METSO'S CUSTOMER MAGAZINE FOR THE PULP AND PAPER INDUSTRY No. 3/2012

results pulp & paper

"Nobel of the forest industry",
the Marcus Wallenberg Prize
was given to Mika Viljanmaa by
His Majesty Carl XVI Gustaf of Sweden 14

Driving customer success

Although we are operating in an environment of cutting-edge technology, efficient processes and high demands on quality and competitiveness, we are, in fact, a people business. People are dealing with people, no matter which side of the table they are on. Even manufacturing organizations like ours are increasingly becoming service organizations in which the professionalism and expertise of our people generate the biggest value to you, our customers. How well we serve our customers, how efficiently we answer their needs, how important their business and its success is to us makes all the difference, placing special emphasis on the competencies of our people.

The first of Metso's four values is "Driving customer success". When our customers succeed, we succeed too. We interact closely with our customers to anticipate their needs and respond quickly and professionally to them. We focus on delivering quality solutions and services to benefit our customers.

Providing good service and partnership is very high on the Metso agenda, externally as well as internally. Customer-service related self-assessments are inbuilt in our main people processes and every Metso employee participates in these regularly. We use the TellUs employee survey and the annual Development Review process to assess how well we are performing in relation to our customers and how much farther we should aim to meet the needs of our customers.

The performance of each Metso employee is an important link in the chain toward the customer interface. The customer experience is equally affected by the attitude we as Metso employees exhibit when interacting with customers: do we stop to listen to what the customers say, do we try to anticipate their challenges and create sustainable solutions that deliver long-term value, balancing even competing needs? From our young freshmen and multi-skilled experts all the way to our experienced pulp, paper and power business specialists everyone is aiming to create an atmosphere of appreciation and trust which will enable our customers' business to flourish. Together we will succeed.

Julia Macharey
Senior Vice President, Human Relations
Metso Pulp, Paper and Power

in this issue

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Reusing, recycling and material efficiency are some of today's hot topics. Read more about these e.g. on pages 8, 14 and 46. (Photo: Pasi Lampinen, Stora Enso Kaukopää Mill)

Reporting results

Featured articles

News in brief

Reporting latest orders

Metso to supply board machine rebuild for SCA to increase value-added production

Metso will rebuild the white top kraftliner machine at SCA Packaging Munksund AB's Piteå mill in Sweden. The rebuilt production line will be fully operational during 2013.

The main target of the rebuild is to increase the share of the production of value-added white top kraftliner products. As a result of the rebuild, SCA Packaging Munksund will be able to increase its total annual white top kraftliner production from the current level of 110,000 tonnes to 165,000 tonnes and the total kraftliner production from today's 360,000 tonnes to 415,000 tonnes.

Metso's delivery will comprise a rebuild of the approach flow system, headbox, forming, press and dryer sections, and the board machine ventilation system.

The 7.01-m-wide (wire) PM 1 produces white top kraftliner in the basis weight range of 115-200 g/m^2 and unbleached kraftliner in the range of 170-440 g/m^2 at the design speed of 1,100 m/min.

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Coater rebuild for Hansol Paper in South Korea

Metso will rebuild an off-machine coater in the coated woodfree paper production line at the Changhang mill of Hansol Paper Co., Ltd. in South Korea. The rebuilt production line will be fully operational during 2013.

"The main target of the rebuild is to convert the production line so that it can also produce thermal paper grades. As a result of the rebuild, the mill will be capable of flexibly changing production between coated woodfree grades and thermal paper grades," says Metso's Senior Sales Manager **Pekka Turtinen.**

Metso's delivery will comprise a curtain coating unit, a soft calender, a reel and a moisturizer for curl control. The new curtain coating unit applies a thin thermal coating layer on the web economically in a non-contacting operation.

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Relocation and rebuild of paper machine for Shandong Chenming Paper in China

Metso will supply Chenming Jilin, part of Shandong Chenming Paper Holdings Ltd., with a project to relocate and rebuild a paper machine to the company's new mill site in Jilin Province, China.

"The main target of the project is to increase production by improving the efficiency of the paper making line and increasing the drying capacity of the paper machine," says **Jukka Vuorela**, Metso's Sales Manager.

Chenming Jilin's paper machine will be relocated within Jilin City from its current mill site to the company's new mill site. Metso will supervise the dismantling and packing of the paper machine line and supervise the installation and start-up of the relocated equipment. Metso's delivery will also include a rebuild of the relocated PM 12. The start-up of the relocated and rebuilt machine is scheduled for the second half of 2013.

The paper machine to be relocated is the 6.95-m-wide (wire) PM 12 paper machine. The modernization will include forming and drying section modifications and a press section rebuild with a new SymBelt shoe press. The PM 12 has been producing coated wood-containing LWC (light weight coated) paper grades, but after the rebuild it will also produce other new paper grades.

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Reporting start-ups

The Shanghai Orient Champion Paper and Metso start-up team in front of a jumbo reel at TM 8.

Two new Metso-supplied tissue machines started up at Shanghai Orient Champion Paper in China

On September 14, 2011, Shanghai Orient Champion Paper started up its new Metso-supplied tissue production line, TM 7, at its facility in Jinshan outside Shanghai, China. Now, less than eight months after the start-up of the first Advantage DCT machine, a second Advantage machine was even more successfully started up at the same site on April 26, 2012.

Metso's scope of delivery included two complete tissue production lines, featuring one Advantage DCT 100+ and one Advantage DCT 135+ tissue machine. Both lines include stock preparation systems, comprehensive Metso DNA automation systems and Metso IQ quality control systems.

The Advantage DCT tissue machine concept has been developed for fast installation and start-up. These two installations were no exception. The TM 7 performance test was carried out two months after start-up. Within 10 days of the start-up, the machine was up to the guaranteed speed; the machine is designed for a production speed of 1,800 m/min. The start-up of TM 8, which

took place smoothly and on time, exceeded all expectations. It is now operating efficiently, producing high-quality tissue paper.

The rapidly growing Shanghai Orient Champion Paper currently operates six smaller tissue machines and converting lines at the Jinshan mill. The two new Metso machines add another 70,000 tonnes to the mill's production capacity.

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Paper machine rebuild for SCA Graphic Laakirchen AG started up in Austria

The SCA Graphic Laakirchen AG PM 10 was successfully started up on January 23, 2012 after a Metso-supplied press section rebuild in Laakirchen, Austria. The main target of the modernization was to increase production and to decrease energy consumption.

"Our target was to increase sheet dryness after the 3rd press for increased speed. We also wanted to reduce the draw and specific energy consumption, and maintain the same high level of quality that was produced before the rebuild," says **Andreas Vogel,** Production Manager of SCA Graphic Laakirchen PM 10.

From left to right: **Andreas Vogel** from SCA Graphic Laakirchen, **Pekka Petrilä** from Metso, **Johann Stadlmayr** from SCA Graphic Laakirchen, **Antti Rintala** from Metso, **Thomas Breiteneder** from SCA Graphic Laakirchen, and **Pertti Herranen** and **Mauri Laurikainen** from Metso in front of the rebuilt PM 10 press section.

Metso's delivery comprised a rebuild of the press section with a new SymBelt shoe press. The delivery also included mechanical drives for the whole press section and an automation system upgrade for the shoe press. The SymBelt shoe press significantly increases sheet dryness, which in turn reduces steam consumption, improves machine runnability, helps reach higher speeds and increases production.

The 7.3-m-wide PM 10 produces uncoated wood-containing paper (SC-A) within a basis weight range of 45-60 g/m^2 at the design speed of 1,600 m/min. The production capacity of PM 10 is 260,000 tonnes annually.

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Metso-supplied spray sizing unit successfully started up at Papierfabrik Schoellershammer in Germany

Metso and Papierfabrik Schoellershammer have together successfully started up Europe's first spray sizing unit on the PM 5 swing testliner and recycled fluting machine at Papierfabrik Schoellershammer's mill in Düren, Germany. The new two-sided spraying unit was installed in an existing pond size press, originally delivered by Metso in 2005. The production line has been producing sellable paper since the start-up on May 12, 2012, and has been able to successfully produce its full product range with the new equipment.

"This is a big step forward in terms of runnability. Thanks to higher solids we can now also use increased starch amounts without compromising production capacity. We foresee considerable savings in steam consumption as well," says **Konrad Franken,** Production Manager at Papierfabrik Schoellershammer.

The 5-m-wide PM 5 produces testliner and fluting grades in the basis weight range of 90-170 g/m^2 at the maximum production speed of 1,100 m/min.

Metso has been developing the spray sizing technology for several years, and the work has its foundations in Metso's long tradition with film sizing, water sprays and earlier spray coating developments. The technology is protected by several international patents and applications. In 2008, Metso started up the first one-sided prototype unit of spray sizing for fluting in Korea. Since then the company has delivered five spray sizing projects in total in Asia, three of them with two-sided spraying units. "We see that spray sizing is clearly the future method for surface sizing of containerboards and it has potential benefits in other applications as well," says **Topi Tynkkynen,** RTD Project Manager at Metso. Spray sizing has a major role in Metso's new OptiSizer family, to be launched on the market in 2012.

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Reporting records

Hayat Kimya's Metso-supplied tissue machine sets world speed record

Thanks to a skilled crew and dedicated efforts, Hayat Kimya A.S. in Turkey has succeeded in breaking the world speed record for tissue machines. The record of 2,210 m/min was set on June 1, 2012 during a 24-hour production run by the TM 2 tissue machine at the company's mill in Yeniköy near the city of Izmit in Turkey. The machine, which was started up on December 18, 2010, is an Advantage DCT 200 TS supplied by Metso.

"The cooperation with Metso has been beyond excellent and both parties did their utmost to make the project successful. The results clearly show that the efforts were worthwhile on both sides. This cooperation will extend to cover new projects in the future," says **Lütfi Aydin,** Paper Group Director, Hayat Kimya.

The new world speed record for tissue set by Hayat Kimya's Metso-supplied TM 2 is 2,210 m/min.

"We are not surprised that Hayat Kimya managed to break the world speed record. We have had great confidence in the capability of the Hayat team since our project started in 2009. We certainly know our machine very well, its stability, production efficiency and speed capability. However, in order to achieve the very top performance a machine needs to be in the hands of a skilled crew willing to push the boundaries. We have certainly witnessed this at Hayat," says **Jan Erikson,** Vice President, Sales, Metso.

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Zhanjiang Chenming PM 1 sets world speed record for woodfree uncoated paper

On May 8, 2012, the Metso-supplied PM 1 fine paper machine at Zhanjiang Chenming Pulp & Paper Co., Ltd. in Zhanjiang City in China set a woodfree uncoated machine 24-hour world speed record of 1,710 m/min. During the record run, the 11.15-m-wide PM 1 produced woodfree uncoated printing paper at a basis weight of 70 g/m^2.

Zhanjiang Chenming's world speed record machine PM 1.

It took the Zhanjiang Chenming PM 1 only 8 months from the start-up to set a world speed record. The PM 1 was started up on September 1, 2011.

The PM 1 features Metso's paper making and automation technology from headbox to reel, air and chemical systems and two WinDrum Pro winders. The annual dimensional production capacity of PM 1 is close to 600,000 tonnes of woodfree uncoated printing paper.

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Reporting agreements and acquisitions

Metso acquires full ownership of MW Power

Metso and Wärtsilä have received the necessary regulatory approvals from the European Commission to complete the initiated ownership changes of MW Power Oy.

According to the agreement released on May 31, 2012, Metso will acquire full ownership of MW Power. The transaction between Metso and Wärtsilä has been concluded. The value of the transaction will not be disclosed.

MW Power supplies small- and medium-sized heat and power plants for the European market, and focuses on renewable fuel solutions. Its main customers are municipalities, process industries and utilities. The company has a total of 250 employees in Finland, Scandinavia, the Baltic area and Russia.

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Metso signs global agreement with Swedish Huhnseal to supply Metso-branded mechanical seals

Metso and the Swedish seal manufacturer Huhnseal have signed an agreement regarding mechanical seals for the global pulp and paper industry. The seals will be sold under the Metso brand with the product name SealMax. The agreement includes mechanical seals both for Metso equipment and for all standard applications.

The introduction of SealMax is in line with Metso's ambition to expand its scope of supply. The two companies have initiated the development of tailor-made mechanical seals for Metso equipment, such as MC pumps, mixers, agitators, pulpers, screens and LC refiners. These sealing solutions will be available for new projects and also as upgrades for existing equipment. Huhnseal already have solutions for most standard applications in the pulp and paper industry. These solutions will now be sold and marketed globally through Metso.

Mechanical seals are vital components in many types of rotating equipment and are therefore often given a high priority in the maintenance strategy. "Adding SealMax seals to the offering will give Metso the opportunity to work even more closely with its customers. Combining the product and application know-how of Metso and Huhnseal, will allow us to offer solutions with improved overall performance, thus saving money for our customers," says **Björn Kempe,** Business Manager, Service Agreements, Metso.

"Huhnseal and Metso have cooperated for more than 10 years. Huhnseal has vast experience of supplying Metso with standard and special sealing solutions for its heavy-duty applications," says **Per Hellman,** CEO of Huhnseal. "This partnership is in line with our strategy to grow on a global scale. Huhnseal will provide product and service support to Metso via both our central and local resources around the world, and help to continue our ambition to supply the optimal sealing solution for each application."

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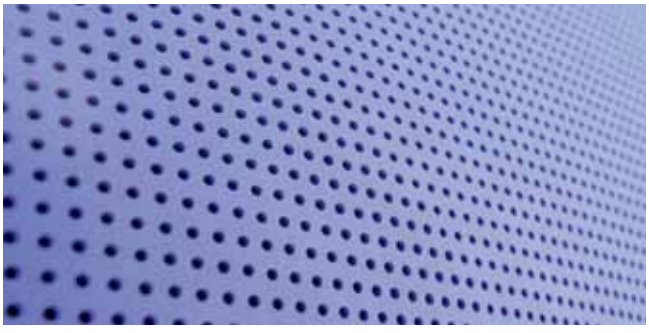
Reporting new products

Metso introduces new energy-saving roll cover for boardmaking

Metso has launched PressPolar, a new polyurethane roll cover for press rolls. The cover is suitable for large and highly loaded press rolls that are mainly used in boardmaking. The PressPolar cover is designed to significantly reduce the energy consumption of roll drives in the press section.



The novel polymer technology of the PressPolar roll cover provides energy savings.

New polyurethane material offers low rolling resistance

The roll drives in press sections consume remarkable amounts of energy, and the soft roll covers on roll bodies also greatly influence energy consumption. The rolling resistance of a roll cover is what affects the drive power consumption. Thanks to its new polyurethane material, the rolling resistance of the PressPolar roll cover is remarkably lower than that of conventional rubber and polyurethane roll covers. In addition to this, a roll with a PressPolar cover needs no internal water cooling. These features significantly reduce energy consumption.

Development of durable and long-lasting cover materials continues

Polyurethane roll covers have been well-known for their good wear resistance properties for decades. Metso will continue its development in this field. The PressPolar cover offers the best durability, ensuring extended service intervals and longer total roll cover lifetimes.

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Energy savings with diamonds

Mechanical pulp production by grinding is an energy-intensive production process. In August 2011, a new energy-saving pressure groundwood process was introduced at Stora Enso Maxau mill in Germany. At the same production level, the process consumes 25 per cent less energy than before. The extensive energy savings are accomplished by replacing the ceramic grinding stone with a steel core coated with industrial diamonds set in specific, precise patterns.

With this upgrade the grinding process has become more controllable since variation between individual grinders is eliminated and their use can be optimized. The high utilization rate of the grinders means energy efficiency. Furthermore, the end product quality will be more even when diamonds grind wood with precision and without fatigue.

The new energy-efficient grinding stone was a result of a development project which was co-funded by Metso, some of the major forest product companies and Tekes (technology and innovation development center). The project made use of earlier laboratory scale results and resulted in various new grinding surfaces which were produced and tested at the Metso pilot grinding facility and later in mill scale. The development project gave birth to a new Metso product called "Galileo". Source: Stora Enso, Rethink magazine 2011

Special edition of Results pulp & paper available for iPad!

Did you know that Results pulp & paper is also available for iPad? The iPad edition is more than just a copy of the printed magazine, it also includes a collection of the top articles published in the previous magazines and extras, such as videos, animations and pictures.

The special edition for iPad is one of the ways that Metso is investigating the potential of new digital technology to complement print. To download the edition for free, visit the App Store and look for Results pulp & paper on your iPad.

While you are online, why don't you take a look at our Twitter account! Follow us here @MetsoPulpPaper **(https://twitter.com/metsopulppaper)** for the latest news, articles and the latest information on what is happening at Metso Pulp, Paper and Power.

RENEWABLE RAW MATERIALS FOR RECYCLABLE PRODUCTS AND RENEWABLE ENERGY

Metso cooperates with customers to create technologies for sustainable development

TEXT Juha P Kinnunen

"Metso has solid technologies which can be used to turn renewable raw-materials into renewable energy and recyclable products," says **Pasi Laine,** the President of the Pulp, Paper and Power segment. "We actively seek to expand and improve the properties of paper and board, and to develop power generation to reduce the use of fossil materials. At the same time, our research and development and customer cooperation focus on creating future opportunities for using biomaterials to create a sustainable society."

We must use renewable raw-materials efficiently and extensively

The world needs more and more sustainable products that can be used to replace fossil fuels that have limited availability and that are becoming increasingly scarce. This is the only way to ensure that society will be able to function also in the long term. Therefore it is important to use renewable materials as extensively as possible and as efficiently as possible, too. From the perspective of Metso and its customers, such raw materials include forests, agricultural materials that are not fit for food production, recyclable paper and organic waste. Non-organic waste can also be utilized by burning.

"In fact, Metso may already be the largest provider of bio raw material processing technologies outside the food industry," Pasi Laine says. Metso currently already offers several technologies that enable its customers to process various end-products from renewable and recyclable raw materials. Boilers supplied by Metso are used to generate renewable energy, Metso-supplied pulp mills produce cellulose fibers and paper, paperboard and tissue machines are used to produce an almost complete range of paper and board products.

