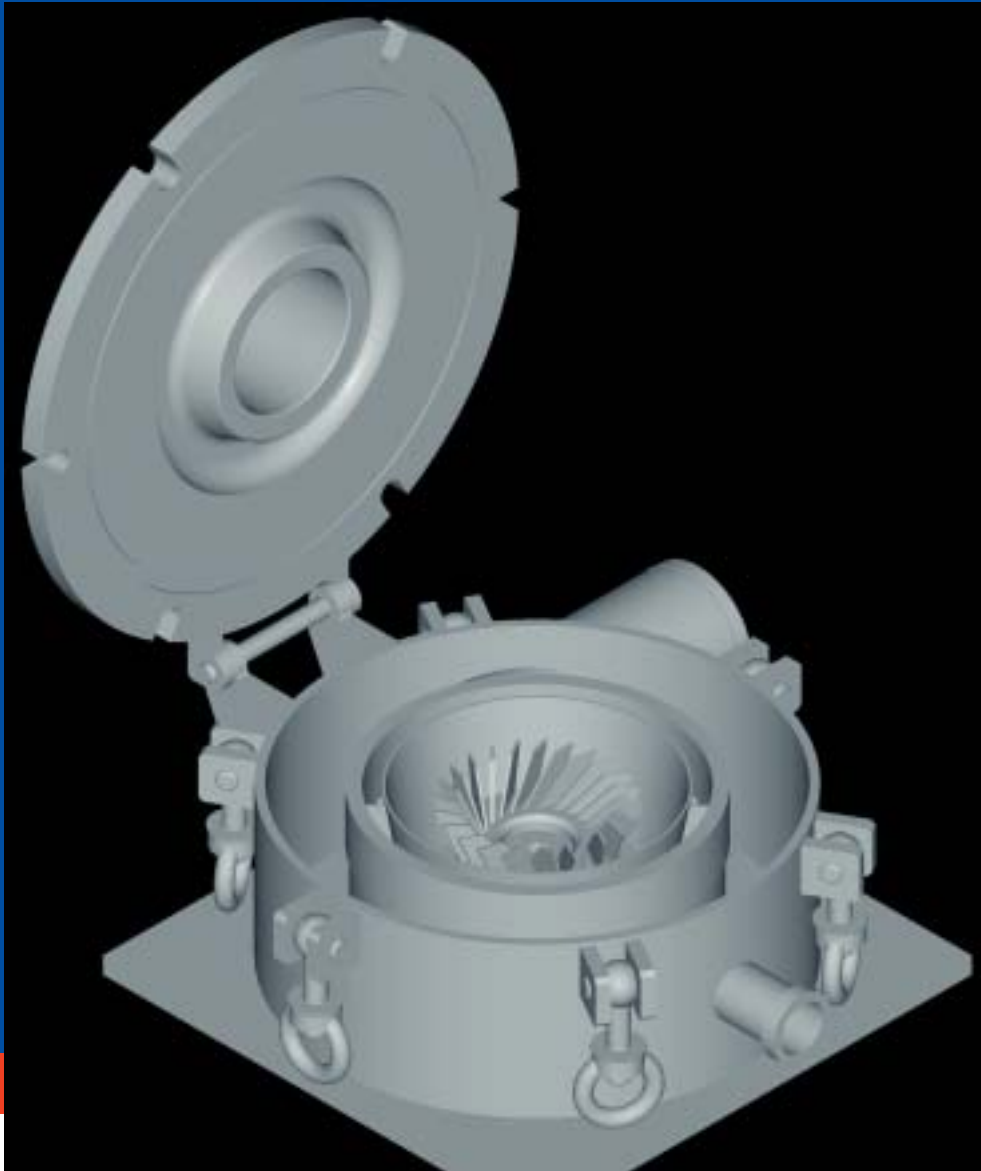


MIKRO ACM Air Classifier Mills



HOSOKAWA MICRON GmbH

Process Technologies For Tomorrow[®]

