



THE PURSUIT OF PERFECTION IN POWDER PROCESSING

More than 110 years of innovation and continuous improvement.



HOSOKAWA ALPINE

Process technologies for tomorrow.



» HOW TO ACHIEVE EFFICIENT PROFITABLE POWDER PRODUCTION?

Dear customers and business partners,

Hosokawa Alpine has been supplying machines and systems for the production of ultrafine powders for over 110 years. Customer-orientation has traditionally formed the focus of our philosophy and all our actions. Whether the development of new products or the elaboration of individually tailored solutions, our focus is always directed at creating added value for our customers. Our long-standing and highly qualified staff support our customers with a great fund of experience and know-how and form the essential basis for this.

As a leader of technology, we aim to also set standards in the future and together with our customers, develop new processes and innovative solutions – regardless of whether for the processing of powders, granules and bulk materials or for manifold recycling projects in a host of different industries.

In order to meet the highest quality standards, we have a state-of-the-art application testing centre equipped with over 60 machines and systems for dry and wet processing. It goes without saying that the entire R&D environment is always kept at the forefront of technology. It is here that we shape the future by developing the cutting-edge solutions of tomorrow.

Our success is always that of our customers. And in order to ensure this in the long term, we offer you not only competent advice prior to making an investment, but also the latest system technology for the various process steps and processes themselves. The experienced service personnel in our after-sales department support you with a full range of services to include the retrofitting and conversion of existing systems and a spare parts service for machines that have been in operation for anything up to 40 years.

The continuous optimisation of processes and products makes Hosokawa Alpine your innovative partner to accompany you into a successful future.



Dr.-Ing. Antonio Fernández
Chief Executive Officer

**» INNOVATIVE TECHNOLOGY
FROM HOSOKAWA ALPINE.**

WE ARE YOUR PARTNER FOR POWDER PRODUCTION:

» SERVING YOUR MARKETS



» COSMETIC



» AGROCHEMICALS



» LAB & RESEARCH



» METALS



» MINERALS



» FOOD



» CHEMICALS



» ELECTRONICS



» FEED



» IN-HOUSE RECYCLING



» COATING



» PHARMACEUTICALS

» FOR A WIDE VARIETY OF APPLICATIONS

» ABRASIVES

» ACTIVE PHARMACEUTICAL INGREDIENTS

» BATTERIES

» BUILDING MATERIALS

» CAOUTCHOUC AND RUBBER PRODUCTS

» CARBOHYDRATES

» CARBON BLACK

» CERAMIC RAW MATERIALS

» COMPOSITE MATERIALS

» DAIRY PRODUCTS

» DENTAL COMPOUNDS

» DYES & PIGMENTS

» FACE POWDER

» FILLERS

» HIGH POTENT COMPOUNDS

» IN-HOUSE RECYCLING

» MAGNETIC MATERIALS

» PESTICIDES

» PHOSPHATES

» POWDER COATINGS

» PROTEINS

» ROUGHAGE

» SPICES, HERBS AND DRIED VEGETABLES

» THIN AND THICK FILMS

» TONER

» VITAMINS

» WAXES

» FOR MANY DIFFERENT PRODUCTS



» **TONER**

High end-product fineness and a steep particle size distribution guarantees a dust-free end product for perfect printing results



» **CABLE RECYCLING**

Copper recovery from mixed cable waste and presorted electronics waste



» **TOBACCO**

Tailored wear protection ensures high system availability



» **MICRONIZED RUBBER POWDER**

Efficient cryogenic grinding for the production of ultrafine micronized powder from recycled rubber used for tire production



» **PIGMENTS**

Reliable fine grinding of adhesion-prone dyes



» **STERILIZED POWDER**

Systems for aseptic, pharmaceutical substances achieve cGMP standards and low OEB values



» **DENTAL COMPOUNDS**

Contamination-free processes for immaculate ceramic inlays of premium quality



» **METAL POWDERS AND ALLOYS**

Processing of rare earth elements, e.g. for the production of heavy-duty magnets for the IT industry



» **SUGAR**

Pressure-shock-proof design compliant with ATEX directives for maximum operational safety



» **NUTMEG**

Cryogenic grinding for the protection of aromas and essential oils in food



» **ZIRCON SAND**

Dry processing with precise top cut for non-porous high gloss coatings required by the ceramics industry



» **PE WAX**

Optimum processing of ultrafine PE wax at ambient temperatures



» WHAT IS THE RECIPE FOR PERFECT QUALITY IN SIZE REDUCTION?

*We work for your products.
At all times.*

**INNOVATIVE TECHNOLOGIES FOR
PARTICLE PROCESSING –
MADE IN GERMANY:**

Hosokawa Alpine sets the standards in size reduction technology. The precise interaction of all components is required at all stages of the production chain, from development right through to the production of state-of-the-art turnkey systems for powder, granulate and bulk material

production. This is where we excel thanks to decades of experience as well as continuous advancement and innovation. Our state-of-the-art process automation and visualisation equipment guarantees a high process stability and easy operation. Learn more about this unique technology 'Made in Germany'. And find out why Hosokawa Alpine is the leading international provider of particle processing products.



» TAILOR-MADE SOLUTIONS AND INNOVATIVE FORCE.

A PARTNER THAT YOU CAN RELY ON

Consultancy and design, development and engineering, production and commissioning, after-sales service and system upgrades – we provide everything from one source. Size reduction technology from Hosokawa Alpine gives you the best solution for every challenge. We offer the entire range of services, no matter whether you need process-related

developments, customer-specific machine designs or upgrades for existing machines – our expertise is pooled in our German facilities in Augsburg and Leingarten.

**HOSOKAWA
ALPINE**



ENGINEERED,
MANUFACTURED
& ASSEMBLED
in GERMANY



» WHAT MAKES A SYSTEM SOLUTION PERFECT?

*We know what we are doing
every step of the way.*

RELIABLE PROCESSES – TAILORED TO YOUR REQUIREMENTS

You already have a clear idea of your system setup and want to explore its potential with our experts? At the Hosokawa Alpine test centre in Augsburg, you have 3,000 sqm to do so. Here, in one of the largest test centres for wet and dry powder processing in the world you have more than 60 machines and

complete systems for a wide variety of line configurations at your disposal. At our test centre in Leingarten, you can conduct tests for the set-up of your system or process parameters for briquetting and compacting. Both test centres have their own test laboratories with state-of-the-art test equipment for analysing sample particle sizes, particle distributions, particle shapes and other product properties.



» QUALITY AND EFFICIENCY RIGHT DOWN TO THE SMALLEST.

Here, you can see for yourself the impressive precision and premium quality of our innovative technologies and explore their full potential when you are planning your system installation.

EXCELLENT PLANNING IS OUR COMMITMENT: WE OFFER COST-EFFICIENT SOLUTIONS WITH HIGH INVESTMENT SECURITY AND QUALITY

At an early stage of your project, we can offer you a high investment security, which guarantees that your performance, quality, energy-efficiency and cost-efficiency objectives are met. In order to achieve this, we work in close cooperation with you – at every stage of your line and system implementation. You will receive a final product that meets your requirements but leaves you with sufficient room for future demands.



» WHY HOSOKAWA ALPINE?

Success in the size reduction market since 1898 is not a coincidence but the result of our philosophy.

WE COUNT ON GERMANY

Looking back on more than 100 years of company history, we are filled with pride. And we will not stop here. We are also proud of our locations: Augsburg and Leingarten (Germany). In both facilities, we have highly qualified specialists at our disposal, a perfect infrastructure and benefit from well-established networks: excellent conditions for

innovative developments and a sustainable production.

WE TRUST IN OUR APPRENTICES

A total of 10 % of our permanent staff are apprentices – consistently. We pass on elementary skills to the next generation at an early stage of their career to create a pool of skilled professionals and experts for the future.



» BECAUSE EXPERIENCE AND CONSISTENCY PAYS OFF.

WE TAP INTO SYNERGIES

Our company history translates into valuable experience in machine engineering. We are constantly developing new production methods, investing in leading-edge manufacturing techniques and tapping into synergies with other divisions to make sure that we can manufacture special components for particle comminution with the required

quality. In addition to this, we can rely on synergies generated by the cooperation with other divisions of Hosokawa Micron Group. After all, we are the largest global supplier of powder processing equipment.

WE CULTIVATE LONG-TERM CUSTOMER RELATIONS

Quality is also the result of consistency, both

technical and personal consistency. Many of our customers have been with us for decades. This special relationship is the product of mutual trust and satisfaction on both sides.



