



SPECTRUM

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ANDRITZ
Pulp & Paper



Switch on GREEN POWER solutions from ANDRITZ

More and more companies are switching on their **GREEN POWER** options. **ANDRITZ** offers a range of technologies for producing solid biofuels, liquid biofuels, and even energy from waste by-products.

We have included several stories in this issue of **SPECTRUM**, highlighted with the **GREEN POWER** symbol, which showcase our customers' successes with renewable energy technologies.

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Leading technology vs. technology leadership



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



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

Some industries (consumer electronics comes to mind) are constantly driven to introduce leading technology. The latest, the greatest, the newest feature. By *leading with technology*, they try to determine what customers really find valuable.

Given the amount of capital required to operate a pulp and paper mill, we find very few owners wanting to risk their production on any equipment that is Serial Number 001. Even the best-funded and technically savvy mills want technology that is proven.

We are a technology-intensive company, but we understand that the technology we supply is only of value to you if it makes your business better and your life easier. There is no sense being first with something unless it passes the acid test of helping you improve your business: either by increasing production, reducing waste, saving money, or helping you make more money.

We search for all opportunities where we can bring our most current technology tools to

a customer who is willing to try new concepts – so that we can develop a better solution in partnership. There are clear examples of these kinds of partnerships at work – big and small:

- The biggest has to be the 11,600 tonnes of dry solids per day recovery boiler now being erected in Indonesia. This would replace about four “traditional” boilers – a “super tool” for the customer to produce the highest amount of electricity while recovering black liquor.
- The smallest might be emulsion-cooled black liquor guns for the recovery furnace. The guns are cooled and cleaned with a water/steam emulsion. What makes them better is that they last considerably longer, basically clean themselves, and form better liquor droplets to arrive at more stable boiler operation.
- Then there is TurnKnife IV: the latest knife system for roundwood chipping. It has a new chipping geometry and is light-

weight – yet has the power to cope with all sorts of wood species. What makes it better is that it stays sharper longer so knife changes are fewer. Plus, it cuts better chips.

- Another is OPP (Optimization of Process Performance) which is a powerful computer-based tool that gives ANDRITZ process experts and mill personnel insight into their processes like they have never had before. The OPP actions, usually without capital investments, can save staggering amounts of money.

By carefully listening to our customers and then combining inputs from a variety of technical sources, we design technology solutions that are responsive. Partnering with customers to prove out these solutions is critical to bringing *technology leadership* to the industry.

What’s on your “wish list” of technologies to help you work better? We would love to know.

Joachim Schönbeck

Humbert Köfler

NEWS

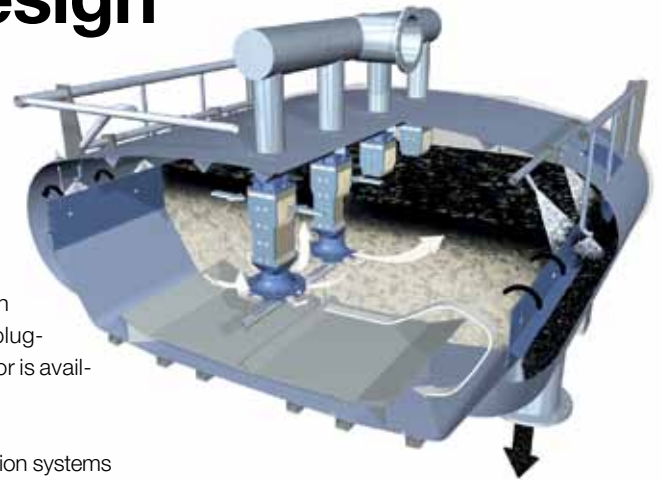
New multi-injector design for DIP

ANDRITZ has developed a new multi-injector design for the primary stage in deinking flotation systems. The multi-injector is tailor-made for effective ink removal and consumes 50% less energy than previous designs. The new design optimizes the air intake in the injector as well as the distribution within the flotation cell. It also utilizes a newly developed pump series, which is more energy efficient.

The new multi-injector was designed using computational fluid dynamics (CFD) to obtain the best deinking performance by

modelling the optimum air bubble size and distribution. It incorporates a reshaped nozzle geometry, which also reduces the risk of plugging. The new multi-injector is available in three ways:

1. In new SelectaFlot flotation systems
2. As a retrofit to existing SelectaFlot units
3. As a retrofit to flotation cells made by other manufacturers.



Find out more about the multi-injector at:
www.andritz.com/flotation

EWR extends the wear life of critical chipper parts

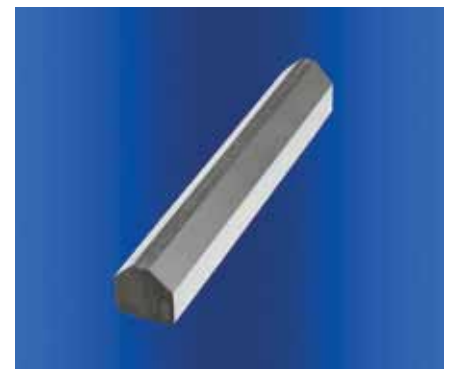
ANDRITZ has developed some Extreme Wear Resistant (EWR) chipper parts for hard wear (e.g. logs with sand and/or bark slices) and high capacity chipping applications.

Two examples of the EWR product line are bedknives and wear segments (inner and outer). The expected life of an EWR bedknife is three to four times that of a standard one, giving a parts cost savings of about 25% per year. Maintenance cost savings are also significant due to reduced labor hours for mak-

ing bedknife changes each year. With fewer changes, chipper uptime is enhanced.

With longer intervals between wear parts changes, less maintenance labor hours required, and savings in wood losses, EWR parts improve equipment reliability and uptime.

Find out how to save money and improve throughput with EWR parts by talking with your ANDRITZ service representative.



FibreSolve rotor saves energy; easily retrofitted to under-machine and tub pulpers

ANDRITZ engineers used the latest CFD studies to develop a better rotor design to not only improve pulper efficiency, but save significant energy in the process (up to 30%).

Historically, pulper rotors have a low profile with many cutting edges. As much as 70-80% of the energy input is required for these cutting and mechanical forces. Due to this, stock circulation has suffered, as low profile rotors are only able to create a circular vortex. Mills have tried many solutions, such as baffles and d-walls to improve circulation.

The FibreSolve rotor has a unique “pumping vane” which achieves optimal circulation by creating a counter-rotating flow pattern that quickly submerges incoming material. FibreSolve also allows pulping at higher consistencies (i.e. up to 10%). Specific energy is reduced by 25-30% with equal or better pulp quality.

Find out more about FibreSolve at: www.andritz.com/fibresolve



Shake, shred, and separate your rejects

Handling rejects in a safe, efficient, and economical way is vital to any plant's continuous production. ANDRITZ has developed several new products to handle reject treatment.

Shake. The Ballistic Separator ReBal removes bulky material from a mixed reject stream. A solid inclined screen plate oscillates at 150 rpm to set the material in motion. Spherical or cubic parts roll downwards to the heavy fraction; flat and light materials move upwards to the light fraction. The angle of inclination and machine speed are easily adjusted.

Shred. The ANDRITZ Granulator UG shreds pulp and paper rejects, reducing the size of

different input materials to a quite small and uniform particle size. A hydraulic pendulum pusher feeds the material to the cutter. Then, the material is cut between a high-speed rotor with block knives and a static counter knife.

Separate. ANDRITZ tackled the traditional problems with sand separators (low efficiencies, bad filtrate quality, wear, and mechanical issues) and developed a new type

of separator, the ReSed. By optimizing the geometry of the sedimentation tank and the internal flow pattern, a huge increase in efficiency has been achieved. Since the chamber is completely filled with liquid, problems with floating fibers that can plug the machine are avoided.

Find out more about ANDRITZ rejects treatment equipment at: www.andritz.com/reject-handling

▼ ANDRITZ Sediment Separator ReSed.



FINE

When the Veracel mill started operating in Brazil in 2005, it was pre-ordained to be one of the world's most advanced bleached pulp mills and also a reference site for sustainability and operational excellence. A passion for continuous improvement – from the smallest process details to large activities such as an innovative maintenance program – still attracts industry attention.



TUNING

a well-tuned mill

Veracel is a partnership of two major leaders in the pulp and paper industry, Fibria and Stora Enso. Ari Medeiros, Chief Operating Officer, says, "This mill is in a very good position, and is also in a very good condition. But it is challenging to stay on top as this is a single-line mill. We must run continuously and at a high level of performance, especially when coming out of a shutdown or blackout or whatever."

In response to the challenges, Veracel has succeeded producing over 10 million tonnes of pulp in 9.5 years – almost 20% over the nominal design capacity.

A reference for excellence

According to Medeiros, Veracel was originally conceived to be a "showcase for the best this industry can offer." And, after 10 years of operation, it is still one of the most competitive in terms of costs, quality, environmental performance, and forest productivity.

"We have a very strong focus on operational excellence," Medeiros explains. "Since we have fine-tuned our operations over the years, we know that big gains are less common. But we are pushing for even the small gains that, when taken together, can equal a big one."

"Veracel has long been a place where others come to watch and learn," Medeiros says. "We have, in fact, trained eight operating teams from other mills here. People come to see what we are doing here. We don't mind. Anyone can buy the same equipment – the difference is in the knowledge and skill of the people."

Pioneering maintenance contract

When Veracel signed a contract for ANDRITZ to handle all the maintenance activities at the mill, it was the first millwide maintenance contract of its kind in the pulp sector in Brazil. "Our expectation was to have similar results to the Frey Bentos

mill in Uruguay (the first such contract in South America, also with ANDRITZ)," Medeiros says.

From the moment Veracel was born, there was a concept of outsourcing maintenance. "My core business is to produce pulp – to innovate better, more efficient ways to produce a commodity," Medeiros explains. "Focusing on maintenance would only detract from my core interest."

Initially, Veracel hired four different maintenance companies (mechanical, electrical and instrumentation, lubrication, and general building maintenance). "The overall results were not so good," Medeiros says. "There were four different approaches, four different management groups, and we had not established any penalties or bonuses, so Veracel took all the risks."

The Veracel mill produced over 10 million tonnes of pulp in 9.5 years – almost 20% over the mill's design capacity. ▼



A specialist from ANDRITZ Maintenance Solutions inspects a fitting on one of Veracel's DD Washers. ▼



In 2011, it was decided to put all maintenance activities with one company. After negotiations with nine different companies, ANDRITZ was selected.

Roberto Costa is ANDRITZ's Maintenance Manager for the Veracel contract. "The contract was negotiated with a fixed maintenance budget, which helps Veracel know exactly what costs will be," he says. "We have organized ourselves to integrate with their Coordinators in the mill process areas, so the communications is very direct and efficient."

"We have reduced our budget for maintenance expenses and we centralized the decisions with one partner," Medeiros says. "On their side, they have a very efficient organization and they control their costs tightly without sacrificing our production, quality, or safety. It has been a win-win for the two companies I think."

According to both Costa and Medeiros, the relationship is improving year by year. "We learn together, and use these lessons learned to improve operations together," they says.

"A big question when you enter into such a contract is whether the maintenance provider will do everything it needs to do to keep the mill running reliably, or will it try to skip certain things in order to make more money," Medeiros says. "It is all based on trust."

The other key element is the quality of the people. "I've known that ANDRITZ has experience in maintenance, but I didn't know about the quality of the people," Medeiros says. "What I can say is, the first year of the mill-wide contract, Veracel had the best results in the company's history. Results in 2013 were also good. Last year we had one disruption that cost us tonnage, but it was not the fault of maintenance. We are in a very good position this year, so our expectation is that in 2015 we will have the best results in our history once again. Together."

