Connecting the pulp and paper industry: KPNB's role in enhancing efficiency, sustainability, and digital transformation

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INTRODUCTION:

In the dynamic landscape of the pulp and paper industry, the quest for efficiency, sustainability, and digital transformation has become highly important. KPNB serves as match-maker that connects specialised suppliers with paper mills, cardboard factories, pulp mills, and since 2025 also paper converting industries. KPNB facilitates partnerships that not only optimise production processes but also pave the way for a more sustainable and digitally advanced industry.

1. Technological Trends in the Pulp and Paper Industry

The pulp and paper industry is undergoing a major transformation driven by technological innovation. New developments in automation, artificial intelligence (AI), data analytics, and Industry 4.0 are enabling more efficient production, cost reduction, and improved environmental performance. In the KPNB-Net-Work you find some of the best specialised suppliers for the pulp and paper industry that deliver state-of-the art technology and set some of the most important technological trends - revolutionising the sector. We want to highlight some of these KPNB partners here.

2. Artificial Intelligence (AI) and Machine Learning

The use of AI allows for the optimisation of production processes. Algorithms analyse large amounts of data in real time to identify bottlenecks, enable predictive maintenance, and reduce quality fluctuations. Predictive maintenance helps avoid unplanned downtime and reduces maintenance costs.

Regarding predictive maintenance KPNB is in cooperation with the Freiburg-based company Endiio. Their expertise focusses on the Internet of Things (IoT) and Sensors.

Sensors and connected devices provide precise data on the production process, from raw material processing to final packaging. IoT technologies create transparency across the entire manufacturing process, helping to reduce costs and minimise waste.

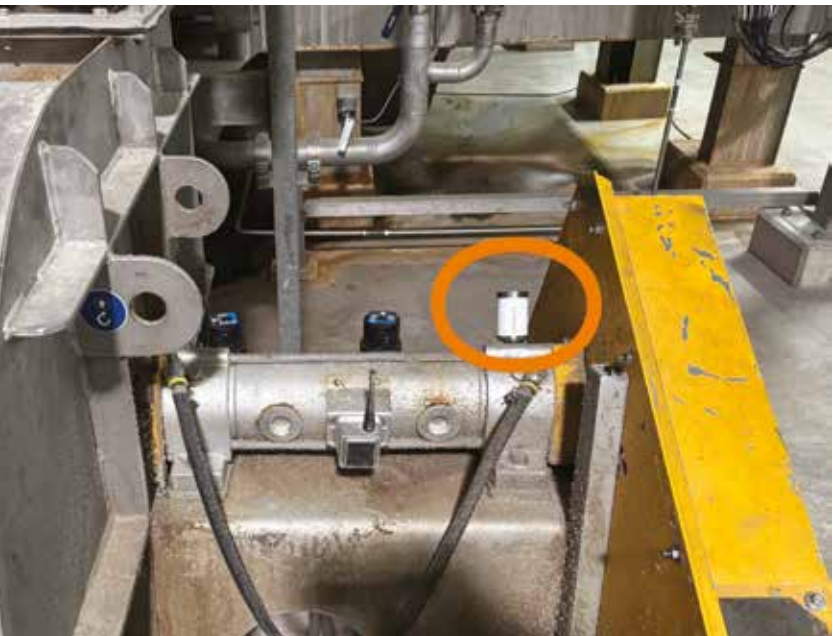


Figure 1: The KPNB Network.

A compelling example of innovative IoT solutions is Endiio's ultra-low-power, real-time wireless technology specifically designed for industrial applications. This technology enables wireless sensor networking at minimal operational cost over decades.

One of Endiio's standout features is its patented *Wake-Up-on-Demand* functionality. Sensors remain in energy-saving deep-sleep mode and activate only when needed to transmit real-time data. This leads to a power consumption up to 10,000 times lower than conventional wireless technologies such as Bluetooth Low Energy or Wi-Fi.

The robustness and reliability of Endiio's wireless sensors have already been proven in the paper industry, i.e. in high temperature applications like dry section of a paper mill. At KÄMMERER Spezialpapiere GmbH, for instance, Endiio helped detect bearing damage on a guide roll at an early stage, avoiding costly downtime. Thanks to Endiio's unique energy harvesting technology, battery or sensors replacements are no longer necessary, leading to further cost savings in the total cost of ownership.

Figure 2: Endiio V2 Sensor installed at a ventilator's bearing.

By integrating such IoT technologies, companies cannot only optimise production but also implement predictive maintenance strategies that increase long-term efficiency and reduce costs. One illustrative case is the collaboration between Endiio and Munksjö Dettingen. Endiio developed a vibration monitoring IoT sensor platform specifically for predictive maintenance in the paper industry. Wireless, energy-autonomous sensors were installed at various production points, particularly to monitor press and guide rolls.

