

SPECTRUM

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ANDRITZ
Pulp & Paper

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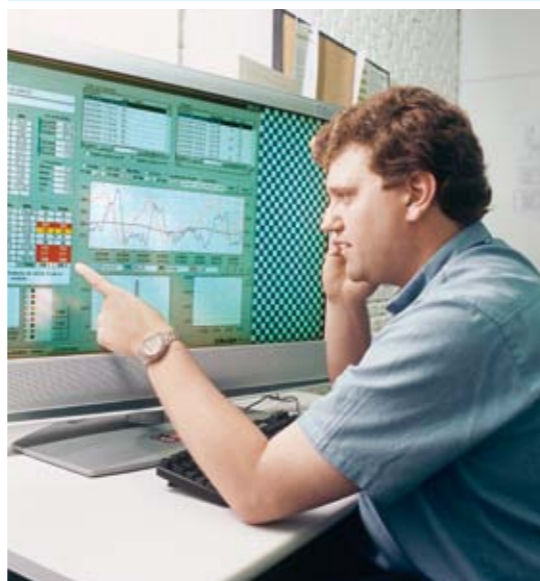
SINDUS OPP: ULTRA-FAST PAYBACKS

Studies show that about 80% of the control loops in mill process control systems are poorly tuned or turned off. Quite often, the process runs better in manual mode than automatic.

A new service called Sindus OPP (optimization of process performance) combines powerful signal processing and statistical analysis + expert knowledge of process and equipment to prioritize the opportunities and make corrections.

The savings can be quite dramatic. To date, 85% of Sindus OPP solutions have paid for themselves in less than three months (e.g. annual reduction in ClO₂ in a bleach plant of USD 1 million; annual savings in refiner plate changeouts of USD 500,000).

Next issue of Spectrum: actual case studies showing the dramatic impact of Sindus OPP.



Eyes North and South

Recently we had the opportunity to brief the international trade journalists who were attending the SPCI 2011 event in Stockholm. We thought you might be interested of hearing their questions and the main topics in our briefing.

Most of their questions were about how ANDRITZ is doing (we'll cover that in a moment) and what the situation is in the growth areas – southern hemisphere, dissolving pulp, and renewable energy.

As a public company, ANDRITZ reported year-end figures and first quarter results in the general press. Of special interest to the trade press was the Group's record order intake of 4,132 MEUR in 2010 (1,388 MEUR for Pulp & Paper) which gives us a solid foundation for 2011 and a little beyond.

The journalists were also interested in our acquisition of a part of Austrian Energy

(now called ANDRITZ Energy & Environment). You can read more about AE&E's capabilities on page 41. This strengthens our existing portfolio of power technologies (see page 4 for a report on the Fortum biomass CHP plant).

Then the question from the journalists, "Where is the growth coming from?"

We see it on two fronts: orders for new lines in the South and market share growth in the North. The big, headline-producing orders are in South America, such as Eldorado Brasil and Montes del Plata in Uruguay – our company's largest order in history (see page 8). Plus, there is the new pulp mill for JK Paper in India.

But while greenfields draw attention South, we have been very active in the "mature" North, particularly Sweden (Holmen Hallstavik, Södra Värö, M-Real

Husum, Billerud Gruvön, Stora Enso Skutskär, SCA Östrand, and Domsjö). Growing, too, is our equipment rebuild business in North America, which has essentially doubled since 2006. We are investing in the expansion and upgrade of our facility in Pell City, Alabama USA to reduce lead times (page 18).

Growth also comes by developing new products and services. One "hot" trend is the conversion of production lines to dissolving pulp to meet the needs of the textile industry (page 42). Another growth area is renewable energy. We see potential in producing torrefied biomass for more effective co-firing in boilers and are building a demonstration facility in Denmark to prove out our technologies (page 42).

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Heat + power + efficiency in Pärnu

When Fortum started up a combined heat and power plant in the city of Tartu, it was said to usher in a new era for the Estonian energy industry. Now, the company has completed its second plant – this time in the city of Pärnu – and is making further advances. ANDRITZ delivered the power boiler island. It is the first installation where ANDRITZ integrated its technology for fuel and ash handling with its biofuel boiler.



▲ Fortum's CHP plant in Pärnu, Estonia considerably increases energy efficiency and the biomass fuels reduce CO₂ emissions by more than 60%. ▼

Work was recently completed and performance tests have been run on a new combined heat and power (CHP) plant in the city of Pärnu, Estonia. Pärnu, with its population of about 44,000, is Estonia's fifth largest city and, due to its location on the Baltic Sea, is a popular summer vacation resort.

The CHP plant is replacing aging capacity and natural-gas based production. Total value of the investment is about EUR 80 million according to Heikki Jaakkola, Fortum's Project Manager for Large Projects.

Not only does CHP considerably increase energy efficiency, the biomass fuels reduce CO₂ emissions by more than 60%. The CHP plant was fully operational at the end

of 2010, with the project being completed about three weeks ahead of schedule, according to Riho Kõks, Fortum's Project Manager from Estonia.

Jukka Jurtila, Process and Commissioning Manager for ANDRITZ, confirms. "We first fired the boiler in early July on natural gas and moved to solid fuels about three weeks later," he says. "The trial-on-completion run was performed and the boiler was handed over to Fortum with everything ready to go by year's end."

Production capacity of the CHP plant is 45 MW heat (for district heating) and 24 MW electricity. The biomass fuel, according to Jaakkola, is mostly forest and sawmill residues from local markets, and the remaining portion will be peat.

"We need the flexibility to burn various fuels with various moisture contents in various combinations, based upon the most favorable market conditions at the moment," he says.

An important step

The Pärnu plant follows a very similar and successful project in the city of Tartu in Estonia where both Jaakkola and Kõks worked together. Though Jaakkola is a resident of Finland, he has been quite involved in Fortum power projects in Estonia for the last several years.

"Pärnu is an important step in our growth strategy in the Baltic countries," Jaakkola says. "Fortum is one of the leading companies in combined heat and power production."

This view inside the boiler building shows the bottom ash handling system. The ash handling, as well as the fuel feeding system, was developed by ANDRITZ. ▼



"I have to say I was impressed with the ANDRITZ project team. They were very professional and a pleasure to work with."

Riho Kõks, Fortum Project Manager

"We need the flexibility to burn various fuels with various moisture contents in various combinations, based upon the most favorable market conditions at the moment."

Heikki Jaakkola, Fortum Project Manager for Large Projects



Fortum acquired the heating operations in Pärnu from Vattenfall in 2006 and made it part of Fortum Termost AS. Its district heating network is the fourth biggest in Estonia with annual sales of about 190 GWh. Fortum has since seen the opportunity to invest further not only in district heating, but also energy generation and distribution in the city. "We performed a feasibility study, developed the technical requirements, and sent out the bids in 2008," Jaakkola says.

"New" supplier

"At the time we sent out bids, I have to admit I knew very little about ANDRITZ," Jaakkola says. "ANDRITZ was just entering the biomass power boiler business and there were no operating references that Riho and I could visit."

"I also didn't know anything about ANDRITZ before this project," Kõks admits. "There was some risk in selecting a new supplier, but it was not a major obstacle for us."

Jaakkola explains their position by saying, "We knew their manufacturing operation in Varkaus. We knew they had experience executing large projects. We certainly knew the bubbling fluidized bed (BFB) technology. We learned the credentials of their designers and engineers. The only open question was whether ANDRITZ could burn solid fuel."

"And that is now proven," Kõks says, citing a project that was safe (no accidents in two years and 450,000 manhours), ahead of schedule, and within budget.

INSIDE THE PÄRNU CHP PLANT



Integrated scope for ANDRITZ

ANDRITZ's scope of supply included the boiler, fuel feeding system, and ash handling equipment.

"This is the first time our two divisions (boilers and wood processing) have worked to provide an integrated delivery to a customer, and it worked very well," says Petri Markkanen, ANDRITZ Project Manager for the boiler plant.

Heikki Valtokari, ANDRITZ Sales Manager for the fuel feed/ash handling installation, agrees. "This was our first delivery of technology for biomass feeding and ash handling, so it was an important reference for us," Valtokari says. The delivery included the systems for fuel feeding (silos, screw reclaimer, balancing bin with screw feed-



▲ An inside view of the boiler equipment.

“This is our first delivery of technology for biomass feeding and ash handling, so it is an important reference for us.”

Heikki Valtokari, ANDRITZ Sales Manager



ers, and rotary feeders), sand feeding for the BFB boiler (silo and screw feeder), bottom ash handling (cooling screws, closing valves, rotating ash screen, and conveyors), and fly ash handling (screw feeders, wet and dry discharge systems, conveyors, and silo).

The ANDRITZ scope was delivered on an EPC (engineering, procurement, construction) contract, excluding the concrete foundations. The boiler plant consisted of the boiler and auxiliary equipment including combustion air preheaters, feedwater tank and pumps, fans, bag filter, stack, field instrumentation, motors, and the boiler house.

According to Markkanen, Pärnu is the fourth biomass boiler that ANDRITZ has delivered and started-up. “This was our first delivery to a large CHP and power production company and their requirements are in some areas more demanding than pulp and paper customers,” he says. “However, the challenges were all successfully met during the project.”

Effective organization, fast response

“I have to say I was impressed with the ANDRITZ project team,” Kõks says. “They were very professional and a pleasure to work with.”

Kõks admits that at the beginning he was not sure how it was going to work out. “In our traditional power plant business we see the same group of supplier people throughout the entire project,” he says. “ANDRITZ brought in different specialists during the project and I questioned how they were going to manage the hand-offs. To my surprise, they handled it seamlessly. Petri Markkanen and his team had everyone reading off the same page.”

Jaakkola has a similar impression. “This was a very nice team of people to work with – from the project team in Varkaus, Finland to the site people,” he says. “They were open to our ideas, adaptable to our way of working, and extremely fast to respond when there was a problem. I would say it was an extremely effective organization.”

A point of interest for Kõks was the weekly reporting from the ANDRITZ project team. “They graphed a simple curve each week showing how much was completed versus the plan,” he says. “You could see where they were at all times and, if a holiday was approaching, how they were actually ahead of schedule so that they would be on-plan when the holiday was over. The S-curve graph is something I think we can use within our own company for future projects.”



▲ The balancing bin, proportioning the biomass fuels, is the most critical part of the fuel feeding system.



▲ Riho Kõks (left) and Heikki Jaakkola standing inside the boiler building.



Another tell-tale clue for Kõks was during the commissioning phase. “Jukka Jurttila (commissioning manager) is a very experienced manager and a team player,” he says. “His team did an excellent job of training and working with our operators. I was really surprised that, after only three or four days of operating, ANDRITZ gave over control to our night shift operators. They were there to supervise, but seemed quite confident that our operators could handle any situations.”

Next?

“The Pärnu plant has been operating quite well since start-up, basically at 100% load,” Jaakkola says. “We’ve got a few small things to clean up and I have been impressed with ANDRITZ’s eager response even after the handover.”

What’s next? “Riho and I are working at the early stages on another project to perhaps work together – either in Finland or somewhere else in the Baltic,” Jaakkola says. How would it be to work with ANDRITZ again? “Of course, their price would have to be competitive,” he says with a smile. “But I would welcome it from a personal perspective.”

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“The trial-on-completion run was performed and the boiler was handed over to Fortum with everything ready to go a few weeks ahead of schedule.”

Jukka Jurttila, ANDRITZ Process and Commissioning Manager

FROM THE GROUND UP

The mill site in the foreground, ready for construction,
with the Rio del Plata (river) in the background.

Building from the ground up

Dear Readers: Regular readers of SPECTRUM know that our articles are usually written after a project starts up. This time, we have a rare opportunity to publish a series of articles walking step by step through the execution of a major project – the 1.3 million t/a greenfield market pulp mill in Uruguay for Montes del Plata. We sincerely thank Montes del Plata and its suppliers/partners for the opportunity to journey with them as they plan, build, commission, and start up a world-class pulp mill.

Dispatch #1: Montevideo, Uruguay

The scene is a typical meeting room: chairs surrounding a large table filled with charts, papers, laptops, coffee cups, and the ever-present LCD projector. It could be from anywhere, but this one happens to be on the 6th floor at 1470 Calle Paraguay – the project planning office for Montes del Plata (MdP) in Montevideo.

Six gentlemen are seated around the table, sleeves rolled up and fully engaged in discussion. The tone is business-like, but congenial. Occasional laughter floats through the closed doors. These six men seem to be working well together as they tick off decision items on the agenda.

The six are the Steering Committee for a greenfield pulp mill project: two from Arauco and two from Stora Enso are joined by the CEO of MdP and the Project Director. Three Chileans, one Finn, one German, and one Brazilian – an international team

with an incredible depth of experience and industry knowledge.

