

Separation / Classification / Concentration

Murata Kogyo Co., Ltd.

# Hydrocyclone Separation System

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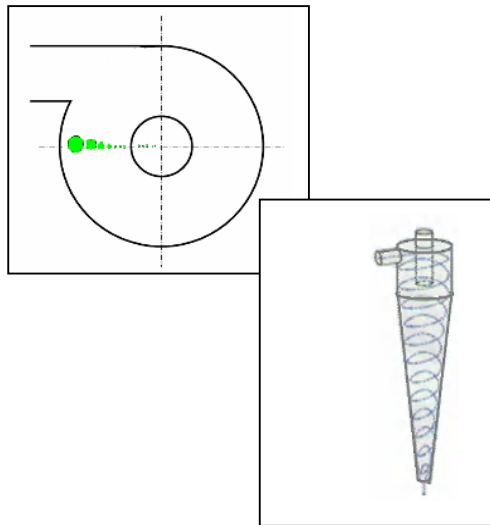


- System Integration / Design / Sales / Engineering Support / Powder Processing Service
- Nano Creating (Grinding / Dispersion / Emulsifying / Classification) Systems
  - Powder & Particles Processing Equipment / Systems



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### ■ Principles of Hydro-Cyclone

WHEN SLURRY IS INTRODUCED TO THE HYDRO-CYCLONE, ACCORDING TO CENTRIFUGAL FORCE, LARGE PARTICLES IN THE SLURRY ARE FORCED TO THE WALL, AND GOING DOWNWARD IN THE GRAVITATIONAL DOWN STREAM, AND DISCHARGED FROM THE BOTTOM NOZZLE.

SMALL PARTICLES IN SLURRY ARE CAUGHT IN UPWARD STREAM IN THE CENTER OF THE CYLONE AND DISCHARGED AT THE TOP NOZZLE.



TR10-30 CYCLONE SET



MODEL T-80

MODEL T-350



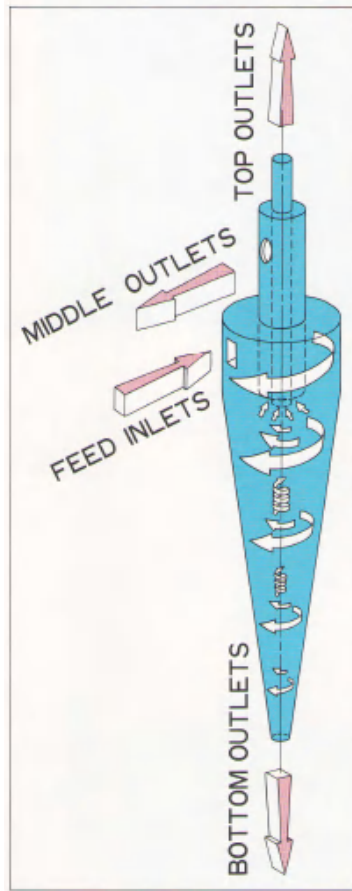
MODEL TR10-5



MODEL SC-100

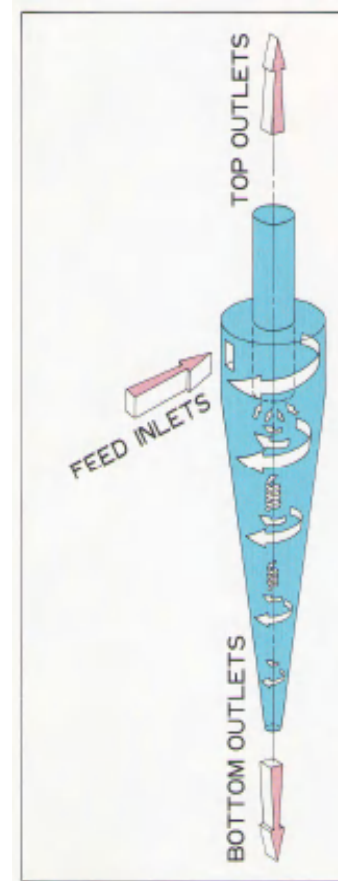
## ■ Hydro-Cyclone System

### 3-OUTLET HYDRO-CYCLONE SYSTEM



- \* FOR SEPARATION AND CLASSIFICATION OF SMALL PARTICLE
- \* VERY HIGH CLASSIFICATION ACCURACY REQUIRED
- \* REMOVAL AND COLLECTION OF SMALL PARTICLE
- \* FOR HIGER YIELD RATE OF LARGE PARTICLE