The benefits for Munksjö Dettingen were substantial:

- **Early fault detection:** Sensors identify anomalies and vibrations early, preventing unplanned downtime.
- **Reduced maintenance effort:** Precise data eliminates the need for routine, assumption-based maintenance.
- **Easy integration:** The system is self-sufficient and does not require direct IT system integration.
- **Lower operational costs:** Early detection of problems like bearing damage or roll fractures significantly reduces repair costs and production losses.

In practice, the system successfully detected a developing bearing defect on a drying felt guide roll and a pin break on a wire guide roll in time, preventing serious production disruptions. These benefits demonstrate how targeted use of IoT and sensors can significantly enhance efficiency and profitability in paper production.

NEW KPNB-PARTNER – Brenpower - Smart Factory 360° for Paper Mills

KPNB has entered into cooperation with Brenpower based in the UK to enter the German speaking market. Brenpower delivers next-generation factory intelligence tailored for paper mills, where energy consumption, steam reliability, and production continuity are mission-critical.

At the core of its offering is online steam trap monitoring powered by batteryless and wireless IoT sensors—uniquely designed for steam-intensive environments like paper production. These maintenance-free sensors instantly detect leaks, eliminate energy waste, and improve operational safety with no wiring, no batteries, and no interruptions to production.

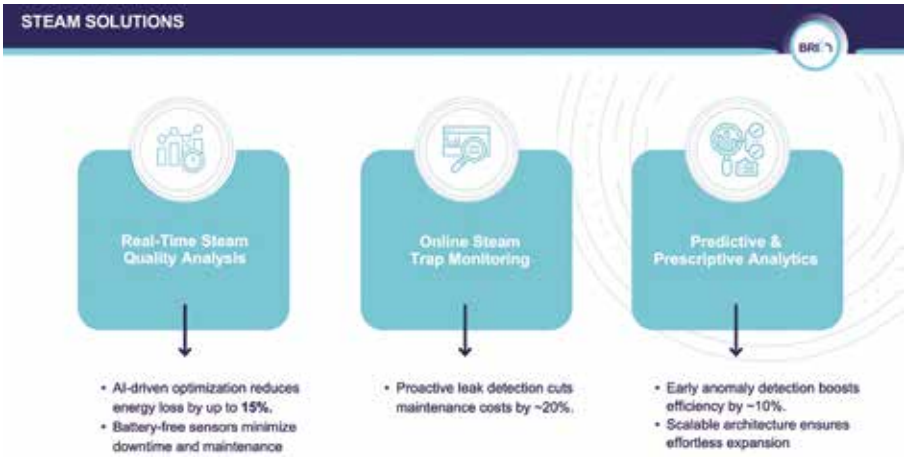


Figure 3: Brenpower Steam Solutions.

But Brenpower goes far beyond steam.

Its Smart Factory 360 platform provides real-time monitoring and AI-driven analysis of all key utilities—steam, compressed air, chilled water, boilers—across the entire plant.

The system collects and compares data across machines, production lines, and departments to:

- Benchmark energy performance
- Calculate utility cost per ton of paper
- Identify anomalies and optimise efficiency
- Enable predictive maintenance before failures occur

In a recent implementation at a major paper mill, Brenpower reduced energy losses by over 20%, stabilized production processes, and enabled full utility transparency—turning consumption data into strategic advantage. The following is the complete case study.

The Magical Transformation of Steam: A Paper Mill's Energy Efficiency Adventure

How one factory turned invisible losses into measurable gains with real-time steam monitoring.

The Challenge: Managing the Unseen

In one of Europe's largest paper mills, steam was everywhere—circulating through miles of insulated pipelines, powering massive drying cylinders, and driving the delicate balance between speed, heat, and quality. Yet, for all its importance, steam remained unseen.

There was no system in place to measure how much steam was produced, where it went, or how efficiently it was used. Steam trap failures went undetected. Fluctuations in steam quality caused inconsistent roll temperatures, leading to defects in paper thickness and texture. Energy bills were rising, but there was no clarity on where the waste was occurring.

For the plant's operations team, this lack of visibility meant constant guesswork. Maintenance was reactive rather than preventive. Efficiency improvements were based on assumptions rather than data. And the plant manager, after decades of experience, summed it up in one sentence during a conversation with our team:

"We produce thousands of tons of paper a month, but we still don't know where our steam goes."