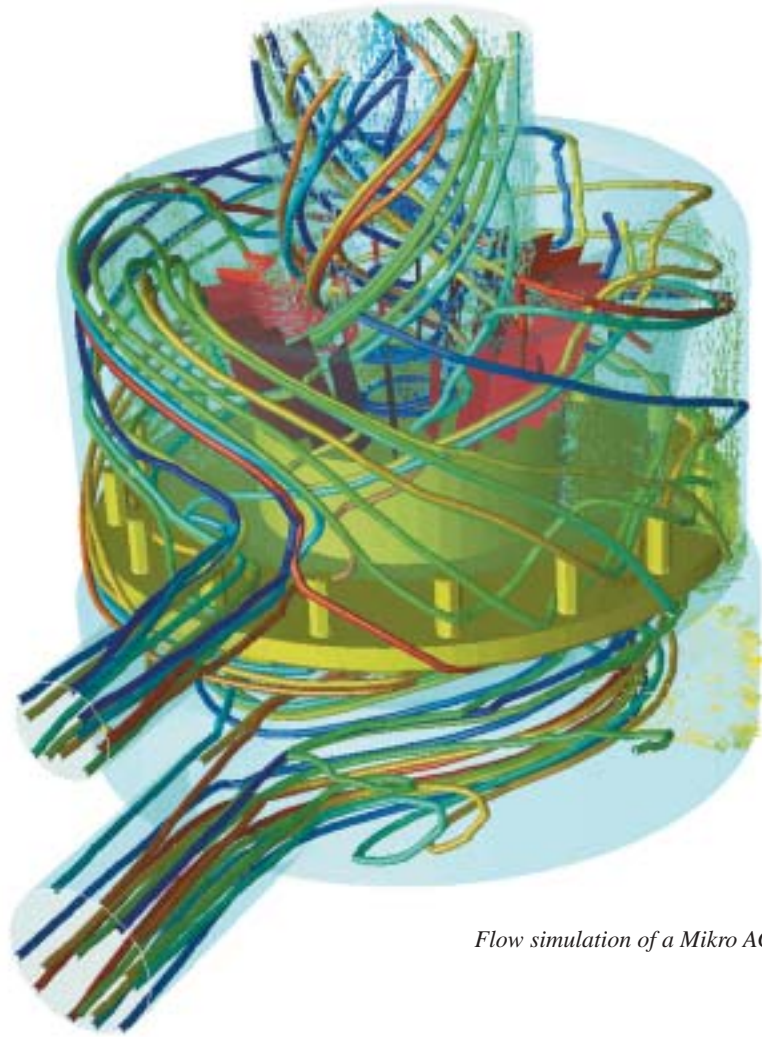
Mikro ACM · Mikro Pulverizer · MikroClassifier

Mikro ACM Classifier Mill – The most versatile mill

In 1962 the Mikro ACM came on the market as the first air classifier mill and since then it has been continuously developed further and adapted to market needs. It is suitable for the size reduction of various products for all industries.

- Chemicals
- Food
- Metal
- Minerals
- Pharmaceuticals
- Powder coating

The first thing catching the eye is the ACM's compact and clear arrangement of the elements. The combination of impact grinding with integral dynamic classification offers the perfect solution for fine and ultrafine milling of soft and medium soft products.



Flow simulation of a Mikro ACM

Principle of operation

The product is fed into the mill pneumatically. Size reduction takes place by the impact of material particles on the rotating grinding surfaces and on the fixed liner. With a striking edge velocity up to 140 m/s, finenesses of $D_{97} = 10 \mu\text{m}$ are achieved. The cooling, conveying and classifying air drawn through the mill by the downstream fan entrains the metered feed material which then passes the blades of the shroud ring. The characteristic feature of the Mikro ACM is the integral dynamic classifier.

The air/product mixture is uniformly distributed by the blades to the rotating classifier. Due to two opposing forces and the different masses of the material particles the separation into coarse and fine fraction is achieved in the classifying section. Those of high mass are thrown away from the wheel by centrifugal force. The rejected particles return to the milling zone. The fine material is carried with the air through the classifier to the outlet connection.

