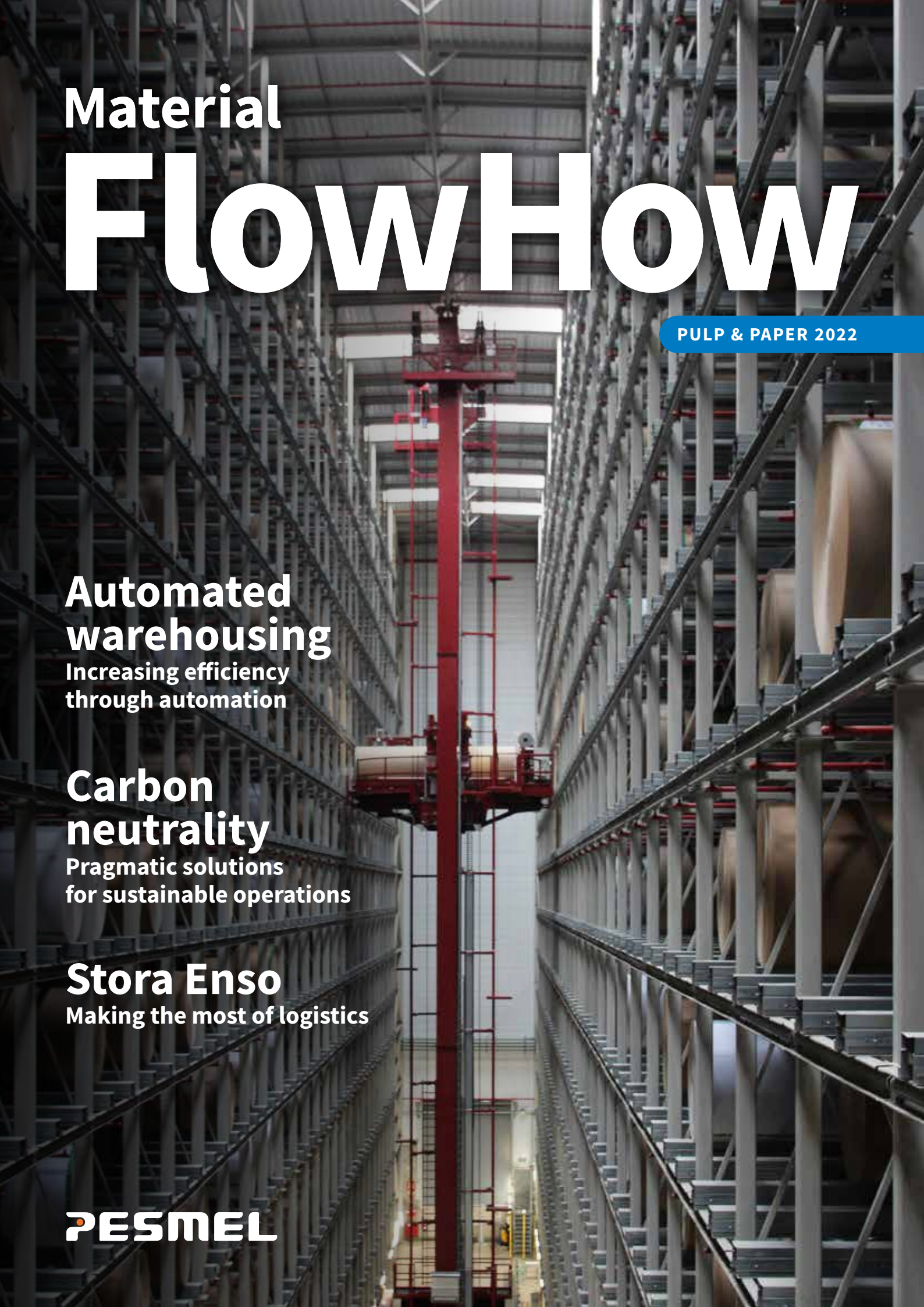

Material FlowHow

PULP & PAPER 2022

Automated warehousing
Increasing efficiency through automation

Carbon neutrality
Pragmatic solutions for sustainable operations

Stora Enso
Making the most of logistics

PESMEL

Contents

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Intralogistics matters!

Pulp and paper mills, like all production plants, go through constant change and evolution. The rocketing growth in e-commerce combined with the green transition has fueled growth that has no end in sight. Increased production and especially increased product complexity with shorter service lead time expectations are putting more pressure on producers. The question is how to manage this accelerating material and information flow in the supply chain not only effectively but cost efficiently.

In theory the supply chain can be split into two parts. Firstly, internal logistics that cover the material and information flows inside the production plant, followed by external logistics which involves the actual transportation of goods to their destination. Yes, that is the theory, but unfortunately reality is much more complicated and laborious. Producers are forced to use networks of distributed warehouses which multiplies the handling costs and significantly complicates inventory control.

According to the LEAN management teachings, one should focus on essentials: creating customer value and eliminating waste. Today, this means fully automated material and information flows inside the plant. For example, an automated warehouse right after production lines multiplies buffered tons. At the same time, it cuts the required footprint in half, and simplifies and reduces handling system requirements.

And this is exactly what we do. During the past decades, we, together with our customers, have created the most comprehensive portfolio in the marketplace. It extends from moving, packing and storing products to securing the information flow within the intralogistics. We create alternatives and, after in-depth consultation, tailor the most suitable solution to meet our customers' needs.

This magazine highlights stories and other topical narratives seen from our customers' viewpoint. For additional information, please get in touch with me directly or find out more at Pesmel.com.

I look forward to hearing from you soon.

Kaj Fahllund
VP, Pulp and Paper
kaj.fahllund@pesmel.com

Next level automated warehousing

Optimizing warehouse operations lays the foundation for improvements over the entire supply chain. Automated warehousing increases efficiency, reduces costs, and allows simplified material flow.

Article on integration of production, warehousing and distribution overleaf.

Recognizing where delays occur in a typical pulp and paper supply chain is the first step in increasing efficiency. The supply chain can be split into three discrete steps.

Firstly, production at the mill where goods are buffered, sorted, and stored at an on-site warehouse for shipping. If the warehouse at the mill cannot handle the volume, a typical solution has been to add distribution warehouses inbetween, multiplying costs and complexity.

Recognizing where delays occur is the first step in increasing efficiency.

The second step is the movement and transportation of products from the mill to customers. This typically involves trucks or rail transportation.

Thirdly, products are received and buffered at the end customer’s warehouse or a port warehouse for transport overseas.

We know that the transportation of goods can take less than half of the total time of the supply chain process, and that opportunities to reduce this time further are limited. This means that the biggest potential for time savings in the supply chain occurs at turnaround points where goods are loaded, unloaded, and stored.