The Solution: Bringing Steam to Light

The turning point came when the factory implemented Brenpower's real-time Steam Trap Monitoring and Steam Quality Monitoring systems. Wireless and batteryless IoT sensors were installed across critical points in the steam network—on traps, headers, and condensate return lines.

These devices began transmitting live data on temperature, vibration, and flow conditions, giving the team immediate visibility into trap performance and steam behaviour. Blockages, leaks, and quality losses that once went unnoticed were now flagged instantly.

KPNB - again as match-maker – connected Endiio and Brenpower and combinations of the two companies software, systems and technology are possible!

For the first time, the plant could:

- Monitor each steam trap individually in real time
- Track steam quality fluctuations affecting heat transfer
- Receive instant alerts for failures or anomalies
- Quantify energy losses down to specific equipment

This wasn't just an upgrade—it was a transformation. Steam, once a mysterious force, became a measurable, manageable asset.

The Impact: From Losses to Leadership

The results were immediate and powerful:

- Steam trap failures were detected 80% faster, reducing unplanned downtime
- Energy consumption dropped by 12%, thanks to quick leak detection and improved condensate return
- Roll temperature stability improved, leading to higher paper quality and fewer rejections
- Operational safety increased, as potential hazards from failed traps were eliminated early
- Customer satisfaction rose, driven by consistent product quality

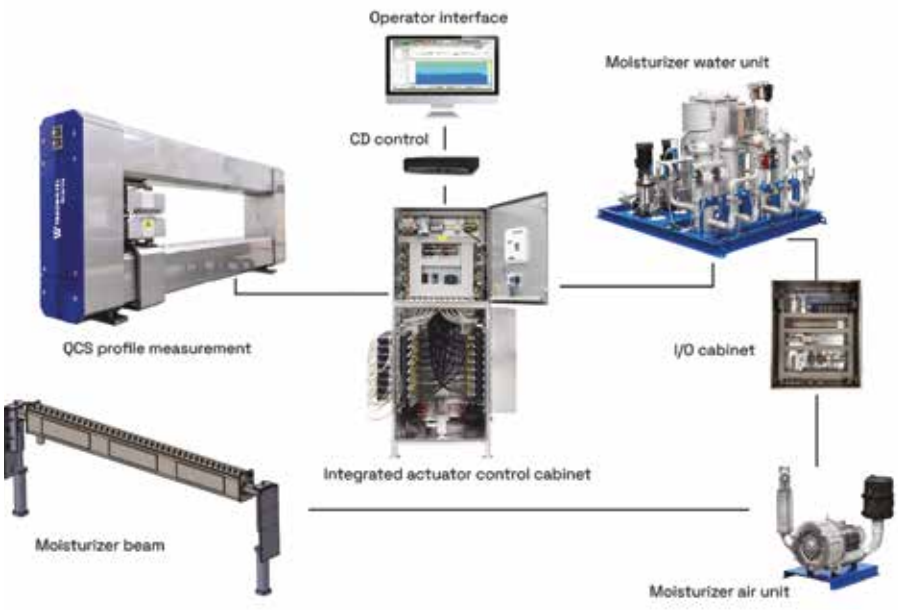
Just as importantly, the plant laid the foundation for future AI-powered diagnostics and predictive maintenance—moving from a reactive model to one of continuous optimization.

KPNB: Bridging the Gap in the Paper Industry

At KPNB, we understand the intricate challenges faced by the pulp and paper sector. Together with our customers we analyse their production processes to identify areas and needs where specialised suppliers can make a significant impact. By fostering these strategic alliances, we enable our clients to save time, resources, money – and to improve:

- Efficiency: Streamlining operations to reduce waste and increase throughput.
- Sustainability: Implementing eco-friendly solutions that minimise environmental impact.
- Digital Transformation: Integrating cutting-edge technologies to modernise processes and data management.

Figure 4: Tasowheel Moisturizer System & Scanner.



KPNB Partners and Projects: Great Improvements for our Customers

The KPNB-Net-Work comprises valuable partners who bring innovative solutions to the global pulp and paper industry. In the following text the focus is put on two innovative and specialised companies from Finland with whom KPNB has been cooperating with for many years.

Tasowheel

Tasowheel is well-known for its advanced Quality Control System (QCS) solutions tailored for the pulp and paper, as well as converting industry. Their expertise lies in turn-key projects AND modernising existing systems to improve product quality and operational efficiency.

Success Story 1: Success through Continuity and Technological Progress

A prime example of Tasowheel's customer-centric approach and technological expertise is its long-standing collaboration with Kyiv Cardboard and Paper Mill (KCPM) in Ukraine. Since the first joint project in 2012—delivering a 9110 scanner for PM2—Tasowheel has continued to support KCPM with multiple systems, including three additional scanners for various machines.

