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Forward

VALMET'S CUSTOMER MAGAZINE | 2/2019

A giant leap

in softwood
pulping

Editorial

Close to you – on site and remotely

Valmet is continuously developing its services business. We want to provide you with the market's best customer experience and services that improve the reliability and performance of your production processes. As a partner, we are committed to safety, available whenever you need us with a professional team you can trust and providing solutions that meet your needs.

Now we have taken further steps in improving our services, especially for pulp and paper customers. During the spring, Valmet acquired two North American-based service and technology companies operating globally. They complement our existing offering especially in chemical pulping, stock preparation, papermaking and paper finishing. The acquisitions also consolidate our local presence and strengthen our global capabilities, with 700 new experts to serve you even better.

Furthermore, Valmet has progressed strongly in commercializing its Industrial Internet services for all the customer industries we serve. I am excited about the possibilities that these open up for our customers. The eight Performance Centers we already have are your highway to our Industrial Internet expertise. We see increasing customer activity in all our Performance Centers, and the latest addition to our Performance Center network, Brazil, has received wide customer interest since its opening in May.

I hope this issue inspires you to receive the full benefit of Valmet's expertise to move your performance forward!



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In brief



Major pulp and board technology delivery for Klabin in Brazil

Valmet has signed contracts for a large pulp and paper technology delivery to Klabin S.A. in Brazil. The order consists of a kraftliner machine (PM 27), a new fiberline, a new continuous cooking system and a pulp dryer rebuild.

The order for the delivery of a kraftliner production line is Valmet's first large boardmaking technology delivery to Brazil.

"Our upcoming new kraftliner production line will be the world's first production line for kraftliner made from 100 percent eucalyptus pulp. We've done a lot of conceptual

and engineering developing with Valmet for this innovative solution that will deliver a high performance kraftliner for the corrugated container industry," says **Francisco Razzolini**, Industrial Technology, Innovation, Sustainability, Project and Pulp Business Officer at Klabin.

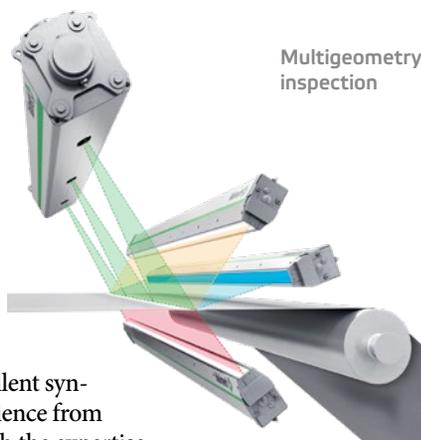
Valmet and Klabin have also signed Letters of Intent (LOI) for the delivery of a second kraftliner machine (PM 28) and a second cooking system and fiberline for which the final agreements are expected to be signed and delivery scheduled to commence in May 2021.

New-generation web inspection system

Valmet has launched a new-generation Valmet IQ Web Inspection System (IQ WIS), which enables board and paper producers to inspect and improve product quality in greater detail. IQ WIS works in real time, enabling immediate root-cause analysis and corrective action. IQ WIS is one of the integral elements of the Valmet IQ Process and Quality Vision system; another element is the Valmet IQ Web Monitoring System.

"The Valmet IQ Web Inspection System has been developed in collaboration with Dr. Schenk, which makes it a showcase of excellent synergy, smartly combining know-how and experience from the world's best inspection system provider with the expertise of a world-class paper process specialist," comments **Marko Toskala**, Director, Quality Management Systems, Automation, Valmet.

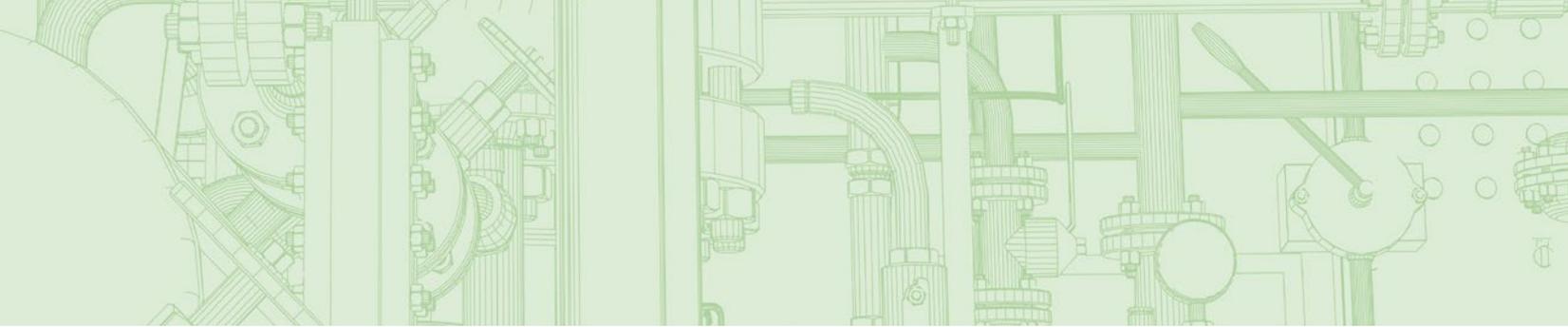
The new-generation Valmet IQ Web Inspection System utilizes intelligent 8K camera technology for high measurement precision. Multigeometry inspection gives more sensitive and reliable defect information. Unique lighting technology enables the detection of print-critical defects that have not previously been visible.



The Valmet ISO certificate (ISO 9001:2015, ISO 14001:2015 and OHSAS 18001:2007) covers more than

70

locations in over 30 countries.



Palm PM 5 to be the largest containerboard machine in the world

Valmet will supply a containerboard making line (PM 5) with extensive mill-wide automation and services packages for Papierfabrik Palm's (Palm) Aalen-Neukochen mill in Germany. The new high-capacity board machine will replace three existing smaller machines and will be designed to produce lightweight and high-quality recycled fluting and testliner grades. The start-up is scheduled for 2021.

"We wanted to make a competitive investment for the next 50 years and aimed for a very wide and high-capacity containerboard machine to be ready for future changes. Valmet was selected because of their high-level and differentiating technology for lightweight grades. The concept was verified during pilot trials," says **Dr. Wolfgang Palm**, Chief Executive Officer of Palm.

The steep start-up curve and optimal production conditions of PM 5 will be ensured with a long-term Valmet Performance Agreement and a comprehensive spare parts and consumables package. The start-up and further optimization of the new board machine will be supported remotely by the Valmet Performance Center and with Valmet Industrial Internet solutions.

Valmet continues to strengthen its stable business

On May 1, 2019, Valmet completed the acquisition of J&L Fiber Services Inc., a manufacturer and provider of refiner segments to the pulp, paper and fiberboard industry. The acquisition follows the recent acquisition of North America-based GL&V, which also strengthens Valmet's stable business.

J&L Fiber Services manufactures and supplies low-consistency refiner segments, which are important wear parts used in pulp and paper production, complementing Valmet's offering in the refiner segments. It also supplies high-consistency refiner segments used in thermomechanical pulping and medium density fiberboard (MDF) refining.

The acquired operations employ about 100 people, most of whom are based in Wisconsin, U.S. The acquired business becomes a part of Valmet's Services business line.

Strengthened automation customer support in India

Valmet has signed a strategic Value-Added Reseller (VAR) agreement for power generation and process industry automation with Fox Solutions in India. The purpose of the agreement is to strengthen Valmet's local automation customer support in India, the Middle East and Singapore.

Thanks to the agreement, customers can be provided with turnkey automation deliveries, including instrumentation and electrification. In India, Fox Solutions focuses primarily on the power

generation industry. In the UAE and Oman, the company serves both the power generation and process industries. In Singapore, the company is active mainly in the process industry sector.

"Fox Solutions looks forward to a long and interesting association with Valmet. We expect a high level of synergy from our mutually shared value systems, focus on technology and customer-centric approach," says **Joy Aloor**, Managing Partner, Fox Solutions.



CUSTOMER'S VOICE

Moving forward together



SCA starts
**world's
largest**
softwood pulp line

The world's biggest production line for bleached softwood kraft pulp is now up and running in Sweden. SCA's massive Helios project, which involved a complete rebuild of the existing Östrand pulp mill, is a textbook example of how a successful project should be executed. **TEXT** Kristofer Sjöblom **PHOTOS** Torbjörn Bergkvist



SCA Östrand's new cooking plant is based on Valmet's CompactCooking™ concept. It is a two-vessel system with an ImpBin™ pre-impregnation vessel, followed by the digester. SCA Östrand's digester is the largest softwood digester in the world, with a height of 64 meters and a diameter of 12.5 meters.

On February 14, 2019, the new SCA Östrand pulp mill was officially inaugurated by Sweden's King Carl XVI Gustaf. The project, which represents the biggest industrial investment ever made in northern Sweden, has resulted in a state-of-the-art pulp mill. In addition to the King, the opening celebration included representatives of the Swedish government, international pulp customers, SCA's owners and a selection of the people who worked on the project. Without a doubt, the Helios project means a lot to SCA, to the company's customers and to Sweden in general.

"SCA and our customers can now rely on a world-class pulp mill in terms of product quality, environmental compatibility and future competitiveness," explains **Ulf Larsson**, President and CEO, SCA. "In addition, Östrand will contribute strongly to growth, employment and economic development in the region, giving many people both direct and indirect long-term positive return from this forward-thinking investment."

A massive project poses major challenges

The massive project was named after Helios, the god of the sun in Greek mythology. It is an awe-inspiring name for a truly huge undertaking which consisted of no fewer than nine sub-projects, all of which were very extensive in themselves. In total, 7,900 people participated on Helios, taking care of everything from construction work, assembly and erection, through to start-up and commissioning of the finished pulp mill.

"We focused on achieving the best total solution in terms of operational consistency, energy efficiency, cost efficiency and final pulp quality."

Ingela Ekebro is the President for Project Helios for SCA and had the formidable task of bringing Helios to reality. "It's been extremely interesting and challenging to set the conditions and create the project infrastructure from the start, and then run it, while coordinating all the various moving parts," she explains. "The successful result means we've been able to build the world's largest softwood pulp line, on budget and on time, without disturbing pulp production in the existing mill. And, most importantly, we've done this without any serious accidents."

↓ SCA Östrand's control room.





€750 million investment in the future

SCA's decision to invest in expanding pulp production capacity at Östrand enables it to increase its volume from 430,000 to 900,000 tonnes per year.

Key factors behind the investment decision:

- Profitable "stand-alone" investment
- World-class competitiveness
- Competitive industry vital for value of SCA's forest land
- Expected stable growth of pulp demand
- Helios facilitates development of future bio refinery

SCA focused on the best total solution

Now, with Helios completed, Östrand's production capacity has doubled to 900,000 tonnes of bleached softwood pulp per year, with the future possibility to expand to one million tonnes. In order to achieve the new 900,000-tonne production level, all of the equipment must operate at peak performance and interact optimally with all the other processes.

"For our selection of suppliers," continues Ingela Ekebro, "we simply focused on achieving the best total solution in terms of operational consistency, energy efficiency, cost efficiency and final pulp quality. We concluded that Valmet offered us the best total solution for the key unit operations – Evaporation, Cooking and Fiberline."

SCA and Valmet have a long and successful history of working together on many unique projects. But, because of its size, this one has been special. "It has been both very stimulating and also a big responsibility to play such a key role in one of the largest industrial projects in Swedish history," says **Thomas Olofsson**, Valmet's project director for Helios. "And SCA is a customer which is always challenging us to find the best solutions. This means that we get extra stimulus in our development work, making us an even better supplier."

Regarding energy efficiency, the evaporator line is a good example of the outstanding effectiveness SCA was seeking to achieve. "The evaporation plant is the world's most energy-efficient facility today, based on pioneering technology," comments **Åke Edwall**, SCA's project manager for the evaporation line sub-project. "It's working

Valmet's scope of delivery

Cooking plant with the world's largest softwood digester

- CompactCooking™ – Valmet's continuous cooking system that gives higher pulp yield, lower rejects and reduced environmental impact.

State-of-the-art Fiberline

- DeltaCombi™ – Coarse screening and fine screening in a single housing. CombiScreen™ has high shive removal efficiency and excellent runability.
- OxyTrac™ delignification with two reaction stages. Valmet's OxyTrac™ system removes up to 65-70% of the lignin remaining after cooking.
- State-of-the-art bleach plant with a customized and optimized bleaching sequence. SCA Östrand produces both TCF (totally chlorine free) and ECF (elemental chlorine free) pulp.
- TwinRoll™ Evolution pulp washers, with high washing efficiency, availability and output consistency, producing low effluent volumes that are achievable only with press-based bleaching.

The world's most energy-efficient Evaporation

- Valmet Super Concentrator with internal liquor heat treatment for stable production of high dry solids liquor. This increases steam generation in the recovery boiler and improves the mill's overall energy efficiency.
- Valmet TUBEL technology allows easy washing, resulting in highest availability in the evaporation plant.



"We put safety at the very top of our agenda right from day one," says Ingela Ekebro, the President for Project Helios for SCA. "For instance, in total 958 safety walks were completed during the project."





↑ “It’s good to know we have the latest available technology to increase our competitiveness for the future,” says Hans Rodling, SCA’s project manager for the new cooking department and fiberline.

perfectly, handling the large water load and recovering enormous volumes of heat, while also allowing us to make methanol to generate green electricity.”

Successful start-up

The first pulp production began on June 23, 2018, Sweden’s Midsummer Day. Finally, after many years of planning, preparation and construction, SCA got proof of what the line could do. And no one was disappointed.

“We achieved excellent pulp quality almost immediately,” Daniel Solberg, SCA’s process manager for the fiberline proudly says. “The start-up was very successful, and we really worked well as a team, both internally in

SCA and together with Valmet.” Thomas Olofsson agrees: “The start-up is certainly what I am most proud of. It was fast and efficient, and after only a few days, SCA had good quality saleable pulp that was being delivered to the market.”

Being part of the project was a unique experience, says Hans Rodling, SCA’s project manager for the new cooking department and fiberline. “It was very exciting to be involved in the installation and commissioning of the world’s largest softwood digester. It’s also good to know we have the latest available technology to increase our competitiveness for the future.”