The major measurement is the amount of production. There are bonuses and penalties in place with ANDRITZ. There are also targets for quality, environmental, and safety.

"I have worked in companies with different maintenance scenarios," Medeiros says. "Personally, I believe that outsourced maintenance is the best way to get good results for the mill. I am satisfied with the progress we have made and I am in favor of it continuing."

Fine tuning: big gains from using new tools

ANDRITZ introduced a service years ago in Brazil called OPP (Optimization of Process Performance). Veracel was a pioneer in adopting this tool, according to Kleverton Figueiredo, OPP Specialist for ANDRITZ.

OPP is a combination of sophisticated software, methodology, knowledge database, in-site specialist" and process/equipment knowledge from experts in ANDRITZ and the client organization. The first OPP project in 2007, Medeiros recalls, was to optimize the DD Washers in the bleach plant. As a result of the work, Veracel increased production from 2,900 to 3,200 t/d. "Things improved dramatically with zero capital investment and I became a big believer," Medeiros says.

"We started with a single DD Washer," Medeiros says. "After it was running perfectly, we moved on to the other three washers in bleaching, and then the four in the brownstock area. In the following years, we have developed new algorithms and control strategies for chemical consumption, temperature, pH, pressures, and flows to help us better control each stage in the fiberline."

The value of OPP is that it can be used for a variety of smaller and easily measurable projects to reduce chemicals, increase electrical generation, optimize the recovery boiler sootblowing routines, and similar things. The project for electricity generation had significant economics. "We analyzed the control loops and improved the programming using multi-variable controls and fuzzy logic to increase the electrical output from the boiler and turbo-generator plant,"



◀ OPP (Optimization of Process Performance) is a combination of sophisticated software and process/equipment knowledge from experts in ANDRITZ and the client organization. Veracel was a pioneer in using OPP.



◀ Maintenance on the fiberline.

Figueiredo says. “The economic impact is in the range of about three million dollars per year.”

“We are running better and better, with more savings,” Medeiros says. “Even a half-percentage point here, and a half-point there adds up to real money at the end of the year.”

Always something to improve upon

“The OPP service today is much more powerful than it was eight years ago when we

started,” Medeiros says. “They are working with data mining techniques. I think that we are on the leading edge of using these tools, but eventually they will be used in all pulp mills.”

In his 31 years of working in pulp mills, Medeiros is constantly learning. “We are doing things today that I could not even have dreamed of back then. The savings of chemicals, the improvements in safety, the energy gains – these are all important things to keep Veracel ahead.”

Medeiros and his team have some ideas about what they will do next, including a couple of large projects that may take up to a year to prove in simulation before they go live. “A big part of that is training operators and getting their opinions and feedback so that we can improve,” he says. “It’s not just technology – the human knowledge is incredibly important.”

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“What I can say is, the first year of the millwide contract, Veracel had the best results in the company’s history.”

Ari Medeiros
 Veracel Chief Operating Officer

A project to convert an existing lime kiln from oil to gas firing gave Sappi Skowhegan the opportunity to reduce energy costs in a big way. The LimeFire burner and LimeCool sector cooler were key to the conversion.

Sappi North America's mill in Skowhegan, Maine is a large, integrated complex with a unique hardwood and softwood pulp blend (Somerset Synergy) which is used by its three machines. Annual production is about 795,000 metric tonnes of paper.

Skowhegan is now running on natural gas instead of oil, a move that is forecast to save about 30% in energy costs in addition to reducing air emissions. The final stage of the energy project involved converting a 1970's vintage FLSmidth lime kiln and upgrading it with some of the latest technology from ANDRITZ.

The switch to natural gas in the kiln replaces the equivalent of 80,000-100,000 barrels of No. 6 fuel oil each year, according to Lance Bolduc, Recovery Manager. "ANDRITZ supplied a great cooler and a great burner," Bolduc says. "I am very happy with the design and performance."

Kiln
conversion
helps
Skowhegan

SAVE
ENER



Best guarantee

The Skowhegan mill evaluated three suppliers for the kiln conversion project. “ANDRITZ was the only one who would guarantee NOx emissions at the production rate and quality that we required,” Bolduc says. “That was the biggest reason we chose ANDRITZ.”

ANDRITZ delivered the LimeCool cooler and shell section and the LimeFire multi-fuel burner, along with other items such as support rollers, crusher, conveyor, elevator, primary air fan, and the burner management system. In terms of support services, ANDRITZ also did some basic, process, and control engineering, as well as provided erection supervision and commissioning support.

Do no harm

“One of my main criteria for this project was that it would do no harm to the existing operation,” Bolduc says. “We had a decent running kiln and we did not want to go backwards in any way. Same production. Same quality. Just do it with a lower cost fuel. We

also wanted the flexibility to burn multiple fuels, so that we can select the lowest cost fuel in the future.”

Concerned about neck-down design

“At the time we made the decision to go with the ANDRITZ ‘neck-down’ design, there was a lot of discussion internally,” Bolduc says. “The retrofit takes the shell diameter of 11’6” (3.5 m) down to 6’ 7” (2 m) at the coolers. Our biggest concern was having the space to get equipment in and out during our annual outage to clean the kiln and re-brick when necessary.”

Robert Kenny, an Engineering Consultant who has worked at the Skowhegan mill for 16 years, remembers the discussions with ANDRITZ well. “The mill ended up going with ANDRITZ’s design,” Kenny says. “But, the thought was that it would add a couple of days to the annual outage because contrac-

tors would not be able to use their traditional equipment to work inside the kiln. It turned out that the extra time was not needed because the kiln was so clean.”

More production: an added benefit

When you convert to natural gas, you decrease energy efficiency by about 10% because the heat value of gas is less than fuel oil. Sappi’s goal was to convert to 100% natural gas without losing any production, so that is where the LimeCool unit comes in.

“One of the things we did was to visit several mills to evaluate sector coolers,” says Gregory Hale, Sappi’s Project Manager. “Competitive coolers were often failing due to thermal expansion. ANDRITZ coolers are robust enough to stand up to the harsh kiln environment.”






▲ The Skowhegan kiln is inside a building. The switch to natural gas replaces the equivalent of 80,000-100,000 barrels of No. 6 fuel oil each year in the kiln.

“Before the conversion, we were running about 340-350 t/d of product,” Bolduc says. “Our old satellite cooler was undersized. Lime coming out of the kiln was very hot which meant we were sending away thermal energy with the product. With LimeCool, we reduced the temperature of the lime by about 60% and the secondary air going back to the kiln is considerably hotter. Putting that thermal energy to work allows us to produce more lime at a lower overall energy cost.”

Today, the kiln operates at 375 t/d. “The process guarantee from ANDRITZ was for

342 t/d, but we have been able to increase production because the kiln is running so well for us,” Bolduc says. “That was an added benefit.”

Very flexible burner

Sappi Skowhegan’s operators have been very impressed with the new LimeFire multi-fuel burner and its flame shaping capabilities. “We used to constantly fight with our old lance burners,” one operator says. “We would often experience flame impingement on the brick. The new burner is very predictable. I can go out and adjust the valves to get exactly the flame shape I want.”

When the kiln started up, operators dialed in the shape they wanted and left it there. “The only time we play with it is during start-up after the annual outage when there is no product in the kiln,” Bolduc says. “We make the flame a little bushier for the heat-up, then dial it back and don’t touch it. The burner is outstanding.”

Ahead of schedule

Conversion work started during the annual shutdown in October 2014. First mud to the kiln began to flow on October 31st. According to Robbie Diaz, ANDRITZ Project Manager, “We had a very good start-up and brought the kiln online two days ahead of schedule.”

Diaz is complimentary of the project team from Skowhegan. “Sappi runs very professional projects,” he says. “They are consistent in their attention to detail and quality. All of the departments – engineering, operations, maintenance, and quality – are active participants. With this kind of attention and support, everyone is motivated to do his or her best work.”

“People talk all the time about teamwork,” Hale of Sappi says. “We had a great group of people on this project with mill process engineers, ANDRITZ, operations, and maintenance. This has been outstanding. We could not ask for a better project.”



◀ Gregory Hale, Sappi Project Manager



▲ Scott Thibodeau, Utility & Recovery Shift Supervisor (standing), discusses performance of the kiln with Steve Simpson, Senior Operator, in the control room.



▲ Lance Bolduc, Recovery Manager (left), is shown with Todd Lewick, Burner Project Manager for ANDRITZ, with LimeFire burner in background.

“The ROI on this project is significant,” Bolduc says. “We did some other things during this project which have paid back as well. We can start up easier and we have the capacity to store more product to keep the kiln running at a stable production rate. We don’t experience the swings that we used to. And, we have cut our purchased lime down to a point where I would be uncomfortable cutting it any more.”

Magnificent!

One year after start-up, Tero Koskinen, ANDRITZ’s Erection Supervisor, was in town to inspect the kiln during the annual outage. “The inside of the kiln and

the new equipment looked brand new after one year,” Koskinen says. “And when the Sappi Reliability Manager and I went into the LimeCool, the only thing he said was ‘Magnificent!’ That is a real tribute to the way that Sappi operates the kiln. First class.”

Bolduc says, “We had scheduled 60 hours for cleanout and completed the work in 20. We did not have to replace any of the burner end brick and lost only ¼-inch (7 mm) of refractory in a year. In the past, we would have to replace 20 feet (7 m) of brick every year because we would lose 2-3 inches (5-8 cm) of refractory at the burner end.”

“I don’t know of any mill we talked to that produces more lime after the natural gas conversion than they did before,” Hale says. “We put in the LimeCool and LimeFire, fired the kiln harder than we had before, produced more product, and had almost no brick loss. This is outstanding.”

Bolduc only expressed one concern, “After the first year of operation, we set the bar so high in terms of the kiln’s performance, I only hope we can keep it that high!” he says.

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Sappi, a global company headquartered in South Africa, acquired the Skowhegan mill in 1994. Sappi is a leading supplier of coated fine paper, pulp, and release paper in the United States- with a production capacity of 1.3 million tons annually. ▼



READY

—
for the next challenge

With construction completed, Montes del Plata mill in Uruguay is intently focused on running and maintaining a world-class market pulp mill. In addition to delivering the production technology, ANDRITZ is now supplying millwide maintenance services as part of a long-term full-service contract.



Arauco and Stora Enso took advantage of the decision by the Spanish company ENCE to sell its assets in Uruguay near Conchillas (Colonia region) and formed the 50-50 venture known as Montes del Plata. This gave birth to a greenfield market pulp mill in Punta Pereira, which has as its goal to be a shining example of high technology, sustainable production, environmental safety, community involvement, and effective maintenance outsourcing.

Montes del Plata manages over 145,000 ha of forested lands in 11 departments of Uruguay, including plantations on third-party lands, that secures the raw material supply for the 1.3 million t/a bleached eucalyptus mill. The site on the Rio del Plata (River of Silver) is ideal for easy transport of logs and pulp.

ANDRITZ was selected as the main technology supplier for Montes del Plata – providing the woodyard, fiberline, pulp drying plant, chemical recovery island, and power plant on an EPC basis. When the mill became operational in 2014, it was calculated that it increased the GDP of Uruguay by 1.7% compared to 2012. It represents the largest and most important private investment in the country's history.

A shift in thinking

Héctor Araneda, Mill Manager, is leading his team through the transition from “construction” to “operations.” “This represents a big shift in thinking,” Araneda says. “During construction, there were thousands of people on-site in constant movement. Now there are a few hundred.”

