

# EQUIPMENT AND SERVICES



## **HOSOKAWA MICRON POWDER SYSTEMS**

Combining the Resources of: **ALPINE | MIKRO | MICRON | VRIECO-NAUTA**



## HOSOKAWA MICRON POWDER SYSTEMS

Hosokawa Micron Powder Systems designs and manufactures powder processing equipment and systems for the chemical, pharmaceutical, food, mineral, cosmetic and plastic industries in North, Central and South America.

Hosokawa offers the leading powder processing technology from the most respected brand names in the industry. We engineer our equipment to assure reliability, durability and optimal performance throughout the life of our machines and systems. With brand names such as Mikro, Alpine, Micron, Vrieco-Nauta, Stott and Vitalair, we guarantee the highest standards of quality and performance and the best solutions for your processing needs.



Angle of repose analysis on Micron Powder Characteristics Tester PT-X



Hosokawa Micron Powder Systems in Summit, New Jersey

### APPLICATIONS AND TECHNOLOGIES

Since 1923, Hosokawa Micron Powder Systems has defined the standards of durability and performance through our leading powder processing technologies for:

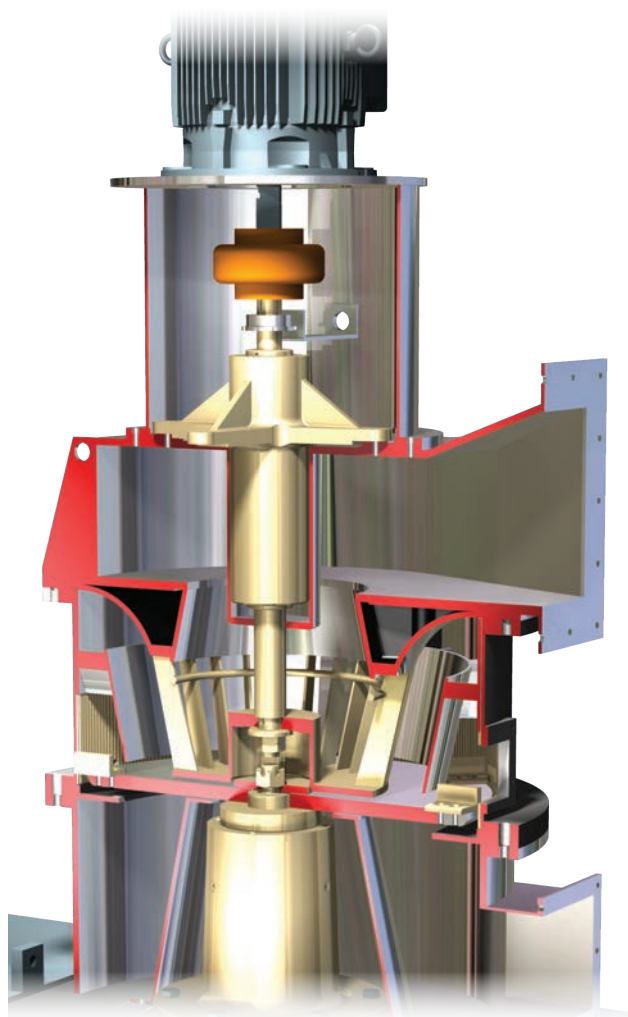
- Fine to ultra-fine size reduction
- Classification and separation
- Mixing and drying
- Compaction, agglomeration and granulation
- Laboratory and analytical equipment
- Isolators, glove boxes and downflow booths
- Hygienic filling and weighing systems
- Process and system engineering
- System control design
- Testing and analytical services
- Contract manufacturing
- System validation and optimization
- Service and maintenance



# POWDER PROCESSING SOLUTIONS

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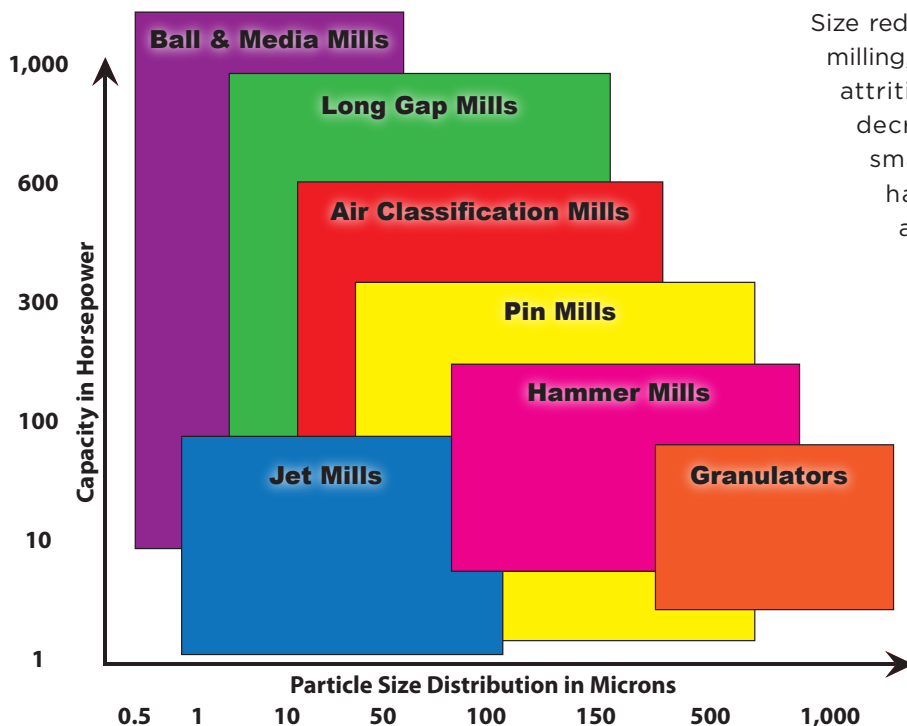
*Mikro ACM® Air Classifying Mill with independent drives for rotor and classifier wheel*

## DESIGNED, MANUFACTURED AND ASSEMBLED IN USA

Hosokawa equipment comes with our pledge of performance and guaranteed dependability. All components are inspected and tested to ensure they meet our strict standards before being shipped to our customers. A majority of Mikro® brand milling and processing equipment sold by Hosokawa Micron Powder Systems is engineered and built in Summit, New Jersey, USA.



## COARSE TO ULTRA-FINE SIZE REDUCTION



Size reduction, also referred to as grinding or milling, is the process of using shear (cutting), attrition, compression or impact forces to decrease the size of large materials into smaller particles or powders. Hosokawa has developed some of the most advanced and precise size reduction systems for coarse granulation down to ultra-fine milling. Most of these machines can be tested in Summit, New Jersey, and are available for laboratory scale to full production systems.

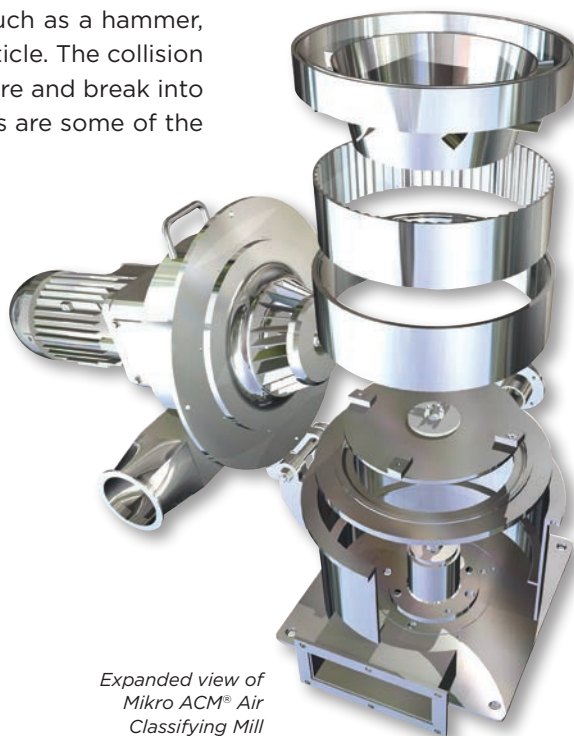


### IMPACT MILLS

The most common size reduction systems used for grinding dry materials are impact mills. Impact milling is defined as a hard, solid object such as a hammer, bar or pin, moving at high velocity coming in contact with a particle. The collision of the impact surface and particles cause the materials to fracture and break into smaller particles. Air classifying mills, hammer mills and pin mills are some of the impact mills Hosokawa produces.



Mikro ACM® Air Classifying Mill - Model 300



Expanded view of  
Mikro ACM® Air  
Classifying Mill

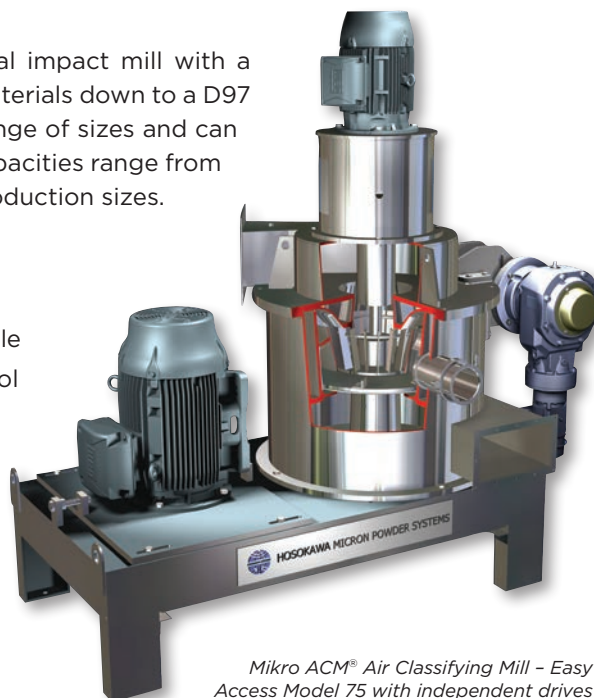


## IMPACT MILLS

### MIKRO ACM® AIR CLASSIFYING MILL

The Mikro ACM® Air Classifying Mill is an air-swept mechanical impact mill with a dynamic air classifier designed to grind an extensive range of materials down to a D97 < 20 µm. The Mikro ACM® Air Classifying Mill is available in a range of sizes and can be supplied for laboratory use or large production demands. Capacities range from 0.5 lb/hr on a laboratory mill to several tons per hour on our production sizes.