Training on simulators provided perfect starting point

Prior to start-up, 175 of SCA’s operation and maintenance people were trained by Valmet to manage and maintain the new pulp mill in the best possible way. The training was delivered via several channels, including traditional classroom teaching, self-study through Valmet Online Learning, and hands-on training using pulp mill process simulators. The simulators, especially, were a key part of the success.

“I think the extensive simulator training is an important reason why the start-up went so well,” Ingela Ekebro

“The start-up was very successful, and we really worked well as a team.”

states. “The simulator was very useful, as it gave the operators practical training in running the facility. We actually spent more time on simulator training than Valmet had first suggested, and it clearly paid off.”

Open dialogue is key to success

Many people who were part of Helios have commented on the excellent team spirit, based on straightforward and clear communication which focused on problem solving. “In a project of this size,” explains SCA’s Åke Edwall, “you face challenges every day. When any problem came up, we addressed it directly with the supplier in order to achieve a quick solution. I find that the Valmet people have been very open about these things. This openness has certainly been an important success factor for Helios.”

“Together, we had a great collaboration and willingness to make this work, with a truly results-oriented organization at all levels,” comments Hans Rodling. “Valmet has performed very well as a supplier, and we at SCA have had an excellent insight into and understanding about how everything was proceeding, based on our excellent communication with Valmet’s site management.”

Safety is priority number one

In the Helios project, one item has been more important than anything else: safety. And, thankfully, there has not

been any serious accidents during this enormous project, a result which can be attributed to the rigorous attention that was given to safety and security.

“As we were starting Helios,” Ingela Ekebro continues, “we studied a large number of other big projects like this. It turned out, sadly, that each of them had experienced at least one fatal accident. This fact put the safety issue at the very top of our agenda right from day one. We therefore spent much time and effort setting up an organization to do everything possible to ensure Helios would not suffer a serious accident. We learnt and developed together during the project, and you can never be completely satisfied or stop trying to improve, as long as you have any accidents or near misses. We placed great emphasis on risk assessments and routines, in close cooperation with Valmet and the other suppliers.”

“As a measure of any project’s success, health and safety are the natural prerequisites that everything else is built upon,” concludes Ingela Ekebro. “In the end, everyone is happy that Helios has succeeded so well, both in terms of safety as well as productivity.” ■

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“We achieved excellent pulp quality almost immediately,” says Daniel Solberg, SCA’s process manager for the fiberline.

"The evaporation plant is working perfectly, handling the large water load and recovering enormous volumes of heat, while also allowing us to make methanol to generate green electricity," says Åke Edwall, SCA's project manager for the evaporation line sub-project.

The world's most energy-efficient evaporation

SCA Östrand's new 7-effect evaporation plant is Sweden's largest such line, with an evaporation capacity of 1,150 tonnes of water per hour and producing 82 percent virgin dry solids.

The evaporation plant is extremely energy-efficient, with built-in recovery of excess heat from Valmet's cooking plant and a methanol plant for producing liquid methanol. This enables SCA Östrand to sell surplus energy in the form of green electricity.

"We immediately noticed a clear improvement in the machine operation, web stability and energy saving in paper production," says Stefano Betta, Beloit PMC Responsible.



Drying innovation brings savings

A rebuild of air dyers with new nozzles on Cartiere del Garda's off-line coating machine has increased speed, reduced energy consumption and improved web stability. On top of everything, they can now guarantee their customers better quality – even on lighter grades.

TEXT Kaisamaija Marttila PHOTOS Joonas Nieminen and Kaisamaija Marttila

Papermakers work hard to produce innovative paper products that truly meet the changing needs of both user and market. For Cartiere del Garda this is essential as customers worldwide place their trust in Lecta's brands.

“Our customers expect a high-quality paper product from us, given the type of prints that are made on our paper,” says **Vittorio D’Olif**, who is responsible for the coating process at Cartiere del Garda. Lecta Group’s Garda mill in Italy produces high-quality coated wood-free paper for publishing and advertising work. The top-coated

“We are now able to guarantee better quality to our customers.”

grade weight of the paper varies from 90 to 400 g/m². The mill has two paper machines and two coating machines.

Improved performance with air drying and new nozzles

Sustainability, energy savings and high-end product quality are the key benefits of Valmet's air drying technology.



“The web has much more stability than with the old nozzles. The adjustment was made in only a day and we've found the new system user-friendly,” says Vittorio D'Olif.

As high-end product quality and the environmental performance of the production process are also top priorities for the mill, Garda decided to join forces with Valmet to improve the performance of its coating process.

“We had challenges with high draws, and the web wasn't stable. We also witnessed waves. And the air blow components of the Beloit off-line coater presented maintenance challenges, especially with corrosion,” explains **Stefano Betta**, Beloit PMC Responsible for the rationales behind the rebuild.

Previously, Valmet had successfully installed a new OptiDry Coat air dryer to PM 2, which has an on-line coating machine. On this occasion, the right solution was to install new high-efficiency air dryer nozzles in four old air dryers to improve the drying and quality of the 3rd paper layer. Installation didn't take long, and it went smoothly.

The trust previous projects had built made it an easy decision to turn to Valmet and start planning a solution. “We decided to carry out the project with Valmet because we had already had very positive experiences with them. Their capabilities and our mutual trust made us sure it would be a success,” says D'Olif.



← With the Valmet air dryer nozzles, it is possible to upgrade an old air dryer into a new high-evaporation, low-energy consumption air dryer.



35% energy savings and better web stability

According to the mill, an immediate improvement was noticed in the coating machine operation, web stability and energy saving in paper production.

“Right from the start-up, we have been able to push the coater further in terms of speed, which has provided several benefits without affecting final product quality, and this has made it possible for us to improve the machine’s performance in every area,” says Betta.

Energy consumption is 15-35% lower, depending on the grade produced. In the past, the mill needed to reduce the speed on certain grades, but no longer. With some grades, Garda has been able to run faster without compromising quality.

“We are now able to guarantee better quality to our customers, even in lighter grades. Waviness is no longer a problem. Our customer satisfaction is higher now, as they don’t have defects in printing like ink spots, and the printability is good. The market is challenging at the moment, so it’s good to keep the customers happy,” says D’Olif. ■

↑ From left: Stefano Betta, William Mascher and Vittorio D’Olif of Cartiere del Garda.

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Light, strong and 100% recycled

To respond to market trends and produce containerboard with both outstanding strength properties and corrugated board print surface characteristics, Pratt Industries recently invested in two Valmet OptiConcept M board machines.

TEXT Marika Mattila

In the US, the use of recovered paper in paper and board making is growing. Recovered paper accounts for about 38 percent of the fiber used to make new paper products. This trend is important from the sustainability perspective. For example, every tonne of paper recovered saves 3.3 cubic yards of landfill space (www.afandpa.org).

Toward lighter but stronger corrugated board

Sustainability is also a cornerstone at America's fifth largest corrugated packaging company Pratt Industries. The company has invested in a Valmet-supplied 100 percent recycled board production. The PM 16 OptiConcept M board machine in Valparaiso, Indiana, started up in 2015,



↑ Pratt is America's fifth largest corrugated packaging company and the world's largest privately-owned 100 percent recycled paper and packaging company, with more than 7,000 highly-skilled, green-collar employees dedicated to sustainable board making.

and the latest board machine, PM 17 in Wapakoneta, Ohio, will start up in 2019.

Pratt Industries' mission is to provide the industry's best packaging solutions with innovative and modern containerboard technology to manufacture advanced grade structures for lighter basis weights. The target is to produce containerboard with both outstanding strength properties and the print surface characteristics of corrugated board. **Jay Hennessy**, Mill Manager, shares his experiences of the PM 16 in the Valparaiso mill. The machine has been running for over three years now.

Shared innovativeness and ingenuity

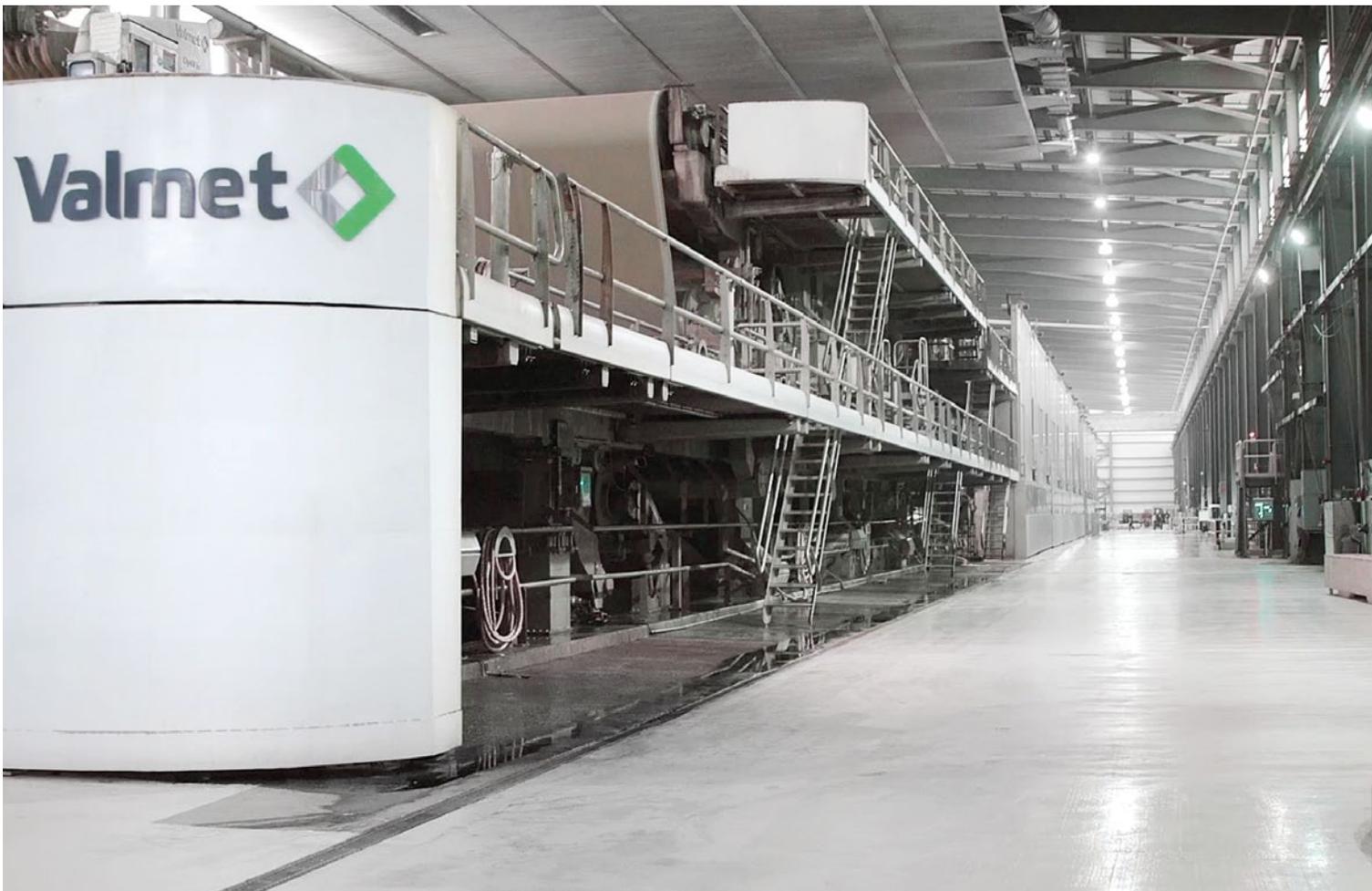
"To stay in this business, you need to produce high-quality products, have the market and be very cost competitive. You also need partners with core capabilities – and Valmet has brought a lot of them to the table. They are very innovative, with a lot of ingenuity. During the start-up in September 2015, we collaborated very closely with Valmet, and as a result, the start-up was really smooth and fast. The pre-training Valmet offered allowed the

Pratt team, who'd never made paper in their lives before, to get this machine up and running at short notice. Within a day or two, we had paper on the reel continuously," says Hennessy.

Combination of automation and process technologies stands out

The PM 16 has numerous quality-enhancing features, including specific wet end, pressing and drying equipment using the latest technologies.

"Efficient use of water, electricity and raw materials is important for our customers, who realize the importance of sustainable packaging."



“The world-class automated winder is the best I’ve ever worked with. The dryer section is designed for high speed, and I’m very impressed with the sheet handling process. The press section delivers excellent strength properties and dewatering capability, creating a nice combination with the forming section.”

“Having the full automation coupled with the machine supply worked out very well for Pratt. The DCS and MCS integration, with the informative displays and the know-how Valmet brought to the table, is invaluable. Overall, it’s a good package,” Hennessy says.

Repeat order for OptiConcept M board production line

Valmet is to supply another OptiConcept M board production line with an automation system for Pratt’s new greenfield paper mill in Wapakoneta, Ohio, USA. This mill will also use 100 percent recovered paper to produce lightweight and high-performance linerboard and corrugated medium grades. The start-up is scheduled for the end of 2019. ■

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↑ Pratt’s PM 16 started up in 2015 and it produces high quality lightweight containerboard in Valparaiso. Valmet’s scope of delivery included a complete OptiConcept M board production line from headbox to winder with a wide scope of automation.

→ According to Jay Hennessy, Mill Manager of Pratt Valparaiso, the start-up of the Valmet-supplied PM 16 OptiConcept M board machine was really smooth and fast, with very close collaboration.





Smooth transition to new bleaching line



A new bleaching line project for one of the world's biggest pulp producers exceeded expectations in many fronts and received a provisional approval in record time thanks to excellent project planning.