### 2-OUTLET HYDRO-CYCLONE SYSTEM



- \* FOR SEPARATION, CLASSIFICATION, AND CONCENTRATION OF MIDDLE TO LARGE SIZE PARTICLES
- \* FOR LARGE FLOW RATE OPERATION
- \* FOR WIDER RANGE SEPARATION
- \* FOR REMOVAL OF LARGER SIZE PARTICLES

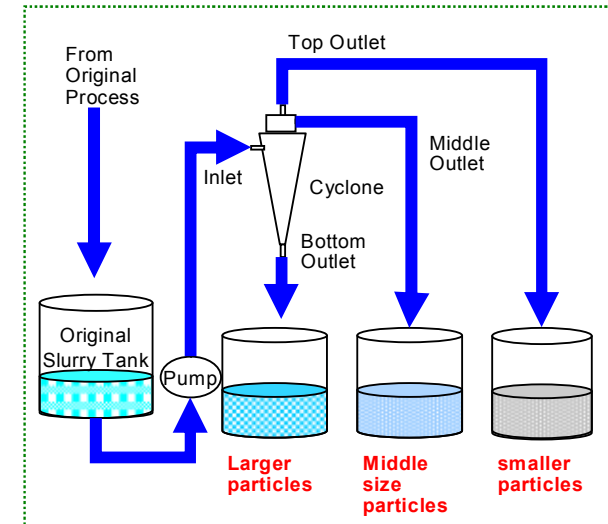
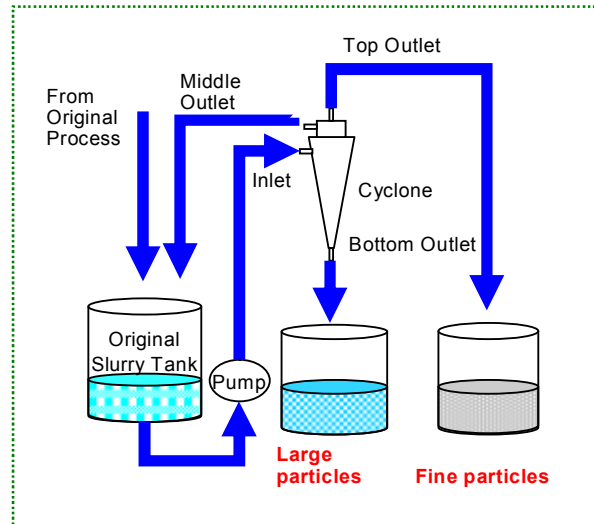
### ■ 3-Outlet Hydro-Cyclone System

IN HYDRO-CYCLONE, HIGHER DENSITY SLURRY FLOW, CONTAINS LARGER SIZE PARTICLE, IS EXHAUSTED THROUGH BOTTOM OUTLET, WHILE LOW DENSITY SLURRY FLOW, CONTAINS SMALLER SIZE PARTICLES, GOES THROUGH THE TOP OUTLET TO OUTSIDE.

IN THREE-OUTLET CLASSIFICATION TYPE HYDRO-CYCLONE SYSTEM, MIDDLE OUTLET IS NEWLY BUIL, IN ADDITION TO TOP OUTLET, AND BOTTOM OUTLET NOZZLE.

THROUGH THE MIDDLE OUTLET, SLURRY WHICH CONTAINS THE SOLIDS, AND VERY CLOSE TO THE ORIGINAL SLURRY IS EXHAUSTED, AND AGAIN RETURNED BACK TO CYCLONE WITH THE ORIGINAL SLURRY.

