

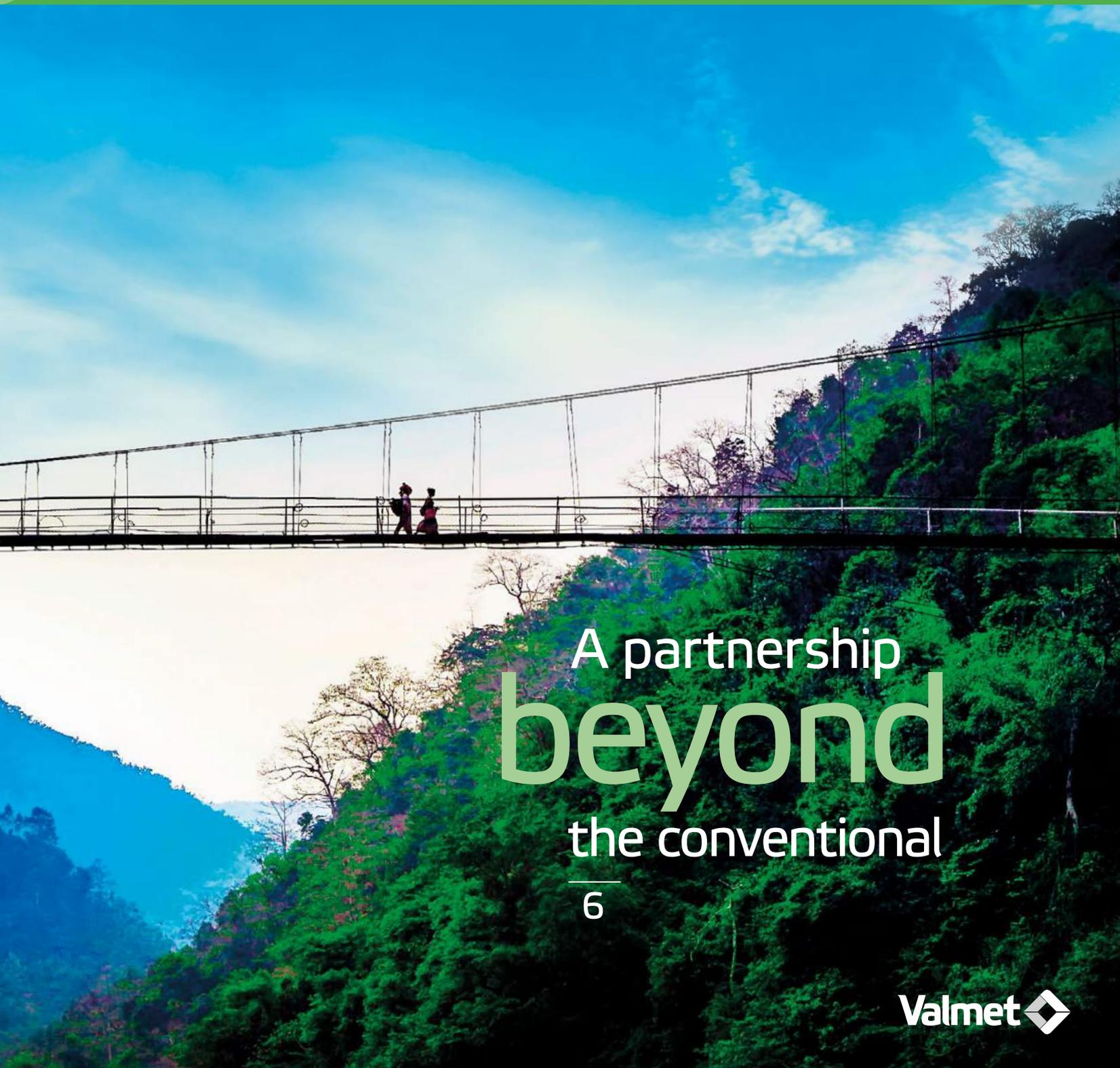
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Forward

VALMET'S CUSTOMER MAGAZINE | 1/2019



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Becoming wiser

At the end of this magazine, Professor Harry Gatterer encourages people to take a positive view towards the future – the world is becoming a better place. He bases his claim on statistical facts: today already around 80 percent of the global population has the fundamental skills of reading and writing, and the global life expectancy has increased to 71 years. In contrast to what many other people believe, Professor Gatterer feels that the “silver society” megatrend and aging population has many bright sides – societies are becoming wiser.

This is an interesting viewpoint that can be applied to business as well. Valmet is building on over 220 years of industrial history. During this journey, the company has accrued a lot of wisdom, creating a solid foundation for Valmet and helping us to bring the future to our customers.

We are proud of our long history, but at the same time we are nurturing a culture

of continuous renewal and learning. This we do through a wide portfolio of learning programs, and by enhancing internal mobility within Valmet – but to a wide extent also together with our customers. In addition to continuously developing our offering based on our customers’ needs, we share a lot of innovation work. Also, our Innovation Pathways training program – which seeks to promote a totally new approach to enhancing innovation culture – allows customers and Valmet specialists from different parts of the organization to sit at the same table to solve real customer problems.

In this issue, we are demonstrating projects that have taken our customers’ performance to the next level. Together, we have been able to make wise decisions to build future competitiveness.

I hope this magazine takes you again on a great journey of learning.



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SENIOR VICE PRESIDENT
MARKETING AND COMMUNICATIONS

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Process efficiency can be significantly increased by utilizing flue gas condensing to recover heat: a source of energy which typically goes up in smoke.

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In brief



Key pulp mill technology for ARAUCO's new pulp line in Chile

Valmet and ARAUCO have finalized a contract to deliver pulp drying and baling, and recovery and biomass boilers for ARAUCO's MAPA project. The delivery is part of ARAUCO's investment to expand current production capacity and build a new pulp production line at the Arauco Mill in the Bio Bio Region, Chile.

The modernization and extension of the Arauco Mill is the largest investment in ARAUCO's history and one of the largest pulp investments in the world.

"In addition to high quality pulp, the expansion project will allow us to continue

generating clean and renewable energy from forest biomass, due to the construction of a new biomass boiler," explains **Franco Bozzalla**, Senior VP Pulp and Energy, ARAUCO.

"We have enjoyed good cooperation with ARAUCO for over 15 years, and we are happy to deliver key technology for the company's state-of-the-art pulp mill. This delivery is also significant for our project and technology teams globally. The project is led from Finland, and key components will be produced in our own workshops," says **Bertel Karlstedt**, Business Line President, Pulp and Energy, Valmet.

Collaboration for improved wastewater treatment

Valmet and Kemira have signed a partnership agreement to develop wastewater and sludge treatment customer applications for municipal and industrial plants in Europe. Reliable real-time measurement data will increase the visibility of the water treatment process

and enable predictive and proactive process management.

The partnership combines Valmet's comprehensive analyzer and measurement technology, process optimization know-how and on-site service network with Kemira's strong chemistry and

process optimization expertise in the municipal and industrial water treatment space. The agreement broadens the existing Industrial Internet ecosystem collaboration between the two companies.

New Valmet Fiber Furnish Analyzer measures a wider range of properties online

Valmet's completely redesigned Valmet Fiber Furnish Analyzer provides fast and precise online measurement of key fiber and furnish properties for paper, board and tissue makers.

"Operators can now see fiber development and the impact of process changes on pulp strength in real time," says **Ismo Joensuu**, Product Manager, Analyzers & Measurements, Automation Business Line, Valmet.

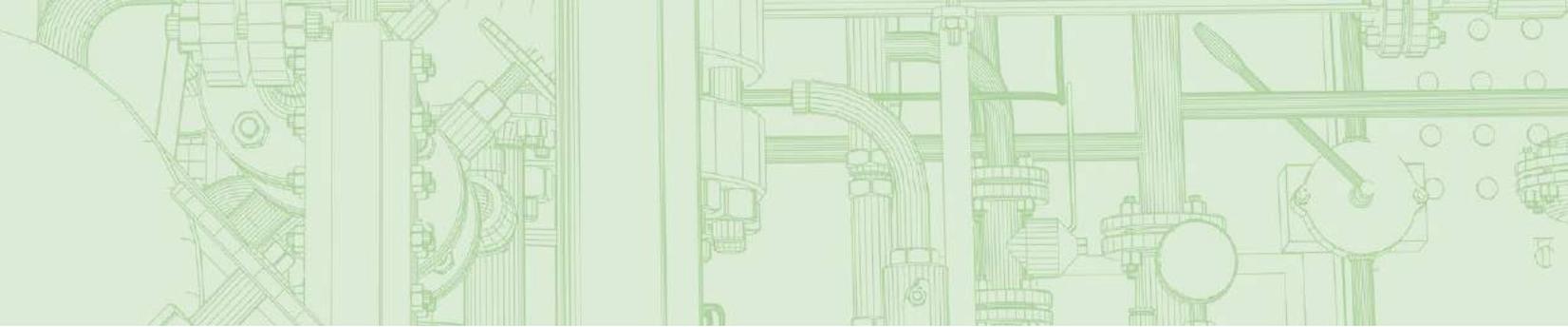
New image analysis techniques enable the Valmet Fiber Furnish Analyzer to automatically measure a wider range of furnish properties. Additional modules can also be added to the Valmet Fiber Furnish Analyzer platform, with standardized measurements of Canadian Standard Freeness or direct Shopper-Riegler, as well as a chemistry module to monitor pH and conductivity.



In 2018,
Valmet conducted

52

supplier sustainability
audits in 13 countries
with a certified third-party
auditor.



Valmet strengthens its business in Asia-Pacific

Valmet has opened new offices in Vietnam, Malaysia and Sapporo, Japan, to further strengthen its operation and local presence in Asia-Pacific. “Close to you” is one of Valmet’s core commitments in its “Shared Journey Forward” services approach.

“Being close to our customers is the key for us, as we want to understand their specific needs as well as to develop the right solutions and share best practices. We believe that the new offices and expanded local capabilities will allow us to better serve our customers and further strengthen our position in the area,” says **Jukka Tiitinen**, Area President, Asia-Pacific, Valmet.



Valmet top-rated in CDP’s climate program

Valmet has been recognized for its actions and strategy to mitigate climate change with the best A rating in CDP’s climate program ranking. CDP’s evaluation is based on the company’s actions to cut emissions, mitigate climate risks and develop the low-carbon economy.

“We are continuously investigating new ways to improve the energy, water and material efficiency of our solutions and to bring new innovations to the market. We also have a systematic program to reduce CO₂ emissions in our own operations with a focus on sustainable transportation, energy-efficiency improvements and process optimization,” says **Anu Salonsaari-Posti**, Senior Vice President, Marketing, Communications and Sustainability at Valmet.

CDP is an international non-profit that drives companies and governments to reduce their greenhouse gas emissions, safeguard water resources and protect forests.

Valmet acquires GL&V, a global provider of technologies and services to the pulp and paper industry

On April 1, 2019, Valmet completed the acquisition of GL&V, which was announced on February 26, 2019. GL&V is a global provider of technologies and services to the pulp and paper industry. The acquired business becomes a part of Valmet’s Services business line.

GL&V provides 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 acquisition has an excellent strategic fit – it strengthens Valmet’s global services business, complements our technology offering and further builds our local presence and capabilities, especially in North America. GL&V has a global team of experts, and I want to warmly welcome our new colleagues to Valmet,” says **Pasi Laine**, President and CEO of Valmet.



CUSTOMER'S VOICE

Moving forward together





A partnership beyond the conventional

ITC Limited invested in new high-class coated board-making technology to respond to the demand of India's fast-growing paper and board consumption. The continued shared journey of the two companies stems from the high technology Valmet can offer combined with the long and trusting relationship between the companies.

TEXT Marika Mattila

TC's site in Bhadrachalam is India's largest integrated pulping and paperboard manufacturing unit. The unit produces high-end virgin and recycled board for packaging and graphic applications, as well as fine printing papers.

Consumption of paper and board is growing at over 6 per cent a year, and ITC wanted to improve their competitive situation in the market by selecting the latest technologies for manufacturing folding boxboard. After the latest investment in a board-making line from Valmet (BM 1), their folding boxboard capacity has increased remarkably.

"The main driver for this investment was the increasing demand for packaging board in India, mainly due to increased online shopping. Coated board also has an important role in replacing plastics. We needed a trustworthy equipment supplier and high technology that can convert raw material to high-quality board in a cost-effective way. We have a long history with Valmet, and we have seen many well-running, Valmet-supplied

"We needed a trustworthy equipment supplier and high technology that can convert raw material to high-quality board in a cost-effective way."

"Excellent-quality board means high printing properties, as well as good functional properties like high bulk, smoothness and stiffness," says Vadiraj Kulkarni.





"We need a partner who understands us well and understands our requirements. One that does not only offer the machine, but an entire solution, and works with us as a partner to meet – and even exceed – the project targets," says Vadiraj Kulkarni, Chief Operating Officer of Paperboards and Specialty Papers Division.



"The high level of technology, knowledge and R&D capability from Valmet is very valuable for us to implement this project," says K. Nagahari, Senior Vice President of Projects at ITC Limited.

board machines. They can offer the best board-making technology and know-how that can make a difference," comments **Sanjay Singh**, Chief Executive Officer of ITC's Paperboards and Specialty Papers Division, about the newest investment of the company.

From engineered solutions to measurable results

"We prefer global partners, like Valmet, who understand our requirements, and the market, and know us well as a company. We require excellent technology, and we need a good set of people both from ITC and Valmet. Together,

we were able to commission a high-speed board machine and produce excellent board to achieve a superior position in the market today," says **Vadiraj Kulkarni**, Chief Operating Officer of the Paperboards and Specialty Papers Division.

"Excellent-quality board means high printing properties, as well as good functional properties like high bulk, smoothness and stiffness. In addition, the cost dimension is essential in terms of lightweighting and energy-efficient processes. Valmet has been very committed to this project from engineering the solution to qualified end product quality," he continues.

→ "Coated board has an important role in the future of packaging, for example in replacing plastics," says **Sanjay Singh**, Chief Executive Officer of ITC's Paperboards and Specialty Papers Division.



→ "ITC has a very robust system in place regarding, safety, environment and health issues. We have seen that Valmet has very high set of standards related to HSE. Working together has ensured that this project has progressed well and has ensured safety," says **A. Harinarayanan**, Project Manager of BM 1 project from ITC.



Optimal balance of scope, cost and time

The BM 1 coated board machine started up in June 2018. According to ITC's Project Manager for BM 1, **A. Hari-narayanan**, the start-up was smooth. "The challenges any project manager faces are related to scope, cost and time. I'm very happy about the support from Valmet: Together, we were able to stick with the original cost level, scope and time schedule. Within a couple of months from the machine start-up, we were able to achieve almost all designed end product properties and the designed production rate."

Valmet's delivery also included automation solutions for the production line. "With Valmet's integrated automation solutions, the performance of BM 1 is better, the start-up was smooth and efficient, and stabilizing the process was fast. This has been the best installation of a board machine with the shortest possible time," says Singh in summary.

Right technology scope for sustainable production

ITC has been carbon-positive, water-positive and solid waste recycling-positive for several years. This drives ITC to constantly develop ways to be more efficient in their processes. "In addition to excellent board quality and high-speed production, we are looking for resource efficiency in order to be more competitive," states Kulkarni. He continues: "For the first time in India, we are using innovations like Aqua cooling calendering technology, which will ensure better end product properties of the board while enabling us to reduce energy consumption."

BM 1 consists of a multi-Fourdrinier wet end concept and a press section with a shoe press. It runs without an MG cylinder, which is uncommon in folding boxboard manufacture in India. "We are running the shoe press very efficiently. This has been beneficial in terms of

ITC Limited's BM 1 board machine produces high-quality folding boxboard grades at their Bhadrachalam site in India.



"Valmet has been very committed to this project, from engineering the solution to qualified end product quality."

