METSO'S CUSTOMER MAGAZINE FOR THE PULP AND PAPER INDUSTRY No. 1/2011

results pulp & paper

Harri Siitonen, (left) Mill Service Manager, Veli-Pekka Kyllönen, Production Manager from M-real Simpele and Marko Nykänen from Metso.

Moving from traditional maintenance to predictive maintenance means maximized profit over the life-cycle of the assets. Read more on page 38.

Dear reader,

It's difficult to predict how the general economic situation will develop. But one thing is certain: the pulp and paper industry will continue to face pressures for cost efficiency and sustainability in the future.

Yes, we all understand that challenges should be seen as opportunities – and that those who succeed in overcoming challenges will gain at least a temporary, or in many cases even a permanent, competitive advantage. But all this is often easier said than done.

Cost pressures have inevitably led to a situation where individual players have fairly limited resources of their own to develop their end products, raise their production efficiency and focus on sustainability. The key to success will lie in close cooperation and in demolishing traditional customer-supplier patterns. We're all in the same boat and should steer it in the same direction.

Cooperation can be a powerful asset and can lead to excellent results. There are plenty of cases where combining the knowledge of a pulp or paper mill's staff with that of Metso's experts has created innovative solutions and improved the mill's performance and financial return. This issue of Results pulp&paper magazine will highlight some examples of successful joint efforts.

Despite the many challenges, there is also great potential in our industry. After all, we produce recyclable end products out of renewable raw materials with sustainable processes.

I want to challenge all of us to work together and look at cooperation with fresh eyes. Let's make this great industry even better!

Jari Koikkalainen
Senior Vice President,
Sales and Marketing

in this issue

PUBLISHED BY METSO PAPER, INC.
PO Box 587, FI-40101
Jyväskylä, Finland
Tel. +358 20 482 150
Telefax +358 20 482 151

ADDRESS CHANGES
www.metso.com/pulpandpaper/results

EDITOR-IN-CHIEF
Riitta-Maija Peltovuori

MANAGING EDITOR
Riitta Räisänen

ASSOCIATE EDITORS
Heli Anttila, Annica Börstell, Björn Engström, Ulf Eriksson, Aija Kalander, Henrik Karlstedt, Taru Katajainen, Marianne Kasjan, Leena Marttinen, Taisa Noetzold, Anne Paloheimo-Seppänen, Riitta Pöntynen, Kati Railevirta, Maiju Salenius, Sanna Siren, Eric Tetreault, Gunnar Vesterlund

ENGLISH LANGUAGE EDITOR
Bellcrest Translations Ltd.
Biztext Business Translations

LAY-OUT AND ART WORK
Non-Stop Studiot Oy

COVER PHOTO:
Tomi Aho, Studio Tomi Aho

PRINTING
Libris Oy

Printed on MultiArt Silk 115/250 g/m^2
Supplement MultiArt Matt 150 g/m^2

Printed on March 15, 2011

Addresses
Metso Paper, Inc. customer data

ISSN 1798-0933

metso

www.metso.com/pulpandpaper

Zibo Workshop Assembly Operator, **Tian Chongju.**

'Metso has a network of close to 50 service centers to serve pulp and paper customers. The latest addition to the network, the Zibo service center in Shandong Province, China, was inaugurated in November, 2010. Read more on page 16.

Reporting results

Featured articles

News in brief

Reporting inaugurations

Wang Dingqi, Executive Vice Mayor of Zibo, (right) and **Jorma Eloranta,** President and Chief Executive Officer of Metso, shaking hands after painting the pupils into the eyes of a lion. This symbolizes that the Zibo service center is ready to start serving its customers.

Metso inaugurates its third pulp and paper industry service center in China

Metso inaugurated its third service center for the pulp and paper industry in China on November 11, 2010. The new center is located in Zibo, Shandong Province, and employs 40 service professionals. It offers advanced machinery maintenance and process development services for the pulp and paper industry in northern China.

The Zibo Service Center is a fully equipped roll service workshop offering rolls, roll covers and mechanical roll maintenance for all makes and sizes of pulp and paper machines. In addition, the center offers spare parts and mill site services, and has the facilities to manufacture ceramic roll covers.

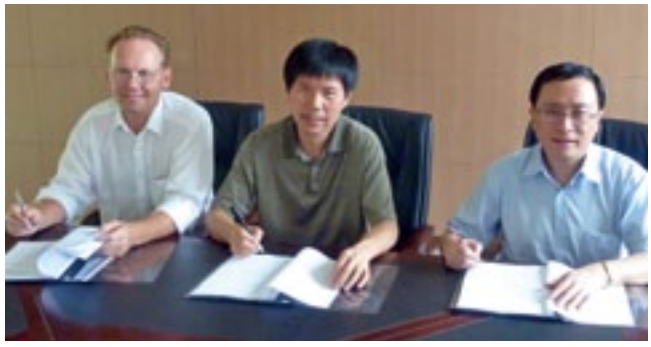
Metso has steadily increased its local presence in China. The establishment of the Zibo Service Center is a continuation of the commitment to serve the Chinese pulp and paper industry locally. Metso's first service center was opened in Wuxi, Jiangsu Province, in 2001. The roll service capacity of the Wuxi workshop was doubled in 2007, when an extension was opened. By September 2010, 3,000 customer rolls had been serviced in Wuxi. In January 2009, a second service center was inaugurated in Guangzhou, Guangdong Province, to serve the pulp and paper industry in southern China.

The Chinese pulp and paper industry has made substantial investments in new machinery and technology over the past ten years. Metso has been involved in many of these projects and is currently the industry's leading technology supplier.

In 2009, China was the Metso Group´s largest country in terms of orders received, with EUR 762 million. China was also the second largest country in terms of Metso Group´s net sales, with EUR 538 million. The Metso Group has about 2,600 employees in China.

daorong.xie@metso.com Tel. +86 510 8522 5939

Reporting latest orders



Signing the contract for the delivery of the new PM 5 and PM 6 to Liansheng Paper Industry are **Chen Jiayu,** Chairman of Liansheng Paper Industry (in the middle), **Antero Kunnari,** Senior Sales Manager, Paper business line, Metso (left), and **Fan Ze,** General Manager, Sales, Paper business line, Metso.

Two board machines for Liansheng Paper Industry

Metso is to supply Liansheng Paper Industry (Longhai) Co. Ltd with two board machines for its mill in Longhai City, Fujian Province, on the southeast coast of China. The start-up of both machines is scheduled for the first quarter of 2012.

Metso's delivery will include two 7.25-meter-wide (wire) board machines with a design speed of 1,200 m/min. The combined annual capacity of the two machines will be about 800,000 tonnes. The new PM 5 will produce testliner in the basis weight range 100-140 g/m^2 and the new PM 6 will produce fluting in the basis weight range 65-100 g/m^2. Both machines will utilize new technology in machine building, design and operation.

hannu.t.pietila@metso.com Tel. +358 40 503 4085

Industrie Cartarie Tronchetti orders a tissue line

Metso is to supply the Italian Industrie Cartarie Tronchetti group with a complete tissue production line. The tissue line will be installed at Montargis in France and started up in the second quarter of 2011.

Metso's delivery will comprise a complete tissue production line with stock preparation equipment and an Advantage DCT 200 tissue machine. The delivery will also comprise an extensive Metso automation package.

With a width of 5.6 m and an operating speed of 1,900 m/min, the new production line will produce 60-70,000 tons of high-quality facial, toilet and towel grades per year. The raw material for the new line will be virgin pulp.

jan.erikson@metso.com Tel. +46 70 517 14 90

Xiamen Xinyang Paper orders a tissue line

Metso is to supply a complete tissue production line for Xiamen Xinyang Paper Co. Ltd., in Xiamen City, Fujian Province, China. The new tissue line will be started up in the fourth quarter of 2011.

Metso's delivery will comprise a complete production line with stock preparation equipment and an Advantage DCT 200 HS tissue machine. The delivery will also comprise an extensive Metso automation package.

With a width of 5.6 m and an operating speed of 1,900 m/min, the new production line will produce 60,000 tonnes of high-quality facial, toilet and towel grades per year. The raw material for the new line will be virgin pulp.

leif.forsberg@metso.com Tel. +46 705 17 13 10

Defibrator system for Gulin Timber

Metso will supply Gulin Timber in Yunnan Province, China, with an EVO 50 Defibrator system for MDF production. Start-up is scheduled for the end of 2011.

Metso's delivery will include a complete fiber preparation system with a capacity of 17 tonnes of bone dry fiber per hour, and automation equipment.

ake.sundbergh@metso.com Tel. +46 70 632 26 12

Upgrade of stock preparation systems for CMPC Celulosa

Metso is to supply an upgrade of the pulp drying line stock preparation systems in CMPC Celulosa S. A.'s Pacifico mill located in the city of Mininco, 600 kilometers south of Santiago in Chile. Start-up is scheduled for the second quarter of 2011.

Metso's delivery will include Delta screens, cleaners for reject handling and particle separation, engineering, erection and start-up supervision. The upgrade will improve pulp quality and cleanliness, and will reduce loss of fiber and electricity consumption at the mill.

jukka.sampi@metso.com Tel. +358 400 590 968

Fiber line for Yun Nan Yun-Jing Forestry and Pulp Mill

Metso is to provide a new 90,000-tonnes-per-year fiber line for the Yun Nan Yun-Jing Forestry and Pulp Mill Co. Ltd.'s Yun Nan Yun-Jing mill in Yunnan Province in China. Start-up is scheduled for the first quarter of 2012.

Metso's delivery will include a SuperBatch cooking plant and fiber line equipment for screening, brown stock washing, oxygen delignification, post-oxygen washing and bleaching, as well as basic engineering, supervision and spare parts. The brown stock washing in the line will be performed on TwinRoll wash presses and the washing after each bleaching stage on vacuum filters.

hakan.ohlen@metso.com Tel. +46 70 653 38 03

Fujian HengLi Paper orders a tissue line

Metso is to supply a complete tissue production line for Fujian HengLi Paper Co. Ltd. in Nanan City, Fujian Province, China. The line will be started up in the third quarter of 2011.

Metso's delivery will comprise a complete production line with stock preparation equipment and an Advantage DCT 200 HS tissue machine. The delivery will also comprise an extensive Metso automation package.

With a width of 5.6 m and an operating speed of 1,900 m/min, the new production line will produce 60,000 tonnes of high-quality facial, toilet and towel grades per year. The raw material for the new line will be virgin pulp.

The order follows the successful start-up of an Advantage DCT 100 tissue machine at the company's Nanan mill in July 2006.

leif.forsberg@metso.com Tel. +46 705 17 13 10

Dissolving pulp line for Fujian Qingshan Paper

Metso is to provide a new fiber line for dissolving pulp for Fujian Qingshan Paper Industry Co., Ltd. in Qingzhou City, Fujian Province, China. Start-up is scheduled for the first half of 2012.

Metso's delivery will include the design and supply of the main equipment for the fiber line, from cooking to bleaching. The batch cooking plant is to be designed according to the pre-hydrolysis process and TwinRoll wash presses will be used in all washing positions. The new fiber line will produce 350 tonnes of air dried softwood pulp per day.

peter.rummel@metso.com Tel. +46 70 653 3802

UPM's Tervasaari Mill to rebuild their PM 8

Metso is to supply UPM's Tervasaari Mill in Finland with a rebuild of their PM 8. The rebuild will increase the machine's capacity by almost 30,000 tonnes each year. The installation work will start in March 2011 and the new capacity will come on stream during the second quarter of 2012.

PM 8, which produces label base papers, was supplied by Valmet (currently Metso) in 1996 and Metso supplied a major rebuild in 2006.

jari.vahapesola@metso.com Tel. +358 40 558 6555

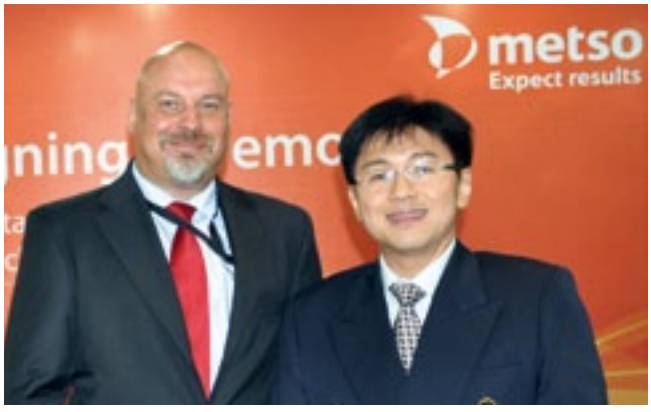
M-real to rebuild the board machines at their Simpele and Kemiart Liners mills

Metso will rebuild two board machines for M-real in Finland to increase capacity and improve quality: the BM 3 cartonboard machine at the Simpele mill and the BM 1 kraftliner machine at the Kemiart Liners mill in Kemi. The start-up of the rebuilt Simpele BM 3 machine is scheduled for the second quarter of 2011 and that of the rebuilt Kemiart Liners BM 1 machine for the third quarter of 2011.

Metso's delivery to the Simpele mill will include a rebuild of the forming section and press section, including a new SymBelt shoe press, and the dryer section. After the rebuild, the annual capacity of the Simpele mill will be approximately 300,000 tonnes, making BM 3 the biggest folding boxboard machine in Europe.

Metso's delivery to the Kemiart Liners mill will include a coating section rebuild. In addition, a coating drying rebuild will replace the old gas infrared dryers with energy-efficient high-drying-capacity PowerDry Plus and PowerDry Compact air dryers. The rebuild will further improve the coated white top liner quality produced by BM 1.

mikko.tani@metso.com Tel. +358 40 564 2007



Hendriko Wijaya, Owner and Factory Director of PT. Pelita Cengkareng Paper (right), and **Ari Harmaala,** President, Metso Paper (China), at the contract signing ceremony.

Metso to relocate a containerboard machine for Indonesian Pelita Cengkareng Paper

Metso is to relocate a containerboard machine for the Indonesian PT. Pelita Cengkareng Paper & Co. at their Subang mill in Indonesia. The start-up of the relocated machine is scheduled for the last quarter of 2011.

A 7-meter-wide Tampella-manufactured (currently Metso technology) kraftliner machine will be reconditioned and modified to manufacture testliner and corrugating medium grades.

Metso will also modernize the dryer section with a new ValHood dryer section hood and OptiCleaner Pro dryer fabric cleaners. A complete automation upgrade package with machine and process controls, quality measurements and drive controls for the entire production line is also to be included in the delivery.

mikko.osara@metso.com Tel. +358 40 841 8804

Cooking plant for Horizon Pulp & Paper

Metso is to provide a new batch cooking plant for Horizon Pulp & Paper Ltd´s Kehra mill in Estonia. Start-up is scheduled for the summer of 2011.

Metso´s scope of supply covers all the main equipment for a displacement batch cooking plant, as well as a metsoDNA process control system.

By replacing the old equipment with a new cooking plant, the Kehra mill will be able to increase capacity and considerably reduce the mill´s environmental impact.

lari.lammi@metso.com Tel. +358 40 571 6661

Metso to rebuild Hinton Pulp's pulp machine

Metso is to supply Hinton Pulp with a rebuild of their PM 2 market pulp machine in Hinton, Alberta, Canada. The project will be delivered and installed in late 2011.

Metso's delivery will include a new SymFormer MB top wire former, press section modifications, air borne dryer rebuild, dry end pulper rebuild, and a new DryWay high-capacity cutter layboy.

The rebuild will significantly increase the pulp machine's capacity. The rebuilt 160-inch (4,064 mm)-wide machine will produce 750 g/m^2 market pulp at speeds over 220 m/min.

peter.jones@metso.com Tel. +1 770 263 1597

Metso to rebuild a tissue machine at the Svenska Pappersbruket Klippan mill

Metso has been awarded a contract to deliver a major rebuild of the PM 9 tissue machine at Svenska Pappersbruket AB's Klippan mill in Klippan, Sweden. The start-up of the rebuilt machine is scheduled for the third quarter of 2011.

Metso's delivery will include a major rebuild of the existing suction breast roll forming section, which will be replaced with an Advantage DCT type crescent forming section, a rebuild of the existing approach and stock preparation system and a minor rebuild of the existing press section. Furthermore, a state-of-the-art OptiFlo II TIS headbox is to be included in the delivery. The project is being handled on an installed basis, including dismantling the existing equipment, complete installation and start-up, and training services.

jan.erikson@metso.com Tel. +46 70 5171490

Reporting start-ups

The start-up team of Changle Numat Paper and Metso after the start-up of PM 1.

Changle Numat Paper Company starts up their board machine

The Metso board machine delivered to the Changle Numat Paper Company Ltd. started up smoothly on November 7, 2010, in Weifang City, Shandong Province, China.

The new PM 1 line will produce up to 500,000 tonnes of uncoated and coated white top testliner (WTTL) grades per year in the basis weight ranges 94-200 g/m^2 for uncoated grades and 120-220 g/m^2 for coated grades.

The 7.25-meter-wide PM 1 features the latest board making and automation technology by Metso, from headbox to winder. The design speed of the board machine is 1,150 m/min.

Ci XiaoLei, General Manager of Changle Numat Paper Company Ltd., has been satisfied with the co-operation with Metso during the project: "All the challenges have been solved together and the commissioning and start-up have gone smoothly."

"With PM 1, high-quality coated white top liner can be produced with a minimal amount of virgin fiber. A key element is the press section of a completely new design, which is running very well," states **Kyösti Tokola,** Project Manager of Metso's Paper business line.

kyosti.tokola@metso.com Tel. +358 40 758 5124

HengAn starts up their tissue machine

A Metso-supplied Advantage DCT 200 tissue production line successfully came on stream on November 9, 2010, at Shandong HengAn Paper Co.Ltd in Weifang City, Shandong Province, China. The HengAn PM 10 started up smoothly on schedule and produced a good-quality saleable product from the very beginning.

