WITH A FLOURISH OF BAGPIPES, FIDDLERS AND DRUMS, Stora's new supercalender (SC) paper machine was inaugurated this May at the Port Hawkesbury mill in Nova Scotia, Canada. The Valmet machine, the largest and fastest of its type in the world, introduces SC-A+ production to North America to compete with light-weight coated (LWC) papers used for newspaper inserts, magazines and catalogues.

More than 500 customer and supplier representatives, company officials, government dignitaries and mill employees gathered for a ceremonial banquet in Halifax the evening of May 28 and for the inauguration ceremony at the mill May 29. The event drew Claes Dahlbäck, Stora's chairman of the board, and Björn Hägglund, Stora's president and CEO (despite a pending merger announcement with Enso), as well as Russell MacLellan, Premier of Nova Scotia.

Judging from attendance, you could see the mill's SC paper in catalogs and newspaper inserts for such companies as Toys ‘R’ Us, K Mart, J.Crew, Target Stores and L.L. Bean. Among the publishing companies represented at the gathering were the Detroit News, Readers Digest, Newsweek, and Brant Publications.

On inauguration day, businesses throughout Port Hawkesbury displayed banners congratulating Stora on the start-up of the new machine. Even school kids were out waving to mill visitors.

People in the Straits area feel a strong kinship with Stora. Bob MacEachern, past president of the Strait Area Chamber of Commerce, said “Stora is unprecedented in their generosity. People make a good living at Stora — bottom line. They’re an excellent corporate citizen...probably Nova Scotia’s best company.”

Natalie MacMaster was one of several internationally renowned musicians who performed at the Stora banquet. Her father worked at the Stora Port Hawkesbury mill for 35 years before retiring in 1997. Her two brothers work there now. “So my family owes you a lot, and I would like to thank you very, very much for providing security for our family, and many other families,” she said.

The Stora mill has been the region’s major employer for several decades, both directly and indirectly. That’s especially important in an area that’s seen unemployment near 17%.

Up to 2000 people worked on the project since groundwork began in May 1996 through April of 1998 when PM2 came on line. Jack Hartery, president of Stora Port Hawkesbury, praised all the participants in the “fast-track” project for completing the project so quickly.

Anders Backlund, Stora project manager, said “joint teamwork by the Stora organization, suppliers and contractors helped us achieve our common goal. Start-up was on schedule and fine-tuning of PM2 will take place over the next several months.”

Stora estimated the cost of the PM 2 project at CAD 750 million (roughly US$ 510 million), less CAD 80 million (about US$ 54 million) invested by the Canadian government in the form of reduced tax payments.
THE SC PAPER MACHINE

The star of the show was PM2, said to be the world's largest SC machine. Over-all length is 146 meters, with a 9.46 meter wire width. The Valmet machine may also be the fastest, with a design speed of 1800 m/min (5906 ft/min). It has an annual capacity of 350,000 metric tons of uncoated magazine paper. That increases the company's total production capacity for SC papers — most of which will be sold in North America — by 70%.

The forming section of the new machine is a vertical gap, twin-wire SpeedFormer™ with a SymFlo D dilution headbox. The headbox uses white water as the diluant, with full control of fiber orientation and basis weight profiles. The SpeedFormer features a high open area forming roll and vacuum-assisted multifoil shoe for enhanced sheet formation and symmetry.

The press section includes a tri-nip Sym-Belt™ press with zone-controlled rolls and a separate smoothing fourth press.

The single-tier dryers include 45 dryer cylinders grouped into nine sections. The dryer is equipped with automatic threading and hood control, according to Stora. The dried paper is wound on a center-driven OptiReel™ equipped with automatic reel changing. Additional features of the reeling area include two beams to determine sheet measurements, a remoisturizer, and a hole detector.

Voith-Sulzer supplied two Janus™ calenders for PM2, each with a maximum speed of 1500 m/min. The calenders use high temperature steel rolls and synthetic covered rolls, alternately stacked, to provide for high-pressure, high-speed calendering, Stora reports. The system also features automatic gloss control, reel changing, and high-speed, open-nip threading.

