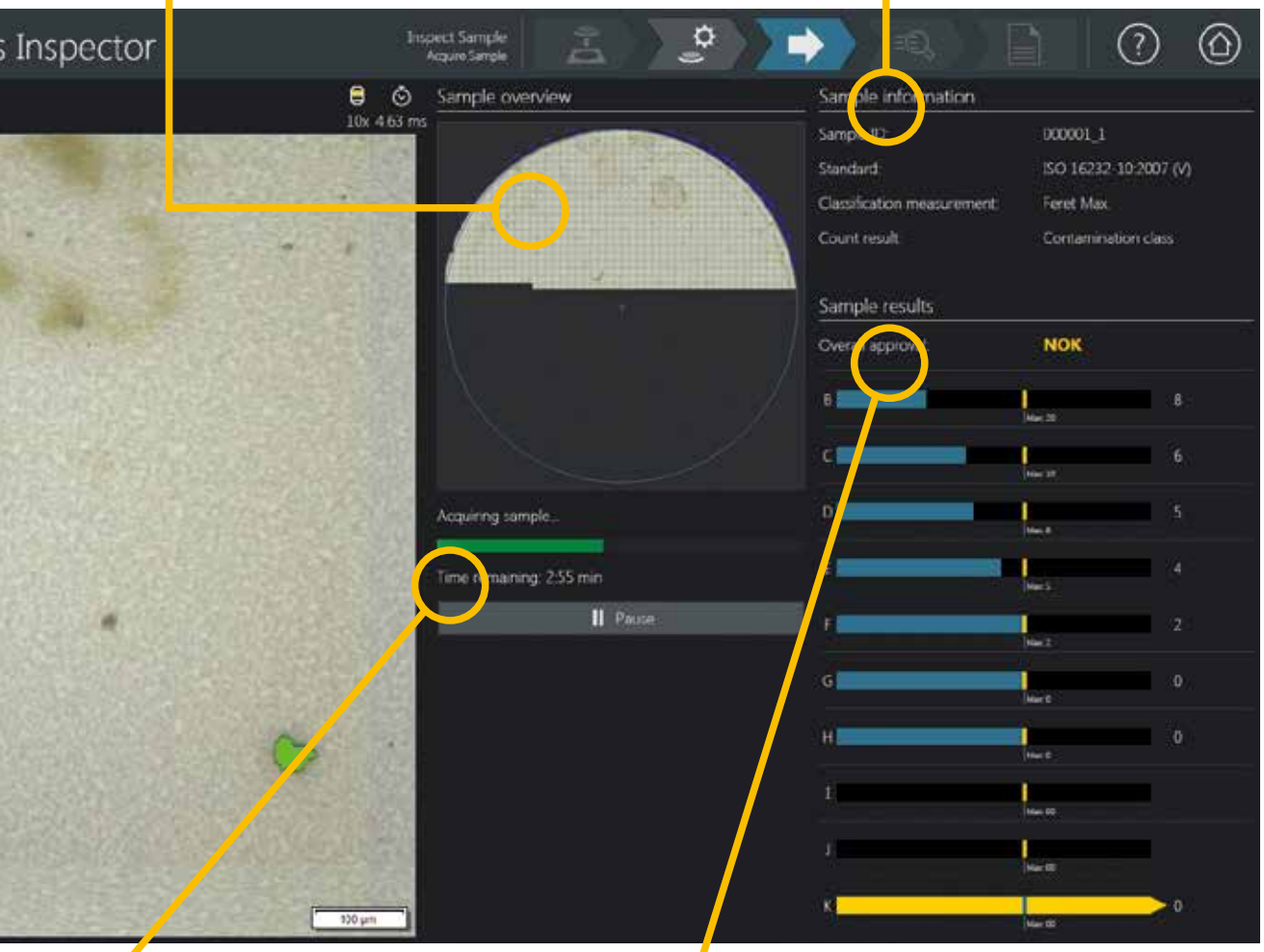
Large particles are reconstructed by stitching together all images where the object is present.

Overview Image

The overview image assists in identifying filter coverage or particle clusters before the sample inspection starts. The blue rectangle marks the user-defined high-resolution inspection area. All of the data from the filter is stored and can be reprocessed using different conditions.

Sample Information Overview

Inspection configurations are used to specify all parameters for sample inspection.



Running Time Information

Clearly view the time remaining for sample acquisition.

Live Display of Results

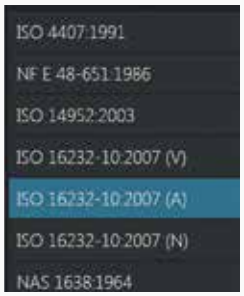
The OLYMPUS CIX90 system counts and sorts particles into the size classes defined in the inspection configuration. Direct result feedback, including classification evaluation, enables users to monitor results during acquisition. A statistical control chart function visually illustrates the level of particle class compliance, for improved reliability.