The two from Arauco are Franco Bozzalla (Managing Director for the pulp business) and José Vivanco (Pulping Operations Director). Erwin Kaufmann, a Chilean from Arauco's panelboard business, is the MdP CEO. The two from Stora Enso are Sakari Eloranta (Senior Vice President) and Bernd Rettig (Executive Vice President). The Project Director is Carlos Pastrana (formerly with Aracruz and Fibria in Brazil).

They take a break from their business at hand to answer questions and sit patiently for a few photographs. Then, it's back to work.

A modern history

"This is not a nation with a long tradition of pulp and papermaking," Rettig of Stora Enso explains. "So it creates some interesting challenges for us."



▲ From May 2008 until April 2010, a massive amount of earth was moved, boreholes were drilled for civil works, environmental baselines and approvals were established, even the evaluation and preservation of a wrecked barge in the port area (deemed historically significant) was completed. The site is now ready for ANDRITZ's Uruguayan subcontractors to begin the civil works.

Steering Committee (left to right): Vivanco, Eloranta, Pastrana, Bozzalla, Rettig, and Kaufmann. ▼



Actually, the history of modern pulp production in Uruguay began with the construction of the Botnia (now UPM) mill in Fray Bentos which started up in 2007. The mill has been a shining example of sustainable production, environmental safety, and high-quality jobs for the citizens of Uruguay. (See Issue 17 – No. 1/2008 of Spectrum for more about Fray Bentos).

Before Botnia was built, the Spanish Grupo ENCE announced plans to erect a 500,000 t/a pulp mill near Fray Bentos. But it became apparent that building another mill so close was not a good idea, so ENCE found a location further south near Conchillas in the region of Colonia. The site is on the Rio del Plata (River of Silver) for easy transport of logs, chips, and pulp.

At different times and at different places, both Arauco and Stora Enso purchased land in Uruguay. Their forest parcels were small, yet, both companies had the dream of someday building a pulp mill. As Bozzalla of Arauco puts it, "Separately, it was going to take a long time, and perhaps would never even happen."

"We have known Stora Enso for many years," says Vivanco of Arauco. "We were partners in a forestry company in Chile

over 20 years ago, and we are partners today in pine and eucalyptus plantations supporting a paper mill for coated mechanical grades in Brazil."

But these partnerships alone were not a strong enough reason for a large joint venture. According to Vivanco, "Separately, we did not have enough land to support a mill of this size, and to be competitive, you need size. So, we became 50:50 venture partners in order to look for opportunities in Uruguay."

Opportunity knocks

The opportunity came when ENCE announced the sale of its Uruguayan assets to raise cash at home. Arauco and Stora Enso formed MdP to combine their land holdings with the assets from ENCE. In 2009, MdP purchased 130,000 ha of ENCE land and plantations, 6,000 ha of leased land, a port and barge terminal, a chipping plant, and a nursery. MdP now has a total land base of approximately 250,000 ha.

"This was an important step for us, given that cost-competitive, plantation-based pulp is a cornerstone of our strategy," says Eloranta of Stora Enso. "This transaction secured the strategic raw material



▲ As part of its commitment, MdP will provide employment for Uruguayans, including some of the 1,100 people in the village of Conchillas and three small towns around it. MdP will also build an extension to the highway system, as well as other improvements for the area.

supply for a 1.3 million t/a pulp mill. Now, the dream of building a world-class market pulp mill in Uruguay accelerated from 'someday' to 'soon'."

Size based on sustainable wood supply

The limiting factor in choosing the mill size is forest resources, according to Rettig. "We look at our combined forestry assets and what our sustainable wood availability will be," he says. "We sized the mill at 1.3 million t/a. We could have gone larger, but then wood transportation costs begin to have a negative impact."

The output of the mill will be split 50:50 between the two owners. "We will decide independently what to do with our pulp, either for market or to be used inside the company," Eloranta says.

Recognizing the challenges

"We want this mill to be a reference place," Bozzalla says, "where people will want to come and see how to operate with world-class sustainable standards. Obviously that means we need the right people here in Uruguay."

"And, that is our biggest challenge," says Rettig. "In many ways we are starting from the ground up here. Our plan is to train and develop the local people to do all these things."



"I think ANDRITZ has a golden opportunity to prove that it can build a complete greenfield mill, using some key local subcontractors. If they can do it here, they can do it anywhere."

Franco Bozzalla, Managing Director, Arauco

"In two years, it is our goal that this mill should be run by Uruguayans," Vivanco says. "We need to recruit local people, train them, and trust them. That is a big investment."

"This is not a country with a tradition in building large industrial complexes or operating pulp mills," Pastrana says. "We are coming from the outside, and we know that people might be sensitive to this. We must respect local customs and provide the foundation for Uruguayans to grow with this mill."

According to Kaufmann, the size of the country presents a particular challenge to MdP. "The total population is 3.5 million people," he says. "Trained resources for the civil works, piping, and erection are very limited. And unlike when Botnia came here and unemployment was high, we now have to compete for resources."

Helping to address these challenges is the government of Uruguay. "Our investment has been very welcome by the local community and the government," Kaufmann says. "We signed an Investment Contract with the government that grants us certain benefits (such as the free trade zone) and receives certain commitments from us (such as building a special highway to connect the mill to a main highway). Also, we have committed to hiring as many Uruguayans as we can. Still, there will be

"In many ways we are starting from zero here – from the ground up."

Bernd Rettig, Executive Vice President Stora Enso

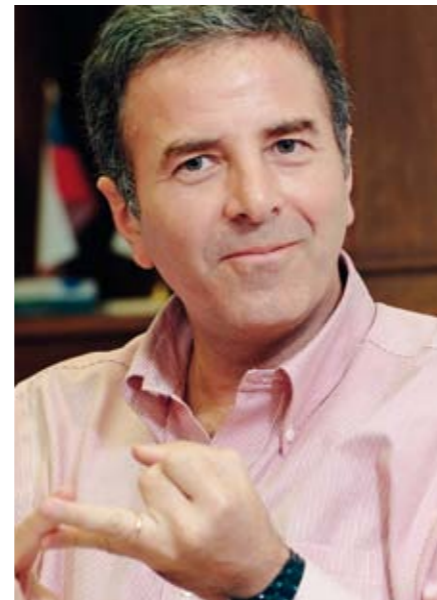


"With the ENCE transaction, the dream of building a world-class market pulp mill in Uruguay accelerated from 'someday' to 'soon'."

Sakari Eloranta, Senior Vice President of Group Investments, Capex, and Pulp Competence, Stora Enso

some cases where we will have to bring in people from outside Uruguay because their specialized skills are just not available in this country yet."

It has been calculated that, when operational, MdP will increase the GDP of Uruguay by 2.5%. It is the largest and most important private investment in the country's history.



Biggest order

The clock is already ticking. March 2013 is the announced start-up for the MdP project. "We have purchased all the main packages, with the exception of the chemical plant," Pastrana says.

ANDRITZ is the main technology supplier – providing the production equipment for the woodyard, fiberline, pulp drying plant, chemical recovery, and power island. It is the largest order in the company's history.

Any concerns about placing such a large order with a single supplier?

"Of course!" the six men say in unison. "It was a difficult, but I think a wise, decision," Bozzalla says. "We are minimizing the interfaces. ANDRITZ has experience in Uruguay with the Fray Bentos mill. The value proposition of their final offer was attractive enough to select them."

"Our main concern is not the pure technical part," Pastrana says. "We are purchasing the best available proven technologies and will not be experimenting with anything new. In every project, project management is key."

"I think ANDRITZ has a golden opportunity to prove that it can build a complete greenfield mill using some key Uruguayan subcontractors as part of our commitment to add value locally, in a country that does not have all the necessary resources to do it," Bozzalla says. "If they can do it here, they can do it anywhere."

Exciting and fun

MdP has an advantage over other greenfields in that usually the contracts are signed and then site preparations begin. "In our case, the site is ready," Pastrana says. "We can start construction immediately. Site mobilization begins in May and by June the real work begins!"

"We cannot build this mill without everyone being aligned," Bozzalla says. Rettig agrees. "There can't be an 'us versus them' mentality," he says. "We have to work as one team, with one goal."

MdP has defined what will make the project a success: on time, on quality, on budget, and a learning curve equal or better than the best ever. "Less than five months would be excellent," Pastrana says.

And, what is the mood now? "We are very excited," the group exclaims. "And also very importantly, we are having fun," Bozzalla says.

"We are excited," Kaufmann explains, "and we understand the importance of this for the country of Uruguay. This is a big project for the country, so we have to ensure that it is sustainable. This is true in every country, but here it has special importance."

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"We are coming from the outside, and we know that people might be sensitive to this. We must respect local customs and provide the foundation for Uruguayans to grow with this mill."

Carlos Pastrana, Project Director, MdP



"We need to recruit local people, train them, and trust them. That is a big investment."

José Vivanco, Woodpulp Operations Director, Arauco



"We understand the importance of this for the country of Uruguay. This is a big project for the country, so we have to ensure that it is sustainable."

Erwin Kaufmann, CEO, MdP

Refining paper quality on PM4

Even with a major investment in the world's most modern white paper machine, Carlos Brás still sees the refiner as the heart of the papermaking process. A former university professor and an accomplished student of the industry, Brás has a strong basis for his viewpoint.

When Carlos Brás speaks, he has your full attention. His training as a university instructor, his technical knowledge, and his ability to make provocative statements with perfect timing all combine to make him a very persuasive personality.

For example, the statement, "Refining is the heart of the papermaking process. The paper machine only takes out water and puts fibers together."

Not what you would expect to hear from a papermaker who is ramping up the world's largest and most sophisticated machine for the production of uncoated fine paper. But his logic is solid.

"You might think I have an obsession with refiners," Brás says with a wink, "but I challenge you to take fibers directly from the pulp mill into a paper machine. What do you get? Garbage! You can have the best machine in the world, but the bonding qualities come from the fiber itself and from the refining."

From thermodynamics to papermaking

Brás did not know anything about refiners, or paper machines for that matter, when he joined the team to install the first paper machine for Portugal's Portucel Soporcel Group in 1988. The fact that he came to the paper industry at all was mostly by

chance. He had been accepted into a PhD program in thermodynamics and was preparing to move to the UK. But a chance meeting with a Soporcel executive diverted his plans.

As Paper Mill Manager at the Setúbal mill, Brás is enjoying the ramp-up of his team's latest achievement – PM4. The machine is 11 m wide and can produce at a design speed of 1,800 m/min. The project is so unique that Portucel Soporcel set up a special subsidiary named "About The Future" for PM4's production.

High quality, competitive advantage

PM 4 produces very high quality office paper. "High quality has always been a competitive advantage for us," Brás says. "We have recognized brands, at the top in Europe, based on very good eucalyptus fiber. The brands have good printability, good bulk, good formation, and good opacity."

It is because of this fiber source that Setúbal was chosen as the site for PM4. "We have the pulping capacity at Setúbal

"Refining is the heart of the papermaking process."

Carlos Brás, Paper Mill Manager at Setubal mill



▲ A view of the TwinFlo refiners (eight for hardwood and two for softwood) delivered by ANDRITZ for PM4's stock preparation.



Eunice Alves, Laboratory Technician at Portucel Soporcel, takes a sample of the paper stock for testing. ►



and excellent power production," Brás explains. "We estimate that we will reach our full capacity of PM4 in 2012."

Helping to achieve this ramp-up is the stock preparation and PM approach technology from ANDRITZ: a FlyingWing Deculator deaeration system with integrated cleaners; 10 TwinFlo refiners (eight for hardwood and two for softwood); a ModuScreen broke screening system; and ModuScreen protection screens.

Designed for flexibility

"I did not have much experience with ANDRITZ before this project," Brás admits. "For the project itself, I was not so involved the details with the suppliers – only the conceptual design for the machine and auxiliaries. PM4 is designed to give us flexibility, high speed, and high productivity at

the same time. What is important about this machine is the flexibility."

Refining eucalyptus has its own special challenges. When PM4 was conceived, Brás looked within his own company for solutions. On PM1, there are double-disc refiners and a certain refining strategy. PM2 has a different concept. PM3 uses conical refiners with another concept. "We have everything inside the company," Brás says. "So why not put everything together and study it?"

The team solicited support from the Group's research and development center in Portugal – and from suppliers like ANDRITZ. According to José Matos, the Area Engineer during the project and now Process Engineer dedicated to stock prep, additives, and water treatment: "The se-

lection of refiners was key to my area. We did studies and comparisons to arrive at the best concept in terms of refining quality and energy savings. After choosing the refiner supplier, we put the broke screening and the pulp screening in the same package. These are important also."

Matos knew ANDRITZ from PM1 (Deculator and PM approach) and PM2 (refiners manufactured by ANDRITZ). "Their equipment is very reliable and runs very well, so ANDRITZ had a good reputation inside our company."