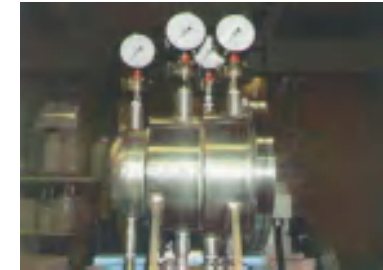
THIS THIRD FLOW THROUGH THE MIDDLE OUTLET CAN MAKE MUCH HIGHER AND ACCURATE CLASSIFICATION AND HIGHER RECYCLING RATE OF SOLIDS.



( ■ 3-Outlet Hydro-Cyclone System )

**Model : TR-5**

- \* Classification / Separation Particle size : 0.5 - 5  $\mu\text{m}$
- \* Flow rate Per Cyclone : 3.5 L / min
- \* Inlet Pressure : 0.6 MPa
- \* Application: Classification of Fine Particle, Polishing Slurry Recycling



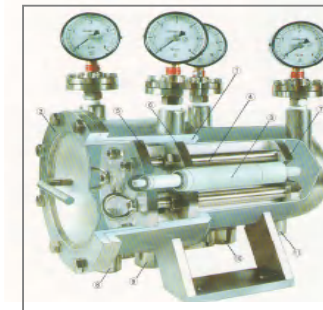
**MODEL TR5-5**

Materials	Particle size of Classification ( $\mu\text{m}$ )	Remarks
Powder	1	Specific gravity more than 2
Mineral powder	1	Silicon carbide, alumina, silica, Cerium oxide, etc.
Metal powder	1	Nickel, pure iron, copper, etc.
Abrasives	1	Silicon carbide, alumina, silica, Cerium oxide, etc.
TiO	1	

( ■ 3-Outlet Hydro-Cyclone System )

Model : TR-10

- \* Classification / Separation Particle size : 0.5 - 20  $\mu\text{m}$
- \* Flow rate Per Cyclone : 12 L / min
- \* Inlet Pressure : 0.6 MPa
- \* Application : Classification of Fine Particle, Lapping Slurry Recycling



MODEL TR10-5

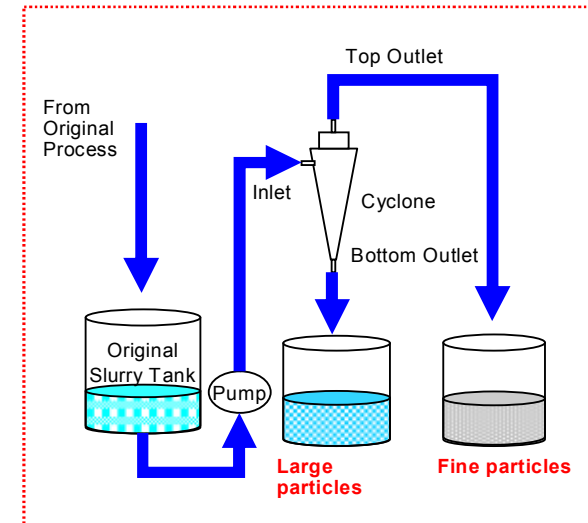
Materials	Particle size of Classification ( $\mu\text{m}$ )	Remarks
Ceramic materials	1	Silicon carbide, alumina, silica sand, etc. large particle (1.5 ~ 2micronmeter included)
Metal powder	1	Specific gravity five or more metal
Mica powder	Approx. 3	(Like scales)
Abrasives	2 ~ 3	
TiO	2 ~ 3	
Abrasive powder	3 ~ 7	
Ceramic materials	3 ~ 5	Silicon carbide, alumina, silica sand, etc.
Carbon powder	Approx. 5	
Polymer powder	Approx. 3 ~ 10	Urea resin, etc.
Calcium carbonate	below 5	

## ■ 2-Outlet Hydrocyclone System

BASED ON THE LONG AND ESTABLISHED EXPERIENCE FOR OVER 1500 SETS OF SALES, WIDE RANGE OF HYDRO-CYCLONES CAN BE OFFERED

HIGH VOLUME PROCESSING CAN EXPECT A HIGH YIELD.

