

POWDER AND PARTICLE PROCESSING FOR THE PHARMACEUTICAL INDUSTRY



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All information in this brochure is purely
informative and non-binding.
Our quotations are authoritative with regard to orders.



HOSOKAWA MICRON GROUP

Hosokawa Alpine 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, plastics 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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HOSOKAWA MICRON GROUP

PROCESS TECHNOLOGIES FOR TOMORROWSM

POWDER AND PARTICLE PROCESSING FOR THE PHARMACEUTICAL INDUSTRY

ONE OF OUR CORE BUSINESS



The HOSOKAWA MICRON GROUP is an international provider of equipment and systems serving a broad range of industries which includes chemical, minerals, pharmaceutical, polymer, food, blown film processing, confectionery and bakery, and specialised food.

The HOSOKAWA MICRON GROUP's broad range of powder and particle processing capabilities includes equipment and technologies for a variety of applications including:

- Drying / Vacuum Drying
- Size Reduction / Micronisation
- Screening / Air Classification
- Mixing / Powder Blending
- Product Collection
- Containment
- Agglomeration / Granulation
- Compaction / Low-Pressure Extrusion
- Hygienic Filling and Weighing
- Toll Processing

It is the strategic objective of the Hosokawa Micron Group to extend its leadership into future markets with high-technology products, to provide economic technical solutions and to ensure customer satisfaction.

HOSOKAWA MICRON places a strong emphasis on research and development. Major technical centres are located around the world. They are equipped and operated for the dual purpose of conducting original research work and demonstrating various processing systems. For our customers, the technical centres are used to develop and test formulations to meet their specific needs for powder and particle processing applications.

WE ARE YOUR COMPETENT PARTNER

ALPINE · HOSOKAWA BEPEX · MIKRO · MICRON · HOSOKAWA RIETZ · STOTT · VITALAIR · VRIECO-NAUTA

POWDER PROCESSING TECHNOLOGY EXPERTISE IN PHARMACEUTICALS

Hosokawa is a global operation with sales, manufacturing and test centers throughout the world.

The pharmaceutical industry is an important business sector for the Hosokawa Group and significant investment has been made, over the years, to enhance and streamline our operations in this area, enabling us to offer increasing levels of expertise, technological development and service.

The Hosokawa Group is a recognised world leader in powder processing technology and is highly innovative with developments coming out of its research centres based in Europe, USA and Japan. All products are designed, engineered and manufactured in house by the individual Hosokawa units which gives our customers a single source supply for guaranteed plants with validation documentation.

We can offer the pharmaceutical industry complete systems in the following areas:

- Mixing, Powder Blending
- Vacuum Drying
- Size Reduction / Size Enlargement
- Micronisation / Jet Milling
- Classification
- Compaction / Agglomeration / Low Pressure Extrusion
- Process Containment
- Hygienic Filling and Weighing



TRAINED PERSONNEL PROVIDE
OUR CUSTOMERS WITH
COMPETENT ADVICE IN ALL
OUR BUSINESS SECTORS



HOW SYSTEMS ARE DESIGNED

Many design standards are used, for example

- cGMP directives
- GAMP directives
- FDA requirements
- ISPE Bulk Guide
- 3-A Sanitary standards
- US. Dairy standards (USDA)
- A.S.M.E. or BS 5500
- DIN/ISO
- Alpine pharma factory standards
- EHDEG directives

SYSTEM DESIGN FOR CIP/SIP

An increasing requirement for powder processing systems in the pharmaceutical industry is the need for them to meet CIP and SIP as this has several advantages:

- Reliable calibration, qualification and validation.
- Reproducibility of the cleaning parameters.
- Cleaning agents do not endanger personnel.
- Savings through shorter down times and reduced equipment dismantling times.

Special equipment designs, which facilitate CIP/SIP are offered, such as special seal bearings, one piece construction of equipment machined from a single piece of stainless steel and electropolished or finished surfaces down to Ra = 0.4 microns.



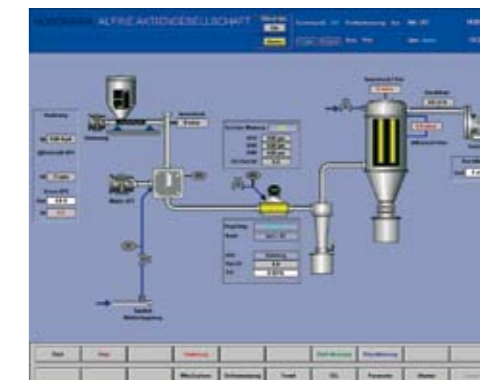
FINE GRINDING WITH 200 AFG INCL. CIP FUNCTION

TAILOR-MADE SOLUTIONS

Our philosophy is not to just offer a standard machine but to work alongside our customers and provide tailor-made solutions to process problems using our maxim "customer and market orientation". With our in-house expertise, supported by major test centres throughout the world, we are able to supply solutions to even the most challenging processing problems.

DETAIL ENGINEERING

- P & I diagrams
- Calculation and design
- System drawings
- Specification of components
- Controls consultation (FDS/SDS/HDS)
- PLC and instrumentation upgrades
- Structural steel engineering with static calculations
- Piping & ductwork layouts
- Acceptance inspections on subcontractors' premises



ANALYSIS

- Particle size analysis
- Air jet sieving
- Powder characterisation
- Sympatec (Helos/Rodos)
- Insittec particle size analysis
- Malvern Master Sizer
- Coulter Counter . Sedigraph
- Fischer Sieve Sizer analyses
- Scanning electron microscopy
- BET
- Vibrating screen - Wet screening
- Thermal Analysis TG/DTA and DSC

CONSULTATION AND TRIALS

- Size reduction and micronisation
- Collection
- Mixing
- Drying
- Compacting
- Granulation
- Low-pressure extrusion
- Spheronisation
- Filling, weighing and containment
- Analysis

