



SEPARATION

# EFFICIENT SLUDGE THICKENING AND DEWATERING FOR THE ENVIRONMENT INDUSTRY

DECANTER CENTRIFUGE D

**ANDRITZ**

ENGINEERED SUCCESS

# Centrifugation, an efficient solution to solve your dewatering and thickening tasks

Centrifugation is a mechanical separation process in which two or more materials are separated using centrifugal forces. The demands of a centrifuge depend strongly on the specific application (e.g. flow rates and solids load), the material characteristics (e.g. particle size and abrasion behavior), and the operating environment (e.g. explosion-proof design).



Each machine in the ANDRITZ decanter centrifuge family benefits from an application-specific design. Whether your goal is to separate solids from liquids, two liquids from each other, or even to accomplish both tasks at the same time, our application specialists have an optimal design for you. Thanks to decades of experience with continuously evolving machine designs, our top-of-the-class decanter centrifuges ensure reliable and efficient performance.

#### **FILTRATION VERSUS SEDIMENTATION**

Compared to filtration equipment, centrifugal sedimentation equipment can often achieve the same capacity at a lower investment cost. The sedimentation process can also reach higher flow rates in a continuous mode. Wide variations in feeding parameters can also be accepted.

In sedimentation processes, consumables, such as filter media in filtration processes, are not used. Better capture rates can be achieved by centrifugal sedimentation as washing cycles in the filtration process could reduce the final product capture rate. Sedimentation processes are better able to handle complex products, especially compressible ones, which are difficult to separate in filtration processes.

Washing of sedimentation equipment is easier than with filtration equipment because the filtration equipment's wash water is under pressure, thus larger quantities are used.





# Get more results with less energy

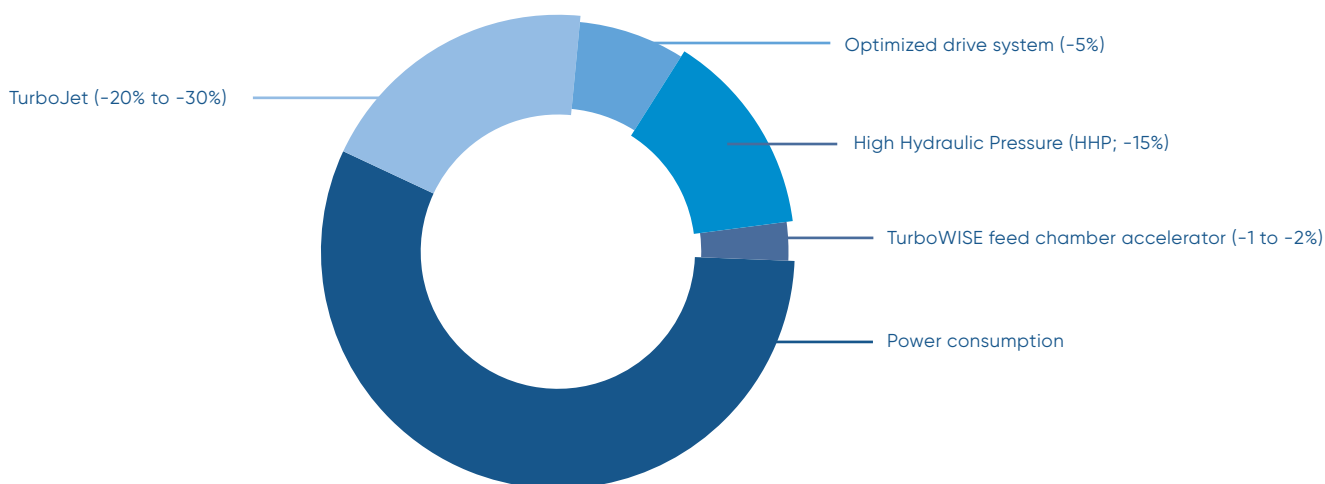
We put all our energy into delivering the best separation equipment so that you never have to waste energy in your decanter centrifuge.

## Energy efficiency

The ANDRITZ decanter centrifuge D has always been at the cutting edge of energy efficiency. We have shaped and improved today's industry standards through a number of technological innovations.