▶ Turboplex ultrafine classifier
ATP 315/6 in ceramic design
for processing quartz sand

MINERAL AND METAL POWDER FOR SPECIALISTS

The fine art of supplying to mineral and metal raw material producers.



➤ 1 Super Orion ball mill SO CL 200
➤ 2 Turboplex ultrafine classifier ATP 100 in ceramic design

Even if it is no longer visible in the finished product, a high number of polymers, construction materials or ceramic high-tech products contain mineral powder. Even the paint, paper and rubber producing industries use high volumes of ultrafine powders as fillers. Hosokawa Alpine is firmly established in these industries as an expert for the comminution of mineral raw materials to produce fine mineral powder.

BIG IN SIZE REDUCTION

The classic dry processing methods offered by Hosokawa Alpine include comminution, air classifying and surface treatment of mineral powder, such as coating and the production of spherical particles. We cater to the entire mineral powder range including soft, medium-hard and hard minerals, and provide systems that are adapted to suit the individual requirements, e.g. regarding an adjusted wear protection. For fineness levels with less than 3 µm top cut, we recommend our energy-efficient wet grinding

method. This technique allows the production of powder in the sub micron level range. Today, wet mills such as the AHM produce metal powder – processed in solvents – in the nano-level range. Many products do not only have to comply with a predefined fineness level but also have to meet requirements such as the following:

- Maintaining of a needle structure (e.g. wollastonite)
- Production of laminar particle structures (e.g. talc)
- Production of spherical particles (e.g. graphite)
- Steep particle size distributions
- Processing with minimum contamination
- Sharp top cut

By the way: Hosokawa Alpine is leading in the size reduction and air classifying of many different metals. Our pre-crushing, drying, ensilage, dust removal, conveyance and transport systems are the perfect addition to your powder business.

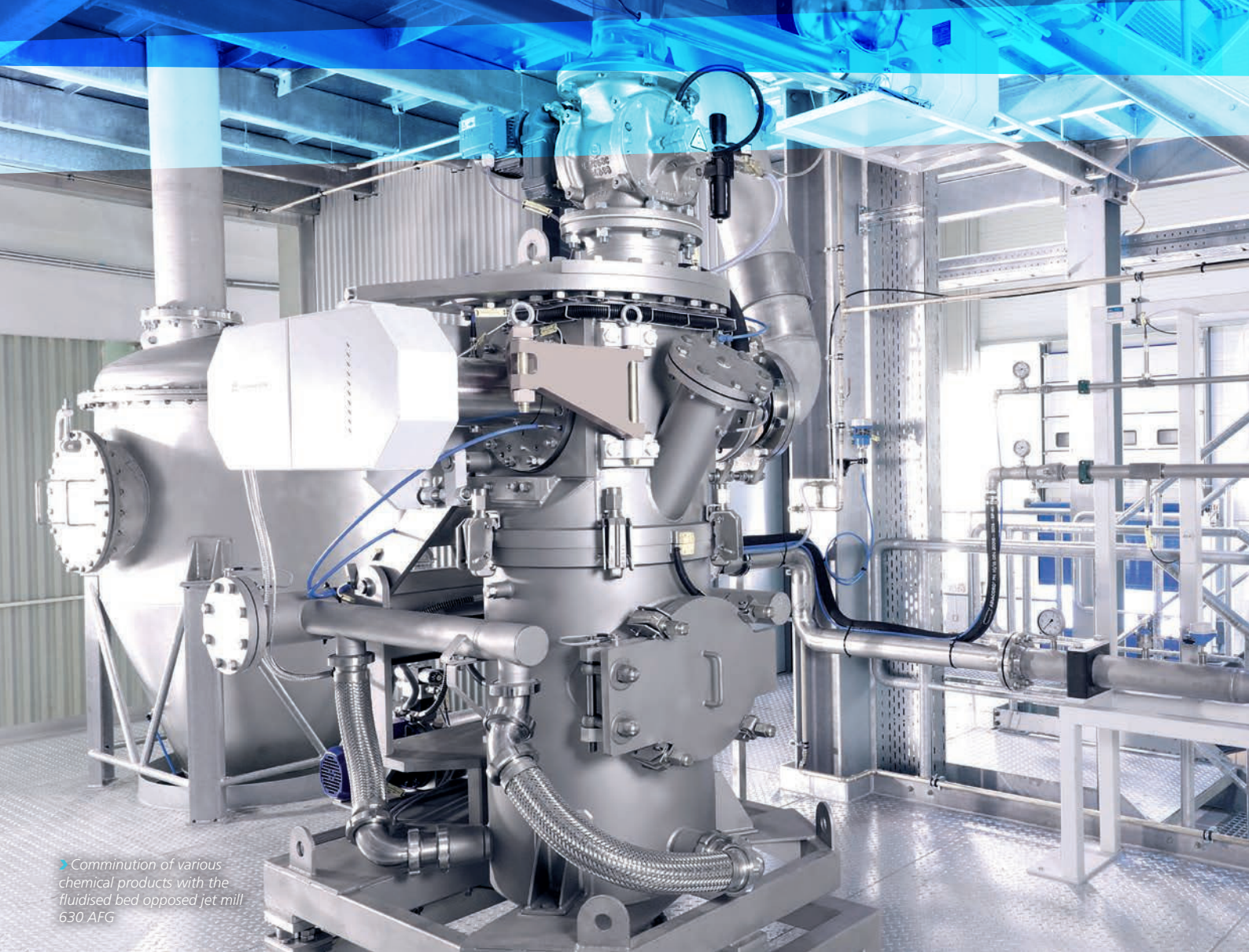
CASE STUDY

MINERAL FILLERS

The trend towards increasingly finer mineral fillers in the fineness range of $D_{97} \ll 10 \mu\text{m}$ is unstoppable and requires efficient solutions.

THE SOLUTION

We developed a low-energy dry processing method for the production of calcium carbonate fillers with a fineness level of $D_{97} = 2.5 - 8.0 \mu\text{m}$. The dry agitated media mill ATR operated in a closed loop with ATP/NG multi-wheel air classifiers are ideal for this application. Recommended for fineness levels below $D_{97} = 5.0 \mu\text{m}$ down to $D_{98} = 2.0 \mu\text{m}$ are ANR-CL wet agitated ball mills for the production of GCC suspensions.



Comminution of various chemical products with the fluidised bed opposed jet mill 630 AFG

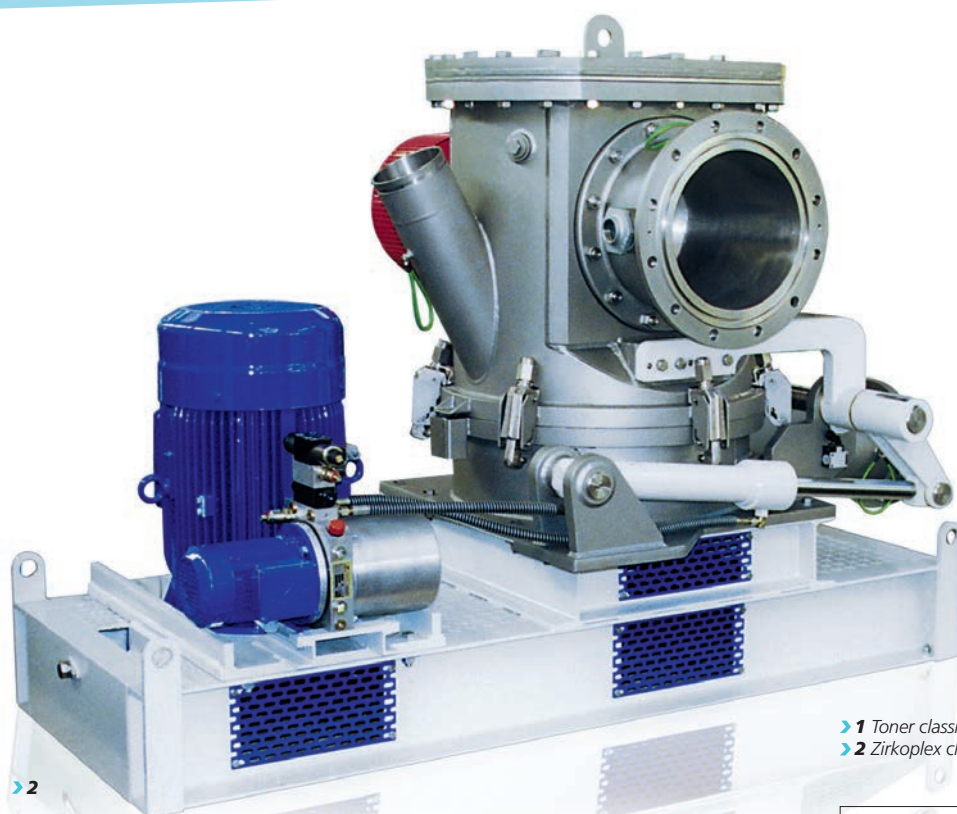
CATALYST FOR THE CHEMICAL INDUSTRY

We are an indispensable element of the chemical industry.

