

# BeVision D2

A Precise Vision of Particles



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## A Precise Vision of Particles



“The BeVision D2 is easy to use and quickly provides high-resolution results that are key to the quality assurance of our product line.”

PetroChina Company Limited Petrochemical Research Institute

The BeVision D2 provides an efficient solution to the size and shape analysis of dry, high-flowability powders or granules. Tens of thousands of particles can be measured by a BeVision D2 within three minutes.

Combining a high-speed camera with a precise telecentric lens, the BeVision D2 is able to efficiently analyze the size and shape of particles in the range of 30 - 10,000  $\mu\text{m}$ .

The BeVision software helps you evaluate particle size and shape from 24 different aspects and further organizes the data into an all-around validation of particles.

Measuring 10,000 particles within

**3 minutes\***

\*Sample and sample preparation dependent

A

**high-speed camera**

captures free-falling particles

**Real-time**

results during measurements

### Features and Benefits

- Measurement range: **30 – 10,000  $\mu\text{m}$**
- **24** different particle size and shape parameters
- **Reduction** of workload and time
- Outstanding **reproducibility**
- Fully **automated** operation
- Results in compliance with **ISO 9276-6**
- **Powerful software** provides a comprehensive evaluation
- **Comparable** with sieving results

# Why Image Analysis Method?

## Easy

Capture an image of particles, identify particles, then measure their size and shape. Every step of image analysis is easy and clear.

## Shape analysis

Based on a direct view of particles, it is possible to analyze not only the size of particles, but also their shape.

## Seeing is believing

The image analysis method determines the size and shape of every individual particle and then sums it up to form a statistic. Details of particle size or shape distribution can be accurately provided.



# Why Dynamic Image Analysis Method?

## Efficiency

A continuous particle flow passing through the measurement zone helps achieve a higher efficiency of the measurement.

## Oversized particle sensitivity

The dynamic image analysis method is sensitive to oversized particles; it is even possible to estimate the size of oversized particles.

## Reliable results

The maximized number of measured particles ensures the statistical significance of measurement results.

# BeVision Series: Precision in Particle Vision



## BeVision S1

Classical and versatile static image analyzer for wet and dry measurements.



## BeVision M1

Automated static image analyzer for wet and dry measurements.



## BeVision D2

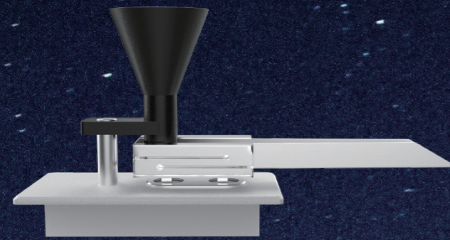
Dynamic image analyzer for dry measurement.

	Static Image Analysis		Dynamic Image Analysis
	BeVision S1	BeVision M1	BeVision D2
Measurement range	1 - 3,000 µm	1 - 10,000 µm	30 - 10,000 µm
Particle shape analysis	●●●	●●●	●●●
High-resolution for narrow distributions	●●●	●●●	●●●
Accuracy for broad distributions	●	●●	●●●
Reproducibility	●	●●	●●●
Small sample volume for a single analysis	●●●	●●	●
Undersized particles detection	●●●	●●	●
Oversized particles detection	●	●	●●●
Simple operation and measurement efficiency	●●	●●●	●●●
Individual particle analysis	●●●	●●●	●●

# BeVision D2 Hardware: Guaranteed Accuracy and Efficiency for You

To measure the size and shape of particles over a great variety of applications, the BeVision D2 has equipped with a comprehensive range of hardware. Corresponding to the sample material properties, selecting the best hardware can help measure the size and shape of particles with optimum accuracy and efficiency.

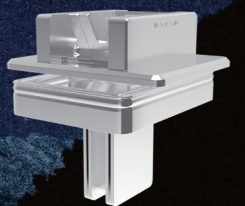
## Feeding chutes and funnels



To help particles flow appropriately during the test process, the BeVision D2 prepares several customization options for feeding chutes and the feeding funnel.