The most recent upgrade, completed in 2024/25, included the delivery of a 1010 model scanner with basis weight and moisture sensors for BM2, as well as a new moisturizer system for BM1. Both units were seamlessly integrated into existing Tasowheel infrastructure. The machines in question cover a wide range of products:

BM1 produces various cardboard grades with a basis weight range of 130–540 g/m² at 115–380 m/min, while BM2 manufactures fluting, test liner, and liner between 60–300 g/m² at speeds of up to 710 m/min. The scanner was commissioned in Q4 2024, followed by the moisturizer start-up in Q1 2025.

KCPM's decision to continue investing in Tasowheel systems highlights their proven performance and cost-efficiency, even under the demanding conditions of board and paper production. Another distinguishing factor is their exceptional ease of use.

Oleksander Glushenko, Head of Automation at KCPM, confirms: "The impact of the new moisturizer system has been very positive. For most grades, the CD moisture profile improved by more than 75%, and in some cases even up to 88%, with 2-sigma values as low as 0.2 to 0.25. We highly value Tasowheel's openness and easy-going communication, along with their reliable control systems, the use of advanced technologies for measurement, processing, and data transmission, low operating costs, and the continuous support from their highly skilled specialists."

This collaboration, now in its 13th year, is based on mutual trust and KCPM's active commitment to implementing cutting-edge technology. The positive operating experience and feedback from KCPM have also served as a benchmark for other Ukrainian board producers in their decision-making regarding quality control and cross-directional (CD) profile management systems.

Success Story 2: Customer-Centric System Upgrade at VPK Paper

A recent project at VPK Paper's Oudegem mill in Belgium showcases Tasowheel's strength in customer-focused retrofit solutions. Following a successful slice profiler upgrade on PM6 in 2020, the customer approached Tasowheel again – this time to modernise the dilution actuator system on PM7.

The challenge: the existing actuators were aging, and spare parts were becoming obsolete. However, VPK requested a staged upgrade to minimise cost peaks and operational disruption. While other suppliers insisted on a full system replacement in one go, Tasowheel offered a unique phased approach.

Thanks to a hybrid setup, old and new actuators can operate simultaneously. Setpoints are synchronised, and the control interface remains unchanged – ensuring ease of operation for plant personnel. Only minor remote support was required for start-up; the customer handled the commissioning largely independently.

Key benefits of this tailored solution:

- Flexible investment planning: A gradual upgrade allows the customer to spread costs over time.
- Targeted component replacement: Faulty actuators can be replaced as needed.
- Minimal downtime risk: Preparatory work and parallel operability reduce shutdown time.
- Improved spare part availability: Ensures long-term maintainability and reliability.

The collaboration reflects a high level of mutual trust and a shared commitment to efficiency. As Reliability Engineer Eric Garcon of VPK noted:

"The system is working smoothly, and thanks to the thorough preparation, we regained control over many actuators that had not functioned properly for months. Excellent cooperation and customer-centric thinking – thank you!"

The project exemplifies Tasowheel's approach to future-proofing existing systems with minimal disruption.

Success Story 3: Tasowheel launches DigiForte: A smarter actuator for slice lip control

With DigiForte, Tasowheel introduces a new digital generation of actuators designed to improve slice lip control and reduce the total cost of ownership. Built on the proven Forte series, DigiForte retains the compact mechanics but adds modern usability, robust design, and digital features that make life easier for operators—especially in installations with high actuator density.

Main Benefits of DigiForte:

- **Digital display instead of dial indicators:** Shows absolute and relative positions; mounted at a 45° angle for easy reading in tight spaces.
- **Magnetic zero-positioning:** Fast and tool-free reference setting using a handheld magnet—no need for disassembly.
- **Durable lightweight housing:** Made from reinforced thermoplastics for high chemical and moisture resistance.
- **User-friendly and cost-effective:** Simplifies installation, servicing, and operation—while lowering system costs.

Designed with future-readiness in mind, DigiForte is set to evolve with IoT capabilities, including Ethernet and NFC connectivity for diagnostics and remote control via smartphone.

Figure 5: Eric Garcon, Reliability Engineer, VPK Oudegem.

Want to dive deeper?

Read more on DigiForte in Tasowheel's own article in this edition. It provides a detailed look at DigiForte's development and features. DigiForte reflects Tasowheel's commitment to offering sustainable, forward-thinking technology: high-quality engineering that solves today's problems while anticipating tomorrow's needs. Find out more at this link: https://www.tasowheel.fi/2025/03/digiforte-a-new-development-in-slice-lip-control-efficiency/.