The toner powder in your workplace printer, the PTFE-coated frying pan in your kitchen or the paint on your car: Powder is ubiquitous. It is used in many everyday products, either as an ingredient or as a final product. Many powder applications are produced by Hosokawa Alpine mills and classifiers.



> 1



➤ 1 Toner classifier 100 TTSP
➤ 2 Zirkoplex classifier mill 315 ZPS

POWDER WITH A SYSTEM

Our lines and systems process all powder types with excellent quality. From powder bulk chemicals and fine chemicals right through to other chemical products such as colorants, pigments, pesticides, fertilizers or abrasives. Our process solutions include essential operations of powder and particle processing – size reduction, classifying, coating, rounding and mixing. In addition to this, we also cater to other processes such as conveying, storing and dosing.

The customers' requirements concerning powder characteristics are as numerous as the areas of application for the products of the chemical industry. Thanks to an extensive range of tailored and standardised products, Hosokawa Alpine can cater to all requirements, no matter how special they are. We provide you with qualified assistance and will always recommend the most future-proof and flexible system for your purpose.

TYPICAL END PRODUCT REQUIREMENTS

INCLUDE:

- High end product fineness with a sharp top cut
- End product: low in fines, good flow properties
- Desagglomeration to primary particle size
- Flat or wide particle size distribution, depending on the application
- Powder particle shape

TO THIS END, WE DELIVER & OFFER:

- Wear-protected and virtually contamination free designs
- Vapour-proof construction
- Pressure shock-resistant design to ATEX
- Gas-loop operation with inert gas
- Energy-efficient line technology
- System solutions to prevent deposits
- Easy and fast purging concepts
- Cryogenic or cooled grinding of temperature-sensitive materials
- Special applications with hot-gas operation
- Intelligent control concepts
- Process optimization with in-line particle measuring

CASE STUDY

PRODUCTION LINES FOR TONER POWDER

Design, planning and engineering of complete lines for toner production is part of our core competencies. This includes all process stages from the execution of turnkey projects and the transfer of production expertise, right through to toner production, raw material supply and quality assurance. Excellent printing results require maximum precision in the particle size distribution and particle shape of toner powders.

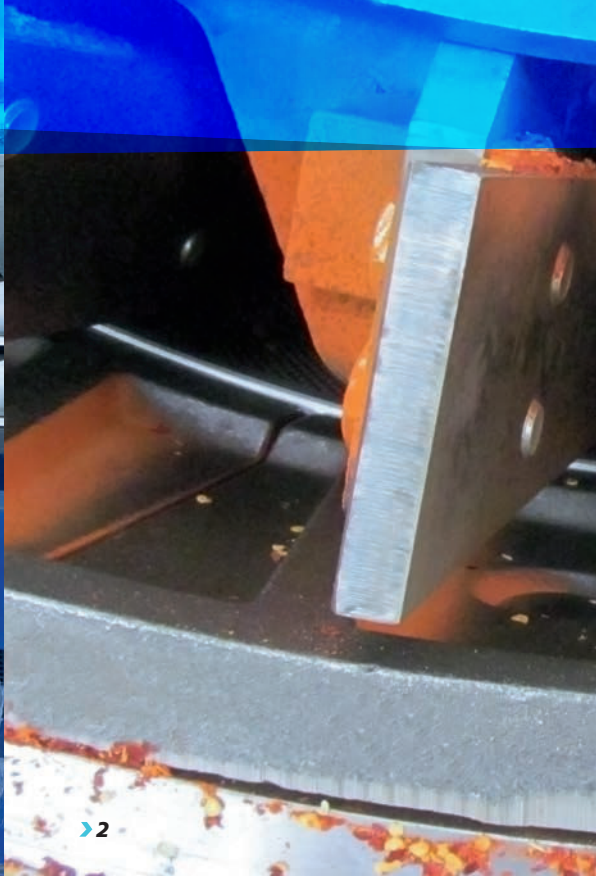
THE SOLUTION

Thanks to our technologies for the size reduction, classifying and production of spherical toner powder particles, we set global standards. Our range of specialized machines and systems such as jet mills of the TFG range and air classifiers TTSP and TSP is distinguished by the following benefits:

- Maximum output
- Sharp top cut
- Minimum dust generation
- Easy cleaning
- ATEX-compliant system design



1



2

PROCESS SOLUTIONS FOR THE FOOD AND FEED INDUSTRY

We supply the food and feed industry with efficient technology.

The exacting safety and hygiene requirements of the food industry call upon our entire range of size reduction technology. For decades, our machines and lines have been established as an essential part of many different production and conditioning processes for food products – and we comply with all standards.

FROM COARSE TO FINE

The market demands – we deliver: crushers and hammer mills for coarse pre-crushing of press cakes in the centimetre range, impact mills with different fineness levels for fine grinding of spices and last, but not least, Hosokawa Alpine classifier mills for ultrafine grinding such as the ACM range for cocoa press cake, the ZPS for carrageenan or the AFG fluidised bed opposed jet mills for coffee. Even special applications in

the submicron range are no problem for our ball mills for wet grinding.

NATURALLY THE BE(A)ST

The feed industry operates with higher output rates than the food industry. Our products deliver the required process stability as is proven by our systems for applications such as soya grinding on a ZPS classifier mill. Soya is used as a milk substitute for feeding calves.

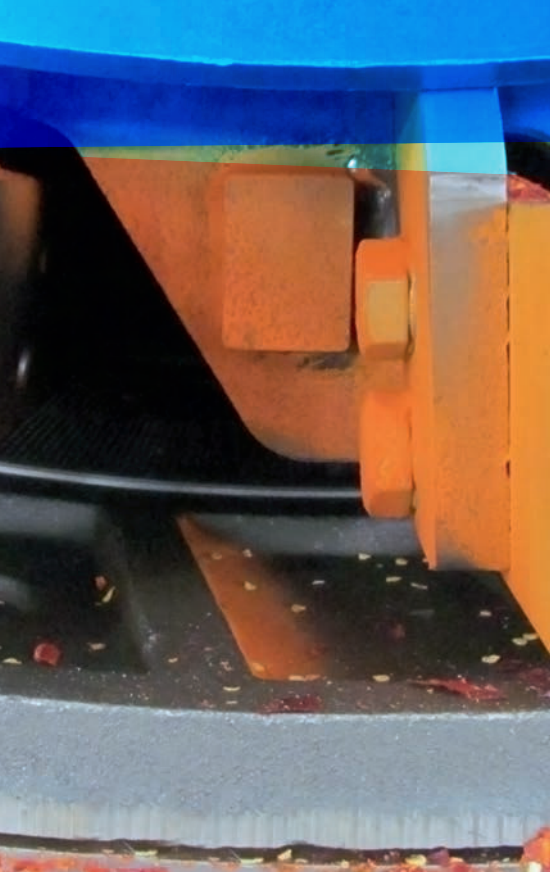
FROM SINGLE MACHINES TO SPECIAL SOLUTIONS

The complexity of food and feed applications varies significantly. Hence, our customers require different systems, from single components right through to turnkey systems, as well as a tailored performance and service package. If required,

we will work hand in hand with our customers to develop a tailor-made special concept to suit all specifications. This also applies to unusual challenges in already established processes. A typical example for this is the integration of a new line into an existing system in a restricted space, taken into account the following prerequisites:

- Strict hygiene and easy cleaning
- Safety (explosion protection, industrial safety)
- Appropriate service life and cleaning cycles

Be it single machines, standard concepts or special solutions: thanks to our extensive experience and many tests in our in-house test centre, we can prepare your food and feed products for the market.



» 3

- » 1 Contraplex fine impact mill 250 CW cryogenic milling system
- » 2 Plate beater unit of a fine impact mill 1250 UPZ
- » 3 Product filling

WE ARE SPECIALIST FOR:

Food

- » Cereal
- » Protein / Legumes
- » Dietary fibres
- » Dairy products
- » Cocoa
- » Sugar and sugar substitutes
- » Starch and starch derivatives
- » Spices, tea, dried fruit
- » Dried vegetables
- » Thickening agents
- » Emulsifiers
- » Vitamins

Feed

- » Milk substitutes
- » Animal feed additives

CASE STUDY

A low fines content is an essential prerequisite for spice processing. The Rotoplex Ro cutting mill is the ideal pre-crushing device for this requirement. Thanks to its cross-scissor cut, it allows a more significant reduction of fines than comparable mills. It also keeps dust formation to a minimum for further processing or for the end consumer.