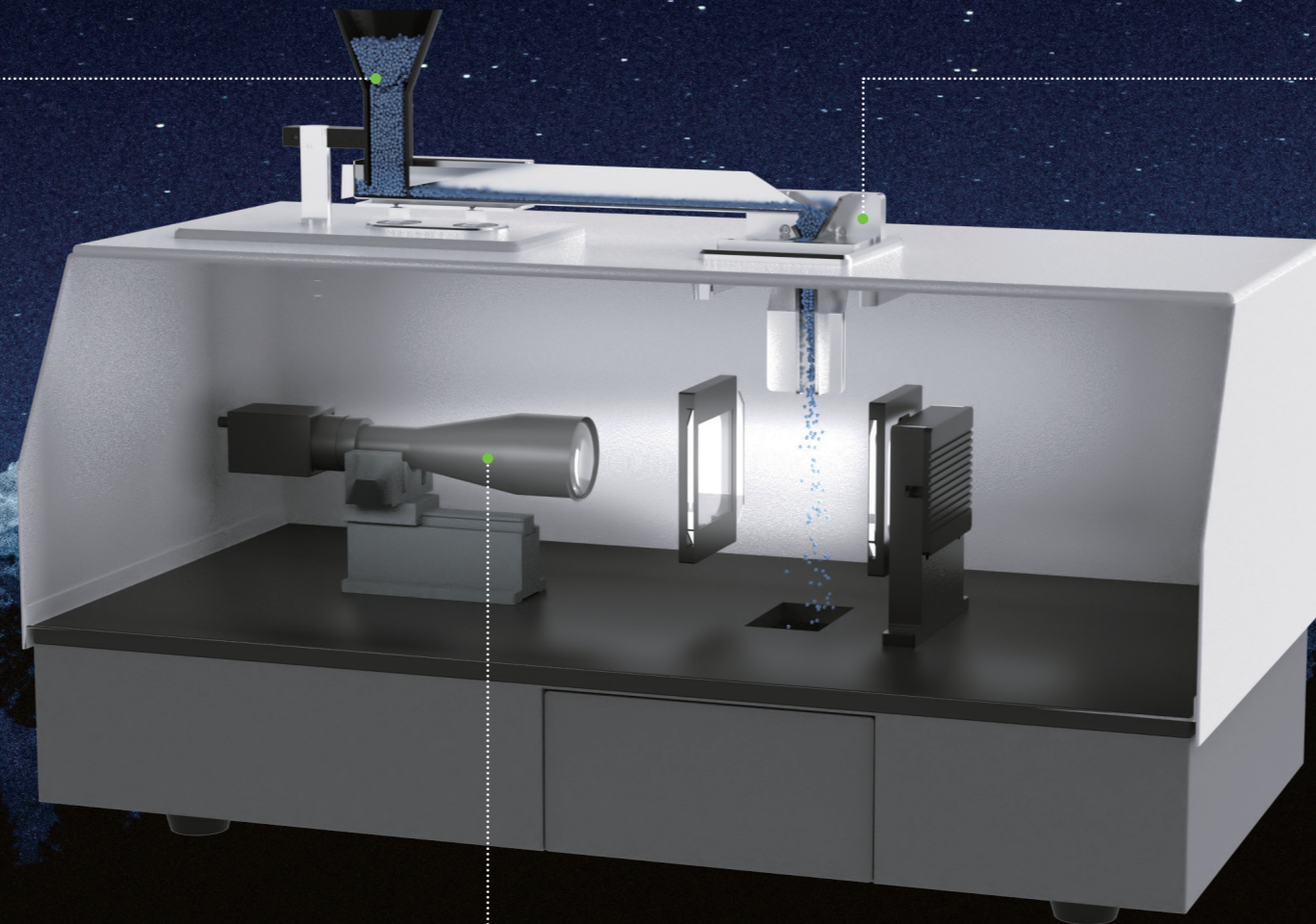
The customizable coating material for the funnel and chute can effectively prevent particles from sticking to the wall. The funnel size and the chute size are also customizable based on requirements, permitting the BeVision D2 to hold an appropriate volume of samples.

