

Dispersing Machine for Mass Producing Nano Particle

MAX NANO GETTER® HFM

MAX NANO GETTER®

Finezation the materials

Can disperse particles, with
high quality and precision,
down to nanometer sizes.

- Realizing **Mild Dispersing** by
Ideal Bead Movement
- **Mass Production** for High-quality
and High-precision Nano Particles
- **Reliable Beads Separation** and
Stable Use of Microbeads
- **A significant increase in
operating parameters** by
selecting an appropriate type



HFM8

Explore the future with invisible things.

Ashizawa Finetech Ltd.

Achieved high-quality dispersion! We will handle wide-ranging cases.

We will meet your advanced requests with the Mild Dispersion® !

The dispersion process is intended to disperse aggregates to primary particles. However, applying excess energy causes them to break into the primary particles. This activates the new surfaces of the milled particles, increasing interaction between particles on the activated surfaces, which results in reaggregation. By controlling energy during particle dispersion helps prevent over-dispersion. This particular method, known as

'Mild Dispersion®' is exclusive to the 'MAX Nano Getter®.' It achieves a balanced 'rolling force' of the beads in both circumferential and axial directions, effectively managing the shear forces of particles and beads. The 'MAX Nano Getter®' is a specialized bead mill designed to meet these conditions. The 'MAX Nano Getter®' can now disperse particles down to nano sizes while controlling over-dispersion without damaging them.

What is Mild Dispersing®?

Mild Dispersion is Ashizawa Finetech Ltd.'s original dispersing technology, which maintains sizes, shapes, crystal structures, and surface conditions of primary particles.

Your Benefits

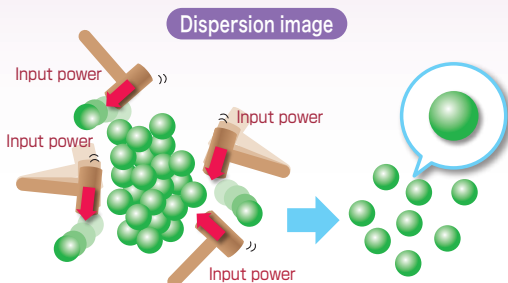
KEEP
particle properties

NO
re-agglomeration

REDUCE
additives amount

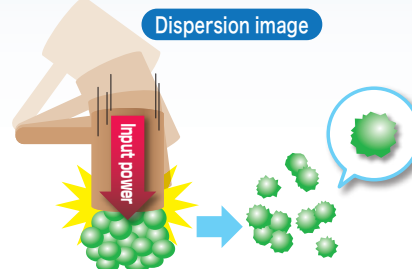
Mild Dispersion®

Controls over-dispersion, and micronizes particles with high quality and precision without damaging them.



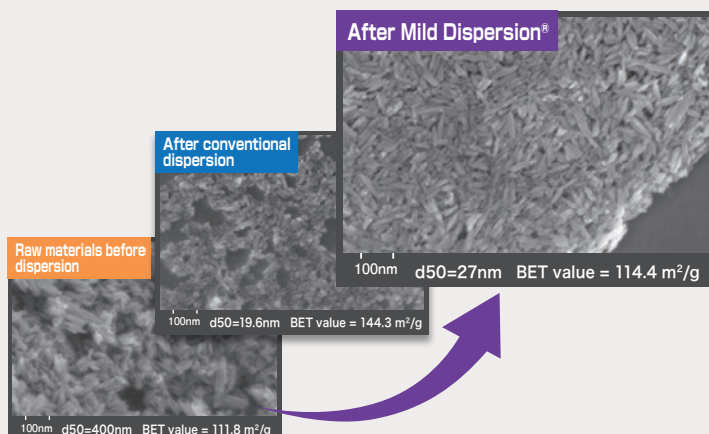
Conventional dispersion

Over-dispersion is likely to increase particle damage and promote aggregation. Product characteristics are also likely to be compromised.

