WHITE PAPER

Expanding its digital information infrastructure helps the pulp, paper and forest products industry take advantage of new market dynamics

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Executive summary:

The pulp, paper and forest products industry is facing unprecedented changes in demand amidst workforce disruptions and increased pressures to minimize energy and water use. To remain competitive, companies must operate more efficiently and become more agile to keep up with supply and demand fluctuations. The best way for them to do this is to invest in their digital information infrastructure with cutting-edge software. Software that makes operations and engineering more efficient lets companies decrease costs, react more quickly to changing markets and increase throughput while minimizing capital expenditures.

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Introduction

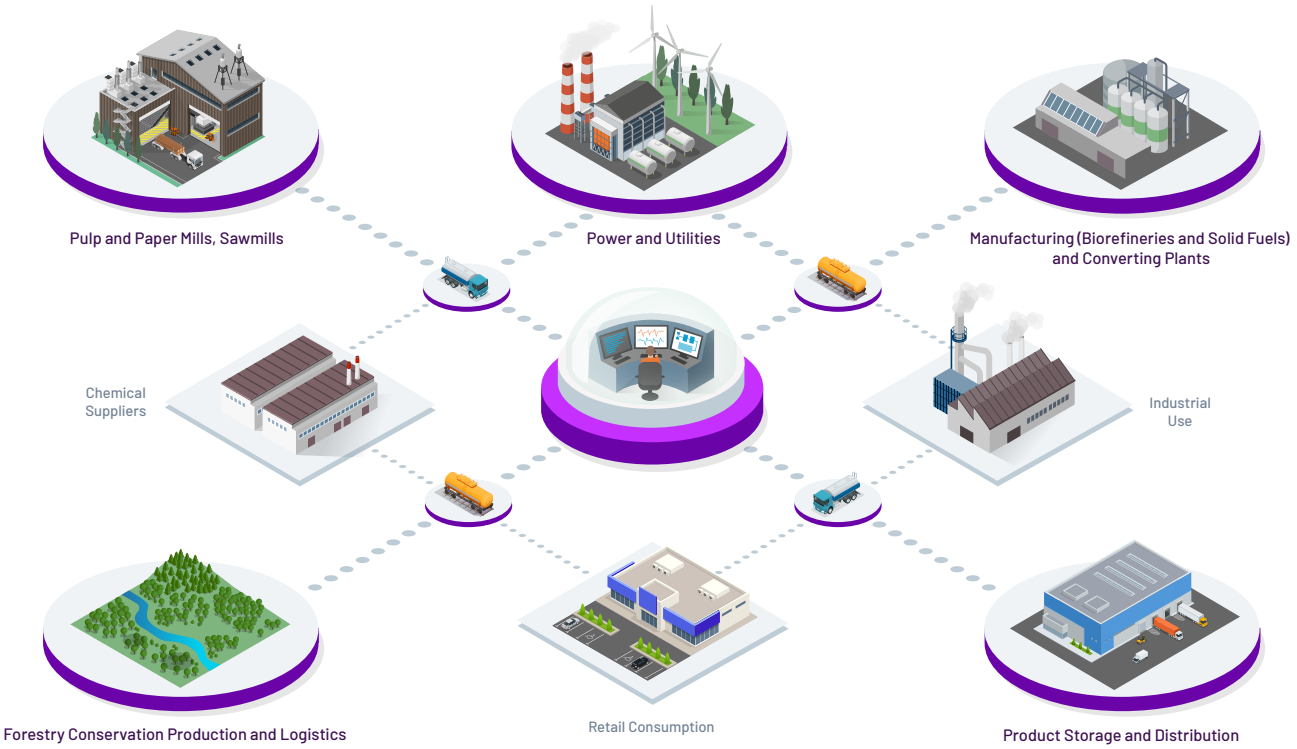
Global economic, social and environmental changes present both unprecedented opportunities and challenges for the pulp, paper and forest products industry. Companies can make the most of these conditions by building up their digital information infrastructures with state-of-the-art software. A McKinsey and Company analysis finds that pulp and paper companies that successfully implement new digital technology get 5-10% gains in throughput and significant savings on materials, chemicals and energy.[1]

Society is using paper differently. Demand for graphic paper continues to decline as people read screens instead of paper. But, at the same time, demand for both commercial and consumer paper packaging is increasing substantially as e-commerce increases and consumers demand sustainable, biodegradable alternatives to plastic. A renewed social focus on healthcare is also spurring a dramatic increase in demand for sanitary-grade papers and tissue. For pulp and paper companies to be successful, they must be agile enough to quickly and efficiently change capacity and re-tool to meet new and changing demands like these.