The PM4 project was completed in 20 months – a very fast track. "Today, we are fibrillating the fibers in a smooth way so that we have enough bonding points without damaging the fibers," Matos says.



“Traditionally we focused on how to prepare the best fibers. Now, we have the added challenge of doing it with less energy consumption.”

José Matos, Portucel's Process Engineer

The newest concern is energy. “Traditionally we have focused on how to best prepare fibers in refining to make paper,” Matos says. “Now, we have the added challenge of how to refine better with less energy.”

The About The Future plant is designed to save energy well into the future. There are four lines with two refiners in series, but the motors are dimensioned to process the fibers with just one refiner per line. “We expect to accomplish this by decreasing the specific energy,” Matos says. “We have good experience on PM3 shutting down one refiner per line. It is possible to save a significant amount of no-load energy.”

Taking out air and impurities

António Sequeira was Project Manager for PM4. Sequeira became involved in discussion with ANDRITZ about the short circulation. (For the uninitiated, he describes short circulation as the system that con-

nects the thick stock cleaners, Deculator, machine screens, headbox, forming section, and wire silo in a continuous loop.)

“We ended up with having the first and second stage cleaners together with the Deculator,” Sequeira says. “This is a highly productive machine. We felt the cleaners would be more permissive of consistency increases as we ramped up production. These auxiliary systems should not interfere with the production or quality of the machine itself. They remove impurities and the Deculator removes the air from the stock. The technology is doing exactly as we expected.”

Sequeira was impressed with the project execution. “Honestly, I was expecting the project to be a bit more difficult with the different ANDRITZ guys from England, Austria, and Finland,” he says. “ANDRITZ managed well the internal flow of information. The project went very smoothly.”



▲ As part of the stock prep package, ANDRITZ also delivered the ModuScreen broke screening system and the protection screens.

A view of the ANDRITZ FlyingWing Deculator deaeration system with integrated cleaners. ▼



What was it like when the machine started up? “It was exciting for me – and exhausting,” Sequeira says. “The last month, we were commissioning at the same time we were still erecting, and we were pressing hard. But we promised two years before to have stock on the wire on August 15, 2009 and we made it!”

About The Future

“The future here at Setúbal is like it is for many other papermakers around the world,” Brás says. “We have to increase efficiency, reduce costs, and sustain or increase quality. There are some new grades that we need to make here. Our aim here is to place PM4 as one of the top efficiency machines in the world.”

That drive to improve is found everywhere within Portucel Soporcel. “We can't just sleep with what we have,” Sequeira says. “We have to get better and better – saving fiber, saving energy, working more productively.”

“It's a little bit strange for a company name, isn't it?” Brás concludes. “However, it's very meaningful. We have a very high-tech machine here and very skilled people. This combination is important for Portugal and it is all about the future.”

FIND OUT MORE AT www.spectrum.andritz.com



▲ A view of the modern control room for the world's largest and most sophisticated machine for the production of uncoated fine paper.



“This project was exciting for me – and exhausting. We promised two years before to have stock on the wire on August 15, 2009 and we made it!”

António Sequeira, Project Manager for PM 4



▲ Craftsmen at work. Rebuilding and upgrading feedline equipment for continuous digesters.

“Everything about this investment is designed to reduce our lead times and enhance our quality.”

Jay Stallings, General Manager of ANDRITZ Inc.'s Pell City service center



Rebuild for speed and precision

Large greenfield projects draw attention to South America and Asia. Yet, a majority of the world's pulp and paper is produced in the “mature” Northern regions. Here, the focus is on rebuilds and small upgrades as mills extend the life of installed assets without large capital investments. ANDRITZ understands this need and is investing to increase its rebuild capabilities in the USA.

Several times a year, over 150,000 racing fans make their way to Talladega, Alabama to watch professional NASCAR racers circle the 2.66 mile track in tight formations within inches of each other at speeds up to 220 miles per hour. The fans love the speed, the precision, and the excitement of race day.

Not 10 miles away from Talladega is a quieter place – Pell City – home to ANDRITZ Inc.'s service center. The excitement of race day may be lacking in Pell City, but speed and precision are still very important components for success.

“Our customers expect quick turnarounds for rebuilds,” says Jay Stallings, General Manager of the Pell City center. “But speed alone is not the story. They also expect precision-machining so that the components are brought back to original tolerances.”

The Pell City facility was built in 1983 as part of Sandy Hill, then was acquired by Kamy, then Ahlstrom, and now ANDRITZ. It was originally constructed to rebuild feedline equipment for continuous digester systems (still the workshop's primary workload), but is today expanding to rebuild other ANDRITZ products as well.

ANDRITZ is making a significant investment in upgrading and adding to the Pell City facility. In addition to more space under roof and four new employees, the investment includes an upgraded horizontal boring mill (“To add capabilities and reduce setup time,” according to Stallings), and an additional vertical boring mill. The work is to be completed by August of this year.

“Everything about this investment is designed to reduce our lead time,” Stallings

says. “Our business has essentially doubled since 2006. We are taxing the limits of our employee and equipment capabilities.”

Why the increase in business? “Mills are not buying much new equipment,” Stallings says. “So, rebuilds have become increasingly important in extending the productive life of their plant. Then too, more mills are seeing the benefits of having the OEM rebuild their equipment.”

One of the biggest benefits is the quality and repeatability of the rebuild work. “Our customers send their reliability engineers to inspect our shop,” Stallings says. “They

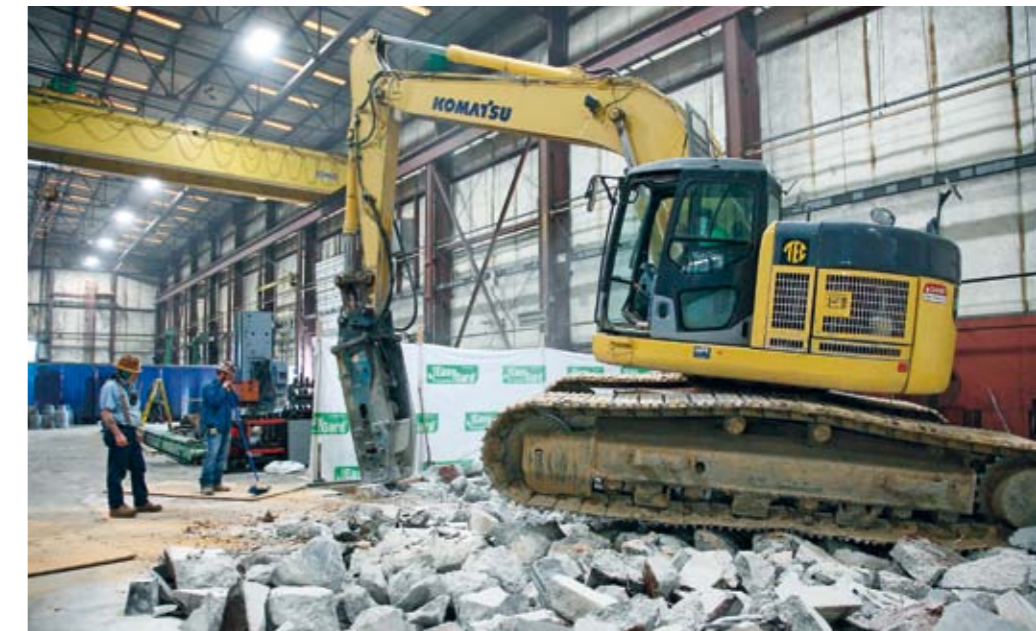
come to see how we do things and the quality procedures we have in place. Every customer visit makes us better because we learn what each customer considers important.”

As part of the project, Pell City committed to implementing the ANDRITZ 5S program for manufacturing excellence that is being executed at all manufacturing and service centers. 5S is an efficiency program that provides the assigned worker with everything needed at the work center.

FIND OUT MORE AT www.spectrum.andritz.com



Workers digging out the old foundation inside the Pell City center to prepare for the installation of an upgraded horizontal boring mill. ▼



Mechanical pulping at a crossroads

It seems we are at a crossroads – a turning point – in the development of mechanical pulping. While mechanical pulp has many benefits (yield and optical qualities being at the top), the competitiveness of mechanical fibers declines as energy costs rise. We spoke recently with Jan Hill and Peter Kaiser of nsiFOCUS, two experts with lifetimes of experience in mechanical pulping, about the role of ANDRITZ's new ATMP technology in helping the industry through this critical time.

In order to meet the challenges facing mechanical pulp producers, ANDRITZ developed an Advanced TMP (ATMP) process – to produce mechanical pulps with high quality while significantly reducing energy consumption.

The ATMP process encompasses several patented ANDRITZ technologies, according to Marc Sabourin, Global Director of Process Development for ANDRITZ's mechanical pulping business. By 2002, the key building blocks of RTS refining, RTPressafiner chip destructuring, and RTFibration were in place. "As a next step, we investigated using chemical treatment to enhance pulp strength further, while reducing the energy consumption of the TMP process," Sabourin says. "Our preliminary trials with chemical treatments were very encouraging."

Necessity is the mother of invention

The impetus for further development was spurred by commercial pressures, according to Peter Bräuer, Director of Technology & Processes of ANDRITZ. "It started in the early 2000's when Norske Skogindustri (NSI) announced it would build a new newsprint machine at their Jaguariava (Pisa) mill in Brazil," he explains, "and would also invest in a new 600+ t/d pulping line to feed the new machine."

The problem (for ANDRITZ) was that NSI favored a pressurized groundwood (PGW) process at the time, due to the energy savings over traditional TMP. "We did not offer a PGW process, and we wanted very much to be part of NSI's expansion," says Johann Aichinger, Director of Technology & Processes. "But it looked as if we would be shut out. It seemed an opportune time

to discuss our ATMP design plans and see if we could forge a way together with NSI."

The missing link: chemical treatment

Jan Hill, formerly an R&D Manager for NSI but now recently retired, recalls well the situation in 2003 when Aichinger came to a meeting with NSI. "Johann brought to our attention some research," Hill recalls, "that showed good results with chip destructuring prior to primary refining, good results with high-intensity refining, and good results with sodium bisulphite application. He floated the idea of combining the existing ANDRITZ technologies with chemical treatments in the same line. Though he said he couldn't promise anything, he asked if we would fund some pilot work together. We agreed to his proposal."

Jan Hill, formerly an R&D Manager for NSI (left) and Peter Kaiser, Manager of Fiber and Pulp for nsiFOCUS. ▼



"We now know how to produce pulp with the same characteristics as traditional TMP, but with 30% reduction in energy demand."

Jan Hill, R&D Manager for NSI (recently retired)

"We knew we were on to something good," Aichinger recalls, "if we could just develop it further. Having Norske Skog involved made the effort more valuable and allowed us to explore the full potential of this project."

With RTFibration, ANDRITZ had a means of better separating the dominant tasks of primary refining – chip defibration and fiber fibrillation – into two distinct steps. Now, with NSI's interest, there was a concerted effort to target the application of chemicals at the right point in the process. Working in partnership, ANDRITZ and NSI were able to better understand the effect of the different process components behind what is now ATMP.

"We ran the trials and the results were more than additive," Hill says. "You might expect 10% plus 10%, but we actually got something more than 30% reduction in energy demand. It was projected that with TMP at Pisa we would expend about 3.6 MWh/t. So a reduction in demand of 30%, which is nearly 1 MWh/t, is huge!"

Another thing that became apparent was the improvements in fiber characteristics. "We immediately obtained a pulp with higher bonding strength and brightness, along with significantly reduced energy consumption," Sabourin says.

In July of 2007, NSI ordered what would have been the first ATMP system in the world. But in March 2008, due to cost overruns of the PM2 construction, the project was stopped cold. "It is disappointing to invest time and personal energy into an exciting project like Pisa and then have it cancelled, but that's life and we move on," Hill says.

The project may have been cancelled, but the work did not stop. Pilot plant work was performed on all the different wood species used by NSI mills – from Northern Spruce to Southern Pine – in anticipation of the next opportunity. NSI also ran mill trials in Norway, Australia, and Brazil. By Hill's count, they have run about 160 pilot trials. "The mill trials for ATMP correlated very well," he says.

ATMP represents the single largest investment by ANDRITZ in any softwood mechanical pulping technology.

Innovation and coincidence

"When you hear someone speak about innovation, you hear about a 10-year sequence of events from initial idea to success," Hill says. "If you want to shorten that somehow, you need some good coincidences along the way. The Pisa mill was running about 10% Araucaria (an evergreen coniferous tree native to Brazil which produced a very good fiber) with the Pinus Radiata. The mix of the two species had a very strong positive impact on fiber quality."

Then, the Brazilian government decided that the native Araucaria forests should not be used for papermaking.

