Particle Analyzer CAMSIZER®

Particle size and particle shape measurement with Dynamic Image Analysis

Measurement of dry, free flowing bulk materials in a range from 30 µm to 30 mm

Retsch® TECHNOLOGY

Solutions in Particle Sizing

Exact Measurement of Particle Size and Shape with the CAMSIZER®

- Measuring range from 30 µm to 30 mm with no hardware adjustment necessary
- High resolution for narrow mono-modal or multi-modal distributions
- Reliable detection of smallest amounts (< 0.01 %) of oversized grains
- Particle shape analysis (e.g. detection of agglomerates, broken particles or contaminates)
- Excellent depth of focus
- Highly comparable to sieve analysis results
- Excellent reproducibility

Product videos at
www.retsch-technology.com

Particle analyzer CAMSIZER

CAMSIZER:
Measuring range from
30 µm to 30 mm

Experts for Particle Characterization

Retsch Technology's core competence is to combine innovative technology for particle characterization and quality control with a maximum of operating convenience.

The product line for particle characterization covers a size range from 0.3 nm to 30 mm. The instruments, which operate with different measurement techniques, permit analyses of particle size and particle shape for suspensions, emulsions, colloidal systems, powders, granules and bulk materials.

Retsch Technology offers customer support in Germany and via a network of international distributors. Samples can be analyzed with a suitable method and instrument at the company's application laboratory in Haan. This provides existing and potential customers with tailor-made solutions for their specific application.

Together with our sister company Retsch GmbH, we offer a complete line of products for sample preparation of solids (size reduction, sample division and analytical sieve shakers).

One measurement method, two application fields

Dynamic Image Analysis with the CAMSIZER and the CAMSIZER XT

CAMSIZER XT:
Measuring range from
1 µm to 3 mm

CAMSIZER and CAMSIZER XT are both based on the proven patented 2-camera system. Whereas the CAMSIZER is optimized for the analysis of coarser, free flowing particles in the range from 30 µm to 30 mm, the CAMSIZER XT specializes in the analysis of fine, cohesive powders from 1 µm to 3 mm. In addition to the higher resolution of the optical components, the CAMSIZER XT offers greater flexibility for sample dispersion. In addition to the free fall module, which corresponds to the measuring setup of the CAMSIZER, the CAMSIZER XT features alternative dispersion methods with compressed air or in liquid. In this way, agglomerates are dispersed and each primary particle is recorded when passing the measurement field.

Both the CAMSIZER and CAMSIZER XT operate with the same reliable and comprehensive software. Depending on the sample's particle size and tendency to agglomerate, either the CAMSIZER or the CAMSIZER XT represents the optimum solution for your particular sample and measurement requirements.

The CAMSIZER® System

Particle size and particle shape analysis

The CAMSIZER has been developed to comprehensively characterize dry, free flowing bulk materials. For example, whereas traditional sieve analysis can only determine the approximate particle size, the CAMSIZER simultaneously determines both the particle size and shape – with much more detail and at a higher resolution.

100 % Quality control

The CAMSIZER is a time and cost-saving alternative whenever permanent quality assurance is demanded during production. It can also be used for checking of incoming and outgoing goods that require laboratory measurements over a wide range of different samples. Typical examples of applications are:

- Abrasives
- Activated carbon and fibers
- Carbon products (coal, coke)
- Catalysts (round or extrudated)
- Ceramics
- Fertilizer / Salt
- Food / Coffee / Sugar
- Glass beads / Glass
- Metal powder
- Pharmaceuticals / Drugs
- Plastics / EPS / EPP
- Proppants
- Refractory products
- Sand

The robust construction and clean operation of the CAMSIZER permit operation even under challenging industrial conditions. Therefore, Retsch Technology also supplies online versions for the continuous monitoring of critical production processes.

Unique design

Patented measuring method with 2 adaptive full-frame matrix cameras

- Maximum resolution
- Extremely wide dynamic measuring range
- Complete and therefore exact particle recording with each digital image
- Unrivaled repeatability
- Simultaneous measurement with both cameras

Software-controlled Venturi air flow sample dispersion

- Avoids instrument contamination even with very dusty samples
- Optimal particle focusing
- Representative measurements even with strongly varying densities and particle sizes

Certified calibration standard

- High degree of measuring accuracy and reliability with more than 50 reference objects
- Calibration throughout the whole measuring range
- Compatibility with national and international standards and other analytical methods

CAMSIZER® versus sieve analysis – maximum benefits from minimal effort

	Effort	Results	Benefits / Advantages
Sieve analysis	■ Assemble sieve stack ■ Weigh/tare sieves ■ Feed in sample material ■ Start sieving ■ Weigh fractions ■ Evaluate ■ Clean sieves	Analysis ■ Particle size distribution from a few sieving fractions ■ Sample fractionation ■ High reproducibility ■ Established measuring technique	Effects ■ Further analysis of individual fractions possible ■ Wet sieving possible
CAMSIZER®	■ Feed in sample material ■ Start measurement ■ Remove sample material	Analysis ■ Detailed particle size analysis ■ Simultaneous analysis of the particle shape and volume ■ Highest degree of accuracy and reproducibility ■ Very fast: results in real time ■ Avoidance of random errors by extremely simple handling	Effects ■ Drastic reduction in the amount of work and time ■ Automatic, individual evaluation of size, shape, density, transparency and particle number ■ Contact-free and therefore nondestructive analysis ■ Online measurement for the best possible process and quality monitoring ■ Self-cleaning and almost wear-free ■ Can be recalibrated in seconds

The measuring procedure of the CAMSIZER is fully automated to prevent operator errors. Manual operating steps are restricted to filling the hopper and removing the material.