Success Story 4: Precision Manufacturing for Dilution Water Valves

In CD-profiling systems precision manufacturing makes the difference.

In the paper industry, every micron counts. Tasowheel has exceptional manufacturing equipment to produce excellent parts for their QCS components. In addition, tailor-made solutions are no exceptions. KPNB has recurring business with the specialty paper producer Pfleiderer Teisnach GmbH & Co. KG in Bavaria, Germany mostly requiring tailor-made parts and equipment.

A recent example of Tasowheel tailored expertise:

Pfleiderer Teisnach approached KPNB with a specific requirement:

The heads of the dilution valves in their headbox had worn out over time and needed to be replaced. They were looking for high-quality replacements made from stainless steel, with a focus on long-term durability and precise fit.

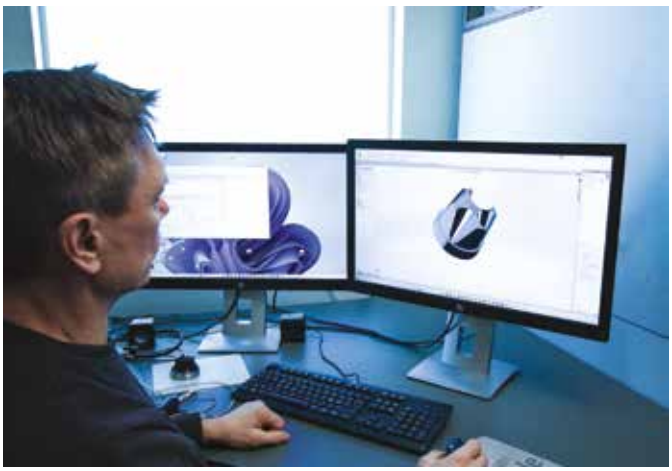


Figure 6: Marko Mäkiluoma, Tasowheel - designing dilution valve.

Tasowheel provided the solution:

1. **3D Scanning & Reverse Engineering:** Even without technical drawings, the original parts were scanned and digitally reconstructed for accurate reproduction.
2. **Material Optimization:** By switching from brass to stainless steel, the new components offered significantly improved durability for continuous operation in demanding environments.
3. **Perfect Fit:** The newly manufactured valve heads met all dimensional and functional requirements, ensuring seamless integration into the existing system.
4. **Fast and Professional Execution:**From the initial request to final delivery, the entire process was carried out efficiently – and the customer was highly satisfied with the outcome.

So much that currently another tailor-made solution is in progress for flow deflectors in the reject chamber of a cleaner plant.

This case highlights Tasowheel's strength in delivering precision-engineered components that match individual customer needs – even in complex retrofit scenarios.

Pixact

Pixact specialises in process monitoring systems that provide real-time data to optimise production processes in the pulp and paper industry. Their solutions contribute to improved product quality and reduced operational costs.

Figure 7: Stock Monitoring Camera Module.

Success Story 1: Innovative security paper production improved with innovative real-time process intelligence

In 2020, the security paper producer Papierfabrik Louisenthal in Königstein – part of Giesecke & Devrient – sought a system to detect dirt particles in their stock preparation.

The initial goal: reduce broke.The technical buyer contacted KPNB: "Our production wants an online system to monitor dirt particles in the stock preparation. Do you know a supplier?"

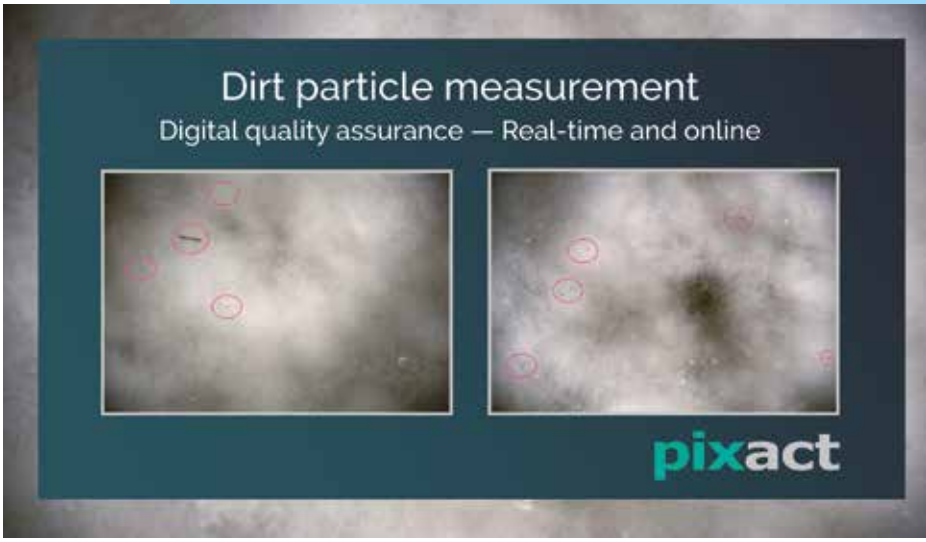


Figure 8: Dirt particle measurement by Pixact.

