METSO'S CUSTOMER MAGAZINE FOR THE PULP AND PAPER INDUSTRY No. 3/2011

results pulp & paper

Dear reader,

In case you haven't heard the news yet, it's my pleasure to inform you that, as of January 1, 2012, Metso's Power business line and Paper and Fiber Technology will merge to create a new Pulp, Paper and Power (PPP) segment.

The new 12,500-strong segment will operate from 110 locations in 26 countries: over 100 service locations, 51 sales offices, 30 production units and 14 technology centers. To ensure a continuous supply of new products and services, PPP will have more than 600 R&D specialists and its annual expenditure on innovation will be some EUR 90 million.

This joining of forces brings a lot of complementary Metso resources and know-how together to serve customers better and challenge competitors harder. The businesses forming PPP have already cooperated closely, but, as part of the same segment, they will be able to produce even better results for our customers.

Metso PPP's vision is to 'Work as one, to be number one in pulp, paper and bioenergy'.

Metso PPP's goal is to regain its position as the leading supplier for the pulp and paper industry and establish a clear leadership position in the bioenergy business. These targets will be reached by growing our services, working in closer proximity to our customers and developing and deploying the best technology in the industry.

In the various market areas the PPP businesses will be able to benefit from each other's experience and well-developed local strengths. Mutual benefits can also be expected from the combined footprint. In the Areas and Services business there are possibilities to utilize common approaches. There is also much potential to develop even better common solutions for pulp mills. Our market and technology leadership position in Tissue should enable us to take full advantage of the new structure to continually strengthen the business.

The new PPP segment will provide Metso with great opportunities for even stronger growth in the pulp and paper industry power generation business. Metso's Power business line will help PPP drive growth through an expanded offering for pulp and paper customers. The segment will also continue to drive growth in the power generation customer segment by broadening the services offered, capturing market growth potential, widening the product portfolio and improving efficiency.

Metso PPP will supply pulp, paper and power generating customers with technologies, solutions and services for the production of recyclable products using renewable raw materials, while producing CO_2 neutral energy. I believe that the requirements of sustainable development will drive and guide us, together with our customers, to find new attractive opportunities to develop our businesses.

All in all, it is our firm intention that customers will benefit from this arrangement in the form of an expanded and more competitive global product and service offering supported by our leading know-how in the processing of wood, biomass and waste into pulp, paper and energy.

I sincerely hope that we will get the opportunity to work with you even more intensively to improve your processes and daily operations!

Pasi Laine

President, Paper and Fiber Technology
(From January 1, 2012: President, Pulp, Paper and Power)

in this issue

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Metso's new OptiConcept M production line optimizes the machine investment in accordance with each mill's capacity needs. Read more on page 12.

Reporting results

Featured articles

News in brief

Reporting latest orders

Cooking plant and fiber line upgrade for Phoenix Pulp & Paper in Thailand

Metso will supply a cooking plant and a fiber line upgrade for the Khon Kaen mill of Phoenix Pulp & Paper Co. in Thailand. Start-up of the equipment is scheduled for July 2012.

Metso's delivery will include a two-vessel Compact Cooking G2 digester for producing 200,000 tons of eucalyptus pulp per year. The delivery will also include a TwinRoll wash press for the fiber line upgrade. The new cooking system will enable the Khon Kaen mill to increase its production capacity, utilize raw material more efficiently, and reduce its environmental impact.

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Rebuild of board machine for Cartones Ponderosa in Mexico

Metso will rebuild the folding boxboard machine at the San Juan del Río mill of Cartones Ponderosa, S.A. de C.V. in Mexico. The start-up of the rebuilt PM 1 is scheduled for the second quarter of 2012.

Metso's delivery will include rebuilds of both the coating and drying sections. Drying capacity will be increased by installing two OptiDry Vertical impingement dryers, which will enable production and speed increases. The coating station will be replaced by an OptiLayer curtain coater, while folding boxboard quality will be further improved by a new coating color supply system. The rebuilt PM 1 will produce folding boxboard in the basis weight range of 235 to 490 g/m^2.

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Rebuild of Hamburger-Rieger's paper machine in Germany

Metso will supply Hamburger-Rieger GmbH & Co. KG with a rebuild of their PM 1 at their Spremberg mill in Germany. The start-up of the rebuilt machine is scheduled for the final quarter of 2011.

Metso will rebuild the existing pond size press into a film size press, and will deliver a TurnFloat air turn and a PowerDry Plus air dryer for coating drying.

The new film size press with two new applicator beams will enable the mill to produce both surface-sized and pigment-coated papers. The applicator rolls will be provided with a CoteFalcon cover, suitable for both film coating and surface sizing. The high-capacity PowerDry Plus air dryer, with its contactless drying, will provide a very efficient solution with respect to paper quality and energy consumption.

The Hamburger-Rieger PM 1 has a maximum trim width of 5,300 mm and a production speed of up to 1,200 m/min.

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Complete woodyard and Defibrator systems for Duratex, Brazil

Metso will supply complete woodyard and Defibrator systems plus chipwashers for two new MDF (Medium Density Fiberboard) projects of Duratex S.A. in Brazil. The equipment for the first project, located in Itapetininga, São Paulo, will be delivered in December 2011, while the equipment for the second project will be delivered at a later date.

In both cases the woodyard will comprise GentleFeed log reception and an EasyTyre drum debarker, plus a Camura chipper, CSE chip screens and RRR reclaimers for chips and bark storage. The refining system for each project will consist of Metso's advanced large-capacity EVO 70 Defibrator and a chipwasher.

The two new MDF plants will have an effective capacity of 1.2 million m^3 per year when completed.

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Rebuild of M-real's board machines at the Kyro and Äänekoski mills in Finland

Metso will rebuild two board machines for M-real in Finland: the BM 1 cartonboard machine at the Kyro mill and the BM 1 cartonboard machine at the Äänekoski mill. The start-up of the rebuilt Kyro BM 1 is scheduled for the final quarter of 2011 and that of the rebuilt Äänekoski BM 1 for the second quarter of 2012.

Metso's delivery to the Kyro mill will include a rebuild of the press, dryer and coating sections. The coating drying rebuild will consist of adding new energy-efficient, high-drying-capacity PowerDry Plus air dryers in order to increase drying capacity and to replace the old gas infrared dryers. The Kyro BM 1 produces folding boxboard in the basis weight range of 200 to 370 g/m^2. After the rebuild, the Kyro mill's annual board capacity will increase to approximately 190,000 tonnes.

Metso's delivery to the Äänekoski mill will include a rebuild of the headbox, the coating section and the reel, including an automatic system to transfer parent rolls to a new winder. The new ValFlo headbox and the new WinDrum two-drum winder are expected to increase capacity. The Äänekoski BM 1 produces folding boxboard in the basis weight range of 185 to 360 g/m^2. After the rebuild, the Äänekoski mill's annual board capacity will increase to approximately 240,000 tonnes.

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Greenpac Mill orders containerboard line

Metso will supply Greenpac Mill LLC with a containerboard production line for their new mill site in Niagara Falls, NY, in the United States. Start-up is scheduled for the second quarter of 2013.

Metso's delivery will include a complete linerboard machine from headbox to roll handling, including air systems, machine pulpers, a broke collection system and a quality control system. The delivery will also include board machine clothing

under a long-term agreement. The production speed of the 9.05-m-wide (356.3 inch wire) board machine, PM 1, will be 915 m/min (3,000 ft/min). The annual production capacity will be approximately 430,000 tonnes of linerboard in the basis weight range of 97.6–170.9 g/m^2 (20–35 lb/ft^2), out of 100% recycled fiber.

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Main components for off-machine coater at Ilim Group's Koryazhma Branch

Metso will supply the main components for the off-machine coater of a coated woodfree paper line at the Ilim Group's Koryazhma Branch mill in Koryazhma, Russia. The start-up of the PM 7 off-machine coater is scheduled for the final quarter of 2013.

Metso's off-machine coater will be 4-stage, 2-sides, and the delivery will include a ValSizer coating station, an OptiSoft Gloss calender, two energy-efficient, high-drying-capacity PowerDry Plus gas dryers and a WinDrum winder. The Metso DNA automation system will comprise quality controls, process controls and machine condition monitoring, as well as electric drive and machine controls for the coater and the winder. Metso's delivery will also include a coating color kitchen with ultrafiltration and a StreamLine C roll handling and wrapping machine, serving both the PM 7 paper machine and the coater. The PM 7 will produce uncoated and coated woodfree paper in the basis weight range of 60 to 170 g/m^2.

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Metso to provide mill maintenance for Amcor in Australia

Metso and Amcor Packaging (Australia) Pty Ltd have executed an agreement for the supply of mill maintenance services for Amcor's Botany mill B9 board making line in New South Wales, Australia.

The B9 containerboard production line at the Botany mill is currently being supplied by Metso and is scheduled to start up in mid-2012. The order was published in 2008.

Under the multi-year mill maintenance agreement, which took effect on July 12, 2011, Metso will assume full responsibility for the establishment of maintenance operations, mill maintenance services, and the management of improvement projects for the stock and paper production facilities and for mill utilities at the Botany mill.

The Metso mill maintenance model optimizes the use of proactive, condition-based maintenance and is based on Metso's streamlined reliability-centered maintenance (RCM). The model ensures the highest possible equipment efficiency and cost optimization.

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Six TwinRoll Evolution wash presses to Swedish pulp mills

Metso will supply six TwinRoll Evolution wash presses with related additional services and equipment to four Swedish pulp mills. The wash presses, scheduled to start up between the end of 2011 and mid-2012, will help the mills to increase their production capacity, optimize their fiberlines and reduce their environmental impacts.

In the case of the Södra Cell Mörrum pulp mill, Metso will supply two new TwinRoll Evolution wash presses as a part of the mill's investment to convert their line 1 for dissolving pulp production. When working at full capacity, Södra Cell Mörrum will produce 170,000 tonnes of dissolving pulp based on hardwood. Metso's delivery will also include rebuilds of two old presses, basic engineering and site services.

For Rottneros Vallviks Bruk AB, Metso will deliver two TwinRoll Evolution wash presses, basic engineering and site services. With the new wash presses, Vallvik can reduce the effluent flow from the bleach plant to the new biological water treatment plant.

Metso will supply the Korsnäs AB pulp mill in Gävle with a TwinRoll Evolution wash press, a rebuild of the existing oxygen stage, piping, basic and detailed engineering, and site services. With the new Metso equipment, Korsnäs can optimize their fiberline operations, which will improve the pulp quality.

Metso will also deliver a TwinRoll Evolution wash press, basic engineering and site services to the Korsnäs AB pulp mill in Frövi. The new wash press will replace an old wash press before the paper machine.

Metso's patented TwinRoll Evolution wash press is the fifth generation in a line of wash presses first introduced over 50 years ago in 1954. The new presses are unique in combining Metso's proven machinery and process know-how with state-of-the-art automation.

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Board machine rebuild for DS Smith Paper's Kemsley mill in the United Kingdom

Metso will supply a major board machine rebuild for the Kemsley mill of DS Smith Paper in the United Kingdom. The start-up of the rebuilt BM 3 board machine is scheduled for the second quarter of 2012.

Metso's delivery will include rebuilds of the forming, press and dryer sections, as well as a new ValSizer film sizer and a new ValSoft softnip calender. Metso will also carry out all the related installation work. The rebuild will help the Kemsley mill ensure top quality in their board production. The BM 3 board machine produces high-quality testliners, and some specialty board grades in the basis weight range of 120 to 220 g/m^2.

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Chinese Anhui Shanying Paper orders two containerboard machines

Metso will supply two containerboard machines to Anhui Shanying Paper Industry Co. Ltd. in the City of Ma'anshan in Anhui Province, China. The start-ups of PM 6 and PM 5 are scheduled for the second and third quarters of 2013 respectively.

Metso's delivery comprises two complete 8.60-m-wide (wire) containerboard machines from headbox to winder, and also includes machine clothing, automation systems and a wide range of process systems. By ordering extensive overall delivery packages from the same supplier it is possible to design highly energy-efficient production lines.

The new PM 6 will be equipped with two winders. Its gap technology will enable a production speed of 1,500 m/min, representing a new speed category for board. PM 6 will produce fluting and testliner grades in the basis weight range of 50–110 g/m^2. The daily production capacity will be approximately 1,540 tonnes.

The new PM 5 will have three headboxes and a production speed of 1,100 m/min. The line will produce kraftliner and testliner grades in the basis weight range of 90–175 g/m^2. The daily production capacity will be approximately 1,380 tonnes.

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Coated board line for International Paper & Sun Cartonboard in China

Metso will supply a coated board production line to International Paper & Sun Cartonboard Co., Ltd in China.

Metso's delivery will include a complete coated board machine from headbox to winders, including stock preparation and approach flow systems, hoods with machine ventilation and coating color preparation systems. Additionally, the full-scope automation delivery will include process, machine and quality controls, web break monitoring and web inspection, as well condition monitoring.

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Reporting start-ups

First ValZone metal belt calender for fine paper starts up at Sun Paper Group

A Metso-supplied ValZone metal belt calender was started up on the PM 23 fine paper machine of Yanzhou Huamao Paper Industry Co. Ltd., a member of the Sun Paper Group, in Yanzhou city, Shandong Province, China at the end of April, 2011. Earlier the line was operated with a soft calender. The Metso-supplied paper machine has a wire width of 7.85 m and a design speed of 1,600 m/min, and it produces approximately 350,000 tonnes of uncoated fine papers annually.

Equipped with the metal belt calender, the line is able to produce top-quality printing paper grades with superior feel and visual appearance. The ValZone metal belt calender enables raw material optimization by allowing an increase in the filler content of the sheet. As a result of increased bulk, the same printing qualities can also be reached with a lower grammage.

This was a repeat order for ValZone technology, as the Sun Paper Group's PM 22 coated board line had already been equipped with metal belt calendering. The ValZone metal belt calender supplied for PM 23 is the first installation for fine paper grades.

"This start-up is a milestone that brings metal belt calendering technology into a whole new area of application. This is the first time it has been used for printing papers and in a wide and fast paper machine, and demonstrates that metal belt calendering technology has much future potential," says **Timo Valkama,** Senior Paper Technology Manager, Metso's Paper business line.

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Newsprint machine relocated by Metso starts up in China

The relocated PM 1 newsprint machine of Guangdong Huatai Paper Co., Ltd. in Jiangmen City, Guangdong Province in China was successfully started up by Metso on May 25, 2011.

Metso's delivery package comprised engineering and supervision services for dismantling, packing, installation and start-up of the relocated paper machine line. The delivery also included a new two-loop deinking line with reject handling, which will provide the stock for the paper machine. The line has a drum pulper with improved mechanical construction and main drive design, together with Metso's new linear cell flotation technology for main and post flotation.

The 5.56-m-wide (trim) PM 1 has an annual dimensional production capacity of close to 200,000 tonnes of newsprint within the basis weight range of 42 to 48 g/m^2. The paper machine design speed is 1,800 m/min.

It is an immense task to relocate a complete paper machine from one mill to another. The Huatai machine is now up and running and producing newsprint at its final destination.

Reconditioning, rebuilding and eventual relocating of entire production lines is part of Metso's service offering for paper machines. It combines the machine rebuilding business, project management and automation solutions.

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Industrie Cartarie Tronchetti starts up Metso-supplied tissue line in France

A Metso-supplied tissue line was successfully started up at Industrie Cartarie Tronchetti (ICT) in Montargis, France, on July 15, 2011.

Metso's delivery comprised a complete tissue production line with complete stock preparation equipment, including OptiFiner RF refiners and an Advantage DCT 200 tissue machine. The latter features an OptiFlo II TIS multi-layer headbox, a Metso Yankee cylinder, an Advantage AirCap hood, an Advantage WetDust dust management system and an Advantage SoftReel reel. Also included was the first installation of Metso's new OptiThick DF disc filter. The production line is optimized to enhance final product quality and save energy. The delivery also comprised an extensive automation package including Metso DNA machine, process and drive controls, as well as a Metso IQ quality control system with non-nuclear Metso IQ Fiber Weight Measurement.

Designed with a large width and an operating speed of 1,900 m/min, the new production line will produce 70,000 tons a year of high-quality facial, toilet and towel grades. The raw material for the new line will be virgin pulp.

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Shandong Chenming starts up a Metso-supplied coated fine paper line in China

The PM 6 high quality art fine paper line supplied by Metso to Shouguang MeiLun Paper Co., Ltd. in Shouguang, Shandong province in China started up successfully on June 30, 2011.

PM 6 includes a complete OptiConcept paper making line from headbox to reel, and two winders. It produces doublecoated woodfree paper within the basis weight range of 70-128 g/m^2. The annual maximum production capacity of the 11.15-m-wide (wire) line is around 800,000 tonnes and the design speed is 2,000 m/min. The paper making line has been equipped with the latest Metso technology: an OptiFormer SB forming section, an OptiFlo Pro headbox and OptiDry Twin drying technology.

PM 6 at Shouguang MeiLun.

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Reporting records

PHOTO COURTESY OF PROPAPIER PM2 GMBH

The setting of another containerboard world record at 1,650 m/min was a fantastic achievement by the teams of Propapier PM 2 and Metso.

Propapier PM 2 sets another containerboard machine world record at 1,650 m/min

On April 14, 2011, the Metso-supplied PM 2 containerboard machine at Propapier PM 2 GmbH in Eisenhüttenstadt, Germany, set another containerboard machine 24-hour world speed record of 1,650 m/min. During the record run, the 10.85-m-wide PM 2 produced corrugating medium at a basis weight of only 80 g/m^2.

This is the second 24-hour world speed record set by Propapier PM 2. On November 25, 2010, the PM 2 set a record of 1,620 m/min at a basis weight of 90 g/m^2, being the world's first containerboard machine to exceed the 1,600 m/min speed level and the first to exceed 1 mpm. The PM 2 was started up in March 2010.

"This second world record in a short period testifies to the fantastic performance of all the teams involved and the outstanding concept of the entire line," says **Jürgen Heindl,** CEO of Progroup AG.

The entire PM 2, from the stock preparation plant to the OptiConcept paper machine, features Metso paper making and automation technology. The design speed of the machine is 1,900 m/min.

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Cooperation agreements

Strategic equipment supplier agreement with Inbicon concerning biomass refineries

Metso has signed an agreement with Inbicon A/S of Denmark for the supply of technology capable of converting biomass into second-generation fuel ethanol.

The agreement covers cooperation in designing and supplying full industrial-scale biomass refinery equipment by combining Metso's fiber processing technology and Inbicon's technology for bioethanol production. Metso will supply the equipment for refineries where non-wood raw materials, such as wheat straw, bagasse and oil palm fruit residues, can be utilized to produce ethanol, solid biofuel for energy production, and animal feed.

Lars Dahlqvist, Senior Vice President, Metso's Fiber Processing unit, is optimistic about the coming cooperation: "With this agreement we have taken an important step towards supplying our equipment for the new industry of biomass conversion. We look forward to working with Inbicon and see them as a fast track towards commercialization of the whole new industry of biomass refining. We are now ready to deliver the equipment for commercial-sized plants making second-generation bioethanol."

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Results pulp & paper **"Special edition"** for iPad available

The first iPad issue of Metso's Results pulp & paper customer magazine is now available. To download the issue for free, just visit the App Store and look for Results pulp & paper on your iPad.

