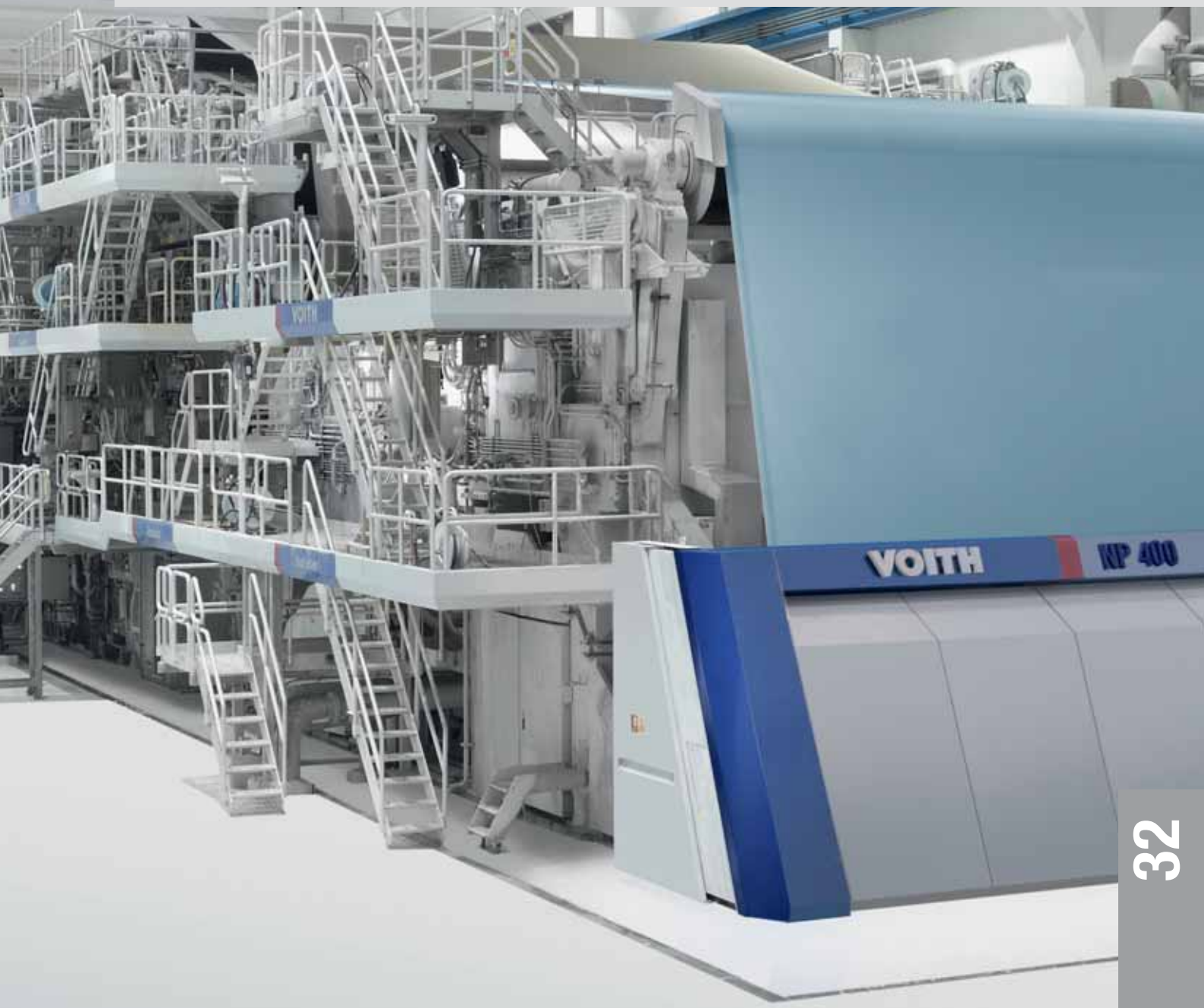
twogether

Paper Technology Journal

First IEM starts up at Perlen Papier AG | New plants in India: Tamil Nadu PM 3 and Dandeli PM 6 | Energy gain from sludge



News magazine for the international clientele, partners and friends of Voith Paper.

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Dr. Hans-Peter Sollinger, Member of the Voith GmbH Management Board and CEO of Voith Paper.

Dear customers, dear readers,

With the PM 7 at Perlen Papier AG, the first Integrated EcoMill has gone into operation. Our expectations for this concept, and of course those of our customers, have been met and even exceeded: since startup, the PM 7 has produced paper qualities of the highest level and with noticeably reduced energy and water consumption. Some of the technical highlights of the new production line are presented starting on page 12.

