MICROTRAC
a VERDER company

ANALYSIS OF BUILDING MATERIAL MIXTURES
CAMSIZER X2 FOR WIDE DISTRIBUTIONS

CONTEXT

The analysis of **finished, ready-to-use building material mixtures**, such as mortar and plaster, places special demands on particle measurement technology. These materials often contain **cohesive components that limit the free-flowing ability** and overwhelm classic image analysis systems. Laser diffraction also fails on this type of sample, due to the **wide size distribution** and the presence of **coarse particles**. **MICROTRAC's CAMSIZER X2** is perfectly suitable for such applications and offers a powerful solution for the **precise characterization of non-free-flowing, fine-grained building materials**.

CAMSIZER X2: Two-camera system for wide distributions

The CAMSIZER X2 is an excellent alternative to laser diffraction if the sample does not contain particles < 1 µm. While laser diffraction has its strengths for very fine powders, **the CAMSIZER X2 delivers reliable results for wide distributions and for the detection of oversize grains**. Especially for finished mixtures, controlling oversize is crucial for processability and surface quality.
Like all instruments in the CAMSIZER series, the X2 model also offers **excellent comparability** of results with **classic sieve analysis**.
A unique attribute of the CAMSIZER X2 is the **two-camera system**, consisting of a **BASIC** and a **ZOOM** camera. The ZOOM camera is optimized for capturing fine particles with high resolution, while the BASIC camera detects large particles with high sensitivity. By **simultaneously measuring with both cameras** at the same time and intelligently combining the data, a **complete picture of the particle distribution** is created – from a few micrometers to several millimeters.

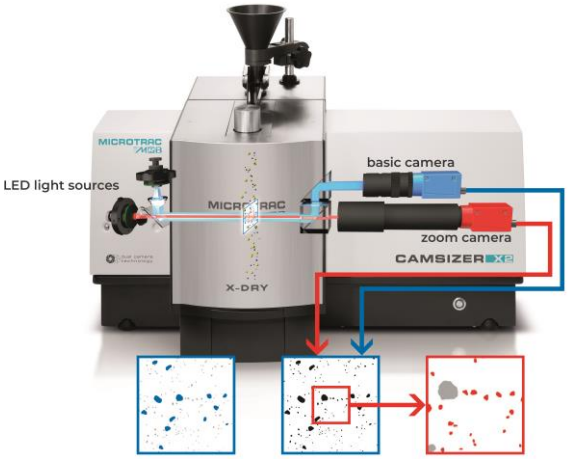


***Figure 1**: CAMSIZER X2 with dual-camera technology*

The CAMSIZER X2 is particularly suitable for the analysis of mortar, plaster, ground rock, and sand with cohesive components. Even complex mixtures with a wide grain size distribution can be characterized reliably and reproducibly. The measurement is in a dry state and automated, which enables high efficiency and objectivity in quality control.

Measurement example 1: Tile adhesive

In this example, a commercially available tile adhesive was analyzed with the CAMSIZER X2. The combined measurement with BASIC and ZOOM cameras provides a complete picture of the particle distribution. Comparative measurements with only one camera show clear weaknesses: The ZOOM camera cannot detect large particles because they do not fit well into its field of view, while the BASIC camera cannot detect fine particles due to insufficient resolution. Only the combined evaluation yields a satisfactory result for the quality assessment.

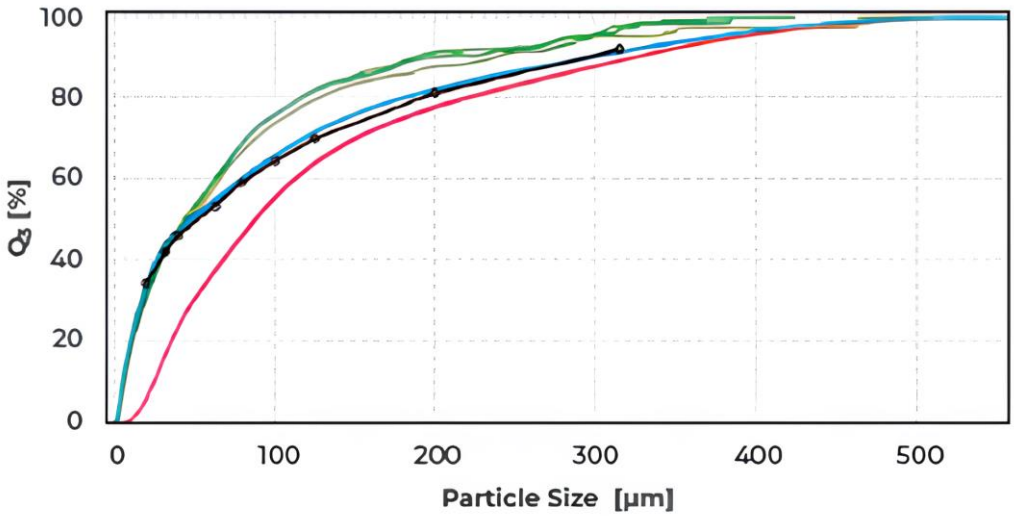


***Figure 2**: Three measurements of a sample of tile adhesive with the CAMSIZER X2. Red: Measurement only with BASIC camera, Green: Measurement only with ZOOM camera, Blue: Measurement with both cameras. Black: Sieve analysis. With a single-camera system, this sample could not be measured correctly.*

