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METRIS OPP

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Metris OPP: **BIG THINKING – BIG RESULTS A SELF-OPERATING MILL AT ELDORADO**

Cover Story // 14

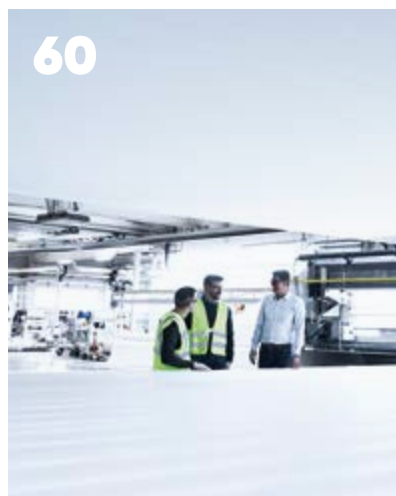
INSIDE

AUGMENTED REALITY CONTENT

To view videos, illustrations and picture galleries in a more direct and lively way, we added augmented reality to several articles! **Download our ANDRITZ AR APP** on our website or in the AppStore/PlayStore!

**SCAN THE MARKED PAGES AND
EXPERIENCE THE ENHANCED CONTENT.**





Metris OPP – Remarkable results from digitization

ANDRITZ Metris technology is at the heart of the digital transformation taking place across the pulp and paper industry.

ANDRITZ digital technology has been transforming processes and operations in the pulp and paper industry for years. In fact, over the last decades, we have been integrating automation, electrification, and instrumentation systems into our high-quality engineering and services across the board of all industries we supply and in which we work.

Now, through Metris Optimization of Process Performance (OPP), ANDRITZ is regularly enabling our customers to achieve remarkable results through the digitalization of processes and effective data management – and all with zero capital investment. In fact, the only time charges come in with Metris OPP is when concrete savings have already been realized.

These factors mean that Metris OPP is proving very popular with our customers worldwide; we are currently supporting 58 mills in 13 different countries, covering over 34 million tons of pulp production annually, with some of the contracts running for more than 10 years. Metris OPP is now undoubtedly a mature and well-proven digital offer for the global pulp and paper industry.



ANDRITZ METRIS OPP IN ACTION

In this issue of SPECTRUM, you can read about real life examples where Metris OPP is making a big difference to pulp operations. One example is our cover story, Eldorado Celulose in Brazil. The mill has been an early adopter of digitalization and is now constantly breaking production records utilizing Metris OPP. You can read all about Eldorado's self-operating mill in the article *Big Thinking, Big Results* on page 14 in this issue.

Another example of ANDRITZ digitalization making a huge impact is in the article *Turning a Shutdown into a Pitstop* on page 70. The new Metris Planning App, which is integrated into the Metris OPP platform, is literally knocking days off the time taken for annual maintenance and is making a big difference to the bottom line at pulp mills when it comes to reduced downtime.

We hope you enjoy this issue of SPECTRUM!

Sincerely,

Joachim Schönbeck
Member of Executive Board
PULP & PAPER Capital Systems

Humbert Köfler
Member of Executive Board
PULP & PAPER Service & Units



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NEWS

ANDRITZ and OTORIO provide world-class cybersecurity solutions

Understanding that safe digitalization requires a holistic end-to-end approach beginning at the development phase and reaching into the ongoing operations, ANDRITZ and OTORIO, a company founded by former Israeli Defense Forces cyber experts with decades of nation-state experience, have developed an extensive cybersecurity program ranging from advanced assessments and consulting services to the implementation of proven, cybersecurity and risk management technologies.

BUILT-IN CYBERSECURITY

In a multi-generational, constantly changing threat environment, customized Operational Technology (OT) cybersecurity measures are an imperative part of the automation development process.

ANDRITZ is embedding OTORIO's innovative solutions in its market-leading products and services, ensuring that every machine meets the highest standard of cybersecurity. The advanced services are delivered in the safest way, ensuring the customer's continuous efficient and effective production along proprietary commercial data security. The solution provides ongoing risk monitoring and management, enabled by Security Orchestration, Automation, and Response (SOAR) machine power and leveraged by top talents. A specifically designed industrial intuitive user interface reduces system integration and operational complexities. In addition, a complementary strategic risk assessment advisory service is available to evaluate the effectiveness of organizational production, industry 4.0 benefits, and cyber resilience.

ANDRITZ – OTORIO: Leading safe industrial digital growth



FROM A-Z, WE ARE ALL-IN

Teaming with the right technology and service partner on the journey to digital growth is a key decision. The ANDRITZ-OTORIO team is an integral part of safe industrial automation solutions. The team is highly familiar with the industry's particularity, engaged throughout the entire process at different touch points, and it is dedicated to ensuring your competitiveness.

The unique ANDRITZ-OTORIO partnership enables industries to move forward with time, undeterred by cyber threats, utilize digital opportunities, and maximize productivity growth.

For more information, please go to: andritz.com/cybersecurity



View video footage of this report in our augmented reality App!

FOR FURTHER INFORMATION SEE PAGE 3

New PrimeLineTEX tissue machine for textured tissue

ANDRITZ has officially launched its new tissue machine for textured tissue, the "PrimeLineTEX", enabling customers to produce textured tissue of a quality superior to dry crepe and very close to structured (TAD) tissue, while at the same time achieving significant cost savings.

PrimeLineTEX is available with widths of 5.6 or 2.8 m and produces high-quality tissue for towel and sanitary applications. The machine offers up to 25% fiber savings compared to dry crepe and consumes up to 50% less energy than a TAD machine. The PrimeLineTEX is substantially shorter in length than other market solutions and uses only one additional fabric instead of two. Furthermore, the PrimeLineTEX machine can switch between production of textured and dry crepe tissue within a much shorter time than comparable solutions.

"Our new PrimeLineTEX tissue machine enables customers to produce high-quality tissue close to TAD but with substantially reduced investment and operating costs. It is available to all markets worldwide, without any restrictions. This new machine offers profitable advantages for our customers," says Klaus Blechinger,

Vice President Tissue at ANDRITZ. As a turnkey supplier, ANDRITZ can offer the complete textured tissue production line, including stock preparation, pumps, and the automation system.

For more information, please go to: andritz.com/primelinetex



The ANDRITZ tissue pilot plant in Graz, Austria – the PrimeLineTIAC – is currently configured as a PrimeLineTEX machine and offers customers the opportunity to test and develop their future textured tissue.

ANDRITZ delivers first SeaSOx_{dry} exhaust gas desulphurization system to La Méridionale in France

Due to the lower sulphur limit that will enter into force for worldwide shipping in 2020, more and more shipping companies are fitting their vessels with exhaust gas scrubbing plants. ANDRITZ has adapted its proven flue gas scrubbing technology from the power plant segment for use in the maritime sector and is offering it under the name of ANDRITZ SeaSOx. ANDRITZ offers wet and dry exhaust gas scrubbers for shipping in open and closed-loop designs or a combination of the two (hybrid variant) depending on customer needs.

ANDRITZ was awarded the first dry exhaust gas cleaning system worldwide on the "Piana" RoRo vessel – a ferry sailing between Marseille and Bastia – until autumn 2019. This solution uses Bicar® sodium bicarbonate as absorbent and a pulse jet fabric filter for SOx and particulate removal. One main engine and one auxiliary engine are routed to the filter system. This technology will reduce the particulate emission to the lowest values and wash water will not be discharged into the sea. ANDRITZ is responsible for the design, engineering, and supply of the main equipment. SOLVAY is in charge of delivery of the sodium bicarbonate and discharge of

the residues. La Méridionale is the owner of the vessel and responsible for the installation work on board.

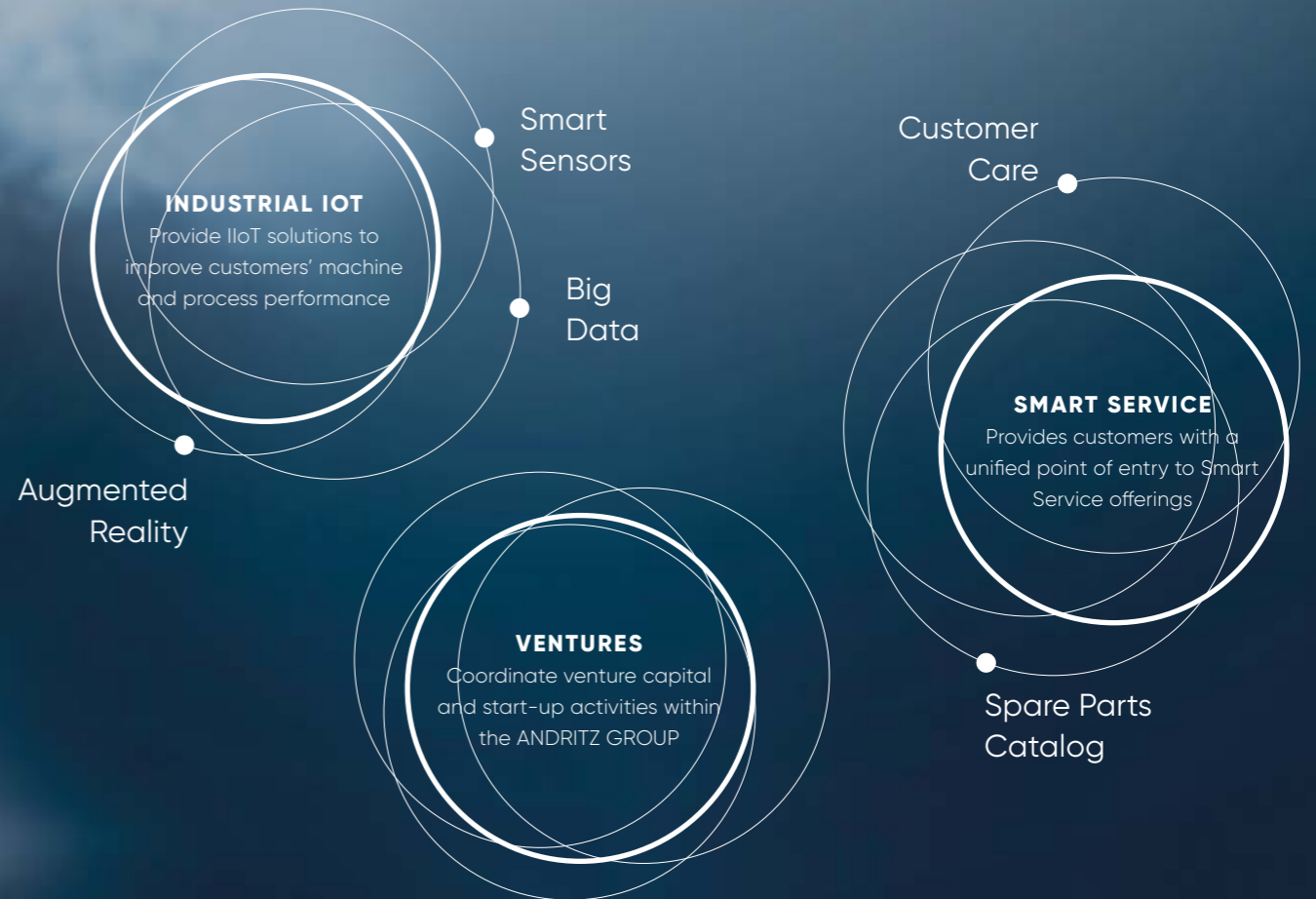
As particulate and wash water emissions are foreseen to be restricted in certain areas in the near future, this unique ANDRITZ technology is the perfect future-proof solution for many new customers.

For more information, please go to: andritz.com/seasox



FORESEE DIGITALLY WITH METRIS

Industrial IoT, Industry 4.0, digitalization – current buzzwords that industries use when seeking to improve their performance and equip themselves for the future of industry.



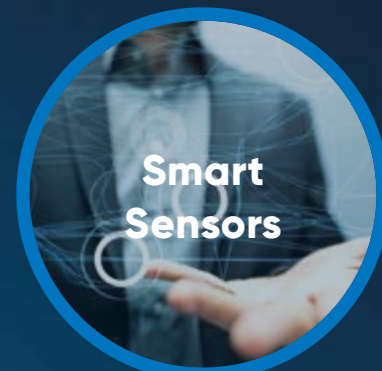
As a technology leader with extensive and long-term experience in supplying industrial measurement, control, and optimization solutions for various industries, ANDRITZ is combining its process and equipment expertise with the latest advancements in the digital era. The result of this powerful combination is Metris: a portfolio of ANDRITZ digital solutions.

One of the flagship capabilities of Metris is its ability to optimize industrial processes, known as Metris OPP. Metris OPP has been developed over the past decade and is installed today in over 50 locations around the world. It combines powerful analytical and data mining software with the knowledge of the world's top process experts to deliver a smart service initiative for customers.

The depth and effectiveness of the Metris portfolio continues to improve thanks to ongoing R&D, collaboration with key customers and institutions, and venture activities.

Portfolio options created for industry and in general as well as the specific requirements of key industries served by ANDRITZ all rely on the three strategic focus areas of the Metris brand: Industrial IoT technologies, Smart Service concepts, and Venture activities. The main technological advancements integrated into individual Metris products are derived from Big Data analytics, Smart Sensor technologies, and Augmented Reality solutions.

Metris helps customers to foresee digitally. With this forward slant, ANDRITZ is continuously improving the portfolio and its performance – providing tailored and fully integrated digital solutions from a single source.



OPTIMIZATION

Imagine the ability to produce the best product at the lowest cost every hour of the day – based on the current realities, constraints, and opportunities. That is optimization in a nutshell. Automation plays a critical role in achieving optimal performance and remarkable results.

LIFE IS BUSY. WE ARE ALL BUSY. We often cram too many activities into our days – both at work and at home, to the point where it can seem chaotic. At work, we are stressed due to deadlines or meetings. In our spare time – especially with the rise of social media – we spend our “free” time staring at screens, texting and tweeting.

All this “busy-ness” and activity may give the illusion that we are living life to its fullest. Yet, inside, we feel that things are not in balance. Self-help gurus come to

our rescue – giving us tools to “optimize” our everyday life.

The same can be true of industrial processes – all the “busy-ness” of flow rates, temperatures, pressures, speeds, inputs, and outputs. Yes, a certain chaos can ensue when things are out of balance.

The self-help gurus for industrial optimization exist as well. In most cases, they are much more effective at helping optimize a plant’s performance than the

ones at the bookstore claiming they can help us get our lives back in order.

However, optimization is a tricky word. The key to optimization is to “get to the root” of what it means to be “optimal” for a given process. Is it consistent quality? Lowest cost? Highest throughput? Highest availability? Lowest equipment wear? Nevertheless, once this has been defined, there are automation tools, such as Metris OPP, that will adjust inputs/outputs in real

time to achieve optimal operations at any given moment.

Not a small task. But achievable.

PROVEN BENEFITS

Metris OPP (Optimization of Process Performance) is an ANDRITZ service, usually performed on a longer-term contractual basis, that improves the performance of a production system. Metris OPP has helped customers worldwide save millions, with pulp mills, steel mills, and chemical plants among the industries that have reaped benefits within weeks rather than years.

Metris OPP is part of the Metris family of

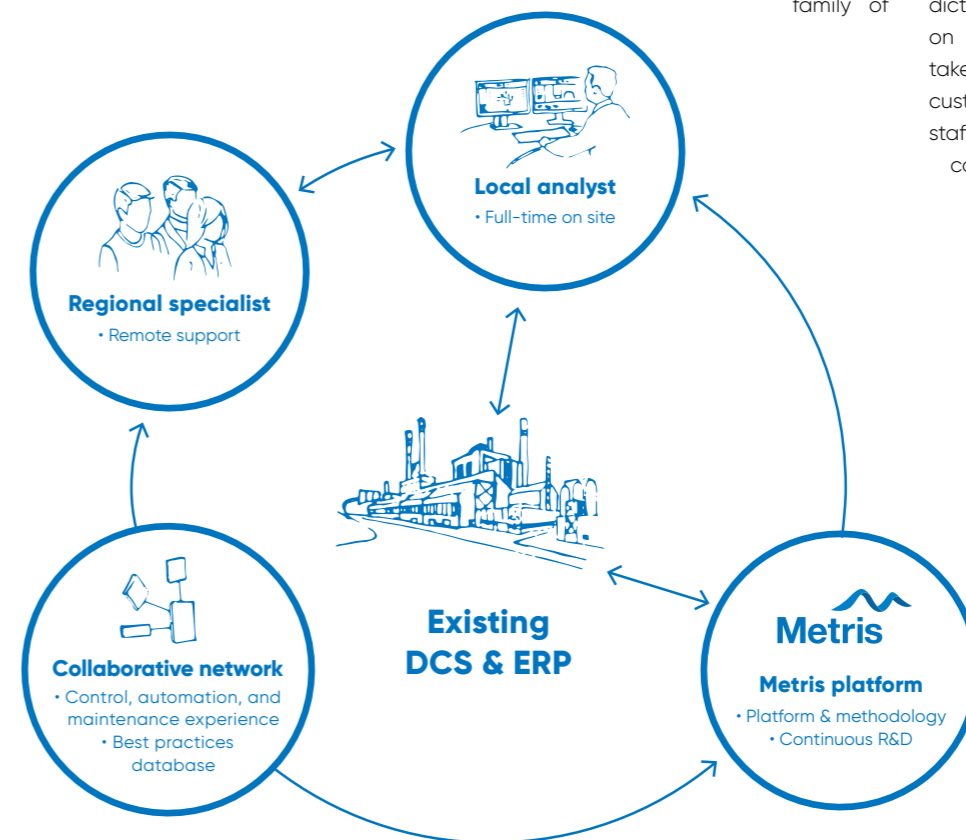
ANDRITZ Digital Solutions. It is based on continuous developments in the three main Metris technologies – Smart Sensors, Big Data, and Augmented Reality – and improves production systems by analyzing a huge amount of data collected throughout the systems.

COLLECTING INFORMATION TO DELIVER RESULTS

How does Metris OPP work? The analytical software collects information from systems about each control loop, control valve, motor, and all the variables in the process. Sophisticated signal processing and statistical tools in the software identify control loops and assets that are not performing to the optimum and predict the economic impact this will have on the process. Then human expertise takes over. ANDRITZ experts work with the customers’ operations and maintenance staff to prioritize opportunities and make corrections. In some cases, it can be a simple fix such as repairing a valve. Others require analysis of the overall control objective and changing the process control strategy to eliminate off-spec production, overconsumption of chemicals and energy, or sources of process variability. The result is increased operational stability and reduced waste.

ACHIEVE KPIs WITH THE HELP OF ANDRITZ

“Talk to those who can make you better than you are.” – Seneca already knew that this strategy was a reliable way of triggering improvement and working towards achieving new goals. When using Metris OPP, a customer





BENEFITS OF METRIS OPP

- Identifies opportunities for savings and efficiency enhancement
- Powerful signal processing and statistical analysis of control effectiveness
- Reduces off-spec production or wasted raw materials
- Increases production by enhancing process stability
- Better quality in end product – less variation
- Predicts failure in specific equipment and increases equipment availability
- No capital investment required; flexible payment can be based on savings achieved
- Field-proven model in many contracts in different countries
- Knowledge database continuously incremented
- Continual R&D

can be sure of being heard. A customer-oriented workflow focused on individual targets and KPIs is crucial, like cost savings in production, reduced energy consumption or smoother long-term operation. As soon as the KPIs are specified, actions are taken to achieve the goal of improving the processes within the three-month test phase. Under the basic pricing model, charges are only incurred once concrete savings have been realized. Both within the test phase and the following quarterly periods, the higher-level goals defined are analyzed, evaluated, and adapted if necessary. This approach always guarantees that the ANDRITZ experts and the customer all pull together.

GAINING INSIGHTS THROUGH DATA

Metris OPP can be compared with a tool kit and offers a variety of functionalities and applications. Tools such as the dashboard allow

managers to gain a clear overview and access KPIs, balanced scorecards, and project management tools. Engineers, on the other hand, can draw on OPP's powerful data analytics tools such as data mining, statistics, and power spectral density to quickly implement any efficiency modifications.

ENHANCED DAILY OPERATION

OPP is an especially powerful aid for operators and shift supervisors, for example, with the Logbook. This stored user data can be utilized to enhance daily operations, find solutions to recurring problems, or train new operators. Smart controls and operator assistance facilitate an array of start-up sequences, diagnostics, and root cause analyses as well as adaptive set-points, multivariable predictive controls, and neural networks. Regulatory control functions include control loop tuning and assessment as well as dead-time compensators and feed-forward options.

REAL-TIME DATA AND AUGMENTED REALITY

Field operators and maintenance technicians can perform more effectively with on-hand, augmented reality support. Real-time data and diagnostics coupled with remote support allow improvements to be implemented as and when they are needed. OPP also has functions that allow a malfunctioning valve or motor to be adjusted or replaced before it has had any significant negative impact on production.

CONTACT

metris@andritz.com

58

mills in 13 countries

50

million euros savings per year

34

million tons of production

2000

experts worldwide

0

capital investment

BIG THINKING BIG RESULTS

A SELF-OPERATING MILL
AT ELDORADO



Autonomous automobiles use a variety of techniques to gather data about their surroundings and feed this data to advanced control systems that interpret the inputs and identify appropriate navigation paths. The development of autonomous pulp mills using Metris OPP is following a similar path – and Eldorado Brasil Celulose is an early adopter of this technology. The results have had a quick economic payback.

Experiments began with automated operation back in the 1920s or even earlier. The first truly autonomous cars appeared in the 1980s. The development of autonomous mills is moving at a much faster pace thanks to smart sensors and tremendous computing power in small packages that are part of ANDRITZ's Metris OPP (Optimization of Process Performance).

Metris OPP is a combination of sophisticated software and knowledgeable human experts. This system is aimed at improving production through data

mining and control strategies, with the goal of reducing costs and increasing profits. It has been around in various forms for over a decade and is constantly evolving and improving. Metris OPP has been implemented in over 50 plants in 13 countries. Arguably the most impressive Metris OPP project is the autonomous mill at Eldorado Brasil Celulose near Três Lagoas (MS), Brazil.

AUTOMATED OR AUTONOMOUS?

"Autonomous implies acting independently," explains Leonardo Soares

Figueiredo, ANDRITZ's OPP Project Manager at Eldorado. "Most of our work at Eldorado to date still has an operator in the driver's seat, so perhaps 'automated mill' more accurately describes what we are doing today – with an eye towards autonomy in the future."

Carlos Monteiro, Eldorado's Industrial Director, does not care whether it is autonomous or automated. Monteiro is focused on results. "I can tell you this," he says, "the results in the first year have been impressive."

FACTS

Company:
Eldorado Brasil Celulose
Location:
Três Lagoas, Brazil
Product:
Bleached market pulp
(1.7 million adt/a)
Automation tool:
Metris OPP



The control room at Eldorado is the action center for production control. OPP software resides in the DCS for advanced control of fiberline processes and also links process, maintenance, and asset management information into one network.

