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There's More to This Story

By John O'Brien, Managing Editor
jobrien@paperage.com

On May 11, British Columbia-based Paper Excellence announced that it entered a definitive agreement to buy South Carolina-based Domtar for $55.50 per share. The all-cash transaction represents an enterprise value of approximately $3.0 billion.

After the transaction is finalized, which is expected in the second half of 2021, Paper Excellence said Domtar will continue as a standalone business entity. "As such, Domtar will continue to be led by its management team and Paper Excellence plans to retain its corporate and production locations."

Let's take a quick look at Paper Excellence.

Headquartered in British Columbia, Paper Excellence is a privately held manufacturer of pulp and paper, including printing and writing, packaging, and specialty papers. Its seven mills in Canada produce 2.8 million tons of production (approx. 1.815 million tons of pulp and 948,000 tons of paper), employ 2,800 workers, and generate $2.4 billion in annual sales.

The company also recently gained full ownership of Brazilian-based pulp producer Eldorado Brasil Celulose, which reportedly produced 1.8 million tons of bleached eucalyptus pulp in 2019.

So what does Domtar bring to the table? The company has 9 mills in the U.S. and 4 in Canada. According to Domtar, its 13 pulp and paper mills and 10 manufacturing and converting facilities gives the company approximately 2.7 million tons of papermaking capacity and 1.5 million air-dried metric tons of market pulp capacity annually.

In addition, Domtar is in the beginning stages of converting its mill in Kingsport, Tennessee, from the production of uncoated freesheet to high-quality recycled linerboard and corrugated medium (600,000 tpy). Start-up is expected in the first quarter of 2023.

But that's not all on the containerboard front. Domtar, upon selling its Personal Care business to American Industrial Partners in January of this year for $920 million, said, "Domtar is executing on a clear plan to create long-term shareholder value by refocusing its portfolio around Paper, Pulp and Packaging. Domtar has begun to execute its strategic plan to enter the containerboard market with highly competitive assets and a differentiated go-to-market strategy. The Kingsport conversion provides the Company with a strategic entry point to build an up to 2.5 million ton business and become a long-term strategic supplier to the packaging industry."

A key question going forward is whether Paper Excellence (PE) will continue with Domtar's plans to convert other printing & writing (P&W) paper mills to containerboard?

Tedd Powers, Senior Strategy Consultant at Fisher International, thinks the conversions will happen. In a brief article posted on Fisher's "Insights", Powers says, "At first glance, PE's portfolio mix post-Domtar acquisition is a head scratcher. Is the company really looking to double its P&W capacity, or is there more to the story?"

Powers pointed out that P&W demand was down 20% in 2020 and will continue to decline at an annual rate of 6-8% going forward.

"While anything is possible, the PE acquisition likely guarantees these conversions will occur – and conceivably at an accelerated rate, given PE's access to capital," Powers says.

"With the exception of its pulp assets, I expect PE's portfolio mix to change markedly over the next few years; we will see its P&W capacity perhaps trimmed by one-third, while its containerboard capacity could increase four or five-fold," he adds.

There's definitely more to this story and it will be interesting to see how Paper Excellence influences Domtar's operations in the future.

PaperAge
MAY/JUNE 2021
VOLUME 137, NO. 2

EDITOR IN CHIEF Jack O'Brien
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LAYOUT & DESIGN Betsy Gold Design

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 PaperAge (ISSN:0031-1081) is published six times per year with those issues being January/April, May/June, Paper-Based Packaging Annual, July/August, September/October, November/December by O'Brien Publications, Inc., 20 Schofield Road, Cohasset, MA 02025-1922. Periodicals postage paid at North Reading, MA.

Canadian Mail distribution information:
Publication Mail Agreement #40112731
Ontrac International
P.O. Box 25058, London BRC.
Ontario, Canada N6C 6A8

POSTMASTER: Please send change of addresses to: PaperAge, 20 Schofield Road, Cohasset, MA 02025-1922.

Subscriptions: PaperAge is mailed without charge in the U.S. and Canada (upon written request) to qualified individuals in the pulp, paper, paperboard, and paper converting industries. To all others there is a subscription charge of $54.00 in the U.S., $60.00 in Canada, and $90.00 in all other countries. Single copies may be purchased for $10.00 each. All payments must be made in U.S. funds and checks must be drawn from a U.S. bank. Credit cards are accepted.

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NORTH AMERICA

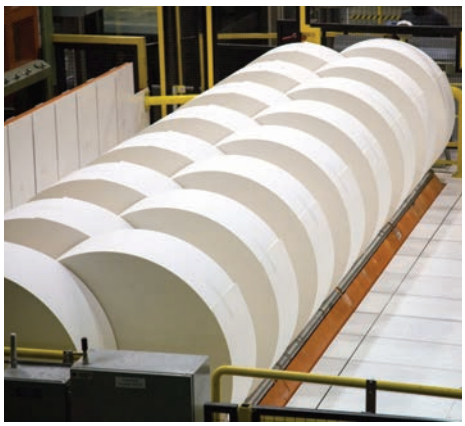
Paper Excellence Agrees to Acquire Domtar in $3 Billion Deal

Paper Excellence and Domtar on May 11 announced that they have entered into a strategic business combination under which the Paper Excellence group of companies will acquire all of the issued and outstanding shares of Domtar common stock for $55.50 per share, in cash.

The purchase price represents a premium of approximately 37% to Domtar's closing share price on May 3, 2021, the last trading day prior to the Domtar's statement responding to media reports regarding a potential business combination between Domtar and Paper Excellence, and a premium of approximately 44% to the 30-day volume-weighted average price as of May 3, 2021.

The all-cash transaction represents an enterprise value of approximately $3.0 billion.

After the transaction closes, Paper Excellence intends to continue the operations of Domtar as a stand-alone business entity. As



such, Domtar will continue to be led by its management team and Paper Excellence plans to retain its corporate and production locations.

"We are excited to add Domtar and its employees to the Paper Excellence global family," said Joe Ragan, Global CFO of Paper Excellence. "This marks a major step in our global strategy of identifying well-positioned assets and positioning them for growth. Domtar is a natural fit for our culture of operational excellence. We are enthusiastic about entering the American market as we continually improve Paper Excellence's ability to serve its expanding blue-chip customer base."

John D. Williams, President and CEO of Domtar, said, "This agreement enables our shareholders to realize certain and immediate cash value at a significant premium for their shares. This transaction validates our long-term strategic plan for our leading paper and pulp businesses, and for our continued expansion into packaging."

The agreement has been unanimously approved by the Domtar Board of Directors.

The transaction is expected to close in the second half of 2021, subject to Domtar shareholder approval, receipt of the required regulatory approvals and other customary closing conditions.

Verso Announces Sale of Duluth, Minnesota, Mill to ST Paper

Verso, on May 13, completed the sale of its closed mill in Duluth, Minnesota, to ST Paper LLC.

Terms of the deal were not disclosed.

"Since the idling of the Duluth Mill in July 2020, we have been working diligently to find a viable and sustainable alternative for the Duluth Mill," said President and CEO Randy Nebel. "We are pleased to have found a buyer who plans to operate the Duluth Mill in the future, providing local employment opportunities and serving the local business community and residents of the Duluth area."

In July of 2020, Verso indefinitely idled its paper mills in Duluth, Minnesota, and Wisconsin Rapids, Wisconsin. At that time, the company said it planned to explore viable and sustainable alternatives for both mills, including restarting if market conditions improve, marketing for sale or closing permanently.

The Duluth Mill has the capacity to produce approximately 270,000 tons of paper per year. The mill makes graphic papers used for magazines, catalogs and retail inserts and packaging recycled kraft paper used for a variety of bag, sack and converting applications.

According to an article on Duluth News Tribune's website, ST Paper LLC intends to convert the mill's production from specialty paper grades to tissue.

"While the negotiations have been long and intense, all parties have focused on reopening the mill," said Sharad Tak, founder and principal partner of ST Paper. "Our tissue-manufacturing business has been expanding for the last 15 years, continuing on that path, we hope to refurbish the existing machines in Duluth in two years' time, in addition to installing a new tissue machine now and double the production capacity, resulting in

a significant increase in local jobs."

Bill Broydrick, a spokesman for ST Paper, said it will likely take about 18 months to ship and install the equipment needed for the conversion of the Duluth mill. But he said work on the plant is expected to begin very soon. However, he stressed the importance of financial support the company expects to receive to make the $54 million project come to pass.

