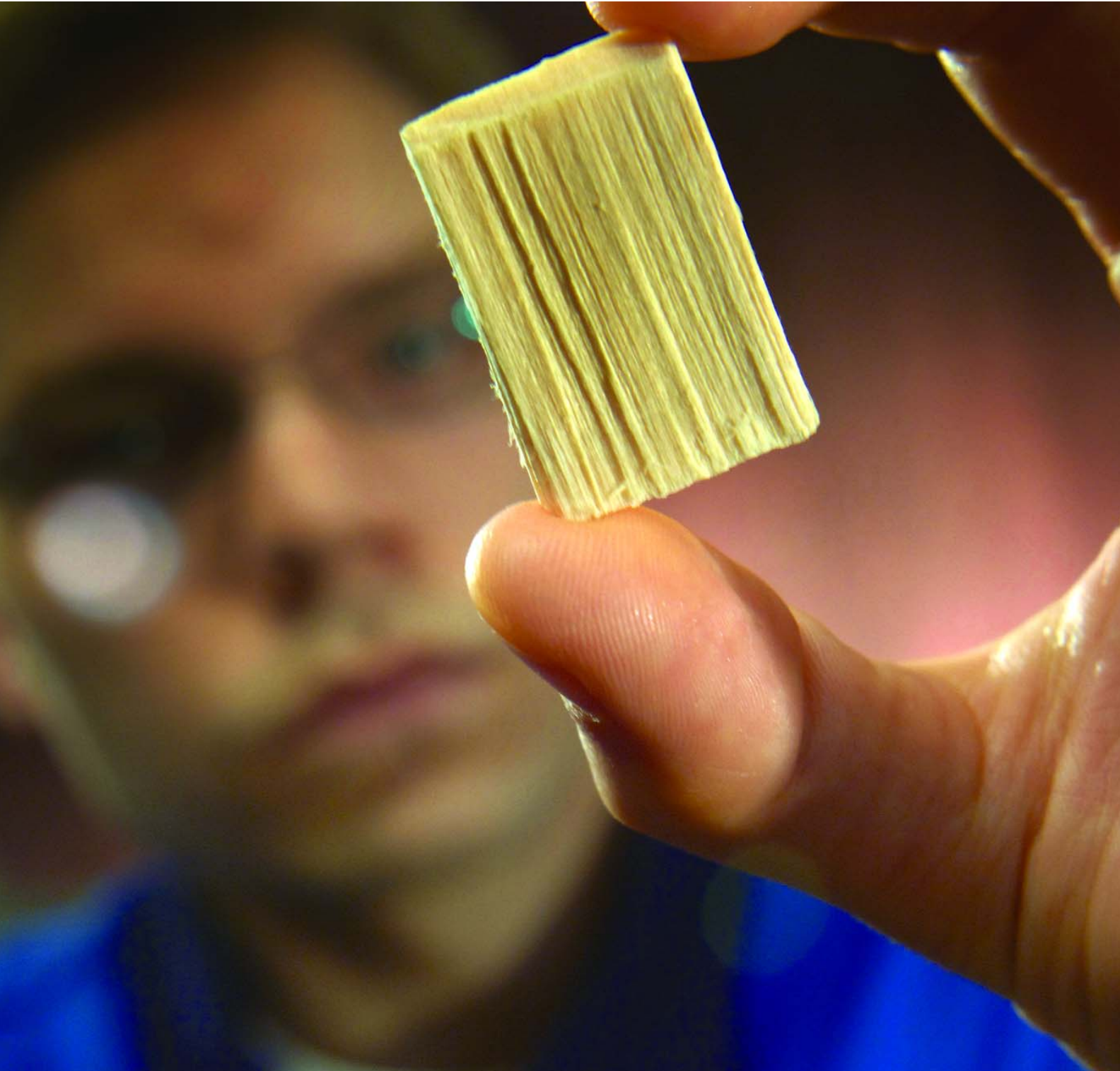


FiberSpectrum

The customer magazine of Andritz Pulp & Paper

Issue 1— 2005



Developing the "perfect chip" at Wisaforest — Page 20

ANDRITZ

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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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The greenfield Veracel mill under construction near Eunapolis in Brazil's Bahia state. The mill has a design capacity of 900,000 admt/a of bleached eucalyptus market pulp and features a complete Andritz fiberline — from digester to finished pulp bales — as well as an Andritz white liquor plant.



A message from **Andritz P&P** Management

As this issue of FiberSpectrum goes to press, we are in the midst of the start-up of the greenfield Veracel market pulp mill in Brazil. We are confident Veracel will be another showcase of our "full-line" capabilities from digester to finished bales of market pulp.

Full-line supply

Andritz's full-line approach and highly reliable equipment are clearly preferred by customers seeking reliable and proven equipment for the whole mill and a unified approach to the design, documentation, training and start-up. These customers benefit from a minimum number of interfaces which simplifies project execution. Combined with the IDEAS simulation technology, this results in the fastest start-ups.

In Chile, we will deliver on an EPC basis a complete Fiberline as well as chemical recovery systems for CMPC's new Line 2 at Santa Fe. When completed in 2006, the line will produce 780,000 t/a of market pulp.

In India, we will supply a new fiberline, recovery island, and woodroom upgrade for APPM's Rajahmundry mill. With this investment, APPM will increase pulping capacity from 300 to 550 bdt/d. Start-up of the new line will be in spring 2006.

Marusumi, one of Japan's biggest newsprint producers, ordered an Andritz fiberline and chemical recovery systems for the Ohe mill. The new line will produce 252,000 t/a. Start-up is scheduled for the second quarter of 2007.

As our latest success, we received a letter of intent from Metsä-Botnia for Andritz to supply the major process lines — wood handling, fiberline, pulp drying and baling, and chemical recovery — for a greenfield pulp mill (1 million t/a) to be built near Fray Bentos in Uruguay.



Markku Hänninen
Head of Pulp Mill Technologies
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World-class production

In May, the Andritz pulp drying line at Jiang Lin (see article on Page 16) set a world production record of 3285 admt/d. This surpassed the guaranteed production level of 3250 admt/d and the previous record set at Aracruz in Brazil (2756 admt/d). This performance and high availability of equipment is what mills expect when they choose Andritz.

Our new goal is to design and deliver a 4000 t/d pulp line. We are simplifying designs and standardizing system modules while maintaining high product quality standards. Modularization allows us to reduce engineering and manufacturing costs somewhat, and "freeze" the engineering sooner. This results in faster delivery and a lower overall investment cost per ton.

The same applies to the world record production speed for tissue machines achieved on Andritz deliveries to China and Indonesia.

R&D

The end of April saw the official opening of the Fiber Preparation Pilot Plant in Graz. Pilot plants play an important role in developing and selling process equipment. The Pilot Plant simulates the complete recycled fiber process for deinked, OCC pulp as well virgin fiber preparation. It can be used for trials on single unit equipment or for a complete system.

Our thanks to customers who have joined us in developing new unit machines and systems — particularly the Papillon™ refiner, the first

1000 t/d dispersing system, and SelectaFlot™ flotation. New products developed jointly with customers are the lifeblood of our R&D program. We appreciate customers who are willing to take the next steps together.



Bernhard Rebernik
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Lighthouse in the East: **a new life** for pulping in Germany

German Chancellor Gerhard Schröder called it "Ein Leuchtturm im Osten" (A lighthouse in the East) when he attended the inauguration ceremony for Zellstoff Stendal's greenfield pulp mill. Built in the state of Saxony-Anhalt, in the former East Germany, the Stendal mill has the capacity to produce 552,000 t/a of softwood market pulp. Andritz's contribution to this "lighthouse" is the recovery boiler, recausticizing and evaporation plant.

The trend towards large packages and single-line systems continues. Andritz's capabilities in providing these large packages is being demonstrated in

China, Chile, Brazil, Finland, India, Japan — and also recently in Germany. Germany? Though it has not previously been thought of as a chemical



German Chancellor Gerhard Schröder attended the inauguration ceremony for the Zellstoff Stendal mill. The greenfield project became the biggest construction site in Sachsen-Anhalt state in Germany.



pulping region, the pulping landscape is changing thanks to Mercer International (see box). Aided by the fact that Germany has a more-than-adequate fiber supply, is looking for meaningful investments (particularly in the East), and has seen the environmental reliability of the Rosenthal kraft pulp mill (also a Mercer project), the climate was right for a greenfield project.

The new Stendal mill started up in

July 2004. Prior to Stendal, Mercer decided to buy the Rosenthal mill, with its existing infrastructure, and modernize it. Rosenthal was changed from top to bottom. The sulfite process was converted to sulphate. Andritz delivered the entire chemical recovery island, modified the continuous digester, and delivered major parts of the pulp drying line. The mill produces 310,000 t/a of softwood market pulp.

After the success at Rosenthal, momentum began building for the greenfield Stendal project. With financing in place, approx. EUR 1 billion, Zellstof Stendal, with its major shareholder Mercer International, awarded the execution of the turnkey EPC contract to a subsidiary of German electricity giant RWE. The contractor, RWE Industrie-Lösungen GmbH (RWE IN), broke ground in August 2002.



Andritz provided the major chemical recovery systems for the Stendal mill — evaporators, recovery boiler, and recausticizing equipment.