International and Company Standards

Evaluation is performed according to all major international standards used in the automotive and aerospace industries including:

- ISO 16232-10 (VDA 19.1),
- ISO 4407:1991,
- ISO 11218:1993,
- ISO 12345:2013,
- NAS 1638:1964,
- NF E48-651:1986,
- NF E 48-655:1989,
- SAE AS4059:2011

Companies also have the flexibility to set up their own evaluation standards.



All Data at a Glance

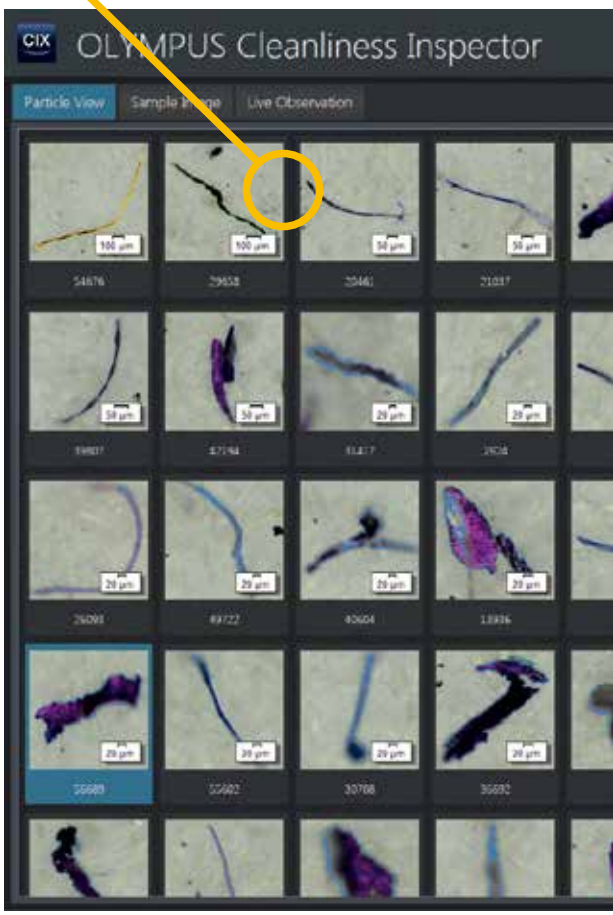
Contaminants are automatically analyzed in real time during acquisition, displayed in the live and overview images, and sorted into size class bins defined by the standard selected.

Efficient Data Evaluation

The OLYMPUS CIX90 system makes reviewing and documenting your samples quick and easy. Thumbnail images of every contaminant detected by the system are linked together with dimensional measurements, making it easy to review the data. Retrieving a particular contaminant's information is simple. Through the review process, all results are updated and displayed automatically in all views and size classification bins.

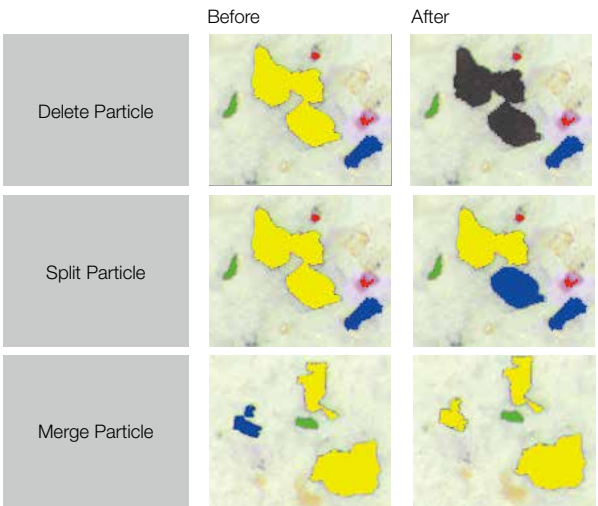
Particle and Sample View

Thumbnails of detected particles are displayed in the particle view in order from largest particle to smallest. The sample view displays the selected image in full view, showing the complete particle even when the image is stitched together.



Quick and Easy: Review, Revise, and Recalculate

Operators can easily revise their inspection data. Powerful software tools including delete, split, and merge make revising the data simple.



The OLYMPUS CIX90 system has tools that make it easy to revise inspection data during the review step.

