

EyeTech

Particle Size Analysis
Dynamic Image Analysis
Concentration Measurement



BEYOND PARTICLE SIZE



Ambivalue
www.ambivalue.com

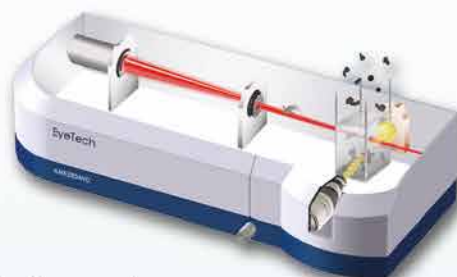
BEYOND PA

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The Ultimate Particle Analyzer!

The EyeTech brings size, shape, and concentration data together to form a comprehensive blue print of your particle system. The remarkable flexibility of the EyeTech enables you to:

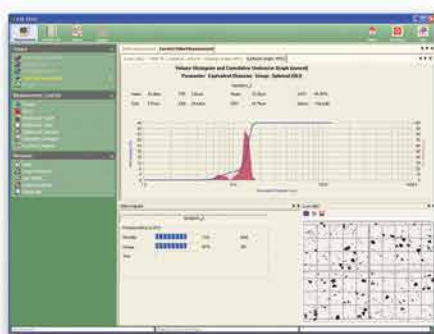
- Monitor kinetic processes
- Plot multi-dimensional data by jotting size against shape
- Analyze complex data to reveal secondary distributions within the distribution
- Identify individual particles in the distribution, by recalling a picture from the database
- Generate standard volume and number distribution results



EyeTech Concept:

- Fast and accurate Particle Size Analysis with the unique Laser Obscuration Time technique.
- Accurate description of non spherical materials with sophisticated Dynamic Image Analysis using the video channel.
- Results are independent of physical or optical properties of the particles or medium

User Friendly InterFace



Advanced Data Output:

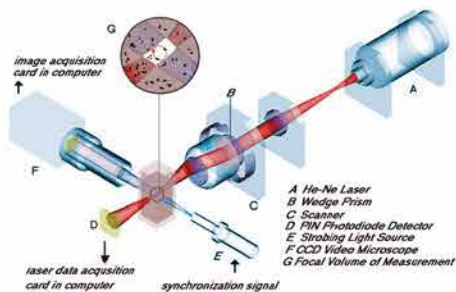
- Automated report generation
- Customized real-time graphs and tables
- Reprocessing of stored images
- Multiple user levels
- Setup Wizard for easy start-up
- 21 CFR Part 11 compliant

The comprehensive information that is generated by laser and video analysis, is easily accessible by intuitive data reporting software. Results can be displayed in a large variety of tables and graphs that can be customized to show exactly the information that is required. Data comparison is made easy by the data mining feature, which allows overlay graphs and comparison tables to be compiled. With a click of the mouse a sample report is generated in a WORD document. The document includes information about sample preparation, size and shape results, and is completed with images or video of the sample.

RTICLE SIZE

ZE & SHAPE ANALYZER

Combined Laser and Video Channel



- Accurate analysis and characterisation of spherical, non-spherical and elongated particles.
- Simultaneous results of Particle Size, Concentration and Shape.
- Modular design for a range of dry and wet applications.
- Real-time visualisation of the sample during operation

Measurement Cells

Sample Presentation:

- WET
- DRY
- SURFACE
- AIRBORN

The EyeTech is a modular system that can be fitted with 10 different measurement cells. With a quick change of a measurement cell this versatile instrument is ready to analyze particles in liquids, emulsions, dry powders, fibers, magnetic particles, heated liquids and aerosols. This application driven approach ensures your sample is measured according to its specific nature.

- Magnetic Stirring Cell ACM-101
- Mechanical Stirring Cell ACM-102
- Liquid Flow Cell ACM-104A
- Fiber Cell ACM-104L
- Aerosol Flow Cell ACM-106
- Micro Flow Cell ACM-108
- Slide Cell ACM-110
- Heated Cell ACM-111
- Free Fall Cell ACM-112



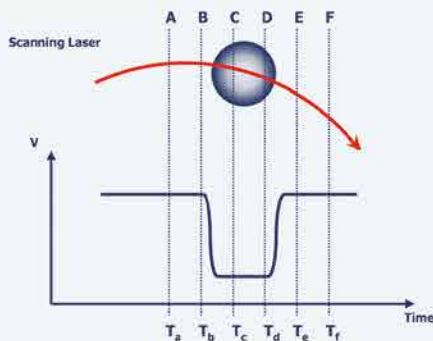
LASER OBSCU

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Laser Obscuration Time Measurement Principle