This "Special Edition" is not just a copy of the printed magazine, but includes a collection of top articles published in the Results magazine in 2010 and an extra bonus of videos, animations and additional pictures.

As Tablet PCs, such as iPad, are increasing in popularity around the world, Metso is exploring the possibilities that these new devices offer. "While the print version of Results pulp & paper will continue to be our main tool for communicating our success stories, this 'Special Edition' is an example of how we are investigating the potential of this new technology to complement print," says **Eric Tetreault,** Vice President Marketing, North America. Metso prints and distributes over 20,000 copies of the magazine to interested subscribers throughout the world.

Guo Haiquan, Chairman, HNIC Dahe Paper Co., Ltd. (left), **Jari Koikkalainen,** President, Metso Paper and Fiber Technology, China, **Xie Daorong,** General Manager, Services, Metso Paper (China) Co., Ltd and **Hong Yanwei,** Wuxi New District CPC Working Committee, Deputy director of CMC, celebrating the Wuxi Service Center's 10 years of operation.

Wuxi Service Center in China celebrates 10 years of operation

Metso's Wuxi Service Center for the Chinese pulp and paper industry celebrated its 10th anniversary on August 25, 2011, having opened in 2001 with 60 employees. Since then, the personnel has grown to 150 committed professionals and the roll service capacity has doubled, due to an extension made in 2007. As a result, the center can now serve a much wider customer base and offer more flexible and faster service.

Located in Jiangsu Province, about 100 kilometers west of Shanghai, the Wuxi Service Center provides advanced machinery maintenance and process development services. It also has a fully-equipped roll service workshop, providing roll covers and mechanical roll maintenance for all types of rolls. In addition, it offers replacement rolls and full-scale services for spare parts and tailored consumables, such as doctoring products.

To support customers' production and maintenance operations, the Wuxi Service Center offers specialized maintenance services and more comprehensive cooperation, including service agreements. In addition to offering extensive backup for Metso's existing installations in China, the center provides services for other makes of fiber and paper making machinery.

Strengthening local service operations is a vital part of Metso's continuing commitment to, and support for, the Chinese pulp and paper industry. In line with this commitment, Metso has steadily been increasing its local presence in China. The latest additions to the service center network are the Guangzhou Service Center in Guangdong Province and the new Zibo Service Center in Shandong Province.

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In challenging times there is a special need for companies to find new and unorthodox ways to cooperate. One effective way of building new partnerships for research, technology development, innovation and business development is to form industrial clusters – geographical concentrations of businesses competing within the same industry.

Mats Williams
Assistant Director
Center for Strategy and Competitiveness,
Stockholm School of Economics
Cluster Consultant and former
President of the Paper Province

Clusters strengthen industry

Research shows that businesses in clusters develop faster, are more competitive, and foster more innovations than companies outside the cluster. Around the world there are a lot of examples that prove this theory, including Hollywood, Silicon Valley and the 'Paper Province' in Värmland, Central Sweden – a pulp and paper cluster that is owned and managed by around 100 member companies.

Research done at the Stockholm School of Economics has identified six key stages in the process of forming a cluster – all of which are reflected in the Paper Province.

Local conditions
Värmland's business history has been strongly influenced by the region's natural wealth. Successful exploitation of the forest started early, which created unique local knowledge and helped the region become a competence center for the global pulp and paper industry.

Enterprises
In recent decades a rich flora of businesses has grown up out of the traditional forest industry base. The times have passed when paper mills, together with a small number of suppliers outside their gates, dominated the business scene. Today the relationship is rather the opposite, with a multi-faceted technology and service sector increasingly expanding its operations into new markets in Sweden and abroad.

Social capital
A unique body of competence and experience has grown around the pulp and paper industry in Värmland. Through formal and informal networks, knowledge and technology are shared among the region's pulp and paper companies, which boosts development and earnings.

Smoothly functioning components
Through their participation in the Paper Province most member companies have a good working relationship with Karlstad University and other public bodies. This is facilitated by the existence of sophisticated demand, specialist knowledge and extensive research and development in the region.

Politics
Close cooperation between local government and the Paper Province has resulted in constructive and creative cluster innovation policies. Politicians have thus supported businesses in the cluster.

Global links
Today the Paper Province has become a hub for the global pulp and paper industry. People and businesses move here to develop, while goods and services developed and produced by the region's pulp and paper industry increasingly reach international markets.

The Paper Province cluster organization was founded in 1999 when seven companies identified common challenges. A decade later member companies affirm that their participation contributes to new products and services, increased sales and more jobs. Last year the EU identified the Paper Province as one of Europe's 100 World-Class Clusters.

I am sure other pulp and paper regions could follow. Forming new, strong pulp and paper clusters in different parts of the world could be one way of meeting the challenges the industry is facing.

New felt conditioning solution increased dewatering by 30% at the pick-up felt

In 2010 the staff at Powerflute Savon Sellu BM 1 in Finland faced problems with inadequate dewatering on the pick-up felt. This led to water rimming around the pick-up roll and runnability issues at the press section of the 7-m-wide containerboard machine. An investigation of the situation revealed that the existing Uhle box setup (two Uhle boxes with two slots) was clearly not efficient enough to remove enough water.

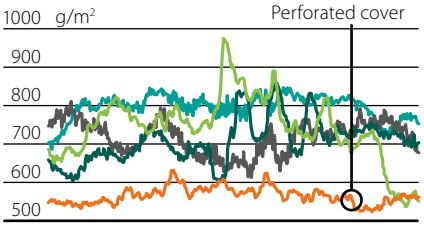
TEXT Pekka Kivioja and Kaisamaija Marttila

To solve the problem, one of the Uhle boxes was taken out of operation and a new perforated Uhle box cover was installed on the other. After this change a 30% increase in dewatering at the pick-up felt was measured simultaneously with a 28% decrease in the vacuum level. Felt conditioning was clearly more effective as the felt remained open longer, and felt moisture profiles stayed good and stable through the felt lifetime.

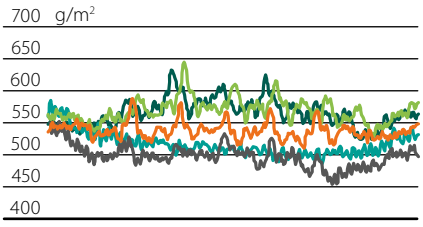
Improved felt conditioning

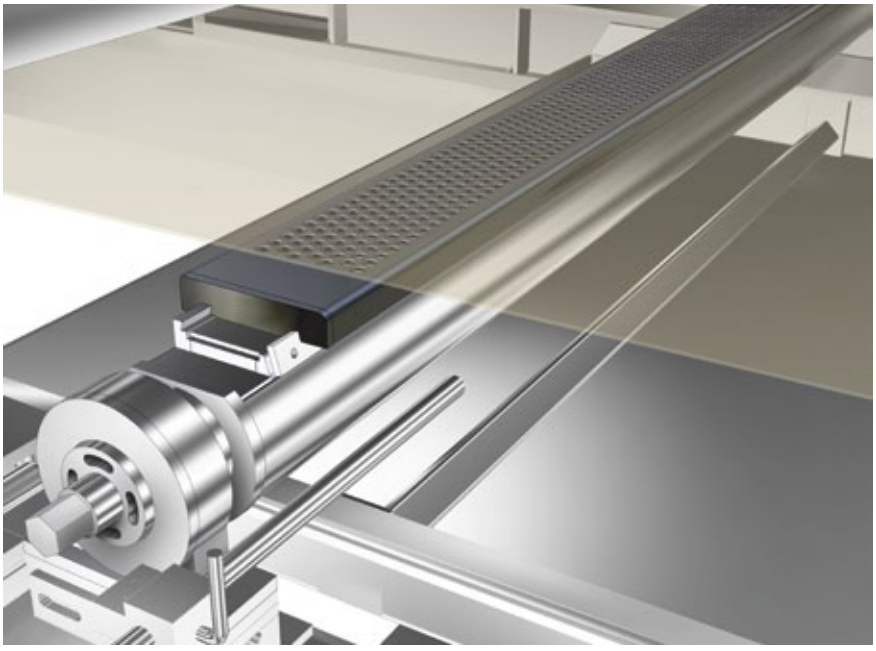
The perforated Uhle box cover is an effective and straight-forward solution to increase dewatering and reduce energy consumption in press section. The more

The pick-up felt moisture profile is very even with the perforated Uhle box cover when compared to standard slotted cover. Water removal efficiency is also better (all felt running times equal).



Felt moisture profiles for felts between 1 and 46 days. Moisture profiles stay good and stable through the felt lifetime.





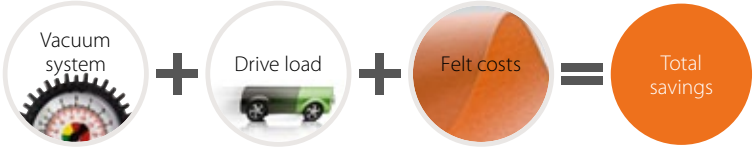
New perforated Uhle box cover with SolidCoat hard coating. Increased dewatering capacity based on a long dwell time in the vacuum zone.

effective dewatering performance of a perforated Uhle box cover stems from the long dwell time in the suction area. The surface geometry of the perforation pattern improves water removal at a lower vacuum level thus saving energy.

The SolidCoat hard coating ensures gentle fabric contact and damaging frictional drag is decreased. The cover provides stable support for the felt over the entire suction area; there is no 'diving' into slots as with conventional covers. Felts run longer and good felt condition is maintained throughout the lifetime of the felt. For achieving these results fast, the new perforated cover is easy to install to existing Uhle boxes.

Significant energy savings with new perforated cover

To exploit the full potential of perforated covers, a study was conducted at Powerflute Savon Sellu BM 1. By using perforated cover and optimizing vacuum system and felts used, following savings potential (up to EUR 324,000 per year) was found:



Vacuum system

Coming down from the 45 kPa level to 20 kPa in Uhle box vacuums means 122 kW power savings per Uhle box. The maximum electricity savings for this customer would be 488 kW per hour, or roughly EUR 245,000 per year at EUR 60/MWh. These savings will require some modifications to the vacuum system.

Press section drives

Reduced vacuum levels and Uhle box numbers naturally lead to reduced sectional drive power consumption. For this customer, the estimated savings would be 30 kW per felt. For the whole press section this would mean 120 kW, which translates to EUR 60,000 annual savings.

Extended felt lifetimes

As the felt is kept more open and friction against the felt is reduced, the lifetime of the felt is also expected to be longer. For this particular customer, the annual savings in felt costs could range from EUR 3,000 to EUR 20,000. This will obviously vary from customer to customer depending on the size of the machine and typical lifetime of the felts used.

No real innovations have been introduced in quite a while for felt conditioning and dewatering. Metso's new invention, a perforated Uhle box cover, has proven its potential in different situations. Now it is up to customers to decide where the biggest benefit lies for each of them. Is it in increased dewatering, reduced power requirements, improved runnability or better moisture profiles, or is it in the ability to start using seamed felts?

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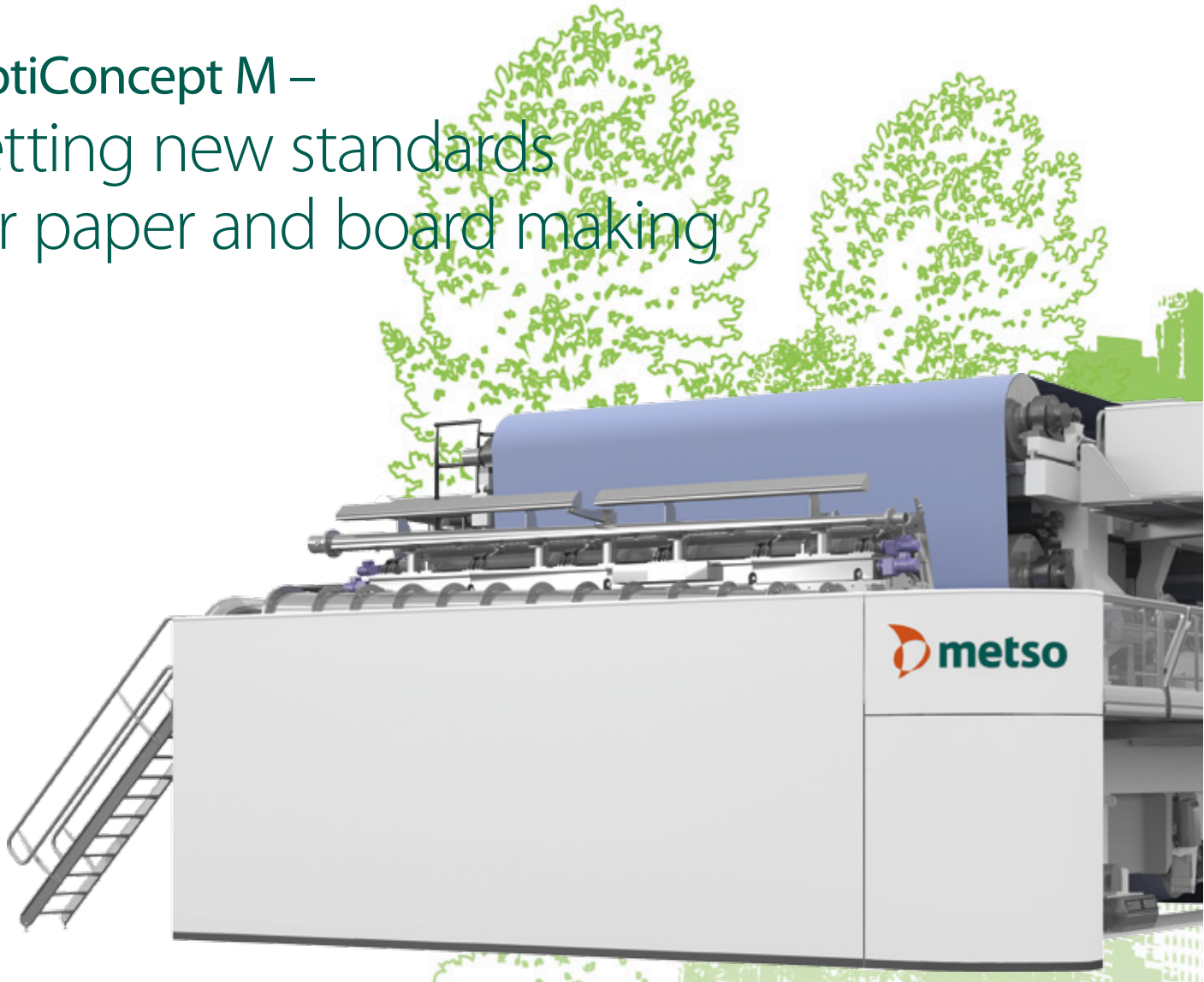
OptiConcept M –
Setting new standards for paper and board making



Economy of initial investment and daily operations

Personnel safety and machine usability

Reduction of the environmental impact

ECONOMY | SAFETY | ENVIRONMENT

Economy of total investment, personnel safety, easy machine usability and reduction of environmental load – these were the key targets guiding the development work of a wide group of experts responsible for Metso's new full-scope paper and board making concept, OptiConcept M.

OptiConcept M represents a new, modular-based way to design, build and operate a paper machine. It is a concept for cost-efficient, high-quality and flexible paper and board making. As a single-supplier production line, it also means fewer risks and easier, more economical investment projects for the customer.

TEXT Marika Mattila

Investing wisely to reach better results

Metso's new OptiConcept M production line optimizes the machine investment in accordance with each mill's capacity needs. These paper and board machines are specifically designed for mills in growing markets, and ensure maximum efficiency with minimal operating costs.

The economy of OptiConcept M is founded on its modularity. The line is modularized to the core, from its machinery to all processes around the line. The concept combines the advantages of standardization and modular tailoring. The modular processes and solutions, set within optimally fixed machine widths, allow the designing of individual lines for each customer's varying needs and targets. Lead times are fast, productivity is high and the investment is economical.

Maximum efficiency with minimal operating costs

The operating profitability of OptiConcept M derives from its high overall efficiency – its energy-efficient and resource-efficient processes and its high-speed production.

The most significant cost savings potential can be found in machine operation. For example, during a lifecycle of 10 years, only about 10% of an average recycled fluting machine's costs are caused by the initial investment. The remaining 90% comes from operating costs.

OptiConcept M saves operating costs through precise process dimensioning, proven technological solutions, optimal running methods, effective maintenance operations and fully integrated automation solutions. These features result in minimized cost per ton produced, and in shorter investment payback.

Less energy, water, expensive raw materials and hall space

One of the key targets of OptiConcept M was to develop more energy-efficient processes and solutions. The production line's modularity provides vast energy-saving potential. For example, in the dryer section it can be up to 20% compared with an average production line.

Raw materials represent about 50% of total operating costs. Therefore, raw material efficiency was another important target – the replacement of expensive materials with cheaper ones, for example, or more production and new products with better properties using less raw material, or savings in virgin natural resources. This minimizes the cost per ton of paper for customers.

A further target was to reduce overall machine dimensions and machine hall space. The new, compact machine and process technology solutions require up to 40% less paper machine hall space. The inherent savings in construction and installation have a positive impact on the total investment cost.

At the heart of OptiConcept M one find well proven paper and board making processes. It is based on experience, long-term product and process development and thousands of managed projects. Technological innovations and proven processes together create a high-quality, flexible production line – one that would widen the range of end products by producing several grades, for example. Production can now be focused on those products where demand and prices are the most favorable.

Exploit the vast energy saving potential of OptiConcept M

Stock preparation energy saving potential up to

10%

Solutions

- Effective refining, screening, mixing and pulping

Wet end energy saving potential up to

20%

Solutions

- New vacuum system concept
- Effective water removal

Dryer section energy saving potential up to

20%

Solutions

- Optimal hood control
- Effective steam and condensate system
- Runnability system grade specific control
- Heat recovery

Finishing energy saving potential up to

20%

Solutions

- Effective drying and air system

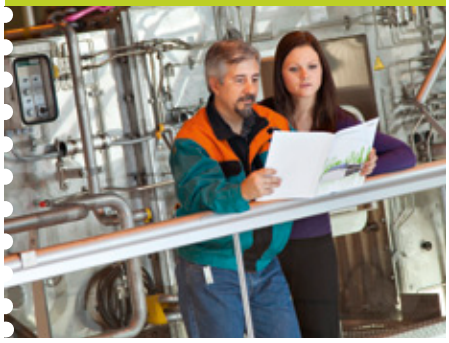
Your project is our project
With OptiConcept M, Metso can take care of total project management, thus allowing customers to focus on their own businesses. In this arrangement Metso will have one dedicated contact person, backed up by the experience and expertise of countless professionals. Metso can manage all phases of the project, including feasibility studies, engineering, installation, commissioning and production runs. Projects will experience cost savings due to short lead times, quick start-ups, high productivity and low risks – all adding up to more value for the customer.

Addressing environmental concerns
Optimized environmental performance is at the core of the design of OptiConcept M. This kind of performance is possible because high-quality processes and innovations, smart controls and accurate dimensioning help our customers to consume less steam, gas, electricity, water, chemicals and other raw materials, and also reduce emissions. As a result, customers can meet or exceed even the strictest environmental regulations. The compact design and reduced amount of materials in manufacturing also remarkably decrease the carbon footprint of the machine.

