



A

SEPARATION

# MAXIMUM RELIABILITY IN SOLID/LIQUID SEPARATION

KRAUSS-MAFFEI  
PUSHER CENTRIFUGE SZ

**ANDRITZ**

ENGINEERED SUCCESS

# Maximum process reliability

Looking for reliability in performance? Proven, yet innovative separation technology? With a one-of-a-kind maintenance concept? An experienced supplier who thinks outside the box? Combining all these factors with its Krauss-Maffei pusher centrifuge SZ, ANDRITZ offers you a solution that runs as continuously as your process is intended to be.

In continuous solid/liquid separation, Krauss-Maffei pusher centrifuges successfully combine the features of high availability with minimum maintenance and reduced specific space requirement. Especially suited for fast filtering products at high throughput rates, our pusher centrifuges are the right choice for reliable and effective dewatering. A variety of washing modes and machine sizes are available in order to meet the individual quality requirements of your final product.

Krauss-Maffei pusher centrifuges were launched on the market over 80 years ago and have been applied since then in over 5,000 installations around the globe.

With these numbers comes a wealth of experience gained in industrial applications from food to bulk chemicals, plastics, fiber, or mining and mineral applications, and the track record keeps on running.

## PROCESSING PARAMETERS

Average particle size	100-10,000 µm
Solids throughput	Up to 150 t/h
Solids recovery	Up to 99 % by wt.
Feed solids concentration	Up to 80 % by wt.
Basket diameter	250-1,250 mm

## MAIN APPLICATIONS

### Bulk chemicals

- Sodium sulfate
- Soda
- ZLD
- Lithium hydroxide
- Many more

### Agrochemicals

- Ammonium sulfate
- Monoammonium phosphate (MAP)
- Potash
- Many more

### Plastics

- ABS
- Paraxylene
- Polycarbonate
- Adipic acid
- Many more

### Foodstuff

- Sodium bicarbonate
- Sodium chloride
- Citric acid
- Many more

## CONSTRUCTION MATERIALS

- Austenitic steels
- Duplex steels
- Nickel-based alloys
- Titanium



## PROCESSING ADVANTAGES

### Outstanding product quality

- Highly efficient cake washing modes
- Minimum particle breakage due to unique feed system design
- Selection of screen configurations designed for your product, for minimized product loss and maximized dewatering properties

### Unmatched capacity

- Patented PreFiltration Technology for integrated thickening and maximum flexibility
- Highest pusher volume
- Patented application specific feed systems
- Multistage centrifuges with 1, 2 or 3 stages available

### In-depth process know-how

- Globally distributed process labs for trials and scale up tests
- Experienced process engineers
- Broadest separation product portfolio

### Superior maintenance concept

- Innovative cartridge system patented by ANDRITZ provides minimum production downtime
- Unique pusher shaft sealing for unrivalled process reliability
- Extended lifetime of screens by using efficient, pre-accelerating feed distributor
- Maintenance-free internal pusher control unit
- Optimized wear parts offer fast replacement

## YOUR BENEFITS

- Unmatched price-performance ratio
- Perfect mix of innovation and experience
- High flexibility and high product quality
- Cartridge system for minimum downtime
- PreFiltration Technology for integrated thickening
- Process expertise with pusher centrifuges for over 80 years



Krauss-Maffei pusher centrifuge SZ

# Operation

## FUNCTION

Krauss-Maffei pusher centrifuges are continuously operating centrifuges. The product is fed through a feed pipe (or feed screw in the case of products that do not flow freely) into the feed distributor, which rotates with the basket. This accelerates the slurry and feeds it with uniform distribution to the feed zone, where the greater part of the liquid (approx. 80%) is filtered. In the feed zone, the solids grow to form a stable filter cake ring. The filter cake is conveyed in the direction of the solids discharge stroke by stroke due to the relative axial movement between pusher bottom and screen basket. During this process, an intact filter cake forms over the entire length of the screen. As the filter cake progresses from the feed zone to the solids discharge, it can be washed as required. For this purpose, a wash liquor is applied to the cake surface, displacing the suspension liquid and impurities. The solids are discharged at the end of the basket after each pusher movement.