An increase in operational efficiency from 89.2 to 93%; variable cost reduction of 7%; 38,000 admt production over the budgeted amount; AND controls in automatic mode 95% of the time.

METRIS OPP

Increasing operating efficiency by 3.8 %-points may not sound like a tremendous improvement. But in a mill currently producing 1.7 million t/a – an amount that is equivalent to millions of Brazilian real in the end. The fact that Eldorado operates sustainably at 13% above design capacity without any additional capital investments is proof of its efficiency.

But why would a mill already operating in the top tier choose a service like Metris OPP? "We are well managed and have tight cost controls," says Leonardo Pimenta, Technical Control Manager at Eldorado and in charge of the OPP project. "But we can always improve our position. We focus on every detail to stay ahead of our competitors. Metris OPP is a tool that helps us stay ahead."

STEP-BY-STEP TRANSFORMATION

The high level of automation at Eldorado didn't come overnight. All changes within the processes of the mill were and are done step-by-step and executed on a daily basis. The advantage of this approach is seen in the smooth, gradual integration of the process improvements without impacting daily mill routines.

"The main challenge was never the engineering itself, but rather the adjustments required in the way that operators and managers worked," Figueiredo says.

"The key to us achieving results is the belief that processes are better controlled by automatic, advanced process control than by manual operator intervention," says Pimenta. "Stability is essential. Every loop in automatic mode makes us money."

KPIs ARE MEASURED CONSTANTLY

"They were pretty high targets, especially for a well-run mill," Figueiredo admits. "But we were committed – both Eldorado and us – to achieving them. We signed an

agreement in August 2016 with the idea that we would have all the front-end work done by the end of the year so we could start measuring results in January 2017."

Early in the project, Eldorado and ANDRITZ set clear goals against which to measure success. These goals, known as Key Performance Indicators (KPIs), form the basis for 30% of ANDRITZ's payment, so they are important. What gets measured gets done.

The three KPIs selected as being most critical are: 1) operational stability in the 90-93% range; 2) a reduction in variable costs versus budget; and 3) all the APC routines will be turned on at least 90% of the time.

Arthur Santos, OPP Technical Specialist at ANDRITZ, believes that the front-end work of analyzing control loops and then "tuning" each loop is responsible for helping achieve the results Eldorado is seeing today. "It all starts with reliable data, which comes from reliable instruments and sensors," Santos says. "We

CARLOS MONTEIRO
Industrial Director,
Eldorado Brasil Celulose

**"I can tell you this:
the results in the
first year have been
impressive!"**





Eldorado Brasil Celulose's senior management team (left to right): Luiz Roberto Araujo, Maintenance; Marcos Steyer, Woodyard and Chip Preparation; Murilo Sanches, Recovery, Utilities and Energy; Leonardo Pimenta, Technical Control Manager; and Marcelo Martins, Production Manager

completed over 40 projects using combinations of smart sensors, APC, loop tuning, data mining, and so on, that created the infrastructure and a standardized way of operating."

ALMOST 100% AUTOMATED CONTROL

Today, the Eldorado mill runs in automatic mode 97-98% of the time, enabling Eldorado to progress from basic control to "hands off" and even "eyes off" operation. However, operators mostly still start and stop the production process and take over when malfunctions or breakdowns occur, which accounts for the remaining 2-3% of control tasks.

For the rest of their shift, operators can safely turn their attention away from mundane control tasks. "By running in auto, we can reassign operators to more highly leveraged tasks," Pimenta says. "If you think about it, even the best operator in the world can't be alert and on duty 24/7/365.

AUTOMATIC START-UP SEQUENCES

At the bleach plant, an automatic start-up sequence has been implemented by the fiber line team and tested. "The operators only have to press one button, and the plant starts up by itself," Santos says. "After the process has started, Metris OPP takes over to control the

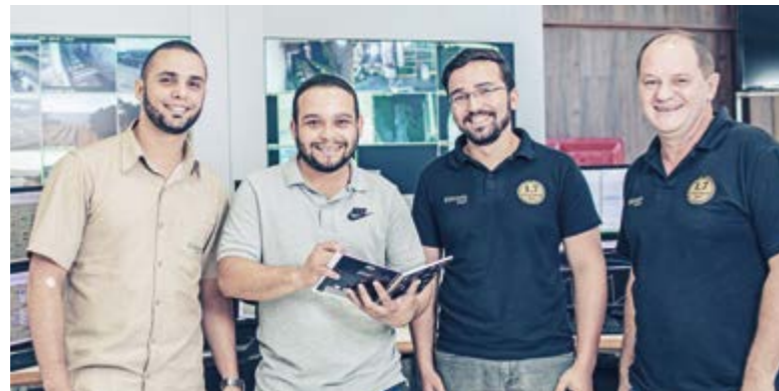
bleach production. The expansion of this sequence within our autonomous mill has reaped tangible rewards already, which is why we are now developing similar start-up control for the washing processes."

SUPPORT FOR RISK-BASED MAINTENANCE

Three reliability engineers are part of the ANDRITZ-Eldorado team working on the Metris OPP project. According to Luiz Roberto Araujo, Eldorado's Maintenance Manager, these three are supporting the mill's culture of risk-based maintenance (RBM) by centralizing information from the process and the equipment in the same database.

It sounds simple, but the amount of work is quite challenging. ANDRITZ OPP analysts have tapped into the mill's SAP maintenance planning software to retrieve vital information on Eldorado's 23,000 assets in the database and combine this with process info from the DCS. The whole team is working on making this communication between the databases mutual.

"This gives us a new level of knowledge about our assets," Araujo says. "Understanding the process is fundamental to understanding the health of our mill. Identifying the risks early prevents unplanned stoppages."



Tiago Garcia, Utilities DCS Operator; Douglas Freitas, Power Boiler DCS Operator; Adriano Cabral, Automation Analyst; and José Spadon Jr., Fiber Line DCS Operator



Each asset has been categorized A, B, C, or D, depending on the critical importance of the equipment to the mill's operations. "We monitor the risks for each asset and focus our attention on the highest-priority risks to our most critical assets," Araujo explains. "One glance at a computer screen shows us where to focus our efforts to avoid unnecessary shutdowns."

The result? "We're operating at 95% overall equipment availability," Araujo says. "That is an excellent result."

METRIS OPP MAKES A BIG DIFFERENCE

According to Monteiro, Metris OPP has

made a "big difference" in Eldorado's performance. "We have achieved excellent results in just a short time," he says. "Every loop in APC makes us money. Selfishly, I would prefer if no other pulp mills were to investigate Metris OPP. But even if there are some who do, we intend to keep pushing and to stay ahead."

"I suppose there are some people who believe that the Industrial Internet of Things (IIoT) is just a marketing gimmick," says Daniel Schuck, Vice President of Technology for ANDRITZ APO. "Maybe they said the same thing about transmitters and the early distributed control systems. But what we are doing is not

pie-in-the-sky fantasy. We are using new tools to do traditional things – saving mills millions of dollars a year."

"We might have tried to do some of this alone, but we chose to bring in an experienced partner with ANDRITZ," Pimenta says. "They have the tools and the experience to help us reach a much higher level of performance faster. Our results show that there is a lot to be gained by extracting the hidden capacity from our assets before having to make additional capital investments."

"Metris OPP is a tool that helps us stay ahead."

LEONARDO PIMENTA
Technical Control Manager,
Eldorado Brasil Celulose





Leonardo Pimenta, Technical Control Manager, meets with the OPP team to discuss progress. The team consists of Eldorado process engineers, reliability engineers, and ANDRITZ OPP analysts working side-by-side.

ONGOING PROJECTS

Another project is currently underway to determine the best production mill balance at any given time. "Think of it as level control for the entire mill," says Santos. "We are writing software to monitor all the tank levels in the mill and combine this info with key process variables. This software will be crucial in achieving a higher level of autonomy of the mill because then we will have a powerful tool that will manage production throughout the mill using real-time data."

In addition, there are Metris OPP projects to optimize ash leaching, dissolving tank TTA, lime kiln energy efficiency, and other control strategies being developed. Creation of machine learning tools, automated data analytics to predict process

disruptions, and two-way communication between Metris OPP and the SAP software of the mill are also in progress.

"PUT ALL OUR EFFORTS INTO THIS"

There are various "flavors" of Metris OPP in various plants. The one thing they have in common is that the work is performed in collaboration with mill personnel – operators, technical resources, and management. Eldorado is unique in that a joint team was formed – ANDRITZ and Eldorado personnel – from the very beginning and works together every day.

"You can find Eldorado process and maintenance reliability engineers and ANDRITZ OPP analysts in the same room," Santos says. "We interact constantly, collaborating and solving problems together."

"We have put all our efforts into the success of this project," Monteiro says. "I don't think there are other mills working this way with a team of committed resources on a full-time basis."

According to Pimenta, when Eldorado decided to go with OPP, it did so in a big way. "We chose to apply all the concepts and all the technologies that OPP offers at the same time," he says. "We didn't want to do it in pieces, but all at the same time and as quickly as possible. That's the Eldorado way."

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98%

AUTOMATIC MODE



+3%

OPERATIONAL STABILITY



AUTOMATED START-UP SEQUENCES



7%

REDUCTION OF CHEMICAL
AND ENERGY COSTS

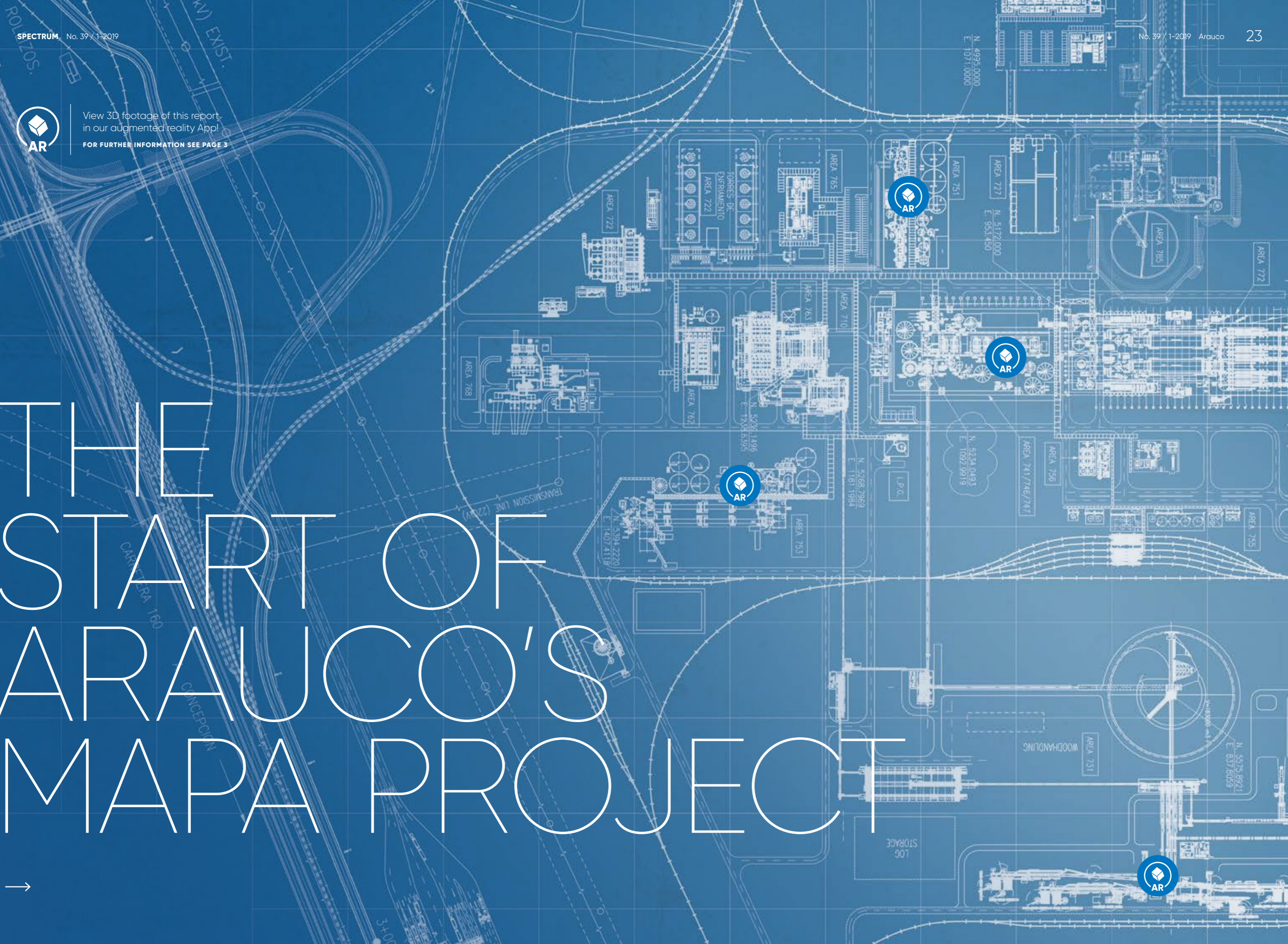
FOCO NO DETALHE
OLHE A SUA
VOLTA, FIQUE
ATENTO!



View 3D footage of this report in our augmented reality App!

FOR FURTHER INFORMATION SEE PAGE 3

THE START OF ARAUCO'S MAPA PROJECT





After start-up in 2021, Arauco's Mill in Horcones will be the most modern mill operating in the 21st century.

Arauco's MAPA project in Chile represents not only the most important expansion the company has ever undertaken, it is also currently the only major eucalyptus pulp project taking place in the world. The company operates five mills in Chile, one in Argentina, and has a joint venture in Uruguay, together with Stora Enso.

Franco Bozzalla, Senior Vice President, Pulp and Energy, Arauco, talked to SPECTRUM at Arauco's headquarters in Santiago about the significance of the MAPA project.

"We are very excited about the MAPA project as it will give us a fantastic opportunity to gain market share both in global pulp supply, but also in our share of the eucalyptus market. We will increase our market share of pulp supply from 5.3% to 7%, maintaining our position as the second largest pulp producer globally, and the new line will mean that we move from seventh to third place in the supply

of eucalyptus pulp. The MAPA project with its higher capacity and advanced technology will mean that we can be more competitive, and in a better position for increasing our market share."

Bozzalla explains why the new mill is being built on the site at Horcones, which is situated in the Bio Bio region of central Chile, close to the Pacific Ocean. "The reasons we are building this new mill in this location are very simple; first, and foremost, we have wood resources that are very close to the mill; the majority of our raw material comes in from a radius of just

60-70 kilometers, where we have access to a vast area of eucalyptus plantations. Second, we have three ports in close proximity from which to serve our customers, with the closest one only 35 kilometers away, and that alone already makes us highly competitive.

"Added to these advantages, MAPA is unusual in that it's a brown/greenfield project, as we are shutting down one old line that is over 40 years old, but we will keep our existing pine mill producing some 600,000 tonnes a year and then, of course, we will add over 1.5 million

tonnes annually with the new line. We have other real advantages at Horcones, including management capabilities, forestry, energy generation, and other Arauco businesses in the area, including panels and saw mills which again make this expansion very attractive."

PEOPLE AND SAFETY FIRST

There is a real culture of "Safety First" that permeates right from the very top at Arauco, and there is a strong emphasis on making sure everything is in place for health and safety across the whole company and, of course, for the complete MAPA project. Bozzalla says, "A group of people simply working together is not a team; a group of people working together with the same purpose and the same values – that's what makes a really successful team. The value of human life is much more important than anything to us at Arauco, including being on time and on budget.

FRANCO BOZZALLA
Senior Vice President,
Pulp and Energy, Arauco

"At Arauco we are very impressed with ANDRITZ's ability to attack real problems, and then solve them."



"In the region there will be some 8,000 people working on the MAPA project, and it is very important to us as a company that each one of those people goes home at night to their families and friends in exactly the same good state of health in which they came to our site. For us a project well done is first and foremost safe, and then everything else comes after it."

ANDRITZ – "AN ABILITY TO ATTACK PROBLEMS – AND SOLVE THEM"

All of the technology and equipment for the MAPA project was ordered at the end of last year, with a large portion of ANDRITZ equipment being chosen by Arauco. Bozzalla says of Arauco's experience with ANDRITZ, "We have known ANDRITZ for years, but we really got a good idea of how the company operates and is managed when we worked together on the Montes del Plata project,

our joint venture with Stora Enso in Uruguay. That was a 100% ANDRITZ turnkey supply, and it was a very difficult project. However, we were really impressed at how the company operated under such difficult conditions, and then how its senior management and experts teamed together to have the mill up and running quickly and with the best possible quality output. At Arauco we are very impressed with ANDRITZ's ability to attack real problems, and then solve them, at the same time as not avoiding any difficult discussions. The way ANDRITZ handled the Montes del Plata project is still something I admire, and it gives us great faith in the company for other projects.



“So when it came to the MAPA project, we knew pretty much exactly what we wanted ANDRITZ to supply. It makes sense to have the woodyard and the fiberline from the same supplier as one raw material is the same for the other one. And as regards the black liquor evaporation and white liquor plants, there was an open race, and ANDRITZ won those due to excellent technology and good negotiations. We are very happy with the technology we have selected from ANDRITZ for this project. It is also very important to choose the right supplier, as all the way across this industry each company is only as strong as its weakest link; with ANDRITZ we feel we have a strong partner. The project phase ends only after achieving the full capacity of the mill, and we know ANDRITZ is fully committed to contribute to Arauco’s business.”

MAPA AND THE AUTONOMOUS MILL

The MAPA project, at its start-up in 2021, will result in the most modern mill operating in the 21st century, how far is Arauco going to go with the concept of the autonomous pulp mill – basically a mill that runs itself? “The autonomous mill will be the standard

for the future, but it will take some time to get there,” says Bozzalla. “However, for us and the MAPA project, it is all part of the design for the new mill. We predict that we will have a virtually autonomous mill here in five years’ time and we will be able to maintain the mill with techniques that are totally different from what we have here today. We at Arauco consider ourselves to be leaders in this industry, and we are taking this concept very seriously. We are building the new mill here from zero, which means it’s easier to take risks, and we can be more proactive in terms of adapting the new technology into our operations, for instance, machine learning and Big Data analysis.

“The fact is, this is not necessarily about having no people running your mill; this is about having the right people to turn the concept of the autonomous mill into reality. We are now hiring a different type of person to work at our mills; they will be engineers and technicians, but they should bring a different mentality and mindset. We mix this with the experienced people we already have. I will be very open about this; we are going to work very hard to become the first

autonomous mill in the industry. We are taking the innovation of digital transformation very seriously and we are putting in a lot of effort to make it happen.”

MAPA: THE GROUND CONTINUES TO BE PREPARED

The ground continues to be prepared at Arauco’s Horcones pulp mill in southern Chile.

It’s not often that the SPECTRUM team gets to see a greenfield project



Arauco is planning to close the existing eucalyptus line L1, upgrade the existing pine line L2 and install a new state-of-the-art eucalyptus line L3.



For this project phase it is important that everything is in place and the ground works are on target.

commence right from the very start – for example, in the preparation of ground works. So we were delighted to take up Arauco’s invitation to visit its site in Horcones, Chile, for what will surely become one of the most modern and efficient pulp mills the world has ever seen.

On our visit to the Horcones site, vigorous work was taking place in earth moving, foundation building, and construction planning. This is a greenfield project with a difference; Arauco already has a

thriving pulp mill right next to the new site, and therefore has all the infrastructure in place for both raw material procurement and for serving its customers all around the world. The MAPA project appears to be a very smart move.

Héctor Araneda, MAPA Project Manager, says, “This is a very exciting period of my life; MAPA is the most important project in the history of the company, so we have a lot of expectations. At the moment, we are working very hard on

making sure that everything is in place for the project, developing the people, making sure all the right equipment has been ordered, and making sure the ground works are on target.

This is the second major project on which Araneda has worked, having gained extensive experience working on Montes del Plata, Arauco’s joint venture with Stora Enso in Uruguay. He says, “There is a lot of work that needs to be done to ensure that a project like this goes well, and is

PATRICK O’SHEA
ANDRITZ Pulp & Paper,
Chile

“From the ANDRITZ point of view, people are at the heart of the MAPA project.”



HÉCTOR ARANEDA
MAPA Project manager

“We believe we will have one of the best mills in the world with a high level of safety, performance, and productivity.”





The site for the new pulp mill will see Arauco rise to be the third largest eucalyptus pulp producer in the world.

without problems, and I mean no problems, no accidents, environmental issues, as well as a good start-up performance.”

There is also ongoing work taking place currently to update the original pulp mill, which involves shutting down line No. 1, and completely modernizing the existing line No. 2. The total production at the Horcones mill after the MAPA project will be approximately 2.1 million t/y.

ANDRITZ is a major supplier to the MAPA project, with its top technology being chosen for a complete wood processing plant, fiberline, black liquor evaporation plant and a complete white liquor plant.

Operating from project offices at the mill site in Horcones, ANDRITZ will also have support from the local company workshop at Concepcion. ARAUCO will also have access to local ANDRITZ experts over the complete life cycle of the mill and receive a holistic service according to their needs and requirements.

“We believe we have selected the right technology to have one of the best mills in the world with a high level of safety, performance, and productivity,” says Araneda. “We have ordered a large portion of our technology and equipment from ANDRITZ simply because we believe they are the best option for our project; we

have experience with those technologies and we are confident we are getting a very good product, with a good outcome.”

Patrick O’Shea, ANDRITZ Pulp & Paper, Chile says, “It is an honor for us at ANDRITZ to be associated with Arauco’s MAPA project. We have completed a lot of successful projects with the company in the past and although we find them quite tough to deal with, they are always professional and open, particularly when any challenges or difficulties arise.

“At the moment; there are various levels of activities that ANDRITZ is engaged in regarding the project and we have

excellent communications strategy in place to monitor progress. Most important are the quarterly steering committee meetings that involve the senior management from both Arauco and ANDRITZ to make sure everything is running on schedule and to make sure this will be one of the most successful projects.”

At the time of our visit in February 2019, the ground works had begun, all the equipment had been ordered, and the process of hiring people who are going to work at the mill had just started. Araneda continues, “There is so much that goes into a project like this; the conceptual study took place six years ago. It then took

around five years to get environmental permits; then there is the basic engineering, and the selecting and buying of all the equipment. We are now working to start the daily engineering and the actual construction of the mill.

“But one of the most important areas we have when working on a project like this is the hiring of the people who are going to operate this mill. We have already been hiring a lot of young people, because this mill must be prepared for the future. In the case of MAPA, we are actually looking as far ahead as 40 years; we need people with the right skills, engineering yes, but also skilled in

the modern world of advanced technology and digital transformation.”

