

Kemutec
Powder
Technologies



Size Reduction Mills

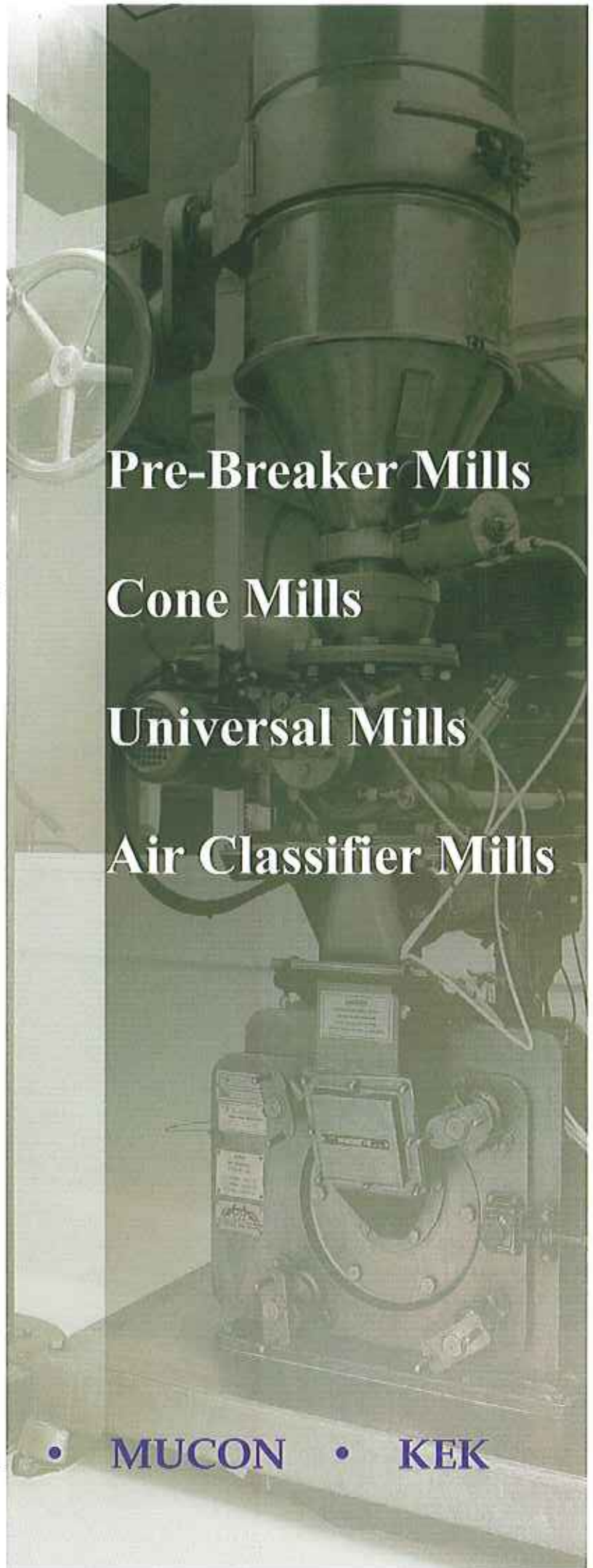
Pre-Breaker Mills

Cone Mills

Universal Mills

Air Classifier Mills

PPS • GARDNER • MUCON • KEK



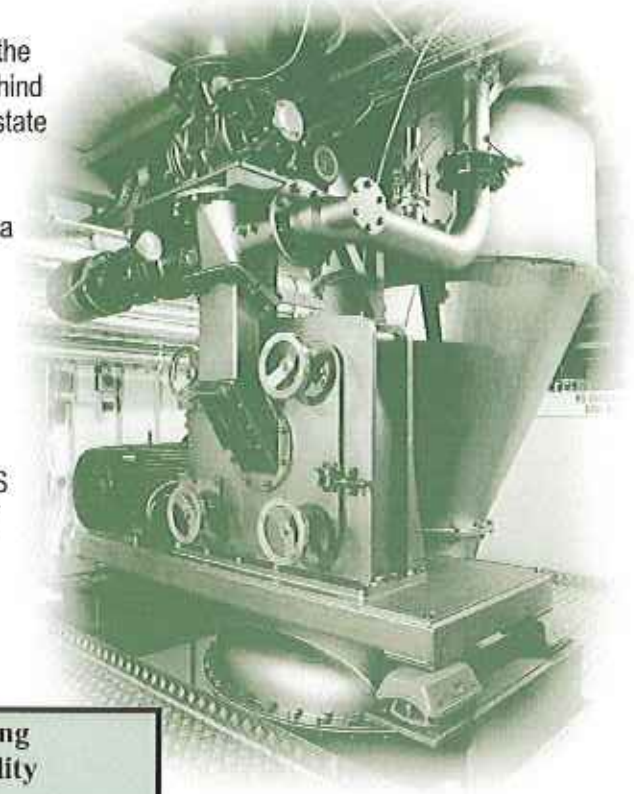
Complete Solutions Provider

Over the years it has been the demands of Kemutec's customers in the Powder Processing Industry that have been a major driving force behind the development of Kemutec Powder Technologies' (KPT) range of state of the art size reduction mills.

