GEA Niro drying and particle formation technologies

Made for the world’s chemical industry
The right process for your product

The intelligence behind your process

From conception to completion

Your project is in safe hands

The right technology for your product

Your spray drying solution

The heart of your spray drying plant

Your fluid bed drying solution

GEA Niro fluid bed – key elements

GEA Niro SWIRL FLUIDIZER™ – turn paste into powder

Spray congealing – turn melt into powder

Spray dryer reactor – create chemical reactions

Complete efficiency and control

Stay productive, protected and compliant

A lifetime of service and support
GEA Process Engineering has provided world-class industrial drying solutions since 1933 that enable businesses like yours to stay competitive, profitable and at the forefront of their industry.

GROW ALONGSIDE YOUR CUSTOMERS
We understand that a successful business relies on its ability to adapt quickly to evolving market conditions. That’s why we specialise in creating highly versatile drying solutions, calibrated for your applications, with the flexibility and scalability to meet your customers’ demands.

As the world’s leading powder engineering specialists, we are uniquely placed to help you develop a highly efficient process and a flawless end-product. Your success is our success; we are here to support you with a dedicated service designed to grow your business and your bottom line.

BREATHE LIFE INTO YOUR PRODUCT
With GEA Process Engineering as your partner, our vast pool of drying knowledge, expertise and technology is entirely at your disposal. Together, we can bring your ideas to life with high quality powders engineered with your specific properties and precise characteristics.

Whether it is expert advice on starting a new project, a more efficient process, plant upgrades, an entirely new installation or even innovative ways to save energy and reduce your environmental footprint, GEA Process Engineering has your ideal drying solution.
The right process for your product

With the most advanced portfolio of drying technologies and the world’s best engineering minds focused on supporting your success, GEA Process Engineering helps you to make the most of new opportunities across a full spectrum of products.

HARDMETALS
More than 130 installations
Our broad experience means that you benefit from dense and free-flowing powders from different hard metal suspensions produced on a robust automated plant with good solvent recovery.
- Tungsten carbides
- Ready-to-press (RTP) powders

NANO MATERIALS
When you need to get small
Our leading range of atomizing technologies enables you to dry Nano particles into agglomerates with a low energy footprint and with full product, operator and environmental safety.
- Inorganic nano material
- Organic nano material
- Safety (environment and process)

POLYMERS & RESINS
Leading experience since 1952
Feedstocks in suspension, emulsion, dispersion or solution, water or solvent-based, can be dried efficiently and according to your specifications.
- Polymer melts
- s-PVC, e-PVC, c-PVC
- ABS
- MBS
- HDPE
- PP
- POM
- PMMA
- PVAc, EVA
- PVP
- Acrylic resins
- Formaldehydes

AGROCHEMICALS
The broadest range of solutions
We fulfill all your powder requirements, including granulometry, low dustiness and re-dispersion characteristics, plus all safety and environmental regulations.
- Fertilizers
- Fungicides
- Herbicides
- Insecticides
- Other agrochemicals

TANNINS
Preserve tannin activity
Create powders and agglomerates that can be easily re-dispersed in water using plants capable of handling a vast range of corrosive or abrasive materials.
- Synthetic tannins
- Basic chromium salts
- Natural extracts
- Sulphonated phenol
- Chrome tannin
- Chestnut, mimosa extract
- Myrobalan, quebracho extract
- Wattle extract

CERAMICS
Traditional through to high-tech
We match your Specifications to deliver a reproducible, free-flowing granulate for single step ceramic pressbody production.
- Proppants
- Hydroxyapatite
- Carbides
- Ferrites
- Titanates
- Kaolin
- Silicum oxide/nitride
- Zinc oxide
- Zirconium oxide/silicate

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**BATTERIES**

**From Cathode to Anode**

Our unique atomization technologies deliver superior powders with uniform characteristics and our atomizing nozzles ensure particle sizes from a few μm to several hundred μm.

- Catode material
- Anode material
- Ultra-fine powders

**INORGANIC CHEMICALS**

From aluminium to zinc compounds

Transform virtually any inorganic compound into a free-flowing product using feedstocks in liquid, suspended crystal or solid form, solutions and slurries of fine crystals, cakes and pastes.

