

FiberSpectrum

The magazine of Andritz Pulp & Paper

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Green HERB for Östrand starts up exactly on time – Page 4

ANDRITZ

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Conical refiner plate being welded at Andritz Pilão's factory in Brazil. (see story on page 14)

A message from Andritz P&P Management

It's interesting how our careers and our lives develop.

At the end of this year, I will leave the Managing Board and will also end my operational responsibility for the Pulp Mill Technologies business. Besides other business activities, I will remain associated with the company as a member of the Andritz Oy Supervisory Board.

When I started in 1974 as a young engineer for KONE (the elevator company), it didn't occur to me that I would spend most of my working life around the pulp and paper industry. All I knew was that I wanted to learn about business and have international challenges with a growing company. And now, 32 years later, I can look back and see how my wishes materialized.

Within the first six months at KONE, I was already working in an international project. Twenty years and many experiences later, I was "acquired" when Andritz purchased the Wood Processing Division of KONE in 1994. We were challenged to expand the business by developing innovative technology. We met the challenge, grew the business, and became good Andritz citizens.

A big event for us was the acquisition of Ahlstrom Machinery. This was a major strategic move for Andritz and had its share of challenges. It gives me great satisfaction that we doubled our sales and profits over the last five years, and mills around the world now recognize Andritz as the leading company in chemical pulping – a business where the company only marginally existed at the end of the 1990's.

During this time, we built the highest capacity single pulping line, we've had the fastest start-up curve of a pulping line, we built the most energy-efficient recovery island, and we're the only supplier to receive an order for all the main packages of a pulp mill. We're also the first supplier to plan and execute all the maintenance activities of a new world-class mill.

This is a source of pride for all of us at Andritz, and gives our employees great motivation for the future.

And, what of the future?

Many trends are already visible: investments moving to the Southern hemisphere; the use of plantation wood; the growing importance of energy efficiency and biomass as a source of energy; the growth in China, India and Russia; the focus on core business and outsourcing of non-core activities such as maintenance; and the streamlining of investment concepts leading to single-lines, EPC contracts, and large packages from a single supplier.

In order to meet customer requirements and also lower the capital costs of new systems, we must develop breakthrough technology. We also must learn to operate a global value and logistics chain so that our products and services are produced in the location with the highest competitiveness. This challenge brings many new members and nationalities to our international organization, and creates new learning requirements for all of us. And also new opportunities with new customers.

Andritz has dynamically transformed itself into a company that anticipates and meets these changing requirements. It has been a real success story in this industry. I am grateful to have been selected to participate in – and at times lead – this transformation. I also want to thank our customers for presenting us with the challenges and giving us an opportunity to earn their trust and, wish great success to my successors."

In the next issue of FiberSpectrum, you will hear from Bernhard Rebernik, who will be retiring from Andritz at the beginning of April 2007 after a long and distinguished career. Furthermore, we will also present the new members of the Andritz Executive Board for Pulp and Paper, Karl Hornhofer and Humbert Köfler, as well as the new head of Andritz Oy, Harry Rickman.

Bernhard and I – and all the members of the Andritz team – wish you and your families a wonderful holiday and happy New Year.



Markku Hänninen
Member of Executive Board
Head of Pulp Mill Technologies
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Certified green energy at Östrand

“It starts as a small stack of papers with some basic calculations – capacity, steam values, and such things. Two years later, it stands before you 18 stories high, and you were a part of making it come to life. I’m proud of what we have done here and I am very happy for SCA.”

Pirkko Paasolainen, Andritz Project Manager, commenting on the advanced recovery boiler at SCA’s Östrand pulp mill.



“We just have to take our hats off to Andritz and say we are very happy.”

Kenneth Eriksson, President and Group Executive Officer of SCA’s Forest Products business

After two years of work and € 150 million investment, SCA’s new recovery boiler at Östrand, near Sundsvall in Sweden, fired its first black liquor on October 9, 2006. The High Energy Recovery Boiler (HERB) from Andritz will enable the mill to generate 500 Giga-watt hours of electrical energy per year while increasing its kraft pulp capacity from 395,000 to 420,000 t/a.

“When we signed the contract with Andritz in October 2004, we said that we wanted the liquor firing to be at 9-10-11 (ninth day of the tenth month at 11 o’clock),” says **Åke Westberg**, SCA’s Project Director. “The fact that we actually did this was quite remarkable.”

Westberg is sitting next to **Kenneth Eriksson**, President and Group Executive Officer of SCA’s Forest Products business. Eriksson can’t resist the opportunity to tease his long-time colleague.

“Actually,” Eriksson says sternly, “I was very disappointed. Åke missed the schedule by being 53 seconds late! I certainly hope he does better on the next project.”

“In all seriousness,” Eriksson continues, “The fact that this project went so well is evidence that we brought in the right people – Åke and his team from SCA and the good people from Andritz.”

Östrand Massafabrik

The Östrand mill, which opened in 1931, is part of SCA’s Forest Products business area (see SCA profile on page 6). With the nearby paper mill at Ortviken, it forms SCA Graphic Sundsvall. In addition to 420,000 t/a of bleached kraft pulp, the Östrand mill produces 80,000 t/a of CTMP. About half of the kraft pulp and part of its CTMP is consumed within SCA mills. The rest is sold on the market. “Östrand is a very important part of the value chain from the forest to our customers,” Eriksson says. “The recovery boiler project is part of our strategic investments to maintain the Östrand mill well into the future.”

Rebuild or replace

“Our plans for this mill required additional recovery boiler capacity,” says **Jan-Åke Olsson**, SCA Project Manager. “The recovery boiler, which was built in 1982, had become a bottleneck. To rebuild the boiler would have forced us into a very long shutdown. Even with a rebuild, the most capacity we could have gotten was 440,000 tonnes of pulp, and we would still have the old steam values, so we could not generate more energy.”

Energy is key

“The high electricity costs in Sweden helped to steer us toward the Andritz High Energy Recovery Boiler (HERB) technology,” Eriksson says. “The price of electricity has tripled within the last four years. There is no way our global customers would allow us to pass these price increases on to them.” The SCA team traveled the world to investigate the most energy-efficient technologies. “We were very interested in what we saw in Japan, because they have experienced high energy costs for years,” Eriksson says. “We were convinced that a boiler at Östrand could go higher in temperature and pressure than anything that has been attempted before.”

World-highest steam values

“Andritz has never supplied a recovery boiler with these steam values before,” Westberg says. “We were confident that the Andritz design would produce a lot of high pressure steam, allowing us to generate more electricity, and would be expandable in the future.”

The boiler’s design is tied to pulp capacity. Although the design capacity of the boiler is 3300 tds/d at 515° C



Åke Westberg (left), SCA’s Project Director, Christian Gustafsson (center), Andritz Project Director, and Jan-Åke Olsson, Project Manager at SCA.

and 105 bar, it is currently operating at 2500 tds/d. If permitted to expand in the future, SCA can expand the Andritz boiler to process 4400 tds/d at the same temperature and pressure. And, it will expand in a unique and elegant way – sideways.

Sideways logic

“Andritz’s technical solutions for internal heat recovery were very compelling, but what really appealed to us was the way they solved the boiler expansion challenge,” Eriksson says. Andritz proposed to expand the boiler in the future by moving the sidewall – instead

of the conventional approach of moving the front wall.

Jan Storbacka, Andritz Sales Manager, explains. “By moving the side wall, the proportions of the recovery boiler do not change,” he says. “There is an optimum distance between the bullnose and the front wall to get the correct flow of gases through the superheaters and generating bank. If you move the front wall, you destroy this proportion. However, if you move the sidewall, the proportion remains optimum. All we have to do is add some heating surfaces for the expansion, but we keep the optimum flow of the flue gases.”

Svenska Cellulosa Aktiebolaget

SCA is a global company that develops, produces, and markets personal care products, tissue, packaging, publication papers, and solid-wood products. It produces products in 40 countries and markets in some 90 countries. Total sales are about SEK 96.3 billion (€ 10.4 billion).

More than half of SCA's sales are consumer products within personal care, tissue, and packaging solutions where the end-users are individuals and households. Industrial companies, the retail trade, and media are the major customers for SCA's transport packaging and publication papers. SCA's own timber resources are a key part of the company's raw material flow.

SCA's Forest Products business, of which the Östrand mill is a part, produces pulp, publication papers, and solid-wood products. This business area has one pulp mill and three paper mills (partial ownership of the Aylesford, UK mill) with a total capacity of 1.8 million tonnes of paper. The business area has eight sawmills in Sweden with a capacity of 1.75 million cubic meters of sawn timber. The business area's forest holdings (2.0 million ha used for timber production) is FSC certified.

SCA is one of only a few companies in the world able to offer FSC-certified paper products based on totally chlorine-free pulp.

"It is a clearly superior and elegant solution compared to what has been done before," Eriksson says. "It's so logical. Why hasn't anyone suggested this before?"

Excellent project

Andritz's scope of supply included the boiler and building, instrumentation, odorous gas handling system, simulator, construction, commissioning, and start-up. According to **Christian Gustafsson**, Andritz Project Director, construction of the boiler house began in June 2005, continuing with construction of the boiler in October of that year. Tie-ins to the new boiler were completed in the summer of 2006. The boiler plant was mechanically completed and ready for commissioning at the end of August 2006.

"Start-up occurred exactly on time and went very smoothly," Gustafsson says. "Since then, the boiler operation, as well as the whole project, have progressed according to plan. The project execution teams have been great, both at SCA and our own. The spirit of cooperation with Åke, Jan-Åke, and the others has been excellent."

For operator training, SCA purchased the IDEAS simulator from Andritz. "We intend to use the simulator well into the future to certify our operators and provide training for new operators," Olsson says.

How would SCA rate the project in terms of schedule, budget, and safety? "Good, good, good!" summarizes Olsson. "The boiler was delivered exactly on time. The costs are all within line. And, we didn't have one serious accident throughout the entire project."



Pirikko Paasolainen (left), Andritz Project Manager, with Christian Gustafsson, Andritz Project Director. At right, Lauri Pakarinen from Andritz checks the operation of the primary ports.



"We have very good cooperation with Andritz," Westberg adds. "We have had the same goal, the same target. Andritz didn't do this project just to make money. It is evident that the Andritz people cared very much about building the best recovery boiler."

Marja Heinola, Andritz Sales Engineer who also worked on the Östrand project team, has a similar perspective. "We care about happy customers, but we also build these boilers for ourselves. We take a great deal of pride in what we do. We want to hand over to each customer the very best product that is possible."

Impressive technical solutions

"Once we began the technical discussions, we were very impressed with Andritz's solutions," Olsson says. In addition to steam, Östrand wanted to get as much hot water production as possible from the boiler. There are several unique features in this boiler to get the maximum energy from the black liquor biofuel. Boiler feedwater and air are preheated using heat recovered from the boiler and the steam turbine.

Black liquor is burned on two levels, while air is introduced on seven levels. The multi-stage air system (Vertical Air™ system) is designed to help lower

emissions. It also increases the load the boiler can handle. Östrand will also burn its weak (diluted) gases in the recovery boiler for the first time. The mill's main source of sulfur is these weak gases.