The extensive milling capabilities reinforces KPT's reputation as a 'Complete Powder Processing Solutions Provider'.

Size Range

The KPT grinding mills series from KEK Kibbler Pre-breakers to PPS Air Classifier Mills gives KPT the capability to break down lumps of 150mm down to 5 - 100µm mean particle size.



	Mill Type	Grinding Capability
Coarse Grinding ↓ Fine Grinding	KEK Kibbler	150mm → less than 2-3mm
	KEK Cone Mill	25mm → 250µ
	KEK Universal Mill	→ 15µ
	PPS Air Classifier Mill	→ 5 - 100µ

Customisation

KPT offer standard, stand alone unit machines for uncomplicated applications but also have the expertise and capability to provide bespoke milling packages for individual process applications and difficult to mill products.

The extensive mill range is suitable for use at Laboratory / R&D level through to pilot plant and production units; and mill parameters can be scaled up accurately from lab conditions to higher throughput production processes.

Quality

Kemutec Powder Technologies' grinding mills can be supplied to conform with ATEX zones 21 and 22, and the company is BS EN ISO 9001 accredited.

Kek Kibbler Pre-breakers



The KEK Kibbler Pre-breaker mill is a heavy duty mill for coarse grinding and lump breaking applications. KEK Kibblers are designed to work in conjunction with other KEK and PPS mills or as stand alone coarse grinding mills in their own right.

KEK Kibblers accept lumps up to 150mm dia. and reduce them to less than 2 – 3mm within a narrow particle size distribution and with minimal fines.

Typical Applications

De-agglomeration

Breaking down of compacted hygroscopic products that have agglomerated due to dampness or compaction:

Sugar Milk Powder Sodium Steratate Detergents Coffee Powder Salt Frozen Fruit
Brown Sugar

Pre-Milling

Pre-grind of very large lumps to a particle size small enough for further grinding:

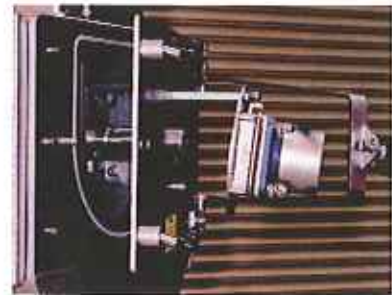
Gum Arabic Soap Pigments Titanium Dioxide Coal/coke Liquorice blocks

Coarse Grinding

Product is broken down for use (e.g. melting or dissolving) in another process. Ingredients can be sized for mixing. Damaged products can be reclaimed for rework. Filter press cake can be broken to increase surface area for more efficient drying.

Biscuits Popcorn Toffee Wax China clay Rusk Boiled Sweets

All applications subject to proving trial



Conventional end bearing



Cantilever model with no end bearing

User Benefits

All models:

- Easily removed screens for rapid changing & easy cleaning
- Heavy duty beater and screens for long life
- Hinged end door with bearing support for easier removal of bearing*
- Bolted flanges for dust tight operation
- 'O' ring seals to end plate for rapid changing and easy cleaning
- Low speed operation with less than 1m/second tip speed
- Wide range of grinding screen sizes/types and interchangeable beaters to suit a variety of process requirements
- Adjustable beater/screen clearance to change particle size distribution
- Optional variable speed drives for even greater particle size distribution flexibility
- Operator friendly - no heavy items to support during cleaning
(* except cantilevered shaft models)

Cantilever shaft models:

- No end bearings or seals for greater hygiene
- Easier to clean and maintain
- More rapid strip-down and re-assembly

Kek Cone Mills

Designed for intermediate granulation applications, cone milling is a gentle, low energy form of size reduction. Used for a wide range of granulation applications including fatty, heat sensitive, sticky, moist or fragile products. It alleviates traditional milling problems of noise, dust and heat generation.

The gentle grinding action of KEK Cone Mills, capable of control within fine limits, maintains a close particle size distribution with minimal fines generation, typically grinding from 25mm to 250µm.

KEK Cone Mills are specifically designed to meet the requirements of today's Food, Dairy and Pharmaceutical Industries. Kemutec's intimate knowledge of the industry processes enables them to produce bespoke equipment to meet the ever changing demands.