The CAMSIZER is virtually maintenance-free. Continuous air purging of the optical components together with the contact-free measuring procedure ensure convenient and clean working conditions.

30 mm

The patented CAMSIZER® principle

From 30 µm to 30 mm: accurate – quick – reliable

The innovative CAMSIZER measuring system is based on the Dynamic Image Analysis principle. The bulk material falls between the light source and cameras. The particle images are optically recorded, digitized and processed in the attached computer.

Simultaneous analysis of number, size and shape

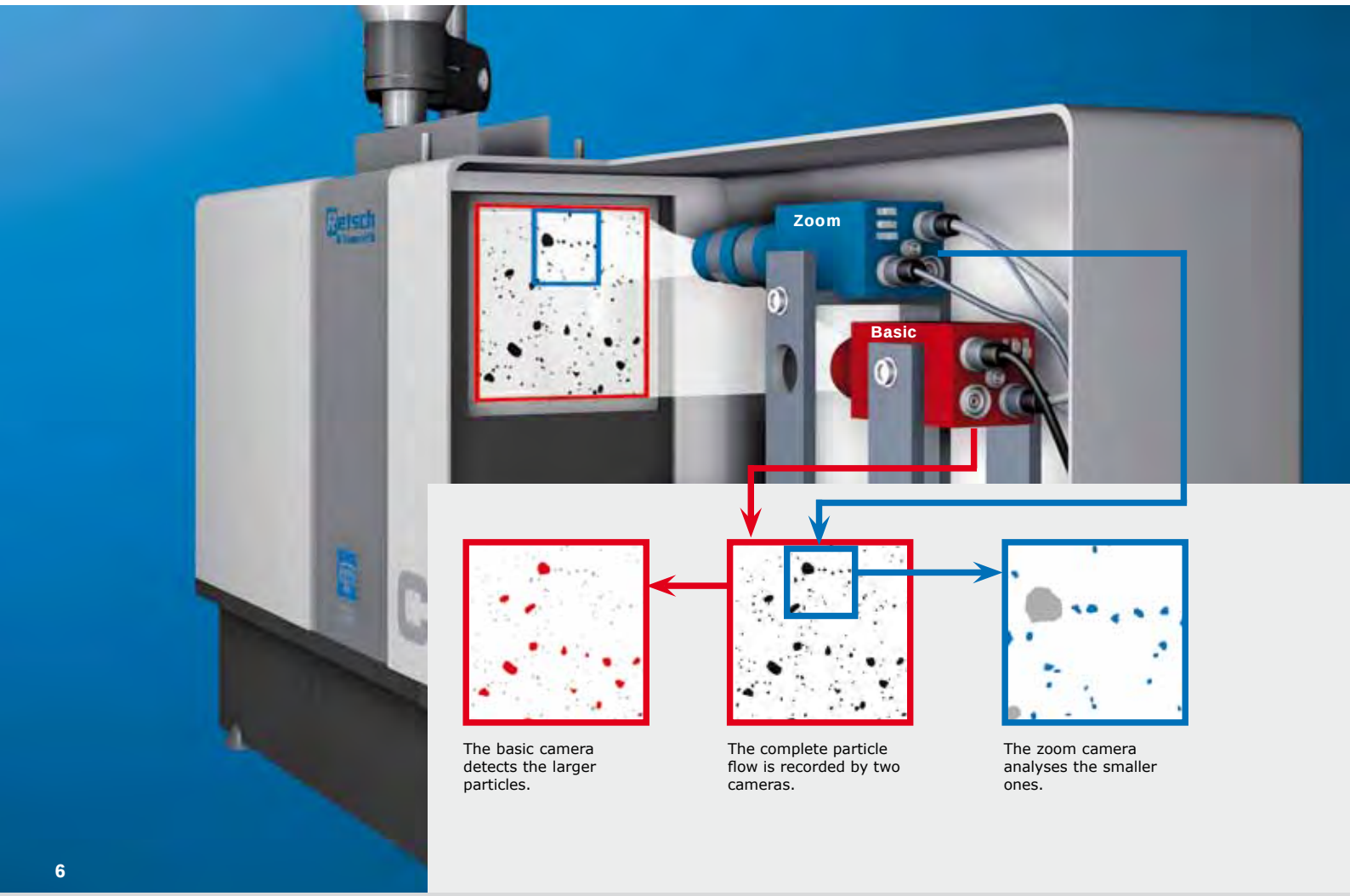
The patented measuring design of the CAMSIZER – two digital cameras as an adaptive measuring unit – improves and optimizes particle analysis by digital image processing. Therefore, it is possible to measure a wide range of particles from 30 µm to 30 mm with extreme accuracy and excellent reproducibility, without having to switch measuring ranges or make instrument adjustments.