- Salts
- Minerals
- Zeolites

**ORGANIC CHEMICALS**

From fine crystals to coarse granulates

Your feedstocks can be in liquid, suspended crystal or solid form. Solutions and slurries can be dried to free-flowing products or to coarse granulates. Cakes and pastes can also be dried and cooled.

- Organic acids
- Plant materials
- Microorganisms
- Waste water drying
- Amino and fatty acids
- Bicarbonates
- Butyrates
- Chlororaminates
- Gluconates
- Hydrazines
- Phthalates
- Purified terephthalic acid
- Salicylates
- Salicylic acid
- Sorbates
- Stearates
- Ureas

**DETERGENTS**

For household and industrial applications

Create plain, agglomerated or granulated powders with low dustiness and superior redispersion properties.

- Dispersing agents
- Emulsifying agents
- Chelating agents
- Enzymes
- Optical brightener
- Phosphates
- Sulphonates
- Silicates
- Surface active ingredient

**DYESTUFF & PIGMENTS**

For a rainbow of colours

Whether your feedstocks are in solution, suspension or paste form, our solutions are fully customisable to meet your exact requirements and ensure minimal risk of explosions or environmental pollution.

- Acid / azoic dyes
- Basic dyes
- Disperse dyes
- Reactive dyes
- Dyestuff intermediates
- Related fillers
- Barium sulphate
- Cadmium carbonate / sulphide
- Calcium carbonate
- Ceramic colorants
- Iron oxide (black, red, yellow)
- Kaolin
- Lithopone
- Phthalocyanines
- Titanium dioxide
- Zinc chromates
The intelligence behind your process

Whatever your product requirements, the GEA Niro International Test Centre offers the largest and most sophisticated facilities for drying process development.

Whether at the first stages of development or the final phases of refinement, our test centre provides the intelligence that brings your ideas to life.

THE WORLD’S LARGEST TESTING FACILITY
Made up of over 35 pilot plants, the GEA Niro International Test Centre houses the most advanced freeze, fluid bed and spray drying technology available today.

We are able to test a huge variety of conditions to make sure your powder is not only possible, but that its production process is viable, sustainable and cost effective.

OUR GUARANTEE – YOUR PROCESS
No matter which industry or market you or your customers operate in, the GEA Niro International Test Centre exists to give you complete confidence that you have the most appropriate drying solution for your needs.

To show our commitment, we will guarantee that the process we’ve developed is set up in the most effective way to achieve your desired results.

Our test facilities comprise more than 35 GEA Niro pilot plants and house a complete range of advanced auxiliary equipment.
As every customer, plant and product comes with their own unique requirements, we make no assumptions as to how your new powder will behave. Our in-depth analyses cover every possible factor so you can make fully informed decisions regarding your product’s commercial potential.

Our testing programme includes:

- **Feasibility studies** – the first step for every new project is a feasibility study that evaluates whether your product is able to be dried, agglomerated, extracted, concentrated or whatever you need it to be. If you already have a prototype, we can investigate the best ways to recreate it on an industrial scale with the same (or better) characteristics.

- **Pre-production analysis** – with the GEA Niro DRYING KINETICS ANALYZER™ it is possible to conduct early stage tests using only a few mL of material, covering a wide range of feed properties and drying parameters. This keep costs and timeframes to a minimum and can be incorporated into Computational Fluid Dynamics simulations to optimise your process design.

- **Pilot testing** – pilot tests obtain all the necessary data for drying your product and to optimise your production process. We cover all drying techniques to ascertain which gives the best results and fits with your existing capabilities. Our GMP-approved Pharma Test Station meets all regulatory guidelines and is capable of producing samples for clinical trials.

- **Laboratory analysis** – our analytics laboratory is fully equipped to investigate and allocate your product’s characteristics. Key properties can be appraised, such as droplet formation and expected behaviour during and after the drying process, particle size distribution, bulk density, moisture content, photomicroscopic analysis, flowability and hygroscopicity.