User Benefits

- **High efficiency** - virtually all the energy input is used in the size reduction process
- **Gentle grinding action** - permits uniform size distribution, resulting in minimal fines
- **Low heat generation** - essential when milling fatty, sticky or heat sensitive products
- **Low dust levels** - No need for air filtration and keeps installation costs to a minimum
- **Low noise** - No costly acoustic protection required
- **Flexibility** - Free standing mobile units are available that can be used in any location. Standard models can be used as part of process systems as well as special, bespoke units that are an integral part of other capital equipment
- **Hygienic designs** - All models can be cleaned with high pressure hoses and are designed to run under fully submerged conditions. Provision is included for air purging where required

Motor Size	Cone Dia	Use	Mill Speed Rpm (max)	Motor Size	
				Kw	hp
75	75mm	Lab	7000	0.5	0.65
120	120mm	Lab / Pilot	6000	0.55	0.75
170	170mm	Pilot / Production	4200	1.5	2
220	220mm	Pilot / Production	5000	4	5
340	340mm	Production	4000	7.5	10
540	540mm	Production	2500	15	20
680	680mm	Production	2000	18.5	25

Typical Applications

Reclaim of damaged biscuits
Reduction of extruded bran
Coarse breaking of hazelnuts
Crumbling of fresh bread
Deagglomeration of brown sugar

Deagglomeration of milk powder
Breaking of filter press cake
Breaking agglomerated detergents
Pre-dispersion of pigments
Tablet reclaim

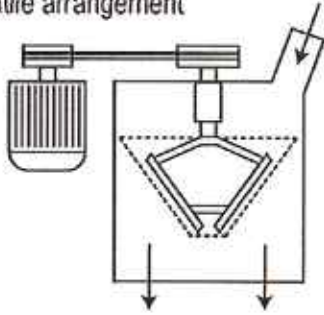
Wet & dry granulations
Dispersion of soap granules
Reduction of breakfast cereals
Homogenized sizing of flakes
Pre-milling and granulation lump breakers

Drive Arrangements

We have extensive applications experience and have developed the flexibility to respond to the ever changing needs of our customers. A comprehensive range of drive options is available to suit particular process requirements.

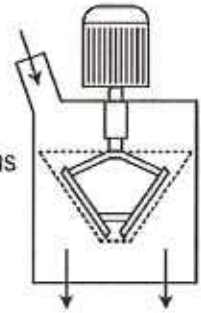
Top driven belt drive

- The standard for 'hopper feed' installations
- Gives the option of speed change via pulley sets
- The most versatile arrangement



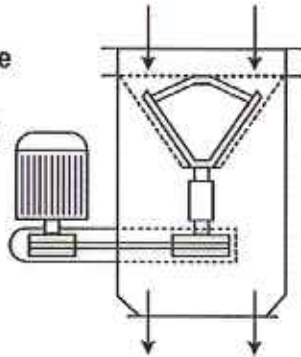
Top driven direct drive

- An alternative for 'hopper feed' installations
- High torque, slow speed applications
- Compact



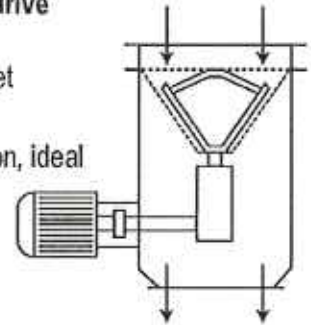
In-line under-driven belt drive

- No drive shaft to restrict inlet
- Accepts larger feed stock
- High speed grinding action, ideal for dry granulation



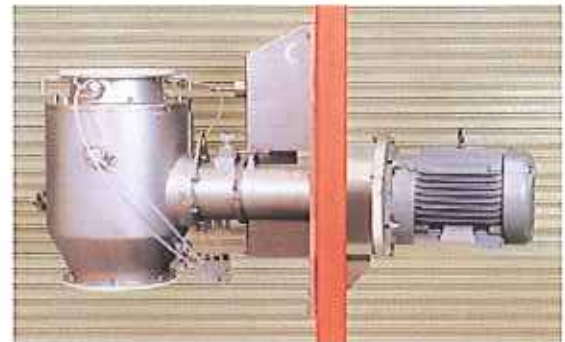
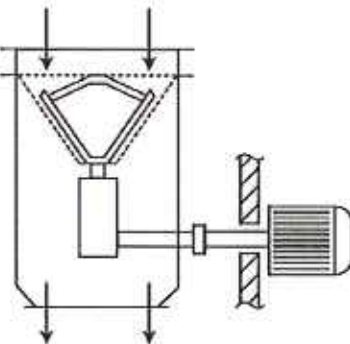
In-line under-driven direct drive

- No drive shaft to restrict inlet
- Accepts larger feed stock
- Slower speed grinding action, ideal for wet granulation



Remote location in-line under-driven direct drive

- Under driven direct drive with the drive located separately from the milling chamber
- Ideal for Clean Room operation
- A practical solution for explosive environments