Jimmy Lee and Mercer

The presence of Mercer International in the center of the European pulp market is a rags-to-riches story. Mercer International is an American-Canadian company that was formed about 10 years ago. Before acquiring the Rosenthal mill and building the Stendal mill in Germany, Mercer only owned a few small Central European specialty paper mills.

Today, Mercer International is one of the world's largest publicly traded producers of Northern Bleached Softwood Kraft, with annual production of approximately 1.3 million tonnes. Nearly 900,000 tonnes come from Germany — which is about 65% of the total pulp capacity in Germany. Mercer's remaining pulp capacity comes from the recently acquired Celgar pulp mill in British Columbia, Canada.

The key strategist and operating chief of Mercer is Jimmy Lee, 47, a chemical engineer by training. Before joining Mercer International, Jimmy Lee climbed the ladder in a financial institution, first as a Director, and later as President. He has served as a trustee at Mercer since 1985.



Project completed on schedule

Less than two years after the contract signing, production at the Stendal mill started up exactly as scheduled — on July 26, 2004.

"The expectations with regard to this start-up were high," says Krister Sannholm, head of the Stendal project

group. "This was an important project for Mercer. Remember that the company started by purchasing a few small paper machines and then took the risks to become one of the world's biggest producers of long-fibered pulp.

"In spite of the complicated contractual structure we had, the project was completed within schedule, and we had a relatively smooth start-up of the mill."



The evaporation plant is built in six effects, with a total capacity of 670 tonnes of water per hour. In the evaporators, black liquor is concentrated to 75% dry solids before burning in the recovery boiler. An integrated stripper, methanol liquefaction system, calcium deactivation system, pressurized heavy liquor system are all included.



The capacity of the recausticizing plant is 8000 m³ of white liquor per day. X-Filters™ reliably provide very clean green liquor for further processing. Dregs are washed and dried with a DreX-Filter™ for a clean environment. White liquor is filtered with a CD-Filter™ providing less than 20 mg suspended solids per liter.



Krister Sannholm, head of the Stendal project group.

"This was a little different situation for us since our primary customer for the project was the contractor RWE IN," says Ari Nieminen, Project Director for the Andritz delivery. "Most of the time we work directly for the mill owner. In this case, we had a customer for the project and a customer for the on-going operation and maintenance.

"It was very important for us to maintain good contacts with both RWE IN and the Stendal organizations during project execution. In the future, our relationship will be more with Stendal directly since they are operating the processes and maintaining the equipment."

Andritz provided the equipment for the evaporation plant, chemical recovery boiler, and recausticizing plant. Also, Andritz supervised the erection and commissioning work on the evaporation plant and recausticizing plant which was conducted by RWE IN. Andritz took responsibility for the recovery boiler erection directly.

"The cooperation between Andritz and RWE IN worked well throughout the project and we ended up in a successful and on-time start-up," says Nieminen. "In fact, we were ready ahead of schedule."

Find out more at www.fiberspectrum.andritz.com



The capacity of the recovery boiler is 3250 tds/d. The Andritz Vertical Air™ system ensures optimal burning conditions and minimum emissions. Weak odorous gases and vent gases are burned in the recovery boiler.

Modernizing to face competitive challenges

Nanping Paper is one of the leading newsprint producers in China. It has enjoyed the benefits of strong growth in domestic consumption driven by the two decades of reform. But with reform comes challenges in the form of competition and fiber supply. Andritz will continue to be an important partner as Nanping meets the challenges head-on.

Nanping Paper is one of China's nine traditional state-owned newsprint producers. From their beginnings in the 1950's to the late 1980's, these mills used domestically-manufactured paper machines. Workforce levels were very high and productivity low. Each producer dominated its home province or region. Life was predictable and secure.

With reform comes competition

In the early to mid 1990's, the new era of economic reform and trade liberalization saw the trickle of newsprint imports into China turn into a flood. The imports were not only a threat in terms of volume, but they were superior in quality.

Foreign investors moved to invest in world-class newsprint capacity near Shanghai. In addition, new domestic competition began to emerge. Some of these players were newer enterprises under private or collective ownership, giving them the advantage of low workforce numbers while Nanping continued to carry the burden of 3000 workers.

The reforms also had a positive impact for newsprint makers like Nanping. Improved living standards, and a new spirit of consumerism in China, created a surge in newsprint demand. The tired old format of existing newspapers was revitalized by color printing, increased pagination, and supplements. New publications catering to a variety of Chinese readers began to emerge.



The new FibreFlow® Drum pulper at Nanping has a capacity of 320 t/d.

China's bold economic reforms have revitalized newspaper publishing, bringing a burst of color, increased pagination, and new titles. Nanping Paper, the leading newsprint producer in Fujian province, has taken advantage of these reforms.





Global fast food chains have even reached remote Nanping city. Western food is just one of the many lifestyle changes that reforms have brought to China.



Nanping Chief Engineer, Mr. Ye Shicheng. "Good technology and good cooperation led Nanping to again select Andritz for a deinking line."



The Fiber Expert Forum included a tour of Nanping Paper, with several Andritz experts on hand to give visiting papermakers a detailed explanation of important features of the new 300 t/d DIP line.

Time to modernize

Production at Nanping started in 1958 with "100 tonnes per day of newsprint output from two 3.15 meter wide domestic-made machines," says Mr. Ye Shicheng, Chief Engineer. Publishers throughout Fujian province in southeast China made up the home market.

Initially, Nanping used virgin fiber exclusively — groundwood and market kraft. The mill added its own bleached kraft line in 1966. In the 1980's, the addition of two locally-made paper machines boosted total output to 150,000 t/a — still based on costly virgin fiber.

Fiber supply, an issue for the mill since its early days, is still a "main concern," says Mr. Chen Shou Qin, President of Nanping Paper. Like most papermakers throughout China, Nanping faces the difficulty of sourcing sufficient fiber at a reasonable cost. The only way to meet both the competitive threats and new market opportunities was to invest and modernize.

In 1998, Nanping made a major investment in a modern 6.1 meter wide paper machine, PM5. The machine started up the following year, adding around 200,000 t/a. The mill took this opportunity to retire older capacity — giving Nanping its present capacity of 295,000 t/a of newsprint. The investment not only made Nanping one of China's largest newsprint producers, but it also became one of the most advanced. The deinking projects that followed have kept Nanping in its current low-cost, high-quality competitive position.

New sources of fiber

Investments in new fiber processing followed soon after the new paper machine started up. In July 2000, the

mill ordered a 500 t/d two-loop deinking plant (DIP) from Andritz and a FibreFlow® drum pulper from Ahlstrom Machinery (now part of Andritz).

Nanping and Andritz worked together closely in engineering, equipment erection, commissioning, start-up, and system optimization, says Mr. Ye Shicheng. "The technical staff from Andritz and the mill worked together well during this period," he says. Extended basic engineering for the line was carried out by Andritz, while Nanping did the detailed engineering for the project.

Start-up of the deinking line occurring in mid-2001 meant the mill could efficiently substitute large volumes of lower cost, deinked secondary fiber in the furnish. This was an important achievement for Nanping, as it meant that the mill could "gradually move away from groundwood and kraft pulp," and switch to "more than 70% DIP, and part TMP," says Mr. Ye Shicheng.

He also noted that "the quality of our newsprint improved steadily" following the use of DIP from the new line. Nanping was also able to introduce lower grammage (45 g/m²) newsprint into the Chinese market, thereby strengthening its competitive position, Mr. Ye Shicheng added.

Second DIP line from Andritz

Following the success of the 500 t/d DIP plant, Nanping wanted to further drive down raw material costs while improving newsprint quality. In 2003, mill management decided to replace an outmoded 100 t/d deinking line with a larger, more modern DIP line.

Nanping again selected Andritz as the supplier. The "good cooperation" and opportunity to use some systems



The compact design of Andritz's SelectaFlot™ flotation system was perfect for Nanping's new DIP line.



CompaDis™ disperser on the new DIP line.

on the existing line were the reasons behind this decision, says Mr. Ye Shicheng. This time, the mill opted for a 300 t/d capacity line.

Technical teams from Nanping and Andritz had to overcome various difficulties during the engineering phase of the project, including the outbreak of the SARS epi-

demic in China. The space constraint was another issue, as Nanping had set the limited area of the old line as the location for the new line. Andritz overcame this by creating a customized flotation cell layout. The stacked design of the SelectaFlot™ flotation cell was an advantage in this design process.

According to Mr. Ye Shicheng, the technology, project management, and implementation were world-class on the project. Nanping started up the new line just 96 days after the shutdown of the old deinking line — with the new line coming on-stream in January 2004.

Another success

Like the first DIP line, the new 300 t/d line was a milestone in the history of Nanping Paper. During trial runs of the new line, the Andritz team worked together with Nanping and "carefully and completely optimized the system," says Mr. Ye Shicheng. "Output and quality have reached expected targets, and stock from the line has been used to produce high quality newsprint," he says.

Following the DIP line investments, Nanping is now able to further boost the deinked pulp content of its papermaking furnish. "We now use 80% DIP and 20% mechanical pulp", explains Mr. Chen Shou Qin. "The high cost of electricity makes production of mechanical pulp expensive. Reducing our dependence on virgin fiber while producing a quality sheet keeps our costs to a minimum and positions us well to compete."



Mr. Chen Shou Qin, President.
"Our cooperation with Andritz has been friendly, honest, and successful."

