



# SPECTRUM

## A WEEK IN THE LIFE OF ...

Berry Wiersum, Sappi // 22

## A WORLD-CLASS RECOVERY

Zellstoff Pöls // 34

## TECH TALK LIGNIN RECOVERY

ANDRITZ technology // 48

# THE ICING ON THE

# CAKE

Stockholm's Environmental Masterpiece // 14

**ANDRITZ**



# CONTENTS

- |    |   |    |  |
|----|---|----|--|
| 05 | Management message  | 34 | A world class recovery // Zellstoff Pöls     |
| 06 | News  | 40 | Global tissue trends // Market Trends        |
| 08 | A voyage of discovery // Celbi                                | 42 | Removing the black box // ANDRITZ Automation |
| 12 | Fiber Boost // Performance Boosters                           | 43 | Jimmy Onstead // Expert Interview            |
| 14 | The icing on the cake // Värtaverket Fortum Värme             | 46 | Paper coating technology // Tech Talk        |
| 20 | PrimePress XT Evo shoe press // Key Equipment                 | 48 | Lignin Recovery // Tech Talk                 |
| 22 | A week in the life of ... // Berry Wiersum, CEO, Sappi Europe | 50 | Leipa's Mission // Leipa                     |
| 28 | Making it all add up // FS Karton Neuss                       | 53 | Orders and Start up's                        |
| 32 | ANDRITZ neXline wetlace // Akinal Sentetik Tekstil            | 54 | Did you know that ...                        |

Coverstory // 14

# THE ICING ON THE CAKE

The locals call it the "Wedding Cake" due to its multi-tiered form sitting quietly and unobtrusively along the cityscape of Stockholm.







# METRIS

## MAKING THE FUTURE VISIBLE



Joachim Schönbeck, Member of the Executive Board, Capital Systems.



Humbert Köfler, Member of the Executive Board, Service & Units.

How do you go about future-proofing your mills and plants so that you, your teams, and vital equipment are prepared for any eventuality that may come your way? **WITH METRIS YOU CAN.**

Wouldn't it be a fantastic asset to be able to see into the future so that you can identify possible problems in advance, helping you to steer clear of potential breakdowns, reduce downtime, save energy, and avoid expensive equipment failures? **WITH METRIS YOU CAN.**

Imagine having real-time reporting, displaying exactly what you need to know about all your production scenarios – where you are winning and where you are losing, reports on energy and raw material usage, time taken, time lost – allowing you to measure, and therefore manage, your whole production process from the digital device of your choice. **WITH METRIS YOU CAN.**

All of the above are possible and achievable for mills and plants through ANDRITZ's new digital technology brand Metris, which has been rolled out as the digital era matures across all manufacturing industries. Metris products and systems will offer the ability to "Foresee Digitally" – an expression of the immense possibilities that a networked digital world promises: to make the future calculable and self-corrective, and to enable proactive action through the analysis of data.

This concept of a mill that has smart sensors gathering real-time data from networked machines is not a futuristic vision for ANDRITZ, it's already existing technology and represents an ongoing evolution. We have been involved in these types of activities for some time through our Optimization of Process Performance (OPP), which detects any anomalies and deviations in pulp and paper production at an early stage by analyzing the captured data. What is new is bringing together all the systems and offerings ANDRITZ has been developing and perfecting and encompassing the three core industrial IoT technologies of Metris: Smart Sensors, Big Data Analysis, and Augmented Reality.

Ultimately, what Metris offers is meeting the expectations of mills and plants by increasing profitability through improving performance; reducing chemical, energy, and raw material usage; and achieving consistent product quality – all prerequisites for successful industrial operations in the modern age. Metris will encompass all of ANDRITZ GROUP's industrial IoT solutions and is available for applications both on new and existing machines and systems.

We hope you enjoy this issue of SPECTRUM as we continue to embrace the digital era and march into the future!

Sincerely,

Joachim Schönbeck

Humbert Köfler

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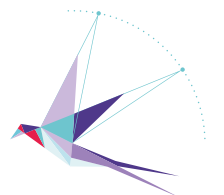
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**On the cover:** The icing on the cake (page 14)

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**Metris**  
Industrial IoT Solutions



# NEWS

## FRANSSONS RECYCLING MACHINES now part of ANDRITZ portfolio



The technology and intellectual property assets of a Swedish pioneer in shredding and recycling machinery – Franssons Recycling Machines AB – have been acquired by ANDRITZ. Franssons, located in Sundsvall, Sweden, has been supplying industrial shredding and recycling technologies for handling waste, wood, biomass, plastic, paper, and board for 70 years, with many references around the globe.

The proven products and solutions of Franssons are now part of ANDRITZ's Recycling product group (part of the Pulp and Fiber Systems Division of ANDRITZ PULP & PAPER) and complement ANDRITZ's other offerings in recycling – extending from recycling refrigerators and electronic waste, to processing rejects for the pulp and paper industry.

More information about the ANDRITZ Recycling product group can be found at: [www.andritz.com/recycling](http://www.andritz.com/recycling)

## METRIS – Industrial IoT Solutions

Digitalization is all around us. We are currently in the midst of the fourth industrial revolution: the “Industrial Internet of Things”, in short “Industrial IoT”. It is fundamentally changing our way of producing goods and will have an increasingly decisive effect on the competitiveness of companies.

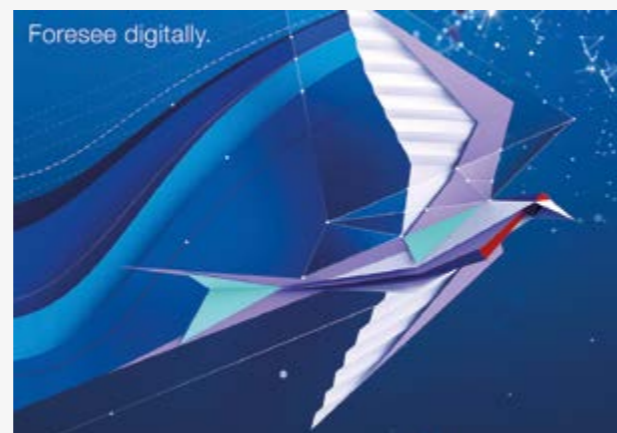
ANDRITZ has combined its innovative IoT solutions, which is field-proven in many reference plants, with immediate effect under the technology brand “Metris – Industrial IoT Solutions”. Metris is based on the three technological pillars:

- Smart Sensors
- Big Data
- Augmented Reality

The brand name Metris is a play on words composed of the words Metis – which in mythology stands for practical, complex tacit knowledge – and Matrix, i.e. the arrangement of figures in a cybernetic sense for the control of machines.

### SUBSTANTIAL CUSTOMER BENEFITS

Over 10 years ago, ANDRITZ developed OPP (Optimization of Process Performance) – a system to optimize equipment and



plants in the pulp & paper industry. Metris transfers the gained knowledge into real benefits for customers:

- Enhancing plant efficiency and profitability
- Optimizing the use of resources
- Constant and highest product quality
- Avoiding production downtime
- Maximum user-friendliness, for example easy control via smartphone or tablet PC

Foresee digitally – with Metris, to make the future calculable and to enable proactive action through the analysis of data.

Find out more about Metris at: [www.andritz.com/metris](http://www.andritz.com/metris)

## PRODUCING TISSUE GIANTS – made of steel

ANDRITZ successfully completed the manufacturing of two giant steel Yankees for tissue production. The Yankee (20 ft diameter) for Guizhou Chitianhua was manufactured directly at the ANDRITZ workshop in China; the world's largest steel Yankee for tissue for Carta Fabril, Brazil with a diameter of 22 ft and a shell length of more than 6m was manufactured in Europe. Engineering and manufacturing are based on worldwide unique concepts. These giants enable safe and energy-efficient production of high-quality tissue.

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## FROM WOOD TO FINISHED BOARD – ANDRITZ to deliver complete FBB line to KAMA Karton in Russia

ANDRITZ will deliver a new wood processing line, BCTMP plant (395 admt/d), and stock preparation line in front of a completely new ANDRITZ folding boxboard production line for KAMA Karton in Krasnokamsk, Perm Region, Russia.

The scope of supply will include a new wood processing line for aspen, which will be added to complement an existing ANDRITZ woodyard for birch at the mill, an ANDRITZ P-RC APMP mechanical pulping line for processing birch, and a complete stock preparation

system with broke handling and fiber recovery as well as approach flow system. The board machine, designed to produce 220,000 t/y with a basis weight range of 200-350 gsm, will have three PrimeForm Fourdrinier layers - one containing a PrimeForm HB hybrid former. Design speed is 800 m/min. The entire line will be equipped with an ANDRITZ PrimeControl system. ANDRITZ will also deliver the Motor Control Center and an advanced Multi Motor Drive system to ensure reduced energy consumption.



## ANDRITZ acquires PAPERCHINE, USA

ANDRITZ has signed a contract for the acquisition of Paperchine, Inc., owned by AstenJohnson Holdings Ltd. The acquisition – now ANDRITZ Paperchine – brings added products and papermaking experts to the ANDRITZ team, giving expanded capabilities at paper mills. Papermakers will benefit from an enhanced range of engineered solutions including Paperchine's horizontal GapFormer, wet end drainage, forming, and VIB moisture profiling systems. ANDRITZ has also strengthened its engineering and diagnostic services with the tools and knowledge Paperchine experts bring.



# A VOYAGE OF DISCOVERY

## Partnering for success

There are a lot of boundaries being pushed at Altri's Celbi eucalyptus pulp mill in Portugal. The company firmly believes in maximizing its production assets to the hilt, often going where no others dare. ANDRITZ has been a reliable partner in Celbi's remarkable transformation over recent years, which has seen it become a world leader in efficient pulp making.

Portugal is world famous for its early explorers, those brave men who set out in the 14<sup>th</sup> and 15<sup>th</sup> centuries to cross the oceans of the world with no idea of what they might find over the horizon.

Fast forward to the 21<sup>st</sup> century, and far flung places are all pretty much discovered; however the Portuguese spirit of adventure – and the ability to push the boundaries of discovery – are still very much alive – particularly at some of the pulp mills in the country. Altri's Celbi mill is a classic example of this continuing spirit.

### A SUM OF IMPROVING PARTS

About two hours drive north of Lisbon, the Celbi mill is not old by European standards. Being built in the 1960s, it has had a colourful past of ownership, including Billerud and Stora

Enso. In 2005, Stora Enso divested the mill and it was bought by the Altri Group and became its first foray into the world of pulp. "This was great news for the morale at the mill," says João Gaspar Rebola, Production Manager at Celbi. "It meant that finally we got the attention and investment that the mill was crying out for."

At the time of the acquisition by Altri, the mill was producing some 300,000 tons of pulp per year, and it quickly became company strategy to double that quantity. In 2009, transformation of the mill began with a wave of projects, starting with "Project C09", a complete rebuild of the drying machine in its existing building (see SPECTRUM 19/1-2009, Raising the Roof). This was a spectacular project that saw a huge capacity increase at the mill with a shutdown lasting only four weeks.

After the initial start-up of the drying machine, production at Celbi leapt from 900 t/d to 1,815 t/d (540,000 t/y).

"This was our first major, successful project working with ANDRITZ," says Rebola. "And we quickly became aware that we were working with a company that was not frightened to partner with us on our ambitious journey."

In the case of the dryer, ANDRITZ had made sure that there was the possibility of a further capacity increase in the future; a second improvement took place in 2015 that included a headbox upgrade and a second shoe press, which allowed capacity to increase further to a 2,320 t/d (700,000 t/y).



The Monument to the Discoveries, Lisbon, honouring famous Portuguese explorers including Bartolomeu Dias, Vasco de Gama, Magellan and Cabral - adventurers who first discovered such places as The Cape of Good Hope, India, Japan, and Brazil.



That ambitious journey, and the Celbi - ANDRITZ partnership, has continued with fervour. "Since the start-up and maximization of the dryer's efficiency, we have set about looking at every area of the mill, not just solving bottlenecks, but finding all the areas where we can make a difference to production in both quality and quantity," says Rebola. "The sum of all those different, improving parts has allowed us to increase production figures across the board at the mill."

Serra Braz, Project Manager at Celbi says, "We rarely have a piece of equipment at this mill that is not pushed beyond its limits. I have worked on a number of projects with ANDRITZ here, and whilst the first trial is not 'always there' the results just get better and better."

The improvements at Celbi are working well judging by the results; the mill holds the record for air-dried metric tons per day (ADMT) per meter of working width at 475 t/d on the 4.88 m wide sheet dryer.

**INCREASING THE YIELD – A MAJOR CHALLENGE**

One of the recent additions to further improve and enhance production at the mill was a fiberline technology upgrade to the digester in 2015, which is now in its optimization phase. Once again Celbi chose ANDRITZ, this time for its Lo-Solids cooking solution, which has seen a lot of success at Latin American mills. The key objective of Lo-Solids cooking is to minimize dissolved organics concentration through the bulk phase delignification while

maintaining an even alkali profile, low cooking temperatures and low dissolved lignin concentrations at the end of the cook. The resulting advantages of Lo-Solids technology are increased pulp strength, decreased cooking and bleaching chemical requirements, and a significant improvement in overall operation.

The scope of supply for the cooking modernization at Celbi included a TurboFeed chip feeding system with Diamondback chip silo, chip metering screw, chip pumps, and vapour reboiler for the heat recovery.

Rebola says: "We wanted to increase the yield as well as the production at Celbi to continue with our holistic approach to our pulp production. ANDRITZ really helped us with its knowledge of production at some of the largest and most modern and efficient mills in Latin America."

"As well as the added benefits that the Lo-Solids cooking process has given us, including the stabilization of the quality of pulp, we have also noticed a major reduction in the amount of energy we use which means we can export more to the national grid. This is a big thing for Altri."

The digester and fiberline upgrade has made another real difference to production at Celbi; however, it was not all plain sailing on this particular Voyage of Discovery – there were major difficulties at first when introducing new technology into the existing space. Carlos Van Zeller, Mill Director and Member of the

"We wanted to increase the yield as well as the production at Celbi to continue with our holistic approach to our pulp production."

**JOÃO REBOLA**  
Production Manager, Celbi



"We rarely have a piece of equipment at this mill that is not pushed beyond its limits."

**SERRA BRAZ**  
Project Manager, Celbi

Board at Celbi, explains, "If you asked me whether the upgraded digester worked perfectly from day one, I would have to be honest and say 'no'; in fact we had a huge amount of problems to begin with. But this is why we like working with ANDRITZ; we throw its managers and engineers ambitious, sometimes outrageous demands, and they come back with ideas and plans, and then ultimately together we get results. The company really does live up to its slogan: We accept the challenge!"