Metso's delivery comprised a complete production line with stock preparation equipment and an Advantage DCT 200 tissue machine.

With a width of 5.6 m and an operating speed of 1,900 m/min, the new line will add another 60,000 tonnes of high-quality facial, toilet and towel grades to HengAn Group's total production each year, consolidating the company's position as China's leading tissue producer. The raw material for the new line is virgin pulp.

A similar Advantage DCT 200 tissue machine, the HengAn PM 8, started up less than a year ago at Hunan HengAn Living Paper Products Co. Ltd. in Changde City, Hunan Province. Together with the PM 4 and PM 6 tissue machines in the company's Anhai mill in Fujian Province that started up in 2006 and 2008 respectively, HengAn now operates four tissue machines supplied by Metso.

leif.forsberg@metso.com Tel. +46 705 17 13 10

Reporting records

Photo: courtesy of Propapier PM2 GmbH

90 g/m^2 corrugating medium at a world record speed of 1,620 m/min is a great achievement by the teams of Propapier and Metso.

Propapier PM 2 sets new containerboard machine speed record

On November 25, 2010, only eight months after its start-up in March, the new PM 2 paper machine at Propapier PM2 GmbH in Eisenhüttenstadt, Germany, set a new containerboard machine 24-hour world record of 1,620 m/min. It is thus the world's first containerboard machine to exceed the 1,600 m/min speed level and the first to exceed 1 mpm.

During the 24-hour world record run, the 10.85-meter-wide PM 2 produced 2,049 tonnes of corrugating medium (Wellenstoff) at an average basis weight of 90 g/m^2 and a machine efficiency of 93.8%.

Mill Manager **Götz Herold** and Production Manager **Peter Resvanis** of Propapier PM2 GmbH both praise the entire Metso and Propapier production and technical teams for their excellent

support, and look forward to making a new world record trial with 70 and 80 g/m^2 paper in January 2011. "We are proud, not only of the new world record, but also of the very high total efficiency of the machine during the trial," they state.

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

ari.hiltunen@metso.com Tel. +358 40 748 8432

Metso's fabrics have contributed to a new world speed record once again – Rhein Papier's PM 1

Metso's fabrics have contributed to a new world speed record for newsprint paper machines: 2,020 m/min, achieved with Rhein Papier's PM 1 in Germany on September 9, 2010. During the 24-hour record run, the press felt in both the pick-up and 1st press was Metso's Transmaster Open (TMO). Both positions are considered to be the most demanding fabric positions on the entire line. September also saw the machine's best ever average monthly speed of 1,937 m/min.

The machine performed excellently during the record run, with a high efficiency rate (97%) and extremely good runnability. The machine ran at a speed of 2,020 m/min for a period of 36 hours. **Juha Ebeling,** General Manager of Rhein Papier, commented: "TMO had a significant impact on setting this record! This would never have been possible without the TMO duo, which worked like a dream on the first press. At best, the dry content measured over 55% when the speed exceeded 2,000 m/min. The edges of the web moved evenly through the press and dryer sections, and we succeeded in keeping the draw between the press and dryer section small. These factors determine the machine's runnability, because if there are problems here, it will lead to breaks and a reduction in speed."

jukka.lehto@metso.com Tel. +358 400 831352

Ningbo APP's cartonboard machine reaches a new milestone in speed

The world's largest cartonboard production line, Ningbo Asia Pulp & Paper's (APP) PM 6 in Xiaogang, Ningbo City, Zhejiang Province, China, has reached a new milestone in its operation. On August 20, 2010, PM 6 produced 300 g/m^2 art board at the amazing speed of 1,020 m/min for 17 hours, without any breaks.

"Surpassing the 1,000 m/min limit is yet more proof of this line's capability, and the result of the combined efforts of both Ningbo APP and Metso to maintain the number one position," says **Chen Hsing Liang,** COO of APP's industrial papers business units.

The 410-meter-long Ningbo Xiaogang PM 6, which was started up in November 2004, today produces high-quality graphic art board and folding box board in the basis weight range 250 to 450 g/m^2. It can also produce white lined chipboard (WLC). The line has a trim width of 8.1 m and a design speed of 900 m/min. Supplied by Metso, the line consists of a complete eight-line stock preparation system for both virgin and recycled fiber, and a complete five-ply board machine, including a five-station on-line coater.

timo.saresvuo@metso.com Tel. +358 400 306 827

Reporting recent awards

Juha Tamper from Lappeenranta University of Technology

Recent winners of the award:
2009 Mirja Illikainen
2008 Tapio Salo
2007 Ville Saarimaa

Mechanical Pulping Award 2010 to Juha Tamper

The Metso-sponsored Mechanical Pulping Award was granted to **Juha Tamper** from Lappeenranta University of Technology. The award was granted to Tamper for his doctoral thesis "Water circulations for effective bleaching of high-brightness mechanical pulps" at the fall meeting of the Paper Engineers' Association held on November 26, 2010, in Finland.

In his doctoral thesis, Tamper aimed to clarify the possibilities for the efficient use of residual peroxide by means of water circulation rearrangements. The thesis shows that with optimum recirculation of residual peroxide, brightness can be improved and chemical costs can be decreased.

The Mechanical Pulping Award has been granted ever since 1989 to a member of the Paper Engineers' Association with the aim of promoting students' and researchers' interest in mechanical pulping, recycled fiber and stock preparation technologies, and their practical use in papermaking processes.

mechanical.fiber@metso.com

Tytti-Lotta Ojala
Future Creation Manager, Arla Ingman Oy

The writer wants to shape the future through strategic design thinking - by creating consumer-led innovations and forward-looking concepts. Packaging innovations and an ecological mindset are close to her heart. Earlier in her career, Ojala branded an ecological fashion label, led multiple successful packaging design projects, and conducted doctoral research at the Aalto University into the packaging innovation design processes of Finnish and US companies.

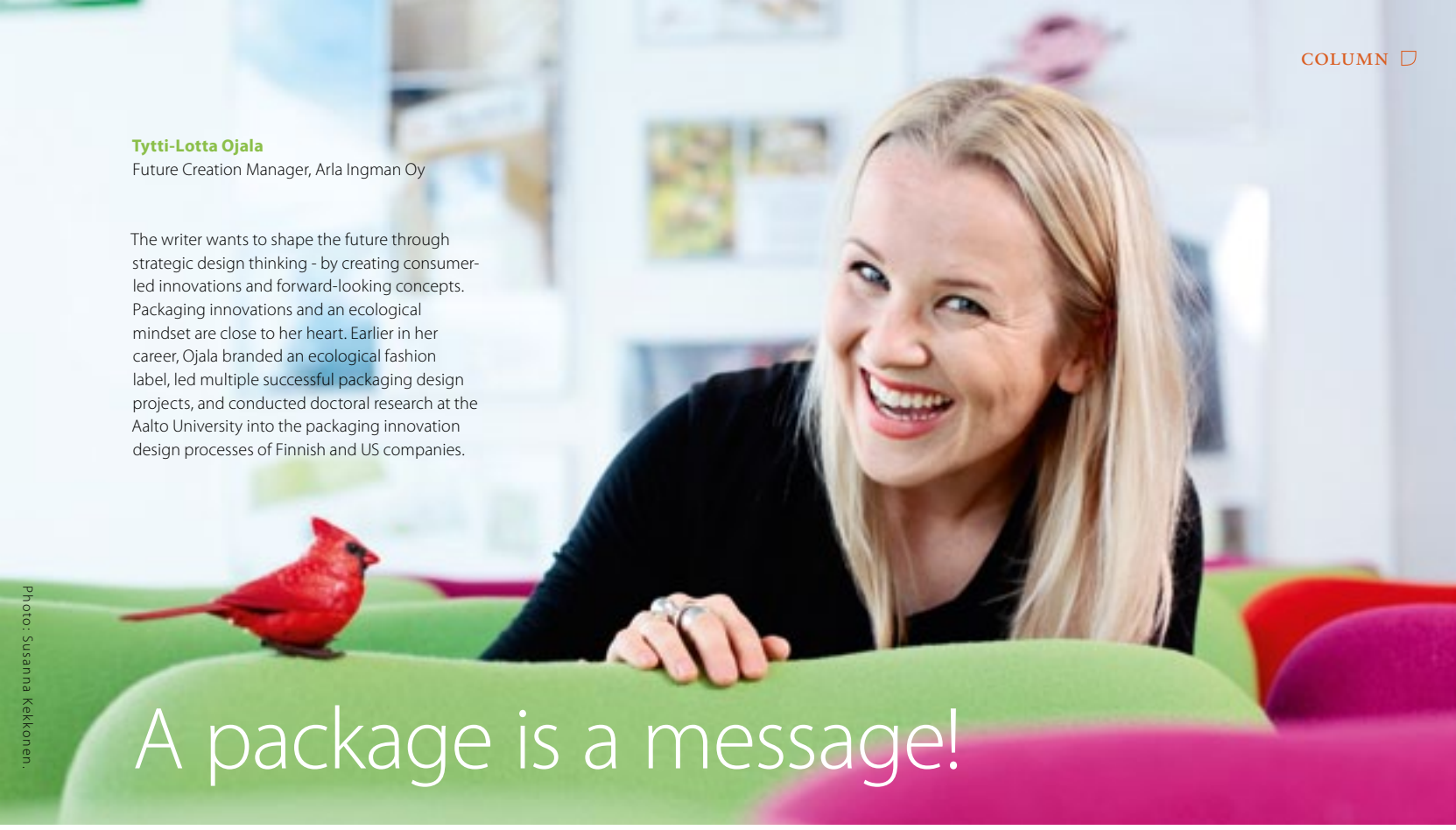


Photo: Susanna Kekkonen.

A package is a message!

Today's business language is full of fancy terms such as innovation, social media, guerilla marketing, design management and branding. But aren't they all, in fact, about creating personalized entities and communicating them in different ways?

Branding and design, at least, simply mean communication between signs and people. We create an entity through images, shapes and words. Separately and together, its parts communicate values and promises that the target person likes or does not like. For example, a package communicates a chosen position regarding quality, price and usability. And, of course, the brand tells its own story about whom it is meant for and what it stands for.

Have you considered how you choose the products that you buy? Do you walk directly to a familiar package? Do you compare product information? Or do you pick the most beautiful package on the shelf to cheer up your day?

Our decision is probably directed by a combination of rational and emotional conclusions arrived at from an aesthetic and verbal basis. The package is the focus of the purchasing process, at least with daily consumer goods. As we make most of our purchase decisions in only a few seconds, the package must quickly get our attention and stand out from its hundreds of competitors.

This presents a challenge for the package designer. It's quite significant what message a package conveys at the time it is bought – and even more significant how we interpret it after its purchase! The package has a long life cycle. It makes and fulfills/disappoints promises about the product and the brand from the moment of purchase until its disposal.

So we can conclude that a lot is required of the package. It's not enough that it protects and attracts. Consumers increasingly want it to be environmentally friendly, too. Overprotection is easily interpreted as over-packaging and unnecessary waste, while excessive gloss or color may be interpreted as not ecological. On the other hand, the same consumers may regard recycled board as dull. The balance between "too much" and "too little" is difficult, and creating "the right amount" can sometimes feel like a lottery.

Although conscientious consumers may talk about the ecological footprint of various materials, many people create an image of an environmentally-friendly package intuitively. Some materials just look more ecological than others. It is the task of the packaging expert to guide the consumer. For example, signs about recycling can create a feeling of "good consumption" and strengthen the pleasure experienced through the brand. The manufacturer of the packaging material is thus part of the product branding.

In contrast to consumer packages, transport packages are often designed to maximize logistical efficiency. However, they have a broad target group, too: including warehouse workers, transport personnel and shop employees – to name just a few. They see the wrappings around the products, padding, too little protection or over-packaging, all of which communicate the brand values. Ecological perceptions are formed throughout the value chain.

Cost efficiency is too often emphasized at the expense of the message in package design, regardless of whether it concerns transport or consumer packaging. For example, unless all the possibilities of the material, shape or usability are considered, there is a danger that not all the elements forming the message will be considered. It might be thought that only colors and symbols matter – but the fact is that all visual elements influence our perception of the entity and potentially differentiate the brand from others.

A hundred years ago, a logo on the package side was enough. Will a personalized form of package carry the message in the 2000s?

TEXT Sari Lehtonen-Lammi and Jouni Kemppainen **PHOTOS** Hannes Frigård, KuvaBitti comp.

MCC Paper Yinhe mill

Excels in quality and energy efficiency

In pursuit of its goal of becoming a leading supplier of top-grade uncoated fine paper in China, the MCC Yinhe Paper mill took the decisive step of investing in Metso's latest paper making technology and services. Results from the first year of operation indicate excellent quality, performance and energy efficiency.

Li Shujian, General Manager of MCC Yinhe Paper:
"As the leading technology and services supplier in the pulp and paper industries worldwide, Metso can also meet the requirements of traditional Chinese enterprises on their way towards becoming high technology mills."

The new 5.8m-wide production line has a design speed of 1,300 m/min and produces around 200,000 tons of uncoated fine paper annually. With a compact design concept from headbox to reel, plus related stock preparation and air systems, the paper machine showcases Metso's latest technological advances in cost efficient paper making. These include, for instance, a hybrid former and a closed hood. Also featured in the machine is an extensive automation package.

A leap into top-notch technology

Located in Linqing City in the mostly rural Shandong Province, the Yinhe mill was long a traditional local company lacking hi-tech machinery. After joining the MCC (Metallurgical Corporation of China) Paper Group, the mill decided to invest in a new production line to enable a capacity increase and quality upgrade, with the aim of becoming a leading producer of uncoated fine paper in China. Today, the Yinhe mill employs around 6,000 people and produces mainly 70/80 g/m^2 copy paper and 60-100 g/m^2 offset paper.

"The market demanded that we develop from a middle-grade producer to a top-level one. Accordingly, to complete our range, we needed to invest in new technology – that is, if we wanted to become one of the biggest fine paper producers in China," says **Li Shujian,** General Manager of MCC Yinhe Paper.

"Metso had good references as a full-scope supplier for the global pulp and paper industry, with a range extending across all grades. Our biggest challenge was our lack of project experience and technology expertise, but Metso's intensive support and well-established local services ensured smooth project execution all along the way."

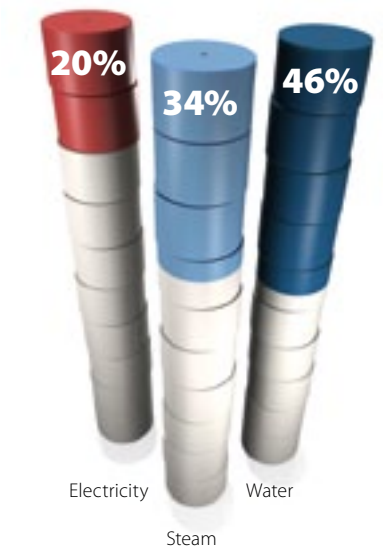
Quality comes first

"Our target market is the top-level offset paper market, so the quality of our products should always come first," says **Sun Chengbo,** Assistant General Manager and Manager of the High-Grade Fine Paper Mill. "Customer expectations must be fulfilled without exception.

"So far, the feedback from end users has been gratifying. By using Metso's latest technological advances we have been able to ensure stable quality, which is what they value most. The ValFomer shoe blade hybrid former, for instance, permits a minimum of two-sidedness compared with conventional gap and hybrid formers, and this translates into superior printing characteristics."

Top quality of the end product is controlled regularly at Yinhe mill.

Resource savings



Benefits from energy efficiency

The introduction of new technology has resulted in significant energy savings at the Yinhe mill. Compared to past figures, electricity consumption has decreased by 20% per ton of paper, while steam consumption has dropped by 34%. Water consumption has been reduced by 46% due to closed circulation and the ability to reuse effluent water for pulp washing. Moreover, the mill can now boast remarkably low chemicals' consumption and fiber loss. Even gas consumption has decreased to one third that of the former production lines. Not surprisingly, **Shan Liwei,** Vice Manager of the High-Grade Fine Paper Mill, expresses great satisfaction with the energy efficiency and environmental soundness of their new line.

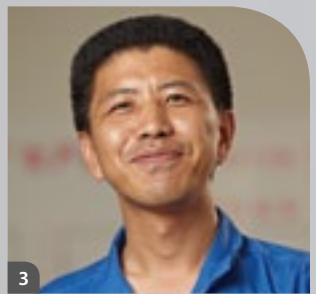
"There are many highlights in the new line, starting from stock preparation which consumes about 30-40% of all the electricity in the paper making process. Thanks to the Metso refining system with low energy consumption, we have achieved electricity consumption levels of 400 kWh/t for refining in copy paper production, which is well below the industry standard.

Sun Chengbo, Assistant General Manager and Manager of the High-Grade Fine Paper Mill

"Currently, our main product is 60-100 g/m^2 fine paper and the new machine handles grade changes well. The entire grade change process takes just 10 minutes for the selected products."

1

2



3

With Metso OptiPress we can achieve approximately 50-51% dryness in the press section. This is a significant increase in dryness compared to the earlier situation. Generally, increasing dryness by 1% in the press section saves 5% of steam in the dryer section. For us, increased dryness means remarkable savings in steam," Shan Liwei explains. "Also, the ValHood closed hood and related ventilation system, as well as Metso's efficient heat recovery system enable us to keep our steam consumption per ton at a low level."

"To summarize, it is not the individual technological advances alone, but the sound design of the entire production line that helps keep energy consumption at such a low level," Shan concludes.

More capacity with less cost

To further improve operating efficiency is one of the key issues at Yinhe. After reaching its design speed of 1,300 m/min, the production line's next goal is 1,350 m/min. The speed is progressing, step by step.