Scope of Valmet's delivery

Complete coated board-making line from headbox to winder, including:

- Aqua cooling calendering technology to ensure high bulk
- Modern concept with no MG cylinder
- A linear operating reel to improve safety and efficiency
- Integrated automation solutions including machine control system and quality control system



board quality. The wet end overall is also very efficient. The formation is at a good level. With this wet end concept together with the press section, we can produce high-quality folding boxboard grades very cost-effectively,” says **K. Nagahari**, Senior Vice President of Projects at ITC Limited.

“We required board properties with as good printability as can be achieved with an MG cylinder. We believed in Valmet’s technology and know-how to be able to produce the same quality without it. We have sent out this end product to our customers for printing. The customers are very happy with the product quality,” states Singh.

Close collaboration

The shared journey of ITC and Valmet is almost two decades long. “We have had good collaboration together. There is deep engagement between us, and it has helped

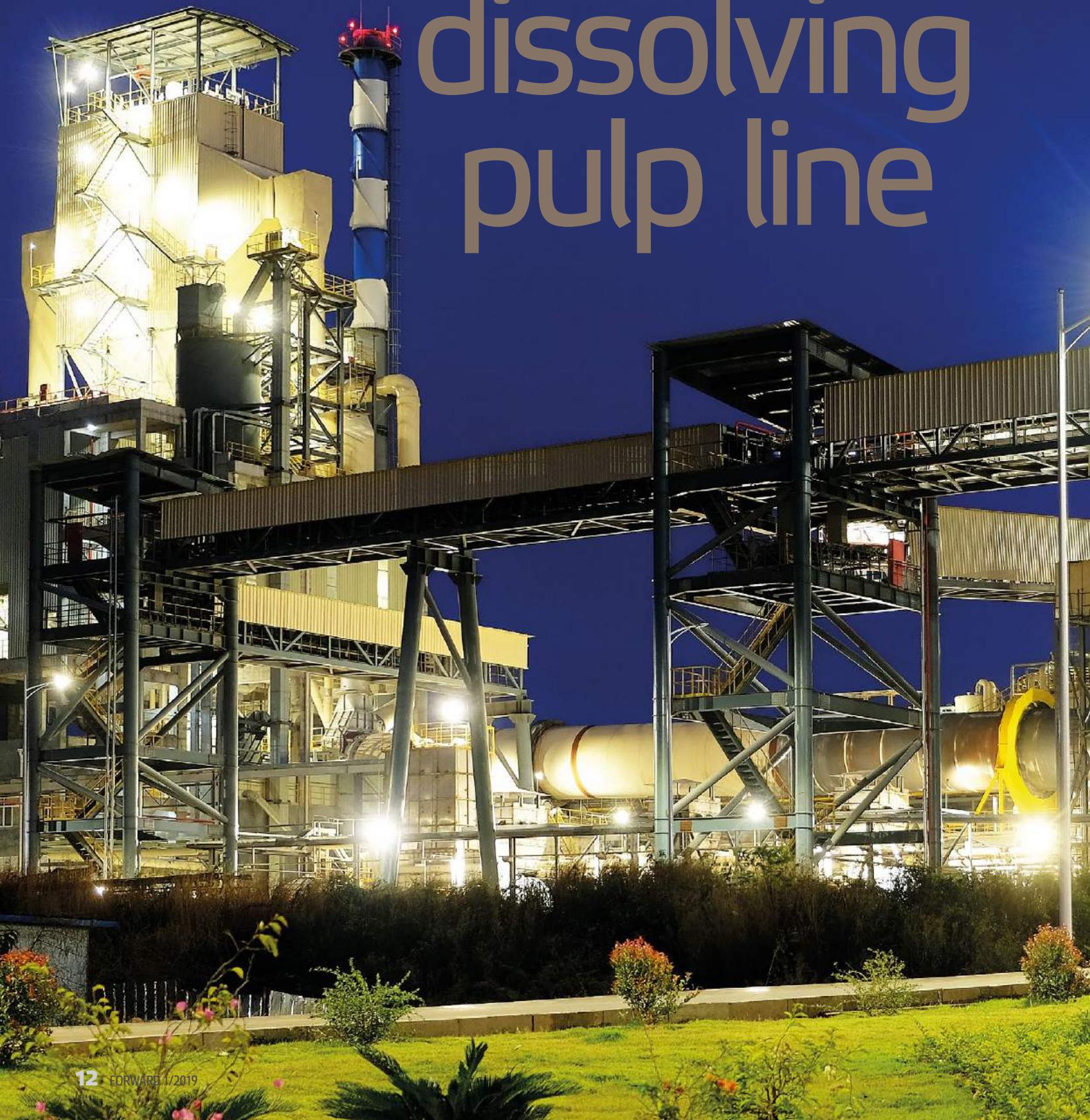
us to solve challenges also during this project. We share engagement at several levels: between the project teams, the optimization teams and the start-up teams,” says K. Nagahari.

“We have had fluent communication with the Valmet team. From day one, ITC’s management and Valmet agreed to have a fixed review mechanism for this project. Once a quarter, we had a senior-level steering meeting, and we were able to review and fix any unsolved issues. At the end of the day I’m very happy that we have successfully commissioned this project by working together,” concludes A. Hari-narayanan. ■

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Smooth startup for dissolving pulp line



The results of Sun Paper's first Valmet dissolving pulp mill in Laos speak for themselves: high production output, stable runs and reduced environmental load.

TEXT Åsa Arencrantz and Johan Eriksson



When Sun Paper decided to build a new dissolving pulp mill in Laos, it made the critical and successful decision to base the operation on Valmet's batch pulping technology.

The new greenfield mill, with a capacity of 250,000 tonnes a year and located in Muang Phin, in the southern province of Savanakheth, started up in June 2018.

"This is our first experience with batch cooking, and it is an ideal fit for this kind of pulp production, since the process can handle raw materials of varying quality," explains **Mr. Ding Xingbang**, Pulp Line Production Manager at the Sun Paper, Laos Mill.

"We already have two continuous pulp lines producing dissolving pulp in China, so our technical team is familiar with continuous cooking from other suppliers. At the China mills, all the wood comes from Australia and the chip quality level is very uniform. Here in Laos, however, the raw material situation is much different, since we use local wood sources, which contain many varieties of trees. That difference is one of the key reasons we chose batch cooking."

Reduced scaling, higher uptime

One of the common challenges of dissolving pulp production can be scaling in the hydrolysis vessel and screens. Sun Paper's Chinese mills, says Mr. Ding Xingbang, must stop every five or six months to clear the scale, as the entire hydrolysis tower is sometimes very fouled. In addition, the hydrolysis tower screen is often blocked by scale, resulting in emergency shutdowns, which are both very risky and costly.

"Here in Laos," continues Mr. Ding Xingbang, "we don't have a local professional maintenance company to clear the scale. For this reason, we liked Valmet's batch cooking, which uses the same vessel for hydrolysis and alkaline cooking. Any scale that forms during hydrolysis is dissolved during the alkaline cooking. That reduces both production losses and quality variations due to scaling, which we are very happy about."

Belt feeding instead of chip pumping

A further reason for selecting batch cooking in Laos was Sun Paper's experience of high wear on the chip pumps in their continuous cooking systems in China. The wear and tear on the pumps means high maintenance work, with a new layer of wear-resistant material being required every month. That, says Mr. Ding Xingbang, was clearly not acceptable in Laos. "The maintenance here is not as effective as it is in China, and we cannot send the pumps to China for repair all the time. So, batch cooking gave us advantages since it doesn't use chip pumping."

In less than six months, output is already above the design capacity.

Next step: 900 tonnes of dissolving pulp per day

The start-up of the mill has gone well, and in less than six months, output is already above the design capacity. As of January 2019, dissolving pulp production has reached 840 tonnes a day, slightly above the design capacity of 828. Chemical paper grade pulp production can reach 1,050 tonnes a day, versus the design target of 1,020.

Now, says Mr. Ding Xingbang, the next step is to increase dissolving pulp output to 900 tonnes a day, which he considers feasible. “We are confident we can

do it since, compared with our continuous cooking, the operating efficiency here is higher, and costly downtime for maintenance is greatly reduced.”

Efficient washing means low COD carry-over

Another area where Valmet’s technology has given definite advantages is in the pulp washing operation.

“The washing operation is very smooth over a wide capacity range, and the washing efficiency is excellent,” Mr. Ding Xingbang reports. “Most importantly, the carry-over to bleaching is the lowest of our three fiber lines, and therefore pulp cleanliness is best. Carry-over to bleaching is less than 3 kg COD/adt, so bleaching chemical consumption is also lower. In turn, this means that the load on the water treatment system and the chemical oxygen demand from the effluent are also greatly reduced.”

Investing in local community for the future

Sun Paper’s Laos mill has also worked actively on corporate social responsibility, both to develop the wood resources it needs and the skilled labor to run it. It began with tree plantations on company forestland in 2008, and over ten years, it has planted around 9,000 hectares of



← The operating efficiency here is higher, and costly downtime for maintenance is greatly reduced,” says Mr. Ding Xingbang.

←← Left: Yingmin Yu, Senior Sales Manager, Pulp Mill Sales, Valmet, China Right: Jinping He, Sales & Technical Support Manager, Cooking & Fiber, Valmet China.



Advantages of batch cooking

- High production reliability
- High and uniform pulp quality
- Possibility to run high-alpha cellulose pulps for dissolving wood pulp
- Steam hydrolysis for dissolving pulp – low evaporation need, high dry solids for evaporation
- Low maintenance cost
- Stable cooking conditions independent of production level – stable pulp quality

eucalyptus. In addition, it has encouraged local farmers to plant eucalyptus trees in their own fields and has included a program to help poor farm families by providing saplings free of charge, says Mr. Ding Xingbang.

During construction, there were more than 2,000 workers on-site, of which 1,200 were local employees, supporting employment in the local community. Sun Paper and Mr. Ding Xingbang see education and training as the foundation for sustainable development, both for the company and the local community.

Good cooperation

Mr. Ding Xingbang and Sun Paper feel they have made a smart move by investing in Laos, and also by choosing Valmet's simple, yet efficient, batch pulping technology. The Pulp Line Production Manager emphasizes that it has been both a rewarding and an enriching project. "We've had pleasant and successful cooperation with Valmet, and they have given us a lot of technical support

from their previous installations. The entire cooking and washing system started up very smoothly, and the technical level of Valmet's experts is very high. We are happy that we have made the right decisions," concludes Mr. Ding Xingbang.

Scope of Valmet's delivery

As the equipment and technology supplier, the scope of Valmet's supply includes the batch cooking process, washing equipment for the whole fiber line using TwinRoll presses, and a lime kiln, which uses wood powder as the fuel. Importantly, due to the mill's remote location, Valmet is also providing site maintenance services for all the equipment it has installed. ■

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↑ Sun Paper's new dissolving pulp mill in Laos uses local wood sources that contain many varieties of trees. That was one of the key reasons to choose batch cooking, since the process can handle raw materials of varying quality.

Continuous development in performance

The Spanish paper and cardboard manufacturer SAICA launched its U.K. operations in 2012 with the startup of its PM 11 paper machine in Partington. From day one, Valmet's expertise has been utilized on site. Due to a recent renewal of the Performance Agreement, the co-operation will continue until at least 2020.

TEXT Marianne Valta

SAICA Paper UK's PM 11 is a complete OptiConcept paper machine delivered by Valmet. It produces high-performance brown containerboard used in the manufacture of corrugated boxes, utilizing raw material that is 100% recycled paper.

Pasi Häyrynen has worked in Partington since 2010 as Production Manager of the PM 11 project. First, he was in charge of recruiting and training a team in Spain, and later commissioning and starting the mill up together with the Valmet project team. He has worked as Mill Manager for the site since 2013.

"I am satisfied with the good co-operation with Valmet's team and with the good relationship we have developed over the years. After the initial warranties of the original PM 11 delivery were fulfilled, we continued

with a new performance agreement – and recently signed our third agreement," Häyrynen says.

Together for the better

Häyrynen gives several concrete examples of how the co-operation with Valmet has improved the mill's performance.

"Initially, one of the action points was to focus on the stock approach stability as well as on both the MD and CD controls. A Valmet expert remotely monitored our system and control loops and made recommendations regarding the tuning. We have also used Valmet experts to optimize the pulper area controls and fractionation controls, with good results," Häyrynen says.

One of Valmet's promises is to take customers' performance forward. At SAICA, the dedicated work and



From left: Nigel Lloyd, Simon Richman, Darren Hoyle, Darren Johnston, Steve Finch, Joan Oliveras, Chris Turner, Paul Evans, Pasi Häyrynen, Steve Fodor, Pasi Puronurmi, Barry Byrne.

co-operation has led to developing new ideas for the forming section and winder area, hence the cleanliness of the forming section has improved and winder speed has increased.

Future goals for PM 11 are clear

Currently, the production capacity of PM 11 is approximately 440,000 tonnes per year, with an average speed of 1,254 m/min. These numbers have been challenged by the PM 11 team, as the line has much more potential in it and new goals have been set for 2020.

According to Häyrynen, the biggest production increase potential is in the average speed. The next biggest potential is in unplanned shutdowns. The plans for the next steps are clear.

“In order to increase our average speed, we need to be

able to run the same grades at the same speed every time and try to eliminate the reasons preventing us from doing this. The normal reasons for this can be restrictions in our effluent plant, stock preparation or winder area. Unplanned downtime is a different matter. For this, we are working with focus groups to improve known problem areas, and we are also continuing with root cause analysis for breakdowns to prevent them from happening again,” Häyrynen explains.

Annual speed trial sets new record

It has become an annual tradition to run speed trials in order to find out the bottlenecks and prepare for the following years' capital investments.

“The speed trial also gives us an opportunity to test and improve tail feeding at higher speeds. This is exactly

The keys to this type of agreement are longevity, personal relationships and trust.

what we achieved this year, and of course at the same time we achieved our new 24-hour speed record – 1,519 m/min! Valmet's top specialists are supporting us during these trials, and afterwards we always have technical discussions about how to solve any issues we found," Häyrynen explains.

Performance Agreement aims for long-term improvements

Valmet offers Performance Agreements to its customers as a long-term solution for improving the performance of mills or machines. Co-operation with SAICA Paper is a good example of the benefits of continuous work.

"A Valmet Performance Agreement guarantees the customers our experts' support in reaching agreed targets, benchmarked services and best practices and new insights through audits," **Pasi Puronurmi**, Manager, Agreement Support at Valmet, summarizes.

"We see our customers as partners and always try to improve their performance as if it was our own. I think the basis for our achievements with SAICA is the mutual trust and co-operative spirit built over the years," continues Puronurmi.

Häyrynen is satisfied with the continuous Performance Agreement SAICA has had with Valmet.