From the ANDRITZ point of view, people are at the heart of the MAPA project. O’Shea says, “Over the next months, we are hiring all the right people for this project, but also we will be bringing in our very best technical engineers and experts to the site to make sure that everything is in place to ensure this project goes as smoothly as possible.”

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Around 15 million person-hours, up to 8,000 workers on site during erection, and more than 7,000 truck loads of material are estimated for the project



A HIDDEN GEM IN GEOTEXTILES

Manifattura Fontana (Sioen Group), near Venice, Italy, is one of those hidden gems – a small-sized company with big ideas where innovation is in the very fabric of its being. The company recently doubled capacity in the manufacture of specialist nonwoven geotextiles by installing a complete state-of-the-art neXline needlepunch line supplied by ANDRITZ, making it the most productive geotextile line in the world.

Geotextiles are specialist nonwoven products that most of us don't even get to see; however, they have become essential ingredients for the construction industry, including road building and foundations for buildings, as they reinforce the soil and stabilize the ground, making areas much more secure for building on.

Manifattura Fontana, situated in Valstagna just north of Venice, was established around 200 years ago, originally

spinning and weaving wool, but has been a specialist in the field of geotextiles since the 1960s. The company was recently acquired by Belgium-based textile giant Sioen Industries, a niche manufacturer of specialist textile products with operations in over 20 countries.

GEOTEXTILES – ENORMOUS FUTURE POTENTIAL

Orwig Speltdoorn, Director, Sioen Industries, and responsible for the Nonwoven Division

and Manifattura Fontana says, "This region of Italy has always been an important area of manufacture for geotextiles; in fact, this is where a lot of development in the industry has come from. The management at Sioen were looking for an opportunity to enter into the geotextiles market, as it's an industry we strongly believe in when it comes to future growth and added value."

In 2015, the owner of Manifattura Fontana and the management of Sioen started

discussions, which ended in the acquisition of the company by Sioen in April 2016. "Manifattura Fontana has an excellent reputation in the production of geotextiles so this was a fantastic opportunity for us at Sioen to get a foothold in the industry," says Speltdoorn.

Although the company had a good reputation for excellent geotextile products, the management at Sioen could see enormous further potential in

gaining market share in the geotextile market and immediately embarked on a major expansion program. But it had to get the investment in new technology absolutely right. Speltdoorn says, "Although geotextiles are niche products, they are still seen as something of a commodity, so operating the right equipment is absolutely essential in order to be profitable. In fact it is the philosophy at Sioen to have operational excellence in all we do, so we are always

investing in the very best performing equipment to produce our textiles."

POSITIVE EXPERIENCES WITH ANDRITZ TECHNOLOGY

Speltdoorn had already had a number of positive experiences with ANDRITZ nonwoven technology and equipment. Before joining Sioen he worked at a senior level in the geotextile industry. "We knew straight away that if we were going to achieve our ambition to become a major player in

JEAN-PHILIPPE DUMON
Sales Director, ANDRITZ
Nonwoven / Needlepunch

"Basically we came in at the very beginning and took a global view on the whole process."



ORWIG SPELTDORRN
Division Manager,
Sioen Industries

"In fact it is the philosophy at Sioen to have operational excellence in all we do."





ANDRITZ high-speed needlelooms: robust, versatile, easy to operate

geotextiles, we needed to invest heavily in increased capacity, which at the same time needed to be the best available technology. We took the time to have a really good look around the suppliers and benchmark the very best nonwoven technology on the market for the production of geotextiles. ANDRITZ came out on top.

"I already knew of ANDRITZ due to my former position in running geotextile plants. So I already had an idea in my mind just what could be achieved at Manifattura Fontana. We knew that ANDRITZ could provide the capacity increase we needed, as well as the top technology. Another important element from my point of view was that we needed an excellent service and support, which, from my previous experience, I knew we were going to get from ANDRITZ."

COMPLETE RESPONSIBILITY FOR DESIGN OF THE LINE

After major consultation between Sioen, Manifattura Fontana, and ANDRITZ, it was decided to go ahead and order a complete nonwovens geotextile production line that would include all machines from opening and blending to an automatic packaging system. Also, for the first time in Italy, the line would feature air-through bonding capabilities in combination with calendaring.

Most of the technology and equipment for the line came from ANDRITZ, including:

- A TCF-X high-capacity chute feed capable of processing long staple fibers
- An eXcelle card with 3.5 m working width
- ProDyn and Isolayer systems for weight evenness
- High-speed needlelooms with the innovative Zeta drafters to fine-tune tensile strength parameters and boost the production capacity for lightweight fabrics.

Also, ANDRITZ was given complete responsibility for the design of the system, including the installation of other vendors' equipment. Jean-Philippe Dumon, Sales Director, ANDRITZ Nonwoven Division, says, "Basically we came in at the very beginning and took a global view on the whole process. Sioen and Manifattura Fontana explained to us what they wanted to do, and what products they wanted to produce, and we designed the whole process.

"The reality is, these lines are not just a case of putting machines in one after the other or next to each other. We have to carefully select what sort of equipment should be used in every part of the process. Yes, the capacity is very important, but being such a niche product, geotextiles demand all sorts of bespoke machine performance and capabilities,

for instance, making sure there is evenness in terms of weight, and top mechanical fabric performances are essential."

"This is one of the things we really like about the ANDRITZ approach to projects like this," adds Speltdoorn. "We discussed our needs when it came to capacity, speed, and quality, and they listened intently. ANDRITZ experts then came back and told us exactly what we needed in terms of our production needs, right from dealing with the raw material down to packing finished product."

The quality of the final product is of maximum importance in the production of geotextiles at Manifattura Fontana; the company delivers for instance to construction companies involved in the reinforcing of some of the biggest dams in the world as well as the deepest tunnels and its products were used in the recent expansion of the Panama Canal.

UP AND RUNNING – HIGHEST CAPACITY IN THE WORLD

Contracts for the project were signed in September 2017, after Manifattura Fontana secured new premises to site the new line. "We had to find a site that would house the new line, at the same time as allow us more space to expand," says Speltdoorn. "So there was a short

hold up until we found exactly what we were looking for."

The right building was found and after some renovations, including a new roof, all the equipment started arriving at the site in June 2018, with tests beginning in January this year and full production following shortly after. "I have to say that I was satisfied and impressed with the way that the whole project has been handled by ANDRITZ. There have been a few teething problems but we like the way that those have been handled, with openness and transparency between both of our teams.

"For the Manifattura Fontana personnel, this is completely new equipment and there has been a steep learning curve, but with the existing experience of needlepunching we have, along with ANDRITZ people who trained them, we have been really surprised at how quickly they have been capable of running the line on their own."

The line is now fully operational and already running in three shifts. This means that the ambition of doubling capacity at Manifattura Fontana has been achieved, at the same time as resulting in the company having the most productive geotextile production line in the world.

"The new geotextile line at Manifattura Fontana is a perfect example of what we can do at ANDRITZ to really make our customers ambitions become reality," says Dumon.

"In a nonwoven industry that is currently moving in many directions, ANDRITZ works with newcomers as well as leading companies, or independent mid-size producers, offering knowledge and expertise to enable the creation and running of an optimal, bespoke needlepunch line. This can be supplied entirely by ANDRITZ, where it can control everything and guarantee the final results, or, with its capability to mix technology, can supply individual machines into an existing line."

CONTACT

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Monitoring system to guarantee smooth operation and enhance production



Web forming: eXcelle card with 3.5 m working width



Easy accessibility of the card for maintenance



Profile crosslapper with ProDyn and Isolayer systems for improving weight evenness



Needlelooms: Pneumatic centralized needleboard pinning system

NEW
TISSUE
FORM
ING
FAB
RICS

Increased quality and better running times.

With the acquisition of Xerium by ANDRITZ, a new division in the ANDRITZ Pulp and Paper Service group named

ANDRITZ Fabrics and Rolls has been formed, including former ANDRITZ Kufferath. Accordingly, ANDRITZ Fabrics and Rolls has

always been the technology leader in tissue grade forming fabrics and is constantly investigating tissue market requirements. Quick draining,

less water carrying forming fabrics are today the preferred products on modern tissue machines.

Therefore, ANDRITZ Fabrics and Rolls has developed a new forming fabric portfolio with plain weave paper side structure and improved dimensional stability with the lowest caliper in the tissue market. With anticipation, the latest technology called QSB (Quattro Support Binder) can now be applied to this new tissue product line. The patented QSB forming fabric design allows producers to improve tissue product quality and machine performance. It has already been tested successfully at the new ANDRITZ Tissue Innovation and Application Center (TIAC) in Graz, Austria.

UP TO 15% BETTER RUNNING TIMES ON THE MACHINE

The patented new tissue design, with its increased number of binding points, offers improved cross-dimensional fabric stability compared to conventional forming fabric designs. The result is reduced internal fabric wear and allows up to 15% longer running times on the machine. The improved co-planarity and fabric stability lead to a significantly improved resistance to high pressure shower damage. New monofilament material compositions and the re-engineered top fabric design reduce fabric wear and enhance energy-saving potentials.

Meanwhile, ANDRITZ QSB designs are operating successfully in the graphic and packaging paper industries, with numerous installations providing added value to different customer processes. With the new plain weave structure,

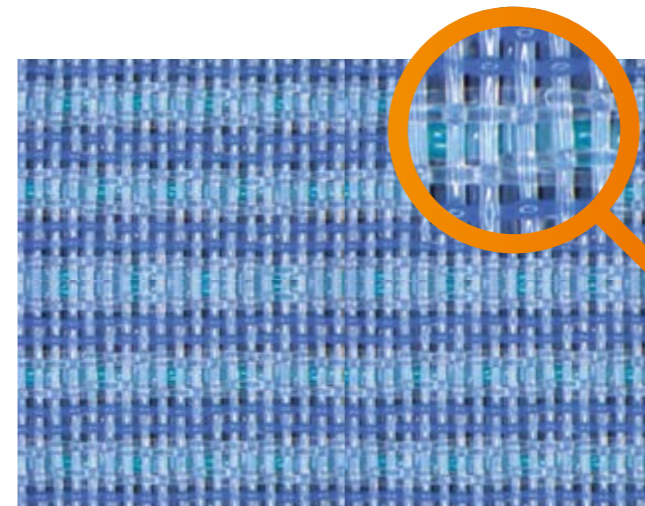


Fig. 1: Surface of plain weave 4-shaft ANDRITZ QSB design

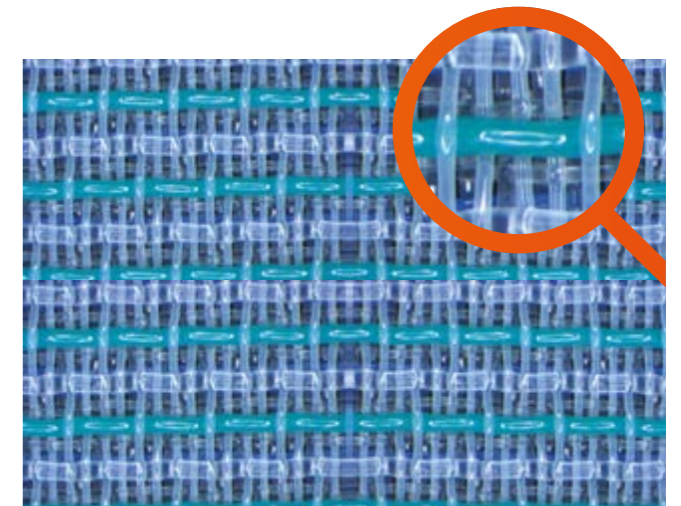


Fig. 2: Underside of the patented 4-shaft ANDRITZ QSB design

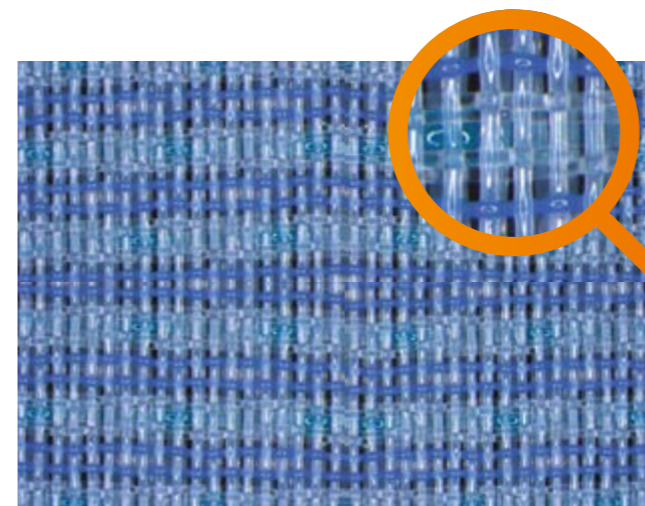


Fig. 3: Surface of plain weave 8-shaft QSB design

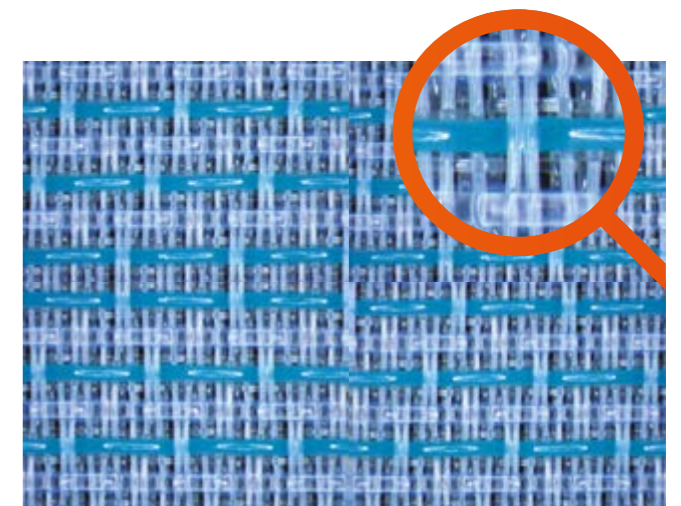


Fig. 4: Underside of the patented ANDRITZ 8-shaft QSB design



ANDRITZ Fabrics and Rolls has now complemented its market leading product series for tissue machine applications.

Fabric calipers between 0.55 mm and 0.69 mm enable enhanced fabric surface characteristics with defined dewatering channels for better formation and an effective dewatering process during operation. Machine cleanliness is greatly improved with the application of thinner fabric calipers.

ANDRITZ Fabrics and Rolls tissue product line including the patented QSB technology is available in 2:1 and 3:2 weft ratios for all tissue products and former designs.

ANDRITZ QSB DESIGN – CASE STUDY

The following case study uses the example of a Crescent Former machine design, as shown in Fig. 5. Operating at 1,750 m/min, the machine has a design speed of up to 2,000 m/min.

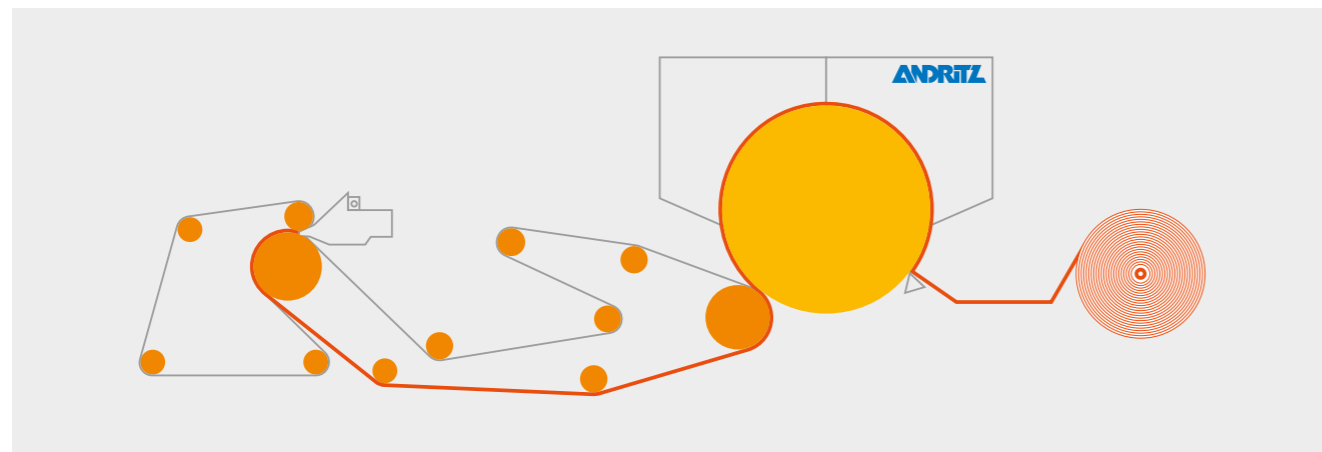


Fig. 5: Crescent Former machine design

First results of the ANDRITZ 4-shaft QSB design in comparison with conventional SSB fabric designs used by a customer in the tissue market.

MACHINE DATA AND FORMER DESIGN:

Former: Crescent Former
 Design speed: 2,000 m/min
 Product: Toilet tissue and other tissue grades
 Grammage: 15–22 g/m²
 Raw material: 100% virgin fiber pulp and mixed pulp+DIP

Forming fabrics:

- Conventional fabric designs
- ANDRITZ 4-shaft QSB design

Improvement targets:

1. Machine hygiene and performance
2. Tissue formation and quality

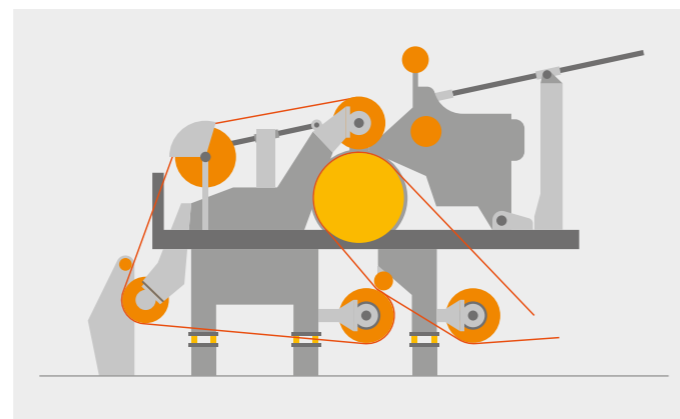


Fig. 6: Crescent Former



Fig. 7: Conventional fabric design
 Sample: 15 g/m² tissue (pulp + DIP). Speed: 1,750 m/min

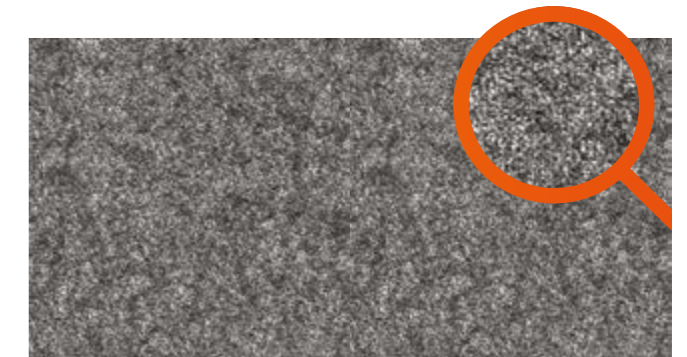


Fig. 8: Conventional fabric design
 Sample: 15.4 g/m² toilet tissue (virgin fiber pulp)

The paper tissue sample in the left-hand picture shows pin holes and strong marking. The toilet tissue sample on the right shows cloudy formation and diagonal markings.

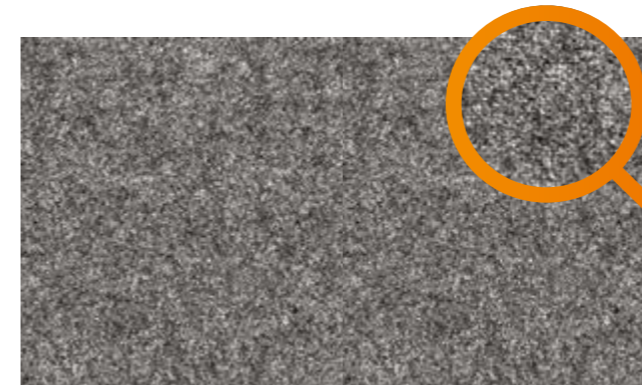


Fig. 9: ANDRITZ 4-shaft design
 Sample: 15.4 g/m² toilet tissue (100% virgin fiber pulp). Speed: 1,750 m/min

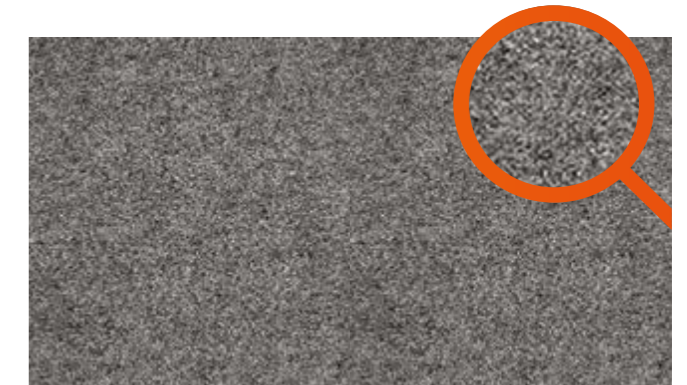


Fig. 10: ANDRITZ 4-shaft design
 Sample: 16.4 g/m² toilet tissue (100% virgin fiber pulp). Speed 1,900 m/min

Formation improved significantly with the new ANDRITZ tissue forming fabric design. There is no marking visible on the tissue product with the new QSB design. The excellent fabric dewatering capabilities resulted in improved tissue product characteristics. This enabled stable production conditions at high machine speeds.

SUMMARY:

With the patented ANDRITZ QSB forming fabric design, both the tissue product quality and the machine performance can be improved.

Proven features:

- High dewatering capabilities (air permeability and low fabric calipers)
- Improved tissue quality (FSI >165)
- Clean run and no water spray at high tissue machine speeds
- Improved cross-dimensional fabric stability for consistent machine operating conditions during the entire running cycle (6 months)

ANDRITZ TISSUE FORMING FABRIC PARAMETERS

QSB 4-SHAFT DESIGN

Machine-side weft diameter [mm]	0.25
Air permeability [CFM]	520 – 560
Calipers [mm]	0.60
Fiber support index	173 – 168
Support points/cm ²	1,229 – 1,170

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EMPIRE OF THE SUN

Sun Paper Holding Laos started up its 300,000 t/a greenfield pulp mill near the small town of Xepon, Savannakhet Province, Laos, last year after just 20 months from the signing of supplier contracts. ANDRITZ was chosen to supply various key technologies for the project.





Sun Paper chose the location in the east of the Savannakhet Province of Laos some 10 years ago mainly because of its excellent climatic conditions for the growing of eucalyptus. The sun often beats down relentlessly in this part of the world, and when it rains, it rains in torrents, making perfect conditions for fast growing fiber. In August 2010, the company formed Sun Paper Holding Laos Co. Ltd., and invested in 100,000 ha of forest land and created an advanced

breeding base with a capacity to grow 10 million trees a year. This was the first part of its "Forest-Pulp-Paper Integration" project in the country and represents Sun Paper's first expansion outside of China.

