

FiberSpectrum

The customer magazine of Andritz Pulp & Paper

Issue 1 – 2006



**Independent and unique producer creates a “pearl”
of an installation in Switzerland – Page 4**

ANDRITZ

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FiberSpectrum is published by:

Andritz AG
Stattegger Strasse 18
A-8045 Graz, Austria
Tel: +43 316 6902 0
pulpandpaper@andritz.com

Managing Editor:
Gudrun Schaffer
gudrun.schaffer@andritz.com

Editor:
Robert Pühr
robert.puhr@andritz.com

Editorial Team:
Bjørn Hansen
Simo Leisti
Katri Lindström
Olavi Pomoell
Brigitte Poms
Eva Riegler
Harri Soila
Manuela Wagner
Elisabeth Wolfond

Contributing Writers:
Thomas Barbieri
Karl Jürgen Gurandsrud
Susanne Haase
Leif Lindberg
Robert Pühr
Martin Swayne

Contributing Photographers:
Croce & Wir
Riku Isohella
Michael Lucas
Timo Vesterinen
Günter Köle
Trollbu

Graphic Design:
Gudrun Schaffer
gudrun.schaffer@andritz.com

Start-up of Estonian Cell Greenfield BCTMP Mill

Andritz supplied the major systems – woodyard, refining, bleaching, flash drying, and bale handling – for this 140,000 t/a greenfield mill which is now being started up near Kunda, Estonia.



Global vote of confidence – thank you!

There has been a good level of activity in global pulp and paper industry (both for greenfield lines and the modernization of existing lines). The large investments continue to be focused in the southern hemisphere and Asia.

Pulp and paper pricing, in general, is improving. This, together with improved technology that helps lower operating costs, creates a positive influence on our customers’ ROI calculations and leads to more trust from the financial community.

In the process of working on our increased order backlog, we managed to improve the Sales of our pulp and paper business in 2005 by 16% compared to 2004 – exceeding € 1 billion.

A notable start-up was the Veracel mill in Brazil (FiberSpectrum 2-2005). Other major start-ups included Finland’s M-real (fiber processing equipment and flash drying systems for a new BCTMP mill), China’s Shandong Hengan Paper (new 200-inch high speed CrescentFormer tissue machine), Portugal’s Portucel (new recovery boiler), and the “start-up” of our own Fiber Preparation Pilot Plant in Graz. In China, Jiang Lin (the world’s largest pulp drying line when it was built) set a world record for pulp drying production – over 3500 t/d of finished bales into the warehouse. Andritz also supplied the woodyard, which is also the world’s largest.

Some of the major orders we received were the major process equipment for Botnia S.A.’s new pulp mill being built in Uruguay and an EPC fiberline and the chemical recovery systems for Marusumi Paper’s Ohe mill in Japan. In the tissue segment, Procter & Gamble awarded us with the order for a complete TAD tissue machine in the USA.



Markku Hänninen
Member of Executive Board
Head of Pulp Mill Technologies
markku.hanninen@andritz.com

The global number of our customer partners in the pulp and paper business is truly astounding. Each of our divisions booked new and repeat orders in 2005 from customers that read like the Who’s Who of the industry:

- South America:** Suzano Bahia Sul, International Paper do Brasil, VCP, and CENIBRA.
- North America:** Martco, Grant Forest Products, International Paper, Smurfit-Stone Container, Orchid Paper Products, Weyerhaeuser, Procter & Gamble, and Katahdin Paper.
- China:** Guangzhou Paper, Shandong Huatai, Guizhou Chitianhua Paper, Hengan Group, Nine Dragon, Lee & Man, and Sun Paper.
- Asia and Japan:** United Fiber Systems, April Desa Pangkalan Kerinci, Indah Kiat, Tamil Nadu Newsprint and Papers, Malu Paper, Sirpur Paper Mills, Chuetsu, Nippon Paper, An Binh Paper, Tracodi, and Phuong Nam.
- Australia-Oceania:** Carter Holt Harvey and Australian Paper.
- Europe:** Nettingsdorfer Papierfabrik, Zellstoff Pöls, SCA, Perlen Papier, SCA, M-real, Stora Enso, UPM, UMKA AD Fabrika Kartona, Myllykoski, Mayer-Melnhof, Norske Skog, and Polesine.
- Russia:** JSC Arkhangelsk P&P, Ilim Group, JSC JTI Yelets, and Solikamsk.
- Middle East:** Middle East Paper and Yildiz Sunta MDF.

This follows our vision and strategy to be a life cycle, full-line partner for high-tech production systems, modernizations, and services for the pulp and paper market segments we cover. We truly appreciate this global “vote of confidence” and will, as always, work to maintain your trust.



Bernhard Rebernik
Member of Executive Board
Head of Paper Mill Technologies
bernhard.rebernik@andritz.com

Thank you!

You will see the use of both “tonnes” and “tons” in this publication: tonnes for metric units and tons for American units. Unless otherwise noted, metric units are used.

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Upgrading the Swiss “pearl”

To meet increased customer demand for its lightweight coated grades, Perlen Papier of Switzerland needed a 36% production increase from its deinked pulp line. Andritz provided the solution.