All Particle Data at a Glance

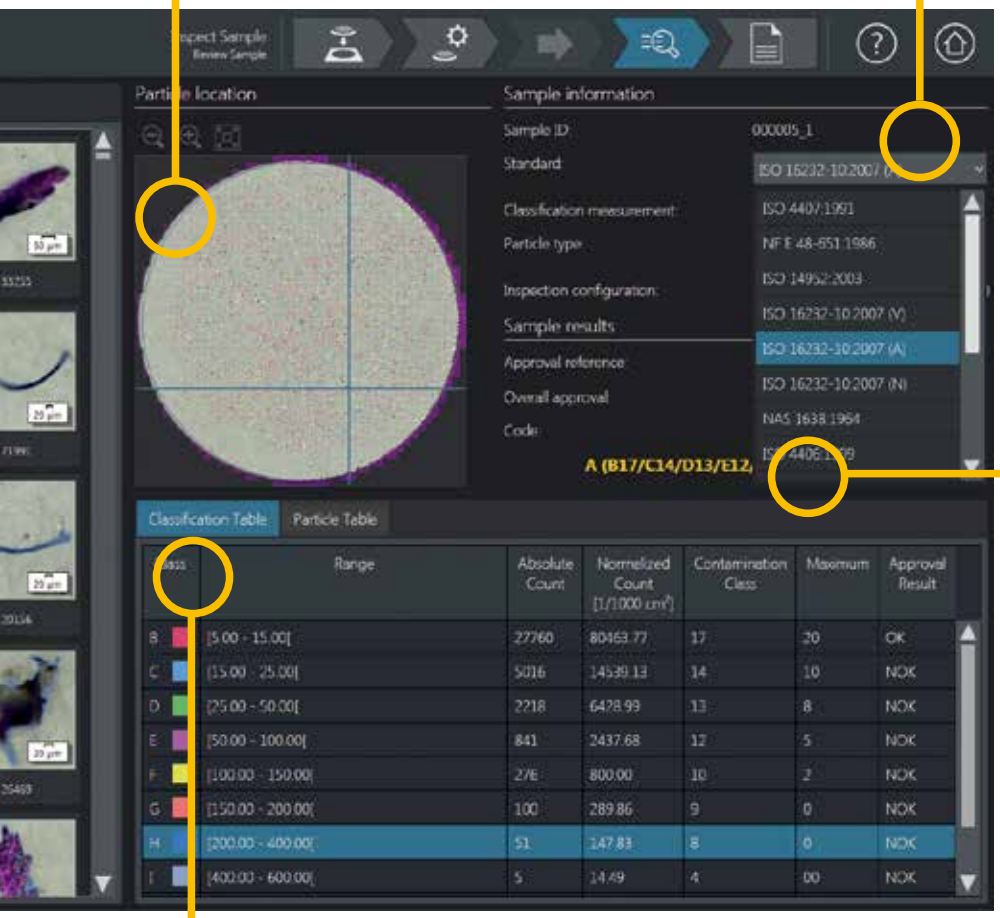
Classification and particle tables list the results according to the selected standard.

Particle Location

When selecting a dedicated thumbnail, its location is automatically shown in the overall image. With just one click, particles can be deleted or reclassified into another particle family.

Standard Configuration

The current inspection configurations are highlighted in the interface so you clearly know what standard is being used. All other defined and available configurations are listed and can be selected by clicking your mouse. The data are automatically recalculated when you change configurations.



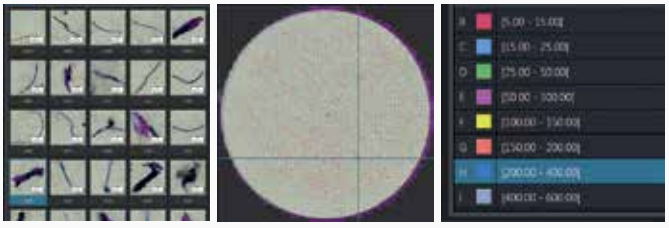
Overall Result

The overall classification result according to the selected standard is calculated and displayed.

Classification and Particle Information

Classification and particle tables show the results according to the selected standard and particle data respectively. If necessary, the results can be recalculated with a different standard. Thumbnail images and data are updated automatically.

Link Data to Particle



Thumbnails of all detected contaminants and dimensional measurements are linked together.