Another important aspect is the product's aroma. Volatile essential oils and fat in the unprocessed virgin material create the specific aroma of spices. Heat generation during grinding will dissipate these oils. In addition to fact that the heat that is generated during the size reduction process leads to a loss of aroma, oils and fat causes problems such as caking, which reduces the line's availability.

THE SOLUTION

Tried-and-tested all over the world and the perfect solution to the challenge of spice grinding: Hosokawa Alpine's systems for cryogenic grinding. The spices are cooled with liquid nitrogen, which freezes the oily-fatty constituents, and the original aroma of the freshly harvested spice is fully preserved.





➤ API micronisation with 200 AFG fluidised bed opposed jet mill in CIP operation mode

SPECIALISED SOLUTIONS FOR THE PHARMACEUTICAL INDUSTRY

A high dose of technologies.

Generic or patented medicines are available in many dosage forms, e.g. as tablets or powders. However, the increasingly exacting product quality, safety and cost-efficiency requirements are common to them all. In order to meet these requirements, the pharmaceutical industry requires products with increasingly higher fineness levels. Our company is a global leader in the

comminution of pharmaceutical products. We develop versatile and efficient process solutions for reducing the size of pharmaceutical products. Thanks to many years of experience, our engineers excel in the development of both standard and specialised solutions. This benefits our product range and our customers' processes with higher output rates and fitness for the future.



➤ 1

SAFETY AND RELIABILITY ACROSS THE ENTIRE PROCESS CHAIN

In addition to guaranteeing reliable processes, Hosokawa Alpine provides all systems with maximum safety standards. Lines can be operated safely in every environment and at all times. Depending on the risk potential of the product, they are equipped with integrated WIP/CIP solutions even for high containment technologies. Our solutions are a class of their own: we deliver the complete system, from isolator right through to the process equipment and automation from one source. With our complete solutions, incompatibilities and interface problems are a thing of the past. All pharmaceutical lines comply with the strictest of international standards:

- Monoblock components guarantee a minimum of weld lines and seals and a design that is free of deadlegs
- A wide variety of surface roughness levels to suit any requirement
- Encapsulated bearings with lifetime lubrication
- Seals and filters with FDA-compliant materials



➤ 2

- Special Pharmaplex® bearing concept provides clear separation of drive and process
- Patented Pharmaplex® bearing concept ensures fully CIP/SIP-capable machines
- Qualification documents and automation systems according to GAMP5

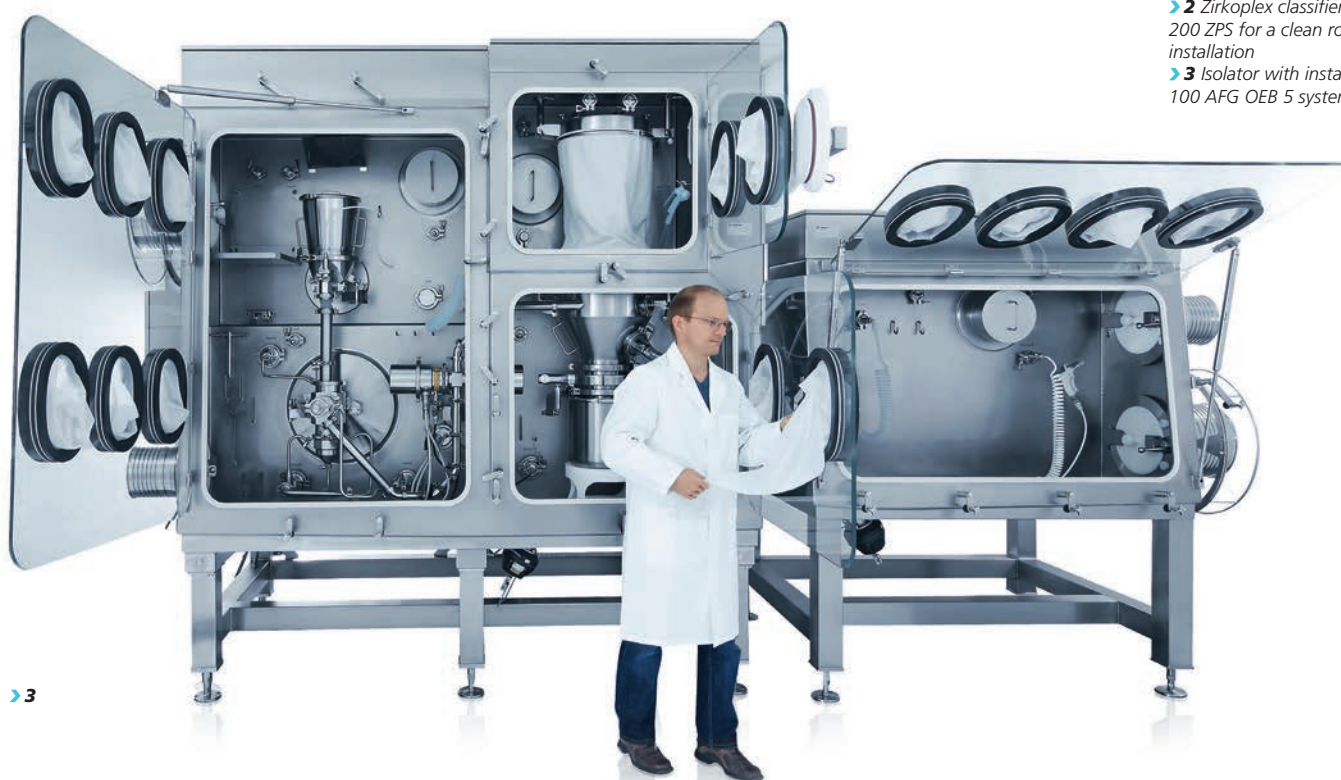
CASE STUDY

ALL-ROUNDER FOR HIGHLY ACTIVE SUBSTANCES

Process solutions for highly active substances are often costly and require further investment into suitable operating facilities such as cleanrooms. At the same time, there is a rising demand for versatile solutions that allow the production of different products and fineness levels without compromising the safety of the operators.

THE SOLUTION

In response to these requirements, we have developed a unique concept: the multi-mill isolator. This system is highly versatile, yet compact and has potential for future applications because it combines several milling modules in one single system. The financial benefit: one isolator accommodates all processes – the customer saves a large proportion of the investment costs.



➤ 3

- 1 Aeroplex spiral jet mill 400 AS
- 2 Zirkoplex classifier mill 200 ZPS for a clean room installation
- 3 Isolator with installed 100 AFG OEB 5 system

LEADING IN LABORATORY EQUIPMENT

Our R&D systems set new standards.

The basic parameters for the production process are set at an early stage, i.e. during the development of new processes. Hence, developers require equipment and analysis processes that also apply to later industrial-scale processes. This eliminates costly developments that cannot be implemented on an industrial scale.

Hosokawa Alpine provides a comprehensive range of high-end quality monitoring and inspection equipment for a wide powder range on a laboratory scale. Our laboratory systems are optimized in an ongoing process to ensure that we set future standards. Close cooperation with research institutes ensures a constant exchange of information. Thanks to their easy handling and high repeatability, our laboratory equipment and pilot plant lines are tested in many applications and accepted worldwide.

► *picoline platform with picocross functional module*



THE ALPINE air jet sieve

Developed by Alpine in 1953, the air jet sieve has become the leading system for the powder analysis. It analyses particle sizes of down to 20 μm with maximum repeatability. It has become the most widely used system for the analysis of powder particle size distributions in the world and has become established in virtually all industries. A high number of industry standards such

as DIN EN 933-10 refers to the ALPINE air jet sieve as standard equipment.

