



FULL-SERVICE CAPABILITIES

For your screw press

ANDRITZ



Service solutions from a global leader in dewatering technologies

ANDRITZ SCREW PRESS EXPERTISE

Efficient dewatering is needed to prepare pulp to the proper consistency range for processes such as HC refining, HC bleaching, and dispersing. A pulp screw press accomplishes this task in a very efficient way. In addition, screw presses are applied for stock washing and water loop separation.

ANDRITZ has a long history in dewatering technologies: the first dewatering press was built in 1950. In the past 25 years, more than 500 ANDRITZ screw presses have been sold and installed in pulp and paper mills around the world.

ANDRITZ supplies spare parts and engineered wear products and provides customer-specific maintenance and upgrade services for all pulp screw presses, no matter who the original equipment manufacturer (OEM) was – with the overall objective of increasing productivity.

IMPROVEMENT OF KEY COMPONENTS

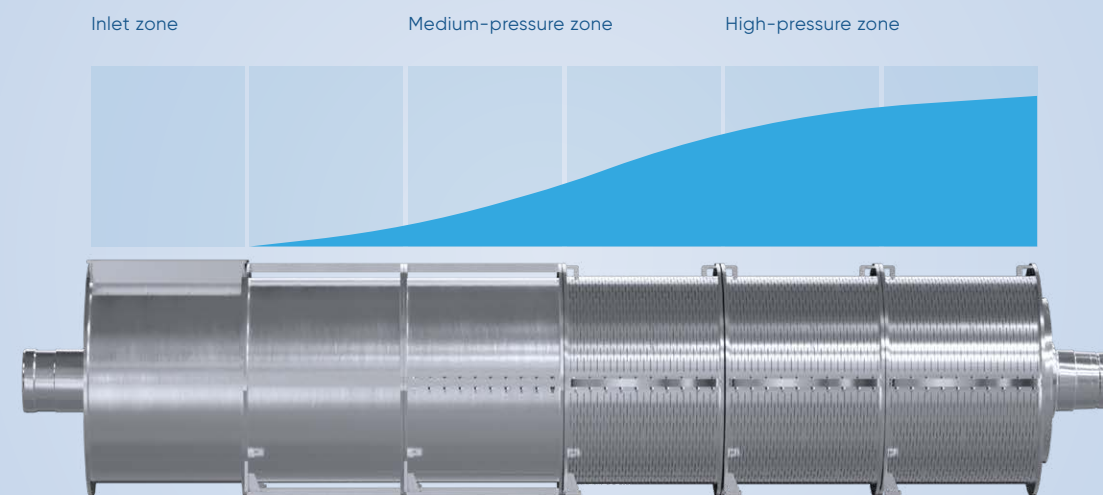
In many fiber preparation plants, efficient dewatering is essential for the overall process performance. If a screw press lacks efficiency, it might create a production bottleneck for the entire process. Thus, it's worth taking a closer look at the individual screw press components and their improvement potential in order to increase the productivity of your pulp screw press, while improving energy efficiency and reducing maintenance issues.

IMPROVEMENT POTENTIAL

- The headbox is important for even feeding as well as for smooth and even operation of the screw press.
- The design of the screw shaft influences the rotational speed – and thus the energy consumption needed at a given production capacity and dryness level – whereas a wear-resistant material composition reduces the maintenance costs.
- The screw flight geometry influences the compression development and, in consequence, the throughput and operational stability. An efficient and durable flight protection system keeps the dewatering performance at a high level for a longer time.
- The baskets and screen plates need to be chosen carefully according to the process application. Each pressure zone of the screw press puts different demands on their design. A proper choice enhances even pulp transportation through the press and optimizes the dewatering behavior, while smart basket designs reduce maintenance efforts.
- The counter-pressure system enables a constantly high level of pulp dryness at the outlet of the press.
- A state-of-the-art control system stabilizes screw press performance, ensures smooth machine operation, and protects the screw press against damage as a result of overloading.

Screen baskets and plates

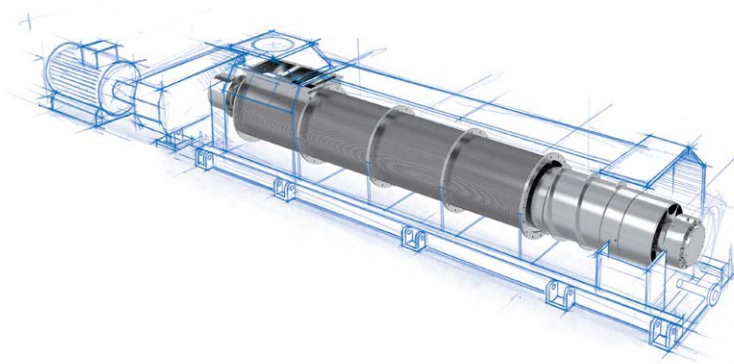
Customized solutions for each application



Pressure zones

THE RIGHT BASKETS FOR YOUR APPLICATION

The ANDRITZ screen baskets are available with different features depending on your application, from standard drilled baskets (solid) to split baskets with grooved screen plates. A typical screw press has three pressure zones. Depending on the consistency range and the type of press, different basket/screen plate combinations are recommended for each zone.



Screen basket with grooved screen plates

GROOVED BASKETS FOR INCREASED EFFICIENCY

The high-pressure baskets of some brands are designed with a lot of overlap from the support basket and screen plate. Due to this design, a substantial part of the dewatering area remains unused and the press lacks efficiency. The ANDRITZ high-pressure screen basket design consists of screen plates that are grooved on the pulp side and mounted on small radial rings in the support basket.

Slanted grooves prevent the pulp from rotating with the screw and enhance axial movement. As a result, the filtrate can be discharged easily through the radial drainage chambers between the support rings and the radial slots in the support basket. This drainage concept provides a larger effective open area – from less than 7% in older presses up to 16%. At the same time, the production capacity and dewatering consistency are also enhanced.

In addition, the plugging tendency is considerably reduced due to the larger dewatering channels. Improved machine performance and extended maintenance intervals are the results. ANDRITZ-design bolted screen plates ensure fast and easy exchange. As no welding is needed, the risk of deformation is also reduced. Thanks to the split baskets, these screen plates can be replaced without removing the screw.

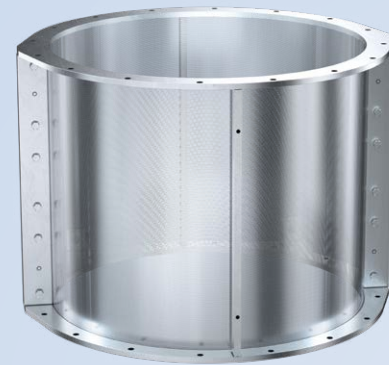
Screen baskets and plates

Full OEM selection

BASKETS



Solid



Split-fix (permanent)



Split, exchangeable, welded

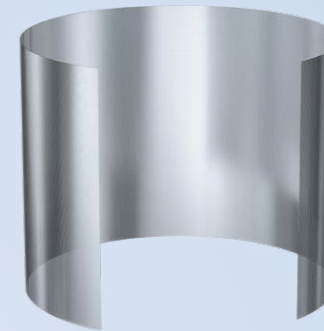


Split, exchangeable, bolted

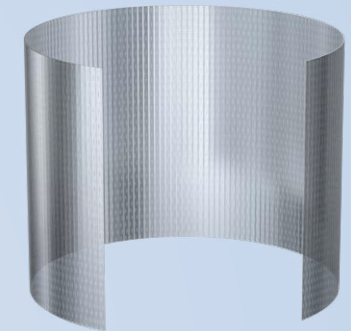
ANDRITZ Fiedler – a well-known screen basket manufacturer – can provide a complete selection of replacement screen plates and baskets for various OEM screw press types. Thanks to its ambitious research and development efforts,

ANDRITZ is able to offer baskets with more progressive designs, such as split baskets or screen plates with slanted grooves. High quality standards guarantee excellent manufacturing of all components.

