Bettersize
BETTER PARTICLE SIZE SOLUTIONS

3P INSTRUMENTS
Characterization of
particles • powders • pores

BeVision M1

Move Beyond Vision

PARTICLE SIZE

PARTICLE SHAPE

BeVision M1: Move Beyond Vision

The BeVision M1 provides an accurate analysis of particle size and shape in the range of 1 - 10,000 μm. Besides, the BeVision M1 can be a vital part of the surface cleanliness test.

With the precise auto - moving stage, the BeVision M1 can do analysis more efficiently and go beyond the size limit.

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.

Features and Benefits

- Measurement range: **1 - 10,000 μm**
- **Powerful software** eases your work
- Results in compliance with **ISO 9276 - 6**
- Automatic sample stage with **high position accuracy**
- Highly **reproducible** measurements
- **24** different particle size and shape parameters
- A **high-speed** CCD camera
- A key part of **surface cleanliness measurements**

With high magnification up to

800 times*

**Includes digital magnification*

Automatic
measurements

Panoramic view
of centimeter-level regions

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.

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.

Shape analysis

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

Why **Static** Image Analysis Method?

Clear vision

In static image analyzers, precision microscopes and cameras are specialized for high-quality particle images.

Undersized particle sensitivity

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

Small sample volume

The static image analysis method requires a small volume of samples. A few drops of emulsions or a few micrograms of powders are enough to do a measurement.

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.

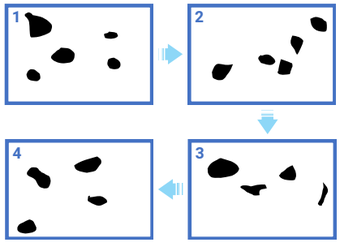
	Static Image Analysis		Dynamic Image Analysis
	BeVision S1	**BeVision M1**	**BeVision D2**
Measurement range	1 - 3,000 μm	1 - 10,000 μm	30 - 10,000 μm
Particle shape analysis	●●●	●●●	●●●
High-resolution for narrow distributions	●●●	●●●	●●●
Accuracy for broad distributions	●	●●	●●●
Reproducibility	●	●●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

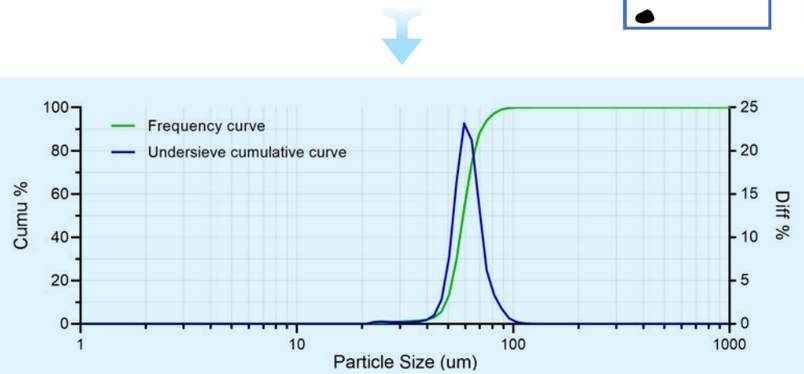
Efficient Scanning Mode and **Limit - breaking** Panoramic Mode

Scanning Mode

The workflow of the BeVision M1 scanning mode is to capture an image first, then analyze the image while moving the stage, capture the next image once the stage has reached a new position, and repeat.
The BeVision software will display real-time results during the scanning process. The scanning mode is widely welcomed in different industries with its efficiency and reliability.

Efficient and reliable scanning mode
Compared with the manual test, the automatic scanning process improves the test efficiency, doing the image capturing and stage moving simultaneously pushes the efficiency to the next level. The efficient scanning mode analyzes many particles in one test, thus strengthening the statistical significance of the result.



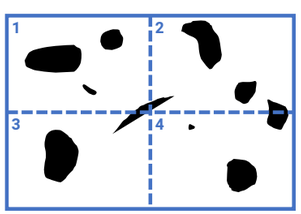


Both scanning mode and panoramic mode offer reliable statistics.

Panoramic Mode

The panoramic mode is to stitch separate images into a panorama before analysis.
With a panorama, it is easy to measure the total number of particles in the region and the size and shape of every particle, even if the particle is an oversized one. The accurate particle number is of vital importance to different industries, e.g., the automotive industry and the pharmaceutical industry.

A combination of macro vision with micro details
Panoramas produced by the BeVision M1 records all particles dispersed in a millimeter-level region and keeps their shape details. A clear panorama helps to accurately count particles in the macro-region and analyze the size and shape of particles, without any leftovers.