BROAD RANGE OF CLASSIFICATION, 3 $\mu$ m ~ 150 $\mu$ m, CAN BE DONE AT LOW ENERGY COST



T10-5型本体



T80型本体



SC-100型



SC-150型

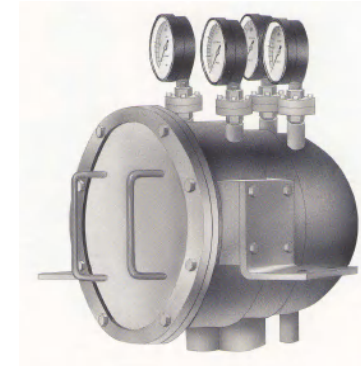
**( ■ 2-Outlet Hydro-Cyclone System )**

**Model : T-5**

- \* Classification / Separation Particle size : 1 - 5  $\mu\text{m}$
- \* Flow rate Per Cyclone : 3 L / min
- \* Inlet Pressure : 0.4 MPa
- \* Application : Classification, Concentration of Fine Particle

**Model : T-10**

- \* Classification / Separation Particle size : 3 - 20  $\mu\text{m}$
- \* Flow rate Per Cyclone : 10 L / min
- \* Inlet Pressure : 0.4 MPa
- \* Application : Classification, Concentration of Middle size Particle



**MODEL T-5**

Materials	Particle size of Classification ( $\mu\text{m}$ )	Remarks
Abrasive powder	Approx. 10	
TiO	Approx. 10	
Calcium carbonate	10 ~ 20	
Acid crystal particles	Approx. 20	
Metal powder metal foil	Approx. 3 ~ 10	
Bentonite	15 ~ 20	viscosity less than 20cp



( ■ 2-Outlet Hydro-Cyclone System )

Model : SC-150 Cyclone Pump Set

Applications

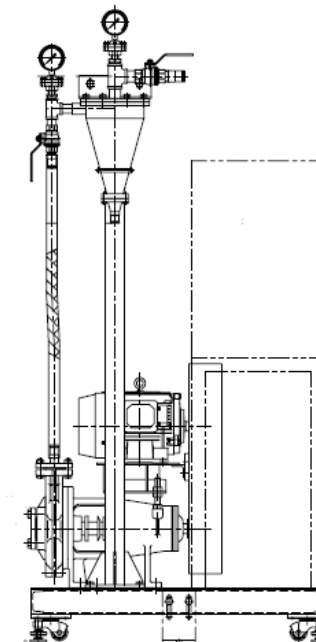
- \* Separation & Classification of medium & large sized powder in various ceramic materials
- \* Classification of medium & large sized powder in abrasives
- \* Classification of medium & large sized metal powder (8 ~ 20µm Cut of bronze, iron, & other metal powders)
- \* Separating, removal of large sized powders in large specific gravity powders
- \* Removal of laminated powder from the scales-shaped minerals powders

Features

- \* Separations of large specific gravity powders sized at 20 to 50 µm, which can hardly separated by Centrifuges, or Vibration sieves, can be done.
- \* Energy cost can be saved for low input pressure driving.
- \* Small compact size system with large capacity is offered.
- \* Very Stable, Simple and easy operation can be done.
- \* Free from the problems like screen damages of vibrating screen
- \* Selected materials are used against the high abrasion nature of big size, or metal particles