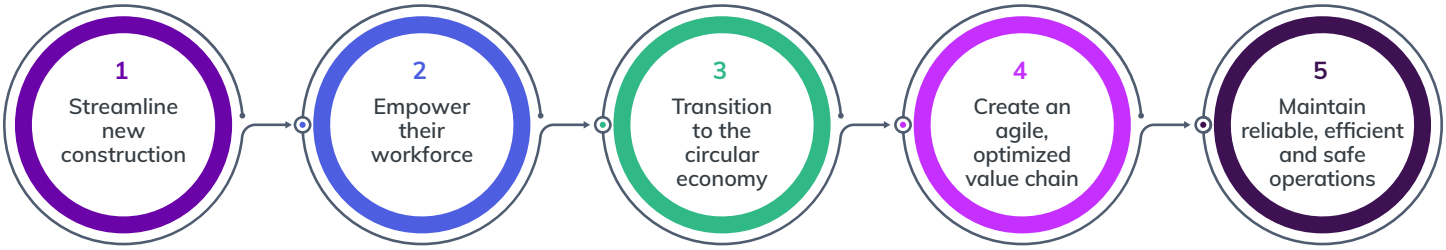
A big part of remaining agile is attracting and retaining new generations of workers. But, the industry struggles with attrition and high turnover. Companies must find ways to guide new workers, retain them – and still do more with a smaller workforce.

Like other industries, pulp and paper is also under pressure to transition to the circular economy and operate more efficiently to cut spiking energy costs and meet environmental, social and governance (ESG) targets. Companies need to build new green facilities and maximize the efficiency of current operations without incurring excessive capital outlays and downtime.

The best way for pulp and paper producers to respond to supply and demand shocks, increase efficiency and get the most out of their workforce is to build up their information infrastructure. The best new software is compatible with whatever hardware and software companies are already using, so it does not require an expensive and invasive “rip-and-replace” of existing infrastructure. It also operates on a subscription basis in the cloud, so companies can easily deploy it throughout the enterprise and pay only for the data and models they need as they continue to grow and respond to changing customer demands.



A robust information infrastructure will help pulp, paper and forest product producers not only cope with, but benefit from, the unprecedented changes affecting the industry. Successful enterprises will:



1. Streamline new construction

Many forest product facilities require critical new upgrades. As demand for new, sustainable products surges, many companies are also building new green facilities or modernizing existing plants. But upgrades and new construction are expensive and can lead to runaway costs and delays. State-of-the-art digital engineering technology reduces these surprise expenses and delays.

Companies that have a robust digital information infrastructure for engineering projects have full visibility of project phases, which streamlines engineering and capital project execution. They have more control over budget and schedules, which further lowers risks and improves the handover to operations.

Good digital infrastructure continues to generate value even after the engineering phase. By the end of the project, it ensures that the owner-operator receives the digital package developed during the engineering phase in a reliable and effective way. The owner-operator can then combine that digital package with operational data and use its digital information infrastructure for continuous improvement.

During engineering (from conceptual design to detailed engineering), state-of-the-art engineering software improves collaboration across teams by allowing them to work with the same information, on the same platform, at the same time. It enables users to quickly evaluate multiple designs – and then choose the designs that will be profitable and sustainable and minimize capital and operational expenditures.

Such software uses a data-centric approach that gives all teams a single source of truth for all data. An engineering database centralizes all the project data and automatically updates the related documentation every time someone from any of the involved disciplines makes a change.

This approach reduces errors, delays and rework, and ultimately lowers project risks and cost. In asset-intensive industries, the right engineering software can reduce engineering hours by 15%.[2]

AFRY (formerly Pöyry) puts such software to good use for its pulp, paper and forest products customers. AFRY is a global engineering contracting company specializing in services for the pulp, paper and forest products industry, among others. Its operations, organized among global and local centers, require high-speed communications, robust working methods and effective management. Its digital engineering approach includes the advanced use of 3D models to visualize and share project data.

These 3D visualizations help AFRY communicate with its clients at all stages of a project. Even after AFRY's work is finished, the 3D models AFRY has created continue to pay dividends for its clients. When an owner-operator commissions a plant, they receive a complete 3D model of the plant that they can use to manage its asset life cycle.