- Grinds and classifies materials with a Mohs hardness ≤ 5
- Chemical, mineral, food and pharmaceutical designs available
- 1 HP laboratory models to 600 HP production systems available
- Narrow particle size distributions with excellent top size control
- Heavy-duty, durable construction
- Stainless steel and special alloy designs available
- Wear protection options such as tungsten carbide and ceramic components
- Easy clean and SIP/CIP options
- PSR 10 bar (g) designs available
- System validation and optimization
- Service and maintenance



*Mikro ACM® Air Classifying Mill - Easy Access Model 75 with independent drives*

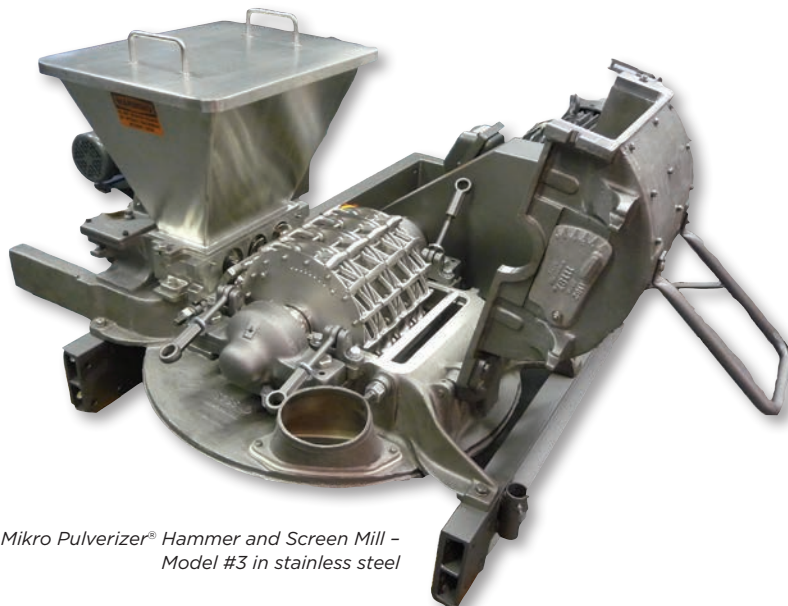
Mikro ACM® Model	Rotor Power (HP)	Classifier Power (HP)	Max. Rotor Speed (RPM)	Approx. Air Flow (ft³/min)	Scale-Up Factor	Optional Designs & Configurations							
						Coaxial Drive	Independent Drive	Easy Access / Easy Clean	High Speed Rotor	Pressure Shock Resistant	E-ACM Carbon Black Mill	Superfine Configuration	High Temperature Operation
1 ACM	1	1	22,000	60	NA		✓						
2 ACM	3	1	10,500	200	0.3	✓			✓	✓			
10 ACM	10	1.5	7,000	500	1	✓	✓	✓	✓	✓	✓	✓	✓
20 ACM	20	2	7,000	1,060	2		✓	✓	✓	✓			
30 ACM	30	5	4,600	1,500	3	✓	✓	✓	✓	✓	✓	✓	✓
40 ACM	40	7.5	4,600	2,000	4	✓	✓	✓	✓	✓		✓	
75 ACM	75	10	3,000	3,750	7.5	✓	✓	✓	✓	✓		✓	
100 ACM	100	15	3,000	5,000	10	✓	✓		✓	✓	✓	✓	✓
125 ACM	125	20	2,100	6,360	12.5	✓	✓			✓			
150 ACM	150	30	2,100	7,500	15	✓	✓			✓	✓		✓
200 ACM	200	25	2,000	10,000	20	✓	✓			✓	✓	✓	✓
250 ACM	250	40	2,000	12,500	25		✓			✓	✓		✓
300 ACM	300	50	2,000	15,000	30	✓	✓			✓	✓	✓	✓
400 ACM	400	100	1,500	20,000	40	✓	✓						
600 ACM	600	150	1,500	30,000	60	✓							



## IMPACT MILLS

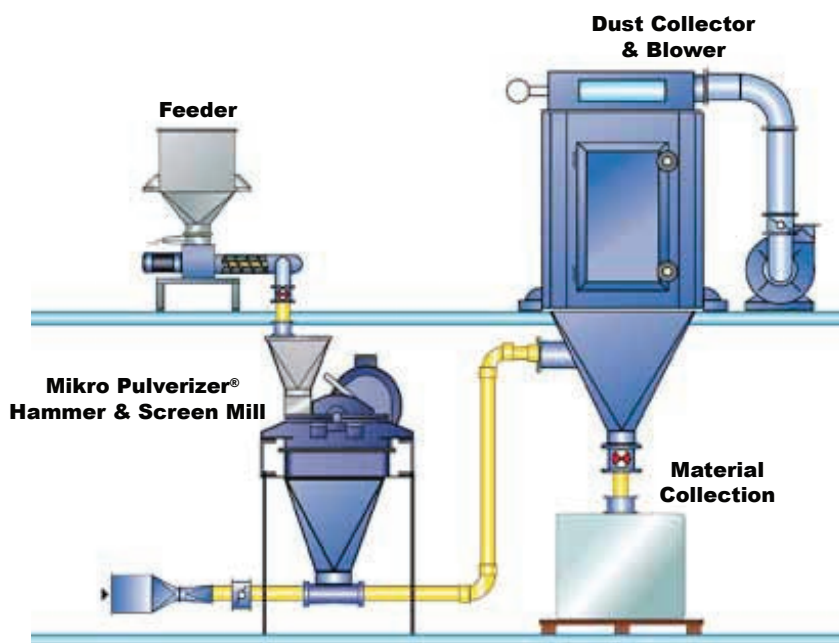
### MIKRO PULVERIZER® HAMMER AND SCREEN MILL

The Mikro Pulverizer® Hammer and Screen Mill is a high speed mechanical impact mill designed for continuous size reduction of a wide range of materials down to D90 < 45 µm. This device has evolved into the preeminent industrial mill with thousands of worldwide installations.



*Mikro Pulverizer® Hammer and Screen Mill -  
Model #3 in stainless steel*

	Samplmill	Bantam	MP 1	MP 2	MP 3	MP 4	MP 44	MP 66
Motor (HP)	0.75	1	5	20	50	100	200	300
Max. Rotor Speed (RPM)	14,000	14,000	9,600	6,900	4,650	3,450	3,450	2,300
Approx. Air Flow (ft³/min)			60-80	150-200	450-600	600-800	1,000 - 1,500	2,000 - 3,000
Scale-Up Factor	N/A	0.2	1.0	4.0	10	20	40	60



*Typical hammer mill system configuration*

- Suitable for chemical, mineral, plastic and cosmetic applications
- Laboratory to full production models available with 3/4 HP to 300 HP
- Capacity from 0.5 lb/hr to 30,000 lb/hr
- Hammer and knife rotors available
- Efficient and economical milling of soft to medium-hard materials
- No ancillary equipment required
- Compact, dust-free design
- Fabricate PSR models available
- Cryogenic milling with nitrogen available
- Easy to clean and maintain



## IMPACT MILLS

### MIKRO® UMP UNIVERSAL MILLING SYSTEM

The Mikro® UMP Universal Milling System is a compact, high-speed impact mill capable of coarse granulation or fine size reduction with interchangeable rotor configurations. The UMP is the next step in the evolution of the Mikro Pulverizer® Hammer and Screen Mill by providing the same grind as the classic hammer mill while adding the flexibility of a pin disc, knife rotor or attrition plates.

