SATAKE
MultiMix

SATAKE
i Classifier

High Precision Wet Type Classifier

Classification precision is further advanced

High Performance Chemicals· Electronic Materials· Pharmaceutical Materials etc.

Flexible control the particle size distribution of high-value-added products

CAT.No.CL-01E（004）

SATAKE *i* Classifier

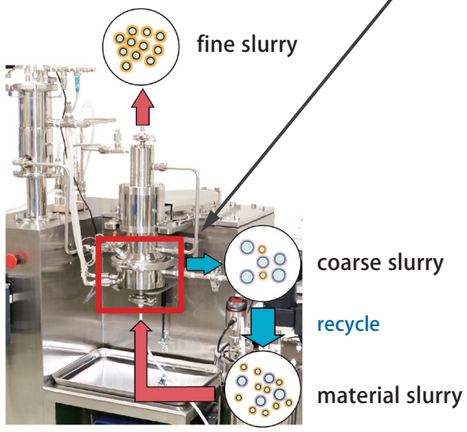
●i Classifier, a completely new high-precision wet type classifier from the agitator manufacturer SATAKE

Electronic Parts Materials | **Battery materials** | **Abrasive Grains etc.**

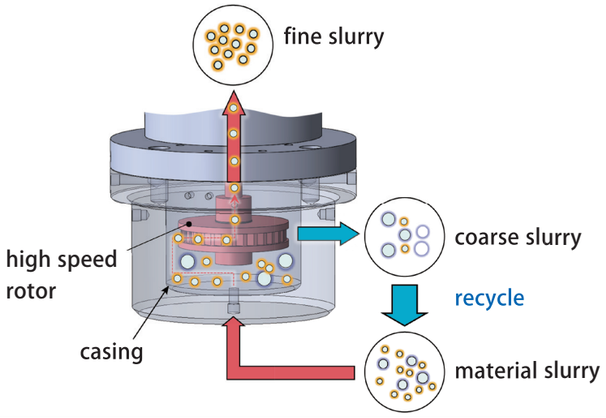
Optimal to classify sub-micron ～ a few 10 microns order size (approx. 0.5~20 μm) fine particles in slurry

The newly developed rotor enables high-precision classification of fine particles (removal of both fine and coarse components). It can flexibly control the particle size distribution of raw materials for various kinds of high-value-added products such as high-performance chemicals, electronic materials, and pharmaceutical materials. The flow path of slurry and geometry of the rotor rotating at high speed have been optimized by maximumly utilizing the fluid flow analysis and control technology which have been grown by SATAKE for many years in the field of mixing. By controlling the fluid flow precisely, desired size of fine particles can be obtained.

■Characteristics



Flow path of slurry and classification mechanism



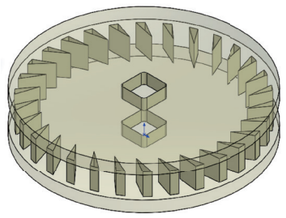
- Both fine and coarse components can be removed with a single unit.
- Particle size distribution can be flexibly controlled.
- The target particles are in the order size from sub-micron to a few 10 microns (approx. 0.5~20 μm). Applicable to a wide range of materials from low-density functional polymers to high-density metals and metal oxides.
- Classification system includes material tank, dedicated pump, control panel etc will be proposed.

■Newly developed rotor

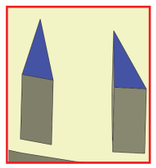
"Uniformity of classified particles diameter" between the outer and inner peripheries of the blades is achieved by the special designed patent rotor.

Patent Structure for classified particle size uniformity

JPN Pat. No. 6713540
USA Pat. No. 10,890,515 B2



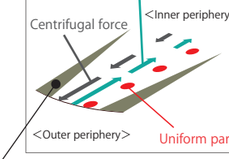
Rotor



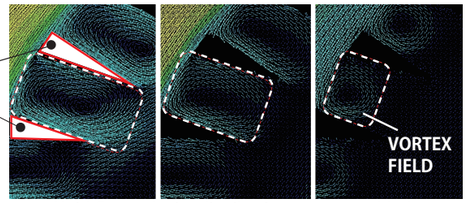
Rotor blade (impeller)

Theory

Fluid flow linear velocity・Drag force



As moving toward the inner periphery
① Centrifugal force decrease
② Fluid flow linear velocity and force decrease due to the triangular shape
③ Uniformity of classified particle size
④ Enhance classification precision



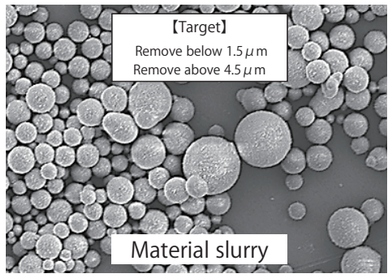
Fluid flow velocity distribution near rotor blade
(CFD simulation result examples: Investigation on the shape and operational condition)

The classification precision is due to the vortices generated around the rotor blades (impeller). Additionally, the classifier performance has been enhanced remarkably by streamlining the flow inside the rotor using CFD simulation to analyze the fluid flow path shape and operating conditions.

