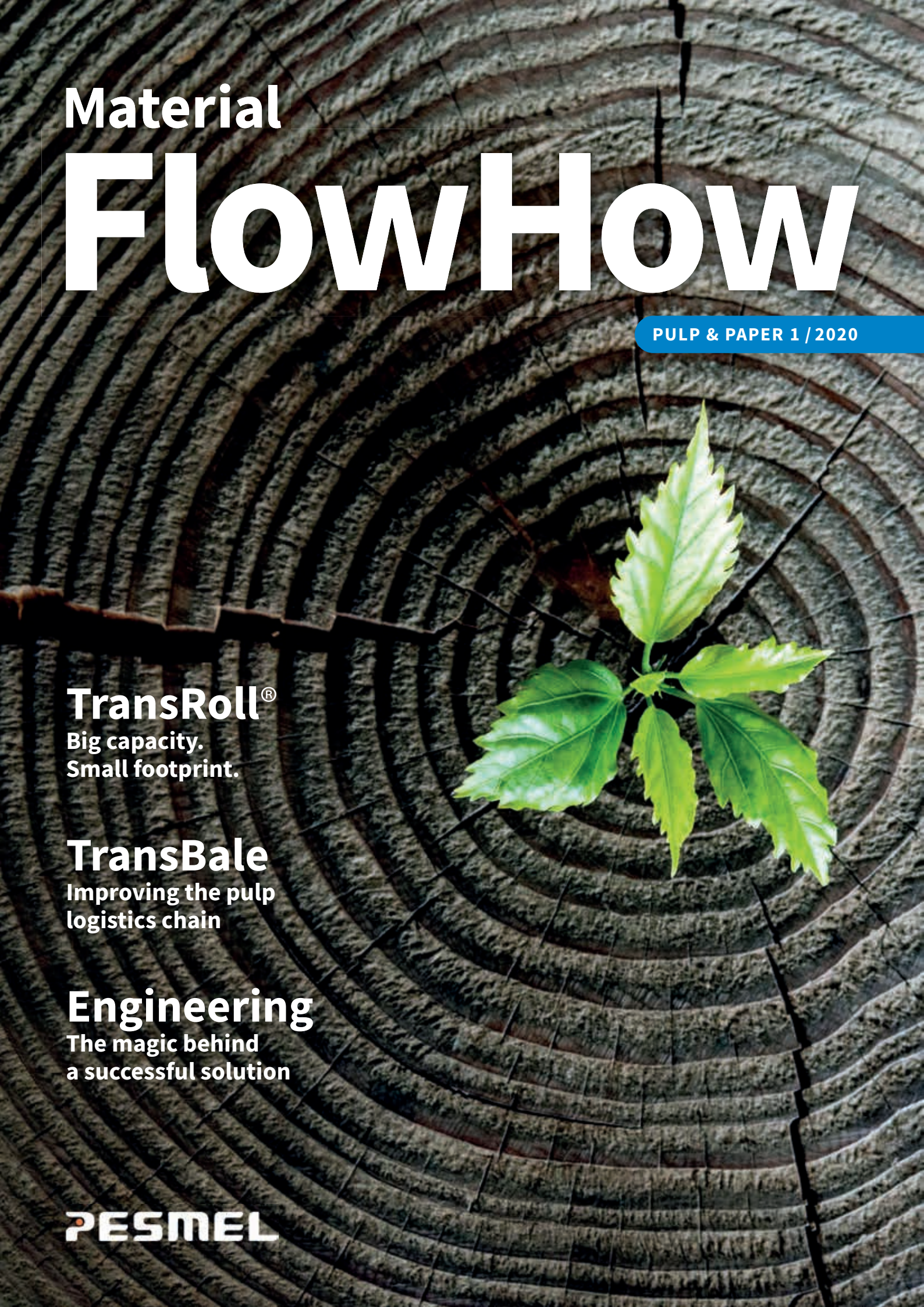
Material FlowHow

PULP & PAPER 1 / 2020



TransRoll®
Big capacity.
Small footprint.

TransBale
Improving the pulp logistics chain

Engineering
The magic behind a successful solution

PESMEL

Contents

NewsFlow is Pesmel's customer magazine

Publisher: Pesmel Oy
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Editorial Board: Ilkka Hiirsalmi, Sanna Leikas and Kaj Fahllund
Editors:

Layout: Brandkind
Printing:
Printed on:
Publishing year: 2020

Automated warehousing

at the heart of the digitalized supply chain

While working with our customers to improve their in-mill logistics we have learnt that the biggest inefficiencies in today's mills tend to lie in the warehouse and shipping operations. Even if the main production processes have been fully automated long ago, the warehouse operations on the other side of the machine hall wall can still be manually operated. Consequently, they have become bottlenecks for the entire manufacturing and supply chain process.

What comes to the actual transportation of goods, it tends to take less than half of the total shipment time. In addition, as the transportation speeds are already at their practical limits, it is obvious that the biggest inefficiencies are banking up in excessive turnaround and waiting times at loading docks.

The root cause for prolonged waiting radiates throughout the entire logistics chain from the mill to the end customer. However, the issues can be identified and quantified, and the solution, based on our long-term experience, is not difficult to realize. Stepping up the level of automation can provide the tools for removing bottlenecks and increasing overall efficiencies in the entire supply chain.

The solution can be based on integration of the mill ERP/MES and the Transportation Management System (TMS) with the help of an automated Warehouse Management System (WMS). This will digitalize the entire supply chain which, in turn, will enable fully automated production and shipping buffers.

We work daily with our customers in removing bottlenecks in their manufacturing and supply chain processes. In this magazine you will find among other interesting articles, a reference case of a board paper mill where the trucks' waiting times at loading were shortened from hours to less than 20 minutes per truck. Another article highlights a pulp mill that was able to cut the pulp train's round trip from mill to port and back from 96 to 36 hours.

To hear more about the topics covered in the articles and other content, please be in touch.

BR. Kaj

TransRoll®

Big capacity.
Small footprint.

The TransRoll® storage solution is an integral part of Pesmel's Material Flow How® -concept for paper mills. It is helping customers around the world achieve efficiency in terms of storage capacity, facility footprint and the speed and accuracy of deliveries.

Pesmel's Material Flow How® -concept is all about arranging production and material flows to help maximize production efficiency and minimize the amount of needed equipment and manual labor. The TransRoll® storage solution helps expedite internal logistics by improving overall efficiency and speeding up throughput times with seamless integration between storage functions and production. At the other end, shipping logistics are helped along by smoother and faster turn-around times, which in turn ensure the high handling capacity of the unique storage facility.

Tried and tested
Our solutions utilize advanced automation and patented solutions, all designed in-house at Pesmel. Before the construction and delivery of your solution, a simulated model is created to examine all the different production procedures and material flows on site. Risks are assessed, and potential bottlenecks identified and addressed. We optimize the footprint of the storage facility to fit the site and process, rather going higher that expanding outwards, to keep the site as compact and manageable as possible.