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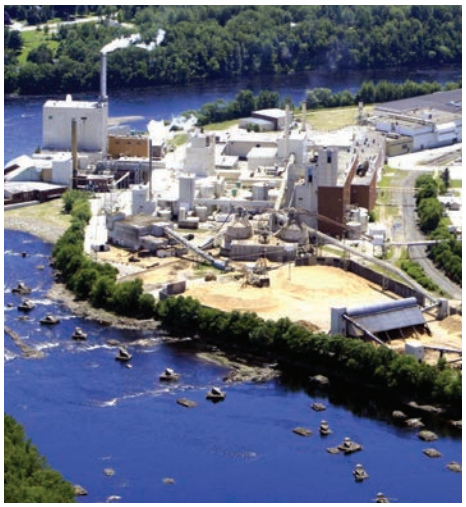
NORTH AMERICA

ND Paper Starts-up New Recycled Pulping Operation in Maine

ND Paper announced the launch of a new recycled pulping operation at its Old Town Division in Maine. The new production line will produce approximately 200 metric tons per day of unbleached recycled pulp.

According to ND Paper, the new recycled pulp line uses patent-pending, proprietary technology and consumes regionally-sourced recovered paper, primarily old corrugated containers, as its primary feedstock. In addition, the new line is designed to use considerably less water than a traditional recycled pulping process.

ND Paper purchased the shuttered mill in October 2018 and has since invested millions of dollars into its restart and optimization.



"We are thrilled to start our new recycled pulping operation at the Old Town mill," said Bruce Hogan, Vice President and General Manager of the Old Town Division. "This multi-million-dollar investment from ND Paper represents another vote of confidence in the State of Maine's forest products sector, the Old Town Division, and our vision to build a sustainable company for the next 100 years."

At full operation, the recycled pulping operation will support approximately 20 new jobs.

Millcraft Acquires Assets of Nashville-based Dennis Paper Company

The Millcraft Paper Company has acquired the assets of Dennis Paper Company of Nashville, Tennessee. Founded by Morris Dennis in 1969, family-owned Dennis Paper has earned a reputation as one of Nashville and Middle Tennessee's leaders in fine paper distribution for more than 50 years.

Terms of the deal were not disclosed.

The Nashville-based business will continue to operate under the Dennis Paper Company name while Millcraft works to add in new core product lines such as retail and beverage packaging, wide format and graphics, as well as direct to garment. This will continue to benefit and expand opportunities for new and existing Dennis Paper customers.

"Dennis Paper has played such an integral role in the Nashville community. We value the trusted reputation and legacy that Morris, his sons Ron, Steve and Jerry, and the entire Dennis organization have built and believe strongly that it is our incumbent responsibility to carry on all that they achieved," said Travis Mlakar, Millcraft's President and CEO. "We know that we will benefit greatly from their market knowledge."

Ronald Dennis, President of Dennis Paper, added, "We are excited about the partnership with Millcraft, as we know this is a wonderful way to evolve our business and drive even more opportunities to our customers."

SOUTH AMERICA

Suzano to Build 2.3 Million TPY Pulp Mill in Mato Grosso do Sul, Brazil

Suzano announced that its Board of Directors approved a capital investment of BRL 14.7 billion (approx. USD 2.87 billion) for the construction of a new pulp mill to be located in the municipality of Ribas do Rio Pardo, in the state of Mato Grosso do Sul, Brazil.

The proposed pulp mill, referred to by the company as the "Cerrado Project", will have the capacity to produce 2.3 million tons per year of eucalyptus pulp.

Suzano said the funds for the project will distributed between the years of 2021 and 2024, and estimates that the new plant will start operating in the first quarter of 2024.

Suzano said the project will be financed by the company's cash position and cash generation from current businesses, which can be complemented by financing, provided that the conditions are attractive in terms of cost and term.

In a written statement, Suzano said, "The Cerrado Project represents an important advance in the company's long-term strategy, contributing to the expansion of its structural competitiveness, meeting the growing demand for hardwood pulp and Suzano's evolution in sustainability — especially with regard to climate and waste, providing a major carbon capture increase arising from the new forest base.

"In addition, the new plant will have a surplus capacity for renewable energy generation of approximately 180 MW average, and is also considered in the industry as free from fossil fuel — a new milestone for Suzano in eco-efficiency that shows its commitment to society and the planet."

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EUROPE

Graphic Packaging to Acquire Sweden's AR Packaging for $1.45 Billion

Graphic Packaging Holding Company and CVC Capital Partners Fund VI on May 14 announced a definitive agreement under which Graphic Packaging will acquire AR Packaging Group AB, Europe's second largest producer of fiber-based consumer packaging, for approximately $1.45 billion in cash, subject to customary adjustments.

The proposed acquisition of AR Packaging is expected to add $1.1 billion in annual sales and $160 million in annual Adjusted EBITDA. In addition, the combination is expected to drive total synergies of $40 million over 36 months following close.

Michael Doss, Graphic Packaging's President and CEO said, "AR Packaging is a leader in the attractive and growing market for sustainable packaging in Europe. The large,

distributed footprint of AR Packaging's 25 converting facilities across Eastern and Western Europe provides significant scale and cost efficiency benefits strengthening our combined presence and ability to service customers throughout Europe and globally."

AR Packaging is one of Europe's leading companies in the packaging sector with net sales of approximately $1.1 billion, 5,000 employees and 30 factories in 13 countries.

AR Packaging's President and CEO, Harald Schulz, said, "I am proud of the progress we have made in establishing a clear strategy and building AR Packaging into a respected provider of packaging solutions. Graphic Packaging's shared approach to customer service and deep focus on providing innovative, sustainable solutions closely aligns with how we operate our own business, making them an ideal partner."

The transaction, which has been unanimously approved by the Boards of Directors of Graphic Packaging and AR Packaging, is expected to close in four to six months, subject to regulatory approvals and other customary closing conditions.

Stora Enso to Permanently Close Kvarnsveden and Veitsiluoto Mills

Stora Enso on April 20 announced plans to permanently close down pulp and paper production at its Kvarnsveden Mill in Sweden and Veitsiluoto Mill in Finland. The planned closures would take place during the third quarter of 2021, and reduce the company's paper production capacity by over 1.3 million tonnes.

The closures would directly affect 670 employees in Finland and 440 employees in Sweden.

In a written statement, Stora Enso said, "Paper demand in Europe has declined for over a decade. This trend has further accelerated due to the pandemic, which has led to changes in consumer behavior. As a consequence, there is a significant overcapacity in the European paper market, which has resulted in historically low price levels and challenged the cost-competitiveness of many paper mills.

"Both Kvarnsveden and Veitsiluoto mills are loss-making, and their profitability is expected to remain unsatisfactory also going forward."

Annica Bresky, President and CEO of Stora Enso, commented, "This is heavy news for our company and our colleagues at Veitsiluoto and Kvarnsveden mills. Our people at the sites are very competent and have done their utmost during very difficult circumstances. Unfortunately, in the rapidly declining paper market, we need to adjust our production capacity to improve the competitiveness of our total paper business. This sadly means the closure of unprofitable assets.

"As communicated last year, we have reviewed our strategy and are shaping our business for accelerated growth and value. We are focusing on packaging, building solutions and biomaterials innovations, where we see strong growth potential," Bresky concluded.

The planned mill closures would reduce Stora Enso's paper production capacity by 35% to 2.6 million tonnes per year. Stora Enso's annual paper sales would decrease by approximately EUR 600 million, and the operational EBITDA is expected to improve

by approximately EUR 35 million annually.

Kvarnsveden Mill in Borlänge, Sweden, has two paper machines with a combined annual capacity of 565,000 tonnes of supercalendered (SC) magazine papers and improved newsprint. The mill has also an integrated softwood thermomechanical pulp mill with an annual capacity of 900,000 tonnes.

Veitsiluoto Mill in Kemi, Finland has three paper machines with a combined annual capacity of 790,000 tonnes on three paper machines. Two machines produce woodfree uncoated paper and one machine produces coated paper grades. In addition, the mill has an integrated chemical pulp mill (360,000 tpy), groundwood mill and a sheeting plant.

EUROPE

Stora Enso Selling Sachsen Paper Mill to Model Group for EUR 35 Million

Stora Enso has signed an agreement to divest its Sachsen Mill located in Eilenburg, Germany, to the Swiss-based family-owned Model Group. Sachsen Mill has an annual production capacity of 310,000 tonnes of newsprint specialty paper based on recycled paper.

The enterprise value of the transaction is EUR 35 million, subject to customary purchase price adjustments.

Under the agreement, Model Group will own and operate Sachsen Mill after the transaction is closed. Stora Enso will continue to sell and distribute Sachsen's paper products under a contract manufacturing agreement for a period of 18 months after the closing. After that period, Model will convert the mill to the production of containerboard.

All 230 employees at Sachsen Mill will move to Model Group with the transaction.

"We believe Model will be a good owner to ensure long-term development of the Sachsen Mill. We will continue to serve our customers with high quality paper products from Sachsen Mill at least until the end of 2022," said Kati ter Horst, EVP, Stora Enso's Paper division.