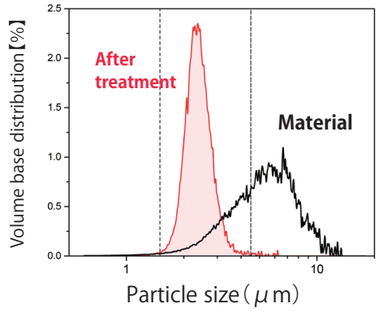
■Example of classification

Silica particles (2200kg/m³)-aqueous dispersion

Removal treatment of fine and coarse particles

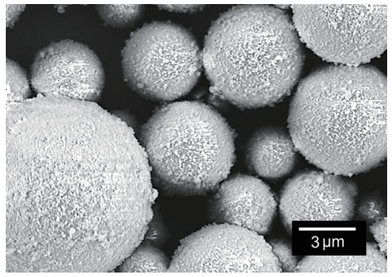


Particle size distribution

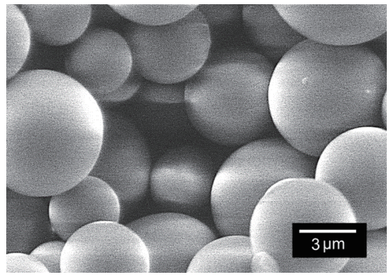


Process ① : Removal of fine particles

Material



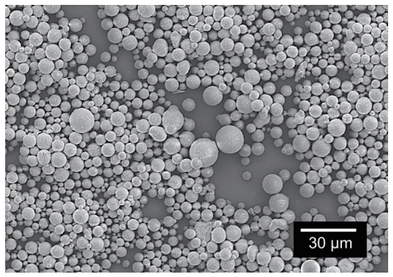
After classification



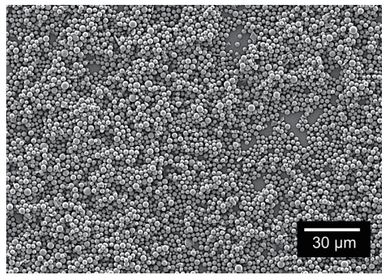
Sub-micron particles attached on the surface of materials are completely removed

Process ② : Removal of coarse particles

Material slurry after removed fine particles



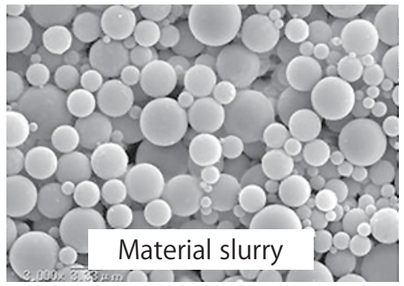
After classification



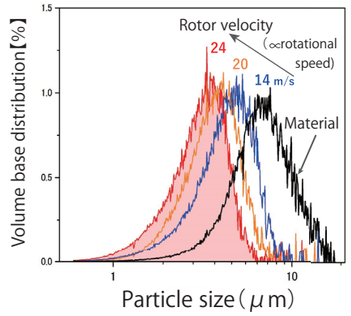
Removal of coarse particles also was successful and highly monodisperse group of particles were obtained.