KPNB identified the ideal partner: Pixact from Tampere – specialists in online process microscopy and real-time image analysis. Their system provides high-resolution insights into particle properties (size, shape, colour) and suspension characteristics (speed, turbidity, homogeneity).

Key features include:

- Live microscope-quality process view
- Real-time data and trends
- DCS integration
- Temperature-monitored camera system

After a successful test during production, the customer installed two Pixact systems. All pre-installation concerns were confirmed positively:

- Lab values could be replicated
- Early-stage PM issues were detected
- Automation and optimization became possible

A few months post-installation, the benefits were clear:

- Reduced broke
- Optimized chemical and energy use
- Improved raw material evaluation
- Fewer claims

ROI was below 6 months! => The system paid itself back within six months!

Success Story 2:

In June 2021, Nicole Buschmeier visited the Sappi Ehingen mill for the first time, introducing the KPNB-Net-Work, including Pixact. The technical manager was highly interested in the monitoring system for dirt particles. In the pulp and paper industry, the purity of the raw material is crucial for product quality and production costs, and Sappi Ehingen was looking for a solution to continuously monitor and optimise its pulp quality.

After analysing samples from the pulp production line in the Pixact lab and analysis report discussion, it was quickly decided to rent a Pixact Stock Monitoring system. The objective was to evaluate the system's worth in controlling the bleaching process. Sappi Ehingen became the first Sappi mill with a test installation from Pixact. The rental convinced the Sappi team, and the purchase order was released to install two cameras permanently.

The Pixact technology is a state-of-the-art, camera-based online measuring system for real-time analysis of dirt particles in the pulp suspension.

Main functions & benefits

- **Precise dirt particle detection:**

o Number, size and type of particles are continuously recorded.

o Individualised classification: e.g. separation of brown and black contaminants.

- **Immediate process adjustment:**

o Conclusions about causes possible → faster reactions.

- **Measurement of the whiteness trend:**

o Saves additional laboratory measurements, increases efficiency.

- **Dashboard:**

o User-friendly visualisation of data for all levels - from plant operator to management.

- Live and retrospective analysis:

o Tests with chemicals can be evaluated live or retrospectively → informed decisions on chemical savings.

Results

- **The system paid itself back in six months!**

o Savings on chemicals & more efficient processes.

o Reduction in manual laboratory & improvement in quality.

- **Automated process control:**

o Development of additional functions in the customer's system.

- **Rapid expansion:**

o The successful pilot project in Ehingen was followed by similar installations in more Sappi mills

Conclusion

- **Pixact sets new standards in pulp production:**

o Early defect detection

o Chemical savings

o Quality improvement

o Fast amortization

Figure 9: Markus Honkanen, Pixact – setting up a Pixact Industrial Installation

The Ehingen location in Germany was the first Sappi mill to work with Pixact. The other Sappi mills in Alfeld, Germany and Gratkorn, Austria followed quickly after.

So benefits from this advanced online process microscopy are clear for any pulp mill, security, specialty and graphic paper producers.

Figure 10: Pixact Software Display Stock Monitoring.

Success Story 3: Technikum Laubholz & Pixact: Paving the way for smart wood processing

Pixact was one of the key suppliers in the KickBio project at Technikum Laubholz!

Through a public tender as part of the EU-funded project, Pixact was awarded the contract to deliver three fibre analysis systems: two for the pilot plant at Technikum Laubholz – where, among other things, nano- and micro-cellulose can be produced – and another for the laboratory, to verify measurement results.

As an independent research institute, the Technikum Laubholz (TLH) has been driving the future of hardwood utilization since 2020. On behalf of the state of Baden-Württemberg, TLH is developing innovative solutions to unlock the potential of beech wood - quickly, practically and with a focus on the market.

One highlight project is the above mentioned KickBio: the construction of a state-of-the-art pilot plant including a digital twin for the production of nanocellulose from beech wood for example. Innovation is demonstrated here in practice - together with the Finnish technology pioneer Pixact.

With the Pixact Particle Monitoring System (PPM), Pixact brings real-time intelligence to industrial processes. Particles, droplets, bubbles or fibres - everything that flows is detected and analysed inline in high resolution down to 1 µm. Even with dense and dark suspensions, the system delivers precise data directly from the running process.