The cut point is adjusted by means of the classifier speed and is infinitely variable even during grinding operation.

Design philosophy

The Mikro ACM is available in four different designs. Consequently, we can offer any type of mill meeting special requirements for almost every kind of application.

Due to its flexible design it is an incomparable allrounder. As a result of continued development and improvements during decades, important features of all Mikro ACM types have been optimised.

- The pneumatical product feed guarantees a maximum product throughput and allows a flexible arrangement. It simultaneously offers explosion protection and also reduces the sound emission during product feed.

- Mikro ACM Classifier Mills are pressure shock-resistant up to PSR 11. Thus, the highest possible explosion protection is achieved.

- Low Noise Design, special sound absorbing design ensures a minimum sound emission.

- With the optional air purged classifier wheel sharp top cuts can be obtained. As a consequence coarse particles in the fines are avoided and an optimum product quality is guaranteed.

- The tangential product inlet ensures optimum flow conditions, reduces the pressure drop of mill and avoids product depositing.

for fine and ultrafine grinding

Important Features

- Grinding and classifying in one machine
- Compact space saving design
- Cool and smooth grinding
- Steep particle size distribution
- Sharp classifier cut point, instantly adjustable
- Easy cleaning and maintenance
- High accessibility
- Low noise emission
- Low specific energy requirements
- Pressure shock and wear resistant
- Appropriate for combined grinding and drying

Grinding Chamber

Those grinding chamber parts in contact with the product consisting of

- Grinding disk
- Shroud ring
- Liner
- Classifier

are made of cast iron, mild steel or stainless steel. The grinding surfaces can be treated and polished as per request. The grinding chamber can also be supplied in pressure shock-resistant design up to 11 bar.

Cleaning and Maintenance

The compact rotor ensures good accessibility to the mill interior. The fixture of the grinding chamber cover can be easily detached. Depending on the construction, the cover is hinged up manually or electrically. Cleaning in case of product changes, replacement of worn grinding elements and maintenance work thus become very easy.

The complete rotor assembly can also be dismantled quickly and easily, as it is fastened in the grinding chamber housing by a few bolts only.

The availability of ACM air classifier mill is very high due to this easy cleaning and maintenance.

Wear Protection

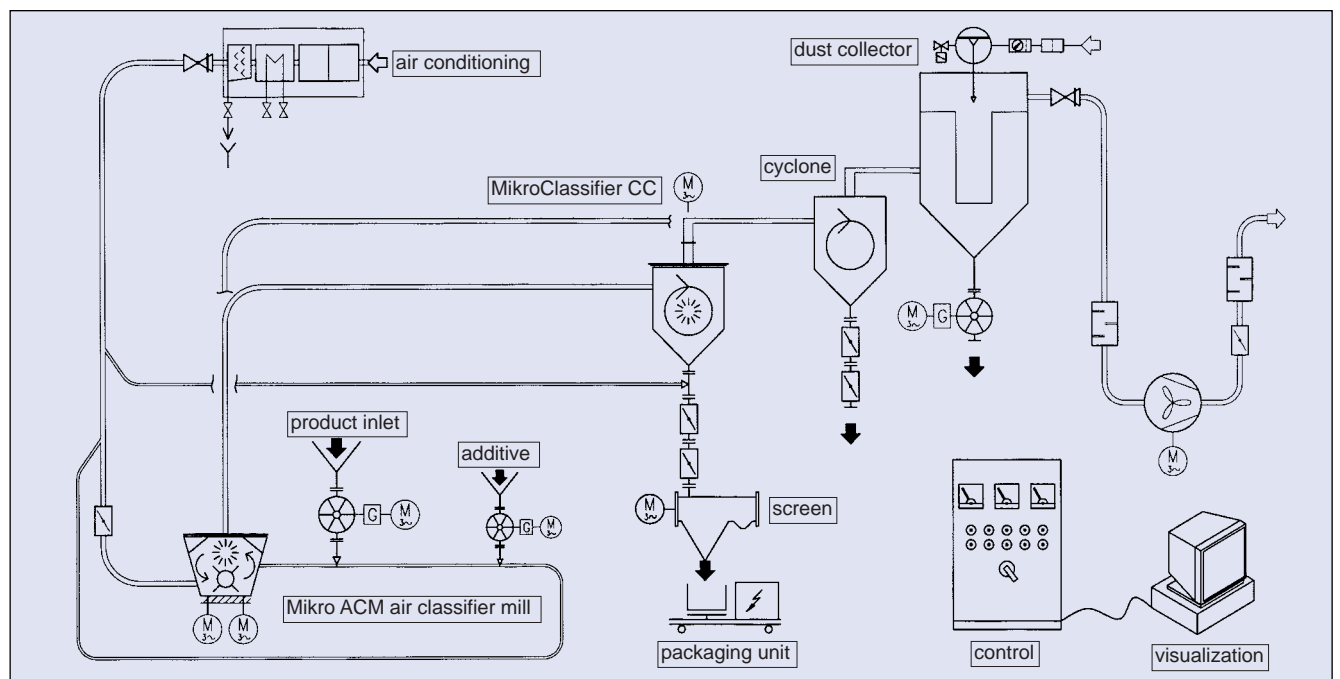
For grinding abrasive products, the grinding surfaces can be protected by the use of wear resistant materials.

