Better Particle Size Solutions
Accelerate Your Business
ABOUT BETTERSIZE

Bettersize has been developing and manufacturing laser particle size analysers since 1995. We are a team of ~160 employees dedicated to share our expertise to satisfy your requirements with reliable products and first-class services.

Nowadays, we are more than instrument suppliers; we help to accelerate your business. We use advanced, scientific approaches, collaborate extensively with global research leaders in academia, government and industry to answer questions at the leading edge of particle sizing research. We carry out every production step under our own roof, including key components manufacturing and automated assembly, to anticipate possible failures or manufacturing problems. We provide analysis demonstrations, installation and training, software upgrade, 10-year supply of spare parts, and maintenance services to improve the working efficiency for our product users. We deliver state-of-the-art technological solutions to understand powder material properties, facilitate new product developments, control product quality, and improve manufacturing efficiency in hand with our clients.

For more than 20 years, we have delivered excellence to our business partners. Now, our ambition is to become the leader in particle sizing and powder characterization field, to support companies and laboratories worldwide.

We are Bettersize, better particle size solutions.

PRODUCT SERIES

We have 5 main product series. Each of the series in our portfolio provides you simple, fast, and reliable analysis of powder and particle materials:

- **Bettersizer** - laser particle size analyzer;
- **BeVision** - image particle size and shape analyzer;
- **Nanoptic** - nanoparticle size analyzer;
- **PowderPro** and **BeDensi** - powder characteristics testers.

Particle size ranges and models

<table>
<thead>
<tr>
<th>Particle size range*</th>
<th>1 nm</th>
<th>10 nm</th>
<th>100 nm</th>
<th>1 μm</th>
<th>10 μm</th>
<th>100 μm</th>
<th>1 mm</th>
<th>3.5 mm</th>
<th>10 mm</th>
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<tr>
<td>Laser diffraction</td>
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<tr>
<td>Bettersizer S3 Series: 0.01 - 3500 μm</td>
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<td>Bettersizer 2600: 0.02 - 2600 μm</td>
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<tr>
<td>Bettersizer ST: 0.1 - 1000 μm</td>
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<tr>
<td>Nanoptic series: 1 - 9500 nm</td>
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<td>BeVision Series: 1 - 10 mm</td>
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</table>

*Particle size ranges are sample dependent
CONFORMITY

All series of Bettersize instruments have passed ISO9001 international quality management certification and the European CE certification. All laser particle size analysers have obtained the approval of 21 CFR Chapter I Subchapter J, Part 1040.10 and 1040.11.

The software complies with the U.S. FDA 21 CFR Part 11, ensuring the validity and reliability of measurement results and solves the challenges associated with traceability requirements.

CUSTOMERS

Wish a solid history of over 12,000 instruments shipped and installed, we understand the importance of customer satisfaction. Bettersize is committed to providing customers cutting edge technology and superior services and support.

We are honoured to provide instruments and services to:
INNOVATIVE TECHNOLOGY

As the leading particle sizing instruments manufacturer in China, we spare no efforts on R&D each year. The following patented technologies have been developed and applied to our instruments:

- DLOIOS - Dual Lens and Oblique Incidence Optical System
- Fourier and inverse Fourier optical system
- DLOS - Dual Lens Optical System
- Laser diffraction + dynamic image analysis
- Refractive index measurement
- Online particle size monitor and control

- SOP (Standard Operation Procedure)
- Automatic alignment
- Automatic circulation and dispersion
- Accuracy calibration
- Anti-dry burning protection ultrasonic disperser
- Automatic water supply

- Small volume sample cell assembly
- Real-time test result monitor
- Automatic water level monitor
- Dew point temperature monitor
- Anti-corrosive circulation and dispersion system
- Dry sampling and dispersion

APPLICATIONS

Bettersize offers a wide range of models that fit different application requirements and provide reliable measurement day-in-day-out.