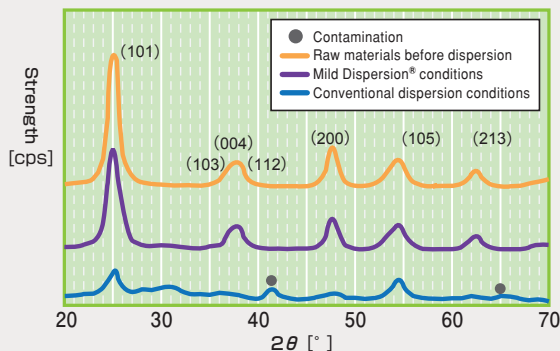


"Mild Dispersion®" is the registered trademark no. 4891867 of Ashizawa.

Case of dispersion while maintaining needle-like shapes: Target: Titanium oxide



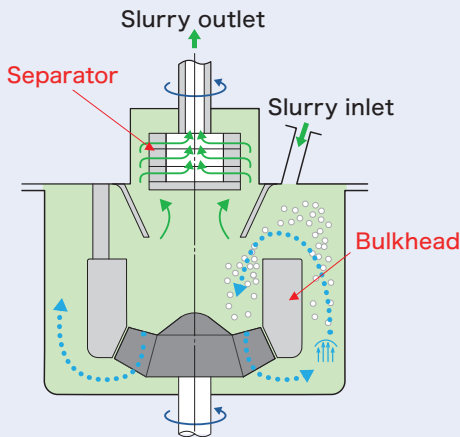
Maintain particle characteristics < results of X-ray diffraction >



HFM

Driving shaft 2 shafts

Independently
driven centrifugal separator



⇒ Ideal bead flow (spiral laminar flow) enables **Mild Dispersing®**.

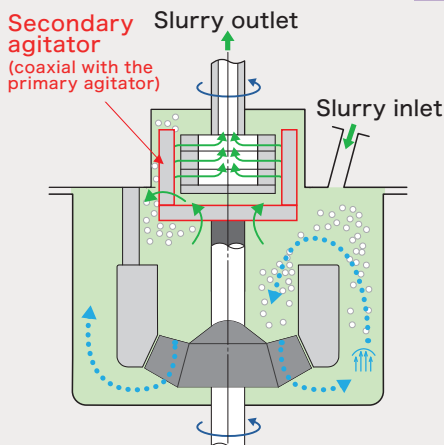
- Enables high-quality and high-precision dispersion down to nano sizes.
- Two-axis centrifugation mechanism enables reliable bead separation.
- Easy to scale up from laboratory equipment to large-scale production.

HFM-E

Strengthened centrifugation separation type

Driving shaft 2 shafts

Addition of a secondary agitator



High flow rate
operation



Ultramicro beads
($\phi 0.015$ to 0.5mm)

Improved bead separation performance thanks to the addition of a secondary agitator

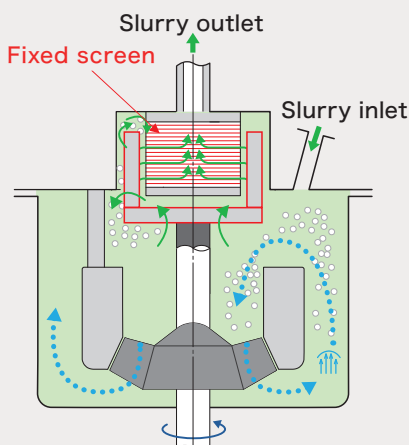
- Capable of stable operation using ultramicro beads
- Achieves finer and sharper particle size distribution

HFM-S

Fixed screen type

Driving shaft 1 shafts

Addition of a fixed screen



Compatible with
high-viscosity slurry



Micro beads
($\phi 0.1$ to 0.5mm)