Particle Size and Shape **Parameters**

Size parameters

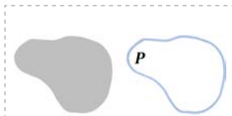
Equivalent diameters:
area-equivalent diameter
perimeter-equivalent diameter

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

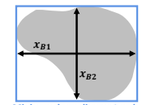
Martin diameters:
maximum and minimum Martin diameters

Legendre ellipse:
major and minor axes

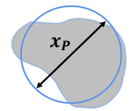
A: projected area of the particle



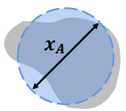
P: length of the projected contour



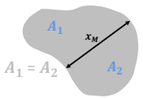
x_{B1} , x_{B2}: long and short diameters



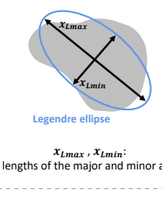
x_P: perimeter- equivalent diameter



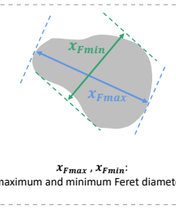
x_A: area- equivalent diameter



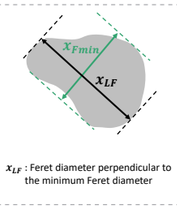
x_M : Martin diameter



x_{Lmax} , x_{Lmin}:
lengths of the major and minor axes



x_{Fmax} , x_{Fmin}:
maximum and minimum Feret diameters



x_{LF} : Feret diameter perpendicular to the minimum Feret diameter

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

$$Aspect\ ratio = \frac{x_{Fmin}}{x_{Fmax}}$$

$$L/W\ ratio = \frac{x_{B1}}{x_{B2}}$$

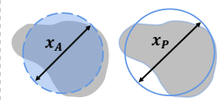
$$Ellipse\ ratio = \frac{x_{Lmin}}{x_{Lmax}}$$

$$Compactness = \frac{x_A}{x_{Fmax}}$$

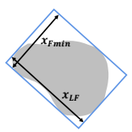
$$Extent = \frac{A}{x_{Fmax} \times x_{Fmin}}$$

$$Concavity = \frac{A_C - A}{A_C}$$

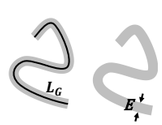
$$Solidity = \frac{A}{A_C}$$



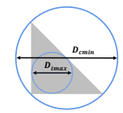
$$Circularity = \frac{x_A}{x_P}$$



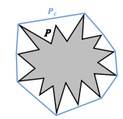
$$Box\ ratio = \frac{A}{A_{box}} = \frac{A}{x_{LF} \times x_{Fmin}}$$