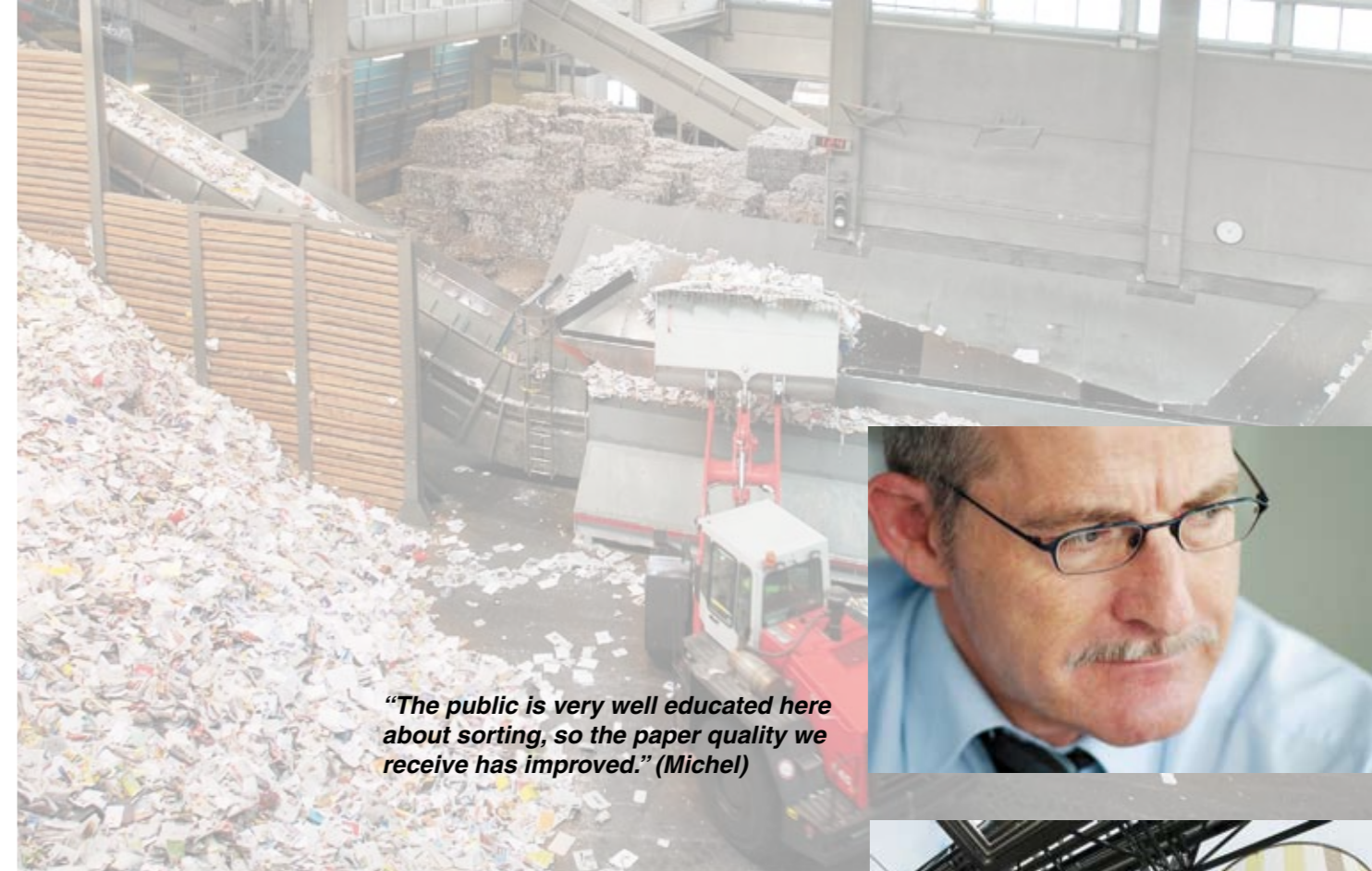


Perlen Papier's mill lies in a picturesque valley on the River Reuss just north of Lucerne. The company, founded in 1872, produces about 300,000 t/a of newsprint and LWC paper on two paper machines.

PM4 (called the “Pioneer”) manufactures high-grade LWC offset papers. In May 2000, Perlen started up PM4 and broke new ground by having the paper produced, coated, calendered, and rolled into large reel-spools inline. Market forces increased the demand for its products, so the company chose to increase the production of LWC by 50,000 tonnes to 200,000 t/a during 2006. To meet its new production target, Perlen had to increase the output of its deinking plant.

Andritz was selected to install the key equipment to raise production from 280 to 380 t/d. The investment was valued at SFr 21 million (€ 13.3 million). Perlen utilizes mechanical, virgin, and recycled fiber in its products. Chips for the TMP line come from local suppliers. The virgin fiberline processes purchased pulp.

Jörg Michel (left), Production and Technical Manager and Member of the Board of Perlen Papier AG, with Hans Jörg Aregger, Manager of the DIP and TMP lines.



“The public is very well educated here about sorting, so the paper quality we receive has improved.” (Michel)

No need to sort

The majority (95%) of Perlen's raw materials comes from Switzerland. The remaining proportion originates from Germany, France, and Italy. Until 1999, Perlen used to sort its recovered paper, but since then it has been in a position to accept unsorted paper.

“We work closely with the local authorities who collect from households and other sources,” says Jörg Michel, Production and Technical Manager and a Member of the Board of Perlen Papier AG. “The public is very well educated here about sorting, so the paper quality we receive has improved. Individual households tie the recycled paper into bundles which go straight into the pulpers.”

The mill no longer accepts old magazines unless there is a shortage of the other recycled grades, which sometimes occurs in the summer months. The increase in capacity, according to

Michel, will not require Perlen to look outside their existing procurement channels.

Upgraded deinking

“In addition to the added capacity, we also wanted to improve the quality of the furnish for both our LWC and improved newsprint,” says Jörg Michel. We wanted to keep our investment at a reasonable level and we only needed an extra 100 tonnes per day,” Michel says. “So we chose to upgrade our existing facility rather than invest in a new plant. The minimum practical size for a new facility would be 600 tonnes per day, almost double our near-term requirements. If we would ever choose to add another paper machine, then we would consider building a new deink plant.”

Perlen Papier has had good cooperation with Andritz for a number of years. In fact, the Andritz RTS™ refiner



Perlen is a niche player in its markets and Switzerland's last independent producer of standard and improved newsprint. It is the country's only producer of LWC papers.





The SelectaFlot™ pre-flotation unit is the heart of the DIP process. It has six primary and two secondary cells.

At the existing plant level, a new FibreSolve™ pulper doubles the pulping capacity of the facility.

This new pulper is the same size as the existing one. Both are fed by a new conveyor, which has a distribution system between the two pulpers.

Following the two pulpers, the existing detrasher is used. Rejects go to a reject drum, while accepts are fed through a high density cleaner via a dump chest and medium-consistency screens to the pre-flotation cells.

The existing screens were rebuilt to accommodate coarse and fine screening and two new ModuScreen™ A units were added for fine screening to handle the additional capacity.

In what is now the top floor of the building, the machine hall is dominated

by the SelectaFlot™ pre-flotation unit. This consists of six primary flotation cells and two secondary cells.

Inside the cells, the injectors are situated along the center axis with foam weirs on either side. The rejects from the primary cells are fed back to the two secondary cells at the front end of the main unit. Aregger noted that, at the end of the six flotation cells, the stock has improved up to eleven points of ISO brightness, which is a much higher gain compared to the existing deinking system. Following the pre-flotation cells, the stock passes through low-density cleaners to a fractionater. A ModuScreen™ A has been installed for this purpose, separating the long and short fibers.

“The Andritz idea of fractionating recycled fibers made it possible for us to significantly raise the capacity to the

500 to 550 tonnes of recovered paper that we feed through the process each day,” Michel says. “Without fractionation, we would probably have not been able to use our existing plant and would have had to build a completely new system.”

After fractionation, the short fibers pass through a disc filter and then to a mixing tank prior to the post-flotation stage. Long fibers pass through low-consistency slotted screens, on to a disc filter, and then to an Andritz twin wire press for dewatering.

The long fibers are then heated and dispersed in existing equipment. The stock is diluted to medium consistency at the outlet of the disperser and then pumped into the mixing tank. In this tank, the long fibers are mixed with the short fiber accepts.



for the production of high-quality TMP installed in 1994 was a pre-condition for the installation of the new PM4 in 2000. The refining process plays a crucial role in ensuring that PM4 produces paper of the high quality which Perlen’s customers demand.

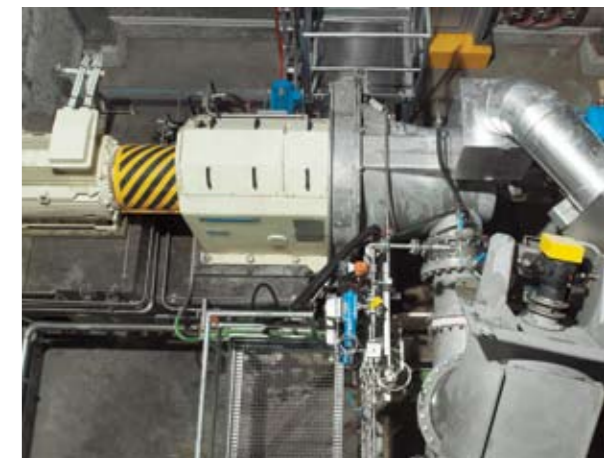
“We consider Andritz to be the most flexible and innovative supplier.” Michel says. “Andritz has always been prepared to take on a challenge. It is an independent company, not linked to any other organization, and prepared to work in close cooperation with us in order to come up with the best way of solving problems.”

Aregger notes that stock out of the SelectaFlot™ unit has improved up to 11 points ISO brightness over the existing deinking system.