"This Metso line is our first advanced paper machine ever, and we have had worries about the start-up and operation, as well as about how our employees will manage with this technology. But the new line has achieved all our expected production goals. The design capacity of 791 tons per day has actually turned out to be 795 daily tons," says Sun Chengbo. "The highest speed we have reached up to now is 1,305 m/min and we are heading towards 1,350 m/min," he continues. His positive opinion is shared by Shan Liwei, who praises the Metso line for its good operational performance.

"Right from the start-up Metso's new line has performed well. If any operating problems arise, they are immediately solved by Metso's experts. To further optimize capacity and energy efficiency, Metso carried out energy consumption measurements, which increased our highest daily output up to 880 tons per day for 100 g/m^2 fine paper, while still decreasing water, electricity and steam consumption," says Shan.

1 **Shan Liwei,** Vice Manager of the High-Grade Fine Paper Mill: "As for energy efficiency, there is a world of difference between the new line and the old one, which was characterized by high costs and low capacity."

2 **Jin Like,** Automation Manager: "The benefits of optimal automation levels are countable, including easy operation and maintenance, fewer quality problems and flexible grade change procedures."

3 **Jiang Liansheng,** Vice Automation Manager.

Optimal level of automation for top-level grades

Metso's delivery to Yinhe also included a full automation package. According to the mill's Automation Manager, **Jin Like,** a high level of automation is a clear must when targeting top-level paper grades. He points out that the main advantage of Metso's automation solution is that it integrates all the process, quality and machine con-

Modular machine concept meets market needs in China

Like a bullet train, the new line with its target speed of 1,350 m/min creates quite a contrast to the old 500 m/min machines.

trols into one and the same metsoDNA platform, which enables seamless communication between all processes during operation.

Jiang Liansheng, Vice Automation Manager, emphasizes the benefits gained from the PaperIQ quality control system, the Sensodec condition monitoring system and the Kajaani analyzers. "Our two PaperIQ scanners measuring basis weight, moisture, ash content, color and caliper are worth their weight in gold in terms of improving our product quality. The Sensodec pulse, light and trigger sensors monitor vibrations in bearings, rolls and fabrics, enabling efficient maintenance and avoiding unplanned outages. When the Kajaani analyzers are used for on-line calculations, they minimize errors and save labor," says Jiang Liansheng.

Jussi Kairus
Project Manager
Tel. +358 40 551 9253
jussi.kairus@metso.com

"Even though the pace is still relatively slow, fine paper consumption keeps increasing in China. The market trend is favoring middle and high-level products, which means that production technologies should improve correspondingly," says **Li Shuijan,** commenting on the paper industry market outlook in China. "Today's paper industry in China faces demands for technologies that will help save costs, reduce energy consumption and increase operational efficiency and product quality, with less environmental damage."

Metso's new modular paper machine concepts provide an easy and convenient way to improve operational efficiency at paper mills in China. Ready-engineered packages offer low risks and a Minimized cost per ton from start up for mills striving for higher levels of technology. The modular concept permits optimized investment and operating costs with short investment payback times. "This is a sure way to future upgradability," says **Liu Jingwei,** Vice President, Marketing and Communications, from Metso Paper China.

To serve the needs of the Chinese market, Metso has established three modern and extensive service centers in China: Wuxi in Jiangsu province. Guangzhou in Guangdong and Zibo in Shandong province. The newest center in Zibo offers a wide range of roll maintenance services and roll covers.

An ideal investment brings big energy savings

Up to 35% saving in coating drying energy means a significant investment payback for Sappi's Stockstadt mill.

TEXT Mark Williamson

Extra drying capacity and up to **35%** saving in drying energy is a win-win investment for a paper company. It sounds easy to justify, but you have to consider the size of the investment as well. To be realistic, in today's economic climate, any decision to invest should strike a good balance between the savings, the total project costs and how much a company can afford to spend. With the right balance, a proposal becomes even more attractive and ideal for today's difficult market conditions where many companies have high expectations to save energy but limited cash available for major process rebuilds. And, if you can achieve the savings quickly, that's even better for the project's viability.

Sappi Fine Paper's Stockstadt mill in Germany has just made an ideal investment with the installation of Metso PowerFloat Plus high intensity air float nozzles in an existing air dryer after the first coating station of the mill's off-machine coater number 2 (OMC 2). The Beloit OMC 2, started up in 1992, produces wood free coated grades with grammage ranging between 90 to 200 g/m^2. An up to 35% energy saving was achieved, bettering Metso's guarantee, and, remarkably, this was soon after a short five-week delivery.

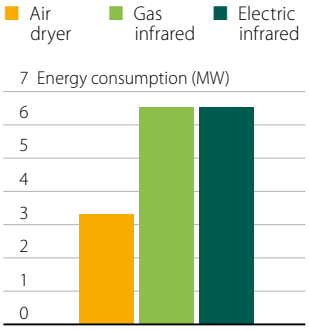
Sappi Fine Paper's decision was backed up by the fact that it has already achieved excellent results with previous installations of PowerFloat Plus air dryer nozzles at mills in Kirkniemi and Kangas in Finland. The coating dryers there have added extra drying capacity and enabled energy savings by eliminating the need for infrared drying.

Replacing low efficiency with high efficiency

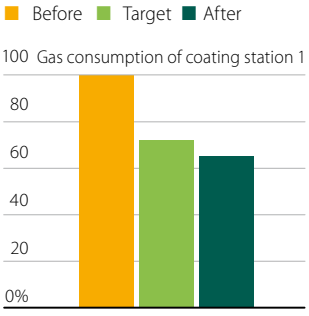
The project was proposed by Metso as a simple retrofit project, not a drying system reconstruction. By replacing the original supplier's air nozzles with the

OMC2 Superintendent **Rainer Griesemer** (left) and Mechanical Engineer **Ulla Peura** agree:

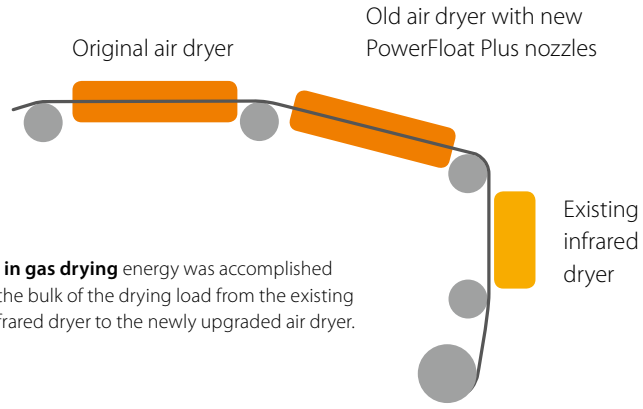
...“All of our expectations were met. We are very happy with this project and the savings we achieved.”



Energy consumption in the air dryer is considerably less than that of infrared dryers.



The original guarantee of 28% energy savings was bettered and the total savings are up to 35%.



The saving in gas drying energy was accomplished by shifting the bulk of the drying load from the existing gas-fired infrared dryer to the newly upgraded air dryer.

High heat transfer means high efficiency

Metso's PowerFloat Plus is the latest advancement in the science of air drying. The design concept has three major objectives: higher drying capacity than previous generations of air dryer nozzles, high heat transfer efficiency and gentle sheet handling. These goals are achieved simultaneously by unique air jet geometry. Some air jets are aligned to provide an air cushion to float the sheet through the dryer and some air jets provide the high heat transfer rate needed for efficient, high intensity drying. This is done by minimizing the air boundary layer on the paper sheet, therefore increasing the heat transfer rate. This type of active drying is not used in passive infrared drying which relies only on radiative heat transfer with no affect on the heat transfer through the boundary layer carried by the paper sheet.

An air dryer has an energy efficiency of 60 to 75% whereas typical infrared dryers have an efficiency of typically 30 to 35%. Drying rates are also much higher, up to 50% more than conventional air foil dryers. With PowerFloat Plus nozzles, the active heat transfer area is much larger than previous nozzle models thus adding to the drying capacity.

new PowerFloat Plus nozzles much higher drying rates can be achieved and the opportunity to save a considerable amount of drying energy is possible. Metso offers this flexible and practical solution for existing dryers supplied by a variety of vendors.

This saving is accomplished by shifting the bulk of the drying load from the existing gas-fired infrared dryer to the newly upgraded air dryer. Simply put, the energy in natural gas is used more effectively and efficiently in the air dryer than in the infrared dryer. To keep the project cost low, existing fans, gas burners and ductwork were kept in place.

Less than one year payback

Ulla Peura, Mechanical Engineer, explains that the project ROI, which was calculated as less than one year payback, was defined mostly by savings in natural gas consumption in the infrared dryer after the first coating station and replacing that drying capacity with more efficient air drying. Also, with the extra drying capacity in the upgraded first air dryer the second air dryer can be shut off while running lighter weight grades, under 135 g/m^2 total weight. Some important maintenance savings will also be made, since expensive infrared emitters will not need to be replaced from time to time. By comparison, the air dryer nozzles are essentially maintenance-free.

Peura explains another essential part of the project economics and logistics: "It was important for us not to have to rebuild the air supply, exhaust systems, or gas burners. As a result, it was a simple project. We didn't have much time either, only five weeks and the timing was critical due to a shutdown on PM 2". Metso responded with a five week delivery from order to start-up within a three day window in March 2010, so the results were achieved quickly.

With the upgraded air dryer providing extra drying capacity, 4 rows of infrared emitters could be switched off. The remaining two rows are used for cross-direction moisture profiling. Peura says the original guarantee of 28% energy savings was bettered and the total savings are up to 35%. "All of our expectations were met," she says. She also notes that there is no effect on coated sheet quality.

Richard Solin
Product Line Manager, Air Dryers
Tel. +358 40 520 4384
richard.solin@metso.com

At Your Service

– Using combined strengths for superior performance

Deeper service cooperation agreements to achieve common performance goals are a growing trend. The possibility to combine a mill's unique expertise in its specific operation with Metso's worldwide pulp and paper process knowledge offers papermakers new ways to meet operational and economic challenges.

TEXT Hugh O'Brian

Services normally play a significant support role for most pulp and paper mills. Metso has for many years been committed to the service business through a wide offering to mills. This ranges from traditional services, such as roll grinding and spare parts, to process analysis services and complete outsourcing of mill functions, such as maintenance.

In recent years, pulp and paper companies have faced the dual challenge of difficult market conditions and cuts in staffing levels. Thus many mills are losing expertise at the same time as they are being pushed to squeeze more tonnage and revenue out of their assets. This has led to increasing use of outside services as mills seek creative, cost-efficient ways to meet these challenges and improve performance.

"We want papermakers to know that Metso is dedicated to finding flexible, tailor-made service solutions that best suit our customers. By combining the knowledge, assets and manpower of the mill with Metso's wide expertise, we have been very successful in achieving improved mill performance and financial return," says **Jari Koikkalainen,** Senior Vice President of Sales and Marketing at Metso's Paper business line.

Services moving wider and deeper

Metso's service offering covers a very wide range, from individual spare parts to full-scale, long-term maintenance and cooperation agreements. Services such as these can be ordered one at a time when needed, or, as is becoming more common, they can be part of a long-term effort between the mill and the service provider. The trend, says Koikkalainen, is clear: services are playing a larger role in giving papermakers operational and financial advantages.

"As an example," he explains, "for consumables such as doctor blades or fabrics, we now have programs that help find the best combination of the right consumable at the lowest total cost of ownership (TCO). Working together with the customer, using their local process knowledge and our global equipment skills, we set common targets for real win-win cost savings. Metso is today doing this successfully with many mills, where we together identify the best performing parts and deliver them at the right time at the best cost."

In some mills, he says, Metso is now taking full responsibility for all roll services, for essentially the same cost as the mill previously paid to several service companies. The key difference is that, included in the price, Metso commits to giving increased PM performance. This has been very successful in numerous mills.

Services have also been expanded to broader process problem solving. An example might be a mill that is having trouble with sheet breaks on the paper machine. Perhaps the mill crew have tried to find the cause for several weeks or months and are frustrated by it. Metso can send in very specialized experts who can systematically work through it with the mill to identify the root cause of the problem. Based on analysis and open discussions with the mill's experts, the team can use each other's knowledge to identify what the problem is and, in most cases, eliminate it.

This type of cooperative approach can be applied anywhere in the pulp or paper mill. It can also be used for customers who are considering ways to increase production and want a thorough bottleneck analysis of what must be done to reach the target they are aiming at in the most cost-effective manner.

Maintenance outsourcing and beyond

To boost reliability and cut costs, some mills are working very closely with Metso in the area of maintenance. This cooperation can range from roll maintenance and maintenance consulting

A properly built plant is the base for sustainability, but it is not enough alone – it also needs to be operated at the optimum point.

to fully outsourced maintenance operations for the entire plant. Metso's maintenance outsourcing started in Finland and Sweden, and is now growing in popularity in other areas of the world. Maintenance cooperation is covered in more detail in other articles in this issue of Results magazine.

The cooperation is now going further, where maintenance and machine performance are simultaneously being optimized. For example, one of Metso's latest big paper machine orders in Western Europe includes a very comprehensive maintenance agreement. But, in addition, it also has a performance extension for several years covering production and energy consumption development.

"This is the direction we see the industry going in," says Koikkalainen. "Our close cooperation shouldn't stop simply because we have built and started the mill. We can offer our global know-how locally to support the mill's expertise to make it a continuously improving process to get the most out of the assets."

Production development cooperation: Existing mills also have a great improvement potential

Older assets can also benefit from this type of service agreement. The forms of long-term cooperation vary, depending on the mill's specific situation and targets. Examples of typical targets are higher production, better quality, lower costs or lower raw material use.

Mikko Karioja, Metso's Manager of Paper Machine Solutions, explains how it works: "To achieve the goals, we form a joint project team with the customer, using each other's expertise. We provide our best experts for that paper grade and the mill provides production, maintenance or technical people for the project team. We eliminate bottlenecks step-by-step to raise the production and performance of the assets. The cost of the program is quickly paid for in improved performance."

Generally, says Karioja, the targets are renewed annually, by checking and adjusting them upwards. This offers customers the opportunity to use Metso's global process knowledge for better performance. Each year the team pushes for new higher targets, like more tons, better quality, higher availability, fewer breaks and, ultimately, higher revenue from the assets.

The same approach of using each other's strengths can also be applied to special maintenance tasks. Karioja comments further: "As an example, with press section maintenance work, instead of the mill doing it alone or us doing it alone, we do it together. We bring the knowledge and procedures and the mill supplies part of the manpower. So they are learning by doing and raising their knowledge level to stay current with the most up-to-date, productive maintenance programs and methods. It's also cost-effective as we don't need to bring a whole crew to do the work. This is a great example of using each other's strengths to the best effect."

Trend towards a higher level of cooperation

Jari Koikkalainen feels that deeper service cooperation is a very timely and cost-efficient solution for today's papermakers. "Going forward," he says, "we are clearly seeing a move in the market towards closer cooperation. Papermakers are challenged by numerous issues: squeezed profit margins, commoditization of products, increasing environmental and sustainability demands, etc. At the same time, the in-house resources, such as the technical, engineering, operations and project staff that deal with these challenges, are more limited than ever. The responsibility for these functions has tended to shift, at least partially, to the suppliers."

"Metso is well positioned to handle this and is now actively doing so," Koikkalainen continues. "We have world-class expertise in a wide range of services for the pulp and paper industry in all stages of the plant's lifecycle. This includes everything from investment planning, building the investment, and operating and maintaining the plant with excellent efficiency, sustainability and economy.

We also have a network of close to 50 service centers to serve our customers. The aim is to get continuously improving performance and efficiency in the plant, both economically and environmentally." says **Jari Koikkalainen.**

Environment and sustainability also vital

Building and operating the plant in an environmentally sustainable way is a must today. Metso can help to design "best in class" plants by utilizing its broad competence, providing a good base for

minimizing overall environmental impacts and enhancing energy efficiency.

"A properly built plant is the base for sustainability, but it is not enough alone – it also needs to be operated at the optimum point. We can assist with this through the various forms of cooperation mentioned earlier. As energy, raw materials and, in many places, water cost money, optimization of the operating parameters improves both the economy and sustainability of the plant at the same time. Our simple aim," concludes Jari Koikkalainen, "is that our customers will outperform their peers in both economic and environmental terms."

Jari Koikkalainen
Senior Vice President, Sales and Marketing
Paper and Fiber Technology
Tel. +358 40 838 8950
jari.koikkalainen@metso.com

Metso services offering to the pulp and paper industry

Production support services
- Machine analysis
- Process studies
- Process development cooperation
- Remote expert services
- Customer training

Maintenance services
- Field services
- Maintenance planning and support
- Maintenance management and outsourcing
- Upgrades

Relocation services
- Complete production lines
- Single equipment
- Studies

Spare parts & exchange unit services
- Daily spares & consumables
- Inventory management
- Process valves reconditioning
- Screen baskets and refiner segments
- Refiner units exchange programs

Fabrics
- Forming fabrics
- Press felts
- Shoe press belts
- Dryer fabrics
- Filter fabrics
- Technical analysis and measurements

Roll services
- Mechanical roll services
- Replacement rolls
- Roll covers
- TwinRoll press roll reconditioning

Save costs
by optimizing water removal

Water removal at the forming or press section is significantly cheaper than at the dryer section. Since removing one liter of water from the sheet at the dryer section costs five times more than at the press section, it pays to optimize dewatering at an early stage.

TEXT Juhani Partanen and Marjaana Lehtinen

A one percentage point increase in dry solids content after the press section decreases the need for steam at the dryer section by up to five percent. Therefore, it offers a reasonable savings potential or extra capacity in drying-limited machines.