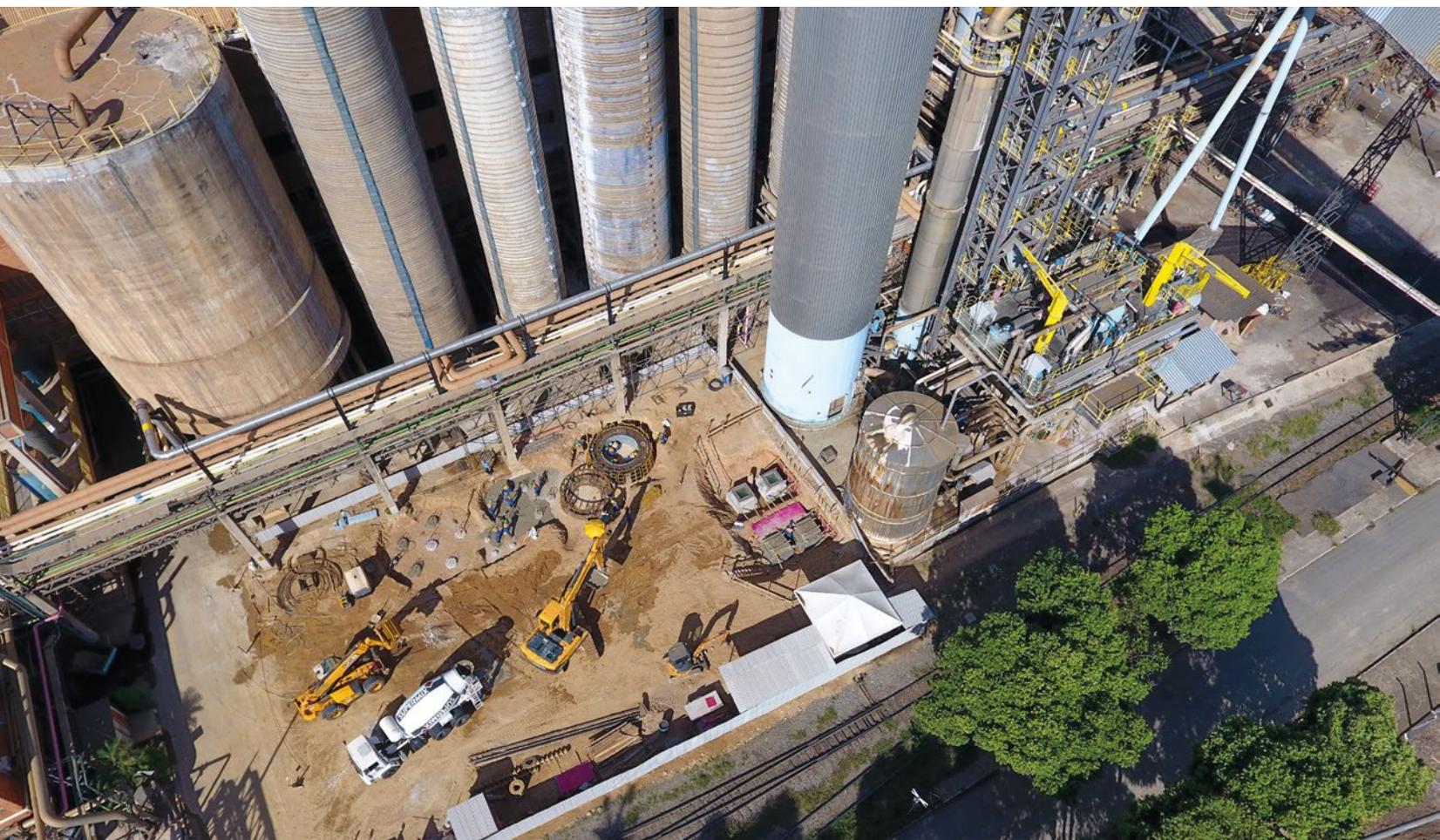
It was not an easy job — to install a new pulp bleaching line within the limited space available at Cenibra's pulp mill, located in Belo Oriente, in the state of Minas Gerais, Brazil. Cenibra is one of the world's biggest producers of bleached eucalyptus pulp producing approximately 1,200,000 ADT/year, of which 95% is exported.

From challenging targets to record-breaking result

With a capacity of 600,000 ADT/year, the new bleaching plant replaces the original plant built in 1977. The objective of this plant modernization was to reduce chemicals, energy and water consumption as well as to decrease effluent generation.

The project took only 18 months to complete—from the signing of the contract to start-up. Another important target was to minimize the production loss during the start-up of the new bleaching plant that replaces the old bleaching plant.

Synergy and know-how from both the Cenibra and Valmet teams - both locally and by Finnish and Swedish engineers - and efficient and proactive action/trouble-shooting during the project were rewarded with a record-breaking result — an operating line within 24 hours



after the start-up of the new line with 96% of its design capacity, with no production losses.

Space-efficiency seals the deal

When looking back, success does not completely remove the challenges experienced in such a complex process. “I think we all agree that the main challenge was the project layout. The new bleaching line needed to be next to the digester and the drying area. Also, it had to run simultaneously with the old line 1, still in operation at that time,” remembers **Julio Ribeiro**, Industrial Director at Cenibra.

Agostinho Salgado Alves, Valmet Project Manager, says that one feature that helped to close the deal was the size of Valmet’s equipment, a crucial factor when considering the challenge posed by the amount of space available. “We needed to use the area effectively,” sums up Mr. Alves. Another key factor was the more attractive cost-benefit ratio of Valmet’s offering. “Investment in this project would bring a substantial operational cost reduction in the long term,” he adds.

50% reduction of in water, energy and steam consumption

One year later, the results are positive and expectations have been reached. “With almost one year in operation, the line allowed for a reduction of 50% in water, energy and steam consumption. Now we are adjusting chemical consumption, but reductions are already significant,” explains **Naohiro Doi**, CEO at Cenibra. “We have also experienced a reduction in fiber losses as well as increased washing efficiency.”

Smooth transition

The new line 3 was built at the same time as line 1 was in operation. One goal in the transition to the new bleaching line was to cause minimal impact on production. “We called this period a learning curve. In this project, that curve was almost undetectable as long as the new bleaching line reached the designed production level in less than three days,” reports Mr. Alves.

“For the start-up, we had one shutdown at the old production line for 12 hours for implementing the last system connections and loading distributed control system (DCS) programs. So there were no work overload or unplanned production losses,” he summarizes.

↑ “I think we all agree that the main challenge was the project layout. The new bleaching line needed to be next to the digester and the drying area,” says **Julio Ribeiro**, Industrial Director at Cenibra.

The new line started operation with 96% of its design capacity.

Leandro Dalvi, Production Manager at Cenibra, says that the initial plan included a 30-day learning curve. “Besides that, we have already reached our goals due to the tests carried out together with Valmet,” he explains. In view of the available area, Mr. Dalvi was surprised with the final result, saying: “It was incredible. Nowadays we can expect more from the equipment as they are more modern and flexible.”

A steady partnership

For **Flávio Marcelo Correia**, Industrial Board Assessor at Cenibra, this partnership was the key for the project success, and the good references received from Valmet in other group companies also contributed in a positive way. “The expertise of Valmet professionals and the assistance of the Finnish and Swedish teams were also key points for supplying technical support with responsiveness and troubleshooting,” he says.

According to **José Manoel Leite Neto**, Project Coordinator at Cenibra, Valmet’s assistance was one of the main



↑ Naohiro Doi, CEO, and Julio Ribeiro, Industrial Director at Cenibra, followed all phases of the challenging project.

contributing factors for this partnership. “After start-up, Valmet along with Cenibra has followed the line performance and also given the necessary support for adjustments in a fast and assertive way,” he says.

Continued cooperation on line 2

After this successful joint effort, Valmet entered into another partnership with Cenibra for modernizing bleaching line 2, which dated from 1995. For this modernization, atmospheric diffusers will be replaced with wash presses to achieve benefits similar to the last project. “Our objective is to increase the production capacity, improve processes and make the company more competitive,” says Naohiro Doi, CEO at Cenibra.

For **Igor Panassol**, Sales Manager for the fiber line at Valmet in South America, this project shows the customer trusts Valmet’s technology and delivery capability. “A great job carried out with Cenibra in the last project for the new bleaching line, as well as our excellent business relationship, was essential in this process. The customer will benefit from this project in terms of maintenance and OPEX,” he states. ■

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Celebrity Edge, the first Celebrity Cruises Edge Class cruise ship in service, showcases the latest in safe, reliable and sustainable sailing. At the heart of the ship is the Valmet DNA distributed control system, providing fully redundant onboard automation.

TEXT Soili Städter PHOTOS Soili Städter and Celebrity Cruises



At the Edge of innovation



Starting with the hull, which is devised to minimize friction when the ship is in motion, the entire vessel is designed for efficient performance. “We believe this is a change in industrial design in the marine business,” states Staff Captain **Mattaios Karandreas**.

At the heart of the ship is the Valmet DNA distributed control system, which provides fully redundant onboard automation designed to handle the control and monitoring needs of the advanced Celebrity Edge. The ship also employs Valmet’s exhaust gas scrubbers.

“We’ve worked with Valmet since 2000 and never had any problem with cooperation. It’s important for us to

have a trustworthy and reliable partner to work with,” Karandreas emphasizes.

The latest and greatest in automation

Celebrity Edge is equipped with several advanced control solutions from Valmet. The Valmet DNA automation system is used for the machinery system, Power Management system, Emergency Shutdown (ESD) system, HVAC and the entire public area. The newly launched Valmet DNA Sea Optimal Mode enables the most fuel-efficient use of the diesel engine plant. Users can also access event history and analyze tools through the Valmet DNA Operate Trend and Event Archive.

Tools for safe operation and troubleshooting

The automation system ensures reliability and safety while allowing absolute control to Chief Electrical Engineer **Patrik Matos**. The Valmet DNA Operate Trend and Event Archive gives him an insight into the most important areas of the ship to guarantee everything is under control.

The system allows engineers to make reports to ensure certain items are checked regularly, which adds another level of security. All the data is stored securely for reference.

Each user of the automation system can customize their own operations desktop by selecting the necessary process windows. This feature grants users easy access to the most relevant information.

“The trend history tells me a lot. I can scroll through the time range and quickly dig into the details. At the same time, you learn more about the process and are also able to draw some conclusions,” Matos says.

A safe and magical ride

One of the incredible onboard innovations is the Magic Carpet. Located outside the ship’s hull, this is a space where passengers can have dinner, listen to live music and enjoy the sea breeze.

The ship’s ESD system plays an important role in ensuring the safety of the Magic Carpet. Aboard Celebrity Edge, ESD is effectively integrated into many areas to protect equipment and people from danger or failure. Matos

The automation system ensures reliable and safe sailing.



Chief Engineer Stavros Zannikos sees Celebrity Edge as a model project for building sister ships in the future: “The feedback can be taken to the next vessel, utilizing all the best practices.”





↑ "I'd say these are the best scrubbers on the market," says Staff Chief Engineer Kostas-Konstantinos Topalis.

adds: "Our Magic Carpet is one of the areas where ESD is used for the carpet's gates. Even when we're offering new experiences to passengers, however, their safety is our priority?"

Environmentally friendly flue gas cleaning

Celebrity Edge also employs Valmet's exhaust gas scrubbers. Both the scrubbers are hybrid versions with open and closed loop operation. The scrubber system's features, size and operation mode are all customized for the ship. Naturally, the Valmet DNA system is also used to track the scrubber operation. It uses the same interface, easing the burden in the engine room.

The Valmet OptiFilter water treatment system reliably cleans the scrubber washwater, without the need for additional chemicals. With the scrubbers, the vessel meets even the tightest emission requirements throughout the world.

The operation of the scrubbers can also be followed in the Valmet DNA system.

Striving toward sustainability

Sustainability at sea is one of the top concerns for Celebrity Cruises. Celebrity Edge takes the company's efforts to interact sustainably with the environment to the next level. With numerous advanced control features from Valmet under the hood, the vessel is well on her way to reducing pollution in the environment. The transformational ship is equipped for safe and sustainable sailing across the Caribbean's waters – and even on to the Mediterranean. ■

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Finding the sweet spot

for the polymer dose

The Mitchells Plain Wastewater Treatment Works installed two Valmet Total Solids Measurements (Valmet TS) in its sludge cake pipelines to provide inline feedback on the dry solids percentage of the sludge cake. The data revealed an interesting finding for optimal polymer dosing.

TEXT Veska Spassov, Kevin Samson, Zaheer and Ortell*

Sludge handling and dewatering contributes a large percentage to the operating cost at a municipal wastewater treatment works, specifically through the use of flocculation aids such as polyelectrolytes. During a recent extension and upgrade to its sludge dewatering facilities, the Mitchells Plain Wastewater Treatment Works operated by the City of Cape Town, South Africa, took the opportunity to conduct a long-term pilot trial of emerging technologies in municipal wastewater treatment. The plant currently treats approximately 400,000 population-equivalents of predominantly municipal wastewater.

From visual to quantitative evaluation

The cost of purchasing polymer is up to 10 percent of the total process-driven cost, and between 15 and 25 percent of the sludge dewatering costs. While other process parameters can be optimized by measurement (such as the measured Dissolved Oxygen or Ammonia concentrations used for aeration), the traditional sludge dewatering control had been for the most part left to visual evaluation and the experience of the operator on duty, with intermittent sampling and laboratory analysis. The installation of two Valmet TS measurements directly measuring the water content of the sludge cake offered the opportunity to augment the qualitative experience and visuals with quantitative numbers.

Trial for polymer dosing

Mechanical sludge dewatering at Mitchells Plain is achieved with belt filter presses. The dewatered sludge cake is conveyed to open-hopper progressing cavity pumps, which in turn pump the cake into elevated hoppers for removal by truck. Two Valmet TS units were installed in June 2017, one in the Primary Sludge pipeline and the second in the Waste Sludge pipeline.

The main operating parameters for effective belt press operation are solids loading (in kg per hour) and polymer dosing (kg of polymer per tonne of solids). Valmet now also supplies the operator with cake dryness, which can be used to observe and develop trends showing relationships between the polymer dose and the cake solids content.

Based on a trial of different polymer dosing rates throughout a shift, the operator maintained a reasonably consistent sludge cake output of between 13 and 14 percent dry solids.