PROCESS AUTOMATION

- Design, programming and net-working of visualisation systems

SYSTEM ENGINEERING

- Project co-ordination / management
- Turnkey projects
- Construction site management
- Assembly - Commissioning
- CE certification

BASIC ENGINEERING

- Conceptual studies
- Flowcharts - System layouts
- Safety concepts (risk analysis, Atex)
- Project documentation

RENTAL MACHINES

TECHNICAL SERVICES

- System optimisation
- System upgrades
- Mechanical start-up and commissioning
- On site repairs
- Maintenance Contracts
- Servicing
- Spare parts

DOCUMENTATION

- Preparation of documentation (operating manuals, as-built documentation, qualification documentation, DQ, IQ, OQ)
- Implementation of IQ and OQ measures

QUALITY CONTROL (machines/systems)

- Surface roughness measurements
- Welding seam inspection (X-radiology + ultrasound)
- Fluorescent penetration processes

POWDER AND PARTICLE PROCESSING SYSTEMS AND TECHNOLOGIES OFFERED BY UNITS



GLOBAL FACILITIES

Hosokawa is a truly global operation with many operating units offering not only single machines but complete systems. Research, development, process optimisation, system design/engineering, project execution, project management, installation and commissioning - all can be provided for complete customer satisfaction.

TESTING FACILITIES

Process guarantees are offered when materials are sent to our Test Centres for machine/process evaluation. Many units offer this facility and one of the largest and most comprehensive is with Alpine AG in Augsburg, Germany. The multi million dollar Test Centre completed in 1987 is one of the largest of its kind in the world.

RENTAL MACHINES

Many of today's drugs and pharmaceutical chemicals are toxic and cannot be handled safely away from their manufacturing base. Frequently placebos or similar low risk compounds are used to evaluate machines

in supplier test centres. However as a Group we offer a rental machine service where specific equipment can be hired and tested on the customer's own site using Hosokawa supplied installation/instruction teams. This

rental route is a very useful one and provides customers with temporary production or pilot plant facilities. A further example of Hosokawa's total commitment in satisfying customer needs.

Full manufacturing programme for each Hosokawa unit on request.

SYSTEM AND TECHNOLOGIES FOR PHARMACEUTICAL APPLICATIONS

■ CIP/SIP-Systems

Full manufacturing programme for each Hosokawa unit on request.			SYSTEM AND TECHNOLOGIES FOR PHARMACEUTICAL APPLICATIONS																																						
			MIXING / POWDER BLENDING				DRYING				SIZE REDUCTION									MICRONISING JET MILLING		SEPARATION		SIZE ENLARGEMENT / GRANULATION						PRODUCT COLLECTION PRODUCT CONTAINMENT				LAB		EXPLOSION PROTECTION		SYSTEM DESIGN			
			Conical Batch Mixers	Truncated Cone Mixers	Continuous Mixers	Intensive Mixers	Stirred Freeze Drying	Conical Vacuum Driers	Fluidised Bed Driers	Flash Driers	Grinder / Driers	Conical Mills	Flake Crushers	Pre-crushers / Hammer Mills	Granulators / Cutting Mills	Fine Impact Mills	Air Classifier Mills	Disintegrators	Wet Processing Systems		Spiral Jet Mills / Fluid Energy Mills	Fluidised Bed Opposed Jet Mills	Air Classifiers / Separators	Sieving Machinery	Low Pressure Extrusion	Agglomeration	Compactors	Briquettters	Gear Pelletisers	Granule Rounding	Filling and Weighing	Cyclones	Densifying	Product Containment	Lab and Pilot Plant Systems	System Design	Explosion Barrier Valves	Individual System Design	Complete Pharmaceutical Plants	After Sales Service	Toll processing
HOSOKAWA ALPINE	Germany																																								
HOSOKAWA BEPEX GMBH	Germany																																								
HOSOKAWA MICRON POWDERS GMBH	Germany																																								
HOSOKAWA MICRON LTD.	UK																																								
HOSOKAWA CONTAINMENT	UK																																								
HOSOKAWA MICRON B.V.	Netherlands																																								
HOSOKAWA MICRON POWDER SYSTEMS	USA																																								
HOSOKAWA MICRON CORP.	JAPAN																																								



The Hosokawa brands MICRON, HOSOKAWA RIETZ, SCHUGI and VRIECO-NAUTA are well-known for state-of-the-art solutions for mixing, powder blending and drying pharmaceutical powders.

When it comes to pharmaceutical applications, Hosokawa Micron can provide a wide range of mixing technologies. Both batch and continuous mixing as well as low and high intensity mixing units are available. All of these technologies fulfil the latest requirements in design and safety, such as cGMP and FDA standards, CIP/SIP and Atex. The Vrieco-Nauta conical screw mixer with its gentle mixing action is designed to avoid product damage, seals out of the product zone, avoids contamination of the product thus guaranteeing optimal product integrity.

Therefore it is very well suited for formulation plants. The Vrieco-Nauta CT vertical ribbon mixer is ideally suited for sterile applications for mixing and homogenisation of pharmaceutical products.

High intensity batch mixing is where the Cyclomix high shear impact mixer is at its very best, especially when it comes to mixing of extremely fine powders, wet granulation and coating of nano-active particles on carriers.

When we look at secondary pharmaceutical products we see a tendency for pharmaceutical companies to look for continuous processes. The Hosokawa Rietz Extrudomix continuous kneader can be one of the answers to that requirement being developed for mixing batches of powder and paste thus combining the advantages of continuous mixing and batch identity.