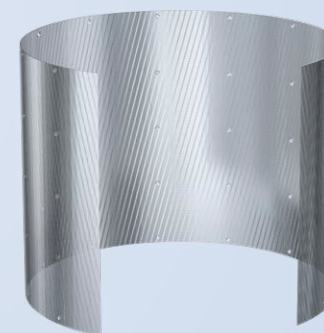
SCREEN PLATES



Flat



Straight grooves



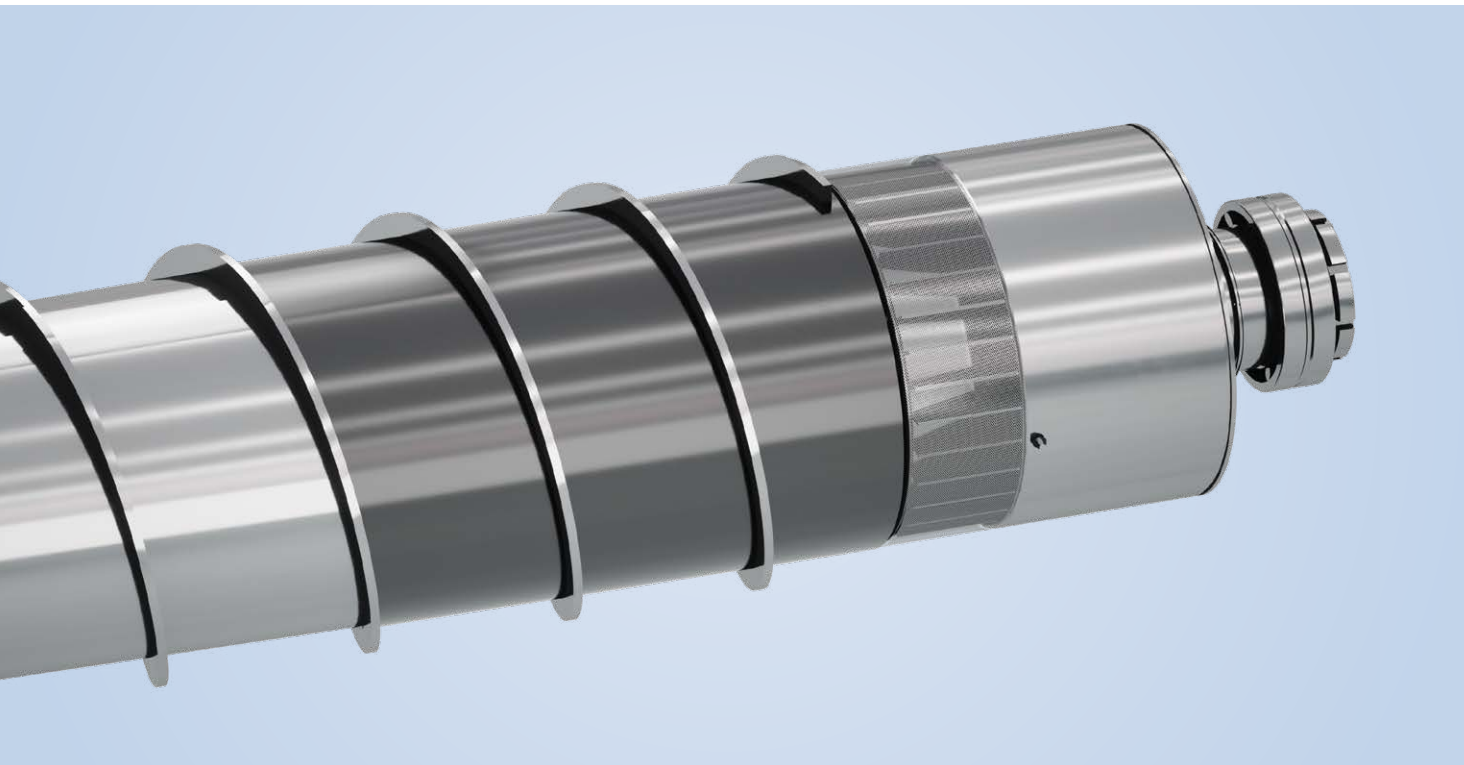
Slanted grooves

BENEFITS

- Complete range of high-quality screen plates and baskets customized to the requirements of the application
- Large open area due to optimized support basket construction
- Less maintenance effort due to split basket design
- Quick and easy exchange of bolted screen plates

Screw shaft upgrades

For stable operation and increased efficiency



Body plate

SCREW SHAFT WITH COATED BODY PLATES

Conventional screw shafts might wear very quickly and develop a polished surface. In this case, the pulp may become stuck, which reduces the production capacity and increases the risk of plugging (stick-slip effect). ANDRITZ has developed a highly wear-resistant coating that maintains the roughness of the shaft over a longer

period of time, which helps the pulp to slip over the screw surface. The coating is applied to customized plates which are welded onto the shaft on site. There is no need to disassemble the shaft for this upgrade. In the future, single plates that are worn-out can be exchanged easily. For simple wear protection, uncoated body plates can also be used as exchangeable wear parts.

BENEFITS

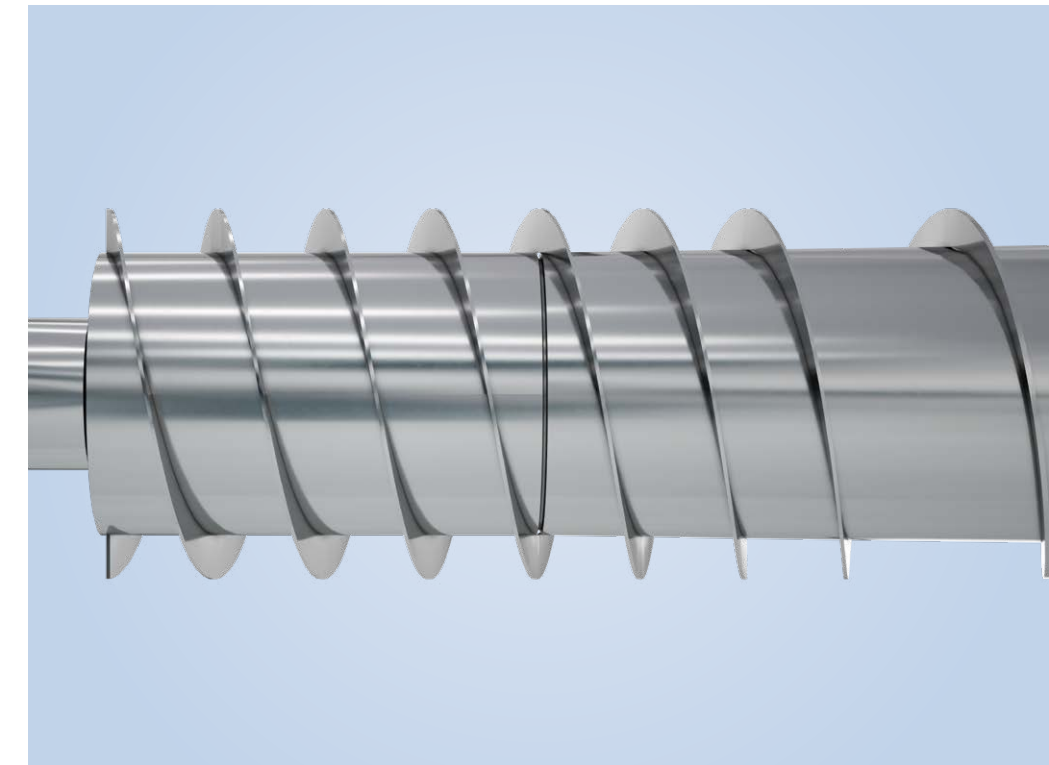
- High ROI: up to five times longer shaft lifetime and reduced service intervals
- Easy application due to single plate exchange on site
- Increased production due to constant production rate over a long period of time