This wear protection is available for the following mill parts of ACM 10 to ACM 150:

- Product inlet
- Liner
- Grinding disk
- Grinding pins
- Grinding blocks
- Classifier wheel
- Grinding chamber cover
- Product outlet

For each application we work out a special wearing protection concept, whereby numerous special materials are at disposal.

- Nodular graphite iron
- HARDOX®
- Hard metal
- Cast basalt
- Zirconium oxide



Flow diagram of Mikro ACM grinding and classifying system, combined with MikroClassifier CC, cyclone and filter

Mikro ACM CX - standard design

Design and technology

The Mikro ACM CX with its coaxial bearing assembly is the standard design of our ACM series. This arrangement allows both classifier and rotor shafts to be driven from below the mill, which allows a straight vertical outlet from the mill. Eliminating bends at mill outlet enables the ACM to handle some products that may otherwise build up and block the outlet.

A one-piece mill housing which cover can be opened motor-driven or by hand is mounted together with both drive motors on a common base frame. Power transmission to the drive shaft is directly effected via V-belts. These are arranged inside the base frame and are easy to access for a trouble-free maintenance and exchange.

With the ACM 500 and 600, for a safe transmission of high drive power an angular gear with oil circulating lubrication is applied.

Rotor Design

A special feature of this ACM classifier mill is the coaxial arrangement of the classifier and grinding disk drive shafts. The compact rotor consists of the following parts:

- Classifier
- Grinding disk
- Bearing
- V-belt pulley

The shaft bearing has a proven sealing system, which prevents product from penetrating as well as lubricants from coming out. This is the basis for a long lifetime and avoids product contamination. For special applications bearings with purging air and cooling are available.

Special features

- Compact design
- Coaxial bearing of classifier and grinding disk drive
- Tangential air inlet



Mikro ACM 150 CX



Rotor bearing assembly of the Mikro ACM CX

Mikro ACM CL - with direct classifier drive

Design and technology

The Mikro ACM CL with separate bearings for classifier and grinding disk is suitable for all applications where the outgoing of product duct shall be horizontal and the downstream system parts shall be in close vicinity. This is very advantageous in case a regular cleaning of product contacted parts is necessary and consequently, a compact arrangement and short product ducts are needed.

By separate arrangement of bearings, a better cooling of bearings is achieved and as a consequence lifetimes which even under rough conditions allow a continuous operation during several years. Due to the direct drive of classifier via the motor arranged on the mill cover, driving elements such as V-belt and pulleys can be omitted. For the grinding disk the proven bearing with belt drive is applied.