"Sweet spot" for polymer dose

For primary sludges, the relationship between the polymer dose and the sludge cake output has been reasonably consistent, with a clear "sweet-spot" between 2.2 and 2.5 kg Poly per dry tonne of solids. This relationship has confirmed the experience observed at other City of Cape Town facilities. However, waste sludge has yielded an interesting result. Two sweet-spots have been observed, notably at approximately 3.5 kg/dry tonne and 5.5 kg/dry

The optimal polymer dosing rate represents a polymer saving of approximately 20 percent.

tonne, with sludge cake achieving results of 14 percent solids consistently at the desired loading of 200 kg/hr/meter of belt width. The dewatering performance is less successful in the range of 4.0 to 5.0 kg/dry tonne.

The overwhelming conclusion is therefore that – with other parameters being equal – the City of Cape Town operators should strive to operate at the lower dosing rate of 3.5 kg/dry tonne. Bearing in mind that the earlier operational costs were initially calculated on the basis of 5 kg/dry tonne of solids, equivalent dewatering results can now be achieved using between R200,000 to R400,000 less polymer per annum. This represents a polymer saving of approximately 20 percent. The sludge cake solids content information supplied by Valmet TS has also enabled operators to more rapidly become accustomed to the sensitivities of dewatering process control. ■

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* The article is based on a conference paper

"I value the straightforward manner in which Juha Heikinmatti takes care of us – sometimes it's difficult to remember whose coat he's actually wearing," Janne Sihvo (left) says.



It's a shared journey

Stora Enso and Valmet have a long history of working for better results at the Veitsiluoto Mill. The cooperation has brought benefits ranging from economies of scale to joint innovation, and helped the mill to improve their production capabilities over time. **TEXT** Marianne Valta **PHOTOS** Marianne Valta and Stora Enso

Stora Enso's Veitsiluoto Mill in Kemi, Finland, is the world's northernmost paper mill and among the largest paper and paperboard mills in Europe. Located in the Bothnian Bay, the mill ships around 850,000 tonnes of paper annually. Veitsiluoto Mill is Valmet's biggest seamed press felt customer, but it's also an important partner in many other ways.

TCO Agreement pays for itself

Veitsiluoto Mill and Valmet have a long history of trust. In 2013, Valmet and Stora Enso signed the first TCO Agreement (Total Cost of Ownership) for paper machine clothing. The agreement includes the fixed-fee delivery as required of paper machine clothing like press felts and forming fabrics.

The agreement, currently effective until 2022, was renewed earlier this year and it includes PM 2 and PM 3.

"The TCO agreement is care-free and lets us reallocate some of our resources – Valmet is responsible for the warehouse and the whole order/delivery process. The agreement is also economical. Our inventory value for paper machine clothing is zero: We know the monthly fee and can budget accurately. We also benefit pricewise from the high total volume of our purchase," explains Production Director **Janne Sihvo** from Stora Enso.

Openness ensures development

According to Sihvo, the cooperation between Veitsiluoto Mill and Valmet is a lot more than an agreement on paper.

"Over the years, we've developed an open and trusting relationship which enables development and growth for us both. Valmet has reacted well to our constantly changing requirements, and together we've searched for answers in challenging situations. I value the straightfor-

“Over the years, we’ve developed an open and trusting relationship, which enables development and growth for both of us.”



ward manner in which our Valmet contact person **Juha Heikinmatti** takes care of us – sometimes it’s difficult to remember whose coat he’s actually wearing,” Sihvo winks.

Heikinmatti is equally thankful for the smooth cooperation.

“I dare to say that our efforts here at Veitsiluoto have benefited Valmet’s R&D on many fronts. The people at Veitsiluoto Mill are always ready to discuss and test new products. I feel we’re trusted. I used to work at the mill myself, so I’m familiar with the machines and the mental-ity here – an absolute asset,” Heikinmatti says.

Veitsiluoto Mill is a pioneer user of seamed press felts

Valmet has been investing in the development of seamed press felts for a long time. In the last few years, Valmet has further improved the seam area and developed special tools to ease seaming.

Originally, the seamed press felts were introduced as a game-changer for occupational safety. Easy installation is also a key benefit: Replacing a seamed press felt with a new one takes one or two hours by two or three people. Changing the traditional press felt can be done in three or five hours, and more people are needed.

At Veitsiluoto Mill, the seamed press felts were first tested position by position at the start of the millennium. PM 2 and PM 3 gradually started to use the seamed press felts after 2010, and today, the traditional endless press felts are no longer in use. PM 5 has followed, and seamed press felts have now been in use for several years.

The start-up has not been totally trouble-free, but the challenges have been overcome one by one.

“Each press unit in each paper machine has its individual character, demanding a lot from the press felts. The challenges have been related to web breaks caused by the seam area. Together, we’ve searched for the root causes, and Valmet has further developed the seam area and felt structure. The effort has paid off, and we wouldn’t change back to using traditional press felts,” Sihvo says.

Continuous development is a must

To succeed, you have to find ways to improve your business on a permanent basis. For example, at Veitsiluoto, the machines are operated with a steadily increasing speed – placing extra pressure on seamed press felt development.

“I’m satisfied with our cooperation. Valmet has always looked after our requirements and wishes. Challenges are part of the game, and how you face them matters. I can believe Valmet wants to be number one in what they do, just as we want to be the best in papermaking,” Sihvo concludes. ■

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Stora Enso’s Veitsiluoto Mill in Kemi, Finland, is the world’s northernmost paper mill and among the largest paper and paperboard mills in Europe.

Expertise to the finest detail

Valmet is committed to moving its customers’ performance forward by continuously developing its products and services. **Juha Heikinmatti**, Senior Product Sales Manager at Valmet, is a walking example of a true professional working close to the customer.

“For ten years, I worked in different positions at Stora Enso’s Veitsiluoto Mill. I know the machines like the back of my hand, consider the people there my own and I know about papermaking – all this helps me to see how Valmet’s products and services would benefit the operations at Veitsiluoto,” Heikinmatti says.

In addition to their own contact person, Valmet’s customers can call on a wide range of expertise. At Veitsiluoto, the use of seamed press felts has supported the development of suction boxes. Today, the traditional suction box covers have been replaced with Valmet’s perforated covers.

“Using Valmet’s suction box covers requires less vacuum, thus creating energy savings. The cover’s special design is also gentler on the seamed press felt, decreasing wear. The papermaking process is quite complex, and even the smallest details matter. With our expertise we can impact them all,” Heikinmatti promises.

Better process control, lower NOx emissions

Bord na Móna's Edenderry Power Plant in Ireland has reduced its NOx emissions with an advanced process control application, the Valmet DNA Combustion Manager.

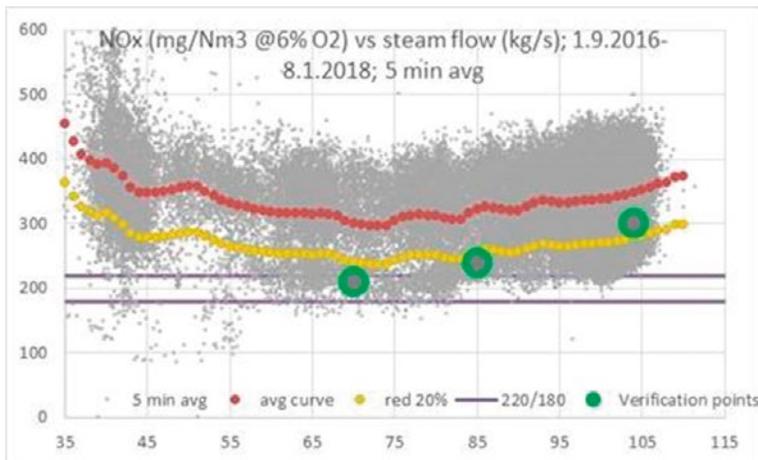
TEXT Marjaana Lehtinen PHOTOS Edenderry Power Plant and Matts Almark

Like many large combustion plants in the EU, the Edenderry Power Plant is faced with the challenge of lowering its NOx emissions and meeting a new projected 220 mg/Nm³ daily and 180 mg/Nm³ yearly limits defined by the Industrial Emissions Directive.

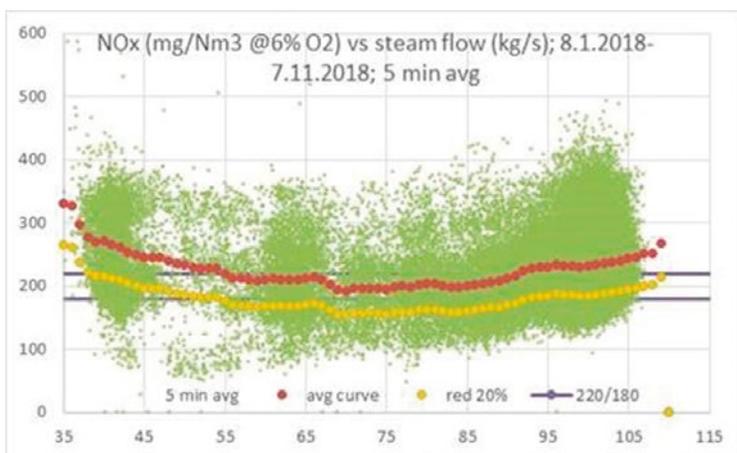
The 128 MWe plant, which started up in 2000, generates electricity by co-firing, with a typical energy mix of 60 percent peat and 40 percent biomass. Co-firing with biomass has produced impressive results and significantly reduced the plant's carbon footprint over the years. The focus is now on NOx emissions.

“With a reduction in our emissions coming into force during 2020, we needed to start a program for emission reduction and product selection. In conversations with

“The 30 percent NOx reduction equals the emissions of approximately 100,000 diesel cars.”



Average NOx level as function of boiler load before optimization project (including verification points used for estimating tuning potential).



Average NOx level as function of boiler load after optimization project. NOx level reduced by 20-30 percent. At medium load, range emission limits are met without the requirement of secondary control measures. At minimum and maximum load, the general NOx level is sufficiently reduced for the emission limit to be met utilizing the upcoming SNCR system.

Valmet's Service Manager **Nigel Earp** and Business Development Manager **Chris Heywood**, we understood that Valmet had the ability to develop boiler controls which could improve boiler efficiency while lowering NOx and CO emissions,” says **Padraig Nolan**, Thermal Plant Manager at Edenderry.

The bubbling fluidized bed (BFB) boiler was built by Valmet (Kvaerner at the time) in 1999, and cooperation has continued over the years in various improvement projects. “Valmet has proven a reliable supplier of services and has always stayed with us to ensure the service they promised is delivered and if possible exceeds their original promises. The automation solution that Valmet proposed was the first installment of our de-NOx program, effectively picking up the low-hanging fruit,” Padraig points out.

Evaluating improvement potential

The NOx project started in 2017, with Valmet conducting a process improvement study to evaluate the potential for emissions reduction with the Valmet DNA Combustion Manager.

In early 2018, this advanced process control application for optimized combustion was installed in the plant's existing Valmet DNA automation system. It is based on the Industrial Internet and designed for a bubbling fluidized bed (BFB), circulating fluidized bed (CFB) and waste-to-energy boilers to manage the combustion process against variations in production, fuel amount, fuel quality and combustion circumstances.

“The project team worked very effectively and efficiently. We had the advantage of Valmet working with the original distributed control system (DCS) system, which minimized any potential complications that come with introducing unfamiliar packages,” Padraig says. “The project duration was accurate. We could see improvements as soon as the improved controls were implemented.



Edenderry Power Plant.

Over the next few months, Valmet made some adjustments based on results and operator experience which could be completed while the unit was online.”

Lower CO levels and NOx emissions

The plant is very pleased with the results. “With the fuzzy logic now in place, the controllers are adjusting constantly, working together to ensure we have the fuel in the right place and air staging at the most optimal point. CO levels and NOx emissions have reduced, and this is the case right through the unit’s load range. As our minimum load is 35 percent of our maximal output, the efficiency improvement and NOx reduction at the lower load is significant. The solution is reliable, and the tweaks we work together on mean the improvements are ongoing,” Pdraig continues.

The main benefits for the process include NOx and CO reduction, improved bed temperature control and higher efficiency. The 30 percent NOx reduction – 320 tonnes per year – is equivalent to the emissions of approximately 100,000 diesel cars.

“This project is a good example of utilizing combustion optimization and advanced control systems as part of the Best Available Technology (BAT) to meet more stringent emission and efficiency requirements,” adds **Matts Almark**, Product Manager, Power Plant APC, Valmet.

Results exceed expectations

Valmet’s expertise in control technology was spot on for the plant’s requirements. Pdraig continues: “The team

displayed a deep understanding of our process and equipment. This gave us comfort in allowing the guys to make the adjustments during the test phase. The results speak for themselves; we have seen results that consistently exceed the original expected improvement, meaning the second phase of NOx reduction, which will be in place toward the end of this year, will have an easier task in achieving our new limit.”

NOx reduction was the plant’s top priority for this project. “We never expected to achieve the new 2020 limit but had hoped to make improvements which meant the next phase of NOx reduction could be achieved. The high capital cost associated with a Selective Catalytic Reduction (SCR) system and the fact we have biomass in the fuel stream meant an SCR was not an option for us, so we are currently installing a Selective Non-Catalytic Reduction (SNCR) system which will complement the Valmet solution in achieving our target. Process stability has improved with the improved controls.”

Pdraig thinks highly of the cooperation with Valmet. “We found the Valmet guys open to sharing information and listening to the experience of our teams, which fed into the testing and programming of the package. We find it comforting that the team reviews the performance of the solution, and that their recommendations are based on the findings.” ■

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Improved profiles with new QCS systems

New quality control systems (QCS) in both paper machines at Bäckhammar paper mill have drastically improved grammage and moisture profiles while reducing profile variations.

TEXT AND PHOTOS Sören Back

Bäckhammar Mill in Sweden is the biggest pulp and paper mill in the Nordic Paper Group and has an annual capacity of 230,000 tonnes of unbleached kraft pulp and 160,000 tonnes of unbleached kraft papers. The mill has two paper machines, PM 4 and PM 5, and their QCS systems were old and needed replacing.

Targeting a 20 percent reduction in 2 sigma variations

PM 5 is a Fourdrinier machine with a capacity of 110,000 tonnes of sack kraft paper in grammages between 58 and 130 g/m². To give maximum stretch properties to the sack paper, the press section consists of five drying cylinder groups, one expanda and an air dryer section.