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**GEA Niro DRYNETICS™ analysis**

1. **SINGLE DROPLET EXPERIMENTS**
   - Temperature
   - Size and position
   - Adhesion/stickiness

2. **ADVANCED DATA ANALYSIS**
   - Drying kinetics
   - Morphology
   - Stickiness

3. **CFD SIMULATIONS**
   - Velocity profiles
   - Temperature profiles
   - Moisture
   - Deposits

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[Diagram of drying chamber]
Your project is in safe hands

With over 10,000 installations across virtually every industry and hundreds of new projects in progress every year, we offer unparalleled experience in managing your project from start to finish.

THE RIGHT PEOPLE
Over eight decades, we’ve fine-tuned our approach to maintaining the highest standards of quality and efficiency at every stage. As a key part of this, we allocate a dedicated Project Manager as your single point of contact to keep everything transparent and tightly organised, and who fronts a larger team of specialists hand-picked for your specific project.

Not only does this guarantee excellent technical and organisational strengths, it also ensures they possess every attribute necessary for the smooth running of your project, including strong communication skills, multiple languages and solid problem-solving abilities.

THE RIGHT TRAINING
We have invested heavily in training all our Project Managers to have the right skill set, application expertise and experience to guide you seamlessly through the process. To be qualified as a GEA Project Manager, our staff must have extensive exposure on accounts of all sizes, locally and globally, and have passed an internationally recognised project management course.

ON TIME AND ON BUDGET
Thanks to our vast expertise, our proven and trusted approach ensures a reliable outcome every time, on time and on budget. This includes:

- 
- Initial meetings to get to know everyone involved and outline project expectations
- Basic Engineering Package to highlight potential technical issues and solutions
- Planning for key milestones, site management, installation, commissioning and safety audits
- 3D CAD plant design, including ERP systems, for optimisation and fault-finding prior to construction
- Transparent and timely management of your plant’s construction and installation
- Commissioning by the project manager, process control expert and process technologist

Finally, when everything has been thoroughly tested and your employees trained in its operation, the plant is handed over to you for production, with our on-going support as needed.

TAILORED FINANCE SOLUTIONS
OUR FINANCE TEAM CAN HELP YOU SET UP A PACKAGE TAILORED TO YOUR REQUIREMENTS, FROM A SIMPLE LEASING CONTRACT TO COMPLETE PROJECT SUPPORT.
The right technology for your product

Decades of engineering experience, first class application know-how and a passion for innovation have led us to create the world’s most complete portfolio of drying technologies.

Whatever your application, our proprietary drying systems deliver exceptional results with the reliability and energy efficiency you need to maintain a consistent, profitable operation.

<table>
<thead>
<tr>
<th>TURN LIQUID INTO POWDER, AGGLOMERATES OR GRANULATES</th>
<th>Use spray drying to remove the moisture from liquid feedstocks such as solutions, emulsions and pumpable suspensions. This is an ideal approach when your end-product must comply with precise powder properties.</th>
</tr>
</thead>
<tbody>
<tr>
<td>TURN WET POWDER INTO DRY POWDER, AGGLOMERATES AND GRANULATES</td>
<td>Use fluid bed drying for powders, granules, agglomerates and pellets with an average particle size of 50-5,000 microns.</td>
</tr>
<tr>
<td>TURN PASTE INTO POWDER</td>
<td>Use the GEA Niro SWIRL FLUIDIZER™ to obtain a fine, homogeneous and non-agglomerated dry product from pastes, filter cakes and highly viscous liquids.</td>
</tr>
<tr>
<td>TURN MELT INTO POWDER</td>
<td>Use spray congealing to transform melted feedstocks into free-flowing, spherical particulates of a controlled particle size.</td>
</tr>
<tr>
<td>CREATE CHEMICAL REACTIONS</td>
<td>Spray drying can be used to allow chemical reactions in atomized droplets to create products with specific characteristics.</td>
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</table>
Spray drying starts with the atomization of a liquid feedstock into a spray of droplets. The droplets make contact with hot air in a drying chamber, evaporate and form particles.

Fluid bed drying achieves uniform processing conditions by passing a gas through a product layer under controlled velocity conditions to create a fluidized state.