VRIECO NAUTA CT 200
VERTICAL RIBBON MIXER



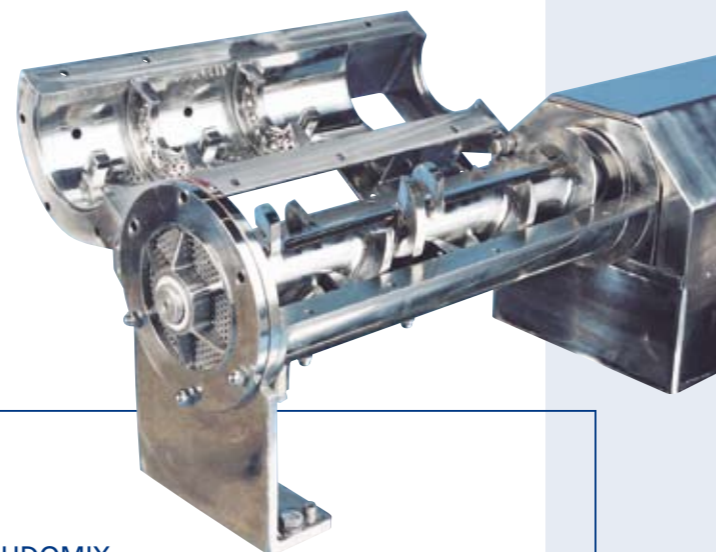
CYCLOMIX 5 L
HIGH SHEAR
IMPACT MIXER



VRIECO-NAUTA
20 MDC 43 CONICAL
SCREW MIXER



HOSOKAWA RIETZ EXTRUDOMIX
EM6 CONTINUOUS KNEADER



DRYING



In the pharmaceutical industry, especially when it comes to vacuum drying, we see a tendency towards multipurpose plants in which it is relatively easy to switch from product to product.

Thanks to flexibility in design (the product decides what technology is used), we are able to offer a wide range of technologies, which are all ideally suited to process the different active ingredients and excipients used in

secondary pharmaceuticals. Our Vrieco-Nauta conical screw dryer is well known for drying temperature-sensitive products. Given the fact that it can work under vacuum condition, it enables drying even at ambient temperatures. Its well proven conical design makes it a very flexible dryer. Powder, filter cakes, paste, viscous slurries, no matter how free flowing or how sticky, can be handled. The conical shape makes the Vrieco-Nauta dryer self cleaning, leaving minimal product residue after discharge. To facilitate cleaning, we have developed the Cyberjet, our unique robotised CIP-system. Using gas, it is ideal for dry-cleaning optimising product recovery. Using wet cleaning, it is ideal for minimising liquid consumption whilst the reproducibility of the cleaning cycle ensures the validation of your cleaning process.

For drying under vacuum conditions, our vertical ribbon dryer (CT dryer) could be of

interest, especially for free flowing powders and filter cakes. Furthermore it is excellent for sterilizing in place (SIP) and ensures optimal heat transfer for free flowing products.

A big step forward in the field of freeze drying as well as in powder-technology:

In just one step and in one single unit, the Hosokawa Stirred Freeze Dryer (patent pending) creates the possibility to produce a non-lumpy and therefore easy to process uniform powder under low temperatures and low pressure. Suitable for temperature sensitive substances, living organisms and nano-materials.

One of the advantages of working with Hosokawa Micron is the fact that we offer complete integration of Hosokawa equipment, for instance drying and containment technologies. That combination ensures an absolute minimum of risk of contamination or pollution while charging or discharging, maintenance or taking samples.

VRIECO-NAUTA
10-VDC-54 CONICAL
SCREW DRYER



CYBERJET



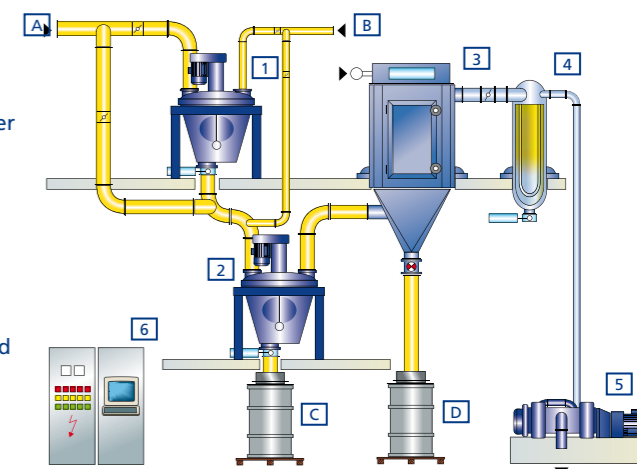
VRIECO-NAUTA CT 50
VERTICAL RIBBON
DRYER



STIRRED FREEZE DRYING PROCESS

- 1 Mixer
- 2 Stirred Freeze Dryer
- 3 Filter
- 4 Condenser
- 5 Vacuum Pump
- 6 Control cabinet

- A Product to be dried
- B Freezing medium
- C Dried product
- D Dried product



POWDER AND PARTICLE SIZE REDUCTION PROCESSING



Nearly every stage of pharmaceutical manufacture involves some comminution with raw materials, additives and active ingredients processed to the required particle size.

MIKRO ACM - CIP DESIGN
AIR CLASSIFIER MILL



This means that a whole range of requirements needs to be fulfilled, from pure disagglomeration and coarse grinding right through to ultrafine comminution.

Hosokawa has the systems which meet the latest requirements as stipulated in the cGMP and FDA standards.

HOSOKAWA
BEPEX
BEXMILL



Fine impact mills are suitable for the fineness range between approx. 30 μm and 1 mm. A range of different equipment variants forms the basis for universal application of this mill type. Modern classifier mills make it possible to generate steep particle size distributions with exact top size limitation. Fineness of $d_{97} = 10 \mu\text{m}$ can be achieved. Machine size range and special designs permit a wide range of applications, from lab to production-scale applications.