Heart of the solution
At a paper mill, at the heart of a delivered Pesmel solution, you will find our automated TransRoll® storage system. Other typical elements may include roll handling and packing systems. All these elements are fully integrated with the Pesmel Control MOM (Manufacturing Operations Management) system.

"We help optimize storage and logistical functions, increasing total capacity and decreasing costs."

Part of our solution is always the software behind the storage solution. The Pesmel WMS (Warehouse Management System) integrates and controls material flows between production, storage, roll handling, and shipping. This helps optimize the storage and logistical functions, increasing the total capacity of the system and decreasing costs.

Smart design
The large number of different processes at a paper mill, from the paper machines and converting all the way to shipping, need to have the ability for individual and independent optimization and maintenance. A smartly integrated Pesmel TransRoll® storage located between the main processes breaks a rigid production line down into smaller, individually more manageable processes with a minimal number of connecting conveyors.

"Our horizontal deep lane technology is extremely well suited for big storage volumes and high capacities."

The storage solution based on horizontal deep lane technology, is extremely suitable for big storage volumes and high capacities. As a solution it has proven to be extremely versatile in customer use. It can handle both rolls and roll sets without limitations related to roll dimensions or packing variants. Rolls can be unwrapped, partially wrapped, or fully wrapped. It can even store rolls and pallets in the same shared rack structure if necessary.

Unlimited handling capacity
The virtually unlimited handling and sorting capacity of TransRoll® sets it apart from all other storage alternatives. The stacker cranes typically used in our storage solution have a handling capacity reaching up to 50 cycles per hour. And as the channel vehicle can handle six to eight rolls per set, the roll stream can be up to 400 rolls per hour, per stacking crane. This also means that the system has plenty of sorting ability for off-peak hours.

To find out how TransRoll® is proving its worth in operation, turn the page and explore some of our customer cases from pulp and paper manufacturers around the globe. See how their operations have benefited from Pesmel's Material Flow How® and dedication to automated excellence.

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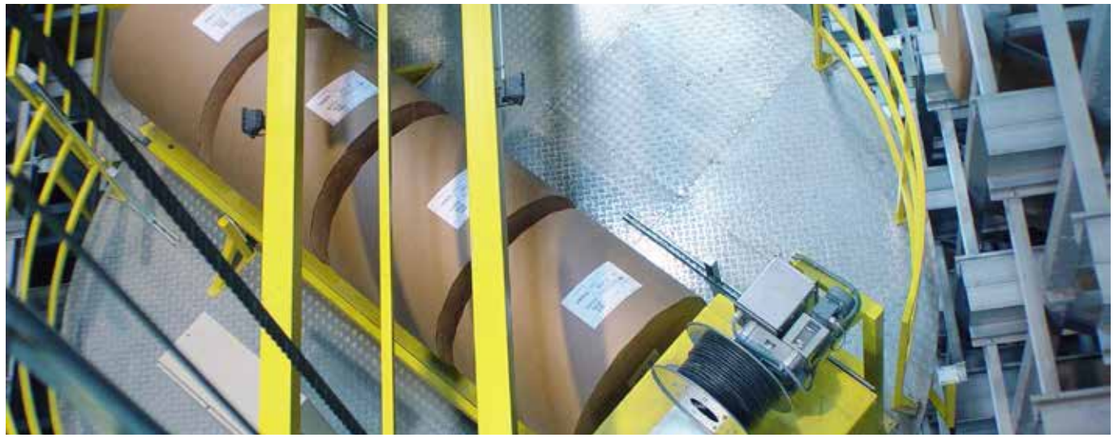
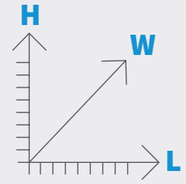


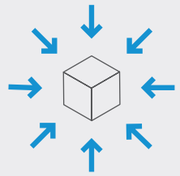
Pesmel TransRoll®

storing gives operational efficiency and cost savings with the following main features:

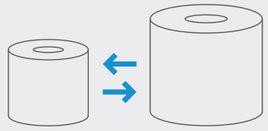
Simplified layout with minimal number of integrated conveyors.



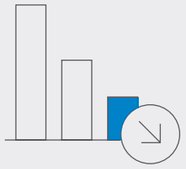
Adjustable storage in all three axes; length, width and height.



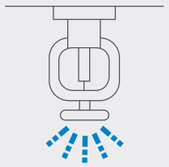
Smallest storage footprint compared to other alternatives.



Highest handling capacity and flexibility to handle different size rolls.



Minimised storage building costs by rack supported walls and roof elements.



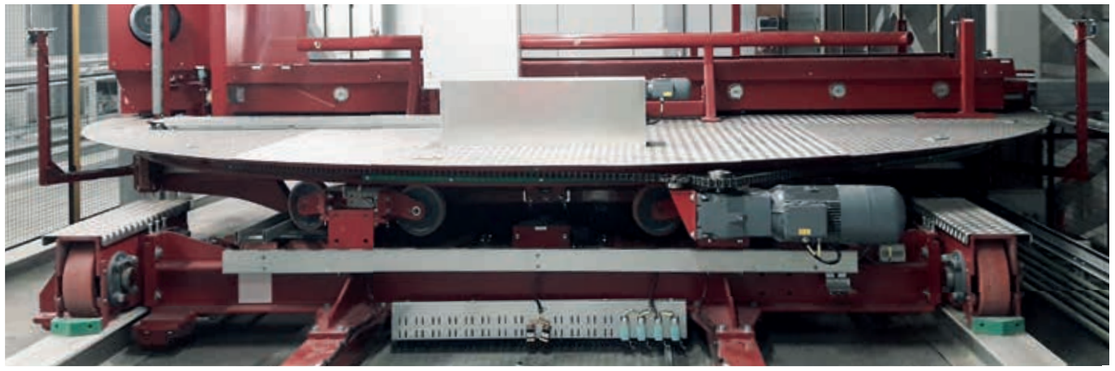
Superior fire safety compared to other alternatives.

TransRoll® in action

Pesmel has successfully delivered automated logistics systems to customers around the world. Whether you have a huge multi-story storage facility or premises with tight space limitations, our experts have the experience and expertise to plan and integrate the right solution for your needs.

CASE: Saica, El Burgo de Ebro mill, Spain

High capacity and smooth flow of products



Saica (S.A Industrias Celulosa Aragonesa) is a major European producer of recycled cardboard packaging and a pioneer in circular economy with operations in most Western European countries. In addition to paper and cardboard packaging mills, the company operates its own recycling system, gathering waste cardboard to be used as raw material for new quality packaging products.

The Saica El Burgo de Ebro mill, located in Zaragoza, Spain, has a production capacity of 1,3 M tons a year. It is made up of three machines and a coating line producing high-performance white and lightweight papers and cardboard.