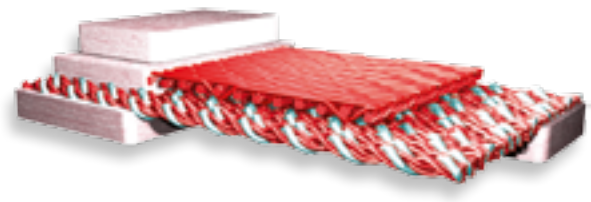
Traditionally, water removal from the web in the press section has been carried out with felts, which mainly remove water with the help of suction boxes (so-called Uhle box dewatering). More than one-fifth of the total energy consumption of the press section is used to produce vacuum; the remaining four-fifths are used by sectional drives. More effective dewatering methods increase the need for vacuum and energy exponentially, as well as shortening the lifetime of the felts, which get worn by friction due to rubbing against the suction box covers.

Roll-based water removal requires suitable press felts

In a modern press section, water is removed from the sheet with a nip load through felts onto roll surfaces, from where it is transfered to save-alls with the help of a foil doctor. Vacuum is mainly needed for suction rolls and suction press rolls. Some suction boxes can even be shut down, which significantly saves energy. Additional savings can be gained through extended felt lifetimes and reduced demand for electric drive power.

One prerequisite for optimal press roll dewatering is that the press felts are suitable for the position in question. Metso's Aquamaster felt, made of non-woven base material, and Metso's hybrid felt, made of a combination of non-woven and woven base material, generate higher hydraulic pressures and allow the water to flow

Typical distribution of electric energy consumption by a modern press section.



Both the non-woven **Aquamaster felt** and the hybrid **Ecomaster felt,** which is a combination of woven and non-woven base materials, are suitable for nip dewatering.

easily through the felt onto the roll surface. Correspondingly, there must be sufficient void volume for the water on the roll surface.

The structure of the new Metso felt types promotes efficient nip dewatering, where water flows directly through the felt without any machine-direction movement. The surface of the felt is smooth against the sheet, which ensures good end product quality and the absence of marking, even with delicate grades. The light, yet tight, structure of the base material shortens the breaking-in time of the felts and thus maximizes the line's production capacity.

Prerequisites for process optimization and maximal dry solids content

- The press felts need to be suitable for the process in question. For example, Metso's press felts allow water to pass through rapidly, and also prevent marking and rewetting.
- The press roll surfaces must be equipped with correctly-sized grooving to ensure enough effective void volume. For example, Metso's PressFox polyurethane cover can handle closely-spaced grooving without breaking.
- Water is removed from the roll surface with effective foil doctors, such as Metso's ValDual doctors.
- All savealls have been designed and placed correctly to prevent rewetting.
- The roll covers must be flexible enough to create a uniform nip load.
- The suction power of the suction boxes has been adjusted so that the felts are not overdried.

Correctly-sized grooving adds to void volume

Water removal in the nip calls for effective void volume on the roll surfaces. Traditional and blind drilling, which is still used, does not provide much void volume, regardless of its seemingly large volume. Correctly-sized cover grooving is a much more effective way to increase void volume.

The following table shows some void volumes created by different groove sizes. Blind drilling increases void volume only slightly.

Adequate groove density and width are important in making sure that the roll surface is able to receive all of the water removed at a nip, even when worn down. Too narrow grooves (e.g. 0.5 mm) easily close up under the nip load and can also get clogged by dirt. Metso recommends closely spaced wide grooves without the risk of shadow marking.

Correctly selected Metso press felts will keep even the most delicate paper grade free of marking under heavy nip loads. Metso's Transmaster Open and Seammaster Open felts feature a special polymer treatment that evens out the nip load and water removal at a micro level, thus preventing marking.

Appropriate totality allows maximal dry solids content

Trial runs and practical experience have shown that raising the web temperature significantly increases the sheet's dry solids content as the water viscosity decreases and nip water removal increases. A steambox adds dry solids content after the press by up to two percentage points. Replacing suction boxes with optimal water removal through the roll surfaces saves energy and makes mechanical water removal more efficient.

The easiest way to gain savings in energy consumption and wear parts costs through press optimization is to assign comprehensive responsibility for the press section to one supplier. Metso can deliver extensive know-how and a broad product range for efficient press section water removal.

Grooving					G+BD (grooved+blind drilled)	
Width mm	Land mm	Depth mm	Open area, %	Void volume liter/m^2	Void volume liter/m^2	
0.5	2	1.0	20.0	0.20	0.22	
0.5	2	2.0	20.0	0.40	0.44	
0.5	2	3.0	20.0	0.60	0.65	
0.6	2.3	1.0	20.7	0.21	0.22	
0.6	2.3	2.0	20.7	0.41	0.45	
0.6	2.3	2.5	20.7	0.52	0.56	
0.6	2.3	3.0	20.7	0.62	0.67	
0.6	2.5	1.0	19.4	0.19	0.21	
0.6	2.5	2.0	19.4	0.39	0.41	
0.6	2.5	2.5	19.4	0.48	0.51	
0.6	2.5	3.0	19.4	0.58	0.62	
0.6	**1.65**	**5.0**	**26.7**	**1.33**	**N/A**	**G-band**
0.8	2.5	1.0	24.2	0.24	0.26	
0.8	2.5	2.0	24.2	0.48	0.51	
0.8	**2.5**	**2.8**	**24.2**	**0.68**	**0.72**	**MP PU** *(Metso Paper polyurethane)
0.8	2.5	3.0	24.2	0.73	0.77	

Effective void volumes with different groove sizes. Blind drilling increases effective volume only slightly, making groove width and groove density much more important. G-band covers provide the largest void volume.

Juhani Partanen
Technology Manager
PBL Sales Europe
Tel. +358 40 511 8741
juhani.partanen@metso.com

Jukka Lehto
Vice President
Sales and Marketing, PMC
Fabrics business line
Tel. +358 400831352
jukka.lehto@metso.com

CalJaguar H

Exceptional durability is what makes Metso's CalJaguar H composite roll cover so special. Experiences have been very positive.

TEXT Rob Stapels

Calendering requires a lot from roll covers due to high loads, speeds and temperatures, as well as doctoring. Moreover, the vibration of heavy, high-speed rotating rolls threatens cover performance. Both the wear from doctoring and so-called cover barring resulting from vibration deteriorate the cover geometry and shorten the operating time of rolls.

This all presents a challenge, especially for an online calender, where every shutdown is scheduled and random calender soft roll changes are not welcome. The longer the grinding intervals, the higher operational efficiency and flexibility can be.

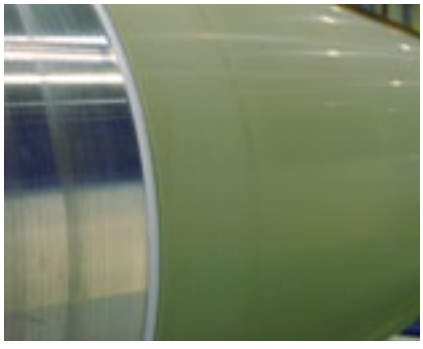
CalJaguar H endures high vibration levels

To tackle calendering challenges and extend running times when exposed to vibration, Metso introduced the CalJaguar H composite roll cover in 2010. It resists barring, the phenomenon in which axial lines are formed on the cover surface. The lines feature micro-scale height differences and affect roll runnability.

Barring problems are often seen in online calenders, but they also occur in offline calenders. They are most noticeable on soft-covered rolls that first come into contact with paper. The most critical cover positions are the first intermediate rolls and sometimes also the first load-deflection compensated rolls.

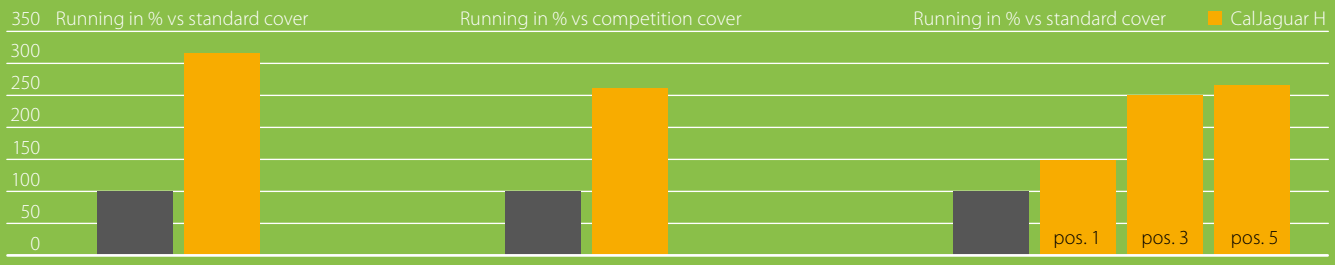
Barring resistance is achieved through the use of multiple technologies. The layered construction absorbs vibration and provides durability in operation. The cover surface resists deformation and wear, delaying barring line formation. Enhanced wear resistance results in longer operating times under difficult wear conditions, such as doctoring.

CalJaguar H has all the typical features of Metso calender covers, including durability under high load and speed, as well as toughness against impacts. It is especially suitable for modern calendering, for example, with online multi-nip calenders, such as Metso's OptiLoad and TwinLine.



CalJaguar H roll cover is especially suited for barring-troubled positions.

Up to 150% longer roll grinding intervals



Running times of CalJaguar H in comparison with standard calender covers in offline WFC

... in comparison with standard calender covers in offline SC-A

... in comparison with standard calender covers in online SC-A+

Up to 150% longer operation intervals

Positive feedback from mills using CalJaguar H has confirmed its high durability. For instance, the operating times of the 1st and 2nd intermediate roll covers at a WFC mill were significantly shorter than those of the rest of the covers in its off-line 10-roll multi-nip calender. Vibration caused by roll flexibility resulted in barred profiling of the cover ends. By replacing a standard cover with CalJaguar H, the operating time was tripled.

A second example comes from a high-speed offline multi-nip calender for SC-A paper. Its production was disturbed by the extremely short running times of the 2nd intermediate roll due to vibration. In this position, the cover is doctored with a steel blade. The mill installed a CalJaguar H cover, which reached more than 150% higher operating time than the competing covers already during its first run.

A third case involves an OptiConcept machine producing SC paper with an online TwinLine calender. The rolls of this double-stack multi-nip calender initially featured standard covers with short operating intervals. When the mill tried CalJaguar H, it ran almost 50% longer on a Sym roll than the original covers. On the intermediate rolls, the operation intervals improved even more: by over 150%.

With the longer operation time of CalJaguar H, the mill has found a cover that allows more flexibility in operation. Also, the longer lifetime gives more efficiency in operation due to fewer roll changes and less need for grinding. Today, CalJaguar H is the only Metso cover that the mill uses in vibration-sensitive positions.

Sensodec 6S monitors cover geometry

Mills have yet another way to ensure calender runnability. With Metso's Sensodec 6S runnability and condition monitoring system, operators are able to check the cover condition and thus get the most out of the cover's operational time. The system presents a way to measure roll cover performance in the stack, allowing follow-up of individual cover geometry changes through the measurement of roll vibration level.

Sensodec 6S enables the operators to pinpoint deteriorating roll performance, gain the optimum operation interval based on the measured vibration trend and follow the scheduled shutdown intervals.

Clean covers with ValEco blades

Doctoring is often needed, and hard steel blades are excellent in keeping cover surfaces clean. But they are harsh on the cover and cause it to wear down locally if blade loading is not controlled properly.

ValEco 4.1 is a carbon-fiber based composite blade that features high wear resistance and minimizes doctoring wear on covers. Thus, the cover keeps its shape, ensuring roll runnability.

Goals reached

With all these solutions, and especially with the CalJaguar H roll cover, the mills have reduced their runnability challenges when it comes to calendering. The new cover has lived up to expectations, offering longer grinding intervals, higher operational efficiency and flexibility in operation.

Juhani Partanen
Technology Manager
Paper business line, Sales Europe
Tel. +358 40 511 8741
juhani.partanen@metso.com

Bill Bork
Product Specialist Composite Rolls
Neenah Service Center
Tel. +1 920 475 2836
bill.bork@metso.com

FABRIC START-UP SUPPORT

Invaluable help during the hectic time

The old saying 'Well begun is half done' fits perfectly with the support given by Metso's fabric specialists during machine start-ups. With Tamfelt now part of Metso, the cooperation between the mill, the machine supplier and the fabric manufacturer is closer than ever – for the benefit of everyone.

TEXT Marjaana Lehtinen

The atmosphere before, during and right after a machine start-up is always hectic. All machine crew members have a thousand things to attend to. With Metso's Fabric Start-up Team by their side, they can count on professional support in making the fabrics and felts perform at their best and contribute to reaching the set start-up targets as soon as possible.

"It all starts with intensive dialog with the customer and the machine supplier's technology team about their expectations of the paper machine clothing (PMC) supplier at the start-up. We carefully go through the mutual targets, services needed and possible bottleneck areas," explains **Pascall Schuivens,** Product Sales Manager, Metso's PMC business unit. "Our start-up team pay attention to the details at all stages of the start-up. The topics that call for urgent action are immediately discussed with the crew, whereas the not-so-urgent ones are attended to after the machine has started up."

Comprehensive training for the machine crew is an essential part of the fabric start-up support, and covers Metso's PMC designs, manufacturing, installation, seaming, cleaning, other available services and troubleshooting.

Specialist services also offered

The size of the fabric start-up team varies according to the scope of the delivery; the more machine sections run with Metso's fabrics and felts, the more members are involved.

"The team not only helps the crew install the PMC products but also performs various measurements, such as the dry solids content in the sheet or the moisture or permeability of the press felts," adds **Sebastian Lohm,** Manager, Technical Service, Metso's PMC business unit.

One of the specialty services is the topographic study of the roll surfaces and dewatering elements that is carried out on the paper machine before start-up. Metso's laboratories in Tampere and Juankoski, Finland, play an important role in producing electron microscope images of surface castings that have been made on-site.

Another specialty is the roll speed service. "We check that the roll speeds are correct and in harmony with the indications given by the drive control system. We are also able to check possible roll speed pulsations. Correct roll speeds are very important in ensuring a smooth machine start-up. A reliable draw setting is key," Schuivens points out.

The one and only Start-up Book

Despite all the hustle and bustle, Metso's fabric start-up team members take time to document all PMC-related facts in the so-called Start-up Book. The book is a summary of the PMC products installed on the machine, together with their settings prior to and after the start-up. Metso is the only fabric supplier to compile such a book. The very first one dates back to 2002, when Metso started up Weyerhaeuser Kingsport's PM 1 in Tennessee, USA.

The book presents excellent training material for the crew. It also contains a lot of valuable information for the fabric production, R&D and product application. Based on the start-up experiences, it is possible to quickly fine-tune products.

Better capability and more eyes

"We're no longer a third party at start-ups. Being part of Metso gives us better capability to serve the mill with regard to schedules and technical know-how," concludes Lohm. "When starting up Metso machines, there are now more eyes to follow the process and ensure a successful start-up."

"We've had excellent experience with Metso's Fabric Start-up Support on PM 9 and PM 10. Generally speaking, when a fabric supplier is chosen for a start-up, we consider the price, the references, the technical proposal and the local support, as well as the extended support on-site," **Francisco Carilla,** Industrial Project Director, SAICA. Carilla gave a presentation on the role of the clothing supplier in a paper machine start-up at the Metso Clothing Days in November 2010 in Tampere, Finland.

Example of forming fabric installation.

Sebastian Lohm
Manager,
Technical Service
Paper machine clothing
Tel. +358 40 703 9144
sebastian.lohm@metso.com

Pascall Schuivens
Product Sales Manager
Paper machine clothing
Tel. +49 172 210 4536
pascall.schuivens@metso.com

Suzano Group

Millions of cloned eucalyptus seedlings planted every year

Cloning doubles eucalyptus growth rate
Brazil is the number one country in the world when it comes to the development and use of planted eucalyptus for pulp production. In the past forty years, cloning technology has increased the growth rate of eucalyptus from approximately 20 cubic meters per hectare per year to the present level of 45 cubic meters per hectare per year.

One of the 19 million eucalyptus seedlings at Suzano Mucuri's nursery ready to be planted.

Suzano Papel e Celulose S.A. in Brazil, the world's first producer of eucalyptus-derived pulp and currently its second-largest producer in the world, actively uses and develops cloning technology. The target is not only to increase wood yield per hectare but also to improve final product quality.

TEXT Alpo Tuomi

According to **Sergio Adriani Pereira** who is responsible for the pulp and paper operations at Mucuri, there are 2,525 people at the mill involved in the daily operations, of which 1,047 are Suzano's own employees.

Today, Suzano Group's total forest area covers 553,000 hectares, of which 252,000 hectares are made up of natural forests. The company has taken possible future expansion into consideration in its planting program. Altogether 122,800 seedlings are planted every day, and a total of 145 million eucalyptus seedlings were planted in 2010.

Pulp is produced at two locations: the Suzano mill in the state of São Paulo and the Mucuri mill in the southern part of the state of Bahia. The company now also owns the pulp and paper producer Conpacel in Limeira, state of São Paulo.

The world's second largest pulping line

The Mucuri mill comprises two pulping lines. Line 1, modernized by Kvaerner Pulping (today Metso) in 2004, has a production capacity of 680,000 tons per year. Line 2, started up in August 2007, is the second largest single pulp production line in the world with a nominal capacity of one million tons per year.

Metso supplied the complete recovery island, including the evaporation plant, the recovery boiler and the white liquor plant, as well as the pulp digesting, drying and baling systems for Line 2. The delivery scope also comprised over 900 process and on-off valves for the whole mill together with a number of analyzers and transmitters for process control.

High wood yield, high product quality

Pulp digesting at Mucuri features a continuous Compact Cooking G2 digester, designed for a daily capacity of 3,400 tons. The process is known to give high yield from wood and high product quality with lowest possible energy consumption. Approximately 3.6 cubic meters of solid wood is needed to produce one ton of pulp.

The black liquor evaporation system with six effects is dimensioned for evaporating 1,100 tons of water per hour, resulting in an 80% dry solid content of the liquor for burning.

