



SEPARATION

# UNLIMITED FLUID BED PROCESSING

ANDRITZ FLUID BED DRYERS,  
COOLERS, AND GRANULATORS

**ANDRITZ**

ENGINEERED SUCCESS



Experience makes the difference! ANDRITZ was among the first to introduce fluid bed technology for use in industrial drying and has been focusing on development of tailored process solutions for its customers since the early 1960s. With this experience and target-oriented development of process solutions in their own pilot plants, ANDRITZ is able to provide you with the optimum solution for your process. No matter whether the best type of fluid bed is static, vibrating, high-temperature, or a unit with built-in heat exchangers, feeding or processing devices: ANDRITZ has them all and will find the best set-up for your particular requirements. A wide variety of design features, such as air distribution plates and different types of heat exchangers, enables ANDRITZ to put together the ideal fluid bed for your application.



**CUSTOMIZATION  
IS OUR  
STANDARD**

# System approach for fully tailored equipment

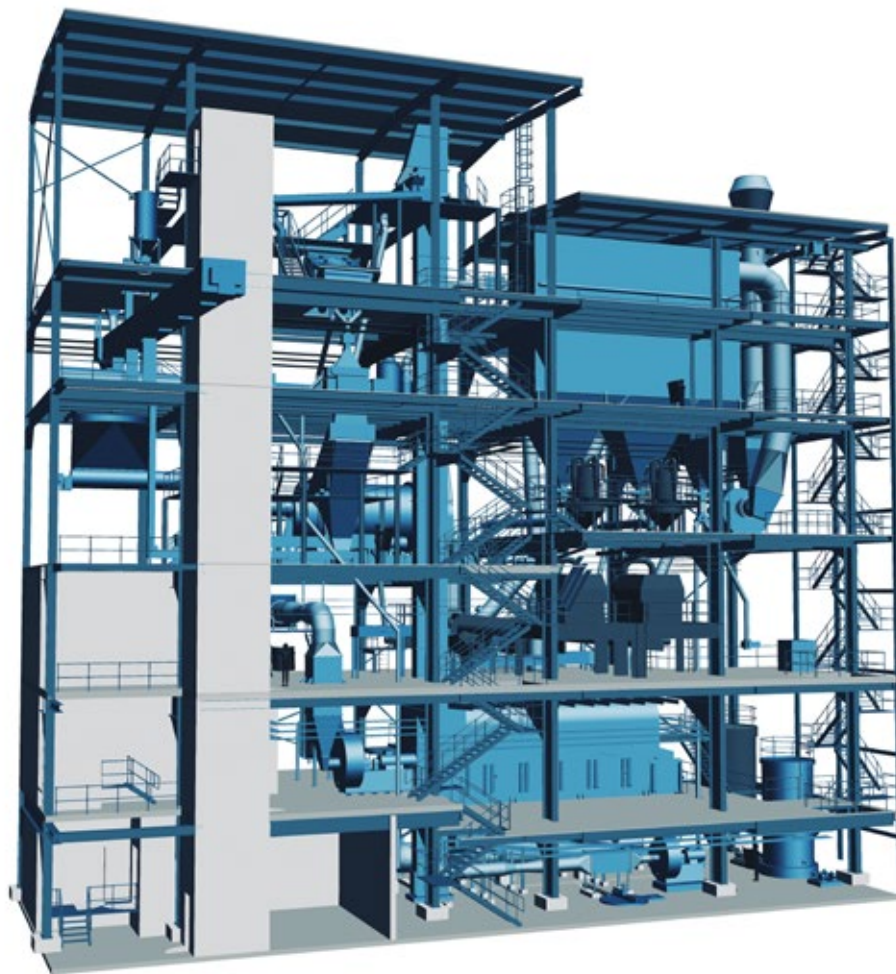
A fluid bed system requires auxiliary equipment that needs to match the core apparatus. As ANDRITZ knows very well which equipment will fit for your specific unit and application, ANDRITZ usually supplies complete packages containing all the required ancillaries. Of course, the particular scope will be adapted to your special requirements and wishes. ANDRITZ is flexible enough to offer everything from single equipment units to turnkey installations with a full engineering, project management, and site supervision package, taking care of your drying project for your peace of mind.

Large throughputs for demanding processes need a closer look and intelligent solutions. As you have to calculate your OPEX on a 24/365 basis, the best set-

up for your application will never come off the shelf. ANDRITZ considers every project as being unique and always strives to match efficiency and operational safety to the best possible extent. The result is an optimized, tailor-made plant set-up, with the right features for long-term and sustainable operation at minimum cost.