Reclassification

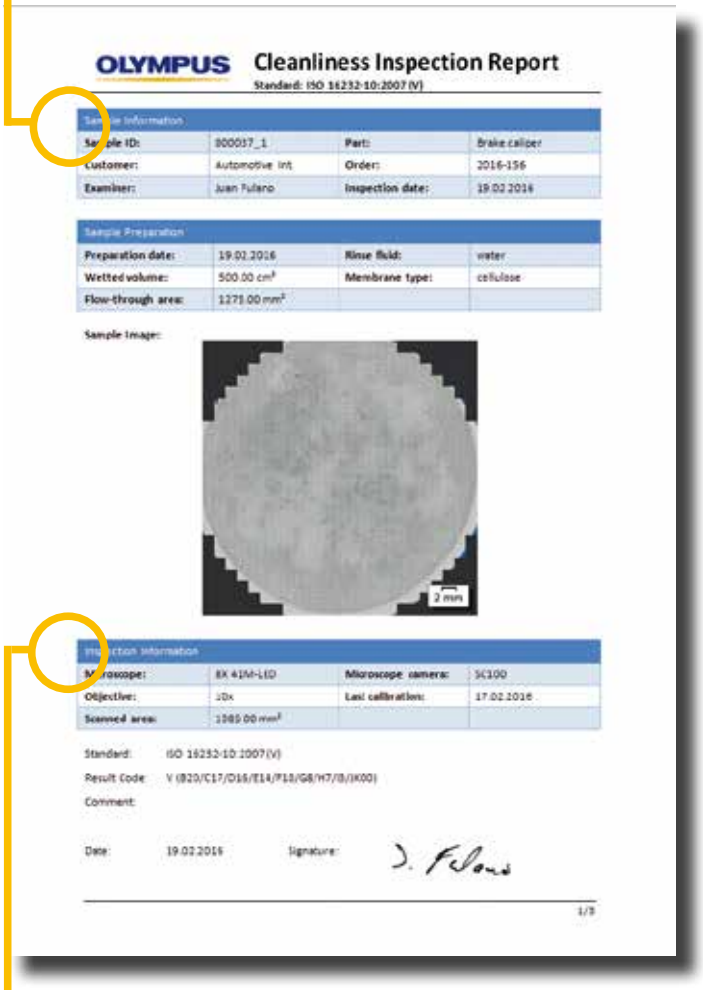
The system supports one-click reclassification of all supported standards. Select the standard and the cleanliness code is displayed.

One-Click Reporting

Analytical reports that comply with the standard used during analysis and customizable templates can be created in MS Word with a single mouse click. Templates and reports can be easily adapted to meet company regulations.

Sample Information Area

This area of the report consists of information about the sample such as customer, examiner, order number, and date of inspection. All data are automatically inserted. Based on the standard selected during analysis, this section of the report includes all relevant data regarding the preparation steps, such as the type of membrane.


OLYMPUS Cleanliness Inspection Report

Standard: ISO 16232-10:2007 (V)

Sample ID:	000017_1	Part:	Brake caliper
Customer:	Automotive Int.	Order:	2016-156
Examiner:	Juan Fulano	Inspection date:	19.02.2016

Preparation date:	19.02.2016	Rinse fluid:	water
Wetted volume:	500.00 cm³	Membrane type:	cellulose
Flow-through area:	1271.00 mm²		

Sample Image:

Microscope:	BX 41M-LED	Microscope camera:	SC100
Objective:	10x	Last calibration:	17.02.2016
Scanned area:	1365.00 mm²		

Standard: ISO 16232-10:2007(V)

Result Code: V (B20/C17/D16/E14/F10/G8/H7/I3/IK00)

Comment:

Date: 19.02.2016 Signature:

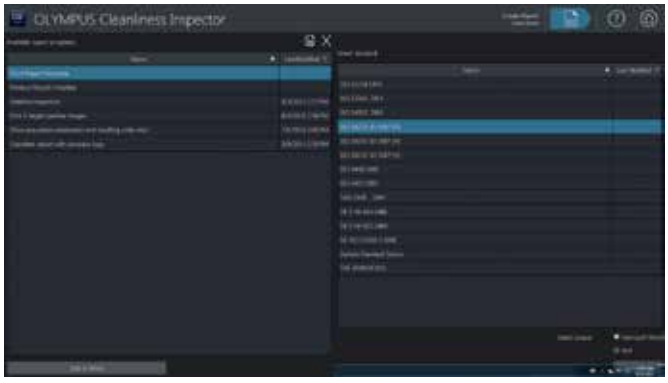
1/3

Results Area

An overview sample image and a list of the microscope settings used during acquisition are presented. The scanned area is shown in the sample image in the middle of the report. The result code of the standard selected is filled in automatically.

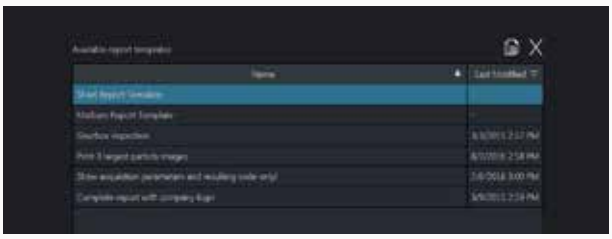
Efficient Report Creation

Creating a report can take longer than capturing the image and taking the measurements. The OLYMPUS CIX90 system makes reporting fast and easy with intuitive report creation that repeatedly produces smart and sophisticated reports based on pre-defined templates. Editing is simple and reports can be exported to MS Word or PDF. In addition, the OLYMPUS CIX90 system's reporting function enables digital zooming and magnification on acquired images. Report files are sized for data exchange by email.