PM2 also has two Jagenberg Vari-Top™ winders, with top speeds of 2500 m/min, and one rewinder. The single drum units can produce rolls up to 12.5-ft (3.8-m) wide by 54-ft (1.5-m) in diameter.

Reels are lifted by cranes from KCI Konecranes' Canadian manufacturing site in Lachine, QC. The installation includes two 100-ton wet end cranes, one 100-ton dry end crane, one 100-ton winder crane, one 100-ton grinding crane, one 50/20/5 ton crane for the TMP refiner and one 38/5 ton crane for the stock preparation area.

Core Link supplied a complete CL4090 core preparation, handling and delivery system for PM2. It includes a programmable pick-up robot that transfers 3-in to 6-in (inside diameter) parent cores from storage racks to the cutting station. The cores are automatically cut to size and moved on to stations for reaming, notching and capping. Finished cores are transported by a conveyor system in set sequence to the winder on a just-in-time basis. The system's operator controls are linked to the mill's computers for automatic set order programming.
The system uses trim width parent cores," Core Link emphasizes. "Unlike batch-prepared cores, this approach guarantees that each core in a set will have identical physical properties," the company notes. "It also reduces waste to a minimum of 2%.

Additional equipment supplied by Core Link includes a CL 1000 manual core cutter, a CL 100 hand-held cutter (to remove cores from inside slit rolls), a 310L hydraulic broke roll splitter with automatic roll loading, portionizing and conveyor to the pulper, plus a core stripper.

Up to 2553 rolls can be wrapped during a 24-hour day on the new Simatec Engineering equipment installed at the mill. The Simatec Robowrap roll wrapping system is fully automatic.

To carry the rolls from winders to wrapping and on to the warehouse, Raumaster Oy supplied a paper roll handling system capable of handling jumbo rolls weighing 8 tons and up to 12.5-ft (3.8 m) in length by 5-ft (1.5 m) in diameter. The system features 3-m wide roll ramps with soft operating cradle stoppers, a +300-m wagon conveyor to transport rolls from PM2 to the warehouse, a lowering up-ender in the warehouse, and a vertical conveyor to carry rewinder and wrapper rolls from the warehouse to the mill.
Narrow rolls are sorted and bundled before the lowering up-ender by using grouping pockets. Roll bundles enter the lowering up-ender along short-pitch slat conveyors. The rolls are lowered 8 m to the storage slat conveyor and positioned for clamp truck handling. The complete conveyor system can be monitored from the wrapline operating room through a comprehensive PC-based roll tracking and fault diagnostic system.

The mill has also contracted with Raumaster to supply grouping pockets, slat conveyors and a lowering up-ender with storage conveyors for the PM1 newsprint machine, to replace the existing lowerator system.

The new machine, as well as a new TMP plant, is housed in an all-concrete building measuring 120 m by 312 m. The structure required 37,500 m³ of precast concrete and 27,000 m³ of concrete poured at the site. Strescon Ltd. of Saint John, NB, manufactured the prefabricated sections at sites in Saint John and Bedford, NS. Those sections were used for the shell of the building, while the flooring and more than 5400 pillars and wall blocks were erected onsite. The choice of an all-concrete structure fit well with the fast-track project, requiring no more than seven months from design to completion. It should also require less maintenance effort and costs than would a steel structure, Stora expects.

Elsag Bailey supplied the mill’s Windows NT-based production management and tracking system. Valmet supplied off-line automated paper testing and on-line...
continuous control for retention, stock preparation and consistency. Systems supplied by Valmet include: Damatic XD process control system, Paper IQ quality control system, Sensodec advisory system.

Stora worked with Canadian National (CN) Railway Company to design a rail car to transport the rolls of SC paper produced at the Port Hawkesbury mill. “This paper is very heavy and it created special requirements for handling to ensure its safe and efficient transport,” CN reported. The new rail cars have about one-third more loading capacity than standard units. The fully-cushioned cars have wood flooring and a 100-ton load capacity. They also use a “securement device” to ensure safe and damage-free transport of paper rolls and to simplify unloading at printing plants. The rail line has ordered more than 200 of the new cars.