By comparison, the mill scene is calm and business-like. Calm, however, does not mean that nothing is happening. “We have a new and active challenge now,” Araneda says. “We need to run stably at full load or even slightly above design. Reliability is a key issue.”

Araneda came to his Montes del Plata assignment from Arauco's Valdivia mill in Chile and was responsible for the organization, hiring, and training of key engineers and operators. Montes del Plata did extensive training, since most of the new engineers had not worked in pulp production before. In addition to 40 engineers, about 125 operators were hired. “We split our training into phases, and made good use of the ANDRITZ IDEAS dynamic simulator for this training,” Araneda explains. “We trained operators to control the virtual mill before the real mill was ready.”





◀ Montes del Plata management team (left to right): Dan Holmsten, Manager of Maintenance & Engineering; Héctor Araneda, Mill Manager; Eero Ristola, Production Manager; and Victor Otárola, Environmental Manager.

Based on progress so far, Araneda is pleased. “I would say we have done well with our selection and training activities,” he says. “The mill is running very well and the quality of the pulp is excellent.”

A commitment to Uruguay

When Montes del Plata built its organization, it made a commitment to hiring and training mostly Uruguayans. Only about 3% of the people in the company come from outside Uruguay. “Most recently, we hired 25 young people from the local high schools and trained them to work at the mill. They relieve some of the operators for a shift so that operators can participate in training to learn multiple skills.” ANDRITZ is also hiring and training Uruguayans for its full-service maintenance organization. The maintenance team of 128 is all local people with the exception of one person from Finland. “ANDRITZ has good experience working in Uruguay,” Araneda says, “and it shows in their ability to build a professional organization.”

Selling all that we produce

Montes del Plata started feeding chips to the digester in June 2014. “We are now regularly reaching our design production and recently have been running above design,” Araneda says. “The pulp quality has been superb to the point where we are selling all that we are producing.”

Running at and above design has given Araneda a chance to evaluate the overall design of the mill. “I am very happy with this mill,” Araneda says. “The overall concept and process flows are extremely sound,” he says. “Once we get over the couple of small bottlenecks we have uncovered, I know that we have a good future.”

No looking back

Certain parts of the construction project were very rough, as schedules and resources between ANDRITZ and Montes del Plata were pushed. “But that period is over,” emphasizes Araneda. “We don’t live in the past. We have a very good relationship with ANDRITZ on both the equipment and maintenance

sides. We get very good support from the ANDRITZ as we fine-tune each process. We have good discussions that are focused on solving problems.”

Millwide maintenance contract

Dan Holmsten, Maintenance & Engineering Manager, worked in Sweden for Stora Enso prior to coming to South America. Holmsten has been part of two greenfield projects (first Veracel in Brazil and now Montes del Plata in Uruguay). Holmsten’s experiences at Veracel helped to shape the maintenance model being used at Montes del Plata.

“We have agreed upon a millwide contract with ANDRITZ and they are responsible for all maintenance activities in the mill with a fixed maintenance budget,” Holmsten says. “We know what we will pay. We have a partner who will share the risks. And, we are willing to pay extra if we get good results.”

Strategic choice

From Holmsten’s point of view, the choice between insourcing or outsourcing main-

TEAMWORK in the white liquor plant

Carolina Rogberg is Supervisor of the white liquor plant for Montes del Plata. The ANDRITZ equipment in the plant is some of the largest in the world, producing 13,370 m³ of liquor per day. The lime kiln is designed to deliver 1,100 t/d of returned lime for the process.

Carolina came to Montes del Plata from the steel industry and joined the project in 2007. She supervises a production team of 10 people. "In general, we are operating well and white liquor quality is excellent," she says. "Our one issue is to push production of the kiln. We are coordinating with ANDRITZ to change the burner to a new design in January."

Carolina says that working with ANDRITZ Maintenance Solutions is easy and natural. "They are very knowledgeable and the working relationship is excellent," she says. "I meet with Javier daily and we coordinate our activities."

Javier Cabrera is Maintenance Supervisor for the white liquor plant and the effluent treatment plants. His team consists of six people. "Our main focus is on preventative maintenance and condition monitoring of the equipment. We classify the equipment based on how critical it is to the process, in collaboration with Montes del Plata. The critical equipment (about 20%) gets regular attention.



◀ Javier Cabrera, Maintenance Supervisor (left) with Carolina Rogberg, Production Supervisor, in the white liquor plant.

tenance is a matter of strategic choice by the owners. "If you insource, you need the competence in-house," he says. "If you outsource, you need a partner who has the competence to build an organization, build the maintenance routines, and manage all the activities."

One essential component, Holmsten insists, is that there is an incentive for the maintenance partner to profit from the mill's excellent performance. "A potential risk is

that your maintenance partner will have short-term thinking and just be motivated to make money," he says. To mitigate this risk, the contract with ANDRITZ has a bonus component. "That keeps it from being solely about costs, and drives us all to reaching our performance targets," he says. "Another key advantage is that the budget is agreed to ahead of time. When the cost is known and fixed, you can do the necessary and preventive things which are essential for long-term mill performance."

As Holmsten summarizes it, "The main benefit for us is that we have high equipment availability and we can focus on producing pulp."

From corrective to preventive

Mauricio Mattos is ANDRITZ's appointed Site Manager, responsible for the entire maintenance team at the Montes del Plata site. He honed his skills in maintenance management while working at the UPM Fray Bentos mill as part of the team assem-



“The pulp quality has been superb to the point where we are selling all that we are producing.”

Héctor Araneda
Mill Manager



Instrument Technician Luis Vico checks the calibration of a field transmitter in the fiberline. ▶

bled by Andrés Sommer, the Site Manager there and the General Manager for ANDRITZ Maintenance Solutions in Uruguay.

“Maintenance with separate specialist organizations is typically more expensive and there is more difficulty in setting performance targets since there is no single organization with accountability,” Sommer says. “As an alternative, we offered a full-service contract to Fray Bentos, which has been in force since the mill started up in 2007.”

“We had confidence that ANDRITZ would do the planning well and have a good set-up for maintenance based on their experience at Fray Bentos,” Holmsten remarks.

One of the keys, according to Mattos, was that ANDRITZ maintenance engineers joined the project team well before the Montes del Plata mill was built. “We created a long-term maintenance plan, entered maintenance routines and spare parts into an SAP database, and staffed a maintenance organization before chips were ever

fed to the digester,” he says. “We also organized a program for our maintenance people to be actively involved in commissioning. They know the equipment and processes intimately.”

During any start-up and ramp-up, the activities tend more toward corrective actions rather than preventative ones. “This is natural,” Mattos says, “as you have the peaks and valleys during ramp-up. But now we pay more attention to preventative actions to put the mill in steady-state. Less swings, less

WED to the fiberline

Daner Perez and Eliana Satrano are production and maintenance supervisors respectively for the fiberline and chemical plant. At the end of each workday, they ride the same bus home and sit side-by-side. Only now, the conversation changes from the calibration of a transmitter on the digester blowline to what to do about dinner and whose turn it is to give 18-month-old Renata a bath. You see, Daner and Eliana are not only work colleagues – they are husband and wife.

Daner is one of the few Montes del Plata engineers who had prior pulping experience. He worked for five years at UPM Fray Bentos, starting as a digester op-

erator and working his way into supervision. “I came to Montes del Plata quite early in the project, so it has been exciting to see the fiberline evolve,” he says. “After the normal hiccups during a start-up and ramp-up, we are running quite well now.”

The main activities for Daner and his team at the moment is focused on optimizing white liquor consumption. On the maintenance side, Eliana and her team are keeping to a strict schedule of preventative maintenance and planning for the next shutdown.

Eliana came to ANDRITZ Maintenance Solutions after working as a lab chief and a recovered fiber mill. “I was a maintenance

planner during the project phase and was recently promoted to a supervisor,” she says. “I love the work, as I love new challenges.”

Any difficulties with being married and working together? “Not really,” Eliana says. “We are not competitive, and we support each other. That’s really an ideal situation for maintenance and production.”

Another positive: “If we get a call in the evening about a fiberline situation that requires maintenance support, I don’t have far to go to get answers,” Daner says. “We can discuss and arrive at an action plan so we’re ready to work the next morning.”



◀Woodyard Mechanic Emanuel Romero changes the chipper knives in the woodyard.

ANDRITZ delivered all the process pumps to the Montes del Plata mill. Shown here is ANDRITZ Robert Prugger, a Technician for ANDRITZ HYDRO during commissioning of a fiberline pump. ▼



disruptions, less emergencies. Plus, we are very actively planning for the next shutdown, which will be our biggest annual opportunity to improve the performance and reliability of the equipment. We will have several hundred people in this mill during a tightly orchestrated time period.”

Monitoring and coaching

“My job is to monitor the maintenance performance of ANDRITZ and administer the contract on behalf of the owners,” Holmsten says. “I also play the role of coach to some of

the younger people here, since I have been through this process before. Mauricio has a similar role for ANDRITZ on the other side of the desk.”

“We are here to execute proactive maintenance using our knowledge of equipment and processes,” Mattos says. “One of the most important factors is to have excellent cooperation with the Montes del Plata production team. Dan and I talk daily. All of our maintenance teams meet and talk daily with their production counterparts. There is value

in having us in the mill every day with our access to all the information within the global ANDRITZ organization.”

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Eliana Satrano, Maintenance Supervisor (left) with Daner Perez, Production Supervisor in the fiberline. ▼



Dan Holmsten, Montes del Plata Manager of Maintenance & Engineering (seated) with Mauricio Mattos, Site Manager for ANDRITZ Maintenance Solutions. ▶



FINNISH MILLS

improve key
processes with OPE

Two case studies show how mills are using ANDRITZ's Overall Production Efficiency (OPE) service to increase throughput and quality without major investments.

Case #1: Kotkamills

Kotkamills produces quality products from two facilities in Finland (Kotka and Tainionkoski) and one in Malaysia. We are at the Kotka mill complex, which specializes in laminating papers, matte coated papers, and sawn products. Our hosts include Timo Tallinen, Technical Director, and Teemu Ukkola, Production Manager for PM1 and the recovered fiber plant.

The recovered fiber plant processes OCC for the production of the Absorbex® product line, with its wide range (140 to 350 g/m²) of unbleached saturating base kraft grades. Typical applications are decorative and industrial laminates and different types of electro-technical products.

“Our latest grade development is Absorbex Eco,” Ukkola says. “The fiber sources are forest industry by-products, sawdust, and recycled fiber from our own plant.”

The mill has another machine (PM2) which is currently producing magazine paper, but is undergoing an over MEUR 100 investment to convert to the production of packaging board grades. The conversion should be completed by mid-2016, according to Tallinen.

A sticky situation

The driver for Kotkamills seeking outside counsel was a nagging problem with stickies removal from the secondary fiber furnish, according to Ukkola. It was about three years ago when they began discussing with ANDRITZ about this problem. “Stickies were causing us headaches on the paper machine,” Ukkola explains, “and surface stickies are a definite problem for laminators, as they must produce a perfectly smooth sheet.”

▼ Timo Tallinen, Technical Director, Kotkamills.





▲ Teemu Ukkola, Production Manager (left) with Jukka Selin, OPE Project Manager at the reel end of PM1. Stickies were reduced by 85-90%, permitting a higher use of recovered fiber in the PM furnish.

When ANDRITZ first proposed an Overall Production Efficiency (OPE) contract, not everyone at the mill immediately saw the value. As Tallinen puts it, “We were not all that interested. At that time, we believed we could manage our processes without suppliers. The more we talked, however, we learned there were things ANDRITZ could give us that we could not do ourselves.”