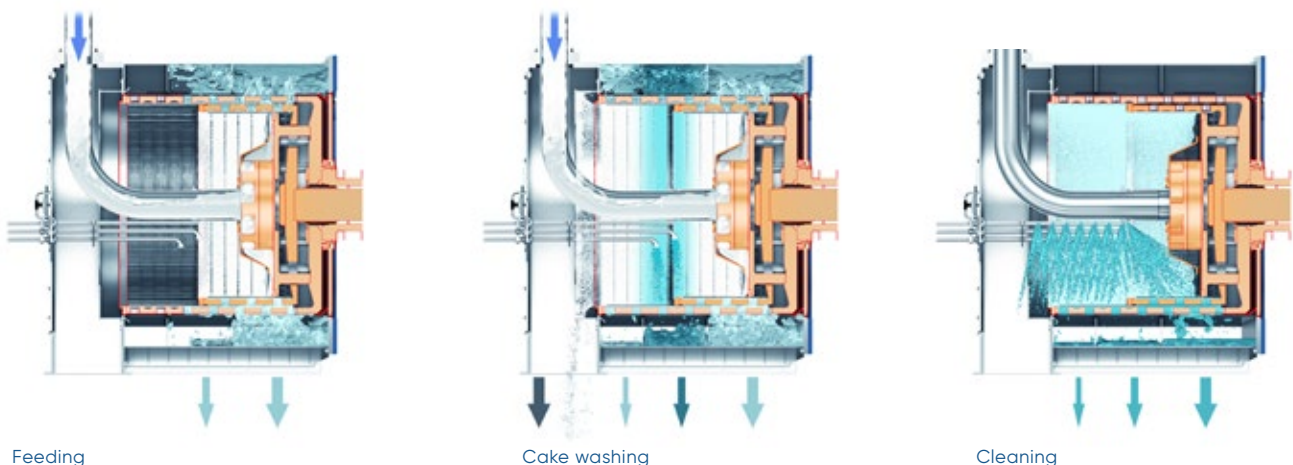
## FEED CONDITIONS

For machine size optimization and maximum operating reliability, it is important to provide a uniform and concentrated slurry feed. As upstream equipment such as crystallizers or reactors frequently do not meet these requirements satisfactorily, a prethickener system is usually applied. This system levels out fluctuations in the feed conditions and minimizes the hydraulic load of the centrifuge, often resulting in a smaller machine size being selected. Stationary or dynamic equipment have become established as pre-thickeners,

depending on the type of application. Examples of stationary equipment are sedimentation tanks and thickener filters, while examples of dynamic equipment include bent screens, hydro-cyclones, vibration screens, and EC screen thickeners. As an alternative, the PreFiltration Technology can be applied. The PreFiltration Technology adds an integrated thickening stage and allows the pusher centrifuge to process twice as much more liquid than any regular pusher centrifuge. This makes the machine much more flexible and less sensitive to changing feed conditions without requiring any additional upstream equipment.

## FEEDING

The feed system has the most significant impact on operation of the centrifuge. The patented, vane-type feed distributor from ANDRITZ diverts the slurry flow in the direction of the rotating basket, pre-accelerating the slurry and distributing it uniformly in the feed zone in order to achieve smooth cake formation. Uniform distribution of the slurry is the basic requirement for trouble-free operation of the centrifuge. The slurry is pre-accelerated to such an extent that the difference between the speed of the slurry and the screen is practically zero. In this way, particle attrition is reduced markedly in comparison with other feed systems. This results in a higher throughput, lower residual moisture, and a reduced loss of small particles in the filtrate. Additionally, machine running is smoother and quieter, and wear is reduced.



Feeding

Cake washing

Cleaning

**FILTRATION**

In addition to pre-acceleration, the residual moisture can be influenced by residence time of the product in the centrifuge. The residence time is usually between 10 and 60 seconds. It is mostly dependent on the adhesion factor between the product and the filter media. With different configurations of screens and baskets, the residence time during operation is optimized and adjusted to the actual throughput rates. There is a wide range of screens available, providing the optimum filter media for a variety of separating tasks. The width between the slots and the screen profile are adjusted to the optimum setting for the respective product. The screen slot widths generally range between 0.1 and 0.5 mm.

**CAKE WASHING**

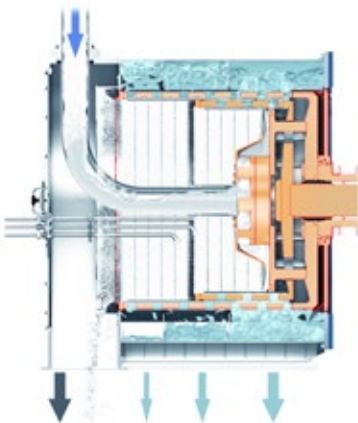
The filter cake can either be washed with a single washing pipe or with several washing pipes. Washing efficiency is very high, especially in multi stage centrifuges. The filter cake is loosened up and reshaped when moving to the next larger basket. As a result of this re-shaping process, impurities that remain between the particles are exposed and washed out by the washing liquor.