Liang Hongjin, Pulp Mill Production Director, Sun Paper Laos, says, "This region of the country has an excellent investment environment, with huge areas of land available for plantations. We obtain

wood from our own plantations, as well as local farmers and we also import acacia chips from Vietnam as the border is really close to where we are located."

AN IDEAL LOCATION FOR A PULP MILL

The next phase of the Forest-Pulp-Paper Integration scheme began with the planning of the 300,000 t/a pulp mill in 2016. The mill is ideally situated to supply products to China and South East Asian

Gong Tieren, Fiberline Sales Director, ANDRITZ, with the Sun Paper production team in front of the dryer at Laos



LIANG HONGJIN
Pulp Mill Production Director,
Sun Paper Laos

"ANDRITZ supplies some of the best performing technologies and most reliable equipment for pulp mills."



countries, as it is close to Vietnam and its well-placed sea ports.

Discussions were entered into with ANDRITZ in the second half of 2016, and Sun Paper ordered a number of key technologies for the new pulp mill in Laos, including equipment for the woodyard, fiberline, pulp drying, recausticizing plant, and methanol liquification. Importantly, Sun Paper also ordered an ANDRITZ HERB recovery boiler, now the largest of its kind in the country.

Liang Hongjin says, "The main reason ANDRITZ was chosen as one of the major suppliers for this project in Laos was because at Sun Paper we already have a lot of experience with pulp production at our two sites near our headquarters in China. It is recognized that ANDRITZ supplies some of the best performing technology and most reliable equipment for pulp mills."

The project itself kicked off with contracts being signed in January 2017 and the first deliveries taking place later in the year. In total, some 2,000 people worked on the project with 100 of Sun Paper's employees coming in from China.



View video footage of this report in our augmented reality App!

FOR FURTHER INFORMATION SEE PAGE 3



The horizontally fed HHQ-Chipper has a unique chipping geometry that enables it to produce superior quality chips at the highest production throughput.



ANDRITZ supplied the mill with the largest HERB recovery boiler in Laos with a capacity of 2,200 tds/d, in order to secure safe and reliable operation.

"The major challenges associated with the project were mostly to do with the weather," says Liang Hongjin. "It can rain really hard here making the roads virtually impassable due to floods and mud. All the equipment for the project had to come in via road from ports in Vietnam but, although there were a few scheduling problems, we overcame the hitches without too many problems."

THE HERB RECOVERY BOILER – SAFETY, EFFICIENCY, STABILITY

Environmental and safety concerns were at the top of the list when it came to choosing the best technology for the Laos project. The recovery boiler was centrepiece to these concerns and, from

the outset, Sun Paper was looking for the best and most efficient technology. ANDRITZ supplied the mill with the largest HERB recovery boiler in Laos with a capacity of 2,200 tds/d, but it was much more than simply capacity the mill was looking for. Fei Da, Recovery Island Director, Sun Paper Laos, explains, "We needed proven recovery boiler design and operation for this project in Laos, as we needed to be certain of safe, reliable, and stable operation, especially since we are in such a remote location, and the recovery boiler would be our only source of power.

"We knew that with ANDRITZ HERB technology, though more expensive than other local suppliers, we would be getting

the safety, high efficiency, and ultimate reliability that we needed."

Fei Da adds that ANDRITZ did an excellent job in the supply and start-up of the recovery boiler, "This was a fast track project, and in challenging conditions. There was only 20 months from handshake to first black liquor firing. The attitude of the recovery boiler team was really impressive; they were extremely professional and nothing was ever too much trouble, including working on weekends and often late into the night."

The extra energy the mill produces is currently being utilized by the national grid in Laos, but there are major plans for



"We knew that with ANDRITZ HERB technology we would be getting the safety, high efficiency, and ultimate reliability that we needed."

FEI DA
Recovery Island Director
Sun Paper Laos

expansion at the mill, with paper machines already on order and a major project for a recycled pulp line already underway.

PULP DRYER – A REPEAT ORDER

The pulp dryer supplied by ANDRITZ at the Laos mill was a repeat order of a similar dryer installed at Sun Paper's headquarters in China. A complete pulp drying line with a TwinWirePress pulp machine, airborne dryer, cutter-layboy, and bale finishing system was supplied. In addition, ANDRITZ supplied equipment for broke handling and process water treatment as well as the control systems for the dryer, cutter, and baling line.

Zhou Yang, Pulp Dryer Manager, Sun Paper Laos, says, "We were very pleased

with runability and stability of the first pulp dryer we had installed from ANDRITZ in China; it made good sense to go ahead and order another one for Laos.

"Commissioning and start-up went very well; as we ramped up, we were having some problems at certain speeds, which ANDRITZ has been working on."

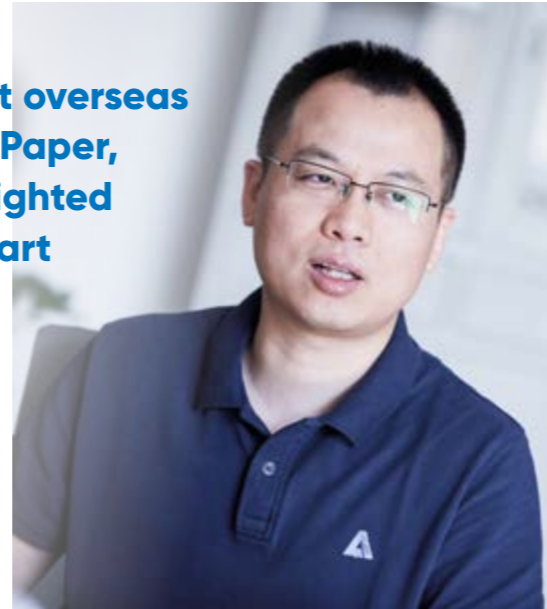


The pulp drying line consists of a TwinWirePress pulp machine, airborne dryer, cutter-layboy, and bale finishing system.



GONG TIEREN
Fiberline Sales Director,
ANDRITZ

"Laos is the first overseas project for Sun Paper, and we are delighted to have been part of this."



SCOPE OF SUPPLY

WOODYARD:

Main process equipment including HHQ-Chipper, with a capacity of 250 m³ sub/h, chip screening and bark processing.

FIBERLINE:

MC equipment for the complete fiberline as well as screening equipment and ozone bleaching stage.

RECOVERY BOILER

The largest HERB recovery boiler in Laos with a capacity of 2,200 tds/d, a steam temperature of 480 °C, steam pressure of 84 bar, and steam flow of 96 kg/s.

PULP DRYING

A complete pulp drying line with a TwinWirePress pulp machine, airborne dryer, cutter-layboy, and bale finishing system.

RECAUSTICIZING

A LimeWhite white liquor filter for the recausticizing plant.

METHANOL LIQUEFACTION

A methanol liquefaction system to produce additional fuel for the recovery boiler and lime kiln from gases from the evaporation plant.

Helmut Senft, Director of Project Management, Pulp Drying for ANDRITZ says, "There were some real challenges during this project, particularly when it came to producing different pulp grades than those produced on the original dryer supplied in China.

"Finally, we made the performance test run near the end of 2018 and achieved all the guaranteed parameters."

The pulp dryer handles 825 admt/d of dissolving pulp and 1,050 admt/d of

bleached market pulp made from eucalyptus and acacia.

READY FOR THE FUTURE

The area around the mill at Laos is a hive of activity as Sun Paper gets ready for the next wave of expansion and additions in the shape of paper machines and a recycled pulp line.

Ding Xingban, Fiberline Manager, Sun Paper Laos, says, "From the HHQ-Chipper in the wood yard to the pulp dryer and bale finishing system, we are delighted with

how this project has gone. In the space of around 16 months, this mill in Xepon has gone from bare ground to start-up, with everything now running well.

"The ANDRITZ team has been excellent in the project delivery and most of all in the way they share knowledge; the sales and service people are always coming to us, presenting new technology, or opening us up to new market ideas."

Gong Tieren, Fiberline Sales Director, ANDRITZ, concludes, "Working with Sun

For the recausticizing plant, ANDRITZ delivered a LimeWhite white liquor filter.



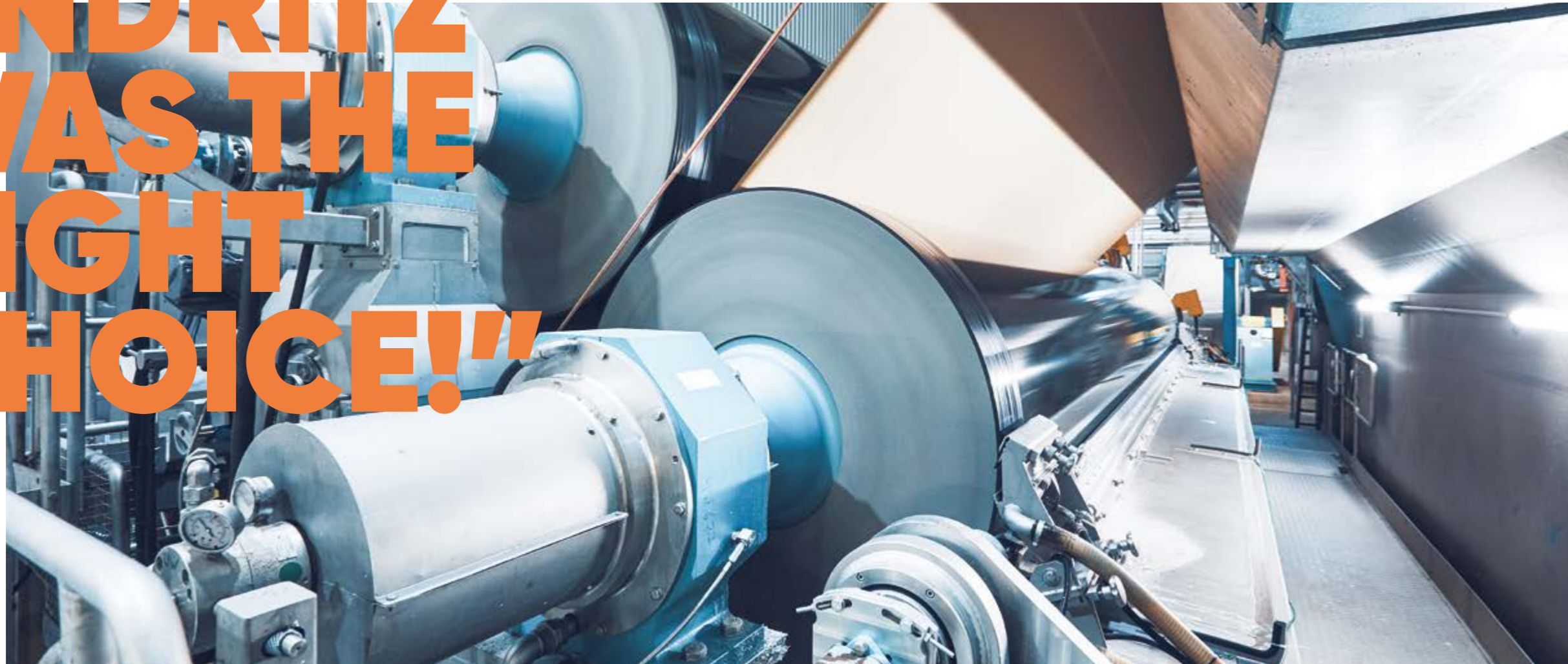
The ANDRITZ airborne dryer handles 825 admt/d of dissolving pulp or 1,050 admt/d of bleached market pulp.



CONTACT

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"ANDRITZ WAS THE RIGHT CHOICE!"



On October 28, 2017, Laakirchen Papier AG in Austria celebrated production of its first containerboard reel: a milestone in an ambitious rebuild project that was of great strategic importance for the papermaker and for the main supplier – ANDRITZ. At the beginning of January 2019, more than one year later, PM 10 was running with basis weights of around 100 g/m² at a speed of 1,300 to 1,330 m/min. CEO Thomas Welt comments, "We have achieved the goals set for speed development."

The rebuild to production of 450,000 tons of recycled containerboard with a basis weight range of 70 to 140 g/m² from 500,000 tons of recycled paper was a real challenge. This was because the rebuild of PM 10 was to take place alongside production

operations on the second paper machine at this location (PM 11 continued to produce SC paper parallel to the rebuild work) and because many innovative units and technical refinements were implemented.

And there were other challenging circumstances: considerable time pressure – only twelve months between the investment decision and the starting date for the rebuild – also added to this was the request to integrate as much of the existing equipment as possible, both in stock preparation and at the paper machine.

But the efforts needed to meet all these requirements were well worth it, "We were lucky to be entering a very good market environment with our new product and thus were able to place our production volumes easily right from the beginning," Welt explained during an interview in Laakirchen recently.

PM 10 after the rebuild is designed for a maximum volume of 1,450 tons per day – and this benchmark was already reached in September 2018. So it didn't even take a year after the first paper reel was produced for this record to be set. And this is not an exception. Welt emphasizes, "We frequently achieve new production records. The guarantee figures for steam and electricity consumption were also achieved. We reached the goals we had set within one year."





Thomas Welt, CEO of Laakirchen Papier AG, in front of the new ANDRITZ PrimeFlow TW two-layer headbox and PrimeForm TW Gapformer with high dewatering capacity

ACHIEVING SOMETHING VERY GOOD TOGETHER

Welt considers both the efforts by his own staff as well as the commitment by the supplier ANDRITZ as important factors in this success; he says, "We succeeded here in achieving something very good together – also if you consider the fact that we were not building a new plant, but rebuilding a part of the plant while the remainder was in

normal operation. If we take a look at other rebuild projects, we can certainly be proud of this." On the part of the supplier, the project was completed on December 20, 2018, when the Final Acceptance Certificate (FAC) was signed. Thus, the project was also completed by the agreed date.

When asked what he found especially convincing in this project, Welt replied,

"Integration of old and new – that was really successful and is also something special." In his view, this also demonstrates good interface planning. "I have only had experience with greenfield projects so far and saw how overall predictability is quite different in projects like this. I would say that it is more demanding – and more strenuous – than a greenfield plant."

ANDRITZ ModuScreen TD coarse screen as part of the stock preparation plant



THOMAS WELT
CEO, Laakirchen
Papier AG

"If we take a retrospective look at where we are now and what we have achieved, we can say that ANDRITZ was the right choice."



The former grinding facility was converted to an RCF line with a capacity of 1,350 tons per day. An ANDRITZ FibreSolve FSR pulper complete with disposal system ensures optimum pulping of the raw material.

Welt is convinced that production will stabilize at 80 g/m² in the first quarter of 2019 and the final capacity of 420,000 tons per year will also be achieved in the first six months of operation. "Then we will prepare in stages for production of 70 g/m² as well and with further increases in speed." So the target of 1,400 m/min at this basis weight is already in sight.

"If we take a retrospective look at where we are now and what we have achieved, we can say that ANDRITZ was the right choice," Welt summarizes. "This rebuild project was a real opportunity for the supplier and thus a large incentive to make it a success."

For Laakirchen Papier, the rebuild was an important step towards securing the

location's economic future. As a result, Welt is looking ahead with optimism, "The project gave us real impetus and we are now on the right road to achieving more growth."

CONTACT

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A DAY IN THE LIFE OF...

... SIMO PYLKKÄNEN

Workplace: ANDRITZ Savonlinna Works Oy, Finland
Position: Managing Director

Simo Pylkkänen took over as Managing Director of the ANDRITZ Savonlinna Works Oy on January 1, 2019.

After starting as a Quality Engineer at the Savonlinna Works in 2006, Pylkkänen was appointed Quality Manager 18 months later. During this time he also completed his Master's thesis at the engineering works and graduated as Master of Science in Engineering in 2007. In 2013, he took up the position of Production Manager, which preceded his position as Managing Director. Pylkkänen very much enjoys working in Savonlinna; he says, "This has been an excellent workplace – we have a good and strong collective spirit here."

Pylkkänen's family includes his wife Päivi, 10-year-old daughter Vilma and 7-year-old son Luukas. To keep fit, he practices ice hockey twice a week in a team established around five years ago.

The workshop was founded in 1917 and became part of the ANDRITZ Group in 2000. The production facility operates at an area of 16,000 m² and is the home of the DD-Washers. All DD-Washers delivered by ANDRITZ are produced here. Other main products made at Savonlinna include: drum filters, disc filters, cooking equipment, pressure vessels and screens with the delivery scope from a single spare part to a wide range of equipment and machinery for fiber line projects.





MARCH 27, 2019

A DAY IN THE LIFE OF SIMO PYLKKÄNEN, MANAGING DIRECTOR, ANDRITZ SAVONLINNA WORKS OY

07:00 // ICE HOCKEY PRACTICE

Pylkkänen starts his day with ice hockey practice. The team is called Lypsniemen Kiekko and was formed some five years ago, consisting mainly of ANDRITZ employees and their friends from other local companies. They practice twice a week in the morning. After practice, he enjoys a quick breakfast in a coffee shop nearby and then heads to the workshop.



07:00



08:30

08:30 // ARRIVAL IN OFFICE, GENERAL OFFICE WORK

Pylkkänen starts his day with general office work. As the Managing Director of the workshop, he is in charge of the whole operation at site.

In addition to manufacturing DD-washers and other special pulp equipment, various services are offered from the Savonlinna site such as maintenance and repairs, upgrades and modernizations, shutdown services, installation and erection services, and management of large rebuild and installation projects from the planning phase to start-up.



10:00

10:00 // OPERATIONS MANAGEMENT MEETING

Operations managers meet weekly for a review and outlook meeting. Discussions take place on production targets and issues relating to their various areas over the last week, review of the KPIs of each area, and planning for the coming week. In case of any problems or challenges, the whole team decides on the actions required.

The Savonlinna workshop is set up in work centers and not in manufacturing lines. Due to the fact that the work centers produce many different products for different product groups, operations managers have to plan precisely and carry out pre-work before a new product can go into one of the work centers. This system speeds up the processes overall and facilitates ongoing work for the employees in a more efficient and productive way, at the same time as making working conditions safer.

11:00 // LUNCH IN THE CANTEEN



11:00



12:00

12:00 // SHOP STEWARDS MEETING

Once a month the shop stewards meet with Pylkkänen. Shop stewards, a group of men and women elected from the personnel, represent all the people working at Savonlinna. These meetings express employees' right and wishes and give Pylkkänen valuable feedback. Topics that are discussed include working hours, work safety, and safety procedures as well as possible improvements in the work centers regarding daily work.



13:30

13:30 // BODY MAINTENANCE

As one part of the "All Well" initiative of ANDRITZ Oy, all employees can join a weekly body maintenance session. This 30-minute workout comprises mainly stretching and focuses on the neck, shoulders, and back regions of the body. This weekly workout program is offered to all ANDRITZ employees in Savonlinna free of charge and can be done during working hours.



14:30

14:30 // MEETING WITH JARMO POHJOLAINEN, DEVELOPMENT AND HSE MANAGER AT ANDRITZ SAVONLINNA WORKS OY

ANDRITZ Savonlinna Works is currently working on the set-up of a holistic IIoT platform. On this platform every work center and all working items and procedures of the workshop are on display and with one click all "live" and up-to-date information can be viewed. The goal of this platform is to enable open and transparent communication and information sharing with all personnel. Therefore, some 50+ tablets with the IIoT platform and all the information are installed at the workshop and are available to all people involved in the work centers.

Currently, the platform has been set up and the system is being tested. The next step is to fill the system with live data. The final implementation of this platform is planned for this year.



15:30

15:30 // QUICK MEETING REGARDING OFFLINE PROGRAMMING AND SIMULATION SOFTWARE FOR WELDING ROBOTS

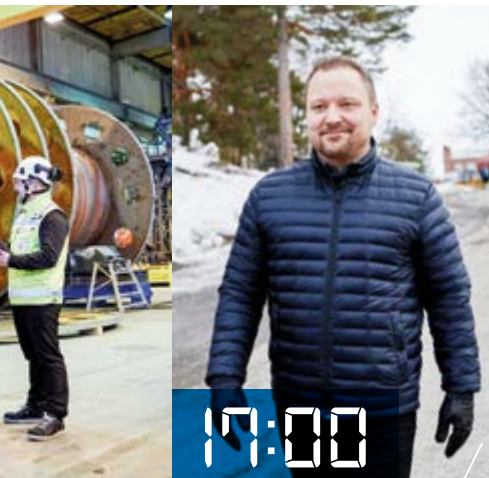
Pylkkänen joins a short update meeting with Simo Lybeck, Development Specialist for robot welding. He is currently working on another step towards a highly digitalized workshop - the set-up of an offline programming and simulation software for welding robots. This software allows the simulation of all welding processes of the robots and can therefore help to detect possible problems or challenges beforehand so that proactive action can be taken.



16:00

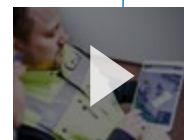
16:00 // SAFETY WALK

Before the end of his working day, Pylkkänen conducts his daily safety walk. This daily routine enables him to stay in constant contact with his personnel. During this walk he puts the main emphasis on safety issues. ANDRITZ Savonlinna Works operates with the certified occupational health and safety management system OHSAS 18001, and concentrates on work safety issues both at the workshop and at installation sites. With the target of "zero accidents", all employees attend regular safety training meetings that help them to apply different risk assessment tools, as well as make them aware of the latest safety notification systems that have been installed at the Savonlinna site.



17:00

17:00 // END OF WORK DAY



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IT'S ALL ABOUT

CUSTOMER SATISFACTION

When integrated Swedish mill Holmen Paper Hallsta wanted to further enhance its book paper production process, it called on ANDRITZ to carry out a rather unique project of utilizing two second-hand twin wire presses, and an existing, pre-used screw press to increase capacity and improve pulp quality for its PM12.

Customer satisfaction is everything when it comes to making quality paper. In the competitive world of book printing paper, it is essential that the final product being delivered delights the customer with both features of runability and good surface printability. The only way to really make sure this happens is to start at the beginning – with the quality of the pulp.

Hallsta Paper Mill, part of Holmen Paper, located in Sweden, has always had something of a pioneering spirit in the way it approaches the production of paper. In fact, it is said to be the very first mill in the world to have used the TMP production process on a large scale, starting up its first process in 1974. Also, at one time, the mill was one of the largest production sites for newsprint in the world.

Fast forward to 2018, and the mill has been through the recent market shake ups of graphic paper decline, particularly in newsprint, and has become adept at adapting to different market needs. In early 2014, Holmen Hallsta got out of newsprint production altogether and concentrated its two remaining machines, PM11 and PM12, on making lightweight uncoated and book papers respectively.