The Andritz solution

Manager of the DIP and TMP lines, **Hans Jörg Aregger**, proudly gives a tour of the new installation. The project involved the rebuilding and extension of the existing deinking unit, installation of post-refining for the stock on PM5, and extension of the kraft line.

In addition to the equipment, Andritz supplied basic and process engineering, services for control and measuring equipment, electrical equipment, automation, and supervision of the installation. The project was completed and handed over to Perlen in March 2006. The new section was added on another floor above the existing plant.



Efficient mixing at the post-bleaching stage is done by an Andritz high-consistency mixer.

ModuScreen™ A for both applications, fractionation and fine screening



Thickening in the second loop of the stock preparation system is accomplished with an Andritz disc filter with ten discs. The design allows for two additional discs to be added if additional capacity is needed in the future.

Post-flotation is next in the process. This existing flotation stage has two lines, each with five primary cells and a secondary cell for rejects.

Following a disc filter in the second loop, the stock to be bleached passes through a new Andritz screw press and a high-consistency mixer where hydrogen peroxide is added. Retention time in the high-consistency bleach tower is about one hour. Andritz also supplied the discharge system for the bleach tower.

Near the HC bleach tower are towers for holding the bleached and unbleached stock. These two towers deliver the furnish to the paper machine approach system for PM4 and PM5. The deinking plant features a new Andritz disc filter (DF57) with 10 discs, each 5.7 m in diameter with polypropylene filter medium in the second loop. There is space inside the unit for two additional discs if additional capacity is required.

In the post-treatment system, Andritz provided two Papillon™ refiners, one in the DIP line and the other in the TMP line. In the virgin fiberline Andritz upgraded the pulper with a FibreSolve™ system and two additional Papillon™ refiners.

"In total, we now have four Papillon™ refiners," Michel says. "We have two for the kraft pulp furnish on PM4, one for post-refining TMP, and one for post-refining DIP on PM5. The beating performance and improvement in quality and energy consumption of the refiners, which were our main targets, is what we were expecting. We are convinced there are further opportunities for optimizing the post-refining of our TMP and DIP furnishes."

Early results

"Things are going quite well," Michel says. "We are still optimizing the fiber yield, but all the main targets were met within two months of start-up."

Prior to the upgrade, Perlen was reaching about 58% ISO brightness before bleaching. Now it routinely achieves 61% ISO ±1 prior to bleaching with peroxide. "Our pulp now goes through the disperser without being bleached," Aregger says. "On LWC grades, we have achieved 70 to 71% ISO brightness following peroxide bleaching at the end of the second loop."

Future plans

"Our main markets are in Central Europe," Michel says. "We are moderately optimistic about future opportunities in the improved grades. Expansion is possible, but the timing has to be right."

If we expand paper production, we would definitely need to expand our DIP capacity," he continues. "We would look again to Andritz as a potential partner. We are always looking for innovation, and there are not that many companies with the sort of vision that we expect."

Find out more at www.fiberspectrum.andritz.com

Michel (left) and Aregger (right) enjoying the experience with Andritz equipment.



Perlen Papier

Perlen Papier AG is a member of the Chemie & Papier Holding Group.

It is Switzerland's last independent producer of standard and improved newsprint and the country's only LWC manufacturer.

It has two paper machines. PM4, the newest, is 5.36 m wide and produces 200,000 t/a of LWC. PM5 is 5.4 m wide and produces 130,000 t/a of newsprint.

Managing Director **Frank Ruepp** says, "We have always had a family-oriented culture. We are a small producer in the market, a niche player. We have the reputation of being flexible and reliable. We aim to give value through our speed, innovation, and close cooperation with our customers."

Ruepp believes that the company is in a good position to expand. "We plan to focus on our core business of manufacturing paper for the mass markets of the printing sector and continue to grow organically. This will involve internal development and investment in production processes to maintain the very latest technologies."

Better feed – better cook

Two successful upgrades to the chip feeding line at Norrsundet have removed a costly bottleneck and now keep high-strength pulp flowing to Stora Enso Publication Paper's nearby mills.



Ulf Lundström, Customer Service Manager for Andritz's Pulp Mill Services Division in Sweden, checks the chip feeding mechanism on Cooking Line 4.

"I have to admit to being skeptical when Andritz promised us 500 tonnes of chips a day after the upgrade to Cooking Line 4," **Rolf Lundberg** says. "But when the operators tell me we're running 520 tonnes a day, I know I can believe them." Lundberg is Project Manager for Stora Enso's Norrsundet, Sweden mill. Norrsundet is situated in a scenic setting on the Gulf of Bothnia, 38 km north of Gävle. The mill was founded in 1923.

Today, the mill is one of the most prominent producers of reinforcement (softwood) pulp, with a capacity of about 295,000 t/a, coming from two continuous cooking lines. The output is delivered to three Stora Enso paper

mills: Kvarnsveden in Sweden, Kabel in Germany, and Corbehem in France. Operation of the Norrsundet mill was combined with the nearby Stora Enso Skutskär mill last year.

A two-stage upgrade

The cooperation between Norrsundet and Andritz started in 1998 when chip feeding problems developed in one of the two cooking lines. The chip feeding system for the mill's Cooking Line 4 was performing poorly and required frequent maintenance. The mill experienced problems with hammering in the high-pressure feeder due to disruptions in the chip flow from the chip bin.

The chip bin was installed with the original continuous cooking system. The early design bin, which was state-of-the-art when installed in 1973, employs a "bin activator" that vibrates the mass of chips to keep them flowing. The vibrating motors are mounted around the circumference of the moving bin bottom. This design helps to move chips out of the bin bottom, but is a high maintenance solution, according to **Ulf Lundström**, Customer Service Manager for Andritz's Pulp Mill Services Division in Sweden.

A new Andritz chip metering screw, in combination with the Diamondback® chip bin and an extended chip chute, have eliminated Norrsundet's chip feeding problems.



Rolf Lundberg (left), Project Manager for Stora Enso's Norrsundet mill, with Ulf Lundström of Andritz.

"The motors, hangars, and bottom seal are subject to wear and require periodic replacement," Lundström says. "Also, the flexible rubber boot that seals the bottom can tear and leak process gases. From a process perspective, the steamed chips in the bin have a tendency to stick at constricted points in the bin, causing uneven flow. The bin design is like a funnel, which can result in chips that are not adequately presteamed due to wide variations in residence time in the bin."

Andritz recommended, and Norrsundet selected, an upgrade to the feed system with a new Andritz Diamondback® chip bin. The Diamondback® has a unique geometry that moves chips without sticking or "bridging" – and has no moving parts.

The result is a smooth flow of chips from the conveyor to the reduced

diameter of the chip metering device. Norrsundet's chip bin problems disappeared with the upgrade to the Diamondback®. But no sooner were the chip feeding problems resolved when a new bottleneck appeared – the old steaming vessel.

Less equipment and no compromise

The old steaming vessel was in too bad a condition to repair, as both the screw and housing were damaged over the years, but the primary bottleneck was the short chip chute. This left little "margin for error" if there was any disruption in chip flow. The process control system stopped the chip chute frequently due to high chip levels.

"It became evident that we had to do something with the steaming vessel as

we were losing production," says **Bernt Åkerdahl**, cooking process expert at Norrsundet. With a career spanning 35 years at Norrsundet, Åkerdahl has seen just about everything possible in a cooking process. "The question was whether we should order a new steaming vessel or find another solution."

In early 2005, Åkerdahl asked the process experts at Andritz to visit the mill and survey the situation. Andritz presented an alternative to upgrade the process section with new technology. Norrsundet's success with the Diamondback® chip bin paved the way.

