



SEPARATION EXPERTISE FOR YOUR SUCCESS IN THE COAL INDUSTRY

ASK YOUR SEPARATION SPECIALIST

ANDRITZ

ENGINEERED SUCCESS

Global partnership for local solutions

ANDRITZ is one of the leading global suppliers of state-of-the-art solid/liquid separation technologies and services.

ANDRITZ Separation is part of the international technology Group ANDRITZ – a globally leading supplier of plants, equipment, and services for solid/liquid separation in the municipal and industrial sectors, hydropower stations, the pulp and paper industry, the steel industry, and the production of animal feed and biomass pellets. ANDRITZ operates over 280 production sites, service and sales companies all around the world with a staff of approximately 29,000 employees.

EXPERIENCE DRIVES INNOVATION

Utilizing the experience gained from more than 150 years in producing equipment for process industries, and the delivery of over 2,000 new solid/liquid separation machines and systems per year. ANDRITZ works in collaboration with customers to extend and expand its portfolio with innovations based on a foundation of proven technologies.

PORTFOLIO FOR VARIOUS CUSTOMER REQUIREMENTS

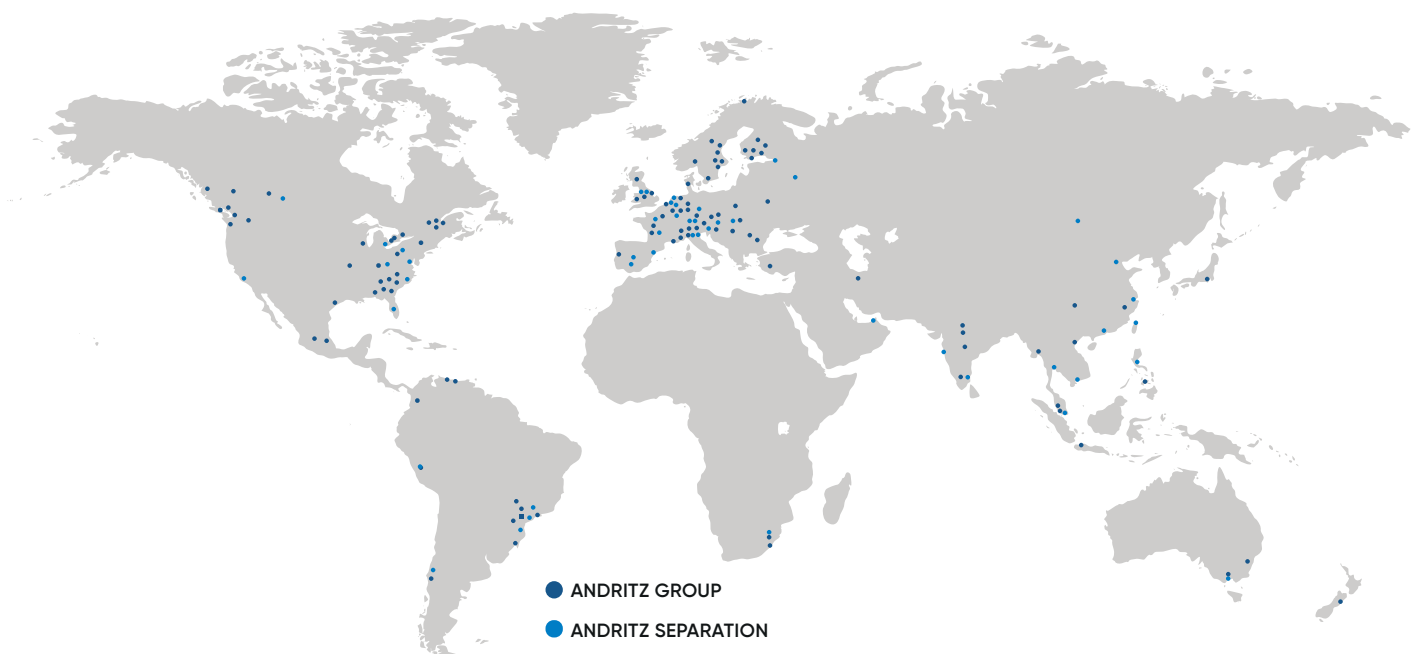
ANDRITZ offers the most comprehensive portfolio of solid/liquid equipment and technologies for a broad range of

applications in various industries. As one of a few suppliers, ANDRITZ also provides thermal treatment systems in addition to mechanical solid/liquid separation equipment. A complete range of state-of-the-art equipment covering screens, centrifuges, pressure and vacuum filtration systems, thickeners, as well as conveying and thermal systems enables customers to optimize every step of their production processes.

