

FiberSpectrum

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The Magazine of Andritz Pulp&Paper



“That we could build this mill without any safety or environmental problems, and start it up in world-record time, is a grand tribute to all involved.”

*Sergio Colvin,
Managing Director of CMPC
Celulosa*

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Dear Readers,

In the last issue, I paid tribute to Bernhard Rebernik, who retired from Andritz. This time, I want to introduce the new leaders of our Pulp & Paper Business.

Karl Hornhofer, 39, is responsible for the Capital Equipment segment of our Pulp & Paper Business. Karl joined Andritz in 1996 as a Project Manager for the Pulp & Paper Business Area and has held several management positions over the years. He was appointed a Member of the Managing Board in January 2007. His responsibilities encompass the Divisions for Wood Processing, Fiberline, Chemical Systems, Recovery, Pulp Drying, Paper Machines, and Paper Finishing.

Humbert Köfler, 46, is responsible for Service and Units. Humbert joined Sprout-Bauer in 1987 in the Commercial department and soon became regional sales manager. He has progressed through several management positions and was appointed a Member of the Managing Board in April 2007. His responsibilities encompass the Divisions for Pulp & Paper Engineered Services, Engineered Wear Products, Mechanical Pulping Systems, and Fiber Preparation Systems Divisions.

A very experienced and capable management team, as well as a staff of 3800 talented people around the world support Karl and Humbert.

This issue of FiberSpectrum reflects the trends in our industry – the continued importance of large greenfield pulp projects in South America, the emerging market in Russia, the role of rebuilds/upgrades in the Northern Hemisphere, and the strategic importance of a manufacturing base in China. Three specific strengths of Andritz emerge – at least as told to us by our customers featured in these articles:

- *One is the importance of a fast start-up. Francis Backhouse, the Mill Manager at CMPC’s Santa Fe mill (page 6), says that good start-ups are the result of quality equipment, trained people,*

and thorough commissioning (and a little bit of luck!). That we could assist CMPC in obtaining a world-record start-up shows a mastery of these important factors.

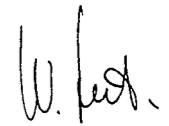
- *The next is our emphasis on life-cycle performance and Overall Production Efficiency. In the recent upgrade for Solikamsk in Russia, we installed some new developments that extend the service life and operational flexibility for refiners that were installed 10 years ago. This commitment to developing our equipment throughout its lifetime – and not just for the sale – is one that we take seriously.*

- *The third strength is supported by the comments of Sergio Colvin (Manag-*

ing Director) and Eugenio Grohnert (Project Director) of CMPC. They both mentioned how important it was that Andritz’s top management was accessible, involved, and able to make quick decisions throughout the project.

We are “hands on” managers who are very committed and very involved in this business. This will not change.

We hope you enjoy this issue of FiberSpectrum. As always, we thank you for your continued trust in us and wish you the very best throughout the holidays and the coming year.


Wolfgang Leitner



Karl Hornhofer
Member of the Executive Board
Pulp & Paper – Capital Equipment

Wolfgang Leitner
President & CEO

Humbert Köfler
Member of the Executive Board
Pulp & Paper – Service and Units

“Working with what nature puts at our door.”

The timing could not have been better – or worse. In a market sense, this was the perfect time to start up an 800,000 t/a bleached eucalyptus market pulp line. From a social perspective, however, this start-up was in the white-hot spotlight of public scrutiny after two other Chilean projects had environmental mishaps. All eyes were on CMPC, its suppliers, and construction partners to see if the “Santa Fe 2” project could live up to its promises.

▼ Eugenio Grohnert, CMPC’s Project Director: “I am most impressed with how Andritz responds. They know their business and are able to support their clients when there is a problem.”



“That we could construct this mill without any safety or environmental problems, start it up and bring it to full production in world-record time, and operate it today with complete transparency for the authorities and our customers, is a grand tribute to all involved,” says Sergio Colvin, Managing Director of CMPC Celulosa.

Now that the intensity of the time has subsided, and Santa Fe’s Line 2 has been producing on-grade pulp since the time it started up (03:15 on December 9, 2006 to be exact), Colvin can focus on CMPC’s next move.

A distinguished man of 60, Colvin is a gracious host in his Santiago office, offering coffee and patiently answering all questions. While the discussion focuses on the Santa Fe mill and Line 2, it is intriguing to understand the background and events leading to this Chilean producer’s largest capital investment.

A proudly private enterprise

Since its founding in 1920, Compania Manufacturera de Papeles y Cartones (CMPC) has always been a privately capitalized company in Chile – even during the challenging political periods in the nation’s history. Today, it has about 7500 shareholders, with the majority shares being held by the founding Matte family.

“Without dwelling on the politics, let’s just say Chile was in a period of political and economic crisis at the time when I joined (1978),” Colvin says. “CMPC was in survival mode and was looking for Chileans with a university degree

who had some experience outside of Chile.”

Colvin’s first task at CMPC was to help them create a network oriented to the export business that would make them a world-class exporter of specialized products. Colvin was instrumental in rationalizing the export product line, establishing the contacts, negotiating with international customers, and creating a profitable export business.

Today, CMPC is an integrated producer of pulp, paper, and other forest products. There are five subsidiaries: Forestal Mininco (forestry and solid wood), Celulosa (pulp), Papeles (paper), Tissue, and Productos de Papel (paper products). Total sales in 2006 were US\$ 2.3 billion.

CMPC Celulosa represents about 34% of total sales and 55% of the total EBITDA. There are three kraft pulp mills in Chile: Pacifico, Laja, and Santa Fe. “Our net pulp production reached a total of 1.2 million tonnes in 2006, a similar volume to the year before,” Colvin says. “This, despite the normal disruptions caused by the major construction projects at Laja and Santa Fe.” Total production for 2007 will approach two million tonnes.

CMPC has one of the most competitive cost structures in the global pulp industry. It has boosted this comparative advantage by the genetic selection of more robust and high-yielding trees. Add to this the CMPC investments in advanced technology. CMPC is the only forest products company in the world to hold an A-rating by Fitch and Standard & Poors. It has a strong balance sheet prepared for growth opportunities and is expert at managing risk.



▲ The twin wire dewatering machine at CMPC. The addition of the shoe press helped Santa Fe overcome the poor drainage characteristics of the *eucalyptus nitens*, which comprise 70% of the furnish for Line 2.

▼ Eucalyptus brownstock contains a high level of hexenuronic acids which consume chlorine dioxide in the bleach plant. Andritz’s patented A-Stage™ in the first bleaching stage reduces bleaching chemical consumption. There is also a large degree of filtrate recirculation in the bleach plant to minimize the effluent being discharged.





▲ Jorge Reyes, Fiberline Superintendent, took on the special assignment of overseeing training for the Santa Fe 2 project. Andritz provided technical training for its process areas. “We had good communications and a friendly spirit,” Reyes says. “There is a very high technical level with the Andritz people.”

▼ Francis Backhouse, Mill Manager, in the pulp baling area. Backhouse and his team achieved a world-record run-up to full design production in 171 days.



From oil and gas to pulp

In 1997, Colvin led CMPC into the acquisition of the Santa Fe mill from the Shell group. That’s right – Shell, the oil and gas company.

“Shell was quite visionary in developing alternatives after their oil reserves were depleted,” Colvin explains. “Their compass led them to biofuels – cellulosic biofuels specifically – and to eucalyptus and to Chile.”

While waiting for biofuel technologies to mature, Shell needed something to do with the wood fiber they would soon be harvesting from the plantations. In the late 1980’s, Shell formed a joint venture with Scott Paper and Citibank to build a 250,000 t/a eucalyptus-based pulp mill in Santa Fe.

“Shell’s logic was sound, but their timing was premature,” Colvin recalls. “With biofuels well into the future, they reached a point where they didn’t want to be in the pulp production business anymore. We wanted to expand into hardwood production. It was a good sale for them and a good acquisition for us.”

Over the years, the single line at Santa Fe was expanded to 370,000 t/a. Today, Line 1 boasts the second most loaded digester in the world (measured by production per m² of digester cross-sectional area). It was upgraded in 1997 with Lo-Solids® cooking technology, which mill personnel credit with improving throughput, yield, and pulp quality. Andritz also added a Diamondback® chip bin to the digester in 2001.

Line 2 = 6

In 2002, CMPC began seriously planning a new line for Santa Fe. The goals were to increase capacity of the mill, produce a first-quality, stable product, and excel in environmental performance, according to Eugenio Grohnert, Head of Projects for CMPC. The new

Line 2 would be divided into six EPC packages: Woodyard, Fiberline, Pulp Drying/Baling, Evaporators, Recovery Boiler, and White Liquor Plant. Each supplier would be responsible for the engineering, procurement, and construction within defined schedule, budgets, and performance guarantees.

Once the project plan was approved by the Board, Grohnert and his team moved quickly into action. The bidding process (requests, proposals, and supplier selection) was completed in nine months. Mobilization and civil construction began in late 2004.

Best available proven technology

“We were looking at all the new technical developments,” Grohnert says, “but we wanted the best available proven technologies in our mill. All of the processes had to be good – the best – but proven somewhere in the world.”

To see the latest Andritz technologies, Grohnert and his team visited several reference mills in Brazil and Scandinavia. “These visits reinforced our knowledge about Andritz and gave us very practical information,” Grohnert says. “The mills were very open to us and shared data about start-up and performance.”

Neil Chablani, an Engineering Consultant for CMPC who managed the fiberline and chemical preparation areas for the Santa Fe Line 2, was part of the team doing the pre-feasibility study and vendor evaluations at Santa Fe. “We observed the Andritz technology at other mills,” he says. “We discussed together some alternatives to the TurboFeed® piping and pumps after observing other installations. Andritz was flexible in working with us to get the right design.

“Probably the best cooking reference for Andritz was right here on Line 1. We knew the quality of the pulp, the

throughput, and the characteristics of the Lo-Solids® process. Our operators were very comfortable with it.”

After the bids were in and the commercial terms negotiated, CMPC awarded Andritz contracts for four of the six EPC packages (Fiberline, Recovery Boiler, Pulp Drying/Baling, and White Liquor Plant) in September 2004.

8000 people on-site

The project plan was for a 24-month period from contract to start-up. Civil work began and Andritz mobilized its project teams. At the height of construction, there were 8000 people working at the Santa Fe site, according to Grohnert.

“Keep in mind that we were operating Line 1 at full production during this entire time,” says Gerardo Vargas, Production Manager for Santa Fe. “We had to prepare and train operators for the new line, consolidate our operating crews, and handle the disruptions while we were making full production. This required a sacrifice and commitment from all our people during this time.”