The RECOX type recovery boiler is able to burn up to 4,700 tons of dry solids per day with a possibility to increase the capacity up to 5,500 tons dry solids per day. The white liquor plant is designed for producing 10,000 m^3 of white liquor per day, and the lime kiln has a diameter of five meters.

The largest single pulp drying line ever built

The pulp drying line at Mucuri is the largest single line ever built in the world. Based on Metso's DryWay concept, it features high specific capacity and low specific power consumption. The dryer with a trim width of 9,990 mm is designed for a nominal capacity of 3,340 air-dried tons per day.

Metso's delivery scope for pulp drying consisted of the systems for bleached stock screening, wet end, airborne dryer, high-speed cutter and three baling lines, as well as the quality control system.

The Mucuri mill is Suzano Group's largest integrated paper and pulp production unit.

The evaporation plant at the Mucuri mill has six effects.

Mucuri's pulp drying line is the largest single line ever built in the world and features Metso's DryWay air-borne dryer.

Suzano gives back

Brazil's huge investments in the pulp and paper sector also influence the lives of the people living in these areas. Suzano Group has built a comprehensive program for co-operating with local communities. For example, the company has built 480 new houses for its employees in Mucuri.

Also, the company has donated over ten million dollars to education, health and infrastructure. Among others, it covers the costs of a daycare center for approximately 120 children from low-income families in the area.

A daycare center in Mucuri is one example of how Suzano Group supports local communities.

Ambitious long-term plans

To meet the huge daily production demand, 100,000 trees need to be cut down every day and a truck load of eucalyptus arrives at the mill every four minutes. Burning black liquor and wood residuals makes the Mucuri mill 95% self-sufficient in energy.

The Suzano Group has ambitious long-term future plans to raise its total pulp and paper production from the present level of 2.8 million tons to 7.2 million tons per year. The plan covers new production plants in Maranhão and Piaui, as well as an expansion at the Mucuri mill.

Metso to strengthen operations in Brazil

Eucalyptus cloning technology and large reserves for future forest plantations strengthen Brazil's position as the most important fiber producing country. There are currently several plans to expand pulp production, a fact which creates new challenges also for the suppliers.

Consequently, Metso is strengthening its operations in Brazil to ensure the best possible service to local pulp, paper and power industries. One of the ongoing actions includes a new facility in Araucaria, near Curitiba.

RECORD SET AT M-REAL SIMPELE

Sizer roll cover lasted for 55 weeks

Months turned into a year and more before the SizeHawk ZL rubber cover was finally replaced on the sizer nip rolls of the BM 3 cartonboard machine at M-real's Simpele mill in Finland. It's no wonder the mill has been pleased with the cover's excellent wear resistance, uniform profile and surface roughness.

TEXT Tero Kovanen **PHOTOS** Tomi Aho, Studio Tomi Aho

"The roll replacement cycle was far too short, so we needed covers that would better withstand wear and deformation. The potential performance offered by Metso's SizeHawk ZL cover convinced us," says Mill Service Manager **Harri Siitonen.**

M-real Simpele has used a ValSizer film size press in its board production line since 2006, when BM 3 was extensively rebuilt. Up until the spring of 2009, the nip rolls had to be changed every three to five weeks because the covers wore so quickly.

"The roll replacement cycle was far too short, so we needed covers that would better withstand wear and deformation. The potential performance offered by Metso's SizeHawk ZL cover convinced us," says Mill Service Manager **Harri Siitonen.**

BM 3 produces very high-quality folding boxboard in the basis weight range from 205 to 340 g/m^2, mainly for food packaging. The maximum speed of the machine is 600 m/min, and its trim width is 4,040 mm. In September 2010, M-real announced that it planned to increase the machine's present annual production capacity by 80,000 tons to about 300,000 tons in the summer of 2011.

Avoiding more than ten roll pair changes

The first roll pair covered by SizeHawk ZL was installed in BM 3 in the spring of 2009 and was removed 55 weeks – that is more than a year – later. Even after that long record run, the covers were in good condition. For example, surface roughness was at the same level as it was when the rolls were installed. The mill praises both the sizer and the new cover.

"It saved us from 10-15 roll pair changes on the sizer during the year. Correspondingly, the same number of roll grindings were not needed," Siitonen explains.

Additionally, the rod bed development carried out on the sizer at the same time extended the rod bed's lifetime from four weeks to four months, and even longer. The successful cooperation between M-real Simpele and the experts at Metso made it possible to achieve the desired result.

The Simpele mill now runs four SizeHawk ZL covers. To date, Metso has delivered about 150 SizeHawk ZL covers to paper and board machines around the world.

SizeHawk withstands wear and retains its roughness

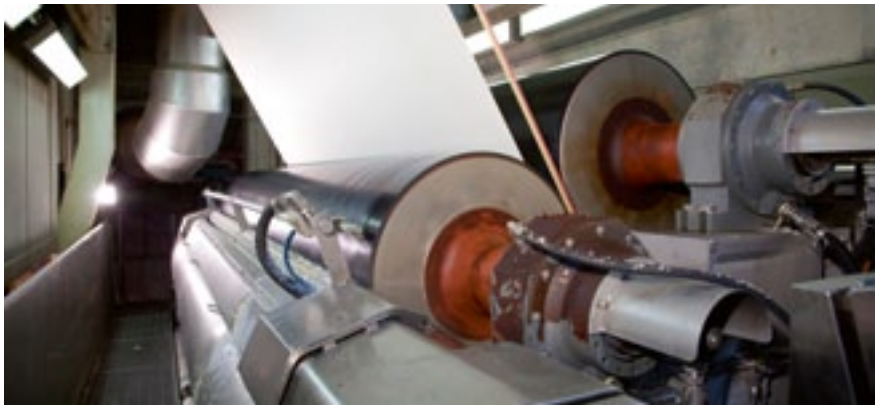
Surface sizing with film size presses is commonly used in paper and board production to improve the surface properties of the sheet. Because it is an online process in most cases, disturbances such as sheet breaks and roll changes cause unplanned downtime. Trouble-free surface sizing and long roll grinding intervals contribute to efficient production.

The wear resistance of SizeHawk ZL is excellent, which makes for long regrinding intervals. Also, the composition of the cover gives it greater resistance to deformation and marking, which is very important in the case of web breaks when paper wads traveling through the nip can leave marks or indentations on the roll covers.

The surface roughness of the cover is at least 1.4 µm and remains at this level throughout the regrinding interval. This yields the best possible film transfer and uniform surface sizing.

Juhani Partanen
Technology Manager
Paper business line, Sales Europe
Tel. +358 40 511 8741
juhani.partanen@metso.com

Mike Stoltz
NA Product Manager
Roll Covers
Tel. +1 920 475 1251
mike.stoltz@metso.com



"The Metso SizeHawk ZL cover helped to reduce the number of roll pair changes at the size press by 10-15 during the year," explains Harri Siitonen, Mill Service Manager at M-Real's Simpele mill.

TEXT Heikki Kettunen

Advanced technological know-how behind Metso's roll covers

Trends in roll cover development

Metso has extensive experience with all modern materials used for papermaking applications. Our recommended solutions are based on proven technology that shares three common denominators: economy, reliability and reduced maintenance. Metso has also been, and will continue to be, active in bringing out the latest materials technology to improve the competitiveness of its customers.

Covers for challenging process conditions

The process of papermaking involves many different applications, and related challenges, for cover materials. Metso therefore provides a full range of materials. We have developed proprietary cover products and suitable production methods in all primary material groups for use throughout the paper machine, and further development work still continues.

The major technical parameters to be considered in papermaking applications are moisture level, temperature, mechanical load and the chemical environment. Good solutions for wet conditions may differ from solutions that work in dry conditions. The maximum temperature applied sets further limits on the use of various materials. The wet pressing or calendering load applied, together with the frequency of the loading cycle, is also a basic parameter to consider when comparing different material options. Last, but not least, exposure to chemicals affects roll covers in several different ways.

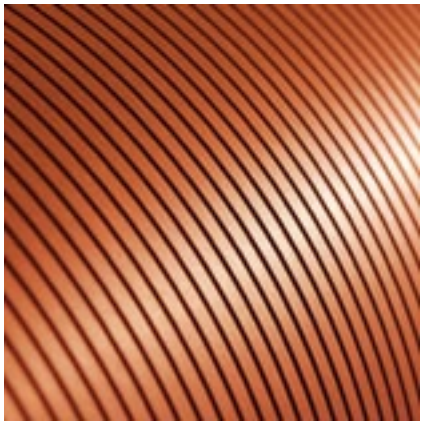
The limits of available cover materials in use can be seen in several different problem areas of papermaking. If the main design parameters are chosen appropriately, problems arise slowly. Metso is continuously looking for better solutions to address these problems and extend the maintenance intervals of rolls.

One of the most common slow-scale problems is the wear of cover materials. For certain applications, such as wet pressing, coating, calendering and reeling, the best paper quality or best machine runnability can be obtained with soft roll covers. These covers, on the other hand, are prone to wear. Another common slow-scale roll cover problem is vibration. This applies to soft covers used in a variety of nip contacts where the roll covers need to withstand minor inherent structural vibration for as long as possible without amplifying it further.

The slow-scale problems of hard coatings typically relate to surface wear or the accumulation of unwanted material on roll surfaces. This usually degrades the roll profile and thus causes trouble in papermaking. One big challenge in cover development is to find wear-resistant coatings that will not accumulate dirt under papermaking conditions. Corrosion and the loss of coating adhesion to the roll body are also sometimes seen on hard-coated rolls in the longer run.

Rubber covers

Modern rubber covers are based on synthetic rubber compounds . In general, rubber has a high coefficient of heat generation in the loading cycle, which reduces its use in applications where the mechanical load is small or the machine is slow. The most typical applications are different guide rolls for fabrics and the paper web, size press rolls, mating rolls of blade coaters, and soft reeling cylinders. In some cases rubber covers are also used on primary press rolls and very occasionally on breaker stack rolls. The typical range of hardness for rubber covers ranges from 2 to 200 P&J units and typical thickness from 10 to 50 mm. The cover temperature is ordinarily limited to 90°C but HNBR tolerates temperatures up to 160°C or 170°C.



Polyurethane PressFox cover features a new type of bonding structure providing improved durability and safety performance.

Polyurethane covers

Polyurethane covers have mostly been developed for the same applications as rubber covers. The key advantages of polyurethanes are smaller internal heat generation and better wear resistance. These covers need less interior cooling of

rolls and are also used in some calendering applications. The thermal curing of polyurethanes does not require as high temperatures as the curing of rubber compounds either. This has an impact on the economics of production and the types of structures that can be covered. On the other hand, the raw materials for polyurethane covers are more expensive than rubber compounds. Polyurethanes also absorb some water, which must be considered in roll maintenance. The typical operating temperature limit is 90°C in wet conditions and 110°C to 120°C in dry conditions.

Composite covers

Composite covers are harder than rubber or polyurethane covers. Their typical hardness ranges from 85 ShD to 95 ShD and maximum operating temperature limit up to 100°C. The coefficient of heat generation is usually very low for composites and internal heat buildup rarely becomes a limiting factor before static strength. The most obvious use for composite covers is therefore found in calendering applications where pressure levels can reach 100 MPa. Indeed, online calendering technology was made possible by the development of composite covers. Other applications include different guide rolls, mating rolls, spreader rolls, press rolls and reeling cylinders, where composites provide better wear resistance than softer materials. Composite covers are made of matrix material , fillers and reinforcement fibers in different proportions.

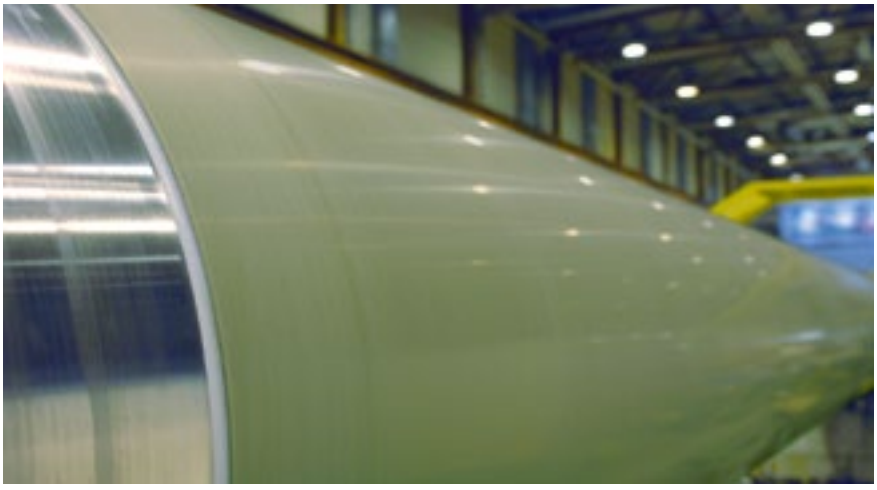
Hard coatings

Novel hard coatings can be subdivided into carbide and ceramic coatings. The customary target is to cover a roll with a thin and hard protective layer that will improve its wear resistance. These types of applications include center rolls, dryer cylinders, thermo rolls and guide rolls. Carbides and ceramics provide hardness levels above 1100 HV. Carbides and ceramics therefore give the best wear resistance and are used in the most demanding applications. In the calendering of glossy paper grades, carbide and ceramic coatings need to be periodically superfinished to keep their surface smooth (< 0.2 mm Ra). The typical maintenance interval ranges from 6 to 12 months. In other applications the targeted roughness is normally around 1 mm, which can be maintained with proper material selection.

Materials development and structural design in focus

The variety of different paper machine materials is large. Metso can supply tens of different cover products for specific uses in the papermaking process. All of these products are based on long and intensive materials development work. It is also not only the choice of materials but the structural design of covers that needs to be optimized. This has been, and will be, a tough but interesting challenge because the requirements of the papermaking process often exceed the demands of any other industry.

Heikki Kettunen
Research and Development Manager
Tel. +358 40 563 2123
heikki.kettunen@metso.com



CalJaguar H composite calender roll cover is developed especially for barring-troubled positions.

The novel nanomaterials technology behind **ceramic PressJade center roll** coatings improves the long-term runnability because of improved stable surface roughness.

TEXT Kare Väisänen

The newcomer in Metso's composite holder family is LiteCompact. With its simplicity, ease of use and superior performance, it takes doctoring to a totally new level.

LiteCompact revolutionizes doctor blade holding

The construction of LiteCompact combines a 100% composite holder and a 100% composite top plate in an optimal way. This results in excellent profiling properties, allowing the doctor blade to conform to the roll surface being doctored.

The holder has been specially designed for the most demanding paper takedown positions. However, it is equally suitable for all cleaning positions throughout a paper or board production line.

Regardless of the doctor blade type in use, LiteCompact presents an excellent holder choice. Its large opening allows the use of a wider blade, making it possible to extend the blade lifetime and blade change intervals. It also makes holder installation easier.

The composite structure has minimal thermal expansion compared with traditional steel holders. This ensures a better doctoring result, regardless of any changes in the process temperature or the surroundings.

LiteCompact features improved composite profile strength compared with other Metso composite holders. New materials such as fibers and resins improve the holder's wear resistance, for example, in paper takedown positions.

Easier, faster and safer maintenance

One of the main drivers in developing LiteCompact has been easy maintenance. The holder profile can be easily slid out of the machine, enabling maintenance work on the machine floor. This gives much more space in which to clean the holder and change the hose, in addition to making maintenance safer and faster.

It's also easy to clean the LiteCompact holder on the machine. The construction is sealed, so dirt cannot penetrate the holder. The holder surface is smooth, and the holder does not have any fingers on which dirt can stick. LiteCompact is also corrosion-free.

The holder is equipped with a quick coupling for the hose, resulting in a faster, safer and smoother hose change. Made of a composite, LiteCompact weighs about half of a traditional steel holder and is therefore easier to handle.

A simplified structure with fewer parts

Simple is beautiful, and this also means there are fewer parts that can fail. The construction of LiteCompact is revolutionary because it features just one hose to carry out both the opening and loading functions. The hose is factory-assembled and comes with cold-vulcanized fittings, ensuring a very fast and trouble-free hose change. Having only one hose also means that there is only one air pipe, which reduces installation costs. The surface is even, making it possible to install web-guiding blows.

LiteCompact's control box always includes an air-leak detector to help identify possible hose breaks.

More than 2,500 holders delivered already

Metso started the development of composite doctor blade holders in the late 90s. The first product, FiberDoc, which is a combination of a doctor beam and a doctor blade holder, was introduced at the beginning of 2000.

Since then, in more than a decade, Metso has supplied almost 2,500 composite holders to paper and board production lines around the world. LiteCompact, the latest member of the successful composite holder family, is now continuing the positive track record.

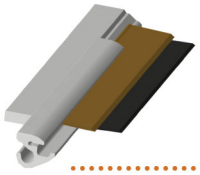
LiteCompact holder with unique one-hose design.

Kare Väisänen
Global Product Manager
Tel. +358 40 705 2439
kare.vaisanen@metso.com

Metso's composite doctor blade holder family

2010

LiteCompact
Adjustable composite holder with one hose
First delivery in November 2009



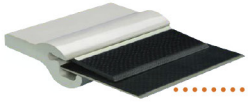
2008

LiteFit Plus
Fixed composite holder
Over 100 deliveries

2006

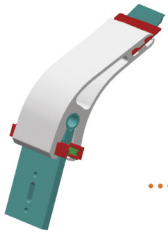
LiteAdapt
Adjustable composite holder
Close to 1,000 deliveries

2004



LiteFit
Fixed composite holder
Over 1,000 deliveries

2002



2000

FiberDoc
Combined doctor beam and holder
Over 300 deliveries

TEXT Nigel Farrand

New trends and technology in refining

Refining is one of the most important operations in tailoring the fibers to obtain the desired paper properties. Recent advances in refining technology at Metso have concentrated on improving fiber development; reducing energy consumption and minimizing plate wear to reduce maintenance costs. Here we look at several new developments to illustrate how these new trends and technologies are improving the final product quality, raising efficiency and reducing operating costs.