Model Holding is based in Weinfelden, Switzerland, with two containerboard mills in Switzerland and nine corrugating production plants in Europe.

Stora Enso expects to close the deal during the third quarter of 2021.

Zeus Packaging to Invest EUR 15 Million in Expansion of Aldar Tissues

Irish-owned Zeus Packaging announced an EUR 15 million investment in Aldar Tissues, a Dublin-based tissue manufacturer that Zeus acquired in 2019 as part of a three-year, EUR 40 million acquisition strategy which concluded in February of this year. The EUR 15 million investment includes construction of a new 100,000 sq. ft. Aldar production facility in Rathcoole, (Northern Ireland) and two new fully automated, stateof-the-art production lines. The new facility will enable Aldar to quadruple capacity and introduce new premium brands to large retailers across the island of Ireland along with exporting to customers in the UK and Europe.

"Aldar is one of only two toilet tissue manufacturers on the island of Ireland, who combined, represent just 20% of the market," said Keith Ockenden, CEO of Zeus. "The rest of the Irish toilet tissue market is completely reliant on import. Not only is this a negative from a sustainability perspective, it also highlights the additional challenges brought on by Brexit and the knock-on impact of high distribution costs on the consumer. At Zeus, we wish to remove this reliance in the Irish market on UK and European imports by strengthening indigenous manufacturers such as Aldar."

UPM to Sell Shotton Newsprint Mill in North Wales to Eren Paper

UPM in May signed an agreement to sell its Shotton newsprint mill site in North Wales, United Kingdom and all related assets to Eren Paper Ltd, a subsidiary of Modern Karton Sanayi Ve Ticaret, the containerboard and corrugated packaging business of the Turkish industrial conglomerate Eren Holding.

According to UPM, Eren's plan is to integrate the Shotton site into its existing business units and to make further investment at the site. All 190 employees currently working at UPM Shotton will be part of the transaction.

Newsprint production is planned to stop by September 30, 2021 and Eren will take over responsibility for the mill as of October 1. While an exact timeline for the conversion plans will be communicated by Eren, the Renewable Energy Generation plant and Material Recovery and Recycling Facility (MRRF) on the site will continue operations throughout the conversion process, corresponding to their role in the regional utility infrastructure.

"We are very pleased with this agreement. It will provide a long-term future for the employees at our Shotton paper mill and a continued use of the site infrastructure. It will help UPM to further consolidate its newsprint production capacity while leveraging the value of the site and its assets," said Winfried Schaur, Executive Vice President of UPM Communication Papers.

The transaction will reduce UPM's annual newsprint capacity by 250,000 tonnes and fixed costs by EUR 30 million upon closing of the sale.

The closing of the transaction is planned for late Q3 2021.

EUROPE

Zanders Paper Discontinues Operations; to Go Into Full Liquidation

Zanders Paper announced that as of April 30, 2021 its business operation has ceased paper production. As the provisional insolvency administrator Dr. Mark Boddenberg announced, no viable concept for the continuation of the company could be found.

After 192 years, the history of the paper mill, which is known for its unique Chromolux paper grade, has ended, the company said.

Zanders paper mill, located in Bergsich Gladbach, Germany, has two paper machines PM2 and PM3, with a combined capacity to produce 325,000 tons per year of speciality papers and board grades used for labels, packaging and graphic applications.

Zanders noted that in regard to open orders and to the sale of remaining paper stocks, customers have been contacted.

Norske Skog Moving Forward with Conversion of Newsprint Machine at Bruck Mill to Containerboard

Norske Skog announced a final investment decision to convert one machine at its Bruck mill in Austria from the production of newsprint to recycled containerboard. The conversion at Bruck will introduce 210,000 tonnes of containerboard capacity to meet the growing demand for renewable packaging.

The project has received financing commitment from regional banks.

"This investment decision represents the coming of a new era for Norske Skog and is a major step to become a leading independent European producer of high-quality, renewable and environmentally produced containerboard," said Sven Ombudstvedt, CEO of Norske Skog.

As announced in June 2020, Norske Skog plans to introduce 765,000 tons of recycled containerboard capacity in Europe by investing approximately EUR 350 million to convert two of its paper machines, Bruck PM3 and Golbey PM1 (France) to the production of containerboard.

The final investment decision to convert Bruck PM3 was taken on April 22, and a similar decision for Golbey PM1 is expected in the second quarter of 2021.

Recycled containerboard production at Bruck PM3 will start in the fourth quarter of 2022 following a three-month shutdown of the machine. Full production utilization of 210,000 tonnes of testliner and fluting is expected in the second half of 2025.

A new waste-to-energy plant is scheduled

to start-up at the Bruck site in the first half of 2022 and will supply cost efficient and sustainable steam for the containerboard production.

The second machine at Bruck, PM4, with capacity of 265,000 tonnes of LWC magazine paper, will continue production unaffected by the project.

INDUSTRY SUPPLIERS

Kadant Successfully Starts Up OCC Systems at Sun Paper in Laos

Kadant Fiberline (China) Co. Ltd., a subsidiary of Kadant Inc., announced it successfully started up two OCC systems at Sun Paper's PM1 and PM2 in Muang Phin, Laos. The OCC systems each have a capacity of 400,000 tons per year.

The recycled containerboard machines have a design speed of 1200 mpm and a trim width of 6.6 m. PM 1 produces containerboard grades in basis weights of 140-250 gsm while PM 2 produces packaging paper grades in basis weights of 100-150 gsm.

"Kadant Fiberline China's innovative technology and high-performance OCC lines supplied to other Sun Paper mills were the decisive criteria for this project," commented Peter Ma, Vice President of Sales and Marketing at Kadant Fiberline China.

"Kadant Fiberline China has supplied and successfully installed seven OCC systems at Sun Paper. All lines feature advanced technology to enable these mills to operate with high stock quality, minimum fiber loss, and up to a 20% savings in energy consumption compared to conventional systems."

INDUSTRY SUPPLIERS

Valmet Signs Industrial Internet Services Agreement with Arauco for New Pulp Line in Chile

Valmet and Arauco have signed an agreement to jointly develop the Arauco Mill Line 3 in Chile to become the world's most autonomous pulp mill. Valmet will supply its Industrial Internet Solutions (VII Solutions) comprised of Mill Wide Optimization applications, advanced prediction and monitoring applications as well as expert services.

Onsite and remote support will be provided through Valmet Performance Centers in South America and the Nordics, and a Valmet expert will be at the mill on a daily basis. In addition, Valmet specialists will visit the mill several times a year to evaluate the performance.

Arauco's US$2.350 billion project MAPA (Spanish acronym for Modernization and Extension of Arauco Mill project) at Arauco Mill in southern Chile includes the termination of pulp line 1, the modernization

of current production line 2 and the construction of a new production line (Line 3), with an annual capacity of 1,560,000 tons of eucalyptus pulp, increasing annual pulp production at the complex by an estimated 2,100,000 tons.

Félix Hernaiz, General Manager, Andes Region, Valmet, added, "With this partnership it will be possible to maximize the production of the mill and move towards an autonomous mill. Our common target with ARAUCO in the first phase is to secure successful commissioning of the MAPA project, fast start-up, ramp-up curve and improve the overall efficiency and profitability of the mill for the years to come."

The contract includes several Valmet Mill Wide Optimization applications that provide a new way to improve mill profitability. The Mill Wide Optimization applications use process flowsheet optimization to automate mill level decisions and coordinate process area actions by generating production and quality plans for each mill area to help increase production and reduce costs.

PAPER

- *ND Paper* announced that **Bruce Hogan** has been named the new Vice President and General Manager of ND Paper's Old Town Division. In addition to his background as a process engineer, Hogan brings 33 years of pulp and paper industry experience with him having worked for companies such as International Paper, Mohawk Fine Papers, Essity and Appvion.

- *PaperWorks Industries* has appointed **Brian Janki** as its new President and CEO and a member of the Board of Directors, effective May 10. Janki replaces **C. Anderson "Andy" Bolton**. Most recently Janki served as an advisor to the PaperWorks Board of Directors, and previously as President and CEO of Dunn Paper. Prior to Dunn Paper, Janki held key leadership roles in Mill, Packaging, and Specialty Papers business units at Caraustar, Greif, and Glatfelter.


Brian Janki

- *Sappi Limited* announced that **Marco Eikelenboom** (53) started his new role as CEO of Sappi Europe on April 1. Eikelenboom formerly served as Vice President Marketing & Sales, Graphic Papers for Sappi Europe. He succeeds **Berry Wiersum** (65), who retired at the end of March. Since joining Sappi in 1998, Eikelenboom has overseen numerous projects which have helped to successfully restructure and reposition Sappi's Graphic Papers business in Europe.