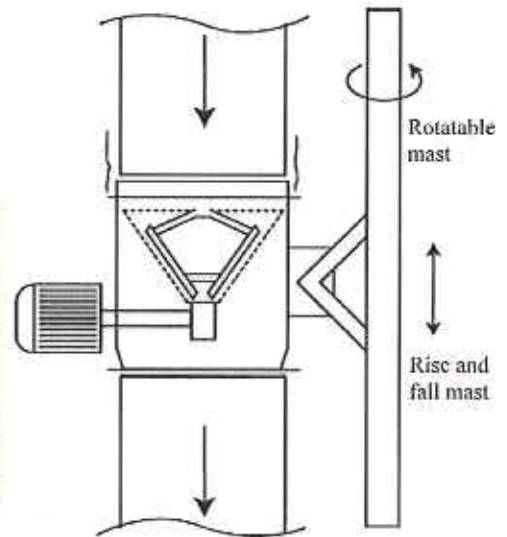
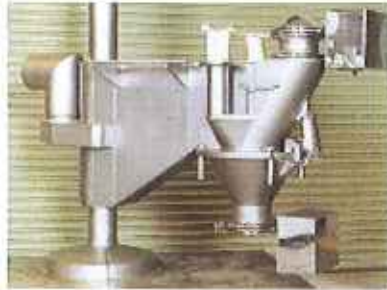
Cone Retention & Rotor Adjustment

Cones are changed easily by releasing the hinged chamber and the cone is simply lifted out and replaced. The rotor/clearance can be adjusted easily by simply loosening the retaining nut and turning the rotor to another position. On larger models, a side access door can be provided, allowing permanent onward connections

Customised Options - Milling Chamber Housing

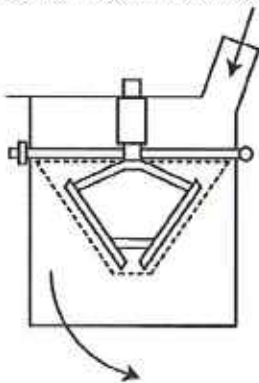
Mast mounted cone mills

- Cone Mill can be swung off-line to the side
- Facilitates raising or lowering for cleaning or grinding media changes
- Enables cone mill to be replaced by a make up piece when product does not require processing



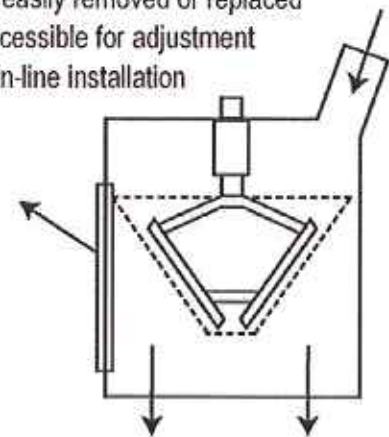
Swing away discharge chute

- Top drives only
- Rapid cone changes for easy cleaning
- Easy rotor clearance adjustment
- Ideal for mobile machines and bagging off applications



Side access discharge chute

- Hinged or removable access door on discharge chute
- Easy access to discharge chute for cleaning
- The cone can be easily removed or replaced
- Rotor is easily accessible for adjustment
- Ideal for fixed or in-line installation



Pull-through Cone Mills

- In-line vacuum conveying systems
- Continuous dust-tight operation
- Less risk of contamination

The comprehensive range can also accommodate any of the following process requirements:

- Fully mobile Cone Mills
- Explosion containment up to 10 bar
- Explosion suppression systems
- Fully flushable CIP
- Spray ball CIP



Kek Universal Mills

KEK fine grinding Universal mills are designed and constructed for aggressive, one pass milling, high performance, robustness, easy maintenance and safety in use. Construction can be of cast iron, cast steel or stainless steel and, where required, can be designed to withstand over pressure situations of up to 10 Bar.

A range of models are available to suit a variety of process and throughput requirements from a few kgs to several tons per hour. Typical requirements are to grind materials of up to 3 Moh hardness down to less than 15µm particle size.

Product Range

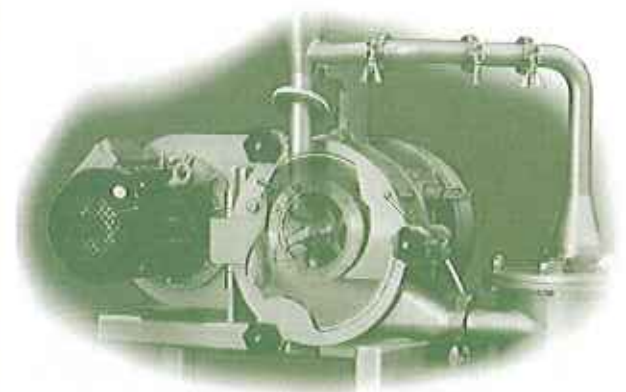
Model Size	Max Drive Power	Mill Speed		Nominal Rotor Size	Max Airflow (free running)	
	Grinding Rotor	Turbine / Screen	Pin & Disc		Turbine / Screen	Pin & Disc
	Kw / hp	rpm	rpm	mm	M ³ /hr / CFM	M ³ /hr / CFM
7H	0.37 / 0.5			50		
6H	2 / 3	25000	25000	100		
5H	3 / 4	19000	19000	120	256 / 150	154 / 90
4H	15 / 20	10000	10000	227	428 / 250	256 / 150
3H	37 / 50	6000	8000	375	1283 / 750	855 / 500
2H	75 / 100	4000	5000	570	2560 / 1500	1283 / 750
1H	150 / 200	2850	2850	800	2560 / 4500	2560 / 1500