To help reduce the recausticizing load, Östrand is running trials with auto-causticizing in the new recovery boiler. This process uses sodium borate to react with sodium compounds in the furnace. Since the de-carbonating reactions take place in the recovery boiler instead of the lime kiln, this process provides increased causticizing and calcining capacities.

Another "first" is the automatic rodding system to keep the smelt spouts clean. The rodders were developed by a Swedish company. SCA selected the rodding system and Andritz added it to its construction scope.

Another interesting feature is the materials used in the superheaters and the furnace. Super austenitic stainless steel composites (Sandvik's Sanicro 28 and 38) are used due to their resistance to corrosion and cracking.

"We had a scrubber on the existing recovery boiler, but this was an expensive piece of equipment," Olsson of SCA says. "Andritz came up with the idea to add a dry flue gas cooler after the electrostatic precipitators.

Heat is recovered from the flue gas to warm water for the fiberline. This is a new thing, so there has been real-time development during the course of this project."

Early results

Before the Andritz boiler started up, Östrand was producing 242 GWh of electricity per year. The new boiler and turbine-generator will permit the mill to boost this to 468 GWh. Since the energy is being generated from biomass, SCA earns Green Certificates which brings additional economic credit to SCA for reducing CO₂ emissions.

Most of the power is used by the CTMP mill. "If you look at the kraft mill alone," Westberg says, "we can generate a surplus of power."

"Andritz has done a very, very good job and has had excellent project management," Eriksson says. "We are very happy with what they have achieved. There have been no social problems, even though they brought in people from other countries. But, they have managed that in a good way. We just have to take off our hats to them and say we are very happy."

Find out more at www.fiberspectrum.andritz.com

“Bold moves are required to close the gap.”

Vasily F. Preminin, Director General of Segezha Pulp and Paper Mill (SPPM), graduated from the Arkhangelsk Forestry Engineering Institute in 1974. Over the years, he participated in the commissioning of the Kotlas, Arkhangelsk, Kherson, Solikamsk, Segezha, Kondopoga, and Okulovka mills in the former Soviet Union. He became a Senior Researcher and, later, Head of the Research Department of the NIITsmash Institute. In 1998, he was appointed bankruptcy commissioner of SPPM and has been working since that time to return the company to profitability. This long experience gives him a unique perspective on the Russian pulp and paper industry. We recently had the opportunity to speak with him between sessions at the 11th annual Adam Smith Conference in Vienna.



“Our technology investments are resolving environmental issues faster than any laws can.”

We must replace our old technology with the most modern – our inefficient organizations with the most productive. Research is critical. For example, in Russia today, there are no research capabilities for coating applications.

Capital constraints

Financing used to be more of an issue for us. Today, we can find the financing, not only abroad, but also internally. Granted, the capital comes at a premium due to the perceived risks.

Wood constraints

Russia is the largest forest country in the world – housing 22% of the world’s forest. So, it seems strange that the biggest issue we face today is our wood supply. Our main problems are the lack of roads to get to the fiber and the huge bureaucracy that we face at the government levels.

The legislation governing our state-owned forests is confusing and complex. The government has combined the functions of forest management and logging, creating a real conflict of interest.

A pursuing industry

The Russian pulp and paper industry can be viewed as a “developing industry,” but in my mind this means a “pursuing industry.” We are lagging behind our foreign competitors in technology. There are approximately 150 mills in Russia, and I believe that it is safe to say that our industry is about 30 years behind the most modern mills. There are, of course, exceptions.

Two things are important – technology and organization. By organization, I mean the productivity of our people and the efficiency of our processes.

I do not want to portray the situation as hopeless. We can close this gap. But, small technological or organizational improvements are not enough for such competition. We must make bold moves, strategic moves.

No one will invite us to compete

Our customers do not buy our products out of pity. No competitor will invite us into their markets as a favor. We have to earn our way into each market with our quality, our brains, and our dependability.



Vasily Preminin spoke to FiberSpectrum during a break in the Adam Smith Conference. Ivo Valtchev of Andritz provided the translation. At right, Alpo Pursiainen, Managing Director for Andritz’s Russian operations, listens intently. Below, Preminin makes a point to interviewer Robert Puhr.

Compare our forests to Finland, a neighbor only 180 km from our mill. The efficiency of Finnish forests is four times higher than our local efficiency and 13 times higher than Russia’s average efficiency. Meanwhile, Finnish reforestation is more than twice ours: 3.5 cubic meters per hectare versus our 1.5 cubic meters.

The need to place forest management on a scientific rather than political basis has been a continuing struggle. I am encouraged about the new Forest Code being debated in the Duma. What we are hoping for is a forest policy that allows us to manage our forests with the most modern and productive practices for sustainability.

Technology

Today, about 10% of Russian mills are near bankruptcy. Yet, all have good chances to succeed if they can upgrade technology quickly enough.

The emphasis today is on modernizing rather than greenfield. This is as it should be. Yet, modernization can only be achieved when the government creates some measures to stimulate technology development and the support functions to promote our industry. In general, we do not have the cash to do this on our own.

Problems can easily arise, though, in mixing the old existing mills with new technologies. This is where suppliers like Andritz can be very helpful to us. We rely upon them to tell us where the potential problems are and how to

solve them when modernizing our old facilities.

Environment

I believe that our technology investments are resolving environmental issues faster than any laws can. For example, the economics of using crude oil are very poor for us. To reduce our dependency on crude, we are making investments that are also significantly reducing our sulfur dioxide emissions.

About 50% of our energy at SPPM is self-produced. If we want to be economical, we must use every part of the tree. Not only does bioenergy reduce the carbon dioxide load, it increases our efficiency and reduces our primary energy costs.

In our own case, the acquisition of Korsnas forced us to address such things as forestry certification and chain-of-custody issues. We have over one million hectares of forests that have been audited and are awaiting FSC certification.

The future

Twenty-six years ago we started a program in the Soviet Union to develop the pulp and paper industry. At that time, we built new mills. This was a big breakthrough for the industry and the country.

Since that time, most of these mills have been in decline, and some have died completely. I can now see the potential for things to turn around. The best times are in front of us, I believe.



“The best times are in front of us, I believe.”

Survive, invest, prosper

The 1990's proved difficult for virtually all pulp and paper producers. Pricing declined and companies wrestled with overcapacity situations. Imagine this global pressure coupled with the collapse of your country's government. This was the challenge facing Russian pulp and paper companies. Thrown into a free market economy with inefficient operations, most of these companies were immediately on the brink of bankruptcy. One dynamic company, Segezha Pulp & Paper, took bold moves to "catch up with the rest," and is today enjoying the benefits of its strategic investments.

After the collapse of the Soviet Union, Russian pulp and paper producers found themselves in deep trouble. In addition to the challenges associated with competing in a free market economy, their operations were extremely inefficient, thanks to the centralized bureaucracy of the former Soviet Union.

Most Russian mills were ill-prepared for these challenges. A large technology gap had grown over the years between Russian mills and their foreign competitors. The only way out was to privatize the mills. Some were purchased by foreign companies with money to invest. Others were bought by Russian companies with limited funds for modernization.

Viktor Fedorov, Chief Project Engineer at Segezha (left), with Valerii Zujev, Mechanical Supervisor (center), and Sergey Malkov, Development Manager for Cooking Technology at Andritz.

Bold moves at Segezha

One Russian-owned company foresaw what needed to be done and made bold investments in modern technology to be competitive. The owners and managers of Segezha Pulp and Paper Mill (SPPM) had the vision – and the courage – to pull the company out of bankruptcy and get financial support for an investment program that is unprecedented in the Russian pulp and paper industry's contemporary history.

"Everything we have earned since we eliminated the threat of the company's bankruptcy and began our economic recovery in 1998, has been channeled back into refurbishing this mill," says

Vasily Preminin, General Director of SPPM. "We are lagging behind our foreign competitors in technology, and to survive, we must catch up."

Slight improvements are not enough for such a race, according to Preminin. "We had to make bold moves. The first thing we did was create a corporate strategic development program with specific activities and timelines," Preminin says. "Sberbank (Savings Bank of the Russian Federation) approved our plans and expressed a willingness to finance our modernization program."

The modernization program had a large price tag – € 410 million – which represents the largest refurbishment investment in Russia's recent history. The financing agreement was signed in May 2003.

Segezha Mill

SPPM is situated in the middle of the Karelia region (northwest Russia) about 700 km from St. Petersburg. SPPM was constructed in 1939 and at that time was the largest pulp and paper mill in Europe.

The primary products from the Segezha mill are kraft paper and kraft paper sacks. Before its break-up, two-thirds of all paper sacks consumed in the USSR were produced at Segezha.



The Segezha Pulp and Paper Mill is located in Karelia, near the Finnish border. It is Russia's largest producer of kraft paper and industrial paper sacks. At left is Vasily Preminin, General Director of SPPM.



Today the mill is able to produce up to 400,000 t/a of kraft pulp, 350,000 t/a of sack paper, and more than 300 million paper sacks a year.

The mill has three paper machines operating, each having a design capacity of 110,000 t/a. The machines produce kraft paper in the 60-120 gsm range.

Softwood (pine) fiber comes to the mill in the form of logs from the nearby Karelian forests. The mill produces its products from virgin fiber, without the inclusion of recycled materials, which contributes to the strength of the paper sacks.

"A major problem for us is the low efficiency of our forest when compared, for example, to Finland," Preminin says. "In spite of a large growing stock, we can only make use of a small part of this wealth. Partially to blame are Karelia's wood harvesting rules. Another challenge is getting access to the fiber. There is not a sufficient road network to get to the fiber base."

Shortly after Segezha's investment program was authorized in 2003, the financing of specific projects began. One of the most significant investments to close the technology gap was a project which started in July 2003 to rebuild and modernize the chemical pulp Fiberline 4 with cooking, screening, and washing technology from Andritz.

During the modernization, capacity of the continuous digester was increased 50% (from 600 to 900 t/d). The mill purchased a Lo-Level® chip feeding system, a Downflow Lo-Solids® cooking upgrade, and a new screen room from Andritz. A two-stage Drum Displacer® washer replaced the mill's old washing system.

Delivery and installation

The first Andritz equipment began arriving at the mill in 2003. Large systems such as the Diamondback® chip bin and the DD washer were transported from Finland via ferryboat and truck. Seven special trailers delivered the components. The heaviest part, the DD washer drum, weighed 46 tonnes.

"A typical challenge with any rebuild is finding space to put the new equipment in the existing line," says **Viktor Fedorov**, SPPM's Chief Project Engineer. "The new Andritz equipment was to be installed in the same buildings as the existing equipment. That meant that we had to disassemble the old equipment from inside the buildings, prepare new foundations and baseplates, and then start the installation of the new equipment. It was not an easy task for us, but thanks to a well-organized effort and good cooperation with Andritz, all the equipment was installed on schedule by July 2004."

Segezha Pulp & Paper

The Segezha Pulp and Paper Mill (SPPM), Russia's largest producer of kraft paper and paper sacks, was founded in 1939 in Karelia (northwest Russia). Its name comes from an old Finnish word meaning "clean, bright." At the time, it was the largest mill in Europe. Up until the 1990's, two-thirds of all paper sacks consumed in the former USSR were produced in Segezha.

Paper produced at SPPM is exported to over 20 countries. Annual production is about 400,000 tonnes of pulp, 350,000 tonnes of paper/board, and 300 million industrial paper sacks per year. There are three operating paper machines.