The sample is fed in from the feed chute so that all particles fall individually through the measurement field. During the measurement procedure the two digital cameras (CCD) perform simultaneous tasks. The basic camera (CCD-B) records large particles, the zoom camera (CCD-Z) records the small ones.

The contact-free optical measurement is carried out in real time and simultaneously obtains all the required information about particle size and particle shape. A modularly configurable online version of the instrument has also been developed to allow automated measurements to be conducted continuously.

Maximum resolution

The resolution capability of the CAMSIZER goes down to the micrometer range. This means that detailed studies are easily possible even on very narrow or multimodal particle size distributions. After the digital images have been processed electronically, the analytical results are saved in up to 3,000 size classes. These size classes are selected conveniently and according to the features that are relevant to the particular sample.



The basic camera detects the larger particles.

The complete particle flow is recorded by two cameras.

The zoom camera analyses the smaller ones.

Quick analysis of representative samples

The sample throughput can vary from grams to kilograms per minute. This is influenced mainly by the size range and material properties of the sample. For small particle sizes a very small amount of the sample may be adequate. The feed hopper has a capacity of 3.5 liters but for a CAMSIZER measurement there is no limit to the maximum sample volume.
With the wide feed chute, the full measurement field is used, which helps to measure very large particles. Thus, a high sample throughput is guaranteed. By using two cameras the highest possible resolution is achieved over the entire measuring range. No adjustment of the instrument is required.
Depending on the sample and the particular requirements, a measuring time of approximately 1 – 3 minutes is typical. This means that real-time monitoring of a production process is possible at any time.

Long life light source

The high intensity of the CAMSIZER's new LED strobe light source (90 Hz) allows for extremely short exposure times and very sharp images with optimum depth of focus and strong contrast. In this way the CAMSIZER ensures precise shape analyses even for very fine particles. After each measurement the light source is switched to the standby mode, which enables a service life of more than 20 years for the light source.

Automatic hopper adjustment

The automatic height adjustment of the filling hopper guarantees optimum feeding of the sample and eliminates manual adjustment steps. This enables the CAMSIZER to provide measurements with excellent reproducibility.

Certified calibration standard

By using a high precision reference object (precision ±0.1 µm) made by lithography producing varying sized particles, the CAMSIZER can be recalibrated in seconds. This means that the requirements of modern validation testing are fulfilled.

CAMSIZER® results

Evaluation and documentation

Real-time results

A major advantage in the application of the CAMSIZER is the evaluation of the results in real-time. Graphical representation of the results is available while the measurement is still running. At the same time the measurement process can be checked visually by observing the digital images. Any irregularities detected in the sample material can be archived and evaluated automatically at the touch of a button. Retsch Technology supplies the CAMSIZER with powerful, process-oriented control and evaluation software. A quick and convenient export of the results is not only possible to dedicated software programs but also to the user's individual LIMS system.

Simple and reliable operation

Setting measurement and evaluation parameters is made easy by a "Wizard" function in the software which guides the user through this process. Product-specific settings for the measurement parameters can be saved. This simplifies the change between different repetitive measuring tasks, also known as standard operating procedures (SOPs). These SOPs can be protected against manipulation by a password that ensures that the same instrument settings and output formats are always used with the highest degree of reliability. This effectively eliminates operator induced errors.

Process-oriented control and evaluation software

Process-oriented entry screen
Quick and simple parameter entry due to the intuitive user interface

Quality control during measurement
Comparison of the measurement result with upper and lower specification limits

Trend analysis of production processes
Up to 4 selectable parameters of the sample material can be continuously monitored

More detailed information due to advanced technology

The basis of the precise and rapid measuring results is the processing of the particle projections in real time. At a capture rate of 60 images per second, each with more than 780,000 pixels, the CAMSIZER processes information from more than 45 million measuring points per second. In the presentation of the results as graphs, tables, characteristics or digital images, a wide range of customers' requirements have been anticipated. The computer calculates all standard particle size distributions (volume, area and number-related) as well as the characteristics of the particle shape and their distributions and standard deviations. The results obtained can be presented graphically and in tabular form as size fractions, frequency distribution or cumulative distribution. In addition, the CAMSIZER can determine the number of particles in the sample as well as the specific surface area, the density and transparency of the sample material. All measured variables are determined precisely and with excellent reproducibility. The CAMSIZER software also allows the presentation of daily reports, trend analyses, mean value calculations and much more. A clear, individually configurable measuring protocol based on accepted international standards can be produced.

Smooth changeover from sieve analysis to CAMSIZER®

The traditional sieve analysis frequently forms the basis for quality standards and product specifications between suppliers and customers. A rapid and efficient alternative to sieve analysis must take this into account and be able to produce results that are fully comparable. This is why the CAMSIZER software is provided with algorithms for simulating sieve analysis. In this way many users have been able to replace the time-consuming sieve analysis by using the CAMSIZER without having to sacrifice the familiar quality features. The automated and wear-free measurement means that the results obtained are more reliable and reproducible over time.