Our instruments find applications in the following fields:
COMPLETE PARTICLE SIZE AND SHAPE ANALYSIS BY ONE DEVICE

Thanks to its unique and innovative design, the Bettersizer S3 Plus combines the advantages of the measurement methods such as “laser diffraction” and “dynamic image analysis”. It offers a comprehensive and precise characterization of particle size and shape from nanometers to millimeters. The live view of the CCD cameras before and during the measurement allows the user to evaluate the dispersion state of the sample and visually assess the measurement result. All particles above 2 μm were photographed and evaluated online at the request of the user.

Features and benefits:

- **Measuring range:**
  - Particle size: 0.01 - 3500 μm
  - Particle shape: 2 - 3500 μm

- **DLOIOS - Dual Lens and Oblique Incidence Optical System**

- **CCD camera technology:** Two CCD cameras with 0.5X and 10X magnification photograph and evaluate more than 10,000 particles per minute

- **Refractive index measurement:** For materials with unknown refractive index

- **Ease of use:** SOP, automatic alignment, automatic circulation and dispersion system

- **Powerful software:** Calculate aspect ratio, L/D, circularity and perimeter

**DLOIOS:**

DLOIOS is a new technology patented by Bettersize based on the Fourier optical system. Lens 2 converts the divergent laser beam into a parallel beam on the one hand. On the other hand, it allows the detection of backscattered light. Using only one laser provides a continuous spread spectrum with a consistent wave length, oblique light incidence and this special structure enables detection in the angular range of 0.02° - 165°. DLOIOS technology guarantees reliable measurement of fine particles of 10 nm diameter.
Bettersizer S3

STATE-OF-THE-ART
LASER PARTICLE SIZE ANALYZER

Bettersizer S3 represents the leading particle size analysis technology for wet dispersion solutions. The measuring range from 0.01 to 3500 μm meets the most stringent requirements of fundamental research, product development and process control applications. SOP and automatic circulation and dispersion system ease workload and improve use experience.

Features and benefits:
- Measuring range:
  Particle size: 0.01 - 3500 μm
  Particle shape: 100 - 3500 μm
- DLOIOS - Dual Lens and Oblique Incidence Optical System
- CCD camera technology: One CCD camera with 120 fps and 1.3 MP
- Refractive index measurement: For materials with unknown refractive index
- Ease of use: SOP, automatic alignment, automatic circulation and dispersion system

<table>
<thead>
<tr>
<th>Model</th>
<th>Bettersizer S3 Plus</th>
<th>Bettersizer S3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Particle size measuring range</td>
<td>0.01 - 3500 μm</td>
<td>0.01 - 3500 μm</td>
</tr>
<tr>
<td>Particle shape measuring range</td>
<td>2 - 3500 μm</td>
<td>100 - 3500 μm</td>
</tr>
</tbody>
</table>
| Measuring principle            | Laser diffraction: DLOIOS
  Dynamic Image: 0.5x and 10x lens |
  Laser diffraction: DLOIOS
  Dynamic Image: 0.5x lens |
| Dispersion system              | Wet                 | Wet            |
| Refractive index measurement   | Yes                 | Yes            |
The Bettersizer 2600 is a modern particle size analyzer that works under the principles of laser diffraction methods and conforms to the ISO 13320 standard.

The intelligent combination of the two traditional devices – Fourier and inverse Fourier – accurately measures fine and coarse particles even over a wide particle size distribution.

For dispersion, Bettersizer 2600 offers normal or small volume wet and dry modules. The smart modular design completes the conversion in seconds.

**Features and benefits**:

- **Measuring range**: 0.02 - 2600 μm (wet); 0.1 - 2600 μm (dry)
- **Dispersion**: Wet and/or Dry
- **Optical system**: Fourier and inverse Fourier optical system
- **Repeatability**: ≤0.5% (wet); ≤1% (dry) (GBRM D50)
- **Accuracy**: ≤0.5% (wet); ≤1% (dry) (GBRM D50)
- **Detectors**: 92 pieces (forward, lateral, backward)
- **Detection range**: 0.016° - 165°

**Intuitive and powerful software**:

- The simplest operation and clear interface
- Real-time mode for determining the optimal measurement conditions
- Working with SOP
- Fully automatic measurement routine with automatic calibration
- Automatic data backup and editable reports
- Direct conversion according to Fraunhofer and Mie evaluation model
- Automatic cleaning routine
- Convert from wet to dry dispersion with one click
Wet and dry dispersion system:

In wet measurement, the particles are dispersed in a liquid medium in the dispersing module; and, if necessary, additionally dispersed by ultrasonic disperser.