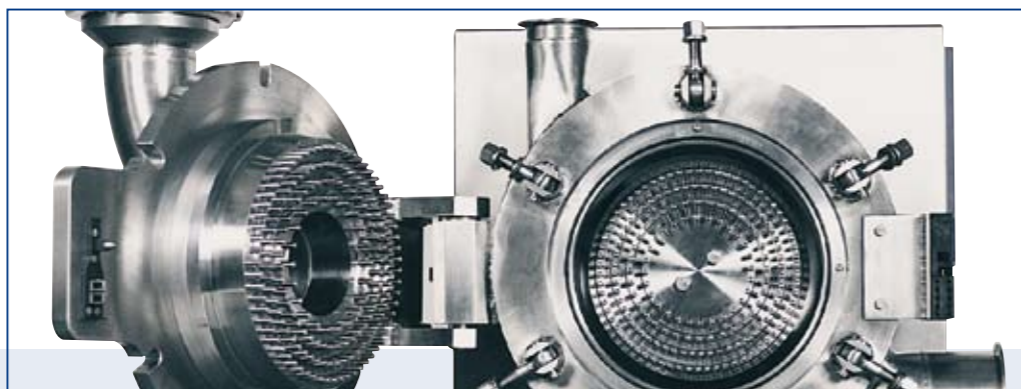
HOSOKAWA
BEPEX FLAKE
CRUSHER



ALPINE ZIRKOPEX CLASSIFIER
MILL 200 ZPS WITH INTEGRATED
TURBOPEX CLASSIFIER



ALPINE FINE IMPACT
MILL 250 UPZ PHARMA
DESIGN, EQUIPPED WITH ONE
ROTATING AND ONE
STATIONARY GRINDING DISC



MICRONISING / JET MILLING



Various types of jet mills are employed for micronising active ingredients. This type of impact comminution in a gas jet generates end fineness of between 1 and 30 μm .

The classic exponent of this type of mill is the spiral jet mill which is characterised by its ease of operation, excellent cleaning possibilities and the lack of rotating parts.

The new product line developed by Hosokawa Alpine retains all the time-proven elements but integrates a whole battery of new features to meet the requirements of the pharmaceutical industry, i.e. ease of dismantling, cleaning and sterilising, right up to CIP and SIP capability.

With the fluidised bed opposed jet mills, even micronisation of extremely "difficult" products down to the μm range is possible. The integration of a dynamic air classifier in this jet mill guarantees reproducible ultra-steep particle size distributions with exact

top size limitation. The carefully selected machine sizes range from laboratory and pilot applications up to production scale applications with throughputs of several hundred kg/h.

ALPINE FLUIDISED BED
OPPOSED JET MILL 200 AFG
PHARMA MONOBLOCK DESIGN



ALPINE AEROPLEX SPIRAL JET MILL 100 AS.
GRINDING CHAMBER MANUFACTURED IN
MONOBLOCK COMPONENTS





Our compaction and agglomeration equipment solves problems in processing tablet masses that are caused by poor flow characteristics of the product.

DRY COMPACTION

These unfavourable characteristics of finely powdered solid materials can be decisively improved through agglomeration. Press agglomeration is the most economic way to enlarge the particle size. Finely dispersed bulk materials are compacted and pressed into flakes, without using a fluid binding agent. Either smooth or profiled rolls are used. These flakes are crushed and screened to dust-free, easy-flowing granules.

The criteria for the machine design is easy cleaning and quick roll and predensifier screw replacement. A variety of screw and roll configurations are available to optimise the process.

HOSOKAWA BEPEX PHARMAPAKTOR MODEL K 200/50

with Flake Crusher in isolator. All drives and control components are in the separated non-hazardous area.

HOSOKAWA BEPEX PHARMAPAKTOR C 250



HOSOKAWA BEPEX BEXROLLER

AGGLOMERATION

The Schugi process for production of free flowing, closely sized granules with very good dispersing properties is well known and the FLEXOMIX continuous process can also be used for bulk pharmaceutical manufacture. A liquid binder(s) is sprayed into the flexing mixing chamber where adjustable blades or knives create a highly turbulent powder flow regime. Evenly sized granules mainly ranging between 0.2 to 1.5 mm are produced.



For the production of cylindrical pellets with diameters between 0.7 and 3 mm the BEXTRUDER will be used. The basis of these systems is the low pressure extrusion of products with sufficient gliding characteristics. For the production of spherical granules the BEXROLLER should be used. The batch sizes of this equipment are in the range from 0.2 ltr. to 50 ltr.



HOSOKAWA BEPEX BEXTRUDER

SCHUGI FLEXOMIX MODEL FX 100 SHOWING BLADE KNIVES



SIZE ENLARGEMENT / AGGLOMERATION



The Agglomaster is our innovative modular multi-purpose batch fluidbed processor developed for drying, agglomeration, coating, layering, micro granulation, spray-agglomeration.

BATCH FLUIDBED PROCESSING

The Agglomaster's unique fluid bed bottom design, with rotating slit disk and agitation blades together with its opposed pulse jet mechanism and the facility for liquid injection in different positions, creates a wide range of controls of not only the particle size, but also for instance the shape and density of particles. The Agglomaster design meets the requirements regarding easy access, dismantling and cleaning.

The Hosokawa Agglomaster, type AGM-2PJ&SD batch fluidbed processor, is a multi-purpose twin-unit of which one provided with „Opposed Pulse Jet“ Technology and the other with „Spray Drying“ Technology. This multipurpose lab- unit is especially designed for research and development work.