## **BENEFITS OF FLUID BED DRYERS**

- Gentle and efficient processing
- Flexible when facing fluctuations
- Combined drying and cooling
- Easy to maintain



Example of the layout for a dense soda ash system using fluid bed technology



# Safe and efficient – the fluid bed operating principle

Fluid bed processing is basically simple and reliable. It was first used for industrial purposes in the 1920ies. Almost one hundred years later, the technology is well established in all areas of bulk material processing.

The key unit is a metal housing (1) with a gas distribution plate (2) that holds up the product (3). Fluidizing gas (4) that is blown down to the bottom chamber (5) penetrates the floor, making the product particles levitate, and bringing them to a fluid-like state. As fluidization is self-regulating in a wide range of gas velocities, the technology provides stable processing and is quite resistant to fluctuations in feed rate, moisture, and other changes in process conditions.

The wet product (6) is fed directly to the fluidized layer (3), where it is immediately mixed with warm and dry

material. Mixing as well as transport through the product chamber are provided by the hydraulic characteristics of the fluidized layer itself. The final product is discharged from the fluid bed through an overflow opening (7). The mechanical impact on the particles is negligible so the fluidization process does not lead to substantial particle attrition. The exhaust gas containing vapor and dust leaves the dryer through its suction hood (10) leading to the exhaust gas nozzle (11).

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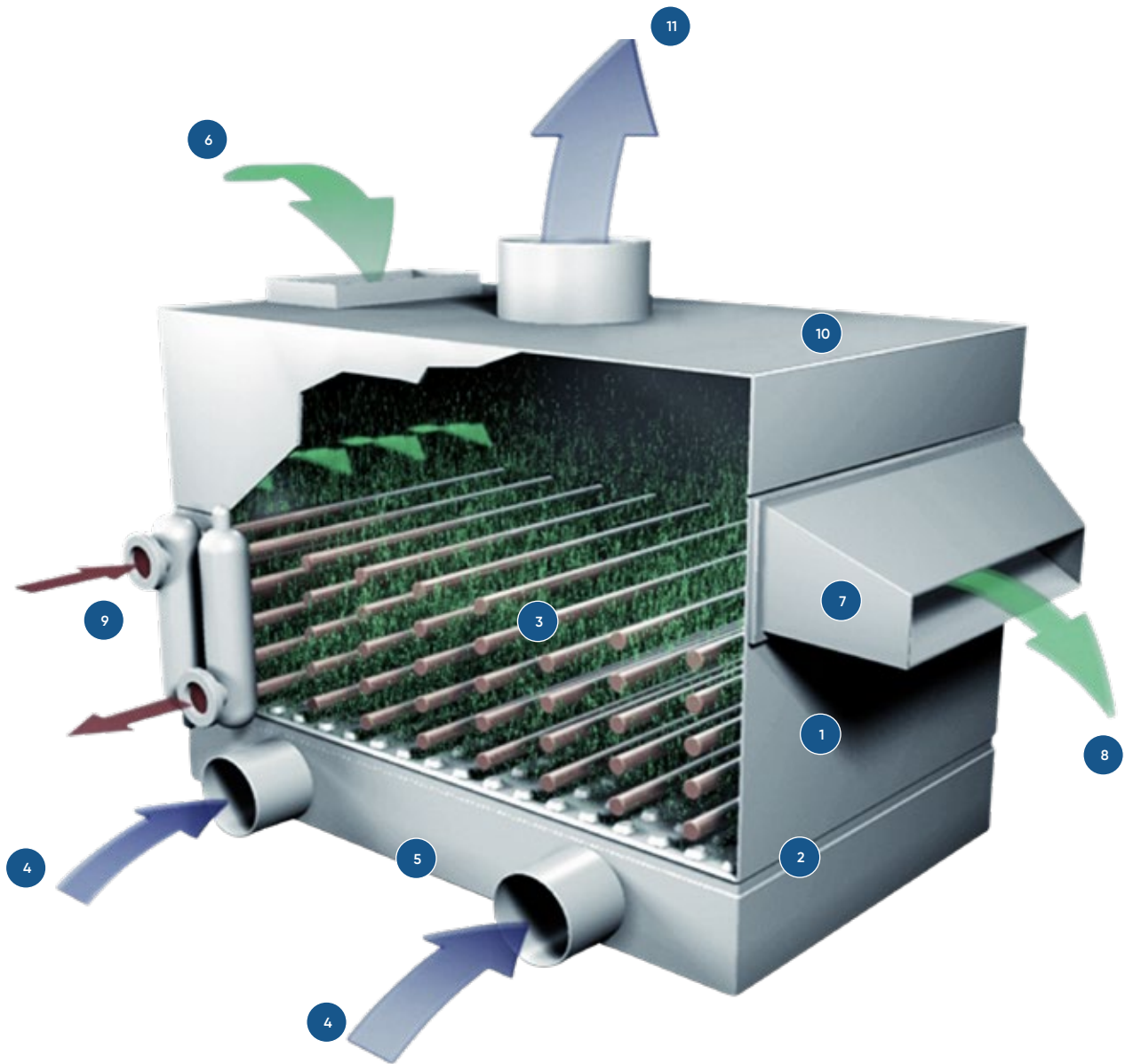
To make the principle work for sophisticated applications and provide safe and efficient processing, ANDRITZ has implemented a number of groundbreaking innovations:

**Improved efficiency**  
by including heat exchangers (7) in the fluidized layer

Special design for supply gas **temperatures up to 800 °C**

Spray granulation and sludge feeding systems for **direct feed of liquids, pastes, and sludges**

Customized gas distribution plates for **transport of large agglomerates and foreign materials** through the dryer, even without fluidization



- |                          |   |
|--------------------------|---|
| ① Housing                | ⑦ Overflow weir                                     |
| ② Gas distribution plate | ⑧ Dry product discharge                             |
| ③ Product layer          | ⑨ Intermediate section with internal heat exchanger |
| ④ Fluidizing gas         | ⑩ Suction hood                                      |
| ⑤ Wind box               | ⑪ Offgas containing evaporated water and dust       |
| ⑥ Wet product feed       |   |

# ANDRITZ fluid bed drying technology, the right choice

Drying is the final stage in the production process of most bulk materials. An optimized combination of mechanical dewatering and drying is essential to create a high-value product with excellent opportunities on the market. In times of increasing costs for energy and a growing awareness of environmental impacts, selection of the right drying technology is crucial in terms of:

- Product quality
- Efficiency
- Profitability
- Operational safety
- Reduced ecological footprint

The best choice may be complex as there are many dependencies, starting with your traditional preferences and continuing with the available utilities, safety considerations, and moving on to product properties, space requirements, and much more.

## EXPERIENCE THAT COUNTS

Fluid bed processing is basically simple, but its design needs a lot of know-how and experience. Many parameters have to be considered when it comes to selecting the right fluid bed system:

- **Drying characteristics:** Each product has its own drying behavior. ANDRITZ considers your material's particular characteristics, no matter if there is only free evaporation of surface water, temperature-driven evaporation of capillary moisture, or drying to the extent where the remaining moisture is determined by phase equilibria. The required flow pattern can also have an impact on selection of the correct dryer. Plug flow characteristics can be achieved with vibrating fluid beds or adequate separation of a static fluid bed into several processing chambers. CSTR characteristics are achieved with deeper fluidized layers and adequate mixing.
- **Feed material properties:** Depending on moisture content and specific properties like stickiness and electrostatic behavior, ANDRITZ can apply several mechanisms for pre-treatment. Starting with solutions for sludges and for pasty to spreadable materials, ANDRITZ provides the right product treatment and the most suitable fluid bed type for your specific material.
- **Heat source:** The wide variety of fluid bed dryer types allows ANDRITZ to use the full range of available heat sources. Convective dryers can be operated with flue gas or directly fired gas heaters. HDC dryers can use heating agents like steam, thermal oil, or hot water.



Each ANDRITZ fluid bed apparatus is fully customized to clients' requirements.

# An unmatched portfolio to meet your requirements

Fluid bed dryers are available for various industries, from the environment to biomass, to food and animal feed, and on to minerals and chemicals.

	Fluidized area*	Hot air temperature*	Water evaporation*	Particle size*
Convective dryers/ coolers DDC	0.2–90 m <sup>2</sup>	up to 800 °c	up to 10 t/hr	50µm–3mm
Vibrating dryers/ coolers VDC	0.6–24 m <sup>2</sup>	up to 300 °c	up to 6 t/hr	50µm–10mm
Heat exchanger dryers/ coolers HDC	0.6–100 m <sup>2</sup>	up to 300 °c	up to 33 t/hr	50µm–6mm
Spray granulators SGS	0.3–86 m <sup>2</sup>	up to 650 °c	up to 15 t/hr	0.5mm–4mm