New initiatives in biomass use

"We continue to invest heavily, in cooperation with our customers, in developing new and even better ways of making pulp, paper and power," Pasi Laine says. "We also intend to create new openings for other uses of biomass and its secondary flows. I believe such opportunities will attract our customers' interest."

Metso already has numerous pulp and paper producing customers in China who are aware of the need to use more renewable materials also in electricity and steam generation. "Paper mills are the most logical location for this: they have excellent heat load and experience in handling biomass," says Pasi Laine. "Many European paper mills have also invested in boilers and are already generating green electricity and steam for their own use."

Gasification of waste and biomass

One of Metso's relatively new but already well-proven areas of technology is the CFB or Circulating Fluidized Bed gasification of waste and biomass. "Gasification offers a very cost-efficient method of using biomass to generate energy, not only in new but

Metso's biorefining technologies comprise pulp, paper, power generation and biofuel industry solutions. Our offering extends over the entire life cycle of the process, covering new installations, rebuilds and services.

Biorefining technologies enable biomass to be converted into renewable energy and recyclable products, i.e. pulp, paper, chemicals and fuels.

even in existing power plants," Laine says. In fact, Metso has already made several deliveries where gasification technology has enabled fossil fuels to be replaced by biomass or waste, such as the Lahti Energia power plant in Finland.

Metso also offers Syngas (Synthesis gas) gasification of biomass. It is used in Sweden in GoBiGas's (Gothenburg Biomass Gasification Project) major investment into biogas production.

Pyrolysis for bio oil production

Pyrolysis is a biomass-using technology in which organic materials are decomposed thermochemically by heating them without the participation of oxygen. The technology has got off to a good start and has great potential for growth. Metso has been testing pyrolysis for several years. Its first commercial application will be launched in 2013 when Fortum will open a plant in Finland that makes bio oil from forest residue and sawdust. Bio oil can be used to replace heavy fuel oil, significantly reducing carbon dioxide emissions.

LignoBoost for lignin separation

LignoBoost is a technology patented by Metso, which is used to separate lignin from black liquor at pulp mills. Wood contains 15–25 per cent lignin, which is a very efficient fuel. At pulp mills, lignin can be used to replace oil in lime sludge re-burning kilns or oil and coal in power boilers.

The world's first commercial LignoBoost plant will come on-stream in early 2013 as an integrated solution at Domtar's Plymouth pulp mill in the United States. The outlook for lignin is interesting. For instance, it can be processed into a chemical for the plastics industry and into carbon fiber.

Second-generation prehydrolysis for bioethanol production

Metso already offers full-scale systems for biomass prehydrolysis, which is a technology that produces second-generation ethanol to replace gasoline as fuel. The company has delivered biomass prehydrolysis equipment to numerous pilot projects and its future is very promising.

"This is one process and technology that certainly does not compete with food production," says Pasi Laine.

Nanocellulose under close scrutiny

"Metso has a very solid position in developing and applying pulp and paper industry technologies and processes, so we are obviously interested in the continuous development of paper and pulp, including nanocellulose," says Pasi Laine. "We invest in developing the properties of paper and paperboard so that they can be increasingly used in packaging instead of oil-based materials."

The interesting issues regarding nanocellulose are cost-efficient production and applications. It can be used to enhance the properties of existing paper grades and possibly to develop new ones. Nanocellulose can also be used in many novel applications including paints and to reinforce concrete.

Our customers refine renewable raw materials into recyclable products and renewable energy in their processes, utilizing Metso technologies.

Competency models bring benefits to business

Global companies face the challenge of building seamless organizational entities, with one core focus area being HR integration across all operations.

By doing so, they are looking to drive workforce excellence through an enterprise-wide common language of role profiles and competencies. Therefore, role and competency expectations must balance rigor with simplicity and future needs that "stretch" with the reality of what is required to meet business needs. This enables organizations to focus on the right people, retain and develop them as future leaders, and drive functional excellence across the world.

Organizations are increasingly driving role profile- and competency-based HR processes and realizing the importance of having a streamlined talent structure to ensure alignment and agility of the organization. Successful competency frameworks are based on the company values and strategy. Competencies help align individuals, teams and managers with the business strategy as they are important for clarifying behavioral standards and company expectations in the context of a job function or role.

Role profiles describe what each job in the organization entails and the specific requirements and expectations for that job. Competencies, by comparison, describe the how and represent the measurable and observable knowledge, skills and abilities required to perform the job well and produce the desired outcomes. Included are core competencies, which apply to all employees, and functional competencies, which are job-related skills and knowledge that apply to targeted employees by function.

Benefits of a competency model

Competency models benefit various organizational groups and can therefore be viewed from different perspectives.

Employees benefit from the competency model because it clarifies role expectations, development opportunities and career options. All these factors are commonly shown to positively influence employee engagement. A clear understanding of competency requirements supports the employee together with the supervisor to define targeted development areas, which makes career planning more transparent. Furthermore, the structured development also drives the employees' long term employability since their competencies match business demand.

The business also benefits from the competency model because it promotes workforce excellence, helping the organization to focus on the right skills and people, retain and develop them as future leaders and drive functional excellence across geographies. As a result, hiring decisions are facilitated, workforce mobility becomes easier and annual development plans become more targeted.

One of Metso' key people ambitions is to develop a working environment that enables their business success, through having strong global leaders, with performance driven teams of competent employees in the right place at the right time. Metso's competency model foundation is derived from the corporate values, in particular 'Driving customer success' and 'Seeking innovation' are at the core of the functional & technical competencies design.

A competency model ensures a better and stronger link between required people capabilities and business needs to enable business success and strong results with the customer.

Cathrine Ropstad
Senior Associate, Mercer

OptiLayer curtain coating station is very compact in size.

The Chinese premiere of curtain coated linerboard

TEXT Jouni Kemppainen, Pauliina Purola and Marjaana Lehtinen

"Our customers want a low price but high quality. Curtain coating technology allows us to meet these requirements," says **Shu Junming,** Vice General Manager, Ji'an Group Co, Ltd. The Ji'an mill, located in Haiyan County, Jiaxing City in Zhejian Province, China, has successfully reduced the need for virgin pulp in its coated white top liner production.

There were two options when the Ji'an Group was making a decision about the coating technology for its new Metso-supplied coated board production line PM 3. Option 1 was to go for traditional blade coating with two or three blade coating stations and the conventional way to produce coated white top liner. The three-ply base board would consist of a top ply of bleached kraft pulp, an under top of DIP and a bottom ply of OCC. Coating would be applied on white top base board. The quality of the coating layer was not a major issue because the base board would be white anyway.

However, option 2 presented a tempting – almost daring – alternative: Metso's novel multiply OptiLayer curtain coating. It would mean creating a totally new grade, curtain coated liner board for the Chinese market that would benefit both the mill and its customers. In this grade, there would be no, or significantly less, virgin fibers in the base board because white chemical pulp would not be needed in the top ply. The brown base board would be coated with blade coating, two-layer curtain coating and again with blade coating.

continued overleaf...

Shu Junming,
Vice General Manager.

Brown becomes totally white with curtain coating

The coating process and new grade was developed through successful cooperation between the Ji'an Group, Metso and Styron to get the most out of curtain coating. Styron is one of the leading companies that provides chemicals for the paper industry. Before the big decision was made, Ji'an, Metso and Styron ran a number of coating trials in Finland and Switzerland with both white and brown base board. Blade coating revealed a clear difference between the two bases. Whereas the white base board produced smooth and uniform brightness after coating, the surface of the brown base board showed clear mottling of brightness. In other words, the brown base partly showed through the coating layer made solely by blade coating.

customers a better price will be our core advantage when competing with our competitors in the future," points out Shu Junming. "Curtain coating technology will give us a cost saving advantage and also a wider selection of furnish such as AOCC and mixed office waste instead of white pulp. We will be able to supply a low-cost, high-quality product to the market."

Clear cost savings achieved

Today, curtain coating is an integral part of the Metso-supplied containerboard line that started up at the Ji'an mill in November 2011. The 7.25-m-wide PM 3 is the world's fastest coated board machine with a design speed of 1,200 m/min. Its annual production capacity is approximately 475,000 tonnes of coated and uncoated white top testliner in the basis weight range of 130-280 g/m^2.

"Feedback from the market has been positive, and orders for the new grade have been increasing. This is closely linked to our improvement in board quality." says **Wen Xuefeng,** Mill Manager at Ji'an.

However, the simultaneous application of the two-layer curtain coating layers resulted in excellent and even coverage of the brown base board. And better yet, this curtain coated brown board had the same superior physical and printing properties as standard coated white top linerboard. The mill quickly recognized the cost savings potential of curtain coating, provided the amount of virgin fiber could be significantly reduced.

"The blade technology would have made it very difficult for us to be competitive in the market, since the biggest challenge in producing coated liner is its fiber cost. Our production line needs to be more capable and produce something unique. Being able to offer our

Since uniform-coverage curtain coating makes it possible to run PM 3 without expensive bleached fiber, the mill has been able to optimize raw material costs and thereby reach clear savings in production costs.

"The cost saving is estimated to be 200 RMB per produced paper tonne compared to conventional grade," says **Wen Xuefeng,** Mill Manager at Ji'an. "Feedback from the market has been positive, and orders for the new grade have been increasing. This is closely linked to our improvement in board quality."

At the moment, PM 3 produces about 50% coated and 50% uncoated linerboard. In the future, the target is to run about 70% of coated linerboard.

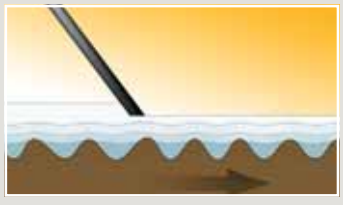
OptiLayer C curtain coating principle

In curtain coating, one to three coating layers are applied at the same time, thus the name multi-layer coating. It creates an even coating layer regardless of the base surface. By fine-tuning the functionalities of different layers in a cost-efficient way it is possible to customize the product's surface properties and improve its optical properties.

The application of coating layers within one station minimizes coating-related drying and space needs, which is especially important in rebuilds.

The first blade coating smoothes the brown base board.

The two-layer curtain coating covers the brown base and increases brightness.



The second blade delivers the final smoothness and gloss for printing.

High physical and printing properties
Coating coverage as well as other physical and printing properties, such as brightness uniformity, smoothness and gloss, are on a high level with the curtain coating. The coating weight is approximately 30 grams in total.

"The appearance of the curtain coated board made from AOCC and OCC is the same as that of white top coated liner made from bleached pulp when the coating formula has been adjusted correctly," Xuefeng adds.

Multilayer curtain coating technology has demonstrated its capabilities to the satisfaction of Ji'an mill. According to **Li Congding,** Technical Manager, the overall performance and efficiency of the new coating line have been good.

"Metso's technology support and its experienced experts have been very important. After all, most of our staff had never even touched a coating machine before. I appreciate all the knowledge and ideas about the new process that we have been provided. This will enable us to make good use of the curtain coating technology," Shu Junming concludes.

Mr. Li Congding Technical Manager of Ji'an Group.

Mr. Wen Xuefeng Mill Manager of Ji'an PM 3.

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Curtain coating benefits

- Production cost savings
- Each layer can be tuned for the desired property and cost
- Stable and even profiles, no need for adjustment
- Excellent runnability and efficiency
- Easy curtain width control
- Wide development possibilities in quality, production costs and raw materials

Li Congding and Wen Xuefeng from Ji'an and Metso's Project Manager **Wenwei Liu** making sure everything works as planned.

The Marcus Wallenberg Prize awarded to Mika Viljanmaa for developing ValZone metal belt calendering

Creating new calendering technology started in the kitchen

TEXT Elisa Lomperi

When the young engineering student **Mika Viljanmaa** came to Metso in 1996 to complete his Master's thesis he was given an interesting challenge, to develop an entirely new calender. His development work reached its climax quite recently: Viljanmaa was awarded the highly-respected Marcus Wallenberg Prize for the development of metal belt calendering technology, i.e. the ValZone calender. "My Master's thesis was now completed," as he himself jokingly says.

The project has seen many turns during these 16 years. "Calendering, which is based on the combination of heat and compressive force, improves the surface of the paper and hence also the print quality. However, conventional calendering is both heat and time limited, so I started thinking if it would be possible to increase the length of the calendering zone. A band saw used by butchers to cut meat gave me a great idea: a nip formed of surfaces curving in the same direction could be the solution for optimizing the calender's dwell time and allowing the paper to be treated on both sides at the same time," says Viljanmaa, running through the initial stages of the development work.

This perception prompted his experiments – the first ones taking place at home in the kitchen, using cooker and iron. "I switched on the cooker plate, heated up the iron and pressed paper between the hot surfaces. It was not always possible to adjust the heat of the plate accurately enough, so pieces of paper would sometimes get burnt, but as I carried on with the experiments I became fully convinced that the idea worked."

The basic idea for metal belt calendering was protected at that time, but was put on hold until the start of the 2000s when it was returned to and the actual mechanical experiments were launched. A pilot calender was constructed to test and develop the idea and along the progressing of the work, everyone became more and more confident in new technology.

First one at Simpele

The commercial breakthrough came at the start of 2006 when M-real (now Metsä Board), who had trusted in new and revolutionary Metso technology also many times before, together with Metso started up the first metal belt calender for the B3 board machine at its Simpele mill in Finland. "The project to upgrade B3 at Simpele was extensive and a lot of new technology was delivered for the machine. The ValZone metal belt calender, which replaced the Yankee cylinder, was a central part of the project and enabled the implementation of many other upgrades," explains Viljanmaa. The confidence in Metso's technology has paid off for Simpele: the board produced at the mill is currently among the best in the world and annual production capacity has grown significantly from the time of the upgrade project.

Mika Viljanmaa points out that it is easy to see the difference between two milk cartons, one of which is produced with the ValZone technology and the other one with conventional calendering. The carton produced with ValZone has an even print surface, with richer color and no cloudiness.

"There is also another reason why I will always remember the start-up of the first ValZone project. The project's start-up was in full swing and tail threading under way when I received a phone call which instantly placed everything else second. I jumped into my car and made it to the maternity ward in Helsinki just in time to see my first son being born. That date, 6th April 2006, is easy to remember," says Viljanmaa with a smile.

During a ceremony in Stockholm on 1 October, **the Swedish King, His Majesty Carl XVI Gustaf** (in the middle) awarded the Marcus Wallenberg Prize 2012 to **Mika Viljanmaa** for his ground-breaking development of metal belt calendering technology. In the background, the chairman of the Foundation, **Marcus Wallenberg.** (photo: Janne Eriksson/MWP).

ValZone is the elite in environmental products

Since the first delivery project, ValZone technology has been sold around the world for both board and paper machines and the method has unquestionably demonstrated its advantages. Compared with conventional calendering, advanced long nip metal belt calendering produces paper and board with better surface smoothness at a desired level of stiffness and bulk, but with 3-10% less fiber raw material.

"ValZone is a genuine environmental product. A milk carton made from ValZone calendered board is 6% lighter than that made with conventional calendering as the technology allows the carton to be made from lighter board with lower basis weight. We have calculated that with an annual production capacity of 300,000 tonnes, over 700 million milk cartons could be produced out of the annual raw material savings achieved by ValZone. Placed end to end, these milk cartons would go around the world 4.3 times! Thanks to ValZone, 6-7 out of every 100 trees that would normally be felled can be left standing."

"Top quality with less raw materials – this is ValZone's basic idea," Viljanmaa sums up.

A creative inventor is rewarded

What kind of a man is Marcus Wallenberg Prize winner Mika Viljanmaa? In his own words, he is a normal engineer who has always been interested in how things work and getting to the bottom of various phenomena. Viljanmaa is a prolific inventor with 134 protected inventions with 57 of these related to metal belt technology.

"The Wallenberg Prize came as a total surprise to me. Our core team, which includes **Henri Vaittinen,** Paper Technology Manager, **Kari Hasanen,** Product Development Engineer, and **Markku Kirvesmäki,** a partner responsible for the project design, has, with a number of other Metso employees, worked very hard to develop metal belt technology and it is great that the results of our work have now been acknowledged by the Foundation," says Viljanmaa.

Viljanmaa tells that the prize money of SEK 2 million has not changed his everyday life much, but admits that his collection of motorbikes has since grown by a Honda CBX from 1979. When at leisure, he greatly enjoys restoring the bike, in addition to spending time with the family or practising glider flying in the skies. Creative work needs a counterbalance.

ValZone calender: One long zone provides unlimited production potential

With ValZone, the traditional calendering nip has been replaced with a one-meter-long machine direction calendering zone. The ValZone calender has a smooth, heated metal belt and a thermo roll that calenders both web sides simultaneously in one extended zone.

Up to 40% more production

The ValZone calender boosts production capacity by removing existing bottlenecks, such as the Yankee cylinder and wet stacks. Full-width calendering also removes trim losses. For example with board, you can expect a major production capacity increase of up to 20...40%.

Improved stiffness and printability

The ValZone calender also contributes to significant quality improvements. For example, it improves bulk and bending stiffness in board grades, contributing to significant raw material savings. For converters, the quality boost gained with the ValZone calender results in excellent printability, even ink setting, and a decreased print mottling tendency.

SCA GRAPHIC LAAKIRCHEN PM 10

Top production line gained through smart modernizations

TEXT Marika Mattila

The papers produced at SCA Graphic Laakirchen in Austria are considered to be of the highest quality available in the uncoated mechanical paper sector. Laakirchen has also been a forerunner in environmental management. Its new technologies, efficient measurement processes and smart modernizations show the mill's focus on sustainability. The latest addition is a PM 10 press section rebuild delivered by Metso, testifying to the deep cooperation and trust that exists between these two companies.

Andreas Vogel.

Johann Stadlmayr.

Thomas Breiteneder.

Pertti Herranen.

The rebuild of PM 10 comprised a press section modernization with a new SymBelt shoe press. The delivery also included mechanical drives for the whole press section and an automation system upgrade for the shoe press. The SymBelt shoe press significantly increases sheet dryness which, in turn, reduces steam consumption, improves machine runnability, helps reach higher speeds and increases production.