**CLEANING**

The pusher centrifuge can be cleaned automatically with a wide range of CIP nozzles distributed inside the basket and the process housing. A unique feature on the market is cleaning not only of the rear basket wall, but also of the space between each rear basket wall and the pusher bottom without requiring any dismantling work.

**DISCHARGE CONDITIONS**

The two flows of filtrate and solids are discharged separately from the machine. It is important that there is no filtrate build-up during this process. As the baskets have the effect of a fan, filtrate and vapor are frequently mixed, although vapor in the filtrate flow is not desirable in most cases. To avoid this, the filtrate flow is subjected to further separation in a degassing cyclone. The vapor is either fed back to the centrifuge housing or discharged to a ventilation system. During solids discharge, it is important that the product is ejected without product congestion or deposits. The solids discharge must be designed differently depending on the properties of the product.



Discharge



Vane-type feed distributor



Special discharge design



# Designs, drives, and applications

## **DRIVES FOR ROTARY AND PUSHER ACTION**

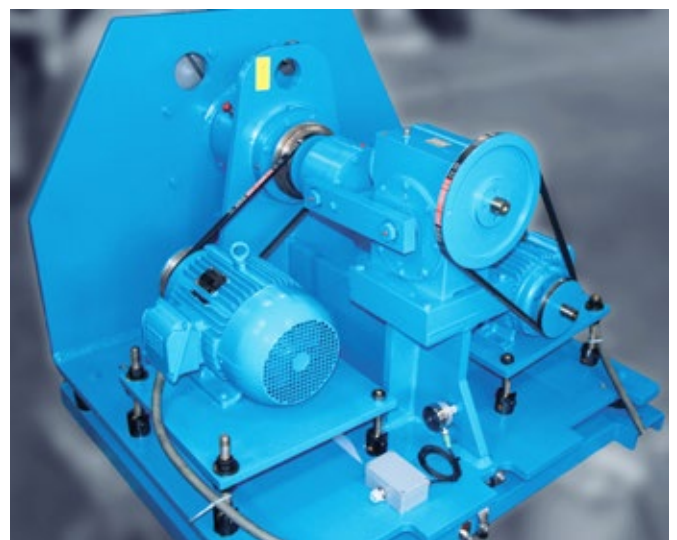
Krauss-Maffei pusher centrifuges use two drives: one for the rotary motion and one for the oscillating pusher motion, and both are controlled independently of one another. While the purpose of the rotary motor is to generate the required centrifugal force the purpose of the pusher motor is to generate the axial, alternating pushing force that moves the solid cake step by step through the centrifuge.

## **HYDRAULIC PUSHER DRIVE**

Pusher centrifuges with a hydraulic pusher drive offer very high throughput rates as a result of their high pusher force and high G-force. Machine sizes with a basket diameter of 630, 800, 1,000, and 1,250 mm are fitted with a hydraulic drive arrangement, while it is optional for the machines with a basket diameter of 400 and 500 mm. The pusher motion is generated in machines with hydraulic drive by alternating admission of hydraulic oil to the rotating pusher cylinder. In this process, the exact quantity of oil required is pre-accelerated. This is a benefit compared to systems with bypass regulating, resulting from distinctly lower energy consumption with reduced cooling and drive outputs.

## **MECHANICAL PUSHER DRIVE**

With the mechanical drive, a worm screw is driven by a motor via a V-belt. An eccentric converts the rotary motion of the gear output shaft into a pusher motion. Pusher centrifuges with a mechanical drive are extremely maintenance-friendly. This is because no significant maintenance work is required apart from regular lubrication of the bearings. The individual drive components can be replaced without disassembly of the centrifuge. A major advantage: The machine does not require cooling water. Machines with a basket diameter of 250, 315, 400, and 500 mm are fitted with the mechanical drive system.



Mechanical drive with eccentric

# Tried and tested from A-Z

The application spectrum of pusher centrifuges ranges from the processing of minerals to the dewatering of highly specialized plastics.

## SODA

In the soda industry, pusher centrifuges are used to dewater a wide range of sodium carbonate compounds. The process engineering requirements vary from product to product: Some products are sticky, with caking tendency, while others require specific temperature control. ANDRITZ is able to provide tailor-made solutions based on the experience it has gathered.

## POTASH

Pusher centrifuges in the potash industry have to meet the following requirements:

- High wear resistance
- High throughput rate
- Low energy consumption

Our experience in processing potash has resulted in a unit with many special wear-resistant features, yielding longer service life with minimal downtime for maintenance by using the cartridge option.