Predefined templates for easy reporting

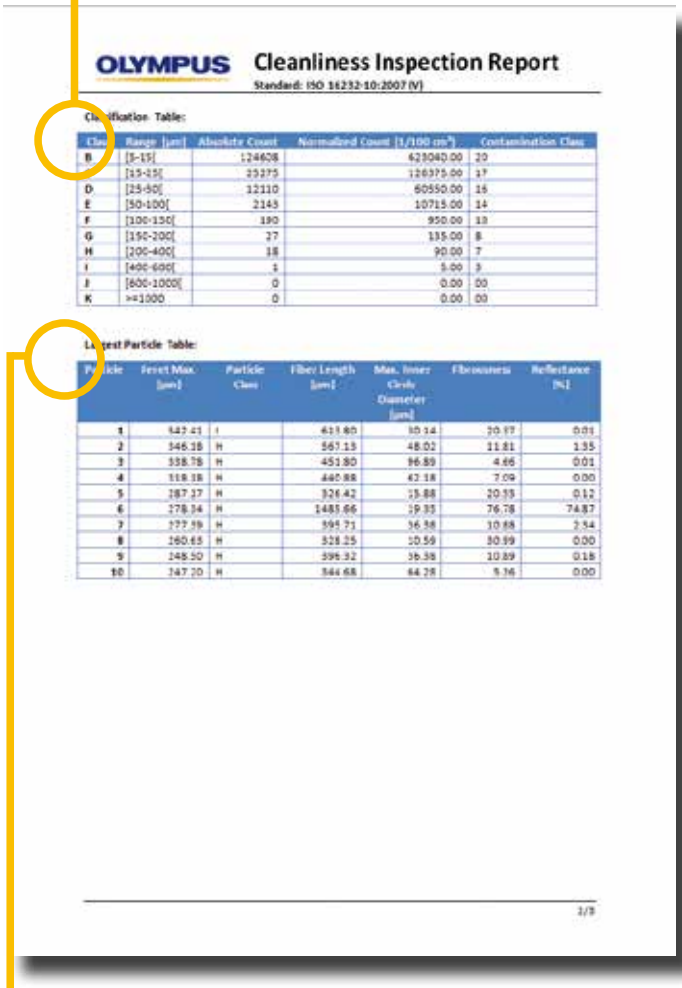
Predefined Templates



All available templates are clearly listed.

Classification Table

This section of the report incorporates the data calculated during the inspection according to the standard used and displays information such as size class and range, as well as the absolute numbers of particles detected and the contamination class.



OLYMPUS Cleanliness Inspection Report

Standard: ISO 16232-10:2007 (V)

Classification Table:

Class	Range [µm]	Absolute Count	Normalized Count [1/100 cm²]	Contamination Class
B	[5-15[	124608	623040.00	20
C	[15-25[	25375	126375.00	17
D	[25-50[	12110	60550.00	16
E	[50-100[	2143	10715.00	14
F	[100-150[	190	950.00	10
G	[150-200[	27	135.00	8
H	[200-400[	18	90.00	7
I	[400-600[	1	5.00	3
J	[600-1000[	0	0.00	00
K	>=1000	0	0.00	00

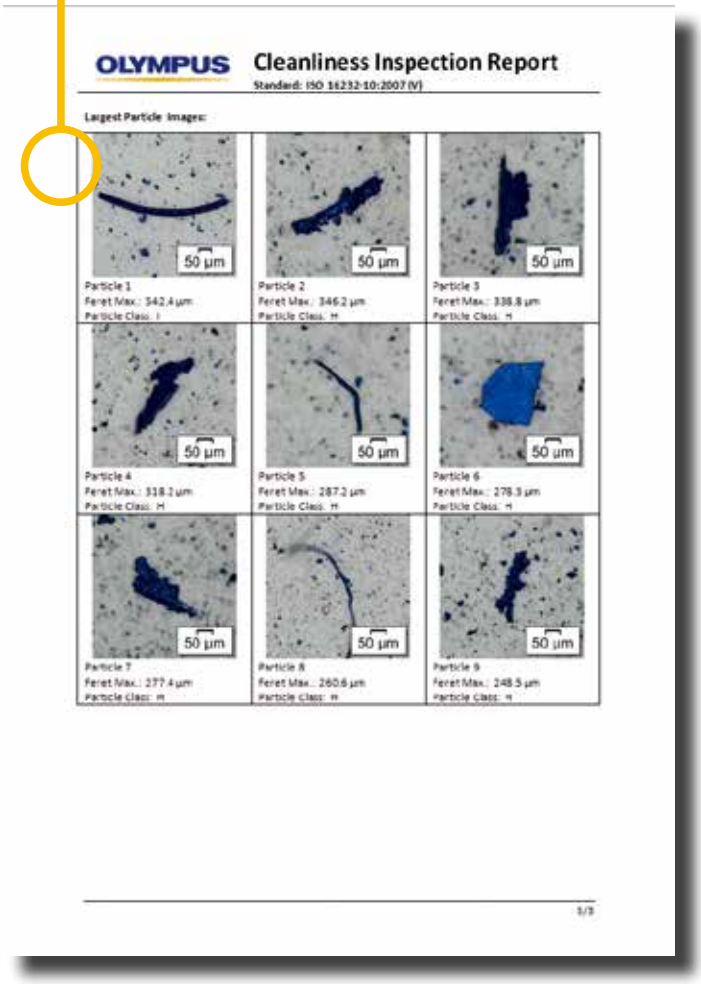
Largest Particle Table:

Particle	Feret Max. [µm]	Particle Class	Fiber Length [µm]	Max. Inner Circle Diameter [µm]	Fibrousness	Reflectance [%]
1	342.41	I	611.80	10.14	20.97	0.01
2	346.18	H	567.13	48.02	11.81	1.35
3	338.78	H	451.80	96.89	4.66	0.01
4	318.18	H	440.88	42.18	7.09	0.00
5	287.37	H	326.42	15.88	20.55	0.12
6	278.34	H	1481.66	19.35	76.78	74.87
7	277.59	H	395.71	16.36	10.68	2.54
8	260.63	H	328.25	10.59	30.99	0.00
9	248.50	H	395.32	16.36	10.89	0.18
10	247.20	H	344.68	64.28	5.36	0.00

1/3

Images of Largest Particles

Thumbnails of the largest particles are displayed together with the particle parameters and the particle class. Thumbnails also show images of contaminants reconstructed by stitching smaller images together.



OLYMPUS Cleanliness Inspection Report

Standard: ISO 16232-10:2007 (V)

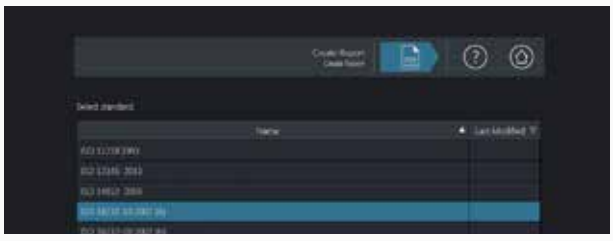
Largest Particle Images:

3/3

Largest Particles Table

Because the largest particles detected during the scan are of high interest, this section lists the ten largest particles found during the inspection.

Supported Standards



A list of available templates is displayed based on the standard used during analysis.

Various Output Selection

Different output formats like MS Word or PDF are supported.

Specifications

Hardware

Microscope	OLYMPUS CIX90	Motorized focus	• Coaxial motorized fine focus with 3-axis joystick • Focus stroke: 25 mm • Fine stroke 100 µm / rotation • Maximum height of stage holder mounting : 40 mm • Focus speed 200 µm/sec • Software autofocus enabled • Customizable multi-point focus map
		Illumination	• Built-in LED illumination • Patented illumination mechanism for simultaneous detection of reflecting and non-reflecting particles • Light intensity pre-set at factory
		Imaging device	• Color CMOS USB 2.0 camera • On-chip pixel size 1.67 x 1.67 µm
		Sample height	• Sample is limited to filter membrane (diameter 47 mm) mounted onto the provided filter holder
Noise piece	Motorized type	Motorized nosepiece	• 6-position motorized nosepiece with 3 UIS2 objectives already installed • PLAPON 1.25X used for preview • MPLFLN 5X used for detecting particles bigger than 10 µm • MPLFLN 10X used for detecting particles bigger than 2.5 µm
		Software controlled	• The image magnification and relation between pixel and size are clearly displayed • Objectives are used at selected steps during the measurement process; objectives are automatically positioned
Stage	Motorized stage X,Y	Motorized stage X,Y	• Stepper motors control movement • Maximum range: 130 x 79 mm • Max speed 240 mm/s (4 mm ball screw pitch) • Repeatability < 1 µm • Resolution 0.01 µm • Controllable with 3-axis joystick
		Software controlled	• Scanning speed is dependent on the magnification; at 10x the scanning speed is less than 10 minutes • Stage alignment is performed at factory assembly
	Specimen holder	Sample holder	• Membrane holder is specially designed to avoid unwanted rotation of the membrane during mounting • The membrane is mechanically flattened by the membrane holder • No tool is needed to fix the cover • The sample holder is always assigned position 1 on the stage
		Particle standard device (PSD)	• Reference sample used to validate the system measurement • Sample used in the built-in check system function for maintaining the proper functioning of the CIX • The PSD is always assigned position 2 on the stage
	Stage insert	2-Position stage insert	• Stage insert dedicated to the proper positioning of the sample holder and the PSD

Controller	Workstation	High-Performance pre-installed workstation	• HP Z440, Windows 7 64-bit Professional (English) • 16 GB RAM, 256 GB SSD, and 4 TB data storage • 2 GB video adaptor • Microsoft Office 2013 (English) installed • Networking capabilities, English qwerty keyboard, optical mouse ,1000 dpi
		Add-in boards	• Motorized controller, RS232 serial, and USB 3.0
		Language selection	• CIX software language can be changed without restarting the controller
	Touch screen	23-Inch Touch screen	• Resolution: 1920 × 1080 optimized for use with the CIX software
Power		Rating	• AC adaptor (2), controller and microscope frame (4 plugs necessary) • Input : 100 — 240 V AC 50/60 Hz, 10 A
		Power consumption	• Controller: 700 W, Monitor: 20.9 W , Microscope: 40 W, Control Box: 7.4 W • Total: 768.3 W