Ukkola agrees. “This is not like contracting for a regular service or like buying a piece of equipment,” he says. “When you buy equipment, you negotiate the best price, put it in, and then you are on your own to figure out how to operate it in the best way. With OPE we work as a team. ANDRITZ people are like our own employees, working here with the same goals that we have—to maximize production and minimize the costs. So I think this OPE experience has been very good.”

Analysis and action

Says Jukka Selin, OPE Project Manager for ANDRITZ, “At the beginning, we involved some of our best process people to do some root-cause analysis on the stickies problem and to develop solutions. As part of the work, we analyzed where the sand and heavy materials were originating from and did a sand-balance for the mill. We made a lot of improvements in the removal of contaminants.”

As a first step, ANDRITZ suggested changing rotors and baskets in the existing screens to a lower profile design. This step improved stick-

ies reduction by about 25%. The installation of Dolphin rotors also saved energy for the mill. In the next phase, Kotkamills purchased a rebuild combined coarse/fine screen used at another mill. This screen, and the existing broke screen, serve as coarse and fine screening stages. As a result, stickies reduction was improved further 18%. “At the same time, we doubled the amount of OCC in our furnish from the starting point, and have increased throughput by 8-10%,” Ukkola notes.

“We also improved the short circulation in the cleaner plant,” Selin says. “We installed a fifth stage in the cleaner plant. By doing that, we lowered the fiber losses in the short circulation by about 75%.”

Other areas of the mill have benefited from the OPE actions. “We installed inverters to lower the rotation speed of some of the pumps in the pulp mill to save energy, and replaced screen baskets and rotors to remove shives before they ever get to the paper mill,” Selin says. “We also recommended a new type of refiner plate for the pulp mill’s rejects refiner which has cut energy consumption and improved fiber properties. This has improved the quality of the end product and enhanced the performance of the paper machine.”

Clear results and a new contract

“Today we are using more recovered fiber in our paper furnish and the quality is much better than it was before,” Ukkola says. “This has helped us

improve machine efficiency and margins by being able to substitute recovered fiber for virgin.”

Our customers tell us that we make a smooth and high-quality sheet,” Ukkola says. “We are in a quite good situation at the moment, especially when compared to three years ago.”

Kotkamills recently renewed the OPE contract for another three years. “The first three-year period was a very good learning experience for our people as we improved the quality and production efficiency of PM1,” Tallinen says. “The targets were achieved. We expanded the scope in the new contract to include the chemical pulp mill. We have new targets that will keep both ANDRITZ and Kotkamills challenged.”

Tallinen speaks positively about the meetings with ANDRITZ experts. “They present new solutions for us to consider,” he says. “We now have access to the latest technologies and techniques, things we can use to retrofit to our existing equipment. Those meetings, and working together, are a very good platform for improvement.”

“It is good to have a sounding board with ANDRITZ on a regular basis when we encounter a process problem or just would like to discuss production issues,” Ukkola says. “They have expertise in all the pulp and papermaking processes and can bring the right experts to us when needed.”

▼ Selin and Ukkola in the screenroom.



Case #2: Stora Enso, Veitsiluoto Mill

Stora Enso's Veitsiluoto Mill in Kemi is said to be the northernmost paper mill in the world. We are speaking today with Juha Mäkimmattila, Mill Director and General Manager, and Kimmo Kangas, Production Director for Pulp Mill, about the results of the OPE service in the pulp mill.

The Veitsiluoto complex includes a sawmill, pulp mill and energy production unit, as well as paper mill producing office papers, magazine papers, and other coated paper products. Output from the pulp mill, with its annual production of 375,000 tonnes of both hardwood and softwood pulp (swing production), is supplemented by production from the nearby Oulu mill.

Veitsiluoto Mill management signed an OPE contract with ANDRITZ in December 2012, six months before Kangas arrived at the mill. The first contract was for a three-year period.

The process areas under contract are cooking, brownstock washing, and the evaporation plant.

"I was not familiar with OPE when I arrived here, since I have been working mostly abroad," Kangas says. "I was curious and perhaps a bit skeptical about the concept at first. I must say now that I am quite satisfied with the approach and the results."

Washing was the driver

The main issue that led to the OPE solution was the mill's brownstock washing process. "It was not running well," Kangas says, "and this caused us problems in effluent treatment as we were very close to the permitted levels. Our consumption of bleaching and make-up chemicals was too high due to poor washing efficiency. It was quite clear that we needed to improve in this area."

Mill personnel were aware of some equipment problems in washing (for example an atmospheric diffuser needed some replace-

ment screens), but ANDRITZ made an important contribution by helping improve the cooking process. "When cooking is going well, the downstream processes also improve," notes Ari Pulkkinen, OPE Project Manager of ANDRITZ at Veitsiluoto.

According to Pulkkinen, "The OPE service concept was created by ANDRITZ in Finland many years ago. Process OPE focuses on improving specific areas in a mill that a customer wants to target. Many of the targets in Process OPE can be achieved without capital investments, but with ANDRITZ specialists working side-by-side with mill personnel to reinforce best practices for operations, troubleshooting, and maintenance."

Measurable results

Although Veitsiluoto has made targeted investments by replacing certain equipment, which has benefited overall results, Kangas also notes the value of the OPE service on its own. "During the three years with ANDRITZ, there have been very positive results. We



◀ Ari Pulkkinen, OPE Project Manager for ANDRITZ (left) with Kimmo Kangas, Production Director for Pulp Mill.

have gotten a lot of support from ANDRITZ to improve our cooking and evaporation processes, which have improved washing efficiency and reduced our COD load.”

Key Performance Indicators (KPIs) are reviewed on a quarterly basis and the progress can be clearly seen. “The most important measurements for us are average daily production, specific energy consumption in the evaporators, and brownstock washing costs, all of which have trended in the right direction”, Kangas says.

Critical to the success, from Kangas’ perspective, is that his Fiberline Operations Manager, Pasi Pigg, has been the OPE project manager from the mill’s side. “He has been very active in motivating and encouraging our people – so it has been a very good teamwork,” Kangas says. “Not only engineers, but also operators involved.”

Supplier in a different role

Mäkimmattila came to the Veitsiluoto Mill in 2008, but has worked at Stora Enso for many years in various roles, including Research Director at the Imatra Research Center. “This is probably the first time in my career where an ‘equipment’ supplier comes to our mill in a different role,” he says. “We have very little ANDRITZ equipment in the mill, yet the OPE specialists are effective in improving our processes. This expertise is appreciated.”

When ANDRITZ first presented the OPE concept to Mäkimmattila and his team, they set certain expectations. “The reality is very close to what I was told to expect,” he says. “Very often these type of programs start with the best intentions, but very often the reality is something completely different. But in the case of OPE, both companies have been putting resources into the work. We actually measure the involvement of the people. Another positive aspect is that people at all levels are involved. They understand what we are doing and why.”

Contract extension

“Based on the results so far, we decided this year to extend the contract for another two years at least,” Kangas says. “We changed



▲ The Veitsiluoto complex includes a sawmill, pulp mill with energy production unit, and paper mill. Annual output from the pulp mill is 375,000 tonnes of both hardwood and softwood pulp (swing production). The first OPE contract was for cooking, brownstock washing, and the evaporation plant.

the scope a little, since the evaporation plant is running so well now. The new contract will focus on cooking, washing, and bleaching.”

From Mäkimmattila’s point of view, “I am pleased with the OPE way of cooperation—combining ANDRITZ specialists with our engineers and operators. This sort of systematic planning and continuous improvement is very good. We are getting the results that we expected. We have removed bottlenecks in cooking, washing, and evaporation. There have been several technical improvements.”

“The main thing I have learned is that the mill has to take an active role,” Kangas says. “We can’t just sit and wait for ANDRITZ people to come and take care of our problems.”

“We have decided to continue with the contract, and will continue as long as it is bringing us clear and measurable results,” Mäkimmattila says. “This is a real investment in money and time, so we have to see continuous results.”

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“This is a real investment in money and time, so we have to see continuous results.”

Juha Mäkimmattila
Mill Director and General Manager



Coated cardboard

TURKISH DELIGHT



Increasing capacity 60% and reducing energy costs for its coated board – plus several quality benefits – were the results after ANDRITZ upgraded Kartonsan’s BM2 and stock preparation system in Turkey. For Turkey’s largest white-lined chipboard producer, the 60,000 t/a rise in capacity means strengthening its domestic position and increasing opportunities for export.



“Our expectations were high, and the pressure was on us all to get the installation running fully.”

Ümit Özkan
Mill Manager

ANDRITZ was selected to rebuild Kartonsan’s second board machine (BM2) because of an earlier successful project. BM1 was upgraded in 2009 from 50,000 to 80,000 t/a by ANDRITZ and the collaboration was excellent. The two machines are housed at Kartonsan’s mill in Kullar Köyü, Izmit, Turkey.

“Our customers expect high quality and good pricing for our coated board products, as well as the ability to deliver promptly,” says Ümit Özkan, Mill Manager. “We expect these things from our suppliers as well. We appreciate ANDRITZ’s flexibility and advanced technical solutions. Communications are good and response time is remarkable.”

ANDRITZ understands the working environment here and has been able to adapt accordingly.”

Kartonsan, headquartered in Istanbul, is Turkey’s largest, and Europe’s fourth largest, producer of coated cardboard. Some 25% of its sales is exported to 20 countries. The mill’s location on the Gulf of Izmit in the Sea of Marmara, about 100 km from Istanbul, is perfect for logistics.

Kartonsan products are used in many industries from food to pharmaceuticals – mostly for packaging. Grammage for the duplex and triplex white-lined chipboard products range from 200-500 gsm. All the products are multi-coated, with a blade top coat that provides brilliant printability. Backsides can be gray or white.

A modest, but solid start

“We started in 1967 under challenging conditions at a time when paper production was a state-controlled business,” Özkan recalls. “The capacity of the mill was just 9,000 t/a. In 1986, we started up BM2, and BM1 was upgraded in 2009. After raising the capacity of BM2 from 100,000 to 160,000 t/a, we can now produce 240,000 t/a at this mill.”

“A very large project and investment”

According to Özkan, the BM2 upgrade was a very large project for the mill. The main drivers were to increase capacity by raising the machine speed (from 250 to 450 m/min) for the lowest basis weights, to reduce energy costs by installing a shoe press, and to improve the output and quality of the furnish (through rebuilding and upgrading the stock preparation and machine approach system). By utilizing ANDRITZ’s newer technologies for forming and pressing, the quality of the coated board itself – with better formation, bulk, stiffness, and smoothness – would also improve.

Gerhard Knes, ANDRITZ Project Director, explains the ANDRITZ contribution. “BM2 is 3.65 m wide and was first installed in 1986,” he says. “We added and replaced components beginning at the wet end section, starting with a new *PrimeFlow* SW headbox with dilution control. We rebuilt the fourdrinier and press section, and installed our *PrimePress* X shoe press. We also replaced the canopy hood and air systems, and rebuilt the pre- and after-dryer sections, hard calender, and coater.”

But, actually, ANDRITZ’s work began upstream of the machine. To meet the increased

demands for furnish quantity and quality, ANDRITZ rebuilt Kartonsan's recycled fiber processing plant. All of Kartonsan's coated boards are made from a blend of carefully selected recovered papers and virgin fibers to achieve both strength and high brightness.

In the stock preparation area, ANDRITZ rebuilt the deinking line for white ledger (capacity: 140 t/d); upgraded the back layer line with flotation deinking and a disc filter to achieve an additional white ledger capacity of 85 t/d; rebuilt the existing OCC and Mixed Waste lines for the base board and grey back layers (capacity: 380 t/d); adjusted the broke pulper and added a new broke thickener; and delivered three primary and two secondary screens for the four-layer machine approach system, and a dilution water screen.