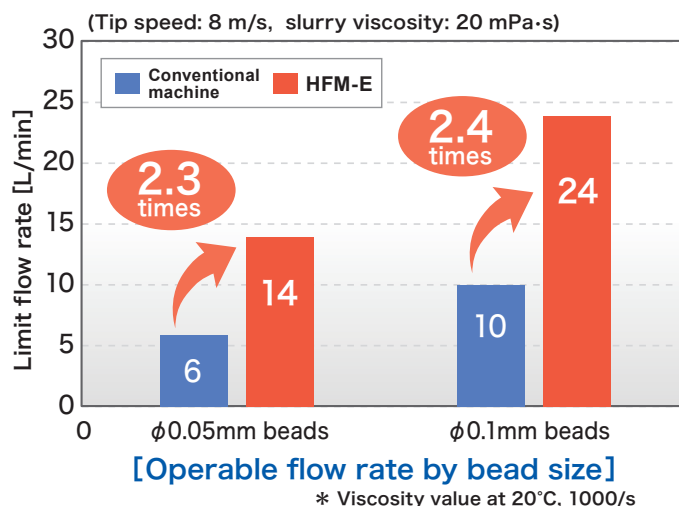
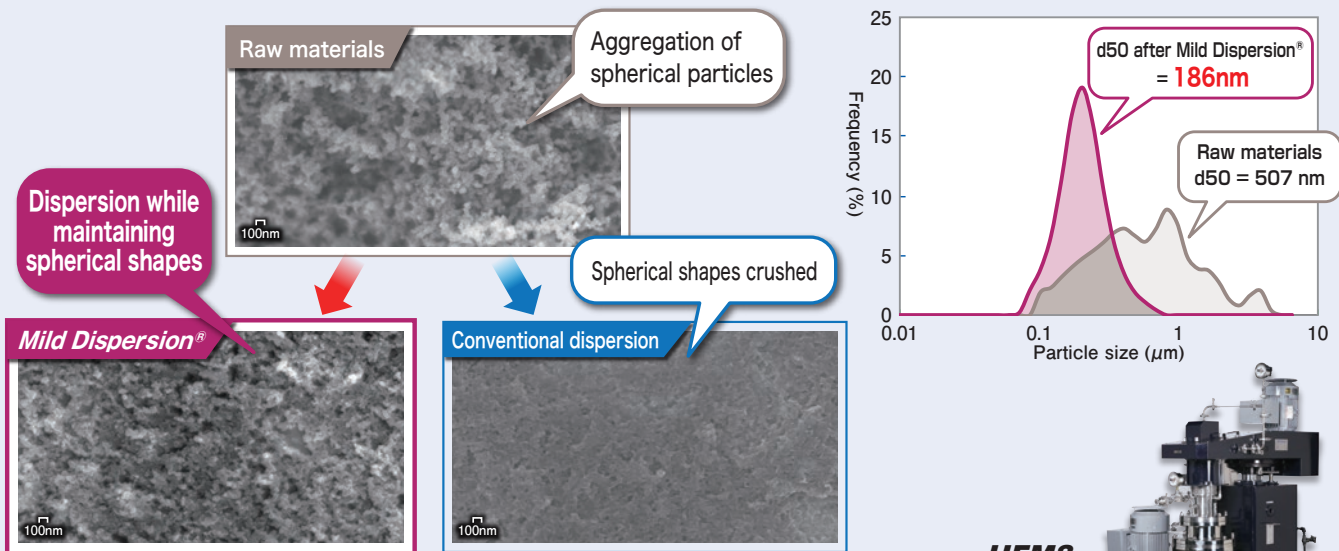
Capable of operation with high viscosity slurry due to the addition of fixed screen

- Achieves sharp particle size distribution with high flow rate operation even with high-concentration slurry
- Zero risk of bead outflow

Product lineup (Production machine scales)