Key benefits at a glance:

- Transparent process monitoring: The progress of pulp fibrillation can be tracked live at any time. Changes in the fibre material are visible even at early stages of the process.
- Superior level of detail: Customized parameter evaluation makes the fibrillation process visible at a level of detail that is far below the industry standard.
- Reliability and redundancy: In addition to the inline measurement, an offline system with identical technical equipment is used to provide stable and comparable values for laboratory tests.

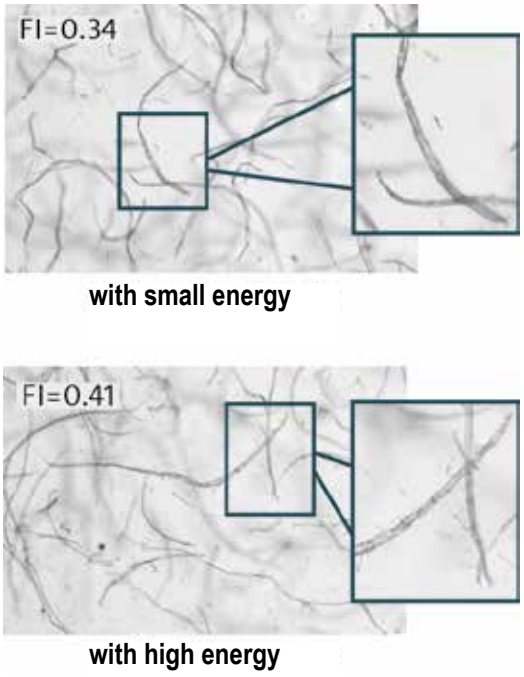


Figure 11: Pixact Fibre Morphology – Fibrillation Control in Real-Time.

Thanks to the exact determination of the particle size distribution, the energy input in MFC production is intelligently controlled - for maximum efficiency, product quality and resource conservation.

In addition, Pixact optimises process control in bleaching, improves water treatment and significantly reduces waste and production costs.

Pixact stands for innovation, precision and versatility - and is constantly developing new applications to make industrial processes smarter and more sustainable.

Together, TLH and Pixact are driving the transformation of the raw materials industry - intelligently, efficiently and with a view to the future.