"If we had replaced the steaming vessel only, we would not have seen any improvements in overall production," Åkerdahl says. "Thanks to a well thought-out concept presented by Andritz, we would actually be able to

increase our capacity and reduce the amount of process equipment. Andritz ensured us that we would have a more stable process without making any compromises in our quality targets.”

Andritz chip metering screw

The second Andritz upgrade of Cooking Line 4 consisted of replacing the old steaming vessel and chip meter with an Andritz chip metering screw and extended chip chute. The work began

in early October 2005 and took six days to complete. According to Lundström of Andritz, chip metering screws are routinely utilized in new cooking systems, but are also valuable retrofits if there is a large offset in the chip bin or if a new chip bin is built next to an existing one.

The Andritz chip metering screw is a horizontal screw feeder that measures and controls the volume of chips entering the cooking system. Each revolution of the conveyor feeds the same volume of chips. There are two basic models – single-screw and double-screw.

Norrundet installed the single-screw model, which uses a single conveyor screw to meter the chip flow.

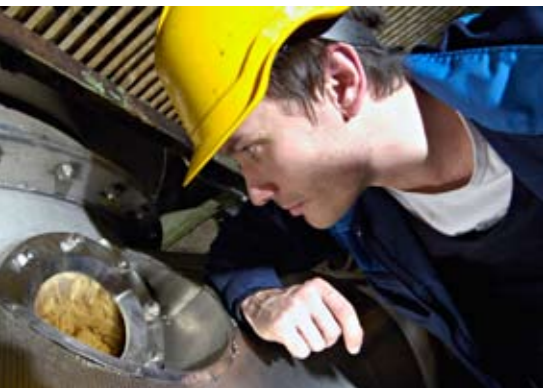
The chip metering screw precisely measures and controls the amount of chips entering the continuous cooking system. Norrundet installed the single-screw model on Cooking Line 4.

This model is normally used for smaller chip feed rates and where the inlet nozzle is small.

Now and in the future

The steaming vessel was also removed as part of the second stage of the upgrade project. In the future, the Andritz design allows the mill to easily incorporate the TurboFeed® chip pumping system (which eliminates the High Pressure Feeder) into the cooking line.

“Following the start-up on October 8, we have not encountered any production bottlenecks and the quality is just right,” Lundberg says.



Bernt Åkerdahl, cooking process expert at Norrundet, discusses the successful chip feeding project. “We process more chips and maintain the same good quality.”

“The project went perfectly in every way. It was carried out with a spirit of great cooperation. I think the biggest challenge for us was dismantling the old equipment to make way for the new Andritz technology within the planned shutdown time.”

Any plans for an upgrade to the second cooking line – or installing the TurboFeed® system?

“It is always a matter of priorities,” Åkerdahl says. “The same type upgrade that we did to Line 4 can, in principle, be done for our second cooking line. It certainly has potential. I feel that we will do the upgrade; it’s just a matter of when.”

“The cost savings we have achieved and the more stable process are very important to us,” Lundberg says. “The technical accomplishment here is the ability of the upgraded technology from

Andritz to process more chips in this relatively narrow screw than we could before with a steaming vessel that was three times bigger – while maintaining the same good quality. I am very happy to say that my initial skepticism about achieving production over 500 tonnes a day has completely disappeared.”

Find out more at www.fiberspectrum.andritz.com

Stora Enso Norrundet

Stora Enso is an integrated paper, packaging, and forest products company with sales in excess of €13 billion and 46,000 employees in 40 countries. It is a global market leader in publication and fine papers, packaging board, and wood products.

Stora Enso’s production facilities have a total production capacity of 16.9 million t/a of paper and board, and 7.7 million cubic meters of sawn wood products. Customers include publishers, printing houses, and merchants, as well as the packaging, joinery, and construction industries – and are mainly concentrated in Europe, North America, and Asia.

As Stora Enso moves into the future, the Group is focusing on expanding its operations in growing markets such as China, South America, and Russia.

The Norrundet pulp mill in Sweden was founded in 1923. During its early years, the annual capacity of 15,000 tonnes made it one of the largest and most modern pulp mills in Sweden. Today, Norrundet is a well-known producer of long fiber (reinforcement) pulp – adding strength to various kinds of paper products. Today, the mill has an annual production capacity of approximately 295,000 tonnes.

Investing for the future

Ružomberok (known also as Rosenberg) is a town with approx. 35,000 inhabitants nestled in the mountainous Žilina Region along the Váh River. With a history of papermaking dating back to the mid-17th century, today MONDI BUSINESS PAPER (MBP) SCP is the largest fully integrated pulp and paper mill in Slovakia. The mill is also the principle employer in Ružomberok, thus MBP SCP is totally committed to corporate citizenship and the welfare of internal and external stakeholders.

“Ružomberok mill has been an integral part of my life and I am proud to be a part of the investment and modernization programs for this world-class mill. We have competent and dedicated employees and state-of-the-art equipment; that said, I firmly believe there is always room for improvement no matter what we do,” says **Vladimir Krajči**, MBP SCP’s Head of Recovery Line and third generation employee at the mill. MBP’s CEO **Günther Hassler** explains:

“In Ružomberok, the local management team did an excellent job to develop the site to a first class central European integrated mill. In many operational respects Ružomberok leads the MBP internal benchmark, which is the result of highly motivated and skilled people and meaningful investment programs.” MBP is striving to become the benchmark leader in business papers by the end of 2006, with Operational Excellence and Sustainable Development as

the cornerstones of this program. “Sustainable management means investing in the future. This not only involves well managed forests and minimized emissions, but also social responsibility. In addition, a unique Group-wide idea management system reinforces our commitment to innovation and better market knowledge. These, along with close customer relations, are the basis for supply chain leadership,” says Hassler.

Increasing capacity, decreasing environmental impacts

In 2005, the mill produced more than 400,000 tons of pulp and over 480,000 tons of uncoated wood-free office papers. Most of the paper produced at Ružomberok comes from hardwood and softwood pulp manufactured at the pulp mill on the premises.

“A significant landmark occurred in 2002 with the implementation of a € 240 million modernization program called the IMPULS project. Our PM18 was rebuilt and the pulp plant was completely renovated. This increased mill capacity considerably and, more importantly, dramatically improved our environmental performance,” says Krajči.

Vladimir Krajči, Head of Recovery, with Ruzomberok’s new Andritz recovery boiler in the background.



MBP’s Ruzomberok mill, nestled in a mountainous region of northern Slovakia, produces about 480,000 t/a of woodfree paper products.

A pressurized liquor handling system, after the rebuilt 470 t/h evaporation plant, delivers 76% dry solids black liquor to the Andritz recovery boiler. The higher dry solids content of the black liquor helps lower the mill’s SO₂ emissions.



Slovakia has mastered much of the difficult transition from a centralized planning economy and has become a modern market economy. The government has privatized most businesses. The banking sector is mostly owned by banks of EU member countries. Furthermore, the government has helped facilitate a foreign investment boom with business-friendly policies. Economic growth continues to prosper, especially in the automotive industry. Slovakia’s economic growth exceeded expectations in 2001-2005, despite the general European slowdown.

Today Slovakia is a young, vibrant and independent nation, albeit, the Slovaks have existed as a unique entity for over 1500 years. Slovakia joined both NATO and the EU in the spring of 2004.

Slovakia is landlocked and its terrain is mountainous and rugged which encompasses the Tatra Mountains in the north. Austria, the Czech Republic, Hungary, Poland, and the Ukraine surround Slovakia, which is geographically considered to be central Europe.