Magnus Rydstrand, Production Engineer, TMP, Hallsta Paper Mill says, "The strategy from Holmen Paper recently has been to get away from newsprint production completely and to focus on making higher quality papers using virgin fiber. In this area of Sweden we have a lot of access to wood, particularly

spruce, which we now use for 100% of our products coming out of the mill.

"We converted PM12 to Holmen BOOK grades in the process of closing down PM2, 11 years ago."

Holmen Hallsta sends its 570,000 t/a of paper products from the mill in Sweden mainly to the European market, including the Nordics, Germany, UK, Netherlands, Poland, and France.

AN IMPROVEMENT PROJECT

In an effort to continually improve the quality of its book paper grades Holmen Hallsta decided that it needed to look into its water management between the TMP line and PM12, and particularly at the dewatering stage

ERIK SANDGREN
Project Manager,
Hallsta Paper Mill

"I have been working on various projects here for over 30 years, and I know that ANDRITZ always does a good job. We can always trust that they take full responsibility for the end result."



on the line feeding the paper machine. Rydstrand explains, "We knew in 2008 that there was a problem with the separation of water between the pulp mill and the paper machine. We needed to have clean water going into the paper machine, otherwise we would have to use extra chemicals because any dead fibers going around will darken the water, encourage bacteria to grow, and cause all sorts of problems with brightness and potentially paper quality and runability."

Due to machine movements and conversions in the past, the dewatering stage between the TMP line and PM12 at the mill was always considered to be a temporary arrangement, and the plan had been to improve the system as soon as the time was right. In the meantime, the mill managed to acquire two 15-year-old ANDRITZ twin wire presses from another Holmen mill, at the same time as having an ANDRITZ

screw press from a DIP line that was shut down at Hallsta Paper Mill in the past. It was decided by the mill that it would be a good idea to utilize all three dewatering presses for the improvement project.

"The twin wire presses we acquired, as well as the screw press, were still in excellent condition, which gives an idea of the engineering and manufacturing quality of ANDRITZ equipment. We decided that utilizing the equipment we had would be an excellent solution for our needs for improving pulp washing for PM12," says Rydstrand.

ANDRITZ TRUSTED TECHNOLOGY WITH FULL RESPONSIBILITY FOR SUCCESS

ANDRITZ was the first port of call for the mill and its pulp washing improvement plan, as not only was the equipment known, but also the mill has had some history with the company as a major supplier in the past.

Erik Sandgren, Project Manager, Holmen Paper Hallsta, says, "I have been working on various projects here at the mill for over 30 years, and I know that ANDRITZ always does a good job. We can always trust that the engineers, experts, and management take full responsibility for the end results. Also, we like the dewatering technology from ANDRITZ; in fact, we already had 12 twin wire presses installed here before this project commenced, the oldest ones dating back to 1989."

With its long history in dewatering technologies – ANDRITZ built its first dewatering press in 1950 – the company was the perfect fit for the project at Holmen Hallsta. ANDRITZ has now built and supplied more than 600 twin wire presses and 500 screw presses to pulp and paper mills around the world but, most importantly for this project, it also has vast experience in servicing both types of presses,

The two twin wire presses were refurbished and installed, adding to 12 existing ANDRITZ twin wire presses already successfully running at Holmen Hallsta.





As well as the two twin wire presses, Holmen Paper Hallsta also utilized a second-hand ANDRITZ pulp screw press to improve pulp washing for PM12.



(Left to right): Magnus Rydstrand, Production Engineer, TMP, Holmen Paper Hallsta; Erik Sandgren, Project Manager, Holmen Paper Hallsta; Axel Elfving, Development Engineer, Holmen Paper Hallsta; Patrik Rådmans, Project Manager Pulp & Paper Services, ANDRITZ; Mahir Mehinagic, Product Engineer, Twin Wire Press, ANDRITZ; and Henrik Fernström, Product Manager Dewatering and Pulping, ANDRITZ.

integrating second-hand equipment, rebuilds, retrofits, upgrades, as well as spare and wear parts and consumables.

In the case of Hallsta Paper Mill, ANDRITZ was contracted to refurbish, install, commission, and start up all three dewatering presses. This included the overhaul and reutilization of the two second-hand wire presses, the relocation and light overhaul of the existing screw press, rebuilds and relocation of two existing conveyors, installation of a new conveyor, and basic engineering and erection.

The first customer contact was in January 2015, with the contract and project start

taking place in March 2018. Start-up took place just seven months later in November 2018, after major works undertaken by Hallsta Paper Mill in civil construction, and the installation of tanks, pipes and piping, and agitators.

AN UNUSUAL PROJECT WITH VERSATILE RESULTS

This was an exceptional project, even for ANDRITZ, in as much that installation took place using two different types of dewatering technology, the twin wire and screw presses, both pre-used. Henrik Fernström, ANDRITZ Product Manager, Dewatering and Pulping, says, "Utilizing a screw press in this process stage was unusual, thus

challenging. However, it was obvious to integrate it, since this piece of equipment was at the mill already."

"The screw press was almost ready to be integrated in the new line, but the wire presses had to be dismantled for transport," adds Patrik Rådmans, ANDRITZ Project Manager, Pulp & Paper Services. "The condition of the twin wire presses was really good. After refurbishment of the rolls, and due to the stainless steel construction, they looked like new machines. Yes, there were some parts that needed replacing, but after the refurbishment work over four or five months, both twin wire presses were as good as new.

MAHIR MEHINAGIC
Production Engineer,
Twin Wire Press, ANDRITZ

"This was a really interesting project we took part in at Hallsta Paper Mill. We can all be happy that such reliable equipment from ANDRITZ is up and running again."



GETTING TECHNICAL

ANDRITZ PROJECT SCOPE

- Overhaul and re-utilization of two second-hand twin wire presses TWP 285LL
- Relocation and light overhaul of an existing pulp screw press SCP 1407MM (used in the former DIP plant at Holmen Hallsta)
- Installation of a new conveyor for pulp diluting and shredding after washing
- Rebuild and relocation of two existing screw conveyors
- The equipment was installed in the former location of PM 2 (already dismantled)
- The ANDRITZ scope included basic engineering, erection, commissioning, and start-up of the above equipment

"We refurbished most of the moving parts and bearing housings, blasted and painted them to keep them running for years to come, and replaced all rubber covers and seals as they had perished a bit after 15 years. The motors were all pretty much intact; we just serviced them and checked them over."

The refurbished presses were connected commissioned and started up during a

short shutdown at the mill in November last year.

Rydstrand says of the results being obtained since start-up, "We have seen a great improvement in the dewatering of the pulp that we are producing, but also a decrease in the use of bleaching chemicals on PM12.

"We are still looking for perfect consistency, and ANDRITZ continues to assist

us in optimizing both the twin wire presses and the screw press to achieve this, but already it can be seen that we will obtain even better results than the ones we were expecting when we first embarked on this project."

Mahir Mehinagic, Product Engineer, Twin Wire Press, ANDRITZ, says, "This was a really interesting project we took part in at Hallsta Paper Mill, and the mill team was a pleasure to work with. Even though this was a used equipment project, the presses looked like new when they were installed and started up, and we can all be happy that such reliable equipment from ANDRITZ is up and running again."

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ANDRITZ + XERIUM THE PERFECT FIT FOR FUTURE INNOVATION IN FABRICS AND ROLLS



ANDRITZ made one of the largest acquisitions it has ever made when it bought Xerium Technologies in October 2018. As anyone working and operating in the pulp and paper industries will know, the name Xerium is synonymous with high quality consumable products used in the paper, board, and tissue industries. It is also a well-known supplier to pulp drying plants around the world. In fact, for ANDRITZ and its vast portfolio of superior technology supplying all those industries above, it is the perfect fit.

Wolfgang Leitner, President & CEO of ANDRITZ was clearly delighted with the acquisition, saying, "With Xerium, we acquired a high-tech global supplier

providing essential services and wear parts to the paper industry. The acquisition fits squarely with our long-term strategy to execute complementary acquisitions and to grow our aftermarket business with its stable source of revenue and earnings."

This acquisition is indeed a perfect fit for ANDRITZ going forward, but also for Xerium and its products, as it now has full access to extensive machine building and process know-how, which will be a valuable factor in the further development of its staple consumables, paper machine clothing, and rolls. Xerium will be fully integrated into the ANDRITZ group this year and joins with existing ANDRITZ Kufferath to operate under the name ANDRITZ Fabrics and Rolls.

Mark Staton, CEO of Xerium and head of the new ANDRITZ Fabrics and Rolls division, says of what the new ownership means, "We are now part of a true global leader in the pulp and paper sector, which will help us develop our products and business based on a much broader range of opportunities. There were alternative possible acquirers, but none was more attractive in terms of a true fit for the business."

"Xerium has been run as a safety focused, results orientated and innovative company that is committed to delivering best-in-class products and services to customers. The wish is that, when history is written, this acquisition will be seen as

one of the most important and valuable in the evolution of ANDRITZ."

Xerium brings to ANDRITZ an extensive global footprint of 29 manufacturing facilities in 13 different countries and is strategically located in the major paper-producing regions of North America, Europe, Latin America, and Asia-Pacific.

MAKING FULL USE OF THE COMBINED PRESENCE

The products the company makes play an essential role in the paper production process as they are right at the heart of enhancing quality and therefore enable its customers to differentiate their products in a competitive marketplace. Staton

continues, "Xerium adds a full range of fabric and felt solutions as a market-leading supplier in paper machine clothing, as well as a true global manufacturing platform. It also brings a position of global leadership for roll covers again on a fully developed operating platform."

"By making full use of our combined presence in the industry and our joint network of talented sales professionals, we should be able to create new opportunities for sales and growth. Also, the





Aerial view of the production facilities in Gloggnitz, Austria



availability of the TIAC pilot plant will support our development effort and help us ensure that ANDRITZ Fabrics and Rolls is at the forefront of delivering customer value with best performing products."

ANDRITZ Pulp & Paper's service business has been growing well over the last 10 years. Dietmar Heinisser, Division Manager in the Pulp & Paper Service segment, and board member of Xerium, was involved in the acquisition process and works closely with ANDRITZ Fabrics and Rolls. He says, "While we have achieved a leading position for service in almost all pulp and paper

process areas, we saw further growth potential in the paper machines segment. Xerium is one of the market leaders in this area and complements our range of products and services very well.

"We will continue to provide added value services and deliver best-in-class products but, of course, we will also combine our sales and service network globally so that we are able to be close to our customers and provide proactive and fast service. Furthermore, we will combine our product portfolio in a way to be able to deliver tailor-made concepts for our customers,

in particular IIoT solutions where ANDRITZ and Xerium fit together perfectly."

GLOGGNITZ – THE LARGEST PLANT IN THE WORLD FOR PRESS FELTS

One of the largest technology and manufacturing centers that forms part of the



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FOR FURTHER INFORMATION SEE PAGE 3

HELMUT MÜLLER
Vice President,
Operations –
Clothing EMEA

"We have a huge history of supplying the pulp and paper industries from this site at Gloggnitz."



The R&D center in Gloggnitz also houses its own laboratory. Research projects, investigations, analysis, and tests are regularly carried out to continually improve the quality and efficiency of the press felts.



"We use only the best in modern equipment, as the construction of felts and fabrics is very difficult and complex and only with the very best in equipment you can control the quality. We also receive samples of the used felts and fabrics back from our customers, so we can really see what happens to our products during usage."

IIOT – BRINGING BEST-IN-CLASS SOLUTIONS

Big data analytics and IIoT technologies have become instrumental tools for



"There were alternative possible acquirers, but none was more attractive in terms of a true fit for the business."

MARK STATON
CEO of Xerium



DIETMAR HEINISSE
Division Manager,
ANDRITZ
Pulp and Paper

"Xerium is one of the market leaders in this area and complements our range of products and services very well."



Xerium in its work to maximize efficiencies and life-times of paper machine clothing. One of its latest innovations is the development of SMART Technology, which provides the first continuous pressure-sensing paper machine roll.

Heinisser says, "One huge advantage we have is our tissue pilot plant in Graz – the TIAC. With the know-how of Xerium on the fabric side, together with ANDRITZ's paper machine knowledge and research facilities, we will be able to develop the best-in-class products where the customer can really benefit. ANDRITZ expects to quickly be in the position to offer more valuable IIoT solutions across the paper, board, and tissue industries." This combined knowledge, as well extensive experience will provide a real boost to customers' long-term performance.

Xerium has always provided tailored solutions, designed to optimize performance and reduce running costs on its customers' machines. "Our new future with ANDRITZ in Gloggnitz is really exciting," concludes Müller. "This is the first time in our history that we have been associated with a producer of machinery and technology that actually uses our products on its machines. This is a big advantage for us and for our customers, as we can develop new products and technologies alongside ANDRITZ that will push the boundaries of quality and efficiency."

CONTACT

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Production of a press felt in Gloggnitz



Twisting

In the twisting department, identical or different strands of thread are twisted together to form yarn. For press felt base fabrics, yarns with combinations of multifilament and monofilament strands are used. This makes it possible to create a product with characteristics that exactly meet the customer's specifications, for instance, better paper quality, higher dry content, stable runability, etc.



Weaving preparation / Weaving

During weaving preparation, the yarns and threads are made into "warp" and "weft". The warp runs through the weaving machine longitudinally; the weft is fed in laterally. Yarns or threads are spooled by means of sectional warpers. The number, length, and tension of the threads



are predefined for each disc. These discs are combined to form a warp beam and inserted into the weaving machine. As many as 100,000 warp threads are pulled into the machine per warp.



Burling / joining department

Following weaving, a 100% quality inspection is carried out in the burling department. Any defects that may have occurred during weaving are removed or rectified. Flat-woven base fabrics are made endless in the joining department on seaming machines.



Batt preparation / production

In the batt preparation department, the fibers, which have been compressed into bales, are opened for the ensuing carding procedure. By means of this opening and mixing of fibers that have different material properties or degrees of fineness, a homogeneous mixture of fibers is obtained, which is then needled to a stable batt on the needle loom.



Needling department (needle felt)

Before needling, the fabric is heatset (exposed to temperature and tension) on the heat setting machine for the first time. Then, the pre-needled fiberweb is needled into the base fabric on modern needle machines with multiple needle boards. The special felt needles used for this have barbs pointing towards the tip on their three-edged front. When the needle enters the batt, the barbs fill up with fibers and transport them through the base fabric. After several passes on the needling machine, the felt attains the necessary density and the fibers are sufficiently embedded in the fabric.



Heat setting/ finishing machine (heat-set, impregnation, pre-compaction, etc.)

The needled felts from the needling department are once again placed on the heat setting machine. There the felt is finished for the end-user in a thermal-hydraulic process, i.e., it is washed, pre-compacted and, if necessary, impregnated against impurities. The felts are heat-set, cut to size, the edges are sealed, and a trade line is applied to facilitate correct installation into the paper machine.



Final inspection

The final inspection is the last stage in the Huyck.Wangner Austria Quality Assurance Organization and ISO 9001. Since every component has been stringently checked during the entire process, the final inspection of the completed felt focuses not only on product-specific components, but also on position-related demands. This guarantees a high standard of quality as well as excellent reproducibility.

Key Equipment: INNOVATION ON DISPLAY IN THE WOODYARD

Hardware, software, and everything in between: ANDRITZ integrates several innovative technologies to increase chipper throughput and wood chip quality.

There may have been a time when the woodyard was a necessary-but-neglected area of the pulp mill, but that time is over. Introduction of new equipment, new features, and expanded capabilities to enhance chip production is happening at a rapid pace at ANDRITZ. The best part is that the economic benefits from these innovations can often be enjoyed by retrofitting existing lines.

HHQ-CHIPPER

ANDRITZ mastered the horizontally fed chipper configuration and has been perfecting this unique geometry since 2001. The HHQ-Chipper creates the thin and square-shaped chips at the highest throughput obtainable. The horizontal feed keeps the logs correctly oriented to the chipper knives where they can be simultaneously chipped against the

bedknife, instead of against other logs, to produce uniform chips with minimal oversize, pins, or fines.

Confidence in the excellent and consistent chip quality produced by the HHQ-Chipper has led some mills to eliminate the chip screening process prior to the cooking plant, significantly lowering investment and operating

costs. This, of course, increases the value-added benefits of ANDRITZ woodyard technologies.

To date, over 130 heavy-duty HHQ-Chipper systems have been delivered to mills worldwide. The innovative and high-capacity EXL model in the HHQ-Chipper series is operating at the world's largest single-line pulp mill (in Brazil). In total, 28 EXL models have been sold. More recently, the EXL+ model with extra high capacity has been introduced to the market.

TURNKNIFE SYSTEMS

ANDRITZ chippers are equipped with well-proven TurnKnife systems, which are available in several models. The latest model is the TK-IV. The chippers can also be equipped with knife changing systems, such as the QuickClamp hydraulic mechanism, to permit very fast and safe knife changes. The TurnKnife systems have proven themselves around the world as the standard for safety, quality, and the ability to change knives quickly to ensure the highest chipper uptime possible.

TurnKnife technology has several key advantages. The knives are light and much safer to handle. In the latest TK-IV model, the knives have a very long operating life. TurnKnife knives do not require regrinding. The knives can be reversed

and rotated, much like rotating tires on an automobile, to extend the knife changing intervals. In this way, the chipper produces consistently higher chip quality over a longer time period, compared to conventional knives.

ANDRITZ offers TurnKnife and auxiliary systems, such as the ScanChip optical chip analysis system and automated chip samplers, for any brand of chipper. It is easy to convert a chipper disc from any other knife system to the TurnKnife system.

CHIPPER DISC MANUFACTURING

In addition to its own manufacturing, ANDRITZ now produces replacement chipper discs for other brands of chippers. The discs can be more than one-to-one replacements. Custom solutions can



BENEFITS:

- Superior chip quality at the highest throughputs
- Minimum fines and pins generation
- Outstanding runnability
- Reliable operation and easy maintenance
- Flexibility as process needs and chip sizes change
- Proven design with more than 130 installed units
- Highest capacity chipper in the market (HHQ-EXL size)

- 1 Horizontal feeding conveyor
- 2 Engineered with **high safety** standards
- 3 ChipperEKG condition monitoring
- 4 Turnknife TK-IV with QuickClamp
- 5 High throughput and excellent **chip quality**



View 3D footage of this report in our augmented reality App!

FOR FURTHER INFORMATION SEE PAGE 3



ScanChip chip analyzer enables the pulp, paper, or sawmill to define chip quality in accordance with standards by continuously measuring the chip quality.

be engineered for capacity increases or because of disc issues. Examples include adding additional knife pockets within the same diameter to increase capacity, or increasing the disc thickness on units where cracking is a problem. The upgrade to add knife pockets can result in a production increase of 6-15%.

THE IMPACT OF IIOT IN THE WOODYARD

Developments in the Industrial Internet of Things (IIoT) have opened the door for ANDRITZ to acquire new sensor technologies that permit direct data access to machines, complemented by cost-effective Big Data analysis.

A recent ANDRITZ IIoT solution is ChipperEKG, which gives online information and knowledge about the chipper and its knife system. Similar to the device a doctor hooks up to the human body to evaluate heart health, the ChipperEKG (Electrical Knife Graphs) keeps track of the heart of the chipper – the knife. The EKG

indicates the knife contact with the log and shows real-time information about the condition of the knives and bearings.

ChipperEKG offers information about the actual knife condition during operation. It correlates knife life with chip quality to accurately forecast the optimum time for knife changes. Sensors embedded in the chipper (front and rear bearings, anvil, trigger, and gearbox) monitor the chipper in real time. This real-time data is analyzed (actual compared to standard) and the results are displayed on monitors for operators and maintenance personnel. The result is online condition monitoring of bearings, online knife wear index, online detection of poorly installed knives

or damaged knives (which prevents serious chipper damage), online detection of abnormal knife forces (typically caused by stones or metal pieces), and increased visibility into chipper health to support maintenance scheduling.

Many ANDRITZ IIoT solutions are available in mobile, hand-held formats – tablets, smartphones, or even augmented reality glasses – to make the daily plant routine much more efficient.

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HHQ-Chipper equipped with well-proven TurnKnife TK-IV with QuickClamp hydraulic mechanism to permit very fast and safe knife changes.

HHQ-Chipper, model EXL, is the world's largest chipper with 18 knives that ensure sustainable conversion of round wood into best possible chips at high capacity.



View video footage of this report in our augmented reality App!

FOR FURTHER INFORMATION SEE PAGE 3



GERHARD SCHIEFER
Head of ANDRITZ AUTOMATION



Metris condition monitoring

We are living in a century where digital devices monitor every move and our own mobile devices know everything about us – where we go, what we do, our health status, and much more. The data available on our lives transfers mobile phones into our private assistants and supports us in many endeavors with helpful functions and hints. Industries are being enabled in a similar way to monitor and control all assets and plants and improve performance in an effort to achieve perfection.

Our automation experts at ANDRITZ are up to the task. The latest development efforts within predictive maintenance programs for machines and plants of our client industries have resulted in an integrative condition monitoring solution. With this tool it is not only possible to monitor and control all assets of a mill regarding individual performance but also, and this is the real gain, it will be possible to predict behavior in advance so as to enable highly sophisticated maintenance planning. The results will be more efficiency, reliability, and resource savings all across the process.

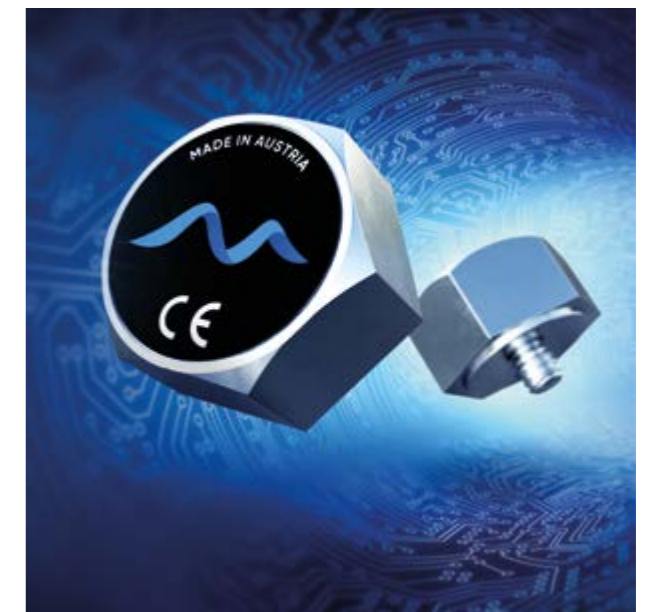
ANDRITZ know-how regarding both process and digitalization is being combined into smart algorithms that have the power to predict machine conditions based on data that is made available by dedicated high-end sensors for industrial applications. The gained data is pre-selected and organized, then processed by the best suitable algorithms and analyzed in order to provide the relevant insights for our customers' targets.