“The installation of a new system had to be done during our annual maintenance break in September 2016,” says **Thomas Skoglund**, Project Manager for the recent QCS upgrades at Bäckhammar Mill. “So we had meetings and discussions with potential suppliers to find

“The new slice control and QCS system resulted in substantially better cross-direction profiles.”

the system that would best suit us. Apart from price and support, our target – and hence demand – was to achieve at least a 20 percent reduction in the 2 sigma variations of the oven dry weight profiles. Having evaluated offers from various suppliers, our choice was a QCS system from Valmet.”

The project comprised the upgrading of the headbox’s dilution controls, an IQ 2015 Scanner measuring grammage, moisture and porosity, a moisture sensor at a fixed point before the expanda unit, MD and grade change controls, as well as communication links between IQ and the distributed control system (DSC) system.

New slice controls on PM 4 headbox

PM 4 is also a Fourdrinier machine and produces unbleached MG kraft paper in grammages between 38 and 120 g/m² with a capacity of 50,000 tonnes. The MG kraft papers from Bäckhammar are used as bags and wrapping papers, for example.

“Apart from a new quality control system for PM 4, we also needed to replace the old slice controls of the headbox,” Skoglund continues. “Again, we evaluated offers from various potential suppliers, and this time we also decided to go for a QCS system from Valmet.”

The slice control and the QCS system were installed during a maintenance break in September 2017. The whole project comprised an IQ with cross-direction control, one IQ One-Sided Scanner in the dryer section before the Yankee cylinder, an IQ 2015 Scanner measuring grammage, moisture and porosity, MD and grade change controls.

Improved cross-direction profiles

Porosity is an important sack paper property, and measurement of porosity profiles is therefore incorporated in both IQ Scanners to ensure production runs to porosity targets. Control of the porosity level is achieved by allowing the vacuum level in the couch roll decide how the LC refining is done.

“The new slice control and the QCS system from





Valmet on PM 4 also resulted in substantially better cross-direction profiles,” says Skoglund. “Our target was a reduction of at least 20 percent in the cross-profile variations measured as 2 sigma, which was significantly exceeded on some qualities and barely missed on others. All in all, we now have a better quality situation for both machines.”

Continued cooperation in services

“Today, we have a service agreement with Valmet, allowing 80 hours per year to be used for both machines,” says **Ulf Henriksson**, Automation Manager at Bäckhammar Mill. “Cooperation between Valmet and our staff is working well.”

“To sum up both QCS projects, Valmet was the best choice for us, even though they had not supplied us previously. There have been some problems during the projects, but almost all have been solved, and solutions for the few that remain will soon be in place. Regarding the PM 4 project, it was definitely an advantage that Valmet could both do the necessary technical upgrading of the headbox and install the new QCS system,” Skoglund continues. ■

Thomas Skoglund and Tony Tran, Nordic Paper Bäckhammar, and Kari Veikkolainen, Valmet, are happy that the PM 4 profile variations have improved considerably.

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Xin Bo, Valmet Senior Sales and Application Manager, is undertaking a routine inspection at the site.

From waste to energy

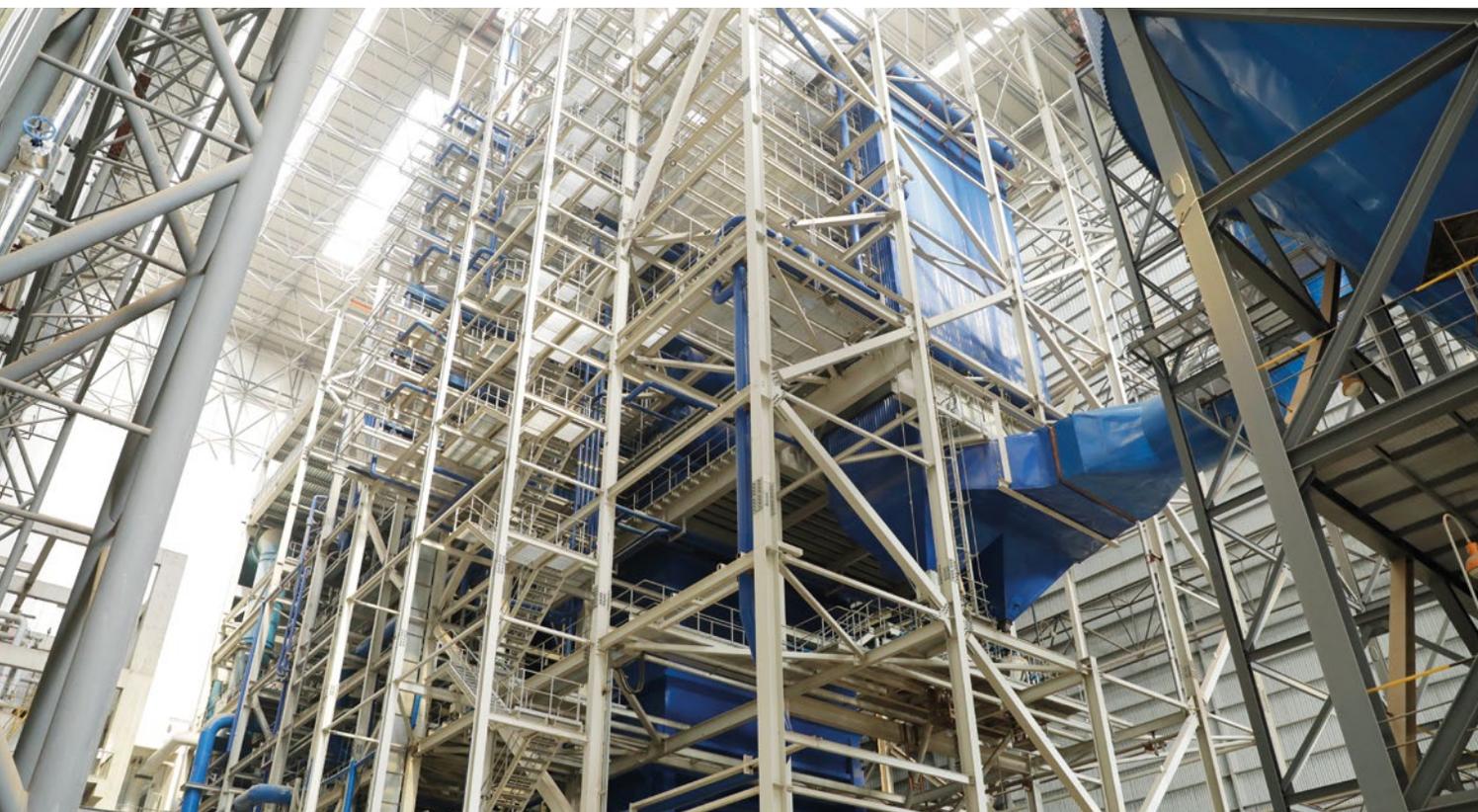
Zibo Green Energy New Energy Co., Ltd. is the first company in China to utilize Valmet's advanced circulating fluidized bed (CFB) boiler technology for turning waste into energy. Besides raising its performance to the next level, their example is setting the direction for the entire municipal Waste to Energy segment. TEXT Sara Li

"Our company is dedicated to the recycling of solid municipal waste. By turning waste into heat and electricity, we can greatly offset the impact of pollution on the atmosphere, water and soil," says **Ms. Wang Yuanluo**, Chairman of China Jingjiang Environmental Holdings Co., Ltd., the parent company of Zibo Green Energy New Energy Co., Ltd. "We handled 8.25 million tonnes of municipal waste in 2018, and generated 2.23 billion kWh of electricity, which can meet the electricity needs of 1.65 million families."

"According to China's 13th Five-Year Plan, the amount of waste incineration for power generation in 2020 should reach 50 percent of total innocuous waste treatment. What's more, China's economy continues to operate in a stable manner, which provides the enterprises like us a very good environment for development," says Ms. Wang in describing the industry's market prospects.

A breakthrough in the technical bottleneck

"Back in 2016, the performance of our fluidized bed technology had reached bottleneck. Indeed, this was the



↑ The Valmet CYMIC boiler at Zibo Green Energy New Energy Co., Ltd.

case for the entire area of domestic waste incineration for power generation. There had been no revolutionary technology breakthroughs for years. To enhance our company's fluidized bed technology performance and brand value, we chose to go for internationally recognized advanced technology."

Ms. Wang continues: "Valmet technology represents the world's top-performing technology, and they are renowned worldwide. The equipment has very high processing capacity and operating efficiency, and it allows the integration of a large amount of automation and after-sales services. We also value the level of their tech-

nical expertise and service quality, which is why we chose Valmet as our main equipment supplier."

Good adaptability

"As the first company in China to introduce advanced foreign fluidized bed technology, the biggest challenge was whether the foreign technology could adapt to the domestic scene: The water content, heat value and ingredients of waste in China differ markedly from those of foreign countries," says **Mr. Wang Rupei**, General Manager of Zibo Green Energy New Energy Co., Ltd., of the challenges at the beginning of the project. "However, we were very pleased to see that Valmet technology's adaptability was excellent."

"Our first start-up was in April 2018. Everything went well, and after 51 days of preparation, the boiler's pipe blow work was completed on June 5: high-quality steam entered the steam turbine, and electricity was successfully generated. We then conducted a 168-hour test run. During the entire test run, all operating parameters met the expected requirements, and all the performance indicators reached our expectations," Mr. Wang says in describing the adaptability of the equipment, which he is very satisfied with.

"We were also worried about the adaptability of personnel cooperation, because neither our own employees nor subcontractors had any experience of working with foreign teams. But it turned out that such concern was unnecessary. Valmet's project team was very professional

Waste incineration for over 20 years

Zibo Green Energy New Energy Co., Ltd. is located in Zibo city, Shandong Province, China. It is affiliated to China Jinjiang Environmental Holdings Co., Ltd., the first privately owned operator of waste incineration for power generation in China, and has been in operation for over 20 years. As of March 31, 2019, Jinjiang Environmental has 20 power plants and 4 waste recycling projects in operation, and more than 30 environmental projects under construction and preparation.

“The efficiency of the boiler is currently the highest in China.”

and dedicated. Good communication ensured mutual understanding and respect, and created a strong basis for the successful achievement of shared goals. I'd like to take this opportunity to thank both teams for their outstanding work,” says Mr. Wang.

High efficiency and low emissions

“The design efficiency of Valmet's circulating fluidized bed boiler is 89 percent. In addition, the efficiency of this boiler is currently the highest in China, processing 1,000 tonnes of RDF per day, equivalent to 2,200-2,300 tonnes of primary municipal waste. This equals the capacity of 3-4 domestic boilers, so the scale benefit is obvious,” Mr. Wang explains.

“We also carefully follow pollutant emissions indicators. At present, our carbon monoxide, sulfur dioxide, nitrogen oxide and other emissions indicators have reached domestic emissions standards, with some indicators even meeting EU emissions targets,” says Mr. Wang.

Successful project

“Overall, I think this has been a very successful project. We have achieved many new breakthroughs,” Ms. Wang summarizes the breakthroughs and changes the project has brought. “The success of this project marks a new milestone in Jingjiang's domestic business and technological development. It has the first high-parameter circulating fluidized bed incinerator in China, and was elected as the Science and Technology Demonstration Project by China's Ministry of Housing and Urban-Rural Development. As a benchmark for domestic SRF technology, its fuel preparation and high-parameter, high-capacity energy conversion technology has established a milestone for waste incineration power generation technology.”

“Thanks for Valmet's support! Their professional and committed way of working, backed by their 220 years of industrial experience, greatly impressed us, and we're looking forward to further cooperation in the future,” Ms. Wang adds. ■

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“The success of this project marks a new milestone in Jingjiang's domestic business and technological development,” says Ms. Wang Yuanluo, Chairman of China Jingjiang Environmental Holdings Co., Ltd.



Mr. Wang Rupei, General Manager of Zibo Green Energy New Energy Co., Ltd., is satisfied with the adaptability of Valmet technology: “We were very pleased to find that the adaptability of Valmet technology was excellent.”



Doctoring for top runnability

When Indah Kiat Pulp & Paper Perawang (IKPP) was looking to further boost machine runnability and performance, they challenged Valmet's specialists to find potential areas for improvement. A plan was made to review the entire doctoring process.

TEXT Pasi Viitasalo and Marianne Valta

ndah Kiat Pulp & Paper Perawang mill is one of Asia Pulp & Paper's biggest mills. It is located on the island of Sumatra in Indonesia. The fully integrated mill produces some 800,000 tonnes of pulp and around 1.2 million tonnes of paper and board annually.

The cooperation between Valmet and IKPP Perawang Mill started in 2012. At the time, a PM 6 rebuild project was coming to an end. The mill was actively looking for opportunities to further boost machine runnability and performance, and Valmet's specialists were challenged to find potential areas for improvement.

"We used the recent machine rebuild project as a base for collecting machine data and evaluating performance indicators. At first, the machine faced pre-dryer breaks and occasional fiber passing problems, and some holes were also detected in the paper. After thorough analysis and several discussions between the customer and our team, doctoring was identified as the tool for improvement," says Global Technology Manager Pasi Viitasalo from Valmet.

Review of doctoring process

PM 6 is 10,500 mm wide and has a design speed of 1,500 m/min and a capacity of 400,000 tonnes per year. It produces woodfree coated and uncoated papers. During several on-site studies, all doctoring positions were checked, and their current status was documented. An improvement plan was made to cover the whole doctoring process.

"The positions needing immediate focus were clearly identified by our doctoring specialists. We scheduled a doctor blade holder replacement project and prioritized the positions in need of immediate action. Our initial delivery included Valmet Doctor Holder Compact blade holders, doctor blades, pneumatic control boxes and fixing screws, all carefully selected for each position. We replaced the outdated doctor blade holders with the latest

"New blade holders enable easier maintenance, with a time saving of up to 50 percent."



technology. In addition to superior doctoring performance and the easy maintenance of our doctor blade holders, we were able to meet the customer's expectations of a short delivery time in the first installation," says Viitasalo.

Continuous benefits

Good results in the initial doctoring improvement project led to continuous cooperation between IKPP Perawang mill and Valmet.

