



SIZE AND SHAPE ANALYSIS OF DETERGENT POWDER USING DYNAMIC IMAGE ANALYSIS

The particle size of the ingredients used in washing powder/detergents determines not only the “look and feel” of the final end customer product, but also the dissolution of the particles in water and the quality of the washing process. This application note describes how the CAMSIZER has been successfully used to characterize detergent powder size and shape.

Introduction

The analysis of the size distribution is an important step during the development of new products and also during the production quality control. In addition to the interest in the average particle size, a special focus is also on the detection of oversized particles. The particle size distributions of detergents used as washing powders are traditionally analyzed by sieving. But detergents are known to create difficulties during the sieving process. The particles are often sticky and agglomerating which tend to block the sieve meshes, requiring time consuming cleaning. In the first few hours after production, the detergents age and change their adhesive behavior due to the exposure to humidity and other chemical processes. The results of the sieving thus depend on the age of the sample, storage conditions and on the handling procedures. The parameters of the sieving process might also influence the result, for example, by breaking up agglomerates in an unpredictable way. As a consequence, the results of the sieve analysis have to be treated with a high degree of uncertainty.

Dynamic Image Analysis

Dynamic Image Analysis with the CAMSIZER offers a contact free, fast and reproducible alternative (see Figure 4.) The instrument is fully automated, which enables every user to achieve the same result in a much shorter time and with less effort than sieving. Up to 40,000 particles can be analyzed per second, thus



after 1 to 3 minutes a statistically sufficient amount of sample has been analyzed. The results are perfectly reproducible and identical to the sieve data due to the advanced sieve correlation algorithm in the CAMSIZER software.

The wide dynamic range from 30 μm to 30 mm enables the analysis of both fine dust particles and oversized particles in the same sample. Also analyzed is the shape of the particles which can determine agglomeration behavior, or other process dependent parameters.

Experimental

A typical detergent used as a washing powder for clothes was purchased at a local store. The sample was measured using both the CAMSIZER and sieves. Figure 1 shows the particle size distribution as measured by the CAMSIZER as the continuous red curve and the results from sieve analysis as the black stars. The first point to realize is that the CAMSIZER provides information over the complete range of the particle sizes while the sieves only define the distribution at specific points.

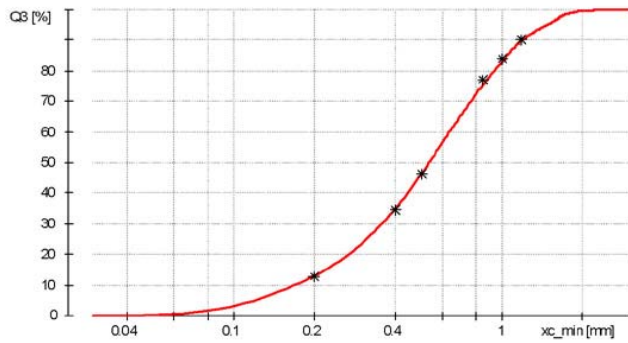


Figure 1: CAMSIZER (red) and sieve results (black points) for a detergent powder

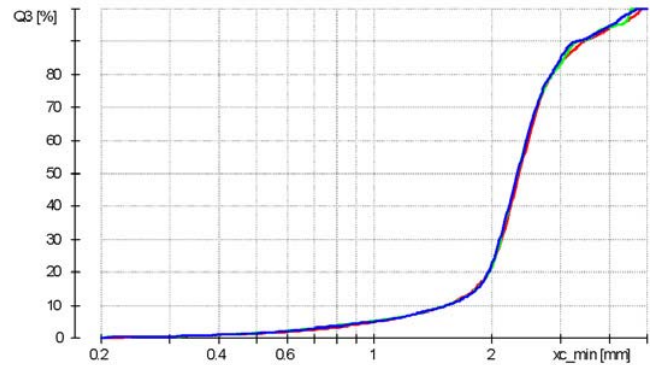


Figure 3: Overlay of three measurements to test reproducibility

The CAMSIZER and sieve results match perfectly due to the selection of appropriate particle shape parameter and the correlation algorithm.

An image from the analysis is shown in Figure 2, showing the wide range of both particle size and shape.



Figure 2: Image collected by the CAMSIZER while analyzing a detergent powder

The sample was riffled to assure proper sample splitting and three representative samples were then analyzed by the CAMSIZER for 50 seconds to test reproducibility.

The graph shown in Figure 3 displays an overlay of these three measurements.

Conclusions

Dynamic image analysis by the CAMSIZER is an attractive alternative to sieve analysis when measuring the particle size distribution of detergents used as washing powders.

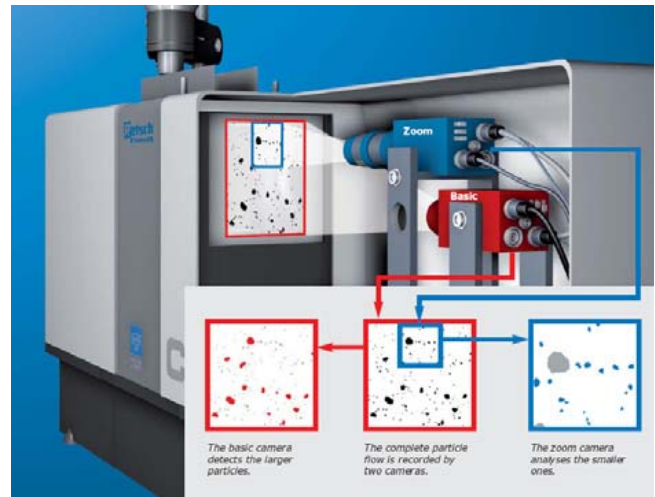


Figure 4: The CAMSIZER principle

Copyright 2011, HORIBA Instruments, Inc.
For further information on this document or our products, please contact:

HORIBA Instruments, Inc.
34 Bunsen
Irvine, CA 92618 USA
(888) 903-5001
www.horiba.com/us/particle