This issue's "New technologies" section features a whole series of innovations. One example is SynStron, a yarn developed by Voith Paper that gives the customer a 30% longer service life for the dryer fabric. With the Voith LSC TecoSens sensor, fiber weight and moisture in tissue production can now be measured without radioactive beta rays. A big success not only for work safety in paper mills, but also with regard to operating costs (p. 46).

The big advantage of the new spreader roll from Voith Paper is continuous sheet adjustment. The spreading effect can thus be adapted to any operating situation. As coating specialists, we can of course provide this roll with special surface qualities to match each application (p. 50).

The "Focus" topic of this issue is "Wastewater, sludge, rejects." Thanks to our new CTC technology, the potential of paper sludge can now be utilized, and value creation in this area can be increased. As a significant part of the Integrated EcoMill, paper sludge can be converted into valuable mineral products and thermal energy by means of CTC (controlled thermal conversion). This is an important contribution in reducing sludge, CO_2 and energy consumption (p. 60).

Finally, take a look at pages 74 and 75 during your next coffee break. Here we've collected some material for you that is entertaining and worth knowing.

Enjoy your reading!

H. P. Solleiger

On behalf of the Voith Paper Team

On the cover picture

With the startup of the PM 7 at Perlen Papier AG, the first Integrated EcoMill went into operation. From the beginning, the entire production line has consumed fewer resources, is highly cost-effective and produces paper of the highest quality.

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Achieving a lot with a little energy

First IEM starts up at Perlen Papier AG

Economical, environmentally friendly, regionally adapted – these are the essential criteria that distinguish a Voith Paper Integrated EcoMill (IEM). The IEM concept was implemented with the PM 7 at Perlen Papier AG, with the resulting resource consumption there for newsprint being well below the average. From the beginning, 5% less electrical energy per metric ton of paper has been consumed than with the PM 5, which was repeatedly optimized and is now shut down. This not only protects the environment but also pays off economically for the Swiss paper manufacturer.

Fig. 1: Perlen PM 7, Switzerland.

Perlen PM 7 – an Integrated EcoMill in numbers

360,000 t/year
Production capacity

40-52 g/m^2
Basis weight

10.45 m
Wire width

2,000 m/min
Design speed

1,900 m/min
Maximum production speed

1,662 m/min
Start-up speed (world record)

30%
Lower fresh water consumption across the entire paper mill

Compared with the PM 5, optimized to its maximum and now shut down:

5%
Lower electrical energy use*

10%
Lower thermal energy use*

50%
Fewer additive costs*

* All results per metric ton.

From the very beginning, the PM 7 looked set to be a record breaker. The production line clearly demonstrates the benefits of the IEM concept in real life. As a complete system provider, Voith delivered wastewater treatment, stock preparation, the paper machine, winder, roll transport and roll packing systems, as well as the entire automation. In terms of the process line package, Voith Paper was also responsible for delivery, overall assembly, startup and optimization of the entire production line. Resource preservation was at the heart of the overall concept developed in close collaboration with Perlen Papier AG, Switzerland, in which all processes are holistically coordinated with one another.

The PM 7 already consumes 5% less electrical energy

As Jörg Michel of Perlen Papier AG's management observes (see interview p. 11), "Almost from the very start, we took a big leap forward with the PM 7's running time efficiency. And even more important: From the beginning, we produced good to very good marketable quality."

According to Michel, this is due to optimally integrated processes from dewatering (DuoFormer) and the press section (DuoCentri NipcoFlex with three nips and a fourth press) to the dryer section (in which 31 dryer cylinders are used in six dryer groups). In direct comparison to the shut-down PM 5, which was technically updated through continuous further development, even right after startup the new PM 7 was consuming 5% less electrical energy per metric ton of paper produced. Even in terms of thermal energy, PM 7 is better compared to PM 5. The goal is to achieve an energy requirement that is lower by about 10%. In addition, the additive costs for binding agents, starch, talcum and dyes on the PM 7 have been nearly cut in half, particularly due to the modern press section.

TwinDrum and LowEnergy-Flotation ideally prepare stock

Recycling of recovered paper is an important topic at Perlen Papier AG.

Voith expanded the existing ALPA 1 recovered paper recycling plant by adding the ALPA 2 to its overall concept. Due to the integrated processes in the recovered paper preparation system, not only is the yield in stock preparation increased, but Perlen Papier AG also saves 7 GWh of energy annually. The latest flotation technology, LowEnergyFlotation (LEF), plays a significant role in this. For the first time, Voith equipped a new system with this technology yielding a sensational result: Inks are efficiently removed and the energy used for this at Perlen is reduced by more than 30%.