"The agreement has definitely been a great benefit to us. One of the key benefits has been the single point of contact the agreement provides. We do not need to remember or think about whom to contact within Valmet – we just contact our co-operation manager, and he knows or finds the help that we need. The keys with this type of agreement are longevity, personal relationships and trust. This can be achieved when you have the same contact for many years with a partner who knows how we work and think – and vice versa," Häyrynen says. ■

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SAICA – S.A. Industrias Celulosa Aragonesa

- Founded in Zaragoza, Spain, in 1943
- Market leader in Spain; produces sustainable solutions for paper and board packaging
- Today, SAICA operates in six European countries
- SAICA UK begun its operation in 2012 in Partington, a town near Manchester, with a new paper plant
- PM 11 at SAICA Paper Partington produces high-performance, lightweight papers with a capacity of 440,000 tonnes a year

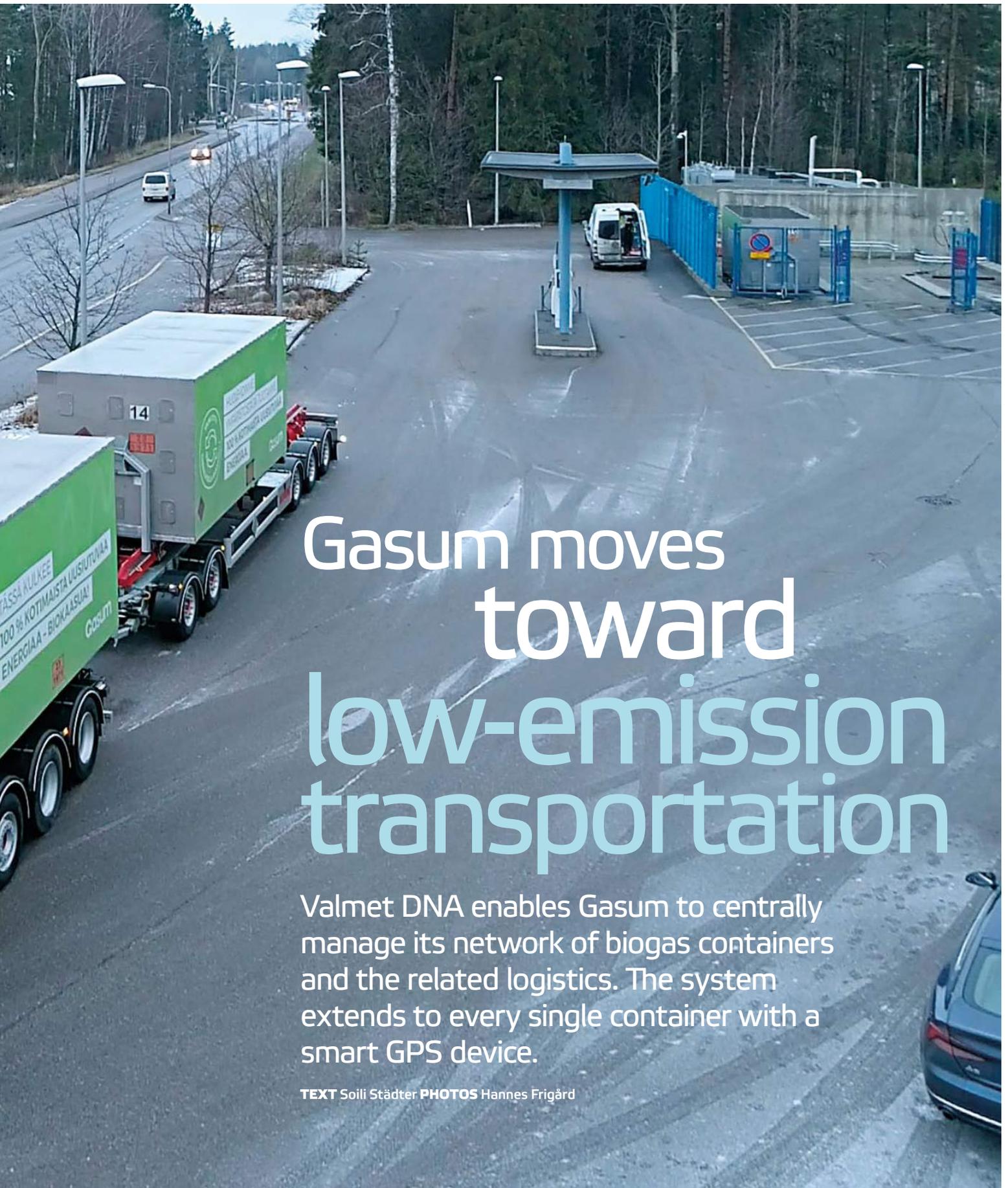


Service around the clock

Over the years, Valmet's experts have developed vast knowledge of paper machines and their maintenance, machine consumables, as well as the entire paper-making process. Today, Valmet also utilizes modern technologies such as remote connections, to offer speedy service. Through Performance Centers, Valmet's globally working professionals are at hand around the clock.



Gasum's biogas plants and filling stations utilize Valmet DNA Integrated Operations, a solution for centralized data collection and container logistics management.



Gasum moves toward low-emission transportation

Valmet DNA enables Gasum to centrally manage its network of biogas containers and the related logistics. The system extends to every single container with a smart GPS device.

TEXT Soili Städter PHOTOS Hannes Frigård

“Through DNA Integrated Operations, we track the containers’ pressure data at all biogas filling stations,” says Jarno Jokinen.



Gasum is a Nordic energy company that, together with its business partners, promotes development of a carbon-neutral future on land and at sea. The company has for some time been building a gas station network for filling passenger cars and heavy-duty vehicles in Finland, and is currently expanding the network to serve the needs of heavy-duty transport in Sweden and Norway. Biogas is a low-emission and renewable fuel produced from feedstocks such as biodegradable waste from households, shops and industry.

Centralized container management

Valmet has supplied all Gasum biogas plants and filling stations in Finland and Sweden with Valmet DNA Integrated Operations, a solution for centralized data collection and container logistics management.

Jarno Jokinen, Production Engineer at Gasum, is

well experienced in using DNA Integrated Operations. “Through the application, we track pressure data from the containers at all biogas filling stations. In addition, we can predict whether the amount of gas available is sufficient.”

“Compared to the previous manual work, Gasum is now able to centrally manage its various biogas plants and filling stations, as well as track container logistics via GPS. In addition, the company can calculate its total biogas sales and transfer this data to its ERP system,” adds **Jani Hautaluoma**, Director of Process Automation at Valmet.

Every container tracked with GPS

Every container can be tracked using an advanced mobile tracking system developed by Yepzon.

Released in the first quarter of 2019 as a joint project between Valmet and Yepzon, the new Atextreme GPS application will provide even more features for tracking biogas containers. This new GPS device will become an integral part of the overall solution, intelligently connecting all process and container information.

Successful shift from manual to online operation

“It is important for us,” Jokinen confirms, “that all information related to gas logistics can be found within the same system. This reduces the time spent on planning logistics, while improving operational efficiency.”

“Since we developed the system together with Valmet according to our specific needs, its user interface is clear and simple. It features exactly the functions we require,” says Jokinen. This application is used by all Gasum employees who manage the logistics of gas containers. ■

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Container delivery records via tablet

Let’s follow the delivery process of one container at the Malmi gas filling station in Finland.

Juho Nakari, a driver for the container transportation services company Speed Oy, drives to the gas station. He opens the fenced container area, prepares the container for lifting up onto the truck, and then gets back into his cab. The container is moved to the truck’s platform and securely attached. Then, Nakari records this container delivery in DNA Integrated Operations via an tablet.

According to Nakari, the system works very conveniently and speeds up his work. Hautaluoma foresees a near future in which all such processes can be handled by mobile device.

Getting on the right track for improved refiner control

Juho Thermal's paper mill installed a Valmet Pulp Analyzer (Valmet MAP) on their PM 1 papermaking line to gain a better understanding of the refiner conditions and their effect on paper quality.

Jujo Thermal, a subsidiary of Nippon Paper Industries situated in Kauttua, the southwest of Finland, is one of the world's leading suppliers of durable direct thermal papers for labels, tickets and tags, as well as for point-of-sale use. The mill operates two paper machines with two off-machine coaters and three winders to produce 80,000 tonnes of paper per year.

More fiber information

Valmet MAP was installed to replace an old freeness analyzer that needed replacing. "The old analyzer only gave Schopper-Riegler (SR) numbers, and for better refiner operation, we needed more information," says **Juha-Pekka Kaivola**, Production Manager at Jujo Thermal. Schopper-Riegler or Canadian standard freeness, provides a measure of the rate at which a dilute suspension of pulp can be dewatered. It is related to the surface conditions and swelling of the fibers, which give an indication of the amount of mechanical treatment to which the pulp has been subjected. "Valmet MAP offered us the ability to also automatically measure other fiber properties in addition to SR and gain a better insight into refining conditions and their effect on paper quality," he continues.

Trending freeness and fiber length

Valmet MAP automates the SR standardized measurement method to provide reliable and accurate freeness results, together with other fiber property measurements that can be added to the standard platform. At Jujo Thermal, four sample points were installed to automatically feed the analyzer: before and after the separate hardwood and softwood refiners, with a fifth sampling point in the broke line.

"The results are shown on a large display in the control room, where operators can see 24-hour trends," says **Albert Ulla**, Operations Manager of PM 1 at Jujo Thermal. "We have the possibility for automatic refiner control, but until we get more experience, the operators follow the values to manually adjust the refiner-specific energy."

Paper strength prediction

"Valmet MAP supplies us with information, such as fiber fibrillation and fines. There is also a tool called Valmet Modeler to predict final sheet strength, which will be a great help with trials. Many customers are going to lighter grades, and if we reduce the grammage, then strength values go down. The ability to predict strength with Valmet MAP means we could see if we reach our targets



Valmet MCA provides accurate consistency measurements.



Valmet MAP analyzer.



Albert Ulla,
PM 1 Operations
Manager, and
Juha-Pekka
Kaivola,
Production
Manager.

by increasing refining without a long trial, but that is still quite far in the future,” states Kaivola.

“At present, changes in strength values can be investigated, and when we see a change, we can look back and see how fiber length or fibrillation index have affected them. We can now also see the differences in fiber length from batch to batch and react if necessary.”

Saving money and materials

The big display in the control room keeps the operators aware of refining: which direction it is going in and what is happening all the time. “We have a very wide grammage scale, from 40 to 200 gsm, which makes for very big differences in machine speeds and pulp flows,” says Ulla. “With no reliable information, it could be three or four

reels before a deterioration in strength might be noticed, and the reason would be that no change had been made to refining conditions.”

“As thermal coating color is very expensive, avoiding waste before coating can save a lot of money. Operators now check the display if there are any changes in strength and can immediately determine whether the problem is before or after refining,” he continues.

Good refining management also requires accurate consistency control to ensure the correct specific energy set points, and this is achieved with the Valmet Microwave Consistency Transmitter (Valmet MCA). “We replaced the blade consistency transmitters, which were not the optimal solution for this application, in both refining lines. Now we really trust the Valmet MCA measurement,” says Ulla.

Better refining

Valmet MAP also has a manual sample capability, which is put to good use on the second paper machine, PM 2. Confidence in the measurement means that routine freeness measurements that were previously done in the laboratory have now been replaced by Valmet MAP. “The analyzer has been working well with no big maintenance problems, and refiner operations are definitely better now,” says Kaivola. “We have seen a reduction in waste, which saves money and, although we are just at the beginning of the learning curve, Valmet MAP is opening many new possibilities for us.” ■

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“Valmet MAP enables us to automatically measure fiber properties and gain insight into refining conditions.”



Shared journey with a **focus** on sustainability

Three decades of cooperation between Yuen Foong Yu and Valmet continued in 2017 with a new OptiConcept M board-making line starting up successfully. The long-term cooperation is based on shared values and a focus on sustainability.

TEXT Sara Li

Focus on sustainability

Yuen Foong Yu is a well-known company in Taiwan and has a history of more than 90 years. Both Yuen Foong Yu's model of sustainable operation and Valmet's Way Forward have a common core: maximizing the use of resources, minimizing the impact on the environment, and dedication to serving their customers.

These common values have contributed to long-term cooperation between the two parties over the past 30 years. The first Valmet-supplied papermaking line was delivered to the Yuen Foong Yu mill in Taiwan in 1989. When Yuen Foong Yu decided to invest in a new production line (PM 3) in 2015, Valmet's OptiConcept M

production line won the bid again. Fewer raw materials, less energy consumption, better-quality products: all the key features of the OptiConcept M technology are highly compatible with Yuen Foong Yu's business philosophy and long-term vision.

Maximum resource utilization with zero waste

"Yuen Foong Yu has been pursuing the goal of zero waste and actively utilizing new technology to cherish every resource. From raw materials to energy, water utilization, recycling and reuse, to the development of appropriate product features, we have been working hard. We



"Valmet has professional service team and a worldwide support team. We feel relaxed when cooperating with them," comments Song Fu Shen, Specialist for PM 3 at Yuen Foong Yu's Hsin Wu Mill.



"OptiConcept M was chosen for its advantages in energy saving and water saving in the beginning," says Chou Yu Lung, Mill Manager of Yuen Foong Yu's Hsin Wu Mill.

promote proper products: too much packaging is a waste, too little can damage the product. The key is to strike a good balance," says **Chou Yu Lung**, Mill Manager at Yuen Foong Yu's Hsin Wu Mill, introducing their business model.

"At the Hsin Wu mill, we have also built a multi-fuel heating and power plant, which can make full use of the waste from the paper mill as the raw material of the power plant. We do very careful classification and maximum recycling. It is not only a cost saving, but also maximum resource utilization," he continues.

"Our PM 3 board machine uses 100% recycled fiber to produce containerboard, including corrugated paper and kraftliner. The OptiConcept M was chosen for its advantages in energy saving and water saving in the beginning. But we were delighted to discover its high tolerance to the raw materials, and production transfer between linerboard and corrugated board is also very smooth. This makes it even more aligned with our original intention of making full use of all resources. The competitiveness of

the design and the concept of sustainability are integrated features of OptiConcept M," says Chou Yu Lung in summary.

Towards zero emission

Willie Chen, Executive staff of Yuen Foong Yu Hsin Wu Mill, recalled the whole process of negotiation and implementation of the project: "We have always adhered to the green business philosophy. We have obtained international environmental protection certifications such as CoCs for paper, PEFC, etc. We had a clear goal at the beginning of the project: energy saving and environmental protection. We always do our best to reduce the carbon footprint, minimize the impact on the environment, and finally achieve zero emissions."

"Many features of the Valmet OptiConcept M board-making technology impressed us. For example, its compact design can reduce the carbon footprint a lot even during the construction period. It saves energy, water, and fiber. Now our steam consumption for 90–95 g/m² board is around 1.1 tonnes, and power consumption is about 320 kilowatts per ton. This is a very low level in the industry and meets our expectations well," he summarizes.

Innovation behind differentiated quality

"The product quality from the Taichung mill could not meet customer needs anymore. In order to better serve our customers, improve product quality and enhance competitiveness, we invested in the new production line. The OptiFlo headbox of PM 3 ensures paper evenness, which means that our customers are satisfied with product quality, and we are also very proud of that. Now we are confident to say that we produce the best corrugated paper in Taiwan," says **Xu Wenxian**, Associate Director of the Yuen Foong Yu Hsin Wu Mill, who is very satisfied with the current product quality.

Common values have contributed to long-term cooperation between the two parties over the past 30 years.



↑ “PM 3 is a smart paper machine,” Mr. Lin Song-shing, Supervisor of Yuen Foong Yu Hsin Wu Mill PM 3 says to Peng Yunyun, Valmet Product Manager (left).

Mr. Zhou also highly recognizes the benefits and quality of PM 3: “Because of low energy and fiber consumption including our own power plant support, our advantage in cost competitiveness is obvious, as well as our profitability and market competitiveness. We always believe in the driving force of new technologies for product development and believe in Valmet’s ability to innovate. Our product quality improvement is strong proof of this. It can be said that Valmet’s product quality has promoted the quality of our products, and its innovative way to service has contributed to our longer-term cooperation.”

Smart paper machine

Lin Song-shing, Supervisor of PM 3, praises the machine automation system: “PM 3 is a smart paper machine. It has user-friendly user interfaces, and a unified platform

for the whole production line with chain control. It is very convenient to control and check machine problems, and easy to maintain. It is also easy for newcomers to get started, which greatly shortens our training time, and solves the most challenging labor shortage problem at the same time.”

”This is not the first time we have used a Valmet automation system. In 2010, we rebuilt PM 1 with Valmet QCS and MCS. The user experience has been greatly improved. So we were happy with management’s decision to choose Valmet automation again this time.”

About Yuen Foong Yu

The company was founded in 1942, and officially established as Yuen Foong Yu Paper Mfg. Co., in 1950. At present, it is widely regarded as the pioneer of private paper manufacturers in Taiwan.