Denis Fournier came to Andritz as Project Director for the Santa Fe project in December 2003. Fournier has extensive international experience in project management, EPC contracting, and pulp mill management. Fournier had lived in Chile as a teenager.

“This was a big project for Andritz involving four different Divisions,” Fournier says. “My role was to efficiently coordinate our common activities, present a single interface to our customer, and a single interface with our suppliers and subcontractors.”

Joining Fournier were the four project managers from the Divisions – Kari Tuomainen for the recovery boiler, Harri Makkonen for the white liquor plant, Wolfgang Maier for pulp drying and baling, and Mike Crotty for the fiberline –



▲ The 2405 adm/d fiberline consists of a Lo-Solids® digester with TurboFeed™ chip feeding, brownstock washing, oxygen delignification, post-oxygen pulp screening and washing, and four-stage ECF bleaching.

▼ The fiberline utilizes DD washers for all washing stages. A special concern during the system design was the requirement to operate the plant with 100% *eucalyptus nitens* pulp, which has lower drainage. After conducting mill trials on Line 1, Andritz sized the DD washers for all washing stages to be 15% larger than would be required for other eucalyptus pulps.





▲ The 8100 m³/d white liquor plant has a 600 t/d LMD kiln. "The X-Filters run great and the plant is very safe to operate," says Marcelo Garrido, Superintendent.

as well as Jari Algars who came from Andritz Finland to set up the accounting and cost controlling activities. Fournier hired two experienced EPC project people, Ralph Johnson as Site Manager and Barry Manson as Contract Manager to round out the team.

"At its peak, our site operations had 140 Andritz people from many different nationalities," Fournier says. "Though we had different cultures, technical goals, and different skills, it was quite impressive to see us pulling together as one operation."

As with every large project, there were the typical problems, according to Grohnert. There were small delays in the construction and start-up of the fiberline that caused some anxious moments. "My responsibility is to solve problems in projects," he says. "For me to be effective, I must have counterparts on the other side who feel the same."

"I was most impressed with how Andritz responded. They know their business and are able to support their clients when there is a problem. They have been very responsive after the sale."

CMPC Celulosa has an internal program called "Zero Fault." The program focuses employee attention on safety (zero injuries) and environment (zero environmental accidents). "We reviewed the safety requirements of CMPC, and together with our construction subcontractors, developed our Safety Program to meet these requirements," Fournier says. "As a result, we jointly achieved a very respectable safety record."

Through the entire project, no environmental contamination events occurred. Even during the start-up phase, the

environmental parameters were consistently met. "I am very proud to say that during the entire project, we had no serious accidents and no environmental events," says Grohnert. "This is an outstanding achievement and speaks volumes about how the project was managed."

Equipment, people, procedures – and some luck

The basis for a good and fast start-up, according to Francis Backhouse, Santa Fe's Mill Manager who was Engineering Manager for the Line 2 project, rests in three things: quality equipment, trained operators and maintenance people, and thorough commissioning. "And maybe a fourth, a little bit of luck," he smiles.

"I started out in this business years ago on the maintenance side," Backhouse says. "So I can evaluate the mechanical design of the equipment. I'm convinced that the production equipment in this mill is high quality."

For training, CMPC made a large and rather unusual commitment. Jorge Reyes, who is Fiberline Superintendent at Santa Fe, explains. "For the Line 2 project I took on a special assignment to be in charge of training." Reyes and his team took the 90 operators for both lines and began a training program so they all had a high level of knowledge and competence. "We didn't want a situation where all the best operators went to the new line, so that the old line would suffer," Reyes says.

One year before the start-up, all the operators for Line 2 began an intensive training program. "A very important part of the training was the simulator,"

CMPC Celulosa

► The 3800 tds/d recovery boiler has a Vertical Air™ system which virtually eliminates NOx emissions. "The Andritz recovery boiler impresses me," says Gerardo Vargas, Production Manager. "It is easy to operate and efficient beyond my expectations."

Reyes says. IDEAS Simulation and Control, an Andritz company, delivered the simulator. This simulator has proven its capabilities in several recent greenfield projects by helping mills start up more quickly and with less disturbances. "Not only does it help us verify all the logic and control loops in the DCS prior to the actual start-up, but it lets us create different scenarios for the operators to learn how to handle start-ups, shutdowns, disturbances, and other things they might see when the mill is actually running."

A world-record start-up

When the time came for start-up, all eyes were on Santa Fe. Francis Backhouse, who was Santa Fe's Start-up Manager, remembers the mood at the time.

"The Andritz experts were responsible for starting up their process areas, working closely with our operations and maintenance teams," he says. "We were all excited that everything was coming together, but, the external pressures were enormous."

"We passed 13 national audits and one international audit for environmental compliance during our start-up period," Backhouse says. "The audits were unannounced and could occur at any time. We can now say with certainty that Santa Fe employs some of the world's most advanced equipment and procedures for environmental and personal safety."

In addition to safety, Colvin had set an internal goal for the start-up. "When we visited Veracel, they shared with us their data about their start-up," he says. "They set a record of 174 days to reach



▼ Marcelo Garrido, Recovery and Energy Superintendent, inside the Andritz recovery boiler house. "What we want to see is a relationship that doesn't end with the project."





▲ "From the Andritz upgrade of Line 1, we knew the quality of the pulp we could get, the throughput, and the characteristics of Lo-Solids® cooking," says Neil Chablani, standing in front of the Diamondback® chip bin. Chablani was part of the CMPC team responsible for pre-feasibility analysis and technical vendor selection.

▼ The pulp drying/baling plant consists of a stock approach system with six-stage screening, a 9.23 m wide pulp drying machine, and a cutter/layboy with three automated baling lines (shown here).



CMPC Celulosa

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design production on a 30-day rolling average basis. I challenged our team to beat this record."

Chips started flowing to the Andritz digester on December 9, 2006 and the mill hasn't looked back since. In June, full production was reached. "I personally thought we could do it in 90 days," Backhouse says, "though others thought I was crazy. We came close, but had to pull back a bit due to some process limitations for awhile. Still, we did it in 171 days, which is a world record."

"Working with what nature gives us"

"We have about 50 key customers, and we have had many of the same customers for years," Colvin says. "They know that we provide a consistently high quality, stable product that they can easily optimize for their own paper production."

Stability is key for CMPC. "Our focus is always on reducing the standard deviation so there are no variations in our product," Colvin says. "We must act properly and efficiently to lower the standard deviation of what nature puts at our door."

Fortunately, CMPC has good raw materials, but there are some variations in fiber supply that must be addressed. Where the eucalyptus mix on Line 1 is 70% *globulus* and 30% *nitens*, the situation is reversed on Line 2.

According to Reyes, the fact that the pulps from both lines are almost identical in their key properties is quite amazing. "Nitens gives us some cost advantages, but can be significantly more difficult to pulp, bleach, and de-water," he says. "The fiberline and pulp drying plant are operating at very high technical levels."

"The Andritz people are extremely knowledgeable," he continues. "We have

very good communications with them – even when they are not at the mill."

Reyes cited a situation where the pickup fingers in the cutter/layboy were causing problems. "We thought it was a mechanical problem which we could adjust," he says. It turned out that the sequencing was done by the automation system. One call to Andritz and an automation expert was located – sleeping at his home in Austria because it was 03:00. "He woke up, logged on remotely, and reprogrammed the system from his desktop computer. Twenty minutes later, we were good again. That's what I call good service!"

200,000 tonnes more?

South America is becoming an increasingly important supplier of market pulp, representing 19% of the world's supply in 2006. "Though pulp prices are always volatile," Colvin says, "we are experiencing a good level of pricing for our eucalyptus pulp and are well-positioned to capitalize on our opportunities."

One opportunity is to increase production at Santa Fe. CMPC has begun the process of environmental assessment and permitting to raise production by 200,000 t/a. "It will probably be about a year for this permitting process and we hope that our excellent environmental performance proves that we are capable of producing this pulp safely."

In fact, as Marcelo Garrido, Recovery and Energy Superintendent, explains, all the main equipment is sized to achieve current production and could handle the increased throughput with minor modifications. Garrido was one of the process engineers assigned to the Line 2 project and was Start-up Manager for the recovery island.

"The Andritz recovery boiler is operating at about 3700 tonnes of dry solids per day and is designed for 3800," Garrido says. "We can certainly handle an expansion."



▲ "Line 2 is operating at design capacity and delivering pulp that fulfills our export customers' expectations, which means the same high quality as Line 1," says Francis Backhouse, Mill Manager.

Garrido stressed that all the technology his team selected for the recovery area is proven. "We were not willing to experiment," he says.

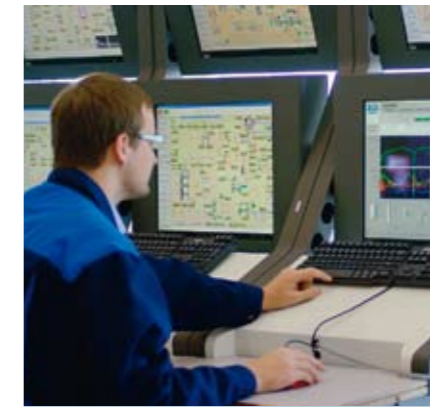
"I am very impressed with Andritz's ability to handle an EPC project," he continues. "All the equipment is performing exactly as it is supposed to. The boiler runs great. The X-Filters perform great. It's a very safe plant to operate and the support by Andritz after the start-up has been excellent."

Andritz continues to provide technical advisory services to CMPC and is developing a longer term maintenance program with CMPC. Andritz has a service center in nearby Concepcion to supply parts and technical support.

"This is what we want to see," Garrido says, "a relationship that doesn't end with the project."

Says Production Manager Vargas, "We must keep on working together to optimize this mill. This is a permanent relationship, not a temporary one."

►► find out more at www.fiberspectrum.andritz.com



Simulation, control, optimization

The level of automation in the Santa Fe mill is quite impressive, and Andritz delivered two important automation tools.

The IDEAS dynamic process simulator was used to verify the control loop integrity and check out the DCS. The simulator also proved to be a very effective tool for training operators in advance of the world-record start-up.

Andritz also delivered its ACE® (Andritz Control Expert) fiberline optimization system. ACE® is based on Andritz's extensive fiberline experience. The foundation for ACE® is the BrainWave® technology. BrainWave® stabilizes key process variables by modeling process behavior to predict – and control – where the process will move. Traditional PID controllers, by comparison, do not have this ability to proactively direct the process. The ACE® supervisory software optimizes control of the fiberline and provides a full-scale "auto-pilot" for the operators to maximize profitability.

Sludge ...unwanted and unloved?