Jorma Olkkonen, Senior Project Manager, Fiber Technologies at ANDRITZ, explains, "This upgrade presented several challenges on the engineering front to bring together existing processes and merge them with a new mode of operation and equipment. The shutdown period is, of course, always short and brings additional challenges to the

project. But with the forward looking attitude of both the Celbi and ANDRITZ teams, those challenges were tackled and the plant started up according to schedule."

"Now we have entered a phase where both Celbi and ANDRITZ co-operate together to find solutions to upgrade the plant to an even higher level."

**THE VOYAGE INTO THE FUTURE CONTINUES**

There is a mutual respect and regard that runs through the Celbi - ANDRITZ relationship, which continues to flourish into productive activity. The next project between the two companies will start up in October this year - this time a new ANDRITZ supplied DD-Washer, part of the upgrade of the mill's brown stock washing process. This upgrade

will substantially improve the washing efficiency, as well as increase the capacity of the fiberline.

Of the decision to install the DD-Washer, Vitor Lucas, Process Development Manager at Celbi, says, "We carried out a lot of comparisons in washing technology before we decided to go ahead with the DD-Washer. Historically, we have always had presses at this mill, but having looked at references around the industry, including mills in Brazil, we are confident that the DD-Washer will deliver on our expectations and stabilize production even further. Actually, we are quite excited about it!"

And how about ongoing production and maintenance, how have the two teams of Celbi and ANDRITZ been cooperating for

continued success going forward? Paulo Jordão, Industrial Maintenance Manager at Celbi, says, "ANDRITZ has been instrumental in assisting us with our long-term ambitions. We always set a high bar, and ANDRITZ continues to jump over it with us – joining us in the risk, and of course the successes, as together we keep improving on the initial installations and the next production achievements."

Van Zeller concludes, "At Celbi, we don't want to be the biggest pulp supplier in the world; however, we do want to be the most efficient and the most competitive. And we have proved that we can be.

ANDRITZ has been a dedicated and reliable partner along the way."

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(L to R): Henrique Costa, Fiberline Operation Manager, Celbi; Vitor Lucas, Process Development Manager, Celbi; Paulo Jordão, Industrial Maintenance Manager, Celbi; João Gaspar Rebola, Production Manager, Celbi; Werner Rechberger, Director Sales Pulp Mill Systems and Pulp Drying, ANDRITZ.



ANDRITZ supplied the latest technology for the digester and chip feeding system at Celbi.

# TIME TO GIVE YOUR MILL A FIBER BOOST?

All the equipment is in place and up and running at your mill. You and your team have worked hard to maximize raw material supply chains and you have solved all the obvious production bottlenecks on the fiberline that have been holding back your mill performance. Your mill, you believe, is pretty much running at maximum efficiency. So now it's time to sit back and relax....

Absolutely not! Now is the time to boost performance, to take what is already working quite well and fine tune it to the max – to get the best production possible out of the existing equipment installed – to go the extra mile, to where the real, recognized success of a mill is: when the cost curve is going down and the production curve is going up.

### Performance Booster – because numbers matter

The world of pulp making is highly demanding and challenging – to be successful, a mill has to be a cost leader and existing equipment capacity must be maximized. The alternative, of course, is to invest in newer, better-performing and more efficient technology – which could be expensive – but it doesn't have to be.

There has been a lot of work going on at ANDRITZ in R&D on specific individual elements of the fiberline. Now, significant savings can be made from new technology and developments that have taken place in the cooking, oxygen delignification, and bleaching stages – and most importantly, they are not expensive to implement as they can easily be added to an existing fiberline.

A surprising amount can be done with a mill's existing fiberline equipment with a *Fiber Boost* program. But to start, imagine what effect significantly lower shives (with improved screening efficiency), lower energy consumption, better runnability, and minimal good fiber losses would have on the bottom line at your mill?

12 FIBER BOOST SYSTEMS SOLD AND OPERATING!

### FIBER BOOST CASE STUDY I SOFTWOOD SULPHATE PULP

**Problem:**  
Final pulp quality was being significantly affected by shives and bark.

**Action:**  
At this mill, the reject handling system was upgraded with the installation of a new shive cleaner to remove a culmination of small shives and bark particles. Pressure screens were upgraded with the latest ANDRITZ rotors and new screen baskets with narrow slots sizes.

**Results:**  
Final product quality has improved dramatically. Before the *Fiber Boost* upgrade, only 6-34% of production was prime quality; most of this was defective because of shives and bark. After the upgrade, over 90% of production was measured as prime and there were no declassifications made because of shives. Thanks to better screening results, the mill has been able to optimize other processes, just one of those being the cooking kappa which has been increased from 26 to 31.

### FIBER BOOST CASE STUDY II EUCALYPTUS PULP

**Problem:**  
Again, shives were affecting quality, and the mill was over-bleaching to mask the presence of shives.

**Action:**  
Once again, the reject handling system was upgraded, with the installation of a new shive cleaner to remove both shives and bark. Pressure screens were upgraded with the latest ANDRITZ rotors and new screen baskets with narrow slots.

**Results:**  
Oxygen delignification oxygen consumption reduced by 10%. Bleaching stages were optimized resulting in the pulp brightness set-point decreasing from 90.5 to 89.5 and chlorine dioxide consumption went down 10%, and after tuning of the hydrogen peroxide dosage and reduced absorption of organic chlorine in the effluent, there was total chemical savings of 1 EUR/t.

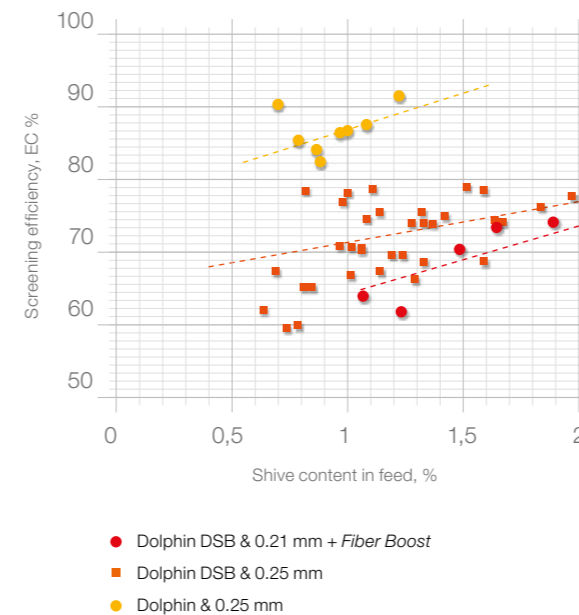
### FIBER BOOST CASE STUDY III SOFTWOOD AND HARDWOOD PULP

**Problem:**  
High losses of good fiber were occurring in the reject handling system due to poor operation that was causing overloading of the evaporation plant.

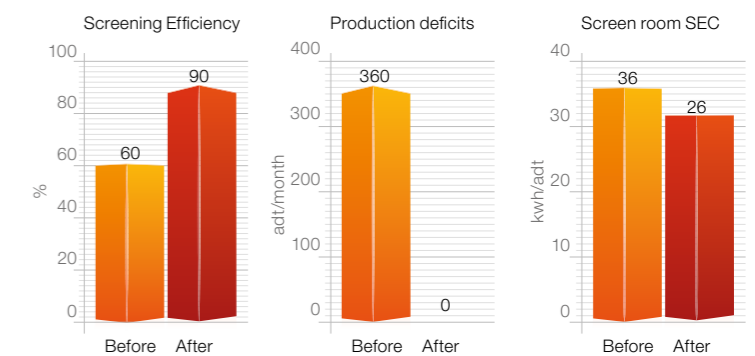
**Action:**  
The screen room reject handling system was upgraded with a new reject washer, sand removal cleaners, and a reject shive cleaner for removing small shives and bark particles.

**Results:**  
Good fiber loss was reduced by 1,400 adt annually. Also, due to the modernization, evaporation plant overloading from washing bypassing was reduced by 7 l/s and the mill has been able to increase production. Screen room wear has also been significantly reduced.

### SCREEN ROOM OPTIMIZATION RESULTS



### SAVINGS SUMMARY (BEFORE VS AFTER FIBER BOOST)



Saving from screen room area	7.8 EUR/t
Additional Saving from Fiberline process	3.6 EUR/t
<b>Total Saving</b>	<b>5.4 EUR/t</b>
Annual Production	650,000 t/a
<b>Annual Savings</b>	<b>3.5 MEUR/a</b>



# THE ICING ON THE CAKE

## Stockholm's Environmental Masterpiece

One of the world's largest biomass projects has recently started up right in the centre of Sweden's capital, Stockholm, helping it on its way to become Europe's most environmentally friendly city. ANDRITZ played a major role in creating Fortum Värme's showcase Värtaverket biomass CHP plant.

The locals call it the "Wedding Cake" due to its multi-tiered form sitting quietly and unobtrusively along the cityscape of Stockholm. Carefully built around three protected ancient oak trees, the uniquely impressive design of the boiler house at the Värtaverket site was recently shortlisted in two categories at the prestigious global MIPIM architectural awards.

While certainly impressive on the outside, this terracotta clad masterpiece of design also holds something truly remarkable within – one of the world's largest biomass boilers, which, along with some of the most modern technology available, ranks it among the most productive and efficient facilities to be found anywhere today.

And this growing city certainly needs a large, efficient, and productive boiler; Scandinavia in the winter can be a very cold place and Stockholm's 1.5 million residents need full on, 100% reliable district heating to enable them to live and work in the city. The new biomass CHP plant at Värtaverket will play its part by delivering heating to some 190,000 households, as well as generating valuable green electricity that goes into the national grid.

### AIR QUALITY – A BIG ISSUE IN STOCKHOLM

What is even more impressive is that the new plant is fuelled entirely by biomass, which comes in chip form from all over Sweden and further around the Baltic region. The chips are fed into the boiler from a dedicated railhead and harbor via a complex subterranean conveyor system down to 40 meters below the sea level through tunnels cut into solid rock. Mats Strömberg, Senior Project Manager for the KVV8 project says, "Not only is this one of the largest biofuel projects in the world, but we have built it in a tight space, right in the heart of the city, with a lot of the main moving parts and supply systems situated way underground."

All of the ash from the plant is transported back through the same tunnels to silos at the harbor through a completely closed loop conveying system.

The authorities in Stockholm have long been working on reducing environmental impact, with clean air becoming an increasingly important issue in the city. District heating through pipes was first introduced to Stockholm in the 1950s, which initially got rid of a lot of emissions into the air from coal fires being used in individual homes. The Värtaverket heating and power plant first started in 1969, and now the distribution grid covers most of central Stockholm's heating needs. The heat distribution grid here has a total length of around 330 km with an average diameter pipe of 261 mm. The system holds approximately 32,200 m<sup>3</sup> of water (40,000 m<sup>3</sup> including the accumulator).

What makes the environmental aspects at Värtaverket even more challenging is that the plant is right next to a residential area as well as very close to Ekoparken, the world's first city national park.

Strömberg says, "The target in this city is to get rid of fossil fuels completely well before 2030. We will do this by building plants such as KVV8, but also using waste-to-heat plants for district heating and generating electricity in other ar-





The conveyor carrying wood chips from the harbor to the boiler.



eas. In fact, Fortum has recently announced that coal plants in the city will be completely closed by 2022.”

Clearly the Värtaverket KVV8 project has become a substantial milestone in the Fortum-Stockholm city strategy of reduced emissions – the new facility has reduced CO<sub>2</sub> emissions by an incredible 126,000 tonnes per year and 650,000 tonnes per year including the impact from the electrical production.

#### GOING UNDERGROUND – THE KVV8 PROJECT

The decision to start the procurement of the biomass plant to supply the city with district heating was made in February 2011, and ANDRITZ experts were called in from the outset due to the long experience the company

has in biomass projects. Strömberg says, “We brought in ANDRITZ and the other large boiler suppliers right from the beginning; we needed to discuss technical solutions and logistics with companies that knew how to place boilers, big boilers, in difficult positions. In the case of the Värtaverket site, we not only had high demands in the capacity of the boiler, we also had major local city planning restrictions when it came to height and space. We needed suppliers who understood how to work with this.”

“To get the capacity we needed, we had to install a very large boiler. That meant height as well as width when it came to capacity. There was no way around it; we had to go underground. To do this, we had to blast through solid rock, build the boiler down to 14 meters below ground and the tunnels

down to 40 meters below sea level – we created a very big hole, all within a stone’s throw of local residents. We also excavated the tunnels underground from the harbor to the plant for the biomass conveyors and in March 2014 we were ready.”

With a total investment of 500 MEUR, ANDRITZ was awarded the contract for the boiler and all automation at the plant in December 2012. Bernhard Haimel, Project Manager for ANDRITZ, explains, “We were delighted and proud to win this order; there was a lot of work involved in the quotation process. Our aim was to convince Fortum that we were the right supplier for the job.”

“This was a unique project in many aspects, particularly the manufacture and installation



“To get the capacity we needed, we had to install a very large boiler. That meant height as well as width when it came to capacity.”

**MATS STRÖMBERG**  
Senior Project Manager, KVV8

of one of the world’s biggest boilers, with a biofuel fed Circulating Fluidized Bed (CFB) and an output of 345 MWth. What was particularly difficult in this case was that we had to fit the boiler into a limited space at the same time as apply the very best technology for efficiency, including the need for fuel feeding via six spouts to ensure even distribution of the biofuels, one of the prerequisites for the lowest possible flue gas emissions.”

ANDRITZ also delivered the flue gas cleaning system. Both, SNCR and high dust SCR technology is used to ensure lowest NO<sub>x</sub> and NH<sub>3</sub> emissions. For primary desulfurization of the flue gases, limestone is injected into the furnace. For dedusting, bag house filter technology is used with the possibility to add bicarbonate upstream the filter.

Another prime element of the boiler supplied by ANDRITZ was the Lxor Bed Material Heat Exchangers, which allow the installed superheaters highly advanced steam parameters of 560°C at 147 bar without the normal corrosion risk.

Being a typically demanding customer, Fortum was seeking the highest possible performance it could obtain. During the sales phase, the company insisted that the demand of the thermal output increased from 300 to a peak load of 345 MWth which was further increased to a peak load of 375 MWth during the project. “Fortum communicated its demands well and clearly, and we knew that if we could meet all those challenges the result would be a plant that is unique in the world,” adds Haimel.

As the contracted suppliers began their work at the plant, communication was absolutely key. Strömberg says, “It is common in Sweden to divide a project such as this into many different contracts and contractors. In this case we had 30 packages, so the coordination of these was a massive undertaking in itself. There were numerous meetings and lots of different, experienced consultants involved working on various aspects of the project. It was quite a task, but there was a really good and open culture of communication that made things continue smoothly when things went wrong or unexpected challenges came along.”