Yuen Foong Yu Paper produces reading and writing, industrial, and home use paper. It is characterized by a fully integrated production chain covering upstream (forestry, pulp), midstream (paper manufacturing) and downstream (printing, packaging, and design) operations, which creates synergies. Yuen Foong Yu Paper currently ranks among the 50 largest paper manufacturers in the world. ■



← Xu Wenxian, Associate Director of Yuen Foong Yu’s Hsin Wu Mill, is very satisfied with the current product quality.

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● A matter of
give
and **take**

Running a tissue line installation project involving several suppliers most certainly raises a lot of questions and concerns. A clear vision, well-defined targets and a clear roadmap help to set the direction for all. Velvet CARE in Poland knows what that means in practice. TEXT AND PHOTOS Katarina Ahsberg

For the past 20 years, Velvet CARE has been the leading tissue brand in Poland. Every day, millions of Poles use tissues, wet wipes, toilet paper and kitchen towels produced at the Klucze mill. But their products can also be found on the shelves in the Nordic countries, the Baltics and Germany. In addition to their own brand, they also supply the private label market. To keep up with the growing tissue demand, Velvet CARE decided to invest in a new tissue machine.

“The check-out went like clockwork. Everything was so precise.”

Reference visits key to evaluation

“First of all, we were looking for flexible, open-minded and close cooperation. Secondly, we wanted the best technical solution at a reasonable price. Thirdly, we looked at the number of machines from that supplier running worldwide, proving that the technology can deliver what’s promised. We weren’t looking for promises; we wanted a machine guaranteed to provide the quality and capacity we needed,” says **Wanda Ciesielczuk**, Plant Strategic Investment Manager, Velvet CARE.



The paper quality has provided new market opportunities for Velvet CARE, especially regarding facial products, and has allowed the company to go for the premium private label market.



“We compared different technologies to find the best solution. Each supplier took us on reference visits. It was a very valuable way to see how the promised features worked in reality. Valmet’s reference visits corresponded to what was promised in every way,” concludes Ciesielczuk.

Clear way forward

“We are working according to a well-defined project execution model based on long experience of more than 200 tissue machine installations. During a project, we pass several gates, or checkpoints, to ensure that all milestones

related to the gate are fulfilled and everything is in shape to proceed,” explains **Hans Englund**, Project Manager at Valmet.

The project model also helps to identify what could be a potential risk in the future and make sure it is eliminated before it causes a problem.

“This way of running projects is, from our perspective, the right way to do it. Even if there were strict checkpoints to be fulfilled, we still had good flexibility and could agree on the best way forward,” Ciesielczuk says.

The first phase of the project is very intense. All doc-



After thorough evaluation, the project team decided to go for an Advantage DCT 200 line equipped with an Advantage ViscoNip press and a F(O)CUS Rewinder. Stock preparation and Valmet Automation were also part of the scope, as well as mill engineering, training, and electrical instruments, among others.

“Co-ordination of all people involved is a matter of give and take. We must make sure we have good relations and that we move forward according to the plan.”

umentation needs to be agreed, time schedules set, and common goals defined. But maybe the most important of all is to build good relations and trust in each other.

Clear and fact-driven communication

“We and Valmet worked truly as one tight team supporting each other throughout the project. The roles and responsibilities were clear, and everyone fully understood what we wanted to achieve. The communication was

straightforward and focused on solving issues together,” says Ciesielczuk.

“Co-ordination of all people involved is a matter of give and take. We must make sure we have good relations and that we move forward according to the plan. Clear and fact-driven communication ensures correct decisions. Almost ready isn’t good enough: either it is ready or it isn’t,” says Englund.

During the installation phase, there are a lot of questions that need to be handled – quickly. Daily follow-up meetings and transparent communication are of utmost importance, not to mention the value of support from the back office. To know you have an expert network backing up from home adds stability and comfort.

Check-out like clockwork

The project team had, from the very start, one common target in mind: to get ready for the start-up. All people involved were totally dedicated to meeting the start-up date.

“The check-out went like clockwork. Everything was so precise. Whenever an issue appeared, it was addressed immediately,” summarizes Ciesielczuk.

“The start-up day presented a few issues, as normal, but nothing we couldn’t solve. We had adjustments done relatively quickly. From the very first roll, the bulk and

Valmet's Project Execution Model

Valmet's project execution model includes nine gates and related milestones to ensure successful project delivery.



Hans Englund, Project Manager at Valmet.



moisture profiles were excellent! I had never imagined achieving that from the start," says **Sebastian Głowczyński**, Project Manager at Velvet CARE.

"The machine provides a safe working environment and is easy to operate, which is important to us. The DNA system is very nice. It is a powerful tool to follow the history and trends. We have immediate access to data to support our decisions. The DNA system is a very good tool," Głowczyński continues.

New market opportunities

The paper quality has provided new market opportunities, especially regarding facial products. The quality and softness are living up to the Velvet name, and allow the company to go for the premium private label market. In paper handkerchiefs, it is already the market leader in Poland.

The installation project has now been closed, but fine-tuning continues. Close cooperation between two professional companies combined with fact-driven communication, well-defined targets and a clear roadmap turned out to be the key to reach the target with the project. ■

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"From the very first roll, the bulk and moisture profiles were excellent! I had never imagined achieving that from the start," says Głowczyński.



Reading vibrations

Remote condition analysis with Valmet's expert services has proved an invaluable tool for achieving trouble-free production at Burgo's Verzuolo paper mill in Italy.

Burgo Verzuolo's paper machine PM 9 is equipped with full scope control and quality systems automation to help monitor machine condition. In addition to the system, the mill utilizes a condition analysis service contract with Valmet to receive expert appraisals of the machine's vibration conditions. **Andreas Nuesse**, a Valmet vibration specialist located a thousand kilometers from the mill in Dörpen, Germany, uses a remote connection to examine machine conditions and prepare a regular report for the mill.

Tool for predictive maintenance

Condition monitoring, which covers mechanical condition measurement and the performance of machines based on vibration measurements as well as other machine parameters from the Valmet DNA Process Automation System, is an essential tool for the mill's predictive maintenance. While the mill has access to the various tools the system provides, expert vibration analysis is a very skilled function, requiring both extensive training and experience. Freed from the day-to-day maintenance activities at the mill, Nuesse can focus on examining

trends or other changes in the vibration spectra the system measures and advise the mill of where to focus maintenance resources. If he finds a problem, his expert analysis allows time to plan, order spare parts if necessary and avoid unplanned downtime.

Advance alerts

There are also occasions when a system alarm alerts the mill to a problem which requires immediate expert analysis. Recently, a dryer cylinder vibration raised concern, and at the mill's request Nuesse was able to remotely examine the situation and give advice about the severity of the problem. Based on the investigation the mill was able to take preventive action.

Nuesse has also been able to alert the mill to problems before they emerge: during one regular check, a severe imbalance at the second press (more than 20 mm/s and getting worse) made it necessary to contact the mill urgently. The machine was stopped immediately, and several loose screws, some of which were completely missing, were discovered on a cardan shaft. The mill's quick response to the warning avoided both serious damage and a longer unplanned shutdown. ■

Burgo Verzuolo mill: Valmet expert services via Industrial Internet





Not just
paper
but
functionality

When it was facing with end-of-life issues of quality control systems (QCS), Neenah Coldenhove turned to Valmet for a new solution. The successful start-up of a Valmet IQ QCS on paper machine PM 1 in 2016 was closely followed by a second system on paper machine PM 2 the following year.

TEXT AND PHOTOS Nigel Farrand

Neenah Coldenhove's paper mill in the Netherlands gained worldwide recognition at the end of the 1990s with the introduction of a very successful paper grade for dye sublimation transfer printing on all kinds of soft and hard surfaces. Together with their other specialty products, such as barrier paper for sterile packaging, the production of transfer paper places high requirements on final product quality.

But the QCS systems on Neenah Coldenhove's two paper machines were approaching end-of-life, with increased need for maintenance, lack of spare parts and aging basis weight nuclear sources. "The amount of servicing the old systems needed was excessive," says **Gert Van Beek**, Process Engineer at Neenah Coldenhove.

Sellable paper within hours

In 2015, the mill had installed a Valmet IQ Web Inspection System on its 2.5-meter-wide PM 1, and van Beek's experience had been very positive. "The web inspection system worked well, and Valmet compared very favorably with two other QCS suppliers we contacted, so we made the decision to install a Valmet IQ system on PM 1 in 2016."

“We don’t sell just paper, we sell functionality, and that is what Valmet offered us.”

“A trouble-free startup, which went better than I could have expected, resulted in sellable paper within one-and-a-half hours. We bought the second QCS for PM 2 the following year, so the experience couldn’t be that bad,” says van Beek.

Second QCS installation in record time

The second QCS, on the wider 3.5-meter-trim PM 2, had a much tighter installation window. “With most of the cabling done, we had one weekend to install the scanner frame before the reel, the single-sided frame for moisture at the glazing cylinder, and a single-point moisture measurement device at the coater. Again, we had sellable paper within hours,” says Van Beek. Operators on both machines quickly accepted the new systems, and according to van Beek, the new QCS is so easy to use that within only two days, the operators became familiar with the most used parts during its operation.”

Laboratory results correlated very well with the scanned values. “There were a few grades where we did not have to change anything, and on others, the biggest deviation of moisture and basis weight before calibration was around 1 percent,” says van Beek. “Caliper correlation has perhaps been the most challenging, but we now have an R-squared correlation of 0.99 on PM 1, with a little more work to do for PM 2.”

First time moisture control – 66 percent less variation

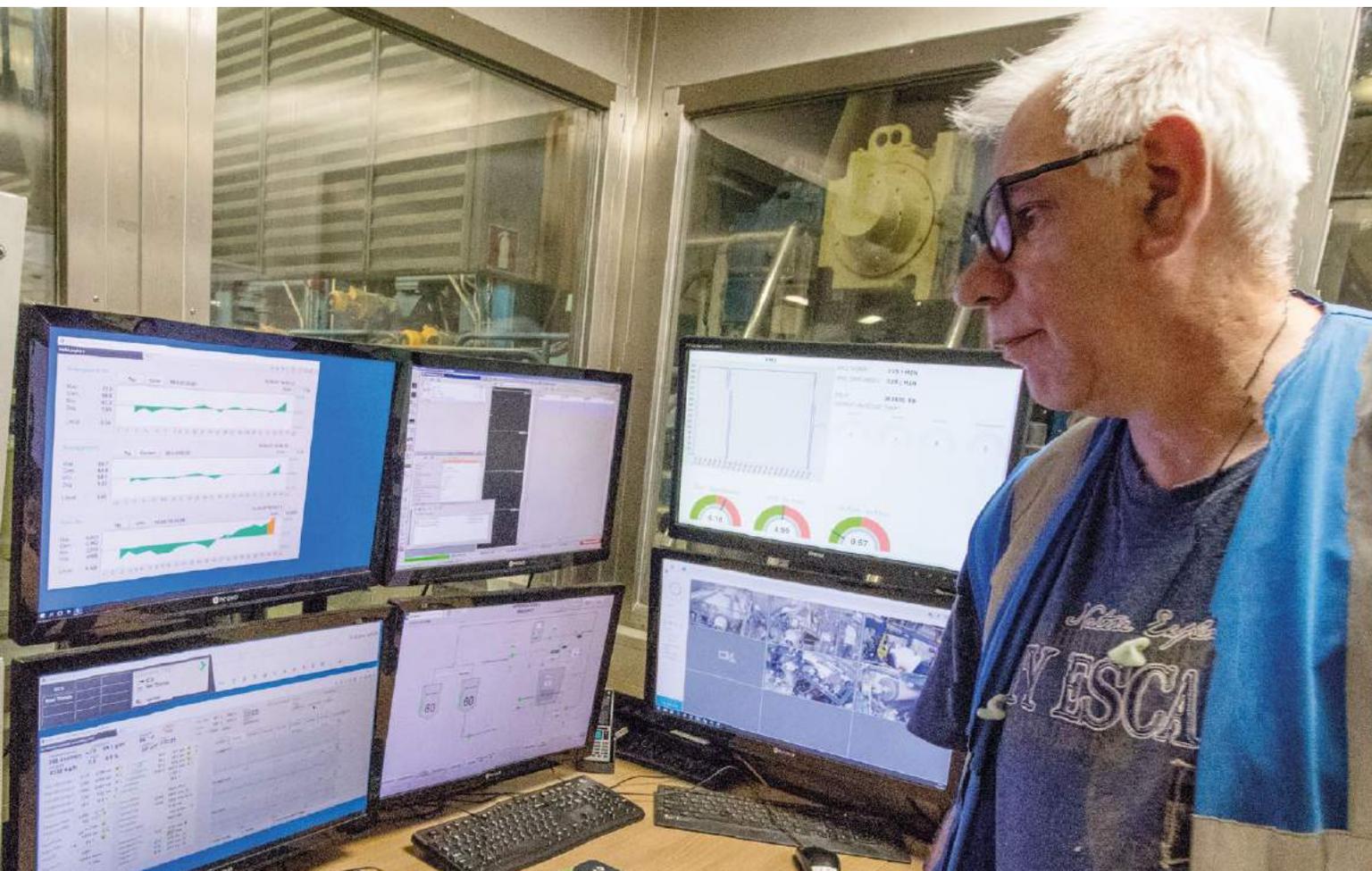
Van Beek already has a thirty-year history of working at Neenah Coldenhove. “When I started at the mill in 1988, we already had QCS on both machines, but in all that time, I had never seen moisture controlled – it was only a measurement. Moisture control at the pre-dryers, glazing cylinder and after-dryers was manual, and each shift had their own way of adjustment. In all the time since then,



Neenah Coldenhove is a small specialty producer with two paper machines producing about 20,000 tonnes of paper, which is exported all over the world.



The Valmet IQ Scanner before the reel measures basis weight, moisture, ash and caliper with a single-sided scanner measuring moisture before the glazing cylinder. Machine direction controls include basis weight, moisture, ash, and jet/wire ratio for both headboxes on this two-layer machine.



we had never dared to control the moisture automatically, but now with the Valmet system the operators trust it and have started using it. Operators on PM 2 were really quick to utilize the automatic moisture control, and the two-sigma value of moisture has now decreased to one-third compared to our earlier manual control,” says van Beek.

“Fingerprints” of good operation

Van Beek emphasizes that as well as identifying problems, they want to know the conditions that ensure really good operation of the machines. “We are learning much more about the machine, IQ has analyzing tools which we intend to make use of much more in the future. We now have good OPC connections from both Valmet quality control systems and the web inspection system on PM 1 to the manufacturing execution system. Every second, we take a load of data from the system and use it for analysis. When a machine is running really well, we take what we call a ‘fingerprint.’ The operator presses the fingerprint button, and we save a lot of defined data from the systems, if possible at least once per shift. Each month, we look at the mean values of the fingerprints for different

grades, and those become the startup values for next time,” explains van Beek.

This helps make grade changes faster and, because at present, both machines are worked with three shifts, with faster startups on Monday mornings after the weekend shutdown. With order books full for PM 2, it has already moved to four shifts and continued production through every second weekend.

More than paper: functionality

“We don’t sell just paper, we sell functionality, and therefore good reliable quality control is essential. That is what Valmet offered us, and they have delivered results,” concludes van Beek. “Their people react quickly and are willing to change things if necessary.” ■

↑ Gert van Beek takes a closer look at the quality profiles at the control room operator station.

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Dissolving pulp has a bright future at Sappi

Clothing made from wood is a growing trend. And dissolving wood pulp (DWP) is the key contributor to this development, since it can be made from all kinds of tree species.

Sappi, the South Africa-headquartered pulp and paper producer, is the largest non-integrated producer of DWP in the world. The company currently produces 1.4 million metric tons a year, giving it a global market share of approximately 16 percent. We recently spoke with **Tracy Wessels**, General Manager Technical for DWP, about the company's optimistic outlook on the sector and how they are positioning their new brand, Verve.