"We work together regularly, and we've been able to further improve the doctoring process. In addition to a better doctoring result, we've achieved less doctoring-related downtime and easy holder maintenance operations. We've also been able to reduce the customer's net working capital tied to the doctor blade inventory with



the optimized doctor blade types the machine requires,” continues Viitasalo.

Easier maintenance

The latest delivery of another 17 doctor blade holders was finalized last year.

“We’ve been very satisfied with Valmet’s doctor blade holders, so we’ve renewed our order. Compared with conventional ones, Valmet Doctor Holder Compact blade holders enable easier maintenance. The time saving is up to 50 percent, and we require less manpower. Changing or cleaning doctor blades as the machine is running has increased overall efficiency by 3 percent. And Valmet offers good support during the start-up,” says Aska Ramadhan from IKPP Perawang Mill.

Reduced costs

Valmet offers a wide range of doctoring products, including doctor blades, blade holders and doctoring accessories. The offering is the most cost-effective on the market, targeting optimal blade lifetimes, energy savings and improved safety.

“We tackle the challenges paper and board makers face from the continuous need to reduce paper making costs. Doctoring plays a key role in modern paper machines when the aim is good runnability combined with the lowest possible costs. One good way to achieve all this is to strive for an effective doctoring process,” concludes Viitasalo. ■

From left: Hannu Eerikäinen, Valmet; Ginanjar, Valmet; Tandi Muharam, Valmet; Aska Ramadhan, APP and Rusman Rianto, Valmet.

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Shandong Sun Holdings Group is a leading cross-national papermaking group integrating timberland, pulping and papermaking. Shandong Sun Paper has six major product lines: premium coated packaging paperboard; high-class art paper; high-class cultural and office paper; specialty fiber dissolving pulp; household paper; and industrial paper.

Sun Paper PM 38 on the move

In March 2018, PM 38 started producing fine paper a month ahead of schedule at the Yanzhou paper mill in Shandong province, China. PM 38 was a Valmet relocation project for Shandong Sun Paper Industry of a papermaking line Valmet had originally supplied to Stora Enso's Suzhou mill in 1996. **TEXT** Nigel Farrand



“Within a week of start-up, the paper machine was producing saleable first-class paper.”

“**T**he PM 38 investment was a strategic decision for Sun Paper. We wanted to have a wider product portfolio and improved product differentiation. The whole project has a large output, while the investment is small compared with a totally new line,” says **Mr. Wu Wenchun**, Production Director, Sun Paper. The relocated machine has a trim width of 3.8 m and a design speed of 1,000 m/min with the flexibility to change grades according to market demand, thus maximizing economic benefits.

Excellent project execution

Valmet was able to offer a unique full-scale delivery scope, combining process technology, equipment, automation, field service and site service manpower. In addition to the actual machine, the scope of the relocation included the rebuilding of the ropeless tail threading dryer section, winder control and automation systems upgrades, a calender tail threading rebuild, as well as line improvement and site service.

Wu Wenchun was impressed by the project’s execution. “With more than 600 containers of components and cast iron, and hundreds of relocated items, it started the right way from the very beginning. Valmet’s professional and committed team made it possible for us to complete this project ahead of schedule! We highly appreciated their timely support and first-class service,” he says.

Better runnability and performance with advanced automation

PM 38 has been one of Sun Paper’s most successful projects. Within a week of start-up, the paper machine and two winders were in normal production and producing saleable first-class paper. PM 38 is equipped with Valmet DNA for process and machine controls and a Valmet IQ Quality Control System with a Valmet IQ Induction profiler to improve caliper control.

“Automation systems are the brain and heart of the machine. Valmet has a single platform for the different types of control, with a friendly and consistent user interface. The CD Caliper improvement rate is 82 percent with IQ induction, which also helps us to improve product quality. We believe that the advanced technology and

solutions Valmet provides give us better machine runnability and operational performance,” says Wu Wenchun.

A wise decision

“The results of the project show that our decision to choose Valmet as our partner was very wise. Valmet provided process know-how and professional experts with a rich experience of machine relocation and system upgrades. These proved the foundation of this project’s success. Based on our previous experience with PM 19 and PM 23, Valmet is a trusted supplier. It’s all strong evidence of how well Sun Paper and Valmet work and move forward together,” concludes Wu Wenchun. ■

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“Valmet provided process know-how and professional experts with a rich experience of machine relocation and system upgrades,” says Wu Wenchun, Production Director at Sun Paper.



Fifteen grade changes per day and meeting the needs of more than 100 customers – that's the reality for Essity's Collodi Mill, requiring fast adaptation and striving for efficiency in colored tissue production.

TEXT Kaisamaija Marttila

PHOTOS Kaisamaija Marttila and Joonas Nieminen

Stronger and more flexible

“We started the stock preparation rebuild project with Valmet because of challenges we had with the old system. Energy

consumption was high, and we wanted to increase our capacity and productivity, as well as safety at work,” says **Vittorio Bellucci**, Mill Manager, of the background to the recent stock preparation rebuild of TM 2 at Essity's Collodi Mill in Italy.

Collodi Mill specializes in the production of deep and light colored paper, used for example in napkins and toilet paper. Huge flexibility, an extensive color

“We can now repulp every kind of wet strength broke without any problem at the engine’s maximum speed.”

range and the highest quality standards make Essity Collodi a leading factory worldwide for colored tissue production. Producing colored grades places high requirements on stock preparation – and on pulping, especially.

“We need to pulp the fibers well, because that’s when the dyes are fixed to the cellulose. We also use wet strength broke from the machine, which is difficult to repulp after storage,” Bellucci explains.

To help Collodi Mill meet its targets, Valmet supplied a rebuild for their stock preparation, which included a new bale pulper with an innovative new

rotor design, two OptiFiner deflakers, an OptiFiner Pro refiner and an under machine pulper.

Co-operation is the key

After the start-up, the Essity crew and Valmet have worked closely to tune up the system. The target is to use more wet strength, and the percentage of recycled paper used has increased from 20 to 60 percent. According to Bellucci, the supplier’s support in problem solving is important. “We’ve met with trust and openness. Valmet has been open to our suggestions too, and we’ve worked



“We need to pulp the fibers well, because that’s when the dyes are fixed to the cellulose. We also use wet strength broke from the machine, which is difficult to repulp after storage,” says Vittorio Bellucci, Mill Manager, Essity Collodi Mill.



Innovative new pulper rotor geometry increases disintegration efficiency and shortens retention time. This in turn lowers energy consumption and increases pulping capacity.



↑ The team is happy about the halved unloading time and a workplace that has become much safer. From left, Mauri Lattunen, Matteo Vanuzzo (Essity Collodi) and Walter Mornioli.

together very well, despite some challenges,” adds **Matteo Vanuzzo**, PM Operations Manager, Essity Collodi Mill.

Innovative pulper rotor increases efficiency

Essity’s bale pulper is equipped with completely new rotor geometry, which dampens the impact of bales, reducing the load on the shaft, bearing, motor and drives, and creating a much stronger pumping effect for improved disintegration efficiency and a shorter retention time. This in turn decreases energy consumption and increases pulping capacity.

“The new bale pulper is working out very well for both the operation and the operators. We can now repulp every kind of wet strength broke without any problem at the engine’s maximum speed,” says Vanuzzo. “We can also run the rotor energy efficiently, without jeopardizing the correct mixing of dyes. We’ve been able to halve the discharging time, and the working environment is safer

for the operators,” he continues. The mill is also happy with the energy-efficient deflakers and refiners.

The system is working well, and we’re enjoying producing the right quality for our customers with increased profitability,” confirms Bellucci. “I think we have the greatest team I’ve ever been part of at this mill. We can do everything with this team – hit the customer’s quality targets and keep aiming higher,” says Vanuzzo. ■

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INNOVATOR'S VOICE

Get inspired

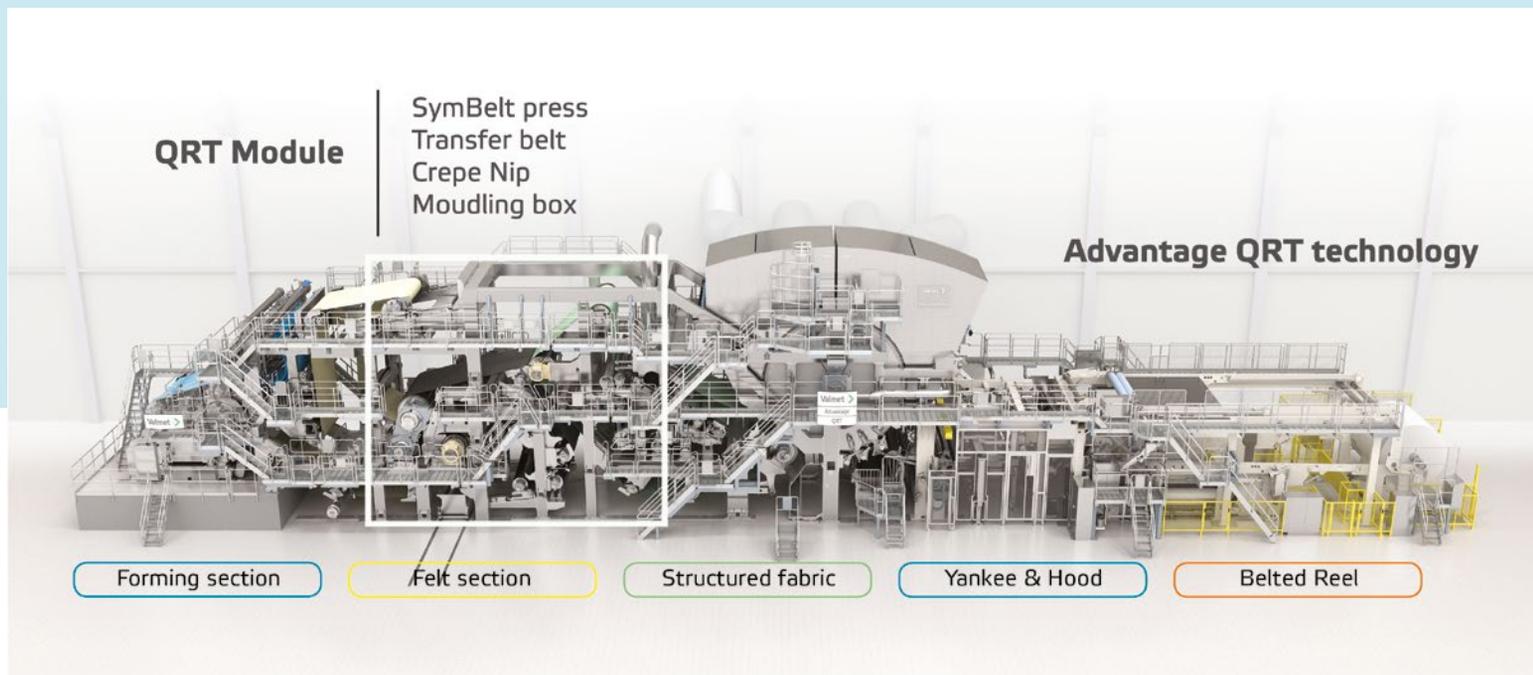




The future might surprise you

As Darwin is alleged to have said: “It is not the strongest, nor the most intelligent that survives. It is the one that is most adaptable to change.” Surviving is about foreseeing the future. Succeeding is being there already. Get set for tomorrow’s needs with flexible hybrid technology!

TEXT Danilo Marcos



Both the QRT module and the eTAD module utilize Rush Transfer but in slightly different ways.

The tissue industry is facing new and stricter demands from modern consumers. They're calling for new products with various paper properties at the same time as they're pushing sustainability to the top of the agenda. This is pressurizing tissue producers to be more flexible, deliver different grades and develop new products.

The recently developed hybrid technologies Advantage NTT, QRT and eTAD provide an innovative and more flexible way of producing a wide variety of premium and ultra-premium tissue products with low energy and fiber consumption. A wider range of companies and market segments can now access premium and ultra-premium tissue products with high bulk, softness and absorbency at a relatively low operational cost.

Rush forward

The recipe for reaching the highest bulk and absorbency is usually to avoid pressing, and to use hot air to dry the sheet. But today it is possible to achieve premium and ultra-premium structured tissue products thanks to these new hybrid technologies. The secret behind Advantage QRT and eTAD lies in the combination of pressing and "Rush Transfer". Simply explained, the sheet is first dewatered by pressing to increase dryness and thereby reduce energy consumption. The sheet is then transferred to a structured fabric with the assistance of a nip and speed difference. The speed difference is, along with a subsequent molding step, the key to creating sheet structure and bulk.