The processing and disposal of sludge may not be glamorous, but it certainly is necessary. The European Recovered Paper Council (ERPC) announced that paper recycling was at a record high in Europe of 63.4% – 58.2 million tonnes of paper and board. This translates to about 3.5 million tonnes of sludge. Fortunately, Andritz has solutions for sludge handling – and the Hylte Mill in Sweden is successfully applying Andritz technology.

Stora Enso's Hylte is a world-class producer of standard newsprint. The mill is located beside the Nissan River in a heavily forested part of Sweden's Småland province. With 900 employees, the mill is the largest private employer in the community. The Hylte Mill produces about 800,000 t/a of newsprint.

Furnish for the mill's four paper machines comes from a deinking (DIP) plant producing 390,000 t/a deinked pulp, a TMP plant producing 250,000 t/a, and a groundwood mill producing 160,000 t/a.

This year, the Hylte Mill is celebrating its first 100 years of operation. Arne

Sundkvist, Strategic Planner at the mill, wants to ensure they are well positioned for many years in the future. Maintaining close contact with customers provides Sundkvist good insight into emerging trends and changing needs. "A daily newspaper is a perishable commodity," Sundkvist says. "We produce uniformly high quality newsprint products at this mill and are continuously working to ensure that the stability of our production is constantly improving. We upgrade and rebuild the mill continuously to maintain our high product standards."

The upgrades extend all the way through the value chain – including the mill's by-products and waste products.

DIP main source of fiber

"The raw material for our DIP plant comes from old newspapers – daily and weekly newspapers collected mainly from the Nordic countries," says Tommy Johansson, Deinking Technician. Johansson has been a mill employee since 1977, and has worked in deinking since 1984.

There are actually two lines producing 390,000 tonnes per year of deinked pulp. "Yield" is the term used by paper manufacturers for the amount of usable fiber rendered after the cleaning and deinking processes remove contaminants, explains Mauri Kurkimäki, Operating Technician in the deinking plant.



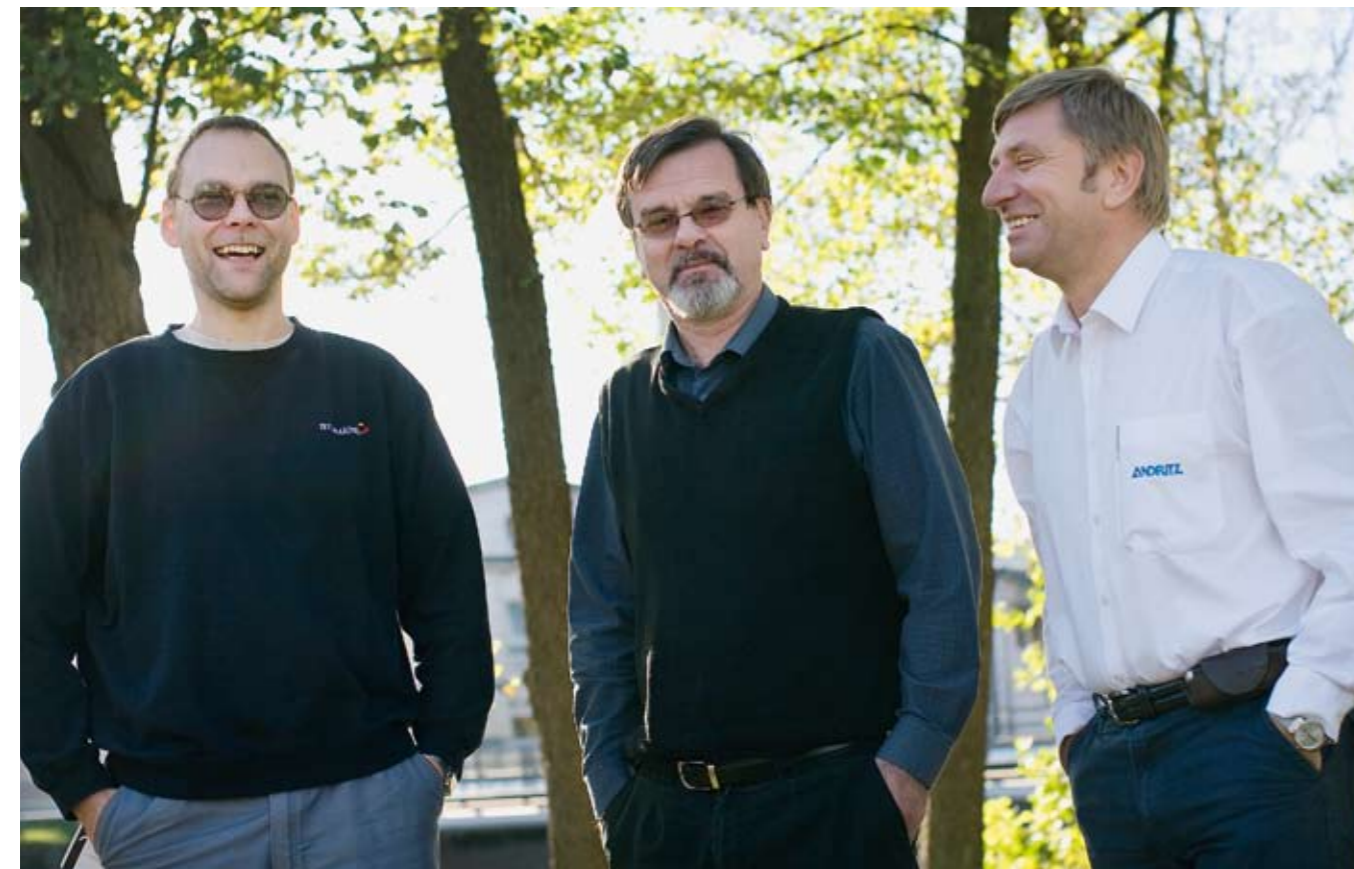
▲ The Hylte Mill celebrates its 100th year of operations in 2007. Today, it produces 800,000 t/a of newsprint.

"The yield we get from old newspapers at the Hylte Mill is about 85%, which is consistent with industry standards," Kurkimäki says. This means that 15% of the incoming volume must pass through the facility as rejected material, or sludge."

The sludge from the two DIP-lines is dewatered on three common gravity tables followed by screw presses. The Andritz gravity table is used due to its ability to gently pre-thicken very dilute sludge suspensions (3.5% in the case of the Hylte Mill). This efficient pre-thickening increases the capacity of the Andritz sludge screw press. The original equipment for sludge handling Line 1 was installed in 1994, for Line 2 in 1995, and for Line 3 in 1997.

▼ The challenge: optimized dimensioning of existing equipment in order to handle changing sludge characteristics and to achieve higher dryness – using the same basic equipment. Andritz and mill personnel met the challenge by extending and upgrading the three existing gravity tables.

▼ Tommy Johansson, Deinking Technician (left), Arne Sundkvist, Strategic Planner at Hylte Mill (center) and Artur Salawa, Product Engineer for Dewatering and Bleaching from Andritz



More production, more sludge

The Hylte Mill wanted to increase its production of newsprint, which meant an increase in DIP production as well. A new flotation system was installed and the next requirement was to rebuild the existing sludge handling equipment to increase production by about 10%.

"While our employees are responsible for providing input regarding increasing efficiency and maintenance, in order for us to have a truly productive and environmentally safe mill, we need the expertise from outside suppliers like Andritz," Sundkvist says. "Most often, we rely upon the expertise of individuals within that network of suppliers."

"This is when we began discussions with Artur Salawa," Kurkimäki says. Salawa is a Product Engineer for De-





Stora Enso Hylte

◀ Artur Salawa from Andritz (left) talks with Tommy Johansson (center) and Mauri Kurkimäki, DIP Operating Technician, about the performance of the rebuilt sludge dewatering system.

watering and Bleaching with Andritz's Paper Engineered Services group. "The Hylte Mill wanted to increase sludge production to about 82 t/d on each gravity table and maintain the current level of dryness (65%) after each screw press," Salawa says. "They needed that level of dryness since they incinerate their sludge to recover energy and reduce the amount going to landfill."

Salawa noted that the existing gravity tables were equipped with beds two meters wide and six meters long, without floating rolls. "We recommended that the Hylte Mill extend the length of the inlet end of each gravity table by two meters and add a floating roll to the outlet end. This would get them the production and dryness they wanted."

"After meeting and discussing with Artur, I knew that he was the right person with the right expertise we needed," Kurkimäki says. "There was no question in my mind about which supplier would do the best job on the rebuild. He was the key driver of this project from the outside and Andritz was the right choice."

The rebuild project

Salawa gives a brief description of the gravity dewatering process: "A flocculent (polymer) is added to the sludge and the suspension stays in the head-box of the gravity table until flocs form. Then it flows onto a fast-moving wire, where the free water drains through the wire and the thickened sludge continues on the wire. The dewatering is

assisted by chicanes mounted in rows so that the sludge cake is gently turned over.

"For additional dryness, we installed a new floating roll at the end of the table to gently remove remaining water from the thickened sludge cake. The thickened sludge cake is removed by a spring-loaded take-off doctor and then fed to the sludge screw press. In the press, the volutions of the slowly rotating shaft press the sludge against the outlet casing. The retention time in the press is about 15 minutes."

Andritz was required to rebuild the Hylte Mill's equipment during scheduled shutdowns, so precision planning was crucial. "Working with professionals certainly made the project achievable in a relaxed yet fast-paced atmosphere," says Johansson.

Each gravity table was extended by two meters on the inlet side. The new floating roll was installed on the outlet side and the original wire was replaced with a new longer spiral wire.

The rebuild work was staged so that the DIP-line 1 was completed first. After the usual checks, the rebuilt gravity table was started up on February 2, 2007. The upgraded units for sludge handling lines 2 and 3 were started up April 16, 2007.

Very dry results

During the performance test for Line 1 in February, technicians from the Hylte Mill took samples to check the outlet

dryness of the gravity tables and the screw press. The samples were evaluated in the mill's laboratory. Similar tests were done in April when the other two lines started up.

"Our objective was fully met by Andritz," says Kurkimäki. "The equipment was able to handle an increased flow of sludge with the same dryness as before."

"All gravity tables easily fulfill the guaranteed values of 82 adm/d sludge production at 20.0 -23.6% dryness," Salawa says. "The highest production we measured during the performance test was 90 adm/d. This with an inlet consistency of 3.5% and an ash content of 64%. After the screw presses, the dryness increases to 65%."

The dewatering process is also using less polymer than before while achieving higher production.

"Currently with the rebuild we are reaching 790 tonnes of deinked pulp per day," Johansson says. "By Christmas, we will reach our goal of 800 tonnes per day."

