

New and Innovative Mikro-ACM® Air Classifying Mill Designs



HOSOKAWA WAGNER POWDER PAINTING SYSTEMS

Process Technologies For Tomorrow®

ALPINE • BEPEX • MICRON • MIKRO • STOTT • VITALAIR • VRIECO-NAUTA

New Robust Designs from Hosokawa

For over 75 years, Hosokawa Micron Powder Systems has been a single source provider of integrated powder processing systems. Dealing with one source for powder technology provides better service and specialized solutions for our customers.

To provide our customers with the best size reduction technology available, Hosokawa Micron Powder Systems has completely redesigned its well known Mikro-ACM® air classifying mill product line.

The new product line encompasses innovative advancements in machine design for optimization in specialty applications. It consists of an expanded range of mill model sizes from 1 horsepower through 600 horsepower with options for co-axial or independent drives on units of 10–300 horsepower.

We've incorporated a wide range of standard features which can address a wide range of applications. We took steps to assure that our customers are able to source the best mill design for their application.

The new Mikro-ACM® air classifying mill line is now standardized worldwide within the Hosokawa organization to make it even easier to source technical information, service and parts no matter where you are located.

The new Mikro-ACM® air classifying mills incorporate the following features:

Wear Resistant Design

- Units up to 100 hp have standard cast reversible Ni-Hard liners
- Tungsten carbide hammers

Sound Abatement

- All mills are designed to operate at noise levels below 85 dba *

Food, Pharma, and Dairy Designs

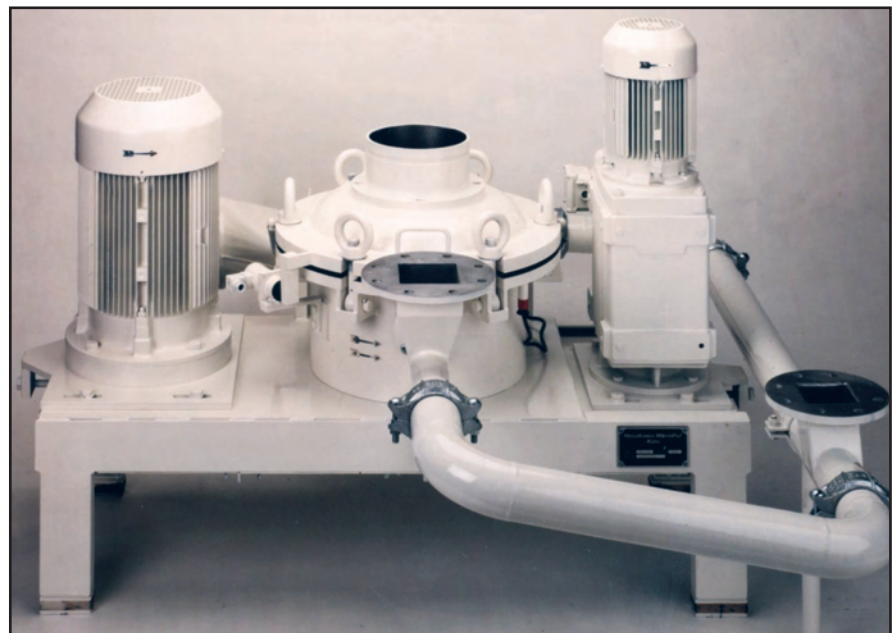
- A complete line of sanitary mills is available to meet special cleaning requirements

Containment

- Issues of safety when handling hazardous materials have been addressed with a complete line of mills designed to handle pressures of up to 150 psi.

Design Advantages

- Grinding and classifying in one machine
- Steep particle size distribution
- Sharp classifier cut point, instantly adjustable
- Low specific energy requirements
- Compact space saving design
- Economical, efficient recovery of fine powders
- Particle size readily adjustable without shutdown
- Simple to clean, maintain and operate
- Low grinding temperature
- Efficient transportation of ground material from grinding rotor to separating element
- Oversize material rejected back to grinding rotor
- Precision manufacturing
- Wide model range for broad application considerations



Mikro-ACM® air classifying mill model 25 with pressure shock resistant construction and sound insulation package.

* Measurement taken under free field conditions

Cutting Edge Design and Reliable Operation Assures Optimal Performance

Description

The Mikro-ACM® air classifying mill is an air swept mechanical impact hammer mill with an integral air classifier. Rejection of coarse material requiring further size reduction occurs totally inside the mill by means of a positive material and air transport system. This feature combined with vertically orienting the classifier and impact drive shafts makes the Mikro-ACM® air classifying mill the most efficient type of mechanical mill available.

Powder fineness transcends all screen type impact grinders as well as most mechanical classifier mills and encroaches on the territory of air attrition mills. A median particle size as low as 5 microns with a sharp top size cut can be achieved on soft materials. Due to the high air to material ratio, heat sensitive materials can be processed without degradation. Many special adaptations are available that further extend the versatility of this mill.

Operating Principle

Referring to the schematics below, most of the processing air or gas enters through the bottom section of the mill. Up to 30% of the total airflow can be introduced with the feed material. Concurrent with this constant mass flow of gas, feed material is introduced to the mill ideally in a constant mass flow manner.