Marco Eikelenboom

- *Sappi Europe* has appointed **Flavio Froehli** as Vice President, Marketing & Sales for the entire Sappi Europe portfolio. Froehli joined Sappi as Sales Director, Graphics through the acquisition of M-real Graphics in 2008. Most recently he held the position of Director, Business Strategy & Development.


Flavio Froehli

INDUSTRY SUPPLIERS

- *Kadant Johnson LLC* announced the promotion of **Jim Maggard** to director of sales for the paper, packaging, and tissue sector. Maggard was most recently a systems development manager and has been with Kadant Johnson since 2006. Before Kadant Johnson he held various technical and commercial roles at Valmet-Enerdry and Voith. He succeeds **John Lefkowitz** who retired after 16 years at Kadant Johnson.

- *Motion Industries* announced that **Aurelio Banda** has joined the company as Motion's new Group Vice President of Automation. Banda most recently served as President and CEO of PHD Inc., a global manufacturer of electric, pneumatic and hydraulic industrial automation actuators.


Aurelio Banda

- *OASIS Alignment Services* announced that **Justin Moker** has been named Midwest Regional Manager at the company's Service Center in Greenville, Wisconsin. Moker replaces **Larry Kubale,** who retired on May 5 after 16 years with the company. Moker joined OASIS in 2018 as Midwest Account Manager and will be responsible for all field service management and operational aspects of the region.


Justin Moker

INDUSTRY ADVOCACY

- *Two Sides North America* announced that **Kathi Rowzie** has become President of the organization. Rowzie succeeds **Phil Riebel**, who retired on April 1. Riebel started Two Sides North America nearly a decade ago. Rowzie's career spans more than 30 years in corporate and consulting roles with Fortune 500 companies, including extensive experience in the paper industry.


Kathi Rowzie


Phil Riebel

RECOGNITION

- *The Paperboard Packaging Council* (PPC) has selected **Steven C. Voorhees**, former CEO of WestRock, as the recipient of its 2021 Robert T. Gair Award. Named after the man whose innovation gave birth to the modern folding carton, the Robert T. Gair Award is reserved for individuals who have made significant and lasting contributions to the paperboard packaging industry. PPC noted that Voorhees' many accomplishments center around expanding WestRock's capabilities, geographic presence and industry leadership with numerous acquisitions. Voorhees is known for cultivating a corporate culture that delivered immeasurable value to customers, stockholders and teammates alike.


Steve Voorhees

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supercorrexpo.org

AUGUST 9-10, 2021
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BNP Media Packaging Group
Lambeau Field
Green Bay, Wisconsin, USA
www.packagingstrategies.com/converters-expo

SEPTEMBER 9-11, 2021
Papertech Expo 2021
Bangladesh Expo & Conference
International Convention City Bashundhara
Dhaka, Bangladesh
papertechexpo-bd.com

SEPTEMBER 14-16, 2021
PPI Transport Symposium 24
Fastmarkets RISI and International Forest Products Transport Association (IFPTA)
Sawgrass Marriott Resort and Spa
Jacksonville, Florida, USA
events.risiinfo.com/transport-symposium

SEPTEMBER 21-23, 2021
Tissue World Düsseldorf
Informa Markets
Messe Düsseldorf
Düsseldorf, Germany
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Advancing Paper Recycling, By Design

By Heidi Brock, President and CEO, American Forest & Paper Association

If your household is anything like mine, you probably have a lot of boxes arriving at your doorstep. E-commerce and online orders increased during the COVID-19 pandemic, and my family certainly contributed. But we also experienced immense gratitude at the convenience in boxes being delivered.

Whether it's a shipment carrying everyday essentials, or a surprise gift from a family member or friend, boxes are helping us juggle the changing demands of life in a pandemic while also remaining better connected to each other.

My family takes satisfaction in recycling these renewable paper-based products. The boxes and packages are emptied, flattened, and placed into our blue bin to turn into recycled fiber that will in turn be used to manufacture future paper products.

OK, I'll confess, with a teenager in the house, we are still working on the 'flattening' step in that process. Still, I will add that just seeing that blue bin filled with paper and other recyclables makes me smile. It's a reinforcing reminder of our industry's success with paper recycling and its role in achieving a consistently high recycling rate. Which, in turn, builds a more circular economy for the future.

The American Forest & Paper Association (AF&PA) plays an essential role in our industry's continuous progress on sustainability, and we are working as a trusted partner, including with brands and products designers, to advance paper recycling even further — and that's all by design.

AFF&PA surveyed 86 AF&PA member mills in the U.S. and Canada to collect data on how non-fiber elements and treatments like adhesives, inks and dyes affect the recyclability of seven kinds of paper-based packaging.

Design Guidance for Recyclability of Paper-based Packaging

The latest example is our Design Guidance for Recyclability of Paper-based Packaging. This guide is an information tool to help packaging designers and brands better meet their recyclability goals. And while it's not mandatory or a standard for the packaging industry, it is a resource to help make better product design decisions.

The guidance is the result of collaborative work by AF&PA members and partners. We surveyed 86 AF&PA member mills in the U.S. and Canada to collect data on how non-fiber elements and treatments like adhesives, inks and dyes affect the recyclability of seven kinds of paper-based packaging.

What we found was every combination of paper-based packaging with non-fiber elements attached, included in the guidance, can be recycled — some of those elements can be more challenging than others for some mills to process, helpful information to keep

in mind as packaging gets designed and manufactured. And being a challenge doesn't mean "not recyclable." Every non-fiber element applied to each kind of packaging was rated by some mills as 'not a challenge.'

The study included corrugated packaging, bleached and unbleached paperboard cartons, carrier stock cartons, Kraft paper bags, multiwall shipping sacks and molded fiber containers. The success of recycling these items is due in part to the industry's significant investment in innovation. And it continues on — from 2019 to 2023, U.S. packaging and pulp producers have committed more than $4.1 billion in manufacturing infrastructure investments to continue the best use of recovered fiber in manufacturing our products.

While we have seen tremendous progress in recycling over the past three decades, we also realize we cannot do it alone. Partnership between the industry and our customers is key. Together we are continuously innovating in the areas of packaging design, materials and mill re-pulping technology.

The Design Guidance for Recyclability is one tool to help customers achieve goals related to increased recyclability. Packaging manufacturers and designers are seeking more clarity as they navigate the path forward to products that are highly recyclable, but they'll need our help to get them there. I encourage you to visit our website and to read, share and apply AF&PA's Design Guidance for Recyclability of Paper-based Packaging: afandpa.org/sustainability/design-guidance.

Experience first-hand a tool that advances our circular economy as we partner with customers to develop renewable products that are highly recyclable. ■

About AF&PA

AF&PA serves to advance a sustainable U.S. pulp, paper, packaging, tissue and wood products manufacturing industry through fact-based public policy and marketplace advocacy. AF&PA member companies make products essential for everyday life from renewable and recyclable resources and are committed to continuous improvement through the industry's sustainability initiative — *Better Practices, Better Planet 2020.*

The forest products industry accounts for approximately four percent of the total U.S. manufacturing GDP, manufactures nearly $300 billion in products annually and employs approximately 950,000 men and women. The industry meets a payroll of approximately $55 billion annually and is among the top 10 manufacturing sector employers in 45 states. Visit AF&PA online at afandpa.org or follow us on Twitter @ForestandPaper.

Producing Renewable, Recyclable, Biodegradable Cartonboard Packaging

As a European leader in the production of cartonboard and folding cartons, Mayr-Melnhof Group points to growth, efficiency, and innovation in sustainable products as keys to its success.

By John O'Brien, Managing Editor

Mayr-Melnof Karton AG (MM Group) is a leading manufacturer of renewable, recyclable and biodegradable cartonboard and folding cartonboard packaging in Europe. Within its two divisions — MM Karton and MM Packaging — the Group has around 10,000 employees at 50 production sites. Both divisions operate as independent profit centers.

MM Group is focused on growth through efficiency and innovation in sustainable cartonboard and fiber-based packaging solutions, and the recently concluded agreements on the acquisition of Kotkamills in Finland and International Paper's Kwidzyn mill in Poland are "transformative milestones on this path."

"We have defined specialization, digitalization and economies of scale as the three main topics for positioning our mills," said Peter Oswald, Chairman of the Management Board and CEO of Mayr-Melnhof Karton AG. "Innovative and sustainably recyclable cartonboard and fiber-based packaging products, especially also as a replacement for plastic, are our growth offer in an economically and ecologically challenging market. Consumers demand sustainable and high-quality packaging at low prices — therefore it is indispensable that we improve our efficiency."

MM KARTON

MM Karton is considered the largest cartonboard producer in Europe, leading in recycled fiber-based cartonboard with a growing share in virgin fiber-based cartonboard. In 2020, the division produced over 1.7 million tons — about 80% was recycled fiber-based and about 20% was virgin fiber-based.