For example, trucks often have to wait many hours prior to loading, especially at warehouses that see dozens or hundreds of trucks a day. Establishing satellite warehouses only pushes the problems further down the chain.

Bottlenecks and the biggest potential for time savings occur at turnaround points.

Slow turnaround is affected through the combination of manual and automated systems. While production is generally fully automated, warehousing operations are often manual in nature. The clamp trucks that are used require space to operate safely, and moving rolls takes time.

Inventory control is complicated due to the multiple handling steps needed in manual operations, such as storing, pre-staging, and truck loading. Furthermore, rolls may be damaged over multiple clampings, and bottlenecks are formed both where goods enter and shipments leave the warehouse.

Extending automation

At Pesmel, we see the solution as an extension of automation to the warehouse side. In addition to practical benefits, this is a cost-effective alternative. Automated warehouses offer higher storage density and automatic handling, thereby allowing centralization of warehousing operations and simplification of overall logistics.

Automated Storage and Retrieval Systems (ASRS) have been used in paper mills since the 1970s, mainly applying overhead cranes (OHCs) instead of clamp trucks. Although these systems can increase pile heights and storage density, OHCs have limitations. Higher sorting and handling capacities are needed for mixed inventories and improved turnover times.

To remove the limitations associated with OHC operated warehouses, high-bay rack warehouses turn vertical roll piles to a horizontal position. Using rack storage stacker cranes which can handle mixed products, the handling capacity is multiplied several times over. Because no clamping is involved, damage to rolls or pulp bales is eliminated.

Logistics integration

Because modern warehouses are automated, they can be fully integrated into the logistic process. Normally, a centralized shipping warehouse is situated directly after the mill’s production lines. Sorting instructions are given automatically and in real-time. Goods enter the warehouse in random order as they are produced and stacked. When required, they are sorted and moved to the relevant loading bays according to truck arrival times. Similar processes can be used in combined intermediate and shipping warehouses.

Warehouse automation is not only a perfect solution for big units and volumes. It is adaptable to any size of existing warehouse which means that capital spending on new construction is reduced while storage volume can be dramatically increased.

Automated warehouses can be fully integrated into logistic processes, thereby reducing costs and improving volume.

Automation and data sharing

One of the biggest plus points of automated warehousing is its contribution to automation and data sharing throughout the supply chain. Instructions, reports, and other data can be shared and utilized for improved management and control. Both the mill production and ASRS operations benefit as inventory control is automated and handling and storing of different stock keeping units is more efficient. The supply chain becomes more flexible, agile, and transparent through integrated data exchange.

For mill operators, enhancing operational efficiency means improving competitiveness. Today, Pesmel embraces the concept of industry 4.0 through expertise in integrating and connecting data in mill environments, helping customers reduce their costs without compromising on efficiency or safety.

Contact person
Kaj Fahllund
kaj.fahllund@pesmel.com
Tel: +358 20 7009 626

Improved warehouse logistics through automation

Pulp mill case

When Pesmel’s customer required a new warehousing solution for their 1.3 million metric tons per annum pulp production facility, an automated pulp shipping warehouse was the answer to their logistics challenges. The customer’s previous manual warehouse was ineffective, with a storage density of just 2.5 tons per square meter and requiring six trucks in five shifts to move a maximum of 900 tons per hour. Pesmel’s 14-level automated high-bay warehouse solution resulted in immediate improvements. Firstly, storage density was multiplied fourfold to 10 tons per square meter with a correspondingly smaller footprint. Also, two automated stacker cranes handle 1,000 tons per hour without needing to maintain clamper trucks.

Immediate cost and time savings

Finally, automated inventory control connected the entire supply chain. Goods are partly shipped by train from this facility, and thanks to the automated warehouse turnaround times were cut to one third, meaning a reduction in rolling stock investment by half. Truck loading turnaround times were reduced to just 30 minutes.

Pesmel’s automated warehousing solutions helped the customer to achieve significant and immediate reductions in costs and time while improving the overall efficiency of their supply chain.

As industries around the world move towards more sustainable operations, the pulp and paper industry is no exception. But recent events have affected fuel prices and introduced some uncertainty into the transition towards greener energy.

Trends in
the Pulp and Paper Industry
Spring 2022

The move to sustainability

We live in an era where the world has understood that we cannot continue to consume our resources in the way we are accustomed to. The European Union is the forerunner in this change by implementing new regulations, driving innovations, and supporting this shift with financial incentives.

Wood fiber is the world's largest fully renewable resource which can also be reused, often multiple times in most applications. The need for a more sustainable world has opened many new paths for the pulp and paper industry to grow. Regulatory changes to how the world utilizes resources in a more sustainable way, and the movement of more people into cities and increasing power consumption, is scaling demand upwards.

For example, a significant percentage of plastic packaging can be replaced without compromising functionality. As we can see in the image below, there are a number of different consumer sectors that present opportunities for the P&P industry in the EU to create and market substitute products.

The importance of ESG

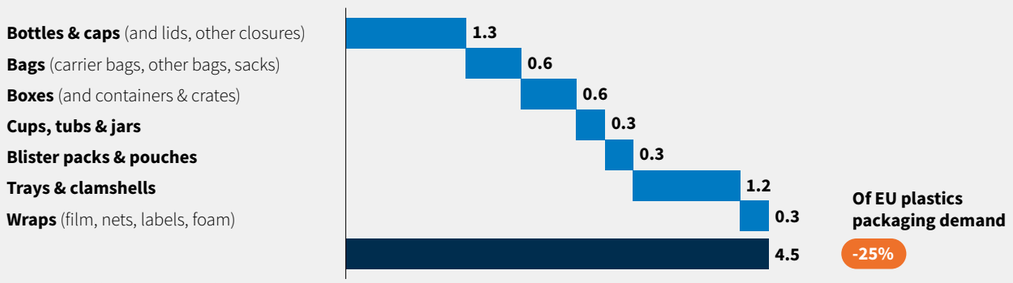
ESG (Environmental Social and Governance) is an important part of a business's operations nowadays. Environmental criteria show how a company performs as a steward of nature. Social criteria examine how it manages relationships with employees, suppliers, customers, and the communities where it operates. Governance deals with a company's leadership, executive pay, audits, internal controls, and shareholder rights. This set of criteria is becoming very important for investors when they consider where their money goes.

The EU has gone even further and is developing taxonomy management standards. The EU's new taxonomy standard is designed to support the transformation of the EU economy to meet its European Green Deal objectives, including the 2050 climate-neutrality target. As a classification tool, it seeks to provide clarity for companies, capital markets, and policy makers on which economic activities should be represented in sustainable finance disclosures. Regulation requires for the first time that asset-management companies provide information about their investments' environmental, social, and governance risks as well as their impact on society and the planet.