### KEY ENERGY-SAVING FEATURES

- The High Hydraulic Pressure (HHP) design of the rotating assembly reduces the discharge radius of the clarified liquid (centrate). Besides improved separation characteristics, this design helps to recover the kinetic energy of the fluid to reduce energy consumption by up to 15%.
- Working the same way as a jet engine, the TurboJet weir plates recover the remaining kinetic energy of the clarified liquid. By creating liquid jets pointing in the opposite direction to the bowl rotation, the reaction force thus supports bowl rotation. The TurboJet weir plate reduces total power consumption by up to 30% as a stand-alone feature.
- As a standard feature, ANDRITZ offers two drive systems: a regenerative back drive and a direct drive. Whereas common back drive systems dissipate the braking energy of the scroll into heat, the regenerative back drive recovers this energy and feeds it back to the main motor. The direct drive system feeds the scrolling power directly to the scroll and therefore avoids recirculation losses, thus reducing total power consumption by another 5%.
- The unmatched TurboWISE solution is key to performance in the raw material feed chamber. The polyurethane liners of the TurboWISE system can be replaced easily on site and serve to accelerate the incoming slurry efficiently. The computational fluid dynamic optimization ensures lowest flocculant consumption, significantly reduced wear, and decreases the total power consumption again by up to 2%.



Energy-saving features

# What's your separation challenge?

ANDRITZ decanter centrifuges are suitable for different processes.