EXPERTISE EMPOWERS PARTNERSHIP

ANDRITZ knows about solid/liquid separation and is a long-term partner for customers throughout the entire plant life-cycle – from consulting to wear and spare parts, full-time technical support, upgrades, and process optimization. Anywhere, anytime.

Equipment, systems, and services are provided worldwide by a network of more than 2,000 separation specialists and agents in more than in 40 countries. To further improve the 24/7 availability, ANDRITZ continuously extends its local presence, establishing a wide network of service centers all over the world.



ANDRITZ network worldwide



Separation to the finest

Coal is one of the world's most important resources. ANDRITZ offers an extensive portfolio of solid/liquid separation products for use throughout the coal preparation process.

LONG-TERM PARTNER

ANDRITZ has been developing equipment for the coal industry for over 50 years. This technology development has resulted in a variety of solid/liquid separation solutions for the various process steps in coal washing and tailings treatment.

IN-DEPTH UNDERSTANDING OF PROCESS REQUIREMENTS

Advanced coal washing plants are focused on increasing washing efficiency, enhancing throughput, and reducing water consumption while meeting all the standards for environmental impact and safety. ANDRITZ technologies are focused on these same targets: handling finer particle sizes, higher product dryness requirements, higher recycling rates for process water, and efficient dewatering of tailings.

FINER AND FINER

One main advantage of working with ANDRITZ is that it offers a range of technologies to ensure that there is a best solution available to achieve the targets for any coal application. Filter presses, various types of pressure and vacuum filters, and different types of

centrifuges – each is configurable to meet specific requirements. ANDRITZ specialists have the experience and skill to recommend the right solution and configure it to achieve precise performance.