Features

- Fine Grinding to average particle size of 15µm
- Easily accessible and interchangeable grinding medium
- Adjustable mill speed
- Choice of bottom or involute discharge
- Option of explosion proof design

Benefits

- Flexibility - caters for differing products and particle size requirements
- Easy and efficient cleaning between batches
- Choice of discharge process overcomes limitations of plant size or layout



Universal Mill Customised Design Options

Explosive Materials

Most materials that are milled have the potential to ignite during the milling process and therefore must be accommodated in the mill design. As well as the traditional vented systems, KPT specialise in Inerted and 10 bar PSR designs

Inerting

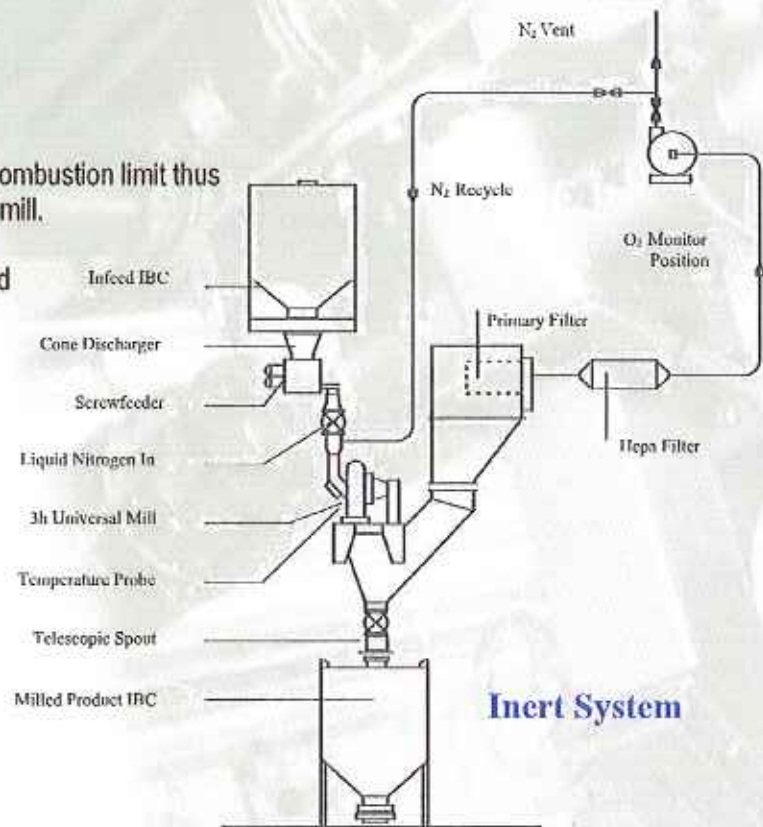
Use of inert gas to reduce oxygen levels below combustion limit thus preventing an explosion taking place within the mill.

This method protects against dust explosions and aids in the process of low / minimum emission energy materials.

The low moisture contact is beneficial when grinding hygroscopic materials.

10 Bar Mill Systems

Systems can be rated to 10 bar pressure shock containment to offer protection against potential dust explosion.



Toxic Materials

With the ever increasing toxicity levels of active ingredients, the need to protect operators from hazardous materials becomes more critical. At Kemutec, equipment is designed to provide the highest levels of primary containment and protection within our core equipment.

'Gloveboxes

Glove boxes are used in high containment applications and also offer CIP capabilities and other features such as remote drive through glove box with motor in non-isolated (grey) area.

Operational extras include sound insulation, dust filtration and systems to vent, suppress or contain risks of explosion and excess pressure of up to 10 bar

CIP

The requirements of CIP within the package are closely linked to the Operational Exposure Levels for the material and must be carefully considered at the design stage.

An optimum solution may be a combination of fixed spray balls, retractable spray balls and pressure rated equipment to accommodate full flooding.

Where required, Kemutec will also provide the CIP skid capability as part of the overall package design.

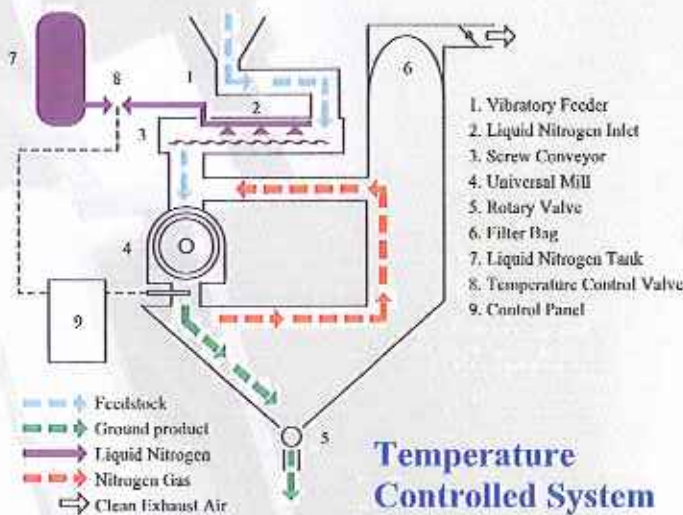
Nitrogen Assisted Milling

As well as using Nitrogen as an inerting medium, it is commonly used as a cooling agent for difficult to mill materials;

Temperature Controlled

Temperature controlled milling involves the use of liquid Nitrogen as a cooling agent which is applied to the mill and collection system.