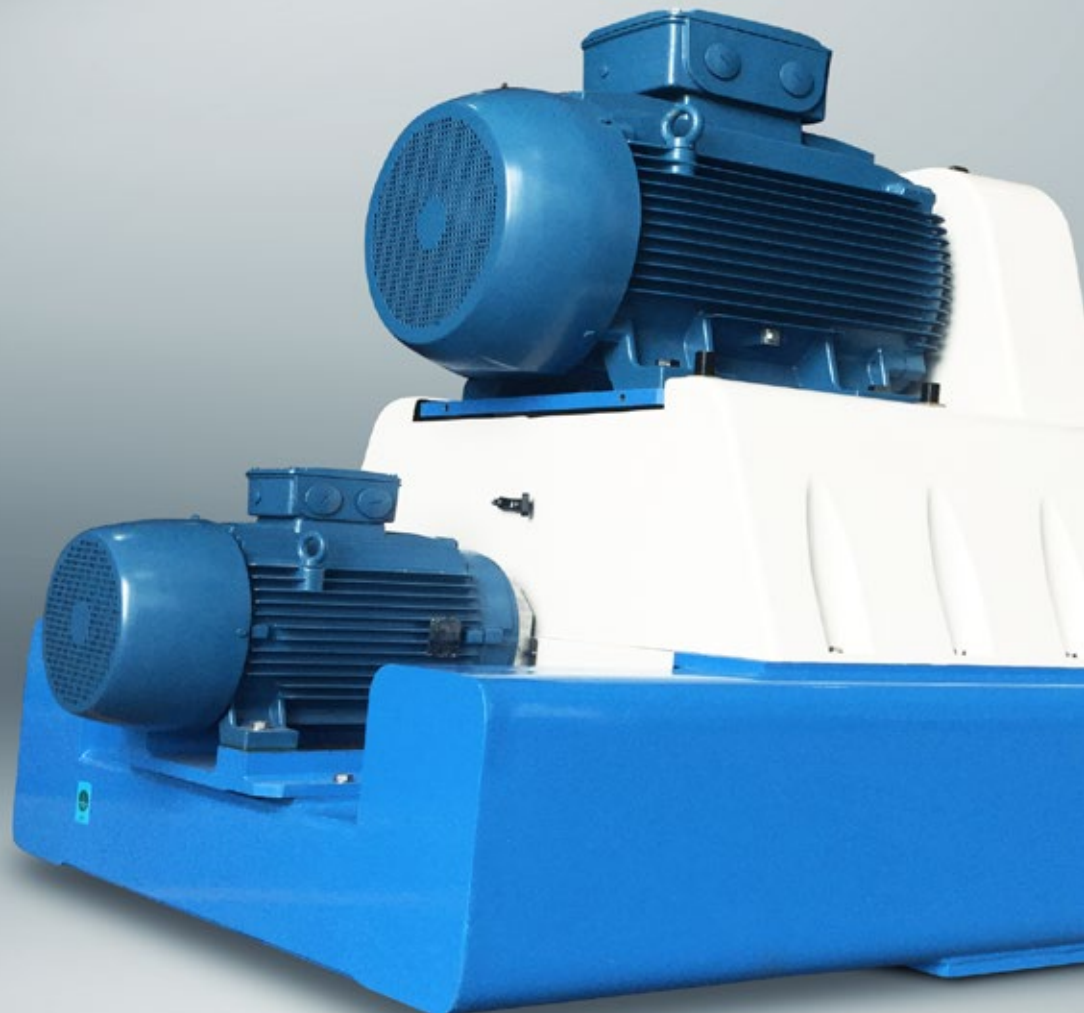
## **DEWATERING**

The ANDRITZ decanter centrifuge D is the most versatile of all existing solid/liquid separation technologies, and can be tailored to meet your target dry solids content. The decanter makes it possible to produce both thickened sludge and extremely dry cake from highly diluted sludge. Some Thermal Hydrolysis Process (THP) plant projects, for example, use it to achieve pre-dewatering (upstream thermal lysis step) and thickening during the same process stage. Others use this dual functionality to run the ANDRITZ decanter centrifuge D in thickening mode during the period in which liquid sludge can be spread on the fields, and in dewatering mode when it is forbidden to spread liquid sludge on the fields. Pig manure separation also falls

into this category. The ANDRITZ decanter centrifuge D is capable of producing clarified liquid with a capture rate of more than 80% TSS, while at the same time producing dewatered solids with a very specific granularity necessary for efficient composting.

## **THICKENING**

As with all sludge dewatering and thickening technologies, performance of the ANDRITZ decanter centrifuge D is affected by the conditioning process, such as polymer type and dosage. But unlike other sludge separation technologies, the ANDRITZ decanter centrifuge D can still achieve a high solid/liquid separation rate in many applications without slurry pre-conditioning.



### CLARIFICATION

The ANDRITZ decanter centrifuge D combines two significant advantages: high g-force capability and a specific HHP rotor design. The HHP rotor design helps to manage internal solids transportation, making it possible to utilize g-force capabilities to their fullest. All applications benefit from this approach, particularly food production processes such as juice clarification, which demand a high degree of separation at all times.

### CLASSIFICATION

The ANDRITZ decanter centrifuge D can also be used in classification processes in all industries – from mining & minerals to food, chemical, and environmental applications. One such application is the classification

of sand contained in sludge before being processed in a wet oxidation unit.

### 3-PHASE SEPARATION

The ANDRITZ decanter centrifuge D can also be used for 3-phase separation, in which the centrifugal force is used to separate liquids and solids with different densities, or to separate light liquid phase and heavy liquid phase from solids. Many ANDRITZ decanter centrifuges D in three phases design are used in applications ranging from slop oil and animal fat separation to olive oil and palm oil. Our machines are designed to support high-temperature processes, up to almost 100°C, to achieve the highest separation rate efficiency.



# Getting to know your ANDRITZ decanter centrifuge D

Design optimized to the very smallest detail to provide best results, while ensuring ease of maintenance and providing modularity for optimum fit to your needs.



## SCROLL

The scroll of the ANDRITZ decanter centrifuge D is the most flexible scroll available on the market. Its specific open flight design reduces the torque created by the sludge and maximizes the clarification rate. The special cone design leads to high sludge compaction.

- Reduction of sludge conveying torque by 30%, which impacts the gear box lifetime and the scroll drive size positively.
- High cake dryness due to better sludge compaction.
- Excellent centrate quality due to minimized internal turbulences and maximized settling volume.



## BOWL

The bowl design is carefully selected to balance the various needs for integrity, stability, smooth operation, minimized windage, high durability, low wear, and easy maintenance, while ensuring the principle process functions. The design is modular to allow an easy fit to different basic process conditions by adjustment of diameter, length, and cone angle. The overall design is optimized to minimize the power consumption and provide the best possible stiffness. ANDRITZ decanter centrifuges are not only factory-tested before delivery to a customer's site, but also extensively type-tested according to international standards to meet all product safety requirements.



## COVER

Covers protect you against spillage and touching rotating parts, meet the noise radiation and thus are vital safety features. The shape is optimized for easy cleaning and handling. Different options are available to fit in with your needs, be it highest corrosion resistance, lowest noise radiation, or similar.