System environment limitations

Normal use	Temperature	10 — 35° C
	Humidity	30 — 80 %
For safety regulations	Environment	Indoor use
	Temperature	5 — 40 °C
	Humidity	• Maximum 80% (up to 31 °C) (no condensation) • Usable humidity declines linearly as temperature rises above
	Altitude	Up to 2000 m
	Level of horizon	Up to ± 2°
	Power supply and voltage stability	±10%
	Pollution level (IEC60664)	2
	Overall voltage category (IEC60664)	II

Software

Software	CIX-ASW-V1.0
	Dedicated workflow software for technical cleanliness inspection
Languages	GUI : English, French, German, Spanish
	Online help: English, French, German, Spanish
License management	Software license activated by license card (already activated at installation)
User management	System can be connected to a network for domain administration
Live image	Display in color mode
	Window fit method
	Live detection - Particles are detected as soon as they are captured for improved speed - User can stop the process if the measurement results are not good
Hardware control	XY motorized stage - Joystick operation and control by software - Automatic or manual repositioning on selected particles
	Motorized nosepiece - Selection by software only
	Motorized focusing - Control by joystick - Software autofocus available - Predictive autofocus using multipoint focus map
Check system	System verification - System is verified by measuring the PSD parameters - OK or NOK quality value is produced
Technical cleanliness standards	Supported standards: ISO 11218_1993; ISO 14952; ISO 16232-10; ISO 21018; ISO4406_1999; ISO4407_1991; ISO12345_2013; NAS 1638-01; NF_E_48_651_1986; NF_E_48_655_1989; SAE_AS4059E
	Identification of particle family: particles can be classified by particle families (fibers, reflecting, reflecting fibers, or others)
	Customized standards: user-defined standards can be created easily
	IInspection configuration: The system enables users to load, define, copy, rename, delete, and save an inspection configuration
Particle tile view	Displays the detected particles in tile view for improved navigation
Store the full membrane	The complete filter is stored and can be reprocessed using different conditions
Particle Edition	Particles can be edited during the revision process. It is possible to: - Delete, Merge, Add Particle - Change the particle type
Dynamic reports	Professional analytical reports can be produced by using MS 2013 Templates are fully customizable

Environment law and regulations

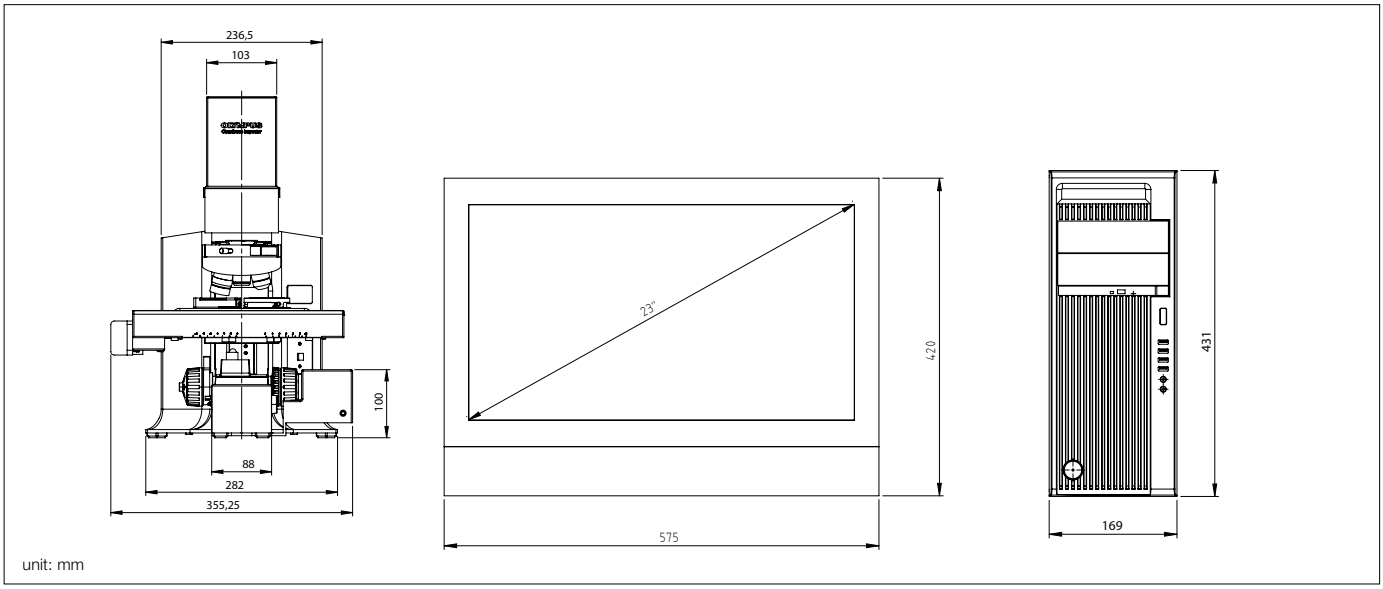
USA	FCC 47FR Part15 Class A		Conformance as system
Europe	CE	Machinery Directive 2006/42/EC, DIN EN ISO 12100; IEC 61010-1:2010	Conformance as system, signed
		Electromagnetic Compatibility Directive 2014/30/EU, IEC 61326-1	Conformance as system, signed
	Regulation 1907/2006 (REACH), 2006/1212/EU REACH directive Sample height		Conformance as a product
	2012/19/EU WEEE directive		Conformance as system, signed
	2011/65/EU RoHS		
	Ecodesign Directive 2009/125/EC; IEC 60950-1		