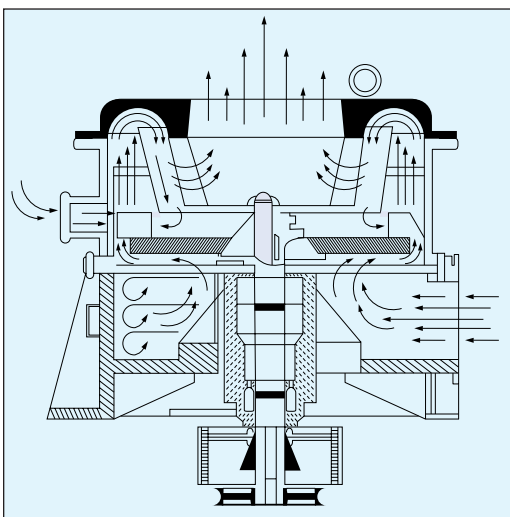
For most applications, material is introduced to the tip of the rotating hammers through a port opening at the side of the mill. Feed material can be either pneumatically conveyed or screw fed. The rotating hammers attached to the impact rotor disc serve to fracture the process material.

A serrated liner mounted on the periphery of the grinding chamber in the hammer path serves to improve grinding efficiency by preventing particles from accelerating to the speed of the hammers thereby increasing the relative speed difference.

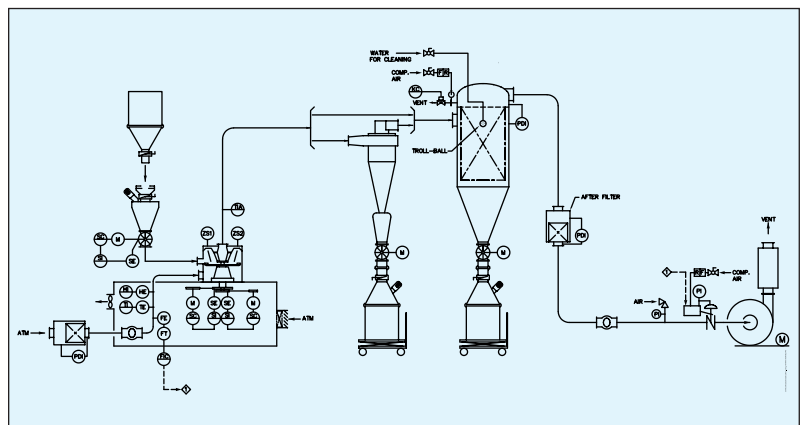
The primary airflow passing through the narrow annular gap formed in between the liner and impact rotor disc in conjunction with the fanning action of the hammers transports the material to the top of the mill. A dispersion ring then directs the material downward toward the classifier. Baffles welded to a shroud ring straighten the flow of material and air so that particle vortexing at the dispersion ring area is avoided.

The shroud assembly effectively separates the grinding zone from the classification zone as well as providing a defined path for the material and air to flow through.

Depending upon the air flow rate and separator speed adjustment, discreet particles are acted upon by either the center seeking drag force of the air that flows through the classifier or the center fleeing centrifugal forces created by the turning of the classifier wheel. Rejected particles fall by gravity and are pulled back under the shroud assembly to the spinning hammers for further impact.



Schematic cutaway shows the flow of material through the Mikro-ACM® air classifying mill.



Typical pharmaceutical Mikro-ACM® air classifying mill system PSR design.

Models for a Broad Industry and Application Range

The versatility of the new Mikro-ACM® air classifying mill designs makes them ideal for the following applications:

Food and Food Ingredients

Sugars, starches, artificial sweeteners, salt, spices, thickening agents (guar, carrageen, xanthan, gelatin, alginates, and pectin), cocoa press cake, proteins, soy, grains, lactose, peas, fish, corn, rice and shrimp meals, cellulose, confectionery crumb

Nutraceuticals

Bovine and shark cartilage, vitamins, magnesium citrate, calcium citrate, ginseng, echinacea, chamomile, oyster shells, psyllium, and oat hulls

Chemicals

Stearates, carbonates, sulphates, phosphates, inorganic salts, rubber and plastic additives, resins, carbon black, iron and other metal oxides, compounded powder coatings, silica gel, zeolites, crystalline polymers, herbicides, and pesticides

Functional Fillers and Minerals

Limestone, calcined kaolin, hydrous kaolin, calcium oxide, brucite, talc, gypsum, bentonite, wood, walnut shells, calcium hydroxide, soda ash, trona.