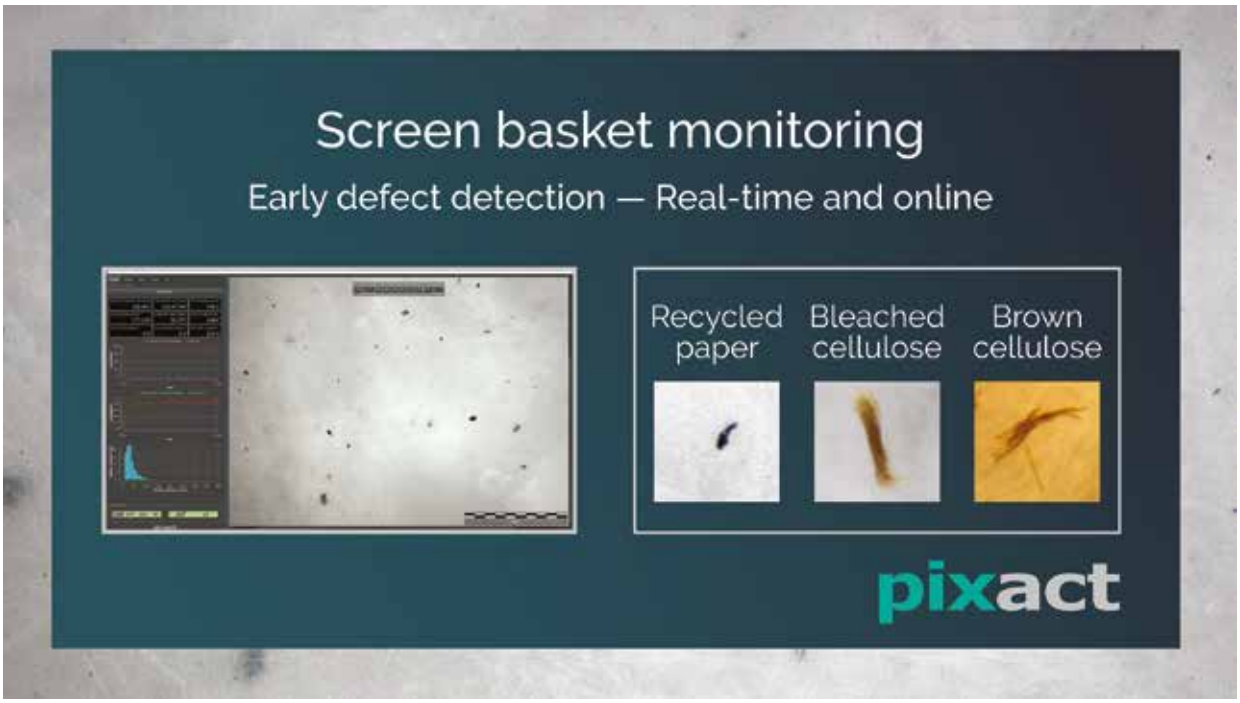
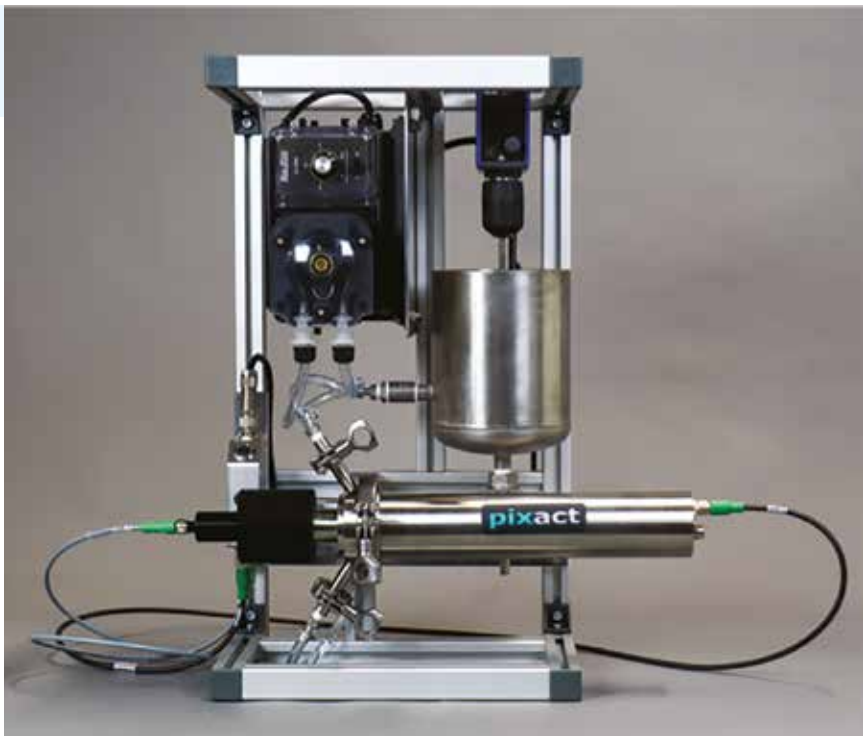


Figure 12: Pixact Screen Basket Monitoring for Early Defect Detection in Real-time.

Success Story 4: KPNB as Matchmaker Between Pixact and PTS – Institut für Fasern & Papier GmbH

Beyond Sappi, KPNB facilitated a cutting-edge research collaboration between Pixact and the PTS institute. With KPNB acting as the matchmaker, Pixact's real-time image analysis is now supporting pioneering research at PTS. This partnership is a prime example of how connecting technology providers and research institutes can drive innovation across the industry.

KPNB thanks the teams at Pixact and PTS for their trust, expertise, and shared vision. KPNB is proud to serve as a bridge between industrial innovation and scientific advancement – and remains committed to enabling forward-looking projects through smart matchmaking.



What's absolutely NEW? – KPNB's Global Strategic Partnership with Pixact

KPNB has entered into a strategic agreement with Pixact to globally market their innovative Process Monitoring System within the pulp and paper industry. This collaboration aims to introduce advanced monitoring solutions that enhance process control, product quality, and operational efficiency.

What is the usual procedure?

- Contacting KPNB for a first chat on-line to explain your process, wishes for stock, particle or fibre analysis.
- Send samples to lab facilities for testing application and modular parts for the accurate system for your needs.
- Discuss results from the sample testing with Johannes Holubec, Pixact Product Manager.
- Decide on next steps purchasing or renting a system to gain on-site real-time data in your own process.
- Check what tools you have for benefiting from the analysis:

Improve and automate controls to

- reduce energy or chemical consumption
- minimise broke
- minimise customer complaints about products not meeting the required specifications.

Some Final Words

The industry faces numerous challenges, including rising raw material costs, regulatory pressures, and the shift toward sustainable products. At the same time, there are opportunities driven by technological innovation and changing consumer behaviour.

With KPNB we strive to support paper and board producers to make use of existing innovative technologies that allow for more and effective process optimisation with automation, sensor technology, and data-driven improvements. Apart from that we always look for tailor-made and reliable proven solutions to fit the customers' needs for highest performance of their production plants and product quality.

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