Why is Sappi so excited about DWP?

We are tightly linked to the growing textile value chain, which is showing positive growth in both organic market growth, and just as importantly, in substitution growth from less-sustainable textile fibers. Our capacity and our geographical production-site mix are well aligned to service this market growth, and we will certainly remain a key player within some of those market segments, notably viscose and lyocell. In addition, in South Africa we are sustainably supplied by our own commercial forest lands and we have robust and strict wood sourcing policies for our North American mill, which adds another level of sustainable advantage.

Today, environmental and ethical performance, as well as transparency within the textile value chain, are major focus areas, as brand owners are driving sustainable sourcing as a means of differentiation. We too are differentiating with the recent introduction of our new Verve brand of DWP, which is produced from sustainably sourced wood carrying with it a number of recognized certifications.



Tracy Wessels,
General Manager
Technical for
DWP.

Regarding Verve, how are you allying with leading partners, and what benefits do they get?

Sappi has for many years worked with a strategic model to partner and collaborate with the leaders in the markets we supply, and Valmet is one of our long-term partners.

We work closely with key customers to ensure optimum pulp performance compatibility with their specific processing equipment and conditions. Essentially, we “tailor” our production processes to ensure it is “fit-for-use weekend pulp,” with consistent pulp quality.

Moving forward, Verve is now extending these relationships outside our direct supply chain and engaging with key leaders in a number of disciplines, from analytics to supply chain understanding, as well as systems implementation for ease of doing business,



through to NGO membership and collaboration with the aim of contributing positively to the entire value chain's sustainability credentials. This not only due to the fact that wood based cellulose is by their nature a more sustainable choice than other textile raw materials, but also by continuously improving the sustainability of this raw material.

Can you explain your term “weekend pulp”?

“Weekend pulp” is a term coined by one of our long-standing customers and is in reference to the consistency in pulp performance that Verve offers. The comment from our customer was that they prefer to run Sappi Verve pulp over the weekends, since they feel confident that they only need to provide minimal process support resources and have the assurance of stable performance. We think this term perfectly embodies our mission to provide top-quality, consistently performing products to our customers.

Valmet was the key technology supplier to the pilot demo plant at the Ngodwana Mill in South Africa.

What progress have you made so far?

The aim was to explore and optimize the possible extraction of bio-renewable chemicals. The plant is close to industrial size and makes it possible to test new ideas and study the next-generation dissolving cooking process at close to mill scale. Everything in this project worked well from the start, based on a very good partnership with Valmet. We rapidly produced top-quality pulp and reached our targets. The learnings gained from the plant regarding extraction of hemicelluloses from the wood during prehydrolysis have been invaluable and given us the confidence to approve the scale up of our Xylex® technology for the production of xylitol and furfural. Therefore, we are currently building a Xylex® demonstration plant adjacent to the digester demo plant at Ngodwana. ■

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End products for dissolving pulp

Pulp consists of cellulose and hemicellulose, but when treated with acid hydrolysis prior to the normal alkaline cooking, where the lignin is removed, the hemicellulose will be dissolved and only cellulose will be left.

The end use of dissolving wood pulp depends on the purity of its cellulose content, which, in turn, depends mainly on the pulping process used. There are two main pulping processes for DWP: sulfite or pre-hydrolysis sulfate.

Dissolving pulp can then be used for many applications, with man-made cellulosic textile fibers (viscose) being the dominant one. Wood fibers have been used in the manufacture of clothing since the 1920s. The emerging markets in Asia and the increased interest in environmental issues have both contributed to an upswing in the production of this type of clothing.

Dissolving pulp can also be used in the manufacture of cellophane products, sponges, hygiene articles, etc.

The impact of cotton clothes

Cotton has faced growing environmental criticism in recent years, and dissolving pulp can be a complement to cotton when producing clothing. Growing cotton requires large amounts of water, and this is especially true for organic cotton. After sugar, cotton is the major crop that requires the most water for growing. On average, 10,000 liters of water are used to produce one kilogram of cotton, but it can require three times as much if farming practices are poor. In addition, cotton production consumes more than 11 percent of the farming chemicals used on earth.

Valmet's scope of supply

To date, Valmet has delivered 15 dissolving pulp plants. For pulp production, Valmet is the only equipment supplier offering both continuous and batch cooking options. Valmet's scope of supply covers every process stage in a pulp mill, starting from handling the incoming wood up to ready-made pulp bales, or rolls, and also including entire chemical and heat recovery plants as well as mill-wide automation systems.



Turun Seudun Vesi stands for

pure water

The Valmet DNA automation system plays a key role for Turun Seudun Vesi to ensure it can produce and distribute naturally treated household water to nearly 300,000 people and numerous industrial companies in the Turku area.

TEXT Soili Städter PHOTOS Soili Städter and Turun Seudun Vesi

Turun Seudun Vesi is a wholesale water company owned by nine municipalities in Finland. It produces clean water using organic methods with very few chemicals. The raw water comes from a river about 100 kilometers north of Turku. Pre-treated river water is infiltrated into the sand and gravel aquifer in an esker area. After the minimum residence time of three months, the water is pumped up as good-quality groundwater through the 13 production wells presently in use.

“The production area is modeled with a three-dimensional hydrogeological model. Based on this, we have developed a 60-layer groundwater flow model. It has millions of cells, each with detailed parameters that describe the quality and properties of the formation. We really know every water molecule’s journey,” says **Aki Artimo**, CEO of Turun Seudun Vesi.

Nearly organic water

Surface water cannot be used as household water. It always requires processing. In practice, either chemical purification or artificial groundwater recharge is used to remove the unwanted substances. However, chemicals can degrade the water quality. In Turku, a minimal amount of chemicals is used in treating water, so it can be said the water is almost organic. A full-scale chemical water treatment plant located in Turku is only used as a backup facility.

Predictive management

A Valmet DNA automation system has been in use since the water company started operating. From one control room, an automation system is used to control and operate the plants. Since the range of activities is more than a hundred kilometers wide, most of the plants are planned eventually to be unmanned.

Predictive control technology ensures there is enough water in the network even during times of peak consumption. Also, certain alarm parameters are specified for the automation system, which monitors the water quality closely. If changes occur, the operator gets an alert and is able to take care of the situation.

Automation provides reliability

“The best feature of Valmet DNA is its reliability. I get the right information at the right time, and I can intervene in

the process if needed,” **Markku Hyytiä** says. He gives an example – if the basins are full, he can manually control the transfer of water simply by closing or opening valves.

According to Artimo, automation data can also be used for sales invoicing, since Valmet DNA allows them to see how much water has been delivered at any point of sale. Data is transferred separately to the billing system. In addition, regular reports can be prepared for the authorities. Part of the data is obtained directly from the automation system, while some is collected from other sources.

Artimo sums the situation up: “The most important thing for us is the reliability of the plant. With the automation system, we can maintain production and distribution. Everything must work smoothly around the clock. It is essential for us that risks are under control. Valmet has been a reliable supplier, and we are pleased with their services.”

To ensure continued smooth operation, Turun Seudun Vesi has agreed on an automation system upgrade with Valmet. ■

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Markku Hyytiä



Joni Pirttisalo

Expert support on-site and remotely

In the control room, operators follow the process and contact Valmet’s experts if needed. Remote connection to Valmet facilities is also possible.

From Valmet Automation, Application Specialist **Jouni Viitanen** and System Specialist **Jani Kivikoski** are familiar faces in the control room. Operator **Markku Hyytiä** from Turun Seudun Vesi appreciates the Valmet specialists’ expertise. Likewise, Automation Engineer **Joni Pirttisalo** from Turun Seudun Vesi works in close collaboration with Valmet. He says he receives excellent support when encountering problems, as well as inspiration for new ideas.



Shizuka Funakawa, who takes care of product inspections in the Quality Control department, using Valmet F55 for fiber measurement and analysis.

Hyogo Pulp invests in both quality and process control

As part of the effort to ensure the highest quality of pulp in addition to improving process efficiency, the Hyogo Pulp Tanigawa mill invested in a new Valmet Fiber Image Analyzer (Valmet FS5) and Valmet Recovery Liquor Analyzer (Valmet Alkali R).

TEXT Nigel Farrand

Since 1955, the Hyogo Pulp Tanigawa mill, situated in the central region of Hyogo Prefecture in Japan, has responded to changing customer needs as an unbleached kraft pulp (UKP) maker. It has taken aggressive steps toward developing UKP manufacturing technology, and with its highly efficient production system, has grown to become the largest UKP supplier in Japan, ranking among the world's top suppliers.

High-quality pulp

The mill operates a single-line continuous digester and pulp washing system with three high-consistency stock storage towers feeding a pulp drying line.

According to **Mr. Nakaya**, Deputy Manager of the mill's instrumentation department, the need for ISO-standard pulp quality measurement results has increased recently, especially for export-grade pulp sheets. One of the uses of kraft pulp is as a material for the exterior liner of corrugated cardboard to add strength, a property primarily determined by the length of the fibers.

"Valmet's Fiber Image Analyzer fulfilled the mill's

expectations and provides fiber length classification performance better than other available analyzers," says **Hisanori Bando**, Sales Manager for Automation at Valmet in Japan.

Improved laboratory procedures

With Valmet FS5, fiber property measurements take six to seven minutes, compared to the earlier microscope and manual operations, which took three hours, with time-consuming preparation. The increased analysis speed is enhanced by automatic consistency adjustment, allowing samples to be inserted without any special preparation, effectively eliminating operator error.

As well as the faster measurement and easier procedure, the measurement accuracy is further improved by the number of fibers measured: ten times higher. Valmet FS5 allows much faster feedback of the measurement results to pulp dryer operation during grade changes, whereas earlier it could take a whole day to give feedback to the operation. The mill is also finding additional value with possibilities to correlate pulp sheet quality and strength to fiber width and other fiber characteristics.

Delivery, installation and start-up were achieved faster than expected.

Stabilized causticizing

At the same time as improving quality assurance, the mill took the opportunity to replace their aging Valmet Alkali Analyzer, with the latest technology incorporated in the new Valmet Recovery Liquor Analyzer (Valmet Alkali R). “The old alkali analyzer, which we originally started up in 2002, had been providing good service with virtually no problems, but we had concerns over its mechanical reliability after 15 years in service,” comments **Masaru Nakasone**, Service Engineer for Automation at Valmet in Japan.

For the mill, the Alkali analyzer is an essential tool for the causticizing process operation, and there was no hesitation in selecting Valmet again for the replacement. Using fully automatic real-time sampling and standard titration methods, Valmet Alkali R consistently measures



↑ Mitsutoshi Izumi, who is in charge of the causticizing process in the Power department, checks the Valmet Alkali R analyzer.

the values of sodium hydroxide, sodium sulfide, sodium carbonate, and sodium sulfate to calculate the reduction degree, effective and active alkali content, total titratable alkali, causticizing degree, and sulfidity. Because the analysis is based on the ABC titration procedure (the most widely used in kraft mill laboratories), no calibration is needed.

In addition to the existing three sample points, newly installed sample points at the white liquor clarifier outlet and orange liquor tank outlet have made it possible to operate the causticizing process more accurately than before. Using laboratory measurements meant a five-to-six-hour interval for active alkali measurements for both white and orange liquor, but Alkali-R measures liquor chemistry from all liquors with intervals of less than one hour. With the stable measurement results from all five sample lines, the causticizing process operation has been stable as well.

Reliable partner

Delivery, installation and start-up were achieved faster than expected with effective operator and maintenance training from Valmet. Mr. Nakaya concludes, “Valmet has proven to be a very trustworthy partner to work together with. Its teamwork and skill, and the relationship with our personnel, work very well.” ■

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The pulp drying line, supplied by Valmet in 2014, resolved the issue of high transportation costs and storage problems with wet lap pulp and has enabled the mill to further expand its sales area to China and other Asian markets.

LNG is an alternative fuel to replace diesel, used as fuel in marine traffic but also in industrial applications. Liquefied gas is environmentally friendly and requires a lot less space than its gaseous form, making it considerably easier to transport and store.



New Tornio Manga LNG terminal promotes sustainable growth

The Finnish Ministry of Economic Affairs and Employment decided to build a new LNG terminal in Tornio, Finland, to promote sustainable economic growth. All the key processes of the terminal are controlled by Valmet DNA.

TEXT Soili Städter PHOTOS Gasum

The demanding process of terminal operations is being controlled using the Valmet DNA automation and integrated information management system. **Marko Kontio**, Terminal Manager, explains: “Valmet DNA controls the main processes in the terminal: ship unloading, bunkering, storage management, truck loading, gas send-out and evaporator units. All the operational data we need comes from Valmet DNA, from where it can be transferred to other IT systems.”

“The automation system provides us with several tailor-made reports. They are needed for regulators, for owners and for our own needs. We are able, for instance, to follow capacity utilization rates. We also have access to the automation system from our office,” says **Mika Kolehmainen**, CEO, Manga LNG.

Start-up training

“The operators have received some formal training from Wärtsilä and Neste Jacobs. However, the best training happens during the startup,” states Kontio. “Outcomes are better when you step right into using the automation system, with colleagues and Valmet’s specialists around you – giving help or support if needed.”

Your own interface

With the Valmet DNA personalized interface, every operator can select their own favorite process windows, creating a custom desktop for their eyes only. Having all operations available in the same place streamlines the work.

“With four displays, you can bring up 16 windows. A lot of information is there at the same time,” explains **Jukka-Pekka Heiskanen**, Operator at Wärtsilä. “Every-

The Tornio Manga LNG Terminal is important locally, since it makes it possible to transport gas to companies outside the existing gas network. Its commercial operations started in the beginning of 2019.



With the Valmet DNA personalized interface, every operator can select their own favorite process windows, creating a custom operating display.



With four displays, you can bring up 16 windows. A lot of information is there at the same time," explains Jukka-Pekka Heiskanen, Operator at Wärtsilä.

body seems to have their own ways of designing the windows and how many of them are used. This allows the system to do its best work, too."

Track trends and events

All the operators and the terminal manager praise Valmet DNA Operate TEA – the trend and event archive, also called Time Machine. You can go back in history to an event, move forwards and backwards in time, and get a straightforward account of trends and events. By using the historical data, operators – and management as well – can learn to anticipate future events.

Another highly valued function is DNA Report, also called the diary. **Onni Harri**, Operator at the Manga LNG Terminal, says, "It is very useful that, when coming back after a few days off, you are able to look at those days, and read in DNA Report what happened while you were gone."

New gas for the future

The outlook for the future is good. Since the business is growing, more services are needed. Kolehmainen expects plant volumes to grow quickly in 2019.