"Improving production and using energy in the most effective manner possible is a priority issue for us," says Sundkvist. "It is our responsibility to utilize investment funds where they do the most good. Well-planned projects like this rebuild lead to reduced costs and provide a high return."

► find out more at www.fiberspectrum.andritz.com



▲ (From left) Artur Salawa, Mauri Kurkimäki, Sven-Ake Bertilsson, and Tommy Johansson check the performance of the gravity table. The rebuilt units are designed to handle 82 t/d of sludge at a dryness of up to 23.6%.

Sludge is not a dirty word.

Removing the ink, clay, coatings, and contaminants from wastepaper in order to salvage reusable fibers creates deinking sludge, and deinking sludge creates disposal concerns.

Wastepaper with high amounts of filler, such as clay-coated magazine paper, produces much lower yields of usable fiber than does wastepaper that is mostly cellulose fiber, such as computer printout or old newspaper. Paper that is only lightly printed will produce less sludge than paper that is heavily printed. Post-consumer papers generally produce more sludge because they tend to be more heavily contaminated.

In the past, the greatest percentage of hazardous material in deinking sludge came from the inks and pigments. In recent years, however, ink manufacturers have made enormous strides in eliminating heavy metals from commercial printing inks.

Along with the inks, deinking removes other non-cellulose materials from the fiber, including coatings, adhesives, dyes and fillers like calcium carbonate and clay, as well as trash like metals and plastics. All wind up in the sludge.

What can be done with all that sludge?

Traditionally, deinking sludge has been handled in three different ways: landfilling, incinerating, and landspreading.

Landfilling is the most widely used method for disposal of deinking sludge. Before the sludge is landfilled, water is removed from it to make it about 40% solids. Some mills are permitted to use municipal landfills, but most use their own private disposal facilities.

A few mills burn deinking sludge in their boilers as "hog" fuel. The high moisture of the sludge affects its ability to burn efficiently. To enhance its heating value, the sludge is sometimes mixed with dry waste material (such as wood chips). Fluidized bed combustion is one emerging technology that works particularly well with the wet sludges produced by deinking mills.

Several mills landspread sludge. The sludge is spread on farmland and adds some organic matter to the soil and provides trace nutrients, including nitrogen, phosphorous, and potassium. The calcium carbonate acts as a lime

substitute, which helps balance overly acidic conditions. The clay increases the soil's capacity to hold nutrients and is particularly effective for sandy soils.

Recognizing that sludge disposal is a growing concern, the paper industry is engaged in intensive research (much of it proprietary) to develop alternative uses for the material. Other applications include composting, agricultural use, cement production, brick manufacturing, furnish for fiberboard production, wet oxidation, fermentation, pyrolysis, hydrolysis, and absorbent material like cat litter.



Russian mill invests in sustainable forestry and newsprint quality

In May 2007, the Solikamsk Paper Mill joined an elite group of Russian pulp and paper producers when it received certification from the Forest Stewardship Council (FSC) for its forest. It also joined the Association of Environmentally Responsible Timber Producers which is largely committed to corporate social responsibility. Russia's third largest producer of newsprint has invested heavily in upgrading production and quality. A recent project with Andritz is the upgrade of TMP Line 1 and a new reject refining system in the groundwood mill.

Founded in 1941 Solikamskumprom is located in the Perm region in western Russia. The mill, about 2000 km from Moscow, sits in a region on the western flank of the central Ural Mountains that is thickly forested.

Production capacities of JSC Solikamskumprom account for 600,000 tonnes of newsprint per year. The newsprint is 50% thermo-mechanical pulp (TMP), with the rest being stone groundwood (SGW), and kraft pulp. Approximately 56% of the mill's output is exported to countries outside the Commonwealth of Independent States.

The basis for sustainable development of the mill has been a continuing series

▼ "We have consistently been implementing an upgrade program at this mill," says Viktor I. Baranov, President of JSC Solikamskumprom.



of modernization programs during recent years. Recent investments totaling about 3.4 billion rubles (€ 102 million) and the FSC certification testify to Solikamsk's dedication to ecologically sound and high quality production.

Upgrades to the TMP mill

Solikamsk operates two TMP lines which provide high-quality mechanical pulp for its four paper machines. The first line, TMP 1, was delivered by Andritz in 1997 and has a Twin 60 refiner in the primary and secondary positions. Original production capacity was 290 t/d and the line has been producing about 300 t/d.

In 2003, a second line, TMP 2, with a capacity of 370 t/d was installed. TMP 2 uses the advanced Andritz RTS technology for energy savings and better pulp quality. A Twin refiner (TC 66) operating at 2300 rpm is in the primary position, with another TC 66 in the secondary position. TMP 2 also has a high-consistency reject refining system from Andritz.

After years of successful operation, the decision was taken in 2005 to rebuild TMP 1. Solikamsk wanted to increase the production of mechanical pulp for the paper machines and to respond to customer demands for higher quality. "The main targets for the upgrade project were to increase production from 300 to 370 tonnes per day (23% increase) and improved the quality of

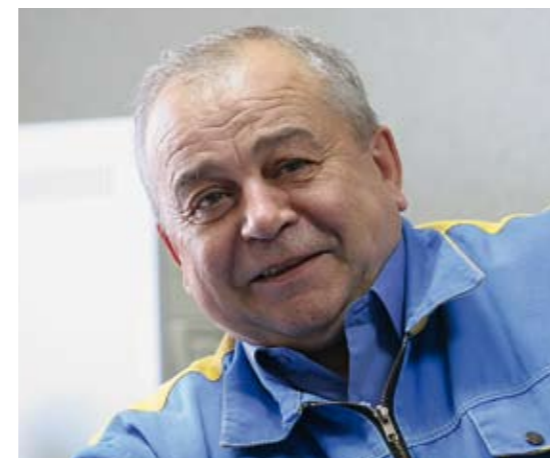
our mechanical pulp," says Aleksey Iwanchin, Deputy Head of TMP production.

Fast track, no disruptions

The contract covering the delivery of the equipment and services for the upgrade of TMP 1 line was signed with Andritz in October 2005. The contract specified that the new equipment would be installed and started up in September 2006 – a short delivery and erection time of only 11 months.

"Solikamsk has been cooperating with Andritz for many years," says Viktor I. Baranov, President of JSC Solikamskumprom. "We have jointly implemented several projects and we knew that work-

▼ Evgeny Pavlovich Ran, Manager of TMP and Groundwood Production at Solikamsk.



▲ As part of the rebuild of TMP 1, Andritz upgraded the Twin refiners to have Trammable And Guideless (TAG) capability. This allows the mill to adjust the plate gap to ensure that it is parallel over the entire service life of the refiner. Process Engineer Igor Viktorovich Berdjugin (left), Rudolf Hafner of Andritz (center), and Aleksey Iwanchin, Deputy Head of TMP Production at Solikamsk, inspect the refiner rebuild.



▲ Aleksey Iwanchin, Deputy Head of TMP Production, with Rudolf Hafner, Andritz's Site Manager for the upgrade projects.

ing with Andritz again on TMP 1 would be quite efficient and professional." One particular requirement during the project was to minimize any disruptions to the existing production. As Evgeny Ran, Manager of TMP and Groundwood Production, explains: "We could not allow any disturbance to our normal TMP production during the upgrade. We relied upon the expertise of the Andritz specialists. Only one 72-hour production stop was required at the end to do some critical rebuilding and tie-in the new equipment. The rest of the new equipment was installed during normal TMP production."

New reject refining and upgraded chip washing

"When TMP 1 was first installed, it did not have separate reject refining," says Iwanchin. "Screening rejects were sent back to the secondary refiner to lower our initial capital investment."

So, an important part of the TMP 1 upgrade was the installation of a separate reject refiner (an Andritz S2070 high-consistency refiner). A new Andritz screw press dewateres the pulp to above 30% consistency and feeds the pulp to the refiner.

Another important part of the modernization included a rebuild and upgrade of the chip washing system to ensure that it could handle the increased capacity and provide clean chips for the refining system.

▼ JSC Solikamskumprom, in the Perm region of Russia, is the third largest newsprint producer in the country and has made significant investments in quality and environmental safety.





▲ Elena Egorovna Novikova, Laboratory Chief for TMP and Groundwood, verifies the improvements in quality of the mechanical pulp for Solikamsk's four paper machines.

Capacity increase

To handle the 23% capacity increase, the feed system for the Twin 60 refiners was rebuilt with a new 16-inch plug screw feeder and a new buffer bin. The power tubes of both refiners were replaced and the refiners were rebuilt.

A new Andritz TwinFlo 52/58 low-consistency refiner was installed as a third refining stage to reduce shives and further improve the pulp quality.

Two existing pressure screens were rebuilt and a new Andritz ModuScreen F40 was installed to screen the refined rejects.

One additional Andritz disc filter was installed, and new discs were added to the existing disc filter, to ensure that all TMP pulp production would be adequately dewatered prior to storage in the existing tower.

Upgraded results

The upgraded TMP 1 line started up on schedule in September 2006. The takeover run was successfully completed in the same month and, after a short optimization period, the guarantee test run was completed on October – with final acceptance reached just a little less than one year after contract signing. According to the management of Solikamsk, the TMP 1 upgrade project met all expectations. "The modernization project was successful because everything was designed properly and the quality of work and equipment met our requirements," Iwanchin says.

Baranov, Solikamsk's President, agrees. "We have been consistently implementing an upgrade program at this mill. For us, a really important event was the TMP 1 upgrade project to increase production from 300 to 370 tonnes per day. This upgrade also

improved the strength of the fiber we send to the paper machines, including the breaking length and tear resistance. In addition, the heat energy recovery rate was improved from 20 to 30 tonnes per hour."

Groundwood rejects project

Almost in parallel with the TMP 1 upgrade, Solikamsk started another project to modernize its groundwood mill. Andritz delivered a new reject refining system which helped the mill increase the quality of groundwood pulp.

The new reject refining system is designed for production of 250 t/d to increase the beating degree of the pulp value by 25°SR (Schopper Riegler). Groundwood rejects are thickened on two new Micrascreens and then mixed with the rejects from an existing Vibra-screen in a new unrefined rejects chest. From there, the rejects are pumped to a new Andritz screw press and are dewatered to a consistency greater than 30%.

The thickened rejects are then fed to a new atmospheric Andritz S2070 high-consistency refiner. The refined pulp is discharged into the existing refined rejects chest and then pumped to the screen room.

Once more a quick start-up

The new system was started up in February 2007 and the takeover was accomplished less than one month after start-up. All guarantee runs were completed over the next two months and final acceptance was signed in May 2007.