Drawing

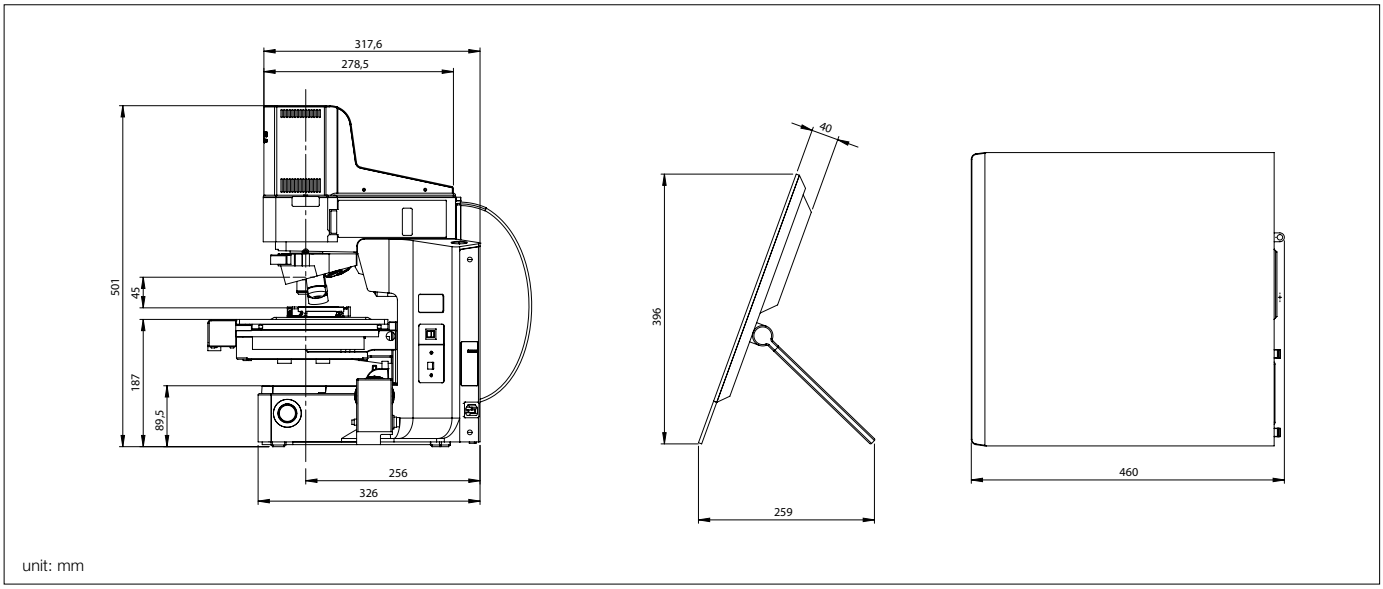
Dimensions (W × D × H)	Approx. 302 mm × 498 mm × 502 mm
Weight	15.4 kg

Dimensions

CIX90



unit: mm



unit: mm

- **OLYMPUS CORPORATION is ISO14001 certified.**
- **OLYMPUS CORPORATION is ISO9001 certified.**
- This product is designed for use in industrial environments for the EMC performance. Using it in a residential environment may affect other equipment in the environment.
- All company and product names are registered trademarks and/or trademarks of their respective owners.
- Images on the PC monitors are simulated.
- Speci cations and appearances are subject to change without any notice or obligation on the part of the manufacturer.
- Illumination devices for microscope have suggested lifetimes. Periodic inspections are required. Please visit our web site for details.

www.olympus-ims.com

OLYMPUS®

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

OLYMPUS CORPORATION OF THE AMERICAS SCIENTIFIC SOLUTIONS GROUP
48 Woerd Avenue, Waltham, MA 02453, U.S.A.

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

Art. code: E0433445 · Printed in Germany 05/2016