The paste or cake is fed to the compact drying chamber, where it makes contact with the warm process gas and the rotation impeller. The dried, disintegrated product exits the chamber as powder together with gas.

The melt is sprayed into a cooling chamber. After contact with cool air, the spray solidifies. The atomization is either done by nozzle spraying or by prilling using a rotary atomizer.

Reactions between gas phase components and liquid phase chemicals are very rapid and have a uniform heat impact. As a result, spray dryers can be used to create substances such as paraformaldehyde, gelatinised starch and silica gels, and can also be used to reduce harmful emissions in flue gases.
Your spray drying solution

Our fully customisable and highly reliable spray dyers deliver quality powders that enable you to meet your customers’ needs today and tomorrow.

THE INDUSTRY STANDARD
Spray drying is the most widely used process for the production of powders, granulates or agglomerates from a liquid or a slurry. It is the preferred method for drying thermally-sensitive materials and due to its consistent particle size distribution, the process is well suited to many other product types.

TECHNOLOGY THAT MEETS YOUR NEEDS
Our spray dryers range from conventional models through to highly sophisticated systems that can be specially calibrated for your individual requirements.

Every spray dryer consists of a feed pump, atomizer, air heater, air disperser, drying chamber and systems for exhaust air cleaning and powder recovery. The process converts a liquid feed into droplets which are evaporated under controlled conditions to produce a dry powder with specific properties.

Our specialists will make sure you get the optimal spray drying solution and support for your needs. Furthermore, in order to keep your employees safe and your environmental footprint low, GEA Niro plants are fully compliant with all international regulations.

WHATEVER YOUR NEEDS, OUR WORLD-CLASS SPRAY DRYING TECHNOLOGY PRODUCES EXCEPTIONAL RESULTS.

PRODUCTS
Spray drying converts liquid into a dry or semi-dry powdered product.

- Agrochemicals
- Ceramics
- Detergents & surface active agents
- Dyestuffs & pigments
- Hardmetals
- Inorganic chemicals
- Organic chemicals
- Polymers & resins
- Tannins and other products

YOUR ADVANTAGES
- Unique selection of atomizer systems and chamber designs
- Tailor-made designs to meet your specific requirements
- Superior powder quality with operational excellence and low energy consumption
- Long operating intervals between cleaning
World-class system design

Since your powder’s characteristics can vary depending on the initial product and your requirements, no single spray dryer is suitable for every application.

GEA Process Engineering offers a complete range of system and chamber designs that give you the flexibility and control to maintain a highly efficient process and production.

GEA Niro Spray Dryer with VIBRO-FLUIDIZER™

GEA Niro Fluidized Spray Dryer FSD™

GEA Niro NOZZLE TOWER™

GEA Niro Spray Dryer, Closed-cycle configuration

GEA Niro HC Spray Dryer
Spray dryer chamber designs

1. Co-current, with integrated fluid bed, rotary or nozzle atomizer.

2. Co-current, conical base with rotary atomizer, for both heat sensitive and stable products. Also suitable for spray congealing.

3. Co-current, flat base with rotary atomizer, for special products.

4. Co-current, with rotary atomizer, for drying chemicals at high inlet air temperatures.

5. Co-current, with rotary atomizer, for drying mineral concentrates at ultra high inlet air temperatures.

6. Co-current, compound air disperser with rotary atomizer, for very large volumes of high inlet air temperatures.

7. Co-current, with nozzle atomizer.

8. Co-current, with nozzle atomizer.

9. Co-current, with nozzle atomizer.

10. Counter-current, with nozzle atomizer.


12. Mixed flow, with nozzle atomizer.

13. Mixed flow, with integrated fluid bed, rotary or nozzle atomizer for non-dusty, free flowing products.

14. Counter-current, with integrated fluid bed, rotary atomization for spray cooling/congealing.
The heart of your spray drying plant

As the central and most important part of your spray drying installation, GEA Niro rotary atomizers and nozzles are engineered with precision and manufactured by us to the highest standards.