Particle shape analysis and its applications

In many applications particle shape information proves to be an important process and quality indicator. Based on dynamic image analysis the CAMSIZER is immediately able to analyze the particle shape of the sample material in a detailed and representative fashion.

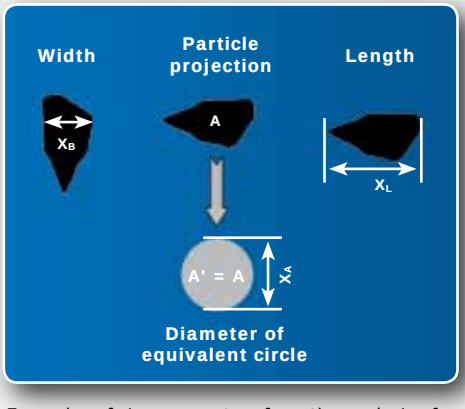
As a result of the high information content obtained from the digital images taken during the measurement procedure, the particle projections can be evaluated in many different ways. Depending on the application, the CAMSIZER measures the particle projections according to various areas, perimeters and lengths. The CAMSIZER software does a high-resolution scan in all possible directions and evaluate the most critical 64 directions. Typical results obtained would be:

- chord length
- straight length
- Feret diameter
- Martin diameter
- aspect ratio (width/length)
- convexity
- roundness
- symmetry

The advantage of the full-frame cameras used by the CAMSIZER for the distortion-free recording of true particle projections is essential when measuring the particle shape.

Examples of particle shape analysis applications are:

- **determination of fractions of mixed components**
  e.g. of ion exchangers and active charcoal for water filters as well as glass beads and antiskid aggregates used for road markings
- **determination of edge-holding property (angularity)**
  e.g. quality assessment of abrasives as an indication of removal and etch rates
- **analysis of the broken fraction of granules**
  e.g. as a replacement for time-consuming breakage analysis of the rolling properties of granules
- **simultaneous determination of diameter / length distribution of extrudates ("rods")**
  e.g. determining the volumetric density of catalysts in reactor beds
- **prediction of flow and compacting behavior**
  e.g. press-molding powders and granules into tablets



Examples of size parameters from the analysis of individual particle images derived from the high resolution scans of the CAMSIZER

CAMSIZER® accessories

Retsch Technology offers a comprehensive range of accessories for the CAMSIZER in order to meet the individual requirements for each application. The individual components are selected according to the sample material properties.

Push-fit feed chutes

The flow behavior of the sample can be considerably improved by a favorable choice of feed chute surface material and shape. Feed chutes made from high-quality stainless steel are used as standard. Cohesive materials such as coffee or cocoa can be fed in uniformly and continuously by choosing a suitable chute coating. For example, for oily/fatty materials chutes made from hard-coat aluminum are recommended. The push-fit attachment means that the feed chute can be exchanged within a few seconds whenever necessary. For the effective feed of different-sized particles chutes with different widths are available.

Feed hoppers

Different hopper sizes are available for different amounts of sample. Hoppers can be supplied with a capacity of 0.5, 2.8, 3.5, and 7.8 liters. For optimal sample feeding these hoppers are available in different materials and with different coatings (stainless steel, hard-coat aluminum, etc.) just like the chutes.

Feed guides

The use of a feed guide ensures that even the finest materials fall through the focusing range of the cameras without any unwanted turbulence. This assures that the particles can be measured accurately.
For special applications a motorized feed guide is available to preferentially orient the particles. For example, this allows the precise and direct measurement of both the length and diameter when analyzing extrudates (see example on page 14). The specially developed motion mechanism allows for perfect alignment without any sample blockage. The motorized feed guide is also suitable for fully-automated online applications.

CAMSIZER® AutoSampler

The use of the CAMSIZER is very economical, particularly for high sample throughput. In combination with the AutoSampler, efficiency can be increased due to the automated sample feeding. A further improvement is possible by using continuous quality monitoring in online operation.

The AutoSampler – automatic, reliable, flexible

Whenever varying sample materials are to be analyzed or repeat measurements need to be carried out, the AutoSampler adapts perfectly to the defined measuring routine. The hopper position automatically adjusts to give the correct material feed gap, even for samples with greatly differing particle size distributions. The sample is fed in by an electro-pneumatic robot arm which lifts the beakers and empties them into the feed hopper. A built-in shaking function ensures complete emptying. The sample beakers are collected in a container for reuse. The use of the AutoSampler maximizes the benefit of the CAMSIZER with minimal operator intervention.

Increased flexibility due to barcode reader

The barcode reader ensures that defined instrument and measurement settings (SOPs) are read automatically for all products to be analyzed. Even specific analysis requirements defined by the product identification or batch number, can also be carried out automatically. This effectively avoids operator errors and ensures constant measuring conditions for each analysis.