Hardwood pulp refining

With the right fiber treatment, papers made from eucalyptus pulps feature good stiffness and bulk with high opacity. Eucalyptus has large vessel segments that, without sufficient refining, cause "picking", where vessel segments separate from the paper surface on the printing press taking coating and ink with them.

To get the best from the pulp, the short eucalyptus fiber requires a fine bar pattern, which, when used with conventional refiner fillings, has narrow grooves that reduce the hydraulic capacity and efficiency of the refiner. Metso's solution is the MicroBar filling design that enables higher loadability compared to standard fillings. The unique combination of a densely designed refining zone and capacity grooves results in an extended cutting edge length and very high hydraulic capacity. With MicroBar, refining energy consumption is reduced by as much as 40% for the same SR (Schopper Riegler) or tensile levels. As refining accounts for one-fifth of the total electricity consumption of a typical fine paper production line, the energy savings are considerable.

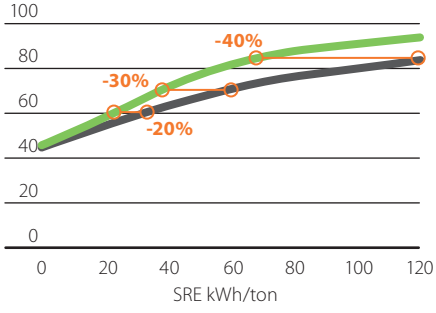
Longer filling lifetimes

Fiber quality, energy efficiency and production runnability all depend on the mechanical condition of the refiner. As fillings wear, a drop in energy efficiency will be noticed, followed by worsening fiber quality until replacement is needed. Bar wear is measured as a loss in bar height, caused by abrasion and corrosion. Bar-edge rounding has the most significant effect on quality and efficiency as the leading edge of the bars is where most fiber treatment occurs as they pass each other.

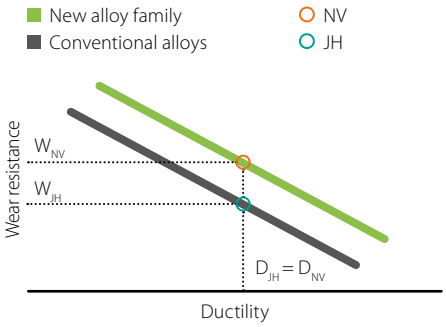
Metallurgy is the key to extending filling life, but increasing abrasion resistance with conventional alloys makes them more brittle and thus less resistant to mechanical damage. Metso is pioneering the use of the NV steel alloy family with improved wear resistance and no loss of impact strength. Using special alloying provides the NV alloy microstructure with a remarkable amount of hard and wear-resistant carbides. Metso has applied for a patent for this application.

The new generation refiner

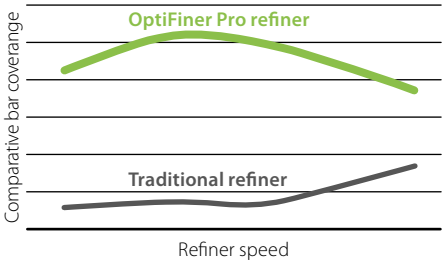
Metso has developed a revolutionary low- consistency refining concept with the new OptiFiner Pro refiner. In conventional refining, the fibers have to travel the full length of the refining zone and suffer excessive impacts, leading to increased



Same tensile index value
with up to 40% less energy.



Compared to a conventional JH steel alloy, the impact strength of NV is similar but wear resistance is 80% higher (abrasive wear laboratory test).



Better stapling of fibers on the OptiFiner Pro bar surface increases the efficiency of the new design.

fines, weakening of the refined fibers and inefficient delivery of energy to the fiber. Some fibers, as much as 70% in a disc refiner for instance, may not be treated at all. The new OptiFiner Pro feeds the stock evenly across the bars directly in the refining zone, increasing the number of fibers that receive proper refining treatment

The improved performance of OptiFiner Pro enables refining with fewer and more compact refiners, thus significantly reducing investment and maintenance costs. The high energy efficiency provides operational cost savings and supports sustainable development with lower entire life cycle costs and less environmental stress.

Turbine Housing boosts refiner production

Metso has developed a new type of housing for its low-consistency refiners that can increase the production of the refiner by 30 per cent and provide longer fillings life. The Turbine Housing replaces the existing radial outlet design with a tangential outlet that allows easier stock flow through the refiner and thus increases outlet pressure. This enables more production through the refiner and can improve pulp properties as finer refiner patterns can be used. The energy savings potential is considerable with a reduction in stock pump speed or by reducing the number of refiners needed.

Markku Partanen
Global Product Manager
Tel. +358 40 759 6004
markku.partanen@metso.com

The old housing with radial outlet.

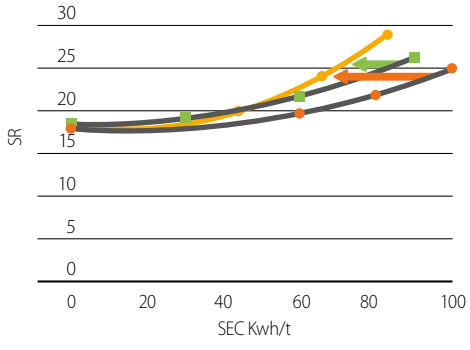
The new Turbine Housing increases refiner capacity by 30%.

Putting new technology into practice

TEXT Nigel Farrand

Production Manager **Raimo Salmi** from Kyro is happy with the results.

Metso's recent advances in refining technology are providing new opportunities for papermakers to improve fiber treatment and save valuable resources. Recognizing this led M-Real's Kyro board mill in Finland to recently conduct an audit of its refiners together with Metso. The audit covered all refining lines in the mill, subsystems and spare part requirements. The target of finding potential energy savings quickly resulted in recommendations from Metso for a dramatic efficiency improvement in short fiber refining while retaining the desired stock properties.



The combination of MicroBar fillings with the new Turbine Housing provides substantial savings in refining energy.

Easier to run and control

The BM 1 board machine at Kyro was rebuilt in 1994 and today produces 150,000 tpa of folding boxboard for beauty care and other demanding packaging products. During the rebuild, two parallel JC03 refiners were installed for birch pulp treatment before the machine chest, where the stock is blended with pine pulp. The two refiners were necessary to provide the gentle low-intensity refining for short fiber treatment. With short fiber coarse-type (SC) fillings, high specific edge loads and low throughput, refining efficiency was poor, but one refiner would have given an unacceptably high refining intensity and was not an option at that time. In Metso's refining audit, it became clear that utilizing Metso's new refining technology would enable the mill to do the job with one refiner. For Production Manager **Raimo Salmi,** this was really good news: "Today we are using eucalyptus in addition to birch in our short fiber supply and refining has to be exactly right. One refiner is easier to run and control." Eucalyptus refining presents an extra challenge as the fibers are smaller than birch and harder to refine, with an increased possibility of plate clashes.

Impressive savings

One refiner was fitted with the new Turbine Housing and Metso's MicroBar fillings in the summer of 2010 and the second refiner was shut down. The Turbine Housing provided the increase in capacity from the refiner and MicroBar gave the correct refining intensity. Metso took many stock samples before and after the modification to ensure stock quality did not suffer, and, according to Raimo Salmi, it did not: "Quality is at the same level and the no-load power on one refiner saves us 100 kW." A reduction in the specific energy control target enabled by MicroBar saves another 15 to 20 kWH/ton. The specific energy control of the refiner is done in the mill's metsoDNA process control system, and the operators report that "It is working very well, no problems." The key parameter for refining is the Schopper Riegler freeness level measured by the Metso automatic pulp laboratory, a kajaaniPulpExpert. "If the refining was too tight, the board on the machine could start 'blowing' as bubbles form in the middle layer because the steam cannot escape. PulpExpert keeps a check on the situation at all times", Raimo Salmi explains.

Metso delivered

One refiner less also means savings for mill maintenance. Wear on the MicroBar fillings has been checked every two months and so far has been acceptable. Raimo Salmi is very satisfied with the results: "The audit was very worthwhile. The project went according to schedule and Metso delivered what they promised."

Jukka Mäensivu
Product Sales Manager
Tel. +358 40 514 6820
jukka.maensivu@metso.com

NORDIC PAPER'S WIN-WIN

Quality and efficiency with QCS replacement

It's a typical story after twenty years or so. Paper machine quality control systems from the 1980s must be replaced because they are technically obsolete. The critical issue is that spare parts supplies are drying up and finding the experts to repair them is getting increasingly difficult. Many have retired. The costs of service are climbing and system failures are beginning to affect machine productivity and paper quality. Simply put, it's time to change.

TEXT Mark Williamson

More valuable asset

If an immediate leap in product quality or efficiency can be achieved at the same time, a QCS system replacement can be a win-win situation for a paper mill. A liability is removed and a more valuable process quality management asset replaces it. After all, there have been major advancements in QCS sensing and control technology over the past ten or twenty years. Add the service cost savings, customer satisfaction and waste reduction and you have a good return on investment.

Nordic Paper has gained such a quality boost and solved the service cost problems as well by replacing an aging 1980s-vintage QCS system on PM 2 with Metso's PaperIQ system. The mill is now producing more consistent product quality with less in-mill waste. Customers are satisfied.

Service cost driven, quality focused

As reported by **Jakob Isaksson,** Automation Engineer for Metso Mill Service, solving the service problems of the old QCS was a primary driving factor behind the investment. Problems with dwindling supplies of spares, lack of service expertise and reliability-related machine downtime had to be solved.

Nordic Paper in Säffle, Sweden, produces 30,000 tons per year of greaseproof paper with the totally chlorine free (TCF) fiber furnish supplied by an onsite sulfite pulp mill. Nordic papers have a wide range of end uses due to their resistance to oils, water, atmosphere and heat, creating a protective barrier for foods, cookware and food preparation surfaces. The papers find end uses as baking parchment papers, baking cups, food packaging and wrapping papers, and some specialty laminating and release papers.

Metso Mill Service looks after all maintenance in the mill. Modern QCS systems like PaperIQ Select are more service friendly than previous generations with extensive predictive maintenance diagnostics and quick-change module replacement procedures. This lowers the long-term costs of ownership.

Consistent quality, uniform caliper for baking papers

In addition to alleviating the escalating service costs, the mill staff was focused on how a modern QCS could help them have more consistent quality for their own onsite baking paper sheeting line and for the converting lines of external customers. White greaseproof baking paper and baking cup papers for muffins and cakes are the major products produced on this 4.2 meter width machine, which has a design speed of 250 m/min. Grammage varies from 38 to 75 g/m^2.

Mattias Wigelius, PM 2 Production Manager, says, "Even profiles are very important for our converting processes and those of our customers. We produce some small rolls (1 meter width), and the converting lines are slowed down if the profiles across the roll width are not so good. Roll hardness differences cause wrinkles and there can be problems with the forming of baking cups," he continues.

Internal reference leads to repeat order

After evaluating competitive offers, the mill decided on the Metso PaperIQ Select system. A previous generation Metso PaperIQ Plus system with automatic color control was installed on PM 3 in 2007, and that good internal mill reference helped to make the repeat order for PM 2 decision clear and logical.

The system on PM 2 comprises a scanner at the reel with grammage, moisture and caliper measurements and a single-sided scanning moisture measurement before the size press. A new Metso formation sensor called IQFormation was installed on the reel scanner in March 2010. The development of this image capture and analysis capability was a significant advantage for Nordic Paper, since formation is a key quality of their products.

Machine direction grammage and moisture controls are coordinated with the

Mattias Wigelius states, "After the change of the system, our sheeting department reports the waste for hard or loose edges totally disappeared and the reels are also much smoother than before. All this is due to the improved control with the new Metso system. The waste is down by 60% – about 6 tons per month less waste. Our external customers have noticed the smoother and better quality reels."

The system on PM 2 comprises a scanner at the reel (top) with grammage, moisture and caliper measurements and a single-sided scanning moisture measurement (circled) before the size press.

One of the major goals of the project was to streamline and integrate the operator interface for controlling the machine so the operators would have a much better and consolidated view of the entire operation.

system's IQWetendMD model predictive controller. Cross-direction caliper control was re-implemented in the new system by interfacing to an existing induction profiler on the machine calender.

Better working effectiveness

One of the major goals of the project was to streamline and integrate the operator interface so the operators would have a much better view of the entire operation and would therefore control it better. Typical of older QCS systems, the operator interface and control operation were not consolidated in one place. The video interface station showed quality profiles, but the system's supervisory control functions were distributed to panel controllers.

This scattered and awkward operating method was resolved by removing the panel controllers and consolidating all measurements and controls in a unified DNAuse operator interface. Operators can now see cause and effect relationships for the paper quality and machine controls, and their time trends.

Wigelius notes the better process overview has made a positive contribution to the operators' working effectiveness. Profile resolution is better, so operators are more conscious of optimizing the sheet uniformity. "The operators see more and spend more time cleaning fabrics. It's had a noticeable affect on quality," he adds. Grammage changes are faster, as well.

60% less sheeting waste; customers take note

The uniformity of the caliper profile has had the most significant impact on paper reel quality and how it converts into sheets.

Although the control of caliper is accomplished with the same number of profiler actuator zones, each control "cell" has much more information about the CD profile. This is because the sensors are faster and more precise. The CD resolution has improved by leaps and bounds from the 1980s. The Metso IQWebCaliper sensor has a CD resolution of 10 mm. The IQWebCD control algorithm takes full advantage of this improved resolution and helps recover paper quality quickly after a break or other upset. The result is faster and more precise control, as experienced by Nordic Paper.

The PM 2 system started up quickly and paper quality was established without delay. The excellent quality has been maintained, according to Wigelius. "I know our quality is better than before, and that results in lower broke in the mill and fewer claims," he says.

Left to right: **Jakob Isaksson, Mattias Wigelius,** and **Mats Nordling,** Production Supervisor.

Roger Holmedahl
Service Manager
roger.holmedahl@metso.com

Lottie Lindh
Sales Manager
lottie.lindh@metso.com

Well-organized maintenance can give mills excellent payback

TEXT Hugh O'Brian

Smarter maintenance planning offers big potential for increases in mill production. Moving from traditional maintenance to predictive maintenance means maximized profit over the lifecycle of the assets. To learn more we spoke with **Jaakko Reivo,** Metso's On-Site Operations Manager for Service Projects in the Paper business line.

What are the principal ideas behind Metso's maintenance programs?
JR (Jaakko Reivo): The basic philosophy on maintenance at Metso is: **PLAN, ORGANIZE, CONTROL, ACT.** We have been very successful at getting big improvements in costs and efficiencies by following this simple strategy. The process is always the same, although each program is tailor-made to the specific case and mill culture.

First we measure things and then make a work plan for improvement. Next we organize and do the actual work, and control if it has succeeded. Based on that, we take actions for continuous improvement. To get started, in very close cooperation with the customer, we look at key figures. These are things like key performance indicators, percentage of shutdowns planned and unplanned, and overall mill performance. The steps are exactly the same whether we are working with an old mill or a brand-new greenfield site.

How closely do maintenance and production work together?
JR: Maintenance should not be seen as a separate function from production. Production and maintenance must work together towards the common goal of increased output. This means that production people are doing some of the routine daily maintenance. This is critical to achieving the best overall performance and efficiency and is now well accepted in progressive, forward-thinking mills.

Is there a general formula for good maintenance?
JR: Our pyramid of good maintenance is a good starting point (Figure 1). The parties might agree that production time must be 95%. That's a key target and we need to set programs to reach it. Planned shutdowns could be agreed at 3% for the mill. But we need to be clear this is done to support production needs, such as felt/fabric changes and cleanups, not specifically maintenance-only shutdowns. Then the remaining 2% is the target allowed for failures or unplanned shutdowns. So total non-running time is 5%, with 3% planned.

"To get the highest possible revenue form assets you need efficient well-planned shutdowns", says **Jaakko Reivo,** Metso's On-Site Operations Manager.

Metso maintenance services can include

- Maintenence management plans
- Maintenance data for mill's CMMS
- Maintenance audit to propose maintenance development plan
- Criticality analysis of equipment
- Preventive maintenance development
- Off-line condition monitoring implementation
- Spare part inventory optimization
- Upkeeping program, e.g. for winder
- Special maintenance services
- Maintenance operations
- Maintenance outsourcing

Some mills that we go in proudly say they have planned shutdowns of only 1% or 1.5%. That is actually not a very good strategy. It is far too low and leads to many more unplanned shutdowns, which are extremely expensive. Mills think they are saving money by aiming for very low unplanned shutdown time but in the end it's costly.

We show them benchmarking data from our experience and say "you have to increase your planned shutdowns". Their initial reaction is that it makes maintenance more expensive but, as we all know, money comes into the mill from production. To get the highest possible revenue from assets you need efficient well-planned shutdowns.

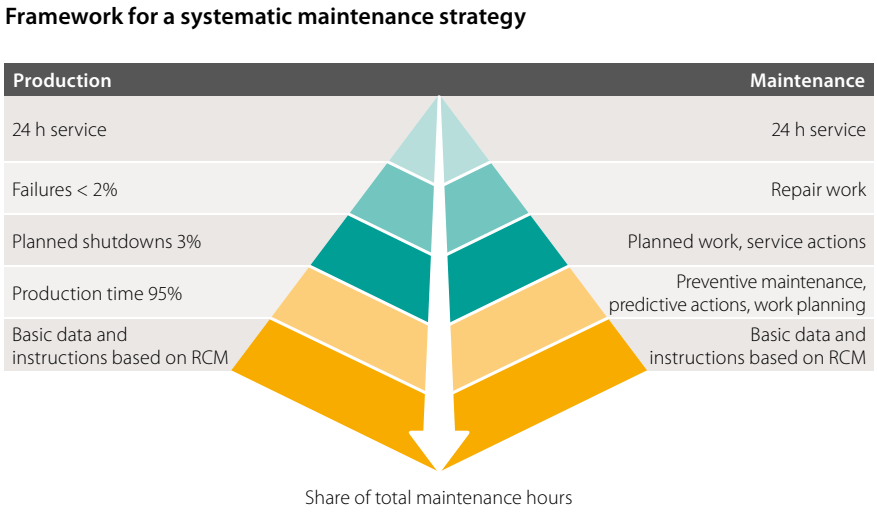


Figure 1. Smart planning and cooperation builds a strong foundation for maintenance work. This helps avoid the top of the pyramid, which involves very costly emergency production stops and expensive repair people.