The people behind this rebuild are not just a bunch of engineers and managers, but a team that shared a common goal. What targets were set, what results were achieved, and how does the future look? Let the participants speak for themselves.

Andreas Vogel, Production Manager of SCA Graphic Laakirchen

"The bottleneck of PM 10 in the past was the high draw between the 3rd and 4th press, which was the main reason we couldn't speed up the machine. Another main target was to reduce specific energy consumption, while maintaining the same quality level as before the rebuild.

The results of the rebuild were amazing, because we were able to reduce the draw significantly, speed up the machine and, at the same time of course, increase production. The quality level is excellent, which is a critical factor for our customers. And we also reached the target to reduce specific energy consumption.

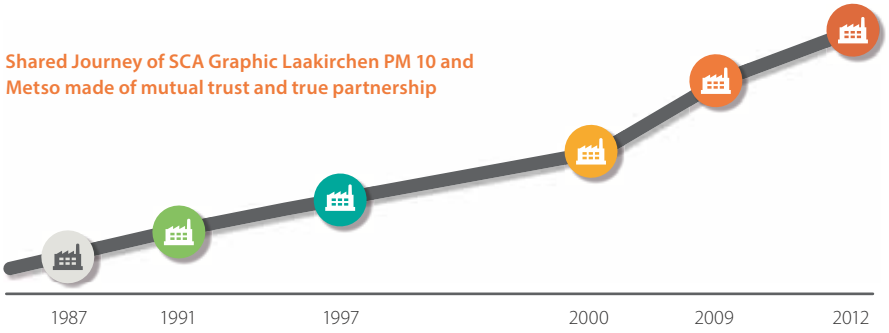
The dryness after the press section increased by 3%. With the new high-quality shoe press we were able to increase energy efficiency due to lower steam consumption. And as we didn't want to take any extra risks, we again selected Metso as the supplier of the rebuild.

The future of Laakirchen seems bright, despite the tight market situation with partial overcapacity and decreasing paper prices. The quality of the SC ++ grades produced by the very modern PM 10 is at a high level. Our aim is to be as efficient as possible and to make similar small improvement steps in the future. As benchmarking shows, we are in the very front ranks globally. Efficiency refers not only to the efficiency of the paper machine itself, but also to raw material efficiency and the skilled people who help us to solve challenges in daily production."

Johann Stadlmayr, Project Manager of SCA Graphic Laakirchen

"With respect to project management, our cooperation with Metso has been a partnership right from the beginning. I believe

Shared Journey of SCA Graphic Laakirchen PM 10 and Metso made of mutual trust and true partnership



- Installation of PM 10 - start of a new technological era
- Press and dryer section modernization
- Extension of PM 10 with a new gap former
- Installation of new reel
- Dryer section modernization
- Press section rebuild with new shoe press

"With the new high-quality shoe press we were able to increase energy efficiency due to lower steam consumption. And as we didn't want to take any extra risks, we again selected Metso as the supplier of the rebuild," says Andreas Vogel, Production Manager of the SCA Graphic Laakirchen mill.

that this is a very smooth way to manage projects. We had many deep conversations with well-known Metso people in a spirit of mutual trust and true partnership. This is exemplified by Metso's way to communicate. They always respond quickly.

The cooperation with Metso concerning PM 10 started as far back as 1987, when Metso originally delivered the machine. There have been several rebuilds by Metso since then. In 1991 the 1st press and the 6th dryer group were installed, and in 1997 a rebuild with new former took place. In 2000, a new OptiReel reeler was installed and three years ago, in 2009, Metso modernized the dryer section. All these projects have been carried out in close cooperation and with good results."

Thomas Breiteneder, responsible for mechanical engineering coordination at the SCA Graphic Laakirchen PM 10

"Installing the PM 10 press rebuild was very challenging, because we had to put a lot of new equipment in an existing machine within a tight schedule. Although staying on schedule was difficult, we reached the targets in the end, together with the Metso people.

Cooperation between the Laakirchen mill and Metso has always been excellent. We had a really motivated project team, which was a key reason why we met the targets set for this successful project."

Pertti Herranen, Project Manager from Metso

Pertti Herranen, a just-retired, long-term project manager from Metso, has been working with the SCA Graphic Laakirchen PM 10 from the very beginning of its history; i.e. since 1987. "The new PM 10 delivery in 1987 was Pertti's project, and ever since then he has been fully involved in all improvement projects. Customer success has been Pertti's motivation during all these years. He is a symbol of true partnership," says Andreas Vogel.

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Facts about SCA Graphic Laakirchen PM 10

Grades
SC ++ (Super calendered) paper designed for rotogravure and heatset web offset printing with both excellent gloss and runnability

Web width	7.3 m
Design speed	1,600 m/min
Basis weight range	45-60 g/m^2
Annual production	250,000 tonnes

Highly motivated project team from left: **Andreas Vogel** from SCA, **Pekka Petrilä** from Metso, **Johann Stadlmayr** from SCA, **Antti Rintala** from Metso, **Thomas Breiteneder** from SCA, and **Pertti Herranen** and **Mauri Laurikainen,** both from Metso.

Consistent quality with QCS upgrade

A new scanner, multi-variable controls and a very successful steam profiler installation ensure top reel quality for Port Townsend Paper. Production increases of over 10% on a benchmark grade add to the investment return.

TEXT Mark Williamson

Versatility is a word that comes to mind when describing the product portfolio of Port Townsend Paper Corporation, located on the shores of Puget Sound in Washington State in the United States. The 75-year-old company has carved out a specialized niche market for its kraft paper converting products in addition to the containerboard grades it produces for Crown Packaging, its sister company in British Columbia. All of these diverse grades with many end users are produced on PM 2 – a 240-inch trim single-ply fourdrinier machine. But versatility also means a lot of grade changes and transition periods, so it is vital that customer quality is spot-on every time a specific grade is run and the recurrent changes in grade specs are made as quickly as possible. Flat CD profiles and excellent roll structure are near the top of the quality list.

PM 2's quality and profile control capability had not been updated since the early to mid-1990s when slice control was incorporated in the then-new Valmet headbox, and CD moisturizing and induction calender control profilers were added. The Valmet QCS and DCS also dated from that time period. Therefore the mill management realized that improvements had to be made to maintain a competitive edge and meet today's more exacting quality control standards.

Consistent products are the top priority

Dave Harke, Paper Mill Production Manager, describes their goals with renewed quality control equipment, "We have to make sure we are delivering a consistent product to our customers who have diverse needs and variable roll widths, some of which are very narrow. For instance, our gumming tape applications are coated and cut to 2.5 to 3 inch widths, and that demands a flat profile.

Seeing is believing. "The reel structure on PM 2 is remarkably better than before. There are no more ridges," says **Dave Harke,** (left). **Tim Reandeau** is impressed with the new steam profiler.

Also, our containerboard end users need a sheet which is free from twist-warp. We had to resolve our profile issues and invest in the equipment needed to improve our quality."

During 2010, the mill installed new Metso quality control upgrades in several steps: The older slice control equipment was upgraded with new electronic controllers with faster and more precise control capabilities, a new higher resolution Metso IQ QCS system replaced the old Valmet unit, and new multi-variable MD and CD controls and closed-loop automatic grade change controls were implemented. The final addition – and one that draws the most attention – was a new IQ Steam Profiler moisture profiler which replaces an older steam shower. The profiles are now so flat that the previous moisturizing profiler has been turned off.

Harke sums up the results of the completed quality control renewal project: "The improvement in profiles has been dramatic. The reels are beautiful and you can see there are no ridges. With better profiles the average moisture level has been raised and we meet today's industry standards across the board. Machine productivity is up as well, and PM 2 sometimes outruns the pulp mill."

Upgraded measurements and controls

In order to base new controls on more precise measurements and to make system servicing more effective, the old QCS system was replaced with a Metso IQ system with basis weight, moisture and caliper sensors. The old scanner was coming to the end of its lifecycle and spare parts were becoming scarce. The new system features higher-profile resolution required for better control, and there has been a significant

"The improvement in profiles has been dramatic. The reels are beautiful and you can see there are no ridges."

increase in scan speed to improve control response. All machine direction controls are now based on a multi-variable model which coordinates wet end and drying controls to achieve better machine stability, especially during upset conditions. A new closed-loop automatic grade change control was also implemented.

The first task for better profile control was to establish a flat basis weight profile. Fast and precise positioning of the slice lip is extremely important on multi-grade machines like PM 2, where grade changes are made frequently and the settling time required to get on quality must be as short as possible. The older motorized actuators and gearboxes were kept in place, but new IQ Slice Profiler electronic controllers replaced the Jetmatic MT controllers. The new controllers use a continuous, variable speed and adaptive control strategy which approaches the target position quickly while simultaneously moving and measuring slice position without overshooting the target position. The positioning resolution has been improved to 0.01%. The new electronic controllers feature much better reliability and on-line diagnostics to detect and correct problems quickly.

Metso-gathered statistics indicate that the CD oven dry weight profile 2-sigma variability was reduced to less than 1%, representing a dramatic improvement from the older slice control system. As an indication of operator acceptance, the control usage is near 100%.

CD caliper control was also recommissioned. The existing induction profiler controls nip pressure in a two-roll calender.

Profiles dramatically improved

With flat basis weight profiles established, the next step was to tackle the moisture

The new Metso IQ system features higher-profile resolution required for better control. There has been a significant increase in scan speed to improve control response.

The steam profiler (circled) is located on the suction roll of a triple-nip press.

This article was previously published in Pulp and Paper International Magazine (PPI), March, 2012.

"With the old steam box it seemed like 25% of the steam came out into the room. Now, you hardly know it is on."

profile, which is in many cases the most critical parameter affecting sheet quality. The previous manually-operated steam shower was replaced with a IQ Steam Profiler located on the suction roll of a triple nip press. The suction through the felt provides good sheet penetration, promotes an optimum condensing rate in the sheet and therefore high heat transfer and sheet temperature rise. It is this rise in temperature that provides increased dewatering throughout the press. A response test in Figure 1 shows the sheet temperature rise immediately after the profiler and the carry-through effect after the second nip. The sheet temperature rises by over 20 °F to over 70 °F, indicating the high range of profiling capability.

The multi-variable CD control has resulted in a "dramatic improvement" in CD moisture profiles as attested by Harke. Statistics in Figure 2 indicate that, over a two-month period, 2-sigma variability averaged below 0.5% and that is a significant improvement from before-control figures. Also, the spread of the data is less, indicating a more consistent product. The precise control by the steam profiler has allowed the mill to turn off the water spray moisture profiling system, thereby saving the energy required to remove the extra water.

Operators give the "thumbs up"

Machine operators are never short for words and usually provide very forthright evaluations of new products. In this respect, the new QCS, steam profiler and CD controls have been given an absolute "thumbs up". Machine tenders **Ernie Pelham** and **Tim Reandeau**, who have over 70 years of combined experience at the Port Townsend mill, are enthusiastic about the new equipment. "Unlike the old one the new steam box adjusts the profile exactly the way you want it. We have also noticed that there is no more steam spillage in the machine room," says Pelham. He also estimates that the new scanner flies across the sheet at about twice the speed, and he believes that is good for control.

Reandeau picks up on the steam spillage issue. "With the old steam box it seemed like 25% of the steam came out into the room. Now, you hardly know it is on. This makes life a lot easier threading the sheet through the press section on a hot summer day," he says. "This new steam box has really impressed me as the actuators were sticking on the old one." Now the control is positive and sure.

Regarding CD weight control, Reandeau says, "With the old one, control worked only on the lightweight grades. After that, it got saw-toothed. Now, it runs well on all grades regardless of weight."

Altogether, the improved control and extra dryness from the press has made a major difference in machine productivity as well as quality. Reandeau estimates that the production rates of the benchmark 23-lb medium grade have been increased from 38 to 42 tonnes per hour – slightly better than 10%.

Better service for customers

Kevin Wright, General Sales Manager, has seen a positive impact on how product quality consistency has improved the company's market position. "It's our competitive strength to use the control equipment and our personnel effectively to make our product consistently. It allows us to make product quality transitions more effectively to serve our niche application customers, and that provides us with a more stable market."

"**Industry standards keep** changing and customers are installing faster-converting equipment, so we must produce better quality paper. We need to do this to keep up with progress in the industry," says **Kevin Wright.**

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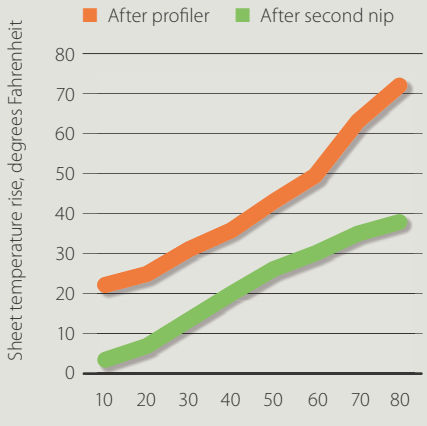

Figure 1.

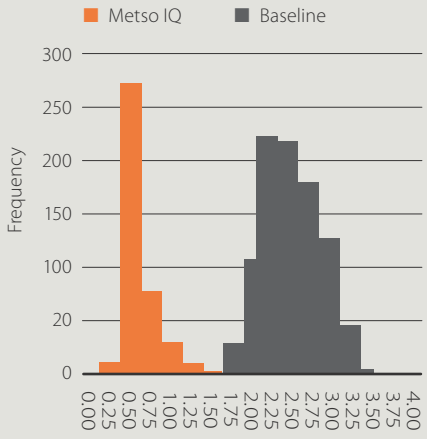

Figure 2.

Figure 1. Depending on the actuator opening, the steam profiler raises sheet temperature from over 20 °F to over 70 °F, promoting good sheet dewatering and profile control.

Figure 2. With control on 100%, the 2-sigma variability averaged below 0.5% over a two-month period. That is a significant improvement from the before-control figures.

INTERVIEW WITH EDMOND LEE,
EXECUTIVE DIRECTOR OF LEE & MAN PAPER MANUFACTURING, CHINA

Maintain competitiveness amid challenges

TEXT Annie Zhu, Brand Manager and Editor of PPI China & Rita Yao, Associate Editor of PPI Asia Newsletter

Pulp & Paper International visited Lee & Man Paper Manufacturing's Hongmei mill, in Guangdong Province, China, and interviewed Edmond Lee, Executive Director of the leading packaging producer in Asia. Results pulp & paper now has the pleasure of sharing Edmond Lee's views with its readers.

Lee & Man is commissioning its first cartonboard unit (PM 17) this year. What is your market strategy for the new grade?
In China, the demand for cartonboard is increasing by 6% every year. We think the demand is very strong because we currently only make brown paper, i.e. the outer part of boxes, not the inner part. Many customers want us to make packaging for both the inner and outer part of boxes.

We see a market there but it is very competitive. There are big players like Nine Dragons, Dongguan Jianhui, to name just a few, and we still have small players with small paper units making board with reasonable qualities 10% cheaper than board made by big players. After our production starts, the market will be very competitive.

But we still see opportunities, because customers say they do not have many choices in Southern China and they want more suppliers. This is quite a good opportunity but it will also be competitive.

What is your competitive edge in the market?
It's all about management. All the big players have similar machines. I don't see a big difference between the machines. Management is the key factor. A lot of producers of linerboard are not making any profit now, but Lee & Man is still able to maintain the same profit margin compared with previous years, so cost management and quality management are the two big issues.

Lee & Man has long been committed to enriching its product portfolio. In addition to cartonboard, are you considering entering into other grades? Is there any specific plan?
Of course we are looking at different kinds of paper, such as tissue. The demand for tissue paper is rising by 18% every year, and that is a lot compared with packaging paper, the demand of which is increasing by 6 or 7% per year. Tissue paper is a growing market, so we will look at tissue in the next few years.

China is in short supply of fiber, and is also a big recycled paper buyer. As a giant board company, how does Lee & Man secure its fiber supply? We understand that you are increasing your domestic OCC supply.
We use around 30-40% domestic recycled paper. At the Chongqing mill, we use 95% local recycled paper and in coastal areas 25%. We have around 20 collection sites in Chongqing and Jiangxi, and we are going to build up more local collection sites in China. We also have purchasing offices overseas.

The Chinese government's environmental regulations are now stricter; do you think this increases costs for Lee & Man?
No, I don't think so. Of course we have to comply with all fundamental rules, laws, and regulations, and we have to do that because the government has online and on-site testing systems to check emissions every hour. If emissions are too high, the local authorities will step in immediately.

continued overleaf...

Edmond Lee, the youngest son of **Patrick Lee,** chairman and founder of the group, is responsible for assisting the chairman in production management, sales, daily operation, R&D, repair and maintenance of production machines and factory staff management. He graduated from the University of British Columbia in Canada.

In order to show Metso's commitment for serving their customers, **Petri Paukkunen,** Vice President, Sales and Marketing of Metso Paper, presented Edmond Lee with a placard reading "Lee & Man and Metso Working as One".

We have managed to keep our costs the same or a little bit more, just 10% more, while following all the government regulations. So it's just a matter of management. And you need good techniques to treat all your waste water or COD; but on the other hand, you can collect any heat produced. All the production systems consume power, but they also produce some heat. So if you recover heat for your boiler and produce energy, your treatment costs will, of course, be lowered. If you can recover some energy, heat or some resources for your power, you won't have to spend too much money on environmental treatment, and you can still comply with all the rules.

Lee & Man also has some ongoing projects in Guangxi, Jiangxi and Vietnam. Can you give us an update?
A new paper machine (PM 18) will start up in January 2013 in Jiangxi province. The capacity of the machine will be 350,000 tonnes/yr. The OCC in Jiangxi mill will mostly come from local recovery, to reduce the cost of transportation.

Our project in Guangxi will take a bit longer, because developing forestry in China is not easy. Not just because of the people but also the climate - trees grow slower in China compared with South America. I don't think there is much profit in producing pulp in China. If you are going to import the wood chips, then you will need a forest overseas. We don't have a forest yet, so I guess it will take longer for our pulp mill in Guangxi to be ready.