Optimized safety

With Retsch Technology, safety is not limited to the analytical process. The moveable parts of the AutoSampler are located behind covers which are permanently protected by safety switches. If anything unexpected should occur, an emergency stop-button brings all moving parts to an immediate standstill position.

CAMSIZER® online system

Closed housing

Extremely robust design – for use in demanding environments

- automatic cleaning system
- maintenance-free
- uninterrupted power supply (UPS)
- vibration absorbers
- wide temperature range -20 to +50 °C (-5 to +120 °F)
- air conditioning available
- flexible configuration of instrument controller & data export

CAMSIZER online in the sugar industry

Modular principle

The CAMSIZER is the only measurement system which can be used in the laboratory but – as an online version – can also be directly integrated into a process line. Due to the identical measurement technology, identical results are obtained from both areas. The modular design of the CAMSIZER Online allows for acquisition in two steps. It is often the best choice to start with the CAMSIZER laboratory instrument. An upgrade to the online version can then follow as a next step. Of course, the CAMSIZER Online is also available as a complete unit.

CAMSIZER online setup

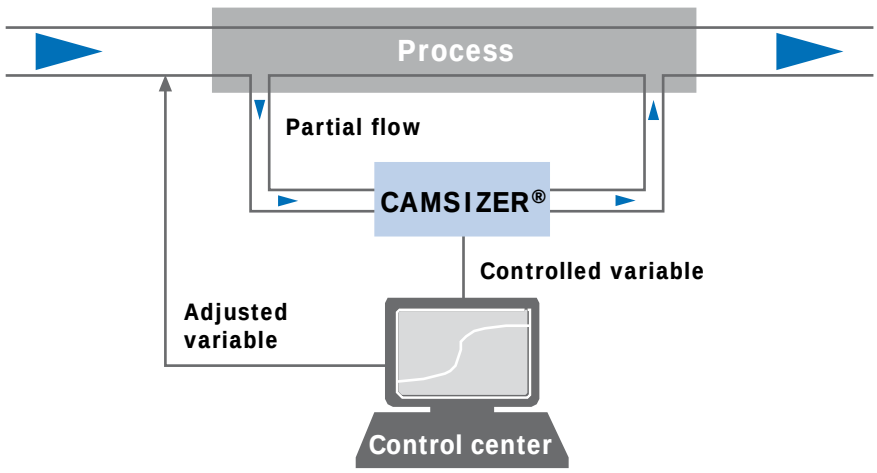
In the CAMSIZER online system the CAMSIZER is integrated into an industry-standard housing which makes it suitable even for very rough environments. The housing features IP 54 protection and automatic cleaning options which help to reduce cleaning and maintenance to a minimum. The housing is mounted on vibration absorbers which means that PC and measurement technology are not influenced by vibrations. If it is placed in an environment where vibrations are strong, the instrument can be suspended from special supports. The industrial PC is protected by a UPS. In case of a power failure it is shut down immediately without damage of the storage medium or loss of data.

Interfaces

With the available interfaces it is possible to connect the instrument to process control systems, internal networks and to transfer measurement data to almost any LIMS. In consequence, remote control and automatic data transfer are possible. Interfaces are available for control via digital card, field bus (profibus) or RS232 and for the results transfer via analog signals, field bus (profibus) or Ethernet.

Process integration

For online analysis, a representative portion of the bulk is taken out of the process and delivered to the CAMSIZER online system. The measurement can be automatically started by the system and the results are available at the measuring station when the analysis is completed. Immediately after the measurement has been completed, the next batch of the product is automatically transferred and analyzed. Thus, an up-to-the-minute status is available at all times which guarantees uninterrupted quality control. The process parameters can then be continuously optimized through a control circuit so that production can react quickly. This reduces rejected material and product quality can be ensured. In all cases, each measurement is preceded by individual sampling and sample preparation. The components for the feeding system can be designed together with engineer firms to meet the customer's requirements. Thus, the customer receives a turn-key system for the automated analysis.



Schematic diagram showing the inclusion of the CAMSIZER in a continuous quality monitoring system.

Application example of CAMSIZER online with integrated de-ionizer to improve the fluidity of a charged sample

Applications

The CAMSIZER online is used in many different industries

Steel industry
Monitoring of particle size in the coking plant to produce the best possible coking coal for the blast furnace. Automated sampling from the conveyor belt with splitting, drying and weighing.

Sugar
Monitoring particle size distribution of the final product during loading of trucks. Exact quality control of each delivery with automated sampling from the discharge line.

Catalysts
Measurement of average length and diameter of extruded catalysts for the monitoring of extruders. Sampling from the discharge line.