High absorbency and stretch

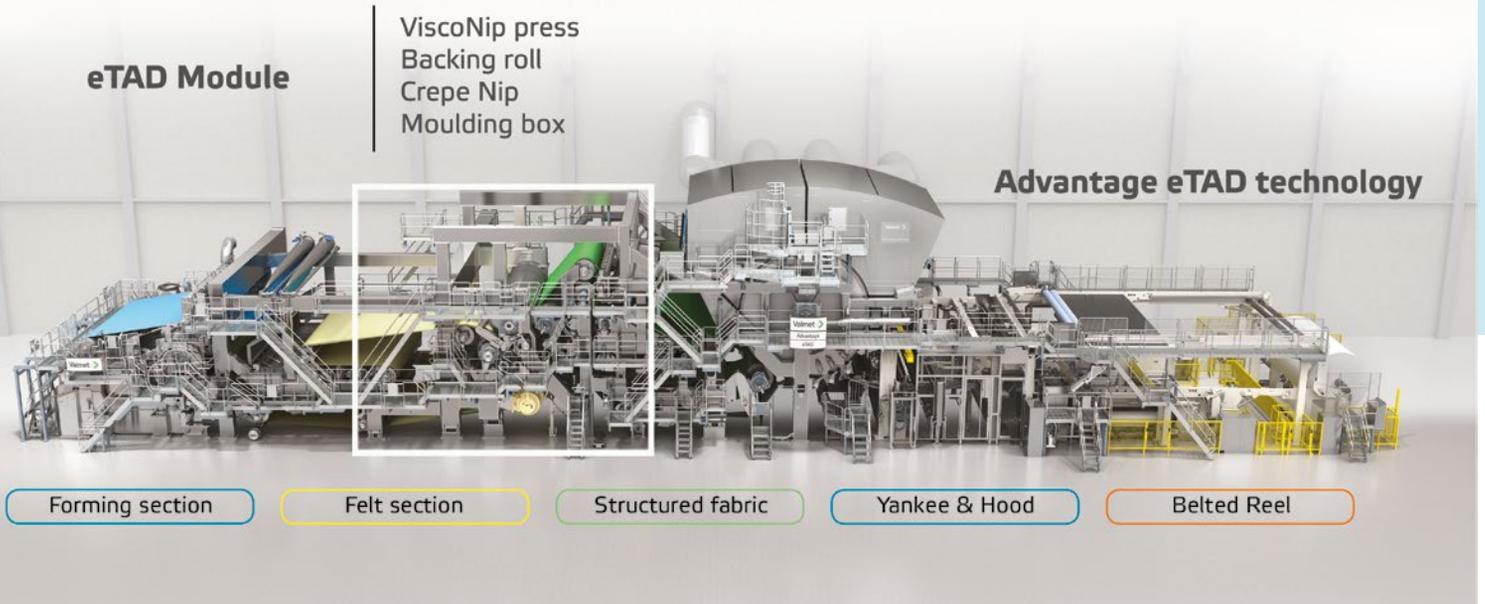
Absorbency rate is a key selling point and a differentiator for tissue producers. The product created in the Advantage QRT and eTAD process offers high stretch and great absorbency. This feature makes it especially suitable for high grammage products like kitchen rolls and towel, but is also perfect for bath tissue. The caliper is already created in the tissue machine, and embossing is not needed.

Advantage NTT the most flexible tissue machine in the world?

The NTT machine can be operated in both plain and textured modes. The key is the changeable belt. Operating with a plain belt produces conventional tissue. A fine belt generates more bulk and is suitable when softness is demanded. A coarse belt enables the production of textured tissue with high bulk and improved water absorbency compared with dry crepe tissue. And it is easy to swing between production modes with a belt change – which can be done in a few hours. Another unique feature is the option to create your own belt patterns and already imprint the desired design in the tissue machine. This opens endless potential for product differentiation, as well as to operate within a wide range of basis weight and products from facial to towel.

Plain mode and remarkable production capacity

NTT technology has a powerful dewatering system which enables not only energy savings but also very high pro-



Valmet's new hybrid technologies bring a new dimension to tissue making.

duction volumes. At high basis weight, drying capacity is normally the bottleneck for increased production in other tissue-making processes. However, the NTT machine enables very high press dryness, which can augment production capacity by about 30 percent. Continuous production of 180-185 tonnes per day on a 100-inch-wide machine is now a reality.

Textured mode for high bulk and softness

In textured mode, NTT technology can achieve a bulk increase of about 50-80 percent compared with conventionally produced paper, depending a little on basis weight and belt design. Most of the European conventional products provide softness in the range of 85-90 TSA. With NTT technology, softness values between 90 and 97 can be achieved. The highest softness can be found in 2-ply products with low tensile strength.

Hybrid technologies combine sustainability, flexibility and high quality

For more than 40 years there have been two tissue making concepts on the market – conventional dry crepe

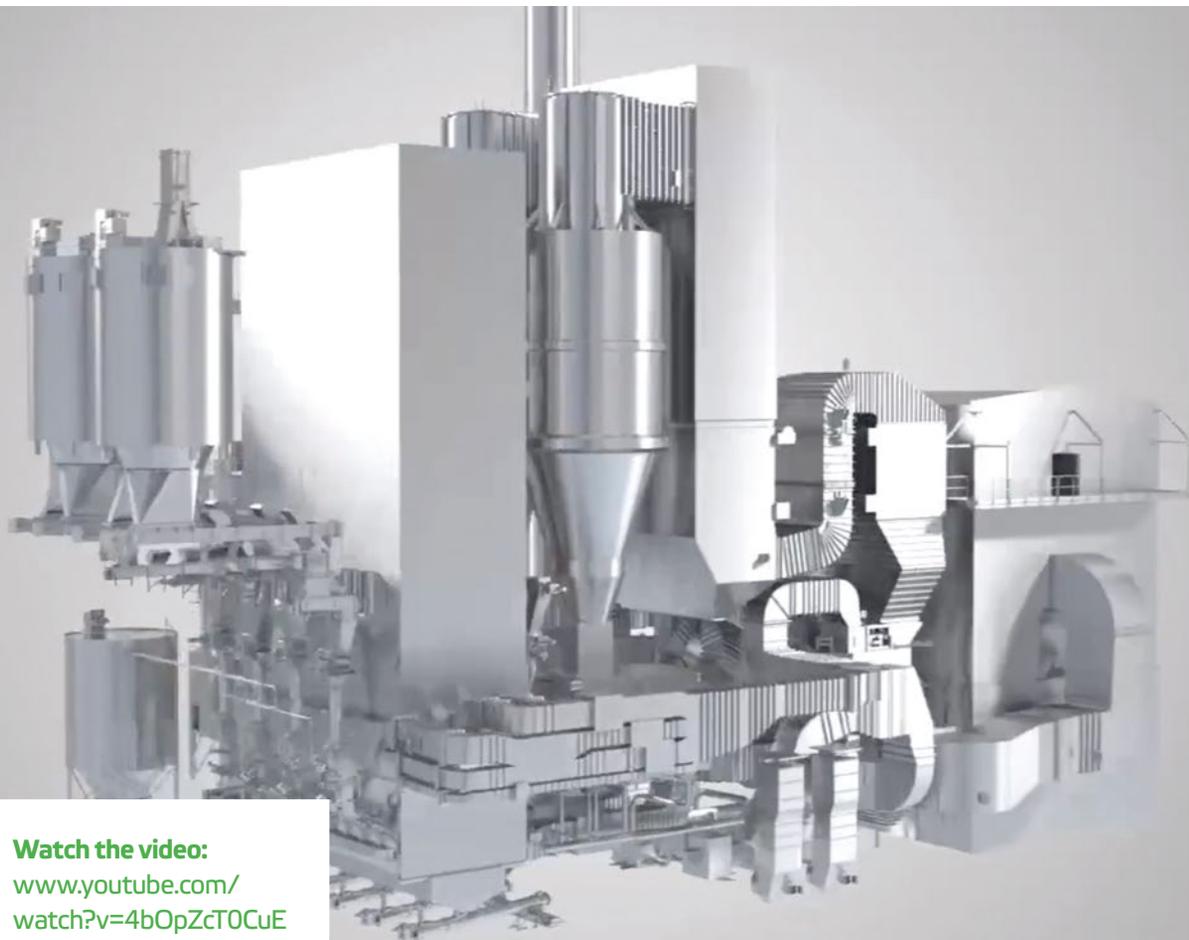
and through air drying machines. Valmet's new hybrid technologies plug the gap and bring a new dimension to tissue making. Thanks to their flexibility, it is possible to produce several grades and qualities in the same machine, ranging from premium to high and ultra-premium tissue. The capability of producing different grades in the same process will give a competitive advantage and make it possible to be ready for any changing market demands. It will also open the way to entering new market segments and for product differentiation. Compared with other processes producing the same quality, hybrid concepts can be operated with low energy and fiber consumption, with the added benefit of a low operation cost. ■

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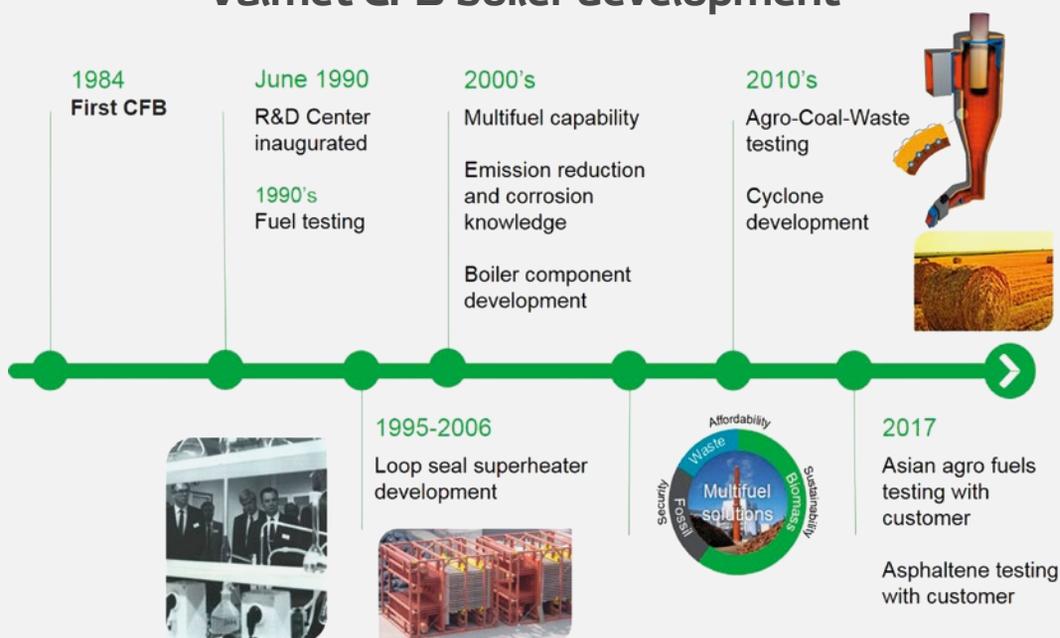
100th order proves flexibility of CFB boilers

The more challenging the fuel, the more flexibility Valmet's circulating fluidized bed (CFB) boiler shows. It has evolved from a coal-only boiler to combusting biomass and anything in between. **TEXT** Marjaana Lehtinen



Watch the video:
[www.youtube.com/
watch?v=4bOpZcT0CuE](https://www.youtube.com/watch?v=4bOpZcT0CuE)

Valmet CFB boiler development



Over the past decades, fuels used in energy production have thoroughly changed and presented the design driver for Valmet's CFB boiler development. Back in the 1980s, energy producers wanted to use low-grade waste coal because it was cheap. Valmet was able to deliver CFB boilers to solve the problem. Next, it was biomass that changed the boiler design dramatically in Scandinavia. In the late 1990s, as energy producers were faced with shortage of reasonably priced biomass, Valmet modified its CFB boiler for a wider design fuel portfolio and introduced its multifuel approach. In the early 2000s, there was a brief boom of pet coke and high-ash coal projects, especially in the US. They were followed by new challenging fuels, such as waste fractions and agro-biomass fuels either fired alone or with other fuels.

"Coal will not disappear from the CFB fuel portfolio but due to political decisions its importance as the main fuel for boilers is decreasing. Also, more and more demanding biomass fuel qualities must be accepted, and the utilization of waste will continue to increase as big cities have to consider waste as a source of energy instead of incinerating it," says **Tero Luomaharju**, Product Manager, CFB boilers at Valmet. "The evolution of our CFB technology is a result of systematic development work as well as lessons learned in projects in a world where everyone is trying to find the most competitive fuel combination."

Components that make a difference

During the nearly 40 years that Valmet and its predecessors have been developing and delivering CFB boilers, there has been a huge evolution in technology to meet ever-increasing customer and emission requirements. The company has introduced pioneering conceptual boiler designs and mechanical structures to enable the combustion of high volatile content fuels with very demanding fuel chemistry.

One of the component design highlights is the first water-cooled cyclone built in 1985, and since 1995 a membrane cyclone has been included in Valmet's every CFB delivery. Its introduction was a huge step forward with regard to maintenance needs and boiler reliability. Scaling up the membrane cyclone has been successful; today even a 100 MWe CFB can be constructed with only one cyclone.

Another major development in CFB design took place when demanding biomass fuels with high chlorine and alkali metal levels entered the fuel portfolio. Corrosion minimization had to be improved due to these fuels. Valmet developed special loop seal and final superheater solutions to tackle the issue.

Focus on fuel flexibility

The CFB success story and component development owe much to Valmet's energy R&D center in Tampere, Finland. "Over the years the center has accumulated significant amount of fuel data and tested dozens of new technological features. By testing 9,000 tons of various fuels on an industrial pilot scale, we have test data for over 50 fuels and over 100 fuel mixtures for operation on fluidized bed boilers," says **Marko Palonen**, Manager, R&D Portfolio.

Today, it is normal to have four to five design fuels in a boiler to decrease the price and availability risk of fuels. "The biggest benefit of CFB technology is fuel flexibility. Regardless of what the future fuel portfolio will be, CFB will ensure the plant's future. Thanks to fuel flexibility, the customer will always be able to use the most economical fuel combination," emphasizes **Ari Kokko**, Director, Technology and R&D, at Valmet Energy Business Unit. Indeed, it seems all future fuels will be waste-streams or by-products from various processes or industries rather than virgin fuels. This means a very resource-efficient approach to energy production will be needed," he continues. ■

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EXPERT'S VOICE

Food for thought



Arttu-Matti Matinlauri, Director,
Analytics & Applications
Development, Valmet.

Towards new AI-based business models

Accumulation of high-quality data will be a key source of future business value. While machines and equipment are one part of a wider production system that creates value, software will play an increasing role in transforming data into digital services and solutions. **TEXT** Vesa Puoskari **PHOTOS** Petri Merta

Analytics-based application development is bringing a new dimension to product development. It allows a holistic approach in optimizing production with advanced analytics tools. The key idea in this approach is to launch the first version quickly and then continue the development in constant cooperation with customers, which at the same time makes development work very agile.

“The Minimum Viable Product (MVP) approach offers customers a first-version solution incorporating only the

required features. However, it’s already a functional application that can be used in production. Only some features are manual or simulated,” explains Valmet’s **Arttu-Matti Matinlauri**, Director, Analytics & Applications Development.

During the development process, new functionalities and subsystems are continuously integrated with the software and then applied in practice based on customer needs.

“When applications are being designed, it’s important to take into account different user groups (maintenance

Analytics-based application development allows taking a holistic approach to optimizing production.

and production, for example) and their user experience, and to evaluate carefully how the new applications will create value for the user,” he adds.