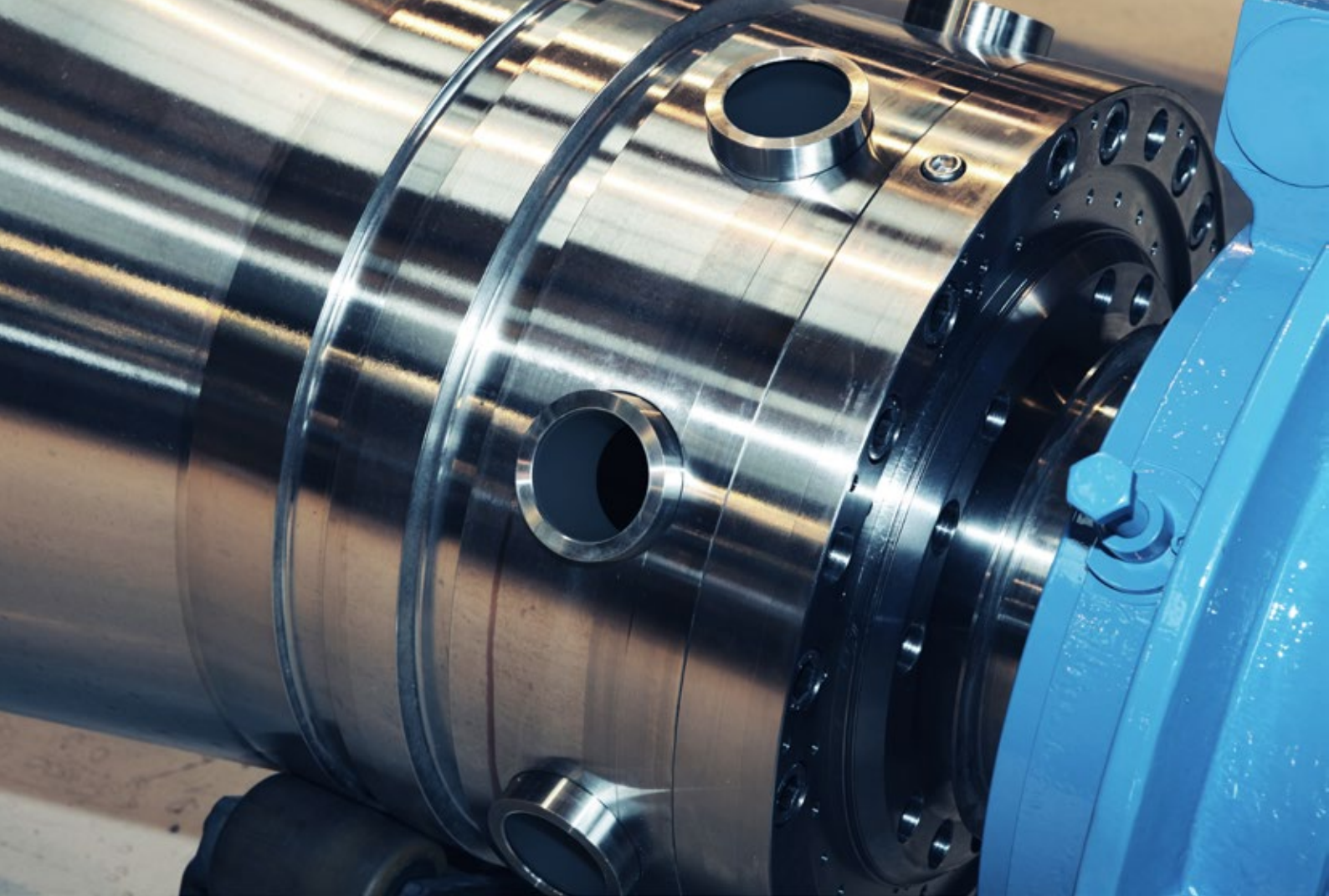
### **WEAR PROTECTION**

The different zones and elements in a decanter that may be subject to higher wear are protected by a carefully composed selection of wear protection means. Depending on the extent of wear, different material compositions, ranging from polyurethane to sintered tungsten carbide elements, are used to protect scroll flights, feed chamber, feed pipe discharge ports, and discharge housing. Your ANDRITZ specialists are glad to offer their expertise in working towards the best combination of protection choice versus cost and selecting the best fit from the wide range of options.



### **MACHINE CONTROL AND PROTECTION**

ANDRITZ decanter centrifuges will be as transparent in operation and for maintenance as you require. From the minimum machine protection to all levels of predictive maintenance information, including bearing conditioning sensors, the recommended minimum configuration depends on your operation and your application environment. It can be scaled to your needs in perfect combination with our addIQ control systems to support optimization of your operation. Our separation specialists seek to make operation and good care of your equipment, ensuring a long service life, blend seamlessly into your work schedule, and will provide fast and precise support should you need it.