Measurement example 1: Analysis of various building materials and adhesives

As part of an extended series of measurements, four different building material samples were analyzed with the CAMSIZER X2. All samples are characterized by a wide particle size distribution and contain fine components such as cement, gypsum, or lime as well as coarse aggregates. Some mixtures contain particles with grain sizes up to 8 mm. For these applications, the CAMSIZER X2 can be equipped with a special dispersing nozzle that enables reliable separation and capture of large grains.

The results of the CAMSIZER measurements agree very well with the classic sieve analyses. The optical image analysis also provides information on the particle shape and enables an automated, time-saving evaluation of the grain size distribution. The following overview table shows the four measurement examples in comparison between CAMSIZER X2 and sieve analysis. The samples are all very different in size and composition. This shows the versatility of the CAMSIZER X2 instrument.

Overview Table: CAMSIZER X2 Measurement Examples

Product	Materials	Max. grain size	Typical Application
Interior base plaster	Gypsum, lime, special cement, crushed limestone, light aggregate	1,2 mm	Plaster for interior walls
Lime-cement base plaster	Non-hydraulic lime, cement, crushed limestone, light aggregate	1,5 mm	Interior walls, ceilings, and facades without moisture exposure
Masonry mortar	Cement, non-hydraulic lime, crushed limestone	3 mm	Masonry
Dry concrete	Cement, additives, aggregates, fibers	8 mm	Building & Civil Engineering