Acrylic particles (1200kg/m³)-aqueous dispersion

Removal treatment of coarse particles

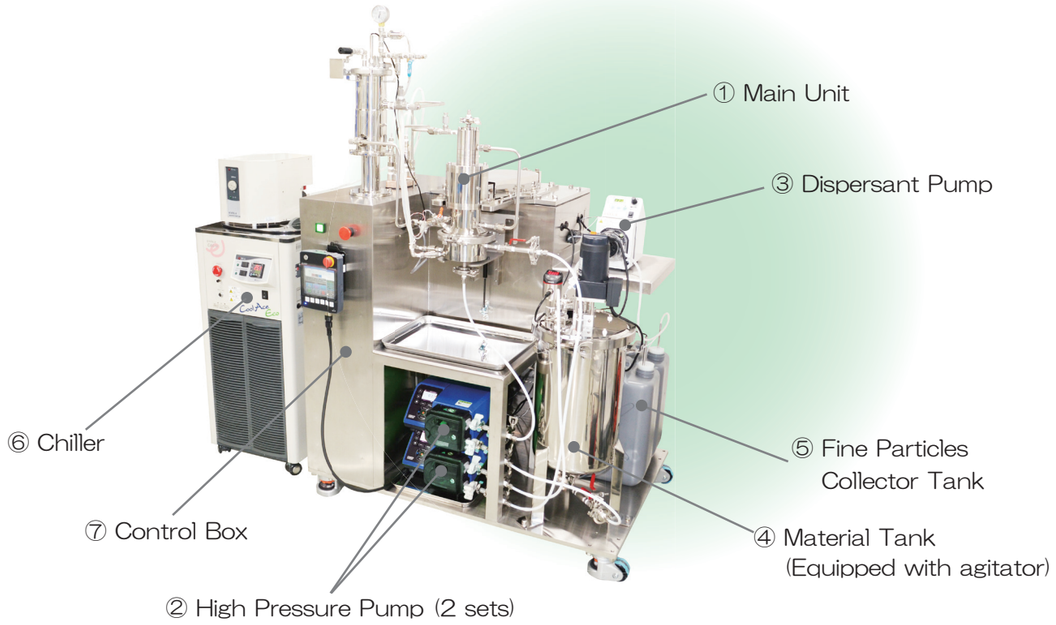


Particle size control by coarse particles removal



Particle size distribution can be controlled flexibly by changing operating conditions (rotor speed)

■Device Configuration and Characteristics



No	Device Name	Characteristics
①	Main Unit	Main unit for high precision classification of particles from sub-micron to a few 10 microns
②	High Pressure Pump (2 sets)	Pulsation-free high precision discharge pump and pressurize slurry liquid.
③	Dispersant Pump	Pump to supply dispersant.
④	Material Tank (Equipped with agitator)	Equipped with agitator to prevent solid particles from settle while keeping the material slurry inside the tank.
⑤	Fine Particles Collector Tank	Tank to collect classified fine slurry.
⑥	Chiller	The chiller supplies cold water to the jacket of the classifier to control the temperature.
⑦	Control Box	Dedicated controller that allows various settings of classification conditions.
Option	A set of mechanical seal spare part for classifier	In the unlikely event such as mechanical seal breakdown, this option offers quick replacement to continue operation.

■Auto mode: “Automatic Operation” Mode

Automatic control of classification conditions(rotor tip speed, flow rate, liquid level). Classification process can be performed unattended such as during night time operation!

■Application and Specification

Device specifications		
Dimension		890×1155×1652
Weight		Approx. 430kg
Rotational speed		666~6660rpm
Classifier rotor tip speed		3~30m/s
Classifier particle size		0.5~20μm
Treatment volume		Max 50L/hr,100L/hr
Classifier chamber volume		0.4L
Wetted part material	Rotor	Any of the following (Depend on specs) SUS304/SUS316L/Resin
	Stator	Any of the following (Depend on specs) SUS304/SUS316L
	O-ring	Any of the following (Depend on specs) FKM/FFKM
	Ferrule packing	PTFE
	Others	Any of the following (Depend on specs) SUS304/SUS316L
Shaft seal		Double mechanical seal
Seal liquid		Water, Organic dispersant (Depend on specs)

Utility specification	
Power supply	AC200V, 3-phase, 50/60Hz
Power	2200W (Main unit only) 4000W (Full package)
Compress air / Nitrogen	High pressure 0.7MPa (Pressure vessel)
Cooling water	Normal pressure (20~Below 30℃, Above 2~3 L/min)

■Evaluation method

Kindly contact us to inform your request.

E-Mail info@satake.co.jp

Please send us an e-mail with the request sheet attached.
※The request sheet can be downloaded from SATAKE website.

↓

We will confirm and contact you on whether the classification is possible or not.

↓

You will be notified if there is no possibility of classification.

If necessary, we may need a small sample from you to submit to us.

↓

Sign non-disclosure agreement (if necessary)

↓

Meeting

↓

Quotation

↓

Contract

↓

Test running

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Results report

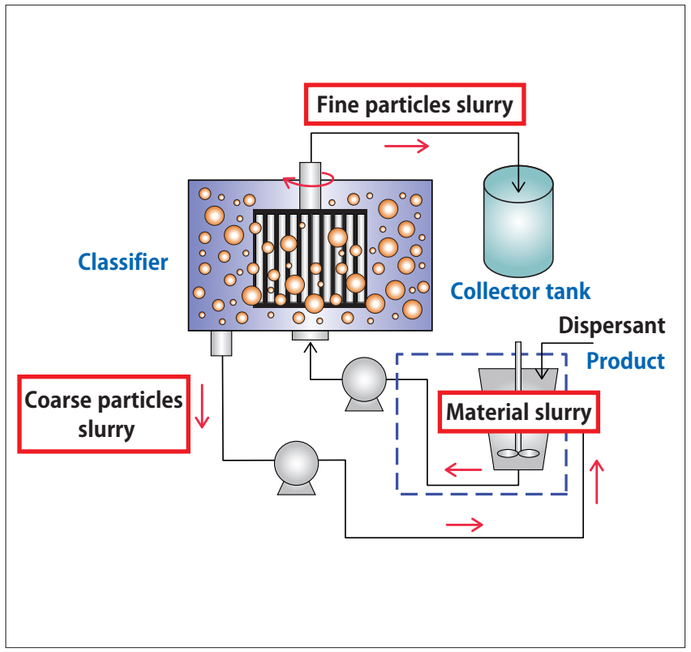
●Examples of Applications using High Precision Wet Classifier