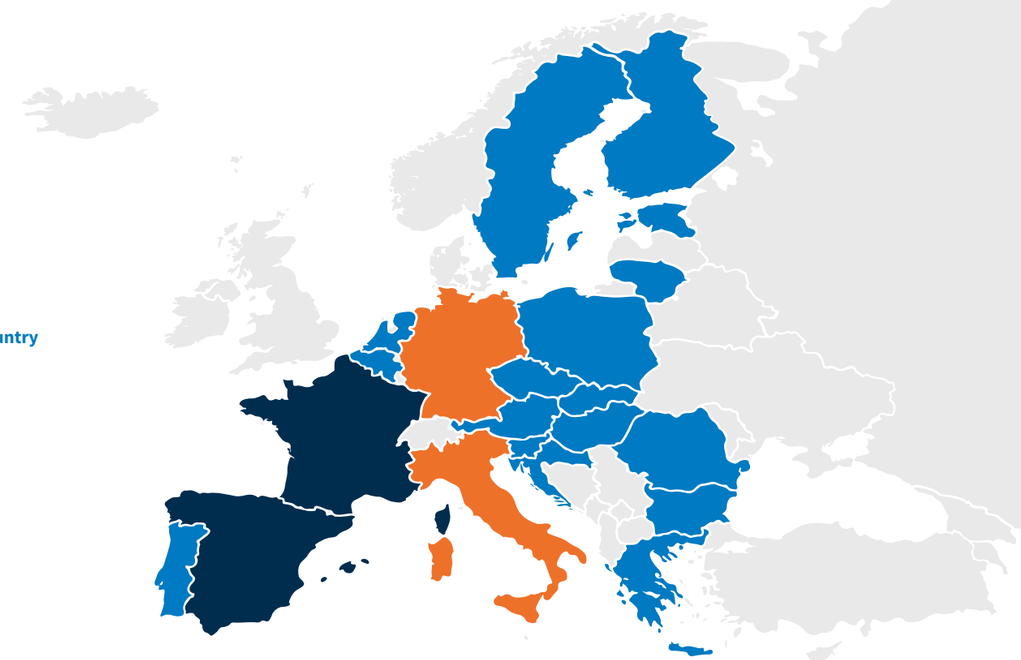
In the future, companies need to consider the taxonomy aspect when seeking financing for their investments. Many financial operators will not finance investments which are not considered sustainable and do not meet the EU taxonomy criteria and standards. The main reason for this is that the world has increasing volumes of capital seeking sustainable targets. This will also significantly affect the pulp and paper industry, from forest management and asset investment to understanding and following the life cycle of produced materials.

European plastic packaging substitution potential

Mt plastics packaging, net potential



Source: Sustainable Packaging - Material Economics

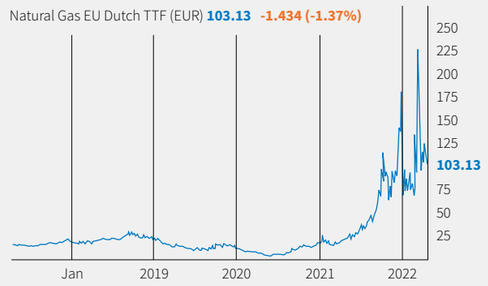


Source: FisherSolve™ Next 2021

Energy consumption and the green transition

One aspect of the green transition is of course energy consumption. Pulp and paper production is very energy intensive and therefore vulnerable to energy price volatility. While Europe has begun phasing out fossil fuels and at the same time post covid activities increased consumption, the result has been a high increase in natural gas prices. The market is currently even more volatile due to the Russian invasion of Ukraine.

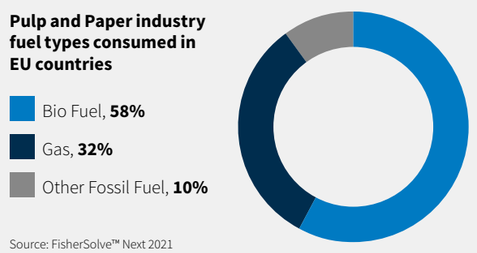
European natural gas price index 5 years trend



Source: Trading Economics

The pulp and paper industry still largely relies on fossil fuels. This price development will likely speed up the decarbonization of the industry. But the important question is, how quickly?

Pulp and Paper industry fuel types consumed in EU countries



Source: FisherSolve™ Next 2021

The impact of gas price volatility

The gas price index has seen a four-fold increase in recent years. The overall gas bill in the EU pulp and paper industry was 3.7 billion euros in 2021. Pricing natural gas at 100 €/MWh as a new standard would result in a couple of things. The paper industry would become greener at a speed nobody would have believed possible a couple of years ago. This is because many mills using gas would no longer be able to produce paper profitably, leading to a shortage of paper-based products which would trigger a price increase, eventually extending to less sustainable packaging - most likely fossil plastic based.

In packaging many corrugated board sites use gas as a source of power generation. This makes the hurdle twice as hard to negotiate for those companies which first make containerboard with gas and then continue using gas in corrugated board and box production. We are likely to see political intervention and/or compensation by the EU to prevent the price of gas from destroying businesses while LNG and other alternative fuel solutions can be established. If not, many suitable sites and companies with good asset bases will shut down, meaning a waste of resources and no help in the overall green transition.

Potential short- and long-term solutions for replacing gas

Making processes less energy intensive and recycling fibers more efficiently would contribute towards reducing dependence on gas. Utilizing new ways of generating energy such as industrial heat pumps or on-site solar power can also be seen as short-term solutions. Increased consumption of coal and other available fossil fuels can be viewed similarly, even if they are not ideal considering the general movement towards sustainability. Nonetheless, mills operating with coal as a fuel will experience a competitive advantage for the time being when gas is not available or very expensive. Hydrogen is a potential long-term solution.

Marko Summanen
ResourceWise,
VP Business Developement,
Forest Value Chain

Pesmel service

Prevention is better than cure

It’s an old adage, but the phrase ‘prevention is better than cure’ rings true throughout all aspects of life and is never more relevant when applied to critical equipment operating in heavy manufacturing environments. In this article we examine how global pulp and paper manufacturers benefit from Pesmel’s customer-centric support services.

Comprehensive customer support

Pesmel customer support provides services for material handling, packing and storing systems including mechanical and electrical works as well as PLC and PC based control systems, in order to guarantee productivity and safety over the life cycle of the process.

Pesmel’s customer support programme embraces six key elements: equipment maintenance, a 24/7 helpdesk, ICT maintenance, comprehensive spare parts provision, system upgrades, and Flow Care. The aim is to minimize risk and expensive downtime, guarantee reliable operation, and extend the life of supplied systems, thus keeping the total investment and operational costs in balance.