Dry dispersion is used when dry powders or granules are to be measured without the use of solvent. During sample preparation, the sample is pre-dispersed by a vibrating transmission channel, falls into a channel and is conveyed by compressed air (venturi nozzle) through The closed, horizontal measuring cell. Dispersion is carried out by collision of the particles on the wall of container and with each other as well as by shearing.

The change between the dispersing modules requires only one handle.

<table>
<thead>
<tr>
<th>Sample dispersion modules</th>
<th>BT-802</th>
<th>Small volume module</th>
<th>BT-902</th>
<th>BT-903</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dispersion system</td>
<td>Wet</td>
<td>Wet small volume</td>
<td>Dry</td>
<td>Dry small volume</td>
</tr>
<tr>
<td>Dispersion module</td>
<td><img src="image1.png" alt="Image" /></td>
<td><img src="image2.png" alt="Image" /></td>
<td><img src="image3.png" alt="Image" /></td>
<td><img src="image4.png" alt="Image" /></td>
</tr>
<tr>
<td>Combine with main device</td>
<td><img src="image5.png" alt="Image" /></td>
<td><img src="image6.png" alt="Image" /></td>
<td><img src="image7.png" alt="Image" /></td>
<td><img src="image8.png" alt="Image" /></td>
</tr>
<tr>
<td>Sample volume</td>
<td>600 ml</td>
<td>8 ml, 0.005 - 0.1 g</td>
<td>0.2 - 10 g</td>
<td>0.02 - 1 g</td>
</tr>
<tr>
<td>Automation</td>
<td>Fully automatic</td>
<td>Semiautomatic</td>
<td>Fully automatic</td>
<td>Fully automatic</td>
</tr>
</tbody>
</table>
RUGGED AND COMPACT LASER PARTICLE SIZE ANALYZER

The Bettersizer ST includes the patented DLOS (Dual Lens Optical System) which allows the ST to measure a wide particle size range. This technology increases system reliability and reduces cost by fully utilizing the capabilities of a single laser diode. The DLOS provides a compact design without resorting to folding optics that are susceptible to misalignment caused by vibrations often present in most industrial laboratories.

The ST incorporates 86 detectors to produce high resolution data from 0.1 to 1000 μm.

Features and benefits:
- Measuring range: 0.1 - 1000 μm
- DLOS - Dual Lens Optical System
- SOP: Standard Operation Procedure
- Compact design saves work space
- Repeatability: ≤1% (GBRM D50)
- Accuracy: ≤1% (GBRM D50)
- Detectors: 86 pieces (forward, backward)

DLOS:
The DLOS (Dual Lens Optical System) detects both the forward and backscatter laser diffraction pattern. This breakthrough technology results in increased particle size measurement range without the added cost of a second light source. This single laser design provides for higher accuracy due to a consistent wavelength throughout the full measurement range.
Nanoptic 90 is a nanoparticle size analyzer based on the DLS (Dynamic Light Scattering) theory. It can measure nanomaterial down to 1 nanometer. Its high-power semiconductor laser device provides stable light intensity and long lifespan; while its correlator with 1000 channels and sensitive photomultiplier tube deliver measurement results with high repeatability and accuracy.