High-efficiency electrostatic precipitators contribute to the low emissions of the 900 tds/d Andritz recovery boiler.

Air and water emissions - IMPULS Project			
Emissions (kg/ton pulp)	Before IMPULS	After IMPULS	BAT
TRS	0.66	0.04	0.2
SO ₂	3.8	0.8	0.8
COD	13.7	5.3	8-23

IMPULS = € 240 million investment program at Ruzomberok
 BAT = Best Available Technology

The IMPULS project yielded significant improvements for the environment. Data shows that the modernization of the pulp mill has reduced emissions significantly and the environmental performance of the mill has improved. "I would like to highlight that emissions have been significantly reduced through the use of the latest technology. The complete elimination of sulfur has resulted in a reduction of more than 90% in odors. And, SO₂ emissions have been cut by around 64% and, therefore, meet all BAT – Best Available Technology – standards. Furthermore, particulate emissions from the lime kiln have fallen by more than 95%. These are significant changes which have a positive outcome for the local community," notes Krajči.

Ensuring long-term competitiveness

For a mill like MBP SPC to succeed on all levels it is crucial that its suppliers deliver superior and innovative equipment. A profound understanding of operations is fundamental, coupled with undivided attention to detail, which is essential. Andritz has been a partner with MBP SPC since 1995 with the most significant deliveries and instal-

Modern natural gas load burner at the front wall of the recovery boiler.



An operator cleans a liquor gun port on the firing floor of the recovery boiler.

"I have heard no complaints from my staff which means operations are running smoothly." (Krajči)

lations completed during the IMPULS project. "We researched several options for modernizing and making the mill more efficient. Andritz was the most suitable partner regarding equipment, cooperation, installation, price, and delivery. That said, we did put very high requirements on Andritz regarding guarantees, but they were, and still are, able to pull it off starting with, for example, the evaporator retrofit project. Over the years, Andritz has proven to be an excellent choice and partner," says Krajči.

The evaporator project was split into two phases, explains Andritz's **Henrik Eneberg**, Sales Director, Recovery Division. The first phase was the rebuild of the multi-effect evaporator and the second phase was to install a new Mechanical Vapor Recompression (MVR) pre-evaporator. "Evaporation is done with electrical energy by compressing the vapor with a fan. We closed the first phase in summer 2003 and the second phase was left as an option, and consequently ordered shortly thereafter in November 2003."

Head of Andritz's US sales team, **Liisa Simonen** sold the recovery boiler which was delivered and installed at Ružomberok mill in record time.

A decade of partnership - Andritz and Ružomberok mill

- 1994/95 Rebuild and extension of the recausticizing plant: new slaker, causticizer, Ecofilter, and CPR lime mud filter.
- 1998 Evaporator plant audit. Installation of smelt dissolving tank and scrubber. Retrofit of recovery boiler, including air system modification.
- 2001 Installation of vacuum system for evaporation plant, including control and manual valves.
- 2002 New recovery boiler.
- 2003 Installation of NCG SOG system and main components for Phase 1 evaporation plant extension. Installation of Phase 2 MVR pre-evaporation. Installation of chip screen for woodyard.
- 2005 Consignment inventory for refiner plates. Headbox screening system for PM 16 and new cleaner plant.



The "penthouse" of the MBP SCP's new boiler, which was delivered in only 18 months from contract signing to start-up. Shown are the main steam pipe and superheater connection pipes.

The operation was on a global scale with a team working from Andritz's Atlanta office under the supervision of **Jarmo Orantie**, Project Manager.

"The project was superbly executed from the signing of the contract to start-up in only 18 months. Albeit, we were somewhat concerned since it involved a team based in the US, production in Finland, and several suppliers from various countries. This type of operation naturally entails detailed coordination and communications. Again, we were extremely pleased with the end result. The recovery boiler has exceeded our expectations and emissions are at almost zero level," says Krajči. Andritz also delivers after sales services and maintenance to Ružomberok.

"At the mill, we continuously seek ways to improve capacity and so there are always several smaller jobs which we have in the pipeline. We are fully aware of what the various competitors have to offer in terms of products and services. However, the synergy with Andritz has always been very good and the technology offered is superior. Prior to making any type of investment, we assert a pragmatic and realistic approach for new equipment or upgrades. We seek flexibility and solutions by listening to our suppliers and in this regard Andritz has done so in every phase of a project. But note that the competitors also have advanced technology, solutions, and good prices and it is a very competitive market," explains Krajči.

The bottom line

Competitors in this industry are always watching and learning from each other. This involves continuous commitment in R&D, and, naturally, when new and more efficient or innovative products become available, competitors always try to improve upon the existing product. "What is fundamentally important is that equipment ordered exceeds expectations and, moreover, there is continuous cooperation, dialog, and communications between all. Andritz has done well in this. Since the installation of Andritz's equipment, I have heard no complaints from my staff which means operations are running smoothly," says Krajči.

Find out more at www.fiberspectrum.andritz.com



Mondi Business Paper

Pushing the limits

The globally active MBP is one of the market leaders in business paper. In addition to its pulp and paper production facilities in several countries, the Group also has forestry operations in Hungary, Israel, Russia, and South Africa.

MBP is a 100% subsidiary of the MONDI Group, which encompasses more than 130 subsidiary companies in 46 countries and over 50,000 employees. In 2005, MBP's 15,000 employees produced around 2.1 million tons of paper and 1.6 million tons of pulp, generating a total turnover of € 1.8 billion. MBP serves its clients on all five continents.

MBP SCP is proactively involved with the local community. In 2002, a four year general agreement was signed with the city of Ružomberok obliging the company to invest approx. € 1 million each year in the areas of sports, education, and health. In addition to the funds donated within the framework of the general agreement, MBP SCP supports charities, surrounding towns, NGO's, and cultural activities with more than € 250,000 per year.

Top quality, top position in China

Active in 14 provinces, Hengan has risen to become the leading domestic corporation for family hygiene products in China. Building upon an eight-year relationship with Andritz, Hengan recently ordered another CrescentFormer tissue machine. In February 2006, a contract signing ceremony took place near the Weifang City mill in Shandong Province. Bernhard Rebernik, head of Paper Mill Technologies and a member of Andritz's Executive Board, attended the ceremony.



Hui Lin Chit, Deputy Chairman and CEO of Hengan

Hengan's decision to purchase another new Andritz tissue machine reflects a relationship that has prospered over the past eight years.

The contract ceremony, followed by a banquet, was attended by about 100 important figures in the Chinese paper industry, as well as print and television journalists. This underlines Hengan's standing among Chinese tissue producers. Yet, **Hui Lin Chit**, Deputy Chairman and CEO of Hengan, is modest about his company's position –

"We are a young enterprise in the tissue sector, and have not yet reached the status to be considered important."

Efficient sales network

For Hui Lin Chit, Hengan's main advantage over its competitors is a highly effective sales and distribution network throughout China. "Before we focused on expanding our production capacity, we built up an extensive sales network," he says. A further decisive role in his company's success is played by Andritz. "Ten years ago, high-quality tissue was not readily available in China," Hui Lin Chit says.

"So, when we entered this market, we did not have experience in the production of tissue. In 1996, Andritz held a seminar in China and those presentations started our successful relationship and close communication." Following the Andritz seminar, Hui Lin Chit visited a number of mills in Europe.

"That is where I saw finished products of extremely high quality," he remembers. Before he traveled to Europe, he visited plants in Taiwan and other countries in Asia, but found that the quality was not comparable. "I had full confidence that we would soon lead the Chinese market, but no one else seemed to believe that Hengan could be a serious competitor in the tissue industry."