## Adjustable feeding guides



The feeding guide is used to orient the particle flow in the focusing range of the objective lens, thus the quality of captured images and accuracy of measurements are ensured.

Based on the approximate particle size, the width of feeding guide openings can be adjusted to achieve a balance between the feeding rate and the quality of images.



## Objective lens



Depending on the approximate particle size and the width of the particle size distribution, the BeVision D2 offers 5 optional objective lenses to ensure measurement accuracy.

Each optical lens has its own efficient working range, to accurately measure particle size and shape of a great variety of samples. According to ISO 13322, it is recommended to select a working range covering the whole size distribution range of the sample.

Objective lens	1 $\mu\text{m}$	10 $\mu\text{m}$	100 $\mu\text{m}$	1,000 $\mu\text{m}$	10,000 $\mu\text{m}$			
2x lens	3.75	11.25	33.75	500				
1x lens		7.5	22.5	67.5	1800			
0.5x lens			15	45	135	3600		
0.3x lens				25	75	225	6000	
0.132x lens					56.81	170.43	511.29	13635

able to detect particles, rough size measurement
  size and rough shape measurement
  size and shape measurement in ISO-area

# BeVision Software : Visualized Insights for You

## Distribution in total

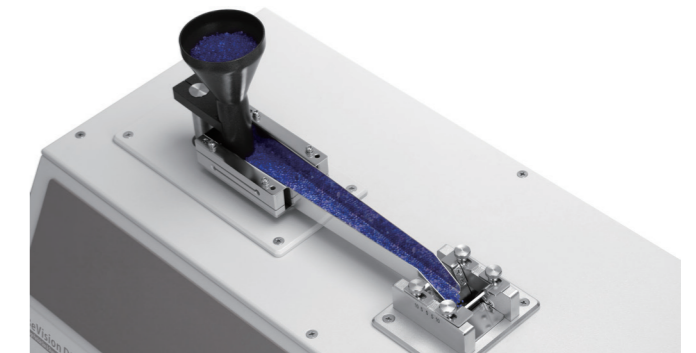
Distribution curves and charts present particle size and shape distributions, and the scattering plot shows the relationship between two different particle size and shape parameters. All these charts, curves, and tables are customizable.

## Distribution in summary

The BeVision software offers statistics and typical values to describe particle size and shape distributions, e.g., the D[1,0], span value, D90. The typical value chart is customizable.

## Reproducible measurements

To ensure a reproducible result, the BeVision software can make a measurement automatically, following a saved standard operation procedure (SOP).



## Comparable results

The record comparison function makes it possible to do a comparison among multiple records: particle size or shape distribution comparison, typical value comparison, etc.



## Reports keep flexible

The BeVision series prepares various report templates for different use. Layouts and contents of report templates are editable and customizable.