INNOVATION DRIVES THROUGHPUT HIGHER, MOISTURE LOWER, AND MAKES CLEAR FILTRATE

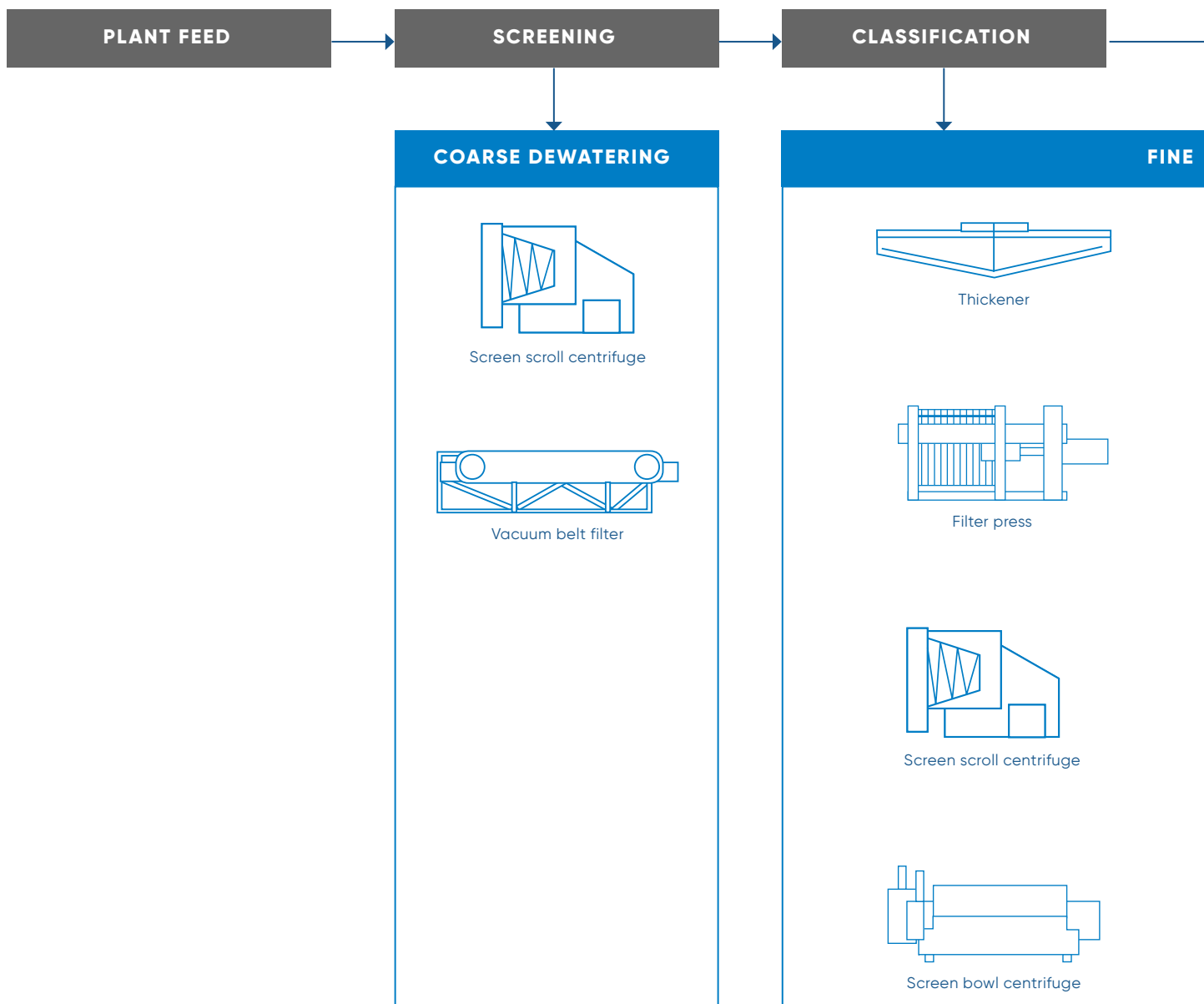
Better execution and enhanced performance are hallmarks of ANDRITZ products. For example, the Hyperbaric Disc Filter (HBF) is an innovative state-of-the-art technology for the coal industry. HBF is the first choice when requirements call for coal particles less than 200 µm to be processed with high solids throughput, low residual moisture, and clear filtrate. HBF units are much less costly to operate due to their outstanding throughput and high reliability. And now, ANDRITZ has enhanced the product even more with a steam-hood filtration option.

Another innovation to a proven technology is the newest model of the screen bowl centrifuge, which employs a conical screen to enhance throughput capacity while significantly reducing energy consumption.

Well-proven, globally accepted: With more than 100 hyperbaric disc filters, 500 vacuum filters, 100 filter presses, 300 centrifuges, 100 belt presses, and numerous thickeners sold, ANDRITZ has established a reputation for proven, reliable products incorporating innovative enhancements.