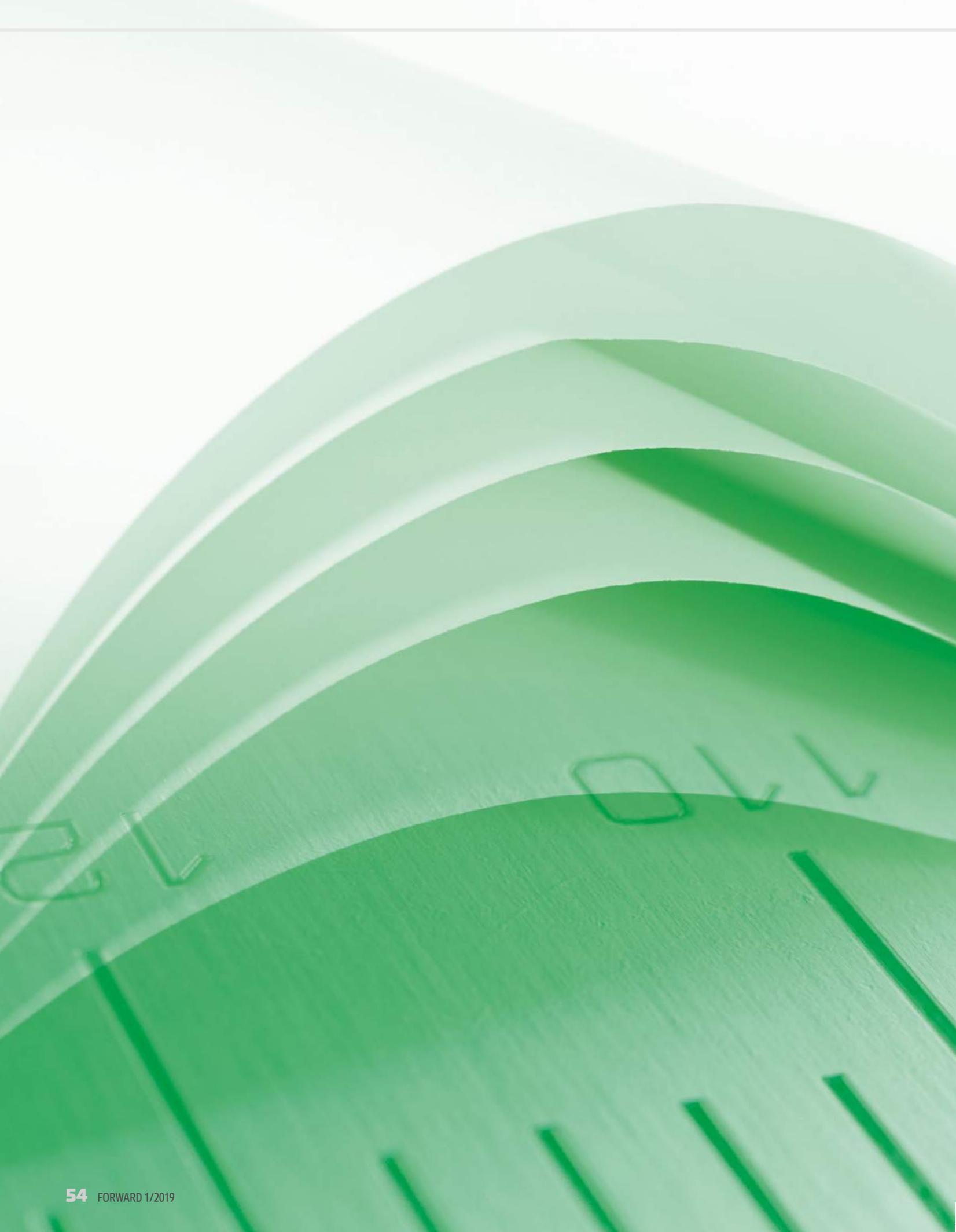
"We already have to consider how to serve our growing customer base even better and faster in the future.

Until now, LNG has not been available in this region. More and more companies are now aware of this new sustainable gas, and they are re-thinking the possibilities of using it. This will certainly change the patterns here in the north. Marine traffic will need gas, and the industry is switching more and more to LNG." ■

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The parent company, Manga LNG Oy, which buys and sells liquefied natural gas, is owned by a joint venture of nearby companies, including Outokumpu Oy, SSAB Europe Oy, EPV Energy Ltd and Skangas Oy, the leading LNG company in the Nordic countries. Manga LNG Oy's 100% owned subsidiary is Manga Terminal Oy, which invested in and operates the Tornio terminal, selling terminal services to Manga LNG Oy and other customers. Wärtsilä as the EPC contractor agreed with Valmet on the installation of the process automation system.



Exact measures

with Valmet IQ Quality Control

For Sappi Kirkniemi, Valmet IQ Quality Control System for supercalendering has enabled quality management and online verification, essential for the introduction of a new product in their manufacturing portfolio.

TEXT AND PHOTOS Nigel Farrand

The Sappi Kirkniemi Mill is located in Lohja, Finland. Every year, its three paper machines produce 750,000 tonnes of high-quality Galerie papers for heatset web offset printing, serving the high-volume print market creating catalogues, brochures and publications around the world.

Faced with end-of-life issues for the quality control systems (QCSs) of two off-machine supercalenders, Sappi's Kirkniemi mill turned to Valmet for replacements. "We had already had the Valmet IQ Quality Control System on paper machine PM 3 for two years with good

results, and for supercalendering, it offered us the potential for good control as well as online quality verification, essential for the introduction of a new product in our manufacturing portfolio,” says **Heikki Järvinen**, Production Engineer from Sappi Kirkniemi. The Valmet IQ Scanners located before the winders are equipped with top and bottom gloss, caliper and moisture measurement heads with multivariable CD controls for gloss and caliper.

Supercalenders consist of steel and elastic cylinders with the paper web snaking around each roll, where heat, pressure and friction in the nips glaze the surfaces of the paper to make them smooth and glossy. At the same time, glazing makes the paper thinner, making caliper measurement a key control variable. The two virtually identical supercalenders – SC 3 and SC 4 – are 6.5 meters wide and run at an average of 600 meters a minute, with mainly ground wood and kraft-containing grades from PM 2, ranging from 54 to 80 gsm.

Optical caliper measurement

Installation and startup of the new QCS on SC 3 was performed in June 2017, with SC 4 following in December of the same year. Installation took three days, and there was very good cooperation with Valmet from the engineering phase to startup: “Good correlations to laboratory were seen immediately and to date we have had no problems with either system,” says **Ari Skyttä**, Automation Project Manager at Sappi Kirkniemi.

“Caliper and bulk play a crucial role in our new product from the super calanders and the improved measurements from the Valmet scanner allow us to really see what affects

Now the quality measurements and automation are at a completely different level than earlier.

the caliper and how to control it,” Skyttä continues. The Valmet IQ Optical Caliper Measurement only lightly contacts the sheet on one side to avoid marks often left by contacting caliper sensors. It combines two precise measurement techniques: a magnetic principle used to measure the distance from an optical to a reference plate over which the sheet runs, and a non-contacting optical triangulation principle measuring the distance to the top surface of the paper. Subtracting these accurate individual measurements from each other provides the true paper thickness.

Automation taken to the next level

“The moisture measurement, not available on the old system, has also proved quite useful, as it allows us to double check sheet moisture from the coater where we have had some problems. Of course, the level is different after the supercalander but we can see the changes,” says Skyttä.

The Valmet IQ Scanner before the winder on SC 3.





“In 2018, we also upgraded the distributed control system (DCS) with Valmet DNA, and now the quality measurements and automation are on a completely different level than earlier. We have a lot more information that we can trust, and it is presented graphically very well by the system to be a real tool in product development,” states Järvinen.

The Valmet DNA information system stores collected process and quality data, including top and bottom gloss for each parent roll, which allows the tracking of information on rolls shipped to customers. “We want to make more statistical analysis of our performance and be able to benchmark good production conditions, which is where the new systems are really useful,” says Järvinen.

Satisfied customers

“Initially, we wanted to improve both the gloss and caliper profiles and while at the present, we can only control CD caliper, we are very satisfied. The amount of customer complaints has decreased, but we have also made many other improvements, such as moisture profiling on the paper machine. As a result, it is difficult to attribute this totally to the QCS, but the situation is definitely better,” concludes Skyttä. ■

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“The improved measurements from the Valmet scanner allow us to really see what affects the caliper and how to control it,” says Ari Skyttä, Automation Project Manager at Sappi Kirkniemi (right), pictured here with Heikki Järvinen, Production Engineer.



INNOVATOR'S VOICE

Get inspired



The human and the paper machine

Digitalization is shaping the working environment at paper mills. When data meets the physical world, things can get complicated. When Valmet develops future paper machine solutions, the focus is on how people feel about using the system as much as it is on performance. TEXT Kaisamaija Marttila



“**T**here are several definitions for user experience, depending on the background of the person giving the definition,” says **Mari Airio**, Industrial Design Manager at Valmet, who is responsible for the design of the user experience (UX). “I’d say the UX is about how users feel when they use a certain product, service or system. In recent years, the hype around digitalization has led to wider interest in the topic, so UX has been often defined in digital contexts,” she explains.

UX in the papermaking industry

Besides digital user interfaces and applications, the user experience is about what the interaction between the human and the machine is really like. “UX starts from the first moment a user encounters our products, whether that’s reading a maintenance manual, at a product training event, or doing actual maintenance work,” Airio says in explanation. “At Valmet, we want to consider UX from its widest possible perspective. You should never limit UX only to the UX of one product, but always consider the whole process,” she argues.

Why should the customer be interested in UX?

From the customers’ perspective, UX makes using products more effective and safer. According to Airio, designing technical maintenance work to work seamlessly with machinery can reduce monotonous maintenance actions. This, in turn, motivates users, making it easier to

learn and understand the product. This reduces mistakes and makes things quicker. “When the user gets a sense of being in control, it amplifies the feeling of the experience and reduces the sense of frustration,” Airio says.

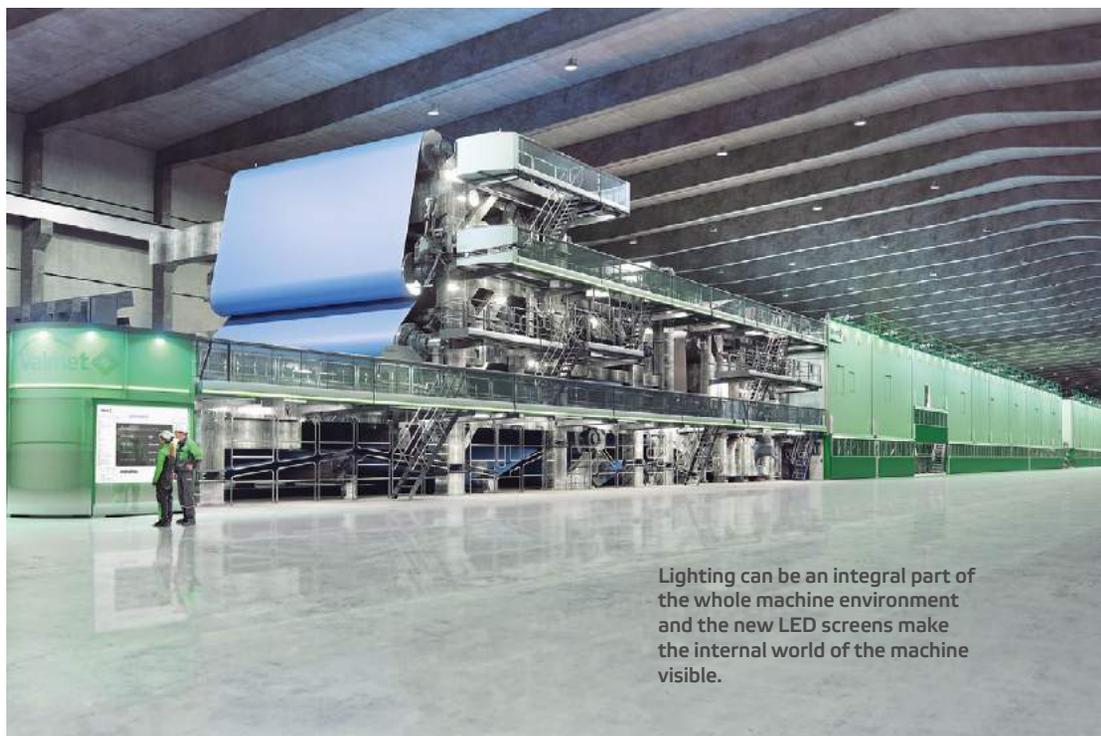
From a broader perspective, digitalization and the Industrial Internet are bringing in more applications and data, which in turn are making the working environment more complicated. Airio sees a need for solutions that help users to operate in both the physical and digital environments. “The physical and digital worlds really are inseparable. We need to help users handle new applications and machines at the same time, and to work effectively in that interface.”

Users’ needs in focus

Valmet has been systematically focusing on industrial design and usability for several years. The OptiConcept M paper machine is a good example of this work. It has been designed with the needs of its users in mind. The design of the machinery allows easier and safer changing of rolls and wear parts, thus reducing the duration and cost of service shutdowns. The spacious walkway design improves accessibility and safety also on the drive side, and all tending side walkways are at one level, eliminating the need to walk up and down stairs. Recently, Valmet has been studying how to use light as a visual element to improve usability and safety.

Designing our way to better safety

Valmet’s paper machine designs take a proactive approach to fulfilling requirements for safety at work



Lighting can be an integral part of the whole machine environment and the new LED screens make the internal world of the machine visible.

“We need a strong user-based viewpoint, as users’ expectations are rising.”

around the world. “OptiConcept M’s walkways were the first in the world that really fulfilled all safety standards,” Airio says. “To meet the tightened standards, we are developing new, higher handrails, which are easy to lower and put back manually during maintenance without removing the railing.”

Valmet also has a unified machine color scheme that is based on visual ergonomics. The human eye works so that lighter surfaces are prominent and darker surfaces tend to fade into the background. “In the color scheme, this means that the less-relevant components are dark grey, and lighter colors are used to highlight the significant process parts,” Airio explains.

“We are also working towards using safety color coding more coherently. For example, yellow is the safety color, so it should be used only to show the dangerous areas and the moving parts, not on the safety fence,” she explains.

The future is human

Most of the new UX developments happen first in the consumer market, but the emphasis on user experience in the business-to-business market is growing. “It’s easy and intuitive for users to adopt new conventions familiar from consumer products. Maybe one day we’ll be able to operate a paper machine with hand and voice gestures,” Airio suggests.

In the future, it will not be enough that the machine works and it is possible to perform maintenance actions on it. “We need a strong user-based viewpoint, as users’ expectations are rising. It’s not enough for a product just to meet the safety standards, because it’s not the same thing as feeling like you are using a safe product.”

“Could lights be used to point out places that need maintenance? Could we highlight the machine operators’ checkpoints during regular rounds with lights? Or it could be something we haven’t even recognized yet.” Airio says that the main tool of a UX designer is empathy. “You need to be able to walk a mile in the user’s shoes, to listen and observe, and to understand their pains and gains when designing future solutions”. ■

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Lime kilns go fossil free

Valmet has developed biomass-based alternatives for moving into 100% renewable fuel also for lime kilns.

TEXT Lotta Forssell PHOTOS Antti Ratia, Valmet, Metsä Group, SCA



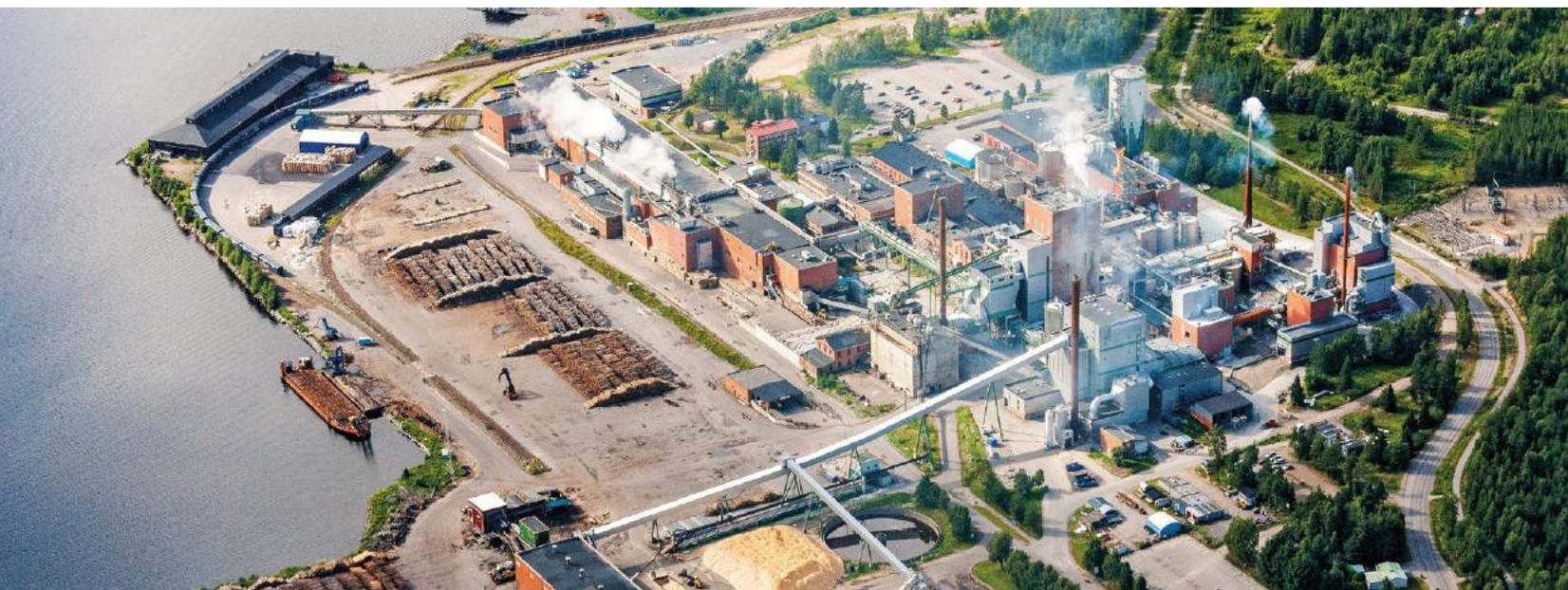
In a modern pulp mill, the lime kiln is the only major consumer of fossil fuel – usually natural gas or fuel oil. During the oil crisis in the 1970s and 1980s, several alternatives to fossil fuel were developed to reduce operational costs. In recent years, there has been an increased focus on environmentally friendly solutions which at the same time can make pulp mills less dependent on fossil fuel. With the latest technologies and expertise, there are now several commercially proven CO2 neutral fuel alternatives. The two main alternatives are wood powder firing and biomass gasification.