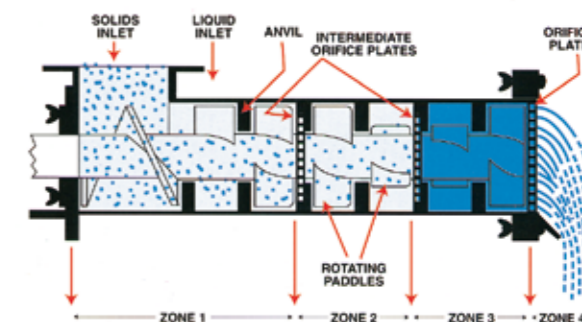
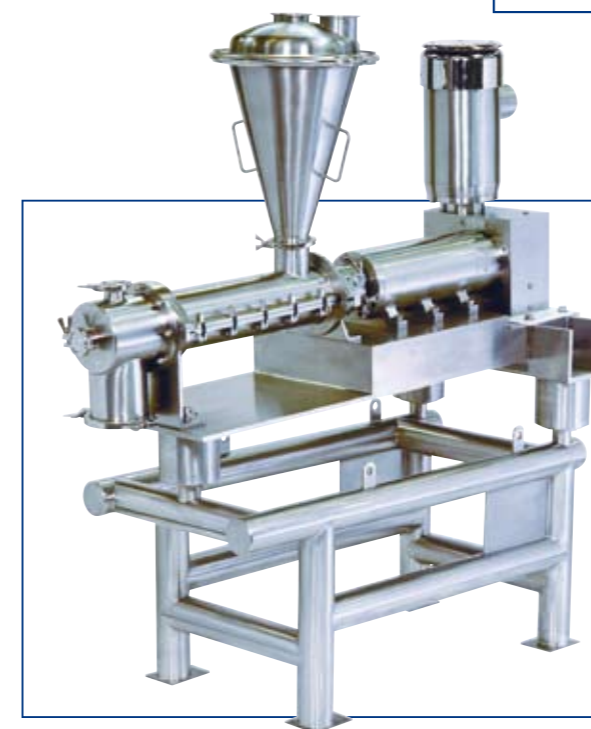


AGGLOMASTER AGM-2PJ&SD

EXTRUD-O-MIX

Designed to continuously mix, agglomerate and extrude, the Hosokawa Rietz Extrud-O-Mix operates with a kneading action making it suitable for use with materials ranging from light pastes to heavy doughs. Dry materials may be mixed and extruded with small quantities of liquid for agglomeration with additional liquids introduced through injection points along the Extrud-O-Mix barrel.

- Split barrel for easy cleaning and plate changes
- Negative pressure dust elimination for clean environments
- Exchangeable intervals design for process optimisation



POWDER AND PARTICLE PROCESSING

CONTAINMENT TECHNOLOGY



Hosokawa Containment have extensive experience providing hygienic filling, weighing as well as powder and granule handling systems for the pharmaceutical industry.

Incorporating a wide range of inflatable and extraction type sealing heads the filling and weighing systems when combined with a Vitalair downflow booth maintain the highest levels of dust control, hygiene and product integrity. Accurate, integrated weighing platforms ensure critical and repeatable packing specifications can be met. These facilities are suitable for use with a range of bags, sacks, drums and boxes with or without liners, both the Stott filling systems and Vitalair booths are available for manual or automated operation.

DUST FREE TIPPING BOOTHS

Containment Level 500 - 1000 $\mu\text{g}/\text{m}^3$

Safe, hygienic discharge of drums or bags can be achieved within a purpose designed, manual action or automated Stott drum tipping booth. Container disposal and



STOTT FILLING AND WEIGHING SYSTEM WITHIN A VITALAIR DOWNFLOW RECIRCULATION BOOTH

QUAD CELL, SOLIDS DISCHARGE DRUM TIPPING BOOTH



DISPENSING SUITE INCORPORATING VITALAIR DOWNFLOW BOOTH



LAMINAR FLOW BOOTHS

Containment Level 100 - 500 $\mu\text{g}/\text{m}^3$

For increased levels of environmental protection, operator safety and product integrity the range of Stott laminar flow booths with their single pass, non turbulent air flow and entrance protecting air curtain can be utilised in conjunction with the Stott filling and weighing systems. They are also suitable for inspection, product transfer or liquid pumping applications. As the requirement for greater levels of containment increases, Hosokawa specialist barrier/isolation technology is more widely used to safe guard the environment, personnel and maintain product integrity.

Hosokawa's extensive experience of clean air environments and associated technology means we are able to work closely with our customers from initial specification to commissioning to ensure individual requirements.

CONTAINMENT TECHNOLOGY



Hosokawa Containment are setting the standard for innovative, high quality process containment for the pharmaceutical industry.

DOWNFLOW BOOTHS

Containment Level: < 25 - 100 $\mu\text{g}/\text{m}^3$

Fully self contained areas for the handling of hazardous powders and liquids, downflow booths use the vertical passage of clean air from the booths ceiling plenum to push dust or vapours away from the operators breathing zone. Achieving a minimum 99.99% filtration performance the high levels of operator protection and product integrity offered makes them ideal for all dispensing, transfer, sampling, mixing and weighing applications.

GLOVEBOXES AND ISOLATORS

Containment Level:
< 50 ng/m^3 - < 5 $\mu\text{g}/\text{m}^3$

Where pharmaceutical companies wish to retain a shirt sleeve environment without the need for operators to wear protective suits, isolators offer an ergonomic option. We can incorporate process equipment inside isolators to provide the ultimate clean environment for processing, cleaning and maintenance.

ISOLATOR (OEL < 1 $\mu\text{g}/\text{m}^3$) WITH 50 AS AND PHARMA MICRO METERING SCREW PMD



WET CHEMISTRY ISOLATOR



Innovative design has seen the development of the Flexible Compact Isolator FCI whose modular design and canopy flexibility meets demands for a cost effective, flexible barrier containment solution, offering high product and personnel protection.

Although world leaders in containment of dry particulate powders, the Wet Chemistry Isolator has been designed primarily for working with liquid forms of potent active ingredients to give easy but contained operator access with OEL's < 1 $\mu\text{g}/\text{m}^3$.