\* Typical values – Can differ depending on application and product



Fluid bed dryer/cooler DDC for salt



Fluid bed dryer/cooler HDC for PVC



Spray granulator SGS for calcium chloride



Fluid bed dryer/cooler VDC for sodium sulfate



# Simple and effective

## Convective fluid bed DDC

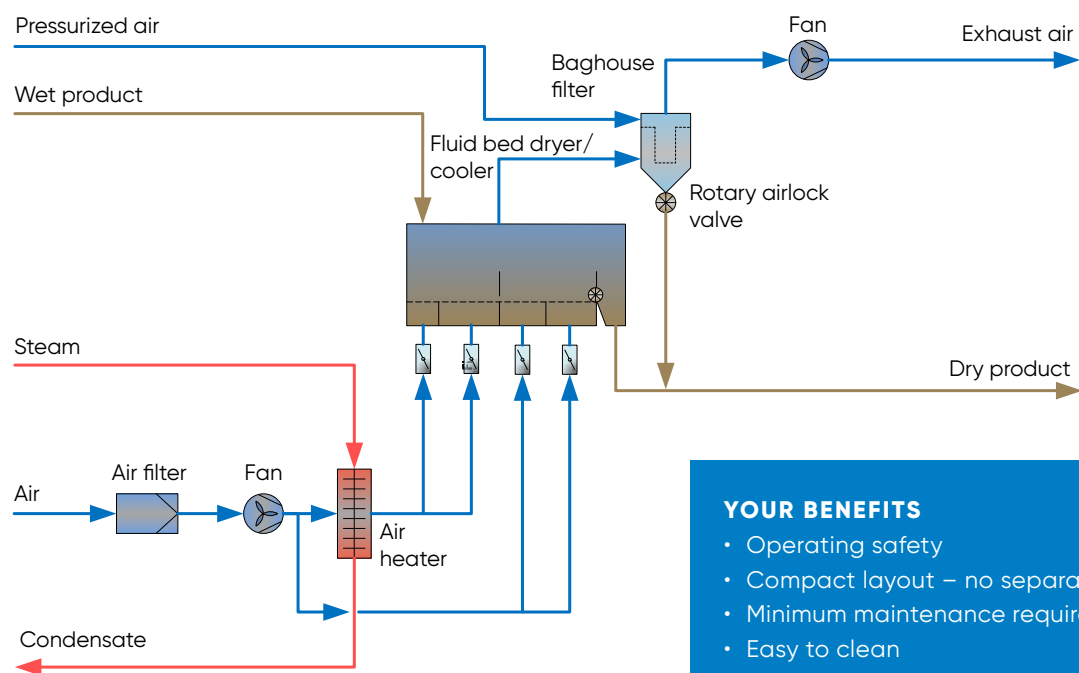
The most basic type of fluid bed comes with a static housing and without internal heat exchangers. Heating or cooling is performed by convection from the fluidization gas, and product transport through the unit is provided by the hydraulic-like characteristic of the fluidized layer. Although our typical design comes with a rectangular footprint, we can also supply a round design for special applications, for example high supply gas temperatures or increased operating pressures.

### BEST FIT

- Products with medium to good flow characteristics
- Products with uniform and constant particle size distribution

### FEATURES

- Simple and reliable set-up
- Several air supply sections for proper flow adjustment during operation
- Flexible heat supply options
- Largest variety of gas distribution plates
- Drying and cooling in one single unit
- No moving parts, no wear parts



Typical system set-up with a DDC fluid bed dryer

### YOUR BENEFITS

- Operating safety
- Compact layout – no separate cooler required
- Minimum maintenance requirements
- Easy to clean
- High safety standards



# Reliable processing for any product

## Vibrating fluid bed VDC

Vibrating fluid beds are used for handling products with poorer fluidization properties. Vibration together with directed or non-directed gas flow provides an optimized process for gentle drying with controlled residence time. Our vibrating units are also available in pressure-shock resistant and sanitary design.