This system is often used to improve the processing properties of heat sensitive materials or give a specified milled product output from the mill where it is essential to eliminate temperature pick up during normal milling.



Cryogenic Grinding

Cryogenic grinding systems also involve the addition of nitrogen but the temperatures are much lower and cooling is applied to both the mill system and the feed product.

Product that is impossible to mill at ambient temperatures is cooled to up to -150 °C and is brittle enough to grind finely.

Cool and Cryogenic grinding will also provide the added benefit of inert explosion protection.

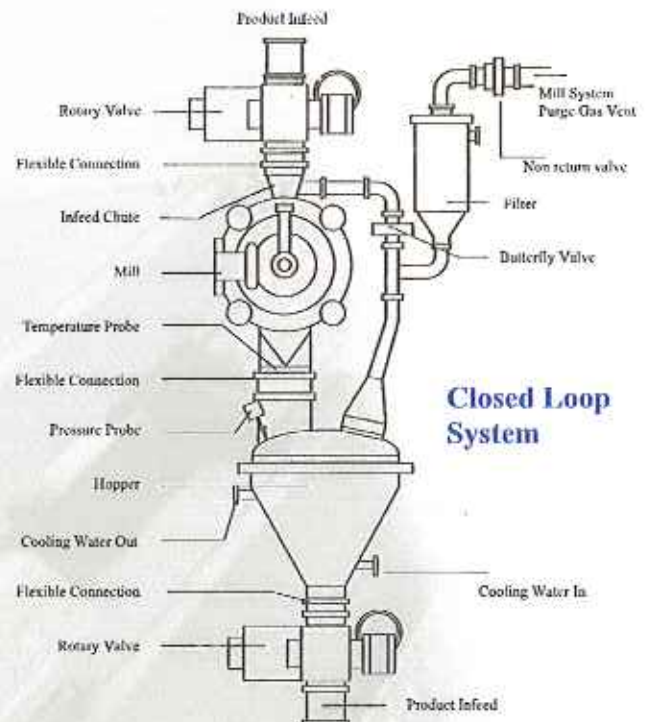
Closed Loop Milling Systems

Closed loop milling involves a process in which the mill airflow is totally recycled around the system back to the mill air intake.

As there is no net airflow through the system, there is no requirements to provide filtration to handle the mill process air.

This makes the mill system much more cost effective to design as a pressure shock resistant 'containment' system and makes a more compact installation.

Closed Loop (filterless) and inerted Closed Loop systems are suited to use within gloveboxes as the compact design enables the use of a smaller enclosure with fewer penetrations needed through the walls.



Universal Mill Interchangeable Grinding Media

All KEK Universal Mill grinding media can be interchanged between Turbine & Screen, Pinned Disc and Ribbed Track models.

Turbine & Screen

Developed for the fine grinding of soft to medium hard materials, particularly those that are fibrous. The turbine develops high airflows which help to reduce grinding temperatures. This also makes the system ideal for harder crystalline products such as sugar which is heat sensitive.

Pinned Disc

Designed for fine to very fine grinding of dry, brittle materials. The size and throughput of the ground product is controlled by varying the pin and disc configurations and the rotor speed.

Ribbed Track

A continuous ring or "ribbed track" cutting block which effectively gives a finer grind as product is in continuous contact with the grinding media.



Typical Applications

- Sugar Grinding
- Spices
- Cereals
- Dairy Products
- Cornstarch
- Carbonates
- Chlorate
- Citric Acid
- Gum Arabic
- Gypsum
- Insecticides
- Metallic Salts
- Nitrates
- Oxides
- Pesticides
- Phosphates
- Stearates
- Talc
- Urea Resin
- Tri-calcium phosphate
- Laxatives

PPS Air Classifier Mills

The PPS Air Classifier Mill offers fine grinding capability plus greater control over particle size distribution.