The project in Vietnam will probably be completed by the end of 2013, and it will be a 250,000 tonne/yr linerboard unit. Vietnam is an exciting market, and we see opportunities over there. We were a little bit too early when we went there in 2007. But now the market is becoming more and more mature and we have demands not just in Vietnam but also Laos, Cambodia. Our competitors already have machines in Vietnam and they have good business over there. However, we don't have any pulp lines in Vietnam yet.

China has mapped out its 12th five-year plan for the pulp and paper industry. What impact do you think the plan (such as the capacity closure campaign) will have for the industry?
I guess there will be benefits for us because we follow the regulations. For example, we use less than eight tonnes of water to produce a tonne of paper. The average water consumption for producing a tonne of paper in China is around 60 tonnes, which means some mills are using around 80-100 tonnes of water to make just one tonne of paper.

We use very little water and our COD discharge is very low, even compared with some other countries. So if the government is going to be very strict on this regulation, they are going to close down all the small players. And the cost of waste treatment is very high; we spend at least RMB 200 million on waste water treatment in Dongguan. So I think it is more fair to bring all these barriers to small players.

Labor costs in China are now getting higher and higher. The investment atmosphere is not as good as it was a few years ago. A few years ago it was a very good time to make investments, now it is very difficult to get all the installation people we need. For example, only 200 workers are doing the installation for PM 17, while a few years ago, we had 450 people to do the installation for PM 4, so it took less time than it does now.

We understand that Metso will further grow its service business in China. What do you think of the future cooperation in this sector?
We have already signed a cooperation agreement with Metso to upgrade PM 9. The unit is running at 1,010 m/min now, but I hope the machine will be able to run

"It's all about management. All the big players have similar machines. I don't see a big difference between the machines. Management is the key factor."

During the long-time cooperation with Lee & Man, Metso has provided four complete production lines to the company, as well as some key components of other lines. At the time of the interview, the company was set to commission a brand new 600,000 tonne/yr coated duplex board production by Metso.

at 1,100 m/min. There are some bottlenecks, so we have asked Metso for help.

We also have another agreement with Metso to run our grinding machine. Lee & Man bought the grinder two years ago, and Metso will provide 5 - 6 workers to work on the machine. We will pay the service fee. Firstly, this means our rolls will be ground properly. Secondly, when there is time, Metso will take orders from other paper mills to do their grinding work, and then the two parties will be able to share the profit. So it's a win-win situation for both companies.

Lee & Man has long partnered with Metso, could you please comment on the cooperation between the two companies?

We are satisfied with the performance of all the machines we have purchased from Metso. Now we are looking into how to upgrade these machines which were bought 5-10 years ago. The technology has changed and we need to do upgrades. We will keep very close contact with Metso. If they introduce any sufficiently sophisticated new technology into the market, we will upgrade our machines.

"We are satisfied with the performance of all the machines we have purchased from Metso. Now we are looking into how to upgrade these machines which were bought 5-10 years ago. The technology has changed and we need to do upgrades."

Lee & Man Paper

Established in 1994 Lee & Man Paper has grown into a major player in the world. The group manufactures linerboards and corrugating medium used for industrial packaging purposes. Over the years, the group has been relentless in pushing to form a vertically integrated operation that covers pulp making, plantation and recycled paper collection to assure a stable raw material supply.

At present, the group has five plants in China, located in Dongguan Huangchong, Dongguan Hongmei, Jiangsu Changshu, Chongqing and Jiangxi. It will also open production facilities in Vietnam - the project was pushed back by the global financial crisis in 2009.

The interview was first published in Pulp and Paper International China. We would like to thank Liv Zhong, Editorial Assistant from PPI China, for her contribution.

PONDERCEL ANAHUAC PM 1

Capacity increase rebuild in Mexico

TEXT Marika Mattila

Mexican Pondercel S.A. de C.V. selected Metso to modernize their PM 1 papermaking line at the company's Anahuac mill in order to increase capacity. The rebuilt production line is currently in ramp-up phase having significantly increased speed and production capacity.

Pondercel's PM 1 paper machine in Anahuac, Chihuahua in Mexico was successfully started up in December 2011 after an extensive Metso-supplied rebuild. Metso's delivery comprised rebuilds of the forming, press and dryer sections, and modifications to the sizer, reel and winder. The scope of the rebuild was vast and also included paper machine ventilation equipment, a chemical system upgrade, a machine control system and process controls. Metso also supplied clothing for the complete paper machine and took care of installation instructions of machinery and equipment, testing, start-up, production test runs and operator support after start-up. "One of the main reasons for selecting Metso as the rebuild supplier was Metso's experience and expertise as a big player in both machinery and technical support," says **Guillermo Mendoza,** Project Manager of Pondercel.

According to **Jarkko Marttinen,** Metso's Sales Director, Pondercel mill and Metso have worked well together towards common goals.

"One of the main reasons for selecting Metso as a rebuild supplier was Metso's experience and expertise as a big player in both machinery and technical support," says **Guillermo Mendoza,** Project Manager of Pondercel.

Targeting 22% increase in capacity

The 5.65-m-wide PM 1 produces printing and writing papers within a basis weight range of 40-180 g/m^2 at the production speed of 972 m/min. The production capacity of the Pondercel mill has increased from 140,000 tonnes of uncoated woodfree papers to 170,000 tonnes annually at the reel.

Pondercel is targeting a capacity increase level of 22% for the rebuilt PM 1. "This significant undertaking to rebuild the PM 1 at the Pondercel mill has once again proven the importance of teamwork and co-operation between a customer and a supplier. From the rebuild concept development, through the project design stage, equipment installation, start-up and production optimization, the Pondercel mill and Metso have worked well together towards common goals. The rebuilt PM 1 production line, especially the new SymPressB press section, has raised the production capability of the PM 1 to new level. The paper machine's speed has been significantly increased since the rebuild, and although further fine tuning continues, current operating parameters have demonstrated a potential for fulfillment of the project goals," says **Jarkko Marttinen,** Metso's Sales Director of Mexico area.

The Pondercel PM 1 was successfully started up after an extensive Metso-supplied rebuild in December 2011 in Mexico.

Good results by working together

Smooth teamwork and intense cooperation are common factors behind every success story. The rebuild of Pondercel PM 1 is no exception. "We have had excellent cooperation with Metso from the start of negotiations, to manufacturing and assembly of equipment. Technical support from the supervision of erection to the commissioning and ramp up has worked well, too. Of course there have been some setbacks during the project, but we have always been supported by Metso. We have created great teamwork," sums up Mendoza.

"Thanks to this project, we will definitely be able to stand up to the market, also in the future. We can reduce production costs and also serve our customers better" says **Carlos Najar,** Plant Manager of Pondercel Anahuac.

Modernized press section improves dryness

The press section rebuild of Pondercel PM 1 featured a new shoe press for improved dryness with good runnability. The 3rd press is a SymBelt extended nip press, which produces an up to 4-6 times longer pressing time than in conventional roll presses. An increase in the pressing time increases the dryness level and a long dwell time guarantees good dryness levels also for flow-restricted paper grades.

SymBelt press enables stable and vibration-free operation. The patented shoe design of the SymBelt roll permits an optimum pressure curve in the press nip and also extends the belt lifetime.

Future prospects looking bright

People in Anahuac believe that in spite of the current tough market situation, the future of fine paper markets in Mexico looks bright. "We now have increased production, and the end product properties such as bulk and strength have remained at a good level. Thanks to this project, we will definitely be able to stand up to the market, also in the future. We can reduce production costs and also serve our customers better," says **Carlos Najar,** Plant Manager of Pondercel Anahuac.

Pondercel is a subsidiary of the Mexican paper producer Copamex. The main activities of the company include the manufacturing, distribution and sale of consumer products, packaging products and products for writing and printing. The mill is located in Anahuac, Chihuahua, in the northwest of Mexico, 400 km from the border with the United States.

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PressFox roll covers

produce good results in Stora Enso Suzhou's ongoing quest for greater press section efficiency

TEXT Martin Yang

When Stora Enso Suzhou Paper Co., Ltd. started its operations in 1996, it was the first high-quality coated paper manufacturer in China. Its Metso-supplied PM 1, with a trim width of 3,800 mm, maximum speed of 1,000 m/min and annual production capacity of 210,000 tonnes, was rebuilt in 2005. PM 1 produces coated art paper in the 128 to 300 g/m^2 basis weight range, which is sold under Stora Enso's SPCO brand in China and such export markets as Singapore, Malaysia, and Japan.

PM 1 at Stora Enso Suzhou Paper in China.

Maintenance Director **Jiahua Mao** appreciates Metso's support of Stora Enso's Suzhou Mill.

The Suzhou Mill has been working on its efficiency for the past ten years, with excellent results. In 2008, it won Stora Enso's Top Performer Awards in the 'most improved total efficiency' and 'greatest reduction in specific energy consumption' categories.

"I appreciate Metso's support. We have been able to utilize Metso's up-to-date technology to upgrade and rebuild our PM 1 production line so that it now operates very stably at maximal capacity," says **Jiahua Mao,** Maintenance Director, Stora Enso Suzhou. "Our current primary targets are to optimize our product and cut our energy costs in order to maximize our profits."

Maximal roll cover durability and improved dewatering

The Suzhou mill decided to optimize its press section in order to reduce energy consumption. It looked for a roll cover that would offer high reliability, durability, and performance, and began to use Metso's PressFox in 2010.

PressFox represents a new generation of polyurethane covers with the latest solutions in durable materials, press roll cover functionality, and dependable quality. It is suitable for plain, grooved, and/or blind-drilled felted press rolls, with any paper grade, roll load, or machine speed. VacuFox cover, in turn, is designed for grooved and blind-drilled suction rolls and suction press rolls.

Both covers feature new adhesion technology that improves bonding and helps to fend off the aging effects of long-term use in wet and warm environments. Bond durability has been tripled. Stronger bonding means longer operating intervals, better safety, and reduced cooling needs. As the material absorbs less water than older polyurethane products, covers do not need to be dried and are therefore less prone to hardness changes.

"When we consider the whole year's production, our steam consumption savings add up to about one million yuans," says Senior Engineer **Gangyi Zhang.**

Their large optimized void volume with tailored grooves and/or holes also allows the covers to remove more water and stay cleaner longer. PressFox covers thus improve the dewatering process, i.e. the primary function of the press section.

"The durability, dewatering, and impact resistance of rolls have improved a lot. It is the best cover we have ever used," adds **Gangyi Zhang,** Senior Engineer. "Our analysis shows that we have been able to cut our steam costs by at least five yuans per paper tonne. When we consider the whole year's production, the savings add up to about one million yuans."

Reduced steam consumption

The Suzhou Mill has followed its dryer section steam consumption since the introduction of PressFox at the press section.

Results have shown that PressFox is durable and long-lasting under severe conditions. The Suzhou mill has been very satisfied with its performance, and has ordered PressFox covers for its spare rolls as well.

Metso **PressFox** and **VacuFox** roll covers	
Color	Red
Hardness P&J	4 - 25
Maximum temperature	105°C (220°F)
Maximum nip pressure	12 MPa (1,700 PSI)

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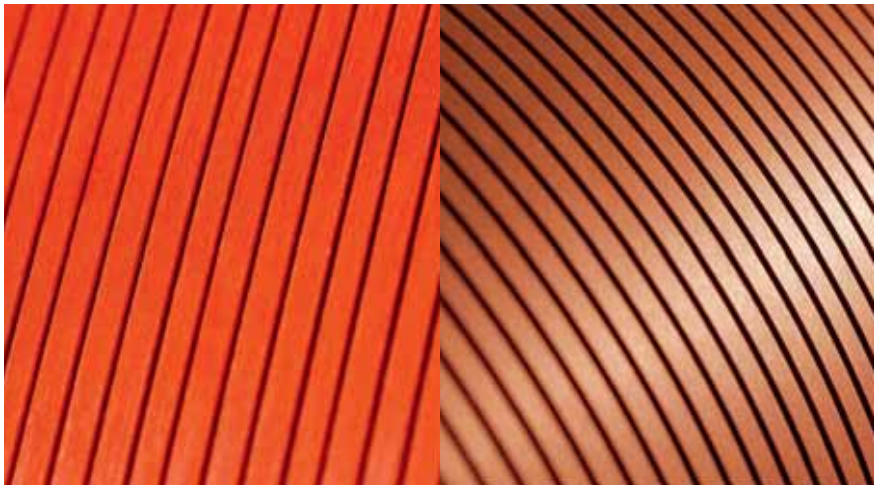
The large and optimized void volume of PressFox with tailored grooves allows it to remove more water and stay cleaner.



Metso's black liquor firing station gives the operators better safety and more options when it comes to adjusting liquor distribution.

BE SAFE WITH METSO

Minimizing safety risks in the recovery boiler area

TEXT Andreas Liedberg

Metso has a wide range of products that offer increased production, better environmental performance and lower consumption of energy and raw materials. Many products also provide better safety for the operators.

The smelt spout robot is the ideal solution for the safe and thorough cleaning of smelt spouts, smelt shatter nozzles and the lower hood. As long as the robot cleans the spouts, the operators do not have to be exposed to the risks at the dissolving tank roof.

The air distribution in the recovery boiler is vital for optimum operation and good combustion results. Metso's air port cleaning equipment is matched to Metso's air ports, velocity dampers and air registers for a complete system with efficient air distribution.

The safety roof enables work to be carried out in the upper and lower part of the boiler independently. It also protects personnel from falling objects and lessens the need for scaffolds.

Training is a cornerstone when it comes to safety. Metso's training packages give operators and maintenance personnel a thorough theoretical understanding of the processes and equipment and also allow them to practice in a very realistic, but simulated, environment.

"Safety comes first. It is a very important part of our corporate culture and it feels good to be able to deliver these solutions. We'll definitely continue developing more equipment to further improve safety."

Ulf Bergström, Technology Director, explains Metso's view on safety, especially in regard to the recovery boiler area: "At Metso, we are often asked how we can help in improving mill safety. My personal focus has been on the recovery boiler and the environment around it. The recovery boiler is one of the most expensive pieces of process equipment at a kraft pulp mill; due to the nature of the process, the boiler imposes risks to the operators. Inside the boiler building there are several hazardous substances, like black liquor, steam, smelt and non-condensable gases. Metso's approach is to build safe systems that have a well-proven design, but we are also automating a lot of the work that used to be performed manually. This means that operators spend less time in the high-risk areas and more time on improving the operation."

The skill level of operators is also connected to safety. "We also feel that training plays a major role in increasing the safety for operators. For that reason, we have developed advanced training programs with simulators to help operators improve their skills in handling upset conditions and hazardous situations."

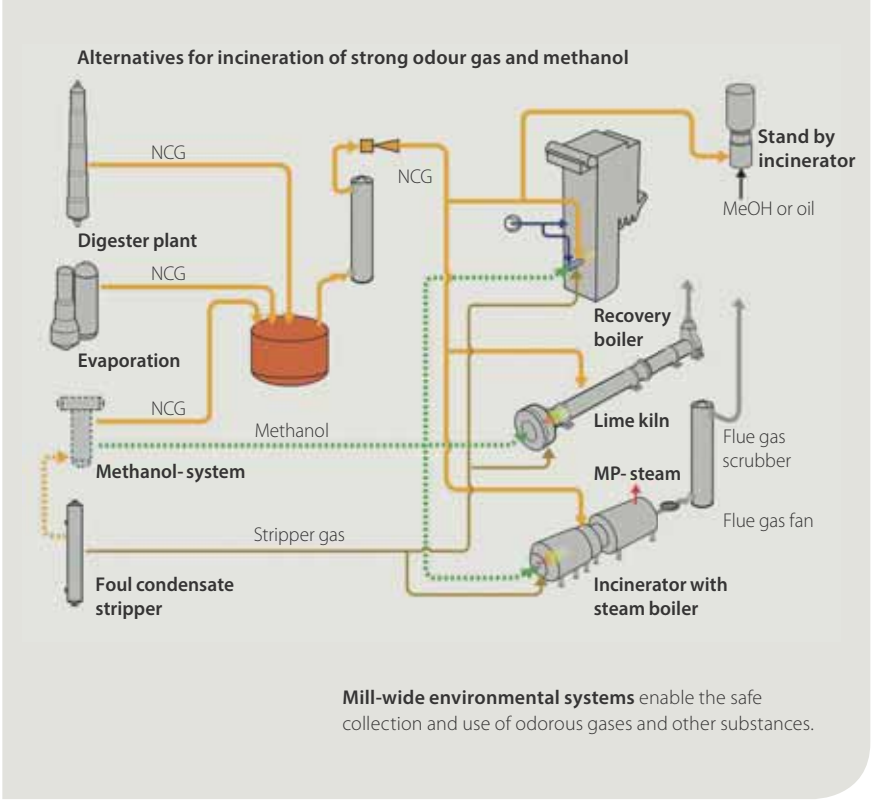
Black liquor firing equipment

According to Bergström, Metso has added several good features to the black liquor firing equipment: "Our liquor firing station is designed to deliver stable and high-performing combustion. It is much easier for the operator to adjust the spraying angle and the air flow through the liquor opening. Our sprayer is equipped with automatic cleaning, which brings multiple benefits: it is safer, it saves time for the operators, and it lowers the risk of disturbances in liquor distribution. Retracting the equipment from the boiler is easy, which also leads to better safety. All in all, I think that our liquor sprayer station is a great step forward in improving safety for the operators."

Smelt spout robot

Cleaning the smelt spouts is often cited as being one of the heaviest and most dangerous tasks in operating the recovery boiler. Insufficient or incorrect cleaning has also been the cause of boiler accidents. After evaluating mechanical systems for smelt spout cleaning, Metso turned to industrial robots.

continued overleaf...



Mill-wide environmental systems enable the safe collection and use of odorous gases and other substances.