Leonid Rogozhin, Deputy Chief Production Manager for Groundwood, describes the effectiveness of the new groundwood reject line: "We were able to replace six old refiners which were



▲ Leonid Grigorjevich Rogozhin, Deputy Chief Production Manager for Groundwood, is pleased with the Andritz project to modernize the groundwood mill.

operated in two stages with one new Andritz refiner – and the quality of our groundwood pulp has improved. As a result, we have increased production while reducing our operating costs. As a side benefit, we now have space available to add a new bleaching line in the future."

▼ Gennady Aleksejevich Lozhkin, Solikamsk's Chief Engineer (left), discusses the fast-track rebuild schedule with Rudolf Hafner, Andritz's Site Manager.

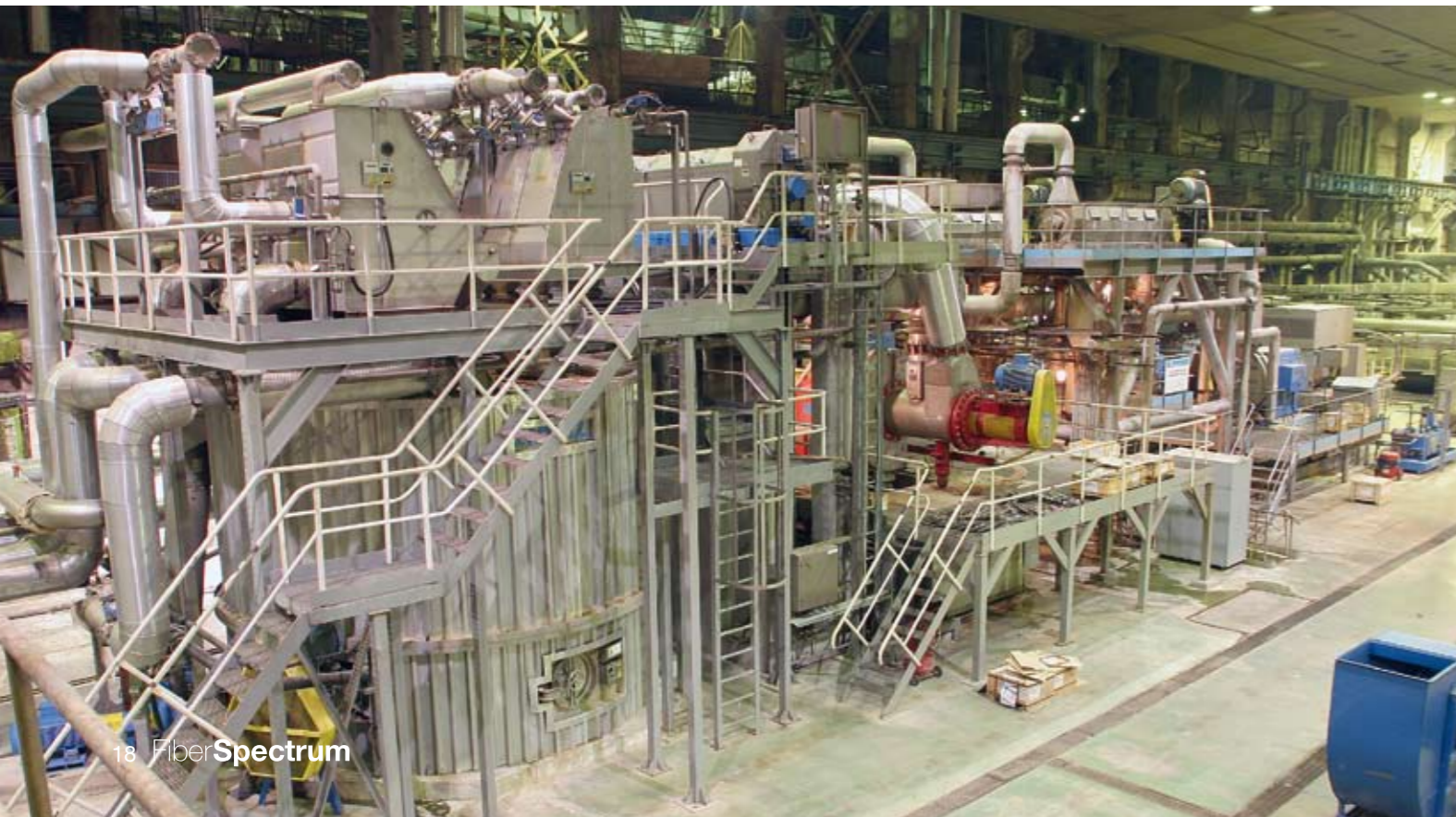
Looking forward

Soon JSC Solikamskbumprom plans to start the second phase of an investment program that is scheduled to be completed in 2011. The investments, totalling about 12 billion rubles (€ 360 million) will raise newsprint production to 950,000 t/a.

The project will include the installation of a new TMP line and a new paper machine. TMP 3 will have a design capacity of 365,000 t/a and will produce high-quality mechanical pulp from hardwood (aspen and birch).

According to Baranov, the key decisions for these investments will be made after the concept has been finalized, probably at the beginning of 2008.

►► find out more at www.fiberspectrum.andritz.com



Tuning up for higher profits

Even modern and well-managed mills can benefit from a little tuning and optimization. Combining a new software tool called OPP with knowledge of the mill processes, the instrumentation and control experts from Sindus Andritz are helping Veracel push more production through the bleaching line without making any changes to the process equipment. The payback is measured in days, not years.



▲ Ronaldo Aguilar, Fiberline Coordinator at Veracel. "We asked for production stabilization in the bleach plant and we got it with OPP. I'm very satisfied with the results so far."

Ronaldo Aguilar is, admittedly, not an expert in control theory. His expertise is in pulp production and leading a world-class production team.

So Aguilar, Fiberline Coordinator at Veracel Celulose's 900,000+ t/a pulp mill in Brazil, has little interest in the inner workings of the Optimization of Process Performance (OPP) software. He is, however, very interested in the results that OPP achieved for his bleaching line – in just one week.

"I don't need to know how it works, I just need to know that it *does* work!" exclaims Aguilar. "We're getting a two to three percent increase in our OEE now."

OEE, Aguilar explains, stands for Overall Equipment Efficiency, which impacts the quality, performance, and cost of production.

A 2-3% production increase in OEE may not seem like much until you consider the production capacity of the Veracel mill. On its best day, the mill produced a record of nearly 3800 admtd. The OPP service helped Veracel establish a new quality record in October, producing 99.94% prime pulp. The economics of OPP, according to Aguilar, are quite favorable.

"We are optimizing each area in terms of reducing costs and stabilizing

production," Aguilar says. With all the production systems at Veracel operating near full capacity to keep up with market demand, the bleaching line was chosen as the first target for OPP because it is currently the "bottleneck" (if running above design capacity can be called a bottleneck).

OPP Service

OPP is a new service offered by Sindus Andritz (see side story on page 23) to its pulp and paper clients in Brazil. Sindus Andritz maintains all the instrumentation and control systems at Veracel and 11 other Brazilian mills. Five mills have OPP systems installed.

Daniel Schuck, Automation Consultant for Sindus Andritz, is one of the main developers of OPP and is the product champion within the company. It took about two years of internal development before the service was ready for use, Schuck says.

"OPP is a combination of special software and our in-house knowledge about instrumentation and control systems, plus our knowledge of our client's process," Schuck says. "Our OPP service reduces process variability by analyzing control loops and strategies. Production is stabilized, costs are reduced, and maintenance is improved."

OPP software collects information from distributed control systems and programmable logic controllers about each control loop in the process. It uses a standard language for automation data interchange (OLE for Process Control).

"A modern mill has thousands of control loops," Schuck says. "We included sophisticated statistical tools into OPP

that give us an overview of all the loops that are not performing well. On its own, the OPP software would be of little value to our clients. It's when we combine it with our knowledge of the process that we achieve results."

What does it do?

To understand what OPP does, it first helps to know a little bit about controllers, loops, and tuning. Fortunately, Schuck can explain these terms in such a way that is understandable to non-technical listeners.

"A control loop," Schuck explains, "consists of the process, a measurement, a controller, and an actuator (valve or other device). The sensor measures a process variable (like temperature, pressure, level, or flow) and sends this measurement to the controller.

"The controller is designed to eliminate the need for continuous operator attention. The thermostat in your house is a common example. You set a comfortable temperature (the setpoint) and the thermostat automatically controls the heating system to hold the temperature at the desired level."

Very different controller behaviors can be considered "good" depending upon the process. "One process may be

best operated with a fast and aggressive control action," Schuck says, "while another may be better suited for a slow and gentle response."

In your home, it would not be a life-threatening event if the thermostat overshoot or undershot the temperature by a degree or two. But in a mill, there are many areas where the control must be very precise for safety, quality, or environmental reasons. This is where "tuning" comes in.

Schuck explains, "The control response of each controller can be programmed to tell it how far to move the actuator (gain), how fast (time constant), and how much delay to allow between actions (dead time)."

The "traditional" way of tuning loops is by trial and error. An engineer or technician enters a new setpoint and observes the process response to the change. This requires a skilled intuitive understanding, and only experienced people are able to achieve good setpoint response this way.

OPP software automatically identifies process gain and dead time and gives recommended tuning. "Then we have the potential for getting closer to what the process is actually capable of," Schuck says. "However, we at Sindus Andritz never take a tuning



▲ Based upon the input from the OPP system, it was determined that the bad control loop was due to a faulty valve positioner. Here Nelson Vaverro of Sindus Andritz performs a test on the instrument to confirm the problem.



▲ Marcelo Verlings, Automation Technician for Sindus Andritz working at the Veracel mill, uses OPP to identify a control loop that is not performing.



◀ Sindus Andritz is working with Veracel to optimize the automated control of each process area. The first target was the bleach plant – where production was increased by 2-3%.



▲ Linked over the Internet to Veracel's OPP system 2500 km away, Daniel Schuck, Automation Consultant with Sindus Andritz, confers with Marcelo Verlings at the mill about the next steps to take in tuning a bad control loop.

action remotely ourselves. The mill operators must be involved and take the action as they are the owners of the process."

Ultimately, the best control is based upon knowledge and experience. "Things we take into account include what the process is physically able to achieve, how this fits into the bigger safety and profitability picture, the impact on downstream processes, and what management has planned," Schuck says. "OPP has tools built-in to help with this where we, together with the mill, rate the importance of each loop in terms of its contribution to safety and economics."

Side-by-side

In Veracel's case, Schuck used the OPP software to analyze about 150 control loops in the bleach plant in one week.