- Capable of fine grinding to D97 < 35 µm
- Lab and production models available with 1 HP to 40 HP
- Capacity ranges from 5 grams/batch up to 3,000 lb/hr
- Suitable for pharmaceutical, food, plastics and chemical applications
- Energy-efficient and economical to operate
- Designed for milling soft to medium-hard materials
- Fabricated stainless steel construction
- Variable speed rotor drive
- Cantilevered design for easy cleaning and rotor changes
- Cryogenic operation available
- Available with pin rotor, hammer and screen, knife configuration or attrition plates
- Isolator installations available for high containment applications



Various milling options for the Mikro® UMP Universal Milling System

Model	LPM-2	UMP-B	UMP-1	UMP-2	UMP-3	UMP-4
HP	1	2	10	20	40	60
Hammer & Screen (LFS)						
Rotor RPM - Max	36,000	14,000	9,600	6,900	-	-
Scale Factor	-	0.2	1	2	-	-
Air Flow - SCFM	10	50	80	200	-	-
Pin Disc Rotor						
Rotor RPM - Max	36,000	27,500	18,000	12,000	7,500	5,500
Scale Factor	-	0.2	1	2	4	6
Air Flow - SCFM	10	20	85	170	350	500
Knife Rotor						
Rotor RPM - Max	-	14,000	9,600	6,900	-	-
Scale Factor	-	0.2	1	2	-	-
Air Flow - SCFM	-	10	35	65	-	-
Attrition Plates						
Rotor RPM - Max	-	22,000	14,500	9,600	6,000	4,500
Scale Factor	-	0.2	1	2	4	6.0
Air Flow - SCFM	-	5-10	30-50	60-100	120-200	180-300

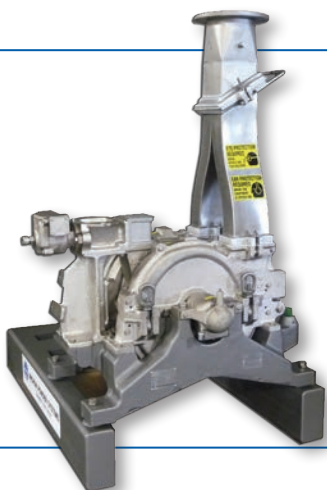
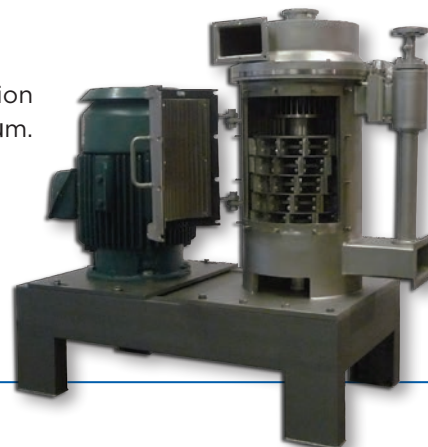


## IMPACT MILLS

### MIKRO LGM® LONG GAP MILL

The Mikro LGM® Long Gap Mill is an air classifier mill that uses a combination of attrition and impact forces for fine size reduction down to  $D_{97} < 10 \mu\text{m}$ .

- Grinds, classifies and even dries in one step
- Available from 10 to 1,000 HP
- Designed for chemical and mineral applications



### MIKRO ATOMIZER® AIR CLASSIFYING MILL

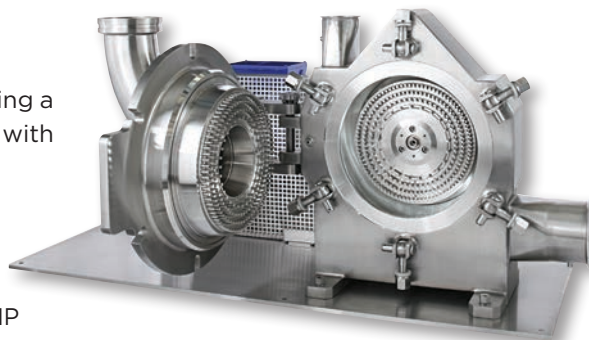
The Mikro Atomizer® Air Classifying Mill is ideal for grinding heat sensitive and extremely cohesive material.

- Grinds, classifies and conveys in one step down to  $D_{97} < 25 \mu\text{m}$
- Pilot to full production models available
- Operates at a low temperature due to high volume of conveying air

### ALPINE® UPZ PIN MILL

The Alpine® UPZ is a flexible milling system designed for grinding a wide range of materials. The versatile design can be outfitted with pin discs, plate beaters or hammer grinding rotors.

- Suitable for chemical, pharmaceutical and food processing
- Capable of fine milling to  $D_{97} < 75 \mu\text{m}$
- Numerous models and configurations available from 1 to 300 HP



### ALPINE® CW CONTRAPLEX PIN MILL

The Contraplex is a fine impact mill with two counter-driven pin discs designed to efficiently grind moist, greasy and sticky materials.

- Capable of milling down to  $D_{97} < 50 \mu\text{m}$
- Cryogenic operation possible with liquid nitrogen or other chilling gases
- The hinged door design permits easy cleaning and maintenance

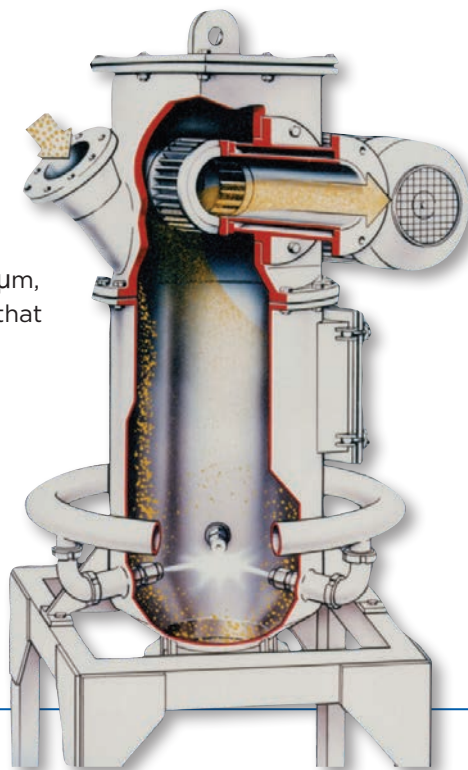


## JET MILLS

### ALPINE® AFG FLUIDIZED BED OPPOSED JET MILL

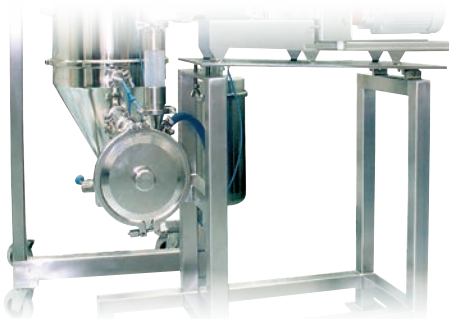
The Alpine® AFG Fluidized Bed Opposed Jet Mill is suitable for ultra-fine size reduction of many materials up to a Mohs hardness of 10. Compressed gas is accelerated through a series of nozzles at extremely high velocities. Particles are drawn into the accelerated gas streams and are ground via inter-particle collisions in the jet stream. In order to achieve ultra-fine particle sizes down to  $D_{97} < 3 \mu\text{m}$ , the AFG is equipped with a dynamic deflector wheel air classifier that can be operated at varying speeds to alter product fineness.

- Laboratory to full production models available
- Steel, stainless steel and ceramic wear protection options
- Suitable for very hard and abrasive materials
- Designed for chemical, mineral and pharmaceutical applications
- Special models for toner, graphite, pigments, abrasive minerals and chemicals available
- Can handle large feed particles

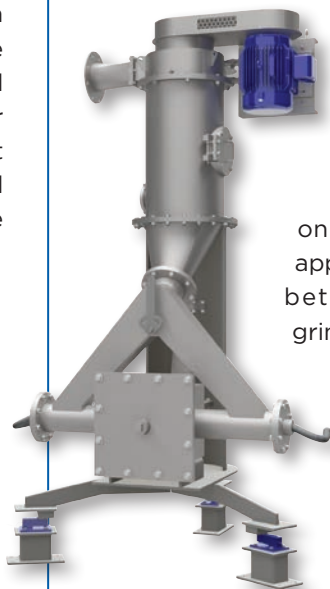


### ALPINE® AS SPIRAL JET MILL

The Alpine® AS Spiral Jet Mill is designed for the micronization of pharmaceuticals and certain chemical powders. Material is injected into the grinding zone by gas nozzles. Material flows around the perimeter of the mill wall in a spiral manner resulting in particle-to-particle attrition and impact against the mill walls. As the material gets finer and lighter, the ground particles are drawn toward the outlet at the center of the milling chamber.



- No moving parts for CIP and SIP
- Capable of ultra-fine milling to  $D_{97} < 3 \mu\text{m}$
- Fabricated housings available in surface finishes as high as 0.2 micron Ra



### MIKRO® JET MILL MJM

The Mikro® Jet Mill MJM uses compressed air to fire particles directly toward each other through two opposed particle guns resulting in particle on particle size reduction. In some applications, a target can be aligned between the guns to adjust the grinding results. An internal classifier is used to control particle top size and reject oversized particles for further milling. This mill has similar operating principles to a fluidized bed jet mill and can achieve similar results with less energy input.

- Pilot to production models available
- Suitable for medium-hard and abrasive materials
- Designed for chemical and mineral applications
- Easy to operate and maintain

## GRANULATORS

### LARGE PART GRANULATOR

Designed to recover large, thin-walled parts including housings, helmets, bottles and automotive components. Our Double Angle Cut™ geometry provides a high shear slicing action which produces a clean, uniform granulate with minimal fines and maximum efficiency.



### ALPINE ROTOPLEX®

The Alpine Rotoplex® Granulator is a workhorse. It is the only granulator with a patented cutting technology, our Cross-Scissor-Cut®. This technology allows for multiple rotor rows and ensures even distribution of material across the entire width of the machine. The Alpine Rotoplex® is designed for the most difficult applications and is ideal for different applications such as film recycling.