Shaft screen

SHAFT SCREEN AND DISCHARGE SCRAPER PIN

To achieve highest dryness levels, the dewatering capacity of the press should be optimized over the entire shaft length. At the discharge end after the high-pressure zone, additional dewatering can be achieved with an exchangeable shaft screen. The pulp is dewatered to the inside of the screw shaft, where filtrate is discharged through channels. This can lead to



Double helix

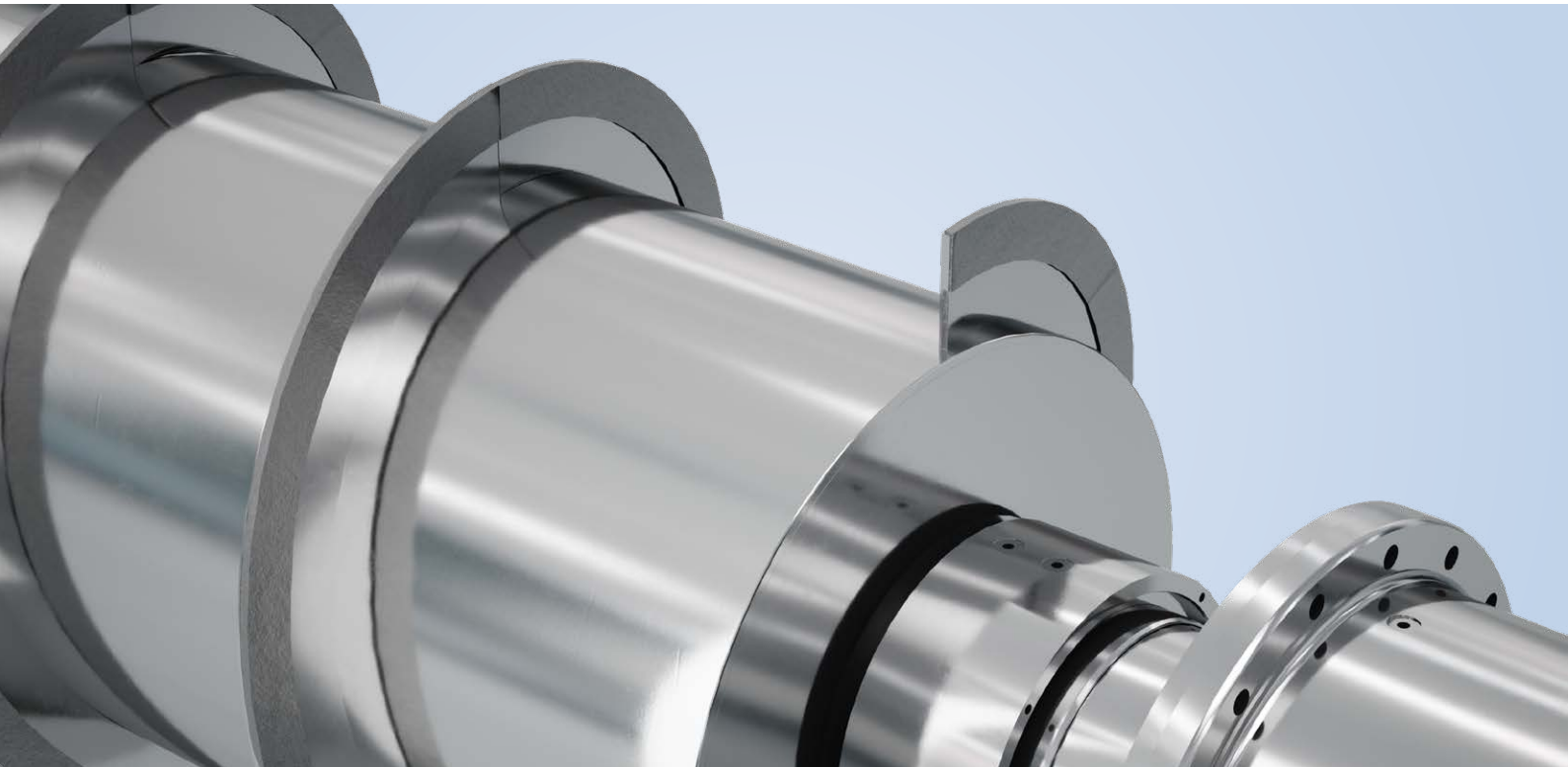
an increase in the dryness content of up to 2%, depending on the pulp characteristics. The higher dryness and compression level of the pulp mat, however, also increase the risk of machine plugging at the discharge end. To overcome this hazard, a discharge scraper pin can be welded onto the screw shaft at the end of the high-pressure zone. There, it rips off the pulp mat, which guarantees smooth discharge.

