

Sugar

Particle size and shape analysis of crystal sugar and sugar beet seeds

Application

Sugar is an essential ingredient in a lot of foodstuff. The annual global sugar production amounts to approx. 145 Mio tons. The size range of crystal sugar spreads between icing sugar (0.024 mm) and rock candy (>10 mm). Most common table sugars are in the size range of 0.5 mm ("granulated sugar"). Different product sizes are either produced by sieving the refined sugar, or by milling the crystals down to the finest powder sizes.



Demands of quality assurance

Sugar measurement

Quality Control is an essential part of the sugar production process as manufacturers must ensure that the product complies with the specifications. The solubility, bulk density, transport and bulk handling properties as well as the product appearance strongly depend on the size range.

Usually, different sizes are stored in different silos after production. The final product is mixed from these size classes according to specifications. Hence, care must be taken that the particles in each silo are neither too small nor too big → they have to lie within the expected size range to allow for a controlled size distribution of the final mixed product. Traditionally, the particle size is determined by sieve analysis which is a rather slow method and subjected to measurement errors.

Seed measurement

Besides measuring the sugar itself, coated beet seeds are often also measured before they are sown. A quality control of the beet seeds is required to ensure their equality in size and shape (Fig. 2).

Solution

The CAMSIZER® can easily replace the size analysis by sieving (Fig. 1). Narrow as well as broad size distributions, and especially also oversized particles can be measured fast, with excellent reproducibility, and even fully automatically if desired. Except for the finest grained powder sugars, the CAMSIZER can analyse all sizes without any readjustments.

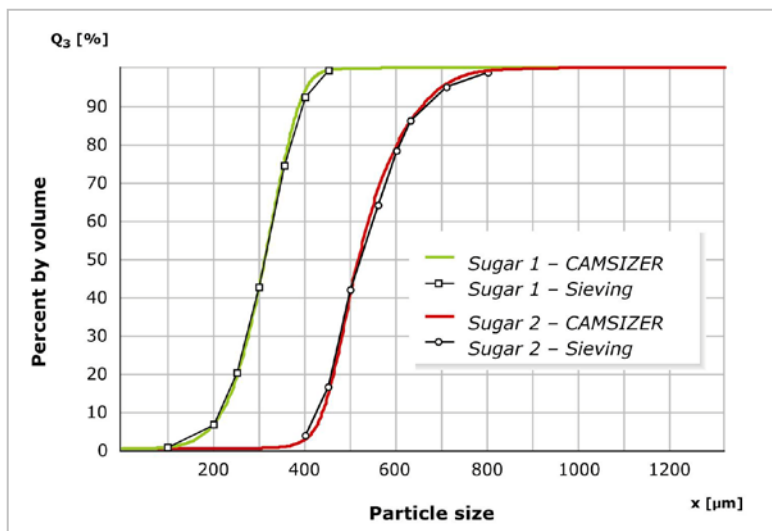


Fig. 1
Comparison of sieving and CAMSIZER® results → 100 % correlation

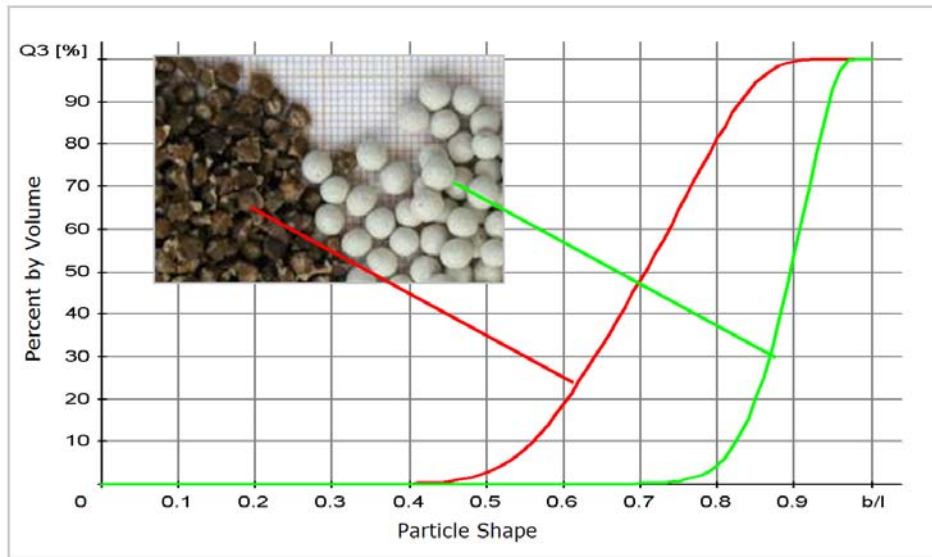


Fig. 2

Comparison of the particle shape (b/l) of uncoated and coated beet seeds (the coated seeds are rounder):

Red: uncoated beet seeds

Green: coated beet seeds

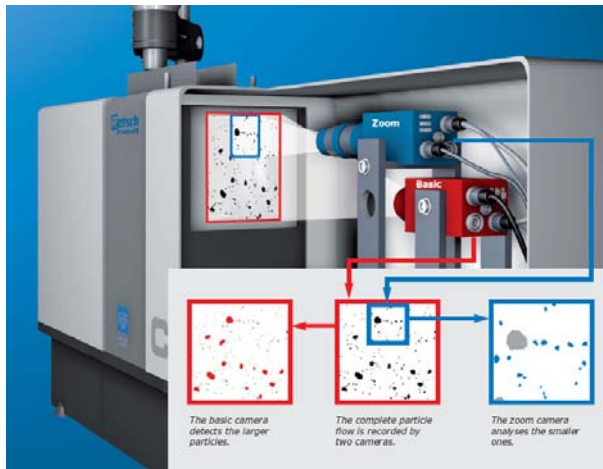
CAMSIZER® - Benefits at a glance

- Patented two camera system: measurement of broad particles distributions in one analysis, without readjustment (30 μ m - 30mm, fine refined sugar to rock candy)
- High resolution, especially for small size distributions
- Reliable, very reproducible particle size and shape information
- Short measuring time (typically 1 - 3 min)
- Reduction of workload compared to sieving
- Results directly comparable with sieving; identical product specifications
- Shape analysis to detect broken or aggregated particles
- Easy to operate, different operation modes for specialists and inexperienced operators
- Easy and fast calibration
- Maintenance-free; no wear
- Automated analysis with Barcode and AutoSampler possible
- Standardized report generation
- Fully automated online and at-line solutions (Fig. 3)
- ISO 13322-2 compliant
- Robust, industrially suited design with more than 400 installed units worldwide



Fig. 3
Online CAMSIZER®

Measuring Principle



The patented measuring setup of the CAMSIZER – two digital cameras as an adaptive measuring unit – improves and optimises 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, **without having to switch measuring ranges or make adjustments**. The sample is fed in from the feed channel so that all particles fall through the measurement field. During the measurement procedure the two digital cameras (CCD) perform different 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 been developed to allow automated measurements to be conducted continuously.

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