Says Haimel, “Due to the fact there were so many different suppliers and subcontractors, and simply so much equipment – which was

The locals call it the “Wedding Cake” due to its multi-tiered form sitting quietly and unobtrusively along the cityscape of Stockholm.





Overlooking  
central  
Stockholm.



arriving on a just-in-time basis because of limits on space and transport restrictions in the city – we had to think in a very detailed way about the erection sequence and what it would finally look like. One big aid for us at this stage was the use of 3D modelling, which really helped us when it came to situating all the many kilometres of pipework used in the plant.”

#### **AUTOMATION – THE MOST ADVANCED IN EUROPE**

The plant has an extremely high degree of automation, also supplied by ANDRITZ. Haimel explains, “The DCS system at Värtaverket is very sophisticated and one of our most challenging tasks was to integrate the various technological areas into the common control system supplied by ANDRITZ. Now the entire plant can be operated or at least monitored from several control rooms located in different areas of the power station, both in the newly built part as well as in the existing buildings. Safety, availability, and efficiency were the key requirements throughout the design of the electrical and automation system and for the selection of suppliers for this project. Consequent observation of these requirements has resulted in one of the most advanced power boilers in Europe.”

In order to achieve the demanded high level of automation, first class instrumentation was required in the plant. ANDRITZ supplied all the automation, control, and the measuring instruments within its technological scope of supply as well as most of the instrumentation and control in technological areas supplied by Fortum itself.

A further significant part of the scope of delivery was the supply and installation of the electrical power distribution with twelve power transformers, switchgears, and numerous drive systems up to several MWth. ANDRITZ also supplied the uninterruptable power supply (UPS) system for critical components and systems with safe power.

#### **RUNNING AT 100% EFFICIENCY AND BEYOND**

The first firing in the boiler at Värtaverket was in November 2015, with commissioning based on biomass in February 2016, some four years after conception of the ambitious, ground-breaking project. Strömberg says, “We reached what you could say was full commercial production in April 2016. Before that we had to make thousands of safety-related checks as the site is so close to the city. We

had to push the boiler to the absolute limit, and then kick it out, to make sure that all the fail safes we had in place worked, and only then we could think about stable operation.”

Much like catching and using the steam generated from a boiling kettle, the technology at the Värtaverket site has been designed for maximum output, and to use and reuse any steam, heat or power to achieve extra efficiency wherever possible. Strömberg explains, “The boiler has been designed for maximum output, which is largely based on a well-designed combustion process with high efficiency. But there are also added extras, which allow us to maximize efficiency at the plant by reusing heat and steam. For instance, a so-called heat shift system is implemented in the boiler back pass that cools the flue gas temperature further down after the boiler. The system allows flexibility, switching over heat to incoming combustion air and/or condensate water after the turbine condensers.”

Haimel adds, “The heat shifting system also allows for a lot of flexibility in reusing waste heat and ensures lowest boiler outlet temperatures. This increases the efficiency of the boiler

itself by far. Furthermore the boiler has varying needs going from winter to spring and autumn to winter. The ANDRITZ PowerFluid technology for power boilers allows for the boiler to go quickly and smoothly from a maximum load of 345 MWth up to overload operation of 375 MWth and down to 80 MWth allowing for a wide operation range, which is unique for a biomass application of this size.”

And there’s more, Stromberg continues, “The recovery of district heat from flue gas is maximized by combustion air humidification upstream of the boiler and a flue gas condensation downstream of the boiler. While spraying water into the combustion air, the concentration of vapor water in the flue gas is maximized through the boiler. The efficiency of the flue gas condensation after the boiler becomes higher while increasing the condensation effect so that more heat can be recovered. The outgoing flue gas to the stack has a temperature around 40° C. This makes the overall efficiency of the plant very high – and certainly more than 100%.”

#### **THE ICING ON THE CAKE**

On SPECTRUM’s visit to Värtaverket on a cold winter’s day in February 2017, the plant was

Much like catching and using the steam generated from a boiling kettle, the technology at the Värtaverket site has been designed for maximum output, and to use and reuse any steam, heat or power to achieve extra efficiency wherever possible.

Carefully built around three protected ancient oak trees, the uniquely impressive design of the boiler house at the Värtaverket site has recently been shortlisted in a global prestigious design awards.



running very quietly at maximum load in the center of Stockholm, delivering heat to tens of thousands of homes and businesses in the city.

A large ship from Finland was unloading chips by the great crane bucket into the crane hopper on the pier in the harbor, and the conveyors in the tunnels underneath the plant were smoothly delivering biomass at a rate of 416 m<sup>3</sup> per hour (10,000 m<sup>3</sup> per day).

From the outside of the plant, there were barely any emissions to be seen coming from the stack, and what there was, was harmless steam. The completely closed loop emissions system makes sure of that.

And the icing on the cake? “The environmental data from this plant is very, very good,” concludes Strömberg. “The contract we made with ANDRITZ stated that the emissions need to be much lower than government regulations, and they have achieved this and more. The success of the Värtaverket KW8 project means we are a big step on the way to creating a fossil fuel-free city.”

**CONTACT**  
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A hole was  
blasted out of the  
rock to a depth  
of 40 meters.

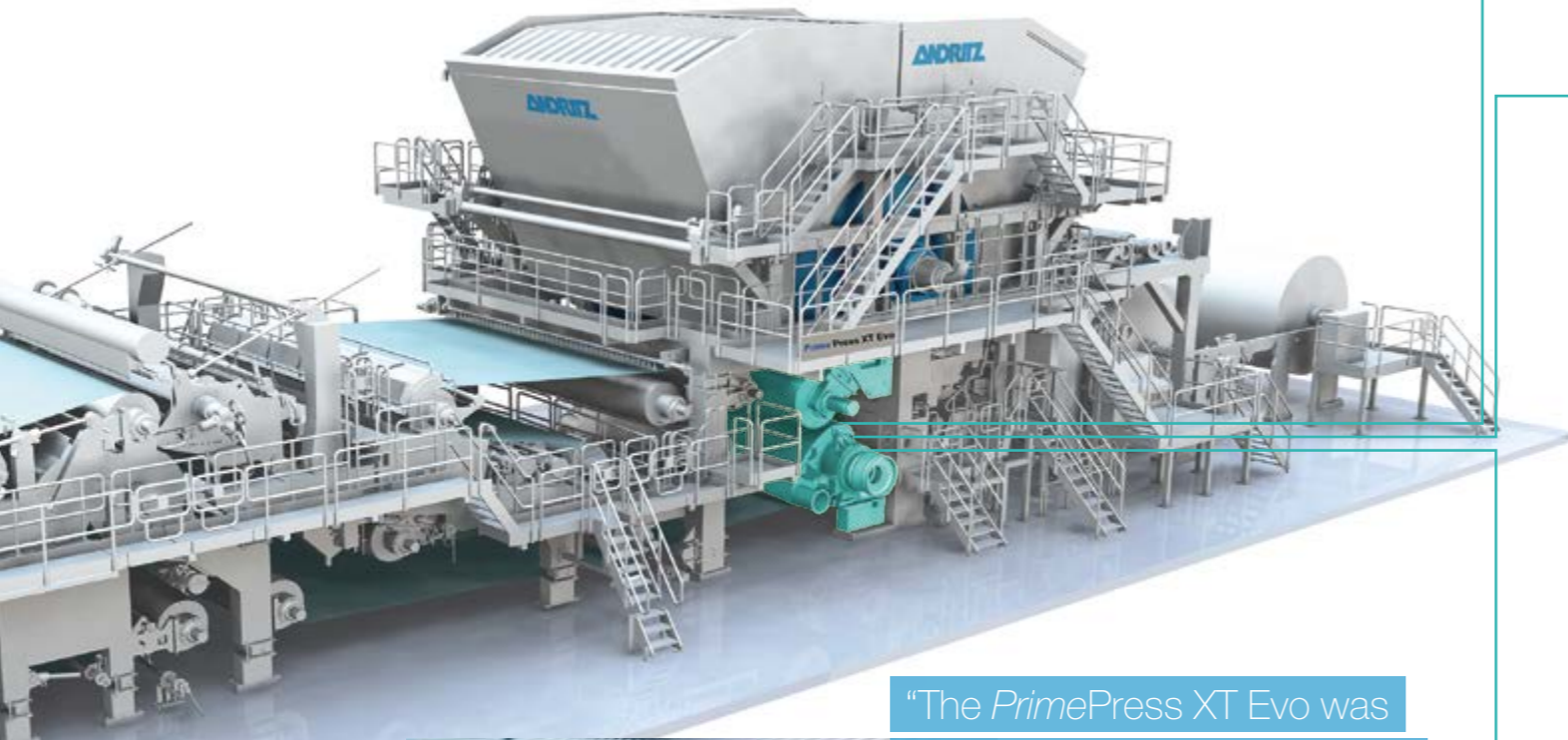


# PrimePress XT Evo SHOE PRESS

This type of shoe press helps tissue makers to achieve remarkable reductions in energy consumption in combination with broad production flexibility (grades and quality) to meet the various different market requirements.

## BENEFITS

- Unique edge control system
- On-the-run nip measurement
- Long felt and belt life time
- Energy savings and improved efficiency



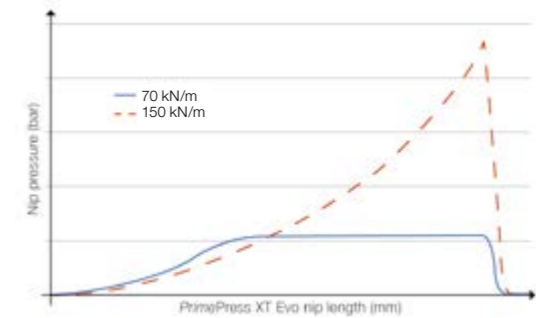
“The PrimePress XT Evo was developed to achieve a higher level of performance while enhancing tissue quality.”

**ANDREAS ANZEL**  
Director Product & Process Management  
ANDRITZ

### OPERATING PRINCIPLE

A thin and flexible shoe in combination with an innovative loading system “follows” the contour of the Yankee shell over the machine width, thus allowing a uniform nip between the shoe press and the Yankee over a wide range of line loads. Due to its flexibility, the shoe is able to adapt to the Yankee, but still has sufficient stiffness to maintain the required nip pressure profiles.

The line load and the pressing profile can be adjusted easily between 70 kN/m and 150 kN/m during operation always achieving an even press load. The pressing profile is monitored online and shown in the control system.

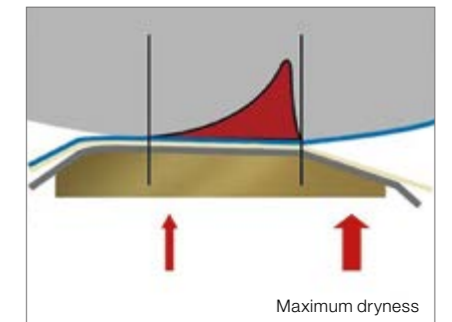
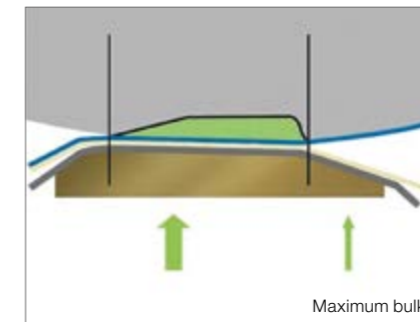
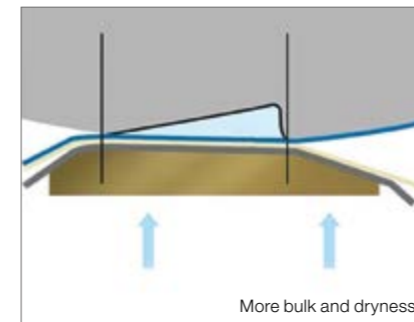


### FROM HIGH DRYNESS TO HIGH BULK

High dryness and high bulk with a single tool – mission impossible? Not with the PrimePress XT Evo. It combines superior tissue quality with effective production because it can be operated in different modes. The bulk operating mode provides a bulkier sheet: lower maximum nip pressures are possible while still achieving good post-press dryness. Typically, shoe presses allow for up to

10% gain in bulk, with a significant increase in smoothness. Tissue producers can take this opportunity to produce sheet with greater bulk than would be possible with conventional suction pressure rolls and less virgin fiber demand. And they can substitute less costly furnish in place of high-quality furnish. All in all, this can lead to a reduction in raw material costs.

### OPERATING MODES:



### PATENTED LOADING DESIGN

A real highlight of the ANDRITZ shoe press technology is the patented loading design. Uniform, machine-wide pressing is a key factor when pushing operational efficiency to the limit. The shoe in the PrimePress XT Evo is loaded by means of two U-shaped hoses. This kind of design is perfect for uniform CD nip loading, irrespective of the line force or the Yankee pressure. The so-called U-tubes feature lower tube stresses compared to standard tube/bellow solutions. Axial stresses are

70% lower, and circumferential stresses are reduced by 85%.

#### The uniform line load across the nip results in:

- Sheet attaching better to the Yankee
- Even moisture profile in the web
- Improved creping uniformity
- Superior handfeel
- Reduced risk of chatter marks

### LOADING OF THE PrimePress XT Evo:





# A WEEK IN THE LIFE OF...

## ... BERRY WIERSUM

**Workplace: SAPPI EUROPE**  
**Profession: Chief Executive Officer**

Berry Wiersum is Chief Executive Officer of Sappi Europe. Wiersum joined the company as CEO in January 2007 from the former Kappa Packaging (BV) where he was Managing Director. Part of the global Sappi Group, Sappi Europe specializes in the production of high quality graphic and speciality papers and has seven mills in its portfolio, as well as 14 sales offices. The company employs around 5,100 people in Europe.

An accomplished musician, singer, and historian, Wiersum is often seen speaking at major industry conferences and events in Europe, and is a vocal spokesperson for the global pulp and paper industry.

Sappi Europe exclusively allowed the SPECTRUM editorial team to follow Wiersum in March this year on what was a typically busy WEEK IN THE LIFE of a pulp and paper industry executive.



# WEEK 10 / 2017 MARCH 06 - 10



## MONDAY 06 MARCH

On a typical Monday morning - when he's not travelling - Berry Wiersum leaves his home in Den Haag (The Hague, The Netherlands) at around 5 a.m., the destination: Sappi Europe headquarters located in the Glaverbel Building, Chaussée de la Hulpe, Brussels.



## MONDAY 06 MARCH

One regular activity on the agenda today is the weekly management meeting.