Fostering mill- or plant-wide optimization

At Valmet, the offering of Industrial Internet applications and services is based on know-how in process technology, automation and services. For example, paper machines can be equipped with features to predict failures and help control product quality.

In future, machines and equipment will constitute one part of a wider production system that creates value, with software transforming data into digital services and solutions. The constant accumulation of high-quality data is a key source of business value.

“Thanks to the accumulated data, it’s possible to take a holistic approach and optimize production by evaluating the whole production chain. Operating costs can be reduced while increasing output at plant and process level,” Matinlauri says.

For instance, raw materials and energy make up some 80 per cent of paper machine production costs. In the new data-driven world, he adds, the objective is to optimize production to achieve the optimal overall profit margin. The target is to cut raw material and energy costs, minimize unplanned shutdowns and reduce the number of web breaks.

“Downtime is often a gray area in operating costs. For example, paper grade changes on a machine result in low production time. Mill- or plant-wide optimization enable these operations to be better linked to the production schedule.”

The focus is on ensuring the smooth operation of the machines. “The more machines can be kept up and running, the better the return on the capital investment. These principles and tools can be applied to all industrial operations.”

Emerging ecosystems

Matinlauri describes his recent visit to a paper mill which aims to be fully Artificial Intelligence (AI)-controlled in two and a half years’ time.

“Although the mill does not have well-developed automation solutions yet, this step change is a fully realistic and achievable target. It involves the development of advisory solutions based on data flows and the increased autonomy of machines. As they’re starting from scratch, they can avoid common mistakes and derive benefit from current tools and technical development.”

The new AI-based systems will automatically classify and synthesize data from databanks. They will not need a huge amount of information to be able to learn, as they can draw conclusions from one or two examples and then always recognize the same patterns exactly.

Matinlauri confirms that AI applications are evolving rapidly, and the evaluation of data flows will enable the creation of new kinds of ecosystems.

“Partners in the value chain can exploit this data in developing their products and boosting their existing business by creating innovative new services. Success requires not only new technologies, but also a customer-centric mindset for value to be created and captured in a new way.”

In future, Matinlauri foresees technology providers playing an even greater role as “performance partners” for their customers.

A dialogue with data

The pace of product development is ever accelerating, fueled by factors such as the rapid development of AI.

“So far, manufacturing industries have fallen behind in development because there is a need to process a huge amount of accumulating data, and the tools for this haven’t been available. These tools are now available, so manufacturing companies will be able to take a quantum leap here and benefit from rapid AI development,” Matinlauri believes.

The next step in digitalization will be to improve the visibility and profitability of a plant or mill by analyzing and utilizing data even more widely for the benefit of the customer.

“We need new AI-driven applications that bring more transparency and understanding into the decision-making process. This is how humans will begin to trust the



“During the development process, new functionalities and subsystems are continuously integrated into the software and then applied in practice based on customer needs,” says Matinlauri.

support of these analytics, and the time will soon be right for fully automated operations as well,” he explains.

Advanced analytics provide good tools to evaluate indicators signaling a need for predictive maintenance, such as temperature and vibration measurements or energy consumption. In any case, there will always be unexpected deviations at the mill or plant, so we will need humans to solve these problems. Automation systems can take care of stable operation in the meantime.

“The skillsets needed to operate the autonomous mill of the future are actually more demanding than those to operate a conventional one. So Valmet and our customers

are constantly exploring ways to secure that skill and talent to serve a wider fleet of equipment,” adds Matinlauri.

Ultimately, data analytics is just one of many methods available to support decision making. Other methods must also be brought into play to enable the analysis of variations and the comparison of different options.

“Digitalization brings more transparency to decision-making processes. Perhaps the key quality we will need from future leaders is not just comprehensive experience, but also the ability to analyze and draw conclusions directly from the data in making decisions,” concludes Matinlauri. ■

Around the world

New process and quality controls for Delkeskamp mill in Germany

Valmet will supply a Valmet DNA Automation System and a Valmet IQ Quality Control System for Delkeskamp's cartonboard machine BM1 in Nortrup.

Valmet strengthens wastewater automation business in Norway

Valmet extends cooperation with Endress+Hauser by signing a distributor agreement for wastewater automation in Norway.

Valmet Clothing Days 2019 in Finland

The Valmet Clothing Days seminar takes place in Tampere, Finland on November 13-15, 2019 with the theme 'Quality never goes out of fashion'. For more information, please contact pmc.fabrics@valmet.com.

DA Alizay's recovery boiler turns into a biomass boiler in France

Valmet will convert Biomasse Energie d'Alizay's recovery boiler into a biomass boiler utilizing bubbling fluidized bed combustion technology (BFB) at the DA Alizay mill.

Green liquor clarifier for Stora Enso in Sweden

Valmet will supply an OptiClear(TM) green liquor clarifier for Stora Enso Skoghall mill. The start-up of the clarifier is planned for the spring 2020.

Fifth tissue production line for Papel San Francisco in Mexico

Valmet will supply an Advantage DCT 100TS tissue production machine to Papel San Francisco's Mexicali mill.

Second tissue line for Faderco in Algeria

Valmet will supply a complete Advantage DCT 100HS tissue production line for Faderco's mill, Warak, in Setif. The order also includes a rewinder and an extensive automation package.

Quality management solution for Cartones Ponderosa in Mexico

Valmet will supply a Valmet IQ Quality Management Solution to Cartones Ponderosa's cartonboard machine BM1 to improve machine efficiency and overall end-product quality.

What is happening in the global pulp, paper and energy industries? *Around the world* demonstrates some of the events and projects where Valmet has worked together with customers to move their performance forward.

Flue gas condensation system for Kokkola Energy in Finland

Valmet will deliver flue gas condensing and heat recovery equipment to Kokkola Energy Oy's combined heat and power plant.

Boiler diagnostics systems for Harbin Boiler Co., Ltd. in China

Valmet will supply two Valmet Acoustic Pyrometer systems to Harbin Boiler Co., Ltd.'s Fugu power plant. The system is currently one of the most advanced industrialized full-load temperature tools on the market.

Repeat automation order from Asia's largest capacity biomass power plant

Valmet will deliver automation technology for phase 2 of the Dangjin 4 Biomass Power Plant owned by GS EPS Co., Ltd, currently under construction near Seoul in South Korea.

New recovery boiler for ITC in India

Valmet will deliver a new recovery boiler and ash leaching plant to ITC's Bhadrachalam pulp mill. The new boiler will replace three existing boilers.

Exhaust gas cleaning system for Daewoo Shipbuilding & Marine Engineering in South Korea

Valmet will supply a scrubber system for seven new building container vessels to be built by Daewoo Shipbuilding and Marine Engineering for the Korean shipping company Hyundai Merchant Marine.

Containerboard line for GS Paperboard & Packaging in Malaysia

Valmet will supply the OptiConcept M containerboard making line with automation solutions and a winder for GS Paperboard & Packaging (GSPP) Sdn., Bhd. in Selangor.

Automation and quality management systems for Suzhou Taison Paper in China

Valmet will supply a Valmet DNA automation system and a Valmet IQ quality management solution for Suzhou Taison Paper's two tissue machines.

Key board machine technologies for Kraft of Asia Paperboard & Packaging in Vietnam

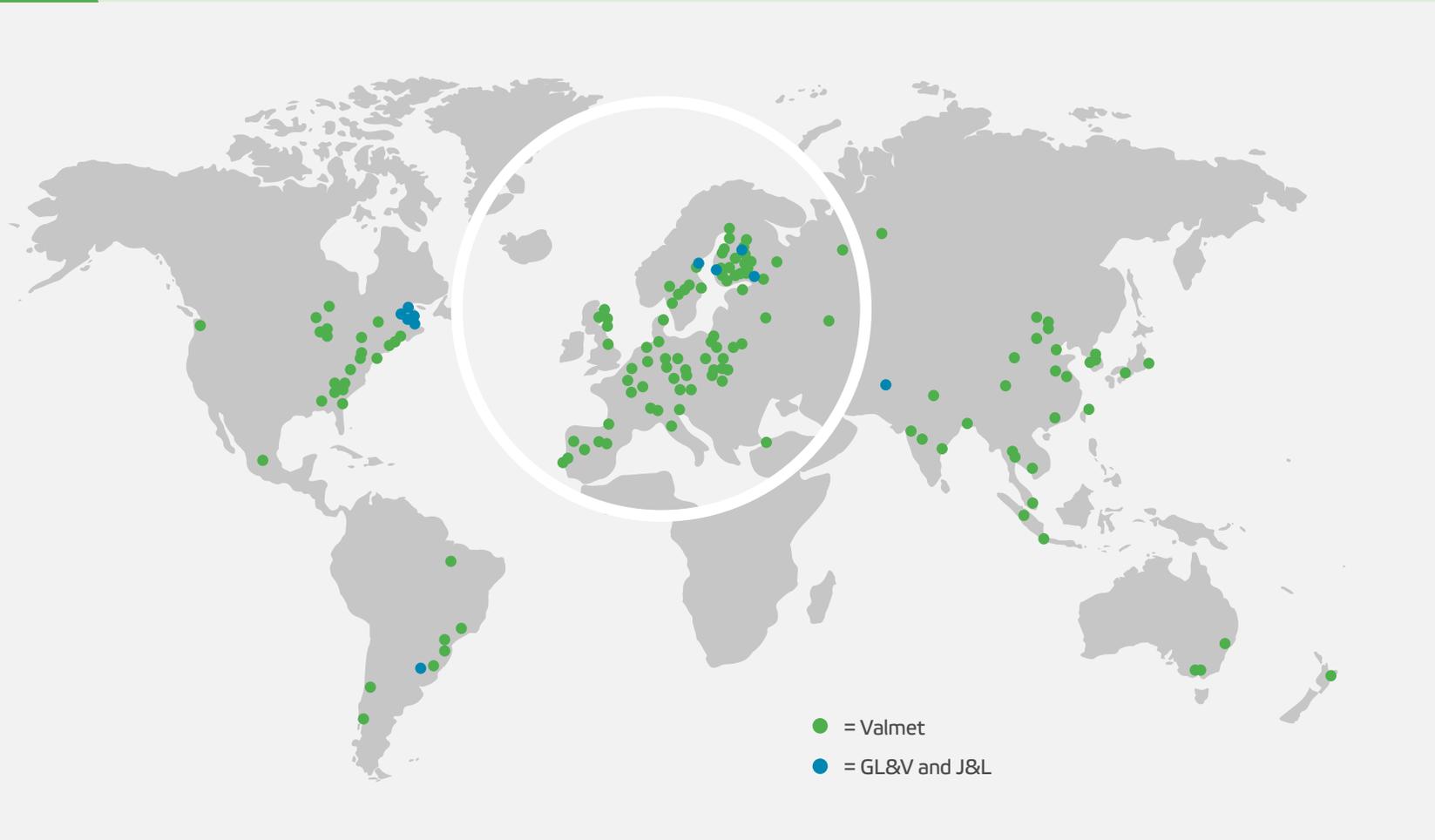
Valmet will supply key board making technologies to Kraft of Asia Paperboard & Packaging for its new containerboard line in Phu My.

21 solids measurement units for Shanghai Bailonggang Wastewater treatment plant in China

Valmet will supply 21 Valmet Total Solids Measurements (Valmet TS) with a high-pressure (PN100) option to the Shanghai Bailonggang wastewater treatment plant.



About Valmet



Moving forward with strategic acquisitions

On April 1, 2019, Valmet completed the acquisition of GL&V, a global provider of technologies and services to the pulp and paper industry. Later, on May 1, 2019 Valmet acquired J&L Fiber Services Inc., a manufacturer and provider of refiner segments to the pulp, paper and fiberboard industry. These complementing acquisitions drive forward Valmet's target to continuously develop its unique technology, services and automation offering and way to serve its customers.

Valmet is a leading global developer and supplier of services, automation and technologies for the pulp, paper and energy industries. Our more than 13,000 professionals around the world work close to our customers and are committed to moving our customers' performance forward – every day.



The two companies joining Valmet were celebrated with townhall events at the acquired companies.

Excellent strategic fit

"The acquisition of GL&V has an excellent strategic fit - it strengthens Valmet's global Services business, complements our technology offering and builds further our local presence and capabilities especially in North America, and in Europe, South America and India," summarizes **Pasi Laine**, President and CEO of Valmet.

On May 1, 2019 Valmet completed the acquisition of the Wisconsin-based J&L Fiber Services Inc., a manufacturer and provider of refiner segments to the pulp, paper and fiberboard industry.

"This acquisition also further strengthens our local presence especially in North America. I warmly welcome our new colleagues to the Valmet team and into our

strong, global Services organization" says **Pasi Laine**, President and CEO of Valmet.

Stronger offering and strengthened local presence

GL&V's offering complements Valmet's technology and services offering with technologies, upgrade and process optimization services, rebuilds, and spare parts for the pulp and paper industry globally - especially in the areas of chemical pulping, stock preparation, papermaking and finishing.

The acquired operations employ about 630 people of whom approximately 65 percent are in North America and the rest mainly in Europe, South America and India. The key locations are in Nashua

(New Hampshire), Lenox (Massachusetts), and Hudson Falls (New York) in the U.S., in Trois-Rivières (Quebec) in Canada, in Stockholm, Sweden, in Pune, India, and in Campinas, Brazil. The acquired business is now a part of Valmet's Services business line.

J&L Fiber Services is located in Wisconsin, U.S. the company manufactures and supplies low-consistency refiner segments that are important wear parts used in pulp and paper production, complementing Valmet's offering in refiner segments. It also supplies high-consistency refiner segments that are used in thermal-mechanical pulping and medium density fiberboard (MDF) refining.

Forward

VALMET'S CUSTOMER MAGAZINE

FORWARD

Valmet's customer magazine

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GL&V is now part of Valmet's 220-year industrial history



Valmet's history is woven from many different threads: Tamfelt, Beloit, Dominion, Sunds, Tampella, KMW, Kvaerner, Götaverken, and now GL&V.

The acquisition of GL&V strengthens Valmet's global services capabilities and complements our technology offering for chemical pulping, stock preparation, paper making and finishing. It also further develops our local presence especially in North America and in Europe, South America and India, creating a good basis for serving our customers even better.

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