**Features and benefits:**
- **Measuring range:** 1 - 9500 nm
- **Testing speed:** ≤5 minutes per test
- **Small quantity of sample required:** 4 ml and 1 ml sample cell
- **Temperature control** range of 15 - 90°C, temperature accuracy ≤0.5°C
- **Repeatability:** ≤1% (GBRM D50)
- **Accuracy:** ≤1% (GBRM D50)
- **Scattering angle:** 90°
- **Detector:** PMT (Photomultiplier)

**DLS:**
Nanoptic 90 works based on DLS theory. It is an ideal tool for particle size measurement of proteins, colloids, emulsions, CMPs, inkjet inks, and a variety of nanoparticles.
REAL-TIME SPRAY PARTICLE SIZE ANALYZER

The Bettersizer 2000S is designed for particle size analysis of sprays containing 1 to 2000 μm droplets or solid particles. The width-adjustable measurement area allows the Bettersizer 2000S to flexibly adapt to the requirements of customers in challenging technical applications in the laboratories or pilot plants.

Features and benefits:

- **Measuring range:** 1 - 2000 μm
- **Width-adjustable measurement area**
- **Repeatability:** <3% (GBRM D50)
- **Accuracy:** <3% (GBRM D50)
- **Test speed:** ≤10 seconds
- **Sealing level:** IP65
- **Lens protection:** Protective groove device with oblique angle
- **Interface mode:** USB 2.0 or 3.0
- **Flexible installation** based on the site environment and customer needs.
ROBUST ONLINE PARTICLE SIZE ANALYZER

BT-Online1 is a robust online particle size analyzer for real-time monitoring and quality control in the powder manufacturing process. Based on SOP, BT-Online1 automatically samples, measures, recovers and processes data directly from the powder pipeline and provides 24-hour particle size detection and control for a variety of dry powder production lines.

Features and benefits:
- **Measuring range:** 0.1 - 1000 μm
- **Repeatability:** ≤3% (GBRM D50)
- **Accuracy:** ≤3% (GBRM D50)
- **SOP:** Standard Operation Procedure
- **Detectors:** 68 pieces
- **Test speed:** ≤1 min
- **High-performance semiconductor laser with long lifespan**
- **Automatic Alignment**

Safe and robust online monitoring:
The BT-Online1 features power interruption and overvoltage protection to automatically shut down the sequence under abnormal operating conditions to protect the lens from contamination. Its rugged design helps to combat harsh and electromagnetic interference.
DYNAMIC IMAGE ANALYZER
DRY DISPERSION

The BeVision D2 is a microscopic image particle size and shape analyzer for non-destructive measurement of coarse particles and millimeter range powder materials. BeVision D2’s high speed CCD camera and multi-threaded software quickly identify particles and obtains stable and accurate measurement results.

Features and benefits:

- **Measuring range:**
  30 - 10,000 μm (dry)

- **Optimized software:** Identify 10,000 particles per minute. Automatic recognition of agglomerated powder

- **Analysis parameters:** Particle size distribution, D100, aspect ratio, circularity and radius-thickness ratio

- **High-speed CCD camera:** 120 images per second, microsecond exposure time, avoid trailing in moving particles

- **Sampler:** Dry sampler using electromagnetic vibration feed, gravity-driven dispersion, suitable for coarse and agglomerated particles
DYNAMIC IMAGE ANALYZER
WET DISPERSION

The BeVision W1 is a high resolution dynamic image particle size and shape analyzer. Based on sheath flow theory, BeVision W1 captures each particle and delivers accurate image data.

Features and benefits:

- **Measuring range:** 4 - 400 μm (wet)
- **Analysis parameters:** Particle size distribution, D100, aspect ratio, circularity and radius-thickness ratio
- **Sheath flow theory:** Ensure that each particle passes sequentially through the focal plane of the cell, eliminating particle overlap and defocus
- **Optimized software:** Identify 10,000 particles per minute. Automatic recognition of agglomerated powder improves accuracy
BeVision M1

CLEANLINESS ANALYSIS EXPERT

The BeVision M1 is an automated image scanning system for filter paper cleanliness analysis. Equipped with metallurgical microscope, programmable motorized platform, autofocus function and high resolution CCD camera, BeVision M1 can capture and recognize each individual particle and automatically stitch the images to a panorama.