INTEGRATION OF ALPINE 315 UPZ INTO STOTT ISOLATOR



STOTT KEG FILLING ISOLATOR INTEGRATED WITH VITALAIR DOWNFLOW BOOTH



FELXIBLE ISOLATOR (OEL < 10 $\mu\text{g}/\text{m}^3$) WITH 50 AS IN PVDF



POWDER AND PARTICLE SEPARATION AND PROCESSING PRODUCT COLLECTION



Frequently, powdered pharmaceutical products need to be separated from process air or gas streams and the reverse jet filter units are available in special pharma design to meet requirements such as CIP/SIP and pressure-shock-proof design.

PARTICLE SEPARATION AND PRODUCT COLLECTION

CYCLONE COLLECTORS

The filter unit was the original design using reverse pulse jet cleaning and as such, Hosokawa experience spans decades and many application areas.

A range of pre-filtration high efficiency easy clean cyclones are also available for collection of pharmaceutical products and they are sometimes used prior to the final product filtration unit to collect the majority of product.



INLINE HEPA FILTER



CREVICE FREE "EASY-CLEAN" FLANGE DESIGN. 360° SPRAY BALLS FOR CLEANING



SPECIAL BAG PLATE FOR MIKROPUL PHARMA FILTER

HEPA FILTERS

Responding to customer needs we offer a safe change push-push technology HEPA/ULPA filter unit, designed for all toxic or sterile systems. Elements specially designed for fitting to the units can be supplied up to grade EU14. Filter housings manufactured in a variety of materials, from stainless steel to special chemically inert polymers, tailored to suit individual customer processes. Special design for inline filtration up to 10 bar g PSR with CIP options.

PHARMA-DESIGN REVERSE JET FILTER



ANCILLARIES



FOR EXAMPLE: THE PHARMA DOUBLE FEED METERING SCREW PDD

The Hosokawa Micron Group offers a large range of ancillaries of own manufacture and superior quality. These components are tailor-made to our customers' requirements.

Alpines metering screw was developed especially for cGMP pharma applications. Characteristic for the twin metering screw is its modular design (drive unit, bearing unit, product bin) and ease of dismantling. A clear division between product-contact zone and drive as well as the ability of autoclaving the subassemblies are also advantages. An

integrated horizontal agitator prevents the formation of arches above the feed screws, even if the bulk material has poor flow properties. The pharma feed screw is also certified for operation in potentially explosive atmospheres (ATEX zones 1 and 21). The metering screw is available in volumetric or gravimetric – i.e. as a differential weighbelt feeder – design. The feed rate ranges from approx. 2 to 130 l/h, dependent on the product line. Hosokawa Alpine also offers a micro feed screw for small throughputs, whereby the feed rate here is between 0.15 and 2.8 l/h. Because of the pharma-qualified design of both feed metering units, product residues are reduced to a minimum.

BALL SEGMENT VALVES



CYBERJET

PHARMA DOUBLE FEED
METERING SCREW PDD

ROTARY VALVE IN PHARMA DESIGN



PHARMA MICRO FEED SCREW PMD





Hosokawa offer a total engineered solution from initial process conception to final validated plant.

MATERIALS OF CONSTRUCTION

We are your single source supply for integrated powder and particulate processing systems and component machinery. We offer a range of services to ensure your pharmaceutical processing needs are met:

- Laboratory testing
- Full scale trials or site trials
- Process design
- Procurement
- Engineering and project management
- Installation
- Commissioning
- OEL testing

We provide a complete service and give documentation and assistance with the four basic stages of our customer's validation namely DQ, IQ, OQ, and PQ.

High quality stainless steel such as AISI 304, 304L, 316, 316L, or even Hastelloy or Titanium are used. One piece construction of individual machines using CNC machining to create Hosokawa's unique "mono-block" designs is used wherever appropriate.

OPERATIONAL TRIAL EQUIPMENT

Hosokawa are able to offer a range of equipment on loan/rental to pharmaceutical companies to enable operational trials to take place. This ensures that process parameters can be finalised and production flows monitored prior to equipment and process layout finalisation. At this stage the highly experienced Hosokawa engineers will work very closely with your in-house engineering team to advise and develop the best solution to your processing requirements.

SERVICE

Hosokawa is committed to providing continual customer support, long after the plant has been installed and commissioned. We have highly skilled Service engineers to cover machinery breakdowns, routine inspections and servicing on site. Whilst our experienced technical engineers can provide both process and maintenance advice.

MILLING SYSTEM WITH MIKRO ACM 10 CLASSIFIER MILL



MULTI-PROCESSING MILLING SYSTEM INCORPORATING ALPINE 70 ZPS AND 140 AFG

SYSTEM DESIGN EXPLOSION PROTECTION



The integration of several powder processing operations into one turnkey system calls for carefully managed and executed engineering and it is in this field that Hosokawa units have extensive experience.

