

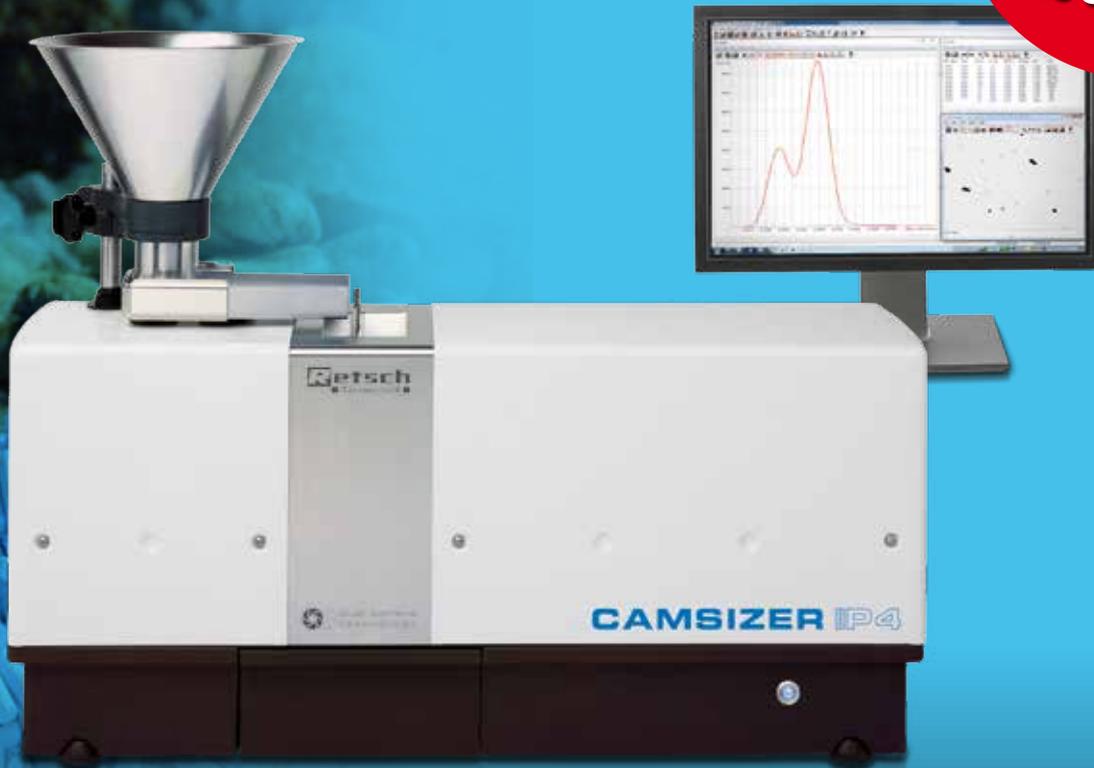
NEW!

Retsch[®]
TECHNOLOGY
Solutions in Particle Sizing

Particle Analyzer CAMSIZER P4 – the fourth generation

Particle size and shape analysis with
Dynamic Image Analysis

Analysis of
dry materials
from 20 µm
to 30 mm



The fourth generation: better performance, new features

- **Higher** resolution of cameras enhances the precision of size and shape analysis
- **Faster** hardware and software detect more particles per second and provide more information about each particle
- **3D Cloud:** flexible and meaningful representation of size and morphology parameters in 3 dimensions
- **New Particle Library function:** advanced search capability of particle images and characteristics for single particles



1,000 CAMSIZER systems are used worldwide for a vast range of applications, such as:

- ◊ Carbon products
- ◊ Fertilizer
- ◊ Refractory products
- ◊ Glass/ceramics
- ◊ Coffee
- ◊ Catalysts
- ◊ Plastic
- ◊ Food
- ◊ Metal powders
- ◊ Pharmaceuticals
- ◊ Polystyrene
- ◊ Carbon black/coal
- ◊ Salt/sugar
- ◊ Sand
- ◊ Abrasives



Solutions in Particle Sizing

Particle Analyzer CAMSIZER P4 – the fourth generation

Better performance, new features

Faster cameras with higher resolution, a brighter light source and improved data processing capabilities differentiate the CAMSIZER P4 from its predecessors. These improvements increase the measurement speed (~ 1 - 3 minutes); allow more precise shape analysis of small particles and an extended size measurement range.