The preventive maintenance program ensures trouble-free process operation. Pesmel’s service specialists have been trained to carry out routine checks as well as equipment-specific repairs when required. In case the capacity needs to be increased or the process otherwise upgraded, Pesmel will submit relevant plans and designs and implement agreed changes.

To support trouble-free operation in its deliveries, a 24/7 ICT help desk is available from Pesmel global support specialists. This service covers troubleshooting of PLC, WMS and YMS systems. We provide this service as a joint effort between dedicated technology centers and local service points. This ensures agile and know-how-based customer care world-wide.

Preventive maintenance ensures trouble-free operations.

Experienced engineers and qualified service personnel make regular site visits for condition monitoring and adjustment of mechanical devices, sensors and electrical components. “We have a systematic approach in inspecting everything, replacing spare parts where needed, and making any necessary adjustments,” says Pesmel’s **Ari Mäkinen,** Key Account Manager at Pesmel Service.

Spare parts provision is all part of Pesmel’s service offering, as are upgrades for existing installations. The latter is designed to increase system capacity, modify equipment for handling different types of product, and improve safety.

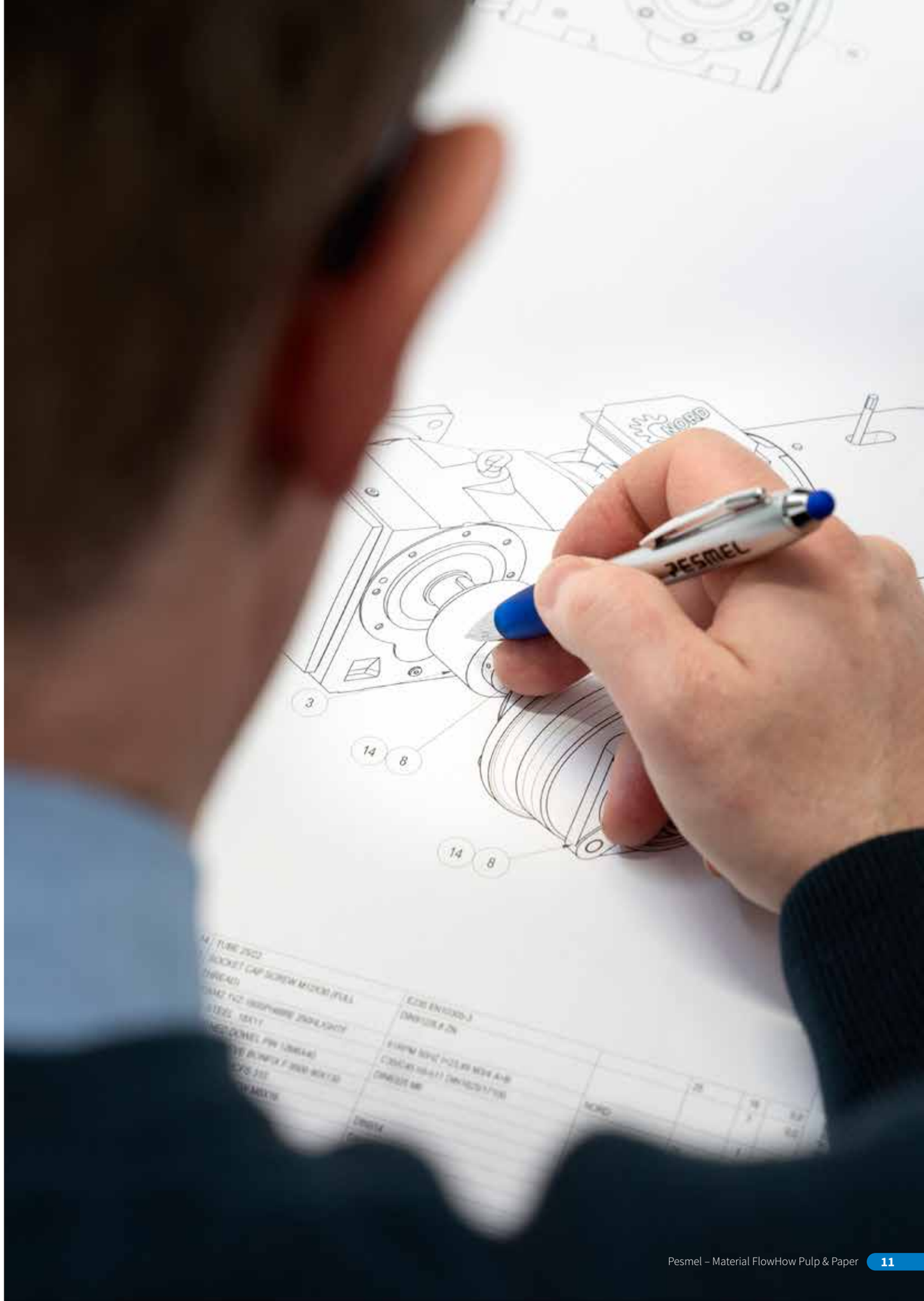
Most problems come when you don’t take care of the equipment.