Important features

- Direct classifier drive
- Separate bearing assemblies for classifier wheel and grinding disk
- Horizontal product outlet
- Compact combination with MikroClassifier or cyclone collector possible
- Particularly appropriate for temperature-sensitive products
- Tangential air inlet



Mikro ACM 40 CL with direct classifier drive



Mikro ACM 40 CL with opened grinding chamber cover

Mikro ACM EC and EC-CL - Easy Cleaning

Design and Technology

The Mikro ACM EC (Easy Clean) has been developed for minimum cleaning times. This is important for industries with frequent product change or batch operation. The Mikro ACM EC is tailor-made for these types of application.

This model incorporates a double chamber design with an outer air chamber. After opening the hinged mill cover, the inner grinding chamber can simply be lifted out for detail cleaning and inspection.

Depending on model size the grinding chamber may be made up of several rings, this ensures that even on a large ACM 60 EC mill, the maximum lifting weight is below 25 kg. Due to this fact, cleaning and maintenance works of Mikro ACM EC are particularly user-friendly, while all health and safety regulations are met.



Mikro ACM 30 EC



Mikro ACM EC mounting parts

Important features

- Tailor-made for powder coating, pharma and food production
- Particularly appropriate for frequent product change
- 50 % time saving when cleaning
 - high availability
 - enormous cost saving
- Low-noise operation
- Also available with CL design. The combination of the Mikro ACM EC with design features of the CL type joins all advantages of both types in one machine.
- Tangential air inlet

Mikro ACM 2 and 5 - the compact solution for laboratory and small batch production

The ACM 2/5 EC with its newly developed Easy Clean concept is very user-friendly. However, the main objective during the development of this mill was to minimize cleaning times during product changes. This philosophy has also been achieved with all other components of the compact mill system.

Design

We supply the Mikro ACM 2/5 EC either as a complete compact unit or with the system arrangement to customers requirements.

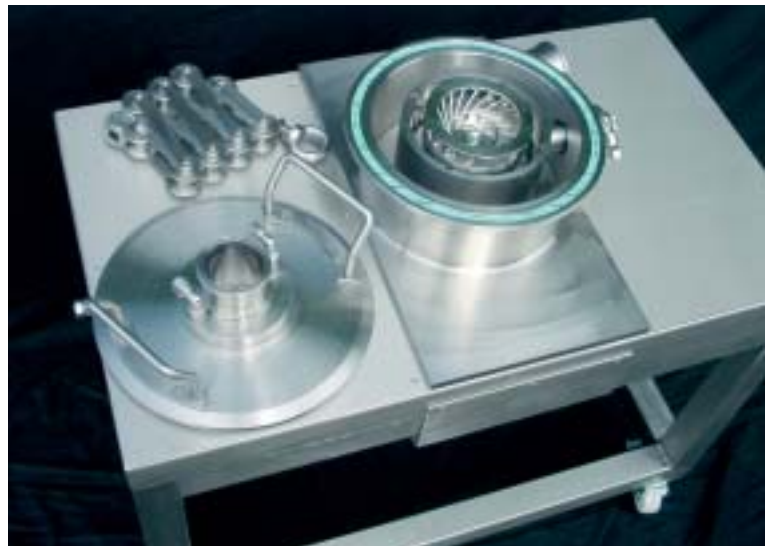
It consists of a mill, a cyclone or MikroClassifier, a residual dust collector, air conditioning, side channel blower, dosing and discharge devices. The individual components can be supplied both as pressure shock-resistant (PSR 11) or non-PSR design.