Taking work safety and usability seriously
OptiConcept M has been developed for its end users – the mill personnel. Both visually and physically, it has been designed with the requirements of its users in mind. For example, the design of the machinery allows for easy and safe changing of rolls and wear parts, thus reducing the duration and cost of service shutdowns. A totally new spacious walkway design also improves accessibility and safety on the drive side.

A further example is the walkway glass walls that isolate the running machine from its surroundings and effectively reduce noise. The industrial design and engineering innovations of OptiConcept M ensure that the mill is a safe, healthy and clean place to work, improving overall employee motivation and commitment.

Close to customers
Metso has a network of almost 50 service centers dedicated to serving customers. This is a strong basis for providing life-long development support for customer production lines. As a production and maintenance development partner, Metso can help to identify systematic measures that will ensure efficient and profitable operation throughout the entire production line lifecycle. In addition, Metso can offer a range of other services like roll maintenance, roll covers, replacement rolls, spare and wear parts and fabrics to ensure reliable operation of a papermaking line.



Smaller carbon footprint with less materials in manufacturing
Compact design remarkably reduces the environmental impact of the OptiConcept M. The potential 430,000 kg reduction in CO_2 emissions* would offset the emissions of a car circling the world 61 times.

* -CML2001 - Dec. 07, Global Warming Potential (GWP 100 years), $kgCO_2$-equiv.

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Team Spirit. Without team spirit, the new OptiConcept M paper production line might have remained half-finished and totally unused. The people behind OptiConcept M are not just a bunch of engineers and managers, but a team that shared a common goal. What efforts has this required and what does the future look like? Some of the team members will now throw some light on these questions. These are the people behind the machines.

Flagship concept

"We set out on a journey of change after seeing the global changes that were taking place around us," says **Jyrki Huovila,** General Manager, Technology, of Metso's Paper business line. OptiConcept M is the answer to those global changes. Huovila's role in the project was to support the team by clarifying the project goals. He acknowledges the fine work done by the dedicated and competent team members that kept their eyes fixed firmly on the goals, and met them. "These professionals really excelled themselves," he says.

According to Huovila, the team's confidence in the concept and in its value for customers was a key driver behind the development of OptiConcept M. A production line comprised of modules, such as in OptiConcept M, makes it possible to streamline the entire supply chain. All important functions – sales, engineering, manufacturing and project management – can now support the modular approach to designing, building and operating a paper machine.

Huovila is proud of the team members for their willingness to contribute wholeheartedly to the new approach. The team's aim was to maximize the measures that promote cost efficiency, flawless operation and high quality. "We wanted to implement change, instead of being merely an object of change. We were open-minded in all our activities," says Huovila.

Samppa J Salminen, Manager, Product Technology, finds inspiration for his work through sailing. Samppa, his wife Kyllikki and their yacht 'Nikea' have thousands of miles of shared sailing pleasure behind them.

THE PEOPLE behind OptiConcept M

TEXT Satu Kontio and Marika Mattila

Huovila predicts that OptiConcept M will be the concept behind many of Metso's future papermaking lines. "I think that, over time, this will become a significant choice for our customers, because this combines the most profitable and cost-effective solutions," he says.

Seeing the big picture

Teemu Turunen, Senior Development Engineer, agrees fully on the potential of OptiConcept M, and on the significance of the team's commitment and hard work.

Turunen's role in the project was to analyze measurements and utilize the results in improving energy efficiency. The OptiConcept M project also opened up new perspectives for him. Theory many times differs from practice.

Turunen stresses the importance for engineering of seeing the big picture. A modular machine cannot be energy-efficient if the big picture is neglected. "Energy efficiency is achieved if all the surrounding processes and systems, including the machine controls, are taken into account. It requires holistic and out-of-the-box thinking," he says.

We all pulled in the same direction

Samppa J Salminen, Manager of the OptiConcept M product development project, draws attention to the importance of uniform engineering.

The product development department was tasked with creating a paper machine that would be optimal for end users. The work started almost from scratch. Salminen points out that shared confidence in the new concept created a strong basis for good engineering. "We boarded this boat called "Team Spirit" and pointed it towards the same destination. We were motivated and we are eager to see the implementation of the first OptiConcept M," he says.

To Salminen, the future looks bright. In his opinion, the meticulously designed OptiConcept M stands out positively from other paper machine concepts.

Long-term considerations

"We've considered everything, from top to bottom. We started building this concept on the basis of the process and especially of customer needs. This kind of simple, well-functioning concept is the future," says **Juha Kivimaa,** General Manager of Technology, Sales.

According to Kivimaa, OptiConcept M has been designed as an economical investment for customers by optimizing all dimensions, for example. There are no unnecessary elements – only essential ones. He agrees with Teemu Turunen that the concept promotes energy efficiency. "For customers, it's important to consider the long-term future. They no longer focus only on the moment of investment, but on the operating costs that accumulate over time," he says.

Kivimaa has worked with the project as a sales representative, and has observed

all activities from sales to launch. "Our innovative, but thorough, approach should encourage customers to use our modular solutions with proven technologies. The mission of sales is to assure them that this is a safe route to take," says Kivimaa.

From experience, he knows that both the customers and the personnel must be convinced of the advantages of a new line. Seeking the customer's financial benefit through more economical and productive machines is not enough. "We must remember the core idea behind everything – the ability to produce as much high-quality paper or board as possible," says Kivimaa.

"We're not offering equipment only, but services and solutions to support our customers' businesses," says **Mikko Karioja,** Manager of Paper Machine Solutions.

New solutions backed by experience

The search for new, cost-efficient solutions has meant that traditional engineering skills have had to be applied to new fields. "In addition to seeking new technical solutions, we've also had to learn new working methods that will benefit us in the future – not only in further developing OptiConcept M, but in everything we do," says **Antti Leinonen,** General Manager of Forming Section Engineering.

Leinonen is globally responsible for forming section concepts, and his role in the project was often to provide both criticism and guidance, based on his 20 years of experience. "Together with the product managers and engineers, we've learned from the past. We've also taken new paths with respect to dimensioning, but have continuously limited and minimized the potential risks. Our goal has been to achieve a good compromise," he says.

According to Leinonen, the new approaches and plans to minimize risks have required persistence and commitment to the future. For good reason, he is proud of his team and all those who contributed to the project. "This has been achieved by the hard work of dedicated people who have had the energy to devote 100% to project implementation," says Leinonen.

"OptiConcept M means savings in project costs, short delivery times, quick start-up, high productivity and low risks," says Project Manager **Susan Deng.**

"Our customers no longer focus only on the moment of investment, but on the operating costs that accumulate over time," says **Juha Kivimaa,** General Manager of Technology, Sales.

"Energy efficiency requires holistic and out-of-the-box thinking," comments **Teemu Turunen,** Senior Development Engineer.

"We've had to learn new working methods that will benefit us in the future – not only in further developing OptiConcept M, but in everything we do," says **Antti Leinonen,** General Manager of Forming Section Engineering.

Understanding customer needs

Like Leinonen, **Mikko Karioja,** Manager of Paper Machine Solutions, acknowledges the tireless work of all the project team members. The outcome of the project is only the tip of the iceberg compared with the major effort behind it.

Karioja was responsible for developing the service offering for OptiConcept M. Understanding customer needs has been the foundation of the project, and the whole organization has stood behind this core principle. "One of the key goals was to create a concept that will best serve our customers' varying needs throughout the production line lifecycle," he says. "We're not offering equipment only, but services and solutions to support our customers' businesses."

Karioja sees a positive future for OptiConcept M. "We need to keep a close watch on changes, but OptiConcept M will surely find its place. It's the road we must follow in the future, too."

Dedication to project management

"OptiConcept M means savings in project costs, short delivery times, quick start-up, high productivity and low risks," says Project Manager **Susan Deng,** who offers project management services for modular paper or board line investments by Chinese customers, in particular.

"For each project, Metso appoints one dedicated contact person who is backed up by numerous specialists in different fields. In addition to supporting the project manager, these professionals are, above all, working for the benefit of the customer and the shared project," says Deng.

One of the most pleasant aspects of Deng's job is noticing the fruits of cooperation with customers. "The most rewarding thing for me is to see a happy ending of the project, and to achieve a win-win situation for both Metso and the customer."

"We wanted to implement change, instead of being merely an object of change," says **Jyrki Huovila,** General Manager, Technology.

Modern paper machine design and engineering

Innovations add safety and usability

TEXT Jouni Juhala and Jussi Salojärvi

The safer a machine is to operate, the fewer accidents there will be. The more usable it is, the more it will produce. Safety and usability play an increasingly important role in Metso's innovative paper and board manufacturing line engineering today.

"Improving the working environment around a paper machine is important for many reasons. Firstly, it ensures safe and healthy working conditions for the staff," lists **Jouni Juhala,** a Product Safety Manager for Metso. "Secondly, it adds to employee motivation and commitment, and to the company's attractiveness as an employer."

The assessment of safety risks starts at an early stage – already on the drawing board. A group consisting of engineers and product safety specialists goes through the machine layout and draws up a detailed product safety analysis that covers all process equipment. Possible human risks involved in operating and maintaining the machine are also assessed by hazard type and risk level.

"Our target is to make the operating environment as safe as possible and to minimize risks. For example, a minimum safety clearance of 850 mm is required for all cramped and dangerous spaces," Juhala points out.

In building a new machine or rebuilding an existing one, the machine supplier always also needs to consider how operators might misuse it. They may be accustomed

Safety and usability highlights

New walkway design
- Improved accessibility and safety on the tending and drive sides
- All walkways at the same level – no running up and down stairs
- No need to remove walkway parts for fabric changes or monthly maintenance

Spacious accessways through the machine
- Direct and quick access between tending to drive sides during machine operation
- Time savings in everyday maintenance work

Integrated automation towers
- Pre-tested and flushed hydraulic, electronic and pneumatic equipment in towers
- All equipment in one cabinet
- Shorter on-site assembly and shutdown times
- Easier machine maintenance and upkeep

to doing something in a way that is no longer safe in the new machine environment. "And this often involves changing the way operators think," Juhala continues.

Good usability shows in production and paper quality

"Usability has traditionally not been at the top of engineers' priority lists. Nevertheless, Metso has been a pioneer in industrial design since the early 1970s," says Industrial Design Manager **Jussi Salojärvi.** "Adding usability to a paper machine concept requires optimization and cooperation with the chief design engineers."

Better usability means more production hours and more output. If a machine cannot be washed and maintained properly due to poor usability, it's the quality of the end product that suffers.

Walkways improve accessibility

Some of the greatest safety risks arise during machine assembly and maintenance when the walkways have not yet been installed or their handrails have been temporarily removed to improve access to the machine.

Making the paper machine environment as safe and usable as possible and minimizing risks is what Industrial Design Manager **Jussi Salojärvi** (left) and Product Safety Manager **Jouni Juhala** specialize in.

For example, in Metso's new OptiConcept M modular papermaking line these risks are eliminated by introducing a brand new walkway approach. Firstly, there are now spacious walkways also on the drive side, which greatly improves accessibility and safety already at the assembly stage due to a new installation order. Secondly, all tending side walkways are on one level, eliminating the need of walking up and down stairs. This same new design improves accessibility and safety now also on the drive side. There is also no need to remove walkway parts during fabric changes or monthly maintenance procedures.

"There are straight and spacious walkways, both vertically and horizontally. They provide a safe, pleasant working environment for the operators," Salojärvi explains.

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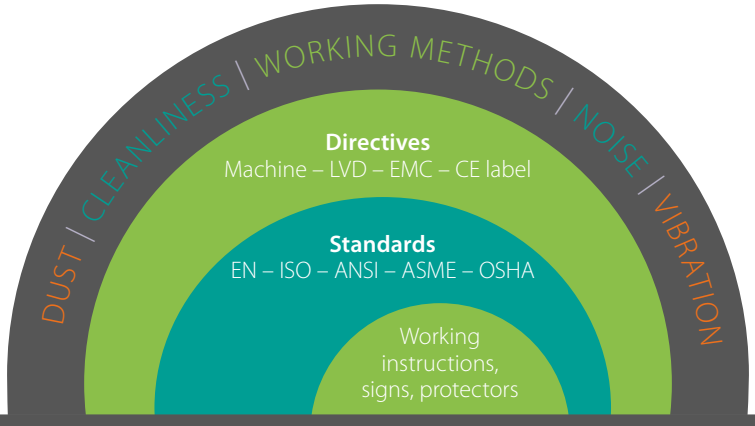


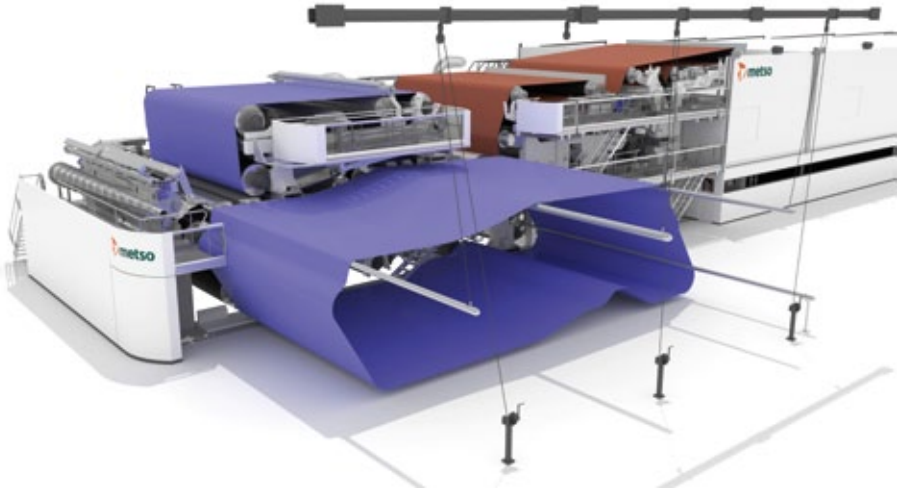
A safe working environment is the result of many different factors. Metso's paper machine designs take a proactive approach to fulfilling the safety-at-work requirements of the European Machinery Directive and various other standards around the world.

Handy mobile equipment
- Reduced need for protective gear and harnesses
- Safe and more ergonomic working positions, e.g. roll replacement grip changes

Innovative fabric insertion unit
- Carries the weight of frames and rolls on the tending side at fabric changes
- More open design makes it easier to keep the machine clean
- Significantly shorter fabric change times

Automated, ropeless tail threading
- No accidents due to ropes
- All threading is done without manual operator involvement
- Less dryer fabric damage due to tail threading waste

Proactive approach to changes in safety legislation and standards
- Equipment changes implemented before requirements actually take effect



New innovative fabric insertion unit improves safety and usability.

Fabric changes safer than ever

One of the most innovative novelties is a fabric insertion unit. It has simplified frame construction and no cantilevering is needed for fabric changes. The weight of frames and rolls is carried by the fabric insertion unit on the tending side. This all leads to major improvements around the machine, including safety and usability.

There is no need to remove walkway handrails for fabric changes and there are no hinged platforms, both of which eliminate the danger of people falling through openings. A more open design makes it easier to keep the machine clean. The fabric insertion unit and other felt change equipment also reduce manpower needs and shorten felt change times.

Mobile equipment and other innovations

Any maintenance locations that cannot be safely reached from the walkways are accessible with the help of mobile equipment. This equipment provides more ergonomic working positions for grip changes in a roll change situation, for example. Unlike a fixed walkway, mobile equipment can always be adjusted to the right working height.

Other highlights in the new concept include spacious accessways through the machine, integrated automation towers, and automated, ropeless tail threading.

Simplicity increases usability

The simplified and pure Scandinavian design of OptiConcept M modular papermaking line comes as an additional bonus. It is one of the factors why its components are easy to keep clean and safe to use. "Simplicity also adds to cost effectiveness and sustainability since less raw material means a smaller carbon footprint," Salojärvi says.

The new machine design is more compact and several meters lower than traditional machines. The absence of cantilevering beams allows a tighter squeeze for the whole process.

Walkway handrails made of glass and optional glass walls bring an ultramodern touch to the design. They effectively block out noise and increase safety by offering a good view of all machine sections. Laminated, tempered glass withstands normal running conditions and is easy to clean.

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Optional glass walls effectively block out noise and increase safety by offering a good view of all machine sections.

Stora Enso's Kvarnsveden mill first in Sweden to install ValDual

TEXT Annica Börstell

ValDual blade at press suction roll with soft cover.

"Daring to take the plunge and test the new ValDual blade wasn't exactly a difficult choice," comments **Lennart Johansson,** Assistant Superintendent for Stora Enso Kvarnsveden's PM 12. "We weren't happy with our old air doctors. They wore out rapidly and were very costly to replace. They ran for a maximum of two months and 'consumed' large quantities of air, which made them real energy thieves. In addition, the noise level around the air doctoring is a big problem, as we all know.

"Two of our air doctors had previously been replaced by blades, and it was time to do something about the third and final doctor position at a press suction roll with a soft cover. After seeing a presentation on the new blade, we decided to act immediately – and the equipment was in place by December 2010," says Lennart Johansson. Kvarnsveden thus became the first mill in Sweden to install ValDual.

"We're really pleased that Kvarnsveden, despite having a relatively new paper machine, still decided to go one more step and invest in further development," says **Dennis Dahlman,** Metso's Product Sales Manager. "I'm not thinking specifically of the doctor blade, but rather the interest in taking on board new products and ideas. That is a major factor at Kvarnsveden."

Quick installation and good dewatering

"The installation was done during an ordinary service shutdown, with the work being completed in just under two hours," continues Johansson. "Everything fitted perfectly – all that was needed was a slight adjustment, and then everything was fine.

"We perform regular checks on the equipment and can confirm that ValDual practically looks after itself. After it had been running for almost a year, our blade assessments found no wear. That bodes well, considering how long it runs for," says Johansson. "The doctoring from the roll has definitely improved – in fact it's almost too good! You only need to see ValDual in action to realize that it doctors more water than the air doctor. The tray sometimes gets full when we run higher basis weights."

Substantial savings

So far, about 100 ValDual installations have been completed around the world. "There was a lot of interest in the blade right from the start – which is hardly surprising considering the substantial savings mills can make, above all by doing away with the need for expensive air doctors," notes Dahlman.

And the figures speak for themselves. There are mills that, after replacing their air doctors with ValDual, have reduced their doctoring costs by around EUR 60,000 a year – not to mention the big savings made by not having to regrind roll covers after damage by air doctors – as happens occasionally.

"Once the last of the three original air doctors had been replaced, we could dismantle one of our compressors that supplied the air doctors with energy," says Johansson. "We have made big savings by not needing to run the compressor and the three air doctors."

Ordinary doctoring or foil doctoring – it's up to you

The aim of developing the ValDual blade was to produce an effective, low-cost solution for dewatering suction rolls and grooved rolls. Previous doctoring solutions always involved a choice – either efficient dewatering at a higher operating cost (with compressed air) or more inefficient dewatering at a low operating cost (plastic doctor blades or traditional foil doctoring). With ValDual, you no longer need to make this choice. The blade can be used as an ordinary doctor that rests against the roll, but it can also be turned, giving it a foil function. The design and specific angle of the blade cause water and dirt to be sucked from the drill holes on the roll, which means that the effect of the dewatering process can be further strengthened.

"We've used ValDual as an ordinary doctor blade, but it would be interesting to make a comparison with a turned blade with foil doctoring. That may be relevant when we decide about replacing a blade next time," concludes Lennart Johansson.