In search of improved capacity and flexibility

Originally, Saica intended to expand its old warehouse using clamp trucks. However, an update of their production strategy from make-to-order to make-to-stock set high requirements for the roll handling capacity and storage volumes: with four production lines pushing a multitude of different rolls to storage Saica needed a genuinely smart and reliable automated storage system.

Saica set several objectives for developing the project. Increasing storage capacity at Saica's El Burgo de Ebro paper plant and transforming Saica's supply chain model from made-to-order to made-to-stock were the starting point. This meant ensuring effective use of land, improvements in storage efficiency, and reducing costs. There was also a clear target of reducing costs related to using external warehouses and transporting paper rolls as well as minimizing costs from rolls being damaged by clamp trucks with traditional handling.

Up to 4000 tons per day of extremely mixed production flowing in from four production lines every hour and up to 250 trucks reporting at the mill gate every day in random order, the storage and logistics were a challenge.

Roll handling with no bottlenecks

The TransRoll™ deep channel rack storage system was found to be the most suitable solution: The rolls are stored horizontally in a 16-level, high-bay storage facility. After the completion of both construction phases, the facility will be 240 meters long and have 12 loading docks. The TransRoll storage concept gives the mill a roll handling capacity of up to 1,000 tons per hour, and the stacker crane capacity is designed to meet the needs of the mill.

"This project has achieved excellent results."

Juan Antonio Meler, Project Manager, Saica Group

The huge scale of the project and size of the facility demands precise in-mill logistics. This is made possible through a warehouse management system, part of the total delivery by Pesmel. The system controls all roll handling and storing functions, being the brain that ensures optimal organization and operation of the storage with no bottlenecks in the mill's material flow.

Results through automation and experience

The high level of automation is the key to success. Pesmel automated the whole logistics chain eliminating bottlenecks and enabling Saica to meet the goals of flexibility, availability and quick service – all essential for made-to-stock production. In addition, building upwards enabled Saica to get more storage space in the existing space.

Juan Antonio Meler, Projects Director, Saica Group explains, "When we selected Pesmel, we evaluated their experience in the paper and metal industries. We also analyzed their capabilities not only in terms of cycles per hour and storage capacity, but also the capabilities of their warehouse management system, i.e. the system functions, monitoring, optimization and problem diagnosis. This project has achieved excellent results."

The TransRoll concept allows increases in capacity and flexibility. It works equally well whether the width of the paper machine is divided between three rolls or eight rolls, and it takes the same number of movements to move the full width of the paper machine.

The extremely complex building process was facilitated by the fact that Pesmel could handle the complete delivery: from conveyors, cranes and the actual buildings, all the way to the control system software. This, together with Pesmel's long experience of holistic system deliveries, allowed efficient project coordination. "TransRoll storage systems are inherently flexible and easy to expand, which also makes them well suited for construction while production operations continue," product manager Jani Matikainen from Pesmel points out.

Pesmel TransRoll™ is helping improve:

- Roll handling and sorting capacity
- Storage volume
- Degree of automation

CASE: Metsä Board, Husum mill, Sweden

Unique solution for limited space

Metsä Board's Husum mill operates in the small village of Husum in Sweden. The mill is an integrated board and pulp mill and it produces 730,000 tons of bleached market pulp every year, as well as 400,000 tons of folding boxboard and 250,000 tons of kraftliner.

Creative engineering required

Metsä Board had shut down two paper machines and replaced them with a new state-of-the-art paperboard machine from Valmet in 2015–2016. One paper machine was converted to produce linerboard. After this, the mill has been producing 500,000 tons of paperboard a year on two production lines. The mill also ceased their fine paper sheet cutting operations and replaced them with a new extrusion coating line. These changes required a new intermediate roll storage (IRS) between the paperboard production lines and the extrusion coating line.

The best location for the IRS was the old empty sheeting hall next to the new extruder line. However, this hall was limited by its six-meter ceiling height and by its small footprint. The height limit meant that stacking rolls would not make efficient use of the vertical space, offering only limited storage. In addition, the floor area was not suitable for traditional clamp trucks or automatically guided vehicles (AGVs), because half the floor space would be needed for vehicle access routes.

A scalable solution

After studying the storage hall and its dimensions, Pesmel proposed a solution based on the TransRoll™ automated storage concept. Because this system is scalable it can be fitted into small, low spaces as well as large, high ones. The TransRoll rack was scaled to fit the available height providing two levels of TransRoll channels for rolls with a maximum diameter of 1.8 meters. To make the most efficient use of the floor area asymmetric channel lengths (24 m and 17 m) were selected to be served by a single stacker crane in the aisle between them. This layout optimized the use of vertical and horizontal space providing double the storage volume of an AGV solution. The whole system, including all features of handling and sorting, is controlled by an intelligent Pesmel WMS warehouse management system.

Despite its compact size this tailored TransRoll automated storage concept successfully fitted 4,500 tonnes of paperboard into a 3,180 m^2 space with just a six-meter ceiling height providing a handling capacity of 300 tons of paperboard an hour. Fire safety was also integrated into the system with sprinkler pipes on the racks on each level of the storage. An additional benefit from the choice of the TransRoll solution comes from the stacker crane handling the rolls. This significantly reduces the need for conveyors.

Tailored solutions with smart engineering:

- Scalability; TransRoll fitted into an only six-meter high space
- Clever use of space; 4,500 tonnes of paperboard stored in 3,180 m^2
- Handling capacity of 300 tonnes per hour

CASE: Asia Symbol, Xinhui (Guangdong), China

Simplicity is the key to superior efficiency

Asia Symbol is a leading producer of pulp and paper. Its' two plants in Shandong (Rizhao) and Guangdong (Xinhui) provinces in China have a combined annual production of 1,7 million tons of pulp, 1 million tons of fine paper and 1,7 million tons of paper board.

Asia Symbol (Guangdong) Paper Co., Ltd., in Xinhui, was established in 2002 with one cut size converting line for the production and sales of high-quality copy paper. Asia Symbol (Guangdong) became the largest producer of fine paper in the Pearl River Delta region with the startup of its first paper machine PM#11 in July 2012 and their second machine PM#12 in January 2017.

Addressing the need for efficient intermediate roll storage

In 2012 the company started up a new fine paper machine at its Xinhui mill. The annual production capacity of the 8.65 m wide production line was 450,000 tons per year. At the same time, a new converting plant with shipping facilities for both rolls and pallets was constructed.

From the start, it was clear that effective, centralized Intermediate Roll Storage (IRS) was needed to ensure free and well-controlled material flow between Xinhui's state-of-the-art paper production line, the converting plant and direct hot load shipping. Without an effective IRS solution, the production line could easily become bottlenecked.

A simple and safe solution

The solution selected for the Xinhui plant was Pesmel's TransRoll™ high bay storage system. This included a fully automated Intermediate Roll Storage (IRS) fitted between paper production and converting, providing an unmanned, flexible sorting buffer between the main production processes.