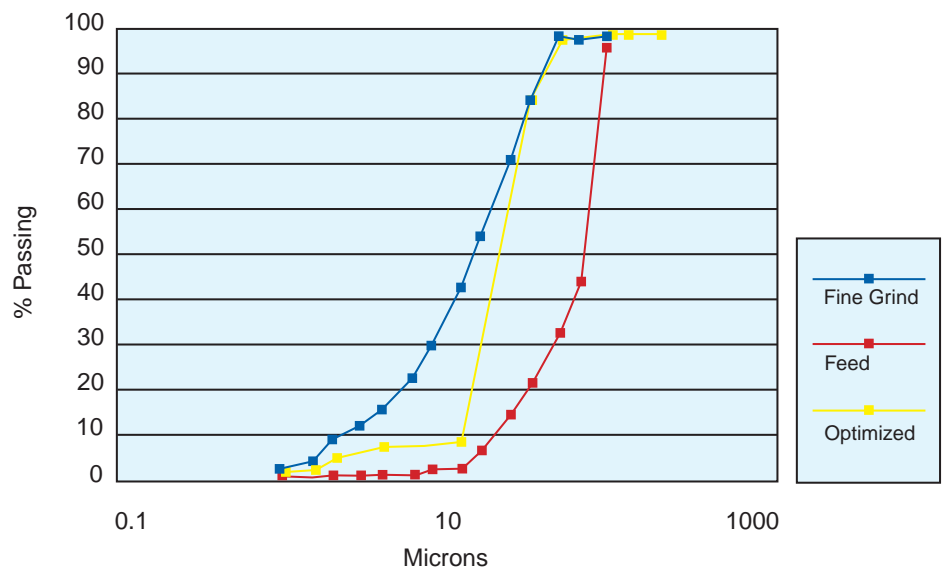
Random Capabilities For The Mikro-ACM® Air Classifying Mill

MATERIAL	FEED SIZE	END FINENESS	RATE (lbs./hr./hp)
Cane Sugar	Nominal 20 Mesh	96% <200 Mesh (10X)	110
Cane Sugar	Nominal 20 Mesh	98% <325 Mesh (fondant)	75
Hydrous Kaolin	Nominal 325 Mesh	6.5 hegman	40
Calcined Kaolin	Nominal 325 Mesh	6 hegman	28
Talc	Nominal 80 Mesh	99% <325 Mesh	45
Soya Flake	1/4" - 0	98% <80 Mesh	70
Hydrated Lime	Nominal 80 Mesh	97% <25 Microns	25
Limestone (soft)	1/4" - 0	97% <20 Microns	15
Milk Crumb	Nominal 20 Mesh	99% <400 Mesh	25
Magnesium Oxide	Nominal 40 Mesh	99% <325 Mesh	50
Cocoa Press Cake (10–12% butter fat)	65% <100 Mesh	99% <200 Mesh	75
Phenolic Resin	1/2" - 0	97% <200 Mesh	70
Zinc Sterate	1/8" Flakes	97% <38 Microns	15
Xanthan Gum	Nominal 1/8"	97% <44 Microns	17
Whole Kernel Corn	Nominal 3/8"	99% <30 Mesh	22.5
Barium Sulfate	Nominal 60µ	97% <14 Microns	20
Carbon Black	900 PPM > 44µ	10–25 PPM > 44 Microns	54

Note: The above results are to be used for reference purposes only. Testing is required on each specific process material to establish throughput at a given fineness.

The New Mikro-ACM® Air Classifying Mill Gives You Complete Control Of Your Particle Size Distribution

Grind Comparison Chart



The “optimized” curve above illustrates the result achieved with the utilization of the Mikro-Classifier CC in line with the Mikro-ACM® air classifying mill for a powder coating application (see page 10 for details).

Innovative Designs to Meet Your Specialized Application Needs

Standard Mill Series

Mikro-ACM® Air Classifying Mill-Co-Axial Design

The new Mikro-ACM® air classifying mill with its co-axial drive arrangement features a very compact profile. As a standard, all mill sizes from 10 to 75 hp are supplied with cast iron bodies and wear resistant components. Both drive motors are mounted on a common structure; drives are concealed underneath the structure with noise abatement. In combination with closed circuit pneumatic feeding, noise levels are reduced to below 85 dba*. For applications which require stainless steel construction, the internal material contact surfaces can be supplied in 304 or 316 stainless steel.

All mills supplied in cast iron construction are rated for pressure shock resistance to 150 psi. The Mikro-ACM® air classifying mill 100-600 series features fabricated construction, which is also available in high-pressure design.

Mikro-ACM® Air Classifying Mill CL- Independent Drive Design

Mikro-ACM® air classifying mill models 10–300 are available with independent classifier drives which are preferred for certain applications and system design requirements. The independent drive design uses a compact horizontal scroll volute discharge. This design allows for the close coupling of other components such as an in-line classifier, cyclone,

or fabric filter dust collector. The classifier drive motor is directly connected eliminating the need for belts and pulleys. A simplified bearing design offers lower maintenance and improved reliability.

Sanitary Mill Series

Hosokawa has developed two different mill types for customers who have special sanitary requirements. Both mills have been designed for quick access and easy cleanability.