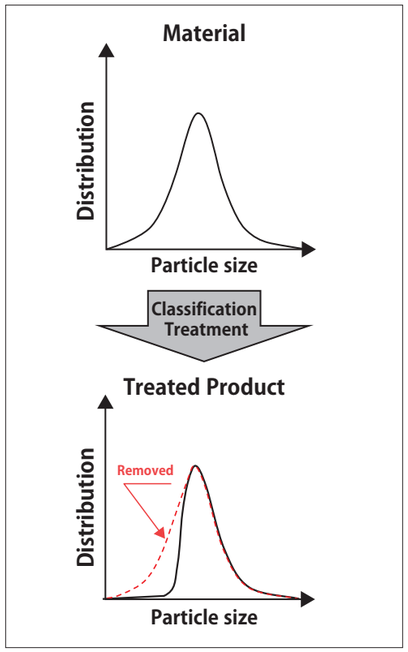
This product can be used for a variety of classification applications. Following are the brief introduction of the device configuration and process flow, as well as its application and purpose by giving some of the examples of applications.

We will propose the most suitable conditions for the device configuration and process, once confirmed the customer inquiry.

①Removal treatment of fine particles

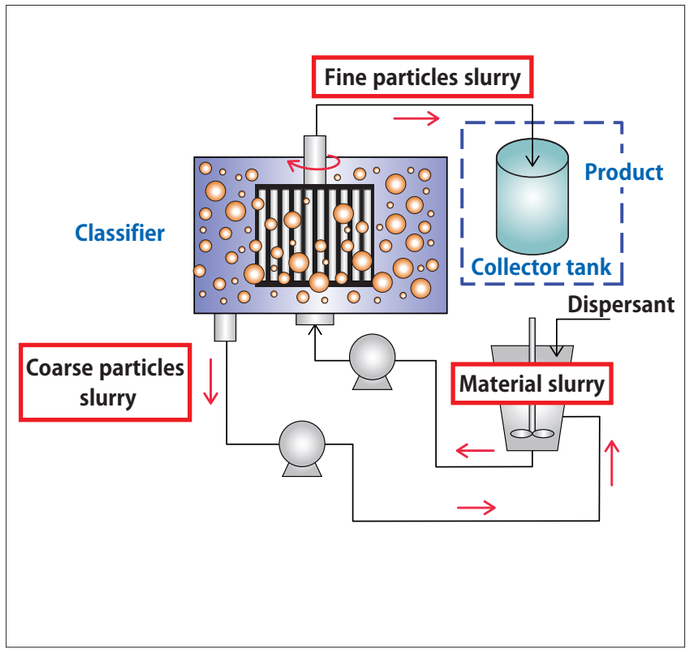
High precision removal of fine particles from slurry material. The slurry material becomes the product. Small particles attached to the surrounding of large particles can also be removed. Kindly consider using the similar way of treatment to solve problems caused by the contamination of fine particles.