There were also the engineering, supervision, commissioning, start-up, training, and

spare and wear part packages for the entire equipment supply. In addition, ANDRITZ provided engineering support to complete the rebuild (drives, vacuum systems, steam and condensate handling, automation, etc.).

"This investment was initiated in 2012 and completed in late 2014," Özkan notes. "Before the contract was signed in January 2013, we visited ANDRITZ several times to familiarize ourselves with their latest products and references."

A need for power

"Like any project of this size which involves combining new components with existing equipment, we faced some challenges," Özkan says.

It was uncovered very early that the power requirements for all the upgraded equipment was in excess of what the mill currently had available. "ANDRITZ stepped in and did a thorough analysis of the power

requirements for the rebuilds and upgrades and designed the power system to accommodate our new requirements," Özkan explains. "Basically, everything had to be renewed – cables, transformers, etc. This required us to shut down the mill to do the work before we could do the equipment upgrades."

As ANDRITZ's Knes explains, "This type of electrical work could take about three months to complete. But thanks to innovation and precise planning, we were able to do it in seven weeks." As part of the work, ANDRITZ replaced 73 AC motors with DC drives, and installed new Motor Control Cabinets for all low-voltage motors. The detailed planning and close supervision during the execution of this phase of the project paid off.

Time to optimize

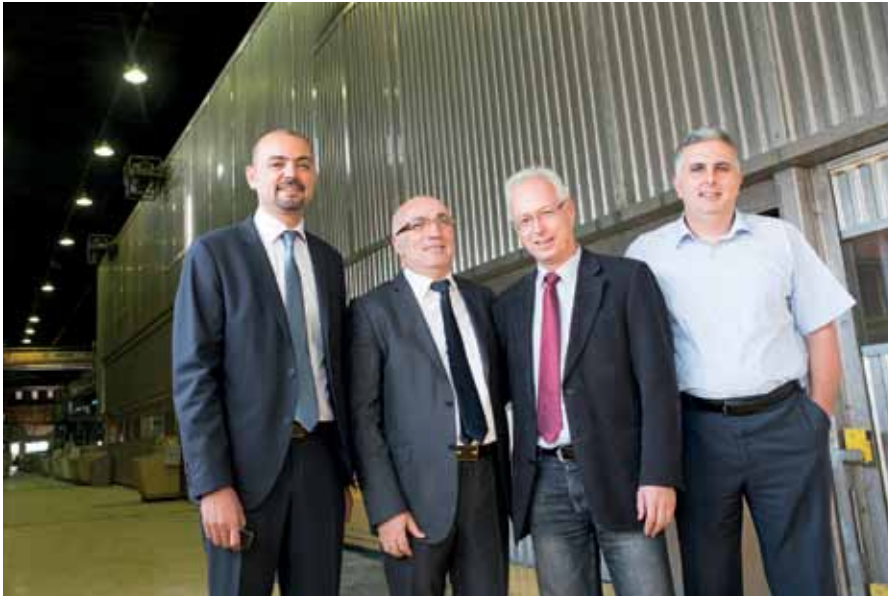
"Our expectations were high, and the pressure was on us all to get the installation running



◀ BM2 after rebuild.

New PrimePress X shoe press installation to reduce energy costs. ▼





▲ (Left to right): Ümit Özkan, Mill Manager; Haluk Iber, General Manager; Gerhard Knes, ANDRITZ Project Director; and Güven Sanli, Production Manager.

We plan to do optimization and will be working with ANDRITZ to finalize any details for improving quality and efficiency, and lowering our production costs.”

Seeking sustainable performance

At Kartonsan, sustainability is the key for long-term performance. The mill recycles up to 99% of its paper in the production process, exceeding the average in Europe. It uses modern techniques to purify and reuse its waste water, generates its own energy, and recovers the turbine exhaust gases to produce steam. The mill was the first in the Turkish paper industry to use the MBR system, which allows 60% of the waste water to be recycled (10,000 m³/d).

“In order to survive in this business one has to constantly invest in new technologies to remain competitive and reduce costs,” says Özkan. “ANDRITZ and Kartonsan have a proven track record, which makes these types of upgrades a good match. The support from ANDRITZ has been excellent. We solve issues effectively and efficiently and we have found common ground for success.”

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fully,” Özkan says. “We were perhaps overly optimistic in terms of a five-week schedule to get all this done, but got everything done in reasonable order.”

According to Knes, the Factory Acceptance Test for the DCS delivered by ANDRITZ was conducted at the Graz (Austria) workshop with a simulated station. “We did this to ensure that all the controls would be fully functional once installed at the mill,” he says. “This reduced commissioning time as the automation portion was sort of like ‘plug and play’ ready to go.”

The start-up of BM2 took place in September 2014. Initially there was a bottleneck with the pumps feeding pulp to the machine, and the capacity was not as expected. ANDRITZ promptly replaced the pumps with larger ones and adjusted the design of the approach system to solve the issue.

“After the start-up, we could speed up BM2,” Özkan says, “but we faced a sheet fluttering problem in the coating section. ANDRITZ checked the data from the distributed control system and did some root-cause analysis to isolate the problem. After some tweaks of the Air Glide system, we have reached the maximum speed and capacity.”

“There are still a few punchlist items we need to work on together,” Knes says. “It is always more complicated when rebuilding a machine, since you have new technologies working with older existing equipment. But we plan to get everything done during the next shutdown.”

Özkan agrees. “Right now, we are focused on getting our ROI, and getting our products to market,” he says. “There is stiff competition.

New SelectaFlot flotation cell in the back layer line. ▼



THE AGE OF FIBRE HAS BEGUN

Interview with Marco Mensink,
Director General, Confederation of
European Paper Industries (CEPI)

“

*The European industry
is extremely dynamic
and very ambitious.*





An industry in transformation

M. Mensink: “It is clear that the industry is going through transformation in many ways. Overcoming current economic challenges, finding new markets, reinvesting and consolidating – there is a lot going on at once. We see a decline in graphic papers, but an increase in packaging, tissue, and the bioeconomy area. We are seeing the impact of investments, as well as the impact of measures that have been taken over the last few years. Sometimes painful to watch, but progress is being made. All in all, we see an industry that is fit for the future.”

Europe’s standing

M. Mensink: “I think Europe leads the world in the forest products industry. At this year’s Paper Week we had guests from all over the world who were impressed with the energy, commitment, and transparency all our members exhibit to tackle and solve problems. This is across the board, whether developing new products and grades to finding new markets. The European industry is extremely dynamic and very ambitious. European companies are expanding abroad (for instance Mondi and Smurfit

Kappa in the US, or Stora Enso in Brazil). We also lead the way in product innovation. Just take a look at what is happening in specialities and packaging. Our companies have become adept at being more agile and flexible, and adapting to survive.”

Challenges and opportunities

M. Mensink: “Our biggest challenges in Europe are the ones of sustainable GDP growth, market conditions, and regulatory uncertainty. Our opportunities are plenty: a recovering economy - particularly in countries like Spain and Eastern Europe. And now, the surge in specialities, and fiber-based packaging, and products of the bioeconomy.”

The Age of Fibre?

M. Mensink: “We have just held one of the best ever CEPI Paper Weeks in Brussels. All the work of the companies over the years is now bearing fruit and we are seeing papermakers create and produce value-added products that are not just paper – but are still made out of fiber. We can only facilitate this transformation. CEPI has created a new publication: The Age of Fibre, which celebrates some of the best of

these new products; bicycle helmets, car parts, carbon fiber, cosmetics and chemicals – and of course innovation in paper and board. The list is a long one, and any products that are made out of fossil fuel – our members can make them too. We came up with The Age of Fibre concept because it is the natural next step from our Roadmap to 2050: a vision we drafted in 2011 and that is becoming more and more real.”

Breakthrough technologies

M. Mensink: “Breakthrough technologies like they are used for products from The Age of Fibre are even more important now than they were a few years ago. The goal is to exponentially grow the yield and benefit from fiber that has just been harvested. There is nonstop work going on in Europe in the areas of lignin research, nano-, and micro-fibrillated cellulose. We are now moving down from fibers to molecules, and we need to be thinking all the time about maximising the yield from our existing fiber. As always, the major challenge is to get the cost of production down in new technologies. There is nonstop work going on in this area, too.”

“We have created a new publication, The Age of Fibre, which celebrates some of the best of these new products and innovation in paper and board.”



Industry 4.0

M. Mensink: “The impact of ‘big data’ on the industry is going to be huge. When you bring data to use for the automation and management of the complete chain from fiber and raw material procurement to printers and end users buying products off of shelves, the possibilities of efficiencies and growth are enormous. Bring in the ‘Energy Internet’ and you then have a completely new sector. Industry 4.0 represents another huge transformation to get the fiber industry to its next stage.”

Sustainability

M. Mensink: “This is a very, very important area. As The Age of Fibre begins, managing our raw material resources becomes even more important for every step of the supply chain. The paper industry in Europe has had decades of experience in this area, and leads the way in managing and maximizing the yield from our forests, raw material bases, and natural resources.”

Looking ahead

M. Mensink: “Think back to three years ago. Due to the economy in Europe, the future looked bleak. Now, things look

completely different. We cannot predict the future; however we can be ready for whatever it is that gets thrown at us, good and bad. One of the fantastic aspects of my job is working with members who may often be competitors in the market place, but when put together generate a huge spirit of cooperation. Everyone in CEPI, including the members and the team, like working towards a future we can all benefit from. And that makes me look forward to going to work every day!”

ABOUT MARCO MENSINK

Early years

Born 1968, son and grandson of a Dutch politician; one twin sister

Education

Graduated from Wageningen University - MSC in Forestry and Business Administration

Work life

- First job at Ernst & Young Consulting in the Netherlands
- Came to Brussels 10 years ago after six years at the Royal NL VNP (the Dutch trade federation for the paper industry)

Private life

- Married; three children (13, 11 and 8)
- Hobbies: Managing my son’s football team, Belgian beer and the sauna

Passion

Passionate about innovation, our industry and the CEPI Team (Temporarily gave up my lifetime passion for Dutch national football)

Engineering a new
source of

ENERGY AND REVENUE

A clean energy initiative by the provincial power utility provided the impetus for Nanaimo Forest Products to invest in a biomass electrical generation project. Upon completion, the mill became energy self-sufficient and also gained an additional revenue stream. ANDRITZ AUTOMATION served as the electrical engineering partner.



Operating under several different owners, the Harmac Pacific pulp mill has been a cornerstone of Nanaimo's business life. Built in the late 1940's in British Columbia, Canada, and named after Harvey Reginald MacMillan (Har-Mac), the mill became one of the world's foremost producers of northern bleached softwood kraft pulp.

When Pope & Talbot, Harmac's owner at the time, filed for bankruptcy in 2007, the mill was shuttered in 2008. That spurred a group of unemployed mill workers to put together their own money, and persuade two local investment groups to put up the additional capital required (75% of the equity) to purchase the mill, save as many jobs as possible, and defy the odds.

Proving the naysayers wrong seven years later, the mill is operating well. It recently mustered the financing and showed excellent dexterity in a project to install a new 25 MW condensing steam turbo-generator (called G4 by the mill). Ryan Prontack, Engineering Superintendent, says about the project, "Added to our existing power generation capacity, G4 allows us to meet all our electricity needs and also send about 190 GWh of electricity each year to BC Hydro's power grid. This adds a good and predictable revenue stream to help us even out the cycles in the pulp business."