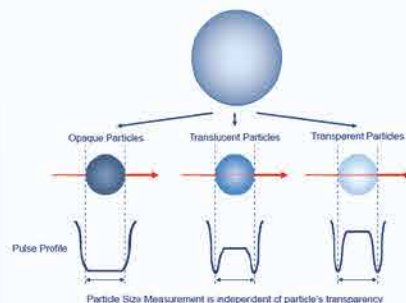
The laser channel determines particle size by analyzing the interaction of the laser beam with the particles in the sample. The EyeTech beams the laser light through a set of lenses in order to focus the laser beam into a narrow spot. This spot is rotated by a wedge prism so that the beam describes a narrow circular motion in the sample zone. When the laser beam interacts with a particle in its path, a photo diode detects the duration of the temporary blockage of the laser beam by the particle. The time of obscuration is directly related to the chord-length of the particle that interacted with the laser beam, where larger particles affect a longer obscuration duration than smaller particles. The results are presented in volume and number size distributions.

The intensity of the obscuration is not a significant parameter for the Laser Obscuration measurement principle, which means that the measurement is independent of physical or optical properties, unlike other sizing methods where these are required.



During each analysis the laser beam has millions of interactions with the particles. To measure particle size correctly, the EyeTech distinguishes between on-center and off-center interactions, as only on-center interactions provide information on the particles true size. This is achieved by filtering the shape of the Pulse Profile. Only pulses with narrow derivatives – the characteristic of a particle that is hit straight on its diameter – are accepted as valid on-center interactions, and subsequently added to the particle size distribution.

Particle Transparency

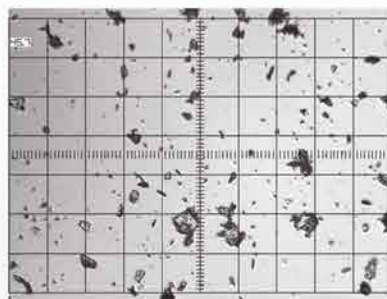


The EyeTech measurement is simultaneously accurate for both opaque and transparent particles in the sample. Opaque particles obscure the laser beam completely, so the obscuration time is easily determined. As translucent or semi-transparent particles are partially diffuse to the laser beam, they will pass on some light to the detector resulting in partial obscurations. However, at the particle boundaries, the detector observes complete obscuration on the edges. The partial transmission of the laser through the center will cause a decreasing signal and a deeper belly towards the baseline of the pulse. Since the pulse intensity is not used for the particle size measurement and the obscuration time between the particle's boundaries can be easily determined, correctly analyzing transparent particles is assured. Therefore, samples with opaque, transparent or mixtures of particles are measured accurately in a single measurement, independent of transparency.

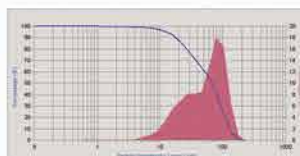
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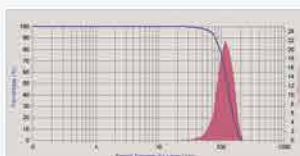
Multi-Dimensional Data Presentation



Sample Image

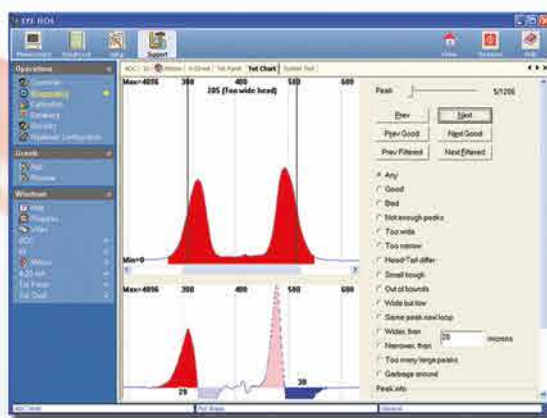


Number Size Distribution



Volume Size Distribution

Obscuration by Laser-Particle Interaction



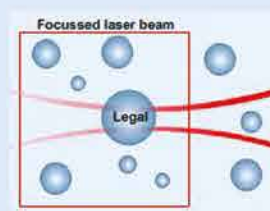
- Data is collected on single particles
- Direct measurement of true particle size
- Independent of optical or other properties
- Particle size and concentration measurement
- No need for alignment or calibration
- Broad concentration range.
- Higher but also lower concentrations than laser diffraction and electrical zone sensing technologies.

Detection of Minor Fractions

The laser obscuration method has significant advantages for particular applications, such as detecting minor fractions that make up 1% or less of the sample volume, or measuring the fraction of very large particles in a sample with high resolution.