Smelt spout robot at SmurfitKappa

SmurfitKappa Kraftliner in Sweden recently installed Metso's smelt spout robot. According to **Urban Lundmark,** Manager, Power Plant and Recovery Boiler, safety was the biggest driver:

"Safety is very important for us at SmurfitKappa and it was the main reason we installed the robot. During our mill risk inventory, we agreed that the dissolving tank roof is the absolutely most dangerous place for our operators. The work required to clean the smelt spouts is also very un-ergonomic. As long as the robot cleans the spouts, our operators don't have to be exposed to the risks at the dissolving tank roof, and they appreciate that. When the robot isn't in operation, it parks in its home position beside the spouts, so it's easy for us to clean the spouts the way we did it before. High robot availability is very important because it means safety for us. Metso understands this and helps us solve any problems we run into."

SmurfitKappa Kraftliner is Europe's biggest liner mill. Its main product is containerboard and its specialties are white-top kraftliner and brown kraftliner. SmurfitKappa Kraftliner was the first mill in Sweden to install Metso's smelt spout robot.

Ulf Bergström continues: "We started looking into robots because we saw the versatility they offer. They can be programmed to clean the spouts in several different ways and can also clean the area below the smelt spout. We usually put a camera on the robot so the operators can see the results and the condition of the smelt spouts on a screen in the control room."

Safety doors on roof of dissolving tank

Splatters of smelt are very dangerous and can cause severe burns, so Metso often installs safety doors that separate the smelt spouts from the dissolving tank roof area. With the safety doors in place, personnel on the roof of the dissolving tank are protected from smelt splatters and they get a quieter working environment. To clean a smelt spout, the operator simply opens the door to that specific spout.

NCG incineration philosophy

According to Ulf Bergström, NCGs have to be handled with care, but can be seen as an asset: "Our philosophy on the incineration of non-combustible gases (NCG) is that the energy in the gas should be used to drive the process. This saves fuel and offers the possibility to increase energy production. It's important to keep in mind that NCGs often are both toxic and explosive, so they have to be managed with the right kind of equipment. We have a wide range of environmental systems to make good use of NCGs and other chemicals in the mill."

Automatic cleaning of air ports

The air distribution in the recovery boiler is vital to optimum operation and good combustion results. With manual cleaning, it is not uncommon to experience fluctuations in emissions. Metso's cleaning equipment efficiently shaves off smelt deposits from the air ports and ensures stable operating conditions and trouble-free boiler operation. The air port cleaning equipment is also matched to Metso's air ports, velocity dampers and air registers for a complete system with efficient air distribution.

Safety roof

Metso has long experience in quick maintenance for recovery boilers as well as one solution that provides dramatically shorter outages and a safer work environment for the maintenance personnel: the safety roof. The safety roof consists of beams and planks that are inserted below the superheaters inside the boiler. The installation is quick and the benefits are numerous – the biggest being the possibility to perform maintenance work in the upper and lower regions of the boiler independently. Other big benefits include the greatly reduced risks from falling objects and the absence of the need to build scaffolds all the way from the bottom up. If superheater-level scaffolds are needed, they can be built on the safety roof.

Operator training packages with simulators

The knowledge and skill of the operators is key to the performance of the plant. Metso offers complete training packages with knowledge inventory, training sessions, interactive multimedia tools and training simulators. The packages teach the theoretical foundations of the process and enable training on hazardous or difficult situations.

Bergström testifies to the good response: "Our simulator training is often praised by customers. Some have even said that the simulators have been the best training tools they have ever seen. I think this is because training in a simulated environment makes it easier for the operator to understand how the plant equipment works and how the process reacts to changes. The simulators give you good feedback on your actions, so you learn well."

More safe solutions to come

According to Ulf Bergström, there will be more safety-oriented solutions from Metso in the future: "Safety comes first. It is a very important part of our corporate culture and it feels good to be able to deliver these solutions. We'll definitely continue developing more equipment to further improve safety."

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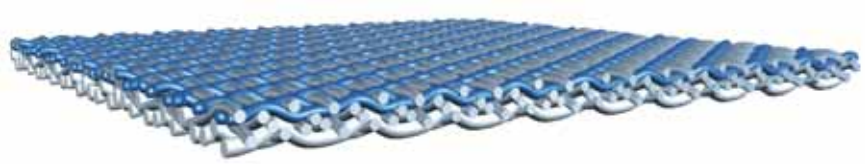
TEXT Pekka Kortelainen

Experience at many mills has shown that Citius forming fabrics increase paper machine efficiency. Paper quality properties also improve and porosity, in particular, decreases.

Citius forming fabrics improve solids and cleanliness



"Why do you only develop Sheet Support Binder fabrics (SSB) and no longer double layer fabrics (DL)?" This question asked by a production manager of a fast LWC gap former machine a few years ago was the starting point for the development of the new Citius forming fabric.

In papermaking, DL fabrics have provided benefits that SSB fabrics have not been able to do, not even after ten years of development work. These include, for example, high solids, low fiber and water carry-back, and reduced water misting on fast paper machines. The SSB fabrics, in turn, have indisputable advantages compared with the traditional DL fabrics, such as stability, wear resistance and higher mechanical retention.

"The Citius fabric combines the best advantages of the traditional DL fabrics and the SSB fabrics. This has been achieved with thin machine-direction yarns, high yarn densities and a new-type nine-shed structure," explains **Pekka Kortelainen,** Product Technology Manager, Forming Fabrics, Metso.

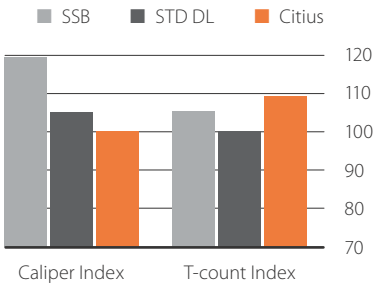
Improved formation and dewatering

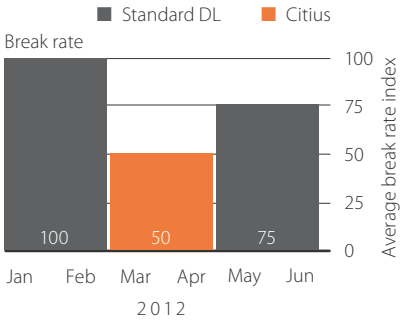
"Citius is, in fact, somewhat thinner than the thinnest DL fabrics so far. This contributes to a small void volume in the fabric and a low fiber and water carry effect," Kortelainen continues. "The best solids are typically reached with a thin fabric, and the need for high vacuum in dewatering elements is eliminated, which saves energy."

Very positive experiences at mills

The Citius fabrics have been run on both gap and hybrid former machines producing newsprint, LWC and fine paper grades. Experience at mills has proven the above claims to be true.

Citius
Lower caliper = less water and water carry;
Higher T-count = good fiber support
and stable structure.





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Improvements achieved with Citius fabrics

Fewer web breaks

A hybrid former machine producing newsprint was using a traditional DL fabric as standard. The problem was that fine fiber and water mist drifted on the top of the headbox, causing fiber build-up. As this fiber dirt fell on the headbox jet, it caused defects on the paper web and, in the worst case, web breaks.

When the machine was run with a Citius top position fabric, there were 50% fewer web breaks compared with a traditional DL fabric. Another benefit with Citius was improved paper quality. The most significant quality improvement was 30% lower paper porosity. Today, Citius is the standard fabric in this position with a 100% market share.

Higher solids and better cleanliness

A SpeedFormer HS that produces newsprint was running both DL and SSB fabrics in its outer position. With the DL fabrics, the machine reached high solids but the fabric's inner loop would get dirty, leading to an increased need for washing, and web breaks. With the SSB fabrics, the fabric's inner loop stayed clean but solids in the forming section were over one solids percent lower compared with the DL fabric.

With the Citius fabric, solids have been even higher than with the traditional DL fabric. However, an even better improvement is visible in the cleanliness of the fabric's inner loop. Citius is now the standard fabric in this position with a 100% market share.

Improved runnability and less coating build-up

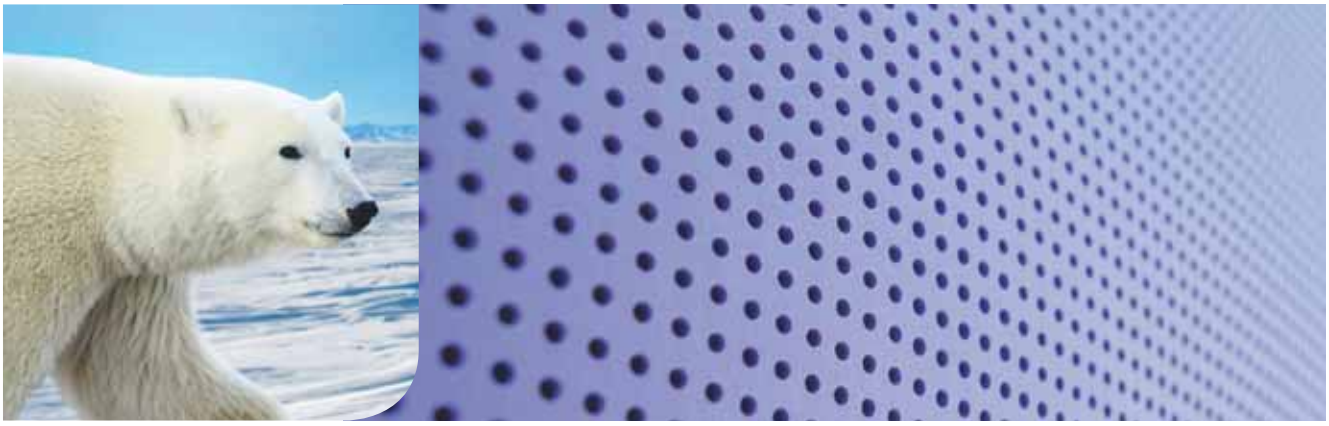
An LWC horizontal gap former was running a DL fabric in both positions as standard. The mill had tested different SSB fabrics but solids remained lower than with the DL fabrics. The Citius fabric was first tested in the bottom position. This resulted in high solids and a cleaner forming section, which both improved runnability. A significant improvement in coating machine runnability was also achieved.

As base paper porosity decreased significantly, much less coating drifted through the paper and there was much less coating build-up on the backing roll. This reduced the need to wash the coating machine. Today, Citius is the standard fabric in both positions with a market share of over 80%.

TEXT Juha Ruotsi

PressPolar - New roll cover technology

Low rolling resistance saves drive energy



Bicycle and automobile operators may know that low tire rolling resistance will save them lots of sweat and fuel. But have you ever thought about the rolling resistance of rolls when operating a paper machine?

Part of the rolling resistance of press rolls is basically attributable to the energy lost in nip contact through the deformation and recovery of the roll cover. This roll cover deformation is, of course, very desirable in terms of proper nip length and nip pressure. Without roll cover deformation, we would destroy the paper web in many cases and have an inefficient dewatering process. When the hardness of the roll cover, i.e. its elastic modulus, needs to be fixed at a certain level, the rolling resistance of the roll cover is determined by other properties of the cover material.

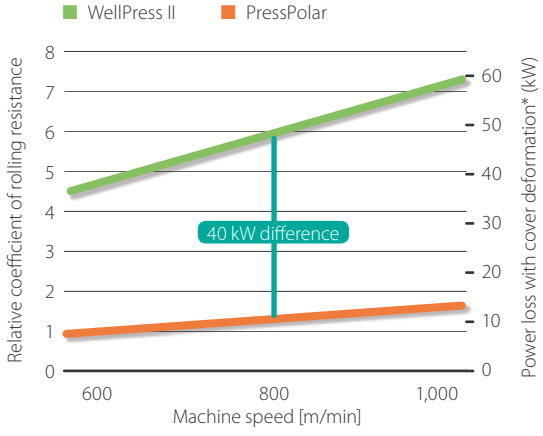
Reduced energy consumption with PressPolar roll covers

Saving energy has been one of the main themes for Metso's roll cover development program. Our intensive research and trial work has just recently produced some impressive publishable results.

Metso's new polyurethane roll cover, PressPolar, offers new opportunities for energy savings. Thanks to a new type of polymer material, the rolling resistance of the roll cover is only a fraction of the resistance associated with traditional roll cover products. PressPolar is primarily targeted for highly loaded (linear load 300-350 kN/m) press rolls experiencing the greatest roll cover deformation under nip loads.

A simulated drive power comparison between a traditional roll cover (WelPress II) and the new PressPolar cover is illustrated in the adjacent graph. The higher the speed (higher nip frequency) and the nip load (higher deformation), the greater the effect of the roll cover. PressPolar offers remarkable drive energy savings, even at slower speeds. For example, a 40 kW cut in drive power conserves 340 MWh annually. Depending on local electricity rates, related savings may reach 30,000 euros per year. In addition to extensive theoretical work, the feasibility of corresponding drive power reductions has also been proven on real production machines.

Besides saving drive energy, PressPolar covers work without internal water cooling. This means savings in related water pumping and cooling system maintenance. Water diffusion inside the cover material can also be avoided when internal water cooling is not used. Furthermore, PressPolar is one of the most abrasion-resistant and durable polyurethane-based roll cover materials available in the papermaking industry today.



Simulated drive power comparison between traditional roll cover (WelPress II) and new PressPolar. PressPolar offers remarkable drive energy savings, even at slower speeds.

40 kW difference → energy 346 MWh/a → potential savings up to EUR 30,000/year

* Roll diameter 1,500 mm, cover thickness 20 mm, nip load 350 kN/m.

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TEXT BJÖRN KEMPE

SealMax for all sealing requirements

Having minimal leakage from equipment not only increases availability and reduces maintenance, but also protects the internal and external environment. In other words, leakage costs money. Metso mechanical seals give an optimal sealing for increased availability and reduced maintenance.

Tailor-made SealMax mechanical seals are available e.g. for MC pumps, mixers, agitators, pulpers, screens and LC refiners. These sealing solutions can be used for new projects and also as upgrades for existing equipment.

Standardization the key to success

Mechanical seals are increasingly in focus, not only with regard to equipment availability, but also in terms of access to spare parts and replacement units. Therefore, it is essential to minimize variants while standardizing whenever possible. "The vast majority of Metso machines can be equipped with SealMax seals from the factory and existing machines can be upgraded. SealMax seals are sold in ready-made packages, which fit without modification," says **Björn Kempe,** Business Manager of Metso.

Sealing design

The design of the seals in SealMax family is based on many years of experience of sealing applications, primarily in pulp and paper processes. The seals are based on technology developed to optimize their lifetime. Flexibility, both axially and radially, characterize their design. These seals excellently compensate for thermal expansion of the shaft at high temperatures, as well as shaft deflection under extreme operating conditions. Since most seals installed are double seals, great emphasis has been put on keeping the springs and other critical driving elements outside the sealing water space to reduce the risk of clogging.

Standard seals

Seals for Metso pumps, screens and mixers are designed not only to fit in these machines, but also to suit most standard applications.

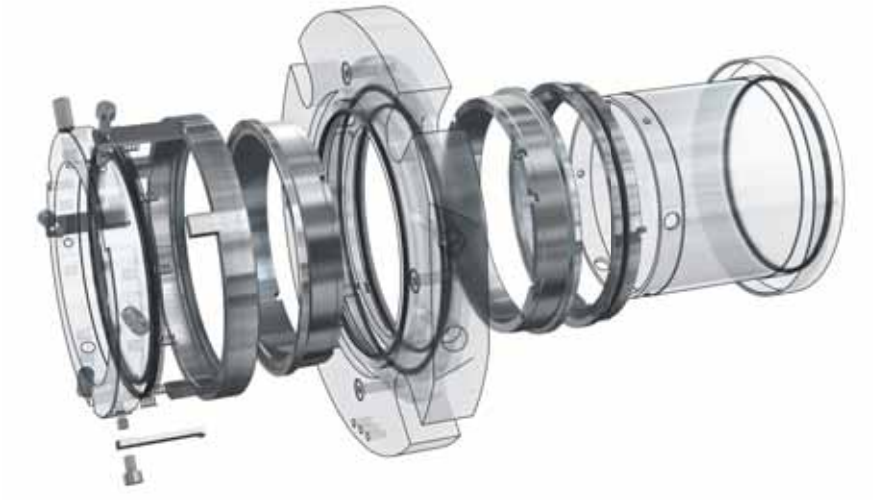
The SealMax concept therefore means that these products can be used as a suitable base in standardizing efforts such as with process pumps and other equipment in standard applications. Metso also offers accessories such as adapters and shaft sleeves specifically designed for various pump manufacturers.

Special seals

Seals to OptiFiner, OptiSlush broke pulpers and Defibrator systems are unique customized sealing solutions, designed only for these specific applications. Metso is willing to develop sealing solutions for older models of machines in the Metso catalog or for special machines of other makes where an upgrade of the seal is justified.

Research and development

We put a lot of emphasis on technology in our market leading sealing products. Continuous evaluation of new materials and design is an important process. Working with tough applications in demanding operating conditions leads to innovations from which all seals in SealMax family benefit. "All seals are optimized for installation on Metso equipment so that everything functions optimally. We don't adapt an installation to fit the seal, we adapt the seal to fit perfectly in the equipment", Björn Kempe concludes.



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TEXT Pauliina Purola

ACCURATE AND RELIABLE

Traversing hot-melt end gluing at winder

Traversing hot-melt end gluing for winders is a unique way to automatically bind the end tails of wound shipping rolls. The system is totally automatic, very reliable and it reduces the need for maintenance.

In traversing hot-melt end gluing, web tails of the shipping rolls are hot-glued to prevent rolls from unwinding and to make roll handling and wrapping easier. When the development of the traversing hot-melt end gluing system was first started, it was essential to ensure that the new equipment would function flawlessly with existing machinery. The system has now been well tested in the Metso Järvenpää unit's own pilot winder in Finland. There are also three running references and six more systems to be delivered in the near future. The references have been working reliably and nearly maintenance-free - the first one for more than a year.