### PRESS SIDE GRANULATOR

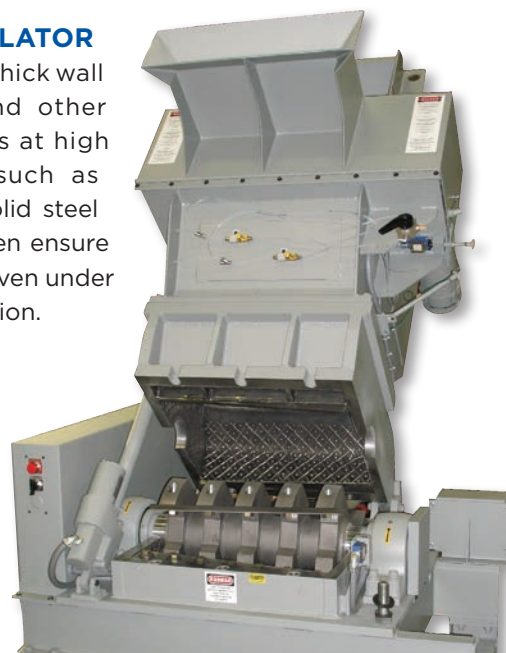
The Press Side Granulator uses a Double Angle Cut™ high shear rotor and bed knife geometry to provide a unique cutting solution that achieves clean, uniform granulate with extremely low dust and fines.

- High throughput rates and lower energy consumption
- Produces uniform regrind
- Available from pilot to production models



### HEAVY DUTY GRANULATOR

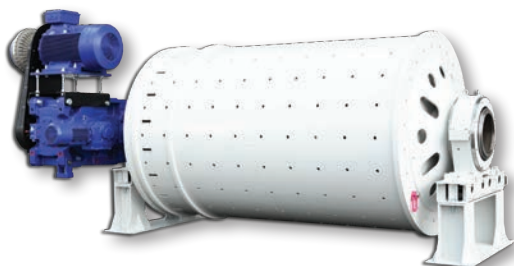
Developed to granulate thick wall plastic components and other demanding applications at high rates. Design details such as a solid 6" rotor shaft, solid steel flywheel and drilled screen ensure durability and reliability even under continuous, heavy operation.





## MEDIA MILLS AND TABLE MILLS

Media milling is a size reduction process using balls or beads that are rolled or tumbled inside a drum chamber to grind materials to ultra-fine sizes. These mills are often paired with classifiers that recirculate oversize materials back into the milling chamber for ultra-fine size reduction at high throughput rates and comparatively low energy consumption.



### ALPINE® SO SUPER ORION BALL MILL

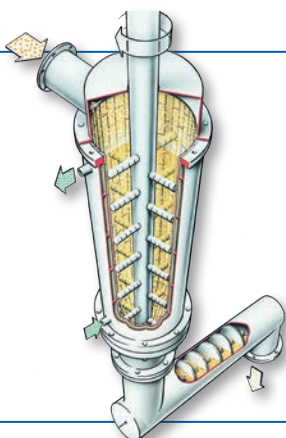
The Alpine® Super Orion Ball Mill was developed for the ultra-fine grinding of hard and abrasive materials. This durable media milling system efficiently and effectively pulverizes minerals and chemicals.

- Designed to mill down to  $D_{50} < 2 \mu\text{m}$
- Systems capable of up to 100,000 lb/hr
- Numerous protective wear options and grinding media choices

### ALPINE® ANR VERTICAL WET MEDIA MILL

The ANR is an energy-efficient, low maintenance, vertical wet media mill designed for ultra-fine milling of concentrated mineral powder slurries.

- Capable of producing ultra-fine materials down to  $D_{97} < 2 \mu\text{m}$
- Ceramic contact components ensure material purity
- Models for pilot and production scales available



### ALPINE® ATR VERTICAL AGITATED MEDIA MILL

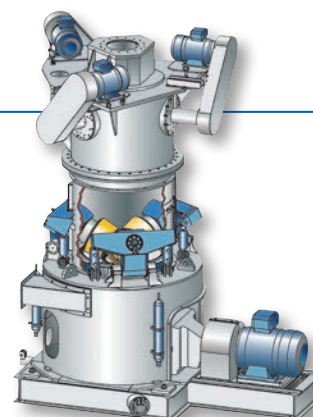
The ATR is a dry vertical agitated media mill that has a cylindrical grinding chamber capable of producing ultra-fine materials.

- Size reduction down to  $D_{80} < 2 \mu\text{m}$
- Designed for hard minerals and fillers
- Double-walled design can be used for water cooling applications

### ALPINE® AWM TABLE ROLLER MILL

The Alpine® AWM Table Roller Mill combines compression forces and air classification to economically mill hard minerals. This system has adjustable milling parameters which allow operators to quickly modify process results.

- Fine grinding down to  $D_{97} = 10 \mu\text{m}$
- Designed for processing hard industrial minerals
- Integrated ultra-fine classifier for particle size control



## MIXING, COATING AND DRYING

### VRIECO-NAUTA® CONICAL SCREW MIXER

The Vrieco-Nauta® Conical Screw Mixer is a convective mixer with a rotating cantilevered mixing screw. The screw is suspended from an orbital arm, which rotates along the conical inner vessel wall, causing convective mixing of particles and shear. Fast and full discharge through the bottom discharge valve is standard.



- Suitable for pharmaceuticals, food, plastics, minerals, radioactive materials and chemicals
- Gentle mixing of free-flowing and segregative powders, pastes, slurries and liquids
- Available from 1 liter to 100,000 liters
- Fast and accurate homogenization
- Energy-efficient operation
- Minimum heat generated

### VRIECO-NAUTA® CYCLOMIX

The Vrieco-Nauta® Cyclomix is a high shear intensive mixer specially designed for fine cohesive powders, slurries and liquids. With excellent temperature control, it can perform multiple processing such as coating, heating and bonding.

- Fast mixing times from 30 seconds to 5 minutes
- Designed for high shear mixing and bonding applications
- 1 to 2,000 liter designs available



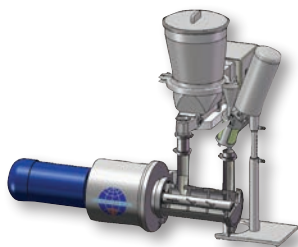
### VRIECO-NAUTA® VITOMIX

The Vitomix is a mid-shear mixer capable of ultra-quick cycle times. With a tip speed from 0.4 m/s to 6.0 m/s it has up to 8 times more transport volume than a conventional screw cone mixer. It features good temperature control, lump-free moistening and fast, gentle mixing of powders, pastes and slurries.





## MIXING, COATING AND DRYING



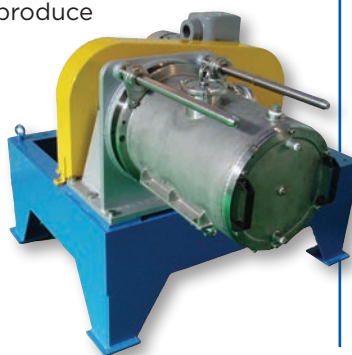
### VRIECO-NAUTA® MODULOMIX CONTINUOUS MIXER

The Modulomix is a continuous modular mixer based on proven Cyclomix batch mixing technology. It has been designed specifically for the pharmaceutical industry and can be used for low, medium or high shear applications. The Modulomix has been designed to be compact with fast reactivity, minimum residue and rapid start-up and shutdown times.

### NOBILTA™ DRY PARTICLE COMPOSING SYSTEM

The Nobilta™ Dry Particle Composing System can produce composite materials in a dry process by applying mechanical forces without any binders. It is also a multifunctional processing unit for precision mixing, particle coating, particle surface modification and shape enhancement.

- Laboratory scale up to full production systems
- Designed for chemicals, battery, pigments, cosmetics and pharmaceutical applications
- Ideal for heat-sensitive and abrasive materials

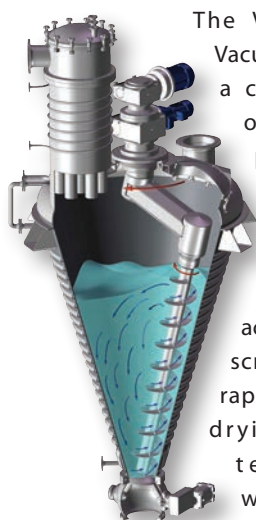


### SPECIALIZED MIXING EQUIPMENT



- Vrieco-Nauta® Horizontal Ribbon Mixer
- Conical Paddle Mixer
- Vrieco-Nauta® Silomixer
- Mechanofusion® Dry Particle Composing System

### VRIECO-NAUTA® VACUUM DRYER



The Vrieco-Nauta® Vacuum Dryer uses a combination of vacuum pressure, controlled temperature rise and the gentle mixing action of a conical screw mixer for rapid and uniform drying. Material temperature within the vessel can be efficiently controlled with the unit's heating and cooling jacket and continuous uniform material cycling.

### DRYMEISTER® FLASH DRYER DMR

The Drymeister® Flash Dryer combines drying, milling and classifying in a single system with inlet gas temperatures up to 600°C. The Drymeister is an economical alternative to spray dryers that can transform damp feed material into an ultra-fine powder with an extremely narrow particle size distribution. This system is available from pilot up to full production models with 400 HP.