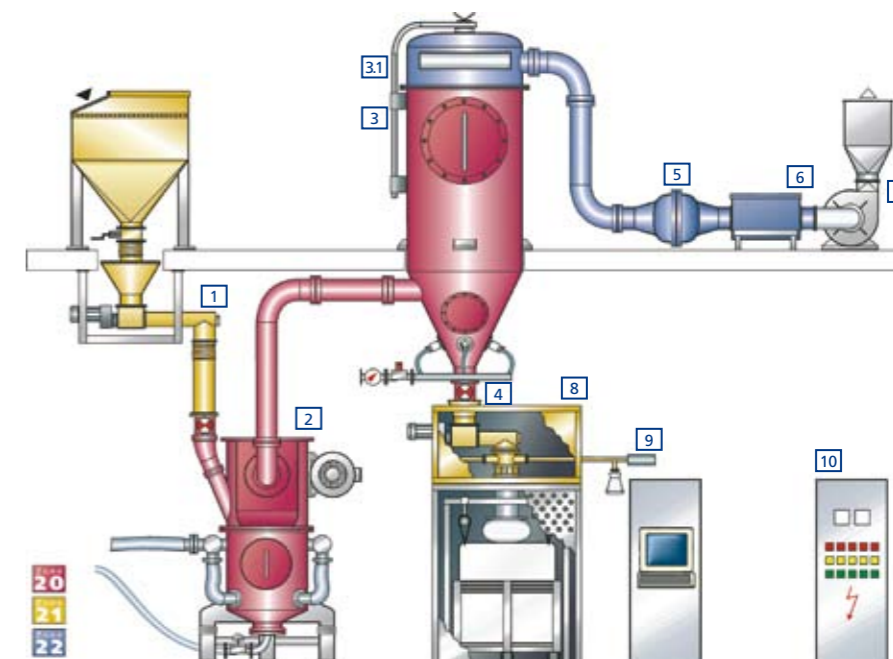
Process Guarantees can be given after testwork in our Group Test Centres, hence a one-source totally engineered package is offered. CAD systems are used to create flow-sheets, P & ID drawings, layouts, detailed designs to whatever code is being employed and units operate to the Quality System ISO 9001. The design of a safe system is of paramount importance and dust explosions with organic pharmaceutical powders are nearly always a real risk. This risk can be minimised by avoiding a source of ignition but this is frequently not possible in high-

speed rotating equipment, and then the system has to be designed to contain any explosion. Normal explosion relief by venting is not usual in the pharmaceutical field, but if this is acceptable then this method too can be designed in. A pressure-shock-resistant (PSR) design is more usual, and here the system is designed to withstand the maximum explosion pressure, usually under 10 bars, without rupture. A typical design code is the German VDI 2263, and this calls for all vessels to be specially strengthened, and in some cases full pressure vessel design

codes may be specified. Running systems under an inert gas such as nitrogen is also frequently used to stop any explosion from occurring, and Hosokawa has supplied many such systems for size reduction, blending and drying.

The process components delivered by Hosokawa and the associated control panels and cabinets all fully meet the requirements laid down in the prevailing national and international directives, especially 94/9/EC (ATEX) and 21 CFR part 11.

- 1 Feed metering screw with feed bin and shut-off valve
- 2 Fluidised bed opposed jet mill AFG
- 3 Automatic reverse jet filter with bin and fluidisation unit
- 3.1 Filter head
- 4 Rotary valve
- 5 Explosion-protection valve
- 6 Safety filter
- 7 Fan
- 8 Packing machine
- 9 Sampler
- 10 Control cabinet



■ = available

	GAS-EX			DUST-EX		
	Zone 0	Zone 1	Zone 2	Zone 20	Zone 21	Zone 22
Control panel		■	■		■	■
Drive technology		■	■		■	■
Actuators (valves)		■	■		■	■
Sensors	■	■	■	■	■	■
Measuring technology	■	■	■	■	■	■



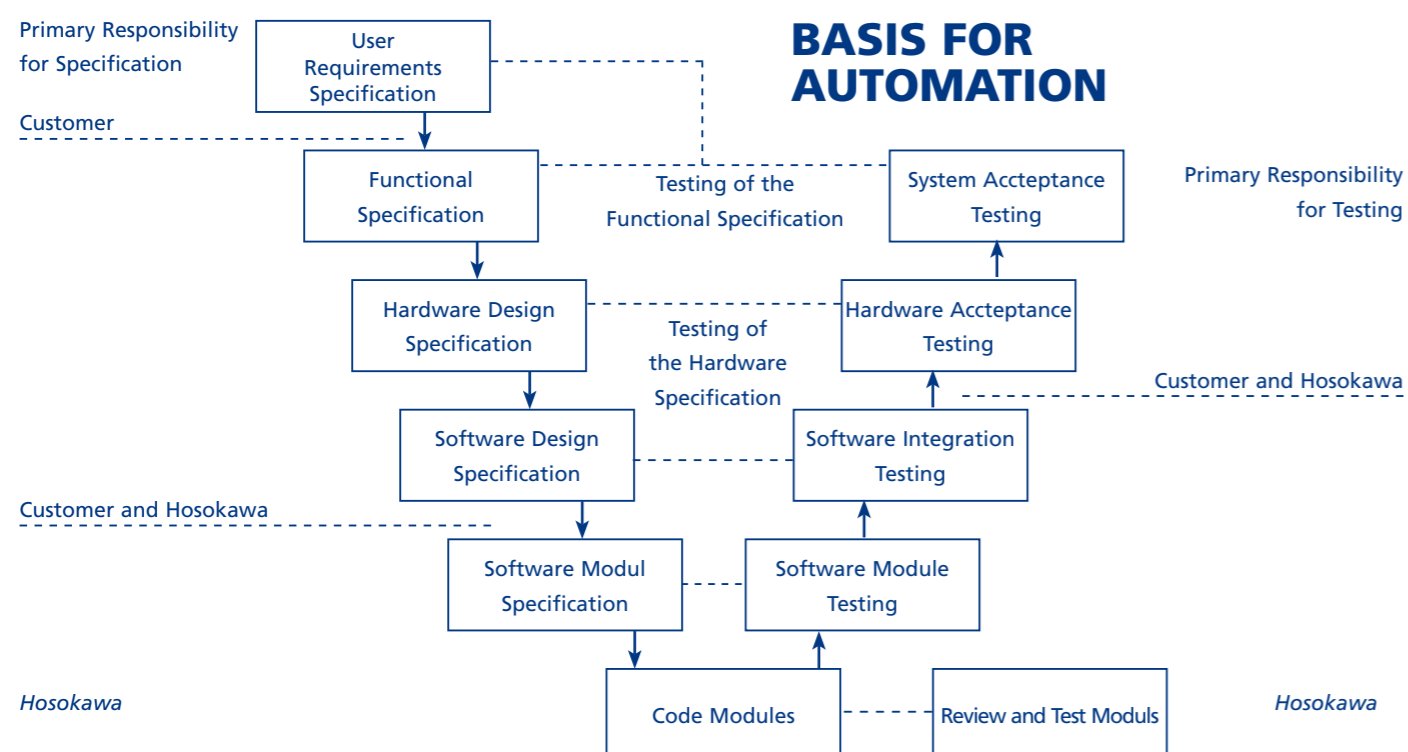
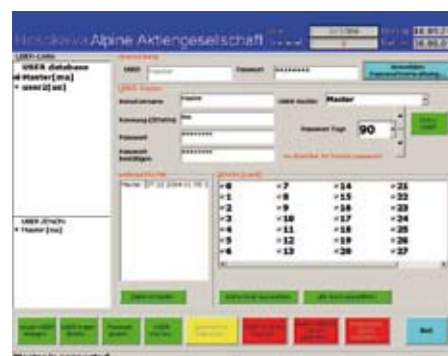