One of the biggest advantages of the TransRoll concept is that it simplifies the mill layout. The straight conveyor lines lead directly from the winder decks to the IRS intake sorting, as well as to the sheeters and roll shipping. The rolls are handled horizontally all the way from the entry pick-up to delivery with the TransRoll sorter vehicle's cradle. In storage the rolls lie on their sides on V-shaped storage channel beams.

With this high bay storage system system, fire is superior to alternative concepts. The water sprinkler system is built into the rack, which enables uniquely precise fire extinguishing with standard sprinkler nozzles. This cannot be done in storage systems where sprinkler nozzles have to be installed high on the ceiling structures 15 meters or more above the floor.

Less is more

The TransRoll concept met the Xinhui mill's needs with the simplest mill layout, using significantly less equipment than alternative solutions. As they had hoped, it can handle rolls with various roll dimensions and packing options. The rolls can be unwrapped, partially wrapped or fully wrapped as they are handled in the horizontal position at all times.

At Asia Symbol's Xinhui mill the TransRoll system has made control of production easy, resulting in increased overall process efficiency and high productivity.

Fully automated Intermediate Roll Storage (IRS) offers unmanned flexible sorting buffer between the main production processes. This allows the mill's production to freely and individually optimize the main processes with simple, straightforward conveyor lines.

Pesmel TransRoll™ delivers true value:

- IRS between production, converting and shipping
- Simple layout with miniomal amount of equipment
- Superior fire safety

CASE: Stora Enso, Imatra mills, Finland

Seamlessly integrated storage and logistics

Stora Enso is a leading global provider of renewable solutions in packaging, biomaterials, wooden constructions and paper. They employ some 26,000 people in more than 30 countries. 1,300 of those employees work at the company's Imatra mills.

The Imatra mills are located in Southern Finland where they have two production units, Kaukopää and Tainionkoski producing chemical pulp and consumer board. Together they are one of the largest consumer board producing entities in the world, exporting over 90% of their produce to Europe and Southeast Asia. Together they produce some 1,155,000 tons of consumer board, 1,020,000 tons of pulp and 285,000 tons of plastic coating each year.

Meeting changing needs

In 2016 Imatra mills decided to increase their production capacity for extrusion-coated products, and to further enhance their position as a leading global supplier of premium paperboards. Alongside the new polyethylene (PE) coating plant Stora Enso also made the decision to invest in a new automated roll warehouse.

Before this investment decision was made Stora Enso's Imatra mills had to utilize outside warehouses in the region to store their intermediate roll buffer due to space limitations in the warehouse at the mills, which used the traditional clamp truck warehouse concept. This meant multiple clamp truck handling phases between the base paper production, PE coating processes and shipping. This decentralized process inventory was challenging to control, very labor-intensive to manage and led to quality-associated costs.

All PE-coated rolls had to be fully wrapped twice: Once in order to tolerate the maneuvering by clamp trucks in the intermediate storage process and again after the PE coating before being shipped to the customer.

With the automated roll warehouse, the target was to integrate a sufficient intermediate roll buffer in the mill area between the production, converting and shipping processes, and to cut costs by simplifying and automating the internal logistics.

Delivering improved logistics efficiency

The TransRoll™ automated high bay storage at Stora Enso is an ideal example of Pesmel's Material Flow How® concept, representing the perfect union between storage and production. This automated storage operates both as an intermediate buffer for rolls going to PE extrusion coating, and also as a shipping roll buffer for finished customer rolls. The volume was defined as being around 30,000 tons, with a wide range of roll dimensions and weights.

When comparing different type of automated warehouse concepts, it is very important to analyze the total cost of ownership of each alternative. This means the CapEx and OpEx costs related to the warehouse concept itself but also the costs of the systems and structures needed to integrate it into the mill operations. This means the ability to integrate the automated warehouse into the center of the production process with a minimal number of conveyors, and the civil engineering to feed the roll flow in and then to distribute it for converting and shipping.

Here, system suppliers like Pesmel, who can offer the full scope, including the conveyor system and all storage concepts, have the upper hand over part suppliers who concentrate only on their own core area. This advantage was obvious in the Stora Enso Imatra case where the automated storage was integrated with the production operations around it by eight automated connections at different floor levels, in a very limited amount of space.

Comparison of features between TransRoll™ high bay storage and traditional overhead crane warehousing

Solution attributes	TransRoll™	Overhead crane warehouse
Ability to sort mixed production	Good, ability to manage and handle mixed storing channels	Limited, limited ability to manage and handle vertical roll stacks
High handling capacity per crane	Up to 400 rolls per hour	Up to 120 rolls per hour
Simultaneous handling of different roll sizes	Yes	Not possible
Conveyor systems and storage connections	• Simple conveyor systems • Connection to warehouse from wherever needed	• Extensive conveyor systems • Complicated to connect
Shipping turnaround time	Short, due to high handling capacity of cranes and conveyors	Prolonged, due to slower cranes and conveyor handling capacity
Fire safety	Sprinklers in every roll channel	Sprinklers on ceiling
Storing density	Up to 6 tons/m^2	Up to 4,8 tons / m^2

"This new automated roll storage simplified our internal logistics a lot."

Tommi Myller, Project Manager, Stora Enso

A smart and simple solution

Project Manager **Tommi Myller,** from Stora Enso Imatra mills says, "This new automated roll storage simplified our internal logistics a lot. Now we only need one operator to control the process of buffering and sorting the production between paper machines, PE coating and shipping. This is a huge advantage over the previous decentralized operations, with multiple clamp truck drivers and supervisors to manage and handle the intermediate inventory."

For Stora Enso, where this new central distribution buffer required eight connection points, the TransRoll™ high bay storage concept was much simpler and less space-consuming to implement than any alternative method. An additional benefit is that it can be easily expanded in the future. If needed, the rack can simply be extended without disturbing the ongoing production process.

Storage tightly integrated into mill processes:

- Intermediate storage for converting
- Shipment buffer for finished rolls
- Simplified and centralized internal logistics

Stora Enso Imatra mills – new 30,000-tonne automated roll warehouse with eight connection points

Production from three board mechines, at machine floor level, rolls flow in random order from production winders.

Finished and wrapped customer rolls from the new PE plant, at ground floor level, after wrapping finished rolls in kralt paper for shipping.

Finished (PE-coated) unwrapped customer rolls, at ground floor level, buffered to wait for wrapping with kralt paper for shipping.

Raw parent rolls for PE coated #2, roll flow on train tracks to the ground floor.

Raw parent rolls for PE coated #6, roll flow on the ground floor.

Automated truck trailer loading (main gate) for satellite PE coating plant on the ground floor.

Finished PE-coated rolls to shipping dock on train tracks to ground floor in shipping warehouse.

Automated truck trailer loading (reserve gate) for satellite PE coating plant on the ground floor.

Integration with the mill layout required eight in and out connection points to the new automated roll warehouse in Stora Enso Imatra.