Sappi continues to succeed despite turbulent times in the industry, particularly as a major producer in the hard-hit Graphics Paper market. It says its success is down to one of its major management tools, the Sappi Performance Engine, which encourages a progressive and open culture, engaging employees right across the manufacturing spectrum. The Performance Engine also encourages "confidence and courage to challenge and change for the better," something the company has done remarkably well, as it has transformed itself from the commodity area of producing Graphic Papers into something of a leader in high-value Speciality Papers.

## TUESDAY 07 MARCH

Picking up the RISI European CEO of the Year Award at the RISI Conference held in Amsterdam this year.

The RISI regional CEO of the Year Awards are prestigious individual awards recognized worldwide. Winners are nominated by investment analysts, industry consultants, and commentators covering the global pulp and paper industry. In the case of Wiersum, one of his nominators said, "Wiersum has been a strong leader in the European pulp and paper industry for years, and has built Sappi Europe to be a powerhouse of graphic papers. Of late, he has led the company into the future by diversifying into specialties and paper for packaging. Wiersum has also been a great ambassador for the industry at large, continually pushing the sector to become more innovative, more politically astute, and more driven to listen to the needs of customers and stakeholders."

## TUESDAY 07 MARCH

Back in Brussels attending Sappi's Technical Innovation Awards.

Sappi's Technical Innovation Awards (TIAs) were created in 2000 to foster and celebrate innovative talent from within the company, supporting the development of commercially and environmentally sustainable solutions for the company. This year's event was attended by Steve Binnie, Sappi's Group CEO where Steffen Wurdinger, VP Manufacturing, R&D and Technology at Sappi Europe and his jury awarded 16 employees with TIAs. As part of the criteria for the awards, the winning innovations must serve a purpose, in terms of what customers want, the manufacturing process, or a product's characteristics.



**WHISTLE A BERRY TUNE**  
& win a bottle of wine!



## WEDNESDAY 08 MARCH

Time for one of Sappi Europe's regular Board meetings with Steve Binnie, Sappi's Group CEO and his Executive Team.

## THURSDAY 09 MARCH

The Mill Director at Sappi Gratkorn - Max Oberhumer - gives a guided tour of the latest developments at the mill.

Sappi Gratkorn is currently finalizing its district heating project. The excess steam generated from the mill allows the supply of approximately one third of the energy demand for the city of Graz 5 km away. ANDRITZ has delivered the heat exchanger for this project.

## WEDNESDAY 08 MARCH

Late arrival in Graz. Wiersum and three colleagues of the Sappi Europe Management Team are going to visit their mill in Gratkorn, Austria the next day.

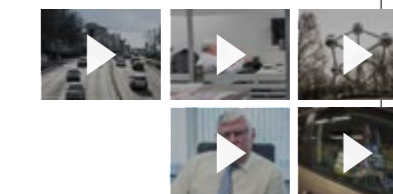
From left to right:

- Marco Eikelenboom** (VP Marketing & Sales Graphics)
- Steffen Wurdinger** (VP Manufacturing, R&D and Technology)
- Berry Wiersum** (Chief Executive Officer)
- Mat Quaedvlieg** (VP Strategic Business Projects)

## THURSDAY 09 MARCH

A meeting discussing the next project to take place at the flagship Sappi mill.

Strategically most important to the group, Sappi's Gratkorn Mill is one of the company's flagship operations; is an integrated mill situated on either side of the river Mur near Graz in Austria. The mill annually produces 980,000 metric tons of high quality multi-coated papers that are used for premium quality publications all over the world. The mill also produces 250,000 t/a of TCF pulp for its own consumption.



View video footage of this report online:

<http://www.andritz.com/witlo-wiersum>



## FRIDAY 10 MARCH

Back in the office in Brussels.

At the end of a hectic week of picking up awards, attending functions, delivering keynote speeches, and visiting mills, Wiersum is back in his office in Brussels checking out the coming schedule for yet another interesting WEEK IN THE LIFE working in the ever-challenging but hugely rewarding pulp and paper industry.



# MAKING IT ALL

# ADD UP

ANDRITZ has recently completed a service at Mayr-Melnhof's FS Karton mill, involving one MG cylinder, two web stabilizers, three dryer cylinders, and a fourth headbox service. From order to completion, it all added up to four service operations in just four months. So – did it all go by the numbers?

Although it started up back in 1990, the 5.25 m wide, 350,000-tonne BM5 at FS Karton in Neuss, Germany, is still one of the largest and most modern recycled boxboard machines in Europe. And every January, the mill makes sure it stays that way – with new improvements.

Udo Koolen, FS Karton's Project Engineer, explains why FS Karton chose ANDRITZ to carry out the latest upgrades. "ANDRITZ knows the machine – they built it. But also, I like that we got everything from one supplier that took responsibility for all the work, including the actual installation – not all suppliers offer that."

#### FOURTH HEADBOX COMPLETES THE SET

BM5 uses four fourdrinier formers to make its boxboard - first top layer, second top layer, filler layer, and back layer. ANDRITZ recently revised the headboxes for three of the four formers and completed the full set this January, bringing the headbox for the filler ply back up to date. Johannes Kraxner, Service Manager, ANDRITZ Tissue, Paper & Board Machines, notes that the headbox had already far outlasted its design expectations, "For example, you would normally change the diffuser inserts every 8-10 years, but these had lasted 16 years!"

As part of a full headbox service, ANDRITZ installed new bottom and top slice lip and renewed all seals. "We took it completely apart," Kraxner explains, "which has given us benefits such as improved cross-direction and machine-direction basis-weight control and correct sealing on the mixing chamber right from the start-up. The upgrade has restored full technical functionality to the headbox, enabling it to reach the desired process and quality parameters."

#### DRYING CYLINDERS – "A VERY SKILLED JOB"

Downstream, the dryer section at Neuss comprises 44 pre-drying cylinders before the MG cylinder, followed by 21 after-drying cylinders. ANDRITZ installed three new 1.8 m diameter, 5.7 m long, PrimeDry Steel cylinders in the pre-dryer section, replacing three cast-iron cylinders.







ANDRITZ has now serviced all four headboxes at Neuss during the past five years. The most recent upgrade was for the filler ply, which restored the headbox's full technical functionality, enabling it to reach the desired process and quality parameters.

And it wasn't easy. Koolen comments, "I was very impressed with how ANDRITZ installed the drying cylinders. It was a very skilled job; they had to be precise down to the millimeter."

Kraxner adds, "Some installation firms actually said it couldn't be done. You've got to know what you're doing."

"Despite the difficulty, the job had to be done for technical and safety reasons," says Koolen. "Two of the old cylinders had become eccentric and were causing the doctors to jump, risking web breaks. And the third older cylinder had been leaking hot steam, causing wear and abrasion, as well as being dangerous."

The new steel cylinders can operate at much higher parameters (6 bar pressure, 1,200 m/min speed) than the cast-iron cylinders, but they will only be used at the existing parameters for now (six bar of pressure and 850 m/min speed). Koolen points out, however, "We always look at the big picture. All new investments have to be able to meet future goals. For example, the plan is to raise the machine speed, so the new cylinders have to be set up for that."

For now, though, Neuss has already achieved its immediate goals of more homogenous heat transfer, smooth runnability, safety, and a return to design quality.

#### MG CYLINDER – A BALANCING ACT

Although the MG cylinder is in the middle of the dryer section and runs hot, it is not actually used for drying. Instead, it ensures a smooth printing surface on the white top layer of the cartonboard and liner produced on BM5.

Over time, line pressure had resulted in the MG cylinder becoming marginally eccentric, by 0.6 mm over a diameter of 6,400 mm (i.e., less than 0.01%) – but even that was enough to require re-grinding of the cylinder. "It wasn't a problem that was obviously noticeable," Koolen says, "but it was causing the cylinder's three doctors to move and was affecting the main bearings."

The grinding reduced the overall diameter by 1 mm, ensuring that the MG cylinder was perfectly round and smooth again, increasing machine stability and product quality.

Kraxner explains just how intensive the grinding process was, "Test speed has to be achieved, with full steam and heat. The balance is then measured, it is all shut down, then locked down. Electrics are disconnected and we wait for it to cool down, which takes hours. Then the human-access hole is opened and two men are sent inside, where they install weights for test balancing. Finally, the men back out and close it all up again, unlock the whole thing, reconnect the electrics and restart. We did all of that three times."

This intensive work was carried out on a mobile basis. The actual grinding itself was performed by ANDRITZ's mobile grinding unit, and the operation also used a mobile steam station for the first time, as the machine elec-

"Technologically, everything went smoothly. We did what we planned to do and achieved everything we wanted."

**UDO KOOLEN**  
FS Karton Project Engineer



In January 2017, ANDRITZ carried out a suite of service upgrades on the 350,000-tonne BM5 at Mayr-Melnhof's FS Karton mill in Neuss, Germany, the largest recycled boxboard machine in Europe.

trics had to be switched off. In addition, the post-grinding balancing was done using mobile balancing.

Koolen empathized with the workers: "It's hard work for the balancing guys. It's 40-45° C in there and very humid. They are completely exhausted at the end."

#### WEB MASTERS

The service in January also included two new PrimeRun M web stabilizers, in addition to two PrimeRun M units that ANDRITZ had installed six months earlier. These easy-maintenance units help to improve efficiency by reducing web breaks, while their patented vacuum design also reduces energy consumption.

Koolen explains, "We wanted to improve runnability. There had been some fluttering, which was affecting machine speed and performance." With the four new stabilizers in operation, threading is now more stable on open draws, which has improved runnability, even at the highest speeds. As a result of the new drying cylinders, plus the web stabilizers, "the machine has calmed," confirms Koolen.

#### TOUGH JOB, BUT SOMEONE'S GOT TO DO IT

One of the challenges of this project was performing all the parts of the service package a very limited time and space. For example, the crane was needed for many different parts of the project being done at the same time.

With the shutdown scheduled to last less than a week, Koolen points out that, "Timing was really important. There were contractual

finances in place if any of the drying cylinders were installed late. Any delay would have been a catastrophe. But ANDRITZ did it all on time. You've got to have people who can work hand in hand, and it worked really well."

Kraxner adds, "Our speed was another one of the reasons we got the project. It was only four months from the order being placed to start-up. We delivered the hardware on Thursday, 29 December 2016 and installed it the following Tuesday. It was almost a just-in-time delivery."

Of course, while speed was obviously important, quality was key. And Koolen says, "Technologically, everything went smoothly. We did what we planned to do and achieved

everything we wanted. The start-up took place with no project-related problems at all. The sealing in the headbox worked. The cylinder set-up was a reward for good preparation and discussions between ANDRITZ and us. It all worked well, which was great for me, because I didn't have to run around too much!"

Kraxner concludes, "We were working for the future here. The customer is happy and they know how much we did. We have to work like we're on the same team."

**CONTACT**  
Johannes Kraxner  
johannes.kraxner@andritz.com

"We were working for the future here. The customer is happy and they know how much we did. We have to work like we're on the same team."

**JOHANNES KRAXNER**  
ANDRITZ Service Manager





# NEXT GENERATION FLUSHABLE, BIODEGRADABLE WIPES

## ANDRITZ neXline wetlace starts up in Turkey

A company that started in the shoe industry over 200 years ago is now one of Turkey's largest manufacturers of nonwovens. Akinal recently introduced its own brand of 100% biodegradable and certified flushable wipes – BioFlush® – using state-of-the-art Wetlace technology from ANDRITZ Nonwoven.

At the end of 2016, Akinal Sentetik Tekstil of Turkey completed the start-up of a 15,000 t/a neXline wetlace production line from ANDRITZ Nonwoven and has since launched its brand of next-generation flushable and biodegradable wipes in response to growing market demands.

Flushable wipes range from adult moist toilet tissue and toddler toilet care to feminine hygiene wipes, and the sector is growing rapidly. But there have been problems – some flushable wipe products made with non-biodegradable material have been causing difficulties with plumbing – particularly with blocked drains.

“The choice and selection of nonwoven substrates for flushable wipes is changing,” says Önder Doğan, Production & Project Manager for Akinal Sentetik Tekstil. “The move is away from petroleum-based non-biodegradable fibers toward the increased

use of wood pulp, which is sustainable. Wetlaid web forming technology has been able to incorporate very high levels of wood pulp, while carded web forming has been limited. Only a few products manufactured with conventional spunlace technology (carding and hydroentanglement) can meet the dispersion requirements, so a different technical solution was called for.”



ANDRITZ Nonwoven is the only company providing complete Wetlace technology from stock preparation to drying and winding from a single source.

### THE PRODUCT HAS TO BE STRONG - AND BE ABLE TO DISINTEGRATE

“It seems like a contradiction that is difficult to solve,” says Stéphane Robin, ANDRITZ Application Engineer for Nonwovens. “The strength of the wipe has to be sufficient during its production and use so that it stays intact. However, after the wipe is used, it needs to disintegrate quickly and completely.”

Conventional spunlacing — carding and hydroentanglement — can provide wipes with high tensile strength and softness. However, the spunlace fiber lengths create entanglements that are difficult to open up again when flushed. “It became clear that a fiber length considerably less than 20 mm is necessary to produce flushable wipes,” Robin says.

From this, the Wetlace technology was developed. “Our fiber processing during stock preparation, fiber lay-down during wet forming, and mechanical bonding with hydroentanglement have all been designed to optimize the strength of wipes for use and fast release when flushed. In addition, we have the added benefit of using a blend of fibers (wood pulp and short-cut staple fibers) without chemical additives or binders so that they are completely biodegradable,” continues Robin.

“The key to success in the Wetlace process is the combination of raw materials, fiber blend, and specific process settings during wet laying and hydroentanglement,” Robin says. “We draw upon ANDRITZ expertise from the paper industry (processing of short fibers) with our nonwovens wetlaid expertise (wet forming) and deep expertise in hydroentanglement from our spunlace technology.”

ANDRITZ neXline wetlace lines are designed for high production capacities of up to 15,000 t/a and integrate stock preparation, wet forming, hydroentanglement, and drying. ANDRITZ Nonwoven is the only company providing complete Wetlace technology from stock preparation to drying and winding from a single source.

### DISCUSSIONS MOVED QUICKLY FROM CONCEPT TO PURCHASE ORDER

When it came to the development of the BioFlush product, Akinal was already familiar with ANDRITZ experts and technologies, having purchased ANDRITZ equipment (Asselin-Thibeau and Perfojet at the time) for their very first spunlace line in 2002. Since that time, additional ANDRITZ equipment has been purchased for spunlacing, calendaring, needlepunching, and drying.

Management from Akinal met with ANDRITZ in 2014; the discussions between the two companies moved quickly from concept to design to technical refinement to purchase order. The contract for the neXline wetlace production line was signed in October 2014.

“For this particular project, there was not an operating reference line that we could visit,”

Doğan confirms. “But we knew ANDRITZ well and we were able to do extensive pilot work at its plant in Germany.”