Fiberline team operators at Veracel were involved every step of the way. "When Sindus Andritz identified the problem loops, we had team meetings with our operators to get their input and to involve them in finding the correct solutions," Aguilar explains.

"To get optimal control, all the components must work together properly," Schuck says. "For the problem loops, we had to verify that each component – control device, sensor, actuator, controller, and software – was operating properly and that the design was ap-

propriate. We worked side-by-side with the operators to do this."

According to Aguilar, "For some loops, it was a simple fix like repairing a sticking valve or replacing a bad transmitter. Others required analyzing the loop's overall objective. For example, we found that one controller was cycling a valve 100 times per hour. By slowing the loop to reduce noise as well as interaction with other control loops we were able to achieve smoother, more coordinated production."

With the help of OPP, Schuck and his team from Sindus Andritz identified 12 valves with problems, 32 control loops that required tuning, and eight loops that needed a different control strategy.

Schuck explains, "One problem that Veracel was having was unstable high pressure in the feed to the DD washers, which triggered interlocks that shut down the system. After analyzing the loops with OPP, we felt that the location of the measurement points and the programmed action of the controllers was contributing to the problem. We discussed this with Veracel and with the Andritz equipment experts and reconfigured the control logic. Things improved dramatically."

According to Aguilar, the next targets for OPP are oxygen delignification and the screening areas. "We hope to make similar improvements in each area as we move down the line," he says.

Veracel Celulose

Much to be gained

There is much to be gained by optimizing control loops. It has been estimated that 80% of process control loops are causing more variability running in automatic mode than in manual. An often quoted study by EnTech showed that some 30% of all loops oscillate because of poor controller tuning.

With a poorly tuned loop, an upset in the process results in waste – causing off-spec production or over-consuming expensive raw materials.

The OPP service also provides data to Veracel about how tuning changes with time. That's important, Schuck stresses, because "one of the most critical things we do is to stay apprised of the variability in process conditions. This is not a one-shot deal, but an ongoing service we offer. I can have a one-screen view of overall equipment efficiency and, seconds later, drill down to the current tuning parameters of a specific control loop."

The OPP software also includes online tools for alarms, motors, valves, and analyzer management. An interesting offline tool, according to Schuck, is the ability to simulate electrical maneuvers. "This is a very useful tool for safety, training, and documentation of the mill's electrical systems."

As an added bonus, OPP can be accessed remotely. Schuck demonstrates this capability from his desktop in Sindus Andritz's Porto Alegre office (2500 km from the Veracel mill). A few keystrokes to establish a secure connection and he is viewing real-time status information from the mill's DCS. Two more mouse clicks and he has a summary of the loops that are in need of attention. One more click and he has the tuning data on a troubled loop. Within seconds, he is on the phone to a technician in the mill's control room, and the optimization continues...

►► find out more at www.fiberspectrum.andritz.com



▲ A technician assembles an analyzer in the Sindus Andritz workshop. Sindus Andritz manufactures all kinds of devices for gas analysis, integrating the total system (sensor, sample handling, and system electronics).



▲ Luis Binotto, President of Sindus Andritz.

Sindus Andritz

In June 2007, Andritz acquired a 50% stake in Sindus Human Technology, a company specializing in maintenance services for pulp, paper, and other industries in Brazil. "We see many ways to cooperate and there are many synergies," says Luis Binotto, President of Sindus Andritz.

An electronics engineer and chemical technician by training, Binotto was working at a corrosion laboratory near his home in Porto Alegre (in the southernmost state of Brazil). It was 1987 when he, four other engineers, and a brother-in-law with an administrative background ventured out on their own and formed Sindus Human Technology.

"Our initial business was the maintenance of complex laboratory equipment such as chromatographs, spectrometers, etc.," Binotto explains. "Later, we developed microprocessor-based systems for controlling the lab equipment."

In 1989, Sindus was asked by a customer to develop a gas analyzer for environmental monitoring – the TRS analyzer. Today, it is the only manufacturer of TRS analyzers in Brazil and has around 100 units operating. Sindus saw an opportunity and moved into maintenance outsourcing of instrumentation and control

systems in 1992. Outsourced maintenance, Binotto explains, is different than maintenance contracting or providing technical assistance. "When a customer outsources their maintenance to you, they are relying on you to manage the maintenance, not just provide manpower," he says. "They ask us to recruit and train the specialists, schedule the work, and perform it. Sometimes they turn their staff over to us and their people become Sindus employees."

"This is one of our key advantages of interest to Andritz," Binotto says. "We are in the mills all the time doing maintenance and we are always on-call for emergency repairs. Our customers know us and trust us – and we know their needs and priorities very well."

Sindus Andritz today has about 650 employees. 15 key site managers are located close to customers all around Brazil. The company has 12 major contracts in force and works with all the leading pulp and paper producers. In general, pulp and paper accounts for about 80% of Sindus Andritz's annual revenue. The rest comes from other process industries such as steel, chemicals, and mining.



Gaining a foothold in a growing market

Entering the Chinese market in the height of the Asian monetary crisis may not seem like the best strategy, but Andritz took the bold step to show its commitment to a market, believing it would recover and develop in a dynamic way. From a small joint venture presence to gain a foothold in 1997, Andritz has grown to offer manufacturing and support for almost its entire product portfolio and is expanding its coverage into Southeast Asia.



▲ Gottfried Schmölzer, President of Andritz Technologies Ltd. in Foshan, China

“Manufacturing follows the market,” says Gottfried Schmölzer, President of Andritz Technologies Ltd. “The reason we established a presence here as early as we did was to support the forecasted growth of the Chinese market.”

Schmölzer is speaking from his office in Andritz Technologies Ltd., located in Foshan (Guangdong Province in South China). He has been a part of Andritz’s strategic move into China from its very beginning – offering his manufacturing expertise and management skills to the first fledgling joint venture and now overseeing all Andritz organizations with over 900 employees in China.

“My nature is to look forward every day, so it is not often that I take time to look

back,” Schmölzer says. “But when I do, I’m amazed and excited about what this team of Chinese employees, with the support of several Andritz locations worldwide, has been able to accomplish.”

Schmölzer sees Andritz’s entry into China as a natural progression of how the company has approached each of its “new frontiers” – from its start at a single site in Austria in 1852, to the expansion in Europe, then to North America, then to Asia and South America. “It is very fundamental to our survival and growth,” he says. “We go where our customers are and we make the investments to support them.”

Not to imply that everything was simple and easy. Schmölzer and his colleagues have certainly “paid their dues” along the way.

To start: a joint venture for pumps

Andritz’s first steps into China were in the traditional “export” mode. This involved sending missionary sales people into the market and fulfilling orders with products designed and shipped from Europe.

“We knew it would be difficult to sustain this approach in such an expansive country,” Schmölzer says. “In our way of thinking, to gain market share we had to be close to our customers, we had to be fast to adapt to the developing market, and we had to be competitive against the upcoming Chinese companies as well as the traditional competitors. We had to become a high quality local source for our customers.”

In order to test the waters, Andritz selected a small product (stock pumps)

and a good partner. Founded in 1954, Kenflo Pumps is a leading supplier of liquid ring vacuum pumps and water pumps in China. It invested capital in the joint venture, and rented some building and office space to the joint venture – Andritz-Kenflo Foshan Pump Co., Ltd. Andritz invested 60% of the capital and began the transfer of technology required to manufacture stock pumps in China. The year was 1997, just as the economies of Thailand, South Korea, and Indonesia were collapsing in what came to be known as the IMF crisis.

“It was not glamorous,” Schmölzer recalls. “We were in an empty rented building and first had to buy some machine tools. We had to fight for orders against several local heroes and the traditional high-end suppliers from abroad. Initially, customers in China were skeptical that we could manufacture high-quality products in China. It wasn’t easy, but we didn’t expect it to be.”

The Andritz-Kenflo team focused on the basics: recruit good people, give them clear instructions and goals, use suitable manufacturing tools and techniques, and aggressively control quality. The strategy was to “start small, grow fast” according to Schmölzer. The first orders were received and the first pumps rolled out.

Customer acceptance

In its first year of operation, Andritz-Kenflo sold 135 pumps. Fortunately, the quality and performance of the pumps were clearly superior. From this humble beginning, the company has dramatically increased sales every year. In 2006, 2700 pumps were sold, bringing the total installed base in



▲ Andritz-Kenflo has grown to be the leading producer of stock pumps in China. To date, over 17,000 units have been sold to Chinese customers.

China to 17,000. All of the large Chinese paper manufacturing groups purchase from Andritz-Kenflo. The largest customer group is Dongguan Nine Dragons who operate over 2200 pumps in their high-end packaging paper production lines. Most of the local competitors have been forced to retreat.

With this foundation, Andritz China has been able to expand to the point that about 20% of the total number of pumps produced are exported to other countries in Southeast Asia and India. “We are rapidly gaining acceptance in new geographic markets, which will help us continue to grow,” Schmölzer says.

Almost all of the employees who started their employment with the establishment of Andritz-Kenflo in 1997 are still with the company. Loyalty to the company is high and the attrition rate is below 2%. “The Chinese people know that the company’s success and their personal success are interconnected,” Schmölzer says.

An umbrella to cover products and customers

Andritz reasoned that if “start small, grow fast” could work for stock pumps, the same approach could work for other products as well. The excellent market share of Andritz-Kenflo pumps opened the lines of communications into about 250 major and important mills in China that Schmölzer defines as “accessible”.

Using the joint venture as a springboard, other Divisions within Andritz began to renew their interest in doing

business with China. Andritz decided to begin producing more of its products in China and in 2002 formed Andritz Technologies Ltd., a wholly-owned subsidiary only 20 minutes from the existing Andritz-Kenflo plant.

Initially, Andritz Technologies concentrated on producing equipment for the Environmental Business (separation technologies such as belt filter presses and centrifuges). Gradually, the other business areas and Divisions in the Pulp & Paper Business Area began the technology transfer process to support their products in China.

“Today, we manufacture a wide range of Andritz products for the Chinese market and also some for export,” Schmölzer says. This includes centrifuges and filter presses for industrial and municipal water treatment; screens, agitators, and stock prep equipment; vertical pumps and water turbine core components; components for board machines; and conveying systems for automated baling lines. A new production line for screen baskets was started in 2007. Capabilities were added to provide re-chroming of used baskets, a popular service for customers in China.

All of the functions from design engineering, to sales, to procurement, to manufacturing, to assembly are handled in-house by Andritz Technologies’ staff of 360 salaried and 290 hourly personnel.

“We pay close attention to the recruiting and development process,” says Schmölzer. “All of our salaried people speak English and 73% have university degrees. Almost all of the hourly



▲ A view of the Andritz Technologies Ltd. offices and plant near Foshan in South China.