Concentration Measurement

In addition to particle size, the pulses generated by the laser-particle interaction also provide valuable information about particle concentration. The EyeTech records the sum of all particle interactions and since the volume of the rotating laser spot is known, the concentration can then be calculated.



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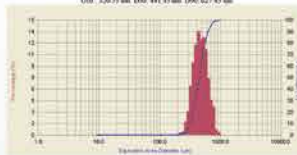
Complementing Size Results with Shape

Spherical Particles



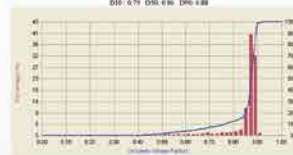
Maximum Diameter

Volume Histogram and Cumulative Underflow (D50:1614)
Parameter: Equivalent Area Diameter Group: A1.1 (10021)
Mean: 477.36 um STD: 123.31 um Conf: 100.00 %
D10: 320.19 um D50: 441.47 um D90: 627.67 um



Shape Factor

Number Histogram and Cumulative Underflow (D50:1614)
Parameter: Circularity (Shape Factor) Group: A1.1 (10021)
Mean: 0.18 STD: 0.08 Conf: 100.00 %
D10: 0.17 D50: 0.18 D90: 0.28

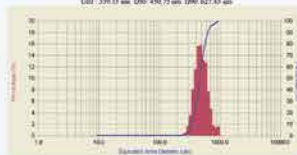


Non-Spherical Particles



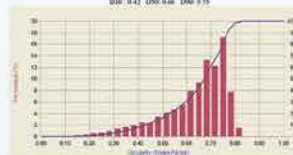
Maximum Diameter

Volume Histogram and Cumulative Underflow (D50:1614)
Parameter: Equivalent Area Diameter Group: A1.1 (10021)
Mean: 475.65 um STD: 118.97 um Conf: 100.00 %
D10: 330.15 um D50: 476.77 um D90: 627.67 um



Shape Factor

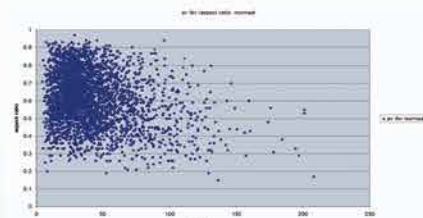
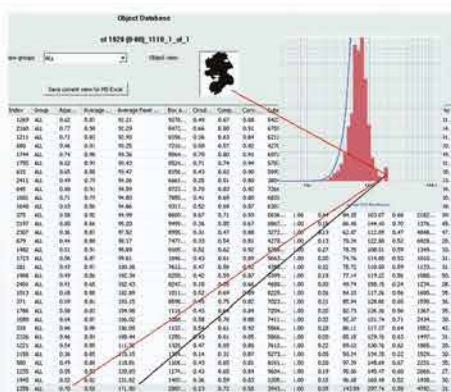
Number Histogram and Cumulative Underflow (D50:1614)
Parameter: Circularity (Shape Factor) Group: A1.1 (10021)
Mean: 0.42 STD: 0.18 Conf: 100.00 %
D10: 0.42 D50: 0.48 D90: 0.77



Complementing size results with shape results adds a second dimension to the particle size distribution data, samples of similar size might have strong variation in shape distribution

For accurate characterisation of non-spherical particles, two-dimensional shape information is essential. Differences in shape may not be reflected in the particle size distribution. Dynamic Image Analysis uses digital video microscopy to capture optimal particle images for processing. Acquired images are processed using sophisticated image analysis procedures and/or are stored for later processing.

Understanding the Particle System

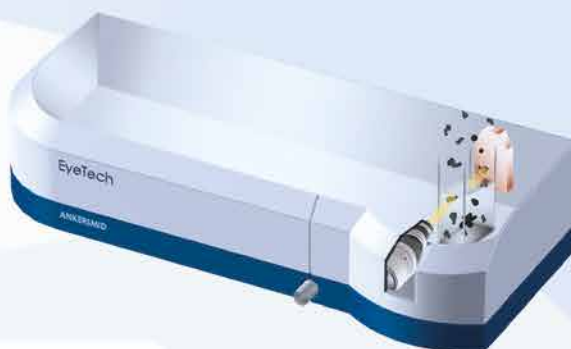


- Detailed Object Information is available for each and every measured particle including its image by a mouse click.
- No limitation for the number of particles.
- Easy export of the raw data to Excel for further processing.