DOUBLE HELIX IN THE INLET SECTION

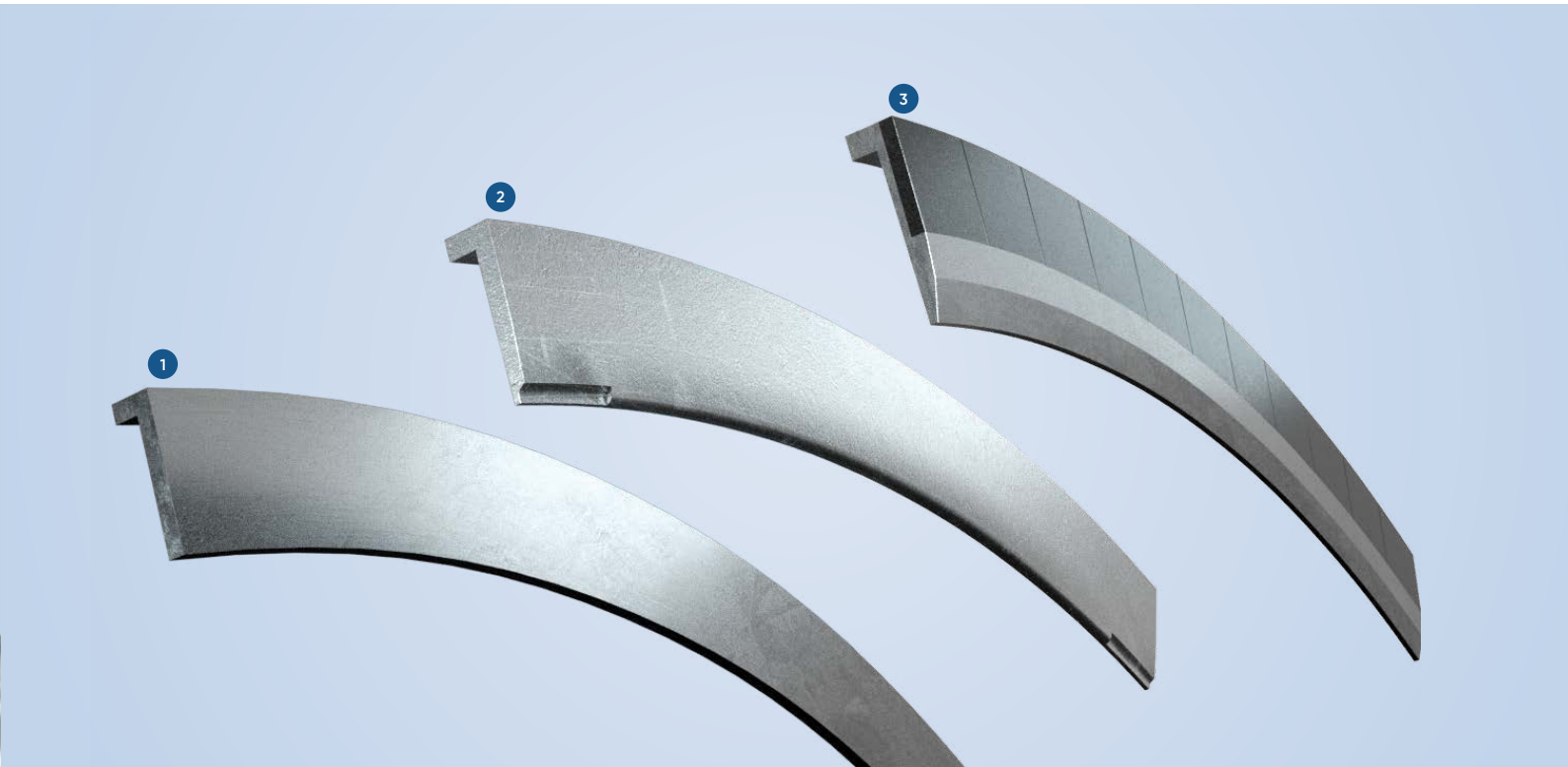
Pulps with higher freeness levels require greater dewatering in the inlet section. A double helix in this zone providing twice as many screw flights helps reduce the dewatering pressure through the holes in the baskets. This results in better forward movement by the wet pulp. As a result, the double helix has an additional cleaning effect on the inlet baskets.

Screw flight wear shoes

Meeting specific process requirements



Screw flight with semicircular, stellite wear protection



1 Stellite semicircle 2 Sintered wear shoe 3 Hard metal wear shoe

Screw presses perform best when the screw flight edges have the correct shape and height to keep the dewatering channels in the screen plates clear. The edges need to be sharp to scrape the fibers off the basket. As this is a highly abrasive process, the flights gradually wear out, dewatering performance deteriorates, and plugging may also occur.

To delay wear on the screw flights – and make it easy to restore performance when the edges do finally deteriorate – a highly wear-resistant screw flight protection system is needed.

A typical screw press has three different pressure zones, and each zone has different protection requirements.

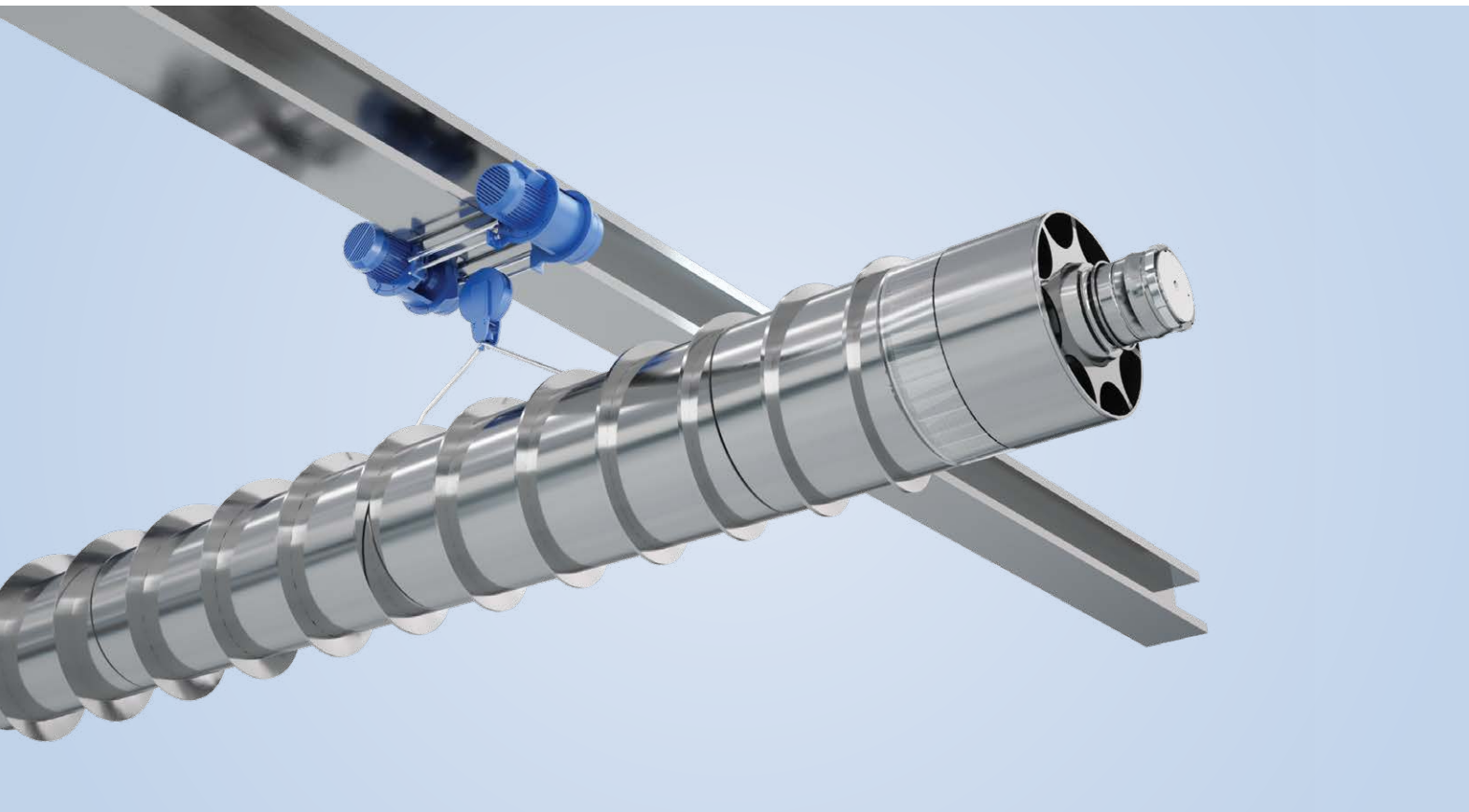
BENEFITS

- High ROI due to fewer wear shoe exchanges and reduced maintenance costs
- Energy savings due to less shoe abrasion, thus preventing pulp being squeezed out between screen plate and rounded flights
- Increased operational reliability due to high durability

TYPE	PRESSURE ZONE	DESCRIPTION
Semicircular, steel	Low	Cost-effective solution
Semicircular, stellite	Low	Steel semicircle with stellite edge
Sintered	Medium	Tungsten-carbide compound
Standard hard metal	High	Special ANDRITZ-patented compound containing carbide
Heavy-duty hard metal	High	With sintered coating on the outer diameter

Screw shaft reconditioning

Making the best of it



REFURBISHMENT

The screw shaft is very much subject to wear and needs to be reconditioned on a regular basis. One option is refurbishment of the screw shaft as follows:

- Cutting off the screw flights and welding on new ones.
- New flight wear protection (wear shoes and/or semicircles).
- Exchange of shaft screen and discharge scraper pin.
- Restoring of shaft tube thickness by spraying on a metal layer or installing body plates.