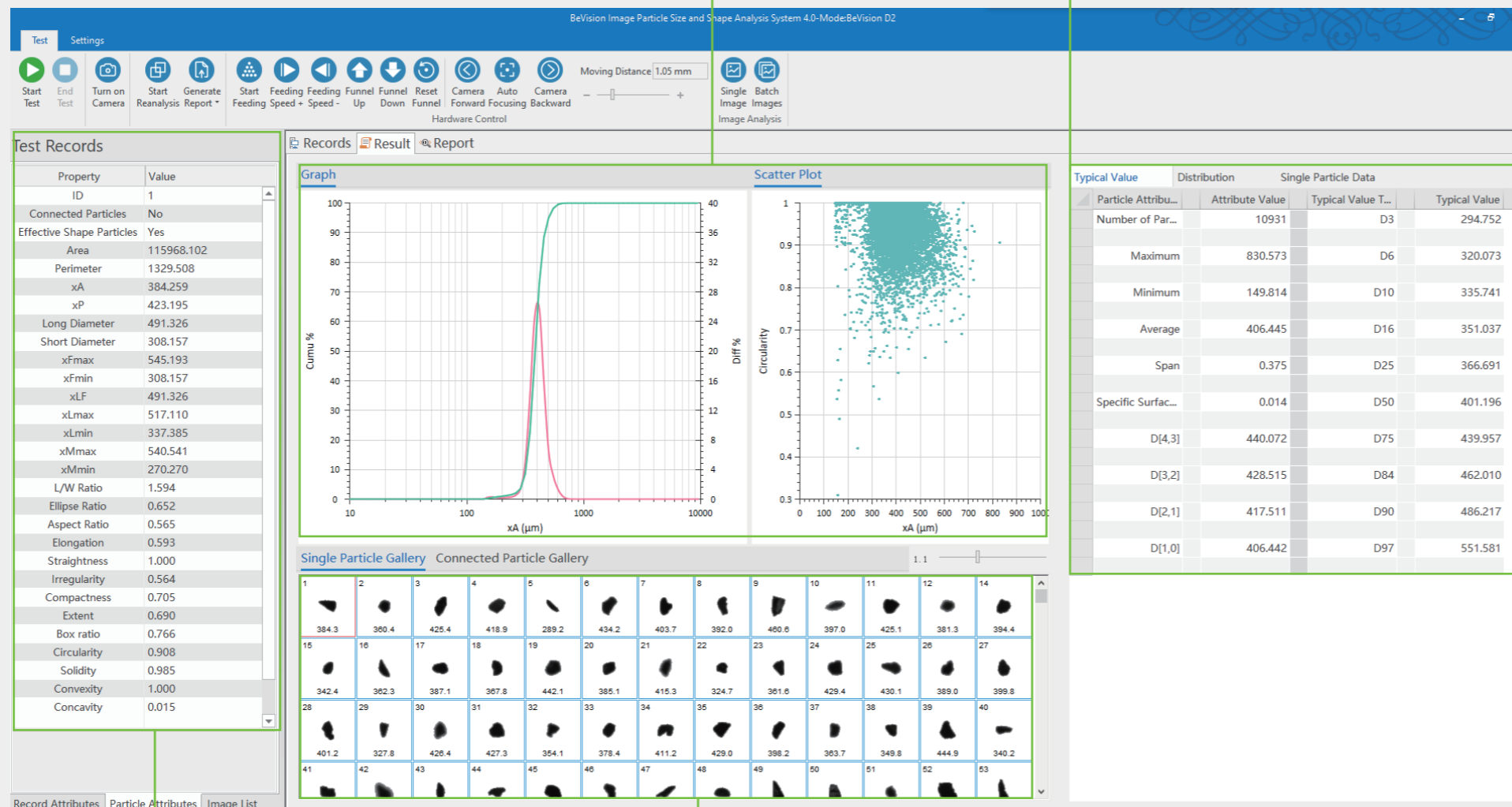


## Particle details

For irregularly shaped particles, it is hard to describe their size with a single dimension. Scanning over 180 different directions of each particle projection, the BeVision software is able to precisely analyze particles, and present the particle size and shape in 24 different parameters. The size and shape parameters are in compliance with ISO 9276-6.

## Locate particles

The BeVision software offers a single particle gallery that can be the direct way to locate particles with a specific appearance. Besides, the BeVision software allows users to find particles with specific characteristics, with a customizable filter.