"Daring to take the plunge and test the new ValDual blade wasn't exactly a difficult choice," comments **Lennart Johansson,** Assistant Superintendent for Stora Enso Kvarnsveden's PM 12.

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When a great rider and a swift horse perform together

Zhuhai S.E.Z. Hongta Renheng Paper (Hongta), part of the Chengtong Group, is located at Zhuhai City in China's fast-growing Guangdong province. On December 18, 2010, Hongta – one of the first paper makers in the world to adopt Metso's ValZone metal belt calender – set a new lifetime world record of 686 days for a ValZone metal belt – almost triple the expected lifetime. The record-winning belt had first been installed on January 31, 2009 and was replaced just to ensure trouble-free production.

TEXT Jingwei Liu, Pauliina Purola

The ValZone metal belt calender was started up on Hongta's board machine 2 in 2007, replacing a hard nip calender. BM 2 mainly produces high-quality ivory board, including folded box board (FBB) and solid bleached sulfate board (SBS). It has a capacity of 230,000 tons, a design speed of 600 m/min and a web width at the reel of 4.26 m.

At the end of May 2011, Metso visited Hongta to present the award for the belt lifetime record, and took the opportunity to invite General Manager **Huang Xin** and Vice General Manager **Liu Wenbo,** also in charge of production, to elaborate on their experience with ValZone, the cooperation with Metso, and Hongta's blueprint for the future.

Hongta has operated the ValZone metal belt calender for over three years and, as the first adopter in the Asia-Pacific region, it has gained a lot of experience. The period required for learning to use and master the revolutionary new calender concept has also been shortened by the input of Hongta's innovative and professional team.

Hongta's main achievements with ValZone

Having been the first in China to use a ValZone metal belt calender, Hongta has acted as an innovator driving overall progress in carton board quality. After seeing Hongta's excellent results, other Chinese carton board makers have also invested in this technology, which has improved the production and international competitiveness of China's coated board.

Using ValZone, Hongta has been able to improve product quality, including properties such as smoothness and flatness. This has guaranteed good competitiveness, consolidated the existing customer base and attracted a cluster of new customers. With this improved quality, Hongta always commands the highest prices on the market.

"Another key benefit is that Hongta now has more flexibility with respect to different fibers and coating colors. With ValZone we can use less expensive fibers and colors, thereby reducing raw material costs, but still achieve the same paper quality with higher bulk," says General Manager **Huang Xin**.

"In addition, as the ValZone belt calender helps achieve higher bulk, we can lower the basis weight of the final product. Especially for high basis weight grades, the contribution is very noticeable."

"As a result, we're advanced in ValZone's operation, and we can summarize our successful experience by underlining three aspects," says **Liu Wenbo,** Vice General Manager. See below.

1. Build up a professional team for ValZone

Hongta built up an extensive and knowledgeable team to support ValZone's operation, While the team studied a number of things, the key factors for ValZone's runnability were a good knowledge of the fiber properties and good housekeeping. ValZone's operators also played an active role in machine optimization. Success was a result of teamwork by the whole group.

2. Record and summarize the appropriate running data

As Hongta produces a lot of different grades, the team recorded the running data to find the best running modes, such as belt temperatures and thermal roll temperature, nip pressure, etc. This data ensures good runnability, web quality and the stability of the machine, while it also helps to improve the metal belt lifetime. With ValZone, Hongta has successfully optimized the ratio of different pulp types for each grade. It contributes strongly to the raw material cost.

3. Pay attention to preventive maintenance

The machine's operating staff strictly apply pre-testing rules and regulations, including initiative inspections, periodic cleaning and pre-maintenance. This helps find any hidden problems, and the team can take the necessary maintenance actions in time.

Metal belt lifetime record was astonishing 686 days

"Actually, the old belt is still in good condition and we were planning to use it for 700 days! But to ensure undisturbed production, we replaced it with a new one," adds Huang Xin.

According to Chinese wisdom, the ValZone calender can be thought of as a 'swift horse', and the Hongta team members as a 'great rider'. The team gradually familiarized itself with ValZone's temperament, and, by taking good care of it, they took it to full gallop.

The metal belt lifetime record at Hongta can be seen as the result of enhancing the overall level of management – but it also reflects the Hongta team's ability to master new technology.

ValZone metal belt calender at Hongta.

Hongta's development plans

Zhuhai S.E.Z. Hongta Renheng Paper has three production lines. The main products are ivory boards, such as cigarette and community board. The overall production is 540,000 tons annually. Hongta still has more land reserved for a production line of 300,000 tons, and they plan to continue developing their strength in ivory board products.

The Chengtong group has also recently announced new investment plans in Zhuhai – the development of another mill with a capacity of one million tons of carton board. The new base will be just next to the Gaolangang base.

Hongta is one of those Chinese paper makers that are focusing particularly on scientific and technological development. Hongta believes that technological development leads to greater productivity. Therefore it is actively trying to use new technologies, while highlighting its own research and development capabilities.

The picture shows the second of the two placards that Metso has awarded to Hongta. From left: **Jerry Zhang,** Manager, Equipment Maintenance and Service, Hongta, **Liu Wenbo,** Vice General Manager, Hongta, **Ari Harmaala,** President, Metso Paper (China) (at the time when the picture was taken), **Huang Xin,** General Manager, Hongta, and **Marko Korpinen,** Metso's Sales Manager.

For example, in addition to being the first ValZone user in the Asia-Pacific region, Hongta was the first in China to invest in Metso's OptiCycle C ultra-filtration system for coating color recovery, and has set a number of world records while using newly developed systems.

Hongta is China's first high-end manufacturer of ivory board. Over the years, the company has been the flagship in carton board R & D and board quality in China. It has received a series of corporate patents and product quality certificates. China's National Science and Technology Ministry awarded the company with a "high-tech enterprise" certificate.

In line with Hongta's values, the company is "Open and Innovative, Pursuing Excellence". As an acknowledgement of their success Metso awarded Hongta with a certificate stating that an 'Innovative mind and expertise bring great achievement'.

Hongta's success relies on professional teams and knowledge, and it is active in strengthening communications with internationally advanced enterprises. "We always strive to master the latest production technology, and we are always willing to be 'the first to eat crab' (an old Chinese expression referring to a market innovator or early adopter). We know that new technology is a result of long-term investment in RTD," says Huang Xin.

Metso is also very happy to be able to work with a professional and experienced customer when launching new products. As another Chinese proverb says: "A swift horse should be together with a great rider." Hongta is one such rider.

The metal belt Hongta has been using since the world record, has worked as well as its victorious predecessor. It is quite possible that Hongta will eventually break its own world record with this new metal belt.

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Hongta's concrete steps to achieve long metal belt lifetimes
Follow the maintenance manuals
Keep the fibers clean and have good housekeeping
Optimize the belt temperature for different grades
Strengthen the machine management and implementation of personnel reporting methods
Clarify the responsibility areas of the process, maintenance and operating personnel
Strengthen preventive maintenance and find the right running modes

WireGem roll coating shows superior performance at Propapier PM 1 in Germany

Novel coating technology solves guide roll cover wear problems

TEXT Juha Ruotsi

Bone-hard rubber materials have been used for fabric and felt guide roll covers for decades. In the world of cars, similarly aged Model T Fords are today commonly seen only in museums and have been replaced by totally new models, like the Focus or Golf. In the world of paper machines, especially in the case of guide roll covers, we have only seen some facelifts, and ebonite rubber materials still dominate today. However, the surroundings of guide rolls have meanwhile developed dramatically: roll technology, machine speeds, machine concepts, and machine widths are all at a totally different level compared to the times of the first ebonite rubber covers. These circumstances set new standards for guide roll cover materials, in many respects. A machine running at 1,800 m/min generates almost 1 million kilometers of paper per year. Is this possible with your GoodYears?

Requirements for modern paper or board machine guide rolls

When paper machine speed increases, fabric tension normally also increases. Modern paper machines also have long, preferably lightweight, rolls. These conditions often lead to complex roll deflection control issues.

Speed differences between roll cover and fabric are often the root cause of forming section roll cover and fabric lifetime problems. The rolls in a fabric loop are designed to run as cylindrical components. If rolls are not running perfectly straight due to small deflections, speed differences may occur between the fabric and roll. If roll covers and fabrics are too sensitive to this slight slippage, they will start to wear, normally near the roll or fabric edges. Once wear starts, it is a self-accelerating process: speed differences will increase as the roll crown increases. The wear of fabrics and roll covers may become a severe problem over a short span of time. Selecting a wear-resistant roll cover is a simple solution to this problem.

Wear resistance provided by WireGem coatings leaves no space for doubt

Thermally sprayed coatings are particularly well-known from press section center roll positions. Over time they have surpassed other cover material types, mostly because of their wear and durability properties. In 2007, Metso utilized similar technology for other applications and introduced the WireGem coating for fabric guide rolls.

WireGem is a thermally sprayed ceramic coating. Its surface characteristics are designed especially for optimal wear resistance, roughness and durability. Effective roll cleaning is ensured by its easy doctoring characteristics. Underneath its visible surface the cover contains technology for dependable corrosion resistance.

Proper roll cover selection can cut your total cost

It's all about costs, and today we calculate them at a very detailed level. Traditional rubber covers are cheaper than WireGem coatings if we compare these two cover candidates simply on the basis of price. But how about extra roll installation costs?

WireGem technical data		
Coating color	Black	
Hardness - P&J	900-1,100 (Vickers, HV)	
Coating thickness	0.4 - 0.6 mm	0.016 - 0.024"
Surface finish	0.5 - 0.8 Ra µm	20 - 32 µin
Maximum temperature	No restrictions	
Maximum fabric tension	No restrictions	
Maximum speed	No restrictions	
Friction coefficient (vs. wet plastic wire)	Same as hard rubber	

Roll regrinding costs? Maintenance costs for other rolls within the same fabric loop? Fabric costs? Roll change and transportation costs? Possible additional production losses because of multiple roll changes?

Each forming section has its own special characteristics and it is not financially sensible to replace ebonite rubber covers with WireGem at every roll position. But there are several applications where a ceramic coating is definitely the most efficient solution. Joint cost analysis by Metso and the customer can provide guidance for cover selection.

Track record at Propapier PM 1, Burg, Germany: Run times multiplied

In 2007, Metso supplied the first WireGem coating to the German corrugated board raw material producer Propapier, more specifically for a forming section roll on PM 1. Field feedback received since then proves excellent performance.

Propapier is part of Progroup, and it produces testliner and corrugated medium on one of the most modern production lines in the world. PM 1 started up in 2001 in the city of Burg and has an annual capacity of 320,000 metric tons, production speed of 1,300 m/min, and fabric width of 6,300 mm.

PM 1 has two gap formers and several fabric guide and drive rolls. Roll maintenance history prior to 2007 showed that rubber roll covers were wearing quickly in some roll positions and frequent regrinding was necessary. The need for recovering came up after 3 to 4 years of cover lifetime.

WireGem coating in excellent condition after 3-year run period at Propapier Burg PM 1.

A roll with Metso's WireGem coating was installed on the machine in December 2007 in one of the most demanding forming section roll positions, which was a wire drive roll position. The regrinding interval of a rubber-covered roll had been modest in this position, approximately 3 months. The following years proved this replacement very successful: the roll was used continuously in the machine until the fall of 2010. After this long running period, a detailed cover inspection at a Metso Service Center also showed that the roll coating was still in excellent condition: no notable wear, no notable roughness change. There was actually no real need to perform any maintenance work on this cover.

Other important improvements have been witnessed in addition to this extended roll cover maintenance and regrinding interval, such as excellent coating cleanliness. These remarkable cost saving benefits have been made possible by the optimal wear, friction and doctoring properties of WireGem.

Besides the first cover placed in service in 2007, the PM 1 crew has had experience with three other WireGem coatings for wire and wire drive roll positions supplied by Metso in the years 2008 and 2009.

WireGem coatings have fulfilled all expectations at Propapier PM 1.

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A vote of confidence in performance-based mill maintenance

Based on several years of successful outsourced maintenance at its Zaragoza mills, Saica has contracted Metso Mill Service (MMS) to be the sole provider of maintenance services, from the recovered paper conveyors to the new reel warehouse, at its new 400,000 tpy Partington, UK mill, near Manchester. The concept focuses on a machine performance and productivity model which has been partially tested in Spain. Reductions in technical lost time and a safer working environment have been achieved.

TEXT Mark Williamson, Journalist Engineer

The PM 10 machine at the El Burgo mill is one of five Saica machines in Spain covered by the MMS maintenance agreement.

Left to right: **Ramón Muñoz** of MMS, with **Luis Miguel Garcia, David Plou, Federico Asensio,** and **Pedro Jariod** of Saica.

When Saica Paper's new Partington, UK recycled furnish containerboard mill starts up in the first quarter of 2012, the entire mill will be maintained by Metso Mill Service (MMS), the maintenance arm of Metso. This is a strong vote of confidence in the concept of outsourcing and in the cooperation which has contributed to improving maintenance management at Saica over the past few years.

MMS will take over responsibility for maintenance operations and the management of improvement programs for the OCC stock preparation system, the board production line, power generation plants and the wastewater treatment plant. Saica had previously selected Metso as the main machinery and automation supplier for the 8.2-meter-wide, 400,000 tonnes per year production line, numbered PM 11.

Federico Asensio Balet, Deputy Managing Director of Saica Paper based in Zaragoza, Spain explains why this agreement is the ideal solution for the mill: "Our agreement with Metso at our new Partington mill combines all aspects of corrective, preventive and predictive maintenance, and is a win-win situation. It adds value to our maintenance activities to have an experienced paper machinery manufacturing company as our partner. This agreement gives us the best quality service, low costs, low downtime and the productivity we need to be successful. And furthermore, it covers the complete production line from the raw material conveyors to stock preparation to the new paper warehouse. The drivers of this agreement are very tightly connected to the mill's overall production," he says.

This comprehensive whole-mill agreement was carefully considered by Saica as it had to be based on shared common goals, mutual trust and the proven good working relationships developed between Saica and Metso. The business model for performance-based maintenance by MMS has its roots within Saica's Spanish organization centered in Zaragoza, where it has been developing and maturing since 2005.

The Saica El Burgo de Ebro mill in Spain.

Performance-based maintenance

Saica has two containerboard mills in the Zaragoza area: the Zaragoza city mill with two paper machines, and the El Burgo de Ebro mill, about 25 km away, with three paper machines. The combined production of the mills is 1.8 million tonnes per year.

Before Saica formed an agreement with MMS, the mill service was done mainly by four outside contractors. But Saica managers realized that maintenance must have a value-added component above and beyond just paying for the labor costs. Costs of work and spare parts should be managed and predictable, of course, but the maintenance activities should be more focused on reducing technical downtime and actually improving the paper making operation. Ensuring a safe working environment was also at the top of the list, as advocated by Saica's motto: "If it's not safe, it's not Saica."

Asensio highlights the reasons for forming the initial performance-based maintenance partnership with Metso. "We needed a partner like Metso that would improve our knowledge of how to service our processes, so our maintenance procedures would be top-quality. Metso would bring this depth of paper machinery knowledge, their skills, diagnostic procedures and service methods, to add value. We would not be just buying hours of maintenance time. The end result would be good performance for our papermaking equipment."

In 2005, Saica and MMS formed a partnership that would address maintenance from a performance point of view.

continued overleaf…

Both companies invested money in the new organization. The staff of four previous contractors was merged into one. To improve the level of skills and methods of service, Saica and MMS developed an extensive training plan which continues today. In the period from 2006 to 2009 about EUR 300,000 were invested in training, and the budget for 2010 was EUR 70,000.

The current 180 maintenance specialists are located in three maintenance facilities: a roll maintenance shop and an electrical maintenance shop close to the El Burgo mill site, and a general mechanical maintenance shop located near Zaragoza. The mechanical maintenance and roll maintenance shops are set up as profit centers, and actively solicit and accept repair projects from other paper mills in the Iberian Peninsula and other parts of Europe, too. Other industries are served as well.

Investment in high-quality equipment

Skills are important, but diagnostic and machining tools are essential for a maintenance organization to perform at a top-quality level. In this respect, Metso has invested heavily in state-of-the-art equipment to provide high-quality refurbished and refinished paper making equipment.

The roll maintenance shop, opened in 2007 near Zaragoza, boasts one of the most precise roll grinding machines in Europe. Equipped with a four-dimensional roll measurement and control system, the grinder can handle the largest rolls with a shell width of up to 11 meters and a weight of 120 tonnes. The roll maintenance shop also has a dynamic roll balancing machine which handles 11-meter-shell-width rolls of up to 30 tonnes. With this precision equipment and a high level of personal skills, the Zaragoza roll shop has been rated as the best in the Iberian Peninsula by customers. Since its inception, over 700 rolls have been processed.

Diagnostic testing equipment abounds in the workshop. This includes vibration analysis, ultrasonic, thermal imaging and endoscopic video equipment. Precision mechanical alignment has also proven to be a valuable tool.

The mechanical workshop provides specialized refurbishing services for a wide variety of pulp and paper equipment including gear boxes, disk filters, stock prep equipment, screens, screw presses, vacuum pumps, and refiners.

Performance is key

Of course, the result of these investments in personal skills and equipment should be better paper machine uptime and improved worker safety. Saica and MMS have therefore developed key performance indicators (KPIs) which show the effectiveness, quality and cost of maintenance, and the deployment of preventive safety actions.

The roll maintenance shop is on the site of the El Burgo de Ebro mill.

The waste-to-energy power plant in the U.K.

In addition to general mechanical maintenance Saica identified key process equipment that was problematic and needed special attention. It included felt-cleaning showers, doctoring (alignment and angle-setting procedures), and dryer fabric continuous cleaning systems. Recently, a committed maintenance concept has been applied to the stock preparation area.

David Plou, Maintenance Director at both Zaragoza area mills, comments on the working relationship with MMS while tackling specific problems: "We openly discuss the specific problems and solutions. It has helped us to improve our depth of knowledge of the process and to reduce lost time due to mechanical reasons. We've also seen a close team spirit develop between the papermakers and the maintenance people. As for safety, MMS shares our safety program goals."

Asensio adds his thoughts on the cooperative spirit at the Zaragoza mills, "We expected MMS to provide continuous step-by-step improvements for maintenance services in specific areas. Saica has developed and established, together with MMS, service actions to improve machinery performance and availability. This has meant a huge change in maintenance strategy – from reactive to proactive, and from a concept of outsourced labor to one of added-value maintenance services," he concludes.

Overall, the mechanical lost time has improved steadily and lost time accidents have been reduced over the last few years. Using the years 2006 and 2007 as a baseline, time lost on equipment under the service agreements due to mechanical reasons has been reduced by 58%, while injury lost time has been reduced by 55%.

The maintenance agreement for Partington was signed by **Federico Asensio** (left) from Saica and **Barry Brown** from Metso in January 2011. In the back from left to right: **Luis Miguel Garcia, Pasi Häyrynen, Darren Hoyle, Paul Lilliot** from Saica, **Ari Telama, Jukka Koiranen, Juha Hentunen** and **Jan Vales** from Metso.

Partington next in line

The concept and results of performance-based maintenance are well-established at the Zaragoza mills and a good level of trust has been established. Saica is in the process of establishing a program at its Venizel containerboard mill in Northern France, where MMS will manage the mechanical maintenance on the OCC stock preparation area. And, of course, the next big step will be the implementation of the agreement at the Partington, UK mill.