# High-performance materials: Best protection against wear for extended decanter life cycle

The ANDRITZ decanter centrifuge D is manufactured with advanced wear-resistant materials for a long, continuous life cycle. A variety of materials ensures that your operations are able to withstand high temperatures, heavy-duty products, and corrosive products.

- To protect the bowl, the inner surface has strips or grooves, depending on machine size and application. Bowl outlets are protected with easily replaceable bushings.
- To protect the screw conveyor, the inside of the feed chamber is coated with tungsten carbide spray or protected with TurboWISE polyurethane inserts. Feed chamber outlets are equipped with replaceable bushings, and the screw conveyor blade has replaceable tiles made of tungsten carbide.
- Good wear protection is a strategic, long-term investment with a guaranteed return.
- To protect the solids casing, the receiving surface is a thick stainless steel plate with polyurethane or tungsten carbide spray coating, depending on the application.
- Exchangeable wear parts mean fewer repairs and less downtime, both of which lead directly to reduced maintenance costs.





# Metris addIQ control system, decades of experience in one box

The addIQ centrifuge control system combines all of our extensive operational, troubleshooting, and start-up experience in one tailored automation solution. The heart of addIQ system is a modular, PLC-based control system that supports you in making the best use of your ANDRITZ equipment.

The addIQ product range is scalable from Eco, Pure up to Prime level and can be run in different operating modes to enhance the performance of your process:

- Optional remote access gives immediate support to your operation and maintenance team.
- Relative speed control allows the operator to enter the speed set points directly. If the feed product concentration is stable, this is the preferred and most efficient control mode.
- Torque control mode ensures constant dryness under varying process conditions. This automatic operation is achieved by a torque feedback algorithm.
- Maintenance and manual operation.
- CIP (Cleaning-In-Place) sequences and an optimized thickening control facilitate the operation of the machine and assure economical best return of the process.
- Alarms and support in troubleshooting.
- Built-in support for trending, documenting, and reporting efficiency is included. Multilanguage functionality is integrated in the operation interface to support communication.



#### **APPLICATIONS**

- Thickening biological sludge with and without polymers
- Thickening primary and tertiary sludge
- Dewatering membrane sludge
- Dewatering fresh, blended sludge
- Dewatering digested sludge
- Pre-thickening and dewatering of hydrolyzed sludge
- Classification of sludge
- Sand removal
- Potable water

# Municipal wastewater: Reliability and performance guaranteed by experience

In cities all over the world, there is a rising need for efficient processing of wastewater and sludge, combined with increasingly tight regulatory standards and municipal budgets. To tackle these complex and conflicting challenges, you need a partner with the full perspective of your wastewater treatment needs, and an array of reliable solutions to fulfill them. Across all thickening, pre-thickening, and dewatering applications, ANDRITZ has the most experience worldwide with the largest installed base of equipment in operation.

## **FLEXIBLE HANDLING OF ALL TYPES OF SLUDGE**

The ANDRITZ decanter centrifuge D is a high-performance solid bowl decanter centrifuge engineered for sludge treatment. It accepts any type of sludge, making the technology extremely suitable for centralized dewatering plants receiving different sludges from different regions. The centrifuge's unique design is the result of decades of engineering experience together with continuous feedback from our customers and service partners. ANDRITZ decanter centrifuges D provide a unique combination of robust design requirements, high-quality manufacturing, and enhanced maintenance-friendly features.

For municipal wastewater treatment plants of all sizes, the final step of sludge treatment is a critical one, accounting for a significant share of the plant's total operating costs. Since this is the last step before the sludge leaves the facility, the equipment must reliably produce stable dewatered sludge while minimizing downtime and maintenance requirements. Medium to large plants will also include a digestion treatment step using either

standard aerobic, anaerobic, or more advanced methods such as pre-hydrolysis sludge treatment.

In each of these cases, the performance of the digester is directly linked to performance of the thickening equipment. ANDRITZ decanter centrifuge D technology is designed to ensure that both thickening and digestion are extremely reliable, flexible, and easily automated.