Applications

- Size reduction and classification of small batches
- Production of small batches for sampling and trials
- Determination of setting and optimization parameters for all Mikro ACM series
- Continuous production

Important features

- Easy to clean
- Easy to open
- Extremely compact
- Minimum pipework
- Movable as compact unit
- Throughput up to 80 kg/h / 150 kg/h
- Low noise operation
- Classifier top ring purge



Competence from A to Z

Mikro ACM mills are used for coarse, but mainly for fine and micro fine size reduction of a wide range of products up to a hardness of 4 Mohs. The effective overall design of high air throughput, favourable material flow and optimised grinding chamber construction enables the size reduction of heat sensitive products and prevents caking and build-ups.

Grinding disk and classifier drive

Both, the grinding disk as well as the classifier drive are speed controlled. The speed and consequently, the particle size distribution of final product can be infinitely adjusted during grinding operation.

Grinding tools

For various size reduction tasks and depending on product features optimum equipment is chosen. Type, shape and number of grinding tools influence the grinding results. The following tools are available:

- Grinding pins
- Grinding blocks, smooth
- Grinding blocks, notched

Classifier

For each Mikro ACM size, there are various heights and arrangements of classifier blades available:

- tangentially arranged classifier blades
- radially arranged classifier blades

Classifiers with radially arranged blades are mainly applied for caking products. The number of classifier blades is adjusted to the corresponding ACM size.

Rotor

The rotor designs available are – even with the exchange of grinding and classifying tools – superior to other solutions. By loosening and removing of only a few fastening elements the classifier, grinding disk and liner can quickly be exchanged.

Applications

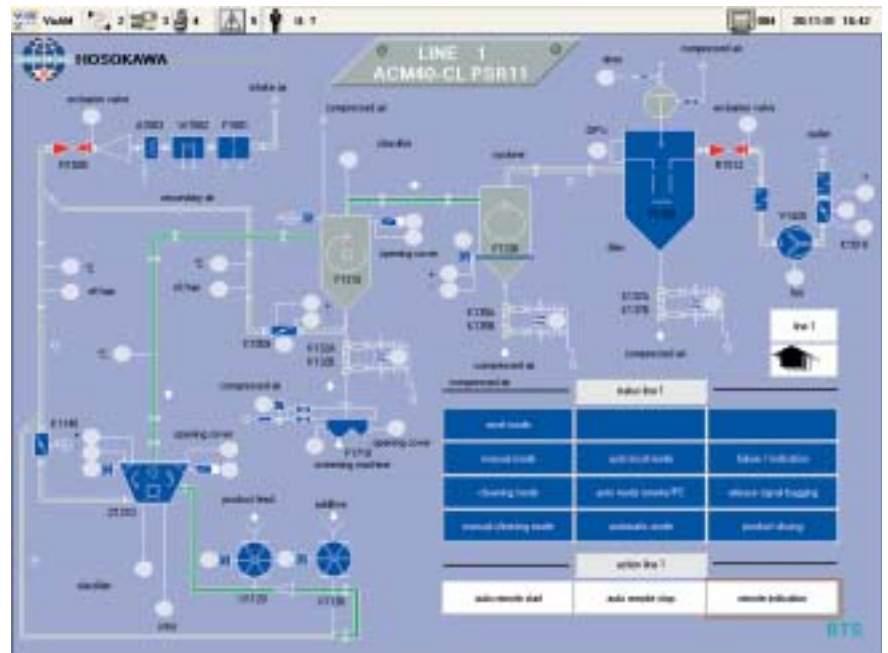
Product	Fineness µm	Throughput kg/h ACM 10 7,5 kw
Ammonium phosphate	99% < 71	110
Bisphenole A	99% < 63	370
Calcium stearate	99% < 71	375
Dextrose	99% < 20	9,3
E-PVC	99% < 40	200
Fish meal	99% < 100	100
Ginger	99% < 500	250
Herbicide	99% < 80	240
Iron oxide	99% < 5	60
Jellification agent	99% < 250	170
Kaolin	96% < 50	180
Lead oxide	98% < 40	280
Magnesium oxide	99% < 20	230
Nickel hydroxide	99% < 40	246
Organic pigments	99% < 2,6	122
Powder paint	99% < 103	240
Quinoline dyestuff	99% < 125	150
Rice	99% < 75	66
Silicagel	99% < 61	214
Talcum	99% < 20	100
Urea formaldehyde resin	99% < 125	120
Vinyl compound	99% < 105	100
Wheat kernel	99% < 100	270
Xantan	99% < 90	27
Yohimbin	97% < 30	25
Zeolite	99% < 40	1350

System Control and Process Visualization

Controllers

Either a common control cabinet or a controller system (SPC) are available upon request to control the most important operating parameters.