"This was our coincidence and our opportunity at Pisa," Hill says. "We got investment money to install what I can call a 'hybrid' ATMP with Impressafiner treatment and chemical addition, but without a fiberizer or high-intensity refining. We were able to maintain quality of the pulp strength without adding Araucaria and we were able to reduce energy demand by 300-400 kWh/t."



▲ The use of LC refining for the secondary stage or rejects processing contributes to overall energy savings. Shown above is the world's largest LC refiner – the TwinFlo 72.



"Every time we work with external companies, we learn something we can apply to our core business."

Peter Kaiser, Manager of Fiber and Pulp for nsiFOCUS

In addition to the Pisa hybrid, some ATMP modules were installed in mills in Norway. "But we never got the complete system in any one location," Hill laments. "We need a running mill to get out the last percentages."

Limited opportunities – until now

NSI and ANDRITZ entered into an agreement to further evaluate and optimize the ATMP process for commercial application. There have not been many opportunities to put in a complete new line for softwood, which is the reason there is only one complete ATMP system operating today, and it has just started up.

"We have complementary, but different targets," says Peter Kaiser, Manager of Fiber and Pulp for nsIFOCUS. "We want to make good paper at the lowest cost. ANDRITZ wants to develop machines and processes. Our core business is not to develop refiners, so it makes a good partnership."

nsIFOCUS was formed in 2009 as a wholly-owned daughter company of NSI. It combines the resources for technical development, continuous improvement, and troubleshooting. According to Kaiser, its primary "customer" is NSI, but they also consult to outside companies (including a salmon farming project that is particularly interesting to Kaiser). "Every time we work with external companies, we learn something we can apply to our core business," he says.

The MSD Impressafiner (shown below) and a Fiberizer delaminate the wood chips into loose fiber bundles which are perfect for targeted chemical treatment. ▼



"We have had many ideas, separately and together, which we tested in our Springfield (Ohio USA) pilot plant," Sabourin says. "We have incrementally reduced energy consumption and improved pulp quality from the initial design at the Pisa mill."

"I have seen a lot of pilot plants, but Springfield is the best facility I have seen on the TMP side," Kaiser says. "It is well organized, the people are very experienced, and very effective."

Pieces of a puzzle

"We are looking for pieces of a puzzle," Hill says. "We stare at our puzzle and begin looking for missing pieces. ANDRITZ has their puzzle and is also looking for missing pieces. It turns out that we have some of the pieces that ANDRITZ needs and they have some of our missing pieces. Together, we come very close to completing the puzzle. And, what we're missing, we can find together."

While the puzzle is not complete, "We now know how to produce pulp with the same characteristics as traditional TMP (single-disc refiner operating at normal speed and with a fairly low intensity segments) with about 30% reduction in energy demand," Hill says.

"We have made substantial progress over the years in disintegrating wood into fibers," Hill continues. "But we have not made as much progress developing these



fibers for papermaking. The free fibers we created were stiff, rather thick-walled, and not very prone to swelling or making surfaces that bond well. Still, we have come a long way."

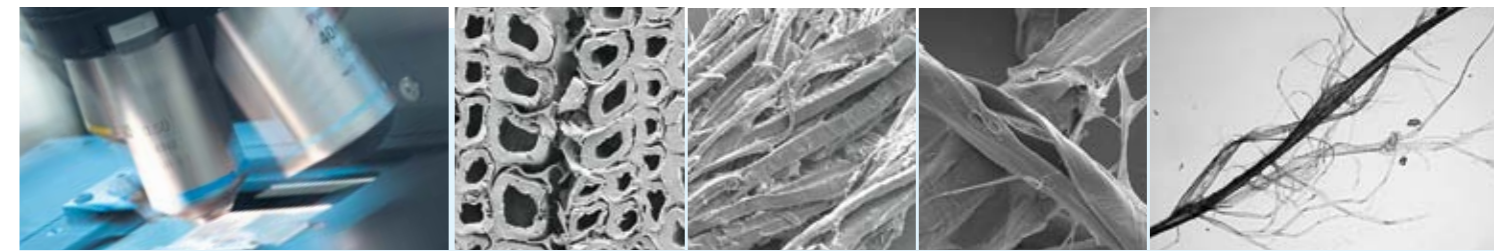
"A unique aspect of ATMP is its modularity," Bräuer says. "Components can be implemented in a step-wise fashion that meets the logistics and economics of a particular mill. In certain situations, it may not be practical to install all components of the process."

Hill remembers as a young man learning that wood costs were by far the largest cost in the mill. "By 2009, energy costs exceeded wood costs on a global scale. Our analysis of virgin softwood pulps produced at our mill locations on four continents shows that no region of the world is significantly cheaper than another when it comes to combined energy and fiber costs. Energy is a big, big issue."

"Yet, it is very difficult to justify an investment on energy savings alone," Kaiser. "You need energy combined with quality improvements, or energy plus a production increase in order to meet the guidelines for the rate of return. As an industry, we still have work to do, and I think UPM will bring the process further at Steyrermühl."

"All in all, our timing is good," Sabourin says. "With rapidly rising electricity costs, TMP mills are eager to take action. Since ATMP can be implemented step-wise, and can deliver paybacks for each step, it is a very viable approach."

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From chip to fiber: Individual steps → RT-pre-treatment → Fibration → Primary refining → Secondary refining

ADVANCED TMP

The ATMP process is suitable for most softwood species and is outstanding with various pines. Due to its modular design, it can be implemented in stages during the rebuild of a conventional TMP plant.

Considerable research has been directed to the fundamentals of wood breakdown – specifically defibration (breaking the chips into fiber bundles) and fibrillation (creating the bonding surfaces) – to reduce energy consumption and improve the fiber bonding.

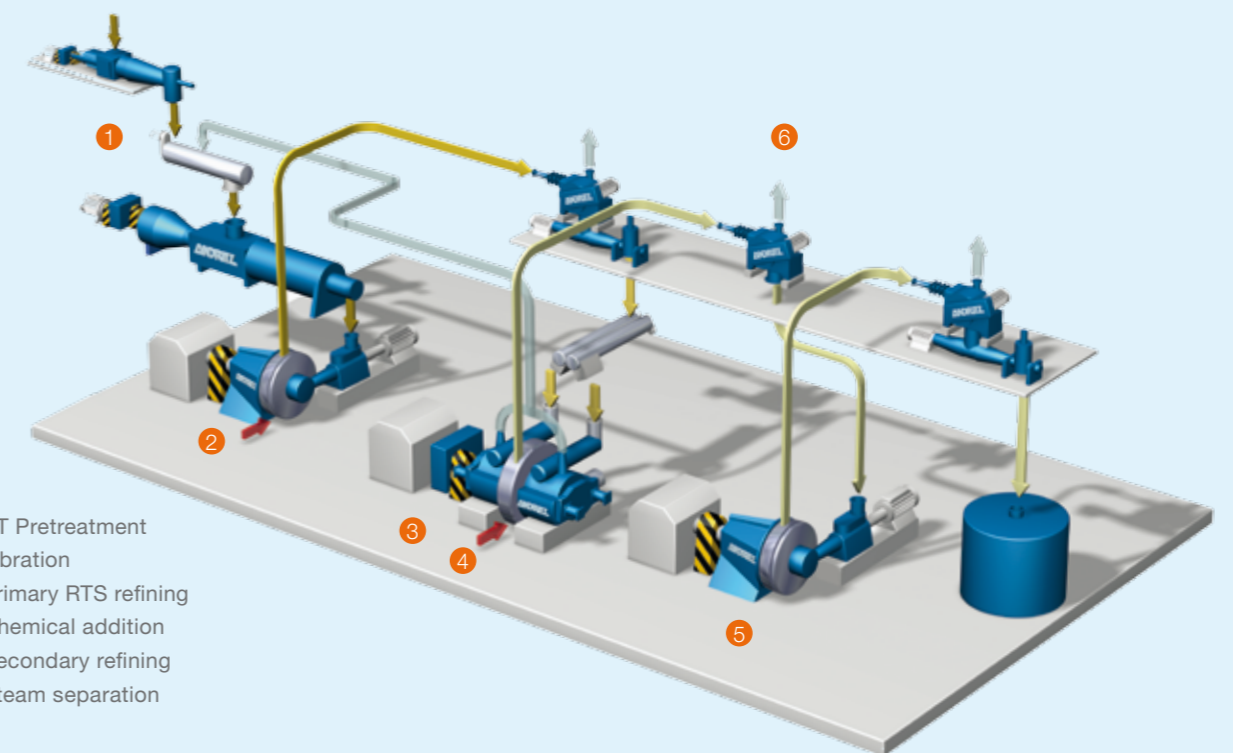
A traditional TMP plant attempts to accomplish defibration and fibrillation in the same primary refiner. The ATMP methodology demonstrates that these two

tasks need different conditions in order to succeed. It is better to separate the two steps.

In the ATMP process, the first stage (RT-Fibration) is performed in a pressurized Impressafiner and a fiberizer (low specific energy refiner) to delaminate the wood chips into loose structures of fibers. With a large surface area, these bundles are perfect for a targeted chemical treatment to attack the secondary fiber walls and improve the bonding characteristics in the next stage (high-intensity RTS refining). A 300-800 kWh/t energy saving for a given pulp tensile strength has been confirmed at mills running the combination of chemicals and mechanical treatment alone.

The high energy efficiency and pulp quality at lower freeness in the primary stage requires less refining energy in the secondary and/or reject refining stages. Modern mills are using energy-efficient LC refiners which further reduces specific energy consumption of the entire production line.

In March 2011, UPM Kymmene Austria GmbH located in Steyrermühl, started up the last modular step of their TMP system after a major rebuild. This creates the first commercial installation of a complete ATMP system, which opens a path for energy-efficient mechanical pulp production at Steyrermühl in the future.



A shoe made-to-measure

ANDRITZ retrofitted the PM6 paper machine at VPK's Oudegem mill in Belgium with a new press section, featuring the *PrimePress Trix*. The heart of the new press section is a shoe press that accelerates dewatering, considerably lowering the cost of production. A speed increase and a more optimized trim width were also part of the benefits package.

These were exciting times for the production team at VPK Packaging Group's board mill in the Belgian village of Oudegem.

PM6 had been giving the mill problems: web breaks and faults due to the press section was causing downtime and waste. After months of preparation and precise planning with the project team from ANDRITZ Küsters, the mill was finally ready for a much-needed retrofit of the machine.

The planning ensured that the machine downtime was kept to the absolute minimum. The *PrimePress Trix*, with a shoe press acting as the third nip, would replace the existing press section. It was going to be a tight fit, as the available space on the machine was very confined, so precision was most definitely required.

Everything ran like clockwork. Despite the confined space, PM6 was back up and running again in only four weeks.

Higher speed, lower costs

This began a new era for VPK Oudegem, according to Rutger Dierickx, VPK's Project Manager, and Alexis Zenner, Project Engineer. Not only were they pleased with the project execution itself, but initial results are most encouraging.

Downtime coming from web faults or breaks attributable to the new press section was reduced to zero. The machine's speed increased from 600 to 650 m/min. Even better, the web width increased to 4.8 meters – a critical 50 mm increase that now makes it possible to produce the most important paper sizes without any trim waste.

PM6, installed in 1976 and rebuilt several times, produces 150,000 t/a of cor-

rugating medium and testliner with basis weights from 105 to 215 gsm. The machine's output is mostly targeted for companies within VPK Packaging Group, one of the leading packaging board producers in Western Europe. But there are also deliveries to external customers where VPK can cater to their specific requirements.



Furnish is 100% recovered fiber (packaging materials and mixed office waste). Some of the fiber comes from other processes inside the mill and the rest is purchased.

Frequent downtime

As there were frequent stops in recent years due to the age of the old press section, VPK Oudegem knew that a rebuild was going to be the solution. They commissioned ANDRITZ Küsters to design and build a new press section that could be integrated into the existing machine. Additional requirements were to overhaul and reuse parts of the old unit, as well as increase the machine's speed.



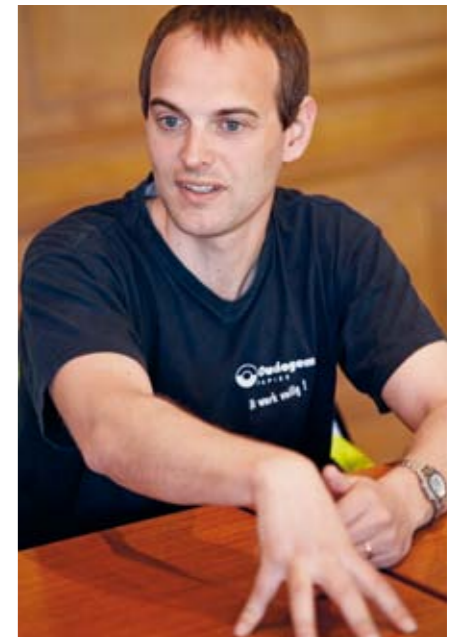
Alexis Zenner of VPK inspects the first nip between the press roll and suction press roll of the *PrimePress Trix*. ▼

"ANDRITZ was quick to respond to our needs and even our special requests."