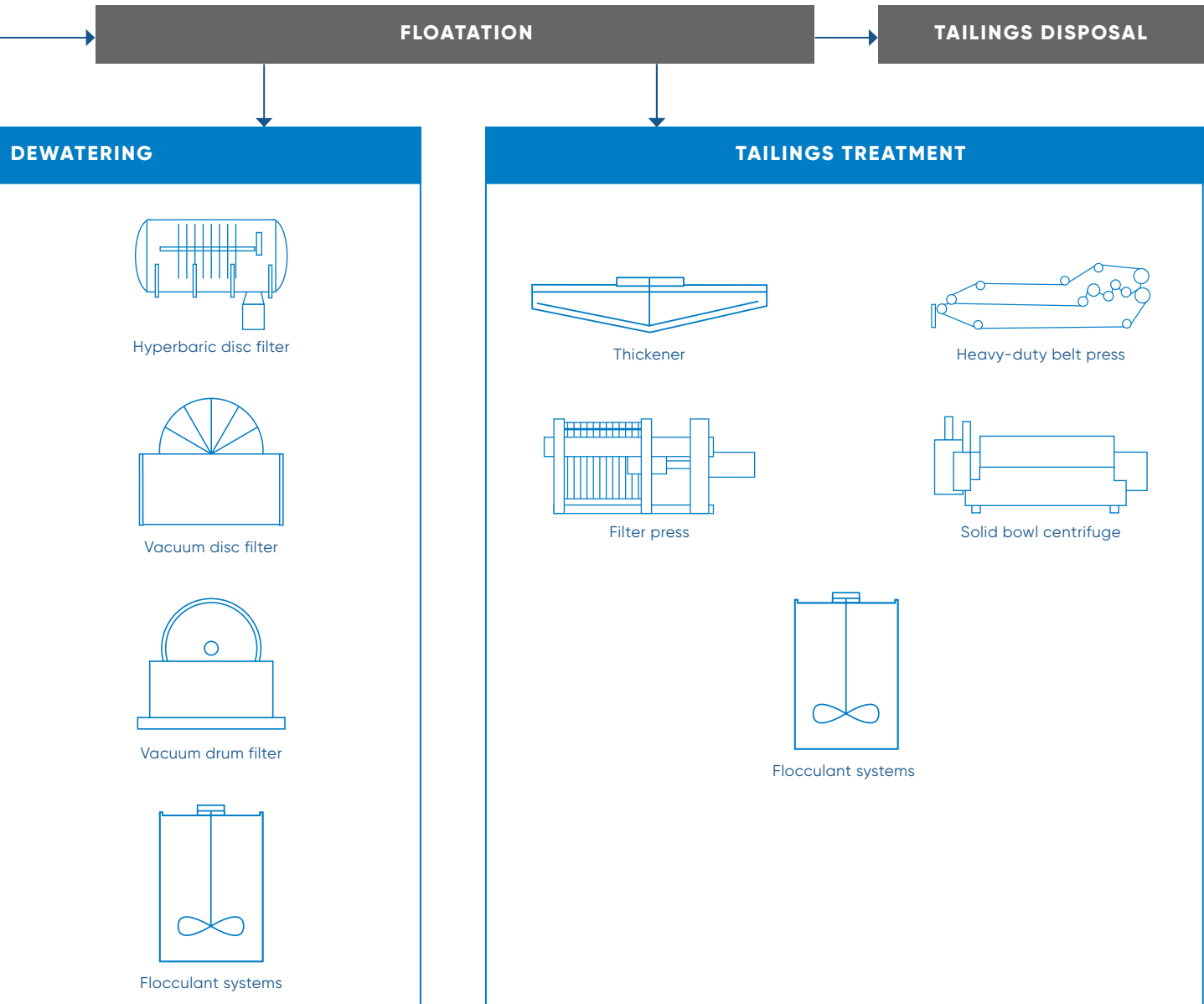
Innovative solutions for every step in the process

ANDRITZ has invested considerably in expanding its competence in solid/liquid separation with the acquisition and integration of such well-known names as Bird, KHD Humboldt Wedag, Rittershaus & Blecher, Netzsch Filtration, Escher Wyss dryers, Krauss-Maffei centrifuges, dryers, and filters, and Delkor Capital Equipment (Pty) Ltd.. The result is a comprehensive product offering for each dewatering step in the coal preparation process.



| Application | Coarse coal | Coal fines | Ultra fine coal | Tailings slurries |
|--|-------------|------------|-----------------|-------------------|
| Particle size (mm) | 32-1 | 2-0.25 | 1-0.150 | |
| Screen bowl centrifuge | | | X | |
| Screen scroll centrifuge | | X | X | |
| Solid bowl centrifuge | | X | X | X |
| Hyperbaric disc filter, vacuum disc filter | | | X | |
| Heavy-duty belt press | | | | X |
| Filter press | | X | X | X |
| Vacuum belt filter | X | X | | (X)* |
| Thickener | | (X)* | X | X |

*depends on performance data





ANDRITZ vacuum belt filter



Coarse dewatering: High throughput with low residual moisture

For the processing of coarse coal particles, ANDRITZ supplies rugged and reliable centrifuge systems that achieve high throughput with low residual moisture.