In 2003, Sberbank of Russia, the Government of the Republic of Karelia, and SPPM signed an agreement to implement a € 410 million investment program for the mill's modernization and expansion.

In May 2006, SPPM acquired Korsnas Packaging, Europe's second largest manufacturer of industrial paper sacks. The transaction created the world's second largest paper sack producer (1.1 billion industrial paper sacks).



As part of the fiberline upgrade, SPPM replaced its old washing system with a two-stage DD Washer.

Andritz specialists from Finland supervised the movement and placement of the large units and the installation of the line. **Raine Huovila**, Andritz's Site Manager for the project, was impressed that, from the early stages of the project, "we developed a very warm and friendly relationship with the Segezha project team. We worked together very closely – sitting in the same meetings and working side-by-side on the site. This was a major factor in the successful delivery and installation."

A new "Lo-" for Russia

The Lo-Level® feed system (which simplifies the complexity and improves the performance of chip feeding to the continuous digester) and the Lo-Solids® cooking technology are modern technologies found in some of the world's most advanced chemical pulp mills. Segezha was the first installation of these technologies in Russia.

"Since this technology is new and represents a different way of running a digester, we had to make sure

the operators were well-prepared to understand and take advantage of the technology," says **Sergey Malkov**, Development Manager for Cooking Technology at Andritz. "In addition, they had to be trained to operate modern DCS systems. Many of the operators at Segezha have a Master of Science education level, while others have long experience that has taught them to feel the process with their soul. There is a good mix of youth and experience. It was fun to work with this diverse group. They were enthusiastic and professional from the very beginning."

Golden feed

Some operators call new Lo-Level® chip feed system with its Diamondback® bin a "golden chip feed." They are extremely happy with simplicity of operation, excellent pre-steaming of the chips, and the high reliability even during the severe Russian winter. The system has automatic control of chip levels and temperature profiles to maintain a flow of well-steamed chips to the digester.

Piping around the No. 4 digester was directed in such a way to optimize the flow of the chip column inside the digester through the application of Downflow Lo-Solids® cooking mode. "With Downflow Lo-Solids®, we achieved very stable cooking and uniform pulp," says **Vladimir Nohrin**, Chief of the Technical Department at SPPM. "Kappa is stable at a maximum variation of three abso-

Boris Nikiforov, Chief Operator for the Cooking Plant, and **Sergey Malkov** of Andritz.



lute units, averaging 45. At the same time, we have optimized the in-digester washing and have reduced specific steam consumption by 20%."

One year after start-up of the rebuilt line, the highest production achieved from the digesters has been 960 admt/d (7% over design). The stability and pulp quality have been exceptionally good according to Nohrin.

Clean and efficient

SPPM saw big improvements in pulp cleanliness right after the start-up of the new screening operation and the DD washer. Andritz guarantees for washing efficiency were achieved soon after the start-up.

In September 2003, SPPM finalized the financing for a rebuild of its PM10. The rebuilt machine operates at its optimum with extremely clean pulp and a low pH.

When the newly rebuilt machine came online in 2005, Andritz specialists worked with Segezha operations people to optimize the pulp for PM10. "Based on the results of tests, Andritz specialists identified the things we needed to do to minimize the amount of air in the system and to improve the pulp drainage characteristics so we can get maximum performance from our paper machine," Nohrin says.

With the air removed, the washing efficiency of the DD washer was significantly improved. Total washing efficiency of the fiberline is now 99.5%.

Malkov explains, "It is important for us to achieve our guaranteed values as specified in a contract. But, it's also important to make sure that our customer is completely satisfied with the new systems. That is why we are continuing

to work with Segezha on optimization and maintenance tasks, with a service agreement planned starting in 2007."

Future Plans

In May, 2006, Vasily Preminin officially signed acceptance of all guarantees for the modernization and optimization of Fiberline 4 at a meeting in Helsinki with Wolfgang Leitner, CEO of Andritz. Future plans were discussed.

According to Preminin, "SPPM is progressing through an important development stage. In the near future, we hope to announce a finalized deal to acquire Kõrsnas Packaging. After that, our company will be the world's second largest producer of kraft sack paper and sacks. We will also introduce a new management structure."

With an eye toward the future, Preminin says that future investments will be directed to rebuilding PM9, modernizing the causticizing line, upgrading the woodyard, installing a new recovery boiler, and modernizing Fiberline 3. There are also plans for new bleached pulp production.

"The projects will help us get to our goal of 600,000 tonnes per year of production," Preminin says. "We want more capacity, but also have clear targets to improve the quality of our products and the efficiency of our operations."

"We hope that Andritz will take an active role in our future modernizations, and are looking forward to fruitful cooperation with great optimism."

Find out more at www.fiberspectrum.andritz.com



Raine Huovila, Andritz's Site Manager for the Fiberline 4 modernization project.

A view of the new Andritz screen room for Fiberline 4 at SPPM.



TriConic® test ground

Not many production managers are willing to install Serial No.1 of a new technology in their mill. The Production Manager at Rigesa's mill in Valinhos (Brazil) was different. "We have had a long and successful partnership with Pilão," says Robson Dutra de Souza of Rigesa. "So when they came to us with a new refiner design that they felt could save us at least 20% in energy costs, we were willing to take the chance."

In 1942, in a small town about 1.5 hours northwest of São Paulo by car, a kraft linerboard and corrugating medium mill was born. First, with a small paper machine. Later another machine was added, along with an integrated box plant. The mill became known as Rigesa.

Even though the ownership changed (U.S.-based Westvaco bought the mill in 1953 and later merged to form Mead-Westvaco 2002), the company and the mill are still known as Rigesa today.

Not too long after Westvaco acquired the Rigesa mill, a 24-year-old mainte-

nance worker in São Paulo, Milton Pilão (Senior), had the bright idea of making replacement discs and cones for the refiners in local mills so that Brazilian mills would not have to import them. It was not too long after this that Rigesa and Pilão crossed paths.

In 1956, Rigesa heard about Pilão's replacement parts. No longer would the mill have to wait the long lead times for these replacements from foreign suppliers (not to mention the shipping costs for these large cylinders).

A partnership was born.

Fast forward

And now, fast forward a generation to the late 1990's. Rigesa is the second largest producer of corrugated packaging in Brazil and part of a large and successful global packaging group. There are two paper mills, five corrugated packaging plants, two folding carton plants, and one forest division in the south region of Brazil.

Pilão has grown as well. The product line expanded accordingly – from refiner fillings to complete refiners.

Pilão introduced the RTD refiner with its patented Tri-Disc system and in 1996 started to develop its latest innovation, the TriConic® refiner.

Milton Pilão and his team needed a mill that was nearby, had a process flow that could stand the interruptions of a live R&D project, and whose management was willing to take the risk.

That mill turned out to be Rigesa's Valinhos mill.

A long-time partnership

Rigesa has two paper machines. The two machines average about 240 t/d of production. Basis weight of the products ranges from 120 to 210 g/m².

Robson Dutra de Souza (left), Production Manager at Rigesa, with Agnaldo Negrão, Sales Manager at Andritz Pilão.



The newest and largest TriConic® refiner – the RTC 3000 – was installed at the Valinhos mill in May 2006. It is powered by a 950 kW motor.

The TriConic® has a unique double-faced conical rotor which is fixed to the shaft with a spoked hub. The hub design ensures uniform distribution of fibers to each of the two refining zones. It also maintains equal clearances between the rotor and two stators.



The first TriConic® refiner ever installed was put into service at Rigesa's Valinhos mill. Since then, the mill has replaced two other stock refiners with the TriConic® technology due to the energy savings.

The furnish is OCC, broke from the Três Barras paper mill, and clippings from all of Rigesa's box plants in Brazil. OCC accounts for about 70% of the mix, and no purchased kraft pulp is utilized.

"We have had Pilão equipment in this mill as long as I can remember," says **Robson Dutra de Souza**, Production Manager. Dutra has worked at the Valinhos mill for 21 years – coming to the mill after graduating as a mechanical engineer and completing the post-graduate Pulp & Paper program in São Paulo.

With a unique design incorporating two stators and a central double-faced rotor in hand, Milton Pilão approached Rigesa to be the test site for his innovation. He felt they could save in the range of 20-30% on energy costs and better refining degree to improve the fiber properties of their paper machine stock.

"We are not typically a mill that tests new technologies or takes big risks with our production," Dutra says. "When we heard about the potential energy savings, of course we were interested. In the case of the TriConic®, we felt we had the potential to really gain something."

Rigesa has a configuration of five refiners, one being on standby. The standby can be brought online quickly in the case of service or repair. This configuration was ideal because the Pilão TriConic® could be installed in the line and easily circumvented if it had to be taken offline.

"We decided we could take the TriConic® in and out of production as necessary and still have our four refiners to keep production up," Dutra says.

So, a deal was struck.

Side-by-side

In September of 1997, Pilão and his team brought their newest design to Valinhos.

"All the other refiners we had at that time were Pilão disc refiners," Dutra says. "Now, we could make a side-by-side comparison of the TriConic® technology and the conventional disc technology."

Certainly there was some risk involved, according to Dutra, but the potential rewards were also attractive. "There was a risk for us that the TriConic® would not work well and that it would detract from the performance of our line," he says. "Plus, we could not afford to give a lot of attention to this pilot test as we had a whole mill to run."

After the TriConic® was installed, it took about two or three days to commission the unit and begin the tests.



Rigesa & MeadWestvaco

In 1942, in the city of Valinhos (São Paulo state in Brazil), a small paper and packaging company was founded with the name Ribeiro Gerin SA. Before long, it was known as Rigesa. Eleven years later, U.S.-based West Virginia Pulp & Paper Company decided to purchase the company.

In 2002, Rigesa's parent company became MeadWestvaco as the result of a merger between Mead Paper and Westvaco. MeadWestvaco is a leading global producer of packaging, coated and specialty papers, consumer and office products, and specialty chemicals.

Rigesa Celulose, Papel e Embalagens Ltda. is today the second largest producer in the Brazilian corrugated packaging market. The company operates two paper mills, five corrugated packaging plants, two paperboard packaging plants, 133,000 acres of forest plantations, and 19 sales offices in Brazil.

Rigesa has won important environmental awards for outstanding results in controlling industrial pollution and for water conservation and re-utilization.



Instruments were attached to measure electricity consumption. "At first, we didn't know how to best operate the refiner, but neither did Pilão," Dutra says. "At first, the refiner would be run for about four hours and then would be taken offline."

Naturally, some fine-tuning was necessary to optimize the first TriConic® installation. Dutra says that several things were done over the course of the first year to improve production. Pilão made some improvements mechanically, process engineers fine-tuned the flows, and the refiner plates were made more durable.

The side-by-side refiner comparison was very impressive to Rigesa. They documented 25% savings in electrical energy with the TriConic®.

More TriConic® refiners

Even today, almost a decade later, the first unit is saving about 20% in energy. "We are refining different stocks today for our paper products," Dutra says. "Fiber for the kraft liner requires much more refining energy."

The performance of the first TriConic® refiner (today known as the model RTC 2000) was so good that Rigesa began replacing the older refiners in the line with the new TriConic® technology. Today, only one old single-disc refiner remains in the line, in the third position.