Kotkamills

Changing the world one cup at a time

Like every great Finnish innovation, the idea for the world's first completely plastic-free disposable cup, was born in the sauna. What started off some 10 years ago as a simple idea, has come full circle and is now a product that is being shipped across the world, replacing cardboard cups with plastic liners. **Kotkamills CEO, Markku Hämäläinen** tells us the story of the ISLA® cup.

Pesmel system:
Rebuild of a kraft wrapping and handling line
Product:
Saturating Base Kraft paper rolls and Folding Boxboard and Barrier Board rolls

	PM1	BM2
Diameter	700-1 500 mm	700-2 100 mm
Width	500-3 500 mm	500-2 700 mm
Weight Max.	7 000 kg	
Packing capacity	80 rolls/hour > Recent project in 2019 was the capacity upgrade to 95 rolls/hour	

The year was 2012, when the idea for a disposable cup with a plastic-free liner was conceived. The growing concerns regarding sustainability and the environmental impact of microplastics in existing cups were a driver behind this innovation. "At that time, and to some degree still today, people don't realize that even the cardboard cups we drink our takeaway coffees out of contain impermeable plastic liners that ensure their integrity in use," Markku Hämäläinen explains. "We understood that a plastic-free cup was possible to produce in a grand scale with a water-based dispersion coating, but we had to prove it to ensure the needed investment to go ahead and set up production."

The commercial product was finally ready for market and launched in April of 2019.

Sustainable development
After lots of testing, a solid proof of concept, numerous pilot runs and the backing of brave Finnish investors, the existing site with a decommissioned paper machine in Kotka, Finland was found. The site became the perfect new home for Kotkamills. The very first cup made of Kotkamills cupstock saw the light of day in late 2016, and the commercial product was ready for market and launched in May of 2018. The product is unique, as it can be disposed of and recycled with any regular paper waste such as office paper, requiring no additional recycling processes at a processing plant to separate the polyethylene (PE) coating materials typically found in other disposable coffee cups.

"When we started developing this unique product, the discussion around sustainability and single-use plastics in particular was nothing like it is today. As an avid sailor in my free time, I see the amount of plastic containers and other rubbish washing up on our beaches and shorelines, and I'm glad that as a society we are finally taking these environmental concerns seriously," Hämäläinen points out. The demand for these types of greener products is increasingly coming from more environmentally conscious consumers. Many big players are showing interest in these products, and the material being produced at Kotkamills is currently being tested by numerous potential partners. "For these larger partners, the testing phase for such products is obviously long… Easily in excess of 6 months," Hämäläinen explains. "But we are looking forward to announcing a number of significant partnerships during the course of this year."

Commercial success
The first of these announcements was made just recently, with Lavazza Professional, the Italian coffee company going public with their KLIX Eco Cup™, a special Kotkamills' eco-friendly cup made from the ISLA® food service board. The cups will find their way around Europe, becoming available in all of the company's KLIX® in-cup vending machines from February onwards. "We are pleased about the collaboration with Lavazza Professional. The company is a frontrunner in bringing eco-friendly solutions to the beverage vending sector, and they are ambitiously striving to implement a model of sustainability that responds to the challenge of reducing plastic in the next couple of years. This kind of collaboration partner is ideal for us," the Kotkamills CEO exclaims in a recent press release.

"Our product also works especially well in places and situations where beverages are regularly consumed out of disposable cups. This means sports venues, concerts, festivals and the like," Hämäläinen explains. The cup not only performs well with hot beverages such as coffee and tea, but it is also highly suitable for serving cold beverages from soda to mild alcoholic beverages such as beer and wine. During January 2020 Norwich City Football Club, which plays in the English Premier League, announced that they will replace single-use plastic cups with the eco-friendlier alternatives starting next season. "It is great to have partners who are moving towards a more sustainable era by using recyclable fibre-based products instead of single-use plastics," Hämäläinen notes.

Markku Hämäläinen also points out that this unique plastic-free innovation is not limited to being a raw material for coffee cups. As the environmental conversation often turns to plastic straws in the ocean, Mr. Hämäläinen is quick to point out that there is already a company in Finland converting their material into fibre-based straws. Kotkamills is also in the early stages of exploring the production of lids for their cups. "There are many viable end uses where our materials are already being used today, such as containers for frozen foods and ice cream."

The demand for greener products is coming from more environmentally conscious consumers.

Bright future
The future in Kotka, Finland is looking bright for sustainable and ecological board products. Markku Hämäläinen is already looking forward to the day when the largest board machine of its kind, with an annual production capacity of around 400,000 tons will not be able to meet global demand. "In Europe alone, the market is already sized at more than 300,000 tons, but on a global scale demand is already about 2-3 million tons a year." With ongoing testing and deliveries to destinations as far as Australia and South America, Kotkamills is looking beyond the horizon. "It is only a matter of time before we will need to start looking at setting up a second production unit. When and where this will be, is still open, but we are actively preparing for future growth and expansion," Hämäläinen explains.

"We arrived at the party early. I think most of the forest industry was caught off-guard when it came to the explosion in demand for plastic-free barrier board." Stemming from his personal experience, Markku Hämäläinen anticipates that opening a second production line will become prevalent before most of the competition have time to thoroughly develop and test their products and bring them to market. He does however welcome the competition, as it will only serve to help rid the world of PE-coated board products for good.

Skills and technology
Markku Hämäläinen has been a recognizable face and voice for the development of plastic-free barrier board, but he reminds us that the achievements of Kotkamills are in no way his alone. He thanks the many people that have been a part of the journey so far. Especially the team at the mill for their dedication to creating something that has never been done before. And just like the materials being produced at the mill are state-of-the-art, so too are the machines and technologies being used. These high-tech solutions also include the automated packaging lines delivered by Pesmel, that our on-site staff have worked hard on to get them working to the exact requirements of the overall mill process. Pesmel is proud to be able to do their small part in supporting Kotkamills in the significant work they are doing.

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Material flow by Pesmel:

1.3 million tonnes

of pulp per year

In depth: TransBale

Dramatic improvements in the pulp logistics chain

TransBale is Pesmel's new intermediate storage and distribution solution for large scale pulp logistics. This automated system dramatically cuts the loading time needed for trucks and trains, enabling shorter delivery times and better use of your transport resources. We developed TransBale specifically to handle very large volumes of pulp bales, and it has already proven itself at Metsä Group's Äänekoski bioproduct mill, the largest wood processing plant in the Northern hemisphere. In addition, we are further developing TransBale for use in harbors, so that both ends of the pulp logistics chain can benefits from improvements in efficiency.

Operational in Äänekoski – successful from the start

Metsä Group's bioproduct mill in Äänekoski is the biggest wood processing plant in the Northern Hemisphere and the largest investment in the history of the Finnish forest industry, and a significant facility in terms of the bioeconomy. It is capable of producing 1.3 million tonnes of wood pulp a year, with five product types and over 20 different quality criteria. From here, trains carry 800,000 tonnes to the port in Helsinki. Another 100,000 tonnes is used by the mill locally, and about 400,000 tonnes are delivered by truck to domestic customers. Metsä Group made the decision that these kinds of product volumes meant that more traditional handling and storing methods simply were not sufficient for their state-of-the-art facility. Because they had already had good experience with our TransRoll system for paper rolls, they knew that Pesmel had the expertise and capacity to deliver on the scale required. As a result, they chose our TransBale solution to handle their pulp bale logistics. We developed the solution in close cooperation with Metsä Group to ensure that it met their precise requirements.