VACUUM BELT FILTER

This unit is ruggedly designed to operate in the most demanding applications. It operates under continuous vacuum to enhance solid/liquid separation. Designed for ease of operation, the filter also has all wear parts easily accessible for maintenance.

YOUR BENEFITS

- Wear strips of low-friction, wear-resistant material
- Pneumatic system for raising and lowering vacuum box (ease of maintenance)
- Reliable filtration under the most challenging conditions
- Ease of maintenance

SCREEN SCROLL CENTRIFUGE

Screen scroll centrifuges have become the preferred machine for dewatering spiral concentrates. This type of centrifuge is a higher-speed alternative to vibrating basket centrifuges. The higher speed increases the centrifugal force to separate moisture from finer coal particles. The screen scroll centrifuge consists of a horizontally mounted wedge wire basket, enclosing a drum on which curved scraper/conveyor blades are mounted in a helical pattern. The basket and conveyor rotate in the same direction, but at slightly different speeds so that the conveyor blades move the coal particles through the basket – controlling the distribution and retention time. Since the basket apertures are smaller than those used with a vibrating basket, the scroll conveyor helps keep the apertures clear.

YOUR BENEFITS

- Powerful planetary or cyclical gearbox maintains the differential speed of basket and scroll
- Highest capacity centrifuge (per area of screen)
- High capacity and recovery
- Lowest moisture content down to 5%

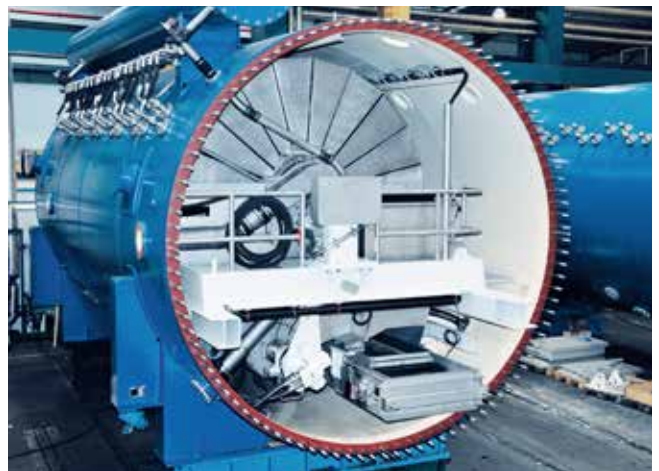
Fine dewatering: Maximum dewatering of even the finest coal particles

The smaller the coal particle, the larger the surface area – increasing the volume of surface moisture that must be removed. ANDRITZ offers both conventional and innovative systems to achieve throughput and moisture targets for any coal preparation operation.

HYPERBARIC DISC FILTER

ANDRITZ's innovation of hyperbaric filter technology sets a new standard for performance – especially in coal preparation applications where particle sizes are becoming finer, higher throughput and clear filtrate is required. The increased pressure differential (up to 6 bar) across the filter medium dramatically enhances the filter's ability to lower residual moisture. The ability of the hyperbaric disc filter (HBF) to operate in continuous mode allows it to be integrated easily into highly automated coal beneficiation plants.

The steam-hood filtration option can enhance the filter's performance by treating the filter cake with steam, which reduces viscosity, among other things. The uniform heating of the filter cake achieved by the steam-hood can ultimately reduce the residual moisture.



ANDRITZ hyperbaric disc filter

YOUR BENEFITS

- Proven double-gate valve for filter cake discharge
- Easily automated to operate with minimal human intervention
- Optional steam-hood filtration
- Lowest residual moisture which is significantly better than filtration with a vacuum system and outstanding capacities of more than 1,000 kg/m²/h
- Low investment for peripheral equipment due to continuous operation
- High level of automation with minimal human intervention

SCREEN BOWL CENTRIFUGE

This is a high-speed centrifuge, originally developed by Bird and KHD Humboldt Wedag and further developed by ANDRITZ, which reduces the moisture content of solids on the screen deck. It provides economic dewatering of even the finest coal particles as a result of enhancements to the proven design. The new ANDRITZ GentleFeeder™ feeding system reduces the particle breakage and reduces the turbulences by the feed resulting in cleaner centrate and higher solid recovery.