## **TURNKEY SOLUTIONS FOR VARIOUS APPLICATIONS**

Although each production line must be specially designed, a sludge dewatering line typically includes a sludge feeding system, a polymer preparation and feeding system, dewatered sludge conveying equipment, and a centrifuge. Over the years, we have gained extensive knowledge concerning all types of production facilities and machines to obtain the required final product characteristics. As a result, we offer comprehensive capabilities for the design, support, and supply of your plant's complete dewatering facility – all with one global partner to respond to your needs.



#### **APPLICATIONS**

- Manure and animal waste
- Dairy
- Food and beverage
- Pulp and paper
- Steel and stainless steel
- Power plants
- Slop oils and lagoons
- Drilling muds
- Sand and aggregates
- Mining effluents, etc.

# Industrial wastewater: All wastewater deserves the right solution

Industrial manufacturing processes generate specific wastewater and residual material flows. Systematic and efficient processing reduces water consumption, conserves raw materials, provides marketable residues, and improves overall efficiency.

## **VERSATILE SOLUTIONS FOR DIFFERENT TYPES OF WASTEWATER**

Organic or non-organic, greasy or oily, corrosive or abrasive, high- or low-solids – all types of content need to be recycled back into the process or discharged into the municipal sewage system. When it comes to industrial wastewater treatment, ANDRITZ provides expertise for each market-specific requirement with a wealth of references and a range of proven solutions.

## **WATER TREATMENT AND ZERO LIQUID DISCHARGE**

Along with the recovery of raw materials, reduced water consumption has become a major topic for most industries. ANDRITZ provides a comprehensive selection of water-conserving and water-recycling solutions based on the unique design of screens, continuous sand filtration technologies, belt presses, centrifuges, and separators.

## **SLUDGE MANAGEMENT**

The sewage sludge produced in organic production processes is often suitable for use as secondary fuel for on-site steam or electricity generation, or for supplying to buyers from energy-intensive industries. In many cases, waste heat can be used to dewater or dry the sewage sludge. Today, there are already large installations that process both their own sewage sludge as well as municipal sewage sludge to generate secondary fuel such as pellets.

## **SOLID/LIQUID SEPARATION**

Every industrial site has to treat its wastewater – even if it does not have its own in-house treatment plant – and performs phase separation, thereby decreasing pollution levels in order to comply with discharge limits or decrease the size of its wastewater treatment plant. In some applications, the solid phase can be reutilized as fertilizer or even be recycled back into the production process. This phase separation process is applicable to mineral as well as organic streams. ANDRITZ offers complete technology packages requiring no further investments and with no environmental impact because no chemicals are used.

## **SELECT THE BEST TECHNOLOGY FOR THE TOUGHEST CHALLENGE**

The ANDRITZ decanter centrifuge D is a high-performance solid bowl decanter centrifuge and one of the market's most versatile technology. Its compact and efficient design makes it possible to customize your solution with a wide range of advanced features. The most suitable configuration is chosen based on the specific industrial waste to be treated. Our vast experience includes the selection of specific construction materials, comprehensive abrasion protection, and 2- or 3-phase separation systems. The standardized design of the ANDRITZ decanter centrifuge D ensures that all configurations perform reliably and cost-efficiently.





# Staying ahead in innovation: Test centers and extra focus on R&D

ANDRITZ, with its competence center for decanter centrifuges D in France, operates its own on-site test center to speed up product innovation and reduce the time to release new products and features to customers in a systematic and well-controlled fashion.

With an available area of more than 250 m<sup>2</sup>, this state-of-the-art facility is able to test all kinds of machines (screens, decanters, separators, filter presses, and similar, including mobile units), even at high flow rates exceeding today's market requirements for single units.

Modern instrumentation equipment is available to analyze mechanical and process elements such as effective power, vibration characteristics, noise rating, and more.





# A decanter centrifuge for every need

At ANDRITZ, we have one of the largest decanter centrifuge ranges on the market, from D2 centrifuges for small flow to the largest decanter either for municipal or industrial applications.