### OTHER DRYING TECHNOLOGIES

- Mikro ACM® Air Classifying Mill and Dryer
- Mikro LGM® Long Gap Mill and Dryer
- Vrieco-Nauta® Active Freeze Dryer
- Conical Paddle Dryer

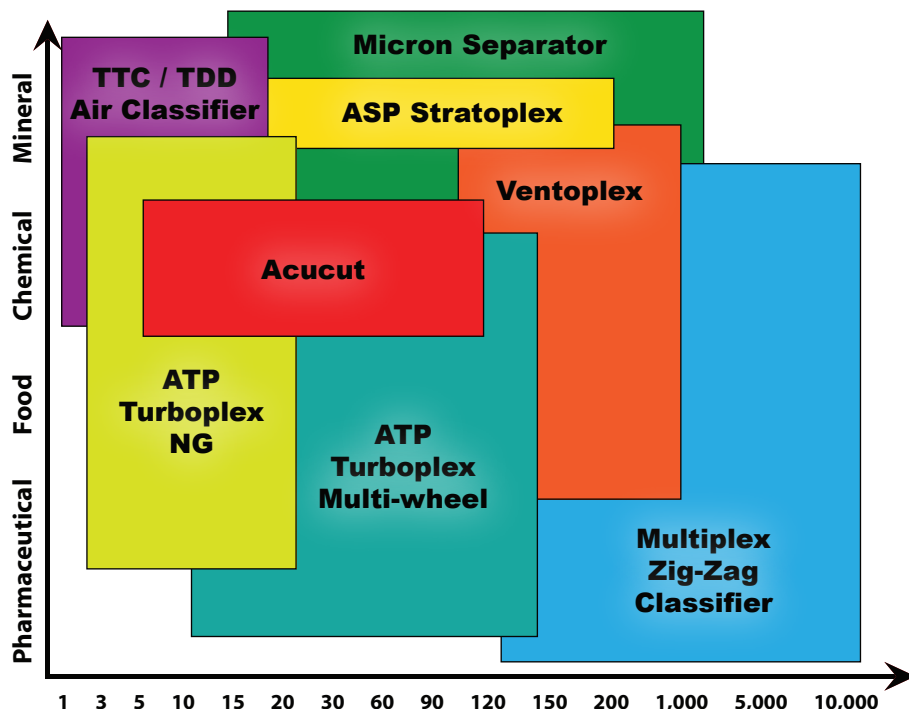
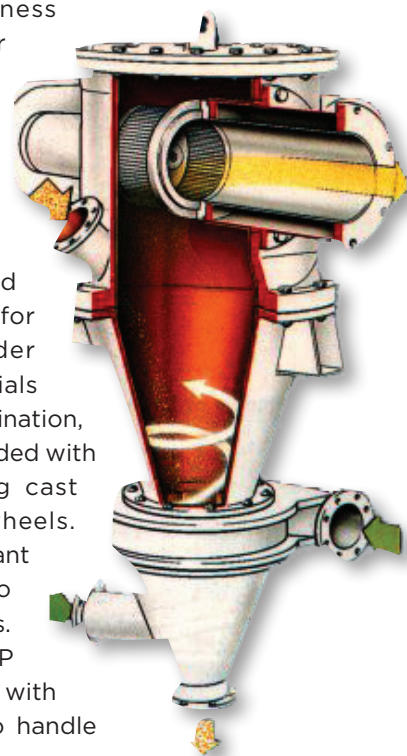
## CLASSIFICATION AND SEPARATION

Air classifiers are used to separate materials by size into coarse and fine fractions. The separation point, which is usually referred to as the cut point, can be controlled by adjusting the primary or secondary airflow in conjunction with the classifier wheel speed.

### ALPINE® ATP TURBOPLEX AIR CLASSIFIER

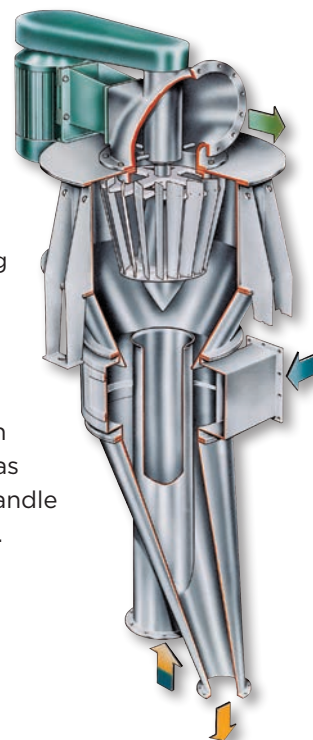
The Turboplex is suitable for food, pharmaceutical, chemical and mineral industries and is a highly efficient classifier. These air classifiers are capable of sharp cut points below 5 microns in applications ranging from a few pounds to tons per hour. Since the sharpness of cut can be affected by the larger wheel diameters, Hosokawa can provide designs with multiple smaller wheels to maintain effectiveness while allowing for higher throughputs.

These units can either be fed via a gravity inlet or placed in a process stream where the feed stream can be conveyed into the classifier, allowing for design versatility. In order to handle abrasive materials or to prevent iron contamination, the Turboplex can be provided with wear protection utilizing cast ceramic or zirconium wheels. The pressure shock resistant models (PSR) can be used to process explosive powders. Smaller models in the ATP line can also be provided with pharmaceutical finishes to handle CIP and SIP.



### MICRON SEPARATOR MS

The Micron Separator (MS) is similar in operation to a Turboplex and is a great choice for applications requiring cut points between 15-150 microns. Similar to the ATP line, these units can also be provided with feed options as well as wear protection to handle a variety of products.





# CLASSIFICATION AND SEPARATION

## MIKRO® ACUCUT CLASSIFIER

The Acucut utilizes dual stage operating controls to ensure sharp cuts and narrow band particle size distributions typically below 10 microns. With precise control of the air flow and rotor speeds, this unit will produce the same sharp cuts every time. Options are available for effective control of product contamination, protection against corrosion, handling abrasive materials and classifying adhesive powders.



## DEDUSTING SYSTEM

The Hosokawa dedusting system can be retrofitted to most granulators or other process lines to remove fines, fibers, papers and other contaminants from processed materials. It uses controlled negative airflow to disperse materials and convey undesirable contents out of the product as it is gravity discharged.



## ALPINE® TTD ULTRA-FINE AIR CLASSIFIER

The Alpine® TTD Ultra-Fine Air Classifier is a high performance particle separator ideal for classification of soft to medium-hard minerals at high throughputs and low energy consumption. The classifying wheel has a new patented design for high throughput rates and loading factors at high fineness values of up to  $D_{97} = 3 \mu\text{m}$ . Due to the low pressure drop, the Alpine TTD is considered one of Hosokawa's most energy-efficient air classifiers.



## MIKRO® CLASSIFIER

Hosokawa's Mikro® Classifier CC is an inline fine classifier that can handle a wide range of materials in many sizes, making cut points between  $3 \mu\text{m}$  to  $20 \mu\text{m}$  possible using unique internal dispersion systems.



## ALPINE® TTSP AIR CLASSIFIER

The Alpine® TTSP Classifier is designed for high dispersion and maximum precision classification. It is used in toner dedusting applications with cut points between  $3 \mu\text{m}$  to  $10 \mu\text{m}$ .



## CLASSIFIERS FOR SPECIALTY APPLICATIONS

- Alpine® Multiplex Zig-Zag Classifier
- Alpine® ASP Stratoplex Air Classifier
- Alpine® TSP Air Classifier
- Alpine® TTC Twin Turbo Classifier
- Alpine® Ventoplex



## LABORATORY AND ANALYTICAL EQUIPMENT

### MIKRO AIR JET SIEVE® MAJSx<sup>2</sup>

The Mikro Air Jet Sieve® — Model MAJSx<sup>2</sup> is a highly accurate and reliable particle size analyzer designed for determining the particle size distribution of dry powders. The MAJSx<sup>2</sup> is easy to operate and quickly determines particle size with a short series of test sieve screens. The system utilizes the pneumatic sieving principle that enhances the accuracy and reproducibility of particle size analysis. Use of this device has become a preferred method for such tasks as quality assurance of incoming raw materials and the confirmation of final product specifications.

- Analyzes materials from 20 µm to 4,750 µm
- Suitable for chemical, mineral, pharmaceutical, food, plastic and cosmetic applications
- CRF 21 Part 11 registration
- Integrated analysis computer with programmable vacuum pressure in multiple units
- Highly accurate and reliable results
- Easy-to-use operational software and touch screen controls



### MICRON PENETO PNT-N



The Peneto measures powder wettability, specifically speed and weight of liquids that penetrate the powder layer. This gives affinity between liquid and powder with easy measurement by computer. This method is widely used in the pharmaceutical and chemical industries to evaluate the surface characteristics between powder materials and various liquids.

### MICRON VIBLETTE™ VBL

Micron Viblette™ VBL is a wet sieve particle size analyzer designed to measure materials down to 10 microns. The Viblette™ is well suited for cohesive or sticky materials that tend to blind test sieve screens. Liquid is sprayed through a rotating nozzle above the sample while intense vibration forces break up films and deagglomerate cohesive materials. The dispersed sample is then dried, weighed and analyzed.





## LABORATORY AND ANALYTICAL EQUIPMENT



### MICRON POWDER CHARACTERISTICS TESTER PT-X

The model PT-X is the latest model of the Hosokawa Micron Powder Characteristics Tester. It utilizes state-of-the-art features to identify the specific characteristics of powdered samples for a wide range of applications. It is equipped with user-friendly, multilingual software, which determines over 10 different material characteristics such as angle of repose, cohesion, aerated and tapped bulk density, uniformity and compressibility.

### MIKRO LPM® LABORATORY PIN MILL

The Mikro LPM® Laboratory Pin Mill is the smallest model in the UMP line used for small sample grinding of 5 to 100 grams. The device is capable of producing materials down to  $D_{97} = 35 \mu\text{m}$ . This compact model has self-contained controls, product collection and can be operated in a small glove box or flexible isolator.