Bernhard Rebernik of Andritz (left) and Xu Wenmo, General Sales Manager for Hengan, at the signing ceremony for Hengan's purchase of the latest Andritz tissue machine.



The new PM5 at Weifang City will be a duplicate of the PM3 machine shown here. It will have the capacity to produce 60,000 t/a of high quality tissue, increasing Hengan's overall capacity to over 240,000 t/a of tissue products.

Cao Zhen Lei, President of the China National Household Paper Industry Association.



Soon the skeptics would have to eat their words when the cooperation between Hengan and Andritz turned out to be extremely successful.

The first machine (PM1) was delivered to Hengan's mill in Changde City (Hunan Province) in 1998, followed by PM2 in 2002. Each machine has a working width of 3.65 m and produces 34,000 t/a. For Hui Lin Chit, these two machines formed the first stage of Hengan's development in the tissue business. "During this period, we focused on learning how to handle the technology, training workers, and exploring the market," he explains. By 2000, the tissue sector had become the major profit producer for the Hengan Group. The next stage began when the company chose to buy a large machine instead of several smaller machines.

"In 2003, we decided to build two plants, each producing 120,000 tonnes per year," Hui Lin Chit says.

"In China, almost 1000 companies produce tissue," explains **Cao Zhen Lei**, President of the China National Household Paper Industry Association (CNHPA). "Only about 30 of these companies produce more than 10,000 tonnes per year, and only four produce over 100,000 tonnes."

On the last day of August in 2005, the new PM3 from Andritz started production at Hengan's new mill in Weifang City. The machine has a working width of 5.55 m at the reel and a design speed of 2000 m/min.

The mill, 150 km from Qingdao, the port for the 2008 Olympic water sports events, employs 450 people.

The Hengan Group

Established in 1985, Hengan Group Company Ltd. was one of earliest foreign investment enterprises entering the sanitary napkins market in the People's Republic of China.

The Hengan Group has grown steadily to become the largest sanitary napkins manufacturer, the second largest disposable baby diapers manufacturer, and a major supplier of personal hygiene products. Hengan now employs 10,000 people and has a nationwide distribution network.

In December 1998, Hengan stock was listed on the Union Stock Exchange of Hong Kong, which was a great milestone in its short history.

The latest Andritz machine: PM5

Location: Weifang City (Shandong Province)

Capacity: 60,000 t/a
Design speed: 2000 m/min
Working width: 5550 mm

Headbox: Two-layer with dilution control
Former: CrescentFormer
Yankee: 4572 mm diameter
Hood: EquiDryF hood and circulation air system
Other: Felt run with PrimePickup™ and suction press roll
Advanced reel
Dust removal system
Mist extraction

Start-up: July 2007

PM5, the newest Andritz machine, will be identical to PM3 and is scheduled to be completed by July 2007 at Weifang City.

Each start-up is faster

Rongwang Ren, Deputy Chief Engineer in Weifang, can trace the company's experience in tissue production to the time it takes to reach the guaranteed production speed level for each machine. "It took 36 months to reach maximum capacity with PM1, 24 months with the second machine, and six months for the third," Rongwang Ren says. "I think the learning curve for PM5 will be even shorter." With the tissue business currently growing from 8-10% per year, Hengan can certainly benefit from a fast start-up. At the moment, the company's supplier of parent rolls for converting cannot keep up with the demand. The sooner Hengan achieves its goal of producing 120,000 t/a from PM3 and PM5, the better it will be for the company.

"Once PM5 is running, Weifang will be the biggest for us in terms of production and sales," says Hui Lin Chit. "We are benefiting from the long-standing and good cooperation with Andritz. We are very satisfied with the technical support and the service we get. We are pleased that Andritz is continuously enhancing its technology. Each new machine has improved and offers advanced features."



Above and below: Operators of the Andritz PM3 machine at Weifang City



Many more opportunities

"We entered this industry in order to meet the demand for domestic products," Hui Lin Chit says. "We started by producing baby diapers, which was a brand new product in China."

The concept paid off. Baby diapers turned out to be a very successful production. From 2003 to 2004, diaper consumption reached 2.9 billion units sold. CNHPA estimates that the volume increased 30% in 2005.

Hengan is making every effort to achieve design capacity of 180,000 tonnes in 2006. "We will also conclude contracts with suppliers for an increase to 300,000 tonnes by 2010, and we want to increase annual production to 500,000 tonnes," says Hui Lin Chit.

The Hengan Board of Directors chose two locations for further investments, Zhejiang and Guangxi. When asked about the nature of these new projects, Hui Lin Chit reveals, "We want to improve our grades." Hengan is planning a pilot project to import TAD tissue from the United States to produce handkerchiefs for the Chinese market. Would the next logical move be to start production with TAD technology?

"At the moment, it is difficult to envisage when that will be," Hui Lin Chit says, "but I have confidence that the market will respond favorably to TAD paper."

Find out more at www.fiberspectrum.andritz.com

Hengan is China's leading producer of sanitary napkins, and second in the production of disposable baby diapers. Last year, China consumed 2.9 billion disposable diapers and the market is growing 8-10% per year.



Clash-proof refining

The gap between rapidly spinning plates in a refiner is very small (1 mm or less). Disruption to the chip feed, or a foreign object in the chips, can cause the refiner plates to clash against each other. Sometimes clashes are quite violent – destroying the plates and bearings. A new digital Refiner Protection System (RPS) decreases clashes and increases production stability for Norske Skog Saugbrugs's TMP mill in Halden, Norway.

A Refiner Protection System is nothing new. Analog versions, designed to protect refiners from plate “clashes” and other serious disturbances, have been around for years.

What is new, however, is the digital RPS developed by Andritz. The digital system responds quicker, is more accurate, and delivers diagnostic information to help determine the cause of the clash.

A plate clash can be a very disruptive and violent event. Imagine the effect of two large masses of engineered metal, one stands still, the other one is spinning at 1500 rpm, being pushed together head-on inside the refiner. This can occur when there is a disruption in the chip feeding system (causing the refiner to be fed with air instead of chips) or when a foreign object (usually metal) enters the plate gap with the chips.

Karl Mosbye, Senior Research Engineer (left) and Kjell Ove Vegstein, Control Engineer (center) of Norske Skog, with Göran Sundkvist of Andritz AB. Norske Skog installed Refiner Protection Systems for their T-60 and S3000 refiners at the Saugbrugs mill.



New refiner disc plate (above) and heavily damaged refiner disc (below) after a plate clash.



At best, the clash simply causes a production stop. At worst, the plates, bearings, or casing are destroyed. When this happens, a mill is likely to lose at least a full shift of production as the plates and bearings are replaced. In the event of casing damage, downtime could last several weeks. While even a small clash will cause damage, a near-clash will not. A responsive and accurate RPS ensures that near-clashes do not become actual clashes.

Clashes at Saugbrugs

The old analog protection system at Norske Skog Saugbrugs mill in Halden, Norway was installed in 1992. Though it was initially state-of-the-art, it had, over the years, become very temperamental. The Saugbrugs mill is one of the largest

and most modern production facilities for SC magazine paper (550,000 t/a) in the world.

The old system “shut down the refiner without any reason,” says **Kjell Ove Vegstein**, Control Engineer at the Saugbrugs mill. The sensors were not reliable and the unfiltered signals from the sensors were often disturbed. “Sometimes it seemed that if you kicked the refiner, the protection system would shut it down,” Vegstein says. “After each shutdown, we would need a minimum of 15 to 20 minutes to get running again.” To compensate for the analog system’s unreliability, operators would lower the protection system’s setpoints, which, in turn, increased the risk for serious plate clashes, according to Vegstein.