The extended software functionalities now include an image library containing pictures and contours of each particle and its respective shape and size readings, and

a **3-dimensional diagram (3D Cloud scatterplot) of the analysis parameters**. New particle shape descriptors allow for analysis of the roundness of particles.

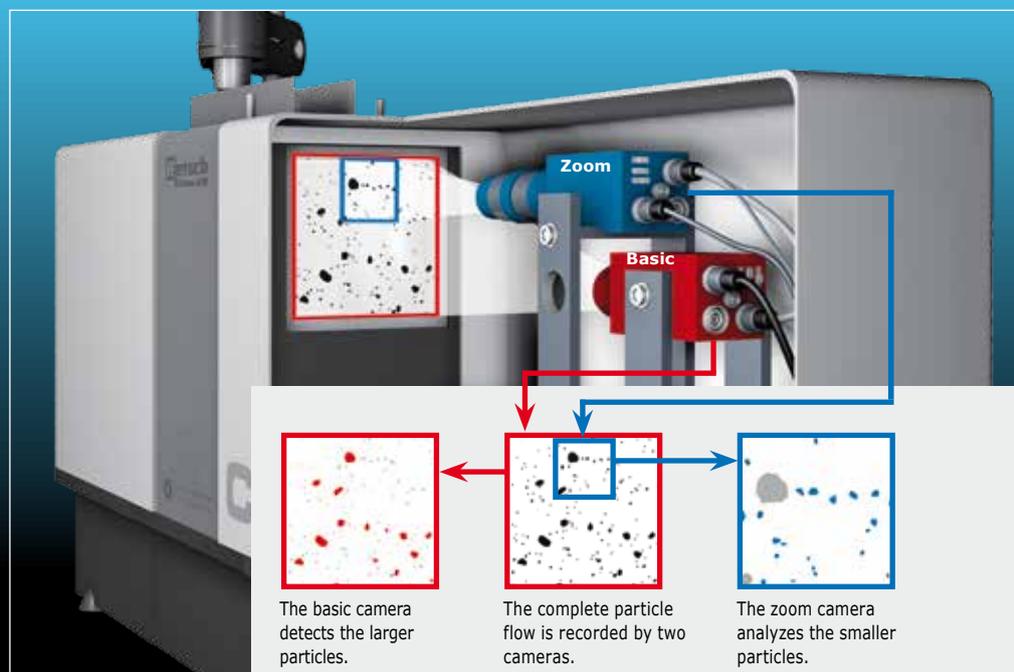
Well-proven functions like the certified calibration reticle, the automated air flow in the measurement zone, and the motorized funnel height adjustment have been preserved in the CAMSIZER P4. These functions provide simple operation, a robust and maintenance-free instrument as well as stable and reliable measurement results even if operated 24/7.

Patented Dual Camera Technology

The dual camera system of the CAMSIZER P4 is superior to any other dynamic image analyzers in terms of width of size range, analysis speed, accurate shape detection and resolution. **The dual camera system provides optimized analysis conditions for small and large particles without compromising resolution or detection probability.** Therefore, wide range measurements from 20 µm to 30 mm with no hardware adjustments can be reproduced with excellent precision.

The vibratory chute feeds the samples to the CAMSIZER P4 and all particles fall individually through the measurement field. During the measurement procedure the two digital cameras (low noise CCDs) perform simultaneously. The basic camera detects large particles and the zoom camera detects the small ones. The combination of the vary-