"The turbine creates energy using steam produced from waste wood (mostly bark)

burned in the power boiler," says Rinus Jellema, Steam Plant Superintendent. "To create this extra energy for the grid, we burn about 40% more hog fuel, but the fuel is carbon-neutral."

Global expertise – locally

Harmac was fortunate to have in its backyard an office of ANDRITZ AUTOMATION which has supported numerous projects with the local utility, BC Hydro, and is well-equipped to provide Electrical, Instrumentation and Controls (EI&C) engineering and project supervision services for the G4 project.

"We have done several projects with ANDRITZ AUTOMATION in the past five or six years," says Graham Cant, Electrical Project Supervisor. "Each time, the quality of work and flexibility in meeting our requirements has been excellent. They have a strong group of guys who really understand power and electrical generation."

One of those guys is Bernie Schmidtke, Power Specialist. "Bernie was a huge help on this project," Cant says. "He has more than 25 years' experience in the design of power and control systems and really knows cogeneration projects in British Columbia. He was ANDRITZ's Engineer of Record and our liaison with BC Hydro and really helped us through the application and review process."

New power for an older mill

"We have one backpressure turbine installed in the 1960's which was recently rebuilt, that

generates up to 33 MW of power," says Russ Lang, Steam Plant Supervisor who represented his department as the ultimate "owner" of the G4 system on the project team. "G4 shares some infrastructure with G3, but is installed in a new building."

Earlier funding from a federal Green Transformation Program allowed Harmac to complete a series of smaller energy saving projects. According to Saul Spearing, Harmac's Project Manager, "These smaller projects paved the way for us to seek financing for the turbo-generator project. Each was designed to improve our mill operations and energy efficiency."

EI&C scope

According to Tom Spence, ANDRITZ AUTOMATION's Project Manager, "The new turbo-generator is connected to an existing 13.8 kV system at Harmac. However, to allow for the additional fault current it provides, the existing 13.8 kV BUS-1 switchgear had to be replaced. Our detail design work for both the BUS-1 replacement and the G4 installation was occurring at about the same time."

Spence was involved in much of the work, including the upgrading of BUS-1 switchgear. "A lot of the electrical infrastructure improvement was accomplished when we did the design for the replacement of one of the two medium-voltage buses in the mill," Spence says.

Harmac Pacific selected ANDRITZ AUTOMATION to perform Electrical, Instrumentation and Controls engineering for its project to install a new 25 MW condensing steam turbo-generator. The new unit allows the mill to meet all its electricity needs and send enough electricity to BC Hydro's power grid to light 17,000 homes annually. ▼





▲ (Left to right): Tom Spence, ANDRITZ AUTOMATION Project Manager; Graham Cant, Harmac's Electrical Project Supervisor; and Saul Spearing, Harmac's Project Manager for the G4 project.



▲ Doug Tymos, Steam Plant Operator, checks the readings on a meter on the BUS-1 switchgear.

In addition to replacement of the switchgear, Harmac's existing generator G3 electrical connection was relocated. "The necessity to switch generators to different buses required us to revisit the entire power system in this mill," Spence says. "Virtually every part of the 13.8 kV electrical system was touched, or at least reviewed in depth. This meant we had to understand and document each system in detail before we designed modifications to it."

"ANDRITZ AUTOMATION did an outstanding job on this project," says Spearing. "We had a lot of work to accomplish in a very short time-frame during an eight-day shutdown. Not only did they do the design work, but they were on site continuously helping to get the work done."

ANDRITZ AUTOMATION did a number of power and control system studies to ensure that the G4 system would be integrated into the existing mill systems in a safe, economical, and reliable way. They also worked with Harmac to develop a control strategy, with control loop narratives, to help Harmac avoid any instabilities in the steam plant as a result of the addition of another steam turbine.

The bulk of the work, however, was in the design and detailed engineering required to write the equipment specs and provide the electrical contractors with proper drawings and work documents. "We had people on site

throughout the project to answer questions or address any issues," Spence says.

In July 2013, the G4 unit went into commercial operation. Unfortunately, 10 days later, the system came to a full stop due to a significant mechanical issue with the turbine. Corrections were made and the unit started back up three months later and has been running reliably ever since.

Unique condenser and cooling loop

"We now take all of the mill's process water and send it through the turbine's steam surface condenser to warm it before using it in the process," Prontack says. "Before this project, we had seasonal steam demand, because the water temperatures would vary considerably. Now, we have smoothed out

this variability, which flattens our steam demand and makes things much more steady state. Plus, we eliminated the requirement for a cooling tower. This has increased our thermal efficiency from the standard 30% for a condensing turbine to 42%."

In-depth knowledge

"The work we did on this project gives us so much visibility into what we have now," Cant says. "We are very confident that our drawings and specifications are up to date. Considering that the original switchgear was installed in 1963, we now have a power network that will serve us well for a long, long time."

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Russ Lang, Supervisor (left), with Rinus Jellema, Steam Plant Superintendent in front of the new turbine. ▶



Higher productivity and reliability in “new generation”



**Tech
Talk**

PULP DRYING PLANTS

The traditional design for pulp dewatering machines served the industry well for decades. The Twin Wire Press or a Fourdrinier with heavy-duty press (or shoe press) were the de facto industry standards and are still used for smaller capacities where high specific production rates are not of as much importance.



▲ A modern pulp drying plant operating in South America.

A huge step forward was realized with the introduction of the Twin Wire Former with Combipress and shoe press. The first installation of this technology at Aracruz (now Fibria) in Brazil created a real buzz in the industry. Several other installations followed. Single machines up to 9.3 m working width, or double lines at slightly narrower widths, became the new standards. Equipment, components, and the overall process were optimized to improve production and reliability. Basis weights were increased up to 1,250 g/m² with machine speeds reaching peaks in the excess of 200m/min.

“New generation” drying plants

ANDRITZ began a development program to harmonize the individual components in order to extract their full potential and increase overall plant performance, with the following goals:

- Increase specific production at the wet end and 300 bales/h in the finishing area while keeping machine size small.
- Optimize design of the former and press section while using standardized components as much as possible to reduce spare parts inventory.
- Develop high-capacity upgrades for existing lines that were housed in small buildings.
- Reduce overall operating costs.
- Reduce steam and electrical power consumption, fiber loss, and water consumption.
- Reduce maintenance requirements.
- Make the equipment safer and easier to operate.

The development program yielded significant results in all key processes – beginning with stock approach and ending with the finishing equipment.

Major developments: Stock approach

The “new generation” stock approach system is based on five to seven stages as follows: three stages of pressurized ANDRITZ ModuScreens with Dolphin rotors and an additional two to four stages of cleaners. The Dolphin rotors make it possible to save 15 - 30% energy at similar levels of screening efficiency and fiber loss as traditional systems.

Major developments: Pulp dewatering

The development program focused on developing forming and dewatering components such as:



▲ “New generation” pulp dewatering.

Headbox. Utilizing Computational Fluid Dynamics (CFD) models, the headbox was modified to include new control valves and the use of fan beam injection to achieve uniform basis weight profiles. This headbox is capable of achieving less than 6 g/m² standard deviation (coefficient of variation of 0.6%, 1 σ) over the entire working width.

Wedge section. Wedge geometry and open dewatering area were improved to increase the dewatering speed in the wedge section of the Twin Wire Former.

Couch roll with Anti-Rewetting Unit (ARU). The same excellent dewatering is achieved with couch roll + ARU when compared to a traditional wire suction roll in this position. The advantage of this couch roll system is obvious: same results as a wire suction roll, but significantly easier and cheaper to operate and maintain (simpler vacuum plant, less spare parts). It produces a stable pulp sheet with no crushing or wrinkles ahead of the lump breaker nip even at high machine speeds (> 200 m/min).

Major developments: Sheet Dryer

With continued innovations in air distribution and impingement, the Sheet Dryer has become more efficient per dryer surface area.

The higher efficiency allows a reduction in the number of fans and steam coils. A unique automatic tail threading system provides rapid, safe, and fully automatic threading of the dryer. With support systems such as internal broke nips and a broke detection system, operation and maintenance of the dryer is enhanced.

Major developments: Baling line

A conventional ANDRITZ baling line operates at sustainable rates of 220 bales/h with peak production of 250 bales/h. The goal for the “new generation” equipment design

was to achieve sustainable production above 250 bales/h with peaks up to 300 bales/hr. The development program focused on producing a baling line with reduced complexity and standardized components. The new design increases the conveyor speeds and uses sound isolation techniques to provide low-noise operation. Certain features were also added: a laser scanner safety device and bar code positioning on the transfer car; gear pumps with variable speed drives at the bale press hydraulic unit; and electrically operated stacker lifting devices.

The success of the equipment is proven: peak production reached on a recently in-

▼ “New generation” sheet dryer.





▲ Automated baling lines in operation, each achieving peak productions above 300 bales per hour.

stalled line is 332 bales/h within the first three weeks of start-up. Cycle time was reduced to less than 11 seconds. In terms of reliability, the binding equipment produces an average of 25,000 bindings without operator intervention (with the exception of coil changes).

Major developments: Cutter-Layboy

A conventional ANDRITZ Cutter-Layboy operates at 190–225 m/min, with peak speeds up to 250 m/min. The development program centered around reducing complexity and improving uptime while using standardized components as much as possible. The “new generation” Cutter-Layboy has several enhancements: an individually driven bottom slitter, traction rolls instead of short tapes, and nip wheels instead of top tapes. The long tape arrangement is independent from sheet / wrapper size. In addition, the electromechanical movements in all key positions have been simplified for increased reliability and ease of maintenance. The electromechanical systems for the main table are now separated for improved vibration damping and the cutter hood has an efficient noise insulation.

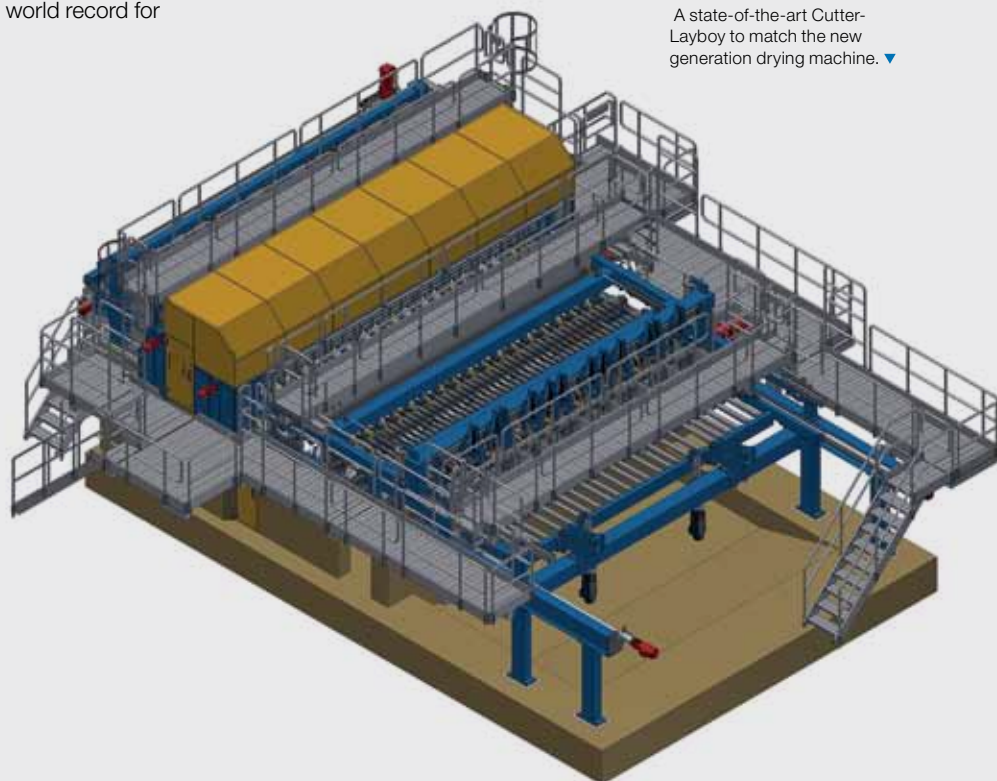
Experience from start-ups and daily operation

The overall design of the “new generation” pulp drying plant proved very successful.