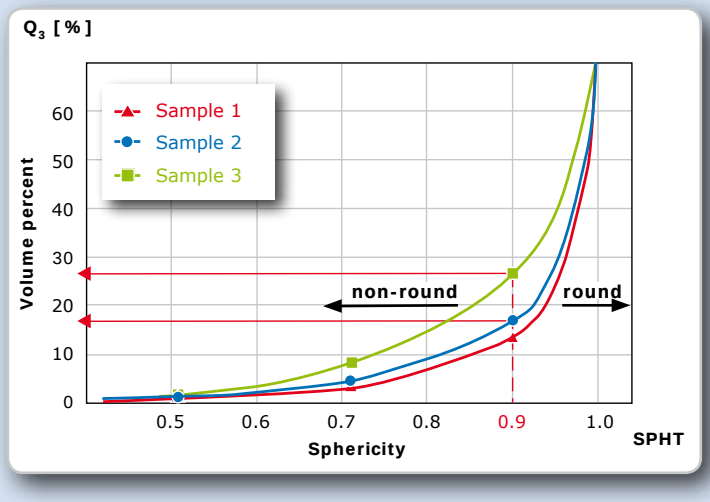
Ore extraction / mines
Particle size analysis for the monitoring of crushers. Sampling from the feed belt.

Animal feed
Control of mills which grind feedstuffs. The particle size analysis helps to detect sieve cracks of the scalpers at an early stage.

Laundry powders
Monitoring of the granulation process of enzymes. Sampling with rotary tube sample divider.

Key features

Quality control of particle size and shape



Example: Glass beads

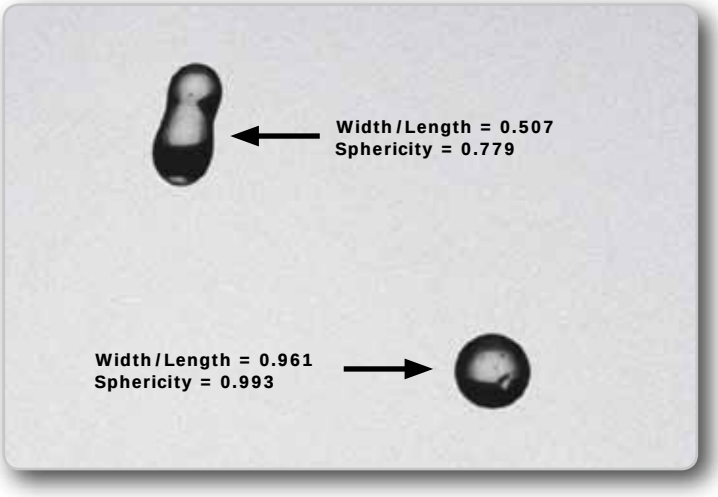
Glass beads are used for a great variety of applications. They are added to paints used for road and airport markings to guarantee high retro-reflectivity at night and when the road or airport runway is wet. Size and shape of the glass beads are essential to ensure that the headlight is reflected directly back to the driver or pilot.

The graphic shows the measurement of the sphericity of glass beads. At least 80% of the beads need to be spherical to fulfill the high quality standards for retro-reflectivity.

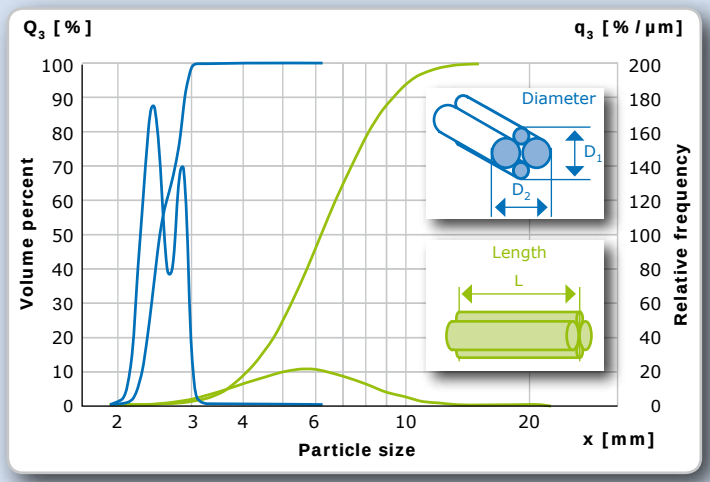
Old analysis specifications – new method – identical results

Example: Glass beads

The quality control of glass beads used in road markings is stipulated in standards ISO 1423 and ASTM D1155. The measurements are rather time-consuming, only a small number of beads are analyzed (poor statistics) and the results strongly depend on the instrument operator. The CAMSIZER allows for automated measurement of both particle size and particle shape. The measurement results can be validated against the methods described in the industrial standards, making the time-consuming manual methods obsolete.
The CAMSIZER provides identical results – but faster, with better reproducibility and with considerably improved statistics.