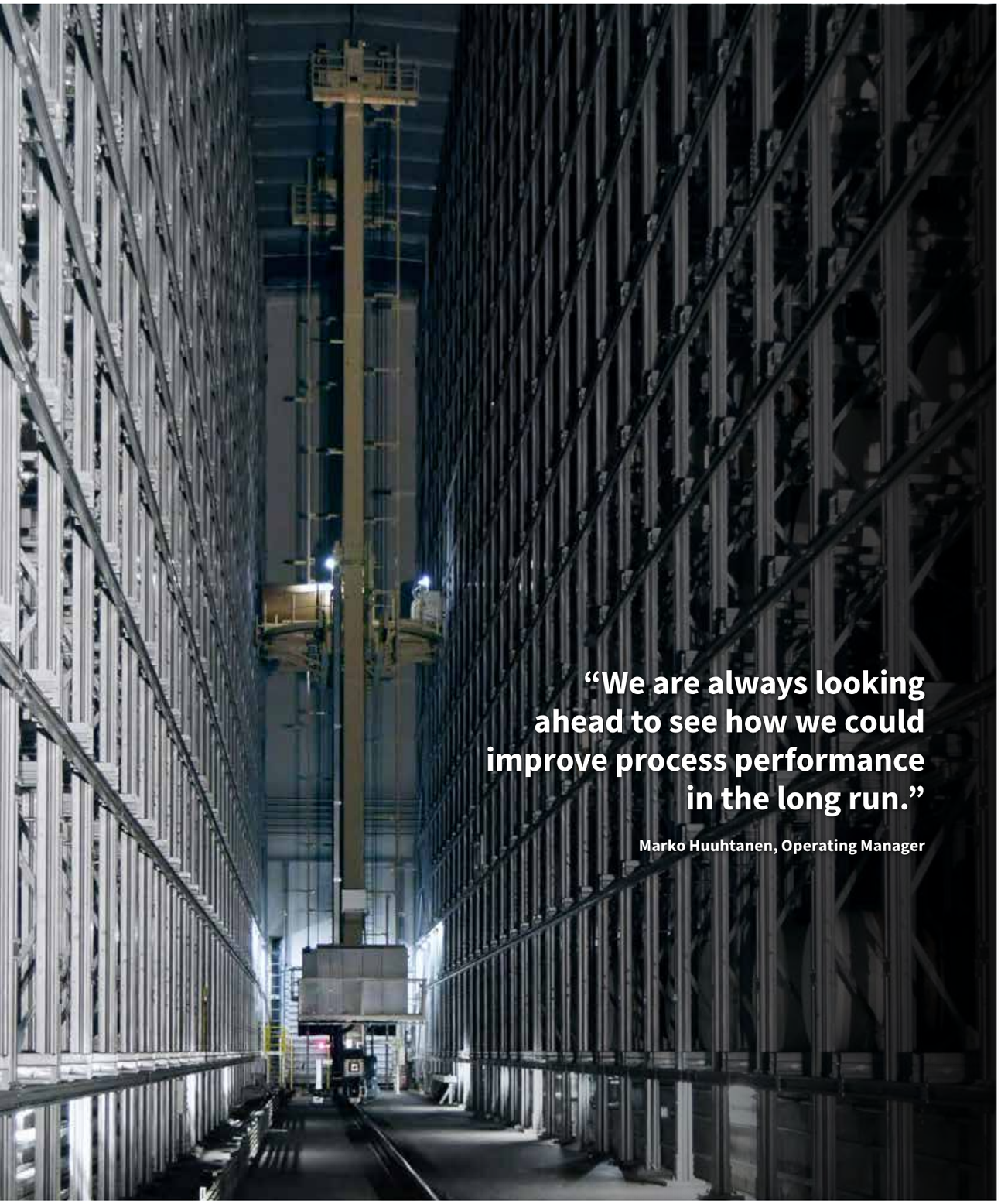
Pesmel’s Industry 4.0-based Flow Care remote supervisory solution visualizes data and is viewable on personal mobile devices. Flow Care is user-friendly, security conscious, and offers customers valuable insight into the performance of Pesmel’s in-plant logistics and storage solutions.

Maintenance means a longer life

The topic of maintenance is rarely mentioned without including the word ‘lifecycle’ and the reason is simple: Poorly maintained equipment has a very short lifespan. Conversely, regularly looked-after electrical and mechanical systems – especially those operating in harsh environments – can almost claim immortality. A bold statement, perhaps, but **Marko Heikkinen,** Chief Service Officer at Pesmel, speaks of stacker cranes built in the 1990s and still working today. Electrical components upgraded 10 years ago are still in action as I write this. There are paper factories in the darkest jungles working 24/7 with properly maintained equipment, and 20-year-old cranes in ice cream factories hard at it in freezing temperatures. “Most problems come when you don’t take care of the equipment,” Heikkinen says, adding that greater performance and higher quality are only achievable if the equipment in question is regularly maintained and upgraded.

Contact person
Ari Mäkinen
+358 20 7009 639
ari.makinen@pesmel.com





CASE: Stora Enso, Imatra Mills, Finland

Staying ahead through service

Co-operation and partnership is the basis for great service and customer satisfaction

An automated roll warehouse and kraft wrapping line by Pesmel were among the investments that Stora Enso decided to make at their Imatra Mills in Eastern Finland back in 2016. After several years in full operation, we touched base with **Marko Huuhtanen,** Operating Manager at the coating mill, to hear about his experiences with the Pesmel solutions in practice.

Service is a team sport

Huuhtanen joined Stora Enso at the Imatra Mills soon after the Pesmel warehouse and packaging line solutions had been installed and started up in 2018. His role includes ensuring three key factors on site – safety, quality and efficiency. From a service and maintenance perspective he has to simultaneously look at the bigger picture and examine the details closely. “On a day-to-day basis, we need to ensure that processes and machinery are up and running. But at the same time, we are always looking ahead to see how we could improve process performance in the long run. There is always something that can be fine-tuned or done differently.”

In terms of daily service and maintenance, issues that arise are typically related to mechanical parts. “Moving parts require regular service and maintenance. That’s a given. Those service needs we are typically able to handle ourselves here at the mill,” Huuhtanen explains. The areas where Huuhtanen and his team turn to Pesmel’s Helpdesk, a 24/7 service included as part of their service agreement, are typically related to the software and automation side of things. “There is always someone on-call that knows the ins and outs of the solutions in use at the mill. Remote access ensures a rapid response time and quick troubleshooting every time.”

Always looking to do better

Pesmel’s Account Manager for Stora Enso Imatra, **Ari Mäkinen,** has been involved from the very beginning of the project. When asked, he expressed his satisfaction with the status of the customer relationship and the Pesmel solutions at the mill today. “Every solution we deliver is customized to the individual customer’s and site’s requirements,” he says. “It always takes time to achieve optimal performance. In close co-operation with Huuhtanen and his team, we have been able to eliminate any issues that we had early on. The many small improvements we have been able to make over the years add up to a considerable overall improvement over the solutions lifetime so far.”

“Together, we have already been able to improve the overall roll handling times at the warehouse.”

Marko Huuhtanen, Operating Manager

Continuous development is a high priority for Stora Enso at the Imatra Mills. Huuhtanen and Mäkinen can both recollect numerous improvements that have been made over the years, from the load-bearing tires on the rolling carriages of the ARW to subtle software tweaks and updates. “Together we have already been able to improve the overall roll handling times at the warehouse. Next up are developments that will allow us to utilize the full capacity of our automated warehouse,” Huuhtanen says. “Those improvements will probably be achieved through developments in the operating system.”

Handle with care and accuracy
Pesmel's on-site solutions cover just a fraction of the operations taking place. Even though the solutions are not directly involved in the production process of the final commercial end product, they are located at extremely vital junction points of the overall process. Wrapping, storage and loading functions are important in terms of the logistics of the mill, but they are also areas where rolls are physically handled by automated machinery and product quality and integrity must be ensured. "In many cases rolls leave the automated warehouse without visual inspection by a human. We have to be able to rely on the technology to handle our valuable assets with the care required," Huuhtanen explains.

"We have to be able to rely on the [Pesmel] technology to handle our valuable assets with the care required."