It is a 34-inch Pilão unit that Dutra estimates was installed about 25 years ago.

In March 2000, Rigesa replaced an older Pilão RTD refiner with a second RTC 2000 in the second position.

A new stock preparation system was installed at the mill in 2002. The system included a pulper, screens, fractionation, and a cleaner plant. Contaminants in the final stock are non-existent, according to Dutra.

The newest TriConic® – the model RTC 3000 – replaced another RTD in the fourth position. Where the first two TriConic® refiners had 550 kW motors, the new RTC 3000 has a 950 kW motor. It started up in May 2006.

A lab technician runs a porosity test on Rigesa's linerboard. Stock quality has been excellent, according to Dutra, which contributes to Rigesa's high-quality boxes.



"This new refiner has a lot of advancements that the first unit did not," Dutra says. "For example, it has a dual-speed gear motor that automatically adjusts the cone position and refining gap. We have no problems with clashes, and the fiber is optimum. The gap control is so good that I have asked Andritz Pilão to give us proposals for retrofitting the other two TriConic® refiners with this feature."

In addition to the energy savings, the quality of the paper is excellent, according to Dutra. "Our porosity and mullen indexes are extremely good, and we get very good feedback from our box plants."

"On top of that," he continues, "I must say that we have always been impressed with the service we get from Andritz Pilão. They are here quickly when we need them and they provide the information we ask for in a professional way. We are very satisfied."



Andritz Pilão – Growing in Brazil and beyond

In May 2006, Andritz acquired Pilão S.A. of Brazil, a company with a good track record with their three-disc (RTD) and low-consistency conical (TriConic®) refiners. By July, the name of the company was changed to Andritz Pilão Equipamentos Ltda.

Andritz Pilão has its headquarters in São Paulo and a workshop in Vinhedo (outside of São Paulo). Through this acquisition, Andritz adds to its refiner portfolio and fulfills its strategy to increase service offerings in South America.

In addition to new refiners, Andritz Pilão produces wear parts for all kinds of refiners. Traditionally, Pilão has been strong in fabricated wear parts (welded plates and cones). Adding fabricated products to the Andritz Duramet cast parts gives customers more options.

Milton Pilão Sr. formed the company at age 24. He came from a poor family, but had a rich mind. After working in a paper mill, he invented a process for making replacement parts for refiners quicker and less expensively than having to import from other countries. Slowly the business grew through the manufacturing of refiner fillings. Pilão expanded its product line to also include refiner plates. In the late-1960's, Pilão became a manufacturing licensee for Beloit-Jones. Milton Pilão developed his own refiner concept and introduced the three-disc system (RTD refiner) in 1973 and the TriConic® refiner in 1997.

Andritz Pilão will build on this tradition of service and innovation and establish the company as the hub for its service business in South America. Capabilities are being added to serve panelboard (MDF) customers in Brazil. Andritz is also using the capabilities of Andritz Pilão to support the launch of the Fiber Preparation business in South America (stock preparation, deinking, machine approach systems, recycled fiber systems).

Find out more at www.fiberspectrum.andritz.com

José Machado, President of Andritz Pilão (left), with Milton Pilão Jr., Technical and Commercial Director.

Rebuilding to meet growing demand

Following a period of no growth due to the Balkan crisis and the disintegration of the old Yugoslavia, Umka Fabrika Kartona in Serbia is once again investing to increase capacity and quality. Recent upgrades to the stock preparation system and the rebuild of a board machine by Andritz and Andritz Küsters is helping the mill meet a growing demand for its folding boxboard products.

“The demand for our board products exceeds our capacity,” says **Mijodrag Milojević**, explaining the motive behind investing in new stock preparation equipment from Andritz and having Andritz Küsters rebuild a 1960’s vintage board machine. “We still have a large potential that we have been unable to tap, but this rebuild completes a capacity expansion that gets us considerably closer to our goal.”

Milojević is Chief Executive Officer of the factory, which is located only 20 minutes from Belgrade. In May 2006, a

wet press section furnished with an X-Nip shoe press (see sidebar – page 22) was successfully commissioned.

Paperboard for packaging is the main product of the Umka mill. However, the white-lined chipboard and gray board find their way into applications for the chemical, tobacco, pharmaceutical, and automobile industries. Nearly 70% of the mill’s production is exported – to Bulgaria, Romania, Macedonia, Germany, the Czech Republic, and Italy.

Milojević and his team at Umka are happy that the machine rebuild has increased the mill’s quality and productivity. In fact, they are eager to expand more. “We have enough space,” Milojević says as he points to vacant land next to the mill’s distribution center. “This could be the spot for a second board machine.” But that depends on the company’s investment planning and the stability of the market. For the time being, management attention is on optimizing the production from the newly rebuilt machine.

Mijodrag Milojević, CEO of Umka Fabrika Kartona.



The main product of the Umka mill, located near Belgrade in Serbia, is paperboard for packaging.



“We still have a large potential that we have been unable to tap, but this rebuild completes a capacity expansion that gets us considerably closer to our goal.” (Milojević)

As part of the machine rebuild, Andritz delivered a new pope reel.

After the Balkan crisis, Umka began a renewed investment program which has resulted in increased capacity and quality.

Investment lull

The board machine at Umka was built by Andritz-Escher Wyss in 1967. Some 10 years later, capacity of the machine was increased to 55,000 t/a and a new coater enabled the mill to produce some new grades of coated folding boxboard. Everything was developing well.

But then, the crisis in the Balkans arose and, the world saw the disintegration of the old Yugoslavia. During this time, there was no use even thinking about investments, and any thoughts of capacity expansions were considered only dreams.





The Umka mill has its own wastepaper collection system. It's a "real recycling economy", according to Srbulov.

During this period, the Umka mill was in a lull – maintaining operations and the business relationships with customers and suppliers. Then in 2003, investments slowly began again when a third coater was installed – further improving the printability of coated boxboard.

Slow but steady

From this renewed investment momentum, slow but steady process in equipment rebuilds became apparent. New tanks were built to store coating materials. A new stock preparation line and a new cross-cutter were installed

to again improve quality and increase production by 20,000 t/a to a total 75,000 t/a.

The Andritz stock preparation line was for Line 7 (top layer). It consists of a pulper, coarse and fine screens, a cleaner plant, a slusher, a pulp screw press, and a CompDis™ dispersion unit.

Prior to installing the Andritz stock preparation equipment, Umka was using kraft pulp to obtain the quality and strength necessary for the top layer. The plan initially was to substitute white wastepaper for the expensive kraft, but

the mill has not been able to obtain sufficient quantities of the recovered paper to meet its needs.

Still, the new stock preparation system is able to deliver clean and bright pulp for the top layer without the addition of expensive kraft pulp. In the future, the mill has the option to increase brightness even higher at the dispersion stage, since no bleaching chemicals are currently being used in this process.

A recycling economy

"We are practicing a real recycling economy," Milojević says, referring to the mill's ownership by the Serbian KAPPA STAR Group. "One of our sister companies produces cookies which are well-known in Serbia. These cookies are packed in boxboard that we manufacture and that is printed by another sister company. After the cookies have been consumed, the empty box finds its way back here to us."

The mill has established its own paper and board collection system, according to Saša Srbulov, Umka's Project Manager for the board machine rebuild. "This ensures that our raw materials supply is secure and independent. This also means that we will not always have an absolutely identical quality in the stock preparation."

The new Andritz stock preparation system delivers high-quality pulp for the top layer without the addition of expensive kraft pulp.

A glance around the mill shows the situation. There is a buzzing of activity at the factory gate throughout the day. Large paper collection trucks, smaller trucks, and delivery vans take turns at the mill's weighing scales. In addition, there are mopeds with trailers packed high with old newspapers, precariously loaded bicycles, and people with simple handcarts – all delivering the raw materials, in large and small quantities, for the stock preparation system.

"Although the new stock preparation line has given us a much more stable operation and much more consistent quality, there are still fluctuations in the furnish," Srbulov says. "The use of recycled fiber has a tendency to reduce the stiffness of our board products. Because of this, it is very important that we minimize the stiffness decrease on the board machine itself."

Wet press rebuild for quality, productivity

In 2005, Umka made the investment to modernize the entire wet press section of its board machine in order to compete with the best qualities from other suppliers. The rebuild had two primary objectives: 1) increase productivity and capacity, and 2) produce high quality even with the fluctuations in the recycled paper furnish.

After an intensive evaluation period, Umka selected the X-Nip shoe press from Andritz Küsters. Andritz Küsters was able to demonstrate to the mill that the X-Nip could markedly increase the dry content of the sheet so that the mill could keep all its options open – increase capacity, save energy in the dryer section, and accommodate swings in the furnish quality. "We were convinced that the X-Nip could give us the best possible flexibility and the best possible product quality," Milojević says.

Andritz was awarded the order for rebuilding two stock preparation lines and for rebuilding the press section of the board machine. Andritz Küsters was selected to provide the X-Nip shoe press. The high dewatering in the wet press section was calculated to increase total capacity of the machine by 25,000 t/a to 100,000 t/a.

The Andritz stock preparation equipment is being utilized on Lines 5 and 6 (OCC furnish). On Line 5, Andritz installed a new pulper, detrasing system, cleaners, fine screens, and dispersion system. For Line 6, the equipment included a new pulper, detrasing equipment, cleaner, fine screens, and a thickening unit called HydroDrain™. Equipment for the board machine's approach flow and the water system were also in the Andritz scope.

Umka A.D. Fabrika Kartona

The Umka mill, near Belgrade, Serbia, produces white-lined folding boxboard and gray board in grades from 230 to 550 g/sm². Furnish is mixed wastepaper.

The Umka mill's products are used primarily for packaging, but also see applications in diverse industries such as chemicals, pharmaceuticals, cosmetics, food, and automotive.

Annual production of the mill is now 100,000 t/a. Nearly 70% of the production is exported to EU countries.

The board machine was originally built by Andritz-Escher Wyss in 1967.

Products:

- one-sided coated folding boxboard (230 - 500 g/m²)
- two-sided coated folding boxboard (230 - 550 g/m²)
- recycled board and paper (230 - 550 g/m²)
- multi-ply board (up to 7 layers)

Investments:

- coater 2001 / Jagenberg
- stock refiner 2005 / Andritz
- stock preparation line 2005 / Andritz
- wet press section 2006 / Andritz and Andritz Küsters
- pope reel 2006 / Andritz
- upper felt guiding 2006 / Andritz



X marks the spot

The Andritz Küsters X-Nip shoe press technology delivers maximum press impulse while saving energy and sheet bulk. Specific designs are offered for various applications in pulp, paper, board, and tissue production.

X-Nip designs differ in diameter (700 to 1800 mm), speed (up to 2000 m/min), line pressure (up to 1500 N/mm), and width (up to 11 m).

The advantages of the X-Nip shoe press are:

- Improved quality (bulk)
- Higher dryness (less energy consumption in drying)
- Higher sheet strength (less sheet breaks)
- Higher production speeds

Shoe press performance

The shoe press from Andritz Küsters is single-felted and works with paper widths up to 3750 mm. The maximum linear force in the nip is 850 N/mm at a production speed of 400 m/min. Dry content up to 48% can be attained, which not only markedly increases the machine's productivity, but the stiffness of the material length, too.