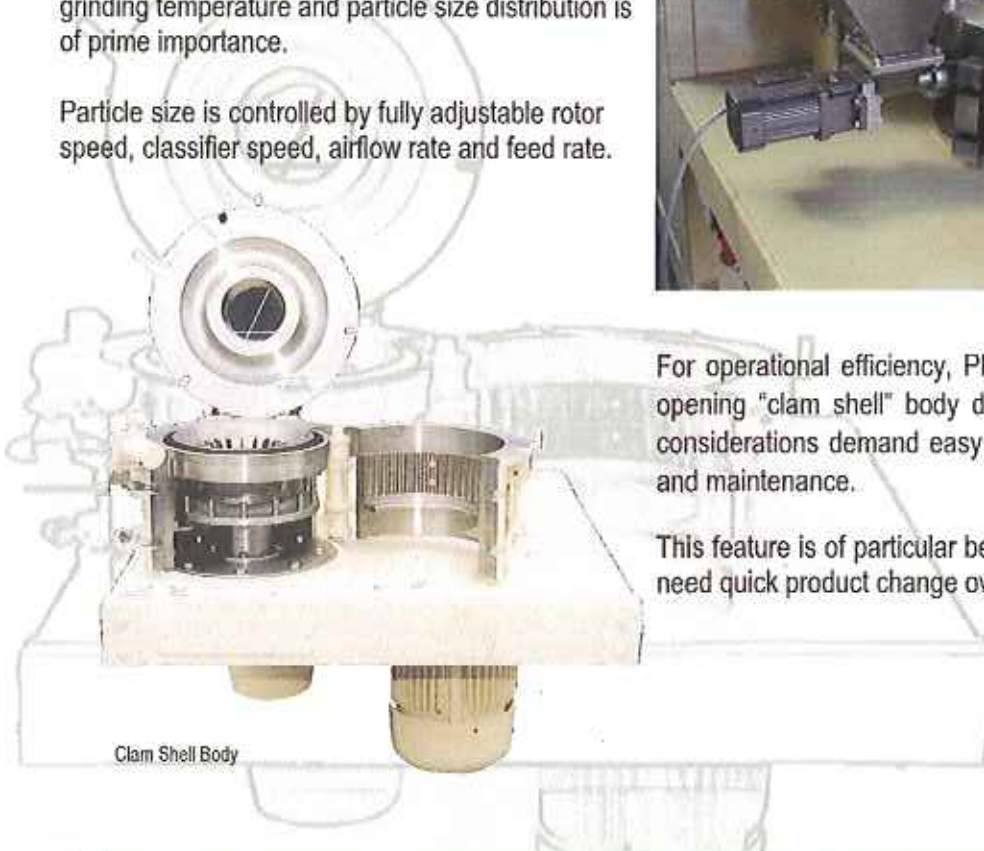
Typically grinding to a particle size in the region of tens of microns, the PPS Air Classifier Mill serves all industries producing fine powders where control of grinding temperature and particle size distribution is of prime importance.

Particle size is controlled by fully adjustable rotor speed, classifier speed, airflow rate and feed rate.



For operational efficiency, PPS Mills are available with fully opening "clam shell" body designs where process considerations demand easy access for inspection, cleaning and maintenance.

This feature is of particular benefit to multi product users who need quick product change over with no cross contamination.



Features

- Grinding to 5 - 100µm mean particle size
- Grinding and Classifying in one machine
- Internals easily removed
- Temperature controlled grinding
- Constant output
- Controlled particle size distribution
- Easily accessible and changeable grinding media
- The unique side opening design
- Easy to adjust particle size capability
- Clam Shell opening

Benefits

- Easy to access for cleaning and maintenance
- No need for separate classification equipment
- Caters for a wide spectrum of applications
- Downtime between products is minimised

The PPS Air Classifier Mill incorporates an internal air classifying wheel with independent drive giving precise control over "particle cut point" selection. Suitable for batch processing or continuous operation, this range of mills serves all industries producing fine powders where control of grinding temperature and particle size distribution is of prime importance.

Product Range

The PPS family of Air Classifier Mills is extensive ranging from the Laboratory size mill delivering a few kilos per hour for Research and Development purposes, through to large capacity 300kW drive production machines capable of throughputs of several tons per hour.

	Lab CMT	1 CMT	2 CMT	3 CMT	4 CMT	5 CMT	6 CMT	7 CMT	8 CMT	10 CMT	12 CMT
Ratio of Capacities	0.2	1	2	2.7	5.4	6.8	10.8	13	31	40	52
Main Drive (kW)	1.1	4.0	7.5	11.0	22.0	30.0	45.0	90.0	150	250	350
Main Drive (hp)	1.5	5.5	10	15	30	40	60	120	200	335	462
Classifier Drive (kW)	0.75	0.75	1.5	2.2	4.0	5.5	7.5	11.0	22	45	55
Classifier Drive (hp)	1	1	2	3	5.5	7.5	10	15	30	60	75
Airflow m³/hr	300	850	1190	1700	4250	5100	9180	10200	20000	30500	42000
Airflow (cfm)	175	500	700	1000	2500	3000	5000	6000	11750	18000	24750
Classifier Max Speed	6000	6000	4000	4000	2900	2900	2650	2650	2400	2200	1750
Rotor Max Speed	10000	9300	7200	7200	4750	4750	3000	3000	2400	2000	1800

Typical Food Applications

- Sugar Grinding
- Lactose
- Gluten
- Cereals
- Dairy Products
- Cornstarch
- Tri-calcium phosphate



Theory of Operation

Product is fed into the grinding chamber by either a feed screw or a pneumatic conveying system via a rotary feeder valve. Impact by the high speed grinding media causes the product to fracture and be thrown to the wall of the grinding chamber by centrifugal force. This, in turn, causes the product to fracture even further. Fractured particles are entrained in the induced airflow liberating around the periphery of the rotor disc which spirals upwards around the the outside wall of the internal baffle assembly (itself containing air baffles to help laminate the airflow).