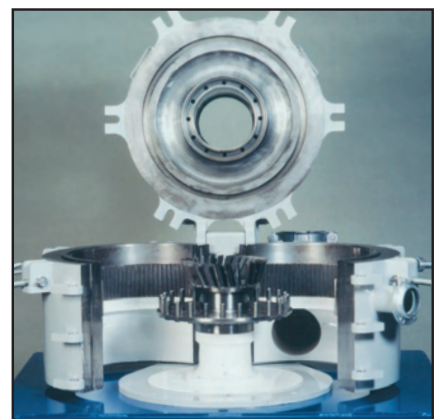
Mikro-ACM® Air Classifying Mill-SB

The Mikro-ACM® air classifying mill-SB (split body) design has a split-grinding chamber, which is hinged and allows both chamber halves to be opened, providing total access to the mill internals, including the area underneath the rotor. Both halves are attached to a static grinding chamber segment that incorporates both the air and feed inlets to the mill. This design eliminates the need to remove these connections prior to opening the mill. The Mikro-ACM® air classifying mill-SB is available in model sizes 20–60 and includes low noise operation as well as PSR construction as standard features.



New Mikro-ACM® air classifying mill model 30 CL with independent drive, standard pressure shock resistant construction, and sound insulation package.

*Free Field Conditions.



Mikro-ACM® air classifying mill model 15 split body design offers total accessibility.

Mills for Easy Cleaning and Grit Reduction

The Mikro-ACM® Air Classifying Mill-EC

The Mikro-ACM® air classifying mill-EC (easy clean) incorporates a double chamber design with an outer air chamber.

Upon opening the top cover of the mill, the inner grinding chamber components can be easily lifted out of the way for detailed cleaning and inspection. Even on larger mills like a 60 Mikro-ACM® air classifying mill, the internal components are manufactured in sections, insuring that the maximum lifting weight of any single component is less than 50 lbs.

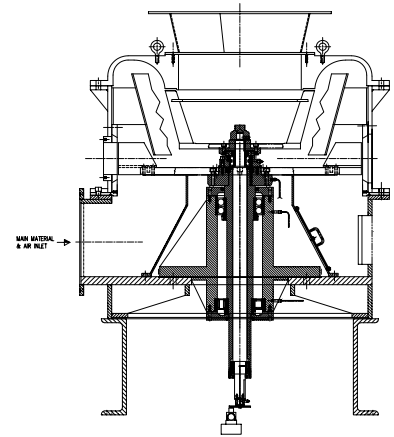
The area below the rotor is enclosed by a ring that prevents any accumulation of material below the rotor. This ring is also air purged protecting the bearing assembly from material contamination. The outer housing provides an enclosure which can be flushed with water for cleaning. The base incorporates a drain to let cleaning fluids exit the main body after cleaning.

Special Designs

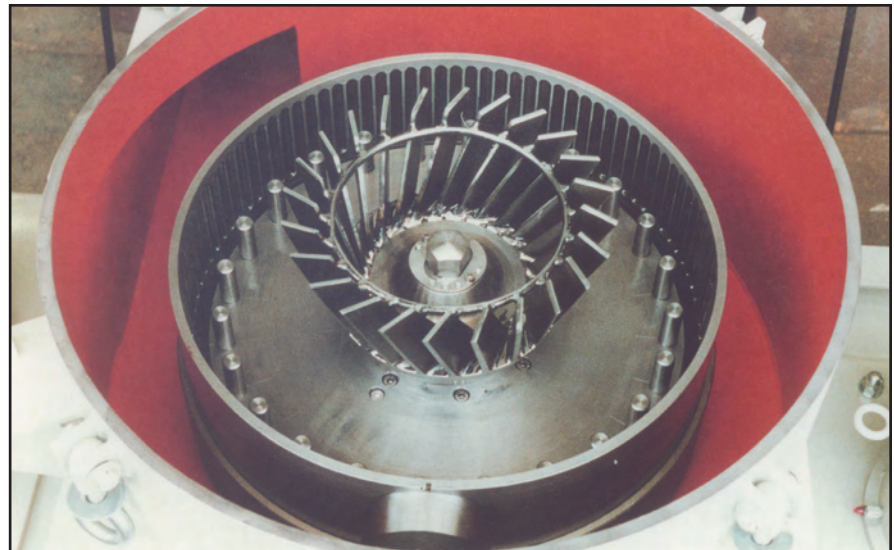
Mikro-ACM® Air Classifying Mill-CB (Patent Pending)

This mill design was developed for the reduction of grit in products such as carbon black, clays, and various mineral fillers. Mills for this application must be designed so that there is positive engagement of the process material to the grinding zone for effective size reduction. In

addition, the conventional impact grinding elements are not particularly suited to have much of an effect on low-density intrinsically fine materials. A special “fan blade” rotor assembly that creates a high vortex grinding zone was developed. Particles are reduced in size by means of particle to particle attrition (autogenous grinding). In the final effort to achieve the best particle presentation, the feed is introduced below the rotor insuring that 100% of the feed is introduced to the grinding mechanism. The end result is a significant reduction in grit below 45 microns, compared to existing technologies used for the same application. This performance is only surpassed by the Mikro-LGM™ long gap mill and expensive jet milling.



Below grinding rotor feeding feature of the Mikro-ACM® air classifying mill CB ensures positive engagement of the feed to the stressing mechanism.



Interior of the Mikro-ACM® air classifying mill model 30 co-axial design with easy clean features. All internal components are designed for easy removal for remote cleaning.