At Umka, the normal working width is 3200 mm. In seven vacuum forms, four presses (two of which are vacuum presses), 65 drying cylinders, one Yankee cylinder, and an IR dryer, a large proportion of the water content is removed from the board. In the coating section, a roll doctor, air knife, and combi-blades provide the required smoothness. This combination makes it possible to produce high-quality coated folding boxboard with up to seven layers from recycled fiber.

Stevan Misljen of Umka (left), Zegg of Andritz (center), and Srbulov, Umka's Project Manager, at the new X-Nip shoe press on the rebuilt board machine.



Roll change

As part of the machine modernization, Andritz delivered a completely new pope reel. The roll has a maximum diameter of 2200 mm and a winding speed of 250 m/min. The working width at the reel is 3180 mm. The pope reel has an automatic turn-up system so that spools are changed automatically. "We are very pleased with the pope reel," says Srbulov. "It helps us build a better roll, adjust the hardness based upon roll diameters, and has really minimized the amount of broke."

"Test run" for a strategic acquisition

Rebuilding the press section was, so to speak, a test run for the cooperation between Andritz and Andritz Küsters. In November 2005, Andritz purchased a 60% stake in Küsters' Paper and Nonwoven Business, and then purchased the remaining 40% at the end of June 2006.

"This first cooperation with Andritz Küsters and the X-Nip shoe press were excellent," says **Werner Pfniss**, Project Manager from Andritz. "Rebuilding a 30 year-old board machine does not happen on a daily basis. It is something special and challenging." **Volker Peters**, Project Manager from Andritz Küsters agrees. "The cooperation between the Andritz people in Graz and the Andritz Küsters people in Krefeld was smooth and effective," Peter says.

The Umka project team was pleased as well. On several occasions, the Andritz Küsters project team was invited to traditional Serbian dinners – a way for the customer to show us that they were pleased with the progress.

"By modernizing our plant," CEO Milojević says, "we have succeeded in building up production that can compete with Western qualities. After all, we export almost 70% of our production to the European Union. The market is there and we are eager to serve it."

Find out more at www.fiberspectrum.andritz.com

Machine operator at the Andritz control station for the new pope reel. Reel turn-up is fully automated.

Andritz Küsters

In November 2005, Andritz announced the purchase of 60% of the shares in the Paper and Nonwoven Business of Eduard Küsters Maschinenfabrik GmbH & Co. KG of Krefeld, Germany. In June 2006, Andritz purchased the remaining 40%.

Andritz Küsters is well-regarded for its roll and calendering technologies for the paper, nonwoven, and textile industries. It employs approximately 500 people worldwide.

Andritz Küsters machines are applied in primary production and finishing processes. For example, the consolidation of nonwoven materials and the dewatering and glazing of paper are among the classical uses of Andritz Küsters' products.

It all began 60 years ago when Eduard Küsters founded the "development department for textile machines" in Krefeld.

Küsters was originally trained as a locksmith and was driven by the idea to convert simple textiles, nonwovens, and paper into top products by refining them. He soon found that the main limitation to "finishing" these materials was the inability to process the webs or sheets over their entire width. To overcome this, he and his team developed the Swimming Roll Küsters®, which was patented in 1956. A sophisticated oil pressure system inside the roll compensates for deflections and allows processing across the entire web with uniform intensity and controllable pressure.

Searching for new approaches to optimize customers' production has always been a major focus at Andritz Küsters. The motto "a staff of 500 means 500 inventors" encourages everyone at Andritz Küsters to bring forward new ideas.



Real Grand Cellulose in the South

Rio Grande do Sul, the southernmost Brazilian state, is home to a mill that has taken extraordinary measures to increase the capacity and quality of their pulp. Today, the digester is producing over two times its original design capacity. The technical challenges of the digester upgrade at Aracruz's Guaiba mill tested Andritz's best experts and the mill's management team. Yet, as one manager now says, "Every project has problems. The test of a supplier is how committed they are to solving the problems." Andritz passed the test – and the mill-supplier relationship is very positive.



Titina Aguiar, Andritz Process Engineer, and José Wilhelms Ventura, Fiberline Manager.

José Ventura, Romeu Zanchin, and Edvins Ratnieks are in a light mood as they sit around the dinner table on this warm September evening in Porto Alegre, Brazil. All three are veterans of the Brazilian pulp and paper industry – and of the Guaiba mill where they work. They are relaxed and smiling as they speak with pride about the productivity and quality of their pulp mill just 30 km from the restaurant.

But, if prodded, they remember a time not that long ago, during a major rebuild and upgrade of the mill, when they were not so casual and relaxed.

"I have been at this mill since 1989," José Ventura, Guaiba's Fiberline Manager says. "The digester retrofit in 2002-2003 is one of the most memorable projects. Initially, not everything went smoothly. We had mechanical, instrumentation, and process problems that took a long time to identify and solve – so we were very stressed."

"But," Ventura continues, "we solved the problems together with Andritz and today have one of the three most productive digesters in the world. We are good friends with Andritz people. And, yes, today we enjoy a good dinner and conversation together."

Norwegian roots

The Guaiba mill began as Celulose Borregaard in 1971. Borregaard, founded in Norway in 1889, is a supplier of wood-based chemicals. In 1975, ownership changed hands to Rio Grande Companhia de Celulose do Sul (Riocell). In 1982, Klabin obtained controlling interest. The mill continued to operate under the Riocell name until being acquired in July 2003 by Aracruz. Today it is known as Aracruz Guaiba mill.

Romeu Zanchin, Fiberline Project Specialist, began working at Guaiba in 1975 after graduating as a chemical engineer. "At that time, we didn't have a bleach plant or drying machine," Zanchin says. "It was a simple line. We produced brownstock and flash-dried it for shipment to Norway. The bleaching was done there."

Early in 1983, Zanchin says, the mill added its own bleach plant. A power boiler, drying plant, effluent treatment, water treatment, and chemical plants followed.

Daily innovation

"Our company has a long history of environmental improvements," says Paulo Silveira, Mill Manager.

"When you are located this close to the residents of a major city – and surrounded by trees and water – you have to have a real concern for the community and the environment."

"Virtually everything we produce in this mill as waste is recycled," Silveira says. "More than 500 tonnes per day (99.7%) of ash from the boiler, bark, biological sludge, tertiary treatment sludge, and other materials are recycled into fertilizers, fuels, and other useful products. This is nothing new for us. We've been doing it for years."

"This is the result of collective thinking and daily innovation on the part of the people working in this mill."

A special digester

"When I came to the mill, the continuous digester was rather special," Zanchin says. "It produced either dissolving pulp (about 480 t/d) or paper grade pulp (about 720 t/d). This was tricky to do, producing dissolving pulp from eucalyptus, and only a few mills in the world were doing it with continuous digesters."

The digester had a very flexible configuration with multiple screens. It could operate with either co-current or counter-current flows, depending on the pulp being produced.

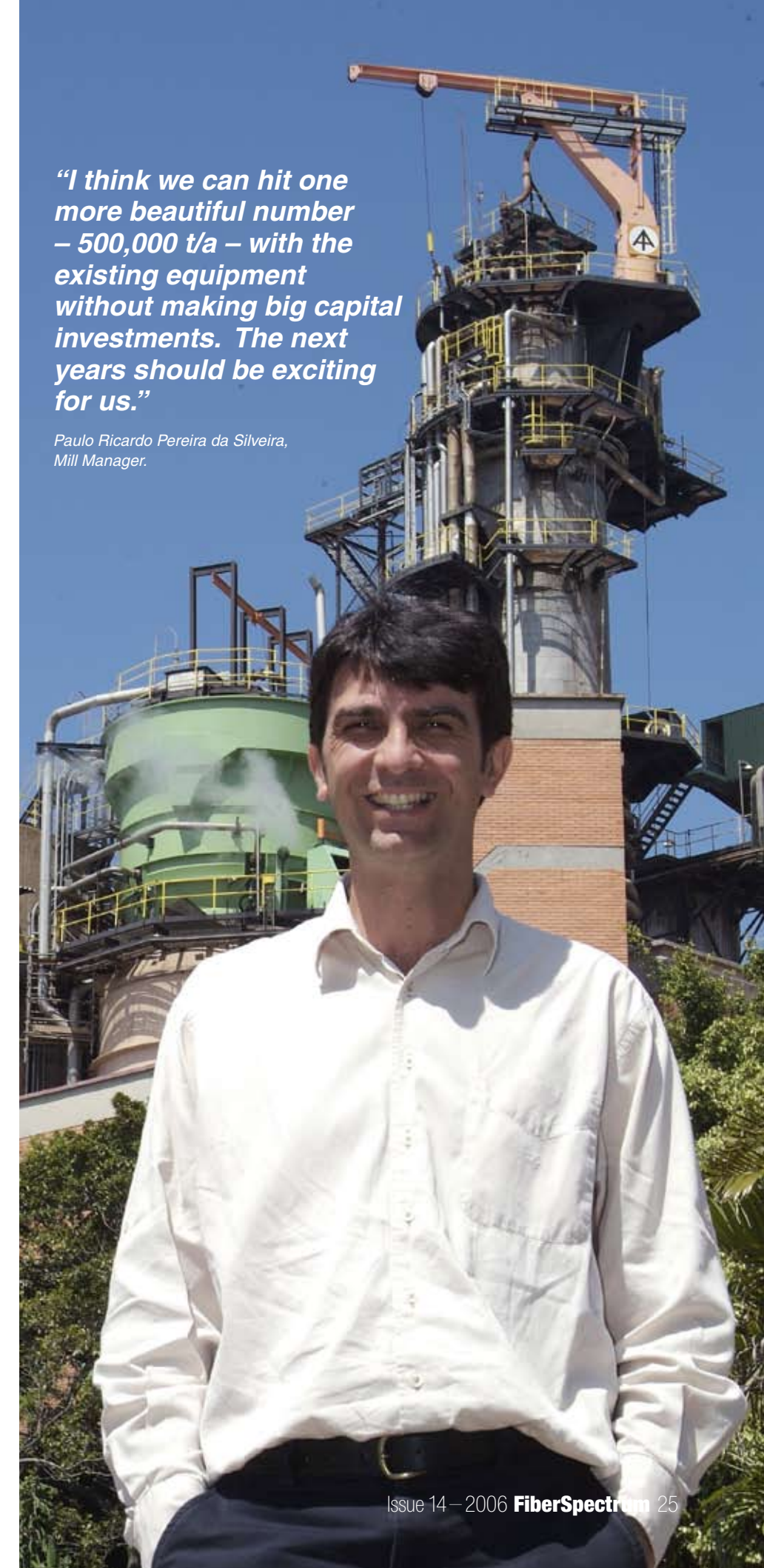
The Guaiba digester has an inclined top separator (the device for separating the chips and liquor flows before they enter the top of the digester).

Suppliers no longer offer this design. "When producing dissolving pulp, we reduced the level of the top separator and used water in the top circulation to reduce the pH of the pulp," Zanchin says. "For paper grades, we increased the levels and the pH."

Guaiba stopped making dissolving pulp in 1998, but the inclined top separator remained. After the Lo-Solids®

"I think we can hit one more beautiful number – 500,000 t/a – with the existing equipment without making big capital investments. The next years should be exciting for us."