Rather than building on-site maintenance shops the roll maintenance and mechanical repair works will be done by Metso's existing shops in Darwen and Haslingden, which are both less than 50 km from the mill. At the same time Metso is upgrading and modernizing the Haslingden workshop.

MMS will play the managing role in mechanical, electrical and process control maintenance. Other site services provided by subcontractors will be managed and cost-controlled by MMS. There will be Saica on-site people who will coordinate maintenance activities and handle investments in the necessary equipment and process upgrades.

Moving into the new agreement, Asensio is confident that the whole-mill maintenance concept will work well. Problems will have to be addressed, of course, but the team spirit established at Zaragoza will carry through. "It's a no-fault situation. Our teamwork with Metso is important since, if a problem occurs, we will work together as a single team to identify and solve it as quickly as possible," he concludes.

The roll grinding machine is one of the most precise in Europe.

The PM 11 machine at Partington is now under construction. The start-up is scheduled for the first quarter of 2012.

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Smooth operation thanks to the annual Metso headbox service at LEIPA

TEXT Marianne Kasjan

"Metso has found faults that could have caused significant problems without the service," says **Carsten Maibaum,** Production Manager, PM 3. "The headbox is a critical element and we want to keep the profiles at a good level. So far, we've had no problems with the headboxes and we don't want any. Therefore, and because Metso has excellent know-how, we have chosen the Metso headbox service."

Ever since 2000, Metso has checked and maintained the headboxes at LEIPA Georg Leinfelder at Schwedt on the Oder in Germany. The LEIPA mill annually produces 170,000 tons of LWC on PM 1, and 230,000 tons of testliner and coated and uncoated white top testliner on PM 3.

Annual testing and service was first introduced on PM 1. The tests involve a series of checks for possible damage in the side panels, the flow surfaces and the top slice lip, for example. The adjustment mechanisms and indicators in the headbox are checked and the profile control system is tested. Seals are checked for cleanliness, defects and functioning. A visual inspection and several measurements are carried out at the flow surfaces.

Based on the critical points found in the test, service measures are then proposed and discussed with the mill. The customer selects which of the proposed maintenance tasks should be carried out at the planned shutdowns.

If necessary, the flow surfaces and other relevant parts are treated with a special flow surface treatment developed by Metso. This ensures that contamination and subsequent process trouble can be effectively prevented. Through this testing and maintenance work, the status of the machine can be kept at a technically optimal level, and the product quality and machine efficiency in this area can be ensured.

More headboxes join service program

In 2005, due to the positive experience gained on PM 1, LEIPA introduced the headbox service on PM 3 as well. This machine has two headboxes. The tests and maintenance are carried out on this machine alternately, which means that each year one headbox is tested and the other serviced, and the following year vice versa.

Headboxes can be sensitive and susceptible to interference. As a result of the service program, no more process disturbances have been caused by the headboxes.

As they develop their own headboxes, Metso has decades of experience and technical know-how concerning this technology. This was one of the reasons LEIPA chose Metso. The LEIPA mill is very satisfied with the results of the service program and the cooperation has been very rewarding for both sides. It has led to annual follow-up orders ever since 2000.

Comprehensive headbox maintenance services by Metso
Surface treatment with MX06 coating
Cleaning and polishing of internal components
Headbox process and condition tests
Headbox alignment
Structural headbox analysis
On-site reconditioning of apron
Slice lip performance upgrades

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TEXT Ilkka Saarinen

The process control system (DCS) is a strategic tool for paper manufacturers and an essential part of every paper mill. Perhaps it has been taken for granted to such an extent that we no longer think about challenging the idea any more. The main task of a DCS is to control and visualise the modes of operation and process flows of each production line. Very simply, a DCS is the steering wheel for operators and a window into the process. In this paper the characteristics of a DCS specifically related to paper process energy consumption are described.

Automation tools for energy saving

Effective monitoring of energy costs
Process automation can be employed on many levels in a paper mill. It provides information and analyses of processes which serve to optimise production efficiency. In paper manufacturing, energy consumption and energy costs play an important role. The costs and the methods by which we can monitor them online and reduce them are, without doubt, of interest to decision-makers.

Normally, energy costs (electricity, steam and gas) are reported on a monthly basis and after the energy has already been used. In a modern control room, energy consumption and costs can be reliably monitored online and in real time. Production personnel can input alerts for product-related reference values into the system. As soon as these are exceeded, operators are made aware of the fact via the alarm system (Fig. 1).

Energy consumption can be optimised
It is worth investing in the correct energy-conserving tools for the control room. Even if energy costs can be reduced by one percent with these tools, the savings are enormous. The online monitoring of process automation helps alert operators to energy problems early enough to find new energy-saving modes of operation. In addition, readily accessible reports on energy and raw material consumption assist plant management.

The costs per tonne of paper can be easily tracked via the online applications for each specific kind of energy consumption. Individual target values and alerts can be set for each paper grade. As soon as new, lower values are reached, they can be reset by the operator and can be used as new alert and target values. In addition, it is possible in the system to document the actions taken that lead to energy savings. In this way new cost-saving modes of operation can be recorded and made visible to everyone. Furthermore, specific energy consumption can be monitored in relation to the production rate, for example. From that, it is easy to determine the speed that might be optimal for each paper grade in each individual situation. In addition to that, various reports are available which clearly show the costs of each parent reel and paper grade (Fig. 2 and Fig. 3).

continued overleaf...

Figure 1. Energy consumption and costs per manufactured tonne of paper.

Malfunctions are immediately reported

The operator is able to search for potential causes of, say, high energy consumption via the operational assistant, called Metso DNA Help. Technical specifications and comments are available on the display screen in the control room. In cases where a pump, etc., does not function correctly, a fault report can be entered in the DCS online diary (Metso DNA Diary). This is forwarded to the service personnel and is dealt with appropriately. Depending on the situation, the causes of the fault can then be addressed immediately or repaired during the next shutdown of the paper machine.

Multi-state monitoring for analysis

Multi-state monitoring (MUST) provides the operator with a detailed analysis of the process. This tool uses measurement data from the process, such as energy, temperature, flow rates or differential pressures. Known process-related interferences in sub-processes, or the process device or function, can be eliminated until the real cause of the fault is found. Online analysis is based on an operational model created from data collated over several weeks. This technology is called 'Clustering and Conditional Histograms.'

The MUST solution is easy to implement and adaptable. Typical fields of application include large-scale consumers of electricity, such as refiners, vacuum pumps, fans and screens. Multi-state monitoring permits real-time data tracking, with compensation for the operating point. The system then recognises variations in performance, and fault reports can be sent automatically to the service personnel. The advantages of this include fast diagnostics and immediate response to the incident. If required, the application can be installed and operated remotely. The main applications for this kind of analysis are slow changes, such as contamination, wear, etc., which cause higher energy consumption.

Steam network optimisation considerably reduces costs

Steam Manager is an application designed especially for pulp and paper mills where rapid changes in steam demand may occur. This solution shortens the duration of disturbances in the steam network and reduces the associated losses. The Steam

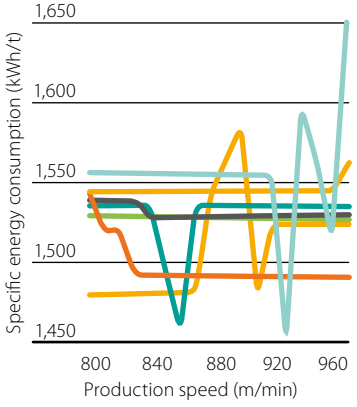

Figure 2. Specific energy consumption in relation to manufacturing speed and grade (t/h).

Speed *	Specific energy consumption [kWh/t]						
	03.000135	00.000135	03.000130	03.000120	00.000115	00.000100	03.000100
Average	1,498.7	1,530.9	1,533.8	1,530.3	1,510.7	1,557.1	1,547.0
Min.	1,492.6	1,530.9	1,531.9	1,458.0	1,481.3	1,450.8	1,546.1
Max.	1,543.8	1,530.9	1,540.4	1,536.7	1,588.0	1,654.7	1,562.4

* Manufacturing speed

03.000135 00.000135 03.000130 03.000120 00.000115 00.000100 03.000100

Fiber	45.20%	78.141
Chemicals	36.01%	62.248
Gas	0.00%	0.000
Steam	7.95%	13.751
Electricity	10.83%	18.727

Figure 3. Cost distribution (Reel, grade or time)

Time	Manufacturing costs (without fiber) €/t	Electricity €/t	Steam €/t	Gas €/t	Chemicals €/t	Fiber €/t
2/1/2011	145.6	18.1	14.2	0.0	113.4	79.8
3/1/2011	88.5	15.0	11.2	0.0	63.6	79.9
Average value	94.5	18.7	13.8	0.0	62.2	78.1
Min.	31.0	15.0	11.2	0.0	1.0	69.7
Max.	158.5	22.6	15.4	0.0	122.2	79.9

Manager solution results in significant savings in relation to manufacturing costs. These savings can be pre-estimated by a process study.

Typical fields of application for the Steam Manager solution include feed water tanks, balancing and storage capacitors, steam accumulators, steam reduction stations, boilers, gas and steam turbines and mill sub-processes.

Steam Manager has enhanced energy efficiency in pulp and paper mills through much improved steam quality, optimised steam production, lower steam losses and reduced use of other fuels. The reduced number of unplanned shutdowns is also an advantage and results in increased availability of the mill. All of these improvements are, of course, beneficial for paper production. The application is linked seamlessly with the automation system. The amortisation period for an investment in Steam Manager is only a few months (Fig. 4 and Fig. 5).

Summary

The process control system is a strategic production tool to ensure the site-specific modes of operation of process flows. Today's systems are far more than just control panels; they also provide an important window into the process. The recording of process measurements and their analysis play an increasingly important role. This large amount of data must be made comprehensible to operators through multi-faceted methods of analysis. The next stage will be process simulation, which will permit operators to test various modes of operation through simulation in order to save energy and other direct costs. This feature is similar to computer games. The task is to find new modes of operation at a lower cost, without negatively affecting production and quality. The simulation runs in parallel with other system functions. □

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Figure 4.

Performance solutions: Steam Manager	Using
Ensures uninterrupted supply with process steam	Feedwater tank / de-aerator
Compensates for load fluctuations as economically as possible	Balancing or dump condenser
Optimises power generation	Steam accumulator
	Steam reduction stations
	Boiler
	Gas turbine
	Steam turbine
	Mill sub-processes

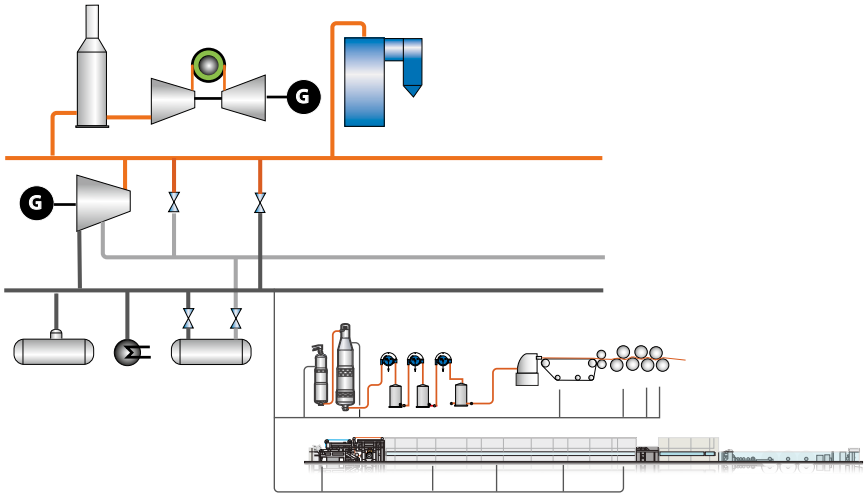

Figure 5. Steam Manager: MPC Regelmatrix

Control variables
Fresh water
Accumulator
Capacitor
GT performance
Boiler (gas)
Boiler (bio-fuel)
Steam reduction
Fluctuations
Control parameters
Feed water level
Steam battery charge
ND steam pressure
Quantity balance
Losses (power generation)
Use of capacitor
Use of steam accumulator
Gas usage

TEXT Nigel Farrand

The new OptiThick DF disc filter provides many operational benefits

Metso's new OptiThick DF disc filter brings a new level of performance and dependability to stock thickening in pulp and paper mills. Disc filters are commonly used in paper mills as savealls for the recovery of fiber and filler and for the clarification of whitewater. Modern disc filter savealls now produce clear and super-clear filtrates for stock dilution and machine showers that minimize freshwater use.

Petteri Riivari, Metso's Dewatering Equipment Product Manager, sums up:
"In designing the new OptiThick DF, we paid special attention to increasing operational capacity through accurate dimensioning while simultaneously maintaining the high filtrate quality."

How it works

The OptiThick DF disc filter consists of filtration discs attached to a hollow center shaft which rotates partially submerged in the vat. A vacuum applied to the shaft via a barometric dropleg causes a fiber mat or cake to form on the disc, which traps the fibers and fines while letting the filtrate pass through. As the disc rotates, the cake increases in thickness and increasingly clearer filtrate is sucked through it and divided into separate flows by a special valve at the end of the shaft. The filtration capacity and cleanliness of the filtrate are determined by the sweetener stock available, the vacuum level, the white water solids content and the pulp cake thickness. Several features of the new OptiThick design have improved efficiency and reliability, as well as simplifying maintenance and service procedures.

Increased capacity without compromising quality

The increased capacity of the OptiThick DF is the result of several design features, including good shaft flow characteristics, optimum internal volumes and filtrate valve selection. The small internal volumes of the disc sectors, shaft and filtrate valve provide a faster response and ensure the best possible filtrate quality, even at faster rotational speeds. The tightly sealed gaskets in the vertical drop leg prevent leakages and maintain the optimum vacuum in the shaft and disc sectors. Another major factor in the capacity of a disc filter is air in the feed stock. "Just 1% additional air in the stock can require two extra discs in the larger filters to achieve the same production rate, with a corresponding increase in investment and operating cost. The OptiThick inlet box has been flow-modeled to ensure

Metso's **Petteri Riivari** (left) and **Lionel Martin** at a recent start-up in France.

OptiThick DF benefits
High level of reliability
Improved capacity
Increased performance
Excellent flow
Cleaner filtrates
Easier operations and maintenance

Metso's new OptiThick DF disc filter brings a new level of performance and dependability to stock thickening in pulp and paper mills.

an even distribution of pulp and smooth flow for better cake formation and filtrate quality," explains Petteri Riivari.

Simple sector mounting

OptiThick DF sectors feature the industry-standard, open-grid design, but their mounting on the shaft is unique. Mounting rods, slotted to hold the sectors, are clamped to hollow feet that are welded to the central shaft. They maintain perfect alignment, enabling a tight seal between the hollow foot and sector base. The welded foot eliminates the traditional bolt-on foot and gasket between the foot and the shaft that can lead to vacuum loss from a poor sector to the center shaft connection. In the event of mechanical damage to a sector mounting rod, replacement is much easier, bolts are pre-attached to the rod clamp, and no loose parts (gaskets, mounting plates or bolts) that can be accidentally dropped into the vat are needed.

Maintenance-friendly design features

Large doors in the filter hood give generous access to the sectors. The rigid construction of the inlet chutes in which each disk rotates reduces any possibility of bending and resultant damage to the sectors. The 20 sectors per disk are easy to replace, sliding in and out on the mounting rods with a simple securing system to hold them in place. The sectors themselves feature zip-on polypropylene filter bags and positive O-ring sealing at the sector base. The hood also has smaller inspection hatches for safer visual examination. Unlike some designs, the shaft bearing on the valve side is outside the vat, which means it can be serviced without opening the disc filter.

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Excellent "cake" formation provides better-quality filtrate.

Sectors are mounted on feet that are welded to the central shaft and maintain perfect alignment, enabling a tight seal to the sector base.

OptiThick DF improvements on the classic disc filter include
Flow-modeled design
Sector design of small volume and good flow
Inlet box design, giving even pulp feed
Improved sealing of vat and filtrate valve
External bearings for easy maintenance
Inspection and repair hatches for safe operation and maintenance

Successful start-up

The first OptiThick DF installation took place as part of Metso's delivery of a complete tissue production line to Industrie Cartarie Tronchetti (ICT) in Montargis, France. Producing 70,000 tons a year of high-quality facial, toilet and towel grades, the production line is optimized to enhance final product quality and save energy. Start-up was in July 2011.

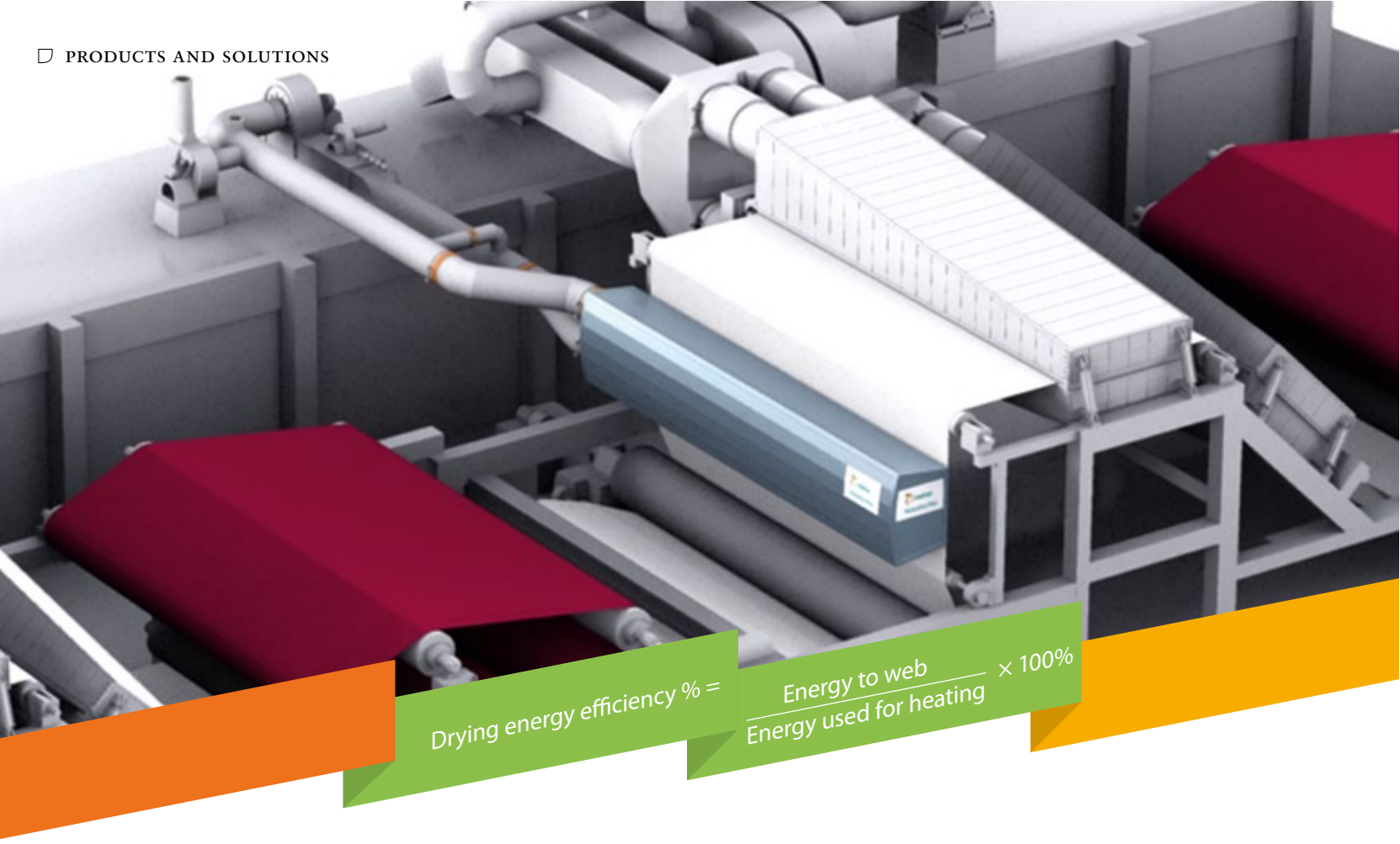
WavStar – the disc filter capacity booster

Metso's WavStar filter bag is suitable for all kinds of disc filter sectors, including the new OptiThick DF disc filter. The secret of WavStar lies in its unique fabric corrugation. The solution increases the sector surface by 29%, enhancing capacity by 10 to 25%. The corrugation also facilitates filter cake removal. The key benefits of this disc filter bag are:

- High capacity
- High pulp discharge consistency
- Improved filtrate quality
- Cost-effective retrofit
- Easy maintenance and service

WavStar ensures high runnability and performance even in the toughest conditions.