# Particle Size and Shape Parameters

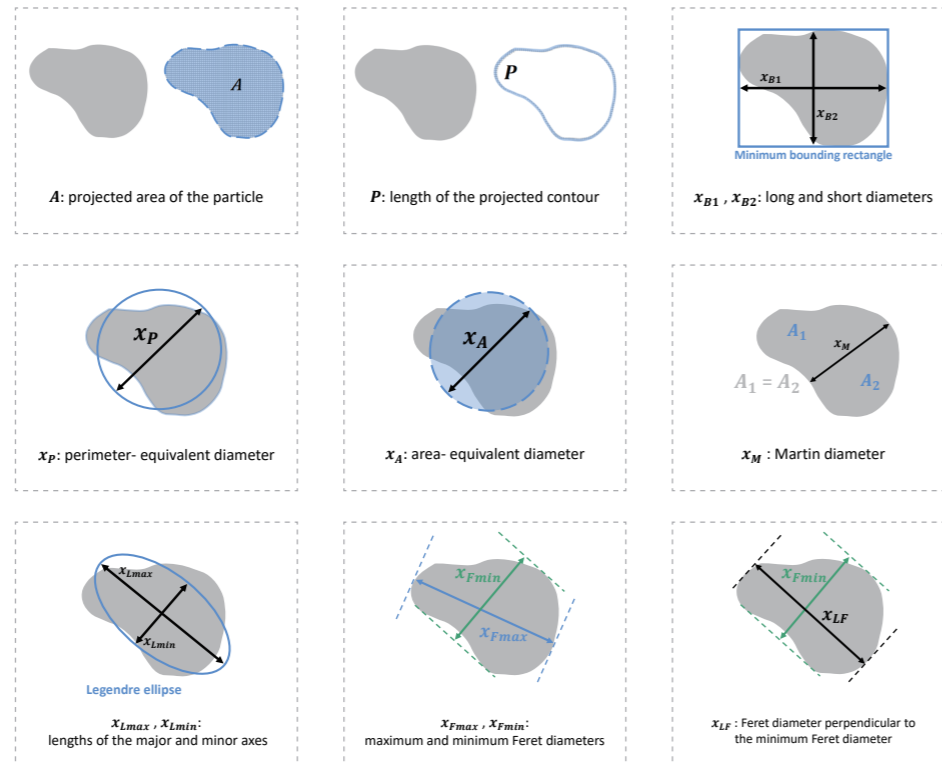
## Size parameters

**Equivalent diameters:**  
area-equivalent diameter  
perimeter-equivalent diameter

**Feret diameters:**  
maximum and minimum Feret diameters,  $x_{LF}$  ("length")

**Martin diameters:**  
maximum and minimum Martin diameters

**Legendre ellipse:**  
major and minor axes



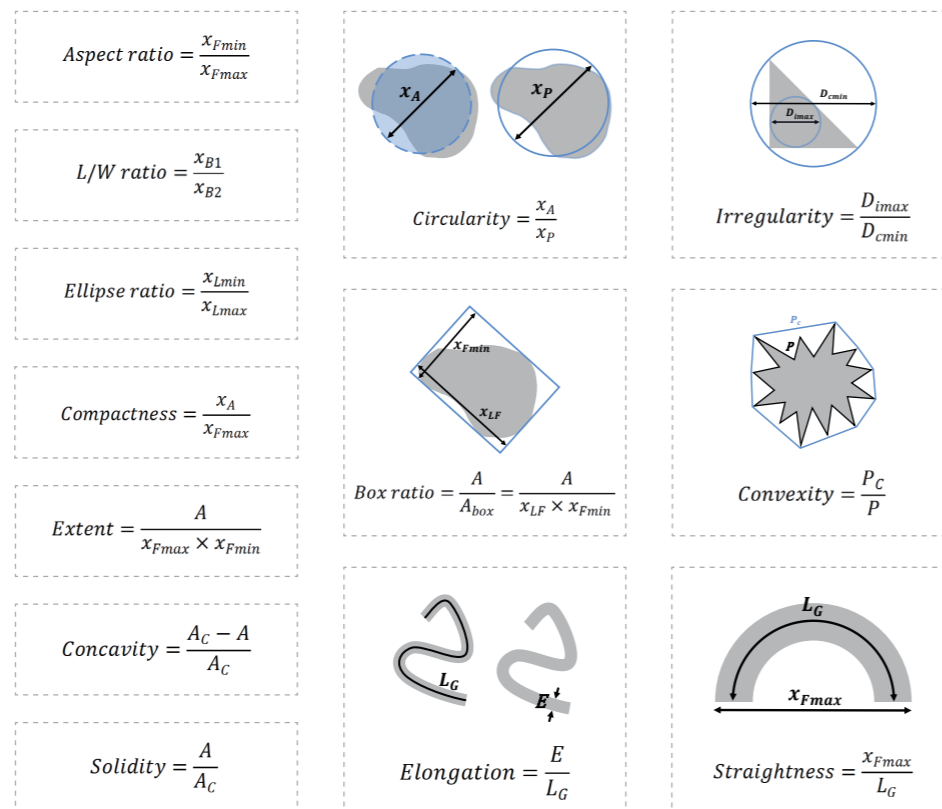
## Shape parameters

**Size difference in 2 directions:**  
aspect ratio  
L/W ratio  
ellipse ratio

**Round-likeness and rectangle-likeness:**  
circularity  
irregularity  
compactness  
extent  
box ratio

**Contour concavity:**  
concavity  
convexity  
solidity

**For elongated particles:**  
elongation  
straightness



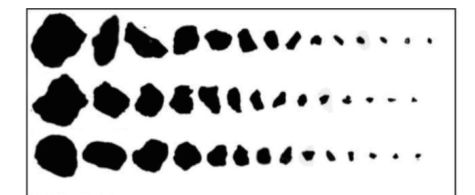
# Typical Applications



## Application Cases

### Natural sands

Researchers of a variety of industries, e.g., the oil and gas industry, place great importance on the morphological information of soils and sediments. The natural sands challenge image analyzers from 2 aspects: the size and shape of natural sands are distributed in a wide range and the efficiency of the shaping process. The BeVision D2 gets over these challenges with its wide measuring range and excellent efficiency and helps a research team of the China University of Petroleum successfully measure the size and shape of natural beach sand samples.

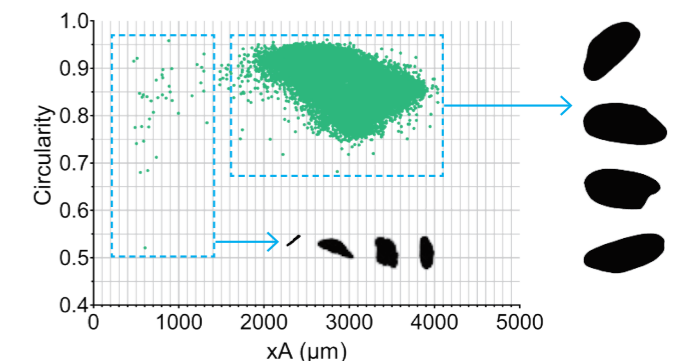


Sandstone sample particle morphology