Determination of length and diameter



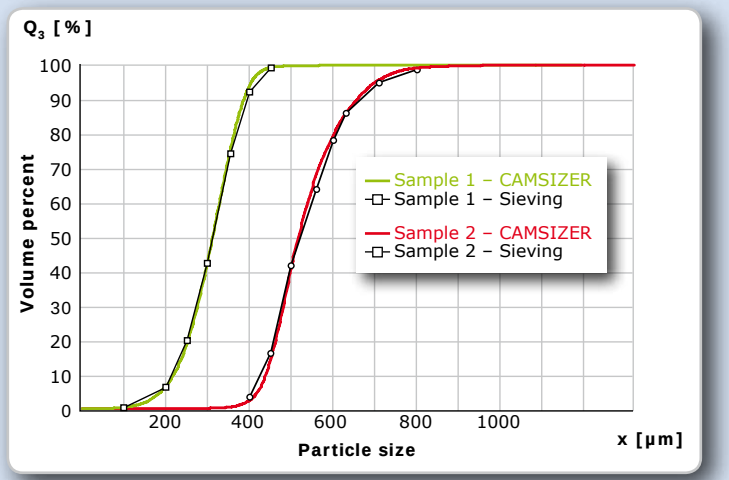
Example: Extrudates

Many samples consist of particles which are not adequately characterized by "size" only. In many cases, the length and diameter of the particles differ considerably, and the variations of both parameters have to be monitored as part of the quality control procedure. The example shows the measurement of the length (green) and the diameter (blue) of a catalyst support material. The rather complex cloverleaf geometry of the rods is reflected by the two maxima of the diameter distribution which can be clearly defined thanks to the high resolution of the CAMSIZER. The CAMSIZER results are based on the evaluation of approx. 100,000 particles in 3 minutes and fully correspond to the results of a time-consuming manual measurement (caliper measurement of a few hundred particles).

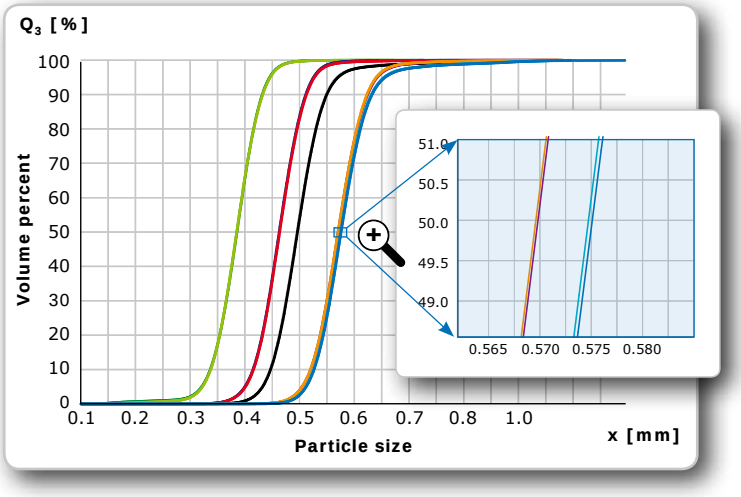
Size results 100 % compatible with sieve analysis

Example: Sugar

Crude sugar is sieved into different size classes, depending on the end product into which it will be made. Powdered sugar, granulated sugar or special mixtures, e.g. for bakeries or beverage production are typical examples. As the CAMSIZER measurement results perfectly match those of sieve analysis, product specifications of producers and customers can be directly compared, despite the different measuring methods. The CAMSIZER allows for the monitoring of the wear (holes) of the production sieves and analyzing the mixture during loading of trucks. Thus, the quality of each delivery is controlled and costly reprocessing is avoided.



Fast and reliable



Example: Pharmaceutical granules and pellets

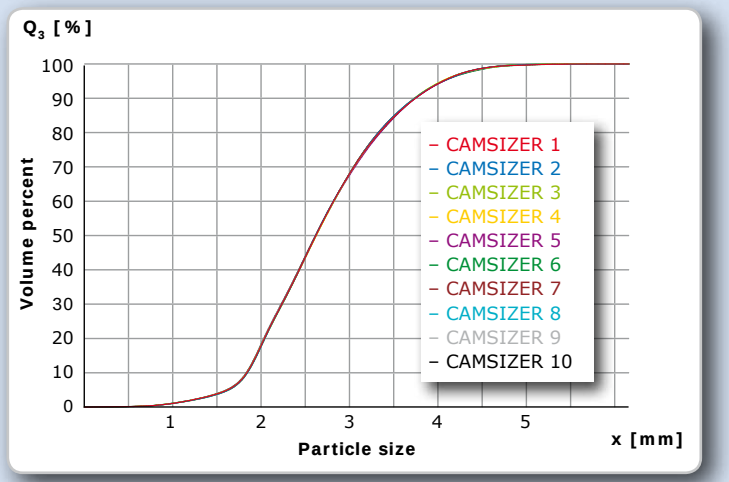
The CAMSIZER is highly suitable for the characterization of the growth of granules, pellets or globules. Parameters such as mean particle size, distribution width, sphericity, transparency or surface roughness are typical examples. They promote information about the thickness and homogeneity of coatings during fluid bed granulation, or the percentage of dust or oversized grains (agglomerates!). Complex parameters such as the time of release of drugs inside the human body can be predicted with these results. The CAMSIZER is used for fast and precise monitoring of the API products. It allows for optimum setting of the process parameters, thus saving time and money. The example shows the original material as well as 4 coating steps (2 measurements of each). The coating thickness of the last process step is 2.5 microns. The CAMSIZER can be validated according to GLP/GMP and can be optionally operated with a 21 CFR part 11 compliant software, which is critical for API materials.