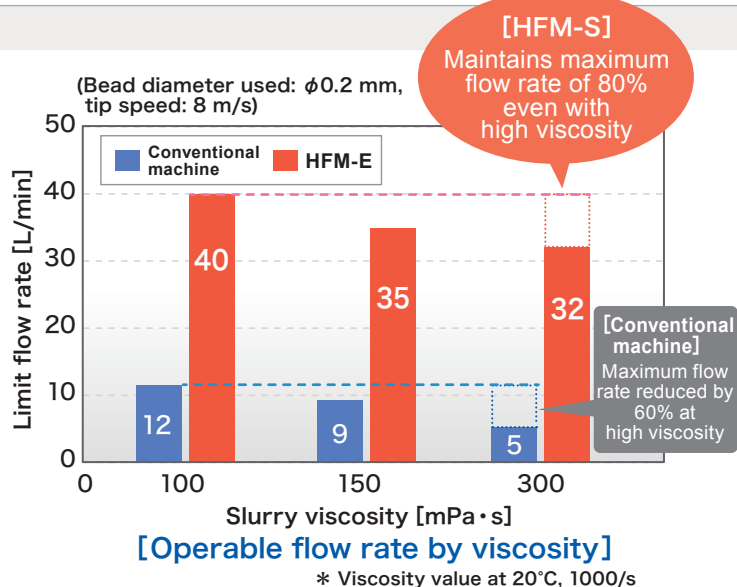
Examples of dispersion of fragile materials

Target: Carbon application: Conductive additive for batteries



Capable of high flow rate operation up to 2.4 times that of the conventional machine

There was a concern that the beads might be pushed toward the outlet and cause imbalance or outflow when the slurry flow rate was increased. Therefore, by **adding a secondary agitator**, we **suppressed the imbalance of the beads and achieved stable operation**.



Capable of operation with high viscosity slurry without reducing the flow rate

The conventional machine could only be operated at low flow rates because there was a concern for outflow of beads due to the loss of the centrifugal separation balance when a slurry of high viscosity was used. **By adding a fixed screen**, we were able to **eliminate the outflow of beads** and ensure **stable operation** without reducing the flow rate.

The 'spiral laminar flow,' which considers balance between circumferential and axial directions, generates an ideal bead movement, resulting in damage-less, high-quality dispersion.

Achieve an ideal bead movement.

What is the ideal bead movement?

- Beads stay uniformly in the grinding chamber.
- Beads are not over-dispersed.
(Efficiently contacts particles without applying strong shear forces.)

Control of contamination

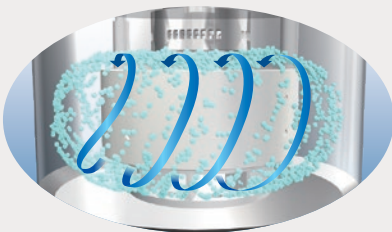
Regarding to wear and contamination, it is very important to select a mill which doesn't use too much energy.
By the ideal beads movement, NANO GETTER® and MAX NANO GETTER® have great characteristics of high energy efficiency and they don't give excess energy which leads to contamination.

Bead movement in MAX Nano Getter® The 'rolling force' of beads disperses particles.

Controls over-dispersion, and micronizes particles with high quality and precision, without damaging them.

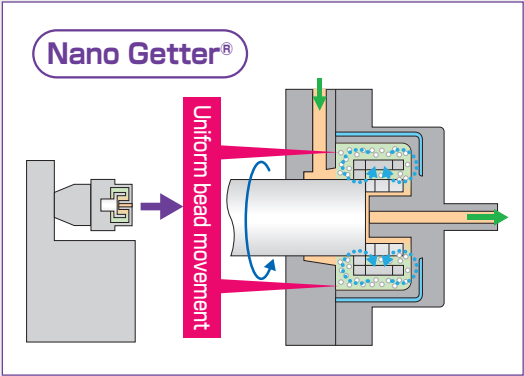
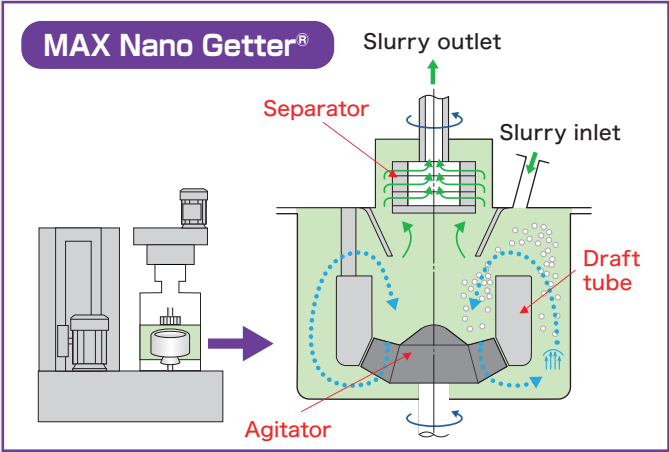
- Achieve an ideal bead movement.