- Temperature
- Humidity
- Airflow
- Capacity
- Speed



Hosokawa Micron Process Visualization

Process Visualization PCVS

To meet the high requirements on process control and quality assurance, HOSOKAWA MICRON GmbH developed a tailored and flexible process control and visualization system for grinding and classifying systems.

- Visualization of process data
- Recording system
- Recipe database
- Process data storage

Process visualization is effected via a PC station installed at an appropriate place in the company, e.g. in the control room. By connecting a PC to the system control, this unit allows a low-cost, quick and easy exchange of process data. Operating data will be shown on screen and can be processed in various menus. All process data necessary for the operation of grinding and classifying system are displayed:

- Speed
- Temperature
- Airflow
- Current consumption

Furthermore, the PCVS is equipped with a recording system storing all actions and troubles of system incl. time, date and a corresponding recording text (database format). As a result, troubles and its causes or faulty operation can be quickly and easily analyzed.

For processing of various kinds of products or product qualities, this system offers the possibility to store recipes including all important operating parameters and additional information. These recipes are saved in a database and thus, are accessible anytime and can be transferred from the PC station to system control device. Consequently, the user saves much time and in addition, the product quality remains constant.

According to the application, the visualization system can be combined with a conventional contactor control, a standard stored program control (SPC) or a SPC with touch panel. By connecting a modem, data can be externally transferred.

In the event, the customer cannot solve operating problems, a costly and time-consuming service visit is not necessary, but our experts at HOSOKAWA MICRON GmbH in Cologne can carry out a teliagnostic and help the customer online. If the process control has to be modified, the SPC can be programmed also online.

The flexible Mikro ACM Series offer the perfect solution for every application...

Mikro ACM Series

19 mill types of the Mikro ACM are available ranging from 3 to 450 kW. Grinding chamber and grinding com-

ponents as well as air quantity, classifier resp. grinding disc speeds are exactly matched together and allow milling

results being transferred from one mill size to another.

Mill Size		2	5	10	15	20	25	30	40	50	60	75	100	120	150	200	300	400	500	600	
Motor Rotor	kW	3	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	160	250	315	375	450	
Motor Classifier	kW	0.55	1.1	2.2	3	4	4	5.5	7.5	7.5	11	11	15	15	18.5	37	45	75	90	110	
Speed	std.	l/min	10660	9400	6215	6215	4970	4970	4320	4320	3295	2625	2625	2100	2100	2100	1850	1650	1400		
Mill	max.	l/min	11900	10400	8880	8880	6990	6990	5770	5770	4580	3750	3750	2950	2950	2950	2000	1850	1860		
Speed	min.	l/min	1000	1200	700	700	700	700	600	600	600	600	600	800	800	800	600	600	400		
Classifier	max.	l/min	5400	4600	4000	4000	3250	3250	2920	2920	3250	2650	2650	2400	2400	2400	2200	2000	1860		
Airflow intake	m³/h	330	510	900	1350	1800	2250	2700	3600	4500	5400	6750	9000	10800	13500	18000	27000	36000	45000	54000	
Bypass	m³/h	60	100	180	270	360	450	540	720	900	1080	1350	1800	2100	2700	3000	3000	4000	4000	4000	
Capacity factor		0.2	0.5	1	1.35	1.8	2.25	2.7	3.6	4.5	5.4	6.75	9	10.8	13.5	18	27	36	45	54	
Dimensions																					
Length	mm	1630	1450	1450	1450	1600	1600	1750	1750	1750	2450	2450	2850	2850	2850	3310	3740	4470			
Width	mm	1220	580	580	580	700	700	700	700	700	1060	1060	1200	1200	1200	1300	1500	1830			
Height	mm	1650	790	850	850	1000	1000	1300	1300	1300	1587	1587	1731	1731	1731	2180	3010	2010			
Weight	kg	500	520	600	620	750	770	900	1000	1800	2400	2500	2800	2800	3000	9500	12500	16800-19200			

Mikro ACM Types

The Mikro ACM can be supplied in 4 different layouts for almost all mill sizes.