Mikro-ACM® Air Classifying Mill Chart of Model Ranges

Mill Size	1L	2	5	10	15	20	25	30
Rotor Power (HP)	1	5	7.5	10	15	20	25	30
Classifier Power (HP)	1	1	1.5	2	2	3	3	7.5
Rotor Speed (Max)	22,000	10,660	9,400	6,200	6,200	5,000	5,000	4,300
Classifier Speed RPM	2,000–10,000	1,000–5,400	1,200–4,600	700–4,000	700–4,000	700–3,250	700–3,250	600–2,900
Mill Inlet Airflow NM3/Hr	102	325	500	900	1,350	1,800	2,250	2,700
Mill Inlet Airflow ACFM	60	190	300	530	800	1,060	1,325	1,590
Scale Up Factor	0	0.2	0.5	1	1.35	1.8	2.25	2.7

Multiple Feed Designs Yield Varying Advantages

CIP Design

This mill combines the traditional features of ultra fine grinding and classifying with innovative Clean-in-Place capabilities. This mill offers all the benefits of reduced downtime due to easy dismantling and cleaning plus increased operator and environmental safety features. As cleaning takes place within the mill, operator contact with toxic or hazardous chemicals and compounds are avoided. Releases of potent products to the atmosphere are also eliminated. Specially designed seals within the bearing housing inflate to protect internal rotating parts from exposure to cleaning compounds and water.

Feeding Arrangements

There are a number of feeding mechanisms available for the Mikro-ACM® air classifying mill.

Each arrangement offers its own specific advantage.

Pneumatic Feed

Closed loop pneumatic feeding utilizes the mills own air intake to convey feed material into the mill. A slip stream of air is taken off of the mill inlet and is diverted to the feed inlet. Material is introduced into this line via a rotary feeder, and is subsequently air conveyed into the mill. The benefits of this include the feed introduction which is totally sealed providing containment and noise reduction. Additional feeders can be mounted to this line for additive introduction. Finally the point of feed introduction can be located away from the mill.

Screw Feed

Another optional feeding arrangement is traditional screw feeding. When feeding heavy or coarse material,

which is difficult to air convey, screw feeding provides positive and reliable feeding to the mill.

Top Feed

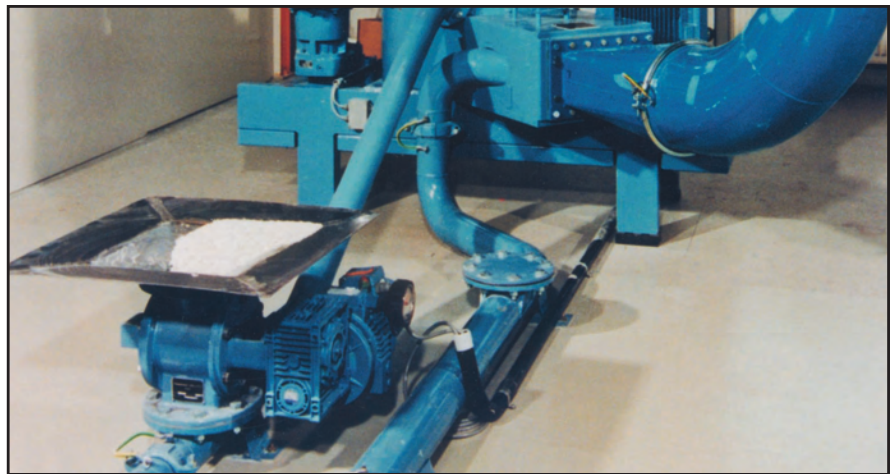
Gravity feeding through the mill volute is another option. Materials too large to air or mechanically convey into the mill can be fed this way. Also, very fine materials which have a large fines fraction smaller than the desired particle size can be fed directly to the classifier eliminating unnecessary grinding thus improving efficiency.

Bottom Feed

Introducing material below the rotor is a requirement for special applications. This is particularly important when processing very low density, intrinsically fine materials that require special presentation to the grinding elements to achieve size reduction.



Internal view of Mikro-ACM® air classifying mill CIP design.

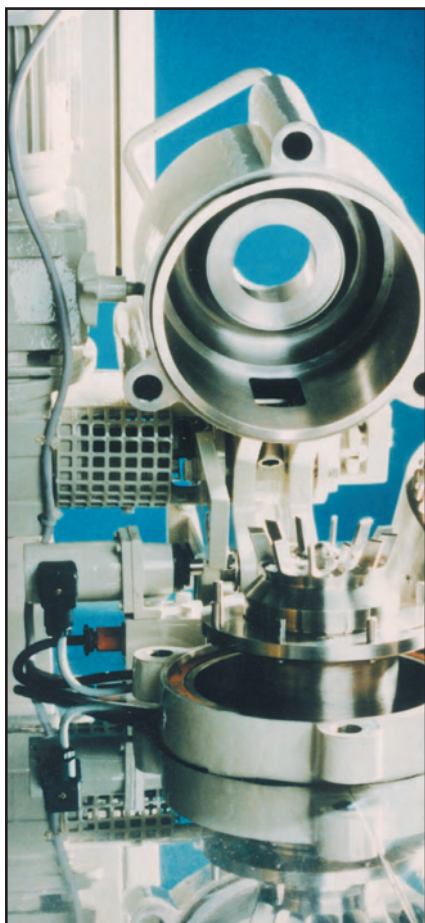


Mikro-ACM® air classifying mill model 40 powder coating system shown with "floorside" feed arrangement.