## ADIPIC ACID

The requirements in dewatering of raw, pure, and superpure adipic acid are:

- Protection of the operating personnel and the environment against nitrous gases
- High level of purity in the final product
- Protecting the particles against breakage.

Krauss-Maffei pusher centrifuges meet these demands by using a gas-tight housing, two-stage backwashing to achieve product purity, and gentle handling of the feed with our patented, vane-type feed distributor

## SODIUM CHLORIDE

High product quality, low costs, and high performance are requirements for processing such bulk products as sodium chloride. Krauss-Maffei pusher centrifuges, with their continuous dewatering operation, meet these requirements right down the line. They are extremely reliable and feature high availability as a result of the unique ANDRITZ maintenance concept.

## ABS

Dewatering of ABS is a major application for Krauss-Maffei centrifuges. In those applications with large particle sizes, pusher centrifuges offer many benefits:

- Gas-tight design and special gas control system minimize the risk of a dust explosion
- High surface quality finishes to avoid plugging and caking of the product
- Compliance with ATEX safety regulations for hazardous processes

## APPLICATIONS FROM A-Z

Acrylonitrile butadiene styrene (ABS), adipic acid, ammonium chloride, ammonium phosphate, ammonium sulfate, borax, BPA, calcium nitrate, citric acid, copper sulfate pentahydrate, dicalcium phosphate, ferrous sulfate heptahydrate, ferrous sulphate, glauber salt, high density polyethylen (HDPE), iron sulfate, lithium chloride, lithium hydroxide, lysine, melamine, methylmethacrylamide, mixed salts, monoammonium phosphate (MAP), nickel sulphate, nitro cellulose, NPK fertilizer, paraxylene, PE, phosphates, polycarbonate, polyol, POM, potassium chloride, potassium nitrate, potassium phosphate, potassium residue, potassium sulfate, sodium bicarbonate monohydrate, sodium chlorate, sodium chloride, sodium cyanide, sodium formiate, sodium sulfate, trioxane, urea, zinc sulfate, ZLD, and many more.



Soda production

# Foundation and installation

## ARRANGEMENT AND FOUNDATION

The centrifugal forces produced by rotation of the basket are used to separate the solids from the liquid. If the product is not distributed uniformly in the centrifuge basket, an imbalance may develop. Vibration-isolated mountings are used to keep the dynamic loads exerted on a building to a minimum. This is achieved by installing the centrifuge on a concrete or steel block mounted on spring damper elements.