EXCHANGE

If refurbishing is no longer an economical option, an exchange of the entire screw shaft may be worth considering.

- The replacement shaft can have exactly the same design and characteristics as the existing unit and will be manufactured accordingly.
- ANDRITZ also has typical screw shafts in stock. Replacement shafts are available for some OEMs as well as for all ANDRITZ screw presses.

As soon as the worn shaft is dismounted, it can be replaced by a reconditioned or new shaft, and production can be resumed without long shut-down times.

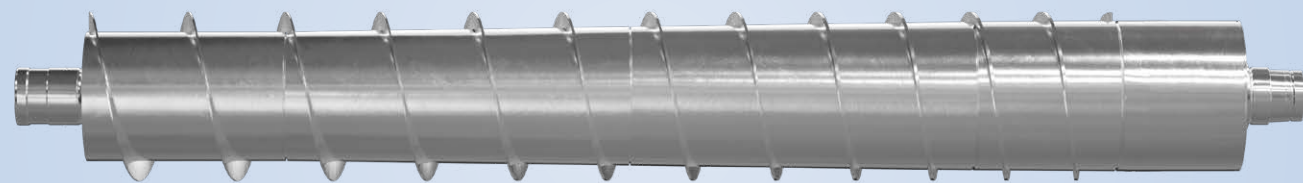


ADAPTING THE SCREW FLIGHT COMPRESSION CURVE

If the pulp quality or the production requirements have changed, the geometry of the screw shaft and flights might need to be optimized. An adapted screw flight compression curve will help achieve a better outlet consistency or a higher production rate. The dewatering behavior over all pressure zones will be improved, thus increasing the operational stability of the screw press.

Low-energy concept

Boosting the performance of your screw press



The Low Energy Screw Shaft (LESS) delivers a new compression curve, producing the desired throughput and dryness while turning more slowly.

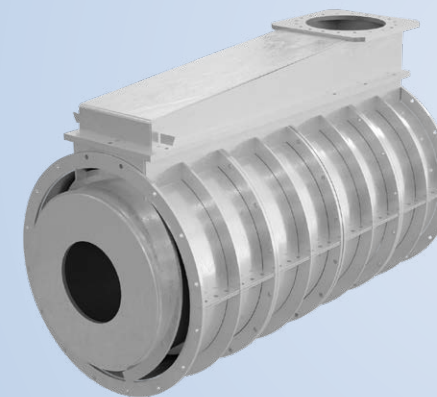
OPTIMIZE ENERGY CONSUMPTION

Improving energy efficiency is an effective way of bringing costs down. In order to reduce energy consumption in a cost-effective manner, ANDRITZ provides a couple of upgrade products. At the same time, the pulp dryness levels and the production rate are improved. This makes machine operation smoother and more efficient. A safe control system stabilizes screw press performance.

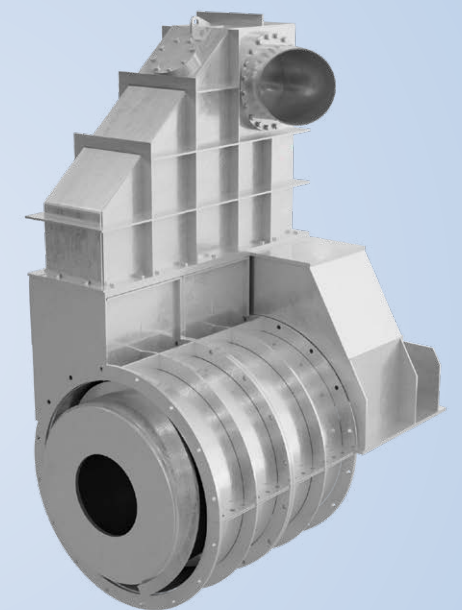
- Low Energy Screw Shaft (LESS): with special screw geometry.
- Grooved baskets: energy savings due to increased transport efficiency.
- Special shaft coating: highly wear-resistant, hard metal coating which reduces pulp rotation.
- Headbox with tangential inlet: for more even feed distribution.
- Counter-pressure system: provides a continuously high level of discharge dryness and pressing torque.

LOW ENERGY SCREW SHAFT (LESS)

The special geometry of the screw shaft delivers the same outlet dryness at reduced speed. This reduction of rotational speed results in a more than 30% decrease in energy consumption. To ensure both performance and reliability, the shaft is coated with a Teflon-based material applied to a replaceable steel base layer. This combination reduces sticking/plugging, allowing the pulp to progress evenly along the screw shaft.