First test at Follum

A prototype version of Andritz’s RPS was first tested at Norske Skog’s Follum mill in 2003. NSI’s Senior Research Engineer, **Karl Mosbye**, followed the project from Norske Skog’s side and took part in the evaluation.

Gerald Zeilinger, Automation Engineer for Andritz’s Mechanical Pulping Systems Division in Vienna was the project leader. “We started by running an Andritz SB170 refiner towards a controlled clash,” Mosbye says, “and studying what happens inside the refiner. The digital RPS was used in parallel with the old one. The new system was not in closed loop with the process and, therefore, could not stop the refiner. The data were relevant for the next step.”

When testing the digital RPS, Mosbye and Zeilinger analyzed the Fourier diagrams on the system’s control panel while the refiner was online.

“From the diagrams, we could determine the vibrational frequencies which were most dominant just before a clash,” Mosbye says. “There was no way to do this with the old analog system.”

“Running a TMP line is extremely demanding,” Mosbye says. “It is difficult to get stable and relevant measurement results. The software with the digital RPS gives us new possibilities to optimize the refiner operation. The old system was more of a ‘black box’ which was also difficult to calibrate. Plus, the replacement parts for the old system were quite expensive.”



Roy Woldheim, Operator and Kjell Arve Kure, Production Manager for Pulp & Energy at Saugbrugs.

Clash-proofing Saugbrugs

Based upon the successful prototyping at Follum, economic analysis for installing the new Andritz RPS at Saugbrugs was conducted in 2004.

“We performed the ROI calculations to make sure the project could be economically justified,” says **Kjell-Arve Kure**, Production Manager for Pulp & Energy at Saugbrugs.

The project was approved and the order placed with Andritz in March 2005. The first RPS was installed during a three-day period in autumn 2005 on an Andritz Twin 60 refiner line producing 450 t/d. By November 2005, another new digital RPS was installed on the second refiner line during a two-day shutdown.

In total, Norske Skog Saugbrugs equipped six refiners – four T-60’s and two S3000’s – with the new RPS. An Andritz automation engineer was on-site for the start-up and tuning of the system. Working together, Andritz and mill personnel established the limit values. When the refiner approaches a critical limit, the RPS safely shuts down the refiner and broadcasts the alarm to the DCS in a time interval less than 30 milliseconds.

To enhance the basic operation, Andritz personnel will add some features to the RPS at Saugbrugs. New condition monitoring software, including diagnostics and graphic displays (RPS Condition Monitoring Software) will be added. The software works with operating data stored in the RPS computer to help the mill get information about plate conditions and refiner performance for preventive maintenance planning.

”All refiners at Saugbrugs are now running with the new digital system, but

there are others within Norske Skog for which we will consider the RPS,” says Mosbye. “The decision will be made based upon the stability of the process that each refiner is involved in.”

Automation knowledge and pulping knowledge

There are several machine protection systems available on the market, but none are backed by the process expertise of Andritz. “There was never any discussion about who would supply our system,” Kure says. “Andritz RPS is tailor-made for Andritz refiners.” In reality, the Andritz RPS is easily installed on any brand of refiner – not just Andritz. In fact, since the system monitors signals based upon frequency acceleration, it can be installed to monitor other rotating equipment such as gearboxes. One RPS can monitor up to four units – four refiners, four gearboxes, or a combination of the two.

The Andritz digital RPS is now shipped as the standard for all new refiners sold and is offered as an upgrade for existing refiners. “The price compared to performance is very good,” Kure says.

Very good cooperation

“The cooperation between Norske Skog and Andritz is very good,” Kure says. “Together, we can continue to develop the refining process at Saugbrugs and also the refiner protection system.”

“We have carried out several different activities and changes to improve performance at the same time,” Kure continues, “so it is difficult to isolate the effect of just the RPS. But we can trace improved refiner operations to the installation of the Andritz RPS. The number of refiner stoppages, for example, has decreased dramatically.”

Kjell Ove Vegstein (left) and Kjell Arve Kure. There is no need anymore for operators to lower the protection setpoints with the new digital RPS.



Norske Skog Saugbrugs

With mills in 15 countries, Norske Skogindustrier ASA supplies about 13% of the newsprint and 8% of the magazine papers produced in the world. The company’s operating revenue is approximately € 3.2 billion.

Norske Skog Saugbrugs in Halden, Norway, was founded in 1859 by local sawmill owners. The first production of paper at the mill started in 1915. In 1937, the first SC magazine paper machine was started. The next two machines, PM4 (started up in 1963) and PM5 (started up in 1968) are operating today after several rebuilds.

In 1989, Saugbrugs became part of the Norske Skog group.

The newest paper machine, PM6 with a trim of 8.6 m, started up in 1993. Investments in the 1990’s, totaling over € 500 million, included the new machine, a new boiler, and a major rebuild of PM5.

Today the mill is one of the world’s leading and most modern producers of SC magazine paper. Annual production capacity of the mill is 550,000 tonnes. Saugbrugs has adopted advanced production and environmental technology in order to effectively meet the challenges of the future.

New Orders

Key Equipment

ICT Iberica
El Burgo de Ebro, Spain
Tissue machine, 5.55 m working width at reel
Repeat order Crescent Former
First commercial installation of Papillon™
refiners in a tissue plant

Upgrades & Modernizations

Kimberly Clark
Barrow in Furness, United Kingdom
Upgrade pope reel

Paper & Board Machines

Upgrades & Modernizations

Mayr-Melnhof Eerbeek
Eerbeek, Netherlands
Rebuild of Yankee dryer section

Ventilation and Drying For Tissue and Paper/Board Machines

Key Equipment

Mayr-Melnhof Eerbeek
Eerbeek, Netherlands
MG-hood for board machine

Upgrades & Modernizations

Shandong Hengan Paper
Weifang City, Shandong Province, China
Hood, air system and dust removal system for tissue machine

Cartones y Papeles del Risaralda
Risaralda, Columbia
Heat recovery unit and humidity sensor

Procter & Gamble Paper Products
Oxnard, California, USA
Turbine exhaust
Prime foil

Procter & Gamble Paper Products
Jackson, Missouri, USA
Prime foil

Scott Paper
Crabtree, Quebec, Canada
Scrubber for winder #24 converting

Confidential Customer
USA
Upgrades of Yankee hood and air system and TAD hood and air system; dust removal system

Jiangxi Chenming Paper
Nanchang, Jiangxi Province, China
RT-RTS™ TMP system
The first and largest RT-RTS™ TMP system in China

Papierfabrik Albruck
Albruck, Germany
Bleach plant rebuild

Estonian Cell
Kunda, Estonia
P-RC™ APMP market pulp line
Market pulp line based on aspen as raw material with a capacity of 140,000 t/a

Upgrades & Modernizations

Norske Skog Golbey
Golbey, France
Extension of the TMP system
Highest throughput of 450 t/d S3000 high-speed refiner

Panelboard

Complete Lines & Systems

Hubei Baoyuan Group
Jinmen, Hubei Province, China
Pressurized refining system for MDF with a capacity of 456 t/d

Kronospan
Egorievsk, Russia
Pressurized refining system for MDF with a capacity of 576 t/d,
incl. plug screw squeeze water handling