On a paperboard mill expansion project in Brazil, AFRY used 3D models at the initial concept stage to clarify the project's scope and the degree of intervention required in the existing mill. Once the project was underway, AFRY could share all the information available in the 3D model with equipment suppliers.

Suppliers used the data to tender with confidence and ensure that their equipment would meet installation requirements.

By using advanced 3D models throughout the entire project, AFRY conducted design reviews efficiently and thoroughly, kept communication clear between its teams, suppliers and the client, and provided lasting value to its customer.

2. Empower the workforce

A digital infrastructure streamlines new construction, but new or expanded facilities need operators. The pulp, paper and forest products industry has been losing talent to retirement and has difficulty both attracting and retaining new workers. Eighty-six percent of respondents to a recent industry survey said that they were concerned about losing both knowledge and labor to retirements.[3]

So, companies need to both attract and retain younger generations of workers as well as update their operations, so they can function with a smaller workforce. Expanding digital infrastructure advances both of these goals.

One reason new generations are reluctant to join the pulp, paper and forest products industry is that they perceive it to be more conservative than others. Digitizing operations helps create the kind of modern workplace that new talent is looking for. Workers also are reluctant to relocate to remote mill locations. Digital technology lets workers run operations at multiple facilities remotely, so new recruits don't have to relocate.

As the number of experienced, veteran workers declines, digital technology can help transfer their knowledge to a new generation. Veteran workers have used their knowledge to configure software that guides newer workers on how to respond to events. Graphical tools give workers a visual understanding of what's going on, and automation, models and AI give them guidance on how to respond to events in ways that ensure safety and minimize losses.

In addition to creating modern plants that attract new generations of workers, digitization helps create plants that need fewer workers to operate in the first place.

Predictive asset optimization and maintenance driven by data can minimize the time workers spend conducting maintenance checks, replacing assets and maintaining asset inventories. Moreover, automated and AI-based alerts and notifications allow operators with limited experience to run operations. Visualization software also makes it easier for fewer workers to keep track of operations.

WestRock is moving away from slow and repetitive Excel analysis and using AI and ML to make better, faster decisions. Now, analysis is faster and easier than ever, saving over 500 manhours per month, per facility.

WestRock's paper mills are scattered all across the globe and are continually producing paper and packaging goods and also a huge amount of data. But analyzing the data proved to be difficult. Teams were mired in hours' worth of spreadsheets, delaying important insights and subsequent decisions.

WestRock wanted to add analytics and predictive models, but before the company could add analytics, it needed a solid data foundation. For this, WestRock used a three-phased approach: foundation, visualization, and analytics. It kicked off a plan to create an enterprise-wide contextualization layer at its operational data management system for 30 paper mills. An asset framework structure was built to serve as the foundation for standardized data collection and visualization across mills.

On the top of structured and standardized data foundation, WestRock added machine learning models allowing it to monitor production and quality data. Team members can now read, trend and visualize live data all in one easy-to-read dashboard display, which WestRock can easily replicate across all its mills. The company quickly saw improvements. For example, the team analyzed four months of data on a pump in just a few minutes. The team then noticed irregularities that indicated the pump was starting to fail and took corrective actions in time. This approach is saving over 500 worker-hours per month in each of its facilities and freeing up time, so the team can use their time to make additional improvements at the mills.

3. Transition to the circular economy

The circular economy and net-zero initiatives present both opportunities and challenges for the industry. A Fisher International analysis finds that "the pulp and paper industry now has a major opportunity to step in and supply replacement products in numerous segments that once heavily relied on plastic.[4]

Although demand for sustainable forest products is rising, energy costs are as well. Operators are under tremendous pressure to decrease water and energy use. Building digital infrastructure to get full visibility of plant operations can help them do it.

Verso's Androscoggin Mill has reduced its energy consumption by nine percent and reduced its water consumption by 20%. Even as it reduced its energy and water use, the Androscoggin Mill has increased its throughput of fiber and paper.

Facing significant variations in energy and water requirements based on paper grades, production rates, and seasons, combined with the increasing sustainability demands, Verso Corporation had to implement a holistic optimization approach to improve energy and water conservation at Verso's Androscoggin Mill. Part of the mill energy requirements is generated on-site with renewable resources (spent pulping liquor, wood waste and hydroelectric stations), so the first goal was to set the energy reduction target to below the level of requiring purchasing energy while operating at full capacity. The second goal was to optimize water usage since this is key to reducing mill energy requirements, and it was a priority to improve water conservation.