A detail of the corrugated WavStar fabric**.**



TEXT Jukka Parvinen and Pertti Heikkilä

With energy prices continuously rising, it pays to get rid of the worst energy gluttons in the process. One of them hides in coating drying.

The PowerDry Plus air dryer can be installed in the same space as an IR dryer.

Air drying plusses

Higher sheet quality and 50% lower energy costs

During the past few years, energy-conscious papermakers have shown that even the best coated paper and board quality can be produced energy-efficiently with Metso's PowerDry Plus air dryer. It has outperformed the infrared (IR) dryer that has been commonly used as the first dryer after the coating station. In this machine position, a one-sided, compact dryer with a high energy output is needed.

The PowerDry Plus air dryer is based on Metso's modern patented nozzle technology, in which impingement and float blowing are combined to ensure high heat transfer into the web, as well as good runnability. The typical operating parameters of the air dryer are a blowing velocity of 60 m/s and an air temperature of over 400°C.

PowerDry Plus is a standard solution in Metso's new machine installations.

IR drying features low energy efficiency

The energy efficiency of the IR dryer is low, 25–35%, compared with the modern air dryer, where 60–80% of the heat input is absorbed by the paper web.

With the electric IR dryer, most of the radiation energy tends to be absorbed by the dryer construction. Thus, 65–75% of the energy is bound to cooling air that is needed to prevent the construction from overheating.

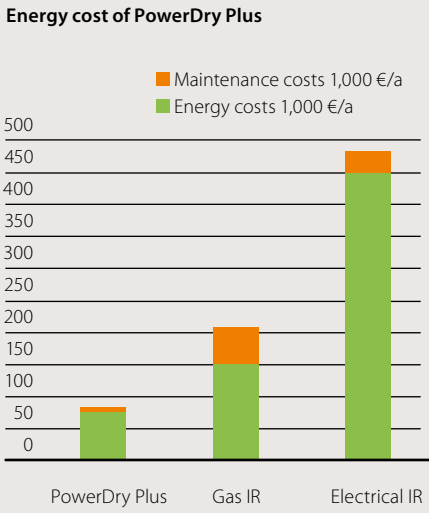
With the gas IR dryer, in turn, less than half of the gas energy can be transformed into radiation in combustion. The rest is bound to combustion gases. In addition to this only part of the radiation is absorbed by the paper web.

Excellent surface properties with an air dryer

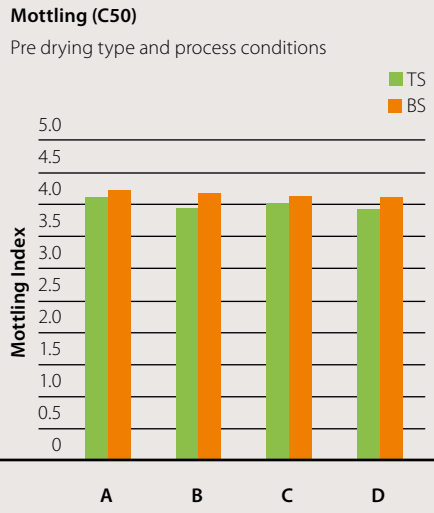
It has been thought that the IR dryer is a must in coating drying in order to ensure good surface properties. This is based on the knowledge that the coating color has to solidify quickly on the paper sheet after its application; thus a high drying effect is needed.

However, this is no longer true. The PowerDry Plus air dryer has a higher evaporation rate than the IR dryer.

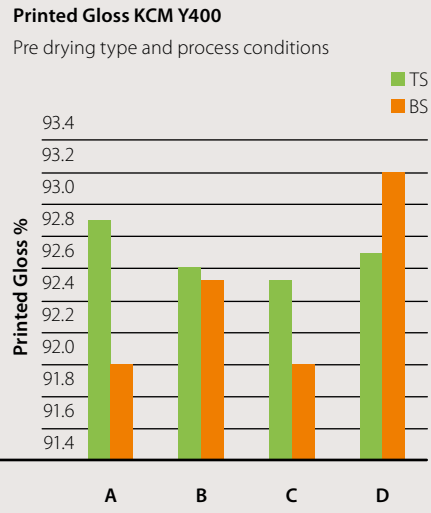
High-intensity drying right after the coating application and before the critical drying phase has a positive effect on paper quality. When you start the drying



Energy cost of PowerDry Plus vs. IR dryers on an 8-meter-wide dryer with the same evaporation rate. Annual operating time 8,000 h/a. Energy source: natural gas. Natural gas 30 €/MWh, electric power 55 €/MWh.



Test results on coated wood-free paper with different outputs from an electric IR.



A IR 100%
B IR 50%
C PowerDry Plus 450°C / 60 m/s
D PowerDry Plus 500°C / 60 m/s

in an early phase, water drainage into the base sheet is reduced. The highest drying intensities with PowerDry Plus (450–500°C, 50–60 m/s) have given the best quality.

When air and IR drying have been compared with each other, high-intensity air drying has provided a little better smoothness and printed gloss than IR drying. This is explained by the fact that the IR dryer heats the sheet more and evaporates less, resulting in higher water drainage into the base sheet.

25-35% lower energy consumption

With PowerDry Plus as a first dryer, the total drying energy consumption in coating drying is 25-35% lower than with the traditional combination of the IR dryer and the air dryer.

The gas consumption of PowerDry Plus has been 50% lower compared with the IR dryers removed from various machines. Significant savings in maintenance costs have also been gained since there is no need to change expensive lamps and radiators with the air dryer.

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Latests new references				
Year	Customer	Mill	Line	Grade
2010	Changle Numat Paper Industry Co., Ltd.	Weifang, China	PM 1	Coated white top testliner
2010	Shandong Bohui Paper Industry Co.,Ltd.	Zibo, China	BM 7	Folding box board
2011	Shandong Huatai Paper Co.,Ltd.	Dong Ying, China	PM 8	Coated wood-free
2011	Shouguang Meilun Paper Co, Ltd	Shouguang, China	PM 6	Coated wood-free
2011	Zhejiang JiAn Paper Packet Co., Ltd.	Jiaxin, China	PM 3	Coated board
2011	Hamburger-Rieger GmbH & Co. KG	Spremberg, Germany	PM 1	Coated white top testliner
2011	M-real Kyro Kyröskoski	Finland	BM 1	Coated folding boxboard
IR dryer replaced with PowerDry Plus				
2010	Korsnäs AB	Gävle, Sweden	PM 5	Liquid packaging board
2011	UPM-Kymmene Corporation	Rauma, Finland	PM 4	LWC
2011	Kemiart liners Oy	Kemi, Finland	BM 1	Liner board

Some of the latest PowerDry Plus dryer deliveries.

TEXT Petri Norri, Nenad Milosavljevic, Heli Anttila

Metso's revolutionary OptiDry impingement drying technology has been developed to replace and improve traditional cylinder drying. The OptiDry Twin dryer was chosen as one sub-process when a life cycle assessment (LCA) was conducted on paper machine lines. The LCA gave vital information to further develop the life cycle benefits of impingement technology.

LCA as a tool to develop impingement drying

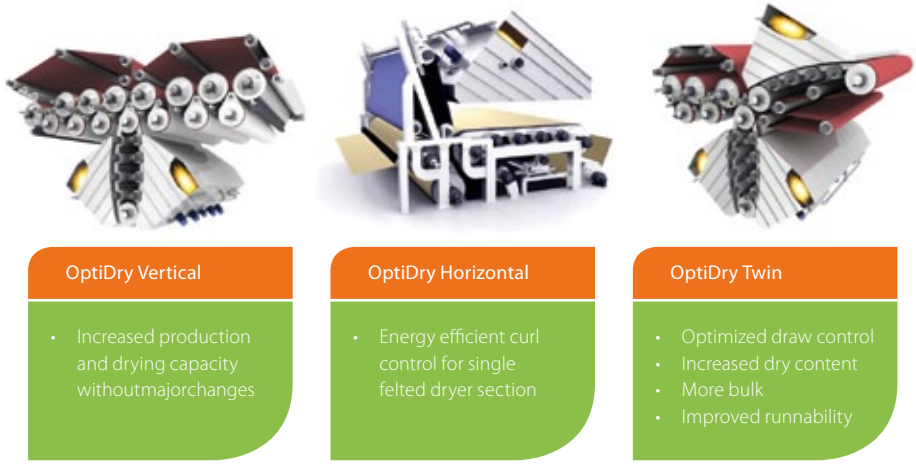

Figure 1. The OptiDry impingement drying family.

Impingement drying solutions for improved productivity and efficiency

In impingement drying, hot air is impinged at high speed against the web to create high drying capacity. The returning air is used to carry out the evaporated water. Metso has three impingement drying solutions offering different benefits for paper makers.

Installation of an OptiDry Vertical impingement dryer at the beginning of the dryer section not only enhances drying, but can also allow the steam pressures of the cylinders to be increased without sticking while the dry content is raised, thus improving the drying effect of the current equipment as well. In many cases OptiDry Vertical is the only possible way to increase production if the machine is drying-limited and there is no extra space in the machine room. The dryer will be located in the basement and there is no need to find space for extra drying cylinders and to relocate the dry end equipment. This means less construction work and a shorter shutdown time.

Installation of an effective OptiDry Twin dryer after the press section of a modern paper machine leads to a remarkably shorter drying section, and thus also to a shorter paper machine and shorter machine room – which saves land, construction costs and material. At the same time it is possible to increase the bulk of the paper, improve runnability, save expensive raw material (pulp) and produce higher-quality paper with higher efficiency than is possible with traditional dryer sections.

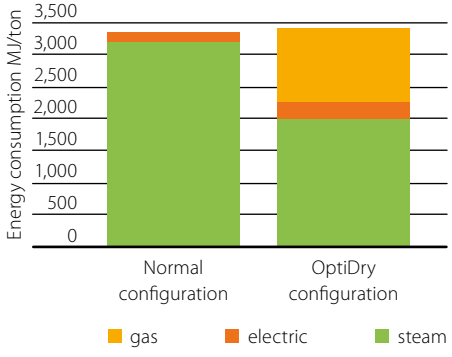

Figure 2. Energy consumption of different drying methods.

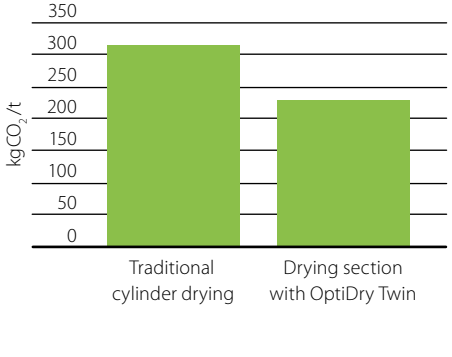

Figure 3. CO_2 emissions when steam is generated by coal.

LCA process for sub-processes

In manufacturing we take building impacts into consideration. A paper/board machine with impingement drying means less land use, less building, less concrete, less steel, etc. A drying section with an OptiDry Twin dryer can be 12 m shorter than a drying section with just cylinder drying, which means some 3,000,000 kg less concrete and 180,000 kg less steel in the building, and approximately the same amount of less waste in the end-of-life treatment. Time-of-use is the most significant factor when studying the lifetime environmental impact of a paper machine. When using the machine, energy consumption is the most significant factor increasing the environmental load.

Energy analysis of different drying concepts

Figure 2 shows an energy analysis that was performed to determine the efficiency and benefits of the impingement drying concept compared to normal single-felted cylinder drying in a pre-dryer section. A fine paper machine having a wire width of 5.8 m and a running speed of 1,200 m/min and producing 80 g/m^2 paper is used as the basis for the comparison.

The energy consumption of the drying section consists of electric and heat energy,

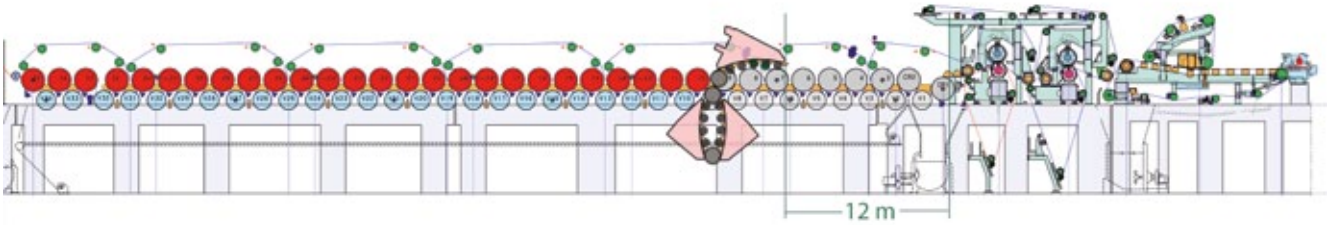

Figure 4. Difference in length of the drying section.

which may be steam for the cylinders, or gas for air impingement drying.

The energy consumption in both cases is almost identical. In the case of cylinder drying the total energy consumption is 3,350 MJ/t and consists of electric and steam energy. In the impingement drying process, the amount of steam energy has decreased and been partially replaced by gas, but the total energy consumption stays at the same level, 3,409 MJ/t.

Depending on the steam-generating fuel in the mill's power plant, there is an effect on CO_2 emissions. Figure 3 shows a comparison of the CO_2 emissions of different drying methods. The steam is generated in a power plant using coal as the fuel.

The impingement drying concept applied on a new paper machine brings major benefits due to the increase in paper dry content (typically 5-6 drying content units) at the beginning of the dryer section. This solution makes it possible in this case to reduce the number of drying cylinders from 35 to 26 in a new papermaking line (Figure 4).

Heat recovery from the exhaust air in OptiDry Twin drying is significantly more effective than in cylinder drying due to the higher temperature and humidity of the exhausted air. The heat energy recovered from the exhaust air is about 12.3 MW in the case of the OptiDry concept, compared with about 8.3 MW in the case of a cylinder configuration.

LCA conclusions for OptiDry

The life cycle environmental impact of OptiDry is the same or smaller than that of a traditional drying section.

Besides increasing the evaporation rate, impingement drying improves cylinder drying efficiency, paper quality and machine total efficiency, saves resources during construction of the machine and during paper production, and controls the emissions into the atmosphere.

As an embodiment of modern impingement technology, Metso's OptiDry dryer has been installed in numerous paper and board machines. The benefits mentioned in this article have been proven by the most efficient paper machines using the latest technology around the world. ▢

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The life cycle of equipment can be described in three steps

Life cycle assessment (LCA) at Metso

TEXT Riitta Talja

Life cycle assessment (LCA) is an environmental management technique whereby the environmental impacts of a product are assessed throughout its entire life cycle, including the manufacturing, use, and end-of-life stages. The technique is regulated by ISO standards 14040 and 14044, which impose strict requirements. The assessment consists of four phases: goal and scope, inventory analysis, impact assessment, and interpretation. The ISO standards ensure that reliable, fact-based information is obtained. Although LCAs are generally used to communicate environmental impacts, they can also be used to communicate cost or consumption figures. Life cycle assessment is a valuable tool for monitoring and calculating the emissions of a product, because of its structured and regulated way of presenting data. It is also useful in guiding thinking towards more sustainable products.

At Metso, pilot life cycle assessments have been launched Group-wide, with the goal of adding value for customers, so they can monitor and improve their own environmental efficiency. LCAs respond to a growing demand for environmental assessments. Metso will use the results of these assessments conducted on paper machine lines to consider various possibilities for improving environmental efficiency by, for example, using OptiDry Twin technology.

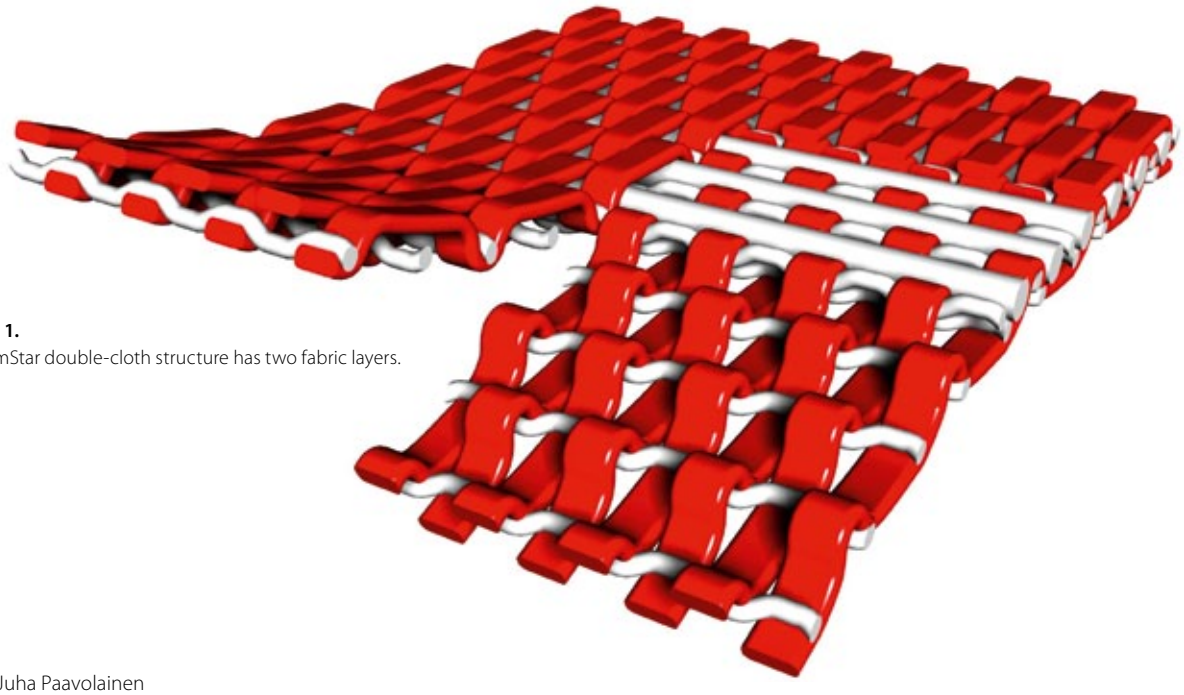


Figure 1.
The TamStar double-cloth structure has two fabric layers.