MODEL SC-150



MODEL SC-150 Cyclone Pump Set



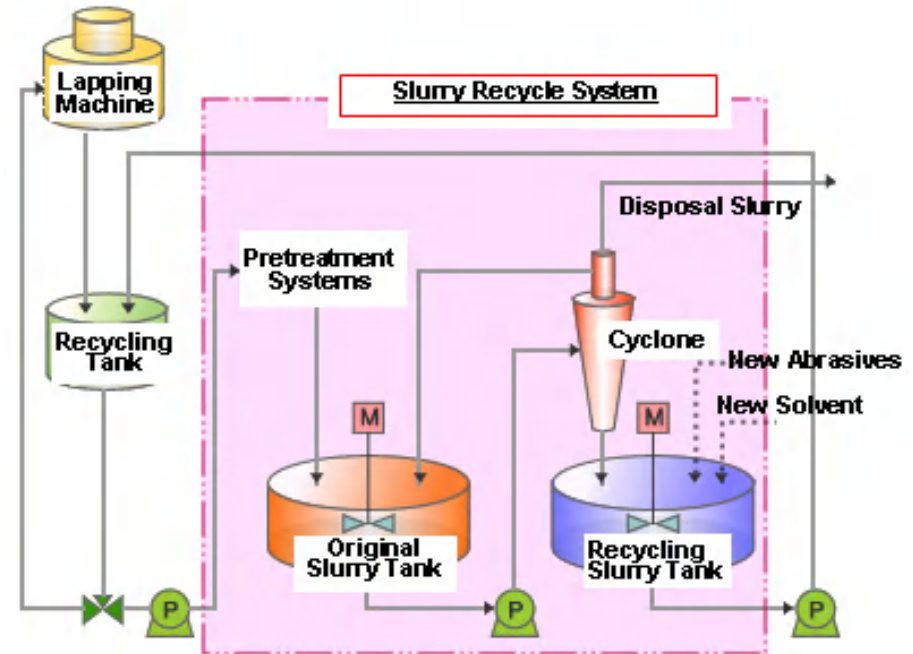
ORIGINAL      TOP FLOW      BOTTOM FLOW

## ■ Slurry Recycle System

- Semiconductor wafers
- Glass substrate
- Quartz substrate

Remove Chips, and Fragments from Lapping, polishing process  
 High Removal efficiency, 50 to 80% recovery of the abrasive powder

System Flow (Patent Registered)

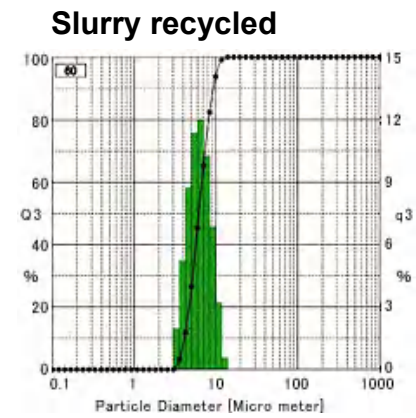
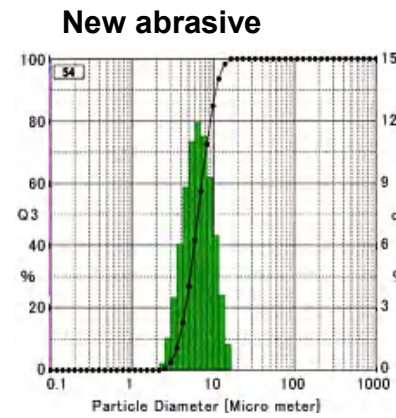
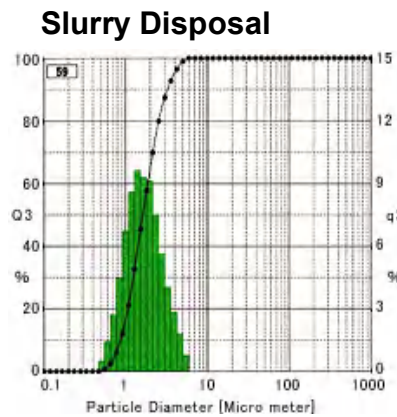
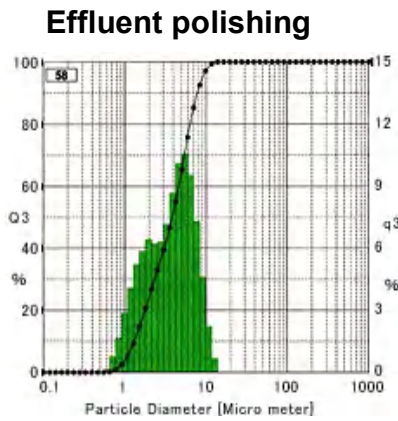