At pulp mills, methanol, turpentine and tall oil may also be available for burning in lime kilns. These work well as support fuel, but they cannot normally cover the lime kiln's fuel requirements. Valmet also has the technology to extract lignin from black liquor, which can be used as fuel.

Safe and proven wood powder firing

Typical wood-based biomass fuels used for direct fired rotary kilns range from wood chips and pellets to sawdust. Before the wood can be used as fuel in the lime kiln, it needs to go through drying and grinding.





SCA's Munksund paper mill in Sweden utilizes pellets as a wood powder source.

Designing a lime kiln to operate with wood powder firing is a balancing act. As in all mill processes, safety is the natural starting point. To avoid wood accidentally catching fire, the temperature is monitored, and good housekeeping is important – especially around the grinding system. In addition to safety, moisture content and particle size is optimized for energy efficiency and kiln operation. A low-temperature belt dryer is often the preferred option for drying, because it can utilize waste heat from other mill processes, is robustly designed and is suitable for heterogeneous particle size.

Controlling the flow of wood into the kiln is an important factor in stable kiln operation. Unstable flow will cause a variation in heat input to the burning zone,

impacting product quality. The lime kiln burner needs to be flexible and able to safely and efficiently burn several different types of fuel.

Suitable solution for both old and new mills

“We have shown during the last decade that wood powder firing has become a fully commercial, proven and – most importantly – safe solution for lime kilns. Today it is possible to convert a pulp mill into a fossil-free mill and thus reduce the mill’s carbon footprint and fuel costs,” says **Claus Jensen-Holm**, Director for Lime Kiln Technology at Valmet.

Extensive heritage in lime kiln services in the pulp and paper industry

Valmet is the leading OEM in lime kiln technology, with a proven record in governing 40 percent of globally operating lime kilns in the pulp and paper industry. Lime kilns became part of Valmet’s own inhouse offering in 2013 when Valmet purchased FLSmidth’s lime kiln technology for the pulp and paper industry.

In recent years, Valmet has also invested heavily in lime kiln services, the training of field service specialists, launching new products and launches in new markets.

With this expertise, Valmet is the natural supplier for lime kiln technology development, services and spare and wear parts for FLSmidth, FFE Minerals or Fuller lime kiln system components.

“Wood powder firing has become a fully commercial, proven and safe solution for lime kilns.”



Valmet has delivered several wood powder firing systems utilizing sawdust, pellets or wood chips. SCA's Munksund paper mill in Sweden utilizes pellets as a wood powder source.

"Our lime kiln was 50 years old and had seen better days. To match our strategy of being fossil fuel free, we decided to build a new kiln utilizing biofuel. The new kiln was ready and in operation in January 2015. At first, we had major problems with e.g. ring formation and variations of fuel flow. After many hours of trouble shooting and process improvements, we have now taken a huge step toward the goal we set from the outset: a fossil-free kiln with great operational effectiveness and a low impact on the environment," says **Fredrik Lind**, Production Engineer at the SCA Munksund mill.

Utilizing bark in biomass gasification

Unlike wood powder firing, bark can be used as a biomass source in gasification. Biomass gasification is a combined system of biomass dryer, gasifier and lime kiln, optimized for burning the product gas. After drying, bark or other wood residue is gasified in the CFB gasifier at high temperatures using a controlled amount of air. The resulting product gas is then burned in the lime kiln burner, which is optimized for product gas.

"One of the challenges is controlling the whole process. Bark is not a uniform fuel, and it is important to understand how the process should be controlled and optimized. This is where Valmet's complete understanding of the process from the dryer, gasifier and lime kiln operation comes into its own," explains **Juhani Isaksson**, Business Development Manager for Gasifiers at Valmet.

Valmet has delivered four gasifier-lime kiln solutions for pulp mills. One of the first to be implemented is Metsä Group's Äänekoski bioproduct mill.

"Bark-derived product gas is produced for the bioproduct mill's lime kiln. This is one example of solutions which enable the mill to be fully free of fossil fuels," says **Ilkka Poikolainen**, Vice President of the Äänekoski bioproduct mill, Metsä Fibre.

Choosing the best alternative

The driver for choosing a biomass-based solution may be the company's commitment to reducing CO₂ emissions or the availability of suitable biomass as a byproduct of mill operations. In recent years, Valmet has delivered both gasification and wood powder solutions for new mills and rebuilds.

"The best solution and the business case needs to be evaluated each time, based on the available biomass, kiln size and possible bottlenecks in the process. Gasification is the right solution for mills with a large or medium-sized kiln and which have bark at their disposal, while wood powder firing is most suitable for smaller kilns," Jensen-Holm explains.

It is also possible to convert existing fossil fuel kilns to use either wood powder or gasification, but it must be acknowledged that replacing the kiln fuel may impact kiln design and operation. ■

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"Bark-derived product gas is produced for the bioproduct mill's lime kiln. This is one example of solutions which enable the mill to be fully free of fossil fuels," says Ilkka Poikolainen, Vice President of the Äänekoski bioproduct mill, Metsä Fibre.

Increasing

efficiency

for CHP power plants and paper mills

Process efficiency can be significantly increased by utilizing flue gas condensing to recover heat: a source of energy that typically goes up in smoke. TEXT Lari-Matti Kuvaja

Flue gases contain plenty of (mainly latent) heat, especially when the fuel's moisture content is high. After combustion, the moisture from the fuel is in vapor form in the flue gas, with high enthalpy (kJ/kg). In a normal combustion process, this energy is not utilized, and all of it literally goes up in smoke.

Typically, CHP plant efficiency has been close to 90 percent. Overall power plant efficiency is calculated using the lower heating value of the fuel – the energy lost in flue gas moisture is not taken into consideration. Although a little deceptive – the fuel moisture has a very significant effect – this efficiency calculation method has become the norm in the energy industry.

Almost all the energy from the flue gas is released when the water vapor condenses into liquid form. Condensation occurs as the flue gas reaches the dew point of water, where the relative humidity is 100%. The higher the moisture content (the higher the dew point) and the lower the district heating water return temperature, the greater the heat recovery. By adding a combustion air humidifier into the mix with the condenser, we can achieve even greater heat recovery. The flue gas temperature leaving the stack may even be reduced to 35 °C, which is roughly 100 °C less than in a conventional process.

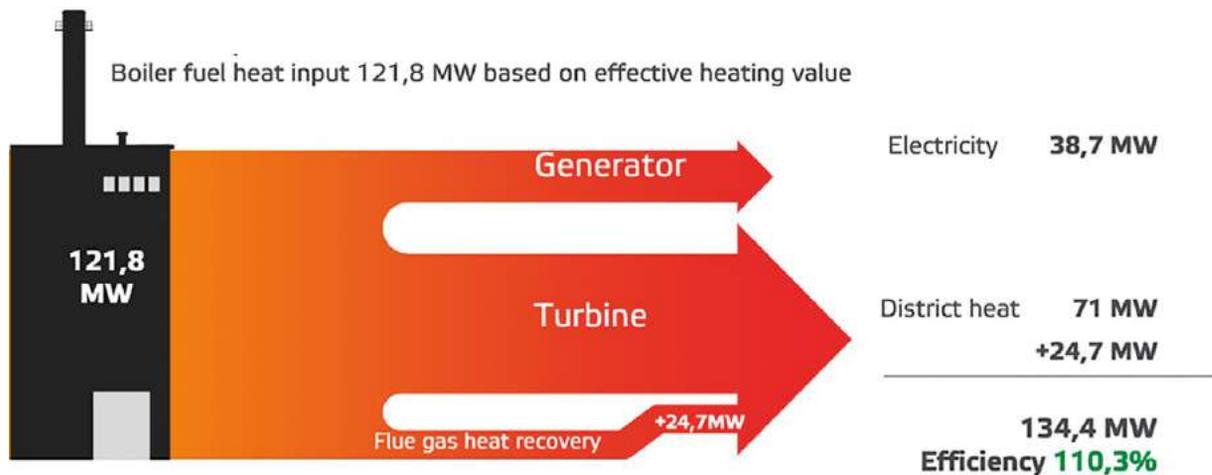
The feasibility of flue gas condensing becomes apparent when the power plant's total condensing efficiency is calculated. An increase of 24.7 MW in the district heating energy produced increases total efficiency to 110%. This defiance of thermodynamics of course stems from the usage of the lower heating value in the calculation.

Short payback time

District heating demand fluctuates with the need for heating, i.e. the weather. This means that the maximum potential cannot be utilized all year round. For this reason,

Flue gas condensing can be used to increase the efficiency of various processes in which it is possible to utilize low temperatures.

Heat recovery by flue gas condensing



The power plant heat balance and efficiency illustration highlights the potential for recovering heat by flue gas condensing. Case example: boiler fuel heat input is 121.8 MW based on effective heating value.

Flue gas scrubber

Multi-pollutant control and heat and water recovery in one process

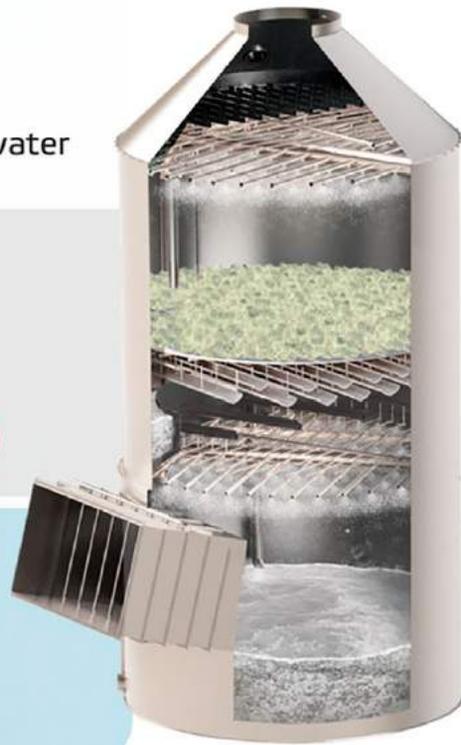
Outstanding performance

near **100%** reduction of:



30%
more energy
from fuel

1m³/h
reusable water
each MW heat
recovered



the most likely profit lines have been highlighted in green (see chart). However, if the district heating return temperature remains nearly constant throughout the year, it may be possible to operate with the two highest profit lines.

The calculation can be made by using either the cost of fuel (generating savings) or selling price (generating revenues). A conservative estimate of EUR 20 per MWh (low-cost biomass) in district heating savings and 5,000 operating hours suggests we can achieve savings of roughly EUR 2.5 million per year, meaning a typical payback time of less than two years.

Recovered heat to replace steam consumption

Flue gas condensing can be used to increase the efficiency of various processes in which it is possible to utilize low temperatures. Potential heat sources are fresh and white-water heating in paper machines, and heating of boiler water and turbine condensate.

The concept diagram presents a situation where heat recovery for district heating is unavailable, but the condenser can recover heat for paper machines, where it can replace the steam consumption used for heating, generating savings. With 8,000 operating hours and fuel savings of EUR 20 per MWh, the payback time for the condenser becomes very attractive, with yearly savings of between EUR 1.5 million and EUR 2.0 million. ■

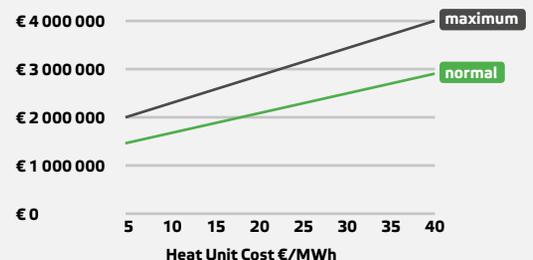
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District heating revenue per year



Using the CHP plant example, which results in 24.7 MW of heat recovery for the district heating network, we can plot the chart presented above.

Yearly steam consumption savings for paper machines



EXPERT'S VOICE

Food for thought





Courage for the future

Professor Harry Gatterer takes a positive approach to the future – he believes that, thanks to overall progress, the world is becoming a better place. Professor Gatterer took the stage and shared his views at the Valmet Customer Days in Vienna last October. **TEXT** Vesa Puoskari **PHOTOS** Sabine Klimpt

“**H**umans are living in the very best times ever on this planet. There is no sense in talking about the future as a threat,” emphasizes Professor **Harry Gatterer** from the Zukunftsinstitut futurology think tank, based in Germany and Austria.

Professor Gatterer can provide hard facts to back up his claims. According to United Nations statistics, global poverty rates have fallen by more than half since 2000, and enrolment in primary education in developing countries has reached 91 percent.

“We often think that there are still a lot of people in developing countries who cannot read or write, but this not true anymore. Approximately 80 percent of the population globally has these fundamental skills, which form the basis of being a part of modern society, as we understand it,” he argues.

In addition, average global life expectancy has increased up to 71 years. “Many people in the Western world are concerned about the economic impact of the ageing population, and how our health and social insurance systems should be built to handle future demographic changes,” says Professor Gatterer.

“Humans are living in the very best times ever on this planet. There is no sense in talking about the future as a threat.”

“On the contrary, the ‘silver society’ megatrend, as we call it, could actually have positive effects on the economy. Thanks to the older population, societies are becoming wiser, which will improve the quality of decision-making and result in new solutions to our needs,” he predicts.

Megatrends as a route map

Megatrends are drivers that have enormous impacts on all aspects of the economy and society – not only in the short run, but also in the medium to long term. To study these changes, the Zukunftsinstitut has identified twelve fundamental megatrends.

Professor Gatterer visualizes these megatrends affecting the future as a metro map, where we reach our destination after passing through a series of individual stations.

“In the real world, there are numerous parallel changes going on at the same time, which influence and reinforce each other in impact. The changes are diverse, complex, and interconnected. To understand these tendencies, we have developed a system of megatrends through a visual map that describes how different aspects are linked together.”

“The megatrends include numerous minor phenomena – such as individualism or mobility – but we bind them together with those major trends to bring clarity and simplification to our observations,” he explains.

“People often feel threatened by the impact of megatrends and worried about the future because they cannot predict it anymore. We have created a system to help in guiding them. At the end we can say: ‘Hey, it’s okay! Let’s calm down and just follow some lines!’” says Professor Gatterer.

High demand for new leadership

The new era requires a new kind of leadership. There is a need for leaders who are able to envision the future and create new ideas.