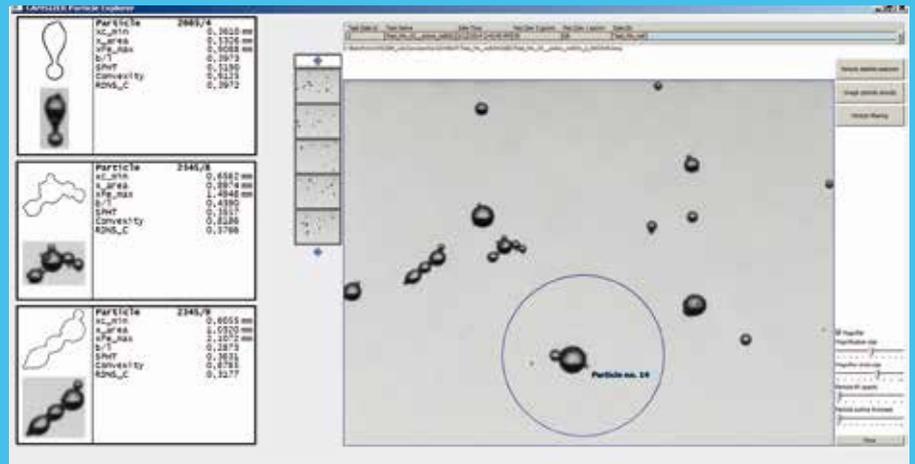
ing image scale on each of these cameras allows both small and large particles to be captured at a high resolution. The frame rate and the area where the particles are detected determine the speed in which the particles can be measured. In order to replace the dual camera system with a single camera, it would require images with more than 40 megapixels with a frame rate of at least 30 Hz, which is impossible by today's standards.



Particle library and 3D-Cloud

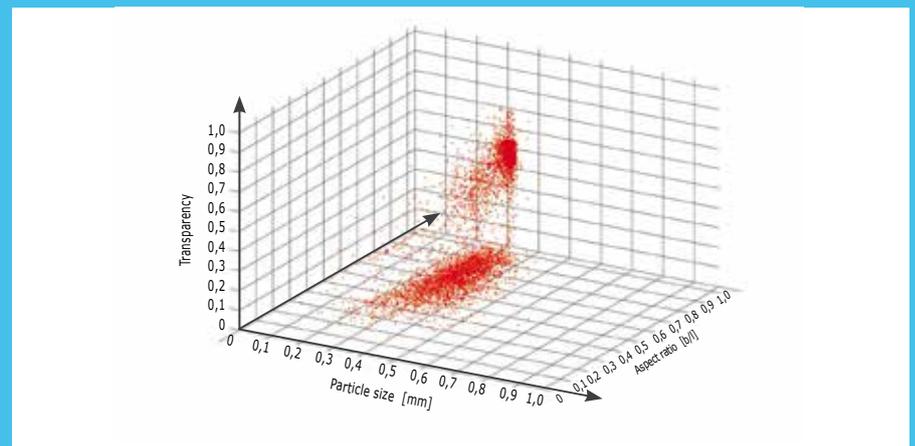
The CAMSIZER P4 integrates higher resolution cameras and a faster interface between the cameras and the PC than the previous generation, which allows for a new internal data structure that **stores large amounts of image data to a particle library**. Images and contours of particles with defined properties can be extracted from the particle library and displayed or processed off-line. Similar image libraries are well known from conventional static microscopes. The CAMSIZER P4 particle library, however, handles millions of single particle images incredibly fast.

In addition to the well-known two-dimensional display of results, the CAMSIZER P4 features a new **3D Cloud (3 dimensional graph)** which allows displaying 3 parameters (for example particle size, aspect ratio, and transparency).



The 3D Cloud gives enhanced data manipulation capabilities for complex analysis tasks. Particles with defined properties can be extracted from the data library and processed separately, such as calculate size and shape results. In this example a filter has been set to identify agglomerated particles.

3D Cloud: Display of the 3 independent analysis parameters **size, transparency, and aspect ratio** for a mixture of road marking materials consisting of irregular shaped, non-transparent antiskid aggregates and round, transparent glass beads.



New particle shape descriptors

The roundness of sand and sediments is commonly determined by geologists. For example, the petroleum industry measures roundness of ceramic proppants and frac sands.

In co-operation with the University of Leuven and SCR Sibelco NV, RETSCH TECHNOLOGY developed a new algorithm that provides automatic, statistically reliable and fully objective Roundness and Sphericity of particles.

The new roundness parameter is related to the work of Prof. Wadell and Prof. Krumbein from 1932 to 1965 which is still the basis of today's ISO 13503-2 or API RP 56/58/60 standards.

