MIKRO-LGM™ LONG GAP MILL

Fine Grinding - Residue Control - Flash Drying

HOSOKAWA MICRON

HOSOKAWA MICRON POWDER SYSTEMS

Process Technologies for Tomorrow®

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

Introducing The Mikro-LGM™ Long Gap Mill

The Mikro-LGM™ long gap mill was developed by combining the well known principal of a mechanically induced vortex as a size reduction stress mechanism and Hosokawa Micron Powder Systems' extensive knowledge of air classification and mill design. The built-in versatility and design features of the Mikro-LGM™ long gap mill have successfully overcome problems associated with other mills of this genre. For example, in the area of grit and residue control, the Mikro-LGM™ long gap mill is unsurpassed and its ability as a flash dryer is unrivaled. Excellent thermal efficiency is achieved while producing an end product free from agglomerates. The Mikro-LGM™ long gap mill effectively performs the functions of flash drying and de-agglomeration in one step. Combining flash drying and de-agglomeration results in capital savings for the customer since less process equipment is required.

The Trick That Makes It Tick!

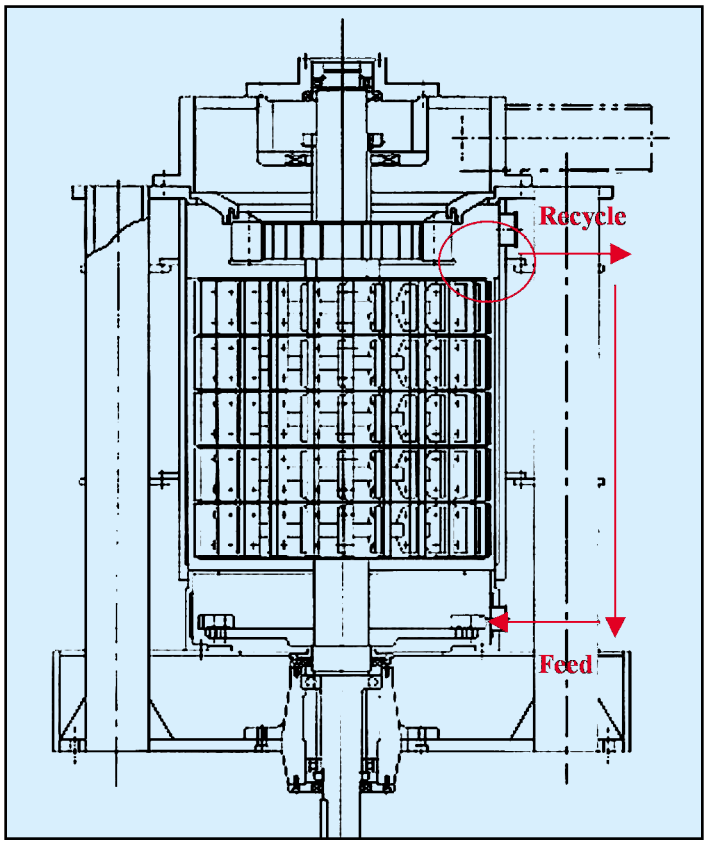
Autogenous grinding occurs as material mixed with air enters a highly turbulent zone formed by the high speed rotation of closely spaced blades against a serrated stator. Grinding takes place in the 2-3mm annular gap formed by the blade tip and liner surface. A "long gap" is created by vertically stacking 5-10 rotor sections depending on mill sizes. The high residence time of the particles in overlapping layers of vortex pockets creates a very powerful grinding mechanism.

Compared to impact mills, most size reduction is by particle-to-particle attrition. Therefore, the effects of abrasion caused by impurities such as silica, mica, quartz and other acid insoluables is much lower than impact mills.

The Mikro-LGM™ long gap mill addresses the shortcomings of other gap style mills. It is the first gap mill to incorporate a precision dynamic classifier wheel with a positive coarse recycle loop. This feature provides smooth operation with high recycle loads. The end result is finely milled products produced at high capacity.

Sharp top size cuts free of excessive "spatter" or residue are realized by a clever aero-mechanical classifier seal.

A patented venturi-eductor forms the basis of a positive recycle loop whereby the particles rejected by the classifier are conveyed back to the feed inlet for further size reduction. Coarse or agglomerated feed materials are pre-sized using an optional fixed "bar" style rotor disc. The "bar" style rotor disc eliminates the need for another mill in some applications, simplifies the process flow stream, and increases the effective size reduction ratio.