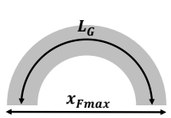
$$Elongation = \frac{E}{L_G}$$



$$Irregularity = \frac{D_{imax}}{D_{cmin}}$$



$$Convexity = \frac{P_C}{P}$$

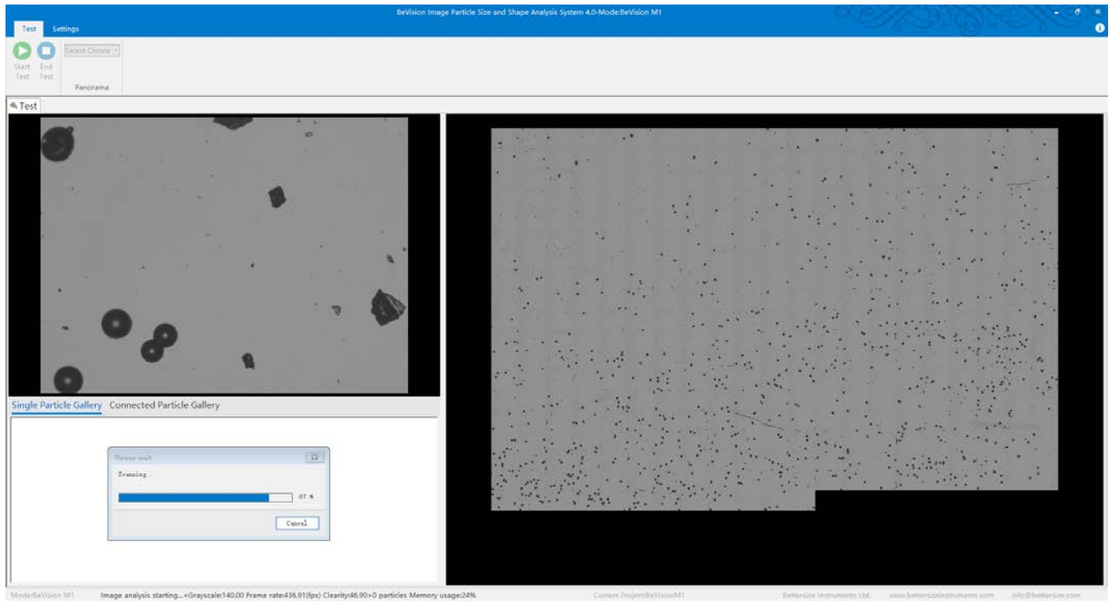


$$Straightness = \frac{x_{Fmax}}{L_G}$$

BeVision Software: Visualized Insights for You

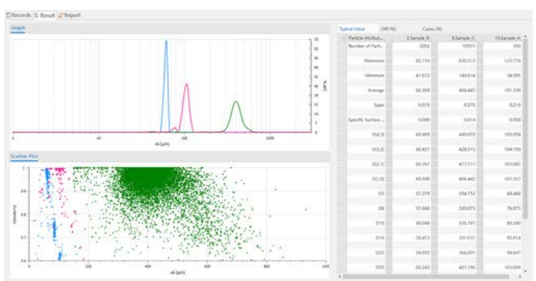
Reproducible measurements

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



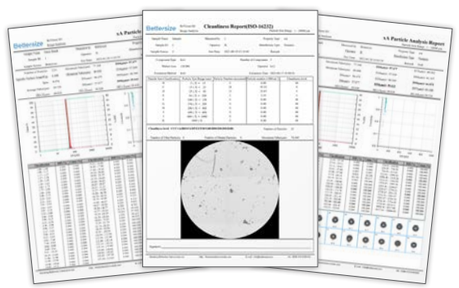
Comparable results

With the help of the BeVision software, it is possible to do a comparison among multiple records: particle size or shape distribution comparison, typical value comparison, etc.



Customizable reports

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

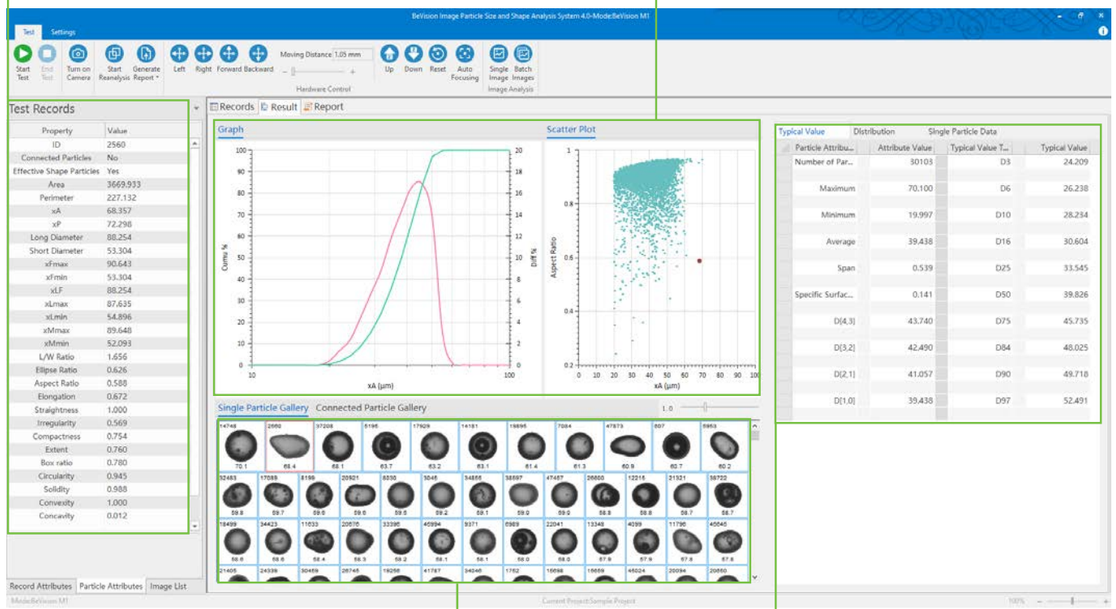


Particle details

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.

Distribution in total

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



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.