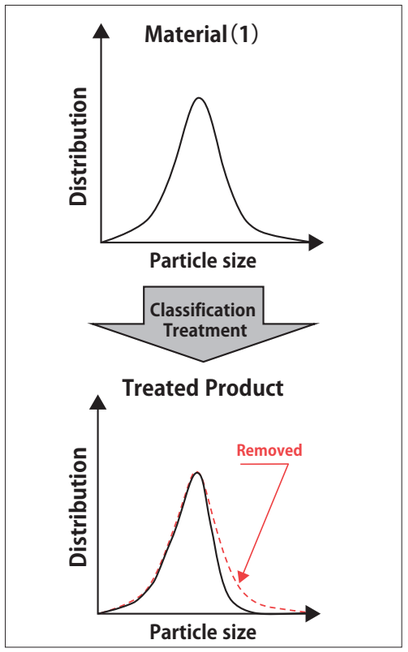


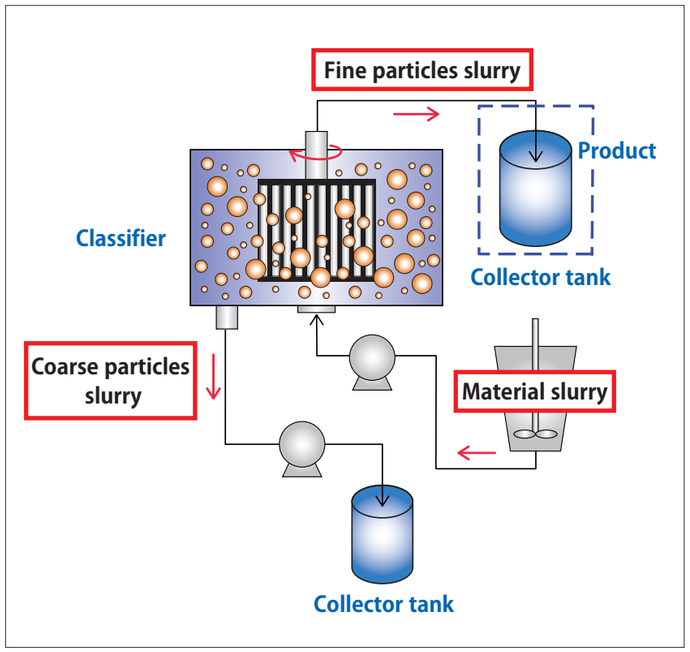


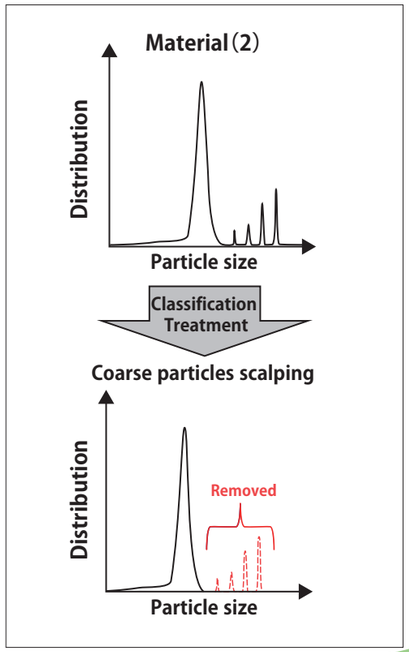
②Removal treatment of coarse particles

Removal of coarse particles from material slurry at high precision. Our expertise is to remove extremely small amounts of coarse particles (scalping). The fine slurry becomes the product.
Kindly consider using the similar way of treatment to solve problems caused by the contamination of coarse particles.