Expansion plans

Mr. Chen outlined Nanping's current planning for a major greenfield investment. "Why not expand operations at the present site instead?" says Mr. Chen. He went on to explain the rationale for a greenfield move.

"Nanping Paper is an advanced paper mill with state-of-the-art paper machines and deinking systems," says Mr. Chen. "Technical renovation projects carried out at the mill have been quite successful, leading to lower utility costs and freshwater use than at comparable mills."

But the investments and technical upgrading have been so successful that there is now little scope for further improvements, Mr. Chen noted. Meanwhile, the requirement to continue employing a large workforce at the existing mill makes it very difficult to further reduce costs, he explained. "So, we

must set up a greenfield mill, and this efficient new operation will help subsidize and support Nanping's overall operations," he concluded.

Facing challenges

In summary, economic reforms have brought nearly two decades of change for state-owned players like Nanping. While this change has brought the benefit of new market prospects, the newly competitive environment has made life tough for Nanping. The mill has had to make con-

tinuous investments in order to remain an important player in the newsprint game.

In addition, Nanping has to overcome quality issues in its RCF supply. There are certain to be more difficulties like this, as well as opportunities, in the years ahead. Nanping's partnership with Andritz will not only help Nanping to survive and prosper in the face of uncertainty and change, but it will also help Nanping to modernize and grow to meet new opportunities, and to achieve further success.

Find out more at www.fiberspectrum.andritz.com

KEY DATES FOR NANPING PAPER

Date	Achievements and milestones
1958	State-owned Nanping mill starts up with two locally manufactured paper machines and a groundwood pulp line (100 t/d newsprint capacity).
1966	Bleached kraft pulp line starts up (140 t/d pulp capacity).
1982	PM3 and PM4 start up and 150 t/d groundwood line (later retired) comes on-stream.
1988	PM1 and PM2 rebuilt, followed by PM3 and PM4 in 1992.
1996	New 200 t/d TMP line comes on-stream.
1999	Modern 6.1 meter wide PM5 starts up. Mill retires some old capacity.
2000	Nanping installs new Andritz 500 t/d deinking line which starts up in 2001.
2002	Further rebuilds of PM3 and PM4 boost newsprint capacity.
2003	Nanping decides to expand deinking and again chooses Andritz.
2004	New 300 t/d deinking line comes on-stream just 96 days after closure of old line.
2004	"Andritz Fiber Expert" symposium held at Nanping attracts 60+ papermakers from across China.



"We are not going to sacrifice quality *for* energy savings."

When it comes to power consumption, the mechanical pulp mill is a major consumer (2500-3500 kWh/t). In a typical TMP operation, less than 10% of the energy goes into separating and preparing the fibers — 90% goes to steam. Andritz introduced RTS™ mechanical pulping technology in 1996, which decreases total refining energy from 15%-30% while producing competitive pulp quality in all respects. In 1997, Bowater Newsprint made the decision to install RTS™ technology. Energy costs are down and pulp quality is excellent.



The RTS™ Plant at Calhoun is designed for 814 adst/d, but routinely produces over this amount. "The pulp quality immediately — from day one — exceeded the quality we were getting from our conventional TMP plant," says Joe Vaughn.

Bowater Newsprint's Calhoun, Tennessee mill in the USA is one of the largest producers of newsprint in North America. It produces 900,000 adst/a of pulp and paper products — 490,000 tons of newsprint, 250,000 tons of specialty grades, and the remainder as hardwood kraft market pulp.

The mill has had extensive experience

operating a conventional TMP plant. Built in 1979 and expanded in 1985, the TMP plant (now Lines 1-6) consisted of Andritz (Sprout-Bauer) double-disc refiners with a production capacity of 1100 admt/d.

"In 1997, we began to talk seriously about a project to establish Calhoun as a world-class facility with lower production costs," says Joe Vaughn, Pulping

Operations Manager, who is responsible for wood processing and fiber processing at the mill. "We wanted to install additional TMP capacity so we could shutdown our old groundwood mill and modernize our woodyard. This would give us better fiber for newsprint production, less kraft in the sheet, and would drive our manufacturing costs down."



Gordon Thom, Mechanical Pulping Superintendent (left), and Joe Vaughn, Pulping Operations Manager, at Bowater Newsprint's Calhoun, TN mill in the RTS™ plant.

Bowater was willing to try something different for this modernization project. Since they were moving from a relatively low energy consuming process (groundwood) to a higher energy consumption process like TMP, they did not want to incur any more energy costs than necessary. "But we would never sacrifice pulp quality just to get the energy savings," Vaughn says.

Bowater decided to take a hard look at the Andritz RTS™ technology because of its energy savings opportunities. In 1997, there were few places Vaughn and his team could go to see RTS™ operating — and none that were running RTS™ on pine.

"The big question for us was what would be the impact of increased refining intensity on Southern Pine?" Vaughn says.

Andritz was developing its RTS™ technology to make the fiber more resilient to high intensity refining. "We went through an extensive evaluation process, visiting mills in Europe, Canada, and the USA," Vaughn says. "We did a lot of pilot plant work with Andritz. We came to the conclusion that RTS™ would give us the biggest opportunity for achieving the best overall results — in terms of quality and energy."

The RTS™ Project

The RTS™ plant (Lines 7 and 8) started up in July 1999. It was designed to produce 814 adst/d of pulp. The primary and secondary refiners are Andritz Twin 66's powered by 34,000 hp motors. The reject refiners are Andritz SB 170's and are powered by 24,000 hp motors.

"We designed the plant with the intention of RTS™ working, but we also found ways to mitigate the potential risk if it didn't work on Southern Pine," Vaughn says. "Motor sizing was one of those decisions we made in the design phase to be able to switch back to TMP mode if needed. The motors are sized for conventional TMP and we are not coming close to utilizing all the horsepower capacity with RTS™."

The first-stage Twin 66 RTS™ refiners at Bowater have demonstrated energy savings of 18-19% while producing pulp exceeding the quality of the old TMP plant.

The evolution of RTS™

RTS™ is a modified TMP process patented by Andritz. The R stands for retention. T is for temperature. S is for speed.

Refining intensity increases with higher rotational speeds — but simply increasing the speed of a refiner does not result in higher quality pulp. In fact, it can have negative consequences — reducing strength and darkening the fibers due to the higher heat generated.

The breakthrough in RTS™ came from pilot plant studies within Andritz that uncovered a "window of opportunity" where the physical strength and optical qualities of TMP pulps could be stabilized even though the fibers were subjected to higher temperatures, pressures, and speeds.

Savings in electricity from RTS™ (compared to conventional TMP) will surpass four billion kilowatt hours in 2005 — representing over Euro 120 million.



Andritz provided the major equipment for Bowater's North and South log lines at Calhoun. As part of the modernization project, which was completed in 1999, Bowater installed this portal crane. With its 650-ft rail and 35-ton grapple, the crane serves as a log inventory organizer and loads the PowerFeed™ conveyor to the Andritz debarking drum.



"Andritz is very focused on our success here," says Gordon Thom, Mechanical Pulping Superintendent. "They believe in RTS™ technology, as we do, and they know it has a lot of potential. The RTS™ plant was designed for 814 short tons per day, and we routinely run about 17-20% over that."

"It was just a great start-up," says Vaughn. "The whole project was very well orchestrated. From the moment we start-

Plate Development Program

"We've run different plates over the years, but predominantly they have been Durametal®," Vaughn says.

"Immediately, we went to pretty good levels of plate life on the primary and reject refiners," Thom says. "Over the summer, Andritz helped us implement a new automatic plate gap control and supplied new plate patterns. We effec-



The configuration at Calhoun enables the mill to directly compare energy savings and pulp quality between RTS™ and conventional TMP. Specific energy consumption is reduced an average of 18.5% with RTS™. Tear, tensile, scattering coefficient, and brightness are all equivalent to conventional TMP.

ed up Line 7, we made 24 hours of continuous production without a shutdown."

Bowater actually started up the RTS™ plant with Line 7 in conventional TMP mode and later migrated this line to RTS™. For about a year, the mill operated with RTS™ on Line 8 and TMP on Line 7. This allowed them to directly compare the energy savings and pulp quality of the two lines using the same mechanical equipment.

"There was a give-and-take period with Andritz during the first year," says Thom. "We had to go through a plate development program and other things to optimize the RTS™ plant."

tively doubled our secondary plate life, which is important to us. Primaries last from 1000-1200 hours, secondaries about 1000 hours, and rejects about 1200-1400 hours."

The Results — No Compromises

"We were fortunate in that, when we put the RTS™ plant in, we had an existing TMP plant against which we could benchmark," Thom says. "We routinely look at the performance of RTS™ versus the older TMP lines. I can tell you



Gordon Thom (left) talks with operators in the TMP control room.

that the energy reduction is there year-round and the pulp quality from the RTS™ plant exceeds the quality we get from the TMP plant."

"The RT pretreatment system reduces extractives content and the reject rate is higher on the new lines," Vaughn says. "Since start-up, we've optimized around throughput and pulp quality, and we've had no significant issues with availability

of the equipment."

"The performance of the refiners has been very solid," Thom says. "The mainline Twin 66 refiners are very robust. The SB 170 reject refiners are very stable and solid performers. They run day-in, day-out."