Rutger Dierickx, Project Manager, VPK Oudegem

"They were very thorough in explaining the design and installation to us."

Alexis Zenner, Project Engineer, VPK Oudegem



At ANDRITZ Küsters' facility in Krefeld, Germany, the very first *PrimePress Trix* was built for this project. The unit has four press rolls arranged to form three press nips for dewatering. In addition, pressing felts run through the press nips with the paper web and absorb water. The third press nip is formed by a shoe press. After the third press nip, the paper web continues along the smooth surface of the central roll and is transferred to the dryers. The web is guided through the press section with no free draw, eliminating the risk of breaks. Not only are breaks eliminated, but much more water can be extracted without applying greater pressure on the sheet, so bulk is preserved.

As a result, the dryness of the sheet was increased from 50 to 52.5% leaving the press section. This allowed an increase in machine speed as well as energy savings because the subsequent drying process has now been shortened substantially.

Accepting the challenge

Like all projects, the press section rebuild for Oudegem had its unique challenges for both partners. VPK had to make significant changes to the basic structure of the machine room, even the foundation.

ANDRITZ faced the challenge of how to precisely measure the old press section

while it was in operation. Patiently waiting for brief breaks in production, the engineers made the measurements and calculations so that the new press could be inserted with a perfect fit. In addition, the bearing assembly of the conventional roll in the combi-press and its pick-up press roll had to be dismantled, shipped to ANDRITZ's workshop in Graz, Austria, and rebuilt before being returned to Oudegem.

"Timing and scheduling were the biggest challenge," says Ralf Doerkes, the ANDRITZ Design Engineer in charge of the project. "Also, the installation of the *Prime Press Trix* was a very tight fit."

Dierickx and Zenner describe the preparation and implementation as one of the most exciting in their career. "The excellent cooperation with ANDRITZ was a great help to us," Dierickx says. "They were quick to respond to our needs and even our special requests."

"And they were very thorough in explaining the design and installation so that we knew it down to the last detail," Zenner adds.



PRIMEPRESS TRIX

The *PrimePress Trix* has four press rolls arranged to form three press nips for dewatering. Dewatering is enhanced by pressing felts that run through the press nips with the paper and absorb the water. The water is removed from the pressing felts by suction boxes.

The third press nip is formed by a shoe press, the heart of the *PrimePress Trix*. The shoe press consists of a pressing shoe and a revolving pressing belt. The shoe is pressed hydraulically against the central roll and forms an approximately 300 mm long press nip that dewateres the paper web while preserving its bulk. After the third press nip, the paper web continues along the smooth surface of the central roll and is transferred to the dryers.

The advantage of this arrangement is that the paper web is guided through the press section on a firm surface (felts or roll surfaces) with no free draw, eliminating the risk of web breaks. The only free draw occurs at the transition between press section and dryers. The length of this draw is minimal.

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◀ Alexis Zenner, Project Engineer (left),
Rutger Dierickx, Project Manager at VPK (middle),
and Ralf Doerkes from ANDRITZ Küsters.



Always a strong sense of “family”

The way Carlos Aguiar sees it, his early exposure to American culture through a local military base in remote northeastern Brazil, a strong sense of family, and a love for jazz have added greatly to the formation of his character and his approach to business.

Carlos Augusto Lira Aguiar was a key player in the formation of Fibria, the world’s largest market pulp producer, and became its first President & CEO in 2009. Since then, he has forged the direction for Fibria as it wound its way through some serious financial obstacles (primarily as a result of losses on exposure to currency derivatives). Buoyed by the sale of non-core assets and rising pulp prices, Fibria posted net income of BRL 389 million for the first quarter of this year, up 140% from a year ago. Net debt/EBITDA continues to fall, reaching 2.9x, its lowest level since Fibria’s founding.

And now, Aguiar has announced his retirement (though he will work as a consultant to the new CEO, Marcelo Castelli, for the remainder of the year and then take a seat on the Fibria board).

With one door closing and another opening, he takes time to reflect with us on his 40+ year career – a career that started quite by chance due to a long bus ride to follow a love interest.

Lessons learned early

Aguiar was born in Camocim, a small coastal town in northeastern Brazil. Electricity in the village came from a diesel-generator that shut down each evening. “When the diesel went down, the lights were out for the night. We turned to music and conversation for entertainment.”

The passion for music has never left him. Camocim also had a particularly attractive feature for a young boy – an American Air Force base. American jazz and news came to Aguiar’s family through the radio. “America was very real and exciting to me!”

Young Carlos made his own toy cars and planes, and explored nature. “It was only

years later that I realized we were poor. Poverty did not bring us down like it does with many people today. We used our imaginations to bring something extra to our lives.”

Aguiar’s grandfather was a railroad engineer and farmer. “He taught me the value of hard work and the importance of family.”

The financial impossibility of buying a piano did not stop him from learning to play by ear. During his college years at the Universidade Federal do Ceará, Carlos lived a dual life. By day, he studied chemical engineering and industrial management. At night, he played piano in a local band. He loved to learn, another passion which he carries with him to this day. In fact, in retirement he is planning to study philosophy, music, and writing.

Finding Pulp & Paper

Aguiar’s professional life started 4,000 km and a 52-hour bus ride south from his birthplace. “Love for my future wife (Helene) inspired me to go where she had moved with her father. When I got there, I needed a job. I had the good fortune to meet the head of the local paper mill in a grocery store and had the nerve to ask him for a job.”

The man was Stuart A. Lang, head of Olinkraft, a U.S. company that had operations in Brazil. Contact with American management culture helped Carlos build a foundation of business skills. He learned quickly from Lang, whom today he calls “a great leader.”

Then, Carlos was given the opportunity to manage the front-end work for a greenfield linerboard project for Continental Can. With the enthusiasm of youth, he moved to São Paulo, but soon found disappointment when the project was cancelled. Next came a critical choice: move to Australia

and work for Alcoa, or join a new Brazilian pulp company, Aracruz Celulose. With his family urging him to stay in his home country, Aracruz became his new employer.

The Aracruz years

He joined Aracruz as a process engineer in 1981. “I cut my teeth on a project to debark eucalyptus, something that had never been done.” After this successful project, he rose to be the manager of technical services and later production manager.

At the age of 40, he advanced to Industrial Director. In 1993, he served as interim President of the company for nine months. “This was a serious time for us. Pulp prices were at USD 330/t and we were about USD 1 billion in debt.” Aguiar worked with his Aracruz “family” to reorganize the company to be more streamlined and globally competitive.

With the support of the visionary founder of Aracruz, Erling Lorentzen, their actions helped launch an American Depository Receipt (ADR) on the New York Stock Exchange, the first Brazilian company to do so. This gave the company easier access to international financing.

Mission accomplished

After guiding his Aracruz “family” through the transition to Fibria, and providing direction for the combined company, Aguiar can say, “I accomplished my mission, both as a family man and as a business man. In a career which has seen the price of market pulp range from USD 350-1,050/t, Carlos ticks off the accomplishments of which he is most proud:

Respect for eucalyptus. “When we started the first line at Aracruz, eucalyptus was considered a filler pulp. We did considerable development work and built a refining pilot plant, to show papermakers how to



refine eucalyptus pulp and how to get better paper qualities from it. We succeeded in convincing papermakers. In fact, P&G sold all their pulp mills and became one of our best customers because they saw the advantages of eucalyptus pulp.

Changing the way things are done. We changed the way projects were done and we reduced the investment cost per tonne significantly. Before Fiberline C at Aracruz (completed in 2002), our design concept was based on the Scandinavian model (all equipment indoors, lots of spare parts, etc.). This meant much of the construction was done in the field, requiring 12,000 to 15,000 people on-site.

I called all our suppliers and told them that we had an opportunity. We have this much money, our selling price is USD 525/t, and need to get 3% over the cost of capital.

So let’s sit together and find a way that Aracruz can build this mill. If we don’t sit together, we can’t make the project.

Our calculation came to about USD 900/t investment, which everybody said it was impossible (the norm being USD 1,300-1,500/t). For the next six months, we questioned everything. We changed the layout to reduce piping/cable runs. We changed the construction so that modules were produced in workshops and delivered pre-assembled to site. We chose EPC to reduce our risk and our internal costs. The investment cost came down. The project was very successful, and this was a turning point for the industry in Brazil.

Opening up. Because of its location, Aracruz was quite an isolated company. We produced everything ourselves. It became clear that this was not helpful to the

“My grandfather taught me the value of hard work and the importance of family.”

Carlos Aguiar



er types of industries? My view for the future is that suppliers and producers should sit down and think how we can make such a step change.

Lead by example. I have three daughters and two granddaughters. All my girls are hard-working and have very good values. Family success directly attributable to my wife, Helane. She has always stressed the value of education – not only in the university, but also life experiences. We have had the privilege as a family to tour the world. Seeing the major world capitals has been a dream for me, but more meaningful because I have viewed these wonders through the eyes of my daughters.

Success is based on at least three key things: knowledge, hard work, and persis-

tence. But I tell my daughters and grandchildren that the most important thing in life is freedom – even freedom to be poor. Don't rely on someone else to survive. Make your own life."

Certainly, Carlos Aguiar has made his own life – supported by family, the ever-present piano (even an electronic keyboard in his São Paulo apartment), and weekend soccer with his cherished friends at his home in Coqueiral de Itaparica.

These things still define this man. His motto sums up his character in just a few words, "To overcome challenges is the very oxygen of my life!"

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"To overcome challenges is the very oxygen of my life."

Carlos Aguiar

local community. I proposed a program to develop local suppliers, which is now an official government program. We have about 60 small and medium-sized companies providing services to our mill. We are now doing the same at our mill in Três Lagoas. I fought very much for this program and am proud that it has been successful.

Brown instead of greenfield. I think we are approaching the practical limits for pulp mill size in Brazil, not only due to technology, but also other factors such as forest distance costs, transportation of wood and pulp, environmental impact. Within our own company, we prefer to grow at Espírito Santo, Três Lagoas, and Veracel where we have the infrastructure and can reduce our investment costs. Brownfield is better than greenfield for us.

Competing with other industries. What is going to drive innovation for our industry to compete with potential threats in packaging, information delivery, and hygiene products? Who wants to invest money in our industry if the EBITDA is too low or if we are losing competitiveness against oth-



From Trash to Treasure

Waste from paper mills that was once sent to landfill can now be collected, treated, and converted to valuable energy. The process is generally known as Waste-to-Power, and ANDRITZ is at the forefront of exciting developments in this area.

Most of us don't like to waste anything. We try to get the most value from what we have.

The same is true for the Pulp & Paper industry, which has an enviable record of recycling and reusing its raw materials. To the industry, waste is expensive. It costs money to transport it and handle it. And, it can have environmental implications if the waste contains chemicals.

In a recycled paper mill, waste is particularly bothersome. Plastics, textiles, wood, scrap metals, wires, and other contaminants are an unavoidable part of the incoming raw material.

Another source of waste is what is left over after water is treated. The processing of incoming raw water from a river, recycling and reusing process water inside a mill, and treating the outgoing waste water produces sludges. These sludges can sometimes be difficult to handle and dry. Transportation costs, gate fees, and landfilling costs are priced on a per-tonne basis. So, each ton of water in the sludge is as expensive as the waste itself.

And, to add more pressure, the European Union has released a directive to ban waste disposal of raw materials and waste fractions which are possible to recycle and utilize as secondary products.

Creating an opportunity

So, waste disposal is a costly problem. Add to that the fact that energy and fuel prices are increasing – and now you have an opportunity. At least, that's how Helmut Gabl and the WTP team at ANDRITZ PULP & PAPER's Fiber Preparation Division see it.

Gabl is Director Business Development. In this capacity, he is deeply involved in setting up a Waste-to-Power (WTP) group within ANDRITZ. "WTP technology offers an opportunity to create energy from what used to be waste," Gabl says. "It's not magic, but rather good science. We produce heat directly by burning the waste, or indirectly by generating gas that can be burned or further processed."



"It's not magic, but rather good science."

Helmuth Gabl, Director Business Development - Waste-to-Power (WTP) group within ANDRITZ's Fiber Preparation Division



By utilizing waste as an energy source, the mill reduces the amount of rejects sent to landfill and reduces its costs for purchasing energy from the outside. "Sounds like a win-win situation to me!" Gabl says.

Waste to fuel

Waste-to-Power is a process which turns rejects, sludges, and other mill residuals to a combustible fuel.