▼ Andritz now has about 900 employees in China. Chinese personnel are active in design, engineering, sales, procurement, manufacturing, automation, and service for this dynamic market.



Andritz in China



▲ Final inspection of a fan pump rotor. The same stringent quality control systems are in place in all of Andritz's facilities worldwide.

▼ Andritz recently added the capability to manufacture high-tech screen baskets and re-chrome existing baskets in Foshan.



people have vocational training. I know the Chinese people to be very conscientious and go-getters. We explain clearly what we want to accomplish, and they figure out and work hard in order to accomplish it."

The latest: a new foundry

In August 2007, a new state-of-the-art stainless steel foundry was inaugurated in Foshan after 11 months of construction work. This joint project of Andritz and a Swiss foundry specialist provides Andritz with its own reliable supply for stainless steel castings in China.

Andritz started to look for an experienced partner to establish its own foundry in the Chinese market. "The global demand for castings from China has been increasing each year," Schmöölzer says. "We wanted more control of the production process from the very beginning and wanted to secure our needed volume of high-quality castings."

A Swiss company, Wolfensberger AG, turned out to be the perfect partner. Established in 1924, Wolfensberger is a family-owned business with two workshops near Zürich. In 1970, Wolfensberger purchased the license for a ceramic precision casting method, which it advanced and later registered under the brand name Exacast®.

As Markus Schmidhauser, Wolfensberger's Commercial Manager and part owner explains, "China was of interest to us, but we had never seriously contemplated going there single-handedly. So, when Andritz approached us about cooperation, we were very interested. Andritz's experience in China is a major advantage for us, and for Andritz to have its own foundry in China is a benefit for them."

Andritz has a 65% share and Wolfensberger holds 35%. Joachim Staab of Wolfensberger, who heads the new foundry, says that the foundry consists of three workshop bays, a warehouse, and an office building. "Future expansion has already been taken into account," Staab says. "The new foundry will also provide the basis for

developing new materials tailored to a customer's needs.

"All the foundry equipment, with the exception of the analysis instruments, was produced inside China. We gave preference to the renowned, internationally active firms with production sites in China. Cooperation with the Chinese suppliers was very good."

At present, Andritz-Wolfensberger Special Alloy Foundry Co. can make castings of up to six tons finished weight, according to Staab. "After our expansion, 12 ton pieces will be possible. In the final phase of expansion, we will be able to process 3000 tonnes of duplex steel and stainless steel per year into castings for pump casings, impellers, hydropower station components, and other stainless steel components for Andritz's worldwide requirements."

There can only be one Andritz quality

When asked if there has been any fallout from the recently publicized stories about the quality of children's toys manufactured in China, Schmöölzer has to smile.

"We don't make toys here," he explains. "This is an industrial manufacturing facility established with the same tools, procedures, and QA/QC programs that we use in Europe or North America. The problems that the toy companies encountered is because they were contracting out the production to the low bidding supplier and did not check the quality of the incoming goods sufficiently. We don't contract out the core components of our equipment and quality control is a stringently controlled core process in our company."

"There can only be one level of quality within Andritz for each product. We are a global supplier serving global customers. The equipment we make here must be on par with the same equipment produced in other Andritz locations. All of our in-house systems are set up to support this."

►► find out more at www.fiberspectrum.andritz.com



1500 kg of liquid stainless steel is being poured into a casting ladle at the new foundry operation – a joint venture between Andritz and Wolfensberger of Switzerland.

New Orders

► Complete Lines

Wood Processing

Complete Lines & Systems

Confidential customer Russia

Complete high capacity debarking plant with two lines

Biggest HHQ-chippers in the world

Duratex

Agudos, Brazil

Woodyard for MDF plant

Key Equipment

Asia Pulp & Paper

Kalimantan, Indonesia

HHQ-chipper

Chuetsu Pulp & Paper

Nomachi, Japan

Help discharger

Svetogorsk

Svetogorsk, Russia

Chip screen

Satipel Industrial

Uberaba, Brazil

Chip screen and rechipper

Tableros Talsa

Utisa, Spain

3 PowerScrews

Upgrades & Modernizations

Mondi Packaging Stambolijski

Stambolijski, Bulgaria

Modernization of debarking line

Fiberline

Complete Lines & Systems

Poyry Empreendimentos Industriais Tres Lagoas, Brazil

Cooking, washing, oxygen delignification, screening, bleaching

World's biggest single line fiberline

Visy Pulp & Paper

Tumut, Australia

Digester upgrade, new refining and washing

First two-pump TurboFeed® chip feeding system

Recovery

Complete Lines & Systems

Visy Pulp & Paper

Tumut, Australia

Recovery boiler, MVR pre-evaporator

Grupo Empresarial Ence

Huelva, Spain

Power boiler

Upgrades & Modernizations

Zellstoff Pöls

Pöls, Austria

Evaporation plant upgrade

Chemical Systems

Complete Lines & Systems

Visy Pulp & Paper

Tumut, Australia

Lime kiln

West Coast Paper Mills

Dandeli, India

Recausticizing plant

Poyry Empreendimentos Industriais

Tres Lagoas, Brazil

Complete white liquor plant

EPC delivery (without civil construction)

Altri (Celbi Mill)

Figueira da Foz, Portugal

LMD lime kiln plant

EPC delivery incl. two-stage lime mud filter and LMD burner

Upgrades & Modernizations

Munksjö Paper

Aspabruk, Sweden

Lime kiln upgrade

Visy Pulp & Paper

Tumut, Australia

Recausticizing upgrade

Pulp Drying & Finishing

Complete Lines & Systems

Poyry Empreendimentos Industriais

Tres Lagoas, Brazil

Pulp drying plant 9.3 m working width

Key Equipment

Altri (Celbi Mill)

Figueira da Foz, Portugal

Cutter Layboy and baling line, screens

Upgrades & Modernizations

Altri (Celbi Mill)

Figueira da Foz, Portugal

Upgrade of pulp drying plant and Fläkt dryer, (4.9 m working width)

Celulosas De Asturias

Navia (Asturias), Spain

Upgrade of pulp drying plant (4.0 m working width)

Rottneros Bruk

Rottneros, Sweden

Upgrade of flash dryer

Mechanical Pulping

Complete Lines & Systems

Norske Skog Pisa

Jaguariaiva, Brazil

RT-RTS TMP line

Repeat order

PF Louisenthal

Confidential end user

Bleaching plant for cotton combers-based pulp

Repeat order

Confidential Customer

USA

Bio-Fuel pretreatment system

Upgrades & Modernizations

Shandong Sun Paper Industry

Yanzhou, Shandong, China

Andritz DCS system

► Key Equipment

Key Equipment

Visy Pulp & Paper

Tumut, Australia

Screw presses and refiners for kraft pulp

Panelboard

Complete Lines & Systems

Turanlar Group

Samsun, Turkey

Pressurized refining system for MDF with 600 t/d capacity

Liaoning Taian Weiliban Woodworking Industry

Anshan, Liaoning, China

Pressurized refining system for MDF with 600 t/d capacity

3rd order from Guandong Weihua Group

Abinsk MDF

Abinsk, Russia

Pressurized refining system for MDF with 348 t/d capacity

Duratex

Agudos, Brazil

Fiber preparation system for MDF, incl. a woodyard, a chip washing system, and a pressurized refining system with 1584 t/d capacity

World's largest MDF single-stage pressurized refining system.

3rd order from Duratex

Siam Fiberboard

Hat Yai, Thailand

Pressurized refining system for MDF with 720 t/d capacity

3rd installation at same site, 5th order from the whole group

Satipel Industrial

Uberaba, Brazil

Pressurized refining system for MDF with 768 t/d capacity

Industria de Compensados Maseal

Campo Grande, Brazil

Pressurized refining system for MDF with 384 t/d capacity

► Upgrades and Modernizations

Fiber Preparation

Complete Lines & Systems

Papeles y Cartones

Medellín, Antioquia, Colombia

Complete OCC line with 350 t/d capacity

Visy Pulp & Paper

Tumut, Australia

Complete OCC line with 600 t/d capacity, paper machine approach system with 1300 t/d capacity, bleached kraft pulp pulping and refining system

Hebei Yongxin Paper

Tangshan, Hebei, China

Complete stock preparation system for board machine

Anhui Shanying Paper

Ma AnShan, Anhui, China

Complete OCC line with 900 t/d capacity, paper machine approach system and white water system

Key Equipment

Georgia-Pacific

Green Bay, Wisconsin, USA

RotoWash, SpeedWasher, screens, cleaners, FibreFlow® drum pulper

Weidmann Transformerboard Systems

Rapperswil, Switzerland

Stock preparation components

Daehan Paper

Cheonwon, South Korea

Sludge handling system

Oji Paper

Tomioka, Japan

Andritz disc filter DF5718/16

First Andritz disc filter in Japan

Tissue Machines

Complete Lines & Systems

SCA Tissue NA

Florence, Alabama, USA

CrescentFormer tissue machine

2nd machine order for SCA (first supplied in 2004)

Paper & Board Machines

Complete Lines & Systems

Hebei Yongxin Paper

Tangshan, Hebei, China

Kraft liner / liner board machine

First delivery of a complete packing paper machine including full automation package (DCS, QCS, electrification)

Key Equipment

Confidential customer

Italy

3 PrimePress X modules

Paprik Kertas Tjiwi Kimia

Surabaya, Indonesia

Headbox for PM3

First headbox for printing and writing grades

Paper Finishing

Complete Lines & Systems

Altri (Celbi Mill)

Figueira da Foz, Portugal

PrimePress X shoe press

Confidential customer

Italy

PrimePress X Twin shoe press

Confidential customer

Italy

PrimePress X shoe press

F.N.M.T. (Fabrica Nacional de

Moneda y Timbre)

Burgos, Spain

PrimeCal ProSoft calendar

Confidential customer

USA

PrimeCal Soft calendar

Confidential customer

USA

PrimeCal Soft calendar

Celulosas De Asturias

Navia (Asturias), Spain

PrimePress X shoe press



Recent Start-ups

▶ Complete Lines

Confidential customer
China
PrimeCal Hard calender

Lee & Man Paper Manufacturing
Kwun Tong, Hong Kong, China
PrimeCal Hard calender

Ventilation and Drying for Tissue and Paper/Board Machines

Key Equipment

Asia Pulp & Paper
Perawang, Indonesia
12 EquiDry hoods
First hoods with new modular design

Asia Pulp & Paper
Hainan, Hainan, China
6 EquiDry hoods
First hoods with new modular design

Recent Start-ups

Wood Processing

Complete Lines & Systems

Botnia
Fray Bentos, Uruguay
Woodyard, 2 debarking/chipping lines and chip storage with stacker-reclaimers
Part of complete mill delivery