Current records for specific productions are all achieved on these new generation ANDRITZ pulp drying lines. In some cases purely mechanical issues needed corrective action. One example of corrective action was the installation at Eldorado Celulose in Brazil – the largest single-line pulp mill in the world. There were some mechanical issues that affected production and customer satisfaction. However, the plant today runs remarkably above design capacity. The world record for

specific production of 455 t/d per meter working width was achieved in Europe on an ANDRITZ pulp drying line. Customers at these plants believe there is potential to increase production even more.

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▼ A state-of-the-art Cutter-Layboy to match the new generation drying machine. ▼

Dry scrubbing at

BIG STONE

With its new Air Quality Control System (AQCS), the Big Stone power plant will reduce emissions of nitrogen oxides, sulfur dioxide, and mercury. Opting for circulating dry scrubbing technology, instead of going the “traditional” route, turned out to be the right choice at the right time.







“The comfortable thing to do would have been to choose the technology that has been around for decades,” says Kirk Phinney. “But we did our homework and concluded that the ANDRITZ circulating dry scrubber would help us well into the future. Today, we have one of this industry’s top performing retrofit units in terms of SO₂ reduction. We know we made the right decision.”

Phinney is Commissioning Manager for the Big Stone air quality control system (AQCS) project. He transferred to Big Stone in hopes of being part of this project – a MUUSD 400 investment – and quickly became part of Project Manager Mark Rolfes’ team.

Rolfes was busy at first obtaining permits and approvals from the three states regu-

lating Big Stone Plant (Minnesota, North Dakota, and South Dakota). Phinney set to work helping to review all the specs and layouts, gathering operating data, and meeting with technology suppliers to obtain accurate bids for the project. He later supported the construction phase and served as Commissioning Manager. “It has been very exciting to be involved with the project all the way through,” Phinney says.

Phinney’s employer, Otter Tail Power Company, is the majority (53.9%) owner of Big Stone. Otter Tail people staffed the project and run the 495 MW power plant, which burns subbituminous coal and has been online in South Dakota since 1975. The other two owners are NorthWestern Energy and Montana-Dakota Utilities.

BART leads to dry scrubbing

The driving force for the project was the need for Big Stone to meet upcoming federal regulations, including new mercury standards, and regulations to reduce haze over Minnesota’s Boundary Waters canoe area, a popular outdoor recreational area. The existing air pollution control system on the boiler was a baghouse – effective at removing dust and particulates, but not gaseous emissions or mercury.

After doing a thorough evaluation of the best available retrofit technology (BART), Big Stone personnel determined the need for a dry scrubber.

My how things have changed

“Flue gas cleaning with a dry scrubber is today an attractive alternative to wet



◀ The scrubber vessel's waste ash pickup point, including the fluidizing air ring and ash transport lines.

(Left to right): Erik Fladhammer, Project Engineer; Kirk Phinney, Commissioning Manager; and Scot Ojard, ANDRITZ Project Manager, inside the scrubber building. ▼



scrubbers, even for large coal-fired boilers,” says Paul Petty, Director of Applications and Technology of ANDRITZ’s air pollution control business in North America. “It was impossible to make this statement when I started in the business. But much has changed.”

Spray dry absorber (SDA) technology had been the traditional dry scrubbing solution for power plants requiring large SO₂ removal rates. The downside of SDA is the potential for corrosion due to the creation of lime slurries and the need to quickly dry

the slurry droplets in the scrubber vessel. And SDA is able to remove only about 85-95% of the SO₂. “Plants today are looking to remove 98%+, which before the advent of circulating dry scrubbing technology, was only possible with much more expensive wet scrubbing technology,” Petty said.



◀ Paul Goettig, ANDRITZ Commissioning Engineer adjusts an air valve for the pulse jet fabric filter.

“The most important advantage of circulating dry scrubbing is the ability to achieve this 98%+ reduction of SO₂ and other acid gases,” Petty says. “Other important benefits are a lower capital cost, simpler design, lower water use, no wastewater discharge, and the ability to remove all pollutants except carbon monoxide and nitrous oxides in one step.”

Rigorous evaluation

"We went through a very rigorous process to evaluate the technical offerings," Phinney says. "Our evaluation concluded that the circulating dry scrubber had further room to perform than the SDA and would not put us at the limits of the technology."

In evaluating suppliers, it came down to experience. "ANDRITZ had six installations at that time, not a huge number, but enough for us to feel confident," Phinney says. "The other supplier had one."

The ANDRITZ CFB Scrubber

Flue gas is directed into the bottom of the circulating fluidized bed (CFB) vessel where it is turned upward and passes through a grid of venturis. The hydrated lime and recirculated by-product is introduced below the venturis and gets evenly mixed and dispersed into the flue gas. Cooling water spray (which can be wastewater from boiler blowdown) is added above the venture section, independent from the reagent feed. The by-product is collected downstream in a pulse jet fabric filter, then

metered to recirculate into the scrubber vessel. A portion of this material is diverted into the ash handling system for disposal.

An excellent project

ANDRITZ's scope included the scrubber (34-foot diameter), gas humidification system, reagent system, gas recirculation system, by-product recirculation/removal system, pulse jet fabric filter, Powder Activated Carbon (PAC) injection system for enhanced mercury capture, and waste ash removal and storage system. ANDRITZ also supplied ductwork, piping, access points, platforms, logic for the DCS controls, and support steel for the scrubber and lime silo.

"In simple terms, the contract we have with Big Stone is for everything above the foundations for the scrubbing and waste ash handling," says Scot Ojard, Project Manager of ANDRITZ.

One twist of the ANDRITZ technology is that Big Stone is a dual-train configuration due to its size (practical limit for a single train is around 400 MW). This is the first dual-train for ANDRITZ in North America. "The SDA supporters told us that we would have problems with the dual fluidized beds fighting each other and the ID fans fighting each other and things would be out of synch," Phinney remembers. "I can tell you that has not been the case."

Allen Narverud, ANDRITZ Manager of Field Engineering (left) and Todd Campbell, Commissioning Engineer near the lime hydration system. ▼



“There has never been a worry during this project,” says Erik Fladhammer, Project Engineer. “It has been a very good relationship. The discussions have always been open. Scot and his team came up through the technical side. Their suggestions are practical and it is clear that these guys know how to build and run scrubbers.”

Construction began in Spring 2013. The plant went down in early 2015 for a planned outage to do all the tie-ins and the extensive boiler work to increase the surface area. “When we came back online, we moved along quite well,” Phinney says.

“We are down to the point of finishing punchlist items,” Ojard says. “Plus we recently used our newest computational flow dynamic model studies to optimize the turning vanes at the bottom of the scrubber inlet to improve the dispersment of recirculated by-product materials. This improves Big Stone’s ability to run efficiently at low loads.”

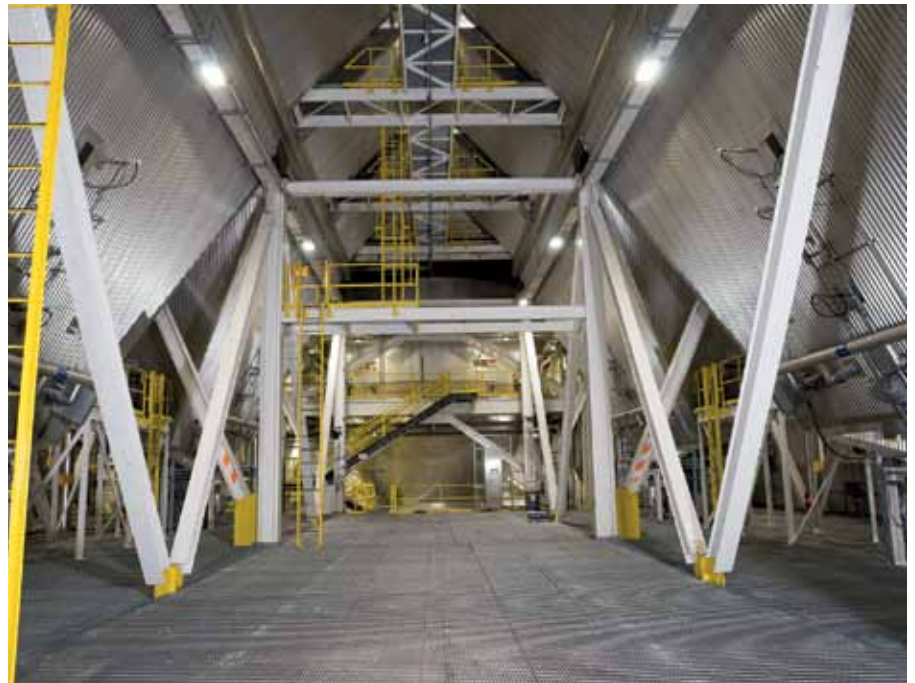
“ANDRITZ gave us excellent performance guarantees for SO₂ removal, availability, and lime consumption,” Phinney says. “If I had to do it all over again, I would do it the same way and with the same suppliers – especially ANDRITZ. Their people are technically smart, practical, and no-non-

sense. They fit the company personality at Otter Tail very well and we did good work together.”

“The original budget was over MUSD 400 for the project,” says Rolfes. “The upgrade is now expected to close out 21% below the budget due to our procurements and engineering work coming in below anticipated cost. Plus we have been able to reduce the contingency reserves. That is good news for our customers, owners, and shareholders.”

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▲ Hoppers for the pulse jet fabric filter.

◀ A view of the ANDRITZ CFB scubber.

MINIMAL MERCURY

*capturing a potentially
deadly element in emissions*

Removing mercury from the emissions of coal-fired power stations can be accomplished with an ANDRITZ-patented system that has synergies with existing air pollution control equipment and downstream processes.

Mercury is a potentially deadly neurotoxin. Mercury emissions from coal-fired power stations are an environmental concern due to the toxicity and persistence of mercury that accumulates in our waterways. Stringent mercury emission limits in the USA and upcoming BAT and IED regulations in Europe might present a significant challenge for some power producers, according to Andreas Gruber-Waltl, Team Leader for Process Development at ANDRITZ.

"These limits must be met," Gruber-Waltl says. "We even have to consider clean gas mercury concentrations below $2 \mu\text{g}/\text{m}^3$ STP dry."

A holistic approach to mercury control

To meet these limits, ANDRITZ has taken a "holistic" approach which works in synergy with downstream processes. "We started by looking at the process as a whole," Gruber-Waltl says, "taking into account not only the various oxidation reactions that make sense in the flue gas pathway itself, but also working in concert with downstream equipment."

Michael Kramer, Process Engineer for ANDRITZ, highlights the options available

to operators of coal-fired power plants in order to meet stringent mercury reduction regulations.

"If conventional oxidation in the gas phase is not sufficient to meet the emissions limits, we offer a well-proven calcium bromide oxida-

tion system," Kramer says. "Dosing calcium bromide into the boiler is often a sufficient and easy way to oxidize the majority of the mercury that originates within the boiler."