QUALITY WHERE YOU NEED IT MOST
Productivity, reliability and efficiency are not only a result of superior design, but of quality components. For spray drying, one of the most important components is the GEA Niro rotary atomizer, which sits at the heart of your system and forms the spray.

GEA Process Engineering offers a full range of atomizer types or corresponding nozzles. Different designs result in different powder characteristics; the right one for you depends on the nature of your initial product and what you are aiming to achieve. Our specialists will help you understand which is most appropriate for your requirements.

ENGINEERED FOR YOUR APPLICATION
GEA Niro rotary atomizers help you to obtain key production parameters, such as, particle size, particle size distribution, density and throughput.

Thanks to our proprietary designs, our feed systems handle higher solids content and operate at relatively low pressures to keep your output high and energy costs low.

As we often create application-specific solutions for the food and pharmaceutical industries, we also take great care when creating systems that require exceptional hygiene and surface quality or that are prone to clogging and would otherwise require frequent maintenance.

THE GEA NIRO ROTARY ATOMIZERS ARE ABLE TO HANDLE LARGE QUANTITIES OF ABRASIVE OR NON-ABRASIVE FEEDS, HIGHLY VISCOUS CONCENTRATES OR EVEN LIQUIDS WITH CRYSTALS.

YOUR ADVANTAGES
- Unique and patented nozzle designs
- Rotary atomizer with market-leading velocity
- Broad selection of atomizer wheel designs
- Abrasive and viscous feeds beyond the norm
- Proprietary designs give you the broadest range of powder properties

Decades of spray drying know-how goes into our patented technology, enabling you to create quality powders with specific properties.

THE GEA NIRO ROTARY ATOMIZER
Johan E. Nyrop (the founder of “Niro Atomizer”, the company which later became GEA Process Engineering), obtained his first patent for a rotating atomizer in 1924. Since then, GEA Process Engineering’s exceptional GEA Niro rotary atomizer designs have led the industry for performance, availability, superior product quality and the lowest energy consumption.
Your fluid bed drying solution

Perfect for heat sensitive products, fluid bed drying can be an exceptionally useful addition to your spray drying production process or a highly effective standalone solution.

**FLUIDIZATION ALLOWS FOR EASY TRANSPORTATION WITH HIGH DRYING RATES AND OPTIMUM THERMAL EFFICIENCY.**

**HIGHER DRYING RATES**

Fluid bed drying is an efficient method to remove residual moisture from an existing powder. During the process, the moist powder is fluidized, dried and carried through each section of the fluid bed using hot gas blown through specially perforated plates.

Fluid bed drying is ideally suited for powders, granules, agglomerates and pellets with an average particle size between 50 microns and 5 mm.

**GEA NIRO CONTACT FLUIDIZER™**

One of our most efficient fluid bed dryers, The GEA Niro CONTACT FLUIDIZER™ is a prime example of how our latest systems have been designed to meet your specific requirements. Key features include:

- **Multiple drying sections** for optimal heat economy and uniform powder properties
- **Proprietary GEA Niro rotary feed distributor** for constant temperatures and moisture, superior fluidization and material dispersion
- **Optimal plug flow drying conditions** using compartments connected by underflow gates to reduce back-mixing
- **Robust GEA Niro GILL PLATE™ distributor plate** for easy emptying and conveying of oversized material
- **Hot air plenum chambers** for excellent air distribution and easy draining
- **Heat panel banks** on overhead rollers reduce heat damage and allow for easy inspections
- **Internal GEA Niro BARRIER GAS™** heat tracing and flushing prevents wet deposits and condensation

**YOUR ADVANTAGES**

- Tailor-made systems based on a market-leading product programme in both vibrating and stationary beds
- Unique rotary feed spreading system ensures optimal drying conditions
- Patented gas distribution system
  - Self-emptying design means minimal downtime caused by clogging
  - Small plant footprint reduces overall building costs
  - High thermal efficiency
  - Can be supplied in open- or closed-cycle designs
  - Greater flexibility to adjust drying conditions
  - Operates with low-pressure steam

**PRODUCTS**

Turn wet powder into dry powder and powder into agglomerates and granulates.