Because state-of-the-art GMP-compatible process solutions demand sophisticated and integrated automation, Hosokawa has extended its range of products and services beyond the supply of mere hardware.

The connection of field measurement technology to the control unit is being realised increasingly via communication systems such as Profibus DP, FMS, and PA or via the industrial Ethernet. Intelligent network components which can also be used in potentially explosive areas minimise the amount of wiring necessary, thus

contributing to a reliable and moreover visually aesthetic solution. The lifecycle approach as described in the GAMP directives is our model in fulfilling this solution. The scope of activities ranges from preparing the hardware and software specifications to writing programs based on PLC systems or also highly integrated visualisation

systems. Great store is set by data integrity and data archiving as well as error message protocols and batch records. The integration of electronic signatures is being realised according to the requirements stipulated in 21 CFR Part 11.



Laboratory and small scale equipment is readily available covering the main Hosokawa product range.

COMPLETE PRODUCT RANGE

This means that when a process is scaled up to full production from laboratory trials, the same equipment type can be used which frequently makes validation somewhat easier. Small scale mixers, impact mills, classifier mills, micronsers, roller compactors, fluidbed processors and vacuum dryers can be supplied or in some cases rented out for site trials if the products are particularly hazardous.



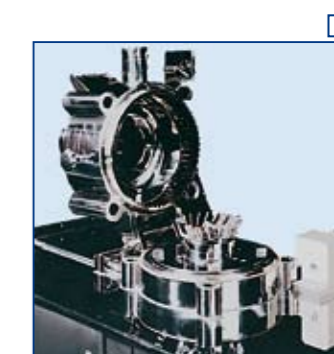
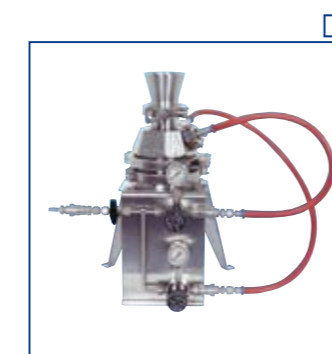
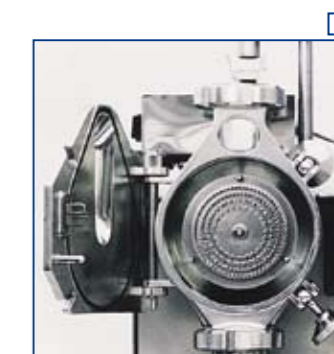
MICRON FLASH DRYER MDV-O

MICRON LAB AGGLOMASTER AGM-2



- Alpine Jet Milling System 100 AFG-M 4
- Alpine Particle Size Analyser 200 LS-N, operating range from 10 µm up to 4 mm.
- Hosokawa Bepex Pharmapaktor L200/30 P
- Alpine Milling System with Fine Impact Mill 100 UPZ
- Alpine Spiral Jet Mill 50 AS
- Micron Powder Characteristics Tester PT-S
- Vrieco Nauta High Shear-Impact Mixer 1L
- Mikro ACM 2 Air Classifier Mill

VRIECO NAUTA CONICAL SCREW DRYER 5L





The HOSOKAWA MICRON GROUP is an international supplier of machines, systems, processes and services. Based on this comprehensive performance range, HOSOKAWA offers process solutions for a great number of different business segments:

1. POWDER AND PARTICLE PROCESSING

HOSOKAWA is the world's largest provider of processing systems for the field of powder and particle processing. Renowned names such as ALPINE, Hosokawa Bepex, Stott, Vitalair, Hosokawa Rietz, Mikro, Micron, and Vrieco-Nauta are all included in the Group's range. Regardless of the size, i.e. production-scale systems, pilot systems or laboratory equipment, HOSOKAWA's products and technologies are used in numerous process stages, for example during comminution, mixing, drying, agglomeration, classification, weighing and metering.

2. BLOWN FILM PROCESSING

HOSOKAWA ALPINE is one of the world's foremost suppliers of film blowing systems. As a one-stop shopping partner, Alpine supplies complete systems for the manufacture of blown film, from granule feeding systems to film winders, from single-layer die heads to 7-layer lines, and from simple speed regulators to state-of-the-art process control systems. And with ALPINE's own film orientation lines, complete systems are now available which facilitate film upgrading and enhancement processes.

3. CONFECTIONERY & BAKERY TECHNOLOGY

The vast fund of know-how built up by the Bepex, Kreuter and Ter Braak companies over many long years makes the HOSOKAWA Confectionery and Bakery Group the ideal partner for the confectionery industry. A complete range of machines and production systems is available or can be custom-designed for each process step, from preparation of the raw materials and confectionery pastes to the end product. The group maintains facilities for research, engineering, manufacturing and service in each of the world's major industrial markets.



PROCESS TECHNOLOGIES FOR TOMORROWSM

HOSOKAWA – powder and particle processing for the pharmaceutical industry – worldwide
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