YOUR BENEFITS

- Optimized wear protection with ceramic or tungsten tiles
- High capacities of more than 120 t/h
- Low operating costs due to advanced wear protection
- Low solids moisture content due to advanced design
- Conical screen design provides highest capacity with lowest energy consumption



ANDRITZ screen bowl centrifuge

FILTER PRESS

The ANDRITZ filter presses are of a proven robust design that is highly efficient in dewatering all grades from raw to superfine coal. The base technology was developed by Rittershaus & Blecher and Netzsch Filtration and has been enhanced by ANDRITZ.

YOUR BENEFITS

- Fast opening mechanism leads to reduced cycle times
- Automated operation, even with sticky filter cakes
- Automated cake discharge without operator intervention
- Low residual moistures due to flexible operation

VACUUM DISC FILTER

This filter utilizes the pressure differential across the filter medium to enhance solid/liquid separation, lower the residual moisture of the product, and produce a clear filtrate. It is best suited for suspensions with medium- to fine-size particles based on the specific permeability of a coal suspension which depends on the fine grain and ash content of the material.

YOUR BENEFITS

- Filtrate collection pipes located externally to the shaft for easy replacement
- Optional steam-hood filtration (see hy-perbaric disc filter)
- High throughput at low residual moisture due to modern design
- Easy to maintain – easily accessible

SOLID BOWL CENTRIFUGE

These centrifuges were originally developed by Bird and KHD Humboldt Wedag and have been further advanced by ANDRITZ. They are well-proven in industrial applications all over the world.

YOUR BENEFITS

- High rotational speed and long service life due to ceramic and tungsten carbide wear protection
- Variable speed adjustment for drum and scroll possible
- Produces effluent with less than 1% solids
- Optimized centrifugation for all process requirements



ANDRITZ heavy-duty belt press

Tailings treatment: Efficient technologies to save water and protect the environment

With the goal of reducing handling and disposal costs while recovering the maximum volume of water for reuse, ANDRITZ has the best solutions for solid/liquid separation of coal tailings.

THICKENERS

ANDRITZ has a depth of experience spanning 30 years in designing and delivering gravity thickeners for coal applications.

YOUR BENEFITS

- Most efficient integrated feed system and feed well
- High-rate, conventional, and paste designs
- Reduced flocculant consumption due to enhanced feed design
- Reliable operation due to rugged design and three-level protection against overloading
- Very low maintenance requirements due to robust construction

HEAVY-DUTY BELT PRESS

The choice of filtration technology for coal tailings treatment, based upon the ash content and particle size, is critical. The Continuous Pressure Filter (CPF) uses two belts and pressures up to 2 bar to achieve excellent dewatering. The drainage and dewatering zones of the press are optimized for each application. Known for providing long-term, reliable operation, the press can be operated in fully automated mode.

YOUR BENEFITS

- Robust design to accommodate high dewatering pressures
- Distribution device ensures uniform distribution of solids over the entire working width
- High throughput of up to 15 t/h per meter working width
- High dry content of over 65%
- Maximum water recovery in combination with thickeners