THE picoline

Testing new size reduction processes with particularly valuable products is a special challenge: the generation of repeatable results with minute amounts of material. As a response to this challenge, we developed a new line generation:



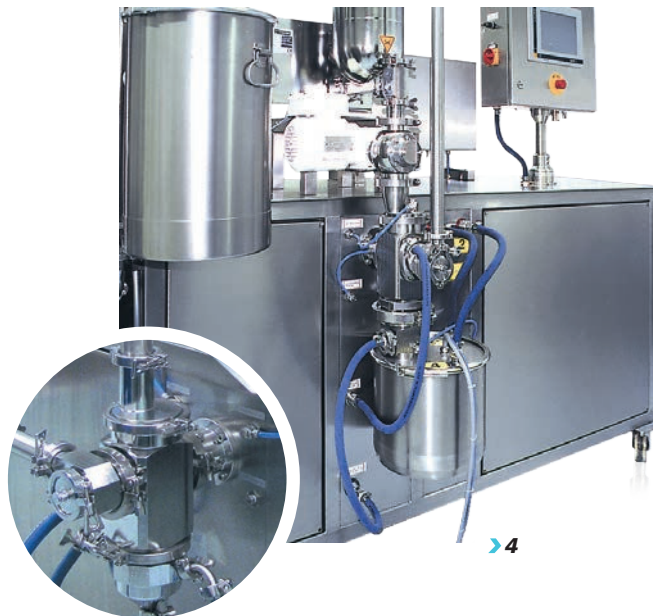
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the *picoline*. Thanks to extreme miniaturisation, comminution processes for very expensive products and strictly minimized sample volumes can be applied to industrial-scale processes. Almost one dozen different modules represent virtually the entire range of possible processing methods on a small scale.

THE MULTI-PROCESS LINE

Similar in versatility and equipment, the *picoline*'s "big brother", Hosokawa Alpine's multi-process line combines five different processing methods to meet a wide variety of requirements. In the wake of a steady flow of newly developed products with unpredictable milling properties, customers require systems that offer maximum versatility. Fast and simple changeover procedures accommodate a high number of different processes. These highly versatile products are suitable for a high number of potential applications: from A for aluminium oxide, to P for powder coating and pigments right down to Z for zinc oxide.



- 1 Particle size analysis on an Alpine air jet sieve e200 LS
- 2 View of the in-house laboratory in Augsburg
- 3 Test on a wear-protected 100 AFG multi-processing line
- 4 Multi-processing system 100 AFG | 50 ZPS

CASE STUDY

SPECIAL EQUIPMENT FOR SPECIAL APPLICATIONS

Our machines have to meet numerous requirements. Every industrial segment and each product calls for an individual, tailor-made approach and solution. Thanks to many years of experience in particle processing, we can meet this challenge with tried-and-tested systems such as Alpine's UPZ fine impact mill:

- Tried and tested in many different areas, from minerals and food to pharmaceutical products
- Suitable for laboratory, pilot plant and production scale
- Versatile size reduction system with exchangeable size reduction modules
- High fineness levels with sharp top cut
- Explosion pressure shock resistant design to ATEX directive 94/9/EG
- Optional wear protection





RECYCLING MEANS ADDED VALUE

We help you extract and reclaim valuable raw material.



➤ Rotoplex 90/300 Ro cutting mill
Used for the grinding of plastic films with high output requests

As raw materials are becoming increasingly rare and expensive, recycling is becoming more and more essential. Accordingly, there is a growing demand for recycling systems for conventional material recycling and in-house recycling. The efficient recycling of production waste as part of a closed-loop material cycle has become established as an important economic part of the value added chain of modern industrial enterprises. Hosokawa Alpine caters to all parts of the process chain with a versatile range of sustainable solutions.

RECYCLING SYSTEMS FROM ONE SOURCE

We deliver a comprehensive machine range for all pre-crushing, cutting, separating and fractionating, pulping, granulating or volume reduction tasks. Fine-tuned, tried-and-tested and well established, our machine technology



» RECYCLING

- » 1 Silo station for BOPET Film Flakes
- » 2 All-purpose shredder Type 50/200UZ for cables
- » 3 Patented, open cross-scissor cut rotor
- » 4 Feeding station for film grinder

guarantees maximum cost-efficiency and user benefits. We also offer one-to-one consultancy, project planning and engineering of customized complete systems for a variety of recycling tasks

- » Injection moulding / blow moulding / thermoforming
- » Extrusion (e. g. profiles/ pipes / sheet)
- » Film (e. g. BOPP, BOPET, BOPA, PE, PVC)
- » Composites (Automotive / roof lining)
- » Natural and synthetic rubber
- » Material recycling (e. g. cables, rubber tires)
- » Special applications (e. g. high-tenacity fibres, millings, old clothes, special paper)

from one source – tailored to your requirements. Many years of experience in this segment has laid the groundwork for our reliable and proven machines, lines and process solutions.

CASE STUDY



COMPOSITE RECYCLING

Composite materials, or composites for short, are used for a wide array of applications, but are particularly widespread in the automotive industry. Re-using materials for production processes involves the separation of individual constituents and their comminution to particle sizes of about 4-6 mm. This is a major challenge for conditioning processes – but no problem for Hosokawa Alpine's recycling concept.

This concept is comprised of a shredder, cutting mill and classifier as basic equipment, which can be combined to suit the requirements of the application. Very stubborn connections, e.g. in fibre composites, can be separated by a specially developed mill,

which “unravels” the connection with the help of mechanical abrasion. The use of Hosokawa Alpine's MZM zigzag classifier reduces the fibre residue to a minimum, which enhances the quality of the regrind. Specially adapted screens eliminate the occurrence of fibre nests, which may lodge themselves in the three-dimensional mill charge and cause problems during extrusion.

THE SOLUTION

Combined with an efficient, automated line control, the smart designed Hosokawa Alpine recycling line with state-of-the-art screening technology will run smoothly in a three-shift operation with minimum operation requirements.

COMPACTION-TECHNOLOGY IN TOP FORM

We knock powder into shape.

The production of granular bulk goods from powder products requires a separate process stage: compacting or dry granulation. During this process, the systems are faced with detriments such as high dust contents, low bulk weights and bad adhesion properties. All these conditions are a major challenge that we are prepared to face: we deliver customized lines for size reduction, mixing, briquetting, compacting, crushing, sieving and drying to knock powder into shape. Customers benefit from our specialists' extensive process engineering experience and skills.

FROM METALLURGY TO HIGH-END PHARMACEUTICAL APPLICATIONS

With its wide machinery range, Hosokawa Alpine offers perfect solutions for specific customer requirements – for every industry. One example: Our machines for briquettes or granulates for the chemical industry have a gas-tight design and also comply with ATEX, if required – an

indispensible requirement for today's markets. We develop and supply efficient contained dry granulating lines for the production of dust-free material particles with good flow properties for the pharmaceutical industry. The required gentle comminution of compacted material is mastered by Alpine's AFC Flake Crusher or Alpine's ABM Bexmill®.