Paulo Ricardo Pereira da Silveira, Mill Manager.





Edvins Ratnieks, Technology Manager at the Guaiba mill.

cooking upgrade by Andritz, it took a while to determine that the control of this device was a major source of the problems that Guaiba experienced.

Riocell 2000 project

In 2000, a major project was initiated to modernize the mill and raise production from 300,000 to 370,000 t/a. This included the conversion of the digester to Downflow Lo-Solids® cooking technology (the first in Brazil), the addition of an Andritz pressure diffuser washer (also the first in Brazil), removal of bottlenecks in the bleaching process, an upgrade to the pulp dryer, a new evaporation plant, and a new recovery boiler.

Before the project, the mill's technology experts had performed a thorough survey of the world's best cooking technologies. **Edvins Ratnieks**, a research technologist at that time and now Technology Manager, was part of that core team, along with Zanchin.

"We were responsible for choosing the technologies and establishing the

technical guidelines for the project," Ratnieks explains. "We did an extensive survey to determine exactly what we needed technically before the project started: such things as a steaming vessel, improved impregnation, improved chip and liquor flows because our digester was overloaded."

"Then, we had discussions with the suppliers," Ratnieks continues. "We liked Andritz's solutions. The Diamond-back® chip bin was key to us because of its steaming capabilities. Also, we felt that Downflow Lo-Solids® was a wonderful technology. I was at a conference in the U.S. and listened to a paper given by the mill with the first Downflow application. This guy was so enthusiastic in presenting his mill's results."

"At the time, it was kind of an adventure for us, because no one in Brazil had installed this technology," Ventura explains. "The one company we used as a benchmark was Zicuñaga in Spain. Their mill was similar in that it was old and they made a small retrofit in terms of money, but increased production a lot. Their digester was smaller than



"The digester runs smoothly. We've had the digester shut down only four hours in the last three months. We're running consistently at 1400-1450 t/d in a digester that was originally built for 720 t/d. We've reduced rejects to less than 0.25% on a wood basis, and we're getting higher viscosity. There is nothing negative to say."

Fernando Toigo Giehl, Fiberline Supervisor (left) with Gernot Pflieger, Fiberline Operator.



Andritz installed a new pressure diffuser as part of the fiberline upgrade at Guaiba.

ours, but they did a good job and are very happy with their retrofit project."

"Before the project, our digester was producing 930 t/d," Ventura says. "Andritz guaranteed a production increase of about 28% to 1192 t/d after the retrofit. Plus, they said that if we made some further small modifications in the future, we could reach 1300 t/d."

From top separator to bottom scraper

"Those of us on the project team knew this upgrade would be difficult," Ratnieks says. "Our operations people, however, thought it could be done easily. When you bring new technology into an old mill, you create big changes."

"There are dozens of Lo-Solids® retrofits in the world that have started up quickly," says **Titina Aguiar**, Andritz Process Engineer. "Unfortunately, this start-up had a series of problems from the moment it started up in April 2002."

Operators struggled to keep the digester running, but could not get it to run steady-state. There were problems with plugging in the top and bottom screens, and disturbances in the feed and the chip column movement.

"One of the first things we tackled was air in the digester feed," Aguiar says. "We made modifications to the steam injection system in the Diamond-back®."

This helped, but it wasn't enough. The Guaiba digester would need solutions from top to bottom.

"The digester was burping like a person with gas on the stomach," Ratnieks says.

Andritz added an air separation chamber to the pressure diffuser's filtrate tank. "We used a special device to measure the air in the digester," Ratnieks recalls. "It turned out there was lots of air in the top circulation. We searched for where the air was entering and in our search discovered that the level transmitter in the top separator was miscalibrated."

"When we discovered the transmitter problem, we began to look more closely at the top separator," Aguiar says. "We found that the screw was different than the drawing supplied to us by the mill. It turns out that the drawing they received from the original supplier was for a completely different digester. So, the speed changes that we calculated for the production increase was not adequate with the existing screw. We installed a variable frequency drive to slow down the screw and added a liquor line to the top separator to maintain the liquor level at all times. With these corrections, we eliminated the air and steam problems in the feed system."

After this important discovery, production went up a little bit, but there were other issues to be resolved.

"In my mind, the first milestone was to achieve at least 1000 t/d on a regular basis," Ventura says. "It was very difficult to explain to the directors of the company that everything we were trying was not solving the problem. So, we tried to keep our minds open, not to panic, and not to argue."

"One of the best things we did was move our daily meetings to the control room so that operators, technical people, project people, and Andritz worked together," Ratnieks says.



And, we are producing very high quality pulp. I think all that is pretty amazing.”

They stayed with us

“We were very surprised how committed Andritz was to staying at the mill and solving the problems,” Ratnieks continues. “If someone asks me about Andritz’s service, I can tell them that Andritz will not quit before giving you a solution.”

Ventura agrees. “Andritz stayed with us all the time. Titina Aguiar, Dave Lebel, Bertil Stromberg, Larry and Richard Laakso, and the other experts worked day and night. This is not common behavior of suppliers. Usually, a supplier will work for two or three weeks, create a punchlist, and come back in two or three months to see if everything’s okay.”

Aumento de Capacidade

In 2005, a project to boost capacity even further (the Aumento de Capacidade project) was completed. Improvements to the drying machine, the addition of a cooling tower, and upgrades to the white liquor plant enabled the mill to produce 430,000 t/a.

In 1998, Guaiba purchased the first Andritz lime mud filter that was manufactured in Brazil. It has a capacity of 330 t/d of lime mud. For the Aumento de Capacidade Project, Andritz also supplied green liquor filtration technology, retrofitted the lime kiln, and retrofitted an older lime mud filter with new Continuous Precoat Renewal technology. The green liquor filter (X-Filter™) improved the quality of the green liquor substantially (from 100 to below 20 mg/l of suspended solids), increasing the capacity to 4300 m³/d

of green liquor, which also increased the capacity of the total recausticizing plant. The reliability and availability of the X-Filter™ is such that it is the only green liquor filter for the whole mill. The lime kiln retrofit included a lime mud dryer, new sector cooler, new burner, and new conveyors for the kiln. With the retrofit, Guaiba has been able to increase capacity of the kiln to 300 t/d and reduce the energy consumption of the lime reburning process.

One more beautiful number

“Andritz has been a very good partner,” Silveira says. “We benchmarked our operation against Zicuñaga and Andritz helped us match this mill. One year after the project was completed, we got an additional 30,000 tonnes over what we had planned. The second year, we got an additional 15,000 tonnes from the same equipment.”

“We are very satisfied today,” Zanchin says. “This is one of the three most loaded digesters in the world as measured by production per square meter of digester cross-sectional area. It also produces prime quality hardwood pulp.”

As for the future, the Guaiba mill has one more “beautiful number” in mind, according to Silveira. “We believe that 500,000 tonnes per year is the maximum production we can get out of this mill without major capital investments,” he says. “We are in the conceptual stages of planning for a new line that would produce an additional 1.3 million t/a. We have the fiber sources and we have the room. If the markets stay strong and our Board of Directors accepts, the next few years should be an exciting time for us.”

Find out more at www.fiberspectrum.andritz.com

Aracruz and the Guaiba unit

Aracruz Celulose is the world’s leading producer of bleached eucalyptus pulp – responsible for manufacturing 30% of the world’s supply. The pulp is utilized in the manufacture of printing and writing, tissue, and specialty papers.

Aracruz’s forestry operations are situated in the Brazilian states of Espírito Santo, Bahia, Minas Gerais, and Rio Grande do Sul. They involve some 263,000 ha of eucalyptus plantations, intermingled with around 143,000 ha of native forest reserves, which are of fundamental importance for ensuring the balance of the ecosystem. Aracruz is one of three Brazilian companies included in the Dow Jones Sustainability Index, which highlights the best corporate sustainability practices in the world.

Aracruz’s nominal bleached hardwood pulp production capacity, totaling 3 million t/a, is distributed between two pulp production units (Barra do Riacho and Guaíba). Aracruz also receives 50% of the production of the Veracel mill (joint venture with Stora Enso).

At the Guaiba Unit, located in Rio Grande do Sul, Aracruz operates a pulp mill that is equipped with advanced environmental protection measures. Guaiba has a nominal capacity of 430,000 t/a of bleached eucalyptus pulp and produces some 50,000 t/a of printing and writing paper from its integrated operations to supply the domestic market.

As part of a capacity upgrade, Andritz also supplied recausticizing technology and an upgrade to the lime kiln. A single Andritz X-Filter™ provides all the green liquor filtration for the entire mill. The city of Porto Alegre is seen in the horizon of this photo.



Leading and learning at Kaukas

We lead. We learn. Innovation and intensive interaction with all our stakeholders form the basis for our learning and leadership. Treating our customers' challenges as our own requires continuous development of our performance. Thus, we invest in people and superior technology. – Extract from the UPM Promise



Asko Paakki (right), Production Manager at Kaukas with Heikki Tanskanen of Andritz's Pulp Mill Services organization in Finland.

An attitude of continuous improvement with long-term commitment characterizes the people at UPM's Kaukas Pulp Mill, located in Lappeenranta (southeastern Finland). Kaukas produces "the best reinforcement pulp in the world," according to **Asko Paakki**, Production Manager at the pulp mill. "Kaukas is a brand in itself within the UPM Group," he says. "It is highly valued for making the high-quality printing papers for which UPM is known."

Paakki started as a Project Engineer in Lappeenranta in 1985 to work with the capacity expansion in the pulp mill at that time. "This mill has become very familiar to me over the years," he says. Andritz technology, and the partnership with Andritz people, have also been very familiar and welcome at the Kaukas pulp mill for decades.

Kaukas produces about 400,000 t/a of softwood kraft and 300,000 t/a of

hardwood kraft. "We supply to our own paper mills in different parts of the world," says Paakki. "Our softwood reinforcement pulp is our flagship product. There are very few producers in the world who can achieve the quality and strength of Kaukas."

Partnership brings value

Kaukas mill management has always believed in enhancement of the processes in cooperation with best-of-breed technology partners. Andritz has played a very central role as one of these partners, explains Paakki.

In the summer of 2005, the Finnish paper industry was rocked by a labor conflict. "In the past, the labor agreements required us to stop production during the long Christmas and Midsummer holidays to do our maintenance," Paakki says. "A pulp mill requires a week to achieve normal production after start-up. That is why it was so frustrating to shut down the mill for these holidays."

"Now, with the new labor agreements, we have the flexibility to schedule our shutdowns," Paakki says. "Our target is to keep the mill going, to run continuously over the winter. To do this, we need a good partnership with a technology and service supplier like Andritz."

"Working with Andritz, we have systematically gone through our fiberline and recovery processes to upgrade them," he continues. "For example, we

modernized our air distribution system in the recovery boiler and added superheaters. And, during our autumn shutdown, we changed the recovery boiler air nozzles from a plate to cast iron design in cooperation with Andritz. This new technology brings us closer to our target of running for over twelve months without downtime."

Paakki stresses that 12 months operation is the minimum. "Even that is not enough for us," Paakki says. "We want longer operating periods. Another thing we want is that one shift (eight hours) is sufficient for carrying out a maintenance procedure. In terms of washers and pumps, we have almost succeeded with this."