Upgrades & Modernizations

Egger Holzwerkstoffe Wismar
Wismar, Germany
Plug screw feeder, ribbon feeder and refiner for MDF pressurized refining system (864 t/d)

Fiber Preparation

Complete Lines & Systems

Shandong Huatai Paper
Dongying City, Shandong Province, China
Pulping system incl. HD-cleaner and sludge dewatering system for PM11, paper machine approach system, thick stock screening, and disc filter
Largest Andritz thick stock screening delivery

Guangzhou Paper
Guangzhou, Guangdong Province, China
Pulping and sludge dewatering system for a new newsprint PM

Holmen Paper Madrid
Fuenlabrada (Madrid), Spain
Paper machine approach system, FibreFlow® drum pulper, 4 pulp screw presses, 2 gravity tables, 2 sludge screw presses

Key Equipment

Pfleiderer Teisnach
Teisnach, Germany
Low-consistency pulper for short fiber (décor paper)

M-real Stockstadt
Stockstadt am Main, Germany
Low-consistency pulper for eucalyptus (magazine paper) and Papillon™ refiner for coated fine paper and copy paper

Papierfabrik Wattens
Wattens, Austria
Papillon™ refiner for cigarette paper

Stora Enso Kabel
Hagen, Germany
2 Papillon™ refiners for SC grades and magazine papers

Papierfabrik Lenk
Kappelrodeck, Germany
3 Papillon™ refiners for primary and post-refining of sulphate and sulphite pulps (bleached and unbleached)

Nordland Papier
(Member of the UPM-Kymmene Group)
Dörpen, Germany
2 ModuScreen™ CR coarse screens for virgin fiber (PM4)

Norske Skog Paper Mills
Lavington (Albury), Australia
Main equipment for paper machine approach system

Tissue Machines

Upgrades & Modernizations

Kimberly-Clark
Barrow in Furness, United Kingdom
Sheet transfer system and center wind reel

Paper & Board Machines

Upgrades & Modernizations

UMKA
Umka-Beograd, Serbia and Montenegro
Rebuild of folding boxboard machine

Ventilation and Drying For Tissue and Paper/Board Machines

Key Equipment

Holmen Paper Madrid
Fuenlabrada (Madrid), Spain
PM hood and air system

Recent Start-ups

Wood Processing

Complete Lines & Systems

Estonian Cell
Kunda, Estonia
Woodyard
First RotaBarker™ barking line in Europe

Key Equipment

Andhra Pradesh Paper Mills (APPM)
Rajahmundry Mill, India
Chip screen and rechipper

Fiberline

Upgrades & Modernizations

Ilim Pulp Enterprise
Ust-Ilimsk, Russia
Cooking plant modernization
Second Andritz digester rebuild in Russia

VCP

Luiz Antonio, Brazil
Modernization of an existing cooking system: Increase of digester capacity and upgrade to Lo-Solids®
ACE III Advanced Control

CMPC Celulosa

Laja, Chile
Modernization of an existing fiberline with new screening, washing, and oxygen delignification

Georgia-Pacific

Palatka, Florida, USA
Modernization of an existing fiberline with new screening, washing, and oxygen delignification.
Multiple lines of batch cooked pulp handled by a flexible screening system.

Confidential Customer
Florida, USA
Modernization of an existing fiberline with new washing
First installation of a new VMax vacuum filter followed by a DD washer.

Recovery

Complete Lines & Systems

Yingkou Paper Mill
Yingkou, Liaoning Province, China
5-effect evaporation plant

Portucel Soporcel Group
Cacia, Portugal
Recovery boiler

Upgrades & Modernizations

Weyerhaeuser
Springfield, Oregon, USA
Recovery boiler upgrade

Weyerhaeuser
Flint River, Georgia, USA
Recovery boiler upgrade

Mondi Business Paper
Syktvykar, Russia
Recovery boiler upgrade

Mondi Packaging Paper
Swiecie, Poland
Evaporator upgrade
80% dry solids

Chemical Systems

Key Equipment

Sappi Fine Paper North America
Skowhegan, Maine, USA
LMD-Filter™

Upgrades & Modernizations

UPM, Tervasaari paper mill
Tervasaari, Finland
Lime kiln upgrade

Stora Billerud
Skärblacka, Sweden
Lime kiln modernization

Pulp Drying & Finishing

Complete Lines & Systems

Estonian Cell
Kunda, Estonia
Flash drying system, slab press, and baling line

Mechanical Pulping

Complete Lines & Systems

Jiaozuo Ruifeng, Forest & Paper
Jiaozuo City, Henan Province, China
P-RC™ APMP system with Andritz S2070 refiner
Largest P-RC™ APMP system in China with a capacity of 450 t/d

Henan Puyang Longfeng Paper
Puyang, Henan Province, China
P-RC™ APMP with Andritz S2070 refiner



ANDRITZ PULP & PAPER



Australia

Tel: +61 38 795 9800
Fax: +61 39 799 4899
E-mail: pulpandpaper.au@andritz.com

Austria

Tel: +43 316 6902 0
Fax: +43 316 6902 415
E-mail: pulpandpaper@andritz.com

Brazil

Tel: +55 41 2103 7611
Fax: +55 41 224 0014
E-mail: pulpandpaper.br@andritz.com

Canada

Tel: +1 514 631 7700
Fax: +1 514 631 3995
E-mail: pulpandpaper.ca@andritz.com

Chile

Tel: +56 2 462 4600
Fax: +56 2 462 4646
E-mail: pulpandpaper.cl@andritz.com

China

Tel: +86 10 85 262720
Fax: +86 10 6500 6415
E-mail: pulpandpaper.cn@andritz.com

Czech Republic

Tel: +420 495 518 220
Fax: +420 495 272 423
E-mail: pulpandpaper.cz@andritz.com

Finland

Tel: +358 20 450 5555
Fax: +358 20 450 5150
E-mail: pulpandpaper.fi@andritz.com

France

Tel: +33 549 9393 81
Fax: +33 549 9393 80
E-mail: pulpandpaper.fr@andritz.com

Germany

Tel: +49 7021 50 74 0
Fax: +49 7021 50 7410
E-mail: pulpandpaper.de@andritz.com

India

Tel: +91 11 2905 2094/2883
Fax: +91 11 2905 3227
E-mail: pulpandpaper.in@andritz.com

Indonesia

Tel: +62 21 725 0137
Fax: +62 21 571 0896
E-mail: pulpandpaper.id@andritz.com

Japan

Tel: +81 3 5634 3450
Fax: +81 3 5634 3460
E-mail: pulpandpaper.jp@andritz.com

Poland

Tel: +48 22 8739940
Fax: +48 22 8739939
E-mail: pulpandpaper.pl@andritz.com

Russia

Tel: +7 812 332 5703
Fax: +7 812 332 5707
E-mail: pulpandpaper.ru@andritz.com

South Africa

Tel: +27 31 561 7271
Fax: +27 31 561 6265
E-mail: pulpandpaper.za@andritz.com

Spain

Tel: +34 93 298 8598
Fax: +34 93 432 5997
E-mail: pulpandpaper.es@andritz.com

Sweden

Tel: +46 660 295 300
Fax: +46 660 295 399
E-mail: pulpandpaper.se@andritz.com

Thailand

Tel: +66 2264 0488
Fax: +66 2264 0499
E-mail: pulpandpaper.th@andritz.com

USA

Tel: +1 770 640 2500
Fax: +1 770 640 9454
E-mail: pulpandpaper.us@andritz.com

Visit FiberSpectrum Online at: www.fiberspectrum.andritz.com or the main Andritz site at www.andritz.com