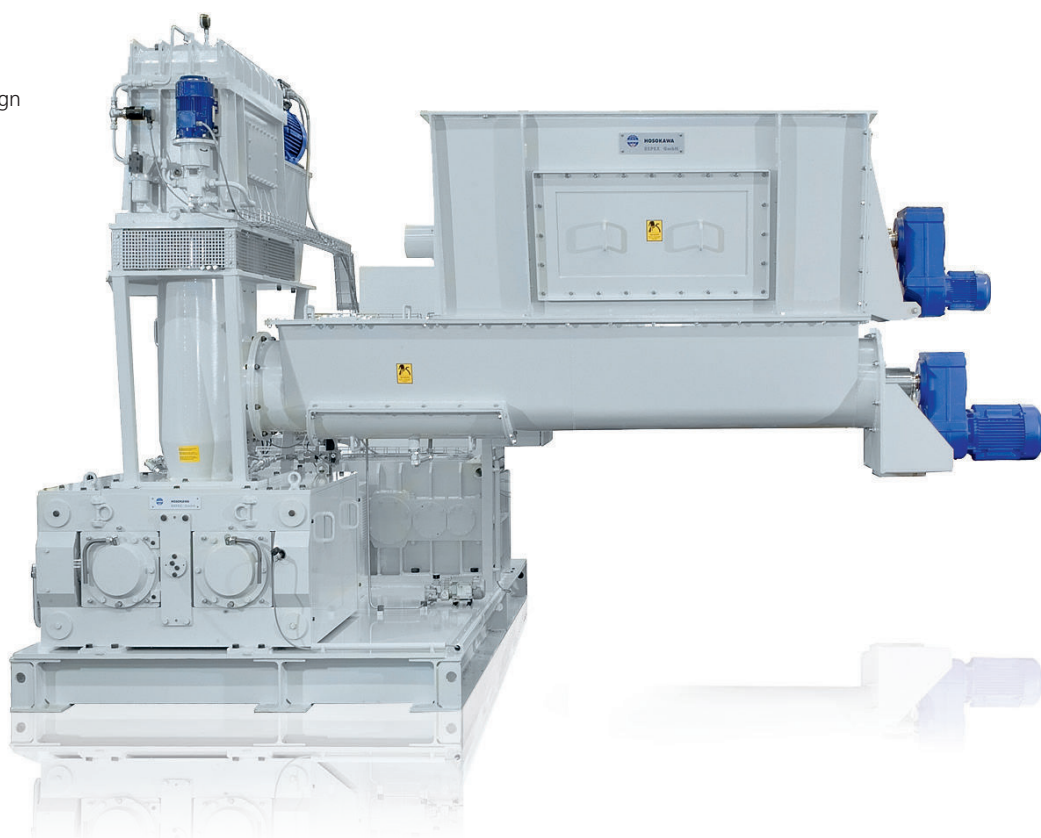
LOW-PRESSURE EXTRUSION OR GRANULATES – THAT IS THE QUESTION

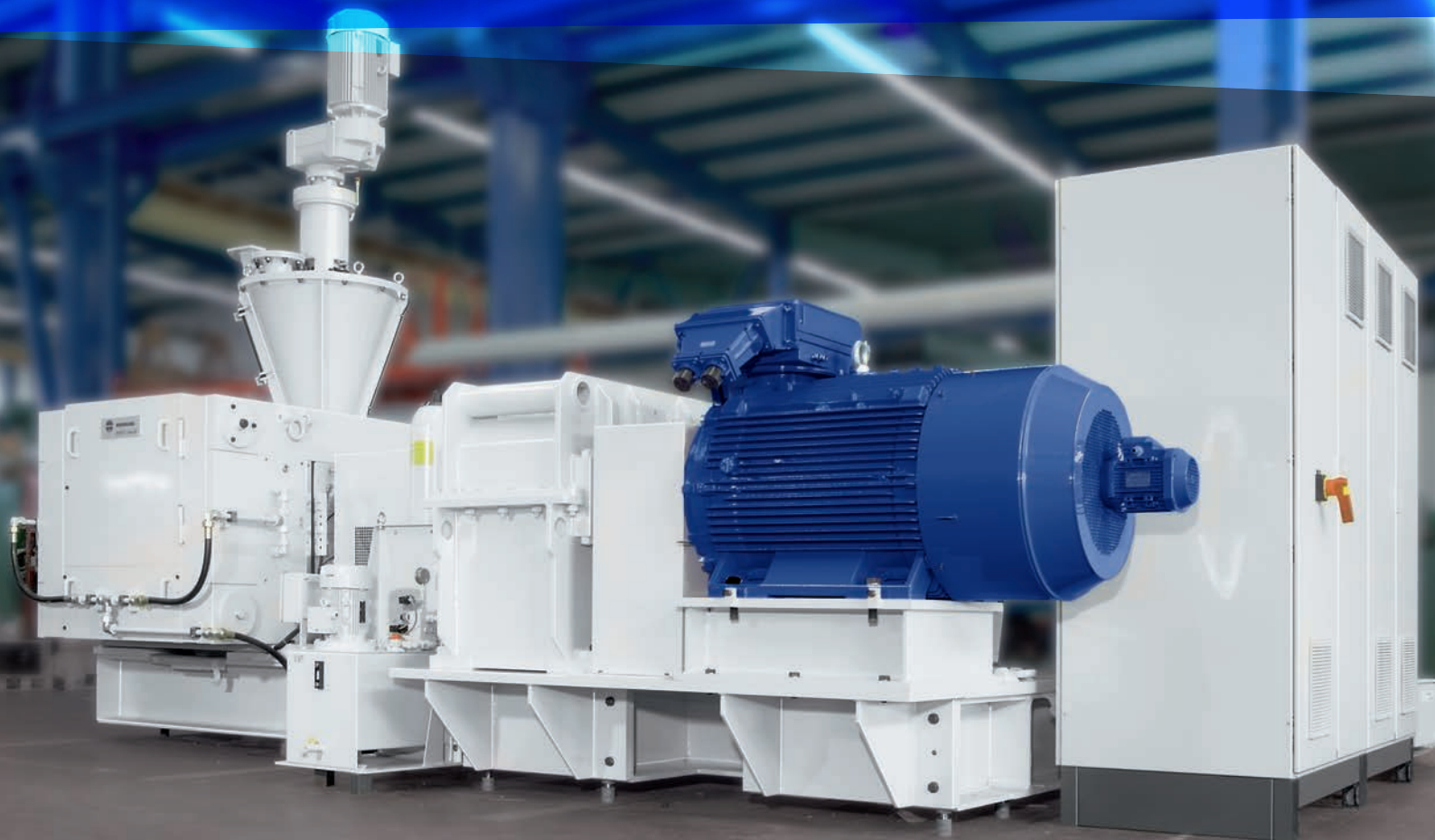
We offer you solutions such as low-pressure extrusion or pelletisers to accommodate any required dispersion level.

WE ARE SPECIALISTS FOR:

- Metallurgy (e. g. Quicklime, Magnesium oxide, Metal powder, Mineral ores, Coke / coal)
- Chemistry (e. g. Cleaning agents, Chemical salts, Fertilizers, Pigments, Toner, Catalysts, POM, Aluminium oxide, Titan oxide)
- Food (e. g. Dry soups, Flavour enhancers, Spices, Coffee, Chocolate, Sugar, Milk powder, Lactose)
- Minerals (e. g. Talc, Limestone, Zircon sand, Gypsum, Feld spar, Quartz)
- Pharma (e. g. Antibiotics, Painkillers, Vitamins, Enzymes)

➤ *Kompaktor MS 60*
Compaction of talc





» Kompaktor MS 300
Used for the compaction of magnesita



CASE STUDY

SPECIAL SALT FOR WINTER SERVICE

Winter services use large amounts of standard road salt, which generally consists of sodium chloride (NaCl). Despite the fact that this chemical compound reliably reduces the water crystallization point (cp. eutectic point: -21.3°C), it has some disadvantages: NaCl is very expensive and its corrosive properties are detrimental to metal parts and road constructions, humans, animals and plants.

Therefore, Hosokawa Alpine Compaction has developed a new technique that produces road salt with a modified formulation. Prior to this development, we carried out a series of tests at our technical centre in Leingarten, which involved compacting and granulating different salt types in various concentrations. The results showed that dried sodium chloride (NaCl) with a residual moisture of $< 0.01\%$ delivers solid granulates.

Hosokawa Alpine replaced NaCl with a residual moisture from centrifugation with dry sodium chloride, which allowed us to substitute 30 % of the material with other alkaline earth chlorides. This produces granulates with particle sizes of between 1 and 5 millimetres and a very high density. The abrasion resistance, determined by means potassium chloride-based analysis methods, met all requirements.

THE SOLUTION

An environmentally friendly and particularly cost-efficient road salt formulation: partial substitution of sodium chloride with potassium salt reduces the damaging effect of road salt. This process is carried out with the help of Alpine's ARC MS 300 Compactor®. This system has a capacity of 10 t/h and produces granulates in sizes from 2-5 mm.



OUR SERVICE RANGE MADE IN GERMANY

We offer a comprehensive service package.

- > 1 New production hall
- > 2 Assembly line
- > 3 Test centre in Augsburg

Perfect support right from the beginning is our trademark. We offer you the best possible service package for your production lines. You benefit from a comprehensive service and support package that is tailored to your requirements.

TEN TIMES SAFER: OUR SERVICE PORTFOLIO

1 SALES

Our sales department does not only sell products, it is your personal contact for all matters concerning your production equipment. The sales department will assist you at all stages of your project – from the initial offer right through to line approval and everything in between.

2 PLANNING

We plan your system right down to every detail and ensure that it is perfectly tailored to your requirements. If required, we offer end-to-end consultancy, make appointments for your tests at our in-house test centre and specify all line details.

3 TEST CENTRE

At our test centres in Augsburg and Leingarten, you can carry out tests to determine the best system configuration and process-related parameters. The following mechanic and thermic process methods can be tested on a production and laboratory scale:

- > Size reduction (dry and wet)
- > Cutting mill technology/ shredding
- > Air classifying
- > Wet classifying
- > Sieving, setting
- > Compacting/ briquetting
- > Mixing, drying, dry grinding
- > On-line particle analyses for dry powder

4 PRODUCTION & LINE AUTOMATION

The mechanical production at our both sites operates a wide range of state-of-the-art production lines. Our line automation specialists apply processing expertise to software and hardware development as well as to visualisation.



5 ON-SITE ASSEMBLY

Assembly is carried out by experienced Hosokawa Alpine technicians. Depending on the arrangement, you will receive turnkey assembly or support for your technicians. The benefit of the "supervision model": your staff members are integrated into the assembly process and are able to familiarize themselves with the new equipment more quickly.