Extended headbox



Headbox with tangential inlet

HEADBOX WITH EXTENDED INLET

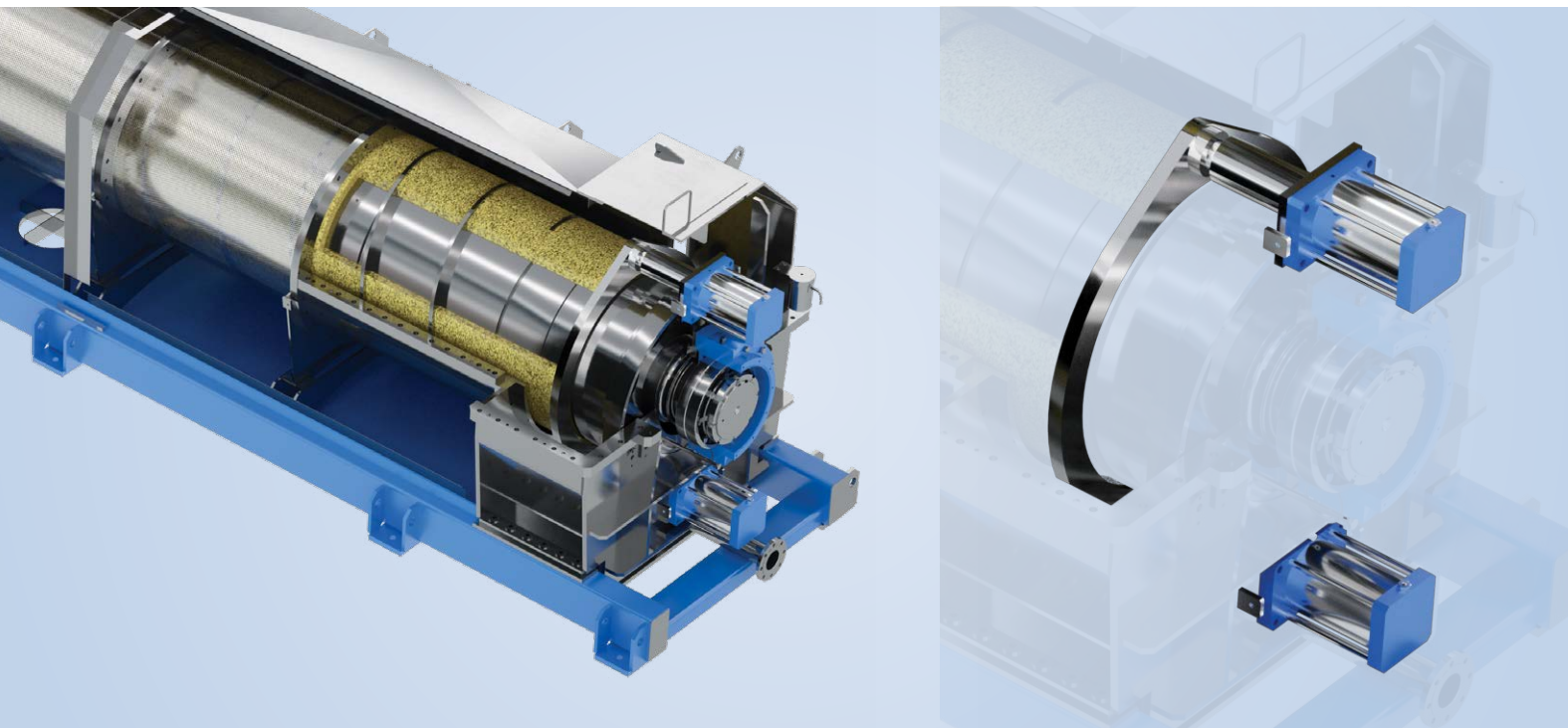
The headbox is extended over the inlet basket and the first low-pressure basket, which ensures better pulp distribution. Furthermore, plugging at the screw press inlet is prevented.

HEADBOX WITH TANGENTIAL INLET

The headbox injects the incoming stock at a tangent to the direction of rotation of the screw. This reduces the risk of the pulp rotating together with the screw, and thus, the axial transport efficiency of the screw press can be improved.

Low-energy concept

Boosting the performance of your screw press



Counter-pressure device

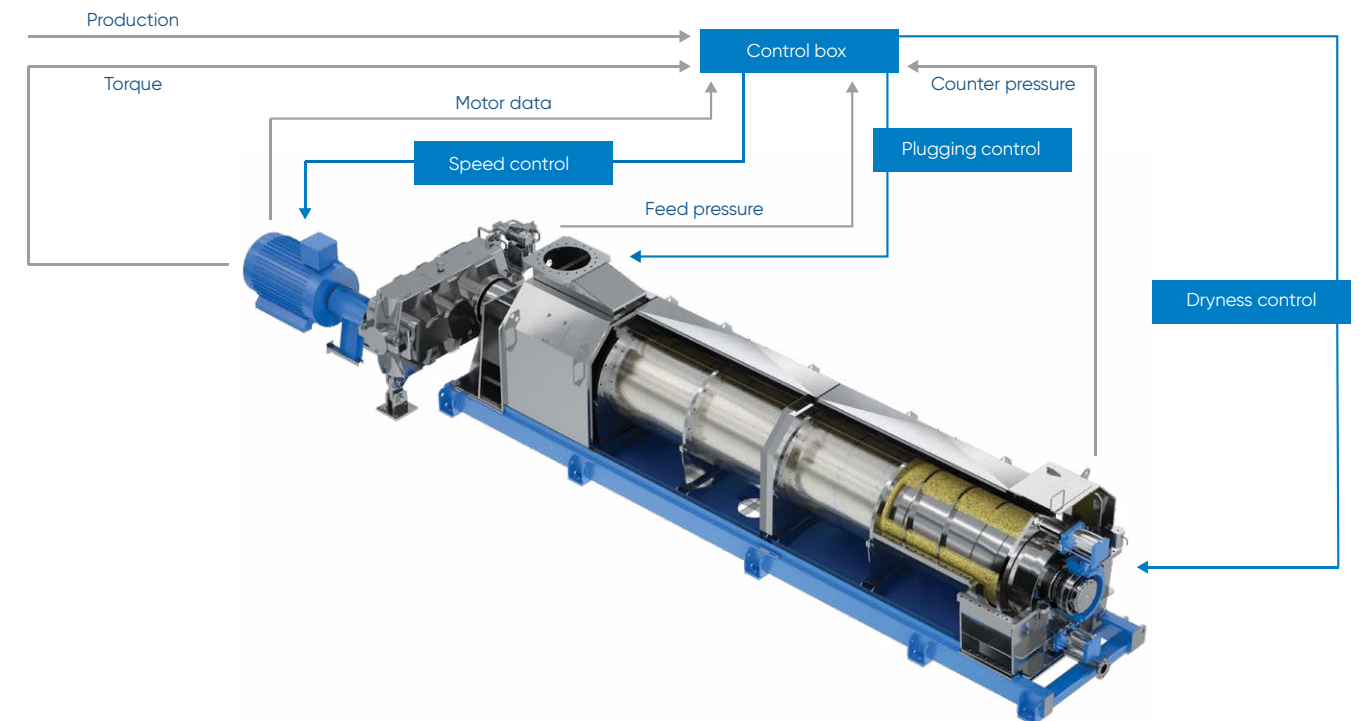
COUNTER-PRESSURE SYSTEM

The counter-pressure unit in some screw presses has quite a complex design, with many moving parts requiring a lot of maintenance. In conventional systems, the flaps tend to get stuck, thus increasing the downtime of the press.

The ANDRITZ counter-pressure system used in all modern screw presses on the market is a reliable regulating device that ensures even pressure distribution in the

discharge area. This results in a constantly high outlet dryness. The counter-pressure device can be regulated very easily by robust pneumatic cylinders that are not in contact with the pulp.

The system is maintenance-friendly, due to the simple and rigid design and the reduced number of moving parts. Still, this counterpressure unit is sensitive enough to respond to fluctuations in dewatering performance.



Control system

SCREW PRESS CONTROL SYSTEM

Instability in screw press performance, such as reduced outlet consistency or plugging, is harmful to your pulp mill process. Operation of the screw press can be optimized by means of advanced control strategies that provide the best output/discharge consistency for any given set of process parameters.

The ANDRITZ screw press control system maintains smooth operation with maximum throughput and no power variations and extends the machine uptime. It ensures safe running of the press at the maximum production level without the risk of plugging.

This control strategy is ANDRITZ's state-of-the-art technology for all newly delivered screw presses. Combined with the counter-pressure unit, it provides a very safe and reliable control system:

- Speed control by production, ensuring a fast reaction
- Dryness control by modulation of counter-pressure system
- Plugging control by interlocking with feed pressure



Setting up the welding equipment



Adjusting the welding equipment



Grinding the screw flight



Automatic facing repair



Selective manual welding of wear shoes

Cost-efficient, on-site services

Professional assessment and refurbishment

AUDITS AND PROCESS OPTIMIZATIONS

A production decrease or lower outlet consistency can have several reasons. Performance evaluations and functional inspections during operation and/or shutdown can be performed by professional and skilled ANDRITZ staff together with your machine and process experts. A survey of this kind can easily pinpoint the recommended improvement activities.