Features and benefits:

- **Measuring range:**
  Particle size and shape: 1 - 10,000 μm

- **Panorama:** Systematically steps and scans defined areas, capturing images at every step interval. The software seamlessly stitches captured images into a high resolution panorama.

- **Particle size and shape analysis:**
  Particle size distribution, D100, aspect ratio, circularity and radius-thickness ratio

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![Image of samples]  
**Agglomerated particles**  
**Depolymerized particles**  
**Flaky particles**

![Graphs]  
**Particle size distribution**  
**Circularity distribution**  
**L/D ratio distribution**
CLASSIC DYNAMIC IMAGE ANALYZER

BeVision S1 uses the latest software particle image processing technology for traditional microscopy imaging methods, providing a variety of particle parameters and distributions, including particle size, L/D ratio, circularity, area, etc. BeVision S1 is widely used for particle shape observation and analysis fields such as abrasives and pharmaceutical development, manufacturing and quality control.

Features and benefits:

- **Measuring range:** Particle size and shape: 1 - 3000 μm
- **Max magnification:** 4000 times
- **Repeatability:** ≤3.0% (GBRM D50)
- **Accuracy:** ≤3.0% (GBRM D50)
- **CCD camera:** 5 MP
- **Analysis parameters:** Particle size distribution, D100, aspect ratio, circularity and radius-thickness ratio

- **Automatically split connected particles**
  
  When using the image method, the aggregated particles have a large influence on the measurement results. Unlike the usual manual splitting, the BeVision S1’s automatic segmentation feature helps you get accurate particle information by quickly and accurately separating particles.

- **Precise calibration**
  
  The actual size of the particles can be accurately calibrated by the scale ruler.

![Image of BeVision S1](image_url)
AUTOMATIC POWDER CHARACTERISTICS TESTER

PowderPro A1 automatically analyze powder characteristics such as angle of repose, angle of fall, angle of spatula, bulk density and tapped density of a variety of powder materials. Applied image technology automatically controlled by PC, PAD or Android App, PowderPro A1 is an essential tool for research and evaluation of powder materials.

**PowderPro A1 measures:**
- Angle of Repose and Fall
- Angle of Spatula (Flat Plate Angle)
- Bulk and Tapped Densities
- Dispersibility
- Voidage and Cohesion

**PowderPro A1 calculates:**
- Angle of Difference
- Compressibility
- Uniformity
- Flowability Index
- Floodability Index
- Sieve size: 45 - 2000 μm

**Key benefits:**
- Measure angles with image method
  Photographs were taken using high-definition CCD imaging technology. Parameters such as angle of repose, angle of fall and angle of spatula are obtained in a fast and easy way with high precision and good repeatability through the unique image recognition and processing technology.

- Automatic control technology
  Fully automatic PC or mobile control ensures easy usage and operation. Accurate and reliable test results are obtained by SOP mode for standardized testing process.

- Data communication
  The electronic scale is connected to the instrument and the weight data is automatically transferred to the system for data processing and calculation of results.

- Tapped density technology
  The tapped density is achieved through the perfect combination of variable frequency and rotary vibration technology. The vibration frequency of 50 to 300 times per minute can be continuously adjusted; vibration amplitude of 3 or 14 mm can be selected. During the vibration process, the cylinder is in a uniform rotation state, ensuring the surface and horizontal powder surface, and improving the accuracy of the reading.

**Conformity:**
- ASTM D6393-08/D6393-14
- ISO 3953: 1993
- USP32-NF27<616>
- EP7.0 07/2010: 20934E
 MANUAL

POWDER CHARACTERISTICS TESTER

PowderPro M1 is the basic version of PowderPro A1. It can perform almost the same measurement and analysis of the PowderPro A1 through a manual process. The PowderPro M1 is widely used in education.