Traversing hot-melt end gluing

- Fast and accurate gluing
- Very reliable equipment
- Less manual work
- Clean surroundings
- Strong glued bond
- Less and easier maintenance - in 15 minutes, the equipment is as good as new
- Fewer spare parts

References

- Three in use
- Six in order book

Traversing hot-melt end gluing

The web tails of shipping rolls are glued to prevent rolls from unwinding and to make roll handling and wrapping easier. When the winder is crawling for set change, a glue stripe is applied to the web in the cross direction through a fast moving nozzle. A small tilt angle between the machine direction and nozzle movement adjusted to web speed ensure that the glue stripe is straight. The stripe is pressed to the surface of wound rolls in the rear drum nip. The glue nozzle is controlled accurately with no glue entering too close to the edges of the slit webs, and one glue stripe is applied. This results in a very durable fastening to the roll since a cross-directional glue stripe is a lot stronger against tear forces than a web-directional one.

Reliable, easy to use and maintain

The gluing system has been designed with reliability and ease of maintenance in mind. A conventional gluing system has up to 100 gluing nozzles but as the design has been dramatically changed, Metso's traversing hot-melt end gluing system requires only one nozzle. The system can be fitted to most winder types because of the small space requirement and glue that can be pulpered. It is very reliable due to a low number of mechanical components, and the amount of maintenance and spare parts are also heavily reduced. Additionally, because the nozzles are continuously used, the glue does not stick into the nozzles or block them completely.

Automatic tail gluing obviously means less manual work at the winder. Servo technology allows fast and accurate control of gluing. This also ensures clean surroundings because the glue is precisely applied only on the areas desired. The gluing system is tuned for water soluble glue which ensures cleaning is even easier. When needed, maintenance can be done easily since the home position is outside the paper web. The 15-minute equipment update is a big advantage. By changing the glue pistol and the glue in the tank, the system is again as good as new.

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PM 9 Management Team from left to right: **Xu Chen, Jixiong Li, Chaorong Wei, Xinchun Guo, Yun Zhou, Jorma Suominen** (Metso), **Ralf Kotiranta** (Metso), **Zhaohui Li** (GZ Paper), and **Xianrong Chen** (Metso).

Optimization of Guangzhou PM 9's dryer section ventilation reduces electricity consumption by 500 kW

TEXT Paavo Sairanen

Guangzhou Paper has been actively focusing on ways of reducing the energy consumption of its 10.2-m-wide newsprint machine PM 9. One of the latest projects was to optimize dryer section ventilation. The main aspect of the optimization was the upgrade of all blow boxes in the dryer section. The modern upgraded design of the blow boxes now enables a new way of running the whole ventilation system that saves both electric and thermal energy.

Smooth cooperation

In the project, all the HiRun and SymRun blow boxes were taken out of the machine for the upgrade work. In the upgrade, the design and operation principle of the blow boxes, 36 in total, was adapted in order to modernize them and make them much more energy-efficient. This was quite an undertaking during a relatively short shut down, but thanks to the excellent cooperation everything went smoothly and even quicker than expected. The newly-upgraded blow boxes function with a much lower air flow, so it has been possible to balance and optimize the whole dryer section ventilation system in a new way, leading to big savings in energy consumption.

Remarkable savings

The decision-making process was quick as the payback was determined to be at a reasonable level. The blow box upgrade and optimization of dryer section ventilation have lowered the electricity consumption of the Guangzhou PM 9's dryer section by 500 kW. This impressive 40% electric energy saving in dryer section ventilation is of major importance for achieving cost-saving targets.

"All actions and ideas to reduce costs are important and worth consideration. The results and cooperation in this project were so good that we are encouraged to continue in order to find more opportunities for similar achievements," says **Zhou Yun,** Executive Vice General Manager of Guangzhou Paper Group.

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Ak Gida

OPERATING WITH CUTTING-EDGE TECHNOLOGY

TEXT AND PHOTOS Ingemar Myren

The Advantage DCT200 TS tissue machine is equipped with several of the Metso Advantage technology options.

"In order to be competitive," is a phrase that comes up repeatedly in conversation with **Mr. Erkan Tirnavali,** General Manager of Tül Kagit, a company owned by Ak Gida, in Turkey.

It becomes evident that part of the strategy of this young company is to provide themselves with state-of-the-art technology for production of superior-quality tissue products. Erkan Tirnavali: "What we have done here is to bring together the best technologies available. Among other options, our Metso Advantage DCT 200 TS tissue machine has an OptiFlo II TIS two-layer headbox with dilution basis weight control and an Advantage ViscoNip long-nip press. In our attempt to build a top-modern mill for now and in the future, focus has not only been on the tissue machine. We have a turbo blower system instead of vacuum pumps. Separate lines for the tissue machine and converting broke help us consume the broke in a better way in order to control paper quality. To lower energy costs and improve efficiency we produce our own electricity as well as hot air for the Yankee hood and the boiler for Yankee steam generation in a 15 MW co-gen plant."

Erkan Tirnavali, with a background in mechanical engineering, was hired in 2008 as General Manager with the purpose of setting up the new tissue production facility. He has 25 years of industrial experience of which 20 are in the paper business. Taking on his new position at Tül Kagit he had the advantage of already having an established contact network: "Part of the reason why we chose Metso for the tissue machine and other process systems was their very good reputation and their reference plants here in Turkey."

Advantage ViscoNip press for higher bulk and reduced energy levels

Why would your tissue paper be different from the paper of your competitors? You, as well as your competitors, run the tissue machines on basically identical pulp, purchased on the open market. "The Advantage ViscoNip press," explains Erkan Tirnavali, "to date we are the only tissue producer in Turkey using this press concept. I knew the Metso Advantage DCT200 machine very well but the ViscoNip press was new to me. We took our time deciding on the concept. With only one tissue machine in the company it is imperative to make the right decision."

"The question was: will the shoe press limit the speed or not? After further reference research and after visiting a high-speed DCT200 machine in China, the decision was made. During our own speed testing, so far

Inside felt loop view of the ViscoNip press.

The modern technology in the new Tül Kagit mill in Turkey is well-matched by the exterior.

Output on continuous increase

Setting up Tül Kagit has been exciting and challenging for Erkan Tirnavali. The next major event in the company's short history is the introduction of their own new brand. What are your views on the future development of the company? "We are still in the learning period and expect to produce 50-55,000 tpy this year. Full capacity of the tissue machine is 65,000 tpy. Our 45,000 tpy converting plant will have an output of approximately 35,000 tpy the first year. With the current setup we can consequently sell a maximum of 20,000 tpy of jumbo rolls. However, we have dimensioned our converting building and storage facilities to allow production to increase to 70,000 tpy finished goods. We are ready for the second tissue machine. Installing the next tissue machine will trigger two new converting plants," Erkan Tirnavali says.

1 **Metso Advantage DCT 200 TS** press section. ViscoNip press on the right. Lower far right: non-Yankee-contacting pre-dewatering suction roll.

2 **The 15 MW** gas turbine co-gen plant, adjacent to the drive side of the tissue machine building, is integrated with the hot air system for the Yankee hood.

3 **There are only three people** in the tissue machine control room, including one operator monitoring the quality of each jumbo roll produced.

there have been no indications that we will not reach 2,000 m/min. We see the press as an excellent contributor to bulk control. The nip load ranges between 70 and 145 kN/m. Lower nip loads for higher bulk are applied for toilet tissue and hankies and higher loads for kitchen and napkin grades. Toilet tissue and hankies are not deep embossed. Bulk and softness are not on a par with TAD products but not too far behind. Besides the benefits in paper properties, the ViscoNip press substantially increases the ingoing sheet dryness. 44-45% is achievable. In summarizing I would say that the ViscoNip press gives us up to 10% higher bulk and 20-25% reduction of drying energy. Additional means for bulk control are the amounts of fiber refining and crepe. One interesting quality indicator is our jumbo roll export to the UK. The reports back on the paper properties have been very encouraging."

"Identification of paper quality parameters and consistency in maintaining these values on a daily basis are important to us. Our customers, whether they are buying jumbo rolls or finished goods, must be assured that they will always get the product they are expecting. Likewise, following market trends and on-going development of competitive grades are important. Therefore we have invested in both modern laboratory equipment and people. All jumbo rolls are checked immediately in a testing station set up in the control room against the paper grade specification. Rolls that are out of specification are rejected. In a separate paper laboratory we have a unique softness testing apparatus. Both the bulk softness and the surface softness, hand feel, can be tested. The method has proven very reliable and we have been able to eliminate human test panels. This tester is used for supporting our product development and also for checking the softness of our competitors' finished products."

With the ViscoNip press, a different machine clothing design is required. How was that sorted out? Erkan Tirnavali continues: "We included the initial sets of clothing in the contract with Metso. This was practical and fair since we had no experience of wire and felt designs for this application. Six felts, two wires and one ViscoNip belt were included in the delivery."

Ibrahim Gökce, Maintenance Manager.

Metso IQ Fiber as first installation in Turkey

Ibrahim Gökce, Maintenance Manager: "During the project stage I was responsible for the electrical and automation areas. I have now also assumed responsibility for maintenance." Ibrahim Gökce is one of the "cornerstones" of the mill staff, who has a wealth of experience acquired during his 22 years in Turkish industry. "During the project three of us went to Metso Automation in Tampere, Finland, twice for inspection and training, and once for the FAT, the factory acceptance test. We checked the operator screens and the logics. The system was modified in a few areas and made ready for commissioning. Due to this pre-work, the installation and I/O check at start-up went very smoothly."

"During the second trip to Tampere the objective was maintenance training on the Metso DNA process automation (DCS) and Metso IQ quality control systems (QCS). The training facility was very nice. The scanner in the laboratory was set up to allow us to perform the troubleshooting in a very "mill-like" and realistic way."

"The DCS system basically controls the whole manufacturing process. We selected Metso IQ Fiber, a new technology and the first installation in Turkey. There is no radioactive source in the QCS scanner, which means that we can manage without a lot of handling procedures and specialist training."

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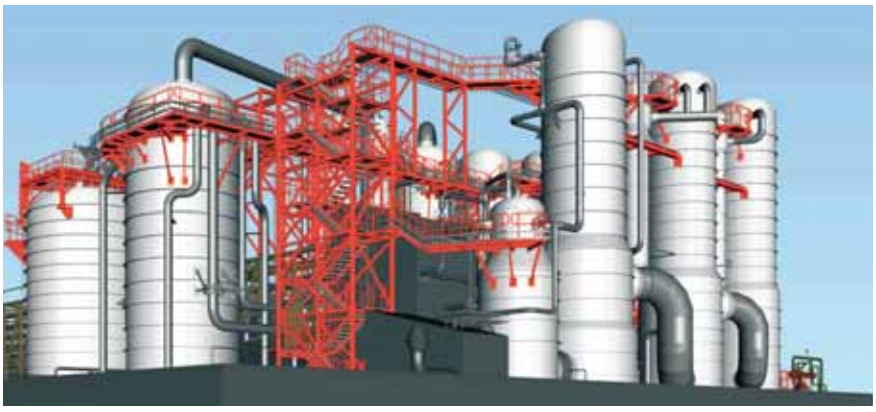
INCREASED ENERGY EFFICIENCY AND OPERATIONAL ECONOMY TARGETED AT

Skärblacka recovery section upgrade

TEXT Kjell-Arne Larsson



The illustration depicts the design of the new evaporation plant.

Skärblacka mill in Sweden has been Metso's customer for a number of years, in both smaller and larger machine deliveries and rebuilds. Metso's knowledge of the mill is extensive. When the time came to upgrade the evaporation plant, recovery boiler and flue gas cleaning system, Metso was on hand to consider the various options available together with the customer. The customer knows the performance expected of the process equipment, while Metso can suggest suitable technical solutions. Together they were able to determine the optimal solutions and Metso offered the mill excellent guarantees for the equipment's performance.

Evaporation plant

Several earlier evaporation plant deliveries by Metso testify to solid mechanical design. The strength of the heating surfaces of the effects contributes to a long service life. The front-end effects are designed according to the TUBEL concept, which makes it possible to wash the outside of the tubes and prevent scaling problems. The number of future line shut-downs and the need for maintenance measures will remain low.

The facility under construction is similar to the one commissioned at Korsnäs, Sweden in 2010. Skärblacka's evaporation capacity will equal 2,060 tonnes of DS black liquor/day and 500 tonnes of evaporated water/hour. Both facilities have seven effects, with the black liquor flow first in the sequence 4-5-6-7 and then 3-2-1. Effect 2 is manufactured from stainless steel and effect 1 from Duplex stainless steel. The latter will thus be able to manage dry solids contents higher than the 74% planned for the initial phase. Metso will also deliver a pressurized concentrated liquor tank to enable higher DS levels in future. The delivery will also include a methanol system, all pipes for the evaporation plant, pumps, motors and control system engineering.

The evaporation plant has been designed to create excess heat from the steam it uses. The design makes it possible to use heat exchangers to produce district heat, which can then be distributed externally.

Metso's delivery also includes a training program in which modern tools are used to enable an optimal understanding of the process.

Recovery boiler and cleaning

The existing recovery boiler and flue gas cleaning will be rebuilt and supplemented in several ways in order to achieve improved energy efficiency and increased capacity.

The air system will be modernized, with a higher number of ports laid out according to a new geometry for a better control of the air supply at the various levels. The secondary air is distributed onto two levels and the dissolver off-gases are directed in through the tertiary ports.

The boiler will also be equipped with six new liquor guns, in addition to which it will be provided with six new start-up burners with their accompanying burner systems.

The first primary superheater in the bank of superheaters will be replaced. The second will be replaced by a new water screen, to protect the bank of superheater tubes and to increase the heat transfer surface area. The secondary superheater will be equipped with additional screens. An economizer will be exchanged for one with a larger surface area. The boiler will be cleaned using steam sootblowing. The existing principle will be built on and complemented with new soot-blowing devices, among other things. Ash handling is also included in the delivery.

The measures will ensure that the boiler is able to achieve a higher dry content and higher flow of black liquor, with a slight simultaneous increase in the steam data.

The dissolver off-gas system which extracts gases from the soda dissolver and directs them into the tertiary air will be rebuilt entirely. The system comprises a venturi scrubber for particle cleaning, a piping system, pumps and fans. Metso also manufactures the new scrubber, which removes sulfur compounds from flue gas.

The delivery will additionally comprise a simulator for the recovery boiler and cleaning equipment. Metso will use the simulator for training the operators after which it will be used internally at the mill.

Metso has been involved in the project since the pilot study, coming up with new ideas based on its global expertise which results from numerous deliveries around the world. The customer appreciated Metso's commitment and ability to quickly and effectively develop solid solutions. The objective is for the new equipment to contribute towards increased energy efficiency and the mill's long-term operational economy. Short maintenance shut-downs will be one contributing factor in achieving this objective.

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Improved paper quality and coating station runnability at Stora Enso Kaukopää

TEXT Anna-Riina Ahonen

Coating station runnability and coating quality are primary issues in any coating process. The coating supply system is a vital element of any coating operation, which is why Stora Enso's Kaukopää mill decided to invest in a supply system rebuild.

Stora Enso Imatra Mills comprise two production units: Kaukopää and Tainionkoski. Together they employ around 1,000 people. Imatra Mills produce a million tonnes of board and paper annually, over 90% of this going for export, mainly to Europe but also to Southeast Asia.

The existing system at Kaukopää was too small for the increased machine production. The screen plugged and the old pump didn't provide the needed capacity. It was running on double rounds compared to recommendations and therefore was continuously broken and in need of spare parts. Also the screen had become too small for current capacity and it had to be run on by-pass which caused additional challenges to the supply system. There was also the quality aspect to be considered.

As a solution Metso offered to rebuild the supply system. The delivery comprised a new pressure screen, OptiScreen RF-75, an OptiScreen Strainer coarse screen and new pumps.

Metso's concept proved to be ideal for the rebuild. The OptiScreen RF-75 screen features high capacity combined with simple construction and easy maintenance. The new pressure screen features a fully automatic reject trap, which allows rejecting without disturbing the coating process. There is no pressure drop on the outlet side and the reject amount can be controlled. As a result web breaks caused by the supply system are eliminated.

During web breaks, paper is pulped into individual fibers. Quality problems can be caused by paper pieces and fiber agglomerates that can also suddenly clog the pressure screens. The OptiScreen Strainer prevents paper entering the supply system.

According to **Pasi Lampinen,** Process Engineer, the project was fairly easy to push along. "Metso had the expertise and plenty of advice during the planning," he says. "The objective of increasing pump and screening capacity was achieved, with associated quality improvement and cost savings increasing the return on investment. Overall, we can be pleased with our purchase."

Metso has recently delivered extensive new chemical management systems and rebuilds to several well recognized paper and boardmakers all over the world including:

- Chenming Shouguang PM 6,
- Nine Dragons PM 3,
- Zhanjiang Chenming PM 1,
- Shandong Huatai PM 8,
- Cheng Loong Houli PM 10,
- Ji'an PM 3,
- Propapier PM 2,
- Mondi Swiecie PM 7,
- M-real Äänekoski,
- M-real Kyrö
- Cartones Ponderosa PM 1

"**The objective** of increasing pump and screening capacity was achieved, with associated quality improvement and cost savings increasing the return on investment. Overall, we can be pleased with our purchase," says Process Engineer **Pasi Lampinen.**

1 **OptiScreen RF** with junk trap: The OptiScreen series offers the best solution for screening of any pigment or coating color. With the automated junk trap, reject removal is possible during operation.

2 **OptiScreen Strainer D** separates paper debris from the coating color during web breaks.

1

2

Advanced chemical management systems for the paper and board industry

Metso delivers complete coating kitchens comprising unloading, processing and storing of coating color components, metering and dosing of components to the mixer and storing of the products. The process includes optimized equipment for sub-processes like agitating, metering, screening and mixing. The automation system is dedicated to the application and provides the ideal platform for raw material, recipe and process data handling.

Metso's main solution for coating kitchens is still the batch process, offering extreme reliability and flexibility in applications where several grade changes are done in a short time and many different recipes are produced.

In the batch color preparation process, components are added according to the specific recipe. In the continuous color preparation process, components are fed continuously into the GradeMatic unit.

A modern coating color preparation process pays special attention to production efficiency and environmental issues. Advanced process control and quality management systems, with recipe, trend and history displays, are essential tools for optimizing the profitability of the coating color preparation process.