WE OFFER

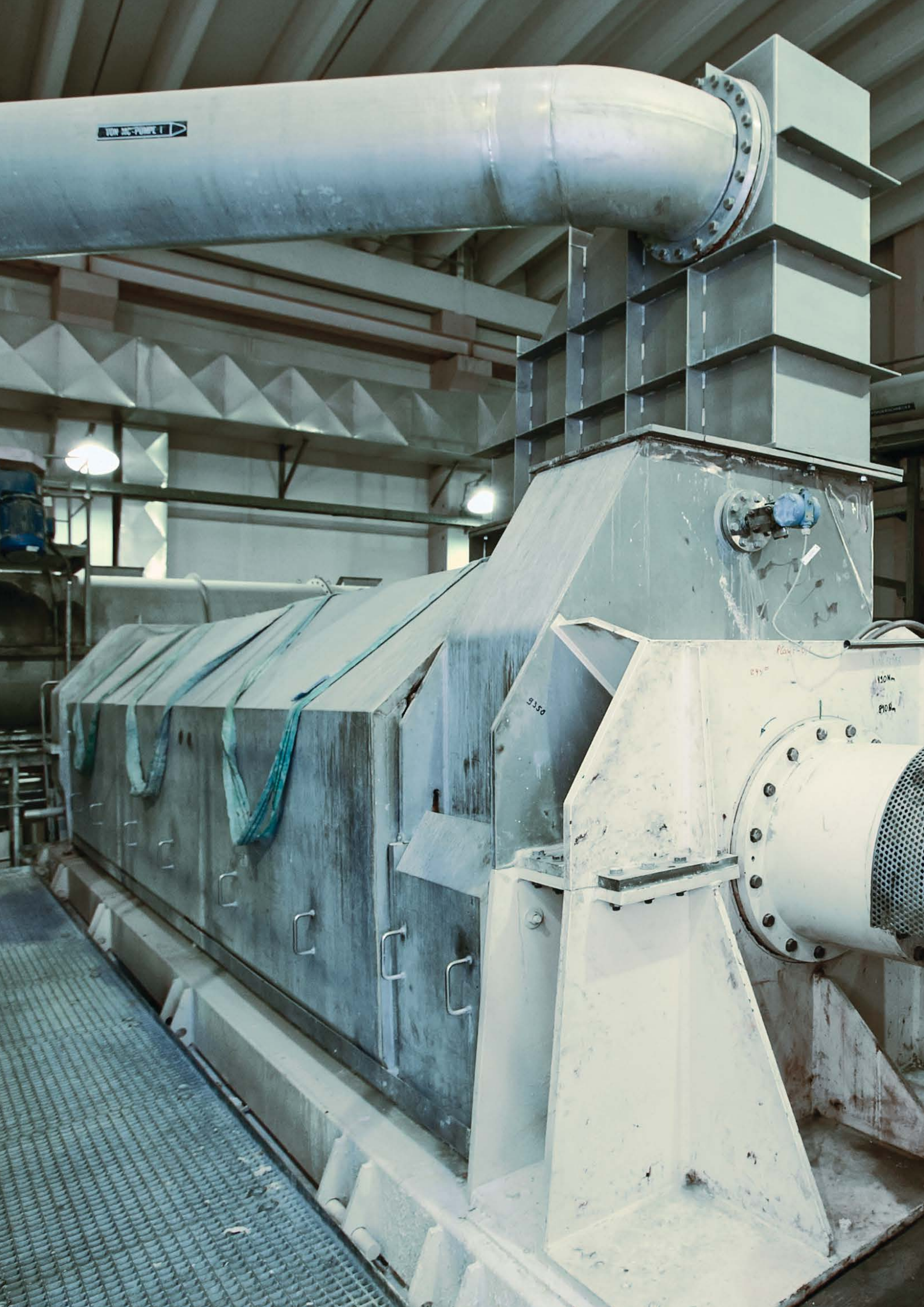
- Mechanical inspection
- Process audit
- Control upgrade
- Service visits

SCREW SHAFT REPAIR AND UPGRADES

Thanks to the ANDRITZ mobile on-site repair unit, there is no need for laborious dismantling of a screw shaft to prepare it for cost-intensive and complex shipment to a repair facility. A mobile machine is used for measuring, leveling, welding, and grinding. The ANDRITZ on-site repair unit can add many productive years to your existing screw presses and restore machine performance with the latest upgraded components. All this can be done in a fraction of the time required to dismantle and ship.

BENEFITS

- Minimize downtime for repairs
- Minimize maintenance costs
- No need to provide a spare shaft
- Repairs on site save transport time and costs
- Wear protection can be applied over all pressure zones



LESS is more

Small interventions with a big impact

CHALLENGE

When the time came to replace a worn screw press shaft, the target was mainly to maintain output volume and quality. But the new Low Energy Screw Shaft (LESS) did better – dramatically slashing energy consumption as well.

The ANDRITZ screw press was installed in the DIP line of a European paper mill that supplies pulp for white-top liner and LWC. The project target was straightforward: The upgraded screw press should deliver at least the same quality and throughput as before. However, ANDRITZ had some new ideas for the screw press shaft replacement.

With the LESS concept, the shaft would be producing the desired throughput and dryness while

turning more slowly, resulting in reduced power consumption. To ensure both performance and reliability, the shaft would be coated with a newly developed Teflon-based material applied to a replaceable steel base layer. This combination would reduce sticking/plugging, allowing the pulp to progress unimpeded along the screw shaft.

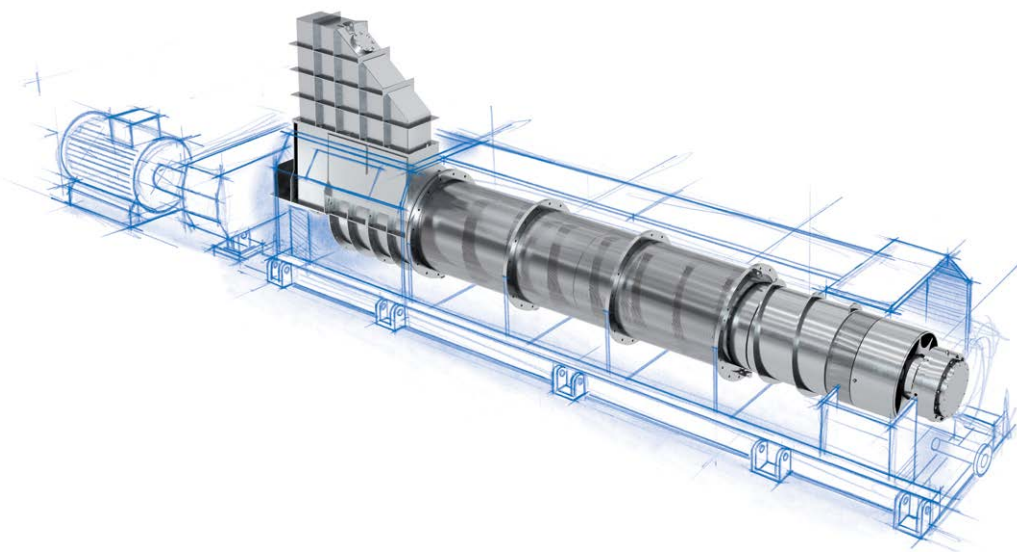
Another idea was conversion to a tangential inlet to inject incoming stock in a direction counter to the screw's volutions. This would reduce the "roll-with" effect, increasing the output consistency of the stock.