The integrative strategy of Metris products, combined with digital solutions from ANDRITZ, makes sure that all solutions have the proper interfaces to seamlessly function together and as a result increase the overall performance. This means customers with existing Metris OPP contracts, our core product for optimization of process performance, can simply include the new condition monitoring app as an add-on to enhance the overall capabilities and accuracy of their solution package. This results in an even higher degree of optimization that is translated into real savings for the customer.

One aspect of the achievements in our digital developments for mills is in the area of maintenance. Now we can provide meaningful information about assets in order to increase productivity, efficiency, reliability or even plan stops of a plant in a more effective way. Besides that, performing proper maintenance increases the lifetime of an asset and therefore decreases or postpones overall investments, freeing up financial resources for other areas.

Metris Vibe is one of the latest developments to come out of our R&D department in the area of condition monitoring. A vibration and temperature sensor, Metris Vibe is the first of its kind, and functions wirelessly on critical equipment that is otherwise very difficult to access or subject to safety issues. With the vibration sensor, the respective equipment can be analyzed on its actual state and provides data via low energy Bluetooth technology to a gateway that sends the relevant information to the Metris platform.

Further developments in the area of condition monitoring that are soon to be integrated into the Metris digital solution portfolio include sound intelligence systems using industrial microphones to capture irregularities in sound with a similar approach. All insights are sent to the Metris platform where big data analysis takes place using individually adapted algorithms that analyze and process captured data in order to provide target-oriented information to the customer in real time.



TURNING A SHUTDOWN INTO A



PIT STOP

Just like super-fast pit stops in Grand Prix Formula One racing, ANDRITZ has been concentrating on helping customers to minimize shutdown times, utilizing its Metris OPP platform. The dedicated Metris Planning App is integrated into the platform and is already achieving remarkable results in shutdown efficiencies.

All sports have crucial moments that define a championship or round, but car races undoubtedly have one of the most emblematic moments to define the success or failure of a driver and his team: the pit stop.

The faster and more efficient the pit stop, the greater the success of the drivers and team in the race. Because of its importance in Formula One since 1982, when the first scheduled Pit Stop took place at the Austrian GP, pit stop time has been steadily dropping from the initial 18 seconds to the ones of today, being less than two seconds. With the development of technologies and teams increasingly integrated and prepared to beat their own records, pit stops can define a race or even the championship.

Just like Formula One racing, continuous process mills face the same challenges year after year, uniting technologies and people to make the stops efficiently and ever faster, with ever more daring production goals.

THE SHUTDOWN CHALLENGE

In this context, a shutdown may involve 25% of the annual maintenance budget over a period varying from 8 to 10 days. Another critical factor of this period is the number of tasks to be performed when processing more than 1,000 service orders, which will be executed by a contingent that can reach as many 1,500 people.

With so many activities being performed simultaneously by so many different people, and unlike car races, where the team knows itself and trains endlessly to manage the pit stop, in mills the complicating factor is that most of the people who perform the activities do not even know the mill. This reality makes the start-up of the production after the shutdown, and the resumption of historical levels of production, another important challenge in the management of shutdowns.

In addition, in this process there are two important trends to be considered; one of them, like the races, is the definition of

the strategic moment to stop in an effort to obtain the best result. The interval of completion of the shutdown has changed and put even more pressure on this crucial time slot. Historically, the interval between shutdowns has been 12 months in some regions; today it often extends to 18 months. The second trend is the increase in production volume in a single production line, which can now reach as much as 2 million t/a.

In this way, the quality with which this shutdown is performed must guarantee reliability to ensure uninterrupted operation for the next cycle, since the loss of revenue per day of a stopped mill can reach 5 MUSD.

All this makes the effective management of shutdowns increasingly essential to a pulp mill that is concerned with remaining competitive. It is necessary to have the right technologies and people to guarantee for the production success of the mill.

In such a scenario, the visibility of the progress of the shutdowns should be

fast and accurate. Taking a day to compile the progressive data of a shutdown is risky but, unfortunately, this is still the reality of many mills.

THE SOLUTION

Aware of these challenges, ANDRITZ has developed a new application which has been integrated into its Metris OPP platform, the Metris Planning App. The new app allows the online monitoring of the activities of the shutdowns as a whole.

This application combined the expertise of two ANDRITZ divisions: one with more than 25 years of experience in Industrial Maintenance, including shutdown management. The other with IIoT technologies, responsible for optimizing the performance of pulp and paper mill processes, with more than 50 contracts in 15 countries, some of them operating for more than 12 years. This division is responsible for the optimization of processes of over 34 million tons annual production.

Luis Binotto, Senior Vice President of ANDRITZ Process Optimization, says, "With regard to shutdowns, it is always important to ask yourself: 'Do you measure your stop in days or in total loss of production? Is meeting the deadlines and budget enough to be successful?' ANDRITZ's

expertise in shutdown management combined with the Metris Planning App solution brings light to these issues in that it enables real-time management of this process as well, such as mill monitoring during the distribution period."

HOW DOES IT WORK?

Cleiton Oliveira, ANDRITZ OPP Technology Coordinator, says, "With the Metris Planning App, the maintenance people go out into the field with their mobile devices, which already have on them the tasks

BENEFITS OF THIS SERVICE:

- Proactive and anticipated action in case of deviations between planned and realized activities
- Online monitoring of the entire Shutdown
- Visualization of the factory as a whole, by area or discipline, allowing those responsible for the scope to act immediately
- Integration with other applications integrating the Metris platform, focused on Asset performance – motors, valves, etc., allowing faster diagnostics in case of problems
- Reporting of problems by text, photos, or videos
- Specialized support by the ANDRITZ team



Shutdowns updated on time by mobile phone



Tree map information about shutdown activities status

that need to be completed and the list of equipment that needs to be checked. These tasks can be completely personalized and dedicated to each area of the mill, for example, woodyard, fiberline, recovery boiler, etc.

"When each piece of equipment is checked, for example, a chip pump, the dedicated box is ticked and the action is uploaded. Or, if the maintenance person spots a problem, or needs to add a comment, there is a facility to do this, including adding photos or even videos illustrating the status of the equipment. This information is then all synchronized into the Metris Planning App, giving a real-time report of exactly what action is taking place around the mill.

The ongoing maintenance at the mill is reported in real time, using a traffic light

system of red, green, and amber, which reveals the status of each area being monitored. At once, the planning tool reduces the chance of making repeats or errors, at the same time eliminating the need for reams and reams of paper and a lot of time inputting information into computers.

It also allows real-time management of both maintenance while the mill is running, as well as when on shutdown.

CASE STUDY – VERACEL

Veracel is a single line mill, with production of 1.1 million t/a, located in the south of the state Bahia in Brazil, operating 25% above its nominal capacity, with excellent rates of availability and performance in general.

The maintenance of the mill is totally outsourced, with ANDRITZ being responsible

for the management and execution of routine maintenance and shutdowns.

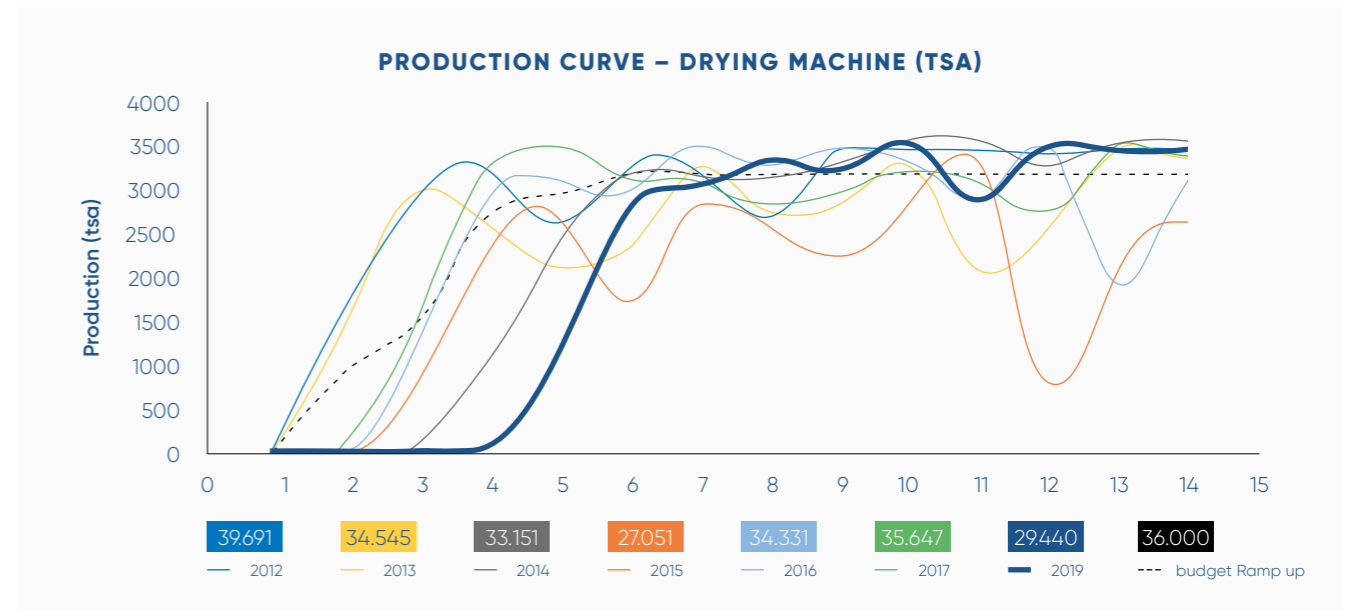
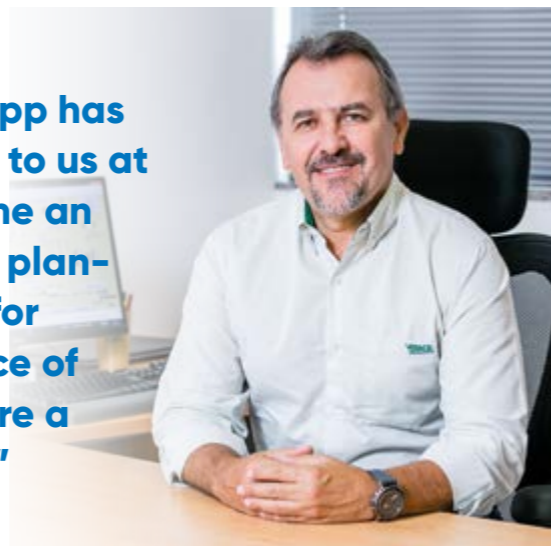
In the February 2019 shutdown, 2,678 work orders were executed in 10 days of shutdown, including maintenance, operation, and engineering, with a peak of 1,825 people working at the mill.

To manage this colossal planning, ANDRITZ used 22 mobile devices connected to the Metris Planning App, allowing it to follow the evolution of the line online and act promptly on the deviations, thus avoiding the deadline being compromised.

As important as meeting the deadline and budget is the start-up and stability post shutdown. To that end, ANDRITZ began to monitor production in the first 15 days after the shutdown. The graph above shows the evolution of this index over the last few years.

ARI MEDEIROS
Industrial Director,
Veracel

"The Metris Planning App has made a real difference to us at Veracel and has become an essential tool for micro planning, and particularly for optimizing the sequence of actions and steps before a shutdown takes place."



Monitoring of production stability after shutdowns in Veracel over the past few years

Veracel has been using the Metris Planning App for some two years now; Ari Medeiros, Industrial Director at the mill, says, "The Metris Planning App has made

a real difference to us at Veracel and has become an essential tool for micro planning, and particularly for optimizing the sequence of actions and steps before a

shutdown takes place. It has also allowed us to identify areas where possible failures might take place, and areas where we can improve upon while the mill is running.

"Of course, we have always had to carefully plan shutdowns in the past, but the planning tool has enabled us to dramatically speed up the process. In terms of ease of use, it is important that you have good people to manage this tool to get the best results, and with our experienced mill engineers together with the knowledgeable people at ANDRITZ, we are reducing our mill shutdowns feedback information from taking one day to be on-line."

This same approach has been used successfully in other large capacity mills in South America and is now being taken to other regions. As in pit stops, the Metris Planning App combines technology and people to obtain better results. Do you want this solution for your mill? Get in contact with one of our experts to put your shutdown in the pole position.

ANDRITZ CURRENTLY OFFERS THIS PRODUCT IN THREE DISTINCT LEVELS OF COVERAGE:

1. Metris Planning App: Metris Planning App and setting it up from the planning in project program.
2. Shutdown support: Metris Planning App plus field monitoring for early identification of execution problems during the shutdown.
3. Shutdown Management: total shutdown management, starting immediately after the end of the previous one, with lessons learned and improvement points, and continuing throughout the year with ongoing reliability work feeding the next shutdown and selection of activities and contracting multi-annual packages with local suppliers.

CONTACT

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WORLD FIRST. AGAIN.

Smurfit Kappa Nettingsdorfer has been something of a trailblazer through the years. It was one of the first paper mills ever to use a shoe press and one of the first to try out "continuous batch" pulp cooking. And now, they have another world first to report...

Because it is now the only mill in the world with batch pulp cooking that also uses recycled secondary steam for woodchip pre-steaming. It also marks a major expansion by ANDRITZ in the world of batch cooking.

DARE TO BE DIFFERENT

Smurfit Kappa wanted to lower the mill's environmental impact by reducing consumption of steam, as well as improving pulp yield. But part of the motivation was simply that Nettingsdorfer's ethos is to be innovating all the time (remember the shoe press?). Pulp Mill Manager, Gunter Leitgeb, explains that "Continuous improvement is in our DNA. We all have to find new ideas and implement them. We get measured on it."

This was good news for ANDRITZ. Paavo Tolonen, Fiberline Director, ANDRITZ Pulp & Paper Services, says, "We are really convinced that this technology will work everywhere. But we needed to try it out in the real environment. It was important for us to find customers willing to share the risks in doing something new." Leitgeb explains, "ANDRITZ did everything to make us feel comfortable, with studies and guarantees. It helped us to do something new."

MOVING THE GOALPOSTS

And this really is something new.

The "continuous batch" system at Nettingsdorfer is basically batch pulp cooking, but with continuous liquor circulation, via a highly-developed system of interdependent tanks. Leitgeb says that before the recent upgrade with ANDRITZ, "our heat recovery system was already very good, near the world's best. But we still had waste energy. We still had to cool our liquid emissions with cold water." And on the quality front, the firm wanted to reduce the shives and the amount of uncooked chips by enhancing impregnation, which leads to improved pulp strength, a key selling point for kraftliner. The project also made it possible to compact the chips more, enabling the mill to increase chip density in the digester by 10% and creating flexibility for process optimizations. In short, the goals were to raise pulp quality and yield, while reducing energy consumption, and thereby cost and environmental impact. All while improving safety. Tolonen summarized, "In general, batch cooking has better flexibility with pulp quality and wood furnish, but worse energy consumption. The idea here was to combine (the best of) both."





Black liquor is flashed in new ANDRITZ efficient flash tank utilizing FlashLance™-technology.



“ANDRITZ did everything to make us feel comfortable, with studies and guarantees. It helped us to do something new.”

GÜNTER LEITGEB
Pulp Mill Manager,
Smurfit Kappa
Nettingsdorf

HOT CHIP

However, he admits that previously “conventional thinking was that chip pre-steaming wasn’t possible for batch digesters.” Nettingsdorfer and ANDRITZ have now proved otherwise.

Around the woodchip bin, the modifications included a new gas-handling and secondary heat-recovery system, which integrates with a new inclined Airlock Screw Feeder, as well as new Center Steaming in the HELP™- chip bin, which distributes steam more efficiently than traditional side-fed nozzles can do alone, so the same amount of steam does more presteaming. Then the chips are fed through new discharge conveyors into the mill’s four batch digesters, which now have new ANDRITZ SureFlow™ diagonal batch circulation screens, allowing increased compaction and higher liquor flow. In the tank farm, a new flash tank, including ANDRITZ’s FlashLance™, feeds unclean flash steam to a new vapor reboiler. Non-condensable gases flow to a new vent condenser, while the clean steam is fed back to the start of the process to steam

the new woodchips, just as some continuous pulping mills already do.

Helmut Adlboller, Assistant Pulp Mill, says “This was the first mill to do a batch rebuild [using continuous technology]. We dared to try it in the chip presteaming, although we didn’t know how it would handle the

temperatures. It was at 30°C, now it is at 60°C in winter and 90-100°C in the summer. It has reduced our steam consumption and given us better impregnation.” They are also minimizing the environmental impact. “Now, we have reduced the heat load going to the cooling system by 2 MW,” says Leitgeb.

Also, the new gas-handling system has prevented any release of gases to the environment. Leitgeb argues, “this is the new state of the art. Previously, the state of the art in continuous pulping used dirty steam for chip presteaming. But if they had no reliable gas-handling system, that created a smell.” He adds, “the new solution, using clean

secondary steam and a gas-handling system, was key for choosing ANDRITZ.”

And? “It worked. There is no odour issue.”

ADDED VALUE

Other benefits include steam consumption reduced by 5% to 10%, while refining

the presteamed chips now requires less energy. Heat waste has been reduced by around 5%, yield is up by around 0.5%, and the new digester screens have helped to increase production capacity.

Leitgeb also believes that “the side effects have been as important as the main

“We are really convinced that this technology will work everywhere.”

PAAVO TOLONEN
Director, Fiberline
ANDRITZ



New gas handling system ensures safety and odour-free operation of the chip bin.



Impregnation liquor pre-heaters are part of the heat optimization system.





Modified HELP™ discharge with center steaming provides excellent impregnation result.

effects. There were so many good side effects." These included an increase in turpentine output, as well as fewer potentially dangerous seal failures caused by the black liquor travelling continuously at high speed and pressure through the mill's complex tank farm. That means higher system availability. "If we have a problem, we have to shut down the whole system. But it's been running reliably for the past year and a half," Leitgeb explains.

TRUST IS A MUST

Which is no mean feat, when you consider

that "one of the biggest challenges was to integrate something new into a fully harmonized system. We needed something reliable, so we put a lot of effort into optimization. It had to take place during our normal yearly shutdown, and we planned for no losses, so timing was vital, and that was one of the reasons we chose ANDRITZ," says Leitgeb.

Another reason was the good relationship, as Tolonen and Leitgeb have known each other for over a decade. Even before Leitgeb joined Nettingsdorfer

seven years ago, the two men were working together at Leitgeb's previous employer (another Austrian paper mill). That mill had a big success in its digester with an ANDRITZ Double-Wash upgrade, and it was also there that Leitgeb first installed ANDRITZ SureFlow™ screens, which formed part of this new project at Smurfit Kappa Nettingsdorfer.

Robert Petroschinsky, mechanical design and construction engineer of Nettingsdorfer's Investment Project Planning group, comments, "The cooperation with ANDRITZ worked very well. They were very good during the shutdown, working shifts day and night to take out the old kit and install the new. Any delay would have meant not meeting our schedule, but we met all deadlines and quality parameters. I absolutely recommend it." Adlboller adds, "It was a very exciting start-up. It was completely new, but I always knew it would be fine. I've done a lot with ANDRITZ and it always worked fine. ANDRITZ gave good cooperation during the installation and start-up, as well as post-sales service to improve the process."

And Mia Rantasalo, Project Manager, ANDRITZ Pulp & Paper Services, points out that it takes two to tango, "Smurfit Kappa was very easy to work with because whatever we needed to discuss, they gave the



Left to right: Paavo Tolonen, Director Fiberline, ANDRITZ; Günter Leitgeb, Pulp Mill Manager, Smurfit Kappa Nettingsdorfer; Robert Petroschinsky, Mechanical Design and Construction Engineer, Smurfit Kappa Nettingsdorfer

Helmut Adlboller, Assistant Pulp Mill, Smurfit Kappa Nettingsdorfer and Mia Rantasalo, Project Manager, ANDRITZ

answer right away. They made it very easy as a team to get the best results for them. Everybody worked very fast."

DIGGING DEEP

Tolonen also argues that this project reveals huge potential for other batch pulp mills. "A lot of batch mills have no secondary heat recovery or chip pre-steaming. And there has been little development of the digester screens for decades. We have developed continuous pulping technology for batch pulping." He



Vapor reboiler generates fresh steam utilizing the energy of hot black liquor (Flash steam) and fractionates the flash steam condensate to turpentine rich and clean condensates.

argues that although ANDRITZ is a relatively new entrant into the batch pulping space, it has "huge knowledge and decades of experience that we can bring to batch cooking."

Leitgeb continues, "I would definitely suggest doing an audit with ANDRITZ, because they look for something new, not just safe. They go digging. They put their experience together with the mill and they are very advanced, with a lot of knowledge and experience."

He concludes, "If you have liquids that can flash, then definitely go for it. You get benefits in safety, environment, quality, production, availability, and raw material savings. I can't see a negative."

CONTACT

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MIA RANTASALO
Project Manager,
ANDRITZ

"Smurfit Kappa was very easy to work with because whatever we needed to discuss, they gave the answer right away. They made it very easy as a team to get the best results for them. Everybody worked very fast."

METRIS PERFORMANCE CENTER EXPERTS ON DEMAND

The new Metris Performance Center expands service to papermakers around the world by putting an ANDRITZ expert virtually in the mill's control room whenever needed.

One of the major advantages of new IT technologies is connectivity – the ability to be virtually anywhere in the world. ANDRITZ has leveraged this technology to become the centerpiece for its new Metris Performance Center.

"It is better than any simple hotline or service line because now we can digitally interlink our experts in Austria with experts at a mill," says Christina Matejka, Sales Manager in the Tissue Product Group of ANDRITZ. "With remote support we can see online what the operator sees on the DCS screen in real time. Through this fast and direct connection, and with the customer's collaboration, we can troubleshoot, answer urgent questions on process or equipment, or even make process adjustments on-the-fly."

When this remote support is combined with Augmented Reality (AR) and Decision Wall tools, Performance Center experts can be "virtually" in the mill. This allows a close communication and interaction just as if people were sitting in the same room.

VIRTUAL PRIVATE NETWORK AS DIRECT LINK

Without getting into all the technical details, the Metris Performance Center relies on a Secured Remote Access as direct connection to the mill's Distributed Control System (DCS) on one end and a Metris server on the other. The connection is private and secure, providing a direct link between the Performance Center and the customer's mill.

The Metris platform is ANDRITZ's branded solution for optimization and decision support – collecting data from the mill, analyzing it, converting it to useful information, and visualizing this information in a way that equipment and process experts can use it to troubleshoot, optimize, or upgrade so that a mill can run its line more efficiently and profitably.

SAVING TIME AND MONEY

From a practical point of view, this exclusive *Prime* level of service performance saves a customer time and money: to call a main contact for fast and preferred

support in case of an emergency or urgent questions.

Matejka acknowledges that not everything is best handled remotely. "It is not our goal to replace the face-to-face relationship with each customer," she says. "But, certainly, there are many occasions where the discussion can be via a camera and shared DCS screen once the initial relationship is established."