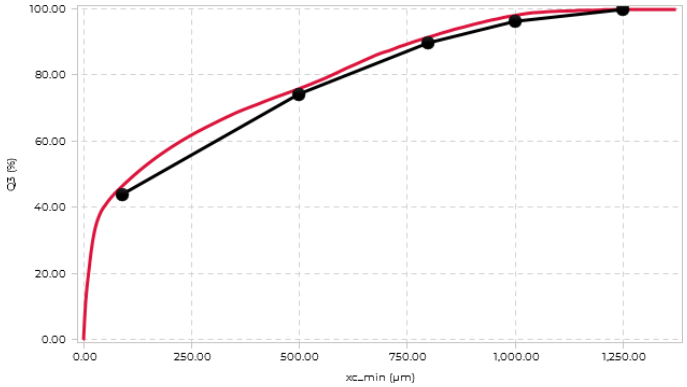


***Figure 3**: Interior base plaster. Red: CAMSIZER, black: sieve analysis.*

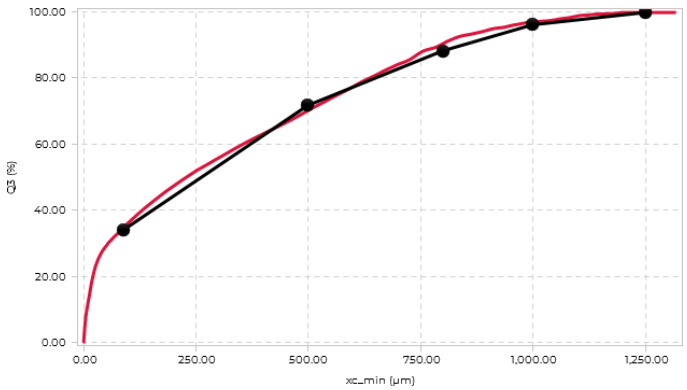


***Figure 4**: Lime cement base plaster. Red: CAMSIZER, black: sieve analysis.*

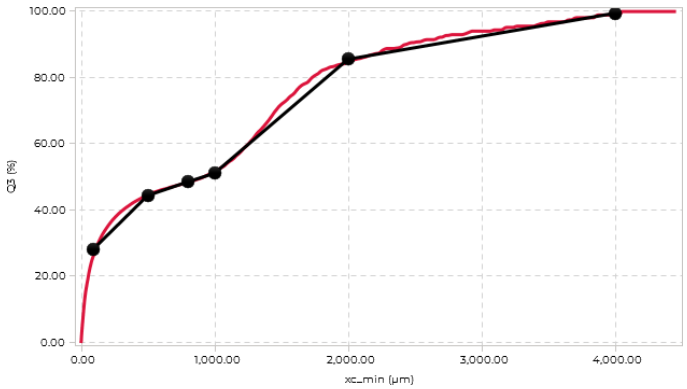


***Figure 5**: Masonry mortar. Red: CAMSIZER, black: sieve analysis.*

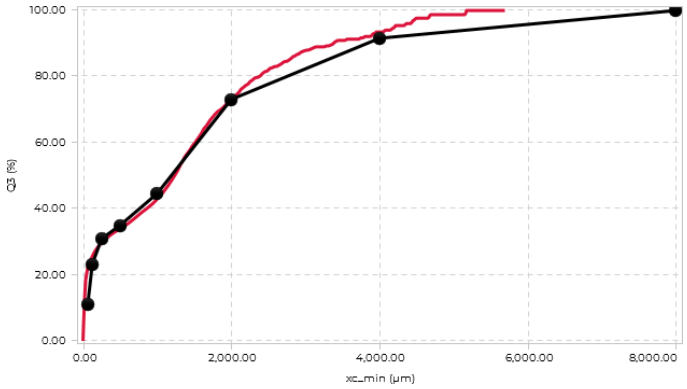
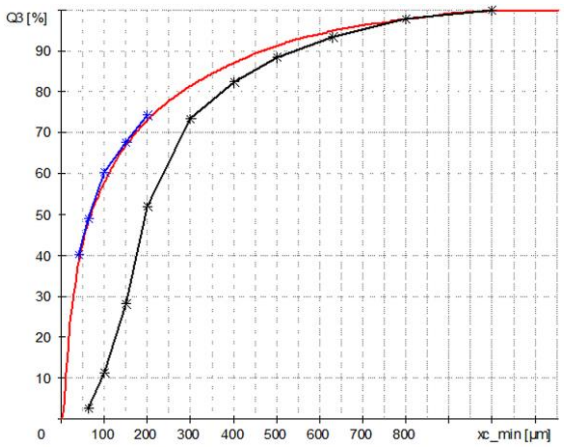


***Figure 6**: Dry concrete. Red: CAMSIZER, black: sieve analysis.*

Measurement example 3: Effective dispersion

The graph shows a typical result from a particle size analysis of a plaster sample. The size range ranges from 2 microns to about 1 mm. The graph shows the result of the CAMSIZER X2 in X-Jet mode, measured with a dispersion pressure of 150 kPa (red curve).
The plaster particles are agglomerating and "sticky", thus the results of a conventional sieve analysis show much coarser data (black curve), especially for the fine particles. However, if the particles are dispersed properly with an air jet sieve (AS 200 jet, blue curve), the results agree perfectly with the CAMSIZER X2. The functional diagram shows the X-Jet dispersion system, which ensures efficient separation of particles even with highly agglomerated materials.



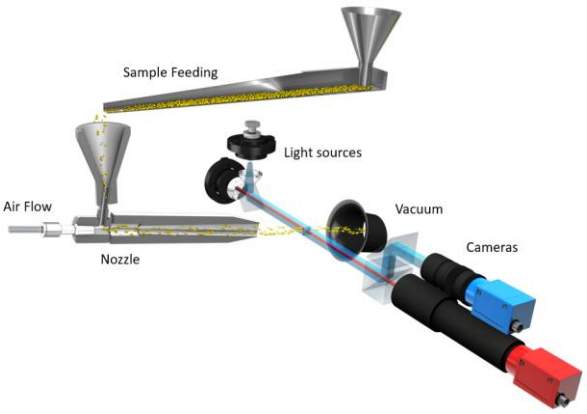


***Figure 7**: Building material samples with fine-grained components are best analyzed with the X-Jet module. The particles are accelerated and dispersed with compressed air. The air pressure is adjustable from 0-460 kPa. The example shows that air jet sieving (blue) and CAMSIZER X2 (red) provide identical results. Traditional vibratory sieving (black) cannot measure this sample correctly.*

SUMMARY

The CAMSIZER X2 from Microtrac is a powerful tool for analyzing building material mixtures such as mortar, plaster, and dry concrete. Unlike traditional methods like laser diffraction and sieve analysis, the CAMSIZER X2 excels in characterizing non-free-flowing, fine-grained materials with wide particle size distributions. Its dual-camera system—combining BASIC and ZOOM cameras—enables precise detection of both fine and coarse particles in a single measurement. This results in highly reliable and reproducible data, even for complex mixtures. Comparative studies show excellent agreement with sieve analysis, while also providing additional insights into particle shape and distribution. The CAMSIZER X2 is ideal for automated, efficient quality control in construction material applications.

➔ CAMSIZER X2