Verso improved data monitoring by feeding information into an operational data management system. The digital infrastructure created was capable of converting data from the complex water and energy systems into insights about past and present water consumption and also predicting paper machine and total mill energy requirements. The system compared predicted values with actual utility consumptions for several operational areas in the mill.

Based on the deviations calculated for any operational areas, the teams could troubleshoot quickly and implement corrective strategies, allowing them to purchase energy at a lower cost or even avoid purchasing energy entirely at times. As a result of the optimization approach, Verso reduced water use by 20% (its the desired level), reduced energy consumption by 9%, and allowed the mill to operate at full production.

4. Create an agile and optimized value chain

The recent upheavals in demand, the supply chain and the workforce require pulp and paper producers to remain as agile as possible to take advantage of the rapidly changing market. Building up information infrastructure is the best way to ensure that they can remain ready to increase production or switch feedstocks or output as quickly as possible.

Reliable operations data along with AI software allow plants to optimize performance, improve quality, minimize waste and optimize planning and scheduling. Software that is compatible with whatever existing automation and digital infrastructure a company already has in place is easier to implement and tends to provide a better return on investment. Advanced process control software (APC), in particular, improves automation, makes processes more efficient and agile, and increases the quality of finished products.

5. Maintain reliable, efficient and safe operations

Sixty percent to 80% of all equipment malfunctions on quality control systems in paper and pulp mills result from incorrect maintenance or a lack of maintenance entirely.[5] As assets in older mills continue to age, regulations increase, and mills are under pressure for "always-on" operations, optimizing asset health is more crucial than ever before.

But, asset maintenance can be a double-edged sword. On the one side, well-maintained assets ensure efficient operations, high throughput and timely delivery to customers. On the other, replacing assets requires downtime that decreases throughput and can require large capital expenditures. Companies can balance these considerations by using predictive asset optimization.

Klabin, Brazil's largest producer and exporter of paper and pulp, uses a digital information infrastructure and machine learning to drastically reduce maintenance costs. Initially, Klabin saved US$10 million, all while increasing its yearly production by 3,400 air-dry tons by implementing a robust operational data management system that helped it make decisions more quickly and effectively.

Once that digital information infrastructure was in place, Klabin used machine learning models to predict anomalies and receive early notifications of asset issues. By implementing predictive maintenance, Klabin avoided failures in equipment, such as turbo generators, paper machine rolls, pulp screens, boiler fans, pumps, and decanter centrifuges, among others. By having a full understanding of its operations, Klabin reduced maintenance costs by an estimated 10%.

What to look for in industrial software

Transforming their digital information infrastructures will help companies address all of the imperatives covered above. The main obstacles companies face in undertaking such digital transformation are:

- Excessive upfront capital expenditures to install new systems
- Additional costs and disruptions to replace current digital technology to be compatible with new software
- Uncertainty about future data requirements and an inability to scale new software with volatile market fluctuations

Companies should partner with software companies that overcome these obstacles with the following features:

Cloud-based and hybrid design	Subscription-based enterprise agreements	Software- and hardware-agnostic	Comprehensive portfolio
Software that runs in the cloud doesn't require excessive downtime to install, and companies can easily expand its use across the enterprise as needed. Hybrid designs allow operators to control software both remotely and directly on-premises.	Companies drastically reduce upfront capital expenditures with subscriptions that allow them to pay for data on an as-needed basis. Combined with cloud-based designs, subscriptions also allow them to easily scale the deployment of their software with market fluctuations and future growth.	The best software is compatible with most other hardware and software that companies already have installed–so they don't need to replace existing investments to continue building their digital infrastructure.	Software providers with products that cover the entire value chain, from engineering to operations and IT, can best help pulp, paper and forest products companies optimize their business across the entire enterprise.

Conclusion

The pulp, paper and forest products industry can take full advantage of today's dynamic market by expanding its digital information infrastructure. A comprehensive digital infrastructure gives companies full visibility of their engineering and operations, so they can operate more efficiently and understand how to take advantage of continuing market fluctuations.

Automation, engineering, predictive analytics and process optimization software help operators use their talents to the fullest. When this software runs on the cloud on a subscription basis, companies no longer face significant barriers to adopting it. Companies with a robust digital infrastructure will have the agility to scale production to meet fluctuating demands while saving on both operating and capital expenditures.

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About the author

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