6 COMMISSIONING

Line commissioning is carried out as agreed by contract. We assist you during the initial production run and help you with a successful transition from line approval to real production conditions. Over time, you will discover the variety of options that comes with our versatile line concept.

7 SERVICE

Our technical after-sales service is a crucial part of our care and quality package for your Hosokawa Alpine line. Our highly skilled, trained and experienced team of experts ensures high system availability at all times. Our extensive spare parts department guarantees short-term supply of spare parts

and components that are subject to wear. Our skilled team of professionals will assist you with all process-related questions, even at short notice.

Our service package includes:

- Supply of spare parts including long-term availability via express delivery
- 24/7 support hotline service
- Telephone support and remote diagnostics via Internet
- Maintenance and maintenance contracts
- On-site service team if required
- Pre-emptive maintenance and inspection
- In-house repair service or on-site assistance
- Extensive consultancy services
- Line update and process optimization
- On-site training directly on the line

8 UPDATES

We make sure that your line is technically up to date – from improved processes and more energy efficiency updates right through to line

control and visualisation. Ask us and we will help you increase your output rates or expand your production options.

9 TOLL PROCESSING

You can avail of our professional processing service and reliably deliver your customers at all times – without high investments in lines and storage facilities. Our subsidiary Hosokawa Micron Powders GmbH with headquarters in Cologne/Germany offers wide range of toll milling and toll processing.

10 FLEXIBLE AND OPEN

We are one of the leading providers to the fine powder particle processing market. As a member of an international corporation, we are very flexible and open for your requirements.

» Do not hesitate to contact us. We will compile a tailor-made service package to suit your specific requirements.



BLUESERV – THE SERVICE DEPARTMENT NOW HAS A FACE

Made-to-measure customer service

BLUESERV – this is the name of the new service brand from Hosokawa Alpine. The service department is thus given a face. We have amalgamated these services in the field of powder production under the umbrella of one service brand: BLUESERV. This distinctive name stands for the comprehensive problem-solving expertise of our services in all sectors of the powder industry. Alpine has been offering expert know-how and problem-solving expertise regarding the development, manufacture and installation of our products for many years now. The service department has become one of the mainstays of the company. Today, Hosokawa Alpine is more than just a manufacturer of machines – the company

has become a customer-oriented provider of solutions.

STRATEGIC SIGNIFICANCE FOR THE FUTURE

Our service experts support customers in finding the best solutions for their special challenges. It might involve optimising processes, adapting systems to new requirements or remote monitoring and tele-diagnosis by means of state-of-the-art software. Preventative maintenance, a reliable spare parts service and repairs naturally also form part of the service range – around the clock and all over the world.

We thus underline our competence and long years of experience. We see ourselves as a solution provider who helps our customers to safeguard long-term investments and make optimal use of them. Hosokawa Alpine positions itself not only as a manufacturer of high-quality machines, but also as a competent service partner throughout the entire service life of a system.

» **Contact us. We will be happy to work out a service package tailored to your specific requirements.**

**CASE STUDY****THE ALPINE VIB SYSTEM FOR THE FIELD OF PROCESS TECHNOLOGY**

Identification of necessary maintenance tasks at an early stage, extension of maintenance intervals and effective reduction of downtime – these are wishes expressed by many companies.

THE SOLUTION

Whether for measuring random samples during the course of regular control procedures or in the event of a specific need for maintenance: the Alpine VIB system always has the status of machines and systems in focus. Thanks to the innovative measuring system, vibration measurements can now be carried out flexibly – without the need for an external service provider. The perfectly coordinated complete package comprising software and hardware is available exclusively from us. This means that vibration analyses can be carried out in the future by yourself in a flexible and wireless manner, thus increasing the productivity of your systems in the long term. The machine status can be individually checked, evaluated and recorded. Measurement curves to permit vibration evaluation are determined from raw data and are displayed directly (as defined in DIN ISO 10816-3). Machine-specific parameters can be defined, stored to memory and retrieved on demand to permit simple and fast control measurements. In this way, measurement reports can be generated without problem. Graphs document minimum and maximum values as well as the variations over time and much more. The Alpine VIB system guarantees precise measurement results – in a smart and flexible manner.

PIN: THE INNOVATIVE PROCESS INFORMATION NETWORK SOFTWARE

Many companies are compelled to prove their production quality and to archive their production data in a reuseable manner. It's a fact that archiving and evaluation with systems which do not employ a process control system is extremely complicated and difficult to realise. The availability of the production data, however, is a decisive success factor – also for Hosokawa Alpine's customers.

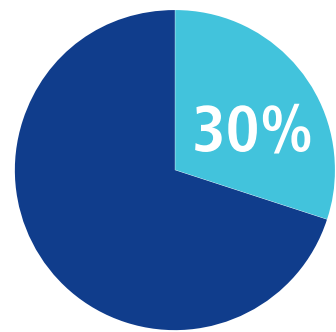
THE SOLUTION

And it is exactly here that Hosokawa Alpine comes into play with the data acquisition software Alpine PIN. PIN stands for „Process Information Network“ software. In other words, process information can be displayed, archived and evaluated via a network. Operation is easy and PIN can be employed for both new systems and older systems. A user of an older system where up to now it was not possible to capture or archive data, for example, now has the possibility of accomplishing this right from his desk. Regardless of whether the system is an original Hosokawa Alpine system or another system operated with Simatic S7: top performance is guaranteed with Alpine's software.

1988

The largest and most efficient cable recycling line in Germany comes on-stream.

The line is still operating successfully today.



30 % of magnesium produced worldwide for the production of furnace linings is made by our compactors.



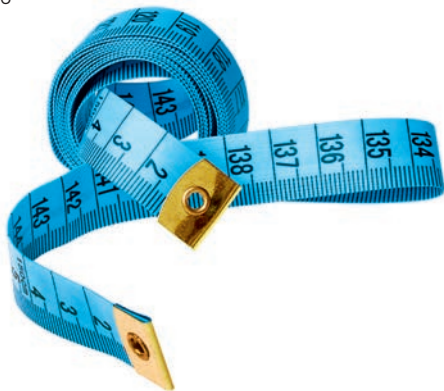
BIG AS **10** FOOTBALL FIELDS IS THE PREMISES OF HOSOKAWA ALPINE.

The manufacturing and assembly lines require about 40 % of the entire company complex.

28,000 TONS/YEAR ...

... this is the annual GCC filler output produced by one Hosokawa Alpine ball mill with a fineness level of 70 % < 2 µm.

This amount is sufficient for the production of **8,000 km** of PVC-pressurised water pipes to DN 200 PN 16



THAT IS THE DISTANCE BETWEEN **AUGSBURG**, GERMANY TO **DELHI**, INDIA.



EXCELLENT QUALITY

During grinding at 15 °C, 87 % of the essential oils contained in cloves are retained.

30 TIMES PER MINUTE

this is the total sum of analyses carried out on Hosokawa Alpine air jet sieves worldwide. Manufactured since the 1950s, our air jet sieves are being sold all over the world.

HIGHLY VALUABLE PRODUCTS

The most expensive product ever processed on a Hosokawa Alpine 50 AS spiral jet mill cost **8,000,000 €/kg**.



10 MILLION/H

THE TYPICAL
OUTPUT RATE OF A
HOSOKAWA ALPINE
TONER PRODUCTION
LINE IS 250KG/H. THIS
EQUALS 10,000,000
PRINTED DIN A4
SHEETS PER HOUR.

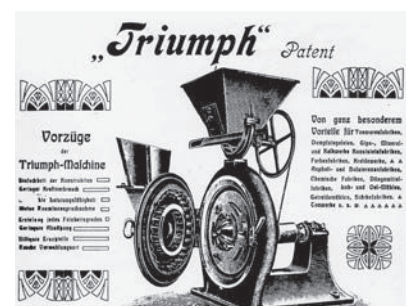


70 METRES

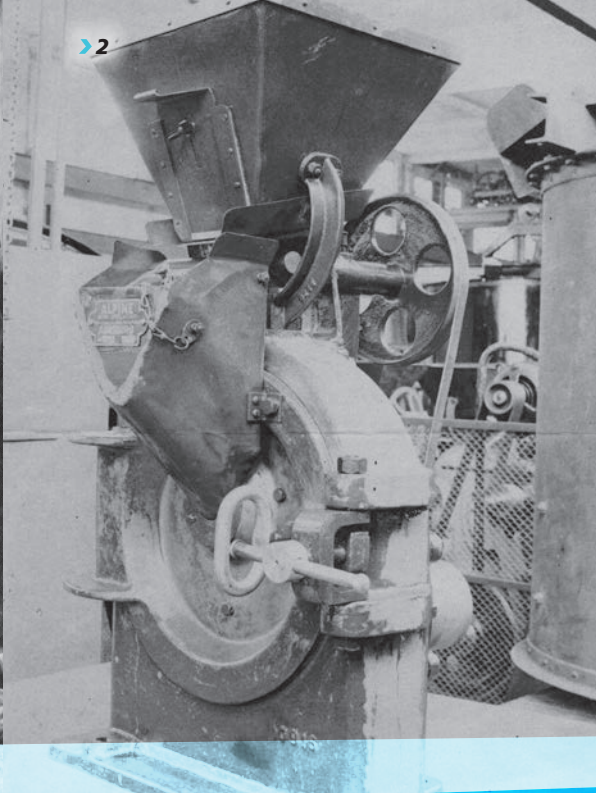
... the amount of Hosokawa Alpine test sieves sold in a year is as high as the "Perlachurm" in Augsburg, Germany, where we are based.