Supply systems

The key elements, such as screens and deaeration equipment, are selected for each coating application. Special attention is paid to layout, piping and software early in the design process. Easy grade changes as well as effective recovery of excess coating color and effluent are especially important factors of our design.

Metso delivers integrated supply systems to all coating head types on the market. Optimized mechanical design and the automation system guarantee functionality in all circumstances especially during start-up and after a web break. Special attention is paid in the design to equipment and piping cleanliness as well as sharp grade change, minimizing effluent and recovery.

Metso has a complete palette of equipment for any supply system comprising machine tanks, pressure screens, deaerators, automated coarse strainers, effluent recovery systems and on-line measurement system for analyzing coating color properties.

For demanding applications several double and return flow screening concepts are available. In double screening the reject flow of a pressure screen is continuously led to a secondary pressure screen. It is highly recommended in applications with frequent primary screen blockage (felt hair, fibers and/or sand), as it reduces the clogging of primary screen and extends maintenance interval. Impurity removal improves and effluent amounts are reduced.

In the coater return flow, the necessary differential pressure is created by the height difference between the machine tank and the coater head. This patented concept is suitable for all applications, especially for those that require great cleanliness or contain especially harmful impurities. It allows the possibility to use finer screening than in the feeding line, and rejecting and automated washing can be managed without disturbing coating process. Both concepts are ideal for rebuilds.

Coating color recovery with OptiCycle C

Controlled rapid grade changes mean greater production efficiency and decreased coating color loss. OptiCycle C is based on OptiFilter CR ultrafiltration technology. It is an effective solution for recycling coating containing effluent. Using OptiCycle C is a safe way to reuse the recovered coating without any additional chemicals. This process minimizes coating color losses and produces a permeate that can be used for diluting chemicals thus providing a very short payback time. This process also benefits the effluent treatment plant as the inorganic material load from the coating color plant is reduced considerably.

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A perforated Uhle box cover proves a success at Propapier PM 2

Propapier's world record setting PM 2 was able to improve dewatering and lower energy consumption by installing a SolidCoat-coated perforated Uhle box cover for the bottom felt of the first press.

TEXT Tomi Tissari

Propapier PM 2, in Eisenhüttenstadt, Germany, has been turning recycled paper into 60 to 115 g/m^2 lightweight and ultra-lightweight corrugated board base paper since March 2010. This 10.85 m wide OptiConcept machine has already demonstrated its capabilities by setting new world record speed three times.

Despite the machine's excellent performance, sheet dewatering still needed a boost, especially at the bottom felt of the first press. There were two Uhle boxes in each felt loop, which meant high airflow demand and consequent high vacuum system energy consumption.

Dewatering improves immediately

Metso supplied a perforated Uhle box cover for PM 2 in December 2011. Dewatering increased substantially at the bottom felt of the first press right after installation. In addition to better dewatering, vacuum utilization was reduced by more than 20% (see graph).

A perforated Uhle box cover contributes to better dewatering as well as better machine runnability.

A Uhle box with a slotted cover was also tested. However, it provided only half the dewatering capacity of a perforated cover. The felts were washed in connection with the installation of the perforated cover, which made dewatering somewhat easier.

"The perforated cover now allows us to reach the same level of dewatering, but with 30% lower vacuum than before with two Uhle boxes," says **Peter Resvanis,** Production Director, Propapier PM 2. The mill has taken the second Uhle box completely out of service.

"Better dewatering at the first press can also be seen after the press section. We have noted better dryness after the press section and lower steam pressure at the dryer section when dewatering with the perforated cover is maximized," Resvanis continues. "A smooth moisture profile before the sizer is also very important, and we have achieved excellent profiles with the new cover."

The performance of a perforated cover is based on a long dwell time and a consistent vacuum applied over the whole perforated area. In addition to better dewatering, a perforated Uhle box cover also contributes to better machine runnability.

Reduced vacuum saves energy

Propapier PM 2 used to employ two blowers to generate the required vacuum for the Uhle boxes. After installing the perforated Uhle box cover, the mill has been able to retire one of these blowers and thereby save energy. A reduced Uhle box vacuum also curbs friction and cuts drive power demand.

Close cooperation between Propapier PM 2 and Metso led to a new world record in February 2012. Pictured here are the machine crew and Production Director **Peter Resvanis** (second from right).

Reduced vacuum and airflow requirements have made it possible to further optimize the performance of the press section vacuum system.

Longer felt running times

The good felt support and conditioning performance of a perforated cover facilitate longer felt running times. The felt is fully supported and there are no slots in the cover for the felt to dip in. This helps in situations where the felt hair may be getting loose, for example, and good felt support is also gentler on seamed felts.

The better felt conditioning performance of perforated covers than slotted covers is based on a long dwell time over the perforated area. This better conditioning can be seen in felt permeability measurements, which indicate that felts stay more open longer.

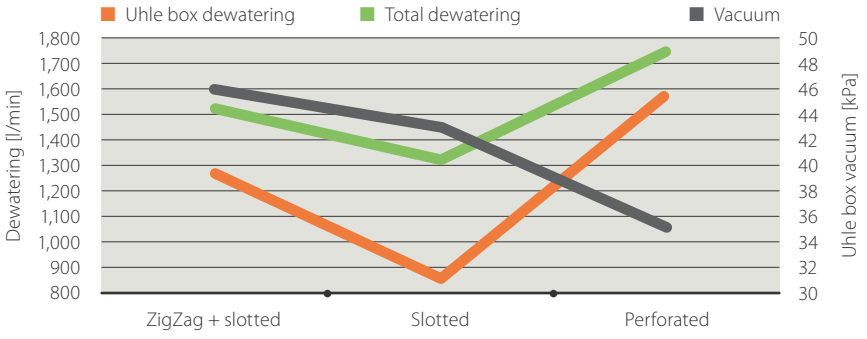
According to Peter Resvanis, longer running times have also been noticed at Propapier.

Excellent results around the world

While a perforated cover will right away save vacuum energy, some modifications to the vacuum system may also be required to take full advantage of the new cover. It is therefore advisable to follow up the installation of a perforated cover with a vacuum system audit and update. If the system's pumps or blowers are controlled by means of frequency converters, the resulting savings will be immediate.

A SolidCoat-coated Uhle box cover can be installed on any box type. Installation is easy, and Metso can provide coating inspection and recoating services as needed.

More than 20 Metso-supplied perforated Uhle box covers are already running in paper machines around the world, with excellent results. Additional Uhle box dewatering was needed in most of these cases, with the remainder focusing on vacuum energy savings.



Dewatering and Uhle box vacuum at the bottom felt of the first press.

Many of these machines have adopted this cover solution for their other felt loops as well. Propapier also recently ordered a second cover for PM 2 and another for PM 1.

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Superintendent **Ari Pöntinen** is pleased with the coat weight profile of PM 2 after the installation of the iRoll Sizer.

Tune up your profiles and runnability with iRoll Sizer

TEXT Tatu Pitkänen and Tero Kovanen

iRoll Sizer, Metso's intelligent roll for the sizer, provides a new way to improve the quality of coated paper and board by measuring the applicator rod profile and sizer nip profile online for a better coating result. It also helps to improve runnability. PM 2 at the Stora Enso Anjala mill in Finland offers a good example of how the iRoll Sizer can help to solve runnability challenges and optimize coat weight profiles.

Stora Enso Anjala PM 2 produces 180,000 tonnes of coated book and printing papers per year, running at 1,000 to 1,350 m/min. After a modernization in 2009, the line started suffering from sizer runnability difficulties. These problems were the result of inaccurate sizer nip loading.

According to Production Manager **Antti Outinen,** the fluttering and wrinkling of the sheet edges were, from time to time, major problems and the situation got particularly difficult with coated grades and after grade changes. The coat weight profiles of coated grades with 5 to 8 g/m^2 of coating per side were also in need of improvement. Profile variation was relatively wide, and the coating profile was slightly skewed.

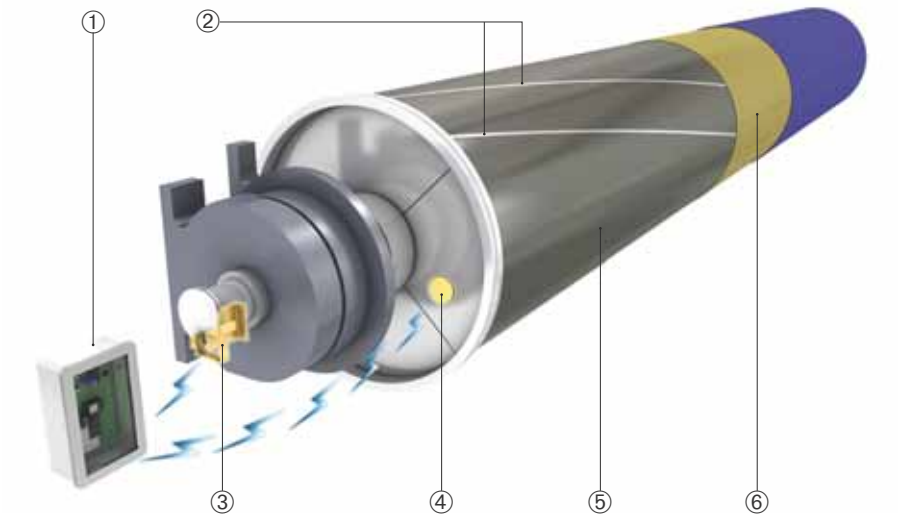
To solve the above runnability problems and to increase knowledge of the sizer nip's behavior, the world's first iRoll Sizer was installed on Stora Enso Anjala PM 2. The iRoll Sizer allowed the nip load profile and loading level to be measured during production. Once the information about nip loading was available, the nip could be tuned accurately to assure symmetric loading and the right load level. In the case of runnability issues, the changes in nip loading could be seen immediately. This was a major improvement compared with the mill's earlier ability to measure nip loading only under static conditions during shutdowns.

Besides the nip load, the applicator rod profile could also be measured and optimized online with iRoll Sizer. The bottom coat weight profile was optimized by straightening the applicator rod profile with manual spindles based on iRoll profile data.

Superintendent **Ari Pöntinen** is pleased with the results obtained: "The overall 2-sigma variation of the coat weight profile has been reduced by 40 % and the skewness of the coat weight profile has been totally removed." The next step will be to also tune up the topside for even better coat weight profiles. iRoll Sizer with automatic spindles would also enable closed loop control of rod profiling.

The newest addition to the iRoll product family

iRoll Sizer is the newest member of Metso's award-winning iRoll product family. iRoll



iRoll operating principle.
The same technology platform is used for temporary iRoll service measurements.

1. Receiver
2. Spiral mounted film sensor on the roll body for measuring nip load profiles
3. Wireless power supply system
4. Signal processing module & transmitter
5. Reel drum
6. Roll cover

Sizer supports the best possible rod profiling through online measurement of the applicator rod loading profile. Optimal rod profiling can cut coat weight profile errors by half, even with manual profiling. In addition to rod profile measurement, iRoll Sizer also facilitates online monitoring of the sizer nip load profile. This helps to prevent skewed nip loading and to time roll maintenance exactly when roll covers wear out. Optimal sizer nip loading can significantly improve the runnability of a film sizer press, as wrinkling and fluttering issues are removed. iRoll Sizer is available for Metso's CoteFalcon and X-Mate X polyurethane covers.

Besides the new iRoll Sizer, a broad range of other iRoll applications are also available for sheet quality and runnability optimization. iRoll Reel Drum is a tool for measuring parent roll hardness and reel nip load profiles online. iRoll Tension, in turn, is a tool for measuring web tension profiles online without any separate scanning devices. iRoll Winder enables online measurement of nip loading in the winder nip and of customer roll set hardness profiles. iRoll Fabric facilitates online measurement of the tension and tension profiles of wet end fabrics.

iRoll working principle

The iRoll system consists of a precision-machined roll body, force sensors mounted in a helical pattern, roll covers, measurement electronics, digital radio transmission free of disturbance, service-free wireless power transmission, and a receiver system that is connected to a sophisticated user interface and the mill automation system.

What makes iRoll special is the fact that layout changes or external measurement devices, like scanners, are not needed: iRoll is just like any other roll in the process, which means it can be seen how the sizer rod application, web tension, or the roll hardness profile are really affecting the production line. iRoll Sizer, as well as other tools in the iRoll product family, can be easily fitted to existing machinery and connected to mill automation systems. iRoll measurements may be used to optimize the sizer rod profile manually or automatically.

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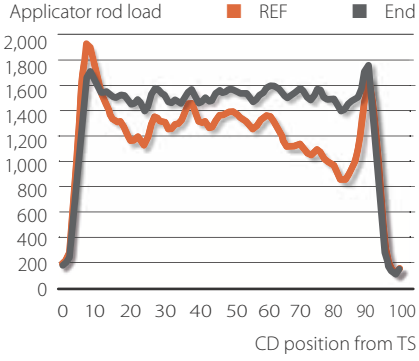
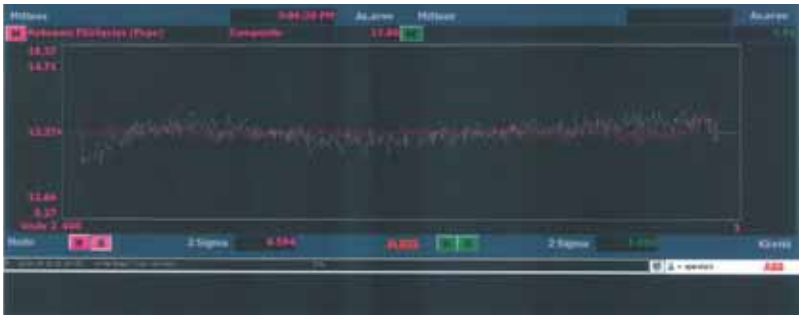


Online measurements of applicator rod profile of Stora Enso Anjala PM 2 before (orange) and after (grey) optimization with iRoll Sizer.



Coat weight profile measured at Stora Enso Anjala PM 2 by online scanner before (white) and after (purple) optimization. Profile skewness was eliminated and variation significantly reduced with iRoll Sizer.

Metso helps papermakers

reduce, reuse and recycle

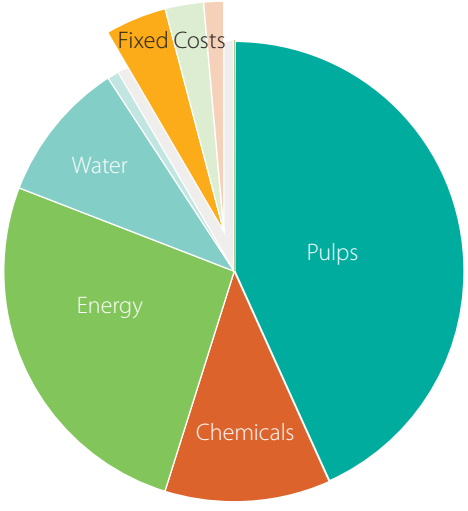
materials to minimize costs

MATERIAL EFFICIENCY:

Use less, get more

TEXT Jari Peuhkuri

Material efficiency means producing the same end result with reduced amounts or lower grades of raw materials. This applies particularly to paper and board manufacturing, but also to certain aspects of machinery construction. Material efficiency measures seek to reduce the amount of virgin natural resources required for producing a certain level of output and recycle post-consumption waste material back in the manufacturing process.



Commission	0,0%
Transportation	0,0%
Variable costs	
Pulps	43,32%
Chemicals	11,6%
Energy	26%
Water	9,9%
Other variable costs	0,8%
Fixed costs	
Personnel	4,3%
Maintenance mat.	2,7%
Overheads	1,4%
Other fixed costs	0,0%
Total costs	100%

Breakdown of paper mill costs. Materials costs dominate.

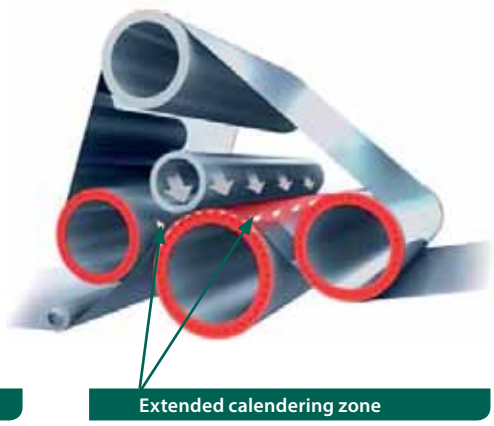
The reuse of wear parts and components is also part of material efficiency, as is extending the lifetime of machinery, components, and spare parts through reconditioning. Material efficiency includes new product innovations to replace previous products that consume greater amounts of raw materials.

Why is material efficiency so important? It is a major cost factor for pulp and paper mills as raw materials represent about 50% of total operating costs. It also provides tools and measures that enable pulp and paper producers to meet global agreements and environmental protection goals by recycling post-consumption waste material, and thus helps to promote sustainability. In the long run, paying attention to the environment is priceless.

ValZone metal belt calender

Solution

- Features a smooth metal belt and a thermo roll that calenders both sides of web in a 1 -meter-long machine-direction calendering zone
- Symmetrical process possible, both sides of the web can be heated



Reduced raw material consumption through ValZone metal belt calender.

It is easy to keep talking about sustainability and the conservation of natural resources. But the key to material efficiency is a demonstrable customer benefit. The basis for any investment, including environmental one, is a sound economic justification. The pulp and paper industry is expecting payback times of less than two years, preferably less than one for process improvements! This is also true for material efficiency investments. The case examples below provide some illustrative savings calculations.

Pulp and paper makers are increasingly adopting a sustainable development profile. Material efficiency is part of sustainable development, and taking it into account is now more important than ever due to the scarcity of natural resources. Emerging markets, such as Asia and South America, are growing fast, which also means rising usage and cost of raw materials. Considering all this, Metso has positioned itself as an environmental solution provider with a comprehensive holistic approach.