The new algorithm generates the identical values when compared to the previous, time consuming manual analysis method. It has been tested on hundreds of frac sand and ceramic proppant samples.

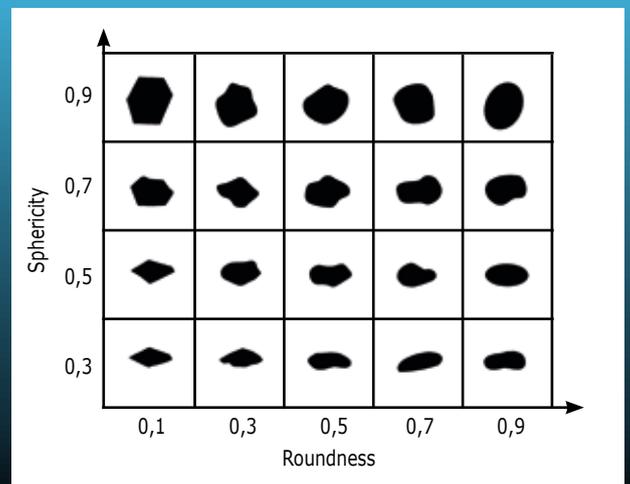


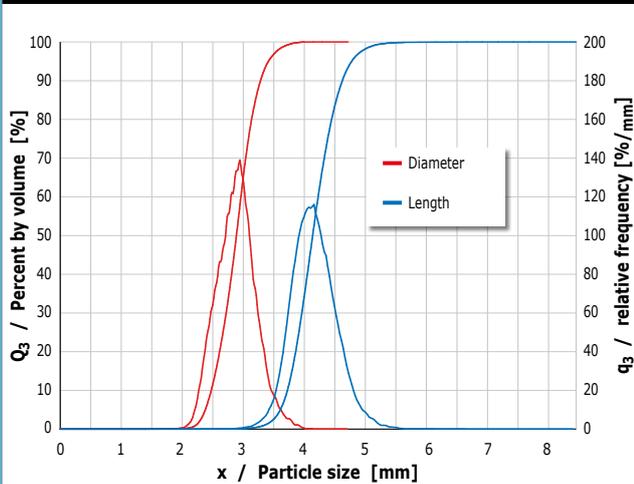
Chart for visual inspection of Roundness and Sphericity according to Krumbein and Sloss



Particle Analyzer CAMSIZER P4 – the fourth generation

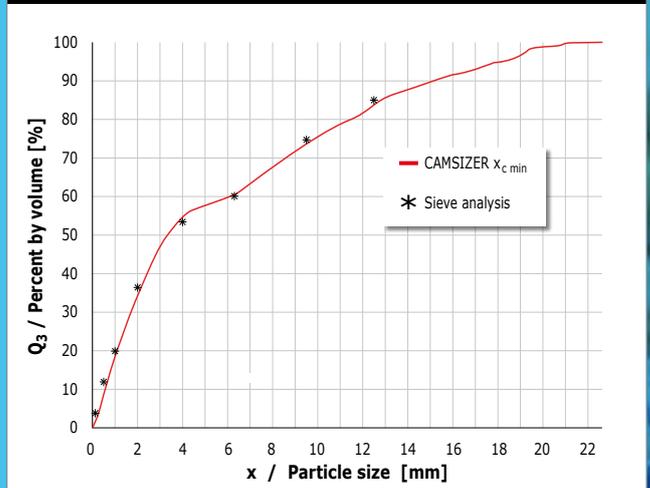
Application examples

Transparent plastic pellets Length and diameter analysis



Thanks to the new, brighter light source and the high resolution cameras transparent particles can be captured with excellent contrast, enabling accurate and precise detection. The example above shows the length and the diameter analysis of transparent pellets.

Refractory raw material with extremely wide particle size distribution



Samples with a wide size range with many fine particles can be analyzed with the CAMSIZER P4 in one simple measurement, without any instrument modification. Just like its predecessor, the CAMSIZER P4 provides measurement results which agree perfectly with sieve analysis results. This makes it possible to replace the time consuming sieving method with the CAMSIZER method.