1903

the first patent in our corporate history was registered on 9 October, 1903, for the Triumph shredder. The design and the construction of the first perplex general-purpose shredder marked the beginning or the era of Alpine fine impact mills.




WE SUPPLY
OPPOSED JET MILLS IN THE
PERFORMANCE RANGE OF
BETWEEN 1 AND 2,000.



PROCESS TECHNOLOGIES FOR TOMORROW

The success story of Hosokawa Alpine Aktiengesellschaft.

➤ **In 1898**, Otto Holzhäuer founded his machine shop in Augsburg, Germany: this is the beginning of "Alpine". Powder and particle processing became a focus in the early years, Alpine received its first patent for its "Triumph" general-purpose shredder in 1903. The product range expanded rapidly to include more mills and size reduction machines, for which the company also received several patents. In 1900, the company's products were

already being sold to customers throughout Europe.

➤ **Mid-1950s** Alpine developed the first air jet sieve. Defining the standards for particle size measuring, this system was a milestone.

➤ **Since the beginning of the 1960s** Alpine has been developing blown film lines for premium-quality films.

➤ **1987** the company became a member of Hosokawa Micron Group with headquarters in Osaka, Japan, and has been operating under the name of Hosokawa Alpine Aktiengesellschaft ever since.

➤ **Today** the Group is leading the international market for powder and particle processing for fine powder preparation and is one of the leading suppliers of plastics processing machinery.



➤ 1898

ALPINE



➤ 1950

Alpine

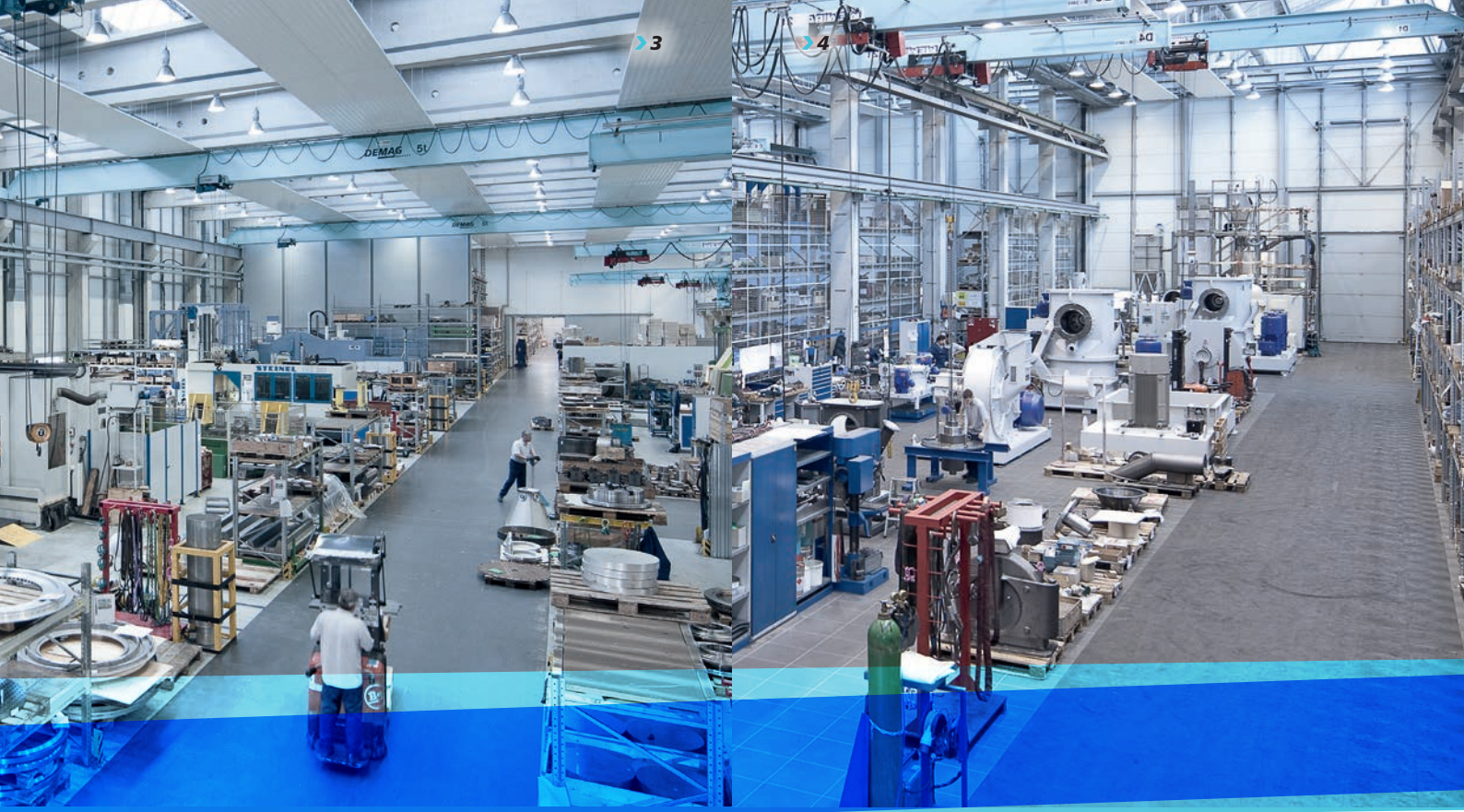


➤ 1970



➤ 1987

**HOSOKAWA
ALPINE**



- **1** Company founder and staff in 1900
- **2** First Perplex universal mill, known then as Triumph mill
- **3** Production hall
- **4** One assembly line in Augsburg, Germany

FIT FOR THE FUTURE

The Hosokawa Micron Group.

➤ **In 1916** Hosokawa Micron Corporation was established as Hosokawa Iron Works in Osaka, Japan.

➤ **Today**, Hosokawa Micron Group is a leading provider of process solutions for powder and particle processing, blown film technology and confectionary processing. The group has research, engineering, production and service facilities all over Asia / Oceania, the United

States and Europe. Hosokawa Micron Group has more than 100 years of experience and is leader of the particle processing market. The company has set new standards for the booming nano-segment with applications, developments and marketing of ultrafine particles.



HOSOKAWA MICRON GROUP

➤ 1987



HOSOKAWA ALPINE INTERNATIONAL

Your Global Partner.

➤ **HOSOKAWA ALPINE HEAD OFFICE**

● **GERMANY**

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HOSOKAWA ALPINE

Process technologies for tomorrow.

➤ HOSOKAWA GROUP BRANCHES

○ CHINA (SHANGHAI)

HOSOKAWA MICRON Powder Machinery Co. Ltd.

○ FRANCE

HOSOKAWA MICRON France

○ GERMANY

HOSOKAWA ALPINE Compaction

○ GERMANY

HOSOKAWA MICRON POWDERS GMBH

○ GREAT BRITAIN

HOSOKAWA MICRON Ltd

○ INDIA

HOSOKAWA MICRON INDIA Pvt. Ltd.

○ JAPAN

HOSOKAWA MICRON CORPORATION

○ KOREA

HOSOKAWA MICRON (Korea) Ltd.

○ MALAYSIA

HOSOKAWA MICRON (Malaysia) SDN BHD

○ MEXICO

HOSOKAWA MICRON B.V.

○ NETHERLANDS

HOSOKAWA MICRON B.V.

○ RUSSIA

HOSOKAWA MICRON SANKT PETERSBURG

○ USA

HOSOKAWA POLYMER SYSTEMS

○ USA

HOSOKAWA MICRON POWDER SYSTEMS

○ USA

HOSOKAWA ALPINE AMERICAN INC.



HOSOKAWA ALPINE

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