There are various technologies to do this, according to Mirka Sireni, Senior Sales Manager in the Fiber Preparation Division. "The front-end technologies are for handling the rejects and preparing them to be

converted into fuel," she says. "The downstream processes convert the waste into solid, liquid, or gaseous fuels."

The WTP team's design approach is always based on the mill's goals and requirements. "There is no standard answer," Sireni says. "Our design recommendations are based on what the customer wants to accomplish, the waste fuels available, the heating values, and the existing equipment at the mill."

To become more efficient and reduce the cost of each tailor-made solution, the WTP team developed modules for reject and

sludge handling, drying, and fuel preparation which can be standalone as independent process islands or be integrated into a total system (see the illustration on page 33).

Rejects handling. "With very few exceptions, practically all recycled paper rejects can be used as a fuel source," Gabl says. "What we do with our technology is to separate out contaminants which don't make good fuel sources."

So the first step is to remove coarse iron-containing metals using a powerful magnet. The separated metal can be recycled as scrap. Then the rejects are made smaller and more homogenous in a shredder. After this, the material may have to be dried.

Sludge handling. Dewatering of recycled fiber sludges is done by mechanical presses. Sludges from biological water treatment are somewhat more difficult to handle mechanically due to the suspensions in water. To remove the water in these type of sludges, thermal drying is required. ANDRITZ technologies here include presses, gravity tables, and other dewatering devices.

Drying. ANDRITZ has a large portfolio of dryers which can be used by the WTP team. Quite often, the belt dryer technology is most suitable for reject and sludge materials, and also woody biomass. Through a closed system the remaining heat in the drying air can be recovered and the energy consumption decreased.

Pelleting. Due to their low moisture content, uniform shape, and high density, pellets are very efficient to transport and store. Wood pellets can be used in the heating of households, but the pellets made from rejects and sludges need official permission for waste combustion. The dried waste material is fed into the ANDRITZ pelleting machine, and forced through a perforated die. The pellets are then cooled to prevent them from sticking together in the storage tower.

Creating energy through combustion

Dried rejects, sludges, and other mill residuals can be converted to steam (which can then be converted to electricity in a steam turbine-generator). The conversion to steam is accomplished with an ANDRITZ power boiler. The BFB (Bubbling Fluidized Bed) technology in the boiler is best for woody biomass, which has a low heating value and low chlorine content. The size range of ANDRITZ BFB boilers is approximately 40-350 MWth.

ANDRITZ recently acquired Austrian Energy & Environment (AE&E). This company is now called ANDRITZ Energy & Environment (see story on page 41). AE&E adds to the boiler portfolio for the Group with its CFB (Circulating Fluidized Bed) boiler technology and its speciality boilers.

Converting rejects into gas

CFB Gasifiers from ANDRITZ Carbona have been used for many years to produce fuel gas to replace fossil fuel in the lime

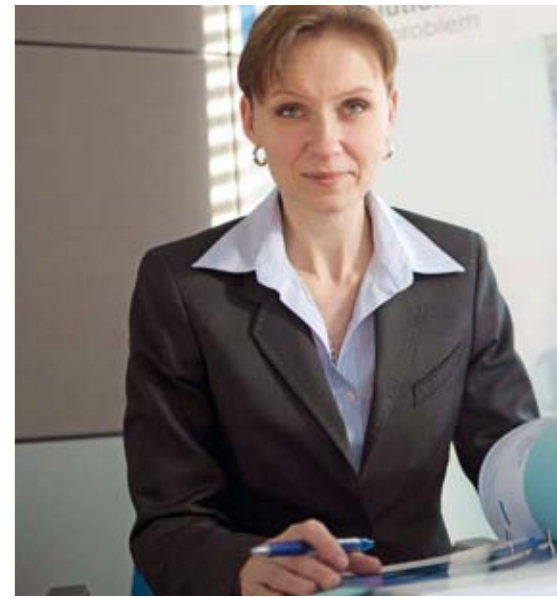
kiln. More recently, the units are producing fuel gas from biomass and rejects. Typical applications are with kilns and power boilers to replace fossil fuels (coal, natural gas).

Trash to treasure

There is an old saying that, "One person's trash is another person's treasure."

Just as craftspeople turn old metal and textile scraps into works of art, ANDRITZ is being creative in turning once-disposed-of waste materials into valuable energy sources.

Perhaps the outcome is not as beautiful as a work of art, but it is important as a cost-saving and environmentally sound solution. That is why Helmut Gabl and the WTP team like to say, "Don't waste power: get power out of waste!"



"Waste-to-Power is the process of turning mill rejects, sludges, and other residuals into combustible fuels."

Mirka Sireni, Senior Sales Manager in the Fiber Preparation Division

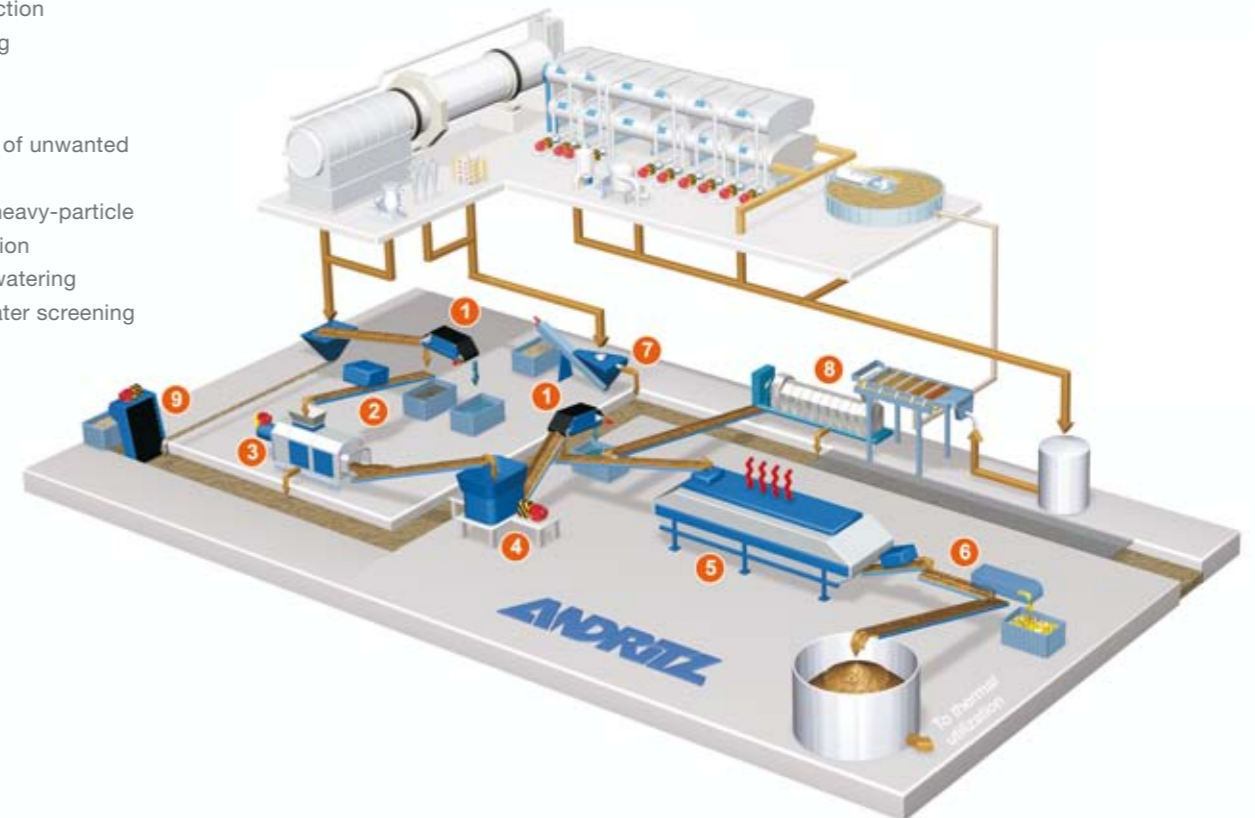
FIND OUT MORE AT www.spectrum.andritz.com

TYPICAL MILL "WASTE" WHICH CAN BE UTILIZED AS FUEL SOURCES:



- Pulper rag ropes, pulper rejects, and coarse screening rejects
- Sludge from deinking system, paper machine loop, make-up water treatment, and sedimentation
- Sludge from biological waste water treatment
- Raw and fresh water treatment sludge
- Bark and waste wood
- Forest waste and residuals
- Other biomasses such as sawmill residuals, furniture industry scrap, demolition wood, etc.

- 1 Metal separation
- 2 Metal detection
- 3 Compacting
- 4 Shredding
- 5 Drying
- 6 Separation of unwanted materials
- 7 Sand and heavy-particle sedimentation
- 8 Sludge dewatering
- 9 Sewage water screening



Change of venue to Rizhao

APRIL SSYMB, the leading pulp producer in China, operates one of the world's largest pulping lines in Rizhao, Shandong Province. But the original location was set for Indonesia. ANDRITZ's flexibility in design and project management allowed for a smooth transition to the new location. The LimeLine technology for white liquor production is perfectly matched to APRIL's targets for high production and environmental safety.

APRIL's mill in Rizhao, Shandong Province, was built under the slogan People, Planet, Profit. Accordingly, the mill meets international standards for safety, environmental protection, and high production. This is where ANDRITZ stepped in, when APRIL needed a white liquor plant that would meet very high international standards for its new pulping line.

APRIL's original thinking was to build the mill in Kerinci in Sumatra. But after planning and analyses, it was decided to change the location to Rizhao where another pulp mill was already located. Fortunately, the design of the ANDRITZ LimeLine allows for flexibility. So, despite the unexpected challenges in changing the location to a new site in a new country – with new requirements for the civil/structural, logistics, and some economic factors – the results have been outstanding.

Limited waste

APRIL SSYMB is a joint venture of the well-known Asia Pacific Resources International Ltd. (APRIL) and SSYMB. The JV started operation of the largest pulp mill in China in 2010, and one of the largest in the world (1 million t/a of bleached kraft market pulp).

Originally, the project did not have enough capacity for PL11's white liquor plant. "As

a consequence, we had to purchase burnt lime from other suppliers," says Huang Wen Hai, General Manager. "At the same time, we were sending our lime mud to landfill."

The Chinese government now limits the amount of waste that a mill can produce, so ANDRITZ was asked to design a recausticizing system and lime kiln that would support the production of PL11, the new pulp line. "This would eliminate our

need for purchased lime and also reduce our solid waste," Huang says.

Since China has a shortage of raw materials, the government imposes a 10% tax for pulp export. So, according to Huang, APRIL SSYMB sells its Rizhao-produced pulp to the domestic market. About 40% of design production is sold to Shandong Province paper and tissue producers, while the rest is sold throughout China. Fiber sources are eucalyptus and acacia.



"ANDRITZ has a vast portfolio of experience and expertise in the pulp and paper industry."

Huang Wen Hai, General Manager at APRIL SSYMB



▲ The LimeLine technology for white liquor production is perfectly matched to APRIL's targets for high production and environmental safety.

"We were the first company to introduce a white liquor disc filter in a mixed hardwood process," says Keijo Savolainen, Vice President in ANDRITZ's Fiber and Chemical Division. "With the first delivery we were able to prove that the technology can be applied to tropical pulp mills, and since then it has become widely used by all mills."

ANDRITZ recommended

Huang, a veteran of 26 years in the industry, has been familiar with ANDRITZ equipment since the mid-1980s. "We are looking for quality and ease of maintenance from our suppliers," he says. "We expect longer service intervals from the equipment, made possible with a good preventive maintenance program. We also require good service and technical support. Our Kerinci mill in Indonesia recommended ANDRITZ for the white liquor plant because of the good cooperation and local support."

APRIL placed the order for the new white liquor plant in October 2006. ANDRITZ's delivery included two LimeGreen filters (green liquor filtration), two LimeWhite filters (white liquor filtration), two LimeDry

(lime mud disc filters) for washing and drying, and two LMD lime kilns. Erection started in the summer of 2008 and the plant was started up in June 2010.

Cost saving is crucial

One of the critical factors in selecting ANDRITZ technology, according to Huang, was the need for utmost reliability. "Our target is stable production," he says, "and we cannot afford to have a new installation that results in unexpected downtime. Not only is downtime costly financially, it is very frustrating to take a system up and down. That is the reason why the equipment from ANDRITZ had to be top of the line."

Huang notes that one of APRIL's strengths is cost savings. As evidence, he points to the efficient transfer of raw materials from port to mill (by conveyor) and the wood chipping centers that ensure there is no shortage of fibers. For its own part, Huang explains that Rizhao works hard to ensure certain raw material specifications, and is selective in the procurement of make-up chemicals, fuel oils, etc. that are utilized in the kiln. "We do this in order to minimize impurities and to maximize the performance of the equipment," Huang says.