Short introduction to some case examples

Reducing raw materials usage - ValZone

Metso's ValZone metal belt calender saves fiber as the basis weight of fine paper can be reduced by up to 7% (e.g. 70 -> 65 g/m^2). The idea is to maintain the same stiffness level and caliper. When lower basis weight paper is produced with higher bulk, the customers can launch a new high-bulk product, such as a 75 g/m^2 product with the properties of 80 g/m^2. This new quality will be priced higher than standard 75 g/m^2 paper, but so that the printer gets the printing area needed cheaper than with standard 80 g/m^2. Or in competitive markets the new quality can even be sold at the standard price, which maximizes the printer's benefit and paper mill gains competitive advantage. ValZone technology also allows the use of up to 5 percentage points higher filler levels while maintaining the same stiffness level.

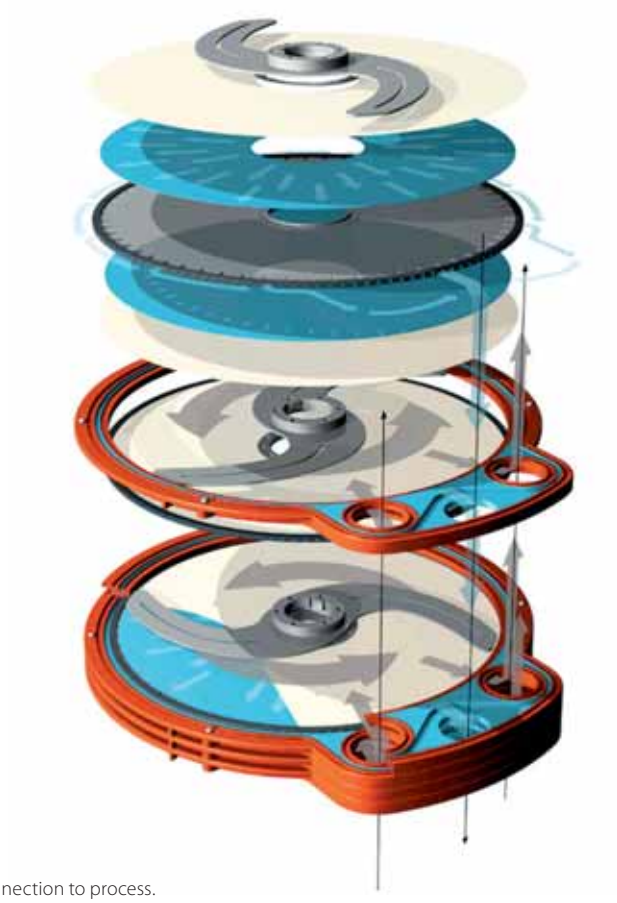
The very same principle also applies to board making. For example, ValZone gives the same LPB stiffness and surface quality at 265 g/m^2 instead of 280 g/m^2.

Think about the environmental effect: over 700 million more quart-sized milk cartons can be produced with the fiber saved by a board machine designed for 300,000 tonnes per year and equipped with ValZone.

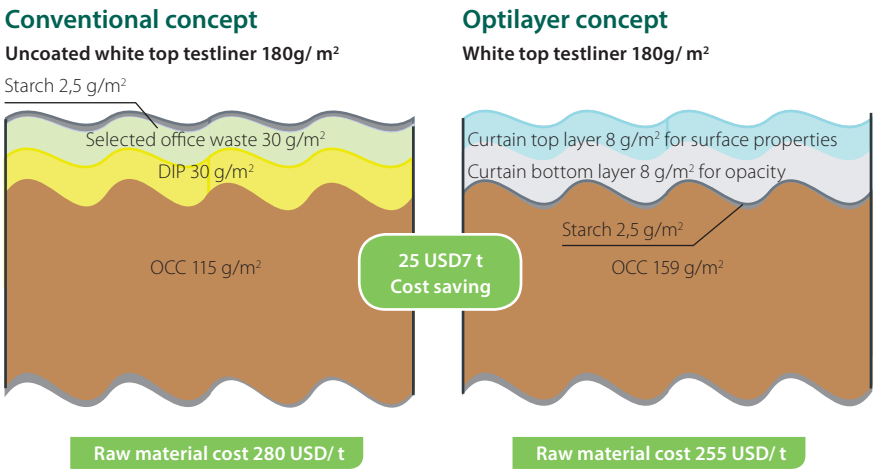
Coating color recovery

Typical coating color preparation and washing losses total about 2%. With coating color consumption of 300 t/d d.s., that equals 6 t/d d.s. By utilizing membrane ultra-filtration, it is possible to recover this solid loss and recycle the pigment back for different pre-coating purposes or as filler, in some cases even back to top coating. Calculated at EUR 500 per tonne, the savings on 6 t/d total roughly EUR 1 million per year. Combined with savings in waste water and solid waste treatment costs, the total savings in this example come close to EUR 1.4 million per year, for a payback time of about 1 year.

continued overleaf...



OptiFilter connection to process.



Turning brown board white.

Replacing raw materials with different ones

Using DIP instead of virgin fiber in newsprint production, or utilizing OCC in containerboard products, has been a well-established practice in the industry for several decades now. The trend tends to be that as global recycling rates get better, the properties of these recycled fibers keep getting worse and worse. This is especially true for some local OCC grades. Another trend is the usage of mechanical furnish and DIP in fine paper products, where the traditional furnish mix has consisted of virgin chemical pulps only. This is a cost driven trend, where both producers and process vendors have to adapt to the situation and start utilizing and developing novel solutions. Metso has lately developed several tangible technologies for cutting materials-related production costs further. Take the OptiLayer, for example. How about turning brown into white without using expensive bleached pulp?

OptiLayer curtain coater

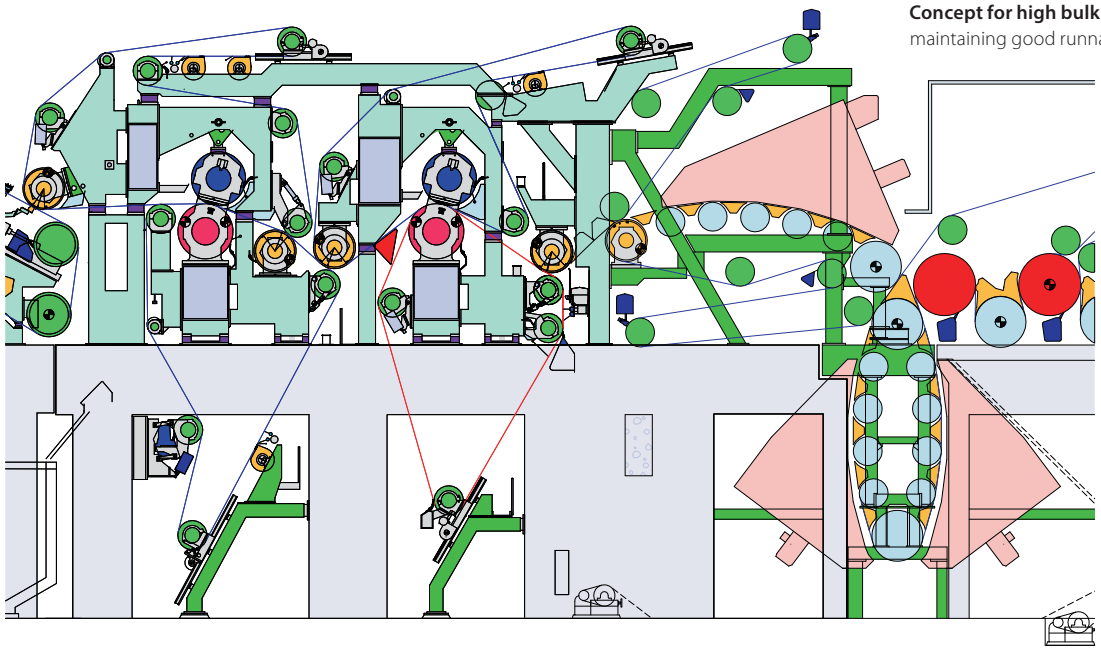
Some 50 to 80 g/m² bleached fiber, like selected office waste, is traditionally used with white top liner board grades to cover a brown filler ply. With Metso's OptiLayer curtain coater, a 10 to 16 g/m² opacifying coating applied with a curtain coater can be used to turn brown board white. This coating costs less than bleached fiber.

The applications are numerous, but let's take just one example: conventional 180 g/m² uncoated white top testliner, turned white with bleached fiber or curtain coating. There is a clear customer benefit of USD 25 per tonne in favor of the board maker who chose OptiLayer. In a difficult economic situation, where competition has eroded prices, this can make the difference between survival and demise.

Bulk saving pressing process

Imagine a WFU copier paper production line with an OptiPress press section followed by an OptiDry Twin impingement unit. Along with ValZone, this is yet another example of the bulk-yield approach, especially if the press section is being run with limited nip loads. This is possible without sacrificing runnability when the press section is followed by an OptiDry unit, which raises the sheet's dry content high enough before cylinder drying.

As discussed earlier, one way of utilizing high bulk potential is to actually start producing high-bulk paper but, if the local market conditions will not allow that, another way to benefit from the concept is to add filler, loads of it. From a grade-typical level of 20%, the filler content of paper can be raised close to 30% while still maintaining bulk and caliper values typical for the grade, despite the bulk eating properties of high filler content. Converted to money, the paper maker saves about EUR 40 per



Concept for high bulk while maintaining good runnability.

tonne. That may just be the difference between the winning concept and the second best.

Extended lifetime and reuse of components

Production equipment savings can be achieved by maximizing the lifetime of consumables through optimized design. Metso's AttackBar refiner segment is a prime example of this. At Buchmann BM 2 and BM 3 (folding boxboard, Germany), the average filling lifetime increased from 12 to 17 months without changing the refiner's rotating direction. NimCat screen baskets, FlexSeal suction roll seals, and ceramic coater blades are all products designed for longer lifetimes.

Metso also provides services that facilitate the use of reconditioned equipment. Fully reconditioned refiners, for example, can be used for a good 20 years. Reconditioned and second-hand machinery is eco-efficient, as it saves raw materials. As one of our customers stated, "to minimize investment without sacrificing performance is an everyday need". Finally, recycling certain consumables, like doctor blades and rod beds, employing our special recycling concept for these products also saves costs.

Material efficiency as part of future environmental solutions

Metso's specific strengths in the material efficiency field include its broad product range and extensive experience. The uniqueness of Metso is evident in its ability to deliver and manage large supply projects for the forest products and energy industries. Not many companies in the world have this type of know-how in house.

In a nutshell, minimizing the use of raw materials and utilizing cheaper materials will provide cost benefits. New products will create new markets. Recycling facilitates the efficient utilization of raw materials, thereby also minimizing possible waste disposal costs. Pulp and paper makers have long been interested in recycling and reuse opportunities. They are concerned with minimizing costs and complying with ever-stricter laws and regulations. There is no doubt that they all are aware of these matters.

Recycling and reuse are megatrends that are changing the world, and no one can remain unaffected. Pulp and paper makers can now derive a tangible economic benefit from Metso's new solutions, of which only a fraction have been discussed here.

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Material efficiency - why is it so important?

- Raw materials are about 50% of total operational costs
- Provides opportunity to improve profitability
- To fulfill global agreements and environmental protection goals
- To minimize amount of, and costs relating to, waste
- To conserve and recycle resources
- To help achieve sustainability

Things to consider.

Reuse case: savings with refiner reconditioning.

- Old refiners supplied to Metso Valkeakoski workshop
- Reconditioning included condition check, refurbishment, process dimensioning, machine manual and spare parts
- Completely reconditioned refiners can be used again, e.g. for 20 years
- Cost of reconditioned refiners is significantly lower than completely new equipment

Before

After

Installation picture from Mondi Richards Bay in South Africa.

TwinRoll Evolution – raising the standards

TEXT Kerstin Eriksson

Ever since its launch in 2009, orders for the TwinRoll Evolution wash press have been pouring in: 56 presses of type TRPE have been sold and 15 of them are already in operation.

Better washing performance, more capacity and numerous features

When the TwinRoll Evolution was being developed, the aim was to create a press that was the same size as earlier twin-roll presses, but with significantly higher capacity and the ability to cover a wider range regarding inlet consistency of the pulp. In addition, all the good qualities that made previous generations of the twin-roll press industry best-sellers would be retained.

The results so far have been good. The machine also has a number of unique features, such as variable nip control, which makes it possible to change the distance between the rolls during operation. This is extremely useful when the machine needs to be trimmed or when major production changes have to be made.

The TwinRoll Evolution's availability is high. The machine has been running without much supervision after start-up at several mills.

Another feature is the Rotoformer, a new pulp inlet arrangement, which is also now available for upgrades of earlier twin-roll presses.

When compared with previous generations of presses, a great visual and functional difference of the TwinRoll Evolution is the movable flaps on the frame. These flaps can be opened for maintenance and they provide full access to the machine's interior, which means the need for platforms around the machine is reduced, simplifying the installation and saving space.

One of the latest TwinRoll Evolution start-ups was in January this year at Mondi Richards Bay in South Africa. Here they have a long experience of presses, with a number of older models of various makes installed at the mill. After a few weeks of operation **Pieter Mans,** Fiber Line Business Unit Manager, confirmed that "our new Evolution press is the most user-friendly press we have, and unlike our older generation presses we experienced no blockages."

Metso's personnel who were on site during start-up verify that everything went really well process-wise. The equipment functioned as promised. "We started to run 1,600 tonnes at start-up, and then quickly switched to 2,000 tonnes. This is impressive, as presses previously needed to be stopped in order to manually adjust the nip at a production change. Being able to easily change the nip during operation is an incredible advantage," says **Thomas Hellström,** SR Electrical & Instrument Manager from Metso. The press at Mondi Richards Bay is dimensioned for production of 2,300 tonnes per day but is prepared for an upgrade to 3,000 tonnes, which the mill intends to run in the future.

The delivery projects follow one after another. The presses for Suzano Imperatriz in Maranhâo, Brazil are currently being manufactured. With the latest TwinRoll Evolution press, with all its new features and benefits, Metso has taken dewatering and washing to a whole new level, and raised the standards in press washing.

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Metso around the world

Automation

Metso's IQ Steam Profiler boosts record level sales

The 4th generation design of the Metso IQ Steam Profiler reduces maintenance needs and opens many new application areas. For instance, a recent tissue machine installation at WEPA Leuna GmbH in Germany resulted in an 8% increase in production on towel grades, as well as a decrease in electrical energy driving the drying hood fans. The interest in the Metso IQ Steam Profiler has increased dramatically.

Dependable and reliable electromechanical actuators provide accurate steam flow control to heat the water in the sheet, reducing its viscosity and allowing it to drain more readily. In a well-designed configuration, improved dewatering can be translated directly to steam savings, and on a dryer limited machine, increased production. The IQ Steam Profiler can provide a more uniform moisture profile and avoid the need to overdry the sheet to eliminate moisture streaks.

The Metso steambox designs are compact: engineering design eliminates many of the problems experienced with conventional constructions. "Steamboxes have become an indispensable tool on many paper machines to improve drying efficiency and cross-directional moisture profiles," says **Mikko Talonen,** Product Manager, Metso Automation.

Mining and Construction

Endomines Pampalo – operating a green and responsible gold mine

At Pampalo, near the most eastern location of the European Union in Finland, a clean and environmentally friendly gold mining operation is being executed by Endomines. Benefitting of Metso's plant design and a state-of-the-art processing plant, the Pampalo mine runs a green, responsible, yet profitable gold mining operation avoiding acid mine drainages, and targeting to reach 100% water recirculation.

With a modest investment of 20 million euros, the Pampalo mine was built fully operational, producing presently 800-900 kg of pure gold per year. An on-going expansion will increase the production capacity by 30-50% next year.

Bioenergy

Metso to rebuild combustion technology at Kuopion Energia power plant in Finland

Metso will convert the combustion technology at the Haapaniemi 2 power plant of Kuopion Energia in Kuopio, Finland, from pulverized peat-fired combustion to fluidized bed technology. Metso's delivery scope covers all the modifications in the boiler required by fluidized bed technology, such as modifications in the pressure vessels, new air, ash and fuel systems inside the boiler house as well as new superheaters and economiser. The rebuild will be carried out during the summer and early autumn of 2013.

The target of the project is to decrease the power plant's emissions since the Industrial Emissions Directive will tighten the emission requirements for power boilers by the beginning of 2016. After the conversion, the plant will use practically no heavy fuel oil at all, and also resulting in lower fuel costs. In the future, the boiler will run on peat and wood with a mixing ratio that can be varied flexibly.

"This conversion will make us less dependent on energy peat that has suffered from delivery problems. It will also enable us to maintain the competitiveness of district heating in the future. The project makes it possible to significantly decrease CO_2 emissions and is thus in line with the Climate Policy of the City of Kuopio," says **Esa Lindholm,** Managing Director at Kuopion Energia.

Biofuel-fired boiler for Jönköping Energi in Sweden

Metso will supply Jönköping Energi's combined heat and power (CHP) plant in Torsvik, Sweden, with a new biofuel-fired boiler. Jönköping Energi is expanding its CHP plant and the new unit will serve as a mid-load unit to meet the district heating and electric power needs of Jönköping municipality.

The expansion and modernization of Jönköping Energi's plant is a significant investment for the municipality of Jönköping as the existing boilers and related systems are in need of replacement and the new systems will enable replacing use of refined bio-fuels with use of primary biomass fuels. The new boiler utilizing bubbling fluidized bed technology (BFB) will mainly be fueled with wood chips, and Metso's solution will offer considerable cost-efficiency benefits for the overall district heating and electricity supply of Jönköping municipality.

"This is an important contract for the continuation of the expansion project as well as its largest. We look forward to co-operating with Metso on this important project," says **Håkan Stigmarker,** Managing Director of Jönköping Energi.

The expanded CHP plant will be commissioned during fall 2014.

The capacity of the new boiler will be 110 MW. The Torsvik plant will annually use roughly 550,000 cubic meters of forest fuels. It will produce approximately 340 GWh of district heat per year, corresponding to the heating needs of 17,000 single-family homes. The production of electricity will amount to 130 GWh/year, corresponding to the power consumption of roughly 25,000 households.

A step forward for sustainable energy generation

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