- For drying moist or damp powders, filter cake or centrifuge cake
- For powders, granules, agglomerates and pellets with average particle size of 50 microns to 5 mm
- Plastics: s-PVC, HDPE, ABS, PE, PTFE, POM
- PTA, CTA
- Sodium carbonate, sodium bicarbonate
- Silica, sand
- Fertilisers
- Calcium chloride
- Salts
- Amino acids
Fluid bed process systems

The GEA Niro product range includes several types of fluid beds. The optimal plant design depends on your product.

We take a huge array of factors into consideration before making any recommendations, including challenges relating to location and requirements for energy efficiency and environmental safety.
Fluid bed types

We offer two types of fluid bed models, designed to optimise the flow pattern of solids within the dryer and cater for particles of all sizes.

- **Back mix fluid bed drying** – for feeds that require a degree of drying before fluidisation is established
- **Plug flow fluid bed drying** – for powders that are directly fluidizable and can achieve the controlled residence time that is the pre-requisite for obtaining the right particle properties

A fluid bed can be stationary or vibrating and is installed either as individual units or combined unit to form a specialised solution for effective drying.
GEA Niro fluid bed – key elements

At GEA Process Engineering, we have invested in decades of research, drying expertise and application know-how to offer you the industry’s leading portfolio of fluid bed hardware.

Our fluid beds can be used as a stand-alone unit for a specific purpose or be incorporated into a larger system, depending on your requirements. All our systems are designed and built to ensure you benefit from many years of trouble-free operation and efficient performance.

FEED SPREADER
The GEA Niro rotary feed spreader ensures uniform distribution of the wet feed material. This is an important stage for maintaining the homogeneity of the Back-Mix section and thereby overall system performance.

• Minimises formation of lumps
• Efficient utilisation of the Back-Mix section

GILL PLATE™
The GEA Niro GILL PLATE™ distributes the gas for the fluidisation of the powder. It ensures an even gas distribution, effective transport of lumps and emptying of the fluid bed.

• Patented GEA Niro design
• Number, size, and pattern of the gills are tailored to the application
• Excellent emptying and conveying of oversize material (if any)
• No backwards flow of particles
• Not prone to clogging
• No discoloured particles as rounded corners ensures no deposits

INTERNAL HEATING PANELS
Our heating panels have been engineered for maximum thermal efficiency and are a highly reliable and vital component for transferring energy required for evaporation.

• Fully submerged in the fluidised powder
• High heat transfer
• Designed with virtually no horizontal surfaces, reducing risk of heat damage to powder
• Panel banks run on overhead rollers
• Heating panels can be inspected and cleaned externally
• External, movable frame with a trolley for easy outside inspection

BARRIER GAS™ SYSTEM
The patented GEA Niro BARRIER GAS™ heat tracing and flushing system lowers your investment costs. It is a highly effective way to prevent wet deposits and condensation, which helps to reduce possible corrosion damage.

• Flushing of ceiling and fluid bed walls above the product layer
• Internal hot air tracing instead of outside hot water tracing
• Allows for single wall construction
• No hot water tracing system means lower costs
• Easier and cheaper installation
• Less maintenance
GEA Niro SWIRL FLUIDIZER™ – turn paste into powder

The GEA Niro SWIRL FLUIDIZER™ is a cost-effective system for obtaining fine, homogeneous high quality powders from pastes, filter cakes and other viscous liquids.

DISINTEGRATION AND DRYING IN A SINGLE STEP

The GEA Niro SWIRL FLUIDIZER™ is a flash type dryer for products that are difficult to pump and disintegrate. It produces a fine powder in a single step without the need to dilute or back-mix the feed before drying and is suitable for a wide range of products and applications.

Its ability to handle even thick pastes makes the GEA Niro SWIRL FLUIDIZER™ an ideal alternative to a conventional spray dryer. Unlike many other types of systems, processing time is short and eliminates the need for costly post-treatments.

The GEA Niro SWIRL FLUIDIZER™ is available as open, semi and closed-cycle plant.