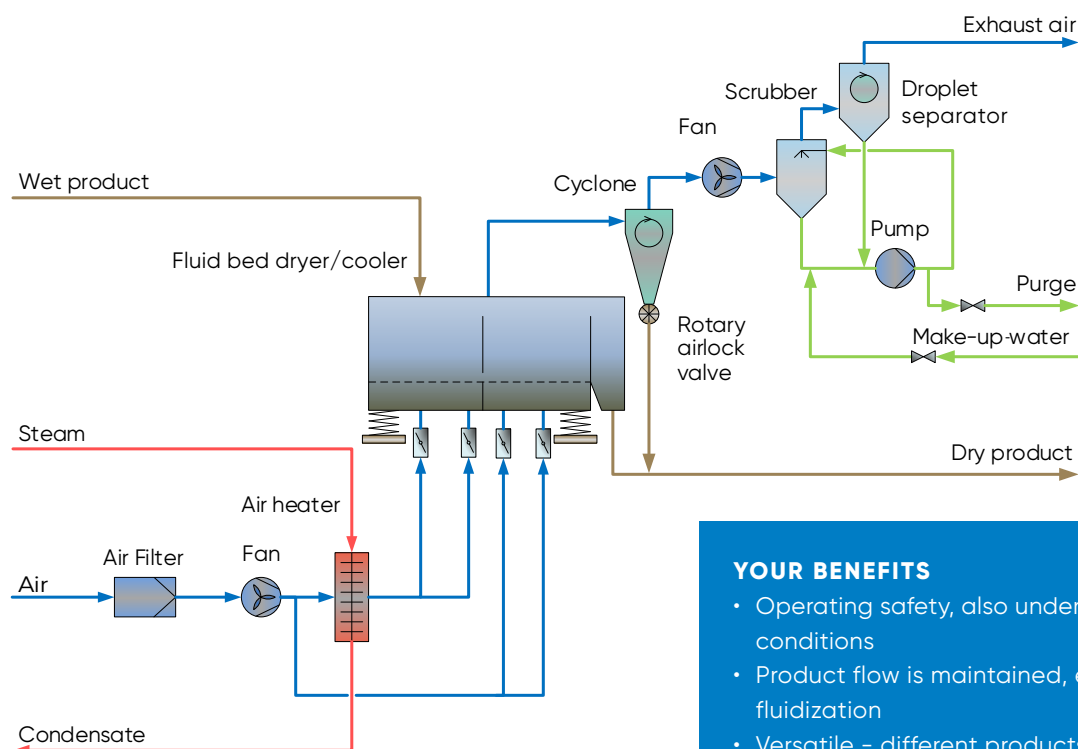
### BEST FIT

- Products with critical properties: fibers, sticky materials
- Particles with a broad size distribution range
- Coarse materials
- Multi-purpose applications

### FEATURES

- Several gas supply sections for proper flow adjustment during operation
- Flexible heat supply options
- Drying and cooling in one single unit

- High acceleration forces
- Hygienic design available
- Plug flow characteristics with distinctive temperature/moisture profile
- Suitable for food and animal feed



Typical system set-up with a VDC fluid bed dryer

### YOUR BENEFITS

- Operating safety, also under fluctuating conditions
- Product flow is maintained, even without fluidization
- Versatile – different products can be processed with the same equipment

# High capacities at maximum efficiency

## Heat exchanger fluid bed HDC

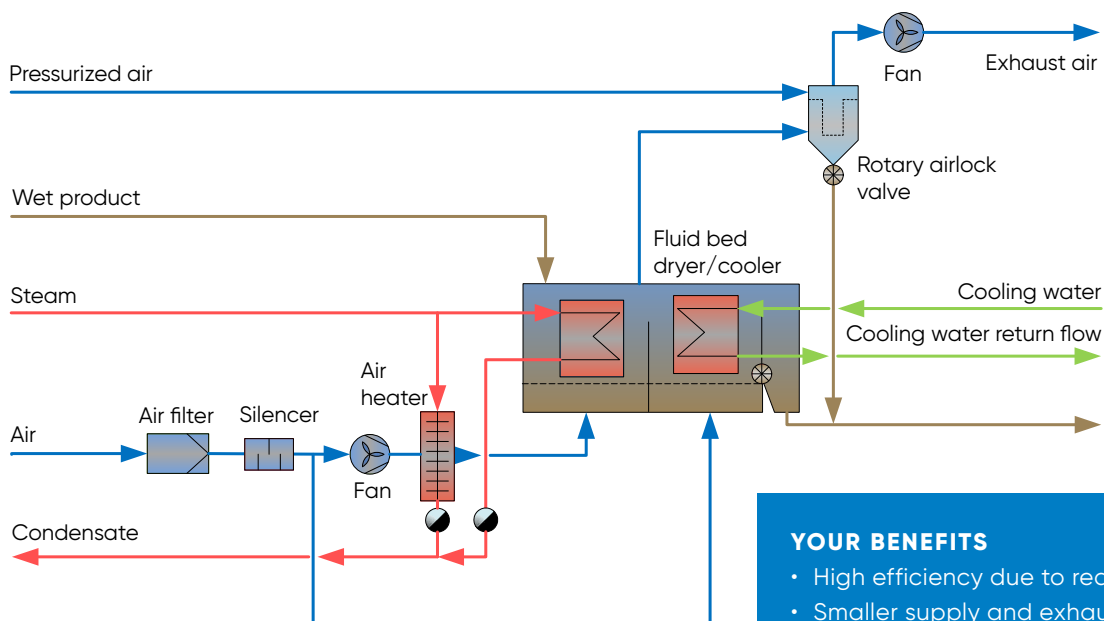
The use of internal heat exchangers inside the fluidized layer was an important step for fluid bed technology, allowing high-performance drying and cooling in one unit. The combined use of convection and conduction allows large amounts of heat to be transferred in a compact set-up. It also makes fluidization and heat input independent of one another. Due to the reduced amounts of fluidizing gas, the auxiliary equipment required for gas treatment is much smaller. Systems efficiency is improved because there are less exhaust gas losses. The static system set-up also allows the unit to be run in a closed loop under inert conditions with highest safety standards.