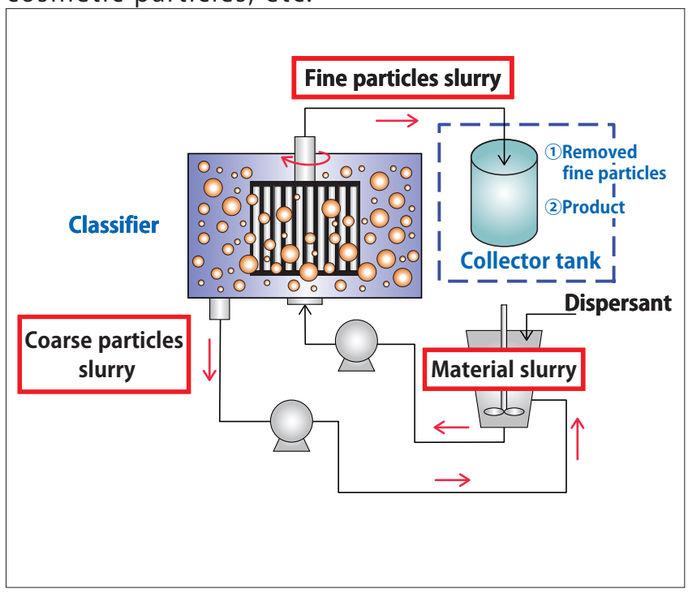


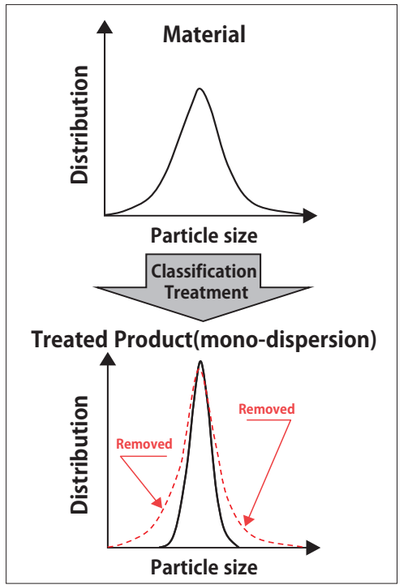




③Removal treatment of both fine particles and coarse particles

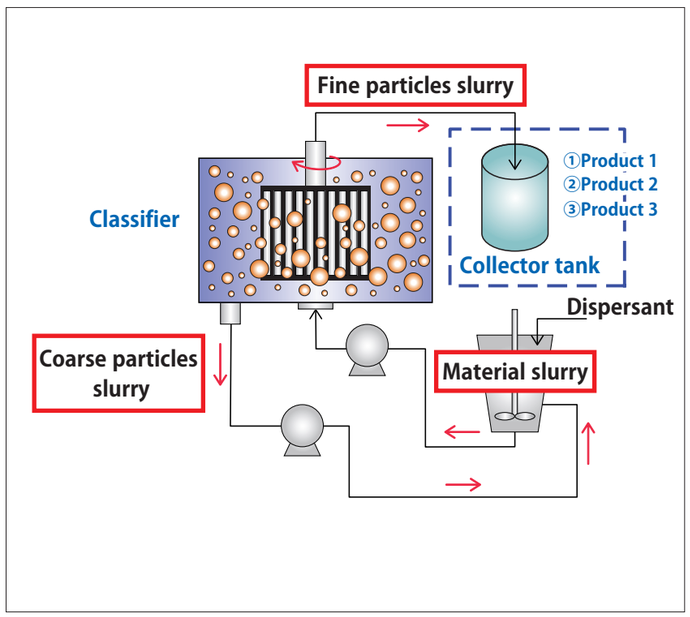
Removal of fine particles and coarse particles from slurry material in a two-step process at high precision. By removing specific particles size, it enhances the spacer functionality, contact performance due to uniform filling, and reduced fluid flow resistance, which in turn lead toboost product functionality. This is efficient for homogenization of crystalline materials, pharmaceutical solids, cosmetic particles, etc.

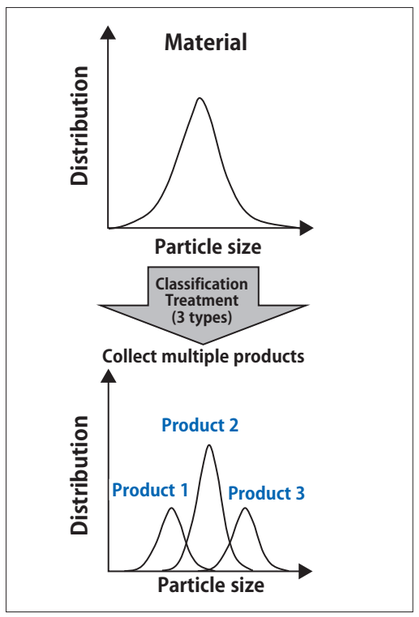




④Separation of multiple products from undiluted solutions

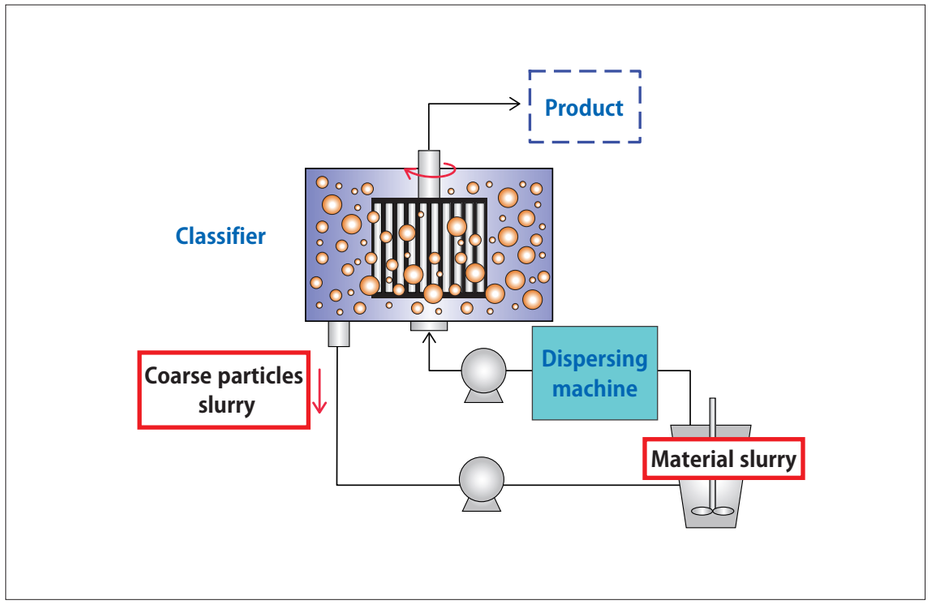
Multiple products of varying size range can be extracted by removing the particles from material slurry while changing the remove points.