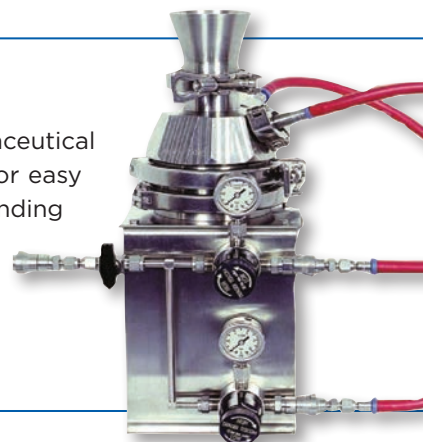


### ALPINE® PICOLINE

The Alpine® Picoline is a series of miniature laboratory machines for processing samples down to 1 gram. The Picoline is ideally suited for research and development or for manufacturing expensive materials such as nanoparticles, pharmaceuticals, plastics, ceramics and specialty chemicals. The Picoline has a universal platform that includes all the necessary controls and mechanical components to operate different interchangeable process devices.

### ALPINE® 50 AS SPIRAL JET MILL

The Alpine® 50 AS Spiral Jet Mill is designed for the micronization of pharmaceutical powders for laboratory research down to  $D_{97} = 3 \mu\text{m}$ . The AS is designed for easy cleaning CIP/SIP and has no moving parts. Material is injected into the grinding zone and accelerated by means of an injection gas nozzle. Material flows around the perimeter of the mill wall in a spiral manner. As material passes each additional high pressure gas port, it is reduced by particle-to-particle attrition and by impact against the mill wall.



### OTHER LAB TECHNOLOGIES

- Mikro® Density Tester
- Mikro® Pneumatic and Vibratory Feeders
- Alpine® 100 AFG Multi-Processor
- Mikro® High Efficiency Cyclone
- Micron Labomixer LV
- Vrieco-Nauta® Mini Cyclomix

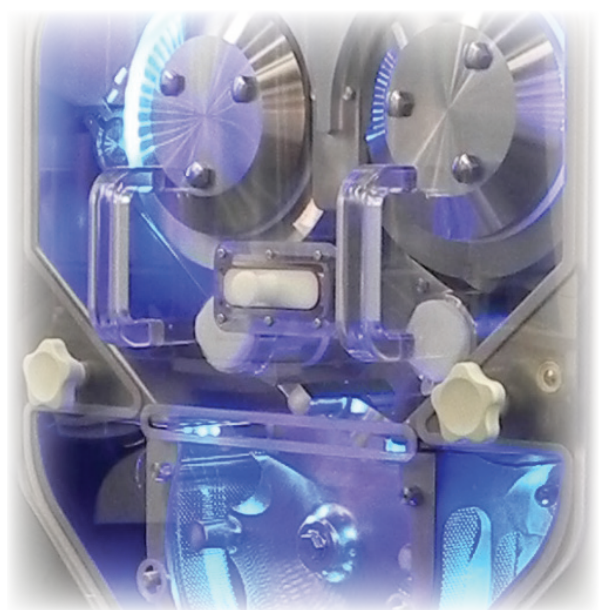
## COMPACTION AND DRY GRANULATION SYSTEMS

In some chemical processes, dust-free bulk materials are required. Briquetting and granulation are used to agglomerate chemicals with or without the aid of binding agents so that powders can be safely and easily handled. These processes can also increase bulk density and therefore improve shipping efficiency



### ALPINE® PHARMAPAKTOR

- Small throughput capacities: 50 to 800 kg/h
- Constructed in stainless steel for pharmaceutical and food grade applications
- Designed for high pressing forces while being easy to clean and maintain



### ALPINE® KOMPAKTOR

The Alpine® Kompaktor is designed for compaction, granulation and briquetting of chemical and mineral materials.

- Roller gaps are controlled and adjusted hydraulically
- Contact surfaces are available in mild or stainless steel
- Suitable for abrasive products, light materials and gas tight operation

#### TYPE ARC - CS

- Small compactor for laboratory and throughputs up to 800 kg/h
- Cantilever shaft design

#### TYPE ARC - MS

- Compactor for medium and high throughputs 0.5 to 120 t/h
- Middle shaft design

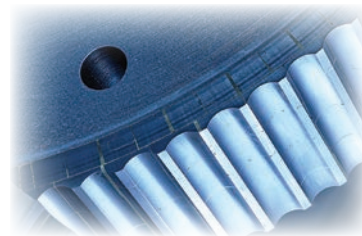
#### TYPE ARC - HK

- Special design for briquetting of ultra-fine charcoal dust



### OTHER COMPACTION EQUIPMENT

- Alpine® High Pressure Roller Mill
- Alpine® Bexmill
- Alpine® Pre-Crusher
- Alpine® Gear Pelletizer
- Alpine® Bextruder
- Alpine® Bexroller
- Schugi® Flexomix





## CONTAINMENT, ISOLATION AND FILLING AND WEIGHING



### VITALAIR DOWNFLOW BOOTHS

Vitalair Downflow Booths protect operators from harmful dust and vapors generated during material handling processes by drawing contaminated air downwards, away from the breathing zone. These systems can achieve operator exposure levels (OEL) typically between 10 to 100  $\mu\text{g}/\text{m}^3$  or better. The fully customizable booths provide safer working environments for operators during material handling, transferring, sampling and loading processes.

### RIGID WALL ISOLATORS

Hosokawa designs and builds a full range of pharmaceutical isolators including systems that are designed to achieve occupational exposure limits (OELs) down to 10  $\text{ng}/\text{m}^3$ . The development of increasingly potent and potentially toxic pharmaceutical products and chemicals has led to demands for increased operator protection from exposure to harmful dust. Hosokawa isolators are ideal for such critical processes as milling, micronizing, drying, dispensing and product pack off.



### STOTT FILLING AND WEIGHING SYSTEMS

Accurate weight-controlled filling systems from Hosokawa maintain the highest standards of hygiene, dust control and product integrity. The Stott Filling and Weighing Systems deliver stable and repeatable weight readings with accuracies as high as  $\pm 0.10 \text{ g}$  to meet exact product weight specifications. All Hosokawa filling systems incorporate internal filter and purge facilities. In cases where containment of the powder is required, Stott Filling and Weighing Systems can be incorporated within isolators, downflow booths and laminar flow booths to protect operators from potentially hazardous dust exposure.



### STOTT HYGIENIC PACKING HEADS

The Stott Hygienic Packing Head provides a dustproof seal when transferring powdered materials into IBCs or plastic bags. It utilizes an inflatable gasket to form a secure and airtight seal between material containers. Continuous liner options are available for high containment applications.



## HOSOKAWA SERVICES

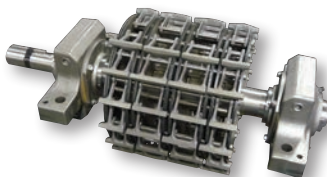
### AFTERMARKET DEPARTMENT

Hosokawa manufactures some of the most sophisticated and dependable processing systems in the world. Although all of our equipment comes with our commitment to quality, parts do wear out over time and equipment requires service. The Hosokawa Aftermarket Department is committed to providing superior customer service and quick resolution to any production interruptions.



### HOSOKAWA BRAND PARTS

The Aftermarket Department highly recommends replacing worn or broken parts with Hosokawa brand parts. OEM components are specifically engineered and manufactured to meet your exact system specifications. The Aftermarket Department stocks over 25,000 different



*Mikro Pulverizer® Rotor Assembly*

Many parts can be shipped in 24 hours, however, if production interruptions would seriously impact your bottom line, consider stocking parts from your equipment's recommended spare parts list. Our aftermarket parts specialist can assist you with maintaining an essential parts inventory.



*Mikro ACM® Rotor Disc*

### SERVICE AND MAINTENANCE

Hosokawa's service technicians are highly trained field engineers with the equipment and process knowledge needed to quickly diagnose and repair your system. Our service technicians can offer a wide range of services.



- Maintenance programs
- Repairs and rebuilds
- Evaluation and analysis
- On-site training
- Process optimization
- Upgrades and retrofits
- Emergency service and troubleshooting



# HOSOKAWA SERVICES

## CONTRACT MANUFACTURING

Hosokawa offers a wide range of contract manufacturing services for chemical and mineral applications including coarse to fine size reduction, classification, mixing and blending and particle analysis. As an established leader in process equipment and systems, we offer the advantage of process expertise, and bring our customers years of experience in understanding the performance of a wide range of powders. With over 20 different powder processing systems available, Hosokawa is prepared to handle a wide range of contract manufacturing services. Our facility is equipped with:



- Mikro ACM® Air Classifying Mills for medium to fine size reduction
- Alpine AFG® Fluidized Bed Jet Mills for ultra-fine size reduction
- Mikro Pulverizer® Hammer and Screen Mills for coarse to medium grinding
- Systems for fine and ultrafine classification and particle separation
- Mixing and blending equipment for batches up to 1,000 liters
- Complete analytical capabilities and product development services

## TEST CENTER AND ANALYTICAL LAB



Hosokawa Micron Powder Systems invites our customers to visit our Summit, New Jersey, facility to observe testing and evaluation of their product. Hosokawa has a highly skilled team of laboratory engineers with decades of experience who can discuss your test results with you. We offer an extensive selection of process equipment for material trials and analyses. Our test center features equipment for R&D testing and larger production systems for scale-up evaluation.