"We proved that our technology can be applied to tropical pulp mills."

Keijo Savolainen, Vice President in ANDRITZ's Fiber and Chemical Division



“The guaranteed production from the LimeLine plant is 18,000 m³ per day, which makes this plant certainly one of the largest in the world.”

Christianus Yong, RC/LK Superintendent for APRIL

Dregs, separated with dregs centrifuge. Clean green liquor is mixed with burnt lime from the lime kiln to make white liquor. ▼



LimeGreen filters for green liquor (formerly known as X-filters). ▼



Faced with strict regulations by the government regarding best available technology (BAT), Huang and his team were comfortable with ANDRITZ. “I feel comfortable, because ANDRITZ is a reliable supplier and partner. With ANDRITZ onboard, we can confidently meet, and in fact exceed any environmental standards,” Huang says.

One of the near-term challenges at the mill is getting APRIL employees familiar with all the new technologies. “With the support of Juha Riihelä of ANDRITZ who is residing here now, and his team, we are quickly transferring the knowledge from ANDRITZ to APRIL,” Huang says.

Operations run by sign language

According to Huang, an ANDRITZ strength is that it has a vast portfolio of expertise and skilled personnel in the pulp and paper business. “I hope as ANDRITZ grows in China that they develop these highly skilled experts who also have good command of the Chinese language and are close to their customers,” he says.

Christianus Yong, RC/LK Superintendent for APRIL, says that his experience of working with ANDRITZ truly highlights the team effort in solving all the minor issues that normally surface during a project. “ANDRITZ is always very responsive to our questions and provides optimal solutions when needed,” Yong says. “While the language difficulties work on both sides, we manage to run our operations with ges-



“Communications is the fundamental element in establishing relationships”

Juha Riihelä, ANDRITZ Project Engineer

Juha Riihelä (left) and Xu Wei, ANDRITZ Project Coordinator

tures and sign language, which is rather remarkable.”

According to Yong, the guaranteed production from the LimeLine plant is 18,000 m³ per day, which makes this plant certainly one of the largest in the world. “These values are easily achieved,” he says. “In terms of performance, we are very pleased with the ANDRITZ PL12 project and equipment.”

“The LimeGreen filters are producing very high quality green liquor with very low impurities,” Riihelä says. “Suspended solids are less than 20 mg/l. The two-stage dregs centrifuges do not require any lime input. The lime circulation is opened from the electrostatic precipitator, which is the most efficient and environmentally effective solution. The LimeWhite filters are running at less than 10 mg/l, which is very good. Our lime kilns have not encountered a single mechanical glitch since start-up.”

Learning together with the customer

Savolainen of ANDRITZ points out that since starting the relationship with the APRIL Group in early 1990’s, ANDRITZ White Liquor Plant operations have grown together with the APRIL Group. “ANDRITZ

is developing its LimeLine to meet the highest environmental standards,” he says. “Our way of working together has improved. Even the change of location of this plant to a different country in the middle of the project was a challenge we were able to meet.”

Originally the challenge was to build a big plant with a short delivery time. With the change of location, the challenge changed focus. “For instance, the buildings in Rizhao required walls,” Savolainen says. “These were not needed at the original location. So, there was much less space at our disposal in Rizhao for piping. The extended erection, commissioning, and start-up phases impacted the economics of the project and required some new commercial negotiations, but everything was worked out.

“At the end of the day, we understand that the reliable continuous operation of the plant is vital for a pulp mill. When developing new equipment and processes, we keep that in mind.”



▲ ANDRITZ LimeKiln

UFO helps Lucca increase high-contribution grades

When it was first lifted into position, the oval-shaped, 25 m long SelectaFlot flotation cell reminded Stefano Andreotti of an unidentified flying object (UFO). But no aliens emerged from this UFO and it has a very earthly mission: to help SCA Containerboard's Lucca mill increase its production of higher contribution testliners for European markets.



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One of the benefits of SelectaFlot is that it is compact, allowing the Lucca mill to save money by lifting the unit into position through second-story openings in an existing building. It was a tight fit. ▶

"The SelectaFlot technology helps us produce a product with stable whiteness, brightness, and control of spots. We get an average of 2.5 to 3.0 point brightness increase without chemicals."

Stefano Andreotti, Technical Manager for SCA Containerboard's mill in Lucca.



No doubt about it. With just a little imagination, the oval-shaped advanced SelectaFlot flotation cell can look like an alien spacecraft – especially when hovering from a crane about 15 m off the ground. Just ask Stefano Andreotti.

Andreotti is Technical Manager for SCA Containerboard's mill in Lucca. Coming from Tuscany (Italy's most significant area for paper production and a magnet for lovers of art, history, and wine), he has never seen a UFO in person – only in magazines. "I am a technical person and detail-oriented by nature," Andreotti reveals. "But we technical people can still have an imagination!"

The alien scene took place in 2007 when the ANDRITZ flotation cells were being

carefully moved in through the second-story openings of an existing building at the Lucca mill. It was a tight fit, according to Andreotti, but worth the effort by eliminating the need for a new structure.

"One of the benefits of SelectaFlot is that it is compact," says Klaus Peter Janisch, ANDRITZ's Project Manager. "Lucca had an existing building where they did R&D and trials for laser printing deinking in the 1980's. To save money, we were successful in removing old equipment and installing the SelectaFlot there. It was possible to even reuse some of the existing tanks."

The move to Presentation Liner

The arrival of the ANDRITZ SelectaFlot unit, a new disc filter, and other stock preparation components marked the de-

cision by SCA Containerboard to improve the quality of the top layer (white top) for PM2 at Lucca. The mill's products have traditionally been brown linerboard (testliner) and corrugating medium. But the market growth, according to Claudio Romiti, Managing Director of the Lucca mill, is coming from a segment that SCA calls Presentation Liners (white top kraftliner and testliner).

For those readers outside the containerboard field, Linerboard is the part of a corrugated box that we see. It can be brown, bleached white, mottled white, or colored. Corrugating Medium is the interior rippled paper in the box (also called fluting). Linerboard made of virgin pulp is called kraftliner. When it is made from recycled fiber, it is called testliner.

It was 1988 when SCA decided to step into the world of recycled fiber with the acquisition of Italcarta. Part of Italcarta's holdings was the Lucca paper mill, which was built in 1970. SCA Containerboard was formed in 1990 and today has mills in Sweden, the Netherlands, and Germany in addition to Italy. It is the second largest producer of containerboard in Europe.

"Our Presentation Liners are created with three things in mind: to protect the product, to realize the packaging designer's vision, and to express the image for the retailer," Romiti explains. "Protection means strength, design realization means runnability, and image means excellent surface characteristics for ink absorption, printability, and appearance."

Higher contribution

Adding Presentation Liners to the portfolio required investments at Lucca. The payoff is that these higher value products command a higher price in the market. The growth potential and higher financial contribution justifies the investments made at Lucca, according to Romiti.

In preparation, the Lucca team changed the configuration of its PM2 from a traditional two-fourdrinier containerboard machine to a machine with a gap former for the bottom ply, a fourdrinier for the top ply, and a new press section (with a shoe press in the bottom position and a transfer belt on the top position to ensure nice surface properties).

With this in place, Lucca now needed to develop its stock preparation for the white top. "Due to the type and availability of recovered fiber here, we decided to add a

flotation plant to remove as much as possible the removable inks and improve the brightness," Andreotti says.

A supplier of choice

Part of SCA Containerboard's branding is to be the supplier of choice for Presentation Liners. "We also needed a supplier of choice for the deinking technology," Romiti says. "Someone who could be a partner as well as a supplier."

Adrien Frediani, ANDRITZ's agent in Italy, explains that during the selection process, yield and ash removal were important technical factors for the Lucca mill. "They wanted a process where rejects were as low as possible," he says. "In Italy today, most mill rejects go to landfill."

The Lucca team selected ANDRITZ, Andreotti says, "because their design was what we wanted and the process guarantees were strong. In talking with other mills within SCA, I learned that ANDRITZ engineers were able to help them solve deinking problems with other suppliers' equipment. This said to me that they understood the process completely and it was a strong reassurance for me."

The results of the product trials at the Graz pilot plant were also promising. "The results showed that SelectaFlot could deliver the results that SCA Containerboard wanted without chemicals, which is an important cost savings," says Janisch. "In practice, we are actually using the rejects in the bottom ply, so we are operating with virtually zero rejects in the overall mill balance," adds Andreotti.



▲ The arrival of the ANDRITZ SelectaFlot unit, a new disc filter, and other stock preparation components marked the decision by SCA Containerboard to improve the quality of the top layer (white top) for PM2 at Lucca.

"Presentation Liner is a relatively new product for this mill and we are finding very good customer feedback. With ANDRITZ, we were looking for a partner as well as a supplier, and we found it."

Claudio Romiti, Managing Director of the Lucca mill





“SCA Containerboard wanted a process where rejects were as low as possible. In practice, they use the rejects in the bottom ply, so there are virtually zero rejects in the overall mill balance.”

Klaus-Peter Janisch, Project Manager from ANDRITZ

Stefano Andreotti (left) with Klaus-Peter Janisch in front of the new SelectaFlot flotation.

“Start it and forget it”

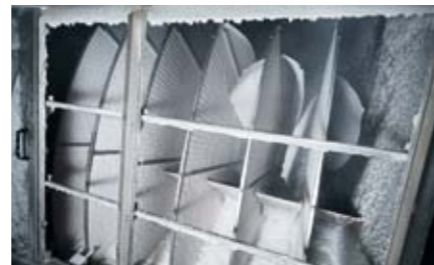
“We organized the project using a local company for drawings and piping,” Andreotti says. “There was no difficulty at all working with ANDRITZ and the interface was excellent. The project went smoothly. By the end of 2007, we were making customer trials for white top. At the beginning of 2008, the ANDRITZ plant went into full production.”

The white top testliner is produced from 100% recovered paper, brown and white grades. “We know what’s in our paper,” Andreotti says. “All virgin fibers are chain-of-custody certified. All recycled fibers are carefully selected using responsible sourcing principles. Generally speaking, our recipe for the white top has a percentage of unprinted materials and lightly printed raw materials (magazines and clippings).”

The quality specs are standardized across all SCA Containerboard mills to ensure a consistent customer experience. “To deliver quality white top testliner that SCA customers expect requires producing perfect white fiber suspension from recovered fibers,” Andreotti says.

From the initial arrival of the UFO at the mill (“Something completely new and strange for our team”), until today has been steady progress. “Today, it is start it and forget it,” Andreotti says. “It runs steady with no problems. In terms of performance, we get an average of 2.5 to 3.0 point brightness

A new disc filter (below) was also part of the ANDRITZ delivery. ▼



increase without chemicals. The ANDRITZ deinking technology helps us produce a product with stable whiteness, brightness, and control of spots.”

Presentation Liners are now about 15-20% of the output of the Lucca mill, according to Romiti. “This is a relatively new product for this mill and we are finding very good customer feedback,” he says. “With ANDRITZ, we were looking for a partner as well as a supplier, and we found it.”

FIND OUT MORE AT www.spectrum.andritz.com



AE&E ADDS MORE POWER TO THE PORTFOLIO

Steam generators, air pollution control, and boiler services complement existing capabilities for the Pulp & Paper business.

At the beginning of this year, ANDRITZ acquired some areas of the former AE&E Austria. The company now operates under the name ANDRITZ Energy & Environment (AE&E).

AE&E originated from two Austrian companies with a 150-year successful business story. There are two locations in Austria (Raaba and Vienna) with 350 employees. AE&E operates in three areas, which complement the capabilities of ANDRITZ PULP & PAPER quite well:

Steam Generators and Plants. The product range covers circulating fluidized bed boilers (POWERFLUID) to generate energy from coal and biomass residues and waste; bubbling fluidized bed boilers (ECOFLUID) for biomass and other biogenic residues and waste; soda liquor and sulphite liquor recovery boilers for the pulping industry; and POWERBLAST boilers for the steel industry. These technologies complement the existing boiler products from ANDRITZ (biomass boilers, recovery boilers, gasifiers, and evaporation plants).

Air Pollution Control. AE&E supplies emission control technologies for a wide range of applications: wet limestone flue gas desulphurization, dry flue gas cleaning (TURBOSORP), complex multi-stage systems for waste incineration, and plants for NOx removal (Selective Catalytic Reduction).

Service. The service business operates across all the technologies mentioned above to fully support products throughout the complete lifecycle. Services include technical support, troubleshooting, replacement parts, repairs, assistance during inspections and outages, and modernization/upgrade activities.

ANDRITZ PULP & PAPER has integrated the steam generator technology into its Recovery and Power division, and the

service business is now a part of the global Service division. Air Pollution Control operates as a new division.