Adapted from Yan, Y., Zhang, L., Luo, X., Li, C., Hu, F., A new method for calculating the primary porosity of unconsolidated sands based on packing texture: Application to modern beach sand, *Mar. Pet. Geol.*, 2018, (98), 384-396.

### Grains

The size and shape of cereal particles, especially refined grains, affect the quality and value of the final product. To help monitor the size and shape of cereals, the BeVision D2 offers high-resolution measurement results at good efficiency. The scatter plot showing the relationship between particle size ( $x_A$ ) and aspect ratio, helps QC engineers handle the size-shape distribution of the rice kernel sample and measure the content of broken rice and impurities.



## General

Measuring principle Dynamic image analysis method

Parameters Particle size, shape, and number

## Measurement performance

Measuring range 30 – 10,000 µm

Typical measurement time 1 to 3 min \*

Number of size / shape classes 100 (user adjustable)

Special functions SOP settings, automatic tests, analysis of saved images

## Main device

High-speed CCD camera Up to 120 images per second

Light source White LED stroboscopic parallel light source

## System parameters

Dimensions (L × W × H) 61.0 × 35.0 × 44.0 cm

Weight 26 kg

Supply voltage 100 / 240 V, 50 / 60 Hz

## Software

Conformity ISO 13322, ISO 9276

Reports Customizable reporting

\* Sample and sample preparation dependent

# Bettersize

BETTER PARTICLE SIZE SOLUTIONS

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