In addition, of the 1.7 million tons of cartonboard MM Karton produced in 2020, 1,478,000 tons were sold externally, while the remaining 226,000 tons were sold to MM Packaging.

MM Karton has six cartonboard mills and

one pulp mill — all in Europe. The Division employs over 2,300 people and produces cartonboard grades for a wide range of consumer goods industries, especially in the sectors of fast-moving consumer goods (FMCG) and e-commerce.

Mills

The **Frohnleiten Mill** (Austria) has two machines, BM2 and BM3, with the combined capacity to produce 520,000 tpy of recycled cartonboard.

The **Neuss Mill** (Germany) operates one machine, BM5, which produces white top coated recycled liner and recycled cartonboard and has the capacity to produce 350,000 tpy.

The **Baiersbronn Mill** (Germany) operates one machine, BM1, which produces virgin fiber cartonboard primarily used in food and pharmaceutical packaging. BM1 has the capacity to produce 92,000 tpy.

The **Gernsbach Mill** (Germany) is considered to be one of Europe's most efficient recycled cartonboard mills. The mill operates one paper machine, BM2, with a capacity of 275,000 tpy.

The **Eerbeek Mill** (The Netherlands) specializes in the production of virgin fiber cartonboard on BM3, which has the capacity to produce 150,000 tpy.

The **Kolicevo Mill** (Slovenia) produces recycled cartonboard, virgin fiber cartonboard, and white top coated recycled liner on two machines, BM2 and BM3. The machines have a combined capacity of 270,000 tpy.

MM Karton also operates the **FollaCell Pulp Mill** in Norway. The mill produces two grades of high-quality mechanical pulp: BCTMP (bleached chemi-thermomechanical pulp) and CTMP (chemi-thermomechanical pulp). For fiber, the mill uses 100% softwood or a mixture of softwood and hardwood and has the capacity to produce 140,000 tpy.

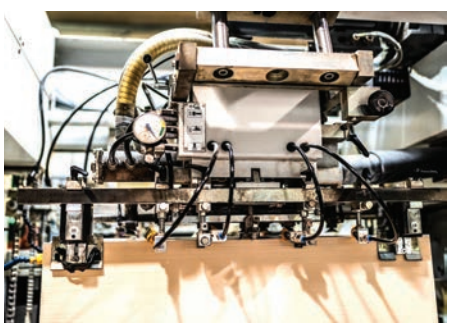
MM Karton's Frohnleiten Mill in Austria has the highest production capacity in the European cartonboard industry (520,000 tpy) and is the parent mill of Mayr-Melnhof Karton.

MM PACKAGING

MM Packaging's 44 production sites and over 7,700 employees focus primarily on folding cartonboard packaging for FMCG sector and e-commerce, as well as in the premium sector. While the FMCG sector serves a wide range of food and non-food applications, the premium business includes highly specialized packaging markets such as health, beauty & personal care, cigarette, and luxury. MM Packaging's customers include both multinational (80%) and local consumer goods producers (20%).

Europe accounts for approx. 82% of MM Packaging's sales, while the Middle East/Asia markets account 11%, and the Americas for 7%.

MM Packaging's intensified investment program focuses on an increased orientation towards growth markets, such as e-commerce, as well as large sites with an advantageous cost structure. The objective is to increase the market share with sustainable folding cartons through efficiency and innovation.



MM Packaging is the leading producer of folding cartons in Europe, serving the high-volume market of fast-moving consumer goods and the highly specialized markets of packages for cigarettes, pharmaceuticals, detergents, personal care, and luxury products.

KOTKAMILLS AND KWIDZYN

In early December of 2020, MM Group announced an agreement to acquire Finnish cartonboard producer Kotkamills for approx. EUR 425 million. Three months later (early February 2021), the company announced an agreement with International Paper to acquire IP's Kwidzyn pulp and paper mill in Poland.

Oswald explained, "With the successful negotiations for the acquisition of Kotkamills in Finland and Kwidzyn in Poland, we have succeeded in pursuing two strategic directions in recent months: Kotkamills specializes in plastic-free barrier cartonboard, which will enable us to offer our customers more innovative solutions with plastic-free barrier solutions after the acquisition. Kwidzyn produces high-quality cartonboard with backward integration into pulp and other cost advantages. This will enable our customers, especially in the food sector, to replace even low-priced plastic packaging with high-quality and very competitive cartonboard."

Kotkamills

Kotkamills operates two paper machines at its integrated mill in Kotka (Southern-Finland). BM2, which started-up in 2016, produces virgin fiber-based cartonboard (FBB) and Food Service Board (FSB). The machine's current sales volume stands at about 260,000 tpy, but MM Karton plans to ramp-up production on BM2 towards its design capacity of 400,000 tpy.

Of note, BM2 has the capability to produce dispersion barrier coatings directly on the machine, producing

MM Karton is in the process of acquiring Kotkamills in Finland. The mill operates two paper machines, one of which (BM2) has a design capacity of 400,000 tpy of virgin fiber-based cartonboard and Food Service Board. The machine started-up in 2016.

barrier boards that can be recycled with normal paper waste due to having zero plastic content.

The mill also operates a saturated kraft paper machine with the capacity to produce 170,000 tpy of high-quality saturating base kraft papers typically used in a wide variety of laminates.

Kotkamills employs about 500 people.

"The acquisition of Kotkamills is an ideal complement to our existing cartonboard business," Oswald said. "It strengthens MM's business model as a dedicated cartonboard and folding carton producer with a reinforced position in virgin fiber based cartonboard which has good growth potential. Kotkamills adds significantly to MM's sustainability strategy offering innovative solutions for plastic replacement."

MM Group expects to close the acquisition in mid-2021.

Kwidzyn Mill

The Kwidzyn mill is an integrated production facility employing approx. 2,300 people. Its pulp mill has the capacity to produce about 400,000 tpy, and the paper mill operates four paper machines that produce cartonboard, kraft paper, and uncoated woodfree (UWF) grades. The mill's flagship machine produces FBB and has a capacity of 260,000 tpy.

According to MM Karton, the Kwidzyn mill recently entered the MF (machine finished) kraft paper segment through the conversion of one of its paper machines to serve the growing demand for flexible fiber-based packaging products. Production of this machine is increasing up to an annual capacity of 75,000 tons.

In addition, Kwidzyn operates two copy paper machines that produce UWF grades with a combined annual capacity of 410,000 tons.

Mayr-Melnhof Group explained that the acquisition will expand its competitive position versus the two market leaders in the growing European FBB market with innovation of sustainable products and a broader service offering, provide entrance to the attractive flexible fiber-based packaging segment, along with entrance to the UWF segment via an established low cost producer.

"The acquisition of Kwidzyn perfectly complements our existing cartonboard business," Oswald said. "It enables MMK to drive innovation for more sustainable packaging solutions in the growing virgin fiber-based cartonboard market and creates attractive new perspectives from the integration of pulp and paper at a site in Europe with cost advantages."

Closing of the transaction is expected in the third quarter of 2021.

LARGE INVESTMENT IN AUSTRIA

In December 2020, MM Group announced a EUR 100 million investment in its Frohnleiten board mill in Austria. The focus of the investment, which will take place during 2021 and 2022, is on sustainability, digitalization and capacity expansion.

"This is the largest investment that the MM Group has ever made in Austria," Oswald explained. "The historic investment in the Frohnleiten mill is a 'triple win.' It not only creates new sales opportunities and an improvement in the ecological footprint in terms of water, energy and emissions, but also makes a significant contribution to safeguarding jobs and training positions at the site."

The Frohnleiten Mill, with about 570 employees, has two board machines — BM2 and BM3 — with the combined capacity to produce 520,000 tpy of recycled cartonboard.