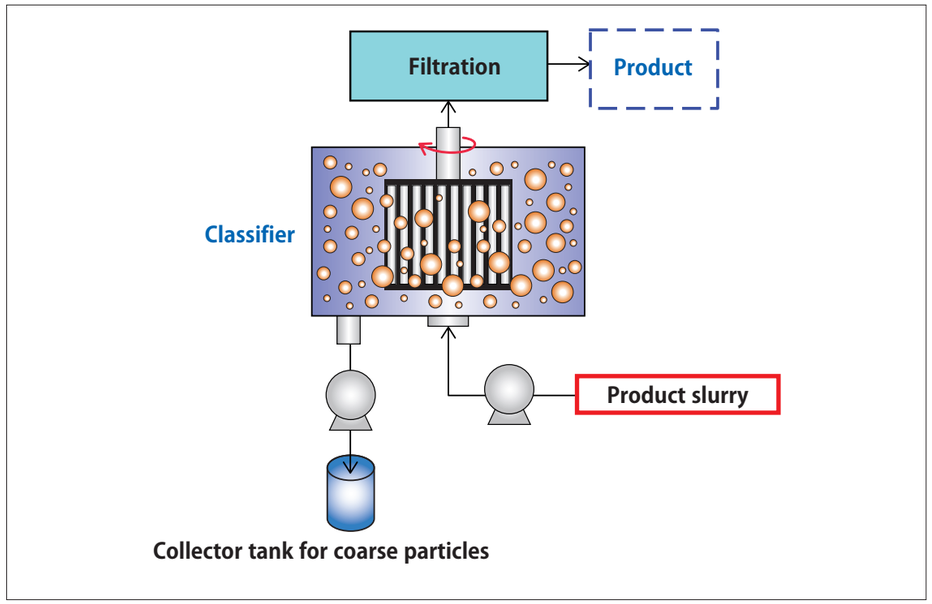
⑤Efficiency of distribution treatment

It enables a more efficient treatment of dispersing machine such as media-less mills etc. and dispersing treatment with less damage to the particles. Moreover, it also contributes to less contamination by removing abrasive particles to realize efficient distribution treatment is made possible.



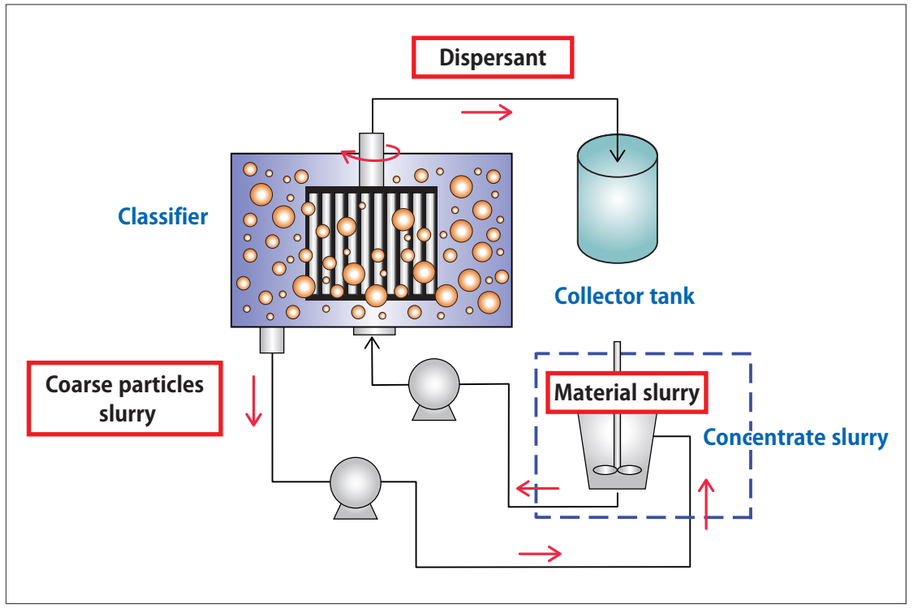
⑥Reduce filter load

Load on the filter is reduced and may extends its service life by installing the classifier before the filter to remove product' s foreign substances. Additionally, less filter replacement means less backwashing, which in turn contributes to lower running costs.