According to Paakki, the interaction with Andritz service people has worked well. "We get a very fast response, and we get state-of-the-art technology," he says. "Our partnership with Andritz has been very successful and indispensable. We can do much by ourselves, but there are still some things we cannot do."

"Kaukas produces very high quality pulp," says **Heikki Tanskanen** of Andritz's Pulp Mill Services group. "The mill demands the best from us. We have developed innovative things in cooperation with Kaukas. For example, our new sealing concepts were developed jointly with Kaukas. We openly discuss the risks and opportunities. This honest interaction has been a great source of inspiration for our product development people."

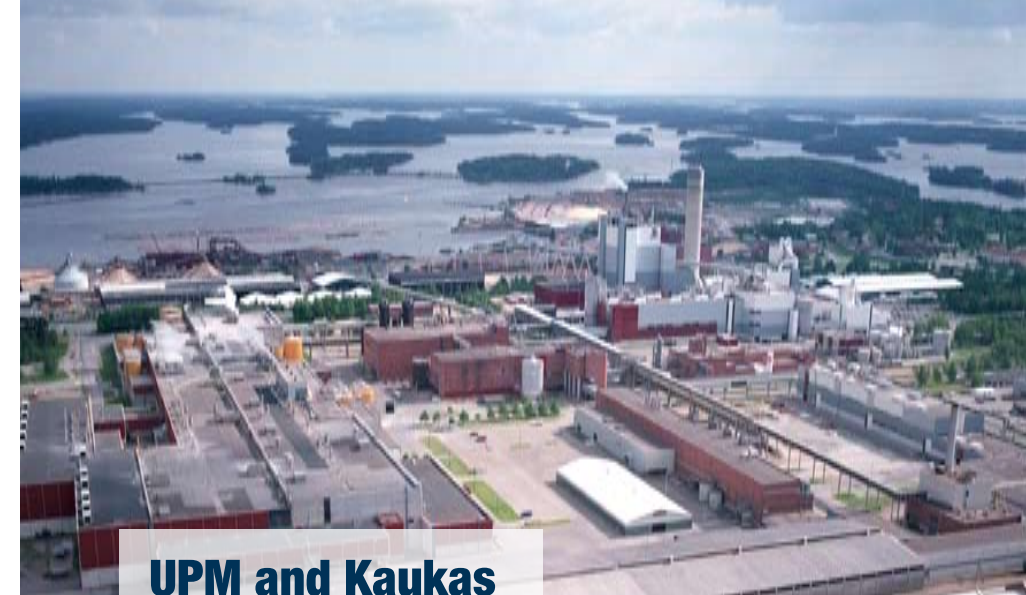
"Supplier's business cards change quite often these days, with new logos and names," Paakki says, "but it is the people that matter. We learn to trust people through their actions and attitudes. The fact that we know and trust each other is the most important matter."

Not bigger, just better

"The fact is that we have reached our physical limits at this mill," Paakki says. "We cannot get bigger, so we focus on getting better. Our customers rely on us to manufacture their own high-quality products. Our crew knows what is at stake."

For the present, Kaukas is looking for ways to maximize the opportunities provided by the new collective labor agreements. "This is a big challenge considering we are also facing a reduction in the number of personnel," Paakki says. "Our people must focus on doing the right things. We must train each employee to do his/her work, but in a slightly different way. As personnel are reduced, there will be new responsibilities for the others."

Find out more at www.fiberspectrum.andritz.com



UPM and Kaukas

UPM is one of the world's leading producers of printing papers. The company's businesses focus on magazine papers, newsprint, fine and specialty papers, converting materials, and wood products. UPM is the biggest producer of magazine paper with its annual capacity of 5.7 million tonnes.

The company has production facilities in 15 countries and an extensive sales network. Sales in 2005 were € 9.3 billion and the group employs approximately 31,000 people. UPM's raw materials, energy, and production are closely integrated. The company is largely self-sufficient in terms of chemical pulp and electric power.

UPM's four pulp mills have a total capacity of 2.3 million t/a. The Kaukas mill was founded in 1873 at the Kaukaankoski rapids and moved to Lappeenranta in 1892. Sulphate pulp production began in 1964. Capacity of the mill for pulp is 720,000 t/a and for LWC is 580,000 t/a. UPM's Kaukas plywood mill and sawmill are also located at the site, as is its new R&D center.



Wood Processing

Complete Lines & Systems

Hunan Tiger Forest & Paper Group
Huaihua, Hunan, China
Woodyard
Woodyard portion of complete pulp mill delivery

Australian Paper (Maryvale Mill)
Morwell, Victoria, Australia
Woodyard

Mondi Packaging Frantschach
St. Gertraud, Austria
Woodyard

Stora Enso Fine Papers
Varkaus, Finland
Woodyard

Eucalyptus Fibre Congo
Pointe-Noire, Congo
Chip Mill Woodyard

Verso Paper
Jay, Maine, USA
Chip mill woodyard

Interbon "Unopan Project"
Burgos, Palencia, Spain
MDF Woodyard

Key Equipment

Lontar Papyrus Pulp and Paper Industry
Jambi, Indonesia
3 Chippers (CHD30) with drop feed

Zhejiang Luyuan Wood MDF
Suichang, Zhejiang, China
Woodyard equipment for MDF

Upgrades & Modernizations

Aracruz Celulose
Barra do Riacho, Brazil
New chipping line

Fiberline

Complete Lines & Systems

Hunan Tiger Forest & Paper Group
Huaihua, Hunan, China
Cooking, washing, screening and bleaching
Fiberline portion of complete pulp mill delivery

Sappi Saiccor
Umkomaas, South Africa
Knot separation, screening, pre-oxygen washing, oxygen delignification and bleaching
Repeat order

UPM-Kymmene (Tervasaari Mill)
Valkeakoski, Finland
Screening, brownstock washing, oxygen delignification and TCF bleaching

Upgrades & Modernizations

Aracruz Celulose
Barra do Riacho, Brazil
Washing, screening and bleaching modernization of Fiberline C
Repeat order

Aracruz Celulose
Barra do Riacho, Brazil
A-stage bleaching equipment for Fiberline B
Repeat order

Recovery

Complete Lines & Systems

Sappi Saiccor
Umkomaas, South Africa
Evaporation plant

Hunan Tiger Forest & Paper Group
Huaihua, Hunan, China
Recovery boiler and evaporation plant
Chemical recovery portion of complete pulp mill delivery

Weyerhaeuser
Campti, Louisiana, USA
Recovery boiler

UPM-Kymmene (Kymi Mill)
Kuusankoski, Finland
Evaporation plant
High dry solids

Klabin Papeis Monte Alegre
Telémaco Borba, Brazil
CTMP MVR Zedivap

Key Equipment

SCA Packaging Obbola
Umeå, Sweden
MeOH liquefaction plant

Upgrades & Modernizations

Papelera Guipuzcoana De Zicunaga
Hernani, Spain
Evaporation plant upgrade

Svilosa
Svishtov, Bulgaria
Recovery boiler and evaporation plant upgrade

Chemical Systems

Complete Lines & Systems

Hunan Tiger Forest & Paper Group
Huaihua, Hunan, China
Complete white liquor plant
Chemical systems portion of complete pulp mill delivery

UPM-Kymmene (Kymi Mill)
Kuusankoski, Finland
Complete white liquor plant

Confidential Customer
Asia
Recausticizing plant and two lime kilns

Key Equipment

Aracruz Celulose
Barra do Riacho, Brazil
StiroX white liquor oxidation system

Pulp Drying & Finishing

Complete Lines & Systems

Hunan Tiger Forest & Paper Group
Huaihua, Hunan, China
Pulp drying plant, 4.2 m working width
Pulp drying portion of complete pulp mill delivery

Sappi Saiccor
Umkomaas, South Africa
Pulp drying plant, 4.0 m working width

Klabin Papeis Monte Alegre
Telémaco Borba, Brazil
Wetlap plant, 2.0 m working width

Upgrades & Modernizations

Ence Pontevedra
Pontevedra, Spain
Pulp drying line rebuild, 3.0 m width

Aracruz Celulose
Barra do Riacho, Brazil
Fiberline C upgrade

Indah Kiat Pulp & Paper (Perawang Mill)
Riau, Indonesia
3 pulp machine rebuilds
Repeat order

Mechanical Pulping

Complete Lines & Systems

Klabin Papeis Monte Alegre
Telémaco Borba, Brazil
CTMP system for board grades

Confidential customer
China
2 P-RC™ APMP systems

Nanning Jinglang Pulp
Nanning, Guangxi, China
P-RC™ APMP system

Confidential customer
China
P-RC™ APMP system

Key Equipment

Södra Cell Folla
Follafoss, Norway
Plug screw discharger with cyclone

Confidential customer
Florida, USA
2 Blowline refiners
Largest in the world – processing 1400 odmt/d

Norampac Paper
Trenton, Ontario, Canada
Chip washing

Upgrades & Modernizations

Holmen Paper Group (Hallsta Paper Mill)
Hallstavik, Sweden
Capacity increase of TMP system; 3 LC TwinFlo™ refiners and screen
Repeat order

Panelboard

Complete Lines & Systems

Yangdong Luyuan Wood-Based Panelboard
Beiguan Yangdong, Guangdong, China
Pressurized refining system for MDF (woodyard, chip washing, and pressurized refining) with capacity of 600 t/d
Fifth order from this customer within five years

Unopan Tableros de Fibras
Burgos, Spain
Pressurized refining system for MDF (woodyard, chip cleaning, and pressurized refining) with capacity of 720 t/d

Fiberboard
Baruth, Germany
Pressurized refining system for MDF (chip washing and pressurized refining system)

Fiber Preparation

Complete Lines & Systems

Stora Enso Huatai (Shandong) Paper
Dongying, Shandong Province, China
Complete deinking line including sludge dewatering and complete paper machine approach system

Fripa Papierfabrik
Miltenberg, Germany
Stock preparation system for PrimeLine™ tissue machine

Indah Kiat Pulp & Paper
Serang, Indonesia
Recycled fiber system for packaging grades and paper machine approach flow system

Zhejiang Jingxing Paper
Pinghu, Zhejiang, China
Board machine approach flow system

Abhishek Industries
Barnala, Punjab, India
Virgin stock preparation and paper machine approach flow system

Al Snobar Hygienic Paper Mill (Nuqul Group)
Amman, Jordan
Stock preparation system for tissue

Shandong Hengan Paper
Weifang City, Shandong, China
Stock preparation system for tissue

Anhui Shanying Paper Industry
Ma'anshan, Anhui, China
Recycled fiber stock preparation system for packaging grades and reject handling equipment

Key Equipment

Pragati Paper Mills
New Delhi, India
Dispersing system

Guangzhou Paper
Guangzhou, Guangdong, China
Pulping system and sludge dewatering system for deinking line

Australian Paper (Maryvale Mill)
Morwell, Victoria, Australia
Pulpers for wet lap system

Celhart Donaris
Braila, Romania
Deflaker for virgin fiber pulp

SCA Hygiene Products
Mannheim, Germany
Refiner for virgin fiber pulp

HARTIJA
Kocani, Macedonia
Stock preparation components for virgin fiber pulp

Georgia-Pacific (Savannah River Mill)
Rincon, Georgia, USA
FibreFlow® drum pulper