In August of 2004, the mill began to detect a shift in raw materials and was receiving more juvenile wood. "So, we

decided to experiment and take the gearbox out of Line 7 to see if lowering the refining intensity would improve pulp quality," Thom says. "Our experiment confirmed that pulp strength properties were preserved when refining juvenile wood with RTS™ technology." The gearbox was reinstalled on Line 7 primary refiner on January 24 of this year and both lines now operate using RTS™ technology.



The conventional TMP plant at Calhoun produces about 1100 adt/d of pulp using Andritz (Sprout-Bauer) double-disc refiners. The plant was installed in 1979.

Energy Reduction

"We're fortunate to have stable, competitive energy pricing in this area," Thom says, "though energy prices today are more significant than they were in 1999."

"It depends upon the season and the raw material, but our energy savings with RT pretreatment and RTS™ refining is in the range of 15-25%," Vaughn says. "When you talk about energy reduction, you have to be careful. The quality of pulp a mill desires will dictate the amount of energy reduction it can achieve."

Find out more at www.fiberspectrum.andritz.com

Pulp mill on the "Oriental Hawaii"

The Jiang Lin mill is located in the Yangpu Economic Development Zone (EDZ) on Hainan Island.

The Chinese government is developing Yangpu as an international center to distribute processed products from its freight-handling port, to take advantage of its location in the core area of the Asia-Pacific sphere.

Yangpu was badly hit by the financial crises that swept Southeast Asia from 1995 to 1998. Now, with the rapid economic growth in China, the zone has entered a period of significant economic recovery.

Jiang Lin created an economic boom in Yangpu. During spring 2004, there were some 8000 workers on site. When in full operation, the mill will employ about 1000 people.

Hainan now has a population of 7.1 million people, of which about one million are ethnic minorities. It is the largest island and the smallest land province in China. The natural beauty of the island has gained a good reputation among visitors and it has been referred to as "the Oriental Hawaii."

"Both Hainan and Yangpu are in a period of transformation," says Mr. Chi Fulin, President of the Hainan Reform and Development Academy. "Hainan is becoming an important processing base for natural gas. Investors are once again turning their eyes to Yangpu. It is the first area in Hainan to operate e-business and e-banking services."

Asia Pulp & Paper



The largest single-line pulp drying plant worldwide

Some of the largest process equipment in the world, including a complete woodyard and pulp dewatering/drying plant from Andritz, is now operating on this island.



The Andritz pulp drying line at Jiang Lin has a design capacity of 3250 admt/d at 250 m/min. Wire width of the pulp machine is 9.9 m. In May 2005, the plant set a world production record of 3285 admt/d.

The Jiang Lin pulp mill on Hainan Island is the first that Asia Pulp & Paper (APP) has built in China. The new mill will supply pulp to several APP paper machines in China, including some destined to be built on the island, according to Mr. Liu Han Hung, President and Director.

Raw material for the mill will eventually come from harvesting eucalyptus plantations on the island. "From 2008 onwards, the plantations will be of the size to supply the mill's total requirement, making us self-sufficient," Mr. Liu says. "But, at present, our pulpwood is

being harvested from the Hainan, Guangdong, and Guangxi provinces."

The Jiang Lin mill started up in December 2004. According to Mr. Liu, the mill progressed from planning to completion very rapidly. "Our original schedule was 18 months, but the actual time it took to complete the project from turning the first soil on the mill site was 18.5 months, an impressive accomplishment."

Andritz delivered major packages to this ultra-modern pulp mill, including the wood processing facility and the world's largest single-line pulp dewatering/drying/baling plant.

Gigantic woodyard

The Andritz wood processing facility at Jiang Lin is the world's largest single woodyard, according to Matti Salmi, Sales Manager for Andritz's Wood Processing Division. The woodyard is dimensioned to handle 1160 m³/h of solid wood (eucalyptus logs debarked in the forest). There are four wood receiving and chipping lines.

"We received the order from APP in January 2003 and had the woodyard operational in October 2004, two months before digester start-up," Salmi says. "We have had an excellent relationship with APP since the early 1990's when they ordered two complete woodyards from us. They know that our equipment will perform as promised, and we have learned how to process the eucalyptus logs very efficiently."

Each chipping line consists of a Feeder Deck, conveyors, and a gravity-fed HQ-Chipper™. There are metal detectors, stone traps, bark separation equipment, and a washing station — all to remove debris, sand, and clay arriving with the incoming wood.

"The Feeder Deck at Jiang Lin is a new type of receiving and feeding system for incoming logs," Salmi says. "It operates without conventional conveyor chains and requires less maintenance. Capacity of the deck can be controlled automatically."

HQ-Chippers™ produce very high quality chips at high volume — even from small diameter wood now available at Jiang Lin. The chipping geometry ensures stable log feed. The gentle side discharge of chips retains the chip quality — thin, long, and square — ideal for Jiang Lin's cooking process. Reject rates at the digester, a critical indicator of chip quality, are extremely low.

Chips are stored in two open chip piles. Each pile has a volume of 150,000 loose-m³. The Andritz conveyors can accommodate 8000 loose-m³/h. Four long CantiScrews™ under each chip pile reclaim the chips and move them to the chip screening system.



Eucalyptus chips are stored in two open chip piles, each with a volume of 150,000 loose-m³.



The Andritz chipping plant consists of four lines of HQ-Chippers™ which ensure ideal chip quality for Jiang Lin's cooking process.



The JetScreen™ is new Andritz technology which uses air to separate the chip fractions. The JetScreen™ at Jiang Lin is the world's largest.



*The Andritz **ModuScreen**® system prior to the pulp machine has a capacity of 4275 admt/d. The screens are arranged in a fully-closed cascade to achieve the highest efficiency with lowest rejection of good fibers.*



*The **pulp machine** has Andritz's advanced twin-wire forming technology. Dewatering in the press section is accomplished by a three-roll Combi-Press, followed by a double-felted shoe press.*



*The **Fläkt**™ dryer uses heated air to dry and support the pulp web. With the exception of the turning rolls at either end of the machine there are no moving mechanical parts inside the drying chamber.*

Chips are screened with the new technology JetScreen™ thickness screening system. "This is our newest technology for chip thickness screening," Salmi says. "The unit is also the largest in the world at a capacity of 2800 loose-m³/h." In the JetScreen™, dust, fines, oversized and overthick chips are separated from good chips with air impulses.

"There is an extremely small percentage of wood loss with the HQ-Chipper™

and JetScreen™," Salmi says. "Loss due to fines is about 0.7% and loss due to pins is 0.5-1%."

Overthick and oversized chips are sent to an HQ-Sizer™ for processing so they can be recovered for the cooking process. Fines and dust are mixed with bark and used as bio-fuel in the power boiler. The water treatment system in the woodyard and the process control system were also delivered by Andritz.

World's largest pulp drying plant

APP had previously installed Andritz pulp drying lines at their Perawang and Jambi mills in Indonesia, according to Mr. Liu. "The total investment costs and the previous experience we have with Andritz's project and service execution were the driving forces behind our decision to purchase from Andritz for the Jiang Lin project."

The Andritz pulp drying operation is designed to produce 3250 admt/d of bleached pulp at a design speed of 250 m/min. The pulp machine has a wire width of 9.95 m. Included in the Andritz scope is a screening system, Twin Wire former pulp machine, a Fläkt™ dryer, the world's largest cutter/layboy, and four automated baling lines.



Robert Rauchegger discusses automated control of the wrapping/baling line with Mr. Hu YinJun of Jiang Lin.



The world's largest cutter/layboy receives the pulp web from the dryer as the web is slit and cut into bale or wrapper-sized sheets.



Pulp bales are pressed, wrapped, stacked four high, and tied together in two-ton units in the bale finishing line.

Single-line success

"The Jiang Lin project is a significant step forward in the single-line production trend," says Bernhard Rebernik, member of the Andritz Managing Board and responsible for Paper Mill Technologies. "We are currently providing large, single-line systems at Veracel in Brazil and CMPC in Chile based upon some of our development work here. When you

shake hands with a customer on a project like this, you need to be certain that what you will deliver is the best available solution, since there are no backup or duplicate systems."

Regarding the Jiang Lin project, Rebernik notes that, "It has been very rewarding to work with APP as they are willing to invest in technological advances. The Andritz team worked very well with the local engineers and

we have been able to source quite a lot of the project supply within China." Mr. Liu confirms, "The single fiberline is the first stage in our strategic planning. Having started up this first stage, we are now planning to install tissue machines in an expansion of the mill."