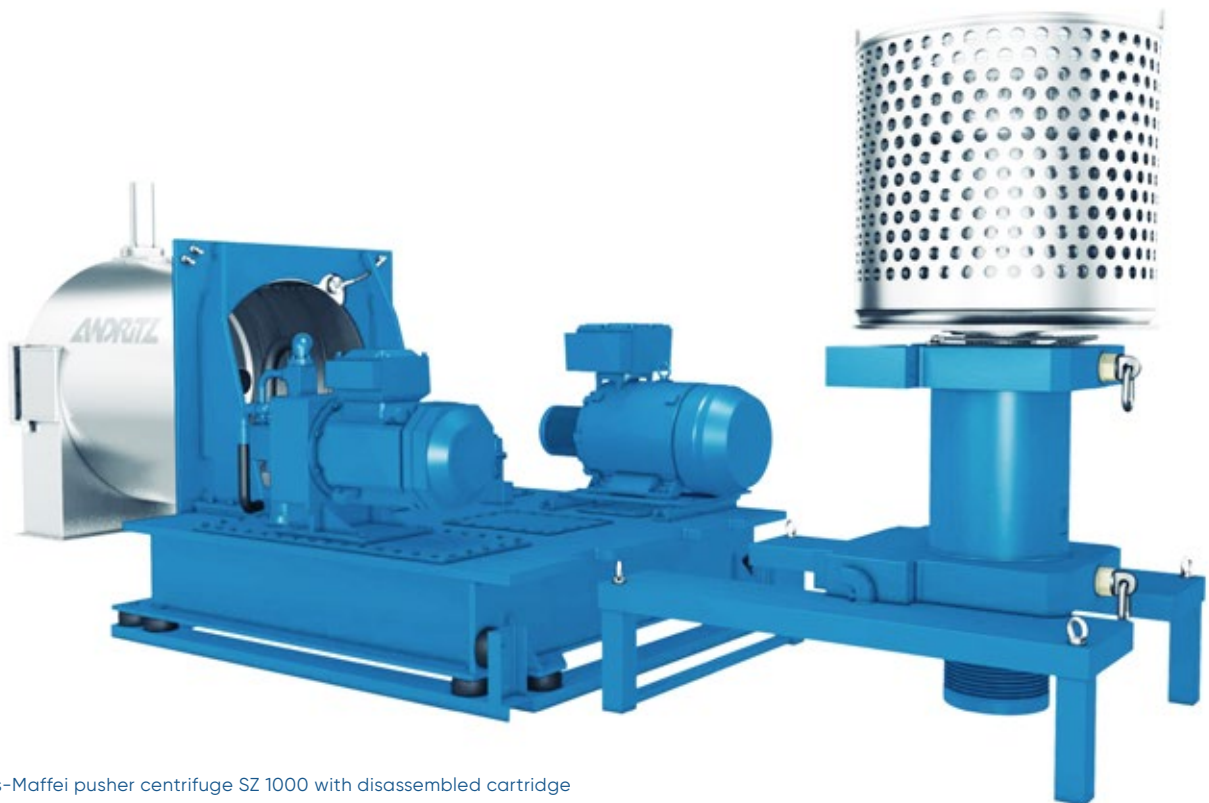
## MAINTENANCE CONCEPT FOR MAXIMUM AVAILABILITY

In pusher centrifuges with a hydraulic pusher drive, the basket, shaft, bearing, pusher drive, and a part of the rear wall combine to form one unit – referred to as the ANDRITZ patented cartridge. This cartridge can be removed in one piece with very little effort. After reinstalling a spare cartridge, all maintenance work on the rotating elements can be carried out in the

workshop area without any time pressure. In this way, downtimes are reduced to a minimum. All connections are available on the process housing and do not have to be removed for maintenance work. For pusher centrifuges with mechanical drives, no significant maintenance is required apart from regular lubrication of the bearings. Large inspection openings and a large door to the process area facilitate access for inspection, maintenance, and cleaning work.

## IMPORTANT GUIDELINES

- Feed pressure should be ~0.5 bar
- Supply pipes as short as possible
- Install all supply and discharge pipes with a maximum gradient
- All connections to the centrifuge must be flexible



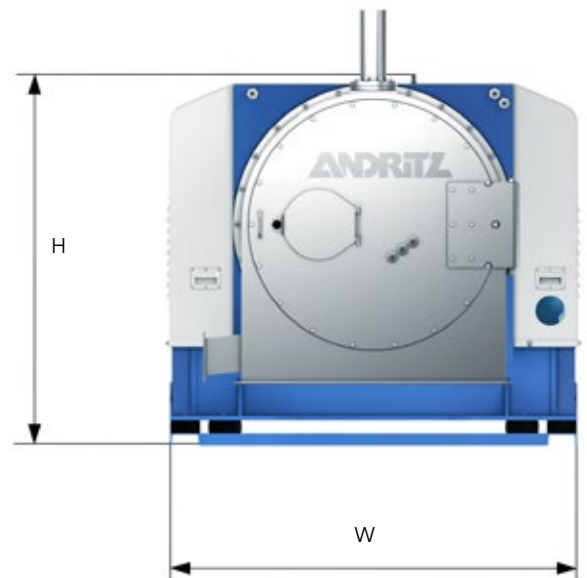
Krauss-Maffei pusher centrifuge SZ 1000 with disassembled cartridge



# Technical data

Model	Nominal diameter [mm]	L [mm]	I [mm]	W [mm]	H [mm]	Operating weight [kg]	Pusher drive
SZ 250	250	1,750	1,000	1,150	970	1,000	Eccentric
SZ 315	315	1,910	1,100	1,250	1,000	1,350	Eccentric
SZ 400	400	2,350	1,400	1,440	1,340	2,300	Eccentric
SZ 500	500	2,870	1,770	1,530	1,130	3,350	Eccentric
SZ 400	400	2,380	1,570	1,470	1,350	3,500	Hydraulic
SZ 500	500	2,530	1,570	1,470	1,350	3,700	Hydraulic
SZ 630	630	3,000	1,780	1,620	1,530	5,300	Hydraulic
SZ 800	800	3,410	2,070	1,950	1,770	8,400	Hydraulic
SZ 1000	1,000	4,060	2,530	2,190	1,950	13,300	Hydraulic
SZ 1250	1,250	4,950	4,000	2,490	2,060	19,500	Hydraulic

Machines are designed with 1, 2, or multiple stages, depending on the application.  
All technical data are approximate and subject to change s without notice



# 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, Frautech, Guinard Centrifugation, KHD Humboldt Wedag, Krauss-Maffei centrifuges, dryers, and filters, Lenser, Netzsch Filtration, Rittershaus & Blecher, Royal GMF Gouda, Sprout Bauer, and Vandebroek.

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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# ANDRITZ

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