The two-year improvement program includes: innovative, fully digitalized processes that will significantly increase the efficiency of the stock preparation while reducing specific energy and water consumption; the latest production technologies in cartonboard manufacturing to increase product quality and capacities as a prerequisite for further applications of recycled cartonboard; and highly automated logistics to significantly accelerate the shipping of product. ■

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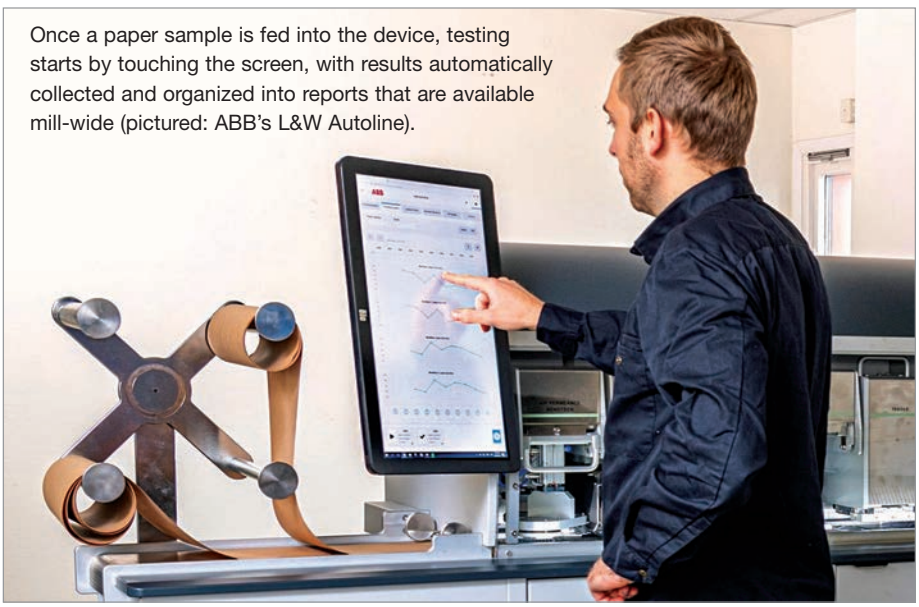
Paper Testing: 8 Reasons to Automate

Modern automated paper testing solutions are more relevant and useful than ever, yet some mills still hesitate. We examine the top misconceptions surrounding paper and board testing automation

Automated paper testing has been available to paper and board mills for several decades now, and the mills that use such systems are reaping the benefits of faster process optimization, improved quality compliance and reduced off-spec product.

Given the many positive outcomes of automated testing, it may be surprising that there are still mills that have yet to invest in automated testing technology, particularly since modern systems are easier than ever to operate and provide unparalleled speed for confirming quality specifications.

Yet some mills are reluctant to forego traditional benchtop testing procedures due to misconceptions about autoated testing. With insight from Jonas Andersson, who has more than 30 years of global pulp and paper industry experience specialized in testing and paper quality and is currently Global Product Manager for automated paper testing at ABB, this article debunks some of the common myths and addresses some of the misconceptions about making the transition from manual to automatic testing.



Once a paper sample is fed into the device, testing starts by touching the screen, with results automatically collected and organized into reports that are available mill-wide (pictured: ABB's L&W Autoline).

MYTH #1: Automated testing is too expensive.

While automated paper testing solutions have a higher initial cost than stand-alone instruments, mills achieve a good payback fairly rapidly through quality improvement and a reduction in rejects. Automated testing can perform up to ten times as many measurements in the same time as it takes for manual testing, delivers better accuracy and can automatically store and manage quality information.

The results generated by automated testing are instantly available remotely and if available, can be linked with other tools such as data historian systems to enable analysis of the impact of process adjustments. Reducing dependence on manual testing also frees up human resources to focus on quality improvement while reducing quality control costs. Paper mills focusing on Six-Sigma levels of quality achievement will benefit greatly from the increased volume and accuracy of paper quality data.

MYTH #2: Paper mills need to upgrade to an advanced quality system in order to fully utilize all the test data automated testing provides.

Modern automated testing provides all the analytical tools needed to review paper quality and optimize production. Detailed cross-machine information makes it easier to maintain high quality across the width of the entire jumbo reel while ensuring all rolls delivered meet end-users' required specifications.

Built-in dashboards typically include tools to follow both short- and long-term quality trends and detect deviations so corrective actions can be taken. While results can be transmitted to other quality systems, the built-in data visualization software includes the necessary functions for quality management, so it is not necessary to upgrade any other systems to see immediate value.

MYTH #3: Automated testers give different results than stand-alone testing equipment.

Since the dawn of automated testing, equipment manufacturers have striven to use the same measurement principles as the benchtop instruments, following ISO procedures and calibrated to the same standards. No correlation is required when an automated testing module uses identical components as the benchtop instruments, thus providing identical test results.

MYTH #4: Detailed cross-machine sample testing is not necessary or too expensive.

Manual testers typically take measurements at only three positions across the machine and the process can be adjusted using these measurements. Automated systems, however, can make more frequent measurements, e.g. every 30 cm across a 10 m wide machine, in the same time or less.

This not only gives a more accurate average, but constantly provides profile information that can be used to verify online sensors and adjust the cross-machine profile of parameters such as moisture, basis weight, thickness and gloss. Without accurate measurements, these parameters cannot be controlled, and quality suffers. To achieve this manually, more resources and more budget are needed, whereas with automated testing, no extra labor or material costs are required to obtain this increased testing frequency as well as detailed CD profiles.

MYTH #5: Operation of an automated tester requires extensive training to operate and maintain.

The latest automated testing systems are simple to operate, requiring minimal training. For example, with ABB's newest L&W Autoline, the intuitive touchscreen interface and trouble-free paper feeding systems further reduce operator involvement compared with previous generations. Once a paper sample is fed into the device, testing starts by touching the screen, with results automatically collected and organized into reports that are available mill-wide. Maintenance procedures are very similar to those of the benchtop instruments when they use the same measurement principles.

MYTH #6: Testing feedback time is not critical.

Many people think that having rapid feedback of test results is not critical because the quality data is only used for quality assurance, and not for quality and process optimization. Standard testing procedures require conditioning of the paper for up to several hours before testing. But if machine operators can have quality information within 15 minutes of a turnup, they can avoid production outside quality limits and the expense of rejecting paper.

An automated paper tester such as ABB's L&W Autoline takes a machine-width strip of paper from a finished reel of paper and can conduct several different tests at multiple cross-direction positions within about 10 minutes, providing rapid feedback to operations. This avoids multiple steps in manual testing, such as sample preparation, sample conditioning, manually entering values, calculations, compiling data and comparing to quality specs.

MYTH #7: It is hard to service equipment running 24/7.

Automated paper testing equipment runs 24 hours a day and 7 days a week, and it's important to keep it running smoothly. Users typically have a service agreement to take care of equipment maintenance that they can't handle themselves. Mills seeking to implement automated testing should be confident that their chosen equipment supplier has a reliable, worldwide network of service representatives to handle this requirement and this maintenance can be non-interruptive to the system, allowing continuity of quality testing.

MYTH #8: Automated testing equipment will not meet our specific requirements.

The latest automated testing equipment is highly customizable, meeting the needs of mills of all sizes and with different levels of testing requirements. Building on the legacy of almost 50 years of automatic paper testing,

ABB's L&W Autoline has been continuously improved in terms of efficiency, testing capabilities, scalability and ease of use. New modules have been developed to provide testing of many different types of paper, from fine paper to board. Each L&W Autoline is scalable and customizable, in that the testing modules to be included are selected by the users to match their needs in a system that is now available in two sizes. If needs change, the modules are "plug-and-play" — easily swapped in and out of the system.

The latest Autoline can even start testing a second sample before a first sample is finished, which can save up to 20% of overall testing time. The data collection system manages all the results coming from each of the individual testing modules and matches them up with the cross-machine position and sample number. The equipment also queues samples, so that a user does not need to be present to start testing of the next sample as soon as the equipment is available.

Overcoming Misconceptions for Higher Quality Achievements

For today's paper and packaging mills, the costs of implementing automated testing are outweighed by its multiple benefits. With a typical return on investment of less than two years achievable through detailed quality reports and faster process optimization, more mills should be ready to make this transition. Ensuring a competitive edge comes from the comprehensive, accurate and rapid test results that are easily achieved with automated paper testing. ■

For further information about the topic presented in this article, please contact Jonas Andersson, Global Product Manager, Paper Testing, ABB, email: jonas.andersson@se.abb.com.

Precision Machine Alignment Critical to Fabric Performance, Sheet Formation & Water Removal

By Myron Smith, OASIS Alignment Services

Alignment tips and techniques for the forming, pressing, and drying sections as well as an overview on how precision alignment can help to increase efficiency and machine performance.

Fabric performance plays a critical role in sheet formation, water removal, and sheet drying. The precision alignment of components in the forming, pressing and drying sections can have a significant effect on fabric operation. Misalignment in these sections can cause issues such as trade seem skew, fabric weaving, fabric slipping on driven components, uneven nips, and more.

The following article is intended to help paper mill personnel learn the importance of precision alignment as it

relates to fabrics, sheet formation, and the water removal process.

What is Precision Machine Alignment?

Precision refers to being exact or accurate and alignment refers to the arrangement of objects either in a straight line or in a correct or appropriate location/relative position. When we speak of 'precision machine alignment' we are typically referring to the level, square and/or parallelism condition of components within the machine; level to earth and square/perpendicular to machine centerline.

Alignment and Effects on Fabric Function

Each section will have specific issues with misalignment and respective, but in general they are all the same. If a fabric is being skewed (trade seam skew or wandering (moving in the cross-machine direction) or running off one side of machine and damaging the fabric, it is not performing as designed. Misalignment of rolls will cause these issues.