Fully automated pulp loading

There are many logistics operations in pulp mills, which offer opportunities for improvement, including sorting, storage and retrieval, loading and the actual transportation from one location to another. With TransBale, Pesmel now offers a solution, which can enhance the efficiency of all these operations at your pulp mill.

At Äänekoski, the TransBale system serves as intermediate buffer storage, an integral part of a pulp distribution system between the mill's production units and the loading facility. It has sufficient capacity to store 25,000 tonnes of pulp – the equivalent of five days' production. The TransBale system can cope with first-in, first-out loading, and it can do sorting as well. It also features a number of sophisticated tracking and optimization functions.

The TransBale system was up and running only in 18 months.

The TransBale system will enable loading trains of 1,400 ton capacity fully automatically in only three hours. For trucks, the loading time is 18 minutes and the loading is carried out by the driver with no need for mill operators to assist. At the loading bay, the driver registers his truck as ready, and TransBale brings the correct bales to the bay. There is no need for mill staff to spend time hunting down the right bales for the consignment, and the risk of human error has been eliminated from the process.

The TransBale system was up and running only 18 months after the contract was signed. According to Metsä Group, the Pesemel TransBale system has met all their requirements and more.

The benefits of TransBale

Speeding up the transportation phase for large-scale industrial applications is both difficult and expensive. For example, if a mill with a million tonne capacity ships 2/3 of their pulp by train and 1/3 by truck, then increasing the transport capacity would be hugely expensive. Each new train unit would cost approximately €10 million, and upgrading the capacity of the train track could easily run into hundreds of millions of euros.

Even an investment as large as this would only have a limited effect: The actual transportation phase is responsible for less than half of the time in the logistics process. The majority of the time is spent in loading and unloading train cars and trucks.

This is where TransBale makes a big difference. The solution focuses on the link in the logistics chain that will have the greatest impact. TransBale enables great reductions in train loading and unloading times, and the round trip from mill to harbor and back can be cut from four days to less than two, for example.

Minimizing truck turnaround-time

For trucks, the equation for improving transport capacity is simpler – Get more trucks. But the bottleneck is still the loading and unloading times, and getting more trucks does not help there, either. In traditional pulp mills, large areas have to be set aside for trucks to sit and wait to be loaded, and the waiting times can be very long. With a distribution center operated by TransBale, the waiting times are much shorter and the drivers are able to take care of all the loading by themselves. When the bales arrive at the loading bay, the driver loads the truck themselves with a forklift truck. TransBale's ability to bring the right bales to the right bay in very little time means that the entire loading process takes under 20 minutes, from the time the driver registers at the bay.

Using a smart system like TransBale, for automated infeed, storage and retrieval, as well as the loading and unloading operations, you can greatly increase the efficiency of your entire system. Trucks spend less time waiting and so they can deliver your products quicker, and trains are more effectively and efficiently utilized. TransBale is also a great deal more economical to implement, with the investment being marginal compared to investments in infrastructure.

TransBale is fully automated so truck drivers can take care of loading safely and efficiently by themselves.

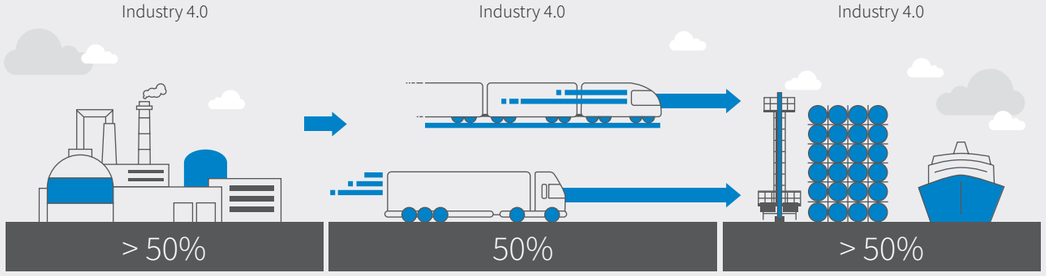
TransBale in a nutshell

TransBale is a markedly different logistics system from what is traditionally implemented in pulp mills, so it takes a certain amount of boldness to move forward with the investment. But TransBale's ability to generate significant savings in loading, unloading and waiting times at both ends of the logistics pipeline is what makes it unique. With time savings of over 50% at either end, investing in TransBale has a greater impact than considerably more expensive investments in boosting transport capacity.