DUAL FEED SYSTEM (PATENT PENDING)

Our Dual Feed System is able to dry products that have previously been impossible due to their solid content or low viscosity. The dual feed technology means that:

- The enlarged, moist surface ensures a rapid evaporation of the liquid
- Liquid feed-rate can be controlled very accurately
- Evaporation load of the dryer can be kept constant
- No need for additional mixing equipment

YOUR ADVANTAGES

- Designed for non-pumpable products
- Good tolerance towards changes in feed properties
- Plant requires minimal space
- Maintenance-friendly design
- Handles very high drying temperatures
- Compatible with heat-sensitive products
- Dual Feed System

PRODUCTS

Obtain a fine, homogeneous and non-agglomerated dry product from pastes, filter cakes and highly viscous liquids in one compact process step.

- Titanium dioxide
- Iron oxide
- Kaolin
- Silica
- Zeolite
- Aluminium and magnesium hydroxide
Spray congealing – turn melt into powder

Spray congealing is the most effective method for transforming your melted feedstock into spherical particles of a specific size to create powders that meet your ideal flow-rate specifications.

Spray congealing is the term given to the transition of a melt from a soft or fluid state to a rigid or solid state by cooling. The liquid melt is atomized into a spray of fine droplets of spherical shape inside a spray cooling chamber. Here, the droplets meet a sufficiently cold airstream to solidify the droplets into spherical powder particles, creating a high quality free-flowing powder.

QUALITY AND CONTROL
As the atomization and air distribution technology for spray congealing is the same as that applied in the spray drying process, GEA Process Engineering offers unmatched application know-how and production control to ensure your product has exactly the right properties. Our advanced spray congealing technology means you can even create average particle sizes ranging from 50 to 2,000 microns. If you require even smaller sizes, our special GEA Niro two-fluid nozzles can create particles ranging from 3 to 50 microns.

Spray dryer reactor – create chemical reactions

This spray drying process can be used to create rapid and highly uniform chemical reactions between gas phase components and liquid phase chemicals. This can be taken advantage of and used in several different ways.

EFFECTIVE POLLUTANT REMOVAL
The spray drying process is effective in cleaning flue gases from coal fired power stations and waste incineration plants. The acidic components are absorbed into slaked lime to create a dry powder that is often used in building materials, or allows for depositing in landfill.

POLYMERISATION AND GELATINISATION
Spray drying can also be used to create polymerisation reactions with specific properties by controlling the drying atmosphere. The resulting product is discharged as a finished powder, that requires no further treatment.

Spray drying is well suited for creating gelatinised products. Consistent quality is achieved due to the immediate and uniform heat impact from the drying gas, giving ideal conditions for the gelatinisation process.

Also, two different liquids can be mixed at the moment of atomization, resulting in a powder that typically will be ready for use out of the dryer.

PRODUCTS
Create average particle sizes of 50-2,000 microns (or even 3-50 microns using our special nozzles).
- Wax
- Stearic acid
- Glycerides
- Emulsifiers
- Bisphenol A
- Magnesium chloride
- Monoglycerides
- Sodium bisulphate

YOUR ADVANTAGES
- Compact plant design means a smaller building
- Rotary prilling wheel atomization using our unique rotary atomizer
- Flexible particle sizes using simple prill wheel modification
- Integrated fluid bed design
- Simple operation
- Narrow and uniform particle distribution for free-flowing products

Flat bottom absorber design for large size SDA applications (patent pending).
Complete efficiency and control

A class-leading installation is one half of your solution; a powerful automation and control system that gives you complete command over its vast array of complex processes completes the picture.

ADVANCED SOFTWARE SYSTEMS
With unmatched competence in every aspect of the spray drying process, GEA Process Engineering provides reliable, flexible and user-friendly software systems that drive performance and efficiency across your plant’s operations.

OPTIMISED PERFORMANCE
As the central ‘brain’ that integrates and governs your network of components, hardware and systems, our plant management software enables you to oversee and optimise production and to keep productivity in line with your commercial and strategic objectives.

An intuitive user interface allows you to monitor and control every part of your installation with ease and our intelligent, automated safety systems alert you at the first sign of irregularity so you can address any issue far in advance of it becoming a serious problem.