THE NEW SC PAPERS

The new line is the first in North America to produce SC-A+ paper, which will be marketed as “MagniPress™.” The mill will also produce SC-A. Basis weight for the SC papers produced on PM2 will range from 40-66 g/m². Their ISO brightness will range from 68% to 72%.

Printing trials on the new grade from PM2 were conducted at the Rochester Institute of Technology in New York. “The company’s tests showed that the printing performance of the new paper was greatly improved and both ink holdout and ink gloss increased,” Stora reported.

The SC paper will be marketed for use in magazines, catalogs, retail inserts and flyers. The papers offer “the brightness, optical qualities and printability typically found in lightweight coated (LWC) papers, but at a lower cost,” Stora stated.

SC-A papers cost about 15% to 20% less than coated papers, according to Folio, which notes that 4.2 million circulation McCall’s is already using SC-A+ paper. Although paper sellers expect the SC papers will provide improved quality on rotogravure presses, they are less certain of how well they will perform on offset printers, Folio notes in its May 1998 issue.

In response to recent advertising claims by European paper manufacturers for uncoated SC-A+ papers, Champion International announced plans in March to launch its own advertising campaign “to emphasize the many benefits of using coated paper in magazines and catalogs.” According to Champion, when compared with
SC-A+ papers, coated papers have reduced ink absorption and higher print gloss; less dot gain, so images are clearer; greater opacity, with less show through; and a more substantial feel because of greater sheet thickness.

The new machine will use TMP, kraft pulp and clay filler to produce the SC papers. The clay comes from Cornwall, England. It works well under acidic conditions and has good opacity, according to mill representatives. Port Hawkesbury is also reported to be testing different kaolin mixes. “It is common for European papermakers to combine kaolins from different areas of the world to produce a broad range of paper and board products,” notes Steve Sullivan, North American kaolin products manager for ECC International.

“ECC is a supplier to Stora in Europe as well as in North America,” Sullivan said. Based on their experience in Europe, Stora “determined that a combination of filling clay from Europe and filling clay from the United States was required to produce the SC-A+ grade they were targeting,” he said. “Higher value Georgia clays have historically been shipped to Europe due to the high brightness, glossing ability, and flow properties of these pigments.”

THE TMP PLANT
As part of the PM2 project, Andritz was selected as equipment supplier for the facility’s TMP pulping and bleaching plant. The contract included chip treatment and storage, refining, cleaning, screening, bleaching and stock preparation systems.

Andritz Kone Wood supplied two 11,000 m³ covered chip storage silos equipped with cantilevered slewing screw reclaimers. The concrete walls of the silos have been insulated to help reduce the fluctuations between inside and outside temperatures, noted Bernard O’Connor, North America vice president for Andritz Kone Wood.

Specific equipment supplied by Andritz included a 3-stage RTS™ refining system comprised of six refiners in two parallel lines. The first and second stages are equipped with TWIN 66 refiners (24 MW @ 2300 rpm). The third stage uses SB 150 68-in single-disc refiners (15 MW @ 1800 rpm). Two SB 150 refiners were installed for rejects refining, also.

“RTS” stands for residence time, temperature and refiner speed. Those are the three variables that most affect the TMP process, Andritz notes. The process pretreats wood chips before the first refining stage. “This makes the chips more receptive to first stage fiber strength development, without a decrease in brightness,” according to Andritz. “Primary refining is accomplished at high speeds in pressurized refiners, which reduces total specific energy requirements with no loss in pulp strength properties.”

Andritz facility proves technology benefits
In order to convince Stora of the benefits of installing its RTS™ TMP process at the Port Hawkesbury mill, Andritz conducted a comprehensive series of tests at its pilot plant and research center in Springfield, OH. The tests were designed to highlight the differences between RTS and conventional TMP processes.

Results of one aspect of the TMP process evaluation were reported in Pulp & Paper Canada 98 (12):T464-468 (December 1997). The study evaluated two-stage and three-stage refining processes using a variety of furnishes. Those included balsam fir, white spruce, red spruce, and a mixture of pine, hemlock and larch.