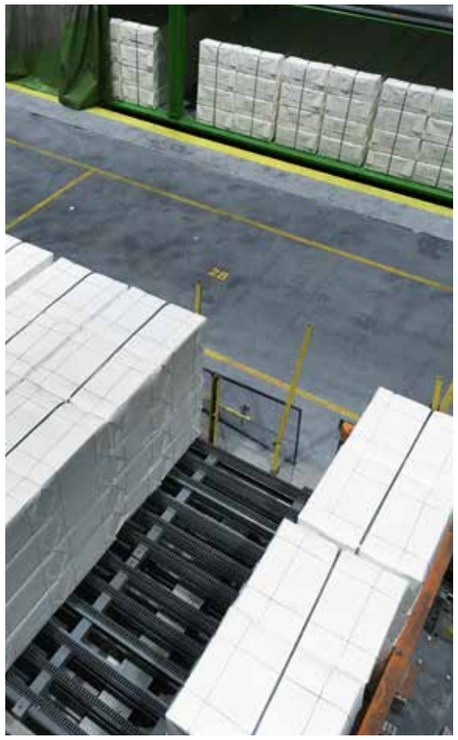
Ideal for pulp bales

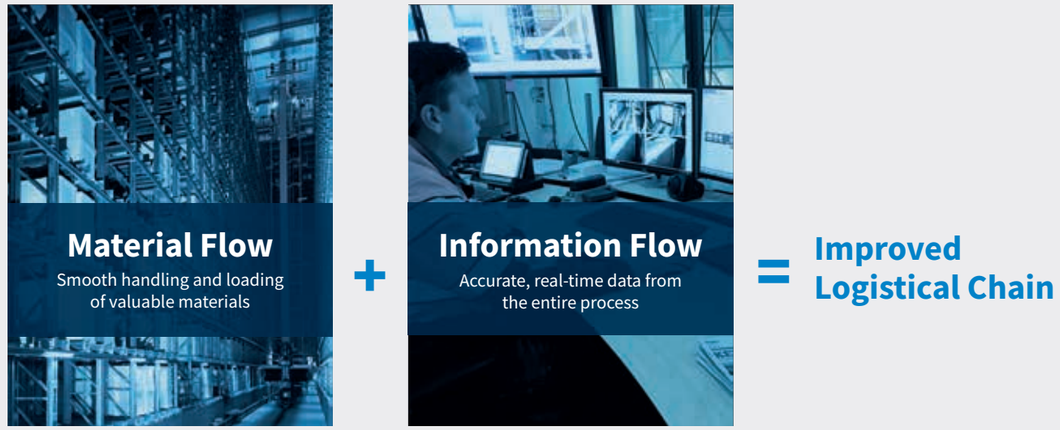
Pesmel's engineers developed TransBale specifically to handle the variable dimensions of pulp bales. Bales can vary in shape and size due to a variety of production factors, such as the level of moisture in the pulp. Because TransBale handles the pulp bales from the bottom, differently sized and shaped loads are not a problem. An additional benefit is the way that TransBale stores bales. In a traditional pulp storage facility, the bales are stacked on top each other, and with forklift handling, the maximum height of a stack of pulp bales is four or five units. However, the TransBale system utilizes stacker cranes to store the bales on racks, rather than stacking them on top of each other. This allows a huge increase in the potential storage density, as TransBale allows storage racks that are up to 15 units high. TransBale's stacker cranes are highly efficient, very fast, and completely automated. One stacker crane has the same throughput as four or five forklift trucks, and it does not require an operator.

TransBale improves efficiency at key points in the logistics chain



TransBale reduces loading and unloading times by over 50%.





Install TransBale without downtime
TransBale is also suitable as an option for upgrades to existing, high-capacity pulp mills. Pesmel has gained valuable experience from implementing TransBale's sister system, TransRoll, in existing paper mills without interrupting operations. Pesmel works together with the mill employees to identify the space available for the system. Even in busy mill environments, with limited available storage footprints, Pesmel's experts have been able to implement these kinds of upgrades while the mill is operating with only minor disruptions and no expensive downtime.

Our vision is to integrate TransBale into intelligent digital systems all the way through the logistics chain.

What does the future hold?
TransBale heralds a bold new future for the entire production and logistics chain in the pulp process with an offering that is unique in its flexibility, simplicity and utility at both ends of the logistical pipeline. The company is determined to remain at the forefront of technological advancements in the field, taking full advantage of every benefit that emerging technologies are bringing – and will continue to bring – to the efficiency and reliability of logistics operations. Pesmel's experts are devoting significant resources to exploring the possibilities of better utilizing big data and machine learning to push the logistics chain to a more advanced level.

Our vision for the future of TransBale is ambitious: We see it as a system that can be tightly integrated into the entire logistics process, taking advantage of Industry 4.0 technologies to communicate intelligently with business management systems at pulp mills, as well as with the logistical systems in harbors. It could take full advantage of innovations such as real-time tracking with GPS and RFID tags. This means the exact location of every single unit of pulp can be known at all times. Every unit and shipment can be tracked, and the information can be passed to systems downstream in the logistical flow at exactly the time it is needed. This will also lead to more efficient routing and utilization of transport vehicles.

Fully automated harbor operations
Following the success of TransBale at the pulp mill end of the logistical pipeline, we realized that the same kinds of enhancements and improvements could be made at the other end of the chain – at the harbor. "If the material flows are in order when they leave the mill, then it's easier to guide and control the whole chain, all the way to the port operations," says Kaj Fahllund, Pesmel's VP for Pulp & Paper. Pesmel's experts have been hard at work, developing ways to integrate TransBale with harbor systems. They believe that TransBale provides lots of possibilities to reduce the loading times for ships in the same way as it does for trains. This will result in operational savings for the port operator through automation of what have been traditionally very labor-intensive operations.

Save days of docking time
At harbors, TransBale brings the same benefits as it does at pulp mills. It can automate unloading and storage in an intermediate buffer facility, even when the amount of available space is limited. It can also transport pulp units from the storage facility and load them onto the ship – all automatically. This can save harbors huge amounts of time and money.

For example, the larger cargo ships often spend up to a week tied up in port, being loaded with shipments of pulp. But with TransBale automating the sorting, storage and retrieval process, as well as the loading process, the time spent at the quay can be cut by half – potentially saving the ship operator days in time and tens of thousands of euros or dollars per day. These are the kinds of savings that Pesmel's TransBale solution can bring to harbor operations.

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New Faces –
Recent developments in Pesmel's customer interface operations

Stan Merrill has joined Pesmel LCC in the USA as Senior Technical Advisor. Stan has 45 year experience in the pulp and paper industry in various key positions, most recently in system studies, new system configuration and specification, development of corporate standards, installation and startup support, new machine design and specification and vendor evaluation within the International Paper Company.

Stan can be reached at
stand.merrill@pesmel.com / +1 513 444 9316

Robert Clayhills of Nipman, an international sales and marketing group, has taken over as Pesmel's sales representative in Sweden, Norway and Denmark. Robert has over 40 years' experience in the branches of pulp & paper as well as metals where he has a solid track record of customer solicitation with leading customer groups.

Robert can be reached at
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Welcome on board Stan and Robert!

Support across the entire lifecycle

Maintenance
Regular maintenance guarantees high availability and extends the lifetime of the system. Preventive maintenance minimizes unexpected repairs and helps to keep total investment and operational costs in balance.

HelpDesk
Our HelpDesk service is there for our customers 24/7 ensuring reliable performance of the process and equipment. When you need assistance, our specialist will help you over the phone or establish remote access to your control system for immediate troubleshooting.

Spare parts
We provide comprehensive spare part services for material handling systems. Spare and wear part recommendations are made for every delivery project. Pesmel's spare part services guarantee the latest, best quality spare parts available.

Upgrades
Frequent upgrades help extend the lifetime and improve the profitability of your original investment. Our R&D regularly generates new innovations and cost-effective upgrade packages for improving e.g. system throughput and capacity, operational safety or the performance of the control system software.

FlowCare
FlowCare is a remote supervisory and preventive maintenance solution for production facilities. The custom-built solution monitors the performance of all Pesmel equipment. Important data is visualized in a web portal that can be easily viewed on a computer or any personal mobile device.

Service

Maintaining modernity

Pesmel's dedicated service personnel are putting their expertise to work to ensure the smooth storage and handling operations at Metsä Group's flagship mill in Äänekoski, Finland. The mill is widely known as the world's most modern bioproduct mill.

Juha Jokelainen
Reliability Designer
Botnia Mill Services

Metsä Group's Äänekoski bioproduct mill has now been up and running since August 2017. As a part of the vast building project, Pesmel delivered the unique automated high bay storage solution for the new mill. Like everything else at the mill, the storage and logistics solutions are at the cutting edge of modern technology.

Service requires understanding

"When it comes to new state-of-the-art technologies, it is the only logical choice to order services from those who best understand it," explains **Juha Jokelainen,** Reliability Designer, Botnia Mill Services, who is in charge of maintenance services at the mill. He has been pleased with the dedication and expertise with which the on-site service staff from Pesmel have handled their work. "Just like with anything brand new, issues and challenges are bound to come up early on. I have been impressed with how quickly and efficiently the guys have tackled and resolved any issues."