Do you have an example of a big turnaround?

JR: There are many. One example is a mill where, when we came in, unplanned shutdowns were 4.3%, planned were 1.5% for a total of 5.8% downtime. Total efficiency was 73%. We changed the targets fairly dramatically. It was that type of machine that needed frequent cleaning so we said 'let's target 4% planned shutdowns and less than 1% unplanned'. In two years we were under 1% unplanned and total efficiency rose to 84% for an excellent payback.

The key point is that smart planning can save money and avoid emergency shutdowns, as well as lots of headaches. Of course you can never avoid all unplanned shutdowns but they will be minimized. And the increased tonnage sold very quickly pays for any additional maintenance costs.

How important is planning?

JR: It's absolutely critical. Shutdown planning, especially, is a continuous process that never ends or begins. It's always running. Somebody must own the shutdown planning process and we sometimes see that the wrong people are planning the shutdowns. A review of procedures may be needed to improve the information flow and cooperation.

Production, maintenance, services like electrical, etc. all need to work as a team. Somebody has to coordinate it and good plans can only be made when all the information is put on the table. There are lots of parties to be coordinated. It goes through several rounds such as the preplan discussions. Ideally the plan should be locked in place two weeks before the shutdown for big shutdowns. But the same process applies to short shutdowns: good planning, agreement on common goals and excellent coordination are vital.

With correct and very detailed planning, manpower requirements for maintenance can be used much more efficiently. There are economic benefits all around: Smaller maintenance departments, better management of spares and services, and increased production at lower cost per ton.

How do Metso maintenance agreements work?

JR: The type of arrangement can be very flexible. Sometimes it only is on one paper machine and sometimes it covers the whole mill. It can be a short term assignment where we agree to target numbers,

Operating model

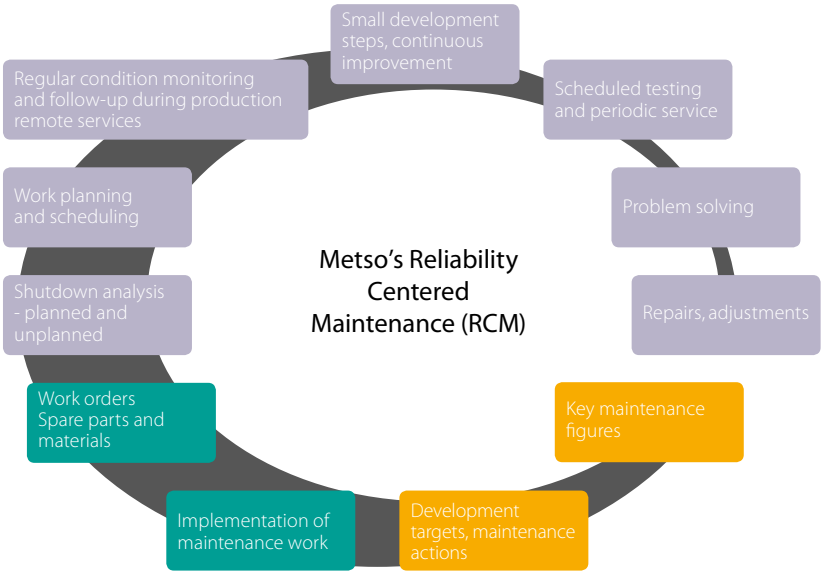


Figure 2. Metso's Reliability Centered Maintenance takes a holistic, continuous-improvement view to keep production up and maintenance costs down.

The upkeeping program will bring the customer benefits in following areas

- General work (routines, tasks, etc.) & shutdown planning
- Reduced unplanned shutdowns
- More availability, consistent customer roll quality
- Optimized upkeeping costs (incl. spares & consumables)
- Ongoing development process to identify development areas
- Improving mill personnel skills to manage e.g. the winder
- Latest updates & benchmarking is available

we reach the targets and we leave. Or it can be long term cooperation where we take responsibility for almost all maintenance tasks as we are doing at Plattling Papier in Germany and Saica in Spain and the UK.

The key is a very clear division of tasks. This involves production doing one part, the mill maintenance department doing another part and Metso the third part (Figure 2). The program has to be based on open discussions. We never go into a mill and pretend we know everything immediately. We do a survey of the present conditions and then compare this with industry benchmarks on breaks, shutdown times, costs, failures, etc. When we do this, quite often the mills are surprised by how poorly they are doing against the best mills.

When mills are in trouble they are more inclined to accept new strategies. But we can't give immediate results to such a complex thing as maintenance programs. It takes time to implement strategies. You might see some changes after 6 months but really it takes 1½-2 years to fully implement the process. You build the cooperation and trust, and then the results come.

Jaakko Reivo
Manager On-Site Operations
Tel. +358 400 246 283
jaakko.reivo@metso.com

Jussi Myllylä
Senior Project Sales Manager
Tel. +358 40 581 6959
jussi.myllyla@metso.com

Upkeeping program – Managing operations around the winder

Upkeeping is a new program from Metso that helps manage overall operations around the winder and finishing areas. Maintenance and production tasks and issues are brought together to sharply boost effectiveness. This includes tasks and observations from normal maintenance checks (such as bearing condition) to winder process function (set change time, etc).

"In some cases the biggest improvement has been in the work planning process," explains **Kai Odé,** Metso's Manager of Finishing Solutions. "Done together with the mill, it includes an extremely detailed description of work tasks. Everybody clearly knows what role they have. So you do the right things with right timing and right knowledge."

A key point is that there is no fixed solution for every mill. "First of all," continues Odé, "we want to understand the customer, their situation, their problem areas and their future targets. We look at maintenance operations, content, intervals and fault history around the finishing area. We give our input for how they could be improved if we feel there is a place for improvement. As a machine supplier, we have the possibility for global benchmarking."

Upkeeping normally is based on a three-year startup period, where Metso has a certain role and the customer of course has the main role. The first agreements were made with Stora Enso Imatra and Kemi mills in Finland and are centered around winders, with the new concept being very well received by mills.

Kai Odé
Manager, Finishing Solutions
Tel. +358 50 317 3736
kai.ode@metso.com

First greenfield mill with totally outsourced maintenance is big success at Plattling Papier

When Myllykoski built its new greenfield SC paper machine line in Plattling, Germany, it made the fundamental decision to outsource all maintenance activities to Metso Mill Service (MMS), including the maintenance establishment. In that mill, MMS has full responsibility for production line upkeeping by providing state of the art maintenance concepts and systems, on top of the highly qualified maintenance competences. The main key performance indicators (KPI's) are technical availability, maintenance costs and tons produced.

When the mill started in early 2008, the maintenance operations were already established and ready for action. Targets were set together with the customer for 2008, 09 and 10 for production, technical availability and maintenance costs. All targets have been met.

"The results have been excellent," says **Jouni Iikkanen,** Managing Director of Metso Mill Service GmbH, "thanks to the right maintenance concept and strategy, to the whole maintenance team and to the customer with whom we have had always an excellent cooperation. Based on these results, Myllykoski has also given us maintenance responsibility for the MD Papier LWC mill, consisting of two paper machine lines. This is certainly the best appreciation for our work, and show of customer confidence and satisfaction, that we could possibly expect."

For further details on this advanced maintenance cooperation at Plattling Papier, see Results pulp&paper issue 2/2009 page 8.

Paper has been produced in Renkum, the Netherlands for over one hundred years. The Parenco mill has had several owners, but it has been part of the Norske Skog Group since 2001. PM 1 was built in 1987 and rebuilt in 1997. It has an annual production capacity of 270,000 tons of paper with 100% DIP furnish and two off-line calenders. There are about 260 employees – all totally committed to papermaking.

Parenco changed from news to SC-B

THE FACTORS BEHIND THE SUCCESS

In a challenging market situation, the Norske Skog Parenco mill in the Netherlands switched from newsprint to SC-B on its PM 1. Just fifteen months later, the mill is recognized as a reliable producer of SC-B paper. Doing all the work in-house further strengthened the machine crew's already good team spirit.

TEXT Anne Paloheimo-Seppänen

In late 2008, Norske Skog Parenco decided to switch PM 1 production from newsprint to an SC-B type of paper in order to respond to the narrowing margins and newsprint overcapacity in the market.

At that time, Norske Skog Parenco operated two 9.15-meter-wide machines: PM 1 and PM 2. PM 1 is the most modern machine and PM 2 is the older one.

Unfortunately, PM 2 was shut down in the latter part of 2009 due to newsprint overcapacity in the market.

Although the mill had had some good experiences with the production of improved news, everyone was surprised how soon good SC-B quality was reached.

"We aim at having the best available quality for the printing house," says **Gerrit Scheffer,** Assistant Line Manager of PM 1, one of the main architects behind the success story. "Now we know what works on the machine and what doesn't. For example, we tested several fillers to raise the ash content in the paper, until we found one that had no negative impact on runnability."

Parenco produced twice the amount of SC-B than anticipated in 2010

"All the work was done by our own staff; everyone is totally committed to papermaking. We carried out a lot of trial installations to see if things would work as planned. We even took a risk with a new solution to reach our goal. During that period we made no changes in the hardware. All the pieces have to fit together like a puzzle," Scheffer adds.

Special credit for the successful grade change goes to **Yan Vassart,** Production Manager at Parenco. With a clear vision and a never-ending spirit, he was the driving force behind the work and the one who knew how to get the best out of the crew.

Parenco is the only mill in the Norske Skog Group that can produce SC-B quality. "In 2010, we produced twice the amount of SC-B than anticipated," says Scheffer. "We have already been approved as an official SC-B supplier to all the markets we have been in so far."

The billboard with samples and **Gerrit Scheffer,** Assistant Line Manager PM 1.

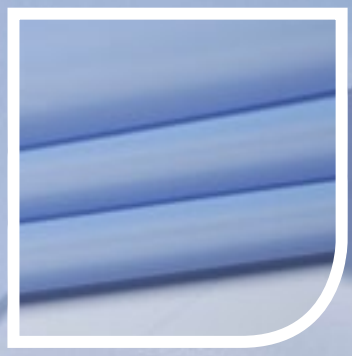
Forming fabrics in a key role

As regards paper machine clothing, changes were only made to the top wire application in the forming section to ensure optimum quality. With the SC-B quality, the most important feature in the fabrics is web formation. Bad formation is immediately visible in the paper.

The Metso-supplied top fabric is now of the Gapmaster GMS type, which gave very good results straight away. It not only improved the machine's operating window and paper quality but increased the dewatering too. The bottom fabric is of the Gapmaster GM type.

The fabrics turned out to be the right choice. Parenco PM 1 reached excellent production results in October 2010 with time efficiency at 96.84%, paper efficiency at 94.84% and total efficiency at 91.84%.

Tamfelt, which became part of Metso in late 2009, has supplied fabrics and felts for Parenco PM 1 since its start-up in 1987. In addition to forming fabrics, Metso also supplies press felts and dryer fabrics for the machine. In fact, Metso supplies 50% of the clothing needed for the whole machine in all sections.



"I know you are there"

The most important thing for a clothing supplier is to closely follow changes on the machine, be aware of what is happening, and improve machine performance. Gerrit Scheffer knows he can count on Metso's clothing service and fast response: "I know you are there if I am in trouble."

Good cooperation was even more important when the paper grade was changed. As **Jarmo Hasselqvist,** Product Group Manager, PMC, Metso, puts it: "Faster reaction is needed from the clothing supplier today. We must be awake and carry out development work all the time. The key point is to listen to the customer very carefully."

Clothing is crucial for the performance of the paper machine. According to Scheffer, the product quality, price, delivery times and service - i.e. everything - must be properly balance. This balance at Parenco lies to a great extent on the shoulders of **Gerard Derksen,** Sales and Service Engineer, PMC, Metso, who is in weekly contact with the mill. And he knows the customer inside out since he worked at Parenco for 13 years before joining Tamfelt/Metso.

Jarmo Hasselqvist
Product Group Manager
Paper machine clothing
Tel. +358 40 500 8751
jarmo.hasselqvist@metso.com

Gerard Derksen
Sales and Service Engineer
Paper machine clothing
Mobile +31 610 781 711
gerard.derksen@metso.com

BURGO VERZUOLO PM 9

Energy savings through a new vacuum system concept

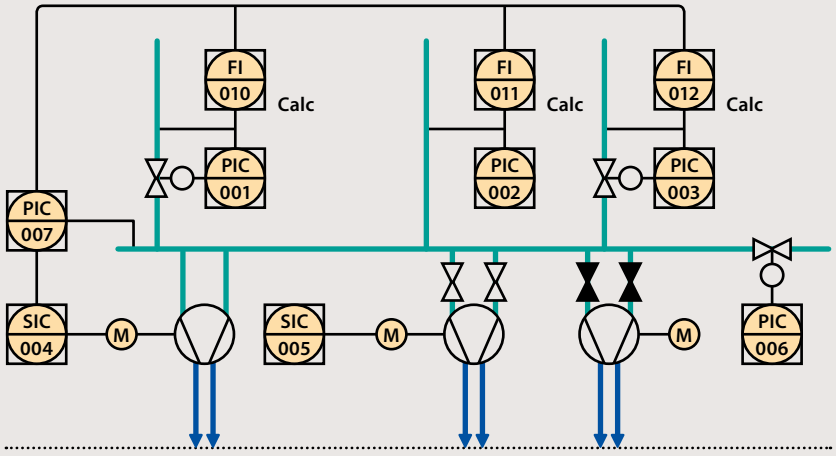
The main weakness of a traditionally designed liquid ring pump (LRP) vacuum system is its poor energy efficiency under varying operating conditions. The Burgo Verzuolo mill in Italy was able to radically improve the energy efficiency and controllability of its vacuum system in a recent rebuild of its PM 9.

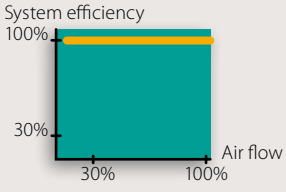
TEXT Kari U Kokkonen

In 2009, Burgo Verzuolo and Metso signed a cooperation agreement with a target of improving the runnability of the OptiConcept LWC machine and ascertaining the potential for saving energy. Several process improvement studies were carried out, including a vacuum system energy efficiency survey.

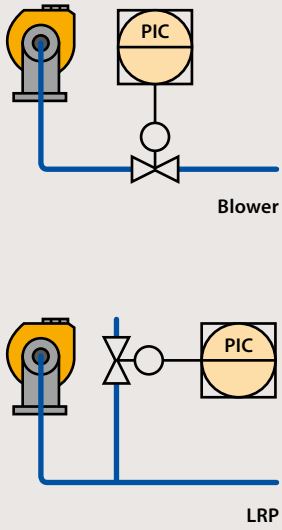
The mill decided to rebuild PM 9's vacuum system in two stages. In the first, the vacuum controls and pump connec-

All in controls in MCS Pat.pend.





Metso's new vacuum system improvement concept (patent pending). Applicable on all vacuum systems with LRP pumps, regardless of machine supplier.



Efficiency losses in the PM vacuum system.

Satisfied start-up group after the successful vacuum system improvement. From the left: **Maurizio Vassallo** and **Enrico Crida,** Burgo Verzuolo; **Matti Huhta, Arto Poikonen** and **Diego Blua,** Metso; **Fabio Monge, Massimo Botta** and **Adriano Mina,** Burgo Verzuolo.

tions were modified. The second stage, featuring new variable speed drives, will take place later as the operation of the vacuum system must be followed for at least two felt life cycles in order to estimate the additional energy saving potential.

Immediate energy savings reached

The air flows from PM 9 were measured during the pre-engineering period, and the system efficiency losses were estimated to be over 1 MW.

In September 2010, the existing LRP system was modified according to Metso's new vacuum system concept during a two-day shutdown. Metso was responsible for the process engineering, automation field equipment and DCS system software modifications, while the mill carried the responsibility for the piping materials and installation. Press section web threading was improved at the same time.

The results achieved through the rebuild were soon visible. Energy savings of 775 kW were achieved immediately, and, with further optimization, the overall savings can exceed 1 MW. The mill has also reported improvements in the controllability and stability of the vacuum system.

LRP system modification at Burgo Verzuolo PM 9

Metso's scope: process engineering, automation field equipment and DCS system software modifications

Energy savings	775 kW
Potential after optimization	1 MW
Improved system controllability and stability	

Metso Felt Permeability - what is the new concept about?

Paper basis weight and pulp characteristics have a strong impact on the air permeability of the paper web. The required turndown ratio of the vacuum system can be as high as 1:2 on many machines.

Also, the requirements for felt conditioning have rapidly changed during recent years. Many mills with fast-running paper machines have turned off at least some of their Uhle boxes and operate them at a lower vacuum than originally designed. Fast-running machines also often use nip dewatering, which requires different kinds of felts.

Felt conditioning requirements.

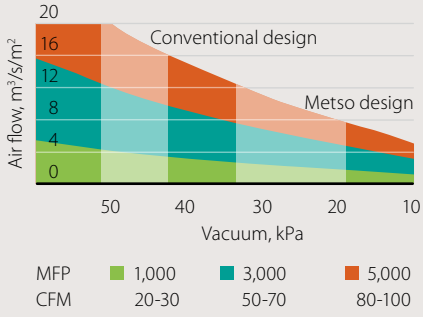
Felt air permeability has a major impact on the vacuum system capacity requirements. In order to estimate these requirements in all operational conditions, it has been necessary to develop a correlation between felt air permeability in a laboratory environment (CFM) and in operation.