### Technical Capabilities

- Hammer and screen mills
- Air classifying mills
- Pin mills
- Pre-crushers and choppers
- Fluidized bed and spiral jet mills
- Compaction and flake crushing
- Granulators
- Flash and vacuum dryers
- Air classifiers
- Low intensity and high shear mixers
- Dry and wet particle size analyzers
- Powder characteristics tester
- Laser diffraction analyzer

## OTHER LAB TECHNOLOGIES

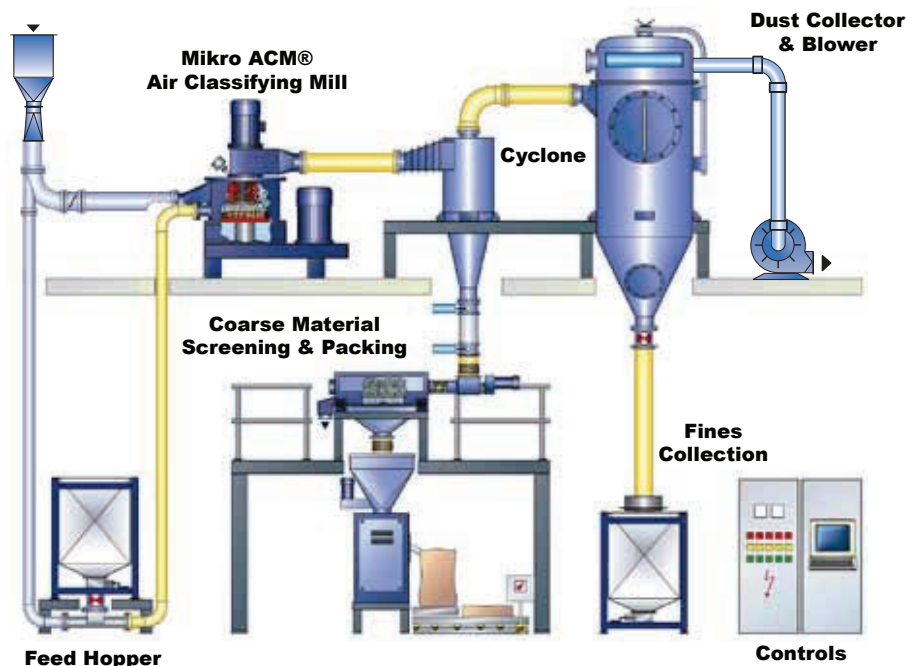
- System and equipment engineering
- Equipment validation and commissioning
- System control design
- Upgrade and retrofit equipment
- Refurbishing, rebuilds and repairs
- Training and educational programs
- Process equipment rentals
- System optimization



## INDUSTRIES SERVED: CHEMICAL



With over 90 different size reduction and powder processing systems, Hosokawa has an extensive history of processing powdered chemical materials. Our test center has conducted evaluations and analysis on thousands of products and has the expertise to provide equipment solutions to almost any dry chemical application.



*Typical milling system for chemical applications requiring fine size reduction*

### COMMON MATERIALS AND APPLICATIONS

- Abrasives
- Aluminum hydroxide
- Carbon black
- Pyrolysis carbon black
- Cellulose
- Chemical salts
- Color suspensions
- Detergents
- Dyestuff
- E-PVC
- Explosives
- Fertilizer
- Lithium carbonate
- Magnesium hydroxide
- Metallic powders
- Natural rubber
- Phosphates
- Pigments
- Plastic fibers
- Polyethylene
- Polystyrene
- Polyurethane
- Powder coatings
- PVC
- Silica
- Silicone
- Sodium bicarbonate
- Synthetic resin
- Synthetic rubber
- Teflon
- Tire pyrolysis
- Toner
- Trona
- Tungsten carbide



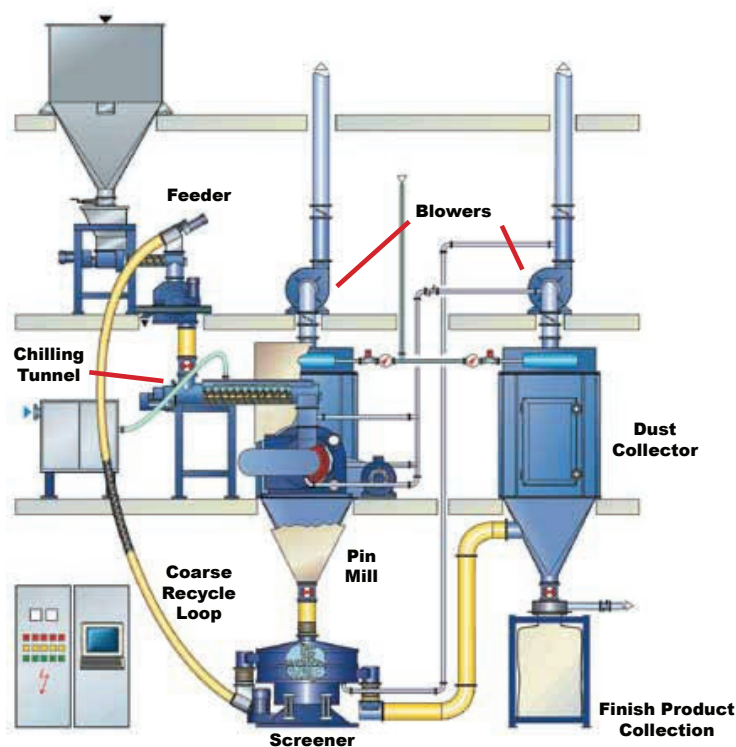
## INDUSTRIES SERVED: FOOD



Hosokawa Micron Powder Systems provides the food industry with some of the most reliable processing equipment available in today's market. With thousands of installations around the world, Hosokawa has the expertise to offer equipment and process solutions for most food processing applications involving size reduction, mixing, classification and drying. In addition to process equipment, Hosokawa offers fill weigh systems that can be integrated with our containment line of equipment to provide a dust-free environment for packaging or handling materials.

### COMMON MATERIALS AND APPLICATIONS

- Animal feed
- Barley
- Berry seeds
- Bran
- Calcium phosphate
- Cellulose powder
- Chocolate crumb
- Cocoa
- Coffee beans
- Corn starch
- Dried fruits
- Fiber
- Fish meal
- Flavorings
- Food seasonings
- Gelatin
- Herbs
- Lactose
- Legumes
- Milk powders
- Mustard seed
- Oats
- Pasta
- Peas
- Pectin
- Pigments
- Plant extracts
- Potato
- Potato starch
- Rice and rice bran
- Salt
- Seaweed
- Sesame seed
- Soy protein
- Soy
- Spices
- Sugar
- Tea leaves
- Thickening agents
- Tri-calcium
- Citrate
- Vitamins
- Wheat



*Cryogenic pin milling system with product screening and coarse recycling*

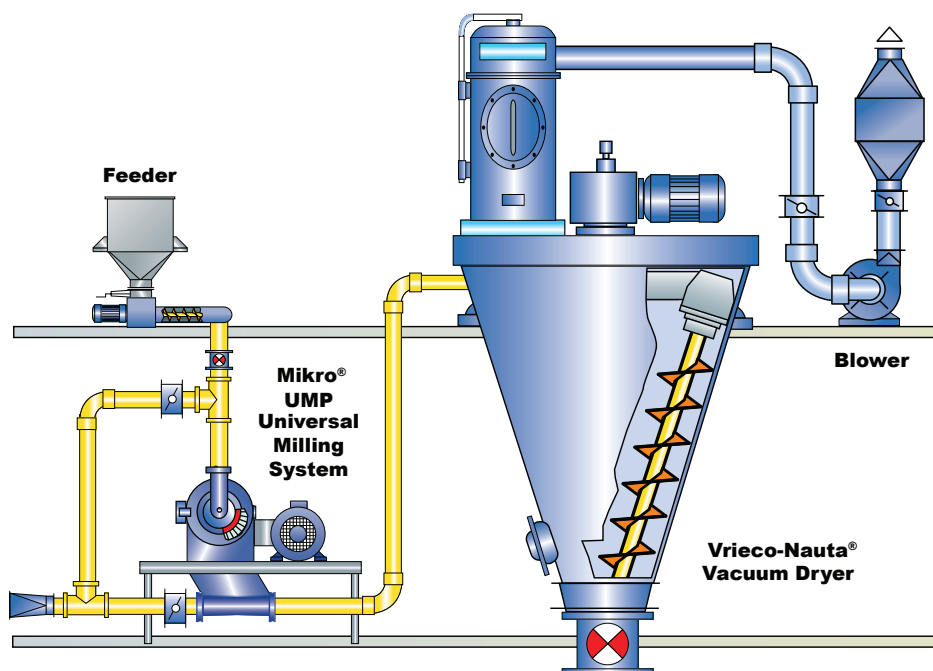
## INDUSTRIES SERVED: PHARMACEUTICAL



Hosokawa Micron Powder Systems prides itself in understanding the needs and requirements of the pharmaceutical industry. Hosokawa is the industry leader in providing unique solutions to demanding cleaning requirements. Hosokawa globally serves the pharmaceutical industry for size reduction, classification, mixing and blending, drying, hygienic filling/weighing and high containment applications, and can provide fully validated systems.

To further enhance our process solutions, HMPs employs the latest control technologies (PLC/SCADA Systems) and works with our customers to comply with CFR 21 Part 11 (Electronic Signature and

Electronic Records) as well as full system automation including Process Analytical Technologies (PAT) utilizing methods such as closed looped particle size analysis, mixing sensors, etc. Through the use of our wide variety of process equipment located in our two clean processing suites, Hosokawa provides excellent facilities for testing and analyzing your materials to assist in new product and process development.