### Slurry Recycle System Sales records

WORK	PURPOSE
Crystal Wafer	Waste collection, lap polishing
LCD glass	Polishing Wastewater Collection
HD glass	Waste Collection, Lapping
Optical Lens	Polishing Wastewater Collection
Silicon Wafers	Waste Collection, Lapping
Gallium Wafers	Waste Collection, Lapping

( ■ Slurry Recycle System )

Particle Size Distribution (AZ#1500)



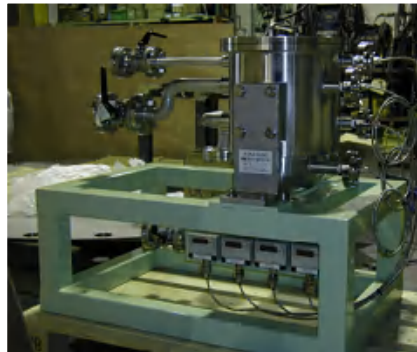
Particle Size Distribution	D10	D50	D100
Effluent polishing	1.317	3.850	7.833
Slurry Disposal	0.870	1.626	3.250
Slurry recycled	4.122	6.206	9.288
New abrasive	3.840	6.527	10.883







**T10-5 Cyclone**



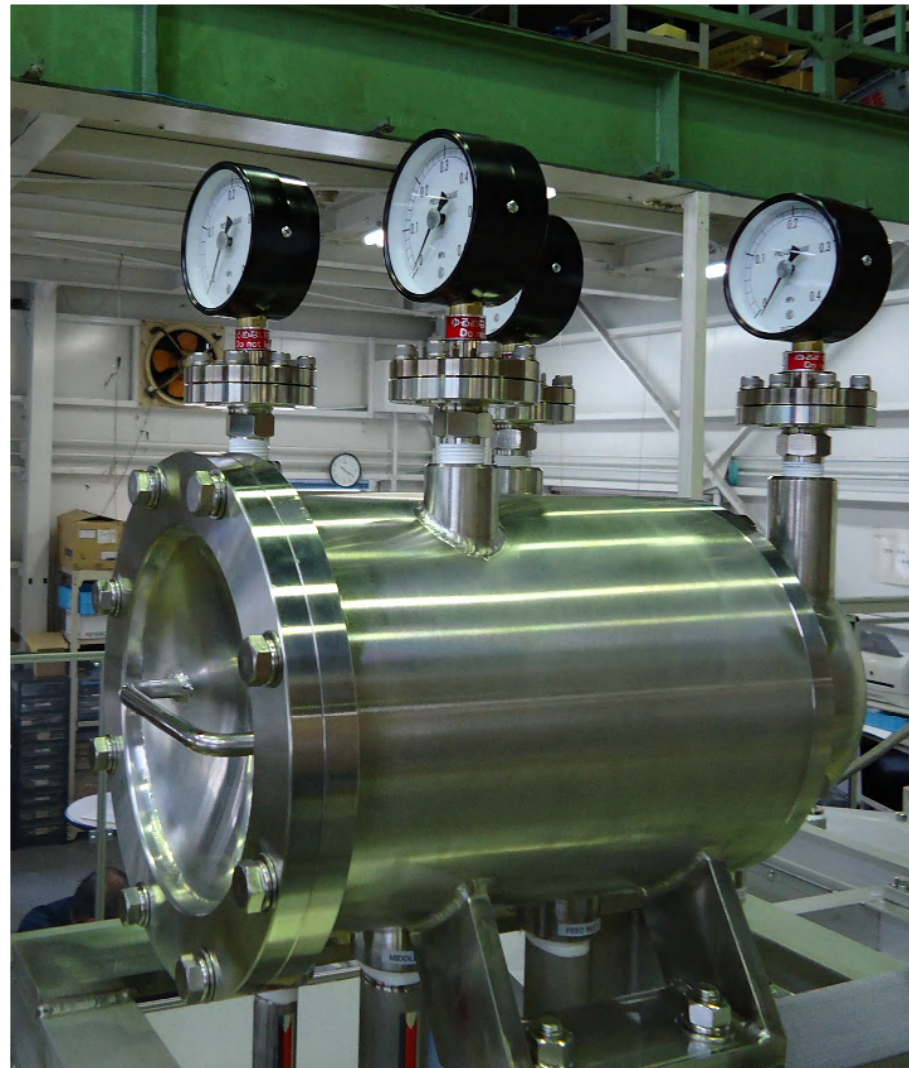
**TR10-30 Cyclone Set**



**Hydrocyclone Lab System**



**Model TR5-5 Hydrocyclone System**



**TR10-10**

**Inquiry Sheet**

Please fill your requirement / Information & return to us.

Customer	Company			Dept. Position				
	Address			Phone				
	Name			E-Mail				
Required System & Request	Category	A) Grinding B) Dispersing / Emulsifying C) Classification / Sifting D) Feeding / Transportation E) Separation / Concentration F) Drying G) Others						
	System	A) Cavitation Mill Dispersing System B) Beads Mill Ultra Fine Grinding System C) Jet Mill Ultra Fine Grinding System D) Grinding Mill Powder Pulverization System E) Super Micro Sieve F) Hydro-Cyclone Classification System G) Vibration Sifter H) Micro Powder Air Classifier I) Constant Micro Feeder J) Others						
	Request	A) Sales Material B) Proposal C) Test D) Process Service E) Rental F) Others						
Materials & Target	Name			Properties Y or N	Bulk Density		Moisture	
	Condition	A) Powder B) Particle C) Solid D) Others			Hygroscopic		% if Yes	