Marko Huuhtanen, Operating Manager

The reliability and repeatability of the automated processes have been positive. Any damage resulting from packing or storage has been extremely rare. Product recalls resulting from damage caused by the storage cars or cranes are virtually unheard of. "Our TransRoll solution does not grab or pinch rolls to lift them, like your typical overhead cranes do. We lift each roll gently from below. Regardless of roll size or weight, we are able to handle multiple rolls at a time with the utmost care," Mäkinen explains.

Good service. Bright future.
According to Huuhtanen, the overall level of satisfaction with the Pesmel solutions and the co-operation between the two companies is at a high level. He gives particular thanks to the fast reaction times and utmost flexibility of the service team. Their professionalism can be seen on-site during scheduled service shutdowns as well as through the remote ad hoc assistance provided through the Helpdesk. He is looking forward to continuing to work towards ever-improved safety, quality and efficiency with his counterparts at Pesmel.

"I believe that digitalization, and automation in particular, will have a profound effect on mill performance in the future."

Marko Huuhtanen, Operating Manager

Huuhtanen sums up the discussion with a few last words. "Our investment into Pesmel technologies has already been able to improve the efficiency of our in-mill logistics. By making sure we can make the most of all the innovations we have at our disposal, I am sure we will be able to continue improving the efficiency of every part of our mill, including storage, handling and wrapping. I believe that digitalization, and automation in particular, will have a profound effect on mill performance in the future."

Interview with Kimmo Kuntze

Account Manager and Automation Engineer at Pesmel

Kimmo, you are an Account Manager and Automation Engineer in Pesmel's Service organization. Can you please elaborate on the responsibilities of the service team and your own role in it.
We are the customers' interface to Pesmel. Most of the day-to-day interaction with the customer takes place in our service team and it is our responsibility to ensure that cooperation with Pesmel equals success.

Our department covers a wide range of activities in the aftersales market from spare part sales to maintenance services and modernizations. We don't only react to requests – we work in close collaboration with our key customers to continuously improve their processes. That being said, the most important part of our job is to know the customer and to be Pesmel's representative in their team.

Pesmel's offering covers solutions for automated material handling. My background within automation, as well as my current role, provide an excellent viewpoint into the customer's world. My own responsibilities vary from program designing and troubleshooting to customer collaboration and finding solutions to their challenges. A double role like this seems to have its benefits. Less limits and box-ticking also mean better visibility of the whole process, which leads to greater responsibility.

When did you join the company and what is your background?
I joined Pesmel in 2019 with ten years' experience in working as an automation designer. I started with material handling in the food industry, took a five-year journey in the ship building industry and now I am back in material handling - heavy duty this time.

In the field of automation, the learning never stops. An advertisement for an opening at Pesmel caught my attention as an opportunity to extend my professional scope – and I have not regretted it at all.

How would you describe a typical day at work?
There is no such thing as a typical workday. One day I find myself working via remote connection with someone on the other side of the globe, the next day I may be visiting a local customer followed by a day at the office. One thing in common seems to be that you will never know what to expect and that there is always something new to learn.

Nowadays it is common to use remote connections when communicating with customers or helping them with their production systems. This saves a great deal of time and effort, especially with service operations. Remote connections offer a good way to improve productivity and provide fast support, and they also enable me to assist customers through making small modifications to their systems.

As Account Manager, how do you understand your customers?
Because I have worked closely with our customers, I have seen their processes, become familiar with their way of doing things, and, most importantly, got to know their people. Even with the possibilities of remote connections, it still comes down to knowing the customer and building up trust. As an account manager my background gives me credibility and confidence as I am quite familiar with the possibilities and challenges at hand.

Working at the customer interface, how do you see the potential for personal development as a member of Pesmel's service organization?
Working at the customer interface means working with people. Although I come from a technology-oriented background, I have realized that not all or even most of the challenges we face are related to technology. It has been refreshing for me to move away from the computer and talk to the customers.

Concerning technology, Pesmel's material handling solutions offer an extensive range, with tools from advanced motion control to sensory systems, simulation, identification systems, the latest safety systems and so on. Not to forget our creative and professional engineering community.

Material handling is at the very core of automation and digitalization. However, there is still lots of manual work done in the field, providing several opportunities for improving our customers' productivity.

My career path in Pesmel's service organization has provided me with interesting opportunities and responsibilities in support of my personal development. As a person willing to advance I have found more than I had expected. Great things await those who dare take the chance.

The Pesmel simulation process

Increasing the credibility and validation of flow solutions

Pesmel uses simulation to ensure efficient and accurate design of complex material flow solutions at their customers' mills, says **Eero Anttila,** Manager, Material flow integration.

Customizing solutions successfully through simulation

The needs of every customer are different. Offering bespoke, customizable solutions to improve material flow is one of Pesmel's clear strengths. But identifying and addressing the specific requirements of a given project require a lot of planning and cooperation.

To bring to life the vision shared between the customer and Pesmel, simulation is used in the early engineering phase to accurately analyze material flow in a given location.

Understanding the process and optimizing the solution

"The simulation is not a separate product," explains Eero Anttila, "but an integral part of our offering. We use it with our customers to design, develop, optimize, and validate our logistics systems."

For the customer, simulation makes it easy to visualize the solution and approve it prior to making further investments. For Pesmel, the data gathered provides greater understanding of the customer's process and integration needs and allows solution optimization.

"Simulation is an integral part of our offering."

To begin a simulation process, customer data – such as product dimensions, warehousing requirements, and the dispatch needs of the planned material flow system – is collected. Upon gathering the data, the next step is solution engineering, including data analysis and layout design.

"When we have the data and basic solution as starting point, we can quickly simulate weeks or months of operation to a degree of accuracy that is not possible with other tools," Anttila points out.

Three steps of simulation provide comprehensive material flow integration

There are three main phases of simulation. Upon gathering and analyzing customer data, Pesmel will identify the actual functionality and capacity requirements of the system. In the second phase, the capacity simulation provides a visual presentation and validation of the tailored solution. Finally, the simulation facilitates the design and workshop testing of the warehouse management system (WMS), the heart of the material flow solution.

"Through the simulation process we can offer comprehensive insights into material flow requirements and potential solutions, prior to the start of engineering or other commitments", says Anttila. "Ultimately, we provide them with skill and experience for devising a well-structured and integrated material flow solution."

Digital twins through the simulation process

A digital twin is a virtual representation that serves as the digital counterpart of a physical process. In Pesmel it is used in the development and maintenance of the customer's material flow solution.

In addition to allowing overall analysis and development of the customer case, a digital twin can be used in daily operations: continuous optimization of automated storage, estimation of near future occurrences and support for operator decision making.

A digital twin also plays an important role in planning and executing after sales operations. These typically include data collection of equipment usage, preventive maintenance, and virtual testing of software updates.