Shape and size related data by dynamic image analysis provide a wealth of data on each individual particle, this information can be displayed in scattergrams to examine a samples particle size versus particle shape trends. The shape filter also has the functionality of an optical filter, allowing the user to zoom in on specific fractions within the sample according to size or shape characteristics.

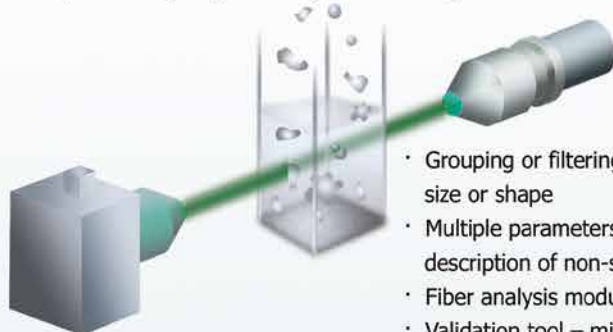
AGE ANALYSIS

PE ANALYZER



Imaging Software Features

- Particles are visualised throughout the measurement.
- Reprocessing of previously stored images and videos is possible.



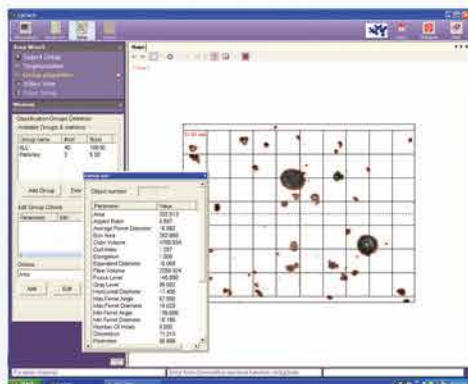
- Grouping or filtering of particles based on size or shape
- Multiple parameters for accurate description of non-spherical materials
- Fiber analysis module
- Validation tool – minimizes uncertainty related to sample preparation

Select the EyeTech for applications where

- particle shape matters
- samples are made up of different particle matter
- high resolution number distribution results are required to identify minor fractions within the sample
- considering to scale up to in-situ process monitoring

The Next Generation in Particle Sizing

Validate your results



- Microscopic precision in a dynamic system
- Storage of real raw data
- Powerfull pre-processing tools for high quality image analysis
- Accuracy for non-spherical particles
- Over 40 ISO compliant shape parameters offered

"Oil-in-water" On line/Process



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Sample Applications

Geology

Soil, clay, sand, kaolin.

Environmental

Ocean water, tap water, waste water, dust, membrane filtration, flocculation.

Pharma / Bio-tech

Powders, suspensions, syrups, emulsions, pastes, microcarriers, injectable solutions, collagen, microcapsules, drug powders.

Chemicals

Pesticides, dispersants, catalysts, resins, emulsions, preservatives.

Ceramics and Metals

Alumina, silica, magnetic powders, tungsten, sintered products, stainless steel, strontium, cobalt.

Energy

Coal, fuels, slurries, shale-oil emulsions, fly ash.

Food Products

Emulsions, fine powders, beer, coffee, chocolate, ground products, agglomerated crystals, flour, peanut butter, corn-flakes.

Heavy Industry

Polymers, oil droplets, wear particles, chalk, fillers, toners, pulp & paper, coatings, pigments, PVC, paint.

Life Science

Bacteria, smears, yeast, inhalation toxicology, cell research, algae growth, blood analysis.

Measured parameters

Particle size range

Concentration range

Particle presentation phases

System dimensions & weight

Electricity

Laser

Laser resolution

Illumination

Video camera

Software

ISO Compliancy

Modular measurement cells

Accessories

Specifications

Particle size, shape and concentration

0.1-3600 μm

Up to 10^9 particles/cc (for 1μ particles)

Liquid borne, airborne, on a surface

665L x 280W x 183H (mm); 14 Kg.

100-130V, 205-240V, 50/60Hz, 100VA

2mW HeNe, 632.8 nm, Silicon PIN

Photodiode Detector

0.33% of full scale, up to 0.2 μm

Synchronized strobe light, adjustable intensity & duration, flash rate up to 30 frames/ second

High Resolution 5 MP

USB 3.0 CMOS Camera

Windows 7 or higher operating system

Compliant to numerous ISO-methods

Liquids, emulsions & opaque liquids, dry powders, fibers, magnetic particles, heated liquids, and aerosols

Automatic liquid flow controller, powder disperser, powder feeder, temperature controller, aerosol controller

EyeTech Model:	Size Analysis	Concentration	Vision	Shape Analysis
Laser	✓	✓		
Vision	✓	✓	✓	
Comb	✓	✓	✓	✓
Research	✓	✓	✓	✓

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