Other actions taken within the flue gas path are often necessary to further oxidize the mercury downstream of the boiler. "For instance, we can look at enhanced oxidation within a Selective Catalytic Reduction (SCR)," Kramer says. "Regardless of the steps taken, much of the oxidized mercury will be caught in the Flue Gas Desulphurization (FGD) scrubber."

Bind and stabilize the dissolved mercury

A wet FGD is not only a very efficient way of separating acidic components from the flue gas, it is also highly efficient when it comes to the removal of the oxidized mercury. The mercury is dissolved in limestone slurry in the absorber tower and then removed through the blowdown process either in a device called hydrocyclone or within the waste water path.

"However, inconsistencies in wet scrubber chemistry can actually contribute to returning some of the captured mercury back to the flue gas," Kramer says. "To avoid this, we have to bind and stabilize the dissolved mer-



▲ ANDRITZ developed a new hydrocyclone design which significantly reduces fine particles (such as mercury-laden activated carbon) from the underflow. Shown here is a small prototype that was built to prove the concept.



Michael Kramer, Process Engineer for ANDRITZ (left) and Andreas Gruber-Waltl, Team Leader for Process Development. ▼



cury in the limestone slurry in the scrubber. This is accomplished with a new design of the hydrocyclone and the addition of either Activated Carbon (AC) or precipitation agents on the other side.”

Particles in a hydrocyclone are separated according to their sedimentation speed. Big and dense particles (like gypsum) are discharged in the hydrocyclone’s underflow (the Apex flow). The gypsum is dewatered and is then ready for commercial use (typically in the construction industry).

Powdered activated carbon (PAC) can be injected into the absorber slurry to inhibit re-emitting the mercury. In this case, the “mercury sink” (place where the mercury collects) will be the by-product of the FGD process – the gypsum. “PAC particles are very fine, but their specific weight is still higher than the fluid’s density,” Kramer says. “So, a standard hydrocyclone cannot separate PAC out of the underflow. A significant portion of the PAC will end up in the Apex flow, which contaminates the gypsum and blackens it so that it is commercially unusable.”

From auxiliary to star

“We had always considered the hydrocyclone to be an auxiliary piece of equipment for us, standing between our FGD and the wastewater treatment system,” Gruber-Waltl

says. “We have never actually focused on its design before.”

“Once we focused on the design,” Kramer says, “we had the idea to use a clean water wash to eliminate the fine particles in the underflow. By directing the fines to the overflow, they do not affect the gypsum.”

The ANDRITZ solution is not simply a water injection system. “We re-designed the bottom of the hydrocyclone where we introduce the wash water so that it causes minimal turbulence,” Kramer says. “Coarse particles can pass through the sedimentation layer, but fines are caught within it and carried to the overflow.”

ANDRITZ did its first tests at its technical center in Austria. Based on the results, two patents were granted: one for the hydrocyclone design itself and one for the process.

Original prototyping tests were conducted with a hydrocyclone supplier in Germany. “Their design was not robust,” Kramer says. “Also, the targeted mass transfer point could not be met with their technology.”

So, the next step was for ANDRITZ to design its own prototype. Tests with the prototype showed that the amount of mercury-laden activated carbon in the underflow could be

reduced significantly. “Mercury separation efficiency of up to 95% has been proven,” Kramer says. “The gypsum was clean with no black activated carbon particles.”

Controlled “mercury sink”

To enhance the mercury transfer to the wastewater treatment plant and prevent an increase in mercury concentrations in the scrubber, ANDRITZ offers an upgrade to any mercury reduction system with a clear “mercury sink” within the FGD system. With its long experience in both FGD design and dewatering technologies, ANDRITZ can assist any power plant in creating a controlled “mercury sink” in the wastewater treatment facility.

Testing at industrial scale

“We are closing the gap in mercury removal technology for FGD systems,” Gruber-Waltl says. “We have now linked up with a power producer and are testing this technology at industrial scale and expect first results by the end of 2015.”

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Highlights

RECENT ORDERS

COMPLETE LINES AND SYSTEMS

Fibra Celulose, Três Lagoas, Mato Grosso do Sul, Brazil

EPC delivery of complete production lines for entire mill: wood processing plant, fiberline, white liquor plant, evaporation plant, pulp drying plant, and recovery boiler.

Woodyard, fiberline, and white liquor plant will have the highest production capacities in the world. Evaporators will be largest in Western Hemisphere; recovery boiler largest in South America.

SCA Östrand, Timrå, Sweden

Woodyard equipment, pulp drying plant, major upgrade to white liquor plant, and extension of the recovery boiler.

Innovative, energy-saving technologies that substantially reduce operating costs.

Chenming Huanggang, Chenming, China

Cooking plant for kraft and dissolving pulp; NCG treatment system.

ANDRITZ is the only supplier with solid references and experience in continuous cooking of dissolving pulp.

POSCO E&C, Pohang, Republic of Korea

Waste-to-energy plant.

Ibrahim Fibers, Faisalabad, Pakistan

Coal-fired PowerFluid boiler (80t/h steam) for a 20 MWel power plant.

Nippon Paper Industries, Gotsu Mill, Shimane Prefecture, Japan

New evaporation plant to replace old multi-effect evaporators.

Mechanical Vapor Recompression (MVR) plant for sulfite liquor with comprehensive cleaning features.

Vinda Paper, Jiangmen City, Guangdong Province, China

Stock preparation and paper machine approach system.

Yunnan Jinchen Paper, Huaning, Yuxi City, Yunnan Province, China

Stock preparation and save-all disc filter.

Hubei Xiangxing Paper, Jianli City, Hubei Province, China

Paper machine approach system for corrugated board.

KEY EQUIPMENT, UPGRADES, AND MODERNIZATIONS

Mondi Merebank, Merebank, South Africa

Automation upgrade of 3 TMP refiner lines
Repeat order (1 TMP line already started up).

Phoenix Pulp and Paper, Khonkaen, Thailand

Lime kiln key equipment (EPS delivery).

Corrigan OSB, Corrigan, Texas, USA

Two 32-ton LogPorter portal cranes and two round wood debarking lines with LogAligner technology.

Zellstoff- und Papierfabrik Rosenthal, Blankenstein, Germany

Lime kiln upgrade with LimeFlash (lime mud drying).

ProGest Group, Carbonera, Italy

PrimeFlow headbox, PrimeCoat Film (film press), post-dryer section, and PrimeReel.
PrimeDry cylinders completely made of steel.

Cartiere Modesto Cardella, Lucca, Italy

PrimeFlow TW two-layer headbox with PrimeProfiler F dilution control; PrimeForm TW gap former for PM 3.

Repeat order (PM 4 has same scope and has started up).

C&S (Hubei) Paper, Xiaogan City, Hubei Province, China

Whitewater recovery upgrade from DAF to save-all disc filter.

Dongguan Shunyu Paper, Dongguan City, Guangdong Province, China

Headbox screen to upgrade paper machine approach system for corrugated board.

ENCE Navia, Navia, Spain

Optimization of Process Performance (OPP) service.

ENCE Pontevedra, Pontevedra, Spain

Optimization of Process Performance (OPP) service.

Arcelor Mittal Tubarão, Serra, Brazil

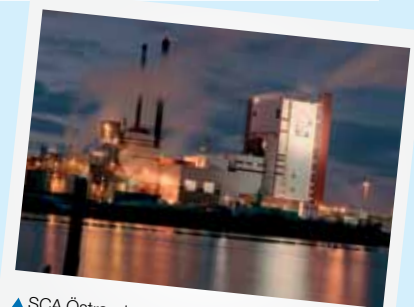
Optimization of Process Performance (OPP) service.

SCA, Östrand, Timrå, Sweden

Debarking drum modernization.

Iggesund Paperboard, Workington, Cumbria, UK

Debarking drum modernization.



▲ SCA Östrand will double its annual production capacity from 430,000 to 900,000 tonnes and become the largest mill in the world for softwood kraft pulp

RECENT START-UPS

COMPLETE LINES AND SYSTEMS

Stora Enso, Varkaus, Finland

Fiberline conversion: modernization of cooking, brownstock washing, and screening; new refiners for blowline and rejects. New LimeDry (lime mud disc filter) for recausticizing plant. Evaporation plant capacity increase.

UPM-Kymmene, Kuusankoski, Finland

Fiberline modernization and pulp drying plant capacity increase and quality improvement.

Suzano Papel e Celulose, Suzano, São Paulo, Brazil

New continuous cooking plant for capacity increase.

Fast learning curve – only 10 days to reach nominal capacity.

KEY EQUIPMENT, UPGRADES, AND MODERNIZATIONS

Chuetsu Paper, Takaoka, Japan

Modernization of oxygen stage and bleach plant (5 DD Washers) and LimeFree centrifuge for white liquor plant.

New smaller size DD Washers (2 m x 2 m).

CMPC Celulosa, Santa Fe, Chile

Increase availability of the cutter layboy.

Zhejiang Jingxing Paper, Pinghu City, China

PrimeLineST tissue machine with steel Yankee (diameter of 18 feet), head insulation, and steam-heated hood.

2nd ANDRITZ tissue machine delivered to this customer for high drying capacity at reduced energy costs.

Zhanjiang Chenming Pulp & Paper, China

65 MW gasification plant.

MSE Mjölby Svartadalens Energi, Mjölby, Sweden

EcoFluid boiler (35 MW); biomass handling system; fuel handling and flue gas cleaning systems; steam turbine with auxiliary systems.

Suzano Papel e Celulose, Suzano, São Paulo, Brazil

Upgrades to bleaching, pulp machine, and winder for the production of fluff pulp.

First mill to produce fluff pulp using Eucalyptus - Eucafluff.

DID YOU KNOW THAT...



... ANDRITZ holds the dominant position for continuous cooking of dissolving pulp?

In the last four years, every order for continuous cooking of dissolving pulp has been placed with ANDRITZ.

ANDRITZ technology is swing-capable, meaning that producers can easily switch between the production of kraft pulp and dissolving pulp depending on market conditions.

Get more information at:

www.andritz.com/dissolving-pulp



... Yankee service extends the life of Yankee cylinders?

A well-maintained Yankee cylinder (steel or cast iron) offers improved runnability and increased machine efficiency. Using Life Cycle Management (LCM) techniques, ANDRITZ has focused on the overall added value of the Yankee and offers services through the life of the product. Yankee Service can include grinding, coating, on-the-run measurements, leak repair, bearing changes, FE analysis, diagnostics, etc.

Get more information at:

www.andritz.com/yankeeservice

... ANDRITZ offers technologies for recycling of plastic-containing rejects?

With consumers and industry generating increasing amounts of waste containing plastic, ANDRITZ saw an opportunity to combine its fiber and rejects treatment expertise with innovative pyrolysis technology. The technology involves high-temperature heating of organic materials in the absence of oxygen. The plastic turns into a hot gas that is cooled and becomes pyrolysis gas or oil – fuel for a mill's power plant. Remaining metals can be pressed into blocks and recycled in the metals industry.

Get more information at:

www.andritz.com/pyrolysis



Here's a fresh perspective on improving your bottom-line efficiency.



We focus our technology and services on your bottom-line efficiency, so you can profit in virtually any market.

As your partner, ANDRITZ tries to ensure that everything we do helps you increase your efficiency and lower your costs.

You can benefit from technological leadership. Our solutions increase throughput, reduce waste, improve yield, substitute less costly raw materials, generate power, reduce energy costs, and keep your equipment running longer.

We are your technology and service partner. When you need a fresh perspective on raising your bottom-line efficiency – let ANDRITZ open up new possibilities for you.