Pesmel has had two people permanently on-site to ensure service availability from the very beginning. They have been on call ensuring the performance of the unique high bay storage solution from the startup of the mill. Even though the solution has mainly performed well, their presence has been crucial during the early days. The service agreement in place covers the two automated lifts as well as all related software support and updates.

Ensuring efficient performance

At full capacity the high bay storage facility can hold around 5-6 days' worth of production, which means between 20 and 30 thousand tonnes of pulp. Keeping stock moving efficiently and reliably is absolutely critical. Any given day up to 44 train carriages full of pulp may leave the mill for international shipping out of Vuosaari Port in Helsinki, Finland. The reliable performance of this logistics chain is a prerequisite for business success.

Thanks to the efficient services provided by Pesmel, there have been no major stand-stills or delays. The well-thought-out service plan ensures that while one lift is being serviced, the other one is fully operational and able to handle the throughflow of pulp. Downtimes for each lift are kept short due to smart on-site stock management for important spares.

Partnership based on trust

Being able to rely on the technology, hardware and the people behind it is an important factor when selecting partners. The Pesmel solution is helping reduce the risks related to human errors. Reducing forklift traffic not only reduces the potential for accidents, but the automated high bay facility allows for a more compact footprint with product being stored upwards. The solution also treats the valuable products with real care and accuracy as absolutely no damage to bales during storage have been reported to date.

"We appreciate Pesmel's open and active approach to service and maintenance."

When asked about how Juha Jokelainen felt about the cooperation with Pesmel so far, he simply stated, "We have been very pleased with the service we are getting. So much so, that we are looking to expand the scope of the service agreement during 2020. We appreciate their open and active approach, and also look forward to new innovations and developments from them in the future."

Juha Jokelainen sums up the discussion by pointing out that "this has been a once in a lifetime opportunity for everyone involved. We have all been a part of creating something unique and building the future of what was once considered a very traditional industry." Pesmel is proud to be playing an on-going part in the equation that forms the world's most modern bioproduct mill.

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Engineering –
The magic behind a successful solution

An automated packaging, warehousing and logistics solution that addresses all of a customer's challenges is not just a collection of components and devices. It takes dedication and engineering expertise to design and deliver something that intuitively works to bring added value to a mill's daily operations.

"Every new solution starts with the needs of the customer."

Culture of innovation

Pesmel is a solution provider that is native to the pulp & paper industry. Our extensive engineering knowhow is a factor that sets us apart from many of our competitors. Our history of innovative solutions for pulp & paper stems back to the early 1980's, when we delivered our first patented packaging lines for paper rolls. Today, we hold some 30 patents, adding new ones to our portfolio every year. A passion for solving our customers' modern material flow challenges is embedded deeply in our DNA. An appreciation for creative curiosity and solid engineering are a key part of our corporate culture.

"An appreciation for creative curiosity and solid engineering are a key part of our corporate culture."

While the mechanical, electrical and automation side has long been at the core of what we do, the past ten or so years have brought the IT component to the forefront of engineering and design. To ensure that we can deliver a seamless solution, we have ensured that we have the in-house expertise and knowhow across every aspect of designing a custom solution. As a partner, we take on the full project and the responsibility without needing to outsource engineering work to any third parties. This is the only way we can truly guarantee the quality and interoperability of your entire warehouse management system (WMS), including seamless integration with external ERP platforms and third party devices.

Tailor-made solutions

Designing a fully custom solution based on the needs of a customer is a major undertaking. The work starts long before any contract is signed, outlining the needs of the customer, and what it takes to fulfill their requirements. Often, to help our customers realize the full range of opportunities we can bring to the table in comparison to more traditional solutions, we choose to challenge them. The real nuts-and-bolts engineering only begins once the tailor-made concept has been defined and common targets have been set. Every new solution starts with the needs of the customer. We always strive for availability, efficiency and reliability.

Each new Material Flow How® solution is tailor-made. The concept is based on proven, standardized and modular elements, with the warehouse management system (WMS) at its core. With the full integration of IT into the Pesmel solution, we ensure that it is seamless, customizable and easy to use for the customer. A well-designed solution with complete coverage will not only save you time and money over its lifecycle, it will also give you the kind of peace-of-mind that will help you sleep at night, knowing that storage and handling will not cause expensive bottlenecks or run a risk of resulting in unplanned shutdowns or extended downtime for your entire mill.

Lifecycle approach

Engineering isn't something that ends with a delivered solution. A successful concept must take into consideration future needs, and enable the development, updating and expansion of the solution over the mill's lifecycle. Also, easy serviceability must be a factor in the design process. This is why our service department is always a fixed part of the engineering team. Our engineering team also always takes part in the assembly and startup phases on-site, to ensure smooth commissioning.

"We make sure that both your valuable materials as well as your important process data always flow freely, without interruptions."

The 3D simulations we offer, play an important role in updating and changing up your solution down the road. We create and maintain a digital twin of your entire solution, that can be used to model, simulate and test new developments in a safe environment before implementation. Safety and flexibility over time are both important things to consider when defining a comprehensive solution you want to last the entire lifetime of your mill. We make sure that both your valuable materials as well as your important process data always flow freely, without interruptions.

It takes a team

As was mentioned earlier, Pesmel has assembled a strong in-house team of engineers that cover everything from mechanical and electric engineering to automation and advanced IT platform programming. We build a dedicated team for each project, including the right specialists from our more than 80 project engineers. Each cross-competence team always includes members from our R&D department, product management and services. We want to ensure that all the bases are always covered, and that when you have a question, we always have the right person to give you an answer based on expert understanding and knowhow.

Nurturing future talent

Pesmel takes a systematic approach to finding the best engineers and nurturing young talent early on. Through long-term cooperation with local schools and universities, we have been able to secure a steady stream of high-quality, motivated engineering talents to our ranks. We offer internships and opportunities to work on dissertation projects at Pesmel.

We not only want to attract the right engineers, we want to keep them at Pesmel and give them the chance to grow and develop with the company. The effects of this approach can be seen in the many young guns that have already accumulated extensive experience and can be considered experts in their field. Just as we challenge our customers to strive towards new heights in packing, storage and logistics, we challenge our engineers to aim high. This is the only way we can continue to develop our solutions to serve our customers in the growing and evolving pulp & paper industry and push the boundaries of what is possible in our field.

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Contact us

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

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Customer reported results from Material Flow How® vs. traditional solutions:

15%
increase in sales due to shorter delivery times

7 day
reduction in invoicing times with integrated software

30%
savings in packing materials

>65%
space savings compared to traditional storage

0
lost orders, shipment/ handling errors

Up to 10%
increase in mill efficiency

pesmel.com
Visit our website to find out more about Pesmel's unique Material Flow How® concept for the pulp & paper industry, and the technologies and processes behind it.

PESMEL

The Material Flow How® company