Cross section of the Mikro-LGM™ long gap mill with optional pre-size rotor.

Flash Drying With Supreme Thermal Efficiency!

The powerful dispersion mechanism of the Mikro-LGM™ long gap mill produces excellent thermal efficiency. Feeding and mill configurations are available for pastes, wet cakes and slurries. The dried solids are typically free of agglomerates thereby eliminating the need for an additional milling step.

The massive internal surface area of the Mikro-LGM™ long gap mill acts as a heat sink that contributes to the thermal stability of this dryer. End product moisture remains consistent even when process parameters may have drifted.

Hot inlet gasses are diverted around the shaft connected to the bearing housing. This extends bearing life and simplifies the bearing lubrication system for most drying applications.

Complete System Design and Engineering

Hosokawa Micron Powder Systems provides complete system capability and single source responsibility for the performance of the entire drying process.

Instruments and controls can be provided for any level of process automation.

All ancillary components are selected on the basis of quality, long life and most importantly, suitability for their intended application.

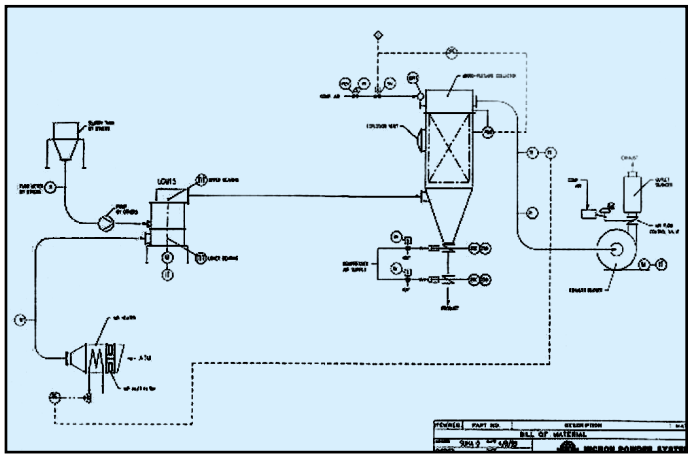
Wide Range of Drying Applications

When bulk transportation of liquid slurries is uneconomical or when process material exists in the slurry form and must be in a dry state, the Mikro-LGM™ merits consideration. Wet media milled materials such as calcium carbonate, kaolin and alumina are prime candidates for this mill.

The Mikro-LGM™ long gap mill size 8, pictured below, is in service drying 1,500 lbs/hr(dry basis) of paper coating grade calcium carbonate slurry. The initial solids content is 75% and final end moisture is 0.2 to 0.5%.

Process material is introduced in slurry form into the mill. Equipped with a screw feeder and the optional presizing rotor, filter press wet cakes can be processed effectively and economically. Wet cake applications include metal salts, oxides, clays, inorganic pigments and more.

Mikro-LGM™ long gap mill size 8 flash dryer



Typical Mikro-LGM™ long gap mill process flow diagram

Sieve Residue Control, Your Choice… Extraction or Destruction

Where high residue in the end product cannot be tolerated, look to the Mikro-LGM™ for your process solution of choice. The Mikro-LGM™ long gap mill has the provisions to separate grit, residue or other impurities. In cases where waste streams must be avoided, the Mikro-LGM™ long gap mill is ideal for grit reduction. The integral classifier works in conjunction with a venturi-eductor. Coarse grit is rejected by classification and drawn away from the mill by a venturi-eductor. These impurities are then collected in a cyclone or filter receiver. Grit such as hard agglomerations, refractory particles, silica, quartz and metal oxides are reduced to below the 44-micron or 25-micron threshold as specified to PPM and PPB levels.