Sheet formation can be directly affected by fabric performance. The headbox distributes a uniform, fiber-slurry (stock) across the wire. If the fabric trade seam is skewed, the weave is being closed and water will not flow through as designed. This will have negative effects on sheet formation as well as water removal. It is the same for press fabrics — skew tightens weave, not allowing optimal water removal from sheet nor drying of fabric across vacuum boxes.

Similarly in dryers — misalignment within felt runs can cause uneven tension of fabric on dryers resulting in uneven drying of sheet. There is also potential for wrinkles in both fabric and sheet.

Alignment Effects in the Forming Zone

In general, formers are designed to do just that — form a sheet and remove a significant portion of water from the sheet. Regardless of machine configuration — Fourdrinier design and/or some type of twin wire former — alignment is extremely important.

Manufacturer design specifications, including alignment of components and designed geometry, are required for optimal performance of any machine.

If table components are not properly aligned, the wire is not supported evenly and will not remove equal amounts of water across the width of the table.

Manufacturer design specifications, including alignment of components and designed geometry, are required for optimal performance of any machine. Impingement angles and the position of forming board/blades and associated rolls, will have a direct effect on quality of product and formation of sheet.

Also critical to sheet formation and water removal are the proper location of breast roll centerline to apron, gap between breast roll and apron, location of forming board (machine direction location and elevation), and having table components aligned to a plane established between the tops of the breast roll and couch roll. Additionally, if your machine has top formers, alignment in these areas is equally important. It would be a waste to form a quality sheet and then ruin it when you apply another layer or run through a top former to hopefully obtain the two-sided sheet desired.

It is just as important for all rolls within a wire section to be properly aligned. Misalignment can, and will, cause wire tracking problems as well as skew in wire trade seam. Even when all table or foil blades are properly aligned, water will not be removed as it should if the wire is skewed. It restricts the openings in the wire, thus restricting the flow of water.

Alignment Effects in the Press Section

The press section removes even more water from the sheet by passing the sheet between rolls and/or shoe press components that apply pressure and thereby transfer water from the sheet into the fabric/felt.

Press rolls should be aligned parallel within 0.005" over the length of the roll surface. Shoe press components should

In general, all machine components should be aligned level to earth and perpendicular to machine centerline.

be aligned parallel and to manufacture specifications of shoe centerline location relative to roll centerline. Misalignment between press rolls/components will create an uneven nip due to more pressure being applied to one side versus the other. Uneven nip will not allow for even water removal across the width of the sheet and render the press inefficient. Furthermore, uneven nips can cause premature wear of press fabrics.

All rolls within a felt run should be aligned level and square to machine baseline or in a worst-case scenario, all rolls within a felt run should be aligned in a similar level and square condition. This will allow the felt to track properly and keep the trade seam aligned. Trade seam skew in a felt is comparable to skew in a forming zone wire. Skew will not allow water to flow into and out of the felt as designed.

Alignment Tips & Techniques

It is important to understand the overall paper making process — continuous web from forming section to reel — in order to establish a paper machine alignment methodology that ensures precision alignment throughout the entire machine.

In general, all machine components should be aligned level to earth and perpendicular to machine centerline. For an entirely new machine installation this may seem fairly straight forward — layout a straight line in the floor and set all equipment on centerline, level and square to that centerline. However, when existing equipment is in operation and inspection of and alignment of components is to take place, it is vital that proper methodologies are followed.

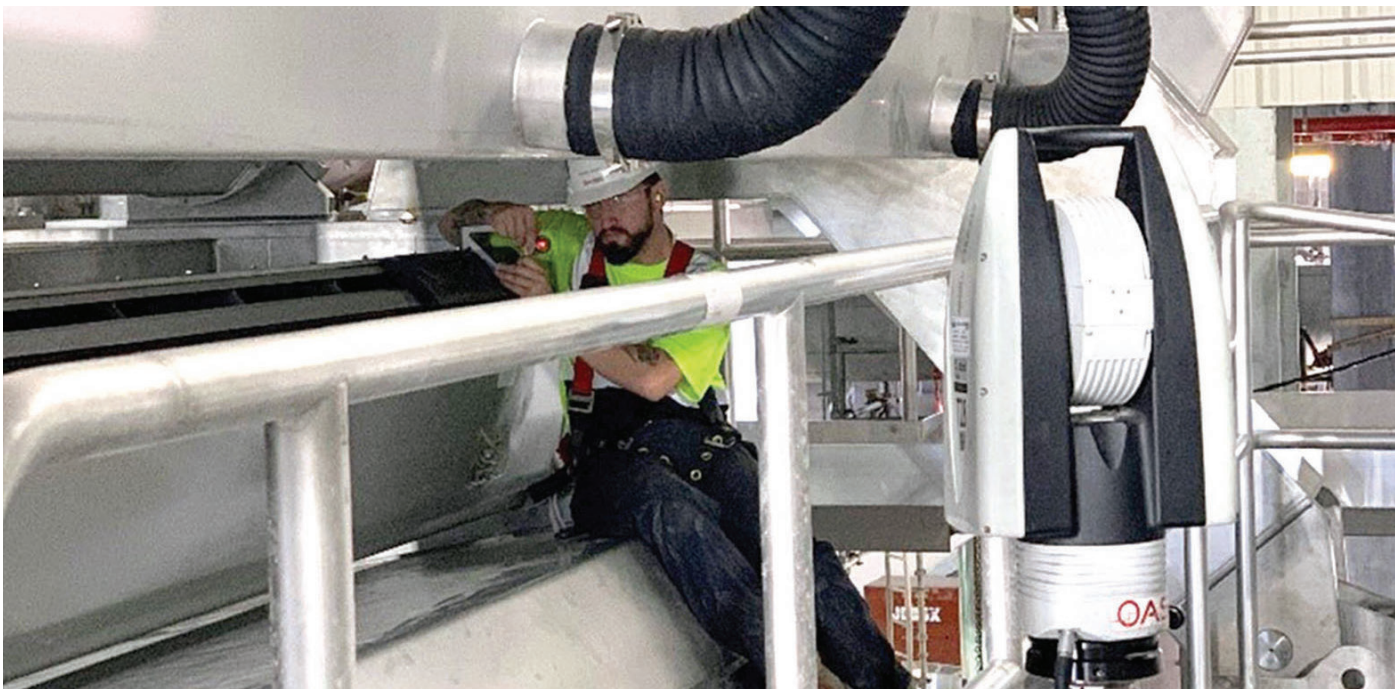
An overall machine centerline survey should be performed and monuments installed in the operating aisle floor. These monuments will serve as an offset representation of the machine centerline. Then optical tooling or laser trackers can be utilized from wet end to dry end for documentation of equipment alignment conditions.

Transitions should be established when aligning only one section of a machine at a time or during a rebuild effort. Proper transitions will allow for continuous sheet transition from one section to the next thereby avoiding sheet breaks.

Forming Zone: Know original specifications/geometry or modified/expected dimensions for alignment. Be prepared to present this information to your alignment company so they can verify and assist with alignment and documentation.

Press Section: During an outage, have the ability to nip rolls and if possible, plan to have felts removed as felts can restrict lines of sight (LOS).

Dryers: Plan for a cooling off period, from shutdown, to time to begin inspecting components. Radiant heat will affect optical LOS or laser beam from tracker. Again, it is best to plan on performing inspections when fabrics are removed as fabrics can restrict LOS. And it is always best to inspect off roll surfaces and not on fabrics.



There are various techniques for alignment but many are outdated and few people know how to utilize those outdated techniques. The preferred techniques are utilization of optical alignment tooling and/or laser-based equipment, such as the laser tracker.

Documentation: You want your alignment data collected and documented in a formal report. This data will serve as history which may show patterns (areas that you struggle to maintain precision alignment) and recommendations on ways to correct and maintain alignment of components.

Alignment Tooling & Technologies

There are various techniques for alignment but many are outdated and few people know how to utilize those outdated techniques. The preferred techniques are utilization of optical alignment tooling and/or laser-based equipment, such as the laser tracker. Highly accurate optical tooling and laser trackers can measure to 0.001" and easily provide precision measurement standards and tolerances required by manufacturers.

Optical tooling and laser trackers use established reference points and allow for measurements to be obtained on all locations of equipment in both vertical and horizontal location and alignment positioning. In general, machine components are measured, end-to-end, to determine relative alignment conditions and corrections are made at mounting surfaces for precision alignment.

Proper use of precision measurement instruments will yield optimal alignment results. The measurement instrument though, is only as good as its operator. When properly trained, alignment engineers and field service technicians can obtain and document precision alignment data that validates the alignment of new and existing equipment.