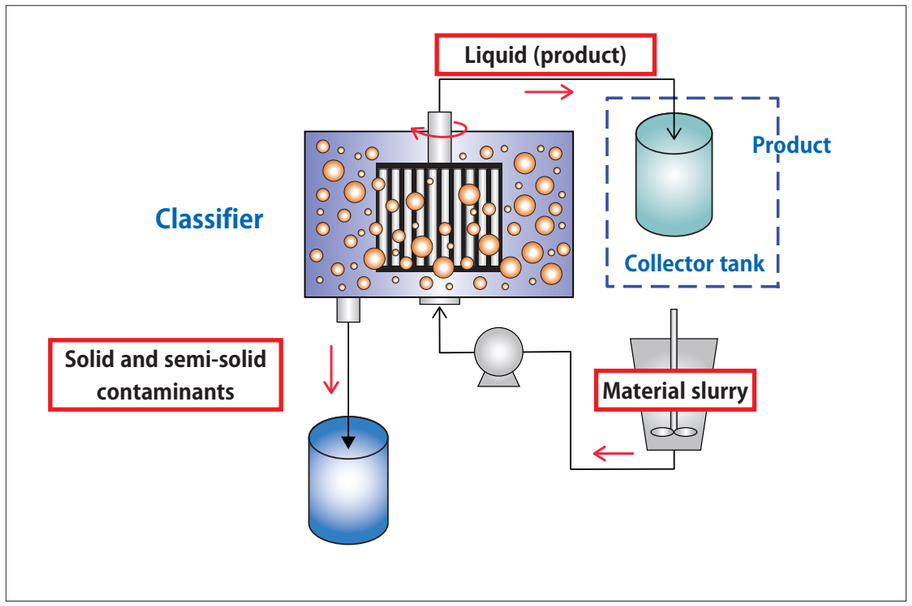
⑦Concentration treatment

Minimize the loss of powder and remove the dispersant (mother liquid) from material slurry. Additionally, this leads to reduce heating energy and time consuming for drying process of dryer, spray dryer etc..



⑧Removal of contaminants

Removes solid and semi-solid contaminants from liquid products to increase product quality.This leads to minimize defects and increase yields in beverages and liquid chemical industries.Additionally, it also contributes to enhance quality of beverages and liquid pharmaceutical products as well.

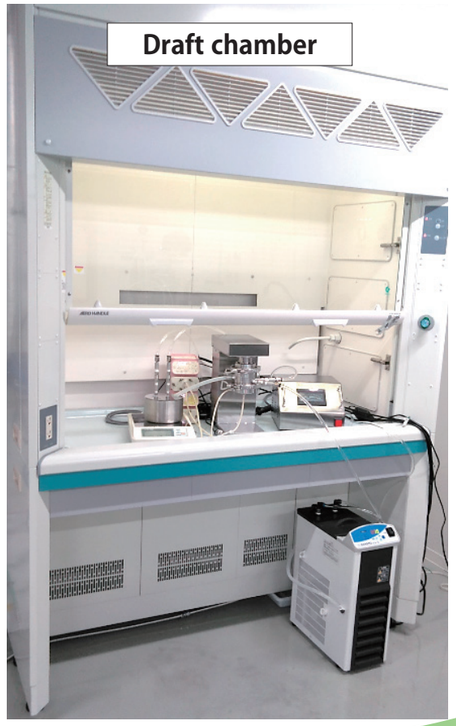


i Classifier Lab

■A tabletop size of high precision wet laboratory "i Classifier" is now available.

- It is ideal for the development of new materials and new processes.
- The classification treatment can be performed at even small samples for particles sizing and mono-dispersion, estimating collection speed and rate during classification, etc.
- Easy to carry due to its table-top size. It can also be installed in a draft chamber.
- It can be also scaled up to the standard size i Classifier.

Main unit



Device specifications		
Dimension and Weight	Main unit	W200×D360×H600・20kg
	Control box	W300×D330×H200・10kg
Classifier rotor tip speed		Approx. 2~20m/s
Classifier particle size		0.5~20μm
Treatment volume		Max. 5L/h
Classifier chamber volume		Approx. 50ml
Wetted part material	Rotor	Resin
	Stator	Any of the following SUS304/SUS316L
	Packing	FKM/FFKM
Power supply		AC100V, Single phase, 50/60Hz
Motor power		1000W

■Classification applications (Examples)

Chemical products

•Uniform particle size of packing materials for preparative chromatography

•Uniform particle size of metal particles for 3D printer

Secondary battery

•Uniform particle size of electrode raw materials for secondary battery

Precision machining

•Uniform particle size of fine powder for precision polishing

Ceramic

•Removal of large particles from various ceramic slurries

※Classification of fine particles for many other applications is also possible.

- Contact for i Classifier -

SATAKE MultiMix

East Japan Sales & Service Dept.

Phone : 81-48-433-8711 E-mail : info@satake.co.jp

ISO 9001 certificate acquisition
Tokyo office

Scope of Review:
Development, design, manufacture, repair and sales management of classifiers

ISO 14001 certificate acquisition
Tokyo office

We are constantly committed to improve the quality of our products, thereby the design and specifications of our products may differ from those shown in the catalog. Please understand this in advance.

Classifier exports from Japan fall under paragraph 3-2 (2) 3 of the Appendix Table 1 of the Export Trade Control Order, and products whose treatment volume is equal to or more than 100 L/hr are subject to the regulation. (as of August, 2024)

In addition, export to users that listed in catch-all regulations is prohibited.

When you export classifiers, please confirm the latest laws and regulations of export country.

We dedicated to manufacture products that satisfy our customers and are safe to use.

SATAKE MultiMix
佐竹マルチミクス株式会社
SATAKE MultiMix Corporation

https://www.satake.co.jp/en/

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