Personnel from the mill side (operators, supervisors, maintenance personnel, technical department) can communicate directly with ANDRITZ experts at the Performance Center. Many times, especially during a start-up, ANDRITZ start-up engineers on-site can rely on technical backup from

specialists at the Center. A recent practical example was when there was a question about drying performance during a tissue machine start-up at Vajda Papír in Hungary. Personnel at the Performance Center were able to locate an ANDRITZ Yankee specialist at the headquarters building and, within a few minutes, the ANDRITZ start-up engineer on-site was discussing data over a shared DCS screen with the in-house ANDRITZ process expert.

"This flexibility is a real benefit for both sides," says Mikhael Iaronka Menezes, a member of the Metris OPP team that provides process optimization for complete mills. "Our experts can assist in starting up at a new installation in China and

diagnose a stock-on, stock-off guiding issue with a mill in Brazil at the same time. All from a central location."

FLEXIBILITY AS A SERVICE

"Strong service and customer support are critical to our customers' and to our success," says Klaus Blechinger, Vice President of the Tissue Product Group at ANDRITZ. "Paper and tissue mills are actively optimizing while reducing costs, which is a key benefit of digitalization. By providing digital support via the Metris Performance Center, we are offering a service to our customers exactly when they need it."

The new Metris Performance Center is available to each ANDRITZ customer

worldwide. The "network" of mills is growing each week, as paper, board, and tissue mills learn about this latest offering in the area of digitalization and Industrial Internet of Things (IIoT) solutions.

"Digitalization plays a major role in business today," says Gerhard Schiefer, Vice President of Global Automation at ANDRITZ. "We want to create digital assets that are tailored to a customer's preferences for on-site as well as remote assistance."

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CHRISTINA MATEJKA
Sales Manager
Paper & Tissue, ANDRITZ

"We can now digitally interlink our experts in Austria with experts at a mill and can troubleshoot or even make process adjustments on-the-fly."



THE METRIS PERFORMANCE CENTER OFFERS:

- Direct customer contact using the latest communication and Augmented Reality (AR) tools
- Optimization of Process Performance (Metris OPP) for process and loop tuning, Big Data analysis, and Machine Learning applications
- Start-up support
- Support in implementing new control strategies
- Remote assistance in resolving process or equipment issues
- Training for mill specialists

DIGITALIZATION AS A MEGATREND

by Bernd Oberzaucher, Business Consultant

Digitalization is progressing in leaps and bounds: The main reasons for this are technical progress, constant further development of the internet, mobile applications and technologies based on artificial intelligence, and increasing globalization. Technology trends emerging as a result of digitalization, such as IoT (Internet of Things), AI (Artificial Intelligence), data analytics by means of Big Data, and AR (Augmented Reality), not only have a considerable impact on society and the working environment, but also on business operations in industry.

1 IoT (Internet of Things)

The ever progressing linking of equipment to the internet opens up many new opportunities for companies and organizations as well as for individuals. According to Cisco, 500 billion devices will be connected and linked to the internet by the year 2030. Each device contains sensors that collect data, interact with the environment, and communicate via a network.

IoT is exactly that – a network of these connected devices, and it generates data that is used to collect, analyze, and provide information in order to make informed decisions and develop targeted measures. Autonomous mill concepts are also based on smart utilization of IoT technology.

2 AI (Artificial intelligence)

Much of what was pure science fiction until just recently is possible today thanks to AI. The progress made in the artificial intelligence sector is so enormous that there will be major changes in the interaction between human beings and machines in the next few years. These machines will learn to anticipate situations and take

control themselves. Digital twin simulations, which are working with artificial intelligence, are already implemented in many production industries. These technologies will open up hitherto undreamt-of process prediction opportunities, as well as further business strategies.

3 Big Data

Data are very important when companies want to make informed decisions about products, services, and strategies. Data acquisition is easier than ever before thanks to digitalization. The problem today is that the volume of data collected is increasing enormously, while most of it will never be used. As a result, one of the digital

trends for the next decade will deal with tools that can actually analyze, evaluate, and use data. Companies like Microsoft, SAP, SAS, and Salesforce already lead the market for data used in business analyses. More tools will follow because this digital trend is expected to increase and will be essential for autonomous mill operations, too.

4 AR/VR (Augmented Reality/Virtual Reality)

Wearable technology as well as virtual and augmented reality (VR and AR) are among the most important technology trends that could ultimately supersede conventional mobile communication. Industry has already tested virtual applications in mobile devices for maintenance, operating, and training purposes

and in a lot of cases is successfully implementing them. Engineering and machine design will experience a new level of perfectionism. Due to VR and AR technologies, design teams from all over the world can work together in virtual rooms and bundle their expertise in new ways. Besides that, AR and VR applications can be used as sales tools to enhance business success.

In spite of the many advantages that digitalization brings, there are also critical voices to be heard that should be taken seriously. Artificial intelligence and platform economy can certainly also have a negative impact on working life and the economy. A platform economy is where online digital structures are created that enable human activities to take place. These technologies and structures may be a threat to many professions, and lower incomes may well be the reason for a

drop in demand. On the other hand, one can also assume that automated routine work increases productivity and growth and creates new jobs. In contrast, industry is worried about cybersecurity above all, which must never be under threat. External enemy attacks in the form of ransomware or other kinds of malware can cripple or even destroy the business of entire companies, so identification and protection against cyber risks has maximum priority.

HOW 2300 EXECUTIVES ACROSS 15 COUNTRIES ENVISION THE FUTURE

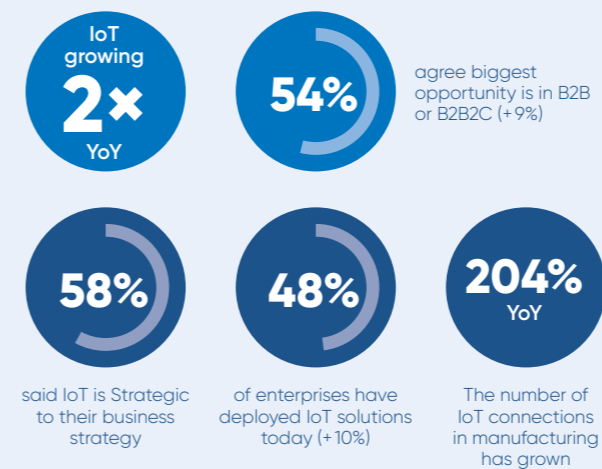


Figure 1. Keys to creating an IoT strategy
Source: IDC

INTERNET OF THINGS (IOT) CONNECTED DEVICES INSTALLED BASE WORLDWIDE FROM 2015 TO 2025 (IN BILLIONS)

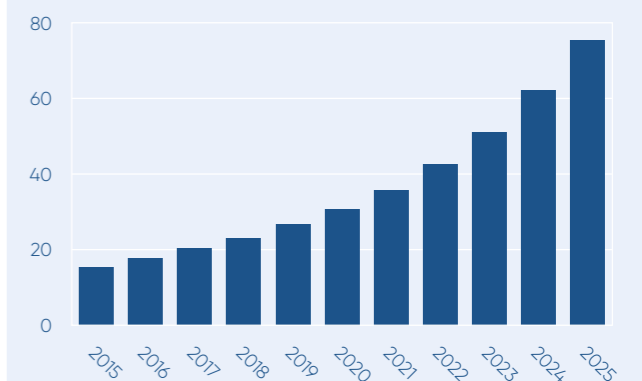


Figure 2. IoT-connected devices installed base
Source: IHS @Statistika 2018

Prime in stock preparation

THE NEXT GENERATION IN SCREENING AND FRACTIONATION

Well-known with over 5,400 pressure screens installed in numerous stock preparation lines worldwide, ANDRITZ presents the latest evolution in screening – the *PrimeScreen X*. The innovative design of the new screen builds on the successes of the widely valued *ModuScreen* family, but offers innovative key benefits. The improvements in energy efficiency, screening performance, and maintainability are significant.

According to Sampo Köyljäärvi, Global Product Manager for RCF screening and flotation systems at ANDRITZ, “Focusing on customers’ needs and market demands whilst benefitting from our long-term know-how in screening, the *PrimeScreen X* passed through all stages of product development – from the initial engineering design to prototyping and two years of mill testing – in most demanding OCC applications.”

MAIN FEATURES OF THE *PrimeSCREEN X*

The main design improvements of the new screen include:

Top-feed stock inlet. The design uses gravity to quickly remove heavy contaminants.

With this top-down design, abrasive contaminants, that cause wear to the rotor and screen basket, are not forced to flow slowly upwards through the entire screen. Top-down also improves the removal of light rejects, preventing their accumulation in the feed area and extending the life of wearing components.

PrimeRotor and foils for increased efficiency and lower power consumption.

The screen can be equipped with the new *PrimeRotor*, which improves screening efficiency and reduces energy consumption by up to 25%. The *PrimeRotor* foils are interchangeable with any other ANDRITZ foils and the rotor could be installed in any screen type available on the market.

Easier maintenance. Changing baskets and rotors is time-consuming work. The *PrimeScreen X* uses a uniquely designed drive flange to connect the rotor to the hub, so maintenance or replacement is quick and easy. The innovative clamping system to fix the screen basket in place allows faster screen basket changes.

Optimized screen basket height-to-diameter ratios.

The *PrimeScreen X* is designed so that the optimized screen basket height-to-diameter ratios meet the requirements of different furnishes and applications. This helps to reduce the thickening factors and leads to better control of fiber loss as well as reduced potential for plugging.

RESULTS FROM THE FIRST INSTALLATION

After extensive internal testing in ANDRITZ’s stock preparation pilot plant, the first commercial installation of a *PrimeScreen X50* was as a primary coarse screen in a 1,350 bdmt/d OCC line.

The *PrimeScreen X50* was installed in parallel to an existing conventional screen from another supplier and began operating at full production from the start, using the same rotor tip speed, flows, and consistency settings that were in place for the existing screen.

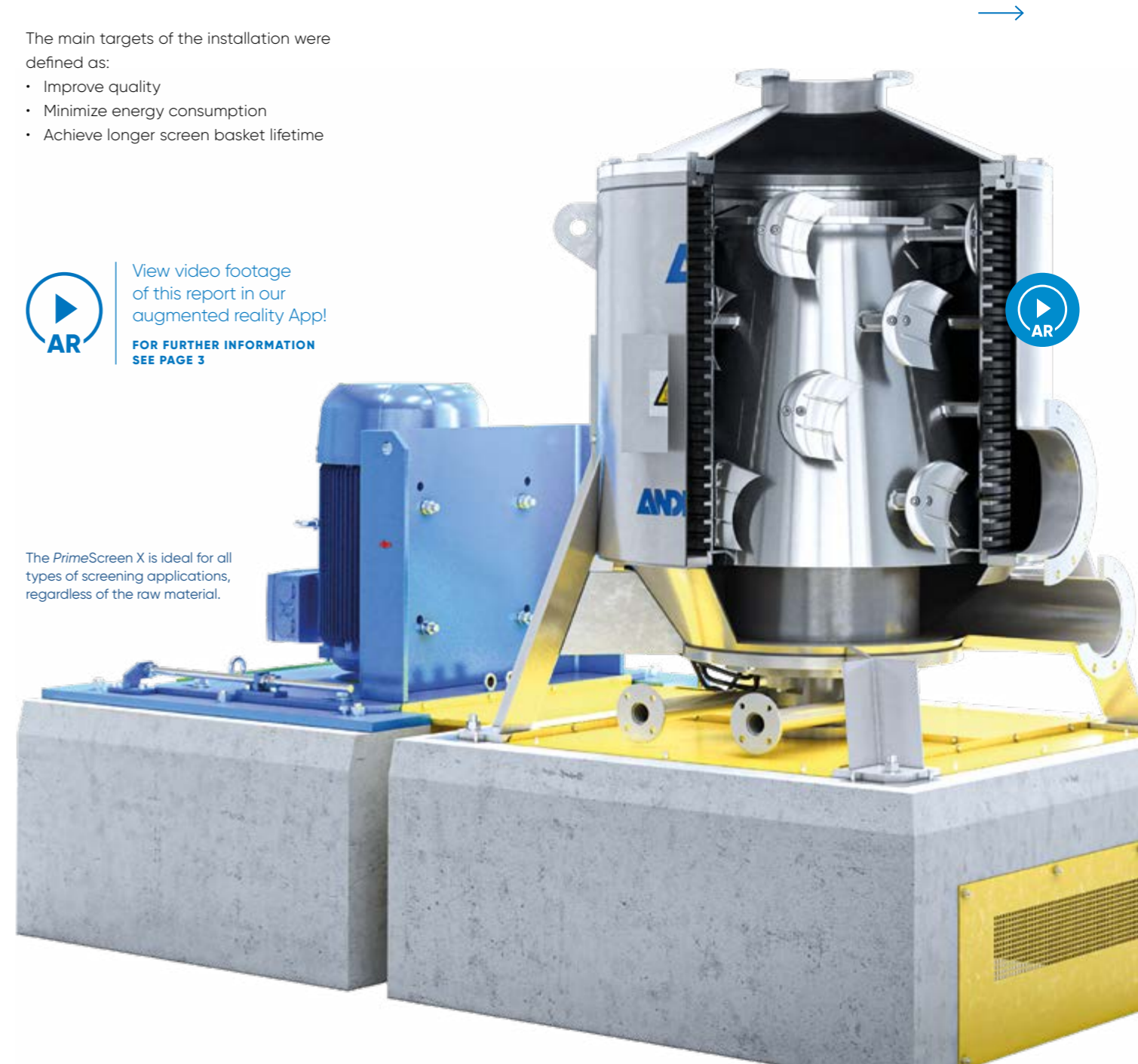
The rated capacity of the *X50* was 705 bdmt/d. First samples from the *PrimeScreen X* compared to the competitor’s unit are shown in Table 1.

The main targets of the installation were defined as:

- Improve quality
- Minimize energy consumption
- Achieve longer screen basket lifetime



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The *PrimeScreen X* is ideal for all types of screening applications, regardless of the raw material.

<i>PrimeSCREEN X</i>			
	FLOW (l/min)	CONSISTENCY (%)	MASS (t/d)
INLET	15,073	3.25	705.4
ACCEPT	14,059	3.11	629.6
REJECT	1,515	4.50	98.2

COMPETITOR			
	FLOW (l/min)	CONSISTENCY (%)	MASS (t/d)
INLET	15,962	3.20	735.5
ACCEPT	14,346	2.88	595.0
REJECT	1,615	4.70	109.3

Table 1: First samples from the *PrimeScreen X* compared to a competitor’s screen (screens running in parallel).

The competitor's screen that was replaced had 250 kW installed power and operated at ~69% load (Table 2). The PrimeScreen X had 132 kW installed power and operated at ~78% load. This reduced energy consumption by 40% (from 173 to 103 kW) compared to the existing competitor's screen.

The screen rotor in the PrimeScreen X was an ANDRITZ LR design, the screen basket an ANDRITZ Rejector type (0.6 mm slot), that actually had 21% less open area than the Rejector basket in the existing conventional screen. Even with this constraint, the PrimeScreen X operated with 5.5% higher capacity and much better screening efficiency – especially for stickies removal (77.5% stickies reduction with the PrimeScreen X vs. 56.4% with the existing screen). Side-by-side comparative data for the two screens is provided in Table 3.

For this mill's coarse screening process, the average screen basket lifetime in the

existing screen was 6–8 months. When the PrimeScreen X was opened up for inspection during a shutdown, 10 months after installation, the slot widths and profiles were excellent. The underside of the rotor was also exceptionally clean. Since that initial inspection, the mill continued to run the screen basket in the PrimeScreen X for 22 months before changing it.

CONCLUSION

The PrimeScreen X is the natural evolution of the ModuScreen pressure screen family. The targets for this development were to improve both the energy and screening efficiency, while making the unit easier to maintain.

The PrimeScreen X is exceptional for all screening applications – brown and white grades, recycled or virgin, including coarse, fine, broke, thick stock, and fractionation duties.

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PrimeRotor – new rotor and foil design



Streamlined rotor attachment



Clamped screen basket design

PrimeSCREEN X			
INSTALLED MOTOR (kW)	MOTOR LOAD (%)	POWER CONSUMPTION (kW)	SPECIFIC ENERGY CONSUMPTION (kWh/t)
132	78	103	3.50

COMPETITOR'S SCREEN			
INSTALLED MOTOR (kW)	MOTOR LOAD (%)	POWER CONSUMPTION (kW)	SPECIFIC ENERGY CONSUMPTION (kWh/t)
250	69	173	5.63

Table 2: Motor data

PrimeSCREEN X					
	REJECT RATE (%)	STICKIES (mm ² /kg)	STICKIES REDUCTION (%)	SOMERVILLE RESIDUAL (%)	SOMERVILLE REDUCTION (%)
INLET	-	81,364.3	-	6.92	-
ACCEPT	-	18,328.4	77.5	0.9	87.0
REJECT	13.9	-	-	-	-

COMPETITOR'S SCREEN					
	REJECT RATE (%)	STICKIES (mm ² /kg)	STICKIES REDUCTION (%)	SOMERVILLE RESIDUAL (%)	SOMERVILLE REDUCTION (%)
INLET	-	61,430.5	-	6.28	-
ACCEPT	-	26,775.9	56.4	1.62	74.2
REJECT	14.9	-	-	-	-

Table 3: Side-by-side performance data for PrimeScreen X vs. competitive screen (screens running in parallel).



A-Recovery+ chemical recovery concept

ALLOWS MILLS TO SEE THE CHEMICAL CYCLE IN A NEW LIGHT

Over the years, chemical recovery technology suppliers have worked with pulp mills to “close” the chemical recovery loops in order to reduce emissions and effluent – and also to increase recovery efficiency. These loop closures have sometimes led to a build-up of certain chemicals and the creation of side streams that are either ignored or disposed of.

A major target of ANDRITZ’s recent development work has been to innovate solutions for utilizing the side streams of a kraft pulp mill to unleash the hidden potential for generating profit, as what was once considered “waste” can be converted to valuable raw materials for commercial-grade bioproducts.

The objective continues to be operating chemical recovery systems as efficiently and environmentally sound as possible while minimizing capital investment and maximizing profits.

SEEING CHEMICAL RECOVERY IN A NEW LIGHT

ANDRITZ was inspired to take a fresh look at achieving this by shining a new light on the chemical cycle, with two targets in mind: 1) for environmental reasons, further closing of the chemical cycle, and 2) for business reasons, converting the side streams into something of value that could be used by the mill in place of purchased chemicals and energy, or sold for additional revenue. Today, with the increased knowledge and emphasis on biorefineries and bioproducts, this potentially presents a new source of profits.

This development work resulted in a technical solution called A-Recovery+, a modular chemical recovery concept that optimizes the sodium/sulfur (Na/S) balance in a mill to increase the revenue generated and/or to reduce costs significantly.

A-Recovery+ also sets the stage for pulp mills to implement a fossil-free operation.

This two-pronged approach of A-Recovery+ – environmental soundness and commercial benefit – will please mills’ process and production experts, and accountants as well. The first modules developed inside the A-Recovery+ concept generate economic value from the side streams in a traditional kraft pulp mill by adding value such as:

- Purifying raw methanol to commercial quality biomethanol
- Producing commercial quality concentrated sulfuric acid on-site
- Recovering high-quality lignin from black liquor

Development work continues to identify and unleash all the hidden potential in the side streams created during the kraft mill recovery process.

PURIFYING RAW METHANOL TO COMMERCIAL QUALITY BIOMETHANOL

Raw methanol originating from the kraft cooking process is often used in a mill as a support fuel – typically combusted in the recovery boiler, for example. However, with a patented extraction process, raw methanol can be purified into commercial-grade biomethanol, which can either be sold for additional revenue, or used in the chlorine dioxide (ClO₂) generation process.

Methanol currently used in the ClO₂ generator is one of the last fossil-based chemicals prohibiting the establishment of a fossil-free pulp mill operation.

PRODUCING COMMERCIAL QUALITY SULFURIC ACID ON-SITE FROM CONCENTRATED NON-CONDENSABLE GASES (CNCG)

The traditional way mills have managed sulfur surplus has been by dumping recovery boiler fly ash. The ash consists mainly of sodium sulfate (Na₂SO₄) and sodium carbonate (Na₂CO₃) – meaning that, in addition to dumping sulfur, valuable sodium is lost. The lost sodium has to be made up by purchasing sodium hydroxide (NaOH).

An alternative way to control Na/S balance is to integrate Wet-gas Sulfuric Acid (WSA) technology in the mill. WSA produces sulfuric acid (H₂SO₄) from sulfur rich CNCG. The WSA combines catalytic conversion and condensation techniques to produce commercial-grade concentrated sulfuric acid that can be used even in demanding ClO₂ generation process.

This is an economically and environmentally attractive way to manage and control the Na/S balance in the mill. The sulfur amount in the CNCG can be further adjusted to result in a better Na/S balance by extracting more sulfur out of black liquor with a Liquor Heat Treatment (LHT) system.

FIRST A-RECOVERY+ REFERENCE

SÖDRA WILL BE THE FIRST TO PRODUCE COMMERCIAL-GRADE BIOMETHANOL AT A PULP MILL

ANDRITZ received an order from Södra, Sweden, to supply a biomethanol purification plant for the Mönsterås pulp mill. When completed, the plant will annually produce 5,000 tons of biomethanol from renewable raw materials. The biomethanol will be in compliance with IMPCA methanol quality reference specifications for merchantable methanol.

EU’s target is to have 10% of the transport fuel coming from renewable sources, such as biofuels, by 2020. Södra has announced its own strategy to be totally fossil-free by 2030.



INTERVIEW WITH LEIF SJÖBLOM, SENIOR PROJECT MANAGER, SÖDRA INNOVATION & NEW BUSINESS

What were the motives to purify raw methanol? Södra decided that the technical, economical, and sustainable benefits of purifying methanol far outweighed the one of simply burning the chemical for energy. Methanol has many worthwhile commercial applications – including being used for making special chemicals – which brings added value to Södra, at the same time as fitting in with its sustainability goals.

Why was ANDRITZ chosen? The technology for purifying methanol was originally partly developed by Södra, so when ANDRITZ became the owner of it, it was a natural step to engage ANDRITZ for this project.

What are the expectations for the technology? We hope that the biomethanol will fulfil the IMPCA standard as guaranteed and to prove biomethanol is applicable anywhere fossil fuel-derived methanol is used today.



Leif Sjöblom, Senior Project Manager, Södra Innovation & New Business

How has the cooperation with ANDRITZ gone so far in the project? Even though both parties knew from the very beginning that this was a development project, we realized throughout the implementation that it is quite challenging and requires really good cooperation. Already from the start, we agreed on the importance of having a good cooperation in the project and this has been a key factor in order to solve any emerging issues.



Producing sulfuric acid on-site significantly reduces or even eliminates the need for recovery boiler fly ash dumping due to surplus sulfur.