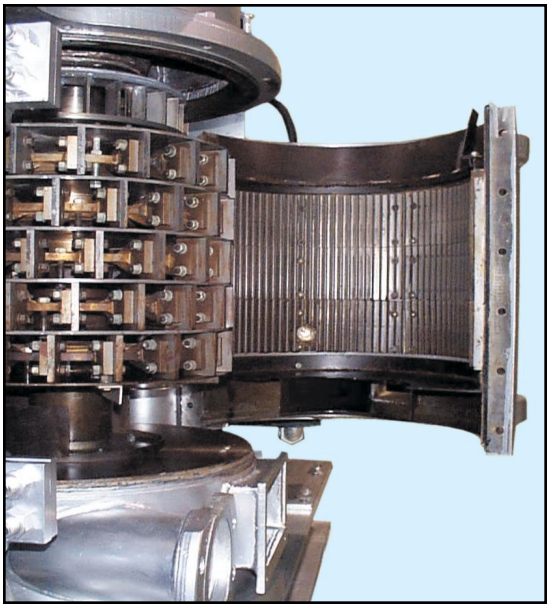
The Mikro-LGM™ long gap mill's performance in the area of residue control makes it the ideal choice for carbon black applications. An excellent alternative to hammer and screen mills, the Mikro-LGM™ long gap mill produces an end product with up to 100 times less grit residue levels. Even in comparison to the Mikro-ACM® air classifier mills, the Mikro-LGM™ long gap mill produces a superior end product with levels of up to 10 times less grit residue.

When processing difficult to handle materials with sticky or cohesive properties, the Mikro-LGM™ long gap mill maintains clog-free and stable operation. The Mikro-LGM™ long gap mill can also be configured in a closed loop system. No secondary air is required except for the venturi-eductor. The Mikro-LGM™ long gap mill works well with low airflow so it is ideal for placement in existing process flow streams.

In addition to carbon black, the Mikro-LGM™ long gap mill has found favor in the functional mineral filler industry. Calcined and hydrous kaolin clay produced in the Mikro-LGM™ long gap mill display dramatic improvement in fineness as measured by the hegman gauge and wet sieve analysis. In some instances, the oil absorptive properties have also been significantly improved (lower oil absorption). In comparison with most impact air classifying mills, the Mikro-LGM™ long gap mill operates with lower air flow, lower wear and more stable operation due to less power robbing re-circulation of tough to grind residue. Specific energy consumption is reduced and smaller size mills can be employed for the same purpose. Microscopic photos of some mineral powders processed with the Mikro-LGM™ long gap mill reveal rounding and polishing of the individual particle surface.

Ultra-fine grades of high silica bentonite clay (99% < 10 µ) are possible with reasonable wear expectancy of the internal parts by continuously aspirating the material rejected by the classifier integral to the mill. 50 - 65% yields are realized.

The above Mikro-LGM ™ long gap mill is designed to process 5 TPH of calcined kaolin to a 6 hegman fineness.



Smaller size Mikro-LGM™ mills such as the Mikro-LGM™ 3 and 6, can be furnished with clam shell access doors for simplified inspection and cleaning.

Fine Grinding and De-Agglomeration

Ideally suited for materials with a Mohs hardness of less then 3, the Mikro-LGM™ long gap mill excels as a de-agglomerating device or fine grinder. Functional mineral fillers treated with a coupling agent such as stearic acid or silane are further improved. Both particle size, density and hydrophobic properties are enhanced. The Mikro-LGM™ long gap mill makes an excellent accompaniment to spray or vacuum dryers for final particle size control.

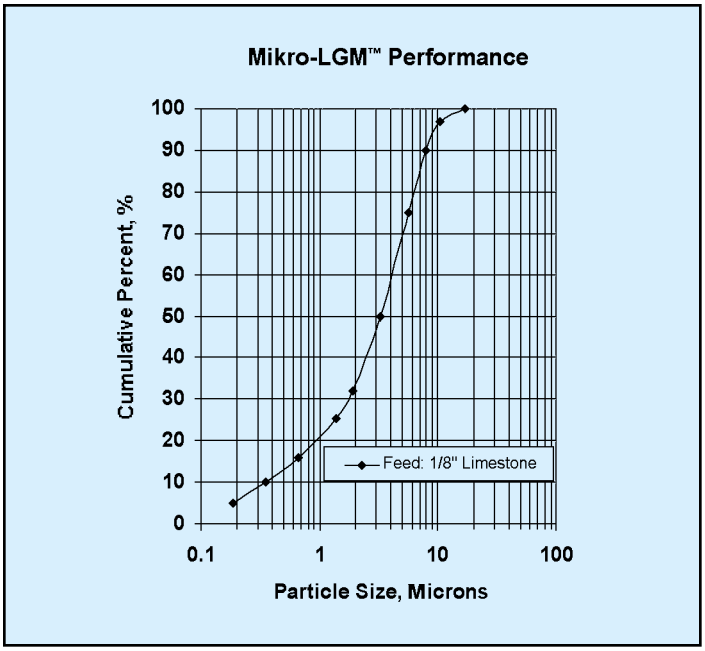
From pre-milled feedstock to crushed products up to a 1/2", the Mikro-LGM™ long gap mill takes them down to size.