The laminar airflow and particles pass to the internal classifier which is rotating in the same direction as the rotor disc. Oversized particles rejected by the centrifugal force applied by the classifying wheel are thrown to the inner wall of the baffle and then move down by gravity and by the pressure created by the classifier. These oversized particles re-entrain into the grinding chamber where further fracture can occur.

This recycle action continues until all the particles pass through the classifier wheel. Product being emitted from the classifier is conveyed in the process airstream where it is either collected in a cyclone or enhanced by further classification in a cyclonic classifier.



Typical Pharmaceutical Applications

- Analgesics
- Laxatives
- Anti-convulsants
- Gastric reflux suppressants
- Vitamins
- Aspirin
- Paracetamol

Typical Chemical Applications

- Citric Acid
- Fertilisers
- Fungicides
- Gypsum
- Insecticides
- Nitrates
- Oxides
- Pesticides
- Phosphates
- Powder Paints & Coatings
- Silica
- Stearates
- Sulphur
- Talc

Capabilities

PPS Mill Systems can be designed to handle both inert and explosive applications and are offered in both vented and explosion pressure shock contained design. They also have the versatility of having the drive mounted above or below the mill base plate and are fitted with either manual or pneumatically operated gear units for lifting the grinding chamber lid. Intermediate cyclone collection ensures rapid clean down and product changeover.

Supplied as a total package with pulveriser, dust collector, fan set, rotary airlock and control console, the CMT milling system will effectively and economically grind, separate, collect and control the product in one operation!

Milling Applications

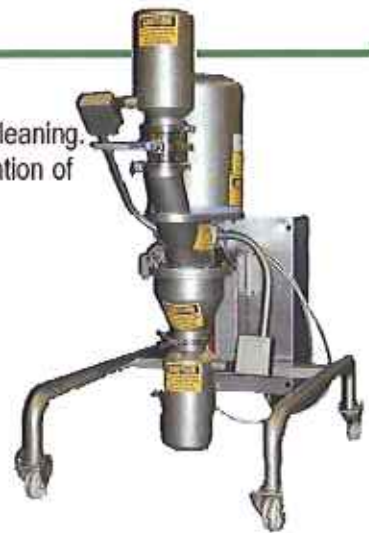
Pharmaceutical Industry

Grinding of Pharmaceutical powders requires high standards of hygiene and ease of cleaning. Kemutec mills are designed to meet the most stringent requirements including prevention of cross contamination between batches and protection against hazardous materials.

Deagglomeration - Breaking down of hygroscopic products that have agglomerated due to dampness or compaction.

Wet Granulation - 'Wet mass' product from a high speed mixer is granulated at slow speed to maximise the efficiency of the onward drying process.

Dry Granulation - Using high impact milling action, product is granulated at high speed after the drying process prior to tableting.



Food Industry

Deagglomeration - Breaking down of hygroscopic products that have agglomerated due to dampness or compaction.



Biscuit & Confectionery Rework - Damaged products can be reclaimed and recycled back into the original production process as a small percentage of the total volume or to produce material which is the basis of a product in it's own right.

Sugar Grinding - Using appropriate explosion protection, different grades of sugar can be achieved by varying the feed rate, mill speed or grinding medium.



Spices - Aromatic food products require special handling as volatile oils are often lost during conventional grinding at room temperature.

Product is cooled to - 150°C and below using liquid Nitrogen to preserve its quality

Chemical Industry

Reliable - Kemutec mills are used to grind some of the most obnoxious and difficult products, whilst giving reliable and repeated performance under arduous conditions.

Lead Additives

Fly Ash

Soaps and Detergents
Reclamation and re-work of product.

Fine Chemicals
Controlled size reduction



Powder Coatings Industry

Easy Clean - Because they are easy to clean, Kemutec mills are ideal for colours, pigments and dyes where thorough cleaning between batches is necessary.

Inks and Toners
Weighing, batch mixing and liquid addition systems



Support Services

Technology Centre

The Kemutec Technology Centre provides support to our Sales teams and Project Engineers to ensure that your product and processing equipment will have been fully evaluated and proven.

This facility enables us to tailor equipment to achieve individual requirements or to develop specific equipment and packages to fulfil unique requirements e.g. under controlled temperature or pressure and vacuum conditions.

Packaged Engineering

Kemutec's extensive experience ensures we are able to design, manufacture, install and commission complete processing packages, including the associated pneumatic (or other) conveying systems, support structures and controls.



After Sales Service / Spares

Kemutec's after sales service department ensures that any further requirements that customers have are dealt with by experienced personnel.

All spare parts are manufactured and stocked in house to ensure rapid identification and despatch when it is needed most.

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