SCA Tissue North America
South Glens Falls, NY, USA
Dispersing system

Ahlstrom Labelpack
La Gere, France
Screening/shortflow package

Mondi Packaging Paper Swiecie
Swiecie n. Wisla, Poland
Disc filter

UPM-Kymmene
Rauma, Finland
Sludge dewatering system

JTI Yelets
Yelets, Russia
Refining equipment

Ningbo Asia Pulp & Paper
Ningbo, Zhejiang, China
Flotation system and deinking line components

Hunan He Tai Paper
Hengshan, Hunan, China
Paper machine approach flow system

Lee & Man Paper
Dongguan, Guangdong, China
Pulpers for PM7, PM8, PM9, PM10
Paper machine approach flow systems and components for PM10 and PM11

Guangzhou Wanlida
Zhengcheng, Guangdong, China
Paper machine approach flow system

Upgrades & Modernizations

Fabricas Mexicana de Papel
Tres Valles, Veracruz, Mexico
Recycled fiberline upgrade

Fabricas de Papel Tuxtepec
Tuxtepec, Oaxaca, Mexico
Recycled fiberline upgrade

Tissue Machines

Complete Lines & Systems

Confidential customer
Europe
Tissue machine, 5.55 m working width

Fripa Papierfabrik
Miltenberg, Germany
Tissue machine, 2.72 m working width
First PrimeLine™ COMPACT VI

Shandong Hengan Paper
Weifang City, Shandong Province, China
CrescentFormer, 5.4 m working width
5th order from Hengan Group – duplicate of PM3

Upgrades & Modernizations

SCA Tissue NA
Menasha, Wisconsin, USA
Wet end rebuild of tissue machine No. 3

Paper & Board Machines

Upgrades & Modernizations

Natron-Hayat Maglaj
Maglaj, Bosnia-Herzegovina
Rebuild of sack kraft machine

New Orders

Ventilation and Drying For Tissue and Paper/Board Machines

Upgrades & Modernizations

Confidential customer Europe

High Temperature Hood (HTH) for the new tissue machine, Low Dust Concept (LDC), room ventilation system

Natron-Hayat Maglaj Maglaj, Bosnia-Herzegovina

Upgrade in speed and quality of the sack kraft machine rebuild

Nettingsdorfer Papierfabrik Nettingsdorf, Austria

Rebuild of heat recovery system

SCA Hygiene Products UK (Prudhoe Mill) Prudhoe, Great Britain

Prime Foil R stabilizer

Mondi Packaging Frantschach
St. Gertraud, Austria
Sheet transfer foil for PM6

Fripa Papierfabrik Miltenberg, Germany

Hood and air system
First PrimeLine™ COMPACT VI

Cellu Tissue (Natural Dam Mill) Gouverneur, New York, USA

Heat recovery systems for PM 2 and 3

Holmen Paper (Braviken Paper Mill) Norrköping, Sweden

Air system

Kruger Products New Westminster (B.C.), Canada

Foil and threading PM3

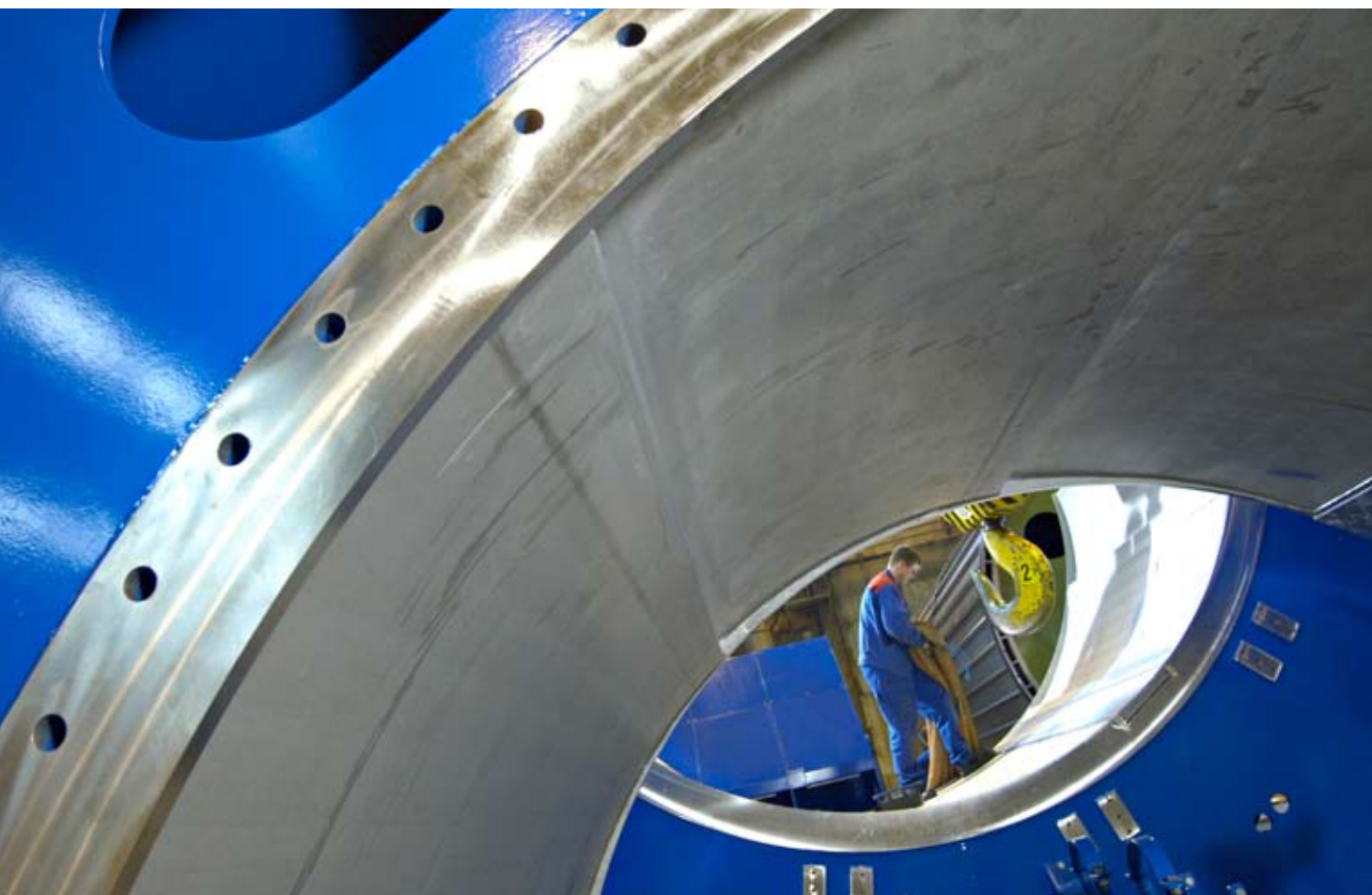
Procter & Gamble Paper Products Mehoopany, Pennsylvania, USA

Prime Foil stabilizer

Sappi Austria
Gratkorn, Austria
Rebuild heat recovery system

Shandong Hengan Paper
Weifang City, Shandong, China
High Temperature Hood (HTH) and air system
5th order of Hengan Group, copy of PM3

DD Washer manufacturing for APPM in India at Savonlinna Works Oy in Finland.



Recent Start-ups

Wood Processing

Complete Lines & Systems

Celulosa Arauco y Constitución
Nueva Aldea, Chile
Complete wood processing system with two debarking lines for eucalyptus and pine

Grant Allendale
Fairfax, South Carolina, USA
Complete wood processing system with two LogPorter cranes and debarking lines
Greenfield OSB plant with highest design capacity in the industry

Shandong Zhongmao Shengyuan Pulp
Dezhou, Shandong, China
Woodyard equipment for TMP

Shandong Huatai Paper
Dongying City, Shandong, China
Woodyard for BCTMP

Key Equipment

Indah Kiat Pulp & Paper (Perawang Mill)
Riau, Indonesia
4 chip thickness screens

JSC Kotlas
Arkhangelsk, Russia
Rechipper

JSC Solombala
Arkhangelsk, Russia
Rechipper

JSC "Vyborgskaya Cellulose"
Sovetskiy (near Vyborg), Russia
Chipper

Upgrades & Modernizations

Metsä-Botnia
Kemi, Finland
New HHQ-Chipper™ line

Fiberline

Complete Lines & Systems

The Andhra Pradesh Paper Mills
Rajahmundry, India
Cooking, Washing, Screening and Bleaching
Largest single line in India

Recovery

Complete Lines & Systems

SCA Forest Products AB
Östrand (Sundsvall), Sweden
Recovery Boiler
High Energy Recovery Boiler (HERB) for maximum energy production

Upgrades & Modernizations

Votorantim Celulose e Papel
Jacarei, Brazil
Evaporation plant upgrade

Nettingsdorfer Papierfabrik
Nettingsdorf, Austria
Recovery boiler upgrade

Chemical Systems

Complete Lines & Systems

The Andhra Pradesh Paper Mills
Rajahmundry, India
Complete white liquor plant
The first Andritz CD-Filter in India

Cenibra – Celulose Nipo Brasileira
Belo Oriente, Brazil
Recausticizing plant modernization and new lime kiln

Celulosa Arauco Y Constitución
Nueva Aldea, Chile
Complete white liquor plant

Zellstoff Pöls
Pöls, Austria
Recausticizing modernization and new lime kiln
2-stage LMD Filter for superior lime mud washing

Grasim Harihar
Harihar, India
Lime kiln plant

Upgrades & Modernizations

Mondi Štetí
Štetí, Czech Republic
Recausticizing plant modernization

Pulp Drying & Finishing

Complete Lines & Systems

CMPC Celulosa (Planta Santa Fe)
Nacimiento, VII - Talca, Chile
EPC delivery of single-line drying machine

Mechanical Pulping

Complete Lines & Systems

Shandong Zhongmao Shengyuan Pulp
Dezhou, Shandong, China
P-RC™ APMP system

Upgrades & Modernizations

SOLIKAMSKBUMPROM Public JSC
Solikamsk, Russia
TMP – TMP1 upgrade
Fast-track project to upgrade existing TMP line. Increased capacity from 270 to 370 bdmt/d and improved pulp quality.

Panelboard

Complete Lines & Systems

Yıldız Sunta MDF
Orman Ürünleri Sanayi Tesisleri. ve Ticaret
Izmit, Turkey
MDF pressurized refining system with 1008 t/d capacity
Largest installation in Turkey

Fiber Preparation

Complete Lines & Systems

Shandong Huatai Paper
Dongying City, Shandong, China
Pulping system, including sludge dewatering, for PM12 newsprint machine

Key Equipment

Norske Skog Bruck
Bruck/Mur, Austria
Papillon™ refiner for LWC grades

SCA Hygiene Products
Mannheim, Germany
Papillon™ refiner for hygiene products
TwinFlow™ refiner for PM6 (special graphics paper)

M-real Stockstadt
Stockstadt, Germany
Papillon™ refiner for coated fine paper and copy paper

Ventilation and Drying For Tissue and Paper/Board Machines

Upgrades & Modernizations

Mayr-Melnhof
Eerbeek, Netherlands
High Temperature Hood (HTH) and rebuild of Machine Glaced (MG) section

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