In the example to the right, the Mikro-LGM™ long gap mill reduced nominal 1/8" minus 200 mesh soft limestone flakes to an average particle size of D50=3.2µ and a top size of D97=10.3µ. Similar results have been obtained with soft talc.

In addition to industrial minerals, the Mikro-LGM™ long gap mill works well with a broad range of industrial chemicals and food ingredients, especially flaked and spray dried starch and proteins. Due to their low density, pliability and planar morphology, these materials prove to be problematic for impact mills.

Special Features

Mikro-LGM™ long gap mills can be equipped with wear resistant components such as hard steel or ceramic liners, carbide tipped blades and plasma coated classifier wheels. Classifier options include radial blades, impeller style forced vortex and independently driven forced vortex classifier assemblies. Adjustable blade clearance and provision for additional rotor stages add to the versatility of the Mikro-LGM™ long gap mill.



Complete Range of Sizes

Model	*HP max*	*Air Flow SCFM max*	*Feed max*	*Evap. lbs./hr.**	*L x W x H in.*	*Rotor Speed (RPM)*	*Factor*
LGM 3	30	800	1,500	150	51x19x38	6,000	1
LGM6	100	3,200	6,000	600	76x38x61	3,200	4
LGM 8	200	5,500	11,000	1,000	95x50x71	2,400	7
LGM 11	300	10,000	18,000	1,800	103x65x87	1,750	12
LGM 15	600	18,000	30,000	3,000	150x87x112	1,300	20
LGM 22	1000	36,000	67,500	6,750	------	900	45

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

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

Leaders in Powder Processing Technology

Size Reduction Technologies

Alpine® AFG Fluidized Bed Opposed Jet Mill
Alpine® Discoplex ADP Disc Wet Pearl Mill
Alpine® AS Spiral Jet Mill
Alpine® ANR Vertical Wet Pearl Mill
Alpine® Circoplex ZPS Air Classifier Mill
Alpine® Contraplex CW Counter Rotating Pin Mill
Alpine® Rotoplex Granulator/Cutting Mill
Alpine® UPZ Universal Mechanical Impact Mill
Mikro-Atomizer® Air Classifier Mill (The Original)
Mikro-ACM® CX Co-Axial Classifier Mill
Mikro-ACM® SB Split Body Air Classifier Mill
Mikro-LGM™ Long Gap Mill/Impact Dryer/Coating Mill
Mikro-Pulverizer® High Speed Hammer and Screen Mill (The Original)

Classification and Separation Technologies

Acucut® Air Classifier High Energy Air Classifier
Acucut® CX Classifier High Efficiency Co-Axial Air Classifier
Alpine® Multiplex Zig Zag High Capacity Separator
Alpine® Stratoplex ASP High Efficiency Classifier for Minerals
Alpine® TSP High Efficiency Classifier
Alpine® TTSP High Efficiency Tandem Classifier
Alpine® Turboplex ATP High Efficiency Classifier
Alpine® Ventoplex High Volume Classifier
Mikro-Classifier Fine Particle Air Classifier
Micron Separator Fine Particle Air Classifier

Mixing, Blending, and Drying Technologies

Isem Ball Segment Valve
The Vrieco-Nauta™ Conical Screw Mixer (The Original)
The Vrieco-Nauta™ Conical/ Vacuum Dryer (The Original)
Vrieco-Nauta™ Cyclomix High Intensity Conical Mixer

Containment, Filling, Weighing, and Isolation Technology

Stott Laminar Flow Booths and Glove Boxes
Stott Bag Break Stations and Drum Tippers
Vitalair Down Flow Booths

Lab/Pilot Processing and Analytical Devices

Alpine® Air Jet Sieve
Alpine® Multi-Process System
Alpine® 100 UPZ-II
E-Spart Particle Analyzer
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

HOSOKAWA MICRON POWDER SYSTEMS

Hosokawa Micron Powder Systems is a member of the Hosokawa 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.

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