### BEST FIT

- Applications and products with medium to high mass flow rates
- Commodities
- Products with temperature limitation

### FEATURES

- Combined convection and contact heat transfer
- Deep fluidized layers
- Large variety of proven heat exchanger designs
- Minimized gas flow rates
- Suitable for steam loop operation
- Low-temperature drying



Typical system set-up with an HDC fluid bed dryer

### YOUR BENEFITS

- High efficiency due to reduced offgas losses
- Smaller supply and exhaust air equipment for reduced amounts of fluidizing gas
- Smaller footprint than convective systems
- Highest safety features with inert closed loop operation





# From liquid to bulk in only one step

## Spray granulator SGS

Spray granulation in a fluid bed is a smart technology to combine several process steps in a single piece of equipment. Whenever it is reasonable or necessary to start thermal drying from a liquid phase, spray granulation is the first choice. The liquid feed material is atomized in suitable nozzles and sprayed onto the surface of the granules inside the bed. As the liquid phase evaporates, the granules grow in layers, like an onion. The result is a stable and spherical granulate with controlled properties like shape, density, hardness, and particle size.

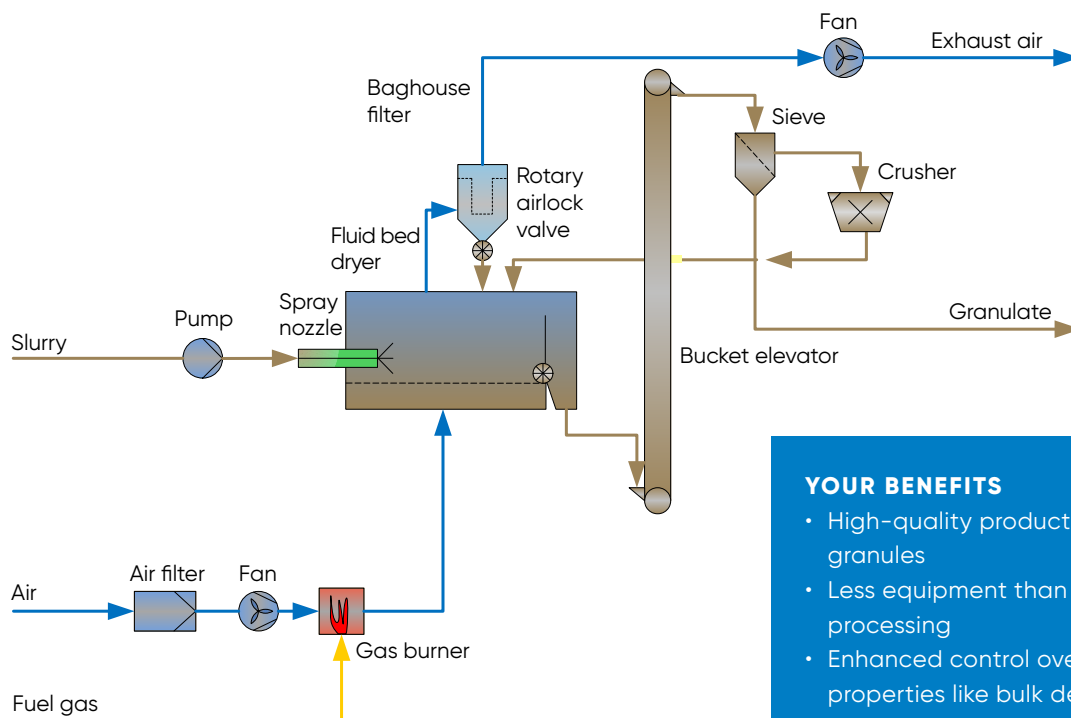
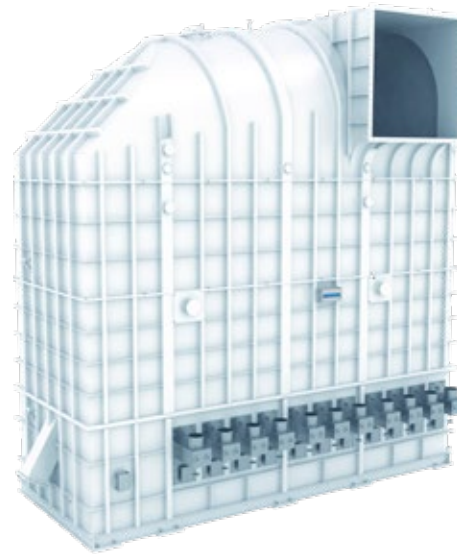
### BEST FIT