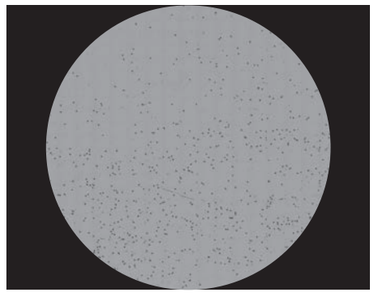
Distribution in summary

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

Application Cases

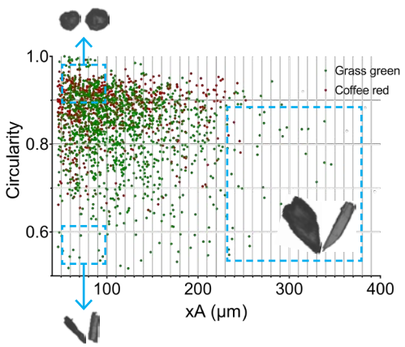
Coolant tube cleanliness measurement

Surface cleanliness is a key factor for machinery manufacturing, the automotive industry, etc. As clarified in the ISO-16232 standard, an important step of coolant tube cleanliness measurement is to measure the size distribution of particles trapped on membrane filters. Also, the types of pollutants need to be identified, such as metals or microfibers. The BeVision M1 can do necessary inspection and analysis automatically, such as counting the particle number, identifying microfibers, and the cleanliness classification.



Mineral pigments

The mineral pigment is a type of pigment derived from ground ore. The size and shape of mineral pigment particles affect the quality and performance of paint products. The BeVision M1 offers high-resolution size and shape measurement results at good efficiency, helping the QC engineers achieve an insightful validation of mineral pigments. A scatter plot showing the relationship between particle size and circularity helps compare the shape distribution of samples A and B, and guides designing paint recipes.



Microorganisms

Traditionally, counting colonies on a petri dish requires taking a microscope image first, and counting the number then. A BeVision M1 could easily handle this job with the panoramic mode. Taking the panorama automatically, then measuring the total number of cells and analyzing the size and shape of them, everything will be done efficiently.

Total number of colonies: 17

Colony ID: 2

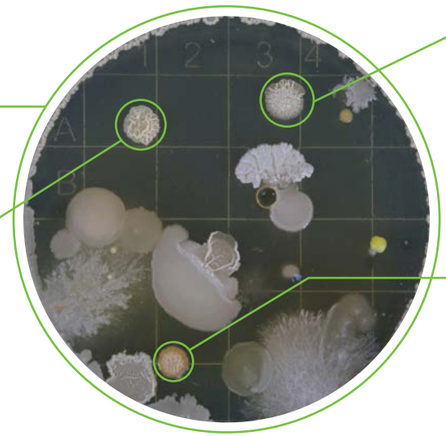
xA: 2561.5 µm

xFmax: 2846.0 µm

Aspect ratio: 0.878

Circularity: 0.917

Concavity: 0.024



Colony ID: 4

xA: 2783.0 µm

xFmax: 2940.6 µm

Aspect ratio: 0.947

Circularity: 0.866

Concavity: 0.026

Colony ID: 14

xA: 2111.4 µm

xFmax: 2327.312 µm

Aspect ratio: 0.889

Circularity: 0.789

Concavity: 0.043

Typical Applications

Agriculture

Abrasives

Paints, Inks & Coatings

Metal Powders

Surface Cleanliness

Mining and Minerals

Automotive

Ceramics

BT-910 Helps to Prepare Dry Powders

How does it help?

The BT-910 dry powder dispersion module generates a pre-set air pressure difference, which drives the dispersion airflow. The BT-910 aims to offer a reliable and reproducible dispersion method for dry powders.

Features and Benefits

- Reproducible dispersion
- No aggregates
- Even Dispersion

General	
Measuring principle	Static image analysis method, automatically scanning
Parameters	Particle size, shape, and number
Measurement performance	
Measuring range	1 – 10,000 μm
Typical measurement time	3 to 5 min *
Number of size/shape classes	100 (user adjustable)
Special functions	SOP settings, analysis of saved images
Main device	
Optical lens	4 ×, 5 ×, 10 ×, 20 × (with 40 × digital magnification)
High-speed camera	Up to 120FPS
Light source	Halogen lamp, Köhler illumination
Stage scanning range	55 × 55 mm
System parameters	
Dimensions (L × W × H)	35.0 × 65.0 × 67.0 cm
Weight	18.7 kg
Supply voltage	100 / 240 V, 50 / 60 Hz
Software	
Conformity	ISO 13321, ISO 9276, ISO 16232, ISO 4406
Reports	Customizable reporting

* Sample and sample preparation dependent

BT – 910 dry powder dispersion module	
Dimensions (L × W × H)	23.5 × 16.5 × 26.6 cm
Weight	4.3 kg
Supply voltage	100 / 240 V, 50 / 60 Hz
Dispersion air pressure	≤ - 60 kPa

Visit Our BeVision M1 Site:

European Representative:

Bettersize
BETTER PARTICLE SIZE SOLUTIONS

3P INSTRUMENTS Characterization of particles • powders • pores

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