"Spiral laminar flow"



Movement of beads in the milling room

- Optimal shape for "dispersion" with uniform energy in the grinding chamber



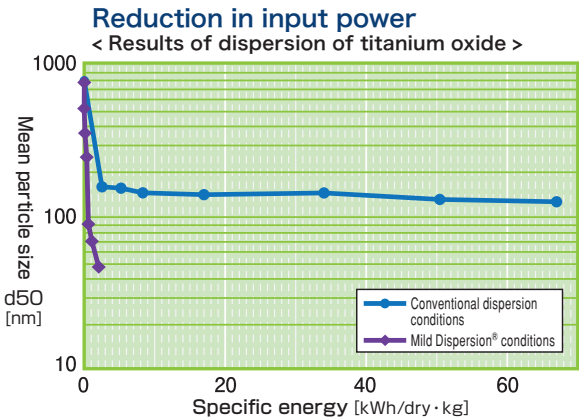
Realize with MAX Nano Getter®/Nano Getter® !

Example of Mild Dispersion® of photocatalyst (titanium oxide) that requires transparency



Concentration: Same for all, primary particle size = 30 nm

* Photographed one year after micronizing



Various lineup from lab machines to large machines

Circulation-type small machine for nanoparticle production

MAX NANO GETTER® HFM06

- Sample volume required for circulation type: 3.0L
- Bead diameters available for screen-less machines: $\phi 0.015$ to 0.5mm
- Easy to scale up to production machines.



Specifications

	MAX NANO GETTER® HFM model						
	HFM02 (Batch type)	HFM06	HFM8	HFM20	HFM50	HFM8	
						HFM-E	HFM-S
Grinding chamber volume (L)	0.2	0.63	6.9	17	50	5.61	
Drive power agitator (kW)	2.2	3.7	11	30	30~55	15	
Drive power for separator (kW)	—	2.2	3.7	11	15	5.5	—
Dimensions (mm) [W X D X maximum total height H]	400×550×600	700×900×1500	1200×1200 ×2300	2500×2000 ×2800	3000×2500 ×3400	1200×1200 ×2300	1200×600 ×2300
Weight (kg)	40	500	1300	2500	3200	1300	1100
bead size (mm)	$\phi 0.015 \sim 0.2$	$\phi 0.015 \sim 0.5$				$\phi 0.015 \sim 0.5$	$\phi 0.1 \sim 0.5$
Bead separation system	—	Independently Driven Centrifugal Separator				Enhanced centrifugation	Slotted pipe
Material of wetted part	Ceramics, resin	Ceramics, SUS, abrasion resistant steel, resin				Ceramics/resin	

* Values are representative and specifications may be subject to change without notice.



Dispersing machine for Nano particle

NANO GETTER®

- The slotted pipe is installable optionally.
- A simple structure enables unparalleled cleanability.
- Easy maintenance

Specifications

	NANO GETTER® DMR Series		
	DMS65	DMR/S110	DMR/S180
Grinding chamber volume (L)	0.12	0.45	2.1
Drive power agitator (kW)	2.2	3.7	11
Drive power for separator (kW)	—	—	—
Dimensions (mm) [W × D × maximum total height H]	400×550 ×600	1000×1000 ×1000	1100×1300 ×1900
Weight (kg)	40	350	800
bead size (mm)	φ 0.03~0.3	φ 0.03~0.5	
Bead separation system	Centrifuge separator *		
Material of wetted part	Ceramics	Ceramics, SUS, abrasion resistant steel, resin	

* Screen installation is optional.

Values are representative and specifications may be subject to change without notice.

Applications

- Optical material/film
- Pigment
- Cosmetics
- Dyes
- Optical catalysts
- Polishing agent for semiconductors
- Magnetic recording material
- Liquid crystal color resist
- Battery material
- Other nanoparticles in general

Explore the future with invisible things.

Ashizawa Finetech Ltd.

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