40	50	60	75	100	125	150	200	300	400	500	600
40	50	60	75	100	125	150	200	300	400	500	600
7.5	7.5	10	15	15	20	25	40	50	100	125	150
4,300	3,300	2,700	2,700	2,100	2,100	2,100	1,850	1,650	1,400	1,400	1,400
600-2,900	600-2,900	600-2,650	600-2,650	600-2,400	600-2,400	600-2,400	500-2,200	500-2,200	400-1,850	400-1,850	400-1,860
3,600	4,500	5,400	6,750	9,000	10,800	13,500	18,000	27,000	36,000	45,000	54,000
2,120	2,650	3,180	3,975	5,300	6,360	7,950	10,600	15,900	21,200	26,500	31,800
3.6	4.5	5.4	6.75	9	10.8	13.5	18	27	36	45	54

Laboratory Mills

We have two small-scale laboratory and pilot plant size Mikro-ACM® air classifying mill systems in our product line. Both units are supplied complete with product collection, fan, and controls fully integrated into a compact cabinet.



Mikro-ACM® air classifying mill model 2.

Mikro-ACM® Air Classifying Mill Model 1

The 1 Mikro-ACM® air classifying mill is truly a laboratory size mill. While capable of producing very small quantities of materials, its operating parameters cannot be scaled up to larger mills. The 1 Mikro-ACM® air classifying mill has been redesigned into an all-new stainless steel cabinet making it much easier to clean. This small-scale unit is a must for any research and development laboratory.

Mikro-ACM® Air Classifying Mill Model 2

The 2 Mikro-ACM® air classifying mill is particularly useful for size reduction, preparation and homogenization of small batches and production runs of up to 100 lbs/hr, and aids in the determination of operating parameters for larger Mikro-ACM® air classifying mills. This mill is also particularly useful for applications that require frequent product change, because it can be cleaned quickly and easily. The 2 Mikro-ACM® air classifying mill is now available in two variations: laboratory and production models.



Mikro-ACM® air classifying mill model 1.

System Configurations for Special Processing Requirements

Special system configurations have been developed that further extend the Mikro-ACM® air classifying mill's range of applications.

Flash Drying

The Mikro-ACM® air classifying mill is ideally suited to simultaneously grind and flash dry a wide array of materials having moisture contents of up to 20 percent. The mill itself employs special heat shielding that enables inlet temperatures of up to 500 degrees F. Either direct or indirect fired air heaters are employed to heat the process air entering the mill. Systems of this type have been used for limestone, clay, and inorganic salt applications.

Controlled Atmosphere

Chilled and/or dehumidified air can be used as process air for materials having a heat sensitive or hygroscopic nature. Typical applications are cocoa press cake, lactose, sugars, sugar alcohol, and whole-rolled oats.

Inert Grinding

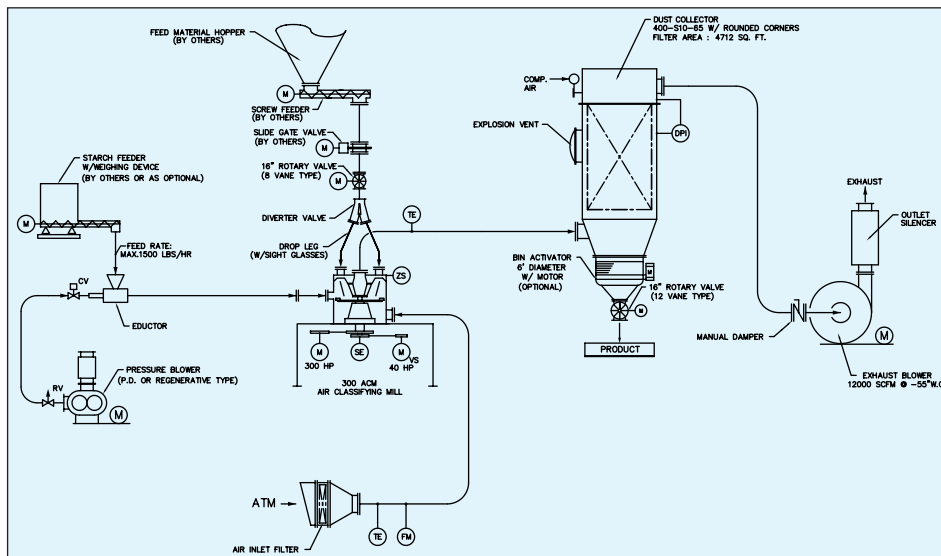
Explosive materials such as organic based chemicals and metal powders can generally be safely processed, when configured in a closed loop inert atmosphere. In applications where explosion venting cannot be employed due to room or other restrictions, the complete grinding circuit can be rated for pressure shock resistance up to 145 PSIG (10 bar gauge).