ACM Type	Features	2	5	10	15	20	25	30	40	50	60	75	100	120	150	200	300	400	500	600
CX	coaxial rotor bearing	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
CL	direct classifier drive	○	○	●	●	●	●	●	●	●	●	●	(●)	(●)	(●)	○	○	○	○	○
EC	Easy Clean with coaxial rotor bearing	●	●	●	●	●	●	●	●	●	(●)	(●)	○	○	○	○	○	○	○	○
EC-CL	Easy Clean with direct classifier drive	○	○	●	●	●	●	●	●	●	(●)	(●)	○	○	○	○	○	○	○	○

○ not available

● available

(●) design study

... and we offer you a comprehensive service



Company Philosophy

Customers satisfaction is our goal. We endeavour to achieve this goal by providing equipment which incorporates the latest technology together with optimum service. Our strategy is to supply you with grinding and classification systems which will produce the highest quality powders. We design components and systems that are user-friendly, while easy to clean and to maintain. With this philosophy we are continuously developing our products to meet changing needs of today's industry.

Engineering Service

HOSOKAWA MICRON GmbH offers you the complete engineering. This means total support for the customer, as not only large-scale operations, such as project planning, engineering are required, but also complete and time-consuming order handling, scheduling and progress control are organized by qualified personnel. As HOSOKAWA MICRON GmbH has many years of experience in this area, individual components can be combined quickly and reliably.

First, we discuss the process flow, clarify the technical data and fix the inter-sections. The customer alone determines the scope of delivery and services to be supplied by HOSOKAWA MICRON GmbH.

Our system engineering includes planning, delivery and performance warranty for all grinding and classifying stages: in front, in between and behind HOSOKAWA MICRON GmbH's units.

Aftersales Service

We supply you with turnkey systems including installation, commissioning and training of your personnel. Our aftersales service guarantees you optimal care and technical support as well as spare parts supply over the whole lifetime of the machinery.

- assembly
- commissioning
- maintenance
- modernization
- training
- spares

Application Center

The HOSOKAWA MICRON GmbH facility in Cologne is well equipped for conducting tests on customer's request. We can test your products and find for you the optimal operating conditions. We use these test results for optimum scaleup and system design.

Toll Processing

Depending on type and size of production plant, much time may pass from initial planning to successful commissioning of the system. You can avoid potential production bottlenecks and tight time schedules by transferring your product processing requirements to us. HOSOKAWA MICRON GmbH has many years of experience in particle and powder processing, which means for you:

- qualified product handling
- comprehensive machinery
- specific solutions to customer's requirements
- quality assurance acc. to ISO 9001
- intermediate storage of raw material and finished product
- flexibility for just-in-time processes

HOSOKAWA MICRON GmbH

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Delivery Program

Products

Mikro ACM Air Classifier Mills
Mikro Pulverizer Hammer Mills
MikroClassifier CC
High Performance Cyclone and Cyclone Classifier Series VME
Dosing and Discharge Devices
Complete Systems for Powder and Particle Technologies

Services

System Design
Engineering
Consulting
Toll Processing
Aftersales Service
Spare parts
Application center

Visit our internet site: www.hosokawamicron.de



HOSOKAWA MICRON GmbH

Hosokawa Micron GmbH 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 systems for powder and particle processing, thermal processing and plastics processing. The Group maintains facilities for research, engineering, manufacturing and service in each of the world's major industrial markets.