Fig. 3

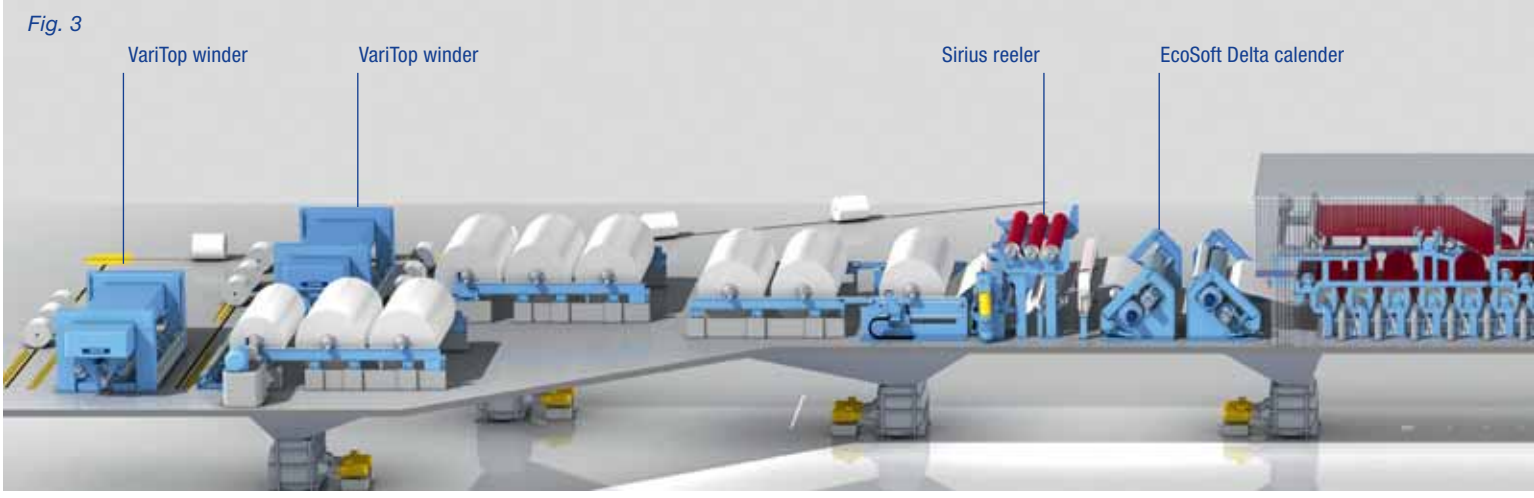


Fig. 2: The TwinDrum lowers additive consumption at Perlen.

The recovered paper used comes mainly from household material collected in Germany and Switzerland. The bundles of recovered paper from Switzerland are typically packed with various cords. The ALPA 2 not only removes the cords from the recovered paper but also de-wires bales weighing several tons, in fully automated fashion, and feeds the loose recovered paper into the TwinDrum. This TwinDrum with a capacity of about 1,500 t/day continuously supplies both stock preparation lines. Its innovative pulping concept combines the gentle slushing of fibers with a reduced requirement for additives. With a pulping consistency of 25 to 28%, outstanding ink removal is achieved, among other benefits, due to the integrated displacer located in the pulping section of the TwinDrum.

30% less fresh water is needed

Consumption of fresh water across the entire paper mill was lowered by one-third. This is a result of water management in all areas, from recovered paper preparation to the two paper machines (the existing PM 4 and the new PM 7) and the wastewater treatment system.

The latter includes purification of the water circulation system and reject treatment, for which Voith has developed and implemented a new concept for machine and process technology. During ongoing operation of the paper mill, the capacity of the clarification facility was doubled to 1,000 m^3/h of wastewater and 50 t/day of COD load. Two moving bed biological reactors (MBBR) are used as high-load biological stages followed by two low-load biological stages and three secondary clarification tanks. They ensure that biologically purified water can be discharged into the fish-abundant Reuss River, which has its source in the Saint-Gotthard Massif in the Swiss Alps. Therefore, the company meets the highest ecological requirements of the Swiss environmental authorities.

Perlen Papier AG gets its fresh water from its own well, where the village of Perlen also gets its drinking water. Thus, in further processing of the water, there is a strict separation of drinking water and industrial water. Perlen Papier AG uses around 50% of the fresh water as cooling water and discharges it back into natural circulation uncontaminated.

IEM adapted to location and customer requirements

Starting from the initial requirements, the Perlen PM 7 was designed so that it would not only meet the customer's quality expectations but also make use of existing conditions and be capable of being embedded in the existing infrastructure. In addition,