EXTRAORDINARY RESULTS

Since this was the first-ever installation of a LESS, ANDRITZ was conservative in its savings calculations, estimating a possible 15% reduction

in specific energy consumption. In fact, the results exceeded expectations. The press, with a single hydraulic drive, has been operating at full capacity since July 2013 – and consuming 50% less power than before the upgrade!

The LESS design can be used on all types of screw presses. 30% energy savings would be a good figure for evaluating payback. Savings up to 50% might be possible with the right process parameters and when hydraulic drives are used. Such optimizations show that smaller changes to single machines or subsidiary systems also have an influence on the ecological footprint of the entire mill.



All seven in one go

General screw press overhaul and modernization

Upgrades of complete production lines often have one major target: higher production at the same or even lower energy consumption. To achieve such a goal, each process step has to be analyzed and optimized in terms of these new requirements. Higher throughput at reduced refining energy in the TMP reject line also was the starting point for the overhaul of seven screw presses in a European pulp mill.

These screw presses built by Sprout-Bauer had an outdated pressure curve layout as well as an old-fashioned basket and screen design. This means that the screw presses were unable to meet the customer's state-of-the-art demands. Due to the original screen basket design, the open area for dewatering was too small for the increased output requirements. Originally, the presses were operated with an inlet consistency of 4.5% and achieved a discharge consistency of 26%.

The proposed ANDRITZ solution was to rework and upgrade all screw shafts with regard to the new requirements. Furthermore, new screen baskets were to be installed in order to enlarge the open area and ensure smooth dewatering behavior. The split basket design

in combination with the installation of bolted screen plates will allow quick and easy exchange and thus, considerably reduced maintenance times in the future.

TIGHT SCHEDULE

As usual, the timeframe of the project was very tight. To optimize the delivery time, all seven screw shafts were reworked in parallel in the workshops in Graz, Austria. The below upgrades were accomplished on each individual shaft:

CAREFUL ALIGNMENT

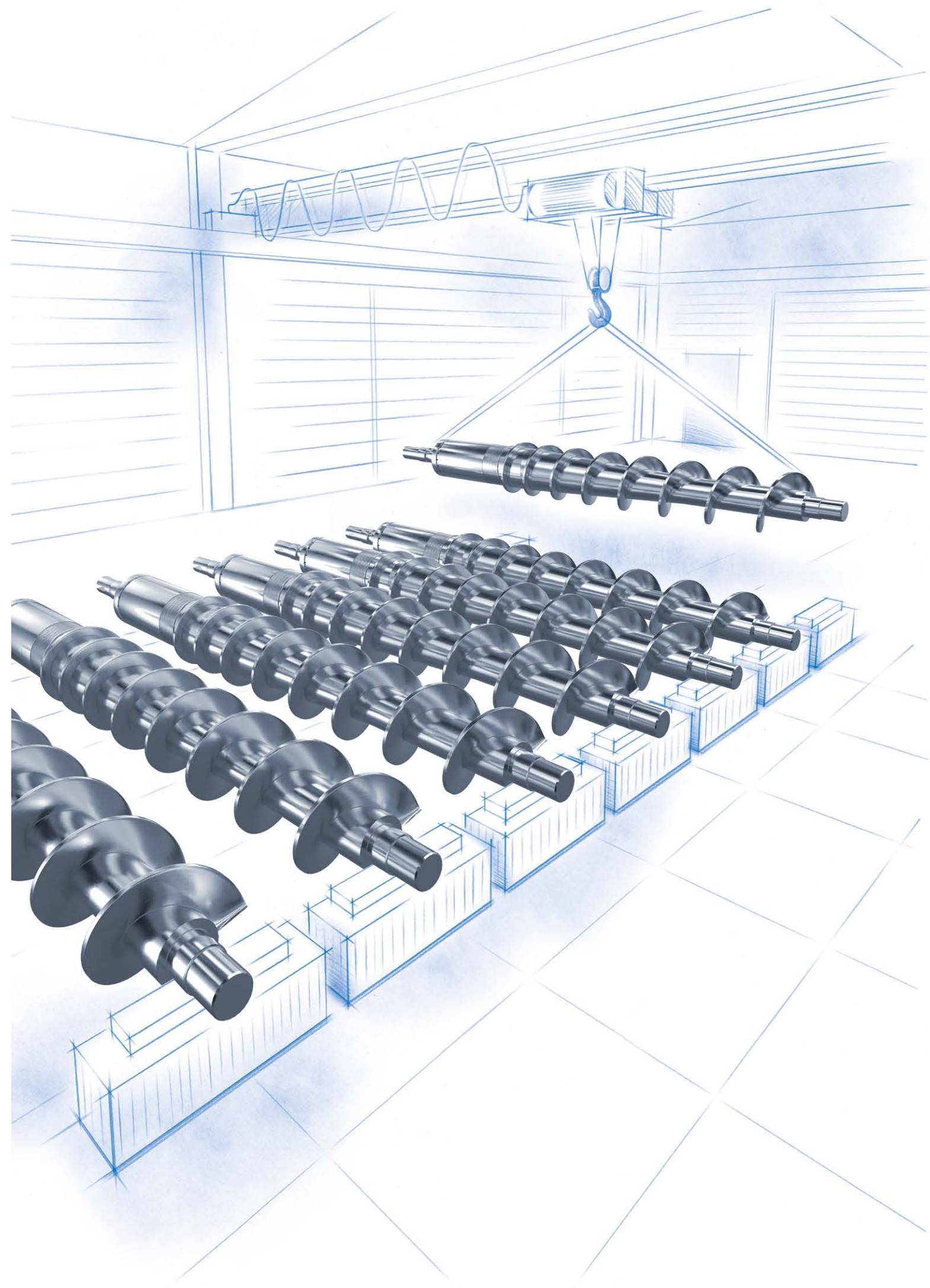
The new screen plates have a larger open area (~19%) than the existing ones (~14%). The screen plate design with pulp-side grooves

prevents the pulp from rotating together with the screw. To ensure most stable and efficient screw press operation, the gap between the screw flights and the screen baskets is crucial. Thus, the design of the reworked shafts and the state-of-the-art baskets was fully aligned to obtain the optimum gap recommended by ANDRITZ.

The result of the screw press upgrades came up to the customer's expectations in full: production per press increased by 20% from 70 to 85 t/d, discharge consistency was raised from 26% to 32%, and last but not least, the average maintenance time per press was reduced by 40%.

SCOPE

- Screw flight geometry adapted to ensure a pressure curve tailored to suit the customer's process conditions, resulting in an increase in discharge consistency and production
- New shaft screen to improve the outlet consistency
- New discharge scraper pin leading to more efficient and continuous output
- Double helix in the inlet area of the screw to ensure smooth pulp feed and stable production
- New exchangeable wear shoes (stellite semicircles in the low-pressure zone; sinter shoes in the medium-pressure zone; hard-metal shoes in the high-pressure zone).



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