Metso calls felt air permeability in operational conditions MFP (Metso Felt Permeability). Traditionally, air flow requirements have been estimated based on the slot speed at the Uhle box, but the new MFP makes it possible to estimate vacuum requirements more accurately than before.

The main reason for efficiency losses in a PM vacuum system is the vacuum level control. In a conventional LRP system, the vacuum is controlled with bleed air, but equal losses can also occur in the blower systems when there is a lot of variation in the air flow from the PM.

In order to improve the vacuum system efficiency at varying operating conditions, the vacuum system concept and control philosophy can be updated with a new Metso vacuum concept that enables significant energy savings.

Many fast-running paper machines have turned off at least some of their Uhle boxes and operate them at a lower vacuum than originally designed.



Arto Poikonen,
Project Manager
Paper business line
Tel. +358 40 732 3469
arto.poikonen@metso.com

CELBI DOUBLES FIBERLINE PRODUCTION

Includes new recovery island and single automation platform

TEXT Nigel Farrand

The Celbi pulp mill in Portugal recently completed a project that doubled production of the existing fiberline and included the construction of a new recovery island. This required the upgrading and renewal of the fiberline process control systems as well as completely new controls for the recovery island and a separate biomass boiler with condensing turbine.

Recognizing the advantages of a single automation platform for the whole mill, Celbi selected Metso to supply a complete millwide solution with metsoDNA. **João Mota,** Engineering Manager explains, "Traditionally we have had two suppliers of automation, with Metso controls on the fiberline. For this project, Metso also had a good solution for the recovery island which also provides us with a common automation platform throughout the mill."

Celulose Beira Industrial (Celbi) S.A. has a long history of automation systems with Metso, starting in 1983 with a Damatic control system for the bark boiler. This was updated and expanded by Metso in 1999 with modernization of the digester and bleach plant.

Meticulous planning and project supervision

The project was completed in two phases. This required very detailed planning and project management from Metso. Everything needed to be in the right place at the right time with the proper expertise available. The fiberline expansion and drying machine rebuild involved upgrading and replacing existing installations as well as adding totally new equipment.

The second phase included a totally new metsoDNA CR control room for the recovery island, recovery boiler, evaporation plant, lime kiln, causticizing, and water and effluent treatment. Operator interfaces are now standardized. Complicated links between various systems are eliminated, and common engineering tools are available to enhance operation and simplify maintenance. A major part of the process technology and machinery for the project was also supplied by Metso, thus simplifying the metsoDNA system engineering. Installation and commissioning was completed on schedule with minimum disruption to production.

Connectivity and continuity

For Celbi, understanding the life cycle of the automation platform was essential to ensure that it is suitable for future production plans. Too often, migrating to a single automation platform involves total replacement of existing equipment, re-engineering and programming as well as learning new skills and ways of working.

Metso's automation systems have life-cycle compatibility going back thirty years to the first Damatic digital control system. All generations can "talk" to each other, share the same engineering tools and are open to all applications. For the Celbi mill, the experience and skills gained with Metso's automation since 1983 provided familiarity with the new system that shortened the learning curve dramatically.

"In the recent mill capacity expansion project, we have performed a complete upgrade of DCS automation that covers all mill departments with the DNA platform, and so we actually have a state-of-the-art platform. Nevertheless, Metso's policy granting the compatibility with further system developments is an important issue when looking towards future mill investments," says João Mota.

The new recovery island control room with metsoDNA CR.

Full Scope Delivery from Metso

Celbi's expansion project, known as C09, started in January 2007 to double production of bleached eucalyptus pulp to 600,000 tons per year. The project made use of the best available technologies in each production stage, supported by a modernized mill infrastructure. Metso supplied a large part of the process equipment, including a new recovery boiler, evaporation plant, modernization of the existing cooking and brown stock washing plant, and a new wood handling line.

Together with project C09, Metso also delivered a biomass-fired power boiler to EDP Produção – Bioeléctrica, S.A., a joint venture of EDP, a Portuguese electricity company, and the Altri Group, owner of Celulose Beira Industrial (Celbi).

Something old, something new

The fiberline upgrade utilized more than half of the old 4,000 I/Os, saving time and cost. Just over 3,000 new MIOs were installed. The new system is more compact than previous generations, which is important when upgrading I/O in existing mills where space can be limited.

The Profibus DP is used extensively for drives and motor controls. The functionality of the old control system was retained, but the new metsoDNA technology will make it possible for the mill to implement advanced controls at a later date. A new metsoDNA CR control room is the center of operations for the whole recovery island, including the water and effluent treatment and a separate biomass boiler with condensing turbine.

The new recovery boiler and the biomass boiler, also supplied by Metso, are controlled by metsoDNA CR, including integrated HIMA boiler safety systems. Two new back-pressure and condensing turbines are also included.

Better process visibility

The operator displays are in one area where improvements can be seen immediately with the new display technology. The drying machine was completely rebuilt, so all the displays were reconfigured. Bleaching, however, was just modified, so only the displays were changed if required by the process changes. For the recovery island and the new boilers, Metso created all new displays as these were new processes.

All work shifts in all departments now share the same operating methods and view to the process. Operators and technicians are supported with functional descriptions, process related information and specific help pages to get the best from the system and maximize its effectiveness. The same information and view of the process is also available to management, providing real-time situation analysis and enabling better informed decision-making.

More improvements

Celbi also took advantage of the upgrade to revise the tag naming system in some parts of the mill in order to have a common system throughout. Existing interlocking and logic were re-formatted to take advantage of the new XML interlocking pages with DNAhelp, a diagnostic tool for machine, process, drive and quality controls.

This aids in quickly identifying production problems and speeds up disturbance solving. DNAhelp shows the root of an abnormal condition or interlock that has caused a problem and allows operators to add comments online to share operating knowledge.

"In addition to having achieved control and quality targets, the new system increased our capability to perform field equipment troubleshooting and process disturbance analysis. Having online windows to any mill process, either in our office PC or in any meeting room, gives the management one important tool for decision-making, and consequently, it contributes to the high competitiveness of the Celbi mill," says João Mota.

Steve Bassett
Project Director
steve.bassett@metso.com

Hood after rebuild in Van Houtum.

New production record at Van Houtum with high velocity hood

TEXT Dieter Mende

Cradle to Cradle is a concept where all waste is reused as a raw material in the following production cycle to preserve the earth's natural resources. A Dutch company called Van Houtum BV, located in Swalmen, the Netherlands, is committed to applying the C2C concept as part of their corporate social responsibility (CSR). Van Houtum is also interested in projects and investments which help reduce CO_2.

In fact it is Van Houtum's ambition to become a 100% carbon neutral tissue producer within the next decade. The company follows the Dutch Paper and Board Industry's ambitious Energy Transition program, launched in 2005, to reduce energy consumption by 50% by 2020. One project which came out of this program was an investigation, with different suppliers, to find out how to optimize the drying process. In this case the end result was a rebuild of the company's tissue machine with a high velocity hood in cooperation with Metso.

Why Metso?

Increased drying capacity needs, quality issues and rising energy costs led to the development of the Metso Advantage AirCap, a state-of-the-art drying system which sets new standards in the industry. In the late 1990s, extensive research and development in Metso's tissue pilot facility in Karlstad, Sweden and fieldwork led to the first commercial installation of a complete Advantage platform in 2000. Today, this Advantage AirCap is a solution for all DCT (Conventional Dry Crepe Tissue) machines and rebuilds. For Van Houtum, Metso was the company with the best expertise to reach the goals they had set.

Main benefits of the Advantage AirCap Yankee hood

full air drying and profiling performance
better quality through profiling
maximum drying and energy efficiency
full air-supported web control from doctor to reel
no sheet fluttering, no ballooning on reel
higher reel speed and additional production speed
web cleaning effect for better converting and printing quality
full wet dust control in the area from doctor to reel
dust free environment
prevents risk of fires inside the ducts
clean ducts mean less need for maintenance

Van Houtum project team: (from left) **Piet Raijmakers, Jean Hoogmans, Ronald Kok** and **Eric Geraedts.**

Fast action in the sales process
Higher capacity, energy savings and fine tuning of the system were the reasons why Van Houtum chose to invest in a new hood for their PM 4 tissue machine. An important issue in the rebuild project was the time frame as the schedule for finalizing all the required steps before the contract could be signed was very tight.

Van Houtum made its first inquiry in January 2010. A Product Manager from Metso visited in February and proposed a complete new high temperature hood and an engineering study to figure out the best solution for the quotation. The study was carried out in March and Van Houtum received Metso's proposal in April. Van Houtum sent their order on April 30, 2010 and the rebuild was completed on August 16, 2010.

Result: a new production record
A new production record was registered for the PM 4 paper machine in Swalmen a few weeks after the introduction of the new Metso hood segments. A 5% increase in production was reached with a paper of 22 g/m^2 grammage in a 24 hour run.

Furthermore, according to **Eric Geraedts,** Training Coordinator, runnability has improved in the section after the Yankee: "The paper is much easier to handle through the measuring beam than before. The quality of the mother reels has also improved and the front ends do not run out as they did before. This is another advantage for the finishing department."

Dieter Mende
Mill Sales Manager, Tissue
Tel. +49 173 3080 531
dieter.mende@metso.com

Small turnkey delivery offers big advantages

TEXT Nigel Farrand and Kati Railevirta

Stora Enso's Heinola Fluting Mill, situated some 135 kilometers northeast of Helsinki, Finland, has been producing high-quality fluting since 1961. The mill, originally designed with a capacity of 90,000 tpy, today produces 286,000 tpy of semi-chemical fluting. Fluting is the corrugated part between the surface liners in corrugated board and has a vital effect on the performance of completed corrugated containers. About 90% of the mill's production is exported, primarily for fruit and vegetable packaging as well as heavy-duty applications requiring good strength properties, such as the packaging of consumer electronics and machine parts. The recent start-up of a broke refiner supplied by Metso as a complete turnkey delivery is helping to ensure that quality stays on track.

Maintaining quality
A continuous goal at Heinola is improving the stability and productivity of the process. According to **Tuomo Sippus,** Manager of Technical Customer Service and Research & Development, "Uniformity and consistent quality is what we strive for and improving broke treatment was a step long overdue. Increased production over the last few years means that we now use more of our own broke, whereas earlier we sold it internally within the Stora Enso Group. The fluctuations in broke quality were getting difficult to deal with and although we first thought to go with a deflaker, we finally decided that a more aggressive refining treatment would be most efficient."

Turnkey delivery
The decision was made easier when the opportunity for a second-hand refiner from the company's Varkaus mill presented itself.

Tero Karvinen, Production Superintendent, takes up the story: "When Metso offered to not only refurbish the refiner but also provide us with a turnkey delivery of the whole project, I must admit I was surprised. Metso made it really easy for us."

The results have been good, says **Tuomo Sippus,** Manager of Technical Customer Service and Research & Development, from Stora Enso Heinola. "Refining gives a good clean bonding surface to the fibers and process stability has improved with a positive impact on product uniformity."

For the mill, this was too small to initiate a full-scale project organization but too big to be handled internally. Metso took care of everything, disassembling the Varkaus refiner and rebuilding it, and made the new installation, including the design, piping, electrical work and instrumentation. Start-up was on schedule at the end of August 2010.

Automation included

Refurbishment of the refiner was done at Metso's Stock Preparation and Recycled Fiber facility in Valkeakoski. Fitted with a new gearbox and motor, new fillings and Metso's innovative Turbine Housing, the refiner was as good as new. Karvinen adds, "Using the Varkaus refiner saved us a lot of time in what was a tight schedule. Delivery of a totally new refiner would have taken four months longer." The controls for the refiner are integrated into the existing metsoDNA automation system, providing operators with a familiar interface to the new equipment.

Innovation

The new Turbine Housing fitted to the refiner is a Metso innovation. Replacing the existing radial outlet design with a tangential outlet allows easier stock flow through the refiner and thus increases outlet pressure. This enables more production through the refiner and can improve pulp properties as finer refiner patterns can be used. While not having any previous data for comparison, Tuomo Sippus is still impressed: "Energy for the refiner is less than estimated from the pilot trials."

The bottom line

The results have been good, Sippus says, "Refining gives a good clean bonding surface to the fibers and process stability has improved with a positive impact on product uniformity." Tero Karvinen is completely satisfied with the project: "This kind of turnkey delivery on a relatively small project was entirely new to me and it has worked really well. It is really easy to achieve results when you have such a good partner."

"For the operators, it is really easy," says Karvinen. "The specific energy control takes care of everything and the operators only have to adjust the flow rate as necessary."

Refurbishment of the refiner was done at Metso's Stock Preparation and Recycled Fiber facility in Valkeakoski. Fitted with a new gearbox and motor, new fillings and Metso's innovative Turbine Housing, the refiner was as good as new.

Jukka Mäensivu
Product Sales Manager
Paper business line
Tel. +358 40 514 6820
jukka.maensivu@metso.com

Reijo Äyhönen
Sales Manager
Automation business line
Tel. +358 40 504 9581
reijo.ayhonen@metso.com

Metso around the world

Automation

Energy automation system for RWE npower renewables in Scotland

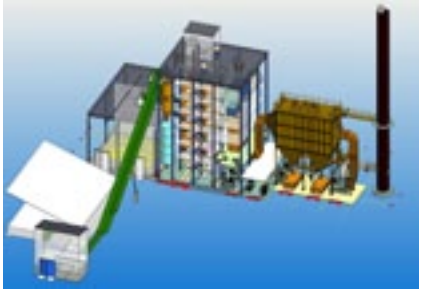
Metso will supply an energy automation system for the new biomass CHP plant being built by RWE npower renewables in Markinch, Fife, Scotland. The operation is scheduled to start in 2013. The new power boiler will also be supplied by Metso. The CHP plant will provide steam and electricity for the Tullis Russell paper mill.

The automation delivery consists of a metsoDNA single architecture control system, which will be used to control and optimize the operation of the 155 MWth circulating fluidized bed (CFB) boiler, steam turbine plant and fuel handling plant.

The new 50 MW CHP plant will reduce the site's carbon footprint by 72%, and will thus help to reduce the company's annual fossil fuel carbon emissions by 250,000 tons per year. About 400,000 tons of virgin and recycled wood diverted from landfill will be used to power the plant.

Power

MW Power supplies biomass power plant to Oü Helme Energia in Estonia



The Graanul CHP plant viewed on the drawing board.

This order is an example of extensive cooperation across Metso's business lines, as the delivery includes not only the biomass power plant, but also a plant automation system from Metso's Automation business line. For MW Power, a Metso-Wärtsilä joint venture, this full EPC order is a very important addition to its tailored CHP-plant references.

The biomass power plant will utilize bubbling fluidized bed (BFB) technology, with a combination of spruce bark, chipped logging residues and wood chips or milled peat as the main fuels. The plant will produce 15 MW of heat and 6.4 MW of electricity, which will be partly utilized in the customer's pellet factory, with the rest being distributed to the national grid. The plant's start-up is scheduled for the end of 2012.

Oü Helme Energia is a subsidiary of AS Graanul Invest, a private equity company specializing in bioenergy and renewable energy production. Today AS Graanul Invest is the biggest producer of pellets in the Baltics, and, due to its high production volumes, is counted among the top five European producers.

Service and reconditioning of recovery boiler at the Arauco pulp mill

In July 2010 Metso's Power business line initiated the service and reconditioning of a recovery boiler at the Arauco pulp mill for Celulosa Arauco y Constitucíon S. A.

The boiler was damaged during the earthquake of February 2010, and dismantling and erection are currently proceeding. Over 250 Metso employees and subcontractors have been involved in restoring the boiler, and work has progressed as planned despite the boiler's poor condition.

A second recovery boiler, which was tilted by the earthquake, had to be lifted back into place. This was done in two stages – the first in September, and the final lift and removal of lifting equipment in October.

Construction

Mobile crushing concept conquers Thailand

Thailand is one of the new countries that have recently taken advantage of the track-mounted, mobile crushing and screening concept. Based on the positive results gained, Silasanon, a family-owned quarry company, is aiming to enlarge its primary

Lokotrack and build a full-scale mobile crushing and screening process.

"The mobile process allows us to refine bigger quantities of the extracted rock – up to two million tons per year – by ourselves. Lokotrack also makes it possible to produce the required end products more flexibly," comments **Chayut Busitarnuntakul,** owner of the Silasanon quarry.

"Our next target is to crush and screen 50% of our total production with the new, mobile process. Later, I would like to have a full track-mounted mobile process, including primary and secondary units, and a mobile screen," he adds.

Recycling

Waste shredding technology gains ground in China

Metso's waste recycling has received orders from major Chinese companies aiming to replace coal with alternative energy sources such as refuse derived fuels (RDF) and municipal solid waste (MSW), i.e. waste containing both domestic and industrial waste.

Metso Denmark A/S believes the emerging Chinese market has massive potential for Metso's product technology. The 15th Conference of the Parties (COP 15) of the UN Climate Change Conference contained a commitment from the Chinese government to substantially reduce carbon emissions. This means there will be a need to replace coal with alternative energy sources such as RDF, biomass or MSW.

The state of the art in pulp-making

Our state-of-the-art pulping technology is a result of long term commitment in developing new innovations, which assure production of high quality pulp in the most profitable and sustainable way. Metso's records as a technology provider and an innovator date back to the very beginning of the history of chemical pulping.

In addition to the longest experience we also provide the largest scope, encompassing all you need from handling of wood up to pulp bales, chemical recovery and mill-wide automation.

www.metso.com/pulpandpaper

metso
Expect results