Range	D2 to D 12
Hydraulic capacity (m <sup>3</sup> /hr)	0.2 to 400
Installed power (kW)	7.5 to 350





D2



D3



D5



D7



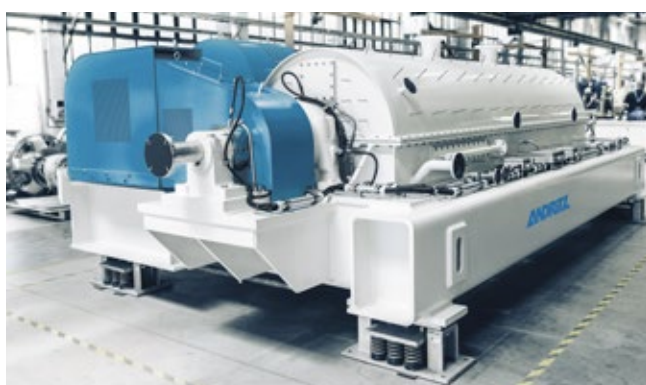
D6 and D10



Container

# ANDRITZ decanter centrifuges: The best fit for the widest range of applications

The ANDRITZ decanter centrifuge D is a centrifuge optimized for lowest consumption and highest output to meet the demands of environmental processes. In addition to the environment market, ANDRITZ decanter centrifuges are versatile in order to fit several applications in various industries. For these specific applications, ANDRITZ specialists would recommend you the following units:



The ANDRITZ decanter centrifuge A, a heavy-duty industry machine, rugged and robust, ideal for mining and minerals as well as the chemical industry. The decanter centrifuge A also includes special products such as the screen bowl decanter (AS machine) or ACZ Censor for plastics recycling.

## APPLICATIONS

### Mining and minerals

- Calcium carbonate
- Potash
- Clay
- Salt
- Coal and tailings
- Aluminum
- Iron and tailings
- Copper and tailings
- Phosphate

### Chemicals

- Petrochemicals
- Soda ash
- Mineral and slop oil
- Pigments and dyes
- Agrochemicals
- Specialty chemicals
- Natural rubber and bioplastics
- Pharmaceuticals and cosmetics



The ANDRITZ decanter centrifuge F, designed for the food industry, an optimized machine in three different finishes to meet the most stringent hygienic requirements, including CIP (Cleaning-In-Place) and pressure discharge.

## APPLICATIONS

### Food

- Beverages
- Dairy
- Vegetable oil
- Animal protein processing
- Functional ingredients
- Industrial fermentation
- Starches and proteins
- Sugar





# Laboratory and trials to meet your needs

Could you get more from your existing equipment? Or do changing process conditions demand a completely new approach? At ANDRITZ, we have the knowledge and resources to help you find out. Whether you are looking to maximize efficiency, reduce filtration times, or explore new processes and products, our test facilities worldwide are always at your service. Helping you to optimize residual moisture levels, bulk density, particle size distribution, and more. Always with the latest application knowledge and an unmatched database of process performance analysis.

## MISSIONS

- Define process warranty, design from experience
- Build sizing charts, specific sizing study
- Build process knowledge, process expertise
- Check technical feasibility of solid/liquid separation through lab tests
- Check performance by pilot tests on-site

## GOALS

- Define and validate technical process warranties, separation performance
- Define technologies, sizing, design for projects according to process
- Technical support for various industries, with main focus on environment, mining and minerals, chemicals, and food





# Put our 150 years of OEM experience to work for you

Need to optimize your process? Boost availability? Ensure non-stop productivity? When you work with ANDRITZ, you gain access to one of the world's largest OEM manufacturers for solid/liquid separation. Put our in-depth knowledge of separation equipment and processing to work for you.

## VAST EXPERIENCE THROUGH LARGE INSTALLED BASE

With an installed global base of more than 55,000 solid/liquid separation equipment and systems, you can imagine that we take service seriously. Wherever these customers are located, we work very closely with them to maximize uptime and boost efficiency.

## WELL-KNOWN OEM BRANDS

Some customers know us as the people with ANDRITZ on our overalls. Others have come to understand that we are the OEM behind former brand names like 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 Vandenbroek, companies who all have been acquired by ANDRITZ. But frankly, we are capable of servicing and supplying spare parts for nearly all brands of solid/liquid separation equipment on the market.

## LOCAL SUPPORT BACKED BY GLOBAL EXPERTISE

Our service philosophy is simple: One phone call, one contact person, one dedicated team that speaks your language and knows your equipment and process. This is not an empty promise. It is backed by a network of 550 service specialists for separation equipment and systems as well as service centers all around the world.

## A TRUE FULL-SERVICE PROVIDER

Whether you need spare parts, rentals, local service, repairs, upgrades, or modernization of your equipment, ANDRITZ is your service specialist in all aspects of separation. 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. In short, we've got you covered.



### 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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