Plus, Akinal had the benefit of learning first-hand from ANDRITZ's experience with the first neXline wetlace installation in China. “That system started up in August 2015,” says Doğan.

Design production speed for the Akinal neXline wetlace is 110 m/min to 225 m/min, depending upon the fiber mix and the nonwovens product being produced (fabric weights from 40 gsm to 80 gsm). Design capacity is from 1,800 t/h to 2,250 t/h and at a production width of 3.4 m.

ANDRITZ supervised the mechanical erection and commissioning of the line, trained Akinal's operators on the new technology, and oversaw the start-up itself.

“We are getting good response from our worldwide customers about the new BioFlush product,” says Önder Karadağ, Foreign Trade Manager, Akinal Sentetik Tekstil. “The specific requirements differ slightly from country to country, and we have the flexibility with this technology to adjust our fiber blend in order to basically produce a tailor-made product for customers. We can produce according to the latest EDANA/INDA guidelines for flushable wipes.”

**CONTACT**  
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“We are getting a good response from our worldwide customers about the new BioFlush product.”

**ÖNDER KARADAĞ**  
Foreign Trade Manager  
Akinal Sentetik Tekstil



On the evening of Sunday 23 March 2014, a catastrophic event took place in the recovery boiler at Heinzl Group's Zellstoff Pöls mill near Graz, Austria. A water leak caused an explosion that ripped through the boiler leaving it irreparably damaged and needing a complete replacement. The event sparked off a flurry of activity at both the mill and the chosen supplier, involving timescale, efficiency and quality that would make the project deliver like no other. ANDRITZ once again accepted the challenge.



# A WORLD CLASS

## Recovery

Zellstoff Pöls, as well as being a high quality, specialist, integrated mill, is also massively important to the local area as a supplier of energy and district heating to some 15,000 residents. The mill has even won a prestigious Austrian national award for its production of renewable energy and heating. The explosion that evening meant that action had to be taken - and fast.

Siegfried Gruber, Head of Project Engineering, Zellstoff Pöls, takes up the story, "As I drove into the mill on Monday 24 March 2014, it was clear that something enormous had happened to the recovery boiler at our mill. From the outside the façade was visibly damaged, but it was when I took a look inside that the seriousness of what had happened became clear. It was a scene of absolute devastation, and it was clear before we could do anything else we would have to make the building safe - even the enormous steel girders in the plant were bent and twisted by the sheer force of the explosion."

"Although it was very bad, we count ourselves fortunate that there were only two minor personnel injuries, and it was certainly a shock to those people that were working there that night."

Also fortunate was the fact that Zellstoff Pöls is one of those mills that has a backup recovery boiler - although with only 50% capacity of the mill's needs. The spare boiler was fired up quickly to continue pulp making to keep its virtually brand new, ANDRITZ-supplied speciality paper machine running and to at least partly supply market customers with pulp as well as most local residents with district heating.

### IMMEDIATE ACTION HAD TO BE TAKEN

Nonetheless, immediate action had to be taken in an effort to get back on track and bring the mill back to 100% production again. Gruber says, "Within a few weeks, we came up with a plan internally - for instance, what the boiler should look like, capacity and environmental demands, and then we went to the potential suppliers."

One area of project management that is not often reported on is the amount of work undertaken by the sales and project quotation teams when an event occurs like the one at Pöls. The un-







The recovery boiler project started up with liquor 17 months from the signing of the contract.



“From the outside the façade was visibly damaged, but it was when I took a look inside the seriousness of what had happened became clear. It was a scene of absolute devastation.”

**WERNER DUER**  
Head of Recovery-Line & Environment/Energy  
Zellstoff Pöls (L)

**SIEGFRIED GRUBER**  
Head of Project Engineering  
Zellstoff Pöls (R)

planned nature of the boiler explosion meant that there was no luxury of time, and the very small team of experts in the quotation department had to pull out all the stops. Antti Mattelmäki, Sales Manager, Recovery Boilers at ANDRITZ explains: “This was a once in a lifetime event for many of the people involved in the project; we had to get to work fast on the quotation for the new boiler, despite the fact that there were a lot of unknowns.”

This is one of the areas where records were shattered. The ANDRITZ Recovery Boiler division managed to deliver complex quotations and plans that would normally take as much as a year to complete in just three months.

“The customer in this case was really in a hurry, and three options were on the table; replace the boiler with an exact replica; build a completely new boiler with housing; or put a new boiler in the existing housing. There were

a lot of differing parameters and possible scenarios, and each one of those quotations takes a lot of man hours,” adds Mattelmäki. “Fortunately, ANDRITZ had similar reference deliveries which we could utilize when it came to technical demands.”

In the end Zellstoff Pöls management were convinced that ANDRITZ technology was the way to go, and a decision was made to go ahead with a brand new recovery boiler installed in the existing building, but with an increased capacity from the old 2,200 tds/d to 2,600 tds/d of liquor per day. The new boiler would also produce more steam, from 350 t/h to 400 t/h at 500 °C and 80 bar. And of course, the new boiler would have significantly reduced emissions to continue with the mill’s proud environmental distinction.

The contract for the project was signed on 11th July 2014, not even four months after the boiler explosion.

**A BIT OF A SQUEEZE**

But of course there were the main project challenges to contend with now. The new, higher capacity boiler had to be squeezed into the existing building, which had to be completely repaired and made ready for what was to be a larger, and completely different shaped boiler. So the challenge baton was passed from the sales team on to the ANDRITZ Recovery and Power project team.

Bernd Zuschin, Senior Project Manager, Recovery and Power, for ANDRITZ says: “There were a lot of uncertainties, and a lot of unknowns; for instance, how secure were the foundations? And how about the structures that didn’t seem damaged, how reliable would they be? In the middle of all this was the fact that we knew from experience what a demanding customer Zellstoff Pöls is, particularly when it comes to mill standards and quality.”

Simultaneously with the engineering works, the clearing and damage assessment work on site began with a vengeance. High tech laser scanning of the steel structure was performed to assess the factual condition of it and to get a proper basis for the engineering teams. Says Zuschin: “Finally 3,800 tonnes of material had to be removed and many adaptations to the existing structure were to be made. In parallel to that we had to reinforce or even renew concrete foundations and platforms to take into account the bigger dimensions and loads of the new boiler.”

“But it wasn’t just a case of brute force and cut out whatever we could, there was equipment remaining in the boiler house that belonged to other mill areas and damage to them would have caused a complete mill shut down. It was also a very delicate operation.”



(L to R): Christian Perschler, Project Manager, Zellstoff Pöls, Winfried Weber, Head of Recovery-Boiler Department, Zellstoff Pöls, Mari Räsänen, Senior Project Manager, ANDRITZ, Olli Knuutila, Commissioning and Start-Up Manager, Recovery Boilers, ANDRITZ, Bernd Zuschin, Senior Project Manager, Recovery and Power, ANDRITZ.



At the end of December 2014, the recovery boiler house was clear, all the foundations had been verified and reinforced where needed, and work could begin on adapting the steel structure for the new boiler to be installed.

And then of course for the next challenge - getting the larger boiler in.

Mari Räsänen, Senior Project Manager, ANDRITZ, says, "The new boiler has 20% more capacity, which means increased dimensions of the boiler and its appending equipment, so engineering was complicated and modifications to the building had to take place. In addition, we received detailed feedback from site concerning what equipment could be reused and what not; this further squeezed the short time

available for the engineering and supply process."

At the same time all this activity was taking place, ANDRITZ installed a simulator for the Zellstoff Pöls recovery boiler team, an exact replica of the new recovery boiler operation system that allowed the operators to get hands-on training, even before the boiler was installed. Christian Perschler, Project Manager, Zellstoff Pöls, says, "The simulator has been a fantastic addition to this project; it is an identical system with all identical operator displays, controls, and interlocking. It has meant that we could actually iron out any potential problems with the boiler before we even started up. In fact, we did have a small problem when starting up with natural gas, but we were able to simulate the problem and solve it on the simulator beforehand."

Georg Krogger, Automation Project Manager, ANDRITZ, adds, "With the help of the simulator, we were also able to speed up the software FAT and commissioning of the boiler. In future our simulator will even provide the capability to test process and software changes before implementing them at the boiler."

**RAMPING UP TO START-UP**

In early 2015, the parts for the boiler began to arrive at the mill, first the pressure parts, and then a big milestone was achieved in April when the steam drum was hauled up using a special crane installed on top of the boiler house. It was at this time that the installation work on the project was ramped up to make sure that the start-up timeline was adhered to, and for the next six months the installation teams were working around the clock. Installation was slightly

more complicated than it typically is at a greenfield project – in this case, the existing building required specialized lifting equipment and erection methods as access was extremely limited.

The pressure test took place in early September 2015 and shortly afterwards the commissioning of the first systems started. As the main milestone for Zellstoff Pöls, the first liquor fire-up was in mid December. After some optimization period, the test run took place with no interruption took place with no interruption from early January until the boiler was taken over by Zellstoff Pöls on the 6 February 2016 - not even 19 months since the contract signing.

"We had the perfect start-up; together with ANDRITZ, we broke the world record for a new recovery boiler", says Gruber, "and we

are amazed at how unbelievably stable the boiler is; we achieved 100% availability during the one-year observation period."

"In terms of the technology we have chosen, we have made a step in the right direction, and although the explosion in 2014 was devastating, it has meant that we have been able to bring our emission reduction goals forward by a good 10 years, as we have made sure that we have installed the very latest technology. In fact, we estimate that we have brought down our emissions by 40-50% with the installation of this new boiler," says Werner Duer, Head of Recovery Line, Zellstoff Pöls. "In addition, we have significantly reduced our odour emissions to the air by now burning mill waste gases in the boiler and we have increased efficiency by using steam extracted from the turbine for sootblowing."

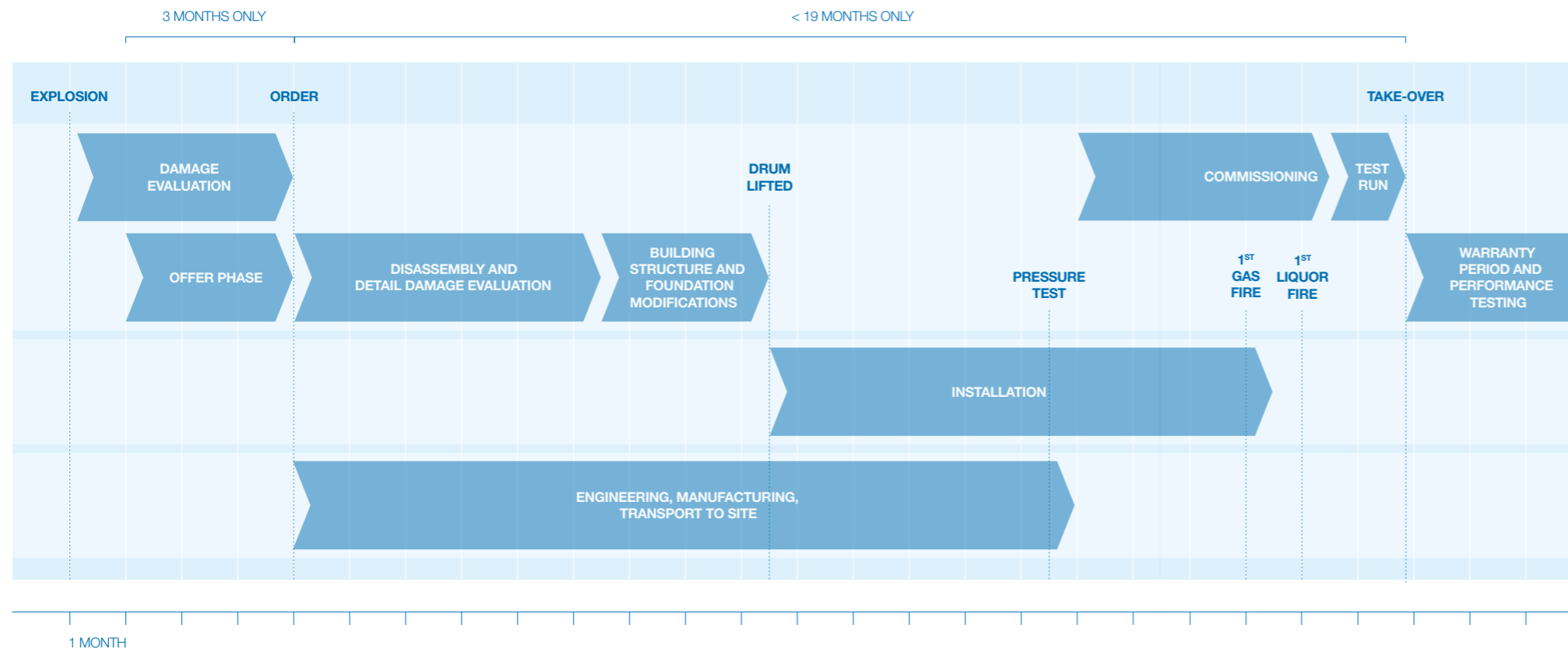
"Moreover, the ANDRITZ advanced control system contributes to a well-optimized boiler and provides a good basis for further fine tuning," adds Winfried Weber, Head of Recovery-Boiler Department, Zellstoff Pöls.

In a commercial sense, the new boiler has also ticked all the right boxes. "We have not had to stop the boiler for a wash for a whole year of operation due to the fact that it keeps itself clean, which of course means more pulp – some 25,000 tonnes more. So now we have created our next bottleneck – in the pulp mill, but that is our future challenge!" concludes Gruber.

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## A WORLD RECORD TIMELINE

### Reconstruction Pöls Recovery Boiler



The liquor burners. The new boiler has cut mill emissions by 40-50%.



(L to R) Winfried Weber, Head of Recovery-Boiler Department, Zellstoff Pöls, and Georg Krogger, Automation Project Manager, ANDRITZ, in front of the ANDRITZ DCS system.



# MARKET TRENDS

## GLOBAL TISSUE TRENDS

According to Esko Uutela, RISI's Principal, Tissue, globally the tissue industry is in good shape and will see long-term growth way into the future. Lately, we have seen steady growth that will accelerate into the future at a rate globally of around 3.5%, but this growth will not be consistent in all areas.

**1** We are seeing steady trends upwards in tonnage, on average slightly more than 1 million tonnes per year over the last 10 years. As the faster growing emerging markets increasingly contribute to the world average, the volume growth is expected to accelerate to 1.5 million tonnes toward the end of the next 10-year period, which is good news for the industry and machine suppliers. In 2025, the size of the global tissue market will approach the benchmark of 50 million tonnes, with the next major milestone of 100 million tonnes coming in the next 20-25 years.

**NORTH AMERICA** is showing healthy growth rates of 2.2% and 3.6% respectively for 2015 and 2016, this despite a low population growth rate of just 0.8%.