According to Andritz, the studies conducted for Stora “showed that while fibers in the TMP processes could be refined for greater strength by increasing steam pressure, this strategy also resulted in pulp darkening and a jump in energy requirements. By the same token, increasing refiner speed reduced energy consumption, but at the cost of lower pulp strength.”

In contrast to other TMP processes, RTS pretreats wood chips before the first refining stage in order to improve first stage fiber strength development without a decrease in brightness. “Primary refining is accomplished at high speeds in pressurized refiners, which reduces total specific energy requirements with no loss in pulp strength properties,” Andritz reports. Consequently, “the RTS pulp had the tear and burst strength properties Stora had specified, along with the initial brightness and response to bleaching required to meet SC-A+ optical standards.”

The Andritz research facility, built in 1973, is set-up to duplicate nearly any refining process, including many chemical pulping processes. It uses extensive automation, variable speed drives, and production scale equipment to closely match mill-scale refining conditions.

The operations at Springfield are divided into three functional areas: refining, chemical impregnation and bleaching, and screening/cleaning. About 40% of the research center’s work is for Andritz itself. Those studies include process development, equipment development and prototype testing, and component testing. The rest of the work is for external clients, potential customers, research groups and consultants. Such studies vary from support for mill upgrades or construction to mill process optimization. In some cases, a client may “rent” the facility for proprietary studies.
Andritz supplied two 52/58-in Twin-Flo II refiners for the TMP plant for post-refining, plus two 34/38-in units for kraft refining. (The same type refiner has been operating at Daishowa’s Quebec Mill Division, with others scheduled to go into service this year for newsprint TMP at Fletcher Challenge Canada’s Elk Falls mill in British Columbia and Bowater Newsprint’s mill in Calhoun, TN.) The refiners are designed to give low intensity refining at high production rates. Lower refining intensity improves bonding properties, preserves fiber length, and minimizes fines generation, Andritz notes.

The TMP plant includes two of the first three Andritz MSD Impressafiners installed in North America. The modular screw device compresses the chips being fed to the primary stages, resulting in greater chip size and moisture uniformity.

The mill is using a 1-1/2 stage, high consistency peroxide bleaching system supplied by Andritz. The system includes MC pumps and four 4.2-m double-wire presses — two for dewatering, two as wash presses. The double wire presses can dewater 770 a.d. metric tons/day of TMP at 25-30 ml CS freeness.

In order to minimize chemical consumption while achieving a brightness gain of 23% ISO, the pulp is dewatered to more than 40% consistency. “Dewatering to 42% saves approximately 5% peroxide compared to dewatering to 32%,” Andritz states.

Through filtrate recirculation, residual peroxide can be recovered and used to pretreat the pulp, reducing the need for fresh peroxide by 5% to 10%.

“To achieve the maximum brightness gain in the high consistency bleach tower, the pulp is stored at high-consistency for the whole retention time of 3-4 hours,” according to Andritz. All dilution occurs outside the tower.

Andritz used ABB synchronous motors to drive the refiners, Valmet pressure screens for the main line and rejects, and Noss cleaners for the main line.

Stora had the equipment suppliers serve as EPC (engineering, procurement and construction) partners. To accomplish that for its segment of the project, Andritz formed a joint venture with KSH (Klockner Stadler Hurter) for engineering and Kamyr Enterprises for construction/erection. The project took just 16 months to complete, with commissioning in February of 1998.

**TREES AND FIBER**

The principal fiber source for the pulp and paper mill has been privately owned woodlots throughout central and eastern Nova Scotia (70%). The rest comes from Crown lands (607,000 ha) and freehold managed by the company (23,000 ha).

Stora tailors its silviculture methods to suit the varied forest types of Nova Scotia. From 1962 through 1997, it planted more than 105 million seedlings, nearly half of which are black spruce and another quarter are white spruce. The remainder include red, Jack and white pine, and Norway and red spruce.

As a pulp and newsprint producer, the Port Hawkesbury mill consumed in excess of 2 million m$^3$ of wood annually. As a newsprint-SC operation, the mill will only require about 80% of the amount of wood it used to use, or about 1.7 million m$^3$.

Pulpwood is generally trucked to the mill in 8-foot lengths. Those are debarked in any of five rotating drums before chipping.