The WSA can also create sulfur deficit by removing more sulfur from the cycle than what enters into the chemical recovery cycle. This free sulfur capacity may save money in the optimization of make-up chemicals – as internal Na_2SO_4 streams can be used as sodium make-up instead of purchased NaOH . The internal Na_2SO_4 can come from the ClO_2 generator as saltcake or from the bleaching plant (e.g., alkaline filtrates). Utilizing both of these sources will further reduce the volume of sulfate effluent or solid waste that the mill will have to landfill.

Up to 99.9% of the sulfur in CNCG can be converted to concentrated sulfuric acid with the WSA. All the sulfuric acid the mill requires can be produced on-site if the CNCG is co-combusted with elemental sulfur in the WSA.

Over 150 references for the WSA technology operate worldwide on a variety of sulfurous gas streams as well as for spent acid. It is a well-proven and robust technology developed by Hal-dor Topsoe A/S.

RECOVERING HIGH-QUALITY LIGNIN FROM BLACK LIQUOR

The lignin recovered from black liquor can be used either to replace fossil fuels in the lime kiln or to generate additional revenue by selling it externally as a raw material for advanced bioproducts.

The A-Lignin technology entails precipitating lignin from the black liquor with carbon dioxide, filtering the precipitated lignin, acid washing it with sulfuric acid, and drying it.

The negative impact of adding sulfur into the chemical recovery cycle by introducing H_2SO_4 at the lignin washing stage can be mitigated by on-site

production of sulfuric acid that allows cost-efficient recovery of high-quality lignin without the negative environmental aspects of dumping large amounts of recovery boiler fly ash.

ECONOMIC FEASIBILITY

In the accounting world, the terms “opportunity cost” and “avoidable cost” are well established. In the chemical recovery world, both of these terms are in play with the A-Recovery+ chemical recovery concept. On the opportunity side, additional revenue is gained from the production and sale of commercial-grade biochemicals and bioproducts that might have been traditionally disposed of or ignored. On the avoidable side, savings result from not having to purchase make-up chemicals for the pulp mill.

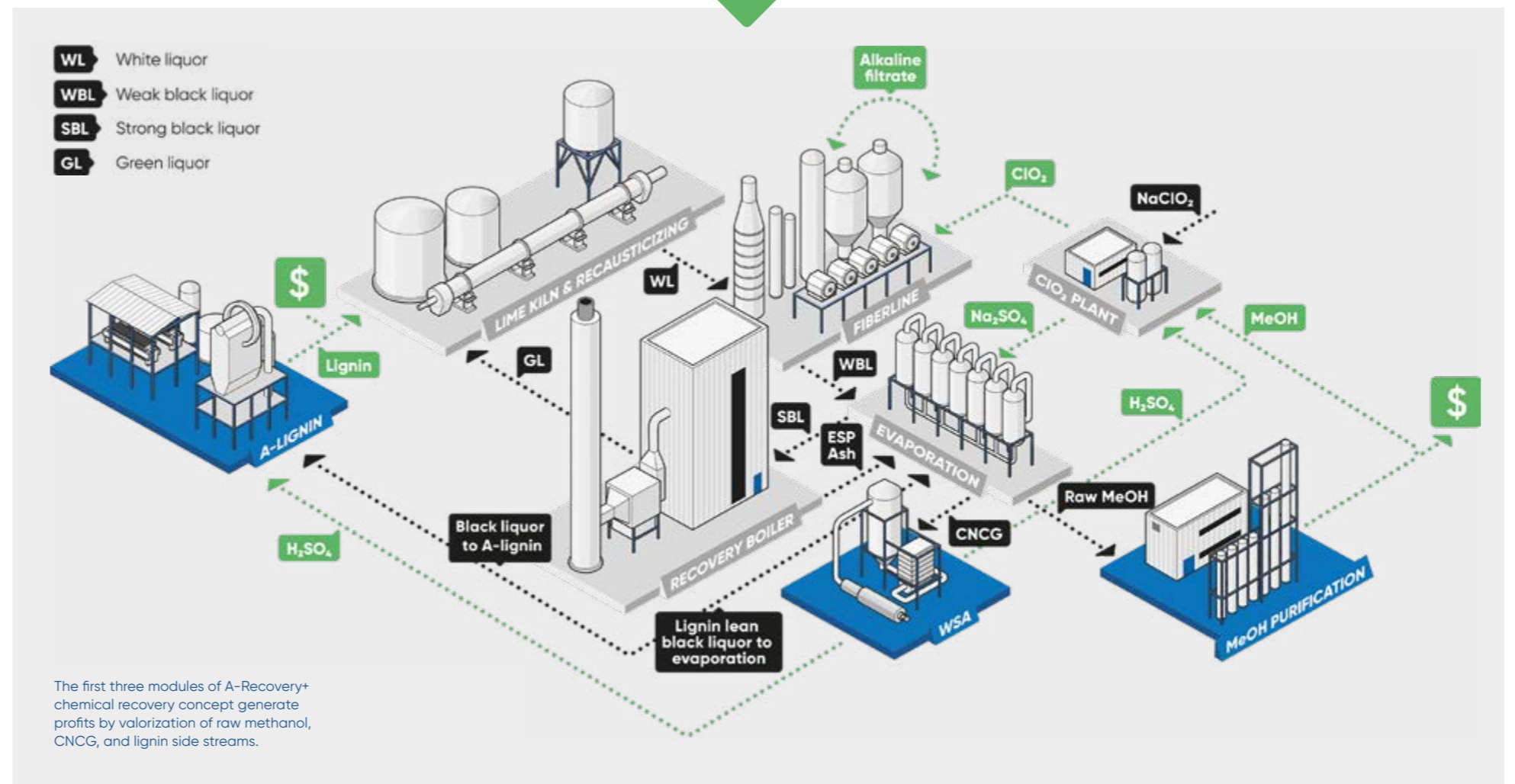
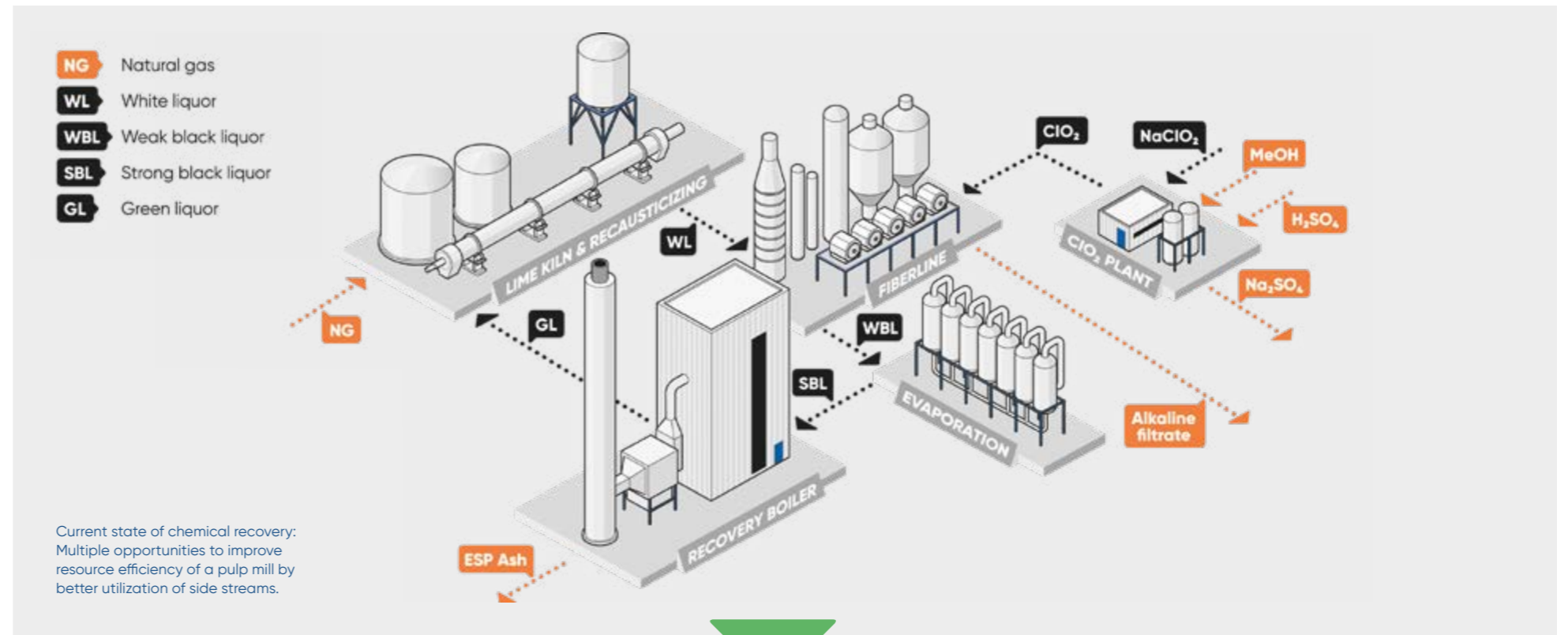
A NEW LIGHT: A-RECOVERY+ CHEMICAL CONCEPT

The A-Recovery+ chemical recovery concept provides environmental solutions for further closure of the chemical recovery loops PLUS commercial solutions for generating revenue and reducing costs.

The first A-Recovery+ modules are for sulfuric acid production, methanol purification, and lignin recovery, but the work continues to identify and unleash all the hidden potential in the kraft mill by utilizing side streams more efficiently.

In total, these interesting and attractive options for next-generation chemical recovery will reduce effluents and water consumption, reduce the need for make-up chemicals, and convert side streams into valuable bioproducts.

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SHREDDING WASTE INTO PROFIT

In modern mill and wood processing plants, adding value all along the production chain has become a "must have". ANDRITZ Universal Shredders provide a vital link in the chain by solving waste wood problems at the same time as turning them into valuable, sellable products.

"We have always been early adopters of new technology here," says Nils Andersson, Production Manager and Chairman of the Board, AB Hilmer Andersson. "It's our ingrained strategy to make the very best of the wood coming in, take out the most value, and to be the cost leaders in the products we produce."

Andersson, a fourth-generation family member related to the original founder, is speaking from the board room of AB Hilmer Andersson, one Sweden's most efficient and profitable sawmills. The company is located close to the Norwegian border, near the small town of Lässerud in the west of the country. The company produces around 200,000 m³ of sawn goods per year for the construction industry, mainly the industrial sector.

A saw milling operation the size of AB Hilmer Andersson obviously creates a lot of wood waste, and the company recently embarked on looking for the very best solution to deal with it, at the same time as looking for ways to add value. This also

coincided with its old solution, a small inefficient and unreliable drum shredder, breaking down completely. "When you are producing as much sawn timber as we are," continues Andersson, "there is always a lot a waste wood generated due to the offcuts, rejects, or poor-quality logs that come into the site. As we are a lean production facility, we do not have the space to have piles of waste wood lying around.

"We needed a solution that could deal with all different shapes, sizes, and types of wood waste, at the same time as being fast, efficient, and reliable and, most importantly, add value so we could sell any side-stream products on. Another important feature we were looking for was one that would eliminate fire risk; we had problems with fire on numerous occasions with our old drum shredder."

ANDRITZ UNIVERSAL SHREDDER FRP – THE RIGHT FIT

AB Hilmer Andersson already had knowledge of ANDRITZ through its recent acquisition of Franssons, a company that has a long history in the wood processing industry. After looking around at a number of other suppliers, it was decided that the very latest ANDRITZ Universal Shredder FRP would be exactly the right fit for what was needed at the sawmill.

John Fransson, Sales & Product Manager, ANDRITZ Recycling, says, "We listened intently to what the requirements were at AB Hilmer Andersson, and we came to the conclusion that the latest ANDRITZ Universal Shredder FRP technology would be the perfect solution for what the sawmill needed."

The FRP has the very latest in innovative technology from ANDRITZ and has a very high throughput, up to 10-12t/h, even though it is a slow-rotating shredder. The FRP shredder works using 74 knives arranged into two rows. The system will process wood waste from offcuts from the saw mill, shredding it into chips, which are finally used as biomass for heat generation. The single-shaft shredder processes the material in one step to the granulate size of 60 mm and importantly even shreds large logs into manageable pieces.

AB Hilmer Andersson took delivery of the ANDRITZ Universal Shredder FRP late last year, and so far the results are very positive. Andersson says, "When we were looking around for a new solution, we automatically thought we should just go for a bigger drum chipper, but we were also discussing that we needed a solution for all types of

"The FRP is perfect for all our waste; the offcuts come in via a conveyor, and any other waste around the mill can be dropped into the shredder by forklift truck."

NILS ANDERSSON
Production Manager,
Chairman of the Board,
AB Hilmer Andersson



wood waste from the site, offcuts from the sawmill, yes, but there are a lot of other kinds of waste around the site, breakages, rejected logs, broken pallets.

"The FRP is perfect for all our waste; the offcuts from the sawmill come in via a conveyor, and any other waste around the mill can be picked up by forklift truck and dropped into the shredder from above. Also, the built quality is so robust that we don't have to worry about the odd stone or pieces of metal as the shredder is designed to cope with all sorts of different, hard, or tough materials. It also has an extremely quiet operation, even when running at full capacity."

Fransson concludes, "ANDRITZ Recycling is a specialist in reject treatment in the pulp

and paper industry, and the ANDRITZ Universal Shredder FRP is a prime example of how mills can deal with the problem of waste wood, bark, or rejected logs from all around the mill or woodyard, at the same time as finding another valuable side-stream from the production process."

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Nils Andersson, Production Manager and Chairman of the Board at AB Hilmer Andersson, and John Fransson, Sales and Product Manager, Recycling, at ANDRITZ, in front of the ANDRITZ Universal Shredder FRP



Small footprint, high throughput; the FRP is built to last for many years of heavy-duty operation, and due to its slow rotation and innovative shredding technology, it very quiet when operating.



New Orders

Cartiere del Polesine S.p.A., Rovigo, Italy
Stock preparation system including reject treatment

Celulosa Arauco, Hércules, Chile
Stand-alone chloride removal system (MVR-ARC)

Dezhou Taiding New Material Science And Technology Co., Ltd., Shandong, China
Basic engineering, erection, commissioning, and start-up supervisory for the main equipment of a new P-RC APMP system

Eldorado, Onça Pintada, Três Lagoas, Brazil
Biomass handling system

Georgia Pacific, Alabama Mill, USA
Baling line

Hamburger Rieger GmbH, Spremberg, Germany
3 PMA systems for new greenfield PM2 that produces test liner and white top test liner

JSC Ilim Group, Ust-Ilimsk, Russia
Cooking upgrade, drying machine rebuild and recausticizing plant modernization for Line 2

JSC Ilim Group, Koryazhma, Russia
Wood processing plant with two debarking and chipping lines, chip and bark handling equipment, SmartWoodyard advanced control system, and two LimeDry lime mud filters for the recausticizing plant

Klabin, Ortigueira, Brazil
Complete wood processing plant, complete white liquor plant, HERB recovery boiler, EcoFluid Bubbling Fluidized Bed (BFB) boiler, on EPC basis

The Navigator Company, S.A. Group, Cacia Mill, Portugal
Pulp Drying Line TM4 upgrade

Toyo Engineering Corporation, Takaoka (Toyama), Japan
PowerFluid Circulating Fluidized Bed (CFB) boiler with flue gas cleaning system for a new biomass power plant

United Pulp and Paper Co., Inc., Metro Manila, Philippines
OCC line including detail engineering

Vattenfall, Uppsala, Sweden
Biomass boiler plant with fuel handling system

WestRock Group, Três Barras, Santa Catarina, Brazil
Wood processing plant

Xuan Mai Paper Co., Ltd. Vietnam, Ho Chi Minh City, Vietnam
PrimeLineECO tissue machine with two stock preparation lines, approach flow system, fiber recovery and broke handling

Project Start-ups

Chung Hwa Pulp Corporation, Hualien Mill, Taiwan
Wet lap plant

OJSC Mariysky CBK, Volzhsk, Mariy El Republic, Russia
Sack paper high-consistency refining system

Sappi Southern Africa (Pty) Ltd; Saiccor Mill, South Africa
New baling line

Shandong Tianxing, Shandong, China
P-RC APMP system

Zellstoff Pöls AG, Pöls, Austria
Vertical Screw Thickener (VST)

New dewatering technology started up at Zellstoff Pöls, Austria

ANDRITZ has successfully started up the latest innovation in dewatering – the Vertical Screw Thickener (VST) – at Zellstoff Pöls AG, Austria. The VST has been operating successfully since the beginning of December 2018 and supplying the existing MG paper production line PM2 with the maximum capacity of 360 t/d.

The pioneering Vertical Screw Thickener is a screw press with a vertical configuration and a very small footprint, making it suitable for retrofit installations in existing buildings. The pulp suspension is fed into the top of the machine, and its downward transport is gravity-assisted. At Zellstoff Pöls, the VST is located just before the finished pulp storage tank that feeds the paper production line and thus enables separation of the pulp mill and paper machine water loops. The VST dewateres the pulp suspension from 3% inlet to 25-30% outlet consistency, and the water removed is recycled and re-used in the pulp mill. The ability to dewater from low-consistency inlet to high-consistency discharge is an important advantage compared to conventional dewatering equipment: Paper machine water is added to the dilution conveyor after the VST. Separation of the water loops results in savings in paper additives (e.g. sizing agent) at the paper machine. The VST replaces an existing gravity table at Zellstoff Pöls and feeds the MG paper production line for PM2.



ANDRITZ to supply major pulp production technologies and key process equipment for Klabin's pulp mill in Brazil

International technology group ANDRITZ has received an order from Klabin to supply energy-efficient and environmentally friendly pulp production technologies and key process equipment for Klabin's "Puma II" project in Ortigueira, Paraná, Brazil. The order value for ANDRITZ is in the range of approx. 190 million euros. Start-up has been scheduled in the second quarter of 2021.

This order once again confirms the excellent business relationship between ANDRITZ and Klabin. ANDRITZ also supplied major technologies and process equipment for Klabin's pulp mill in Ortigueira (Puma Unit), which was started up successfully in 2016.

For Puma II, the ANDRITZ scope of supply includes the following equipment, to be supplied on full EPC (Engineering, Procurement, Construction) basis:

- A complete Wood Processing Plant using the same proven technology as the existing ANDRITZ woodyard for the Puma Unit line; including two eucalyptus debarking and chipping lines, chip storage with 360° stacker-reclaimer, chip screening, bark handling with ANDRITZ BioCrushers, bark storage, and a receiving system for purchased biomass to be fed to the new power boiler. Each debarking line can process both eucalyptus and pine with world record capacities (pine/euca 400/350 m³ sob/h) and consists of an ANDRITZ debarking drum, which provides excellent debarking results with very low wood losses, and the unique, horizontally fed HHQ-Chipper (EXL model), ensuring high capacity without compromising on chip quality.
- An ANDRITZ HERB Recovery Boiler for a combustion capacity of 3,300 tds/d with high steam parameters of 103 bar(a) and 502°C to maximize power generation. The HERB recovery boiler features energy-efficient recovery of cooling gases and feed water preheating technology to maximize steam production for power generation. It is designed for long operating periods without having to be washed out with water. ANDRITZ's delivery includes state-of-the-art sootblowing control technology. Optimum sootblowing results are controlled by ANDRITZ's latest technology innovations: the Hanging Heat-Transfer Surface Weight Indicator (HEWI) and the sootblowing Advanced Control Expert (ACE).
- A complete White Liquor Plant, consisting of the same technology as the mill's existing ANDRITZ white liquor plant in the Puma Unit. The new recausticizing plant (5,000 m³/d capacity) includes efficient green liquor filtration with LimeGreen filters – producing clean green liquor and minimizing waste to landfill, white liquor filtration with a LimeWhite filter – maximizing the white liquor quality, and efficient lime mud

filtration with a LimeDry filter – ensuring high lime mud dryness, which results in low heat consumption in the kiln. The LimeKiln has a multifuel burner and capacity of 450 t/d.

- A Power Boiler based on ANDRITZ EcoFluid Bubbling Fluidized Bed (BFB) technology. The scope of supply includes a biomass-fired boiler with flue gas cleaning and other auxiliary equipment. The new Power Boiler is combined with the Recovery Boiler to form a "Boiler Island", and some of the auxiliary equipment is shared between the two boilers. This provides savings in both investment and operating costs. The capacity of the boiler is 220 t/h of superheated steam, which is brought to a steam turbine shared with the Recovery Boiler. The fuels used are bark and wood rejects from the mill.

The ANDRITZ order also includes some items for the existing Puma Unit pulp line:

- Wood Processing Plant rebuild to increase capacities in the 360° stacker-reclaimers and conveyors, and
- Preparation for the eucalyptus and pine cooking feeding systems, addition of a first stage for oxygen delignification and an ANDRITZ Stirox white liquor oxidation for the eucalyptus line.



A The white liquor plant delivered by ANDRITZ in 2016 for Klabin's pulp mill in Ortigueira, Paraná, Brazil, has one of the world's largest recausticizing plants, with 16,000 m³ white liquor production daily.

B In 2016, ANDRITZ delivered the Wood Processing Plant with four debarking and chipping lines, each having world record capacities (pine/euca 400/350 m³ sob/h) when started up in 2016.

DID YOU KNOW THAT...

... ANDRITZ SET UP AN ONLINE SPARE PARTS CATALOGUE FOR PULP MILLS?

The first customer pilots of the Metris Spare Parts Catalog in selected pulp mills in South America and Europe are starting in Q3 2019. With its user-friendly interface, the search and inquiry process can be handled very easily and guarantees fast access to the correct spare parts, providing optimum performance, reliability, and a long product lifecycle. We are able to respond to customers' requests much faster, more efficiently, and in a way that is transparent for all concerned.



For more information, please contact:
PULPANDPAPER-SERVICES@ANDRITZ.COM

... ANDRITZ CAN DO COMPARATIVE DISC FILTER TESTS AT YOUR MILL?



The ANDRITZ Leaf Tester™ – a measurement and simulation device – can help determine the improvement potential of your disc filter based on stock samples collected directly at your machine during everyday operation. In these test runs, various disc filter sector types, bag fabrics, and process parameters can be compared. The ANDRITZ Leaf Tester can be used in both thickening and save-all applications.

Get more information at:
ANDRITZ.COM/DISC-FILTER-SERVICE

... ANDRITZ PULP DRYING LINE AT ALTRI CELBI ACHIEVED ONCE AGAIN GROUNDBREAKING PRODUCTION WORLD RECORD?

Celbi was started up successfully after extensive reconstruction in 2015 and has achieved several production records since then. On March 23, 2019, Portuguese pulp producer Celbi set an outstanding production world record of 2,456 admt/d at its Leirosa mill, Portugal. In terms of specific drying capacity, Celbi thus achieved 503.3 tons per day and meter of working width on the ANDRITZ drying plant of 4.88 meters sheet width.



Get more information at:
ANDRITZ.COM/CELBI-RECORD

