

Purpose-driven automation powers Mondi Štětí's new kraft paper production line

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INTRODUCTION:

As global demand for sustainable packaging solutions continues to rise, manufacturers are investing heavily in advanced production technologies capable of delivering both higher output and greater operational efficiency. At Mondi's Štětí mill in the Czech Republic, a major new investment in kraft paper production is demonstrating how intelligent automation and material handling systems are becoming essential to the future of paper manufacturing.

At the heart of the project is a customized automated sorting and buffering solution supplied by Pesmel, integrated into Mondi's new 210,000-metric-ton-per-year kraft paper production line. Designed to support the growing market for paper-based flexible packaging, the facility combines high production capacity with advanced logistics automation to optimize material flow from production through to dispatch.

Building for the Future of Sustainable Packaging

The new PM10 production line officially began operations in December 2024 and represents one of Mondi's most significant recent investments in kraft paper production. The project supports the company's strategy to expand its portfolio of sustainable packaging materials as industries increasingly shift away from plastic-based alternatives.

Demand for paper-based flexible packaging has accelerated across multiple sectors, including e-commerce, food and beverage, industrial packaging, and consumer goods. This shift has created pressure on manufacturers to not only increase production volumes, but also improve operational efficiency, reduce waste, and maintain consistent product quality.

To achieve these goals, Mondi partnered with Pesmel to implement a highly automated material handling and warehouse solution capable of managing the mill's demanding production requirements.

A Warehouse Designed for Organization, Not Storage

"Every warehouse has its own purpose. In the case of Mondi Štětí, it is not designed for storage, but for organization," explains Jani Matikainen, Sales Manager at Pesmel.

Rather than functioning as a traditional long-term storage facility, the automated roll warehouse (ARW) acts as a high-speed sorting and buffering system that ensures smooth product flow throughout the operation. The system supplied by Pesmel includes a 3,000-metric-ton-capacity warehouse specifically designed to handle sack kraft paper rolls efficiently within a relatively limited footprint.

Incoming rolls are first directed through dedicated pre-sorting channels where they are organized according to product specifications and dispatch requirements. From there, automated stacker cranes collect the rolls and transfer them into deep-lane storage channels.

Image 1: Mondi's Štětí mill in the Czech Republic.



This two-stage material flow architecture offers several operational advantages. It allows for continuous production flow, minimizes bottlenecks, and provides full redundancy and re-routing capabilities in the event of maintenance or temporary disruptions.

“Daily production is approximately 600 tons, meaning the warehouse handles around five days’ worth of storage,” says Matikainen. “Compared to some facilities we have worked on, this creates a relatively fast turnover rate. Managing that level of product movement manually would be extremely difficult, especially within such a compact area.”

Maximizing Capacity Within a Limited Footprint

One of the project’s major engineering challenges involved achieving high storage density while operating within the physical limitations of the site.

To address this, Pesmel designed a 32-meter-high deep-lane rack warehouse operated by two automated stacker cranes. The system maximizes vertical storage capacity while maintaining rapid roll handling speeds necessary for the mill’s high production throughput.

The warehouse continuously processes rolls with varying grades, dimensions, and customer specifications. Because products are manufactured in constantly changing sequences, the automated system must intelligently organize inventory SKUs in real time.

Rolls enter the warehouse in random order and are automatically sorted, stored, and retrieved based on production schedules and shipping priorities. This dynamic inventory management capability ensures that dispatch operations remain smooth and responsive even during peak production periods.

Automation Improves Product Protection

Beyond efficiency gains, the automated handling system also significantly reduces the risk of product damage.

Traditional roll handling methods often require multiple clamping operations during transportation and storage, increasing the likelihood of edge damage or deformation. Pesmel’s system minimizes handling by allowing rolls to be clamped only once during final loading onto transport vehicles.

“Traditional clamping can damage the products,” Matikainen explains. “In this system, the rolls only need to be clamped once as they are loaded for transport. This essentially eliminates broke from the equation.”

Reducing product waste not only lowers operational costs, but also supports broader sustainability goals by minimizing material losses throughout the supply chain.

Flexible Dispatch for Modern Logistics Demands

Once dispatch orders are received, rolls are automatically retrieved from storage and transferred to the loading area through two dedicated outfeed lines. The dispatch system has been designed to accommodate both truck and rail transportation simultaneously, providing Mondi with greater logistical flexibility.

This capability is increasingly important as manufacturers seek to optimize transportation efficiency, reduce emissions, and respond more rapidly to changing customer demands.

The integration of automated dispatch functions also reduces dependency on manual forklift operations, improving workplace safety while increasing loading accuracy and consistency.

Image 2: Pesmel designed a 32-meter-high deep-lane rack warehouse operated by two automated stacker cranes.





Image 3: Pesmel designed Material Flow How® concept focuses on adapting storage, sorting, and handling solutions to meet specific production environments.

Digital Control Through Advanced Warehouse Management

Coordinating such a complex material flow operation requires sophisticated digital oversight. Pesmel's proprietary Warehouse Management System (WMS) acts as the operational brain of the entire installation.

The WMS controls warehouse movement, pre-sorting functions, inventory positioning, dispatch sequencing, product identification, and full traceability throughout the process. By continuously monitoring inventory and production flow in real time, the system helps optimize throughput while minimizing delays and handling errors.

Advanced traceability functions also provide valuable operational data that can be used for quality assurance, production analysis, and long-term process optimization.

From Skepticism to Confidence

For Mondi, adopting this type of highly automated rack storage solution initially represented a significant departure from more traditional approaches.

"This kind of rack storage solution was a new idea for us, and we were a bit skeptical at first," admits Helmut Riesenberger, Senior Project Manager at Mondi. "But the advantages it offered compared to alternative solutions were overwhelming. We quickly realized it would be an excellent fit for our needs."

A visit to Saica's mill in El Burgo de Ebro, Spain, where a similar system was already operating successfully, ultimately helped reinforce confidence in the project.

"I have had a long relationship with Saica, and when they gave us such a strong recommendation, we were convinced," Riesenberger says.

Customization as a Competitive Advantage

For Pesmel, the Mondi Štětí project highlights the importance of tailoring material flow systems to the unique operational requirements of each facility.

The company's Material Flow How® concept focuses on adapting storage, sorting, and handling solutions to meet specific production environments rather than relying on standardized systems.

"Adapting and customizing Pesmel's Material Flow How® concept is a major advantage," Matikainen concludes. "It enables us to efficiently meet the individual needs of our customers while improving both operational performance and long-term reliability."

As the paper and packaging industries continue evolving toward higher automation, greater sustainability, and more intelligent logistics systems, projects like Mondi Štětí offer a glimpse into the future of modern paper manufacturing — where production efficiency and smart material flow go hand in hand.

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