Our advanced plant management solutions include:
• PLC and SCADA programming and development
• Track and trace control
• Instrumentation and industrial networking
• Data logging and reporting
• Electrical design, hardware and instruments
• Risk assessment and failure-mode effect analysis (FMEA)

Our systems also keep you compliant with all international standards, including:
• Machinery Directive and Low Voltage Directive (EN60204-1)
• ATEX and EMC Directives
• S88 Batch Control and S95
• FDA 21 CFR part 11
• Qualified acc. to GAMP (V model)
• Functional Safety acc. to EN 61508

NIROWARE™

Our flagship control system, NiRoWare™, integrates historian logging, tracking, tracing and reporting into a comprehensive and fully customisable plant management solution.
SAFETY FIRST
The very nature of powder production means that your process will generate a fine dust that is suspended in air, which can lead to explosions or fires.

Each year, hundreds of companies rely on our comprehensive safety assessment programmes to safeguard against these dangers and minimise risks to their equipment, employees and reputation.

EVALUATING SAFETY
GEA Process Engineering offers a complete range of services for the evaluation of your plant’s condition and operating environment. If additional safety measures are needed, we will help you plan the best way to implement them with minimal disruption, downtime and expense.

We ensure that your GEA Niro drying plant complies with all international legislation, including ATEX, and can also provide the input for a detailed Explosion Protection Document – something many authorities and insurance companies demand as a guarantee of compliance.

Our safety services cover:
• **EU directives and harmonised standards** – consultation on matters related to the directives and the CE marking of plants and equipment
• **Technical consulting service** – review of all compliance issues and procedures, with advice for risk reduction measures
• **Technical documentation service** – guidance in drafting an EC Declaration of Conformity and other mandatory documentation
• **Explosion protection advisors** – on-site inspection, reports and advice for the specification and installation of safety equipment on new installations and existing plants

WARNING SYSTEMS
- Temperature switches
- Air flow switches for cooling air
- CO monitoring
- Flow control
- Vibration monitoring of rotary atomizer

PROTECTIVE MEASURES
- Venting systems to direct explosive pressure away from equipment
- Suppression systems that prevent the release of hazardous chemicals
- Designing the plant to withstand explosions (containment)
- Isolation systems that prevent propagation of an explosion
- Automated fire extinguishing systems

Stay productive, protected and compliant

Keeping your plant in optimal condition is the best way to extend its lifespan and to make sure you stay compliant and your workforce stays safe.
A lifetime of service and support

For us, service and partnership go hand in hand. We will provide the proactive support you need over your plant’s lifecycle to keep you updated, upgraded and able to upscale as opportunities arise.

GEA Process Engineering offers the most comprehensive pre-sale and aftermarket support in the industry. Our customer care programmes focus on keeping your business in a leading position by maintaining constant efficiency and performance throughout your production process.

A TRUSTED, PROACTIVE APPROACH
As your trusted advisor, rather than waiting for an issue to occur we take a proactive approach to help maintain the smooth running of your installation, continuously looking for better ways to increase production quality, save costs and lengthen the lifespan of your equipment.

Should action be necessary or if we have designed new technologies that could augment overall performance, we can repair, upgrade or retrofit your plant as required with minimal disruption to operations.

LOCALLY-BASED, GLOBAL SUPPORT
GEA Process Engineering is your point of contact whenever you need support. Our teams are on hand, no matter where in the world you are, with locally-based specialists who know your equipment and processes, and who have access to a complete inventory of GEA-made spare parts.

With GEA Process Engineering as your partner, you can always be confident that you have the best equipment, the right production process and total global support to maintain a seamless operation and build a strong platform for your business growth.

From basic spare parts to full service contracts based on a maintenance plan, our goal is for you to achieve OEE (Optimal Equipment Efficiency) throughout the lifetime of your GEA Niro plant.
We live our values.
Excellence • Passion • Integrity • Responsibility • GEA-versity

GEA Group is a global engineering company with multi-billion euro sales and operations in more than 50 countries. Founded in 1881, the company is one of the largest providers of innovative equipment and process technology. GEA Group is listed in the STOXX® Europe 600 Index.