Benefits of Precision Alignment

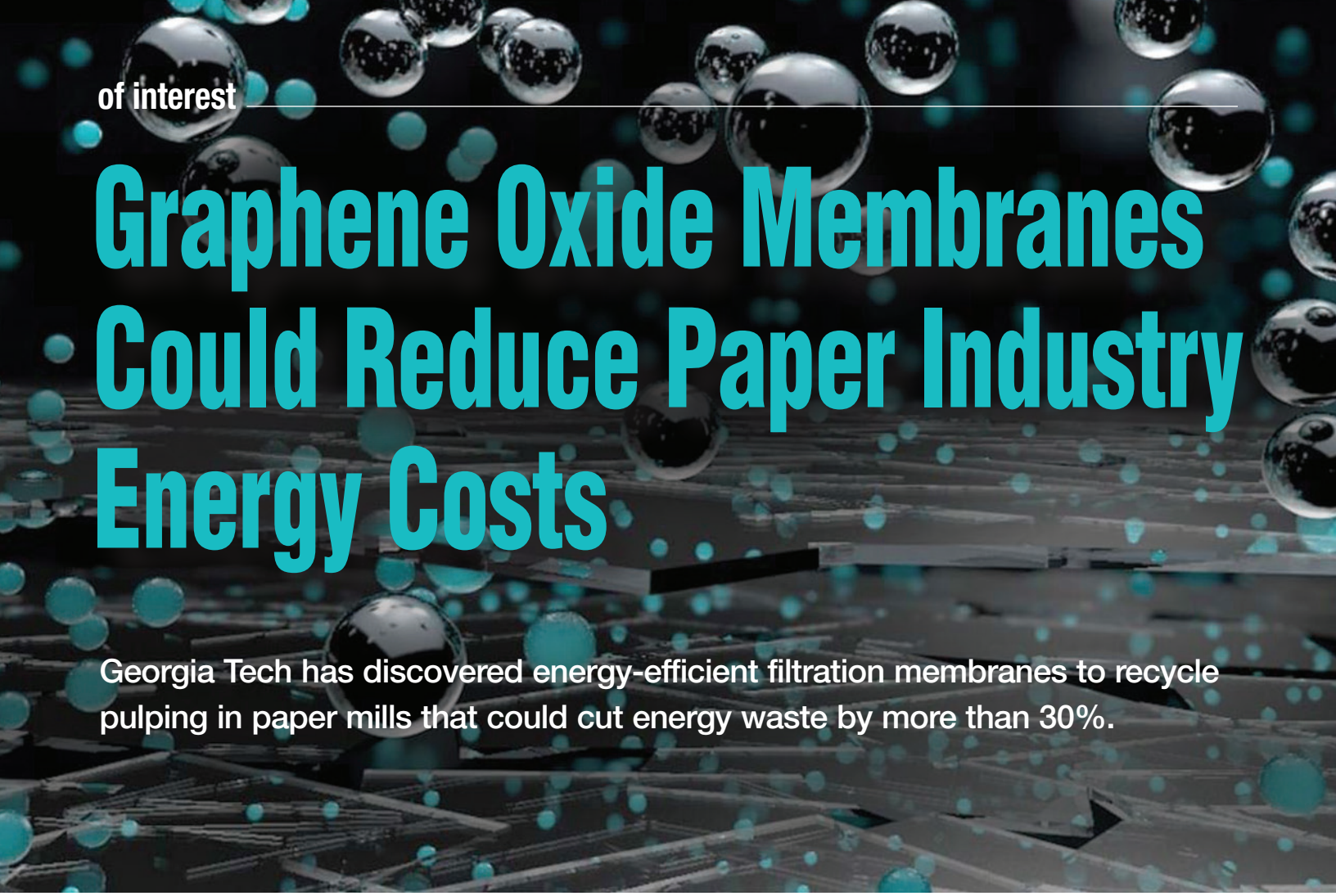
You gain time through:

- **Increased efficiency –** improved fabric performance and sheet formation, and improved press performance and drying capabilities.
- **Less machine downtime –** decreased sheet breaks and bearing, coupling, and gear failures and fabrics lasting their expected life cycle
- **Optimum production levels –** meet target number of tons per day; meet or exceed KPIs
- **High quality end product –** improved product quality and less scrap, and satisfied customers

One of the most important benefits, is that you can spend more time on what matters most: People. Quality. Productivity. ■

Myron Smith is Director of Training & Development for OASIS Alignment Services (www.oasisalignment.com). He has close to 30 years of experience in precision machine alignment with OASIS. Myron can be contacted by email at: myron.smith@oasisalignment.com.

Graphene Oxide Membranes Could Reduce Paper Industry Energy Costs



Georgia Tech has discovered energy-efficient filtration membranes to recycle pulping in paper mills that could cut energy waste by more than 30%.

By Anne Wainscott-Sargent

The U.S. pulp and paper industry uses large quantities of water to produce cellulose pulp from trees. The water leaving the pulping process contains a number of organic byproducts and inorganic chemicals. To reuse the water and the chemicals, paper mills rely on steam-fed evaporators that boil up the water and separate it from the chemicals.

Water separation by evaporators is effective but uses large amounts of energy. That's significant given that the United States currently is the world's second-largest producer of paper and paperboard. The country's approximately 100 paper mills are estimated to use about 0.2 quads (a quad is a quadrillion BTUs) of energy per year for water recycling, making it one of the most energy-intensive chemical processes. All industrial energy consumption in the United States in 2019 totaled 26.4 quads, according to Lawrence Livermore National Laboratory.

An alternative is to deploy energy-efficient filtration membranes to recycle pulping wastewater. But conventional polymer membranes — commercially available for the past several decades — cannot withstand operation in the harsh conditions and high chemical concentrations found in pulping wastewater and many other industrial applications.

Georgia Institute of Technology researchers have found a method to engineer membranes made from graphene oxide (GO), a chemically resistant material based on carbon, so they can work effectively in industrial applications.

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"GO has remarkable characteristics that allow water to get through it much faster than through conventional membranes," said Sankar Nair, professor, Simmons Faculty Fellow, and associatechair for Industry Outreach in the Georgia Tech School of Chemical and Biomolecular Engineering. "But a longstanding question has been how to make GO membranes work in realistic conditions with high chemical concentrations so that they could become industrially relevant."

Using new fabrication techniques, the researchers can control the microstructure of GO membranes in a way that allows them to continue filtering out water effectively even at higher chemical concentrations.

The research, supported by the U.S. Department of Energy-RAPID Institute, an industrial consortium of forest product companies, and Georgia Tech's Renewable Bioproducts Institute, was reported recently in the journal *Nature Sustainability.* Many industries that use large amounts of water in their production processes may stand to benefit from using these GO nanofiltration membranes.

Nair, his colleagues Meisha Shofner and Scott Sinquefield, and their research team began this work five years ago. They knew that GO membranes had long been recognized for their great potential in desalination, but only in a lab setting. "No one had credibly demonstrated that these membranes can perform in realistic industrial water streams and operating conditions," Nair said. "New types of GO structures were needed that displayed high filtration performance and mechanical stability while retaining the excellent chemical stability associated with GO materials."

Georgia Institute of Technology researchers tested the graphene oxide (GO) nanofiltration membranes with multiple water streams containing dissolved chemicals and showed the capability of the membranes to reject chemicals by size and shape, even at high concentrations.

To create such new structures, the team conceived the idea of sandwiching large aromatic dye molecules in between GO sheets. Researchers Zhongzhen Wang, Chen Ma, and Chunyan Xu found that these molecules strongly bound themselves to the GO sheets in multiple ways, including stacking one molecule on another. The result was the creation of "gallery" spaces between the GO sheets, with the dye molecules acting as "pillars." Water molecules easily filter through the narrow spaces between the pillars, while chemicals present in the water are selectively blocked based on their size and shape. The researchers could tune the membrane microstructure vertically and laterally, allowing them to control both the height of the gallery and the amount of space between the pillars.

The team then tested the GO nanofiltration membranes with multiple water streams containing dissolved chemicals and showed the capability of the membranes to reject chemicals by size and shape, even at high concentrations. Ultimately, they scaled up their new GO membranes to sheets that are up to 4 feet in length and demonstrated their operation for more than 750 hours in a real feed stream from a paper mill.

Nair expressed excitement for the potential of GO membrane nanofiltration to generate cost savings in paper mill energy usage, which could improve the industry's sustainability. "These membranes can save the paper industry more than 30% in energy costs of water separation," he said.

Georgia Tech continues to work with its industrial partners to apply the GO membrane technology for pulp and paper applications.

This work is supported by the U.S. Department of Energy (DOE) Rapid Advancement in Process Intensification Deployment (RAPID) Institute (#DE-EE007888-5-5), an industrial consortium comprising Georgia-Pacific, International Paper, SAPPI, and WestRock, and the Georgia Tech Renewable Bioproducts Institute. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the sponsoring organizations.

CITATION: Zhongzhen Wang, et al.,"Graphene Oxide Nanofiltration Membranes for Desalination under Realistic Conditions." *(Nature Sustainability, 2021)* https://doi.org/10.1038/s41893-020-00674-3. ■

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