TEXT Juha Paavolainen

The double-cloth structure makes TamStar last long

The TamStar dryer fabric family consists of several fabric designs with different functional properties – all designed to improve papermaking efficiency. They all feature the unique double-cloth structure, which contributes to a long running life. According to a study on the fabrics that were run in Finland during 2000-2008, TamStar's running life was measured to be 15-30 percent longer than that of traditional dryer fabrics.

Other much-appreciated features of all TamStar dryer fabrics include good runnability, elongation of less than 1%, a very strong and non-marking warp loom seam, and easy installation thanks to the straight seam loops.

The double-cloth structure improves wear potential

The secret behind TamStar's significantly longer lifetime lies in its unique double-cloth structure (Figure 1).

TamStar has up to 40% more machine-direction yarn material than a conventional dryer fabric. Its structure with stacked MD yarns ensures excellent strength, which is higher than 200 kN/m.

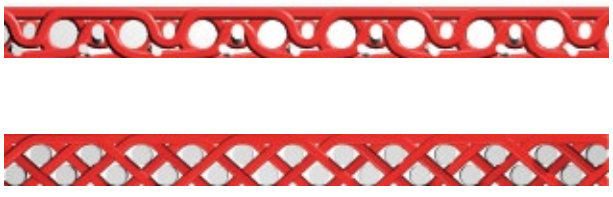
Figure 2 shows how a conventional dryer fabric is heavily worn on the roll side and how each machine directional yarn has lost its strength.

Because of the double-cloth structure, TamStar's roll side takes the wear, allowing the machine-direction yarns on the paper side to stay undamaged.

In Figure 3, the roll side of TamStar has hit the edge sealing of a sheet stabilizer and the roll side of the fabric is worn out. However, in this case, it was possible to run the fabric until a planned shutdown, because the paper side of the fabric, and especially the non-ravelable seam area, were undamaged.

The strongest seam on the market

In conventional seams, the machine-direction yarns that bind the seam spiral have been twisted. This decreases the seam strength, increases the seam thickness and makes seaming more difficult. In TamStar's warp loop seam, all yarn floats are straight and have not been twisted. See Figure 4.



Double-cloth TamStar
Fabric strength
200 kN/m -> 100 kN/m

Conventional dryer fabric
Fabric strength
150 kN/m -> 0 kN/m

Figure 2. The double-cloth structure ensures better wear potential.

Easier to keep clean

Correct dryer fabric permeability is a precondition for the efficient operation and runnability of modern, vacuum-utilizing sheet stabilizers.

A contaminated dryer fabric surface decreases runnability and causes an uneven moisture profile. The need for easy cleaning of the dryer fabric with high-pres-

What's required of a modern dryer fabric?

The main task of a dryer fabric is to transfer the paper web from the press section to the pope reel through the challenging (hot and humid) paper machine hood environment. A dryer fabric must also act as a drive for otherwise undriven rolls and cylinders.

Although paper machine speeds are increasing all the time, the average lifetime of a dryer fabric is also increasing. This means several million extra laps over a dryer fabric's running lifetime.

The runnability challenges set by higher paper machine speeds and modern, more effective sheet stabilizers have doubled the running tension of dryer fabrics. Due to the high tension, the fabric's wear resistance and strength – especially seam strength – at the end of the planned running time are very important.

Good basic properties of a dryer fabric

Durability
Strong seam
Dimensional stability
Easy to keep clean

When comparing the warp loop spiral seam to TamStar's warp loop seam the following benefits can be noticed
when damaged, individual seam loops do not ravel/unwind like spiral tends to do
the seam is all flat and, thus, non-marking – unlike the spiral seam with its twisted loops
seam caliper is smaller than that of the fabric body, ensuring excellent late life strength

sure cleaners has become an important criterion for selecting the dryer fabric type and structure.

Metso's TamStar HS dryer fabric features cleaning channels through the double-cloth fabric structure. Figure 5 shows how easily the high-pressure shower goes through the fabric. In a conventional dryer fabric, the cleaning shower goes through the fabric in a more labyrinthine way, resulting in a lower permeability level.

Figure 6 shows a permeability comparison of 1st and 2nd group dryer fabrics on a newsprint machine that runs at 1,500 m/min. There are similar high-pressure cleaning units in both sections, and both dryer fabrics were installed at the same time. After 170 running days, the permeability of the conventional dryer fabric had decreased by 20%, but the permeability of TamStar HS had decreased by only 10%. In addition, the permeability profile of TamStar HS is much more even.

More than 10,000 TamStar fabrics produced

Metso's dryer fabrics are manufactured in two locations – at the Tampere plant in Finland and at the Tianjin plant in China. TamStar can be supplied from both locations to optimize delivery time and reliability. ▢

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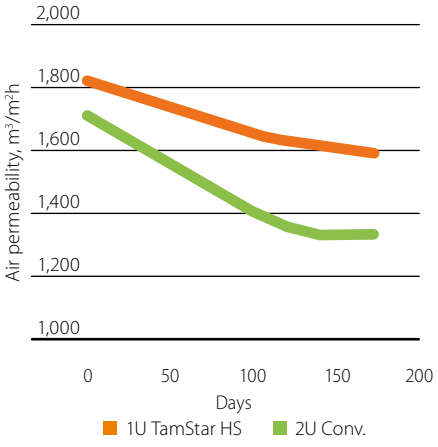
Figure 6. Air permeability follow-up between TamStar HS and a conventional dryer fabric.



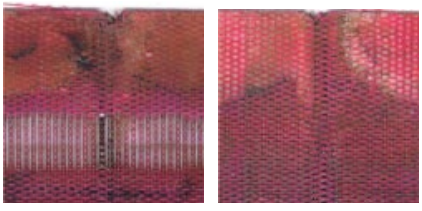


Figure 3. The double-cloth structure provides excellent damage resistance in the case of accidents.

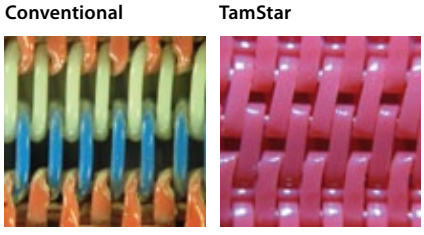


Figure 4. TamStar's warp loop seam has no twisted loops.

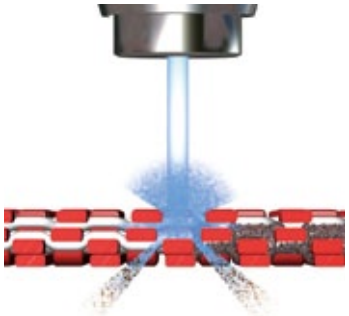


Figure 5. TamStar HS cleaning channels make high-pressure cleaning easier.

TEXT Anne Paloheimo-Seppänen

FiberStar SL is a single-layer shrink fabric designed for drum filters. In addition to boosting production, it provides many other significant benefits.

FiberStar SL – a reliable production booster


1


2


3

1. FiberStar SL provides a thick and dry cake.

2. Patented low-profile woven loop seam.

3. Thanks to **the high shrinkage force,** fastening bands are needed only on the edges.

"The fabric is an excellent choice for bleaching and washing drums, especially in the case of blinding problems and/or poor fabric washing," says **Tapio Salminen,** Product Sales Manager, Fabrics business unit.

FiberStar SL	key benefits
Excellent drainage	high dry content
Shrinking	starts at low temperatures
Extremely high shrinkage force	long lifetime
Unique woven seam structure	low profile and high strength
Metal-like structure	stays clean and runs longer
No shrinking in axial direction	easy to install
No need for welding	quick installation

"FiberStar SL provides an extremely thick and dry cake, which results in more produced tons. The dryer the cake is, the less bleaching chemicals you need, and the more cost savings you achieve."

FiberStar SL starts shrinking at low temperatures already. An extremely high shrinkage force in boiling water – achieved by the specially developed circumference Kynar yarn (PVDF) – makes the fabric firm and durable, in addition to ensuring a long lifetime.

A strong woven loop seam

The shrink fabric features a patented woven loop seam. As the seam loops form during the weaving stage, there is no separate seam structure. "The woven seam is very strong and as thin as the fabric itself," says Salminen. This structure contributes to a long lifetime and good mechanical durability. A flap under the seam loops prevents fiber loss.

Quick and easy installation

Thanks to the non-shrinkable axial Ryton yarn (PPS), FiberStar SL can be manufactured with very little extra width. This, along with the large seam loops that keep their shape, make the seaming and installation of the fabric quick and easy.

Longer running time

The Ryton axial yarn (PPS) gives the fabric a metallic effect, keeping it clean longer and enabling easier cake release. The reduced need for fabric washing saves washing chemicals and, above all, ensures a longer running time.

No welding needed

"Compared to a metal fabric, no welding is needed with FiberStar SL. Thus, the drum does not require cleaning from welding leftovers, which saves the drum surface and makes the whole fabric change process much quicker," concludes Salminen.

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Shandong Huatai Paper

Instant success on the fine paper market

The Shandong Huatai Paper mill in Shandong Province invested in a new PM 8 line with the goal of extending their offering and breaking into the Chinese fine paper market. In April 2011, just 3 months from start-up, PM 8 was already producing art paper that met the market's quality standards and customer expectations.

TEXT Rosalind Laaksonen and Pauliina Purola

Huatai PM 8 - the design reflects the true effectiveness of the machine.

Expanding into new markets

The Huatai mill is already the largest base for newsprint production in the world. Huatai's own research showed that there was room in the market to expand into high-grade art paper production. When it came to investing in PM 8, they decided to leave the project in Metso's competent hands. Metso's repeated project successes and advanced technology were the key factors in their decision.

Full-scale delivery

To help Huatai achieve their goals, Metso supplied a complete paper machine from headbox to reel, with related air systems and coating color supply systems. The delivery also included an OptiReel Plus re-reeler, an off-machine coater with four OptiCoat Jet coating stations, two off-machine OptiLoad multinip calenders, two JR 1000 E winders, and a parent roll handling system including three automatic OptiCart parent roll carts. The comprehensive Metso automation system package comprised process, machine and quality controls, profilers, a web inspection system, condition and runnability monitoring, and analyzers.

The new 8.1-m-wide line will annually produce close to 500,000 tons of coated and uncoated fine papers in the basis weight range of 80 to 200 g/m^2. PM 8 has a design speed of 1,800 m/min and the coater's design speed is 2,000 m/min.

Proven technology and industry know-how

Expressing his delight with the mutual understanding and good cooperation between the Huatai mill and Metso, General Manager **Wei Li Jun** commented: "We chose Metso as the main supplier for the PM 8 project for several reasons. Firstly, as a leading corporation in the pulp and paper industry, Metso has its own advanced technology. For example, the PowerDry

General Manager **Wei Li Jun.**

Acting Deputy General Manager **Li Ting.**

Technical Development Deputy General Manager **Chai Jun Ming.**

and PowerDry Plus air dryer technology on the coating machine has been very helpful. Metso's achievements with other mills in the world were another decisive factor. We also found Metso to be more cost-competitive than other suppliers."

Importance of quality

The Huatai mill is very impressed with the capacity of the PM 8 line and the smoothness of the end product. The web is wider and the speed is faster than competitors' lines. The mill was delighted that the coating machine could be run at an operating speed of 1,700 meters per minute after just three months' operation.

But perhaps the most noticeable impact has been on quality. As Wei states: "Quality is one of the reasons our customers trust us. Our goal is to produce art paper with the best quality. With the help of Metso's technical support and advanced equipment, we are accomplishing that goal. It would normally take two years to produce the quality that Huatai achieved after just three months. With further product optimization in the future, we will occupy a strong place in the market."

Sensodec 6S condition monitoring tool helps to analyze the paper machine runnability and mechanical condition in time.

Acting Deputy General Manager **Li Ting** adds: "Our quality is very close to the indexes for branded paper in the market. Metso's equipment, especially paper machines, is well known in this industry, as the evenness of the paper is extremely good. The evenness of raw paper is the key element in art paper production. Without high-quality raw paper, more cost and time are required to produce high-grade art paper."

Good technical solutions improve quality and save time and money

Energy efficiency is very important to the Huatai mill, and the ability to lower water, gas and electricity consumption were major goals when investing in PM 8. The energy savings experienced have been beyond Huatai's expectations. Water consumption is low, with almost 100% recycled water being used. And even when the PM 8 output increases, there will be no corresponding increase in waste water emission.

The savings made in gas consumption, in particular, were quickly recognized by Li Ting**:** "Following Metso's recommendations and thorough pilot machine trials, we chose the new PowerDry air drying technology over infrared dryer technology. We are happy to report that the advantages of this technology can be seen in energy savings, lower maintenance costs and improved safety compared to the industry standard. The major impact has been on gas consumption which, at 25 m^3, is much lower than our estimated 39-40 m^3."

Metso fabrics are used in the Huatai mill. Li appreciates Metso's know-how in the field of fabrics and is more than satisfied with the increased wet strength and decreased web broke. He feels the main benefit of using Metso fabrics is their smoothness, and recognizes that Metso's dewatering process and fabric design are better than those of competitors. Wei believes the quality of Metso's TMO fabrics, in particular, is superior to that of fabrics from other suppliers.

Having worked in other mills, Li is keen to express the advantages, in terms of reduced time and costs, of using Metso's winding technology. The winders run smoothly at speeds of 2,300 meters per minute and there are no bottlenecks at the end of the process.

As an extra challenge, the Huatai mill has a narrow, one-way transportation path. This was no obstacle for Metso when it came to providing a solution for transporting parent rolls. OptiCart is an automated parent roll cart solution that is safe, efficient and requires fewer operators.

Automation contributes to top-quality art paper

It was very important to the Huatai mill that the main equipment and automation solution could be provided by the same supplier. The combination of machinery, the control concept and the automation controls themselves clearly contribute to the mill's high-grade production.

Data collection is an important function in large paper mills as it helps operators follow paper production values. The mill finds that the historian trends of the Metso DNA automation system are easy to use, and the information can be quickly shared and stored.

Metso's Process and Quality Vision system, which integrates web quality inspection and web break analysis capabilities, is constantly in use at the mill. Its role is to find the root causes of breaks, and also to prevent them from occurring. The system clearly increases the mill's machine efficiency and decreases sheet breaks.

Keeping emissions below the limits

Li has always paid close attention to environmental protection, and considers it a 'lifetime project'. The Shandong government sets strict emissions standards. Metso was one of the few suppliers who could supply equipment to keep emissions below these strict standards. Only a few other paper producers in the Shandong area are able to meet these standards.

The Huatai mill previously used groundwater. Because of a private lake project, the mill achieves 100% usage of water from the Yellow River. Waste water is recycled after four stages of treatment and reused in PM 8's coating line. All the white water is transported to other workshops for recycling purposes. An incinerator project generates electricity and steam and reduces sludge emissions to zero. Wei happily states: "We have 'zero emissions' and a closed circle for water usage".

Gas consumption is lower than the competitors' levels thanks to the PowerDry air dryers, and Wei believes these levels will be even lower after optimization.

Good communication ensures project success

The Huatai mill appreciates the excellent cooperation with Metso, right from its expert and patient sales team to the personnel who stayed at the mill site after start-up. With staff from both companies becoming good friends, Wei explains: "We are very satisfied with PM 8, and especially with Metso's technical support. We reached all our goals. To ensure that deadlines were met, Metso sent in more people to install the coating machine so that it was ready to produce paper synchronously with the paper machine. This ensured the success of the whole project."

Chai Jun Ming, Project Manager of PM 8, added: "We were deeply impressed by Metso's sales team and their attitude. They won our trust, which was a crucial reason for Metso being awarded the project, and will ensure our long-term cooperation."

Solid support from Metso's service centers

Metso's service centers in Shanghai, Zibo and, in particular, Wuxi have provided valuable support to the mill. Metso has the capability to make the large rolls needed by the mill, grind the rolls, and provide any necessary wear and spare parts. Huatai considers the after-sales service very important.

Metso's OptiScreen RF screens provide clean and even starch and coat application.

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All-round project success

Metso's technological knowledge and industry expertise enabled them to deliver solutions and services that have made a real difference to the Huatai mill's business.

Off-machine coater with four OptiCoat Jet coating stations and PowerDry and PowerDry Plus air dryers.

Metso's Project Manager **Seppo Kaukiainen** and Huatai's General Manager **Wei Li Jun** are happy with the excellent cooperation.

SCA Obbola in Sweden manufactures some 420,000 tons of kraft liner per year, with a large portion made from recycled fiber. The new 'Evaporation 4' plant raised capacity, lowered energy costs, produced cleaner condensates and resulted in a much better working environment.

"The world's quietest evaporation plant?"

TEXT Andreas Liedberg

SCA Obbola's new 'Evaporation 4' plant has raised capacity, lowered energy costs and produced cleaner condensates. It's probably also the world's quietest evaporation plant.

A few years ago the SCA Obbola mill in Sweden started planning for a new evaporation line. **Mats Persson,** Project Manager, was involved from the very beginning: "Our evaporation plant was getting old and we needed more capacity. We also believed a new line would bring other advantages, like easier maintenance and lower operating costs."

Good cooperation

There were other considerations, too, as **Thure Sandström,** Manager of Evaporation, Causticizing and Lime Kiln Areas, explains: "Our study visits to other mills gave us some good ideas. But we also knew that we wanted a silent plant, so we established a 'noise pool' that both we and the supplier contributed to."

Mats Persson, Project Manager at SCA (left): "We're quite ambitious. We don't like downtime and unnecessary maintenance, so we wanted to build a good plant. By involving many of our own people in the project, we got a good understanding of what we needed. I'm also happy with the Metso project team, and we got all the performance improvements we asked for. As the noise level in 'Evaporation 4' is below 80 dB, it's probably the quietest evaporation plant in the world. We have no need for hearing protection inside the plant. We can use mobile phones and speak to each other without raising our voices. Of course, all this makes it easy to work."

Other SCA team members (second from left, to right): **Berndt Gustavsson, Thure Sandström, Kurt-Lennart Olofsson, Christer Björk** and **Martin Wahlberg.**

Cooperation was smooth from the outset. Speaking for the supplier, **Andreas Gunnergren,** Metso's Project Manager, notes that "we had good support from a very committed and skilled customer. I cannot recall a single occasion when we felt that the work was slowed down by SCA. On the contrary, we got straight answers from people who knew what they wanted."

Although the project advanced largely as planned, the sub-supplier responsible for construction at the site was ultimately unable to keep its commitments, and had to be replaced. However, according to Mats Persson, "the new supplier had skilled people, so we were able to start on schedule."

Bottlenecks removed

Due to a postponement in rebuilding the fiberline, it was necessary to modify the evaporation plant. Says Persson: "Initially, we had big problems at high loads – partly because of the hiccups in the construction work, but also because the volumes of black liquor from the fiberline were much higher than the original design. Metso explained why, and helped us to remove the bottlenecks."

Water and energy saved

Thure Sandström is pleased with the technology: "We followed Metso's recommendations and chose a TUBEL concentrator, which works well at high dry solids and is easy to clean during operation. Another good feature of the plant is the internal condensate treatment, which makes it possible to substantially decrease the amount of foul condensate without any extra equipment. Moreover, the clean condensate is very clean, which saves water and energy."