Blow-through System

In some applications, it is desirable to place the system fan ahead of the Mikro-ACM® air classifying mill in a so-called "blow-through" arrangement. One typical application is for flue gas scrubbing. A reacting agent (lime, sodium carbonate, trona, and magnesium oxide) is blown directly in a flue gas stream for the treatment of sulfur dioxide in flue gas streams.

Simultaneous Mixing of Flow and Grinding Aids

Multiple feed ports allow the simultaneous metering and mixing of minor ingredients in Mikro-ACM® air classifying mills. This is especially useful for confectionery sugar applications where it is common to introduce two to five percent potato starch. Also, tri sodium phosphate, fumed silica, and other flow aids can be easily and accurately introduced for spices, salt, and powder paint coatings.



Process flow diagram depicting the simultaneous introduction of starch and granulated sugar. The end product is a 12x fondant grade confectionery with 3% starch added.

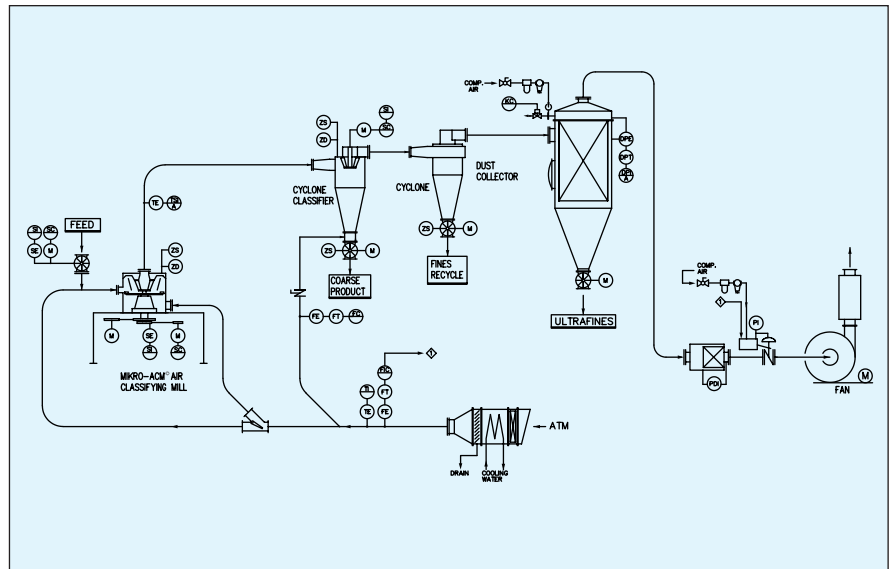
Removes Impurities and Achieves Finer End Products

Mikro-ACM® Air Classifying Mill with Coarse Throw Out

Very often it is desirable to remove impurities mixed in or bound to the process material to be milled. These impurities typically are crystalline silica, mica, quartz, feldspar, and various metal oxides. In addition to reduced machine wear, a purer end product is realized.

True In-Line Classification

Process materials requiring double classification (fine and top cut) to produce extremely narrow particle size distributions can be done continuously in one process stream. “Flow-through” style air classifiers such as the Hosokawa Mikro-Classifer CC or Micron-Separator can be placed in series with the Mikro-ACM® air classifying mills.



The Mikro-ACM® air classifying mill grinding system with our flexible Mikro-Classifer CC makes possible the single-pass production of extremely narrow particle distribution epoxy and polyester resin-coatings.



This turnkey system for manufacturing powder coatings uses a Mikro-ACM® air classifying mill model 40. The system is designed to safely contain dust deflagration by means of pressure rated components and explosion barrier valves.

Hosokawa—Your Single Source Provider of Powder Processing Technology

Services

We offer complete service packages for Mikro-ACM® air classifying mills and grinding systems:

- Quick delivery on replacement parts
- Upgrading of complete systems including enlargement of filter area, optimization through advance filter media, etc.
- Parts stocking programs
- 24 hour service
- Complete overhauls and upgrades
- Refurbished equipment available

Hosokawa Micron Powder Systems offers systems engineering, applications technology, electrical and control design, process optimization and mechanical field service. In providing these services, we maintain our total commitment to product quality and customer satisfaction.

Comprehensive Testing

We operate a comprehensive Technical Center for powder processing technology in Summit, New Jersey, where we demonstrate equipment for every functional operation required to make powdered products and ingredients.

Our Technical Center consists of demonstration equipment configured in a 14,000 square foot facility, an adjacent analytical laboratory, customer conference and work areas, a meeting room equipped with audiovisual equipment for conducting seminars and a specialized staff of research and technical personnel.

All processed test materials are analyzed on-site in our analytical laboratory devoted exclusively to powder characterization. The analysis is confined to physical characterization, primarily particle size distribution.

Pharma-Tech CenterSM

Also located in Summit, the Hosokawa Pharma-Tech CenterSM is a cGMP facility designed to meet current pharmaceutical and FDA standards. This 1,600 square foot facility is designed for pilot plant production and testing of a diverse range of pharmaceutical products. The facility includes two processing suites, a clean equipment storage area, equipment washroom, material quarantine and release areas, analytical laboratory and client conference room.