"Ultimately, simulation is an end-result of a thorough analysis of a particular material flow set-up," Anttila concludes. "Together with the customer we can address any issues and find the best possible solution."

Towards carbon-neutral warehousing

With over 40 years of experience, Pesmel is well-known for its innovative material flow solutions. The company's practical and pragmatic approach to its products is also useful in pursuing a zero-carbon policy, explains **Tony Leikas,** Pesmel CEO.

Compensation cannot last forever

"We have noticed that many companies use a compensation approach when planning their sustainability agendas," Leikas notes, "and say that their operations are carbon neutral. But in the long run we can't compensate forever. It is better to lower the starting point. We prefer a practical approach based on our wide company knowledge."

Pesmel provides tailor-made solutions to our customers in internal and shipping logistics. "The most effective thing we can do is to make sure that our own solutions are as sustainable as possible. Then we also help our customers improve their sustainability."

"Energy efficiency is only one part of the overall picture."

A focus on environmental issues is not a new thing for Pesmel. Related work started some 15 years ago in improving energy efficiency through technology such as regenerative drives and optimized control systems. "Better structuring of the systems and equipment has led to increased development in energy efficiency measures. But energy efficiency is only one part of the overall picture," Leikas points out.

Understanding the whole picture

To get an idea of the overall possibilities, Pesmel have analyzed the typical emissions and resources required to build and optimize with Pesmel solutions the in-mill logistics of a fairly large board mill producing 820,000 tonnes annually. Through this analysis, the company has been able to calculate the climate impacts of an automated ASRS throughout its lifecycle, from construction to recycling. The research found that the total life cycle climate impact of the manufacture, use and disposal of the evaluated system is equivalent to approximately 16,600 tonnes of CO_2 emissions. Most of the emissions occur as a result of the racking manufacture and the in-use energy consumption.

Compensating for such a facility operating a Pesmel automated solution would require planting 10 hectares of forest. "It's not so much for a big mill, especially considering a 40-year operating cycle," Leikas says, "and a warehouse that uses traditional technology like forklift trucks would require 5 to 10 times more compensation."

Sustainable benefits through automation

In fact, Pesmel's automated high bay warehousing solutions are one of the main reasons the operating carbon footprint is so low. "Our automated systems are powered by electricity that can be obtained from renewable sources. Creating sustainable energy sources like installing solar panels on a roof, or identifying certified energy providers, can significantly increase energy efficiency and sustainability. These are low-hanging fruit that can be identified to benefit our customers."

Furthermore, over 90 percent of the materials in Pesmel automated storage and retrieval systems are recyclable. "The percentage of recycled steel is increasing, and we are further optimizing our recycling and reusing efforts," Leikas remarks.

Future improvements on the way

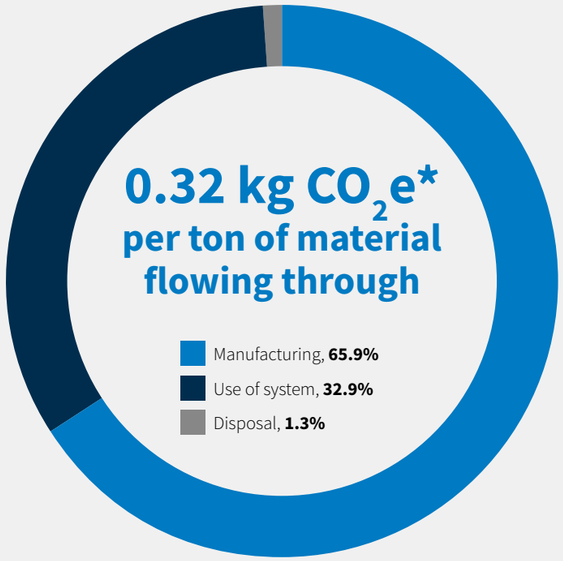
While progress has been made on improving sustainable operations, more can always be done. "Our aim is to improve carbon neutrality in two ways. Firstly, we will continue to increase the amount of steel that is recycled. Secondly, when purchasing steel, we will ensure as far as possible it is carbon neutral."

These measures have a surprisingly powerful effect, says Leikas. "Whereas, as we have mentioned, compensating for the typical Pesmel solution requires planting ten hectares of forest, when we have implemented these measures the required compensation will be only one or two hectares."

"Creating sustainable energy sources benefits our customers."

Ultimately, every business needs to do its best to improve sustainability within their own and their customers' areas of operation. "We can identify the best possibilities for energy sourcing and usage," Leikas concludes, "and I believe there will be big steps in the next few years through better energy efficiency, recyclability, optimization, and the use of renewable energy."

The biggest factors affecting carbon neutrality in automatic storage are the steel used for construction and the electricity required to operate. By increasing the recycling rate of steel, or by buying carbon neutral steel, and using sustainably certified electricity, the carbon footprint can be reduced by 90 percent of the current level.