PowderPro M1 measures:
- Angle of Repose and Fall
- Angle of Spatula (Flat Plate Angle)
- Bulk and Tapped Densities
- Dispersibility
- Voidage and Cohesion
- Angle of Slide
- Hall Flow Rate (customized)

PowderPro M1 calculates:
- Angle of Difference
- Compressibility
- Uniformity
- Flowability Index
- Floodability Index

Conformity:
- ASTM D6393-08/D6393-14
- ISO 3953: 1993
- USP32-NF27<616>
- EP7.0 07/2010: 20934E

Measure angle of repose

Measure bulk density and tapped density
BeDensi series / HFlow-1 / BT-50

**BeDensi T1 / T2 / T3**

**TAPPED DENSITY METER**

The BeDensi T series consists of BeDensi T1, T2, and T3, which has one, two, three cylinders respectively. T2 and T3 can simultaneously measure the tapped density of 2 or 3 powder samples.

BeDensi T series is compliant per international standard ISO3953: 1993 and the United States Pharmacopeia for drug tapped density testing.

**BeDensi B1-S**

**BULK DENSITY METER (FOR METAL POWDER)**

The BeDensi B1-S bulk density meter uses the Scott capacity method to measure the bulk density of various metal powders. The manufacturing standard of BeDensi B1-S is in accordance with ISO 3923/2.

**BeDensi B1**

**BULK DENSITY METER (EXCEPT METAL POWDER)**

The BeDensi B1 bulk density meter adopts the natural deposition method. Fully in accordance with GB / T16913.3-1997- Part III: Determination of bulk density.

**HFlow-1**

**FLOWABILITY TESTER (FOR METAL POWDER)**

HFlow-1 evaluates the flowability of metal powders by testing the capability of the sample to flow through a 2.5 mm standard funnel.

The HFlow-1 Hall Flow meter is designed and manufactured based on the ISO4490-2008 standard.
Services and Support

Quality is at the core of the way we do business, and is constantly verified by our customers and partners. The latest technology and strict quality control system enable our instruments to operate trouble-free on average for more than 1,000 days.

Over past decades, Bettersize has provided every product user analysis demonstrations, installation and training, software upgrade, 10-year supply of spare parts, and maintenance services. We also offer regular workshop of maintenance and repair services to our business partners and global distributors.
**Betttersizer S3 Plus Particle Size Analysis Report**

**Sample:** DUKE-sum  
**Number:** 1#  
**Sample Owner:** duke

**Operator:** LC  
**Time:** 2018-05-15 10:15:40  
**Measured By:** bettersize

**Method:** Laser  
**Preparation:** Medium: Water

**Dispersant:** Ultrasound: Stirring

**Optical:** Mie  
**Mode:** 8.0 - Multipeak  
**Distribution:** Volume

**Particle RI:** 1.59-0i  
**Medium RI:** 1.333  
**Remark:** 

| D(4,3) | D(2,1) | D(3,2) | \(\mu m\) | SSA | OBS. | Residual
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<tr>
<td>5.066</td>
<td>4.549</td>
<td>5.800</td>
<td>100.00</td>
<td>403.8 m²/kg</td>
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<td>3.748%</td>
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<th>D(03)</th>
<th>D(06)</th>
<th>D(10)</th>
<th>D(16)</th>
<th>D(25)</th>
<th>(\mu m)</th>
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<tbody>
<tr>
<td>3.136</td>
<td>3.510</td>
<td>3.733</td>
<td>4.025</td>
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<tr>
<th>D(75)</th>
<th>D(50)</th>
<th>D(84)</th>
<th>D(90)</th>
<th>D(97)</th>
<th>(\mu m)</th>
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</thead>
<tbody>
<tr>
<td>5.763</td>
<td>4.999</td>
<td>6.177</td>
<td>6.543</td>
<td>7.405</td>
<td></td>
</tr>
</tbody>
</table>

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**Accumulation %**

**Diam \(\mu m\) | Percent**
---|---
0.020 | 0.00
0.050 | 0.00
0.100 | 0.00
0.200 | 0.00
0.500 | 0.00
1.000 | 0.00
2.000 | 0.11
5.000 | 50.01
10.00 | 99.99
20.00 | 100.00

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**Interval**

**Range:** 0.01um - 3500um