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FILTER PRESS

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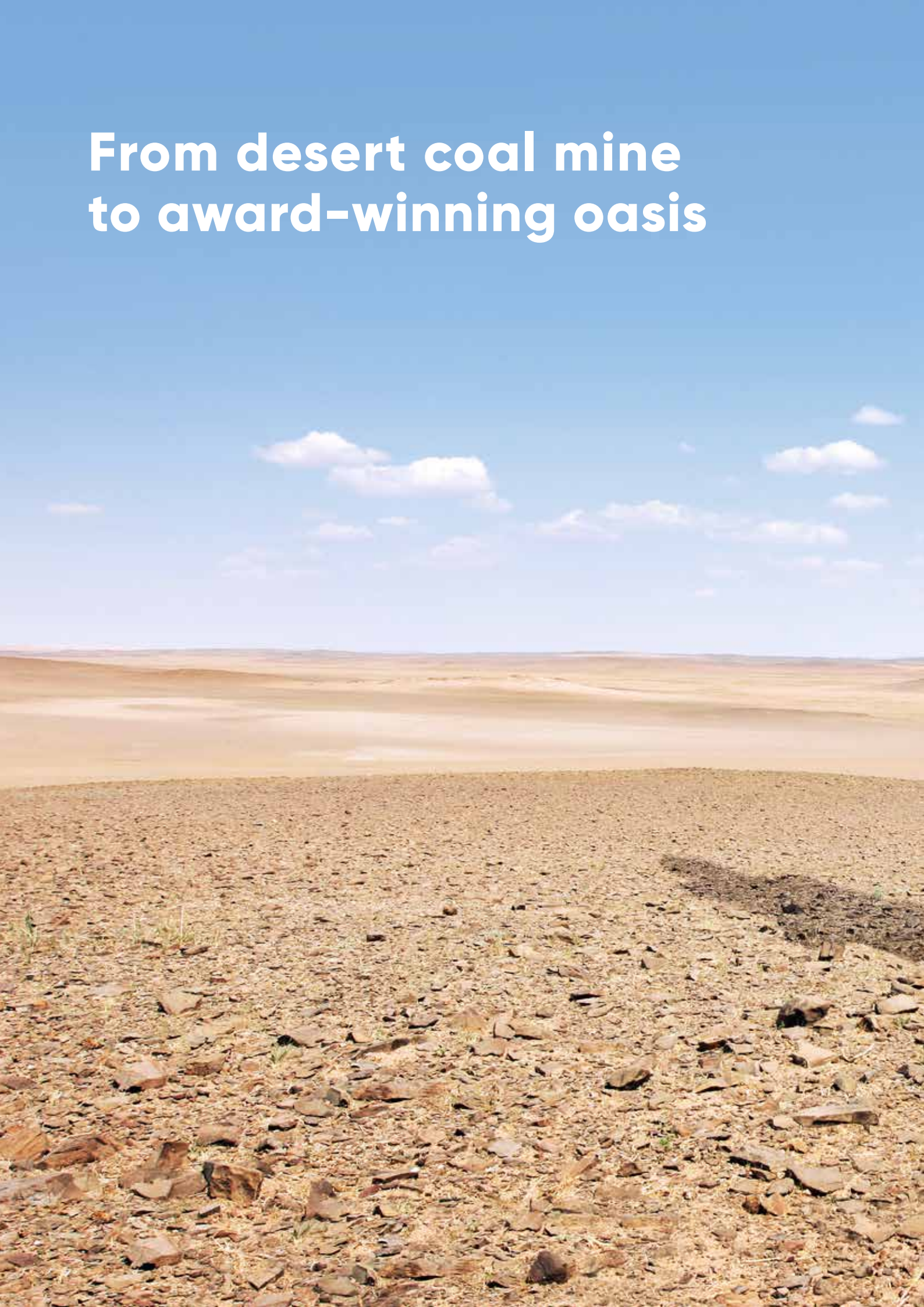
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ANDRITZ overhead filter press A4 2500

From desert coal mine to award-winning oasis





In the Mongolian Gobi desert, conditions are harsh and water resources are scarce. Fortunately for one mining company, our coal tailings dewatering solution makes it possible to achieve annual water savings of more than 3 million cubic meters. Powered by a continuously operating series of eight belt presses, it saves time as well as resources – with uptime gains of more than 1,000 hours per year.

Ultimately, it all came down to choosing the most economical solution with the best technical performance, together with a partner able to execute all deliveries on schedule in one of the world's most remote locations. As an added confirmation, the project was awarded Best Technology of 2013 in the Mining Journal Awards.



Intelligence for machine and process control

Metris addIQ control systems

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.

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.



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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