Notable projects in the recent history of AE&E include the world’s largest alternative fuel boiler plant in Eisenhüttenstadt, Germany (which provides power and steam for the nearby ProPapier paper mill), the largest sulphite liquor boiler (Sappi Amakhulu, South Africa), and turnkey installation of a flue gas desulphurization system for the largest thermal power plant in Romania.

AE&E customers within the Pulp & Paper segment also include UPM, Stora Enso, SCA, M-real, and Sappi.



▲ For the growing Waste-to-Power segment, AE&E supplied this fluidized bed boiler firing refuse-derived fuel, with TURBOSORP air pollution control, in Witzhausen, Germany.



▲ AE&E delivered the world’s largest alternative fuel boiler plant in Eisenhüttenstadt, Germany which provides power and steam for the nearby ProPapier paper mill.

Air Pollution Control technology is an important component to meet strict environmental regulations. This photo shows the turnkey installation of flue gas desulphurization pollution control for a thermal power plant in Romania. ▶



DISSOLVING PULP: RISING PRICES

Dissolving pulp is the major source for natural cellulose used in rayon production. Global cotton supply is not sufficient to meet textile industry demand, so the price for dissolving pulp is rising dramatically.

Many producers announced plans to expand capacity, particularly in China with the high textile industry concentration

there. By the end of 2012, China's dissolving pulp capacity is forecast to increase by 529% and its share of global dissolving pulp capacity will increase from 6.5% to 26.8%.

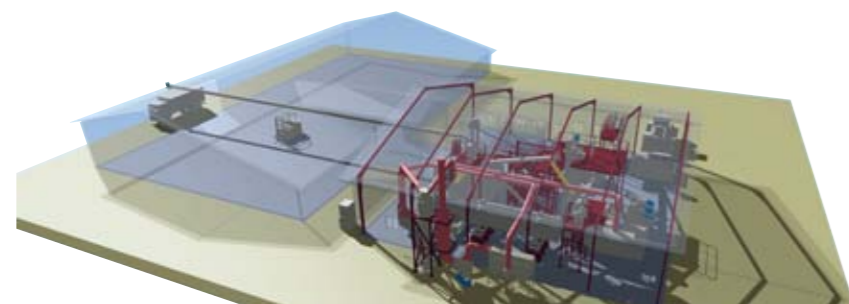
Two recent orders placed with ANDRITZ highlight this trend to convert existing kraft pulping lines to the production of dissolving pulp. Both Sun Paper Industry Joint Stock Co., Ltd. and Chenming Zhanjiang Pulp & Paper Co., Ltd. ordered cooking pre-hydrolysis upgrades for their production lines to produce dissolving pulp. Both of these lines are scheduled to be operational in 2011.

Dissolving pulp requires a pre-hydrolysis step to remove hemicelluloses and boost the cellulose content to 92%+. ANDRITZ is delivering a cooking pre-hydrolysis upgrade to a cooking line at Sun Paper Industry Joint Stock Co., Ltd. in China (pictured here). The line is scheduled to be operational this year. ▶



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TORREFACTION SHOWS PROMISE



▲ Architect's rendering of the torrefaction demonstration facility in Sønder Stenderup, Denmark which is being built by ANDRITZ to provide proof of the company's technologies for large-scale torrefied biomass production.



Torrefied biomass has great potential for reducing the costs of the biomass-to-energy production chain. The process resembles coffee roasting in the absence of oxygen. Compared to regular wood pellets (left), torrefied pellets (below) have higher energy content as a result of removing low energy constituents from the wood. ▼



ANDRITZ will build a demonstration facility in Sønder Stenderup, Denmark to provide proof of the company's technologies for large-scale torrefied biomass production and to assist customers in developing their production processes for this promising technology.

Torrefaction is a process similar to roasting coffee beans. Heat is applied in the absence of oxygen to remove moisture. As utility companies are being required to reduce carbon emissions, more of them are investigating co-firing wood with coal. Their costs may be reduced significantly by using torrefied biomass.

Current technology is limited to 100,000-150,000 t/a production. The proposed ANDRITZ solution provides for more than 700,000 t/a in a single line. In the facility, ANDRITZ will have the ability to pelletize the torrefied biomass into a final product which will be tested by various power company partners in the project.

Highlights of

NEW ORDERS

COMPLETE LINES
Montes del Plata Punta Pereira, Uruguay All major production systems for greenfield 1.3 million t/a pulp mill on EPC basis <i>Largest order in ANDRITZ's history</i>
Eldorado Celulose e Papel Três Lagoas, Brazil Woodyard, complete fiberline, complete drying plant, and white liquor plant for 1.5 million t/a greenfield market pulp mill
JK-Paper Rayagada, Orissa, India Major production systems for new pulping line (wood processing, fiberline, and recovery island) <i>Largest millwide scope for ANDRITZ in India</i>
Sun Paper Holding Lao (part of Sun Paper Group) Muang Phin, Laos Wood processing equipment and pulp drying plant EPC fiberline and white liquor plant
Botnia Joutseno, Finland Biomass gasification plant, including fuel/ash handling systems
Iggesund Paperboard Workington, Cumbria, United Kingdom BFB biomass power island, including fuel receiving/handling systems
Hämeenkyrön Voima Hämeenkyrö, Finland BFB biomass boiler island, including fuel/ash handling systems

Highlights of

COMPLETE LINES
Graphic Packaging International Macon, Georgia, USA BFB biomass boiler including fuel/ash handling systems
Hunan Tiger Forest & Paper Group Yuanjiang, Hunan, China Repeat order for P-RC APMP system
KEY EQUIPMENT, UPGRADES, AND MODERNIZATIONS
SCA Packaging Obbola, Sweden Waplans Debarking Drum
Mondi Štetí Štetí, Czech Republic Evaporation plant modernization
M-real Husum, Sweden Evaporation plant modernization
Chenming Zhanjiang Pulp & Paper Chenming, China Conversion of fiberline to dissolving pulp, including continuous cooking upgrade and modifications to recovery island
Sun Paper Industry Joint Stock Co. Yanzhou, China Conversion of fiberline to dissolving pulp, including continuous cooking upgrade

COMPLETE LINES
Propower Eisenhüttenstadt, Germany POWERFLUID CFB boiler <i>World's largest refuse-derived fuel CFB boiler</i>
Zhumadianshi Baiyun Paper Zhumadian, Henan, China Washing, screening, bleaching system for new fiberline
Shandong Sun Paper Industry Joint Stock Yanzhou, China ANDRITZ Wash Press (AWP)
Södra Cell Värö, Sweden ANDRITZ Wash Press (AWP) <i>Second AWP at Värö</i>
Vyborgskaya Cellulosa Vyborg, Russia Phase 1 start-up of complete pellet plant <i>World's largest pellet plant when completed</i>

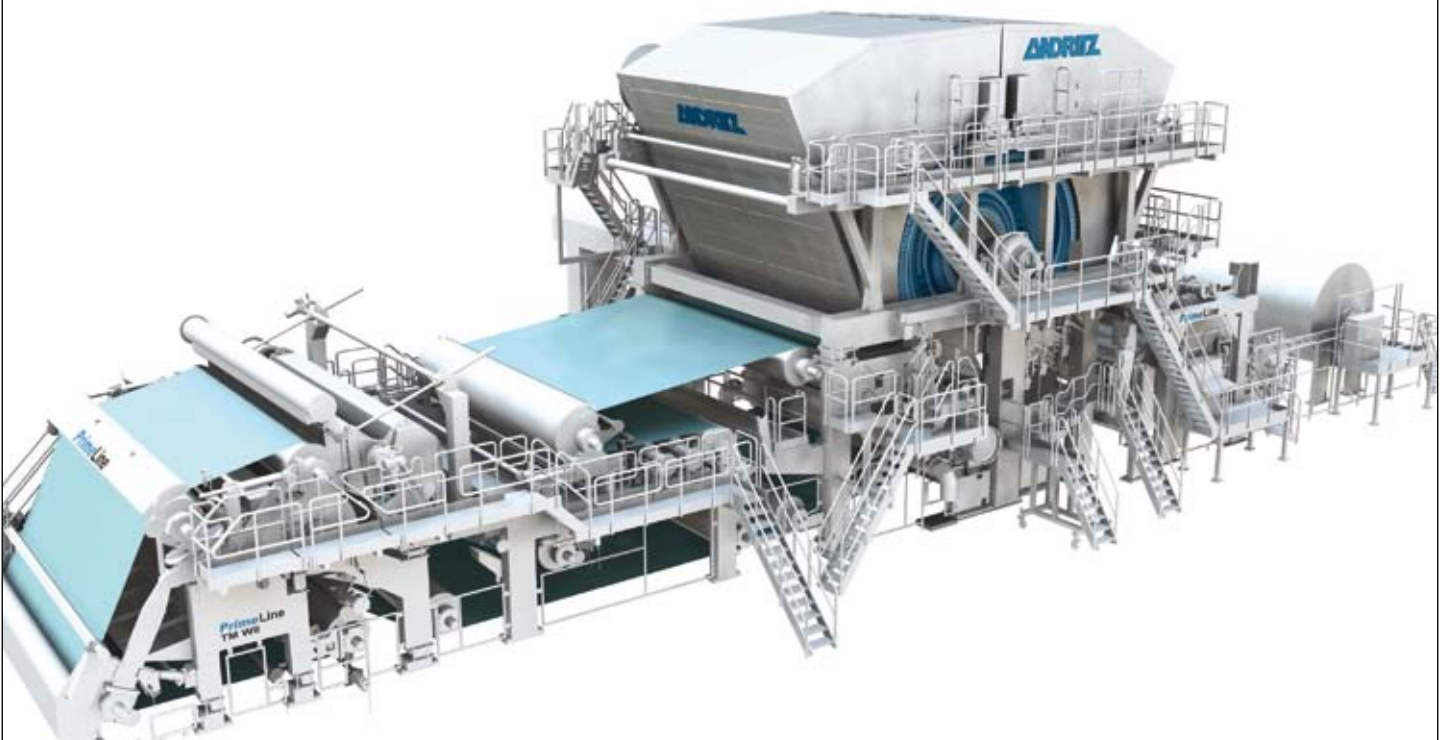
NEW START-UPS

COMPLETE LINES
APP Guangxi Jingui, Guangxi, China Two P-RC APMP lines <i>Lines started up in record time</i>
Shandong Huatai Paper Dongying, Shandong, China 1210 t/d stock preparation system
Shouguang Meilun Paper Shouguang City, China <i>PrimeLine™ W8 tissue machine</i>
KEY EQUIPMENT, UPGRADES, AND MODERNIZATIONS
Norske Skog Skogn, Norway LC refining, pulp washing, and screening
Estonian Cell Kunda, Estonia LC refining stage

KEY EQUIPMENT, UPGRADES, AND MODERNIZATIONS
Rigesa Celulose Papel e Embalagens (subsidiary of the MeadWestvaco Corporation) Três Barras, Santa Catarina, Brazil OCC line for 350 t/d production Defiberizing, screening, HC reject refining and washing system
ONEA-Engineering Austria for Baoding Swan Baoding, Hebei, China FibreSolve pulper and twin wire press
W. Hamburger Pitten, Austria PrimeCoat film press & PrimeAir glide airturn system
Hebei Changtai Paper Industry Tangshan City, Hebei Province, China Paper machine components for fluting and testliner (headboxes, shoe press, calender, film press, and airturn system)
Jiangsu Fuxing Paper Fuxing, Jiangsu Province, China Paper machine components (shoe press, calenders, film press, blade coating heads, and airturn system)
Kolicevo Karton Proizvodnja Kartona Domzale, Slovenia Rebuild of machine wet end

KEY EQUIPMENT, UPGRADES, AND MODERNIZATIONS
Daehan Paper Seoul, South Korea FibreFlow drum pulper
Smurfit Kappa Hoya Papier und Karton Hoya, Germany Rebuild of drying section, adding film press, airturn system, and web threading system <i>Largest PrimeCoat film press from ANDRITZ</i>
Reno De Medici Santa Giustina Belluno, Italy Rebuild wet end of BM 1
VPK Packaging Oudegem, Belgium Complete rebuild of the press section, including PrimePress Trix shoe press <i>First ANDRITZ rebuild using 3-nip shoe press</i>

PrimeLine™ tissue machines with key components that save resources



PrimeLine™ machines are widely embraced by the global tissue industry: not only due to proven performance, but also for innovations that are available now. Based upon its extensive experience, ANDRITZ PULP & PAPER brings new energy-saving features and capabilities to its CrescentFormer

machines and components: Type M machines (widths from 3.4 to 3.65 m) and Type W machines (widths from 5.4 to 5.6 m) can be equipped with the *PrimeDry* Steel Yankee, the *PrimePress* XT shoe press, and the *PrimeDry* HeatRecovery ReEvaporation system which help achieve remarkable resource savings.



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