- Solutions
- Suspensions
- Melts

### FEATURES

- Direct processing from liquid to dry granules
- Evaporation, granulation, and drying in one single unit

- Flexible configurations (side spray, bottom spray, top spray)
- Spherical particles of controlled size



Typical system set-up with an SGS fluid bed dryer

### YOUR BENEFITS

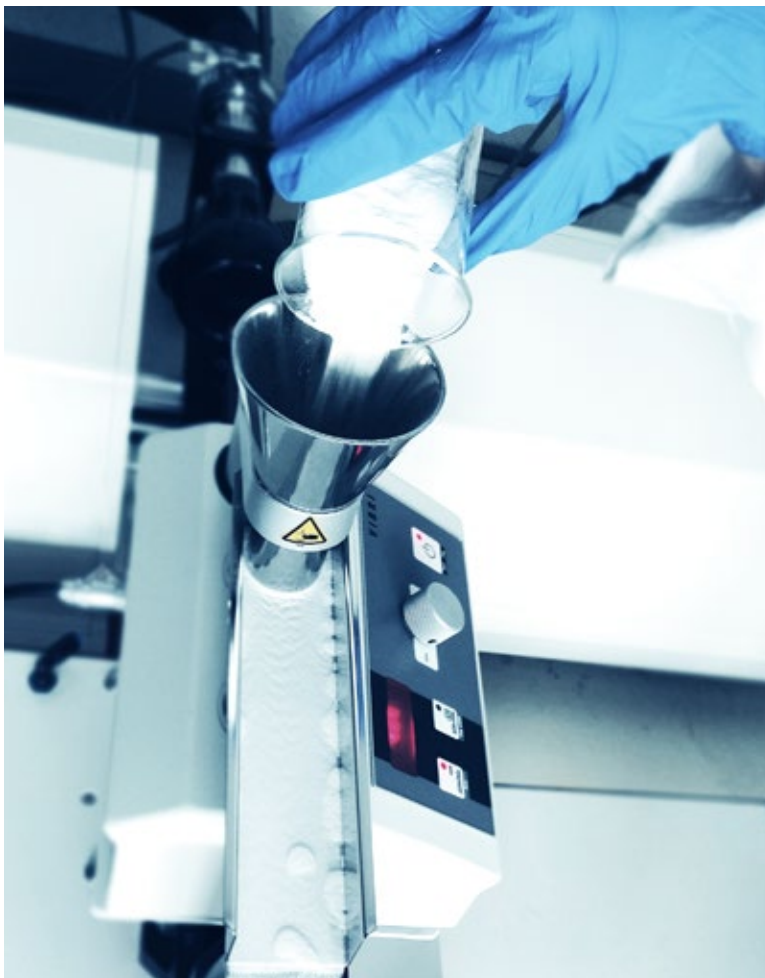
- High-quality products with spherical granules
- Less equipment than conventional processing
- Enhanced control over product properties like bulk density, PSD, etc.
- Excellent handling features due to free-flowing, dust-free product
- High single-line capacities

# A reliable technology for your peace of mind

## LED BY INNOVATION

Research and development always were and are a key focus of ANDRITZ's business. As fluid bed technology became popular for a lot of products all over the world, ANDRITZ's focus was set on the more sophisticated applications with challenging requirements in terms of operating safety and sustainability. In its test lab and pilot plant, ANDRITZ can establish the right process set-up and derive specific parameters for your drying/ cooling or granulation challenge.