The Hosokawa Pharma-Tech CenterSM provides Hosokawa's pharmaceutical customers the unique opportunity to explore and develop process solutions to critical processing problems in a controlled environment. Designed as class 100,000 areas, the two process suites incorporate the most advanced levels of engineering design.

Features include automated air handling systems with temperature and humidity control for the process areas, once through air designed for 20 changes per hour, HEPA filtration throughout processing areas, on-site nitrogen supply for inert processing, validated equipment operating procedures and control systems and an analytical lab for on-site powder analysis and characterization.

Toll Processing Facility

Hosokawa Micron Powder Systems is proud to be the worldwide leader in providing powder processing solutions to customers in all industries. This 20,000 square foot facility incorporates various process systems specifically designed for toll processing and includes an analytical room for continuous quality assurance testing.



The Hosokawa Pharma-Tech CenterSM is designed to meet current pharmaceutical and FDA standards.



Our Toll Processing Facility features Mikro-ACM® air classifying mill systems for fine grinding.



Our Technical Center conducts trials on more than 40 different systems for size reduction, air classification, mixing, drying, filling and weighing and powder/particle analysis.

Leaders In Powder Processing Technology

SIZE REDUCTION TECHNOLOGIES

Alpine® AFG Fluidized Bed Opposed Jet Mill
Alpine® TFG Fluidized Jet Mill
Alpine® ADP Discoplex Disc Wet Pearl Mill
Alpine® AS Spiral Jet Mill
Alpine® ANR Vertical Wet Pearl Mill
Alpine® ATR Vertical Dry Pearl Mill
Alpine® ZPS Circoplex Air Classifying Mill
Alpine® CW Contraplex Mechanical Impact Mill
Alpine® Rotoplex Granulator/Cutting Mill
Alpine® RSK Annular Ball Mill
Alpine® UPZ Universal Mechanical Impact Mill
Mikro-Atomizer® Air Classifying Mill
Mikro-ACM® Air Classifying Mill (The Original)
Mikro-ACM® Air Classifying Mill CX Co-Axial
Mikro-ACM® Air Classifying Mill SB Split Body
Mikro-Crusher Delumper/De-Agglomerator
Mikro-LGM™ Long Gap Mill
Mikro-Pulverizer® High Speed Hammer and Screen Mill
Bepex Bexmill/Granulator
Bepex Flake Crusher

CLASSIFICATION AND SEPARATION TECHNOLOGIES

Acucut® High Energy Air Classifier
Alpine® AHP Hydroplex Wet Classifier
Alpine® Multiplex Zig Zag High Capacity Separator
Alpine® ASP Stratoplex High Efficiency Classifier for Minerals
Alpine® TSP High Efficiency Classifier
Alpine® TTSP High Efficiency Tandem Classifier
Alpine® ATP Turboplex High Efficiency Classifier
Alpine® Ventoplex High Volume Classifier
Mikro-Classifier CC Fine Particle Inline Air Classifier
Micron Separator Fine Particle Air Classifier



HOSOKAWA WAGNER POWDER PAINTING SYSTEMS

HOSOKAWA WAGNER POWDER PAINTING SYSTEMS is a member of the Hosokawa Wagner Micron Group, responding to global needs through emphasis on materials science and engineering. The Group is an international provider of equipment and technology for powder and particle processing, blown film processing and confectionery products. The Group maintains facilities for research, engineering, manufacturing, and service in each of the world's major industrial markets.

MIXING, DRYING, AND AGGLOMERATION TECHNOLOGIES

- Isem Ball Segment Valve
- The Vrieco-Nauta™ Conical Screw Mixer (The Original)
- The Vrieco-Nauta™ Conical Vacuum Dryer (The Original)
- The Vrieco-Nauta™ Cyclomix High Intensity Conical Mixer
- Mikro-LGM™ Impact Dryer
- Bepex Roller Compactors
- Bepex Gear Pelletizers
- Bepex Low Pressure Extruders
- Bepex Spheronizers

CONTAINMENT, FILLING, WEIGHING, AND ISOLATION TECHNOLOGY

- Stott Hygienic Filling and Weighing Systems
- Stott Laminar Flow Booths
- Stott Bag Break Stations and Drum Tippers
- Stott Isolators and Glove Boxes
- Vitalair Down Flow Booths

LAB/PILOT PROCESSING AND ANALYTICAL DEVICES

- Alpine® Air Jet Sieve
- Alpine® Multi-Processing System
- Alpine® 100 UPZ-II Fine Impact Mill
- E-Spart Particle Analyzer
- The Vrieco-Nauta™ Mini-Mix Lab Mixer
- Micron Air Jet Sieve™
- Micron Powder Characteristics Tester
- Mikro-Bantam® Pilot Scale Hammer and Screen Mill
- Mikro-Samplmill® Lab Hammer and Screen Mill
- 1 Mikro-ACM® Air Classifying Mill
- Alpine® 50 AS Spiral Jet Mill
- Alpine® 100 MZR Lab Classifier
- Acucut® A-12 Air Classifier
- Mechanofusion AMS System