Stora buys reinforcement pulp, primarily northern softwood kraft, from mills in British Columbia and Quebec to mix with the TMP pulp and filler clay for its SC papers.

**THE EXISTING MILL**

Stora made its decision to build a pulp mill at Port Hawkesbury in 1957. It added newsprint production with a 1971 start-up of PM1.

Stora decided to end sulfate pulp production at the mill, in connection with the start up of PM2. The sulfate mill started operations at Point Tupper, NS, in 1962. The pulp line produced about 170,000 metric tons/year, but it had been operating at a loss because of adverse market conditions. In 1988, the mill installed a chlorine dioxide generator and became the first in North America to manufacture elemental chlorine free (ECF) pulp. It also began producing totally chlorine free pulp in 1990, using hydrogen peroxide. The market sulfate pulp mill ceased operation at the end of February 1998, but there are no immediate plans to demolish the building. A separate high yield sulfate plant continues to produce reinforcement pulp for PM1. The sulfate pulp is combined with stone groundwood pulp and a small amount of purchased kraft pulp to produce newsprint.
The mill continues to produce 190,000 metric tons of newsprint annually on its PM1, most of which is sold to U.S. publishing companies.

For newsprint, the mill uses about 894,000 m³/year of wood, including black spruce (38%), balsam fir (36%) and white spruce (25%).

After debarking, one line of logs is conveyed to a slasher to be cut in half and then to the groundwood mill. There the logs are mechanically loaded into three gridding lines. Each line has two 6-ft grinding stones to produce the pulp which then goes through screening and cleaning. Rejects are refined in a high consistency refiner. High yield sulfite pulp (27%) is added as a reinforcement fiber to the newsprint furnish, along with a small amount (3%) of purchased kraft pulp.

The newsprint machine was built by Valmet in 1971 and rebuilt in 1994. PM1's forming section consists of a Valmet hydraulic Sym-Flo™ headbox, with a combination Valmet Sym-Former™ and Voith Duo-Former™. "The press section consists of a suction pick-up with a twinver first and second press and a straight-through steel third press," the mill reports. A 48-cylinder drying section leads to a four-roll, three-nip calender stack equipped with a Kusters king roll and a Calcoil system for caliper control. The finishing area includes a Valmet shaftless two-drum winder and an automated Lamb wrapping system with an overhead wrap dispenser, with computerized roll tracking and labeling.

The sulfite mill faced possible closure in 1993, but Stora decided instead to spend CAD 48 million (about US$ 32.7 million) on environmental improvements, while employees at the site agreed to a one-year, 5% pay cut. The improvements included an activated sludge, secondary effluent treatment system equipped with Ahlstrom Aquaflow's Selector Plug Flow™ Reactor process technology. The system began operation in October 1995, just as new Canadian effluent regulations were going into effect. (The treatment plant was featured in a photo of the mill on the cover of the December 1996 TAPPI JOURNAL.)

In 1996, Canada’s Ministry of Natural Resources acknowledged the mill’s efforts to improve energy efficiency, reduce greenhouse gas emissions and implement sustainable forestry practices by presenting it with the Climate Change Challenge Award. A CAD 7.5 million (US$ 5 million) investment in chemical recovery had reduced CO₂ emissions by 12% and biomass fuels were supplanting fossil fuels.

COD at the mill averaged 88.3 kg/metric ton of end products in 1997, up from 79.8 kg/metric ton in 1996. Sulfur dioxide emissions were down from 19.4 kg/metric ton in 1996 to 13.9 kg/metric ton in 1997. Landfill disposal also decreased, from 140.3 kg/metric ton in 1996 to 117.1 kg/metric ton in 1997. With the closure of the sulfite mill, air emissions from the Port Hawkesbury facility have dropped significantly and the load to the secondary treatment plant from PM1 and PM2 is only about half of what it used to be with the sulfite mill running. There is no longer any H₂S and ClO₂ on site and the use of several other chemicals has been reduced.

**EMPLOYMENT AND TRAINING**

With the shut-down of the sulfite pulp mill, the facility will require fewer workers. Full-time employees for the pulp and newsprint mill, along with its woodlands operations, had numbered 870 people. To reduce that number, unionized workers were offered early retirement packages. Full-time employees required for the newsprint and SC mills will be about 600.