Above contract capacity

Performance also met expectations: "The mill has been running at a high load, and the evaporation line has sometimes run at 10% above the contract capacity – resulting in a lot of extra production. As it is also very energy-efficient, we make savings on energy, too."

But Sandström has plans for further improvements: "Now we think we can achieve even higher energy efficiency – partly due to mEvap, Metso's supervisory control system, which tracks the operation and helps us to run the evaporators in an optimal way, and partly because Metso will review the data logs with us to enhance the system. We can probably decrease the steam consumption even more."

The right training

SCA Obbola also made sure the operators got the right training. Interviews formed the basis for three-day courses carried out with Metso's tools for interactive multimedia training. **Karin Andersson,** Process Engineer and Head Designer for 'Evaporation 4', was present: "By giving all operators a thorough theoretical understanding of how the plant works, they were better able to run it with good steam economy, low energy consumption and clean condensates. The operators were interested and committed, and it was fun to show them the new plant."

More questions were answered during specialization training after start-up. Thure Sandström continues: "The operators were very pleased. They got answers, and the multimedia tool worked well. You could tell that Metso took the training very seriously. It was really good!"

The right technology

There are several reasons why 'Evaporation 4' is so silent. An often-mentioned one is the vacuum pump. But according to **Jonas Stjernlöf,** Technical Manager at Busch Vacuum Technology in Sweden, although there are technical reasons like high-precision manufacturing and the direct drive, the main reason is 'soft': "We worked closely with Metso to get good performance and easy control. People have actually called me to find out what made it so good, and I think it depends on the knowledge of the people behind the technology."

Committed to good results

Thure Sandström believes that the good results come from good cooperation: "When all the parties involved work towards a common goal, the end result is often good. 'Evaporation 4' is stable and easy to operate. It's quiet inside the building and it's easy to work there. I want to highlight our good cooperation with Metso, because I think that it was the best part of this project. Metso has provided incredible support and they have been very committed to us.

Thure Sandström: "I want to direct a special thank you to the evaporator engineers; their explanations really helped us understand what we needed to do. It was sometimes tough work, but we have all endured. Our new evaporation plant is real proof that you can build an economically sound, high-performance plant that is also easy to work in. We have a very fine installation."

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ABC in energy saving

TEXT Mikael Wiklund

The continuous challenge for tissue makers is how to deal with mills' increasing needs for raw material, water and energy in the wake of growing tissue consumption – at a time when authorities around the world are tightening environmental legislation and consumers are demanding more environmentally-friendly products.

It is clear that low energy consumption and low emissions are more important than ever. But merely having a green image will not make tissue makers more competitive – actions are also required. Since tissue production has always been energy-intensive, it is high time for a change. It is time to evolve.

Quite often, when talking about energy saving, we focus on how to recycle energy from the tissue-making process. So let us now start from another angle, by considering how to reduce the demand for energy. The first and most important step ought to be to decrease consumption by utilizing the Best Available Technology (BAT). The second step would then be to make more energy-efficient processes and take advantage of integrated systems utilizing Best Mill Design and Best Operational Practices (BOP). Finally, for the last step, one should take care of energy losses – if there are any left.

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A Reduce demand

Best press dryness

The best way to reduce energy consumption in the tissue-making process is to improve dryness after the press. Increased post-press dryness means significantly less water to evaporate on the Yankee dryer, resulting in a smaller energy requirement. Let's look at an example. Assuming an instantaneous production of 200 tons per day with an increased post-press dryness of just two percentage points, say from 44 percent to 46 percent, the result will be 98 kg less water to evaporate – per ton. This in turn will mean a reduction in energy consumption of 166 kWh per ton. It follows that the annual energy saving will exceed EUR 350,000 based on Central European energy prices. But, using our best available technology, a post-press dryness of 48 percent is achievable. In fact, today, we are approaching the 50 percent level. In our example, a sheet consisting of 50 percent water and 50 percent fiber would result in 272 kg less water to evaporate per ton, and an annual saving of EUR 767,000.

Reducing the demand for energy essentially requires a holistic view of the tissue-making process, taking into consideration all possible actions and technologies from stock preparation to the reel. If we move on from the above example, there is still a lot that can be done to decrease energy consumption. By reducing the flow through the headbox, the energy consumption of the approach system can be reduced without sacrificing quality. The shower water set-up, using only clarified white water, reduces the mill's fresh water consumption, which indirectly contributes to a reduced demand for drying energy. Yankee head insulation prevents heat losses, and thus reduces the steam consumption of the Yankee dryer. A direct drive instead of a gearbox eliminates the need for cooling water and oil. When gearbox losses are eliminated, power consumption is reduced. A new type of refiner gives further savings. These are only some examples of what can be done.

B Increase efficiency

Best mill design

Environmentally-efficient and cost-effective mill design always contains integrated process solutions that optimize the interaction between pulp and paper systems – as our advanced simulation model verifies. How process equipment units are arranged relative to each other, and their dimensioning relative to the products produced, has a major impact on energy consumption. Oversized equipment lowers energy efficiency, affects runnability and raises production costs. Much more power is required for the worst mill design, than for the best mill design. Moreover, poor mill design and over-dimensioned equipment can increase the power consumed by stock and water pumps.

From passive to active control

To meet demands for lower environmental load and production cost, an integrated process solution for the complete tissue line is essential. Even with the best available technology and best mill design, the "body" can't move without its "brain". An intelligent control system facilitates interaction between operators and the process. It not only automatically controls the process and maintains center-line parameters, but also provides valuable feedback on average and momentary energy and water consumption, online help dialogs and remote diagnostic possibilities for online support from experts.

Training

Monitoring is one tool for ensuring high-quality production. However, operators also need to interpret feedback from the systems, and to take the actions needed to ensure energy-efficiency and full production capacity. The connection between machine efficiency and energy consumption is obvious and best operational practices are thus essential. Training helps operators to behave in ways that reduce energy and water consumption and the environmental load.

C Take care of energy losses

Even with the best available technologies and best operational practices, it is almost impossible to avoid heat waste. The basic question is: can heat be recovered and what can it be used for? Heat recovery systems recover even "low" temperature excess energy from the hood. Air-to-water recovery systems that mainly heat machine halls and offices are most useful where the heating needs are great. The challenge is to develop technologies that not only catch the losses, but can also transform this energy into more valuable forms. In the near future we will see methods of recovering energy losses in a totally new way. For example, one of our new technologies will enable kinetic energy to be recovered from tissue-making and converted into electricity for re-investment in the process – a big step towards an eco-friendly mill.

A holistic approach

Tissue producers and machine suppliers are equally committed to and responsible for the long-term sustainability of the tissue industry. However, long-term plans are not enough; action is required now! To succeed, we must combine the Best Available Technology with the Best Mill Design and use the Best Operational Practices. We must start in the right direction and get the essentials done first. If we can reduce energy demand while increasing operational efficiency, we will have fewer losses at the end. Reducing energy usage, while still being able to produce the same product at the same quality is increasingly vital. Therefore, forward-looking tissue producers are willing to invest in energy-efficient equipment. Combining good technology with common sense benefits the industry, the consumers and the environment. In teaming up with Metso, tissue producers can call on the help of a full-scope supplier with total control over the equipment, the process and mill design. It's also an opportunity for Metso to get the very best out of your mill. Let's do it together! It's time to evolve!

Unique cooperation agreement with the Hallsta mill

TEXT Annica Börstell

A unique roll service agreement was signed at Holmen Paper's Hallsta mill in Sweden on June 22, 2011. "We have exceptionally high expectations for this agreement – and I'm not just talking about the quality of roll grinding and improved maintenance. We also hope it will have positive effects on productivity," says **Daniel Peltonen,** Technical Manager at Holmen Paper Hallsta. "It will be extremely interesting to follow the development of this concept. It's incredibly important that we all pull in the same direction and really cooperate with one another, as we want the end result to be a proper win-win situation. Like any other mill, we're looking for ways to gain control over and reduce maintenance costs, with one of our main objectives being to reduce the overall costs of roll servicing. Through this agreement, we expect to be able to increase the availability of the paper machines by minimizing unscheduled roll-related shutdowns. The roll service agreement is also designed to give us access to expert resources and the latest developments in paper machine maintenance. And as we have been forced to reduce staffing levels at the mill, the remaining workforce needs to be organized as efficiently as possible. This cooperation agreement is one way of meeting staff requirements."

"Through this agreement, we expect to be able to increase the availability of the paper machines by minimizing unscheduled roll-related shutdowns," says **Daniel Peltonen,** Technical Manager at Holmen Paper Hallsta.

Metso will take over roll grinding

"So far, we've taken care of all roll grinding at our own roll workshop, but as things stand today the machinery needs to be modernized," continues Daniel Peltonen. "To run a roll workshop successfully, it must be cost-efficient and have a sufficient volume of work. So we were faced with having to decide whether to upgrade the grinding machines to the latest standard and invest in new equipment, or whether to find other solutions. We calculated that the best course of action from a financial perspective would actually be to send the rolls to Metso's roll service workshop in Borlänge, where they have the latest technology to perform 4-point measurements and 3D grinding. For us, the most important consideration when improving roll servicing is to improve the quality of the grinding work."

Metso personnel on site

"We will have three men based at the Hallsta mill," explains **Mikael Nyman,** who manages Metso's Service Centers in Scandinavia. "It opens up fantastic opportunities for us to work more closely with the mill, enabling us to quickly identify any problems they might be having. Our maintenance engineer will serve as an important link between Metso and Hallsta, providing support for the mill's own maintenance personnel. Metso's workforce will also include two maintenance technicians, whose main duties will be to take care of on-site mechanical roll maintenance.

"This approach is the best solution in terms of optimizing costs and avoiding unnecessary roll transportation. However, larger service jobs and basic maintenance will be carried out at the Karlstad roll workshop, where all necessary resources are available."

What is it that makes this agreement so special?

"The concept of suppliers to the paper industry stationing their own personnel at mills has been around for a while. For example, Metso has personnel at paper mills in several sites around the world. But in Sweden this way of working is less common," says Mikael Nyman. "However, it does seem as though mills are increasingly warming to this idea, as the benefits of such cooperation become clear.

"There will be very close cooperation with the mill as a whole, and with Hallsta's operation and maintenance personnel in particular," sums up Mikael Nyman. "In order for us to play our part, we will need a clear understanding of Hallsta's needs and wishes, and it feels really exciting to take on this role and see how we can together develop our teamwork further. We hope and believe that it will prove rewarding for all parties involved."

The roll service agreement came into force on September 1, 2011, and will run for three years.

PHOTO COURTESY OF HOLMEN PAPER

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Holmen Paper's Hallsta mill is located in Hallstavik, just north of Stockholm in Sweden.

Metso around the world

Recycling

Major scrap metal shredding technology order from Russia's Vyksa Steel Works

Metso will deliver a shredder plant to Russia's Vyksa Steel Works, part of OMK, the United Metallurgical Company. The order is the largest ever received from Russia for Metso's metal shredding technology. Delivery of the ZZ 300x300 shredder plant will be completed in the second quarter of 2012.

The 7,500-kilowatt (10,000 hp) shredder plant will process ferrous scrap from all kinds of miscellaneous scrap and car bodies. Metso's technology will enable the Vyksa Steel Works to produce high-quality material for manufacturing its steel products. "When we chose the supplier, we naturally took the world-leading position of Metso into consideration. In its 90-year history of making recycling machinery Metso has implemented dozens of similar projects in the world," says **Oleg Fedotov,** the head of the project for OMK STEEL Works.

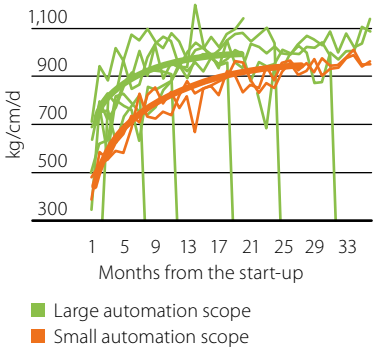
Automation

Metso's new control applications improve pulp and paper mill operations

Metso DNA is again leading the way by being the first in the world to introduce new control applications, such as winder controls and power plant turbine controls that enhance productivity and profitability. Another new application is machine condition and runnability monitoring, which Metso has been the first to embed within process controls. Metso has also pioneered usability in process control work.

Metso DNA is now offering pulp and paper makers a single system for all controls, from the fiber line to baling information, and from the headbox to the winder. This will provide pulp and paper makers with measurements, analyzers and a complete selection of state-of-the-art advanced process controls. One system will enable pulp and paper mills to integrate all their operations into one mill-wide or even corporate-wide entity, enabling easy access to information for comparing and combining process data. Operators will need to know only one system. Metso DNA customers will also benefit from having a single source for global system support, updates and spare parts.

Newsprint production



The chart shows the correlation between paper machine start-ups and the scope of Metso's automation system deliveries. The largest scope results in clearly the fastest start-up of new paper machines.

Power

Green energy technology for Elektrociepłownia Białystok in Poland

Metso will convert a coal-fired boiler into a biomass-fired Bubbling Fluidized Bed boiler for Elektrociepłownia Białystok S.A's combined heat and power plant (CHP) in Białystok, Poland. The new boiler system will cut the power plant's CO_2 emissions significantly, by partly replacing the coal fuel supply with biomass fuel.

"Poland is one of the largest countries in Europe to have such a high dependence on coal-derived energy to meet national electricity needs. We thus have plenty of scope to reduce future CO_2 emissions and produce more green electricity, and, with Metso technology, we are certain to accomplish our goal," says **Andrzej Schroeder,** President of Elektrociepłownia Białystok S.A.

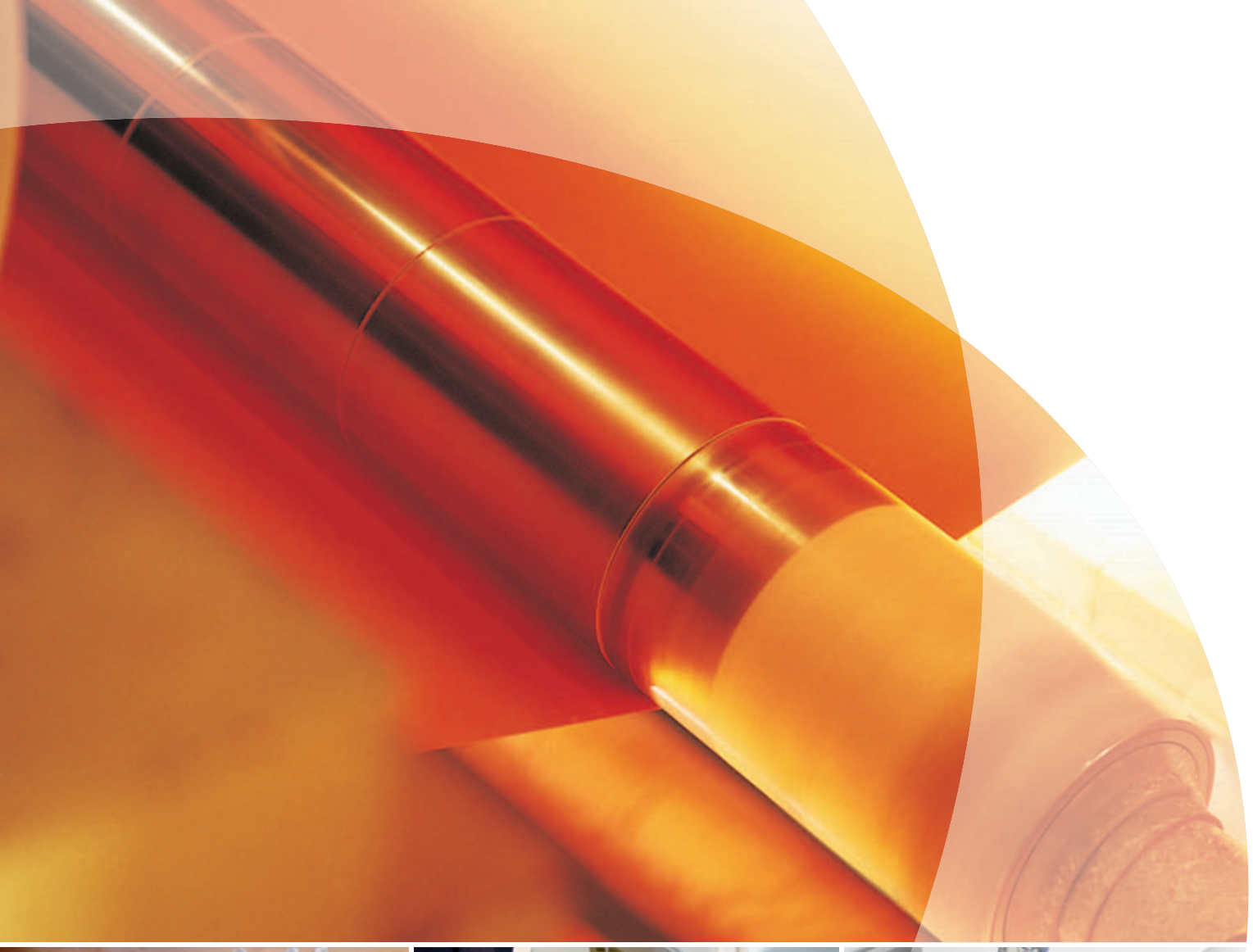
Metso has received seven biomass boiler conversion orders from Poland since 2000. But, even so, the renewable energy share in Poland is still only 7.5% (2010), and has a long way to go to reach the EU's target of 20% by 2020. Approximately 80% of the current energy boilers, turbines and generators installed in Polish power plants are over 20 years old, so modernization will be necessary to meet the strict EU environmental requirements.

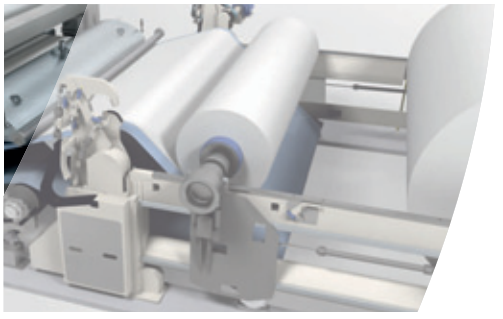
Construction

The Sochi Winter Olympics will be built on top-quality aggregates

Only washed, highest-quality aggregates are approved for the demanding building contracts going on around Sochi, the city hosting the 2014 Winter Olympic Games in Russia. With the help of Metso's mobile crushing and screening fleet and a stationary washing plant, the Maykop Nerud company is processing ancient river gravel into the very best quality aggregates for the Olympics projects.

Until now, over one million tons of aggregates have been shipped from Maykop Nerud's quarry near Krasnodar to Sochi. Because of the high Caucasus mountains, a rail network is the only feasible logistical connection. One daily train normally carries 3,000-6,000 tons of aggregates to the Olympic city.





Best in Tissue

Metso exists to advance tissue making for the long-term success of its customers. Our target is to be the best in developing unique innovations and providing solutions that meet, or even exceed, customers' expectations.

As a result of this work, Metso's hallmark is the cutting-edge **Advantage** technology for producing specific grades of high-quality tissue. Mutual success is driven by high product quality, process knowledge and technology, as well as the best possible services. This is why forming a partnership with the total solutions provider Metso is so rewarding.

Join us to become Best in Tissue!

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