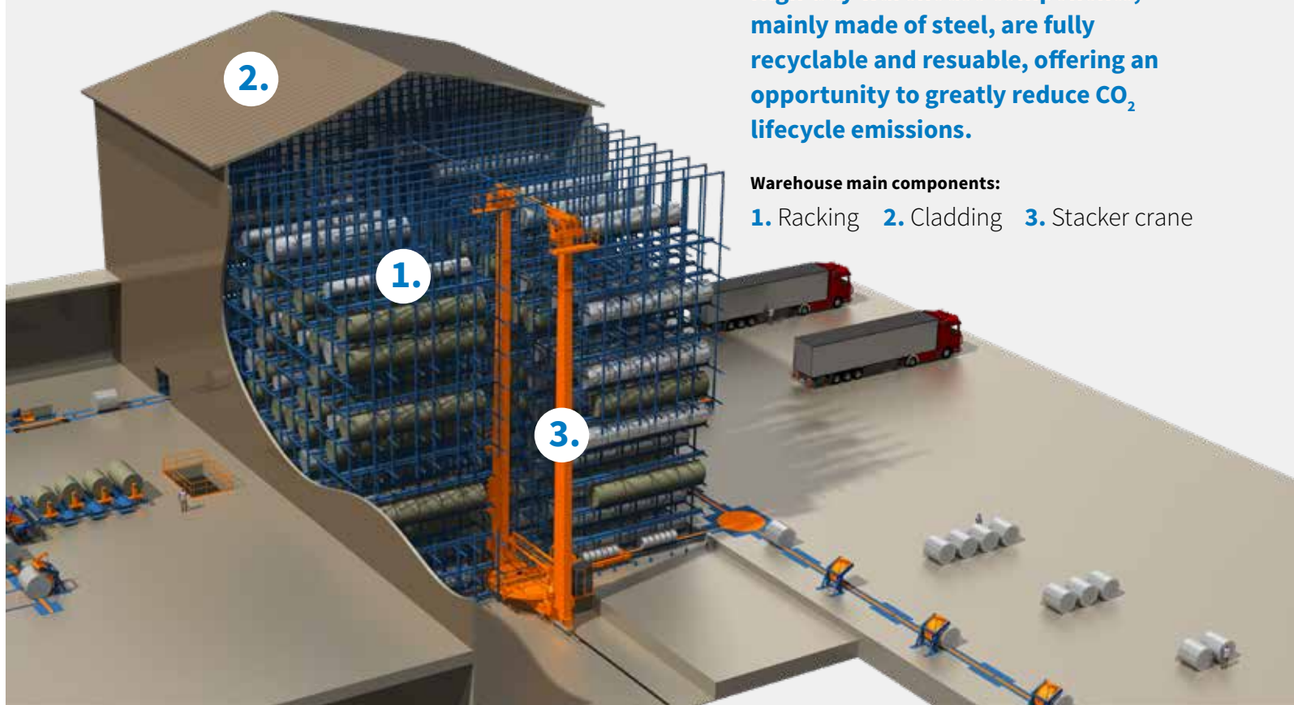


Current storage carbon footprint over a 40-year lifecycle from manufacturing to demolition

Key figures for the evaluated system:

- Storage capacity 55,000 metric tons
- Storage output 820,000 tons per annum
- Two stacker cranes

* Carbon dioxide equivalent



High-bay warehouse components, mainly made of steel, are fully recyclable and resuable, offering an opportunity to greatly reduce CO_2 lifecycle emissions.

Warehouse main components:

1. Racking **2.** Cladding **3.** Stacker crane

Solutions for improved packaging quality and safety

CASE: Saint-Gobain ADFORS, Czech Republic

Customization, automation, and cooperation

When ADFORS needed to expand their fibreglass roll production line, Pesmel was the natural partner thanks to applicable expertise and customisable packing solutions.

Part of the Saint-Gobain group of companies, ADFORS offers technical textile solutions for construction and industrial customers based on a wide range of technologies. At their factory in Litomyšl in the Czech Republic, fibreglass mat is produced in large rolls. But when it came to expanding their production, ADFORS needed to address some challenges in their processes.

Quality and safety through automation

"We needed to improve our packaging systems when we built a new production line next to the old one," explains **Garry Kitchen,** Key Project Leader at Saint-Gobain ADFORS. "Our existing line is semi-automated. In addition, we have a rewinding department which in terms of packaging is a manual operation. We envisioned the possibility of improving efficiency while standardizing packaging in this area. To improve the situation on the new line we wanted to set up a fully automated packing line that would benefit us in terms of both quality and safety. These were our challenges."

In Litomyšl, fibreglass mat is produced in large rolls for applications such as wall coverings, insulation, roofing, and LVT flooring. The material is delicate and can easily be damaged on conveyor belts. Any solution had to take this into consideration, requiring in-depth knowledge of the material and production process.

"When we visited trade shows, we realized that nobody could offer us a full turnkey project like Pesmel could," Kitchen says. "Other companies could do smaller parts of the overall project, but not everything, and it proved impossible to find another company that really understood our business."

"No other company offered what Pesmel did."

Pesmel's solution consists of a fully automated handling and packing system with foam and stretch wrapping. Automated plugging and board header inserting functions are also included. The aim was to provide a customized solution to ADFORS' challenges. Kitchen continues, "when we explained what we required, Pesmel not only met our needs but surpassed them by working with us to identify other possible areas of improvement in the system. Cost wasn't a consideration simply because we couldn't find a comparable offer that took all our requirements into account."

Discussing solutions in partnership

Not only was Pesmel's offer comprehensive but the whole project was easy to implement. "For me as project manager it was a really simple cooperation. Pesmel were open to conversation, and even though starting a project like this in the middle of a pandemic probably wasn't the best timing, communication was easy. We needed a bespoke solution because our products are not standard. I can't fault Pesmel at all – working with them was a breeze."

"Working with Pesmel was a breeze."

Now that the project is completed, Kitchen is quick to notice resulting benefits. "One of the biggest advantages now is safety, and another is efficiency. We need less people on the line but we're packing more rolls per hours that look better and more professional. We can use many different types of packing and they all look great. The system can easily be updated, and our employees feel it's easy to operate. Also, Pesmel's aftercare is excellent," he concludes.

The ADFORS Litomyšl project is a fine example of the cooperative spirit that makes Pesmel automated packing solutions the best on the market.

Contact us

If you would like to know more about the topics covered in this issue or have any other enquiries, our experts are more than happy to help. We would love to hear from you.

Head Office

Pesmel Oy
P.O. Box 14 (Päntäneentie 3)
61801 Kauhajoki, Finland
Tel. +358 20 7009 600
pesmel@pesmel.com

Sales

Kaj Fahllund
VP, Pulp & Paper
Tel. +358 20 7009 626
kaj.fahllund@pesmel.com

Service

Ari Mäkinen
Account Manager
Tel. +358 20 7009 683
ari.makinen@pesmel.com

Regional

Central Eastern Europe
Krzysztof Kwaśniewski
Tel. +48 660 990 258
krzysztof.kwasniewski@pesmel.com

China
Jeany Liu
Tel. +86-1300 616 1741
jeany.liu@pesmel.com

Denmark, Norway, Sweden
Robert Clayhills
Tel. +46 70 483 5567 / +46 8 5592 3019 / +358 400 216 702
robert.clayhills@nipman.com

France
Jean Kuster
Tel. +33 9020 56220
jkuster@paper-run.com

India
Jagannathan Rajagopalan
Tel. +91 93 2284 9709
jagannathan.rajagopalan@pesmel.com

Indonesia
Rasiman Aguspen
Tel. +62 811 807 226
rasiman@pesmel.com

Japan
Achim Wagner
Tel. +81 72 241 3821
a_wagner@horitomi.co.jp

Portugal
João Lobato
Tel. +351 1234 426 400
joao.lobato@optieng.com

South Korea
Dae-Yu (David) Kim
Tel. +82 (0)31 492 1691
dykim3e@hanmail.net

Taiwan
Harry Lehto
Tel. +85 9 2839 0547 / +886 6 3022 593
harry.lehto@pesmel.com /
taiwan@pesmel.com

Thailand
Vorarat Kulchotirat
Tel. +66 984 437 404
vorarat.kulchotirat@fersmek.com

UK
Peter Nadin
Tel. +44 161 449 7707 / +44 786 065 1212
rolpexuk@aol.com

USA, Canada
Stan Merrill
Tel. +1 513 444 9316
stan.merrill@pesmel.com

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