Lower investment and operating costs

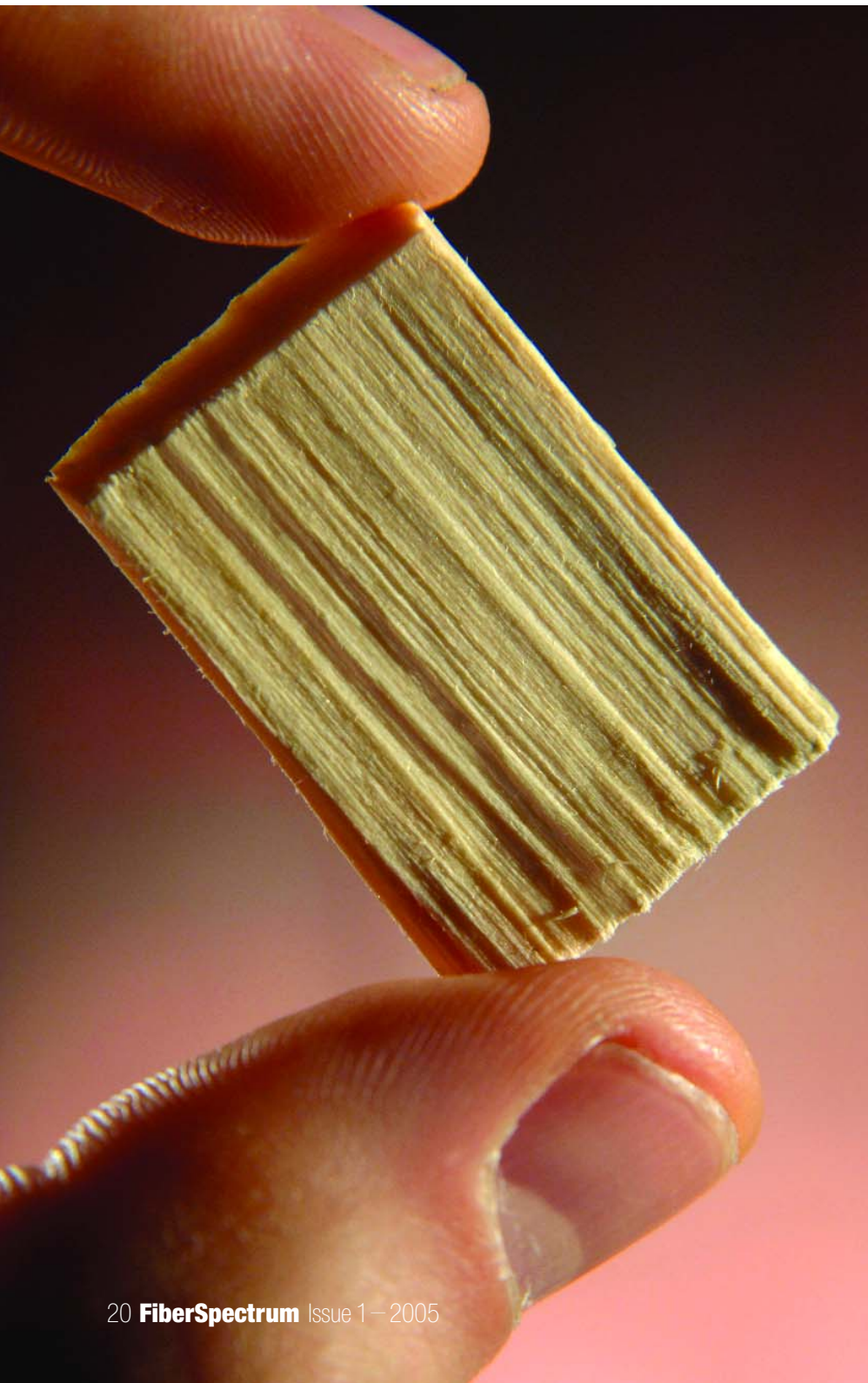
Through an intensive program of computer simulations and pilot work, Andritz determined that there are significant advantages in a large capacity single line operation. "We show customers how they can lower their investment cost per ton of product by as much as 20%, as well as lowering their operating costs," Rebernik says. "This is when compared to a two-line operation. Potentially, we can go even higher in capacity."



Finished bales are conveyed to the warehouse and are ready for dispatch.

Find out more at www.fiberspectrum.andritz.com

Unique combination of technology and service helps **Wisaforest** produce **high quality chips** in volume.



Three million cubic meters of logs are chipped each year at UPM's integrated Wisaforest complex in Finland. The woodroom, now 20 years old, keeps up with the demand for high quality chips with the help of new chippers and tools developed by Andritz.

Located near Pietarsaari on the west coast of Finland, UPM's Wisaforest mill has a capacity of 800,000 tonnes of pulp and 180,000 tonnes of paper per year. There are two separate cooking lines in the pulp mill, fed by two different wood debarking and chipping lines (one for hardwood, one for softwood).

"These lines started up at the end of 1985," says Tero Virkkala, Pulp Mill Production Manager. "I think this was the very first Kone (now Andritz) dry debarking system in Finland. Compared to a modern woodroom, it is naturally showing its age, but it performs as it should be performing."

The two original chippers have been upgraded to Andritz HQ-Chipper™ models, and the bark press has been changed out. "But, through 20 years of service, all the other main pieces of equipment are the original ones," says Virkkala.

"This year, as pulp production is increasing, we will debark and chip over 3 million cubic meters of roundwood," Virkkala says. "Such production from two debarking lines is a great accomplishment. I have to say that the Andritz chippers have been very good at achieving the capacity and quality we need."

In spite of its excellent operation, Wisaforest's woodroom is now approaching the end of its life cycle, according to Virkkala. "We are contemplating whether to modernize the main equipment or build a completely new woodroom. Until the decision is made and the work completed, we need to keep the woodroom operating reliably and producing high quality chips."

Wisaforest has implemented several innovative technologies and services from Andritz to extend the life of the woodroom and ensure the smooth flow of high quality chips to the fiberlines.

Longer chips with HQ upgrade

As Virkkala says, "The center of focus in any woodroom is the chipper." Kenneth Winberg, Pulp Mill Manager at Wisaforest, agrees.

"Chipper operation is a matter of high priority because it establishes the quality of chips produced. We cannot afford low quality chips or our cooking quality would be compromised."

The conventional single regrindable knife system in the chippers had been reliable for many years, according to Virkkala. "But we now know that the best possible knife, in terms of chip quality, is the thinner HQ-Plus™ cassette knife system in the HQ-Chipper™. It produces longer, thinner, and more uniform chips, which improves the cooking process."

Before upgrading the chippers in 1992 and 2001 at Wisaforest, the Carthage chippers produced chips 22 mm in length. "With the HQ-Plus™ knife system in the chippers, we are close to lengths of 30 mm," Virkkala explains. "Our hardwood line delivers chip lengths of 28-29 mm and the softwood line 27 mm."



HQ-Plus™ makes routine knife changes at Wisaforest an easy, safe, and quick operation – for the best possible chipper availability.



"We cannot afford low quality chips or our cooking quality would be compromised". Kenneth Winberg, Pulp Mill Manager (left) and Tero Virkkala, Pulp Mill Production Manager at Wisaforest.

The main enemies of a chipper knife are stones and metals that come in with the wood. These items can quickly damage or dull the rotating knives inside the chipper and lead to off-quality chips.

"With the old knife system, we had to change knives even if they received only minor damage," Virkkala says, "because the chipper capacity would drop off significantly. Now, the HQ-Plus™ knife geometry is so good that a fairly high capacity is maintained even with damaged knives or duller blades."

While this was great for production, the good performance of the knife system might also mask potential problems with the chipper, according to Virkkala. "If we only monitor production, we might not detect more serious problems such as a broken knife striking against the anvil. We installed a cost-effective way to monitor the condition of the chipper knives and other wear parts in the chipper."

"Listening" to the chipper

Andritz's Automation & Diagnostics group was supplying sensors to detect changes in the condition of process equipment and pressure vessels for other areas of a pulp/paper mill — so why not the woodroom?

"When Andritz told us they had developed acoustic emissions technology to monitor the condition of chippers, we were very interested in trying it," Virkkala says. "We wanted to improve the reliability of our chipping lines and still keep the thinner cassette knives of the HQ-Plus™ system. We felt that Acutest® technology could help us do that."

"Hearing aids" for your process equipment

Andritz Services' Automation & Diagnostics group specializes in designing and supporting specialized sensors, process control, and optimization systems for the pulp and paper industry.

Part of the group's offering includes Acutest® systems which monitor process machinery and vessels to "listen" for potential structural cracks, leaks, vibration, fissures, and friction.

Acutest® systems use a technology called Acoustic Emissions Monitoring. Ultra-sensitive piezo sensors "listen" and record the amount of "elastic waves" generated by rapid changes in the microstructures of metals or composite materials. Potential problems such as friction or cracks can be detected and monitored — typically before they result in downtime for the equipment.

The systems are designed to be integrated into open network distributed control systems and can also be monitored remotely through an Internet connection.

Acutest® acoustic emissions technology uses ultra-sensitive sensors to "listen" for elastic waves generated when a material begins to deform, fatigue, or fracture. Acutest® systems are used to detect problems such as the initiation and growth of fatigue cracks in steel structures; the failure of bonds, fibers, and filaments in composite materials; and the appearance of potentially hazardous flaws in pressure vessels.

Operators watch "traffic lights"

The Acutest® system at Wisaforest continuously monitors the chipping equipment and displays critical information about the knife condition. Any variations from normal are displayed to the operators in the form of a "traffic light" — green for good, yellow for caution, and red for alarm. The Acutest® system is designed to work with any open distributed network where condition monitor-

ing measurements are a part of the process control system.

Kari Aura, Application and Sales Manager for the Automation & Diagnostics product group, explains, "Three sensors are mounted on the chipper, at the front bearing, tail bearing, and gearbox. "In principle, we could do it with one sensor, but the others give us more information for better control and also serve as a backup."

"If the knives are dull or in bad shape, this is immediately shown on the traffic light display in our control system," Virkkala says. "If vibration increases, the operator gets an alarm. We have the possibility to add some automatic interlocks to stop the chipper if certain limits are reached. The damaged knife, or other wear part, is changed out."