Stora Enso Fine Paper
Varkaus, Finland
Two-line debarking and chipping, chip screening with JetScreen

Natron-Hayat
Maglaj, Bosnia and Herzegovina
Debarking and chipping line

Suzano Papel e Celulose
Mucuri, Brazil
3 chipping lines and circular stacker-reclaimer-type chip storage
EPC project

Upgrades & Modernizations

Aracruz Celulose
Barra do Riacho, Brazil
New chipping line

Fiberline

Complete Lines & Systems

Botnia
Fray Bentos, Uruguay
Cooking, washing, oxygen delignification, screening, bleaching
Part of complete mill delivery, high-quality, high-brightness fiberline for eucalyptus pulp

Marusumi Paper
Ohe, Japan
Cooking, brownstock washing, oxygen delignification, screening, bleaching

Upgrades & Modernizations

Mitsubishi Paper Mills
Hachinohe, Japan
Digester upgrade, TurboFeed® chip feeding system, DD washer for brownstock washing

Metsä-Botnia
Rauma, Finland
Screening and bleaching system

UPM Kymmene
Kuusanniemi, Finland
Diamondback® chip bin and TurboFeed® chip feeding system

UPM Kymmene
Tervasaari, Finland
Systems for screening, brownstock washing, oxygen delignification and bleaching

Recovery

Complete Lines & Systems

Botnia
Fray Bentos, Uruguay
Recovery boiler, 7-effect evaporation plant
Part of complete mill delivery

Klabin
Monte Alegre, Brazil
MVR CTMP-effluent evaporator

SCA Packaging
Obbola, Sweden
Recovery boiler
High Energy Recovery Boiler (HERB)

JSC Kotlas
Koryazhma, Arkhangelsk region, Russia
6-effect evaporation plant
First Andritz complete evaporation plant to Russia

Marusumi Paper
Ohe, Japan
6-effect evaporation plant
First Andritz complete evaporation plant to Japan

Key Equipment

SCA Packaging
Obbola, Japan
MeOH liquefaction plant

Upgrades & Modernizations

Papelera Guipuzcoana de Zicunaga
Hernani, Spain
Evaporation plant conversion to 6-effects

Nanning Pulp & Paper
Nanning, Guangxi, China
Concentrator and 5th-effect

Georgia Pacific
Palatka, Florida, USA
Recovery boiler retrofit

Smurfit Kappa
Nettingsdorf, Austria
Evaporation plant retrofit

Chemical Systems

Complete Lines & Systems

Botnia
Fray Bentos, Uruguay
Complete white liquor plant
Part of complete mill delivery

Marusumi Paper
Ohe, Japan
Complete white liquor plant

▶ Upgrades and Modernizations

Ripasa Celulose e Papel
Limeira, Brazil
LMD+
New LMD system

Pulp Drying & Finishing

Complete Lines & Systems

Botnia
Fray Bentos, Uruguay
Drying line (2 x 5.3 m working width)
Part of complete mill delivery, double line

PT. Riau Andalan
Pekanbaru, Riau-Riau, Indonesia
Pulp drying plant (6.7 m working width)

Upgrades & Modernizations

Aracruz Celulose
Aracruz, Barra do Riacho, Brazil
Upgrade Fiberline C

Rottneros Bruk
Rottneros, Sweden
Upgrade of Flash Dryer

Vallviks Bruk
Vallvik, Sweden
Upgrade of Flash Dryer

Mechanical Pulping

Complete Lines & Systems

Klabin
Telemaco Borba, Brazil
CTMP – 432 admt/d *eucalyptus grandis*
CTMP for liquid packaging board

JSC Solikamskumprom
Solikamsk, Perm region, Russia
GWD – reject refining 250 admt/d

Xinxiang Xinya Paper Group
Xinxiang, Henan Province, China
P-RC APMP refining system for 330 admt/d
3rd APMP Line in Henan Province

Upgrades & Modernizations

Holmen Paper
Hallstavik, Sweden
TMP refining system – 1100 admt/d spruce

Panelboard

Complete Lines & Systems

Fiberboard
Baruth, Germany
Fiber preparation system for MDF, incl. a chip washing system and a pressurized refining system

Yangdong Luyuan Wood Based Panelboard
Beiguan Yangdong, Guangdong, China
Fiber preparation system for MDF, incl. a woodyard, a chip washing system and a pressurized refining system with a capacity of 600 t/d
5th order from customer within 5 years

Kronospan Mofa
Mohacs, Hungary
Pressurized refining system with a capacity of 576 t/d

Fiber Preparation

Complete Lines & Systems

Anhui Shanying Paper
Ma AnShan City, Anhui, China
Complete deinking line for newsprint with 600 t/d capacity

Ahlstrom LabelPack
Pont Eveque, France
Paper machine approach systems

Yanzhou He Li Paper Industry
Jining, Shandong, China
Stock preparation lines for NBKP, LBKP and BCTMP

Tissue Machines

Complete Lines & Systems

Shandong Hengan Paper
Weifang City, Shandong, China
CrescentFormer tissue machine
Fast ramp-up: after 9 weeks machine is operating close to design speed

Procter & Gamble
Green Bay, Wisconsin, USA
Tissue machine

▶ Key Equipment

Upgrades & Modernizations

SCA Tissue
Menasha, Wisconsin, USA
Wet end rebuild to CrescentFormer
Final acceptance signed 6 months after start-up

Paper & Board Machines

Upgrades & Modernizations

Natron Hayat
Maglaj, Bosnia Herzegovina
Rebuild of sack kraft machine
Successful start up after a 15-year production stop

Paper Finishing

Complete Lines & Systems

Ningxia Meili Paper
Zhongwei, Ningxia, China
PrimeCal Hard, PrimeCal Soft calenders

Lee & Man Paper
Dongguan, Guangdong, China
PrimeCal Hard calender

Cartiere Burgo
Mantova, Italy
PrimeCal Soft calender, PrimeFeeder
First Andritz Küsters feeder on the global market, perfect start-up

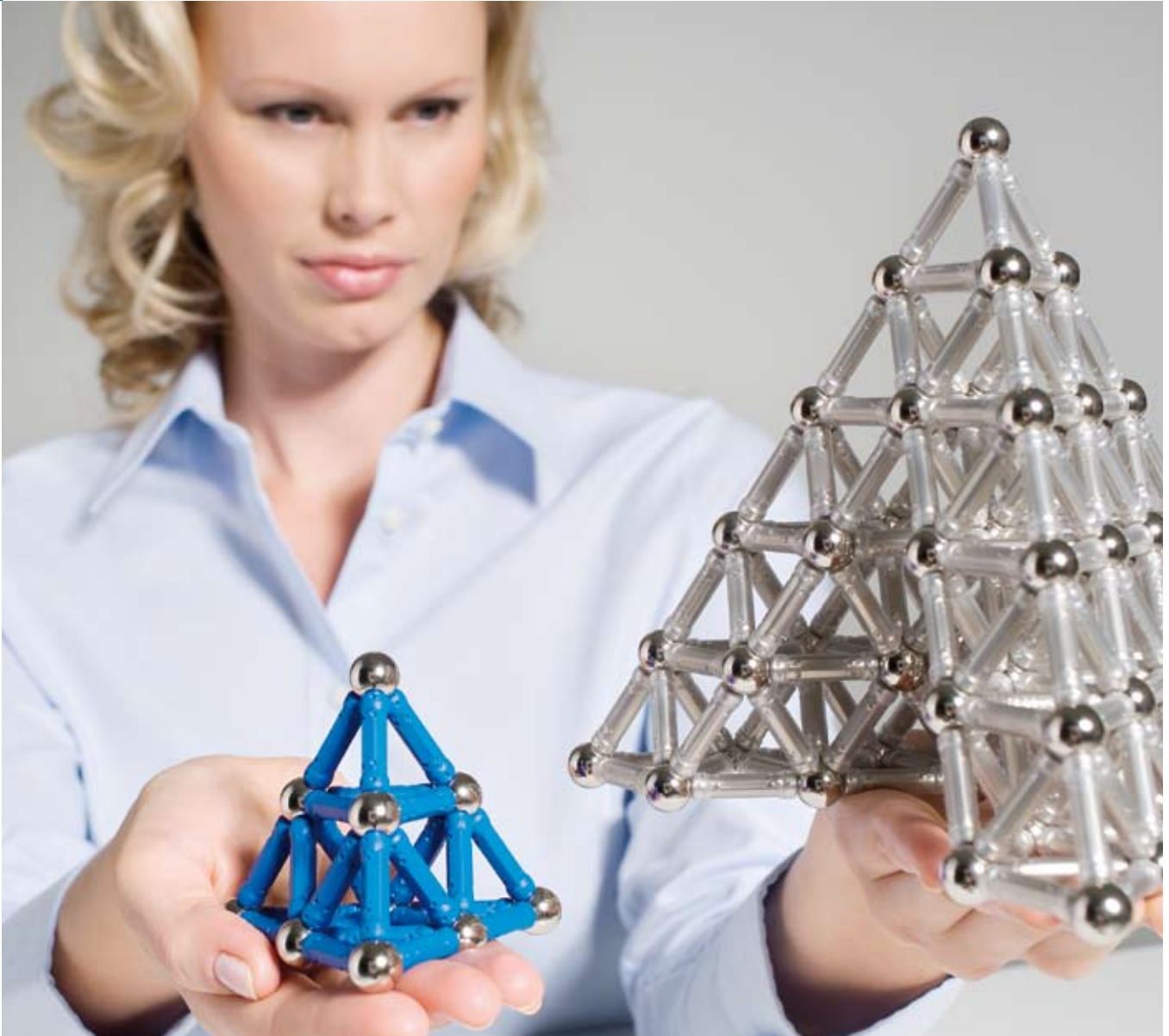
Key Equipment

Naini Papers Limited
Kashipur, India
PrimeRoll S with hydraulic unit

Upgrades & Modernizations

Stora Enso Hylte
Hyltebruk, Sweden
Rebuild of PrimeRoll HV Smart, upgrade of PrimeRoll S top and bottom position, 3-roll calender stack for counterflow principle

Starting with what's at hand



Upgrading your mill for higher performance can be a real challenge. It takes knowledge of the whole, as well as all the parts. Put the challenge to Andritz.

Every modernization project requires critical decisions about which equipment to keep, which to upgrade, and which to replace. With its millwide process expertise and equipment experience, Andritz will help you arrive at an integrated solution that meets your targets. Challenge Andritz to be your partner for higher performance and profitability.

We accept the challenge!

ANDRITZ