### COMMON MATERIALS AND APPLICATIONS

- APIs
- Excipients
- Nutraceuticals
- Homeopathic products
- Lactose
- Vitamins
- Cell culture media
- Inhalants
- Hormones
- Proteins
- Cellulose
- Dental compounds

*Milling and drying system for pharmaceutical grade materials*



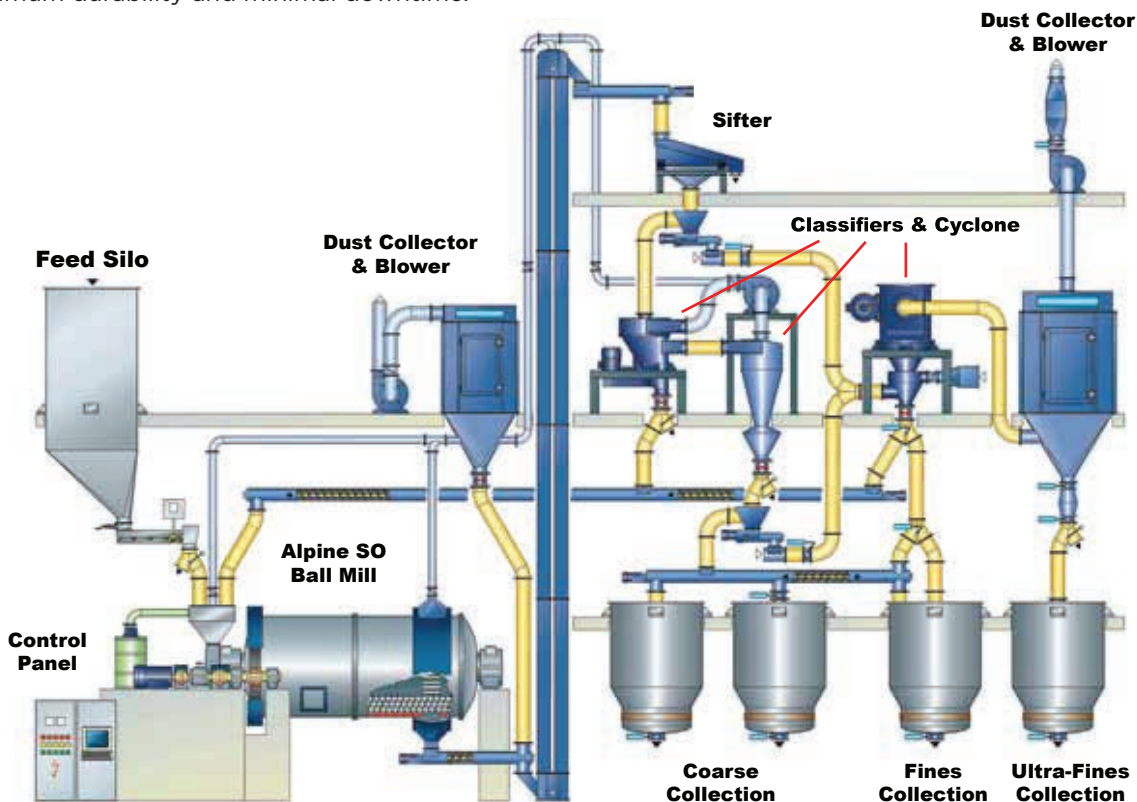
## INDUSTRIES SERVED: MINERAL



### COMMON MATERIALS AND APPLICATIONS

- Aluminum silicate
- Bentonite
- Calcium carbonate
- Catalysts
- Ceramics
- Diatomaceous earth
- Feldspar
- Fillers
- Glass
- Graphite
- Gypsum
- Kaolin
- Limestone
- Metallic powders
- Quartz
- Rare earths
- Refractories
- Talc
- Zinc oxide
- Zircon sand

Hosokawa's heavy duty milling and classification systems are well-suited for hard and abrasive materials commonly processed in mineral applications. Our equipment is capable of grinding materials with a Mohs hardness of 9 down to  $D_{97} < 2 \mu\text{m}$  at high production rates with narrow particle size distribution. Hosokawa offers state-of-the-art technology that is renowned for its high efficiency and reliability. Every system is engineered for high performance with maximum durability and minimal downtime.



*Ball mill system with classifier to recycle oversized particles*

## OUR HISTORY

### HISTORY IN NEW JERSEY

Over the last 90 years, Hosokawa Micron Powder Systems has been the leader in providing size reduction systems and powder processing solutions for the chemical, pharmaceutical, mineral, food, plastic and cosmetic industries.

- In 1923, the Pulverizing Machinery Company was founded.
- The invention of the Mikro Pulverizer® Hammer and Screen Mill was the first fine grinding mill of its type at that time.
- During World War II, the company processed millions of pounds of magnesium for the war effort.
- To address the demand for finer materials, the company developed the first air classifying mill in the 1950s, the Mikro Atomizer®.
- The development of the highly successful Mikro ACM® Air Classifying Mill followed in 1962.
- In 1985, the company was acquired by the Hosokawa Micron Group and was renamed Hosokawa Micron Powder Systems.
- A new test center was built in 1988 to showcase a wide range of Hosokawa technologies for customer demonstrations.
- Hosokawa began offering contract toll processing services for chemical and mineral applications in 1992.
- A new pharmaceutical testing facility was completed in 1995.
- The Mikro LGM® Long Gap Mill was introduced in 2001 to address the need for specialty grinding applications.
- In 2003, the Micron Air Jet Sieve™ MAJSc, Hosokawa's first computer assisted particle analyzer, was introduced.

*Annual company picnic in 1951*



- The Mikro® UMP Universal Milling System was developed in 2007, offering a new design and the flexibility of various milling options.
- In 2009, the company established the Hosokawa Educational Center, a free online library of educational videos and resources.
- The Mikro E-ACM®, specifically designed for grit reduction applications, was introduced in 2008.
- The New Easy Access Mikro ACM® Air Classifying Mill was introduced in 2011 as a variation of the original ACM. It was specifically designed for food and pharmaceutical applications that require frequent and thorough equipment cleaning.
- In 2013, the Mikro Air Jet Sieve® (MAJSx) was developed and introduced as Hosokawa's newest particle size analyzer.
- The new Mikro® Jet Fluid Energy Mill, an economical ultra-fine jet milling system, was introduced to the market in 2015.



### HOSOKAWA MICRON GROUP HISTORY

Hosokawa Micron Corporation was established in 1916 as Hosokawa Iron Works in Osaka, Japan. Today, the Hosokawa Micron Group is a world leader in providing process solutions in the fields of powder and particle processing technology. Hosokawa Micron Group maintains facilities for research, engineering, manufacturing and service throughout the Americas, Asia/Oceania and Europe. With over 100 years of experience, the Hosokawa Micron Group continues to advance the field of powder and particle technology for the future with the development and commercialization of ultra-fine composite particles in the rapidly expanding field of nanoparticle technology.



## FIND YOUR HOSOKAWA OFFICE



### HOSOKAWA MICRON POWDER SYSTEMS

Providing size reduction systems and powder processing solutions in North, Central and South America for chemical, food, pharmaceutical, mineral, cosmetic and plastic industries.

10 Chatham Road, Summit, NJ 07901 USA  
Phone: (908) 273-6360 | Fax: (908) 273-7432  
[www.HosokawaEquipment.com](http://www.HosokawaEquipment.com)  
[help@hmps.hosokawa.com](mailto:help@hmps.hosokawa.com)

#### NORTH, CENTRAL, AND SOUTH AMERICA

**Hosokawa Micron Powder Systems**  
Summit, New Jersey, USA

**Hosokawa Polymer Systems**  
Berlin, Connecticut, USA

**Hosokawa Micron de Mexico**  
Mexico City, Mexico

#### EUROPE, MIDDLE EAST, AND AFRICA

**Hosokawa Micron Limited**  
Runcorn, United Kingdom

**Hosokawa Micron France**  
Evry, Cedex, France

**Hosokawa Micron B.V.**  
Doetinchem, The Netherlands

**Hosokawa Alpine GmbH**  
Leingarten, Germany

**Hosokawa Alpine AG**  
Augsburg, Germany

**Hosokawa Micron St. Petersburg**  
St. Petersburg, Russia

#### ASIA, AUSTRALIA, AND OCEANIA

**Hosokawa Micron Corporation**  
**Headquarters**  
Osaka, Japan

**Hosokawa Micron Limited**  
Seoul, South Korea

**Hosokawa Micron Powder**  
**Machinery Company Limited**  
Shanghai, China

**Hosokawa Micron SDN**  
Kuala Lumpur, Malaysia

**Hosokawa Micron Pvt. Limited**  
Chennai, India

# EQUIPMENT AND SERVICES



## **HOSOKAWA MICRON POWDER SYSTEMS**

Hosokawa Micron Powder Systems, located in Summit, New Jersey, is a member of the Hosokawa Micron Group. We are a leading provider of equipment and systems for size reduction, classification, mixing/blending, drying, particle analysis, compaction, granulation as well as a full line of laboratory and analytical equipment. We also provide contract manufacturing, complete aftermarket services and OEM parts, equipment leasing, refurbishing, product development services and educational programming. We serve the chemical, mineral, food, pharmaceutical, cosmetic and plastic processing industries.

**Disclaimer:** The content shown within this brochure may contain errors and omissions and is subject to change at anytime without notice. The data and details provided in this brochure are for promotional purposes only. The purpose of this brochure is to provide information about specific devices or services offered by Hosokawa Micron Powder Systems. This information does not constitute any equipment warranty or performance guarantee.

### **Hosokawa Micron Powder Systems**

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Fax: (908) 273-7432