With the Acutest® system, necessary actions can be taken before a malfunction occurs and before chip quality is compromised. "It is even possible to optimize chipper knife life because we



The Wisaforest mill complex in Finland showing the wood processing operations.

know the correlation between the acoustic emissions and the wear on the knife set," says Aura.

"The Acutest® acoustic emissions system tells us the knife condition at any time, so we have found a well-functioning and reliable solution to our problem," Virkkala says.

HQ-Plus™ Chipper Service agreement

A big contributor to uniform quality in the chipper is optimizing the process of changing knives and other wear parts. The changes must be swift, reliable, and controllable.

"Pulp quality starts with chip quality, so we are not interested in setting world records for the longest knife life," Virkkala says. "During continuous operation, we typically change knives once every 24 hours, or about 6000 cubic meters of chips at best. Fortunately, the hydraulically operated quick clamp mechanism in the HQ-Plus™ system allows for extremely fast knife changes."

Wisaforest utilizes Andritz's HQ-Plus™ Service to keep the chippers operating reliably and effectively — regrinding knives at regular intervals, and maintaining a stock of sharpened knives and critical wear/spare parts at the mill. As part of the service, Andritz technicians perform regular chipper inspections.

Remote link to Andritz

The Acutest® system at Wisaforest is linked remotely through the Internet to Andritz service centers in Tampere and Hollola, Finland, according to Jarno Kämäräinen, Andritz's Product Manager for HQ-Plus™ Service.



Kari Aura (left), Application and Sales Manager for Andritz's Automation and Diagnostics product group, and Jarno Kämäräinen, Product Manager for Andritz's HQ-Plus™ Service, team up to provide innovative tools such as remote diagnostics to help mills achieve excellent chip quality, uniform quality, and reliable operation.

Summary reports and "traffic lights" are used at the mill. Andritz analyzes the detailed data received and issues a summary report of chipper operation for the mill.

Remote diagnostics can also discover irregular noise emissions from the chipper which should be investigated by the mill or by an Andritz service engineer in order to find the cause.

"At the moment, we are developing a broader service package related to our chipper HQ-Plus™ Service and Acutest® monitoring," Kämäräinen says. "This will include special tailor-made options, including connecting other pieces of woodyard equipment such as debarking drums, feed equipment, and screens as necessary."

Chip analyzer for online quality control

The Acutest® system at Wisaforest gives information about the condition of the chipper knives. Andritz has also developed a new system to measure and analyze chip quality online. Wisaforest is one of the first installations of this online chip sampler and analyzer which displays continuous data about chip quality to optimize the chipper operation.

"Fluctuating chip quality makes the cooking process extremely difficult to control," Winberg says. "We expect that this newest Andritz innovation will turn out to be a good tool for us."

Suzhou mill sets **Gold Standard** for speed

China, once considered a "developing" nation, has developed its tissue industry into a producer of high quality products. Shanghai offers insight into one of the most modern cities in the world. A visit to APP's Suzhou mill, outside of Shanghai, offers a glimpse into a modern tissue production facility that operates two of the fastest machines in the world.

Gold Hong Ye Paper, owned by Asia Pulp & Paper (APP), operates a tissue mill near Suzhou, two hours drive west of Shanghai. The mill recently set a standard in making premium facial and toilet tissue that could be a target for tissue producers around the globe.

Gold Hong Ye is producing high-grade tissue on a regular basis at the highest average speeds in the world.

Early last year, one of two Crescent

Former tissue machines supplied by Andritz to Gold Hong Ye (TM2) set a world record of five continuous days production of 13.5 g/m² facial tissue running at 2100 m/min.

"We now regularly run our two machines over 2000 m/min when making premium grade facial tissue and at 1800 m/min on 18 g/m² premium toilet tissue," says the mill's Production Manager, Mr. Y.T. Hsu.

No time to rest

"Still, we are not satisfied to rest on these achievements," Mr. Hsu says.

"With the assistance of Andritz specialists, we fully expect to improve the performance of our two machines, which are almost seven years old."

The two machines supplied by Andritz "are very well engineered" according to Mr. Hsu and "have proved to accord us a



TM2 is one of the two identical CrescentFormer tissue machines at Gold Hong Ye. Both machines have a trim width of 5.6 meters and run at the highest average speeds in the world.



Years of experience in tissue

Y.T. Hsu has been involved in tissue making for some 30 years. He started with Scott Paper in Taiwan and moved to Kimberly-Clark. Seven years ago, he moved to the mill in Suzhou as a project leader for the installation of the two Andritz machines. He worked himself up to graduate level in the mills as, at that time, there were no formal papermaking courses in the schools or universities of the region.



TM2 started up in December 1998. The second machine started in January 1999. "We now employ graduates from mechanical and chemical engineering courses for the more skilled jobs in the mill," Mr. Hsu says, "but we have found the local people, who have no prior experience in production, to be very quick to learn. Plus, they are immediately educated into our way of thinking." Mr. Hsu is looking forward to playing a major part in the team established to develop the new tissue machines on Hainan Island in the South China Sea, off the coast of Guangdong province.

(See page 16 for related story)

high degree of reliability and runability." The mill has made some upgrades and minor modifications to the machines during the first three years and "the wet end and dryer still perform as required."

"In the intervening years, technology has advanced and some modifications to the dry end are necessary," Mr. Hsu says. "Andritz is cooperating with our engineers to make the necessary amendments. Threading and reeling are the most critical points and where we get most breaks. However, we still run two of the fastest tissue machines in the world."

The Andritz machines

The two machines at Suzhou are CrescentFormer designs, each with two pressure rolls. The ribbed Yankee cylinders have diameters of 5.5 m. Trim width of both machines at the reel is 5.6 meters.

Following the start-up of TM2 in December 1998, performance tests were run for different tissue grades. Phase 1 optimization by Andritz technical specialists included the installation of PrimePickup™ in the former. After this, the first speed record of 2020 m/min was achieved. In December 2003, Gold Hong Ye engineers carried out Phase 2 optimization by making some modifications to the wet and dry ends

and releasing the maximum speed limit on the multi-motor drives. In January 2004, a new world record speed* of 2100 m/min was reached. TM1 also reached 2060 m/min producing 17.5 g/m² toilet tissue in January of last year.

Increasing efficiency

The mill generally uses TM2 for the production of facial tissue and TM1 for toilet grades. "This means that TM2 is the machine that generally runs at higher speeds," Mr. Hsu says. "If we assume 100% efficiency is achieved at 2200 m/min, we average 92% efficiency for regular grades and 85% on premium grades. Our target is to reach 90% efficiency in the production of premium grades."

Mr. Hsu says there are improvements to be made between the creping doctor and the reel, and his engineers are working with Andritz in order to reduce dusting.

"We are using a conventional creping system and this has the tendency to cause a significant amount of dust, especially with the shorter fiber and higher softness of our premium grades," he says. "With the new developments in technology, we expect to be able to cut down on the amount of dust created, and increase our machine speeds and efficiency."

* The current official world speed record for CrescentFormers is also held by an Andritz machine — at PT. Lontar Papyrus, Jambi, Indonesia (part of the APP Group). In December 2004, the machine ran 32 hours at a continuous speed of 2110 m/min (13.5 g/m² facial tissue).

APP Group

Andritz's contribution to APP's expansion over the years:

1992

- **Two 7.4 m wide pulp drying lines for APP's Perawang facility and PT. Lontar Papyrus Pulp & Paper Industry, Jambi, Indonesia**

1996-1999

- **Two more 7.4 m wide pulp drying lines for Perawang and Jambi**
- **The 4th Andritz pulp drying line for Perawang**
- **Four 600 t/d packaging board machines (two at Indah Kiat Pulp & Paper, Serang, Indonesia, and two at Ningbo Zhongua Paper, China) — order received in a consortium with Sulzer Escher Wyss**
- **Four large tissue machines (one for PT. Pindo Deli Pulp & Paper Mills, another for PT Lontar Papyrus Pulp & Paper Industry (both Indonesia), and two machines for Chinese Gold Hong Ye Paper**
- **Stock preparation lines for Jiangsu Gold East Paper's Dagang, China mill**

The latest Andritz installation for APP is a complete pulp dewatering and drying line, as part of the world's largest single-line pulp plant at Hainan Pulp & Paper, China, started up in late 2004. (See page 16 for story)

Additional machines?

Gold Hong Ye's engineering and production teams are undertaking de-bottlenecking projects around the machines, and are also looking to install new machines on Hainan Island, in the South China Sea. This island is the site of APP's new large-scale pulp mill (see related story on page 16).

"In our process we use only virgin fibers as APP is a major producer of chemical pulp," Mr. Hsu says. "The furnish is primarily eucalyptus and acacia hardwoods, but we also add a proportion of Northern softwood pulps."