**ASIA** is a growth area and particularly China is the main force with its GDP of 6-7%, but there is still huge potential in Thailand, the Philippines, and Vietnam where the general standard of living is increasing.

**EUROPE** is relatively stable when it comes to tissue demand and growth, with Eastern Europe showing a lot of promise. Russia, Ukraine, and Romania in particular are showing growth promise.

**LATIN AMERICA** has always been an interesting market to follow, as there is always something going on with the various economies of the different countries, which has an impact on consumption.

**AFRICA** is a continent that is seeing a lot of long-term potential. In the south, west, and east, companies are investing in tissue production in Africa.



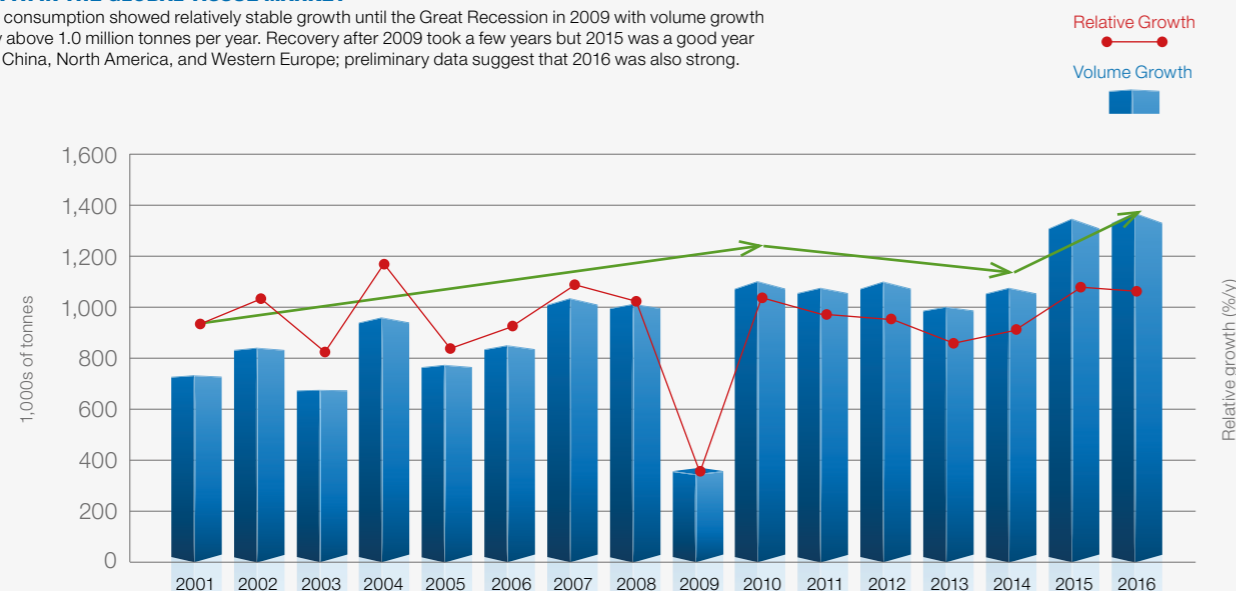
**2** Emerging markets are still providing most of the growth in the tissue market. This is not just Asia, although China is still instrumental in the growth figures. It is also Latin America, the Middle East, and lately even Africa that are showing possibilities looking longer term. The drivers of growth in tissue are varied, but a big one is the raising of hygienic standards around the world. But there are, of course, the usual factors; economic growth, population increase, fast-growing middle classes from the emerging nations.

**3** In terms of grades, the industry is dominated by bathroom tissue, but we have seen phenomenal growth in North America of the toweling business, including both kitchen towels and Away-from-Home (AfH) towel rolls. In parts of Asia, particularly China and the Middle East, it is facial tissue that has the highest growth rate. In Latin America, facial tissue is rather small except in Mexico which seems to follow the usage pattern in the USA. Napkins see growth in the AfH sector in particular, supported by the continuing growth in outside eating and fast-service restaurants.

**4** The tissue industry has been the leader of the pack when it comes to innovation in the paper industry. There is always something new and exciting being brought out by the suppliers in this sector. In particular, there is a lot of work being done on reducing basis weight in tissue, at the same time as maintaining bulk, strength, and diameter. Flushable wipes are proving popular with consumers, but producers have problems with biodegradability. It really is a fantastic opportunity for fiber-based companies to capture market share if the wipes are made from biodegradable paper.

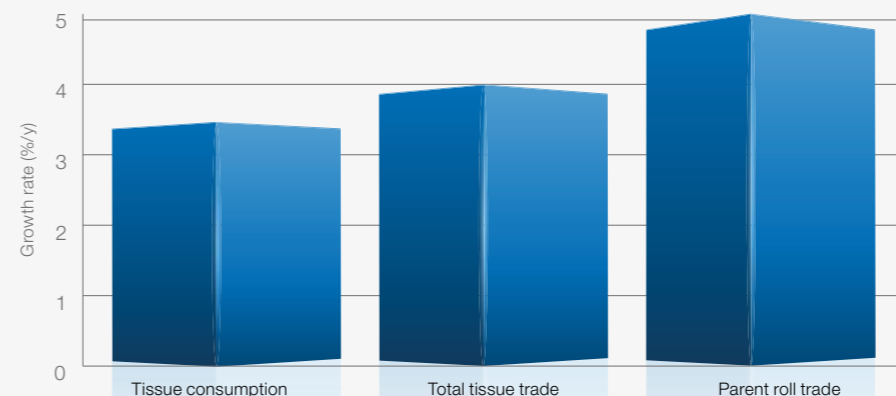
**GROWTH IN THE GLOBAL TISSUE MARKET**

Tissue consumption showed relatively stable growth until the Great Recession in 2009 with volume growth slightly above 1.0 million tonnes per year. Recovery after 2009 took a few years but 2015 was a good year due to China, North America, and Western Europe; preliminary data suggest that 2016 was also strong.



**LONG-TERM GROWTH TRENDS IN THE GLOBAL TISSUE MARKET**

International trade in tissue shows a higher growth rate than tissue consumption, a clear sign of business globalization. Parent roll trade has accelerated in recent years.



**ESKO UUTELA PRINCIPAL, TISSUE, RISI**

Known as "The Guru" of the global tissue industry, Esko Uutela has more than 30 years' experience in the global paper market. Uutela's expertise lies in the tissue and recovered fiber markets. After working nearly 18 years for a large forest industry consulting company in Helsinki and Munich, Uutela established EU Consulting, his own forest industry consulting company where he carries out numerous private client projects, and since 2007 he has also been responsible for RISI's comprehensive studies on worldwide tissue business development and forecasts worldwide.





**Gerhard Schiefer**  
Head of ANDRITZ AUTOMATION

## Removing the black box around drive systems

Systems to control the electrical drives in a pulp or paper mill (paper machine drives for example) have been in use for a long time. These systems have traditionally been “black boxes” that are never touched unless there is a significant problem. It has been almost impossible to seamlessly integrate drive systems into the standard distributed control system so that they can become part of a mill’s Industrial IoT network.

Electric drive systems play an important role in pulp and paper mills: starting up and shutting down motors, controlling the dynamics in response to applied loads, matching the power to suit the motors’ requirements, and protecting the motors from damage.

The traditional drive system has been designed as an electrical “black box” – a device deemed untouchable by mill personnel. Commission it, tune it, and leave it alone until there is a problem. Then, call in outside experts to hook up their diagnostic equipment, speak to each other in a strange technical jargon, and solve the problem. After that, the black box is sealed and the motors start up again.

This is the equivalent of having a separate dashboard in your car just for the engine, and another dashboard for everything else.

### COMMON DASHBOARD

Until recently, it was almost impossible to seamlessly integrate the inner workings of the drive system into the operation and maintenance routines for the main distributed control system. We at ANDRITZ have built a common dashboard for control and drive systems, and we accomplished this by opening up the



black box and treating the drive system as a mechatronic unit.

*Originally, mechatronics combined the disciplines of mechanics and electronics. But, as the systems have become more complex, the definition has broadened to include computer control, telecommunications, and information technology.*

Mechatronics has become a reality in many applications, including drives. Taking advantage of power electronics (inverters), drive systems can do more than just turn an electric motor with variable speed. The capability exists to measure speed, torque, and energy flow within milliseconds – providing useful real-time information to the distributed control sys-

tem. To harness this potential in the drive system requires deep knowledge about inverter technology and the capabilities of the myriad control systems on the market – and then the ability to implement the solution in a customer’s industrial environment. These competencies are well established within ANDRITZ.

### PRACTICAL APPLICATIONS

Information from seamlessly integrated drive controls can be very helpful in detecting and analyzing sheet breaks on a paper machine, for example, and are much more reliable than on-machine sensors and detectors that are exposed to moisture, dirt, and vibration. Having an accurate data log once there is a sheet break would also help to analyze the root cause. Another example would be controlling nip closures on a machine based on adaptive diameter compensation. There are many more potential applications – all resulting in faster ramp-ups, less downtime, and less waste.

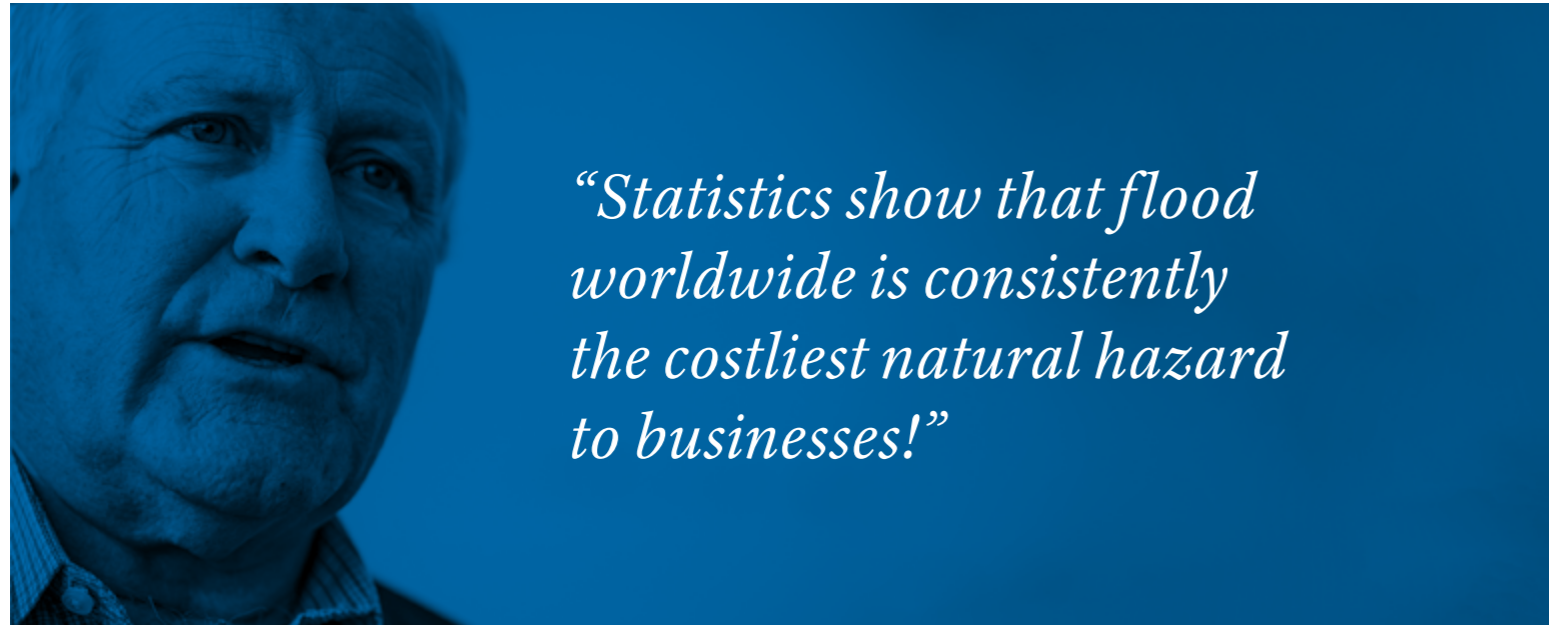
We can do this thanks to the state-of-the-art power electronics available today, complemented by our own data analytics capabilities. The information will be available in real time where it is needed – including mobile applications and tablets – thanks to its integration into IoT.

# MANAGING RISK IN THE PULP AND PAPER INDUSTRY

Interview with Jimmy Onstead, Staff Vice President and Principal Engineer Forest Products at specialist pulp and paper industry insurer, FM Global

*“I expect mills will be much more automated, and with more internet connectivity.”*





*“Statistics show that flood worldwide is consistently the costliest natural hazard to businesses!”*

#### CURRENT RISKS CHALLENGES AT MILLS

*J. Onstead:* “Well, that list can be pretty extensive, but at the mill level it involves a constant, proactive approach of inspection, testing, and maintenance of equipment. Fire protection is a big issue because there is a lot of exposure in the industry as a result of pulp and paper storage and the manufacturing process. There also are risks to equipment such as boilers, pressure vessels, and mechanical and electrical systems. Maintaining the integrity of such equipment can be a daily challenge for mill owners.”

#### IMPORTANCE OF EQUIPMENT BUILD QUALITY

*J. Onstead:* “Our clients must protect their market share, margins, and reputation. Equipment used in the pulp and paper industry is expensive and having top-of-the-line products that meet the highest loss prevention standards is essential. For recovery boilers, the three standards that drive design come from BLRBAC in the United States, the Swedish Norwegian Recovery Boiler Committee in Sweden, and the Finnish Recovery Boiler Committee in Finland.”

#### OPERATOR TRAINING

*J. Onstead:* “Operator training is essential,

especially with regard to addressing common causes of industry losses. Almost all losses today can be attributed, at some level, to human factors – those actions people did or did not do. Certainly, a loss may start with mechanical damage or fire, but what the operators do in terms of their reaction during such events can make the situation worse or better. It is a constant struggle for many organizations to ensure their operators are properly trained. A mill’s employees are probably the most important factor when it comes to managing risk.”

#### CATASTROPHIC EVENTS

*J. Onstead:* “Depending on the peril, there are steps that can be taken. When it comes to natural hazards, flood and wind exposure come to many people’s minds. However, earthquakes and tsunamis should be considered, too. The first step is knowing and understanding your risk before the construction of a plant, if possible. Can you build the facility out of harm’s way? Relocate it? If not, then what can you do to design and protect as much as possible of the facility against property-related threats, followed by a comprehensive and tested response plan should an event occur.”