Excellent reproducibility

Example: Fertilizer

For many companies a consistent quality control process is of great importance, particularly if the production sites are located globally. Thanks to easy operation and extensive automation the CAMSIZER provides perfectly reproducible results, even at different production sites. In round robin tests the CAMSIZER outperforms other methods, for example, sieve analysis, partly due to the easy, quick and accurate calibration of the instrument.

The graphic shows the excellent instrument-to-instrument agreement: 10 measurements of the same fertilizer sample with 10 different CAMSIZER systems. The curves perfectly match each other.



Specifications

Technical Data CAMSIZER	
CAMSIZER®	
Measuring range:	recommended range 30 µm to 30 mm (500 mesh to 1.25 in.) (with no hardware adjustment)
Parameters:	particle size, shape, density, transparency and number
Measurement:	60 images/s with more than 780.000 pixels each (corresponds to more than 45 megapixels per second)
Measuring time:	approx. 1 to 3 min (depends on required measurement statistics)
Instrument data:	dimensions (H x W x D) approx. 650 x 850 x 350 mm (25.5 in. x 33.5 in. x 14 in.) weight (without PC) approx. 40 kg (88 lb.)
The CAMSIZER is CE-tested and follows the relevant guidelines and standards. It can be supplied with software complying with FDA rule 21 CFR Part 11.	
AutoSampler	
Compressed air supply:	6 – 8 bar (87 – 123 psi)
Compr. air consumption:	max. 10 l/min (2 gal/min)
Instrument data:	dimensions (H x W x D) approx. 900 x 1450 x 490 mm (35.5 in. x 57 in. x 19.5 in.) weight 60 kg (132 lb.)
Sample feed:	control of the conveyor belt by light beam interruption during sample container positioning, sample feed by electro-pneumatic robot arm, emergency stop-button
The AutoSampler is CE-tested and complies with the relevant guidelines and standards.	
CAMSIZER® Online	
Measuring data:	see CAMSIZER
Working range:	temperature range -20 °C to +50 °C (air-conditioned), (-5 to +120 °F) enclosed for rough surroundings by housing (IP 54), shock and vibration-absorbing installation
Instrument data:	dimensions (H x W x D) approx. 800 x 1600 x 600 mm (31.5 in. x 63 in. x 23.5 in.) weight approx. 250 kg (550 lb.) compressed air supply 4 – 8 bar (58 – 123 psi)
Interfaces:	Ethernet, Profibus, various digital and analogue contacts and signals (e.g. 4 – 20 mA)

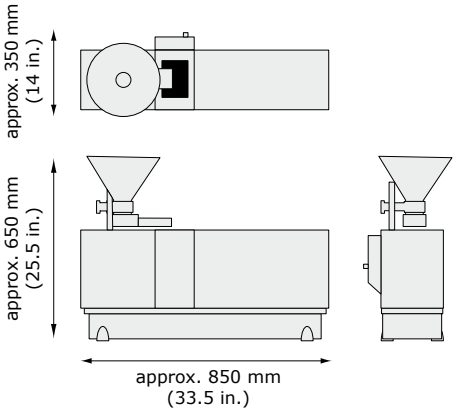
Fields of application	
Scope and purpose:	rapid and exact particle size and shape analysis of all dry, flowable bulk materials and powders
Sample material:	e.g. abrasives, carbon products, carbon black/coal, catalysts, coffee, fertilizers, foodstuffs, glass/ceramics, metal powders, pharmaceuticals, plastics, polystyrene, refractory products, salt/sugar, sand etc.
Operating sites:	factory laboratories, research institutes, locations close to the production line as well as online for optimal quality control of products and processes

CAMSIZER® at a glance

With more than 500 installations, the CAMSIZER is the most successful particle size analyzer using Dynamic Image Analysis. It is not only characterized by precision, robustness and convenient operation but also by its wide measuring range from 30 µm to 30 mm. The patented 2-camera principle provides an unrivaled combination of high measuring speed with high resolution which makes the CAMSIZER indispensable for a great variety of applications. The almost 100% comparability to the results of sieve analysis allows for a smooth transition to this new method without the need to introduce new particle size specifications.

Thanks to easy operation and short measuring times, the use of the CAMSIZER not only reduces the labor costs of the laboratory but also helps to monitor and optimize the production process. More accurate and faster analyses of particle size and shape improve the product quality, reduce rejects and save energy and raw materials.

The main areas of application of the CAMSIZER are quality control, research and production monitoring. Together with solutions for the partial or complete automation of the measuring process, a continuous sample analysis process can be realized in an economically efficient way.



Retsch Technology

Retsch Technology GmbH
Retsch-Allee 1-5
42781 Haan, Germany

Telephone +49 21 04/ 23 33- 300
Telefax +49 21 04/ 23 33- 399

E-Mail technology@retsch.com
Internet www.retsch-technology.com

A VERDER COMPANY

Retsch Technology – your specialist for particle analysis offers you a comprehensive range of instruments. We would be pleased to provide you with further information about our analytical instruments for dry and wet measurement with Dynamic Image Analysis or Laser Diffraction.

Printed in Germany
Subject to technical modification and errors
99.011.0001/E-02-2012