Most of the PM2 workforce was selected from those already working at the mill. All union employees were eligible to apply for the new jobs. As it turned out, there were more applicants than available positions, so a series of aptitude tests was included as part of the screening process. Even after that, there were still two applicants for every one opening, so the final selection was by seniority.

Those selected for the new jobs received basic skills training and then job-specific training that included classroom, on-the-job and off-site training at Stora mills in Europe and Scandinavia. Training also had to be provided for replacement workers for the existing mill.

Stora took the approach that training should be functional and enduring, that it should be designed to meet the needs of the job. Claymore Inc., of Toronto, served as training consultant for Stora. They helped identify the skills, tasks and knowledge required to operate various processes and equipment. Claymore's technical writers and graphic illustrators then worked with Stora writers and trainers to develop training manuals and computer-based training (CBT) material. Training manuals for replacement workers and maintenance procedures were also developed.

**Reader service numbers for some of the suppliers who helped with Stora Port Hawkesbury's PM2 project**

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Stora to merge with Enso

Days after the inauguration of PM2 at Port Hawkesbury, Stora and Enso announced that they were merging “to create the world’s largest paper and packaging board producer.” Now only International Paper, among pulp and paper producers, is bigger.

Combined sales for the two companies totaled US$11 billion in 1997. The merged companies will have 40,000 employees in 40 countries and an annual production capacity of 13.1 million metric tons of paper and board. Stora Enso will be particularly strong in the packaging board market, with a combined annual output of 1.47 million metric tons.

The intended merger still had to pass approval in the Finnish Parliament and receive blessings from the European Union and Stora shareholders. The actual merger is expected to take effect in September. The Finnish State will own about 18% of the capital and 21% of the votes of Stora Enso. Investor AB of Sweden will have 10% of the capital and 11% of the vote in the new company.

“The merger will be implemented by a public offer from Enso for all outstanding shares in Stora against new shares issued by Enso,” according to a joint press release issued by the two companies. “Following the merger, Stora’s current shareholders will own 60% of the capital and 55% of the votes,” notes the release.

Claes Dahlbäck (chairman of Stora’s Board of Directors and CEO of Investor AB) is designated chairman of Stora Enso, with Jukka Härölä (president and CEO of Enso) as chief executive officer and Björn Hägglund (president and CEO of Stora) as deputy chief executive officer.

Dahlbäck received his MBA in 1972 from the Stockholm School of Economics. He went to work at Investor AB’s New York office as an investment manager in 1973, moved to Stockholm as senior investment manager in 1976, and was named president and CEO in 1978.

Investor AB was formed in 1916 by Stockholm’s Enskilda Bank, with Marcus Wallenberg Sr., and Jacob Wallenberg among its principal directors. Members of the Wallenberg family continue to serve in board positions to this day.

Stora is the world’s oldest incorporated company, dating back to A.D. 1288. It began as a copper mining operation at Falun, Sweden. During the 18th century, the company became increasingly involved in forestry and iron production in support of its copper operations. Stora Kopparberg acquired Billerud in 1981 and Papyrus in 1986. It bought Germany’s Feldmühle Nobel AG in 1990.

Enso began operations in Finland in 1872 when Hans Gutzeit of Norway started a sawmill operation at Kotka. The Gutzeit company acquired its first pulp and paper mill when it bought Enso Träsliperi Aktiebolaget in 1912. The company was sold to the Finnish State in 1919. The company grew through various acquisitions and was know as Enso-Gutzeit Oy for most of the 20th century. In 1996, after the company merged with Veitsiluoto, the name was changed to Enso Oy. In 1997, Enso acquired majority share in E. Holtzmann, the German newprint and magazine paper manufacturer.

The Holtzmann deal added 340,000 metric tons/year of SC papers to Enso’s line of products. That capacity for uncoated magazine papers will increase by 50,000 metric tons/year in 1999 when Valmet completes a modernization of PM8 at the Maxau mill in Karlruhe, Germany.

Claes Dahlbäck
Björn Hägglund

Stora to merge with Enso