The dedication to innovation and advanced technology also extends to the project execution mode. ANDRITZ was one of the first medium-sized plant manufacturers to use 3D modeling and works with the most recent management software and simulation tools. However, the level of standardization is kept to a range that still allows high flexibility and responsiveness to adapt your particular system set-up to your exact needs.



## SAFETY

Using their long-term experience in drying of hazardous substances, the ANDRITZ specialists choose the safety measures that are the best fit for your installation.

## LAB-SCALE AND PILOT FLUID BED PLANT FOR TESTING AND DRYING

ANDRITZ's R&D center with its qualified personnel and integrated laboratory is at your disposal to develop your process or examine your specific tasks. It handles products in the form of solutions, suspensions, pastes, filter cake (dry sludge), or bulk solids and has capacities for development of components and processes and for providing product samples (over 2,100 products already tested on lab and pilot scale).





Pilot plant in ANDRITZ test centre



# Intelligence for machine and process control

With Metris addIQ, you have a well-proven, intelligent control solution for industrial processes and machines. Our solid/liquid separation specialists use their in-depth expertise to provide scalable solutions that are individually tailored to regional and application requirements. Whether you're automating new equipment or upgrading to extend the lifecycle of existing systems, we find the ideal solution for you.

## **METRIS addIQ CONTROL SYSTEMS**

Our tailored turnkey systems from a single supplier can improve entire plants or individual machines. By providing state-of-the-art automation technologies and digitalization, we ensure best-in-class performance. Automating machine and plant equipment measurably reduces gaps in many different production process steps. By using automation from ANDRITZ, you can reduce downtime thanks to features such as predictive analysis that allow you to optimize productivity.

Metris addIQ covers all levels of automation, starting at basic automation (machine, process, and plant control), to upgrades, and add-ons for process optimization. Together, you have a full range of optimized solutions that help reduce maintenance efforts and ensure preventive service for your machines and plants. These are all delivered from a single source and always individually tailored to your business demands. addIQ control systems are part of Metris, the ANDRITZ brand for digital solutions.

ANDRITZ offers a broad and constantly growing range of innovative products and services in the industrial digitalization sector under the brand name Metris, helping customers to enhance plant efficiency and profitability, optimize the use of resources, achieve constant and highest product quality, reduce production downtime, and maximize user-friendliness.



# Your full-service provider

With ANDRITZ, you gain access to one of the world's largest OEM manufacturers for solid/liquid separation systems, including such well-known brands as 3Sys Technologies, Bird, Delkor Capital Equipment (Pty) Ltd., Escher Wyss dryers, Guinard Centrifugation, KHD Humboldt Wedag, Krauss-Maffei centrifuges, dryers, and filters, Lenser, Netzsch Filtration, Rittershaus & Blecher, Royal GMF Gouda, Sprout Bauer, and Vandenbroek.

Whether you need spare parts, rentals, local service, repairs, upgrades, or modernization of your equipment, ANDRITZ is your true full-service provider. From initial consulting through to service agreements, process optimization, and training programs, we are always looking for ways to minimize downtime and increase

predictability in operations while raising your overall production efficiency. Wherever you operate, our network of 550 service specialists and global service centers ensures we'll always be there to support you for many life cycles to come. Let's sit down and see how we could take your operations to the next level.



#### LOCAL SUPPORT

Responsive local service centers and field service technicians



#### REPAIRS & UPGRADES

Optimization of machine and process performance, repair work, retrofitting, and modernization



#### SECOND-HAND & RENTALS

Certified second-hand and rental machines



#### TRAINING

Operator training and tailored seminars for operating and maintenance personnel



#### OEM SPARE PARTS

Filter cloths, spare and wear parts from OEMs or with OEM level quality, all readily available



#### SERVICE AGREEMENTS

Preventive maintenance, contracts for spare parts, maintenance, inspections, repairs, upgrades, operation, and equipment monitoring



#### PROCESS OPTIMIZATION

Automation tools and process expertise to boost your profit



#### LAB AND ON-SITE TESTS

Lab and testing capabilities for process optimization and machine upgrades



## WHAT'S YOUR SEPARATION CHALLENGE?

ANDRITZ Separation is the world's leading separation specialist with the broadest technology portfolio and more than 2,000 specialists in 40 countries. For more than 150 years, we have been a driving force in the evolution of separation solutions and services for industries ranging from environment to food, chemicals, and mining & minerals. As the OEM for many of the world's leading brands, we have the solutions and services to transform your business to meet tomorrow's changing demands – wherever you are and whatever your separation challenge. **Ask your separation specialist!**

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