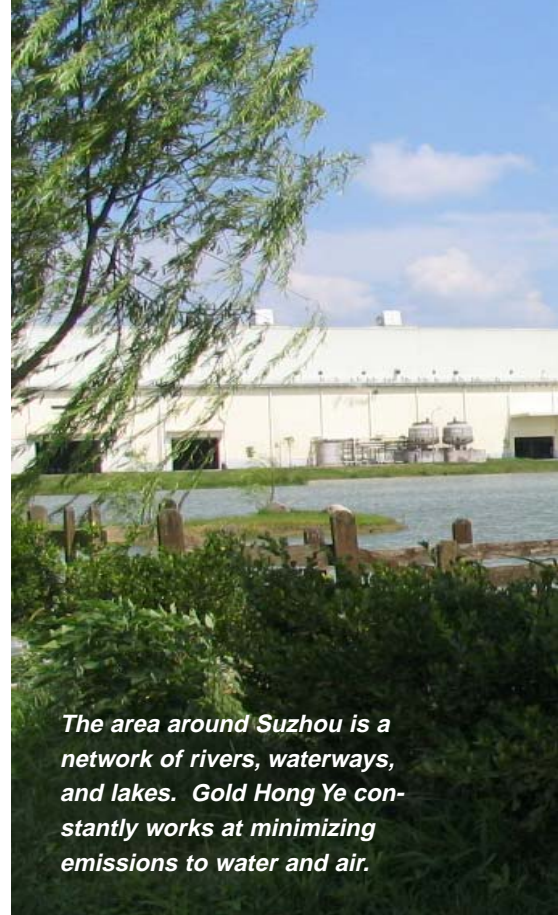
Leading tissue brands in China

According to Mr. Hsu, Gold Hong Ye produces the leading tissue brands in China. The company is also able to export a large proportion of its premium grades to countries with high quality demands in the Pacific region.

"It is important that we work in cooperation with our suppliers and potential customers to refine our products, in order to meet their requirements in the most cost-effective way possible," he says. "It is very important in the tissue making process to get the mix right."



Mr. Y.T. Hsu, Production Manager at Suzhou (left) with Mr. Ted Chen, Executive Vice President Director, who is responsible for Gold Hong Ye's tissue mill at Suzhou.



The area around Suzhou is a network of rivers, waterways, and lakes. Gold Hong Ye constantly works at minimizing emissions to water and air.

Environmentally sound

The Suzhou mill complex, which incorporates the papermaking facilities of sister company Gold Hua Sheng, has now been certified to ISO 14001 environmental standards. The area around the mill and Suzhou city is a network of rivers, waterways, and lakes.

"It is important that the high pollution levels of some local paper producers in China be reduced as quickly as possible," Mr. Hsu says. "Our mill site has its own treatment plant and we are constantly moving towards the minimum emissions to water and air, and the most efficient use of energy."



not that easy since, with the machines running faster, more cooling water is needed," he says.

Mr. Hsu was very enthusiastic about the cooperation with Andritz. "We work together very well," he says. "Compared to 10 years ago, machine builders have really focused on the tissue making processes and, in some cases, know more than the papermaker himself. They understand the different fibers, chemicals, and machine clothings. And, they are learning how to keep the costs down.

"We consider the new Andritz machine to be one of the best. Andritz and our people have formed an excellent team and share knowledge on a regular basis. We know that if we face a problem, we can depend on their quick technical support in order to help us continue to operate at these very high speeds."

The site has its own power plant with electrostatic precipitators to reduce flue gas emissions. Andritz has contributed to helping Gold Hong Ye reduce water

consumption. On average, the mill is down to 9 m³ of water consumption per ton of tissue produced. The target, according to Mr. Hsu is 8 m³/t. "Which is

Find out more at www.fiberspectrum.andritz.com



The Suzhou mill produces some of the leading tissue brands in China. The company is also able to export a large proportion of its premium grades to countries with high quality demands in the Pacific region.

New Orders

Wood Processing

Complete Lines & Systems

Weyerhaeuser
Columbus, MS, USA
Woodyard
Tree Length Debarking System

Weyerhaeuser
Port Wentworth, GA, USA
Woodyard
Tree Length Debarking System

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

Key Equipment

Martco
Oakdale, LA, USA
Two Linear Portal Cranes
Greenfield OSB Plant

Andhra Pradesh Paper Mills
Rajahmundry, India
Chip Screen and Rechipper

Upgrades & Modernizations

Footner Forest Products
High Level, AB, Canada
Maintenance Contract for Two Portal Cranes
Three-year contract for full maintenance of the portal cranes. Footner is the largest OSB mill in North America

Fiberline

Complete Lines & Systems

Marusumi Paper
Ohe, Japan
Complete Fiberline

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

Koch Cellulose
Brunswick GA, USA
Oxygen Delignification System

Key Equipment

Horizon Pulp and Paper
Kehra, Estonia
Main Equipment for Washing and Knot Separation

Fujian Qingshan Paper Industry
Qingzhou, China
Main Equipment for Screening and Reject Refining

Upgrades & Modernizations

VCP
Jacarei, Brazil
Digester Upgrade

CENIBRA - Celulosa Nipo-Brasileira
Belo Oriente, MG, Brazil
Digester Upgrade

Oji Paper
Tomioka, Japan
Two Ozone Bleaching Stages

Recovery

Complete Lines & Systems

Marusumi Paper
Ohe, Japan
Evaporation Plant

JSC Kotlas Pulp & Paper
Korjazma, Russia
Evaporation Plant
Largest Evaporator in Russia



Andritz fiberline under construction for Veracel S.A. in Brazil.

Andhra Pradesh Paper Mills
Rajahmundry, India
Evaporation Plant and Recovery Boiler

Upgrades & Modernizations

Weyerhaeuser
Springfield, OR, USA
Recovery Boiler Upgrade

Mondi Business Paper
Syktyvkar, Russia
Recovery Boiler Upgrade

Weyerhaeuser
Flint River, GA, USA
Recovery Boiler Upgrade

M-real
Husum, Sweden
Evaporator Upgrade

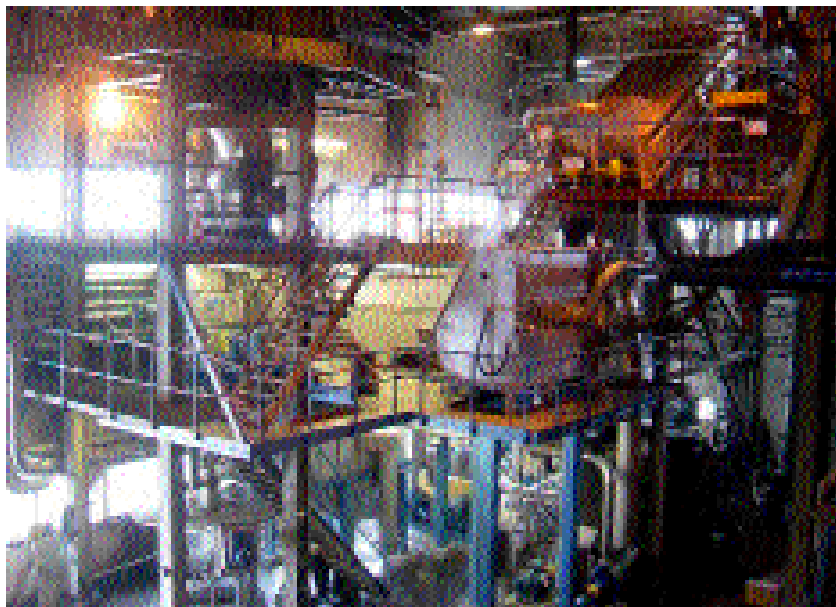
Mondi Packaging Paper
Swiecie, Poland
Evaporator Upgrade

Chemical Systems

Complete Lines & Systems

Marusumi Paper
Ohe, Japan
Complete White Liquor Plant (Recausticizing Plant and Lime Kiln) and White Liquor Oxidation System StiroX™

Andhra Pradesh Paper Mills
Rajahmundry, India
Complete White Liquor Plant (Recausticizing Plant and Lime Kiln) Delivery with Enmas-Andritz *EPS Delivery*



490 adm/h Andritz Chip Washing System at Södra Cell Folla A/S, Norway

CENIBRA - Celulosa Nipo-Brasileira
Belo Oriente, MG, Brazil
Complete White Liquor Plant
(Recausticizing Plant and Lime Kiln)

Key Equipment

Sappi Fine Paper North America
Somerset Mill
Skowhegan, ME, USA
LMD-Filter™

Pulp Drying & Finishing

Complete Lines & Systems

Zellstoff Pöls
Pöls, Austria
Pulp Drying Line Rebuild

Hokuetsu Paper
Niigata, Japan
Wet Lap Plant

Guizhou Chitianhua Group
Chishui City, China
Pulp Drying Line

Upgrades

Confidential Customer in North America
Flash Dryer and Curing Bin Upgrade

Confidential Customer in North America
Extension Fläkt Dryer

Key Equipment

Carter Holt Harvey, Tasman Mill
Kawerau, New Zealand
Twin Wire Press

Mechanical Pulping

Key Equipment

SCA Laakirchen
Laakirchen, Austria
Double Wire Press

Panelboard

Upgrades & Modernizations

Kunz/KFB
Baruth, Germany
Plug Screw Feeder & Digester Rebuild
Largest installed MDF line

Kronospan Chirk
Chirk, Wales, UK
Plug Screw Feeder Rebuild

Kronospan Luxembourg
Sanem, Luxembourg
Refiner Rebuild

Fiber Preparation

Complete Lines & Systems

UMKA
Umka, Beograd, Serbia & Montenegro
Complete Stock Preparation Line
for Board Machine

Perlen Papier
Perlen, Switzerland
Virgin Fiber Pulp Line

M-real Zanders
Bergisch-Gladbach, Germany
Complete FilRec™ Filler Recovery System

Middle East Paper Company
Jeddah, Saudi Arabia
OCC Line

Key Equipment

SP Newsprint
Dublin, GA, USA
FibreFlow® Drum Pulper and Feed System

Drewsen Spezialpapiere
Lachendorf, Germany
Tailing Screen for Paper Machine Approach System

Mondi Packaging Paper
Swiecie, Poland
ModuScreen™
Biggest CR-screen with slots

Svetogorsk (International Paper)
Svetogorsk, Russia
Two TwinFlo™ Refiners

Shandong Sun Paper Industry Group
Yanzhou City, Shandong, China
OMC Broke System



Holmen Braviken, Andritz third stage TMP low consistency Refiner — takeover in last quarter 2004.