	Particle Shape	A) Spherical B) Unspecified C) With Protrusion D) Single Particle E) Aggregates F) Unknown			Abrasiveness		Aggregation	
				Solvent	A) Water B) Ethanol C) IPA D) MEK E) Acetone F) Toluene G) Xylene H) Ethyl Acetate I) Others			
	Size	Original Powder	Required					
	D <sub>50</sub>			Slurry	Density wt%		Viscosity cps	
	Top							
	Others			Detergent				
Test & Work	Required Volume	Test sample			Production			
	Test / Work Schedule					Attendance		
Remarks								

Excel version is available at <http://www.ftajapan.com/inquiry.xls> , if required.

## ■ Major Systems & Services offered by FTA



### Grinding / Crushing / Dispersing / Emulsifying

**Dispersing / Emulsifying / Mixing** Wet Operation  
Cavitation Mill Nano Dispersing System

**Nano Grinding / Crushing / Dispersing / Mixing** Wet Operation  
Beads Mill Nano Grinding System

**Grinding / Crushing** Dry Operation  
Jet Mill Ultra Fine Grinding System

**Dispersing / Emulsifying / Mixing** Wet Operation  
Ultrasonic Processor Nano Forming System

**Grinding, Crushing** Dry Operation  
Grinding Mill Powder Pulverization System



### Classifying / Sifting

**Classification / Sifting** Dry & Wet Operation  
Super Micro Sieve & Screen

**Classification/Separation/Concentration** Wet Operation  
Hydrocyclone Classification System

**Sifting / Screening / Classifying** Dry & Wet Operation  
Powder & Particles Vibration Sifter

**Classifying** Dry Operation  
Micro Powder Air Classifier



### Other Powder Processing Systems & Services

**Concentration**  
Screw Decanter Concentration System

**Constant Feeding**  
Powder & Particles Constant Micro Feeder