“As the future is unclear, you need a lot of courage to do things differently, especially when others are questioning your choices. We need people who can bring passion to organizations and enable others to accomplish things and shape the future. The future is not set, so we need leaders that have the courage to do things differently.”

“Leaders have to become coaches that enable those visions and encourage team members to work together.

Dialogue has to be based on empathy, understanding and feeling, and not on heroic leadership,” predicts Professor Gatterer.

He adds that there are a great many opportunities and positive solutions around us, so we have to pause and choose very wisely when we pick the direction in which we invest all our efforts.

He especially praises new business models that break down the tradition linear model of the economy and old-fashioned supply chains, where raw materials are used to make a product, and after its use any waste is thrown away.

“For example, if most of a company’s income comes from leasing and maintenance services, then they will manufacture better devices that are more economical to use and will last far beyond the end of the warranty period.”

According to Professor Gatterer, he most prosperous companies are capable of concentrating and reacting on essential issues. “I believe that success is based on reflective thinking – the ability to analyze and make judgments will be the key factor and main driver for triumph in the future,” he predicts. “There is a lot of work to be done in finding sustainable solutions to major problems like collecting the plastic waste floating in the oceans, but these cannot be completed without some reflection.”

Seizing the digital advantage

Digitalization has become a driver that has a positive impact on human lives and the environment. Predictability, in particular, is the biggest advantage that digitalization brings to complex systems.

“Digital tools can save human lives by warning us about potentially hazardous accidents in workplaces. They can help to save a lot of money by alerting us to the risk of breakdowns in machines and production systems.”

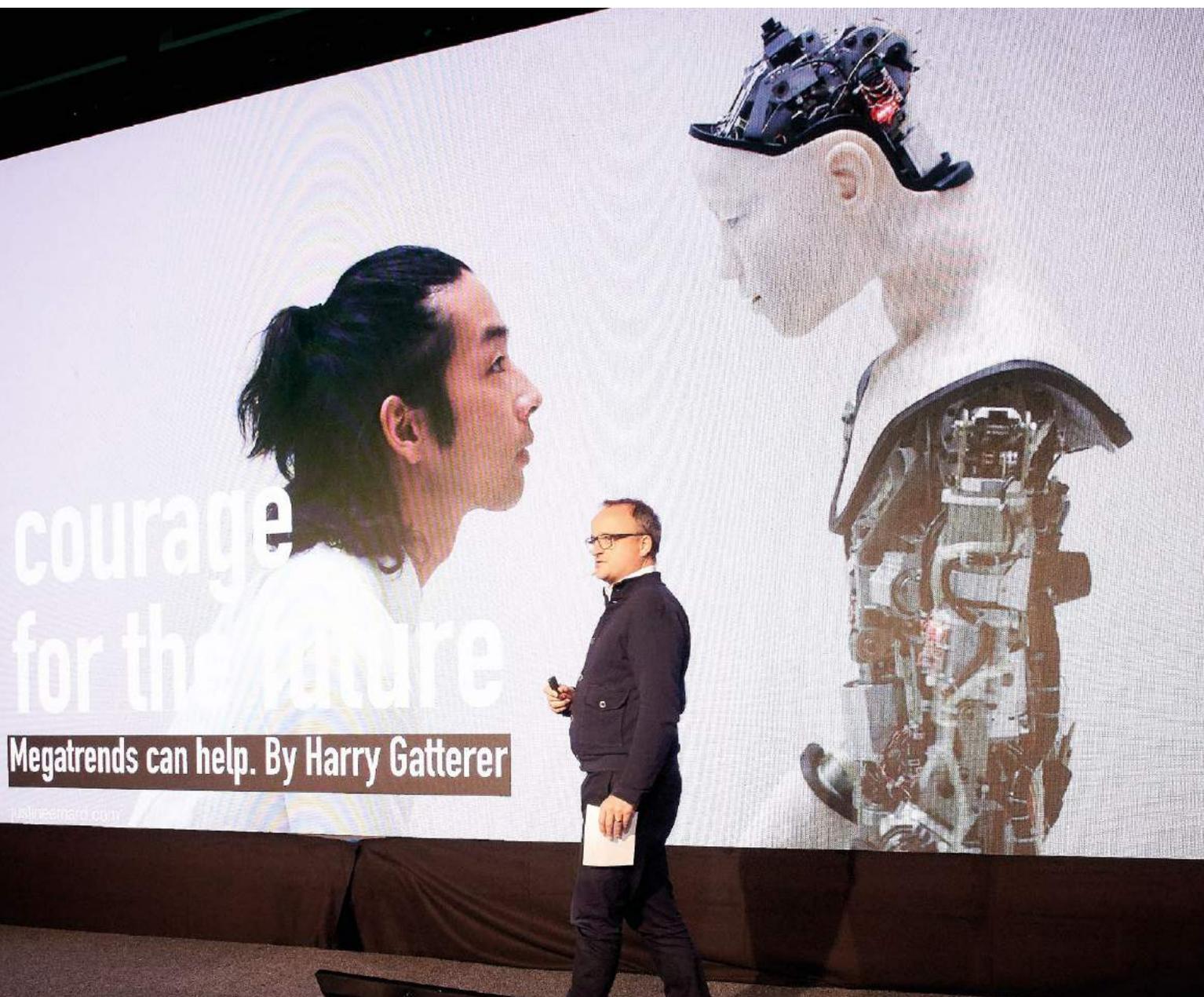
Digital connectivity has also made sharing a major part of our daily lives. “We can share rides, working spaces, or commodities that we need. Thanks to digitalization, we have more opportunities to define what really matters to us as humans, and then we can shape the technology with this knowledge.”

Professor Gatterer notes that the hype around artificial intelligence and robots taking over jobs is greatly exaggerated.

“If robots did everything in our societies and we all



“Thanks to digitalization, we have more opportunities to define what really matters to us as humans, and then we can shape the technology with this knowledge,” says Gatterer.



lost our jobs, that would be the greatest achievement ever! There is a lot of work and interaction that can only take place between humans, so we could concentrate on these issues instead of money and our daily routines. Of course, this is just a kind of Utopia, and it is not going to happen in the next few decades.”

Making people to resonate

In modern, data-driven societies, digitalization affects life everywhere, but Professor Gatterer prefers already to talk about the post-digital era.

“We are already living in a post-digital reality. Nowadays, it is normal to wear smart materials and use digital systems. Things that were once very alternative have become common. That’s why I think it’s good to step back and put some distance between us and all the hype, and

concentrate on all the advantages that digitalization is bringing us.”

Digitalization has simultaneously spawned a trend for “retro”. People are buying vinyl records and books because they want to touch and feel something in their hands. Even sales of old-fashioned electric guitars have been skyrocketing lately.

“People need to do things that resonate with others. We have to have and share new ideas or feel the music, because that is something that makes us humans,” Professor Gatterer reflects.

“Ultimately, I think digitalization is a good thing because we have to reconsider the value of human interactions in our system. We cannot digitalize everything, so we have to rethink what we are doing and what our role as humans is in all of this.” ■

Around the world

Valmet modernizes the wastewater treatment plant at LondonEnergy

Valmet has signed a contract to modernize the automation systems and the electrical and instrumentation infrastructure of a wastewater treatment plant for LondonEnergy Ltd.

Online performance monitoring for Mercer Group's Stendal pulp mill in Germany

Valmet and Mercer Group have signed an agreement on online performance monitoring for nine Valmet TwinRoll wash presses at the Mercer Stendal mill in Germany. During this period, Valmet and Mercer will cooperate to further develop fleet management with respect to predictive maintenance and reliability.

Automation of Pori Energia's new Aittaluoto biomass power plant in Finland

Valmet will supply automation technology to Pori Energia Oy's Aittaluoto biomass power plant in Pori, Finland.

Automation service agreement with Celebrity Cruises in the United States

Valmet has signed a service agreement with Celebrity Cruises for Valmet DNA integrated automation systems on board four Millennium-class vessels in the United States. The service agreement will enhance the performance, safety and availability of the automation systems and continuously improve the data analytics available onboard.

Fifth Valmet Advantage DCT tissue line started at ICT's Iberica's Burgo mill

In September 2018, a Valmet-supplied Advantage DCT 200HS tissue production line including an extensive automation package was successfully started at ICT Iberica's mill in Burgo, Spain. "Thanks to the teamwork between Valmet and ICT technicians, the project achieved all its objectives in both quality and timing," say Silvano Marcelli, Technical Manager and Antonio Jordan, Project Manager at ICT Iberica.

Ten-year operation and maintenance agreement with Uni Viridas in Croatia

Valmet and Uni Viridas have renewed their cooperation by signing a ten-year operation and maintenance agreement for the biomass power plant in Babina Greda, Croatia. The companies' cooperation started in 2011.

Lignin extraction project for Klabin Technology Center

Valmet has signed a supply agreement project with the Klabin Technology Center in Telémaco Borba, Brazil for a small lignin extraction plant. The start-up of the operation is scheduled for 2019.

Automation services for Dalkia biomass power plants in France

Valmet will supply automation services to seven Dalkia power plants in France for the next five years.

Inauguration of Östrand's pulp mill in Sweden

SCA Östrand's new pulp mill was inaugurated in February 2019. The project is one of the largest industrial investments ever in Sweden. Valmet's delivery as a key supplier included a Compact Cooking G2 with a TwinRoll press based fiber line and an evaporation plant.

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.

Toward coal-free energy production at Turun Seudun Energiantuotanto, Finland

Valmet will supply flue gas condensing and asphaltene combustion systems to Turun Seudun Energiantuotanto Oy (TSE) to enable its development toward coal-free energy production.

Automation for Gasum's liquefied natural gas delivery to Metsä Tissue Mänttä mill in Finland

Valmet will supply an automation system update and expansion for Gasum's project at the Metsä Tissue Mänttä mill in Finland. As part of the project, the mill will replace liquefied petroleum gas (LPG) with Gasum's low-emission liquefied natural gas (LNG) in the burners of the drying processes on its tissue machines.

Two waste-to-energy boilers to Urumchi Jinghuan Environmental & Energy, China

Valmet and Urumchi Jinghuan Environmental & Energy Co., Ltd. have signed a contract for the delivery of two boiler plants fired with refuse-derived fuel (RDF) for a greenfield waste-to-energy plant in Urumchi, China.

New wood handling line for Metsä Group in Finland

Valmet will supply a new wood handling line to Metsä Group's Joutseno pulp mill to process larger amounts of fiber wood.

Grade conversion rebuild for Shangrao City Lulin Paper in China

Valmet will supply a grade conversion rebuild with automation solutions for Shangrao City Lulin Paper Co., Ltd. in Shangrao, China.

OCC and containerboard lines for Mondi SCP Ružomberok in Slovakia

Valmet will supply Old Corrugated Container (OCC) and OptiConcept M containerboard making lines with a winder to Mondi SCP's mill in Ružomberok, Slovakia. PM 19 including Valmet's automation solutions will be designed to produce a unique new environmentally sound containerboard grade, kraft top white.

Pulp technology for Naini Papers in India

Valmet has been selected to deliver the key process technology for a new cooking, fiberline and recausticizing plant, as well as a new lime kiln, at Naini Papers' mill in India.

Valmet IQ Steam Profiler for Luzhou Yongfeng Pulp and Paper in China

Valmet will supply a Valmet IQ Steam Profiler to Luzhou Yongfeng Pulp and Paper Co., Ltd in China. The solution will enable the mill to increase production capacity and improve runnability, as well as the pulp production line's economic efficiency.

Pulp technology for Sappi Saiccor's Vulindlela project in South Africa

Valmet has received an order for a new baling line and a cutter layboy rebuild for Sappi's Saiccor pulp mill in South Africa. Valmet will also deliver a new magnesium oxide (MgO) no. 3 brown stock washing and screening line for the same mill. The orders are part of the Vulindlela project at the Sappi Saiccor mill. The overall targets for the Vulindlela project are to reduce the mill's environmental footprint and to increase its total production.

Second tissue line for Century Pulp and Paper in India

Valmet will supply a tissue production line to Century Pulp and Paper's (CPP) mill in Lalkua, India.



About Valmet



Valmet's year 2018

2018 was a record year in many ways, and the continued improvement created a good basis for taking the next steps towards our vision. Valmet also maintained its position as a recognized sustainability leader.

In 2018, Valmet's growth with improved profitability continued, and the market activity was high. Orders received increased by 14 percent, and order backlog at the end of the year was on a record high level. Net sales increased 9 percent and amounted to EUR 3,325 million. The comparable

EBITA margin was 7.7 percent, making 2018 another successive year of margin improvement.

With the good order backlog level and consistent roadmap to enhance the company's growth with improved profitability, Valmet has a good basis for 2019.

Active demand in all business lines

During 2018, Valmet's paper business line received a large number of new orders for new board making lines, rebuilds and new tissue making lines, leading to a high order intake for a second consecutive year. Orders received increased in all geograph-

Valmet is a leading global developer and supplier of services, automation and technologies for the pulp, paper and energy industries. Our more than 12,000 professionals around the world work close to our customers and are committed to moving our customers' performance forward – every day.

ical areas except China, which was an exceptionally active market in 2017.

The Pulp and Energy business line had a good year, too. Valmet has continuously developed the competitiveness and performance of the key pulping technologies and project execution competences. In the energy market, the demand for multifuel boilers was good, leading to several delivery agreements.

The Services and Automation business lines are less sensitive to the economic cycles and are therefore more stable businesses. In 2018, Services continued its consistent progress and growth, and the demand for automation solutions for the pulp and paper industries was also active.

Valmet's strong R&D spend in automation offering development has led to over 50 percent of the sales coming from products commercialized within five years. In 2018, we launched new visual Valmet DNA Dashboards that are an important part in development work towards the future automation solutions.

Next steps towards the vision

We have made consistent and strong progress forward in the past years and this continued in 2018 as well. Valmet is now ready to take a next step in the company's roadmap towards its vision – to become the champion in serving our customers.

In 2018 we defined two Growth Accelerators – cross organizational initiatives for the coming years. “Becoming the frontrunner in field services” and “Taking the lead in Industrial Internet and Digitalization” are accelerators enhancing Valmet's growth with improved profitability.

We also continued our major services transformation program – Shared Journey Forward – towards excellent customer experience. As part of the program we launched a new Customer Portal, which will be further developed in close cooperation with customers.

Furthermore, Valmet expanded its services footprint with new spreader roll workshops in North America and Brazil, and by starting to build a service center in Chile.

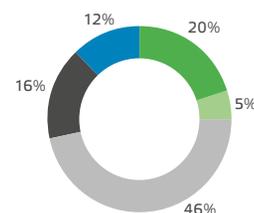
Sustainability as the core in competitiveness

Valmet's approach of continuously improving its sustainability performance has positioned the company as the industry leader. In 2018, Valmet was included in the Dow Jones Sustainability Index for the fifth consecutive year and in CDP's Climate A list for its actions to help mitigate climate change. Enhancing the position as an acknowledged company in sustainable business practices is the core in ensuring competitiveness today and in the future.

Personnel by area, %



Net sales by area, EUR million



Forward

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FORWARD

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SCA Östrand and Valmet moving forward together



We are honored that SCA Östrand has chosen Valmet's cooking, fiberline and evaporation technologies. The expanded pulp mill SCA Östrand in Timrå, Sweden, was started up end of June 2018, according to plan. Following the investment, SCA Östrand mill has state-of-the-art technology to minimize emissions to air and water.

Pulp, paper and energy producers worldwide rely on Valmet's advanced and competitive technologies, automation and services. For the pulping industry our scope of supply covers everything from raw material handling to finished pulp bales.

Our innovative pulp technology solutions help you to reach high productivity with minimum environmental impact. To maximize the reliability and performance of your processes; utilize our advanced services and remote support.

Read more and find out how we can help to improve your business at valmet.com/pulping