Corner Brook Pulp and Paper
Corner Brook, NL, Canada
Screens

Perlen Papier
Perlen, Switzerland
Two Papillon™ Refiners

Gebr. Lang
Ettringen, Germany
Pulp Screw Press

S.A. Industrias Celulosa Aragonesa
Zaragoza, Spain
Gravity Table, Sludge Screw Press

Hebei Pan Asia Long-Teng Paper
Hebei, China
Broke Thickening and Screening Equipment

SC Ecopaper
Zarnesti, Rumania
Upgrade of Pulper and Coarse Screening
System

Upgrades & Modernizations

Perlen Papier
Perlen, Switzerland
Rebuild and Extension of Deinked Pulp Line

UPM-Kymmene
Jämsänkoski, Finland
Saveall Disc Filter

Holmen Paper
Hallstavik, Sweden
Pulp Screw Press with Two Screw Conveyors

Tissue Machines

Upgrades & Modernizations

Procter & Gamble
Neuss, Germany
Dust Removal and Sheet Stabilization System
**3rd tissue machine modernization contract with
Andritz within a year**

Start-ups

Wood Processing

Complete Lines & Systems

Weyerhaeuser
Oglethorpe, GA, USA
Full Bite Circular Crane
First 180 ft. radius circular crane

Upgrades & Modernizations

Stora Enso
Port Hawkesbury, NS, Canada
Loading Deck/De-icing System
Modernization of existing wood-room infeed system to increase debarking efficiency and capacity

Fiberline

Complete Lines & Systems

Veracel Celulose
Eunapolis, Brazil
Complete Fiberline
Biggest single-line capacity in the world

Key Equipment

Weyerhaeuser
Rothschild, WI, USA
DD Washer

Recovery

Complete Lines & Systems

Soporcel
Figueira da Foz, Portugal
Recovery Boiler

Key Equipment

Soporcel
Figueira da Foz, Portugal
ARC Chloride Removal Unit

Upgrades & Modernizations

Phoenix P&P
Khoen Kaen, Thailand
Evaporator

Mondi Kraft
Richards Bay, South Africa
NCG System

Chemical Systems

Complete Lines & Systems

Veracel Celulose
Eunapolis, Brazil
White Liquor Plant, Reausticizing Plant and Lime Kiln
EPC Delivery



First 180 ft. radius circular crane started-up in October 2004 at Weyerhaeuser, Oglethorpe, GA, USA

Upgrades & Modernizations

Bahia Sul Celulose
Suzano, Brazil
Lime Kiln Retrofit

Pulp Drying & Finishing

Complete Lines & Systems

Veracel Celulose
Eunapolis, Brazil
Sheet Drying Line 9.33 m
Complete line from storage tower to finished bales — one of the largest in the world

Mechanical Pulping

Complete Lines & Systems

Dunaujvarosi Cellulozgyar
Dunaujvaros, Hungary
Flax Refining System
New technology

Trombini Papel e Embalagens
Fraiburgo, Santa Cata, Brazil
HC Refining System for Kraft Sack Paper

M-real
Joutseno, Finland
Reject Bleaching System

Panelboard

Complete Lines & Systems

Jiu Ke Song WBP Hubei
Hubei, China
Pressurized Refining System for MDF

Heze Chenming Panels Lindun
Shandong, China
Pressurized Refining System for MDF

Anhui Luzhou WBP
Anhui, China
Pressurized Refining System for MDF

Yunnan Jinggu Forestry
Yunnan, China
Pressurized Refining System for MDF

Henan Mengzhou WBP
Henan, China
Pressurized Refining System for MDF

Anhui Taihu County Board Jinchan
Anhui, China
Pressurized Refining System for MDF

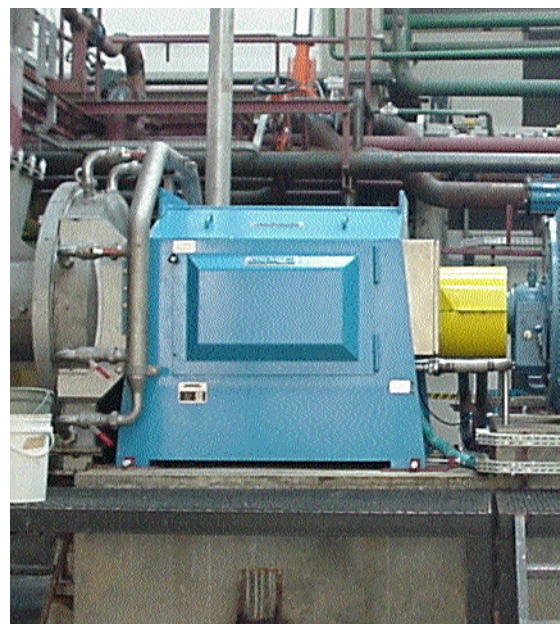
Kronostar
Scharja, Russia
Pressurized Refining + Chip Washing System
1100 t/d MDF plant – highest capacity for one refiner/chip washing line

Tever MDF
Bölgesi, Turkey
Pressurized Refining System for MDF

Fiber Preparation

Complete Lines & Systems

Nanping Paper
Nanping, Fujian, China
DIP System for 370 t/d Newsprint Grades
First complete line in China with new Andritz equipment



HC Kraft Sack Paper Refining, Trombini Papel e Embalagens.

FS-Karton (Mayr-Melnhof Group)
Neuss, Germany
 DIP System for 200 t/d
 for Top Layer of Board Machine
*First complete line including sludge dewatering
 in Germany*

Al Sindian Paper Mill (Nuqul Group)
Giza, Egypt
 Complete Stock Preparation for Tissue
 Machine
Andritz major supplier for new tissue mill

Shandong Chenming Paper
Shouguang, Shandong, China
 Complete Paper Machine Approach System

Key Equipment

Smurfit-Stone Container
Bathurst, QC, Canada
and Matane, QC, Canada
 Coarse Screening Systems
*World's largest recycler chooses Andritz's
 unique technology which dramatically
 simplifies mill flowsheet and power costs*

Norampac
Cabano, QC, Canada
 TwinFlo™ Refiner

M-real Hallein
Hallein, Austria
 FilRec™ System
First FilRec™ system in Austria

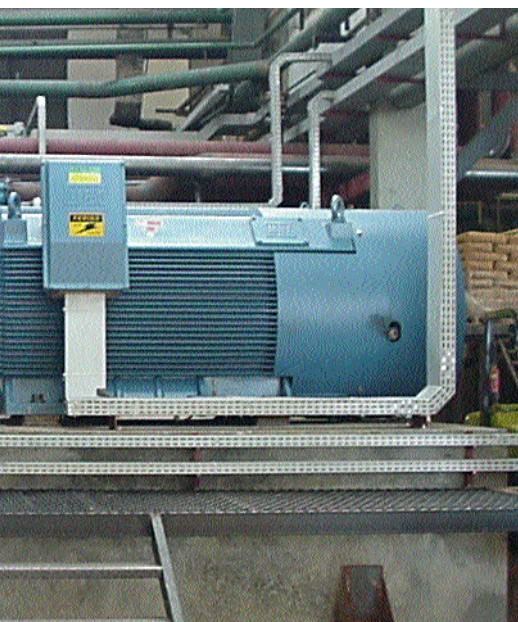
M-real Stockstadt
Stockstadt, Germany
 FibreSolve™ Pulper

Pfleiderer Spezialpapiere
Teisnach, Germany
 Papillon™ Refiner

Dr. Franz Feurstein
Traun, Austria
 Five TwinFlo™ Refiners



M&D Impregnator from the new Sawdust Cooking Line at Wisaforest, Pietarsaari. Start-up was summer of 2004.



Norske Skog Bruck
Bruck, Austria
 Papillon™ Refiner

Daehan Paper
Cheongwon, South Korea
 Conveyors and FibreFlow™ Drum Pulper

Stora Enso Hylte
Hyltebruk, Sweden
 FibreFlow™ Drum Pulper with
 Three-Stage Coarse Screening System

UPM-Kymmene
Kaipola, Finland
 Fine Screening System, incl. ModuScreen™
First start-up of big A-type screen

Tissue Machines

Complete Lines & Systems

Thüringer Hygiene Papier
Wernshausen, Germany
 PrimeLine™ Tissue Machine with
 TissueFlex™

**Ventilation and Drying
 For Tissue and Paper Machines**

Key Equipment

Adolf Jass
Schwarza, Germany
 PM Hood and Air Systems

ANDRITZ PULP & PAPER



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