#### INCREASED CHANCE OF FLOODING

*J. Onstead:* “Natural hazards are

classified by the type of damage caused: wind, flood, freeze, hail, collapse, tornado, and earthquake. Our statistics show that floods worldwide are consistently the costliest natural hazard to businesses. Today, due to increased urbanization, flooding is occurring in places where it hasn’t in the past. When I look at how much of the topography has been changed by ongoing development such as concrete, roads, you name it, changes have been made to the natural storm water drainage that traditionally protected locations. I expect to see floods continue to increase. To help companies address these challenges, we recently released our online Global Flood Map, available at no cost for use by businesses and the public. It helps a user understand whether their locations are in or out of potential flood zones across the globe, even in areas where previously available information was unreliable, inconsistent, or nonexistent.”

#### THREATS FROM INSIDE THE MILL

*J. Onstead:* “These are the types of everyday risks a pulp and paper mill deals with. However, the mills can take steps to prevent loss. Much of this begins with inspection, identifying and quantifying exposure, and applying engineering solutions that help prevent or mitigate



the risk. I suggest finding a company like FM Global who have risk engineering expertise.”

#### CYBER ATTACKS

*J. Onstead:* “Cyber risk is a growing concern for businesses. Last year, FM Global formed integrated engineering and underwriting units dedicated to enhancing the company’s expertise in first-party cyber solutions. Currently, our company’s research and engineering units are developing location- and account-based assessment standards, tools, and methodologies to assist clients with cyber risk mitigation. And, we are continuously enhancing our cyber insurance coverage to help ensure our clients are protected. We don’t often think of a paper mill as being a target for cyber attack, but we have already seen instances in the industry where, for example, disgruntled employees, perhaps IT people, have gone in and attacked a company, which resulted in physical damage.”

#### THE MILL OF THE FUTURE

*J. Onstead:* “The future new mill will look so different from anything that I can possibly imagine. I expect mills will be much more automated, and with more internet connectivity. That will bring with it

new property exposures, too. With more automation, we are likely to see increased cyber risk, less people in the mill operating equipment, more major control centers, and fewer people making adjustments to equipment.”

#### LESS PEOPLE, LESS RISK?

*J. Onstead:* “We still need people to go out there and listen, look, and touch. When it comes to sound risk management, there are some things that automation just can’t replace.”

#### WHERE SHOULD MILL OWNERS BEGIN?

*J. Onstead:* “Mill owners and managers should begin with their people. There will be a lot of challenges in the future with regard to new hires – finding talent and attracting the right people to the pulp and paper industry. Training those people properly will be critical and knowledge transfer from seasoned veterans with much institutional knowledge will be imperative. Then other programs naturally fall into place such as system design, maintenance, and repair of systems. Lastly, make sure you have a good insurance company and partner in loss prevention!”

#### WHAT DOES FM GLOBAL DO?

FM Global is one of the world’s largest commercial property insurers and has a unique risk management focus – utilizing loss prevention engineering to help clients be more resilient. In the pulp and paper industry, breakdown and failures of boilers and machinery are commonplace so we help clients prevent loss from perils like fire, natural hazards, and equipment breakdown, as well as insure against it. As a mutual company, we are owned by our policyholders and we believe in long-term partnerships with our clients – most are 20+ years upwards to 135-year relationships.

Watch the whole video interview:





# NEW ADVANCES



Tech Talk

## in paper coating technology

A new patented nozzle for curtain coaters allows precise sectional volumetric correction of flows to ensure even coating across the entire web surface. Another advancement makes it possible to apply barrier layers in the inboard mode without defects at the edges.

### NEW NOZZLE FOR MULTI-LAYER COATING

Curtain coating transfers a thin film of falling liquid (the "curtain") from the applicator die to a moving web of paper or board. When applying multiple layers simultaneously, the thickness and composition of each layer must be constant over the entire web surface. Achieving this can be particularly difficult with wide webs and/or a wide range of coating weights.

Certain packaging materials require environmentally friendly and sustainable barrier layers to prevent the migration of oxygen and/or oils. ANDRITZ developed a new prototype of nozzle for these multi-layer barrier applications which has advanced cross-direction (CD) profiling. For the first time, it is possible to make volumetric corrections to the CD profile of inner layers and pro-

duce a completely uniform coating without defects.

### THE LABYRINTH BREAKTHROUGH

In collaboration with research institutes, ANDRITZ tested different variations of diffuser block and nozzle geometries. In 2013, there was a breakthrough. A new type of diffuser block was produced with a labyrinth geometry. Extensive CFD studies were conducted to optimize the shape of the labyrinth. This led to a nozzle outlet geometry that achieved the most even coating distribution possible.

Numerous tests were conducted on a prototype unit to confirm the CFD simulations. Figure 1 shows the prototype with eight diffusers in the block and a labyrinth with three expansion chambers. Extensive tests confirmed that the labyrinth renders the flow absolutely evenly.



Figure 1. Prototype of new nozzle with sectional volumetric correction of the CD profile.



Figure 2. Cascade nozzle with sectional volumetric correction and mechanical CD profile adjustment combined.

The design combines volumetric correction and mechanical cross-profiling to create a cascade nozzle that can simultaneously apply a thin barrier layer and a top coat of desired thickness in a stable curtain that can be adjusted online during production.

The CD profile of the first layer (which is usually the most expensive material) is controlled by specialized valves that adjust the flow volume zone-by-zone across the web. This is done on-the-fly without interrupting production. The top layer of coating, which normally has a constant thickness and solids content, is easily set with the mechanical cross-profiling adjustment.

Figure 3. Operating principle of the new ANDRITZ edge guide system.



A range of very thin to very thick coating layers can now be applied with high profile accuracy to eliminate defects or streaks. The deviations in CD profile are typically in the range of  $\pm 1\%$  for coating weights between 2 gsm to 14 gsm.

### EDGE GUIDE SYSTEM FOR INBOARD BARRIER COATING

The challenges of inboard coating (i.e., coating within the width of the web) center around variations in the coating at the edge of the web, and the potential damage to the uncoated portion of the paper/board substrate. Conventional edge guide systems such as simple guides or edge guides with lubrication layers all have limitations (Table 1). None of these existing systems are able to completely fulfill the requirements for challenging inboard barrier coat applications.

ANDRITZ developed a new edge guide system that uses advanced water jet technology. This makes it possible for the first time to apply

Conventional edge guide systems	Comments
Overboard	Coating on rear side Color deposits on guide rolls Coating with barrier not possible in many cases Not cost-effective
Inboard with color removal by suction	Color deposits on return run Not capable of continuous stable production
Inboard with one overflow and one mechanical cutting element	Edge beading (edge too thick) Color deposits on guide rolls during drying Not capable of continuous stable production
Inboard with one overflow and cutting of the curtain in a conventional water jet process	Edge beading Not capable of continuous stable production

Table 1. Limitations of conventional edge guide systems for barrier coatings.

barrier layers in inboard mode without coating defects at the edges. It can be used with a wide range of coatings – from very thin to very thick barrier layers – and it can operate continuously without downtime for cleaning.

Due to the buildup of coating on conventional edge guide devices, production lines can typically be operated only in short intervals before cleaning is required. With this new system, the nozzle can be operated continuously since deposits on the equipment are eliminated by the water jet.

Figure 3 shows the operating principle of the new edge guide system. A water jet nozzle is mounted between the coating curtain and moving paper web. The angle between the jet and the curtain is critical.

Unlike conventional water jet systems where the curtain is cut by the kinetic energy of the jet, this new system stretches the curtain be-

fore gently cutting it. The curtain becomes thinner and thinner along the length of the water jet until its thickness falls below the minimum, at which time it is cut. In this way, the coating color on the inside is spread over a larger area. Since there is only a small amount of color at the edges, no significant beading occurs. Eliminating beading by stretching the inner side of the curtain avoids contamination and discourages layers from sticking together on the roll.

### EXTENSIVE TESTING

Numerous pilot tests with different barrier colors and viscosities confirm the performance of this new edge guide system. The system is robust in handling these changes and no adjustments were required in the setup of the water jet for the different coatings.

The low water pressure required to stretch and cut the curtain makes the design simple, economical, and safe to operate. The jet nozzle is positioned so that the water is carried off alongside the paper web, minimizing the space required between the cutting point and the paper web. With a stable cutting edge, it is possible to minimize edge trim losses.

Figure 4 shows the web immediately after coating. While edge beading is apparent with the web treated using a conventional mechanical device (left photo), the web from the new edge guide system has no edge defects (right photo).



Figure 4. Comparison immediately after coating: with conventional mechanical system (left) and with ANDRITZ edge guide system (right).

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# NEW TECHNOLOGIES

## Tech Talk

### for Lignin Recovery and sulfuric acid production in a kraft pulp mill

The most quantifiable benefits to a kraft mill for installing a Lignin Recovery system are the ability to debottleneck a recovery boiler to increase pulp production and to have a sustainable biofuel to replace fossil fuels in the lime kiln. The enhanced revenue from increasing pulp production and the cost savings from substituting purchased fossil fuels, in addition to the environmental impact of reducing greenhouse gas emissions, can be readily calculated to determine the payback.

Today, with the increased knowledge and emphasis on biorefineries and bioproducts, potentially there is a new revenue stream. Lignin is now utilized as a sustainable, renewable

raw material for advanced bioproducts such as composites or as a substitute for phenolic and aromatic compounds (Figure 1).

The challenge in making the Lignin Recovery technology cost-competitive has been to reduce the cost associated with removing excess sulfur that is introduced in the chemical recovery cycle with the addition of sulfuric acid used in the process. This cost is primarily the NaOH needed to make up for sodium losses that occur when sulfur is discharged with recovery boiler fly ash, which consists mainly of  $\text{Na}_2\text{SO}_4$  and  $\text{Na}_2\text{CO}_3$ .

Beginning in 2010, ANDRITZ worked on the de-

velopment of alternative process concepts and investigated them at pilot scale in several pulp mills (Figure 2). Today, it offers tailor-made solutions for Lignin Recovery, customized for each application out of proven components (Figure 3).

The system can be configured as one stage without washing, two stages with acid washing, or two stages with acid washing and drying. The exact configuration is based on the system infrastructure of the mill and the end use of the lignin to be produced.

The process is designed to remove lignin from black liquor at 35-45% dry solids having a typical pH of 12-13. After filtration and wash-

Figure 1. Lignin: renewable fuel or a renewable raw material for bioproducts.



Figure 2. ANDRITZ began pilot plant testing of Lignin Recovery alternative concepts in 2010. Shown here is the portable pilot plant that can be easily transported to mills.

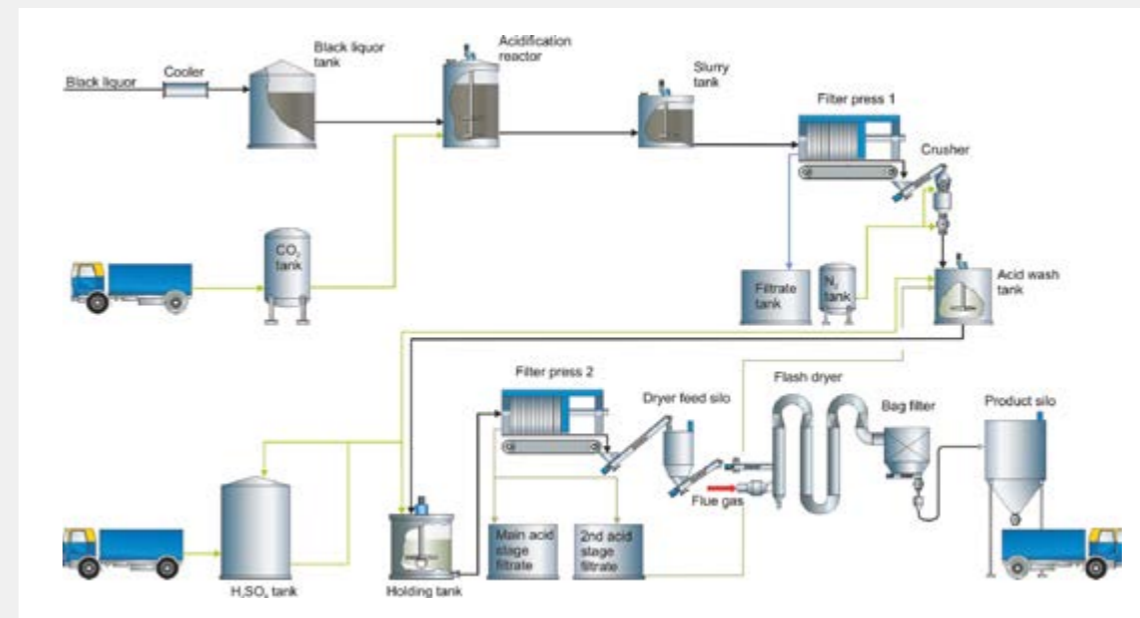


Figure 3. The ANDRITZ Lignin Recovery process.

ing, the dry solids content of lignin is typically 60-62% before the drying stage, and 95% after. In its most complete form, the Lignin Recovery process consists of these sub-processes:

**1) PRECIPITATION.** The pH of black liquor from the evaporation plant is decreased with carbon dioxide ( $\text{CO}_2$ ) in the acidification reactor to precipitate the lignin from the black liquor. The resulting slurry is fed to a Membrane Filter Press that efficiently separates the precipitated lignin and lignin-lean black liquor.

**2) ACID WASH.** Impurities (mostly sodium) are leached from the compressed precipitated lignin in a dilution wash with sulfuric acid. Displacement washing is used to remove the sodium sulfate formed during the acid

wash. Counter-current washing minimizes the consumption of fresh water as well as the amount of filtrate recycled to the evaporation plant. The displacement wash is carried out with pressurized hot water from the black liquor cooler and without additional chemicals to ensure that no new sulfate molecules are formed. A second Membrane Filter Press is utilized to dewater the slurry.

**3) DRYING.** The moist lignin cake is fed through a disintegrator for proper size reduction and to increase the surface area before the dryer. The heat source for drying is mainly the flue gas from a lime kiln or recovery boiler, which also acts as an inert drying media.

While producing high-quality lignin, the amount of sulfur in the chemical recovery cycle is in-

creased considerably due to the large amount of sulfuric acid consumed in the acid washing step. This means that the excess sulfur must be dumped in order not to increase the sulfidity of white liquor. When sulfur is dumped in the form of recovery boiler fly ash, the amount of NaOH required a make-up chemical is high (up to 20-30% of the total cost of produced lignin). For this reason, it makes sense to combine the Lignin Recovery system with a Wet gas Sulfuric Acid (WSA) process (Figure 3).

In the WSA process, commercial-grade sulfuric acid is produced on-site from CNCGs by catalytic conversion and condensation. There are over 130 references for the WSA technology operating worldwide on a variety of sulfurous gas streams, but none in the pulping industry. Up to 99.9% of the sulfur in CNCGs can be converted to concentrated sulfuric acid.

Depending on the downstream use of the lignin, ANDRITZ tailors the processes to achieve a mill's exact goals. As with many ANDRITZ solutions, the company can deliver a complete plant – with the process design; main equipment including presses, crushers, dryer, bag filter, and lime kiln burner; as well as automation, and erection – from one source.

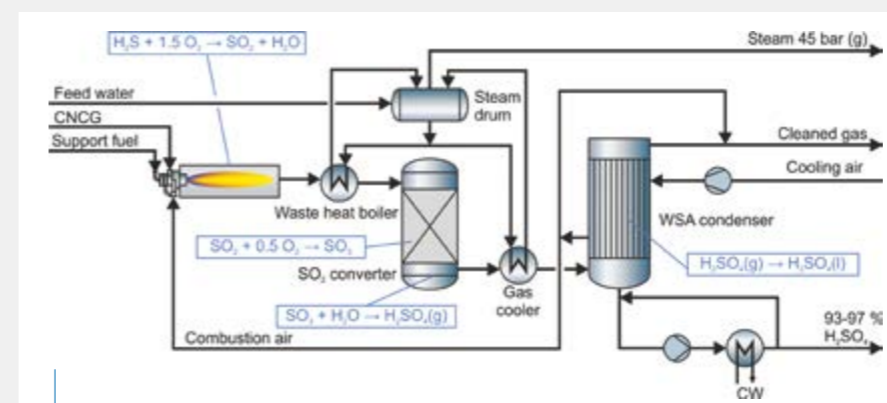


Figure 4. The Wet gas Sulfuric Acid (WSA) process enables in-mill production of concentrated commercial-grade  $\text{H}_2\text{SO}_4$  to significantly reduce the cost of purchased chemicals.

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# LEIPA'S MISSION

Environmental protection at all levels

LEIPA, in Schwedt an der Oder in the German state of Brandenburg, continues on its serious mission when it comes to environmental protection – each individual process step in the production lines must make a contribution at the mill. ANDRITZ took this mission on board during the rebuild of the screening plant in DIP1.

Sebastian Stockfisch – head of the two deinking plants and the effluent treatment system at LEIPA Georg Leinfelder GmbH in Schwedt – speaks frankly about the mill's original screening plant in DIP1, "We needed a separate machine operator just for this tailing screen to move and re-adjust the levers again and again in order to avoid excessive losses." LEIPA had

tried for some time to find a solution to the continual problems in the screening plant – above all the strikingly high fiber losses – and to determine the right settings for the tailing screen.

It was clear to LEIPA that a rebuild of DIP1 coarse and fine screening plants was needed to lower pulp losses and improve pulp qual-



Loose deinking material (illustrated magazines and newsprint) and coated magazines are fed to DIP1.

ity and that energy savings would also have to be one of the targets. "We had to make the project pay for itself as well, and that is not possible simply by increasing the yield," Stockfisch explains.

#### BUILDING ON AN EXISTING TRACK RECORD

LEIPA in Schwedt already had a successful track record in rebuild projects with ANDRITZ with a DIP1 screw press project in 2013, which then halved the energy consumption of the unit.

In the case of the screening plant rebuild, ANDRITZ suggested a consistent technological solution to LEIPA. In addition to replacing the inadequate tailing screen with a new ModuScreen T4C, the two screens in the first and second stages of preliminary screening were to be fitted with the latest slotted screen baskets and rotors from ANDRITZ.

Also added to the scope of supply was a new standpipe and a feed pump to the final stage as well as a new AhlCleaner RB300HD4 high-consistency cleaner to protect the new screen. In the fine screening sector, a new ModuScreen A44 was planned as the first stage, while existing screens would be used in the second,

third, and fourth screening stages – stage three preceded by an HD-cleaner from the existing equipment. All screens were also to receive new screen baskets and rotors from ANDRITZ.

The turnkey supply agreed with ANDRITZ included detailed engineering, all drive motors, complete instrumentation, piping and supports required for the rebuild, electrical installation work including adjustments to the DCS and MCC, complete installation work (mechanical, electrical, pipework, and machinery), as well as start-up with trial opera-

tion and training. "LEIPA ordered an all-round package with ANDRITZ as general contractor," ANDRITZ project manager Markus Mairitsch explains.

#### MISSION ACCOMPLISHED

Start-up was at the beginning of October 2014 and the result was impressive. The agreed reduction in weight losses to a maximum of 7 kg/min o<sub>tro</sub> was achieved quickly, as was the guaranteed capacity and the increase in capture rate for stickies.



Sebastian Stockfisch, head of deinking and effluent treatment at LEIPA (right), and Markus Mairitsch, ANDRITZ project manager, beside the new ModuScreen T4C tailing screen.



The new ModuScreen T4C screen from ANDRITZ played a central role in the rebuild of the preliminary screening plant. This special, two-stage tailing screen operates with centripetal force in the lower area with a rotating screen basket perforation diameter of 2.0 mm and with centrifugal force in the top section under atmospheric pressure with a screen basket hole diameter of 2.2 mm. It is not sensitive to spinning and keeps the fiber content in the reject to a minimum. With good screening efficiency, the reject leaves the screen with a high dryness of approximately 20%.

The new ANDRITZ ModuScreen A44 in the fine screening plant has achieved excellent screening as a result of the special screen basket/rotor concept. The new Bar-Tec rejector screen baskets used in coarse screening (slot width 0.4 mm) with patented bar profile achieve better removal of impurities compared to the perforated screen baskets used so far and feature low energy consumption.

In order to secure the energy savings of over 20% as agreed in the contract, a few optimiza-

“This optimization demonstrated that changes to individual units or sub-systems influence the ecological footprint of the entire company.”

**SEBASTIAN STOCKFISCH**  
Head of deinking and effluent treatment, LEIPA



tions were needed first of all, but were completed quickly. “There are always small snags in any project. But everything was resolved very well overall,” Gerhard Laue, LEIPA project manager, confirms satisfactory execution of the project. “At last, we no longer have to think about screening any more after this rebuild – that is certainly the biggest compliment for ANDRITZ as supplier.”

“Just like the screw press rebuild in 2013, this optimization demonstrated that changes to individual units or sub-systems influence the ecological footprint of the entire company,” Stockfisch concludes.

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## Highlights

# NEW ORDERS

### COMPLETE LINES AND SYSTEMS

**Burgo Group, Avezanno, Italy**  
Conversion to liner and fluting machine, upgrade dryer section, complete stock preparation line incl. reject handling system and ShortFlow de-aeration  
Conversion from graphical to packaging grades

**First Quality Tissue, Lock Haven, USA**  
PrimeLineTAD tissue machine  
Through-air-drying technology for premium products

**Hangzhou Pengtu, Hangzhou, China**  
Complete spunlace line

**Hebei Yongxin Paper, Yongxin, China**  
PowerFluid CFB boilers, residue concept  
ANDRITZ' re-entry in Chinese reject/sludge fired boiler market

**Confidential customer, Thailand**  
EcoFluid BFB boiler, residue concept  
ANDRITZ' re-entry in Thai market

**Nine Dragons Paper, Taicang, China**  
PowerFluid CFB boilers, residue concept, EPS supply  
ANDRITZ' re-entry in Chinese reject/sludge fired boiler market

**Nine Dragons Paper, Quanzhou, China**  
PowerFluid CFB boilers, residue concept  
ANDRITZ' re-entry in Chinese reject/sludge fired boiler market

**Dongguan Nine Dragons Paper, Dongguan, China**  
PowerFluid CFB boilers, residue concept  
ANDRITZ' re-entry in Chinese reject/sludge fired boiler market

**Sea Dragon Resources, Chongqing, China**  
PowerFluid CFB boilers, residue concept  
ANDRITZ' re-entry in Chinese reject/sludge fired boiler market, EPS delivery

**Jiangsu Bohui Paper Industry Defeng, Jiangsu, China**  
P-RC APMP system and pulping and broke system for PM 4  
Biggest hardwood mechanical pulping system worldwide

**Shandong Bohui Paper Industry Zibo, Shandong, China**  
FibreFlow drum pulping, deinking, refining, broke and reject handling system

**Shapoorji Pallonji, Gisagara District Rwanda**  
2 EcoFluid BFB boiler island incl. fuel receiving, screening with oversize crushing  
First fluidized bed boilers supplied to African market

**Sun Paper Holding Lao Xepon, Lao People's Democratic Republic**  
Main process equipment for the woodyard, MC equipment, screening plant, ozone bleaching stage, pulp drying plant, HERB recovery boiler, LimeWhite white liquor filter, methanol liquefaction system

**TTL, Lörrach, Germany**  
Complete needlepunch line

### EQUIPMENT/UPGRADES

**Blue Paper, Straßbourg, France**  
20 new PrimeDry Steel cylinders to replace old cast iron cylinders  
Largest drying cylinders ever made of steel (shell length of 9.4 m)

**BillerudKorsnäs Gruvön Mill, Grums, Sweden**  
Brown stock washing modernization incl. new DD-Washer, MC- Pumps, and a ANDRITZ Pulp Screw Press  
DD-Washer enables to achieve customer's extremely high purity request in washing stage

**Chelny Paper Mill, Chelny, Russia**  
FibreFlow drum and reject handling equipment  
First FibreFlow drum pulping technology in Russia

**Consorzio Cartiere, Tivoli, Italy**  
PrimeFlow SW headbox, elongation of the Fourdrinier former, PrimePress X shoe press, PrimeFilm pre-coating, PrimeReel reeling, rebuild dryer section, and stock preparation line upgrade and broke pulper

**Knauf Petroboard, Kommunar, Russia**  
Main components for the approach flow system, fiber recovery system and rebuild of the complete wet section incl. 3 PrimeFlow SW headboxes

**Rottneros Bruk, Rottneros, Sweden**  
Flash dryer heating system  
Heating system to enable usage of energy from biomass boiler, replacing fossil fuel

**Oji Fiber Solutions Tasman Mill, Kawerau, New Zealand**  
Three effect pre-evaporator for black liquor

**Sappi Ngodwana mill, Mpumalanga, South-Africa**  
CLB modifications, new bale press, Lime Kiln and recausticizing plant upgrade

**Södra Cell, Mörrum, Sweden**  
Lime Kiln upgrade to LimeFlash kiln  
Upgrade will increase capacity and lowering dust emissions

**Ust Ilimsk Branch of JSC Ilim Group Ust Ilimsk, Russia**  
Drying machine rebuild

# PROJECT START-UPS

### COMPLETE LINES AND SYSTEMS

**AUTOTECH Nonwovens, Surat, Gujarat, India**  
Complete needlepunch line  
For the production of automotive fabrics

**Fortum Värme, Värtaverket, Stockholm, Sweden**  
Biomass Powerfluid CFB boiler  
Largest biomass boiler in Sweden

**Hengan Group, Chongqing, China**  
PrimeLineTM W8, incl. stock preparation and automation for PM 23 and PM 24  
Start-up of 12th and 13th ANDRITZ tissue machine in Hengan Group

**Hebei Yihoucheng, Baoding, China**  
PrimeLineCOMPACT II, incl. stock preparation, drives and automation

**Lee & Man, Vietnam**  
Recycled fiber and stock preparation line

**OKI Pulp & Paper Mills, Indonesia**  
HERB recovery boiler and woodyard with nine new chipping lines  
The recovery boiler is 50% larger than any other worldwide.

**Riikinvoima, Varkaus; Finland**  
Waste-to-energy power plant with CFB boiler  
First full waste-to-energy power plant in Finland

**Stora Enso Packaging Beihai, Guangxi Province, China**  
Complete wood handling line

### EQUIPMENT/UPGRADES

**BillerudKorsnäs, Skärblacka, Sweden**  
LimeSlaker and green liquor cooler  
Highlight of the order if there is any

**Bukocel, Bukoza, Hencovce, Slovakia**  
Upgrade of Fourdrinier machine with new steam blow box

**Caima Indústria de Celulose, S.A. Constância – Sul, Fabrica Constancia, Portugal**  
Cutter and baling line rebuild

**Metsä Tissue, Kreuzau, Germany**  
FibreFlow drum for tissue

**Mercer Stendal, Arneburg, Germany**  
Mechanical and process improvements in batch cooking with SureFlow™ screen plates

**Nippon Paper Chemical, Gotsu, Japan**  
MVR evaporator for MG sulfite liquor  
First MVR evaporator for sulfite liquor in Japan

**Phoenix Pulp & Paper, Khonkaen, Thailand**  
Lime kiln key equipment  
EPS delivery



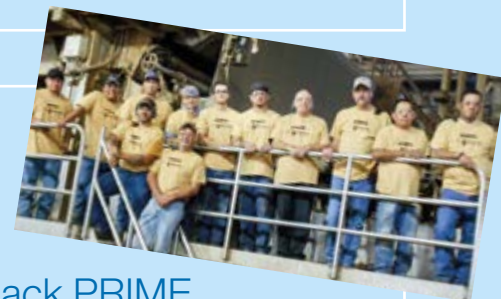
# DID YOU KNOW THAT...

... ANDRITZ uses Cloud Engineering to help customers fully collaborate on modernization and upgrade projects?

ANDRITZ has used computer-based engineering tools internally for some time, but is now making its software and standardized templates available to customers on the Cloud. Residing on either ANDRITZ servers or on the customers' Cloud Engineering gives customers instant access to the designs, diagrams, equipment lists, etc., as soon as they are available. Approvals, workflows, communications, and efficiencies are greatly enhanced.

Get more information at:

[www.andritz.com/cloudengineering](http://www.andritz.com/cloudengineering)



... a WePack PRIME forming fabric ran a record 273 days on a linerboard machine for Bio-PAPPEL?

This double Fourdrinier machine (17.3 ft width and speed of 2,500 ft/min) runs on 100% recycled and produces high performance linerboard grades. The WePack PRIME GE fabric that set the record was on the top position. The sheet-side of the fabric is ideal for enhancing paper surface properties – the machine-side is made of a special low-friction material to achieve longer life.

Find more information and send your congratulations to the team at:

[www.andritz.com/WePack](http://www.andritz.com/WePack)



... Brazilian pulp producer Fibria and ANDRITZ co-authored a presentation to the 8<sup>th</sup> International Colloquium on Eucalyptus Pulp in Chile about the results of their mill-scale polysulfide cooking trials?

The distinctive orange-colored polysulfide cooking liquor is better known with softwood applications, but trials were conducted on a continuous digester at Fibria's Aracruz mill producing bleached eucalyptus pulp with notable results for yield improvement, pulp strength increase, and reduction in specific energy required to refine the pulp.

Get more information about polysulfide cooking at [www.andritz.com/polysulfide-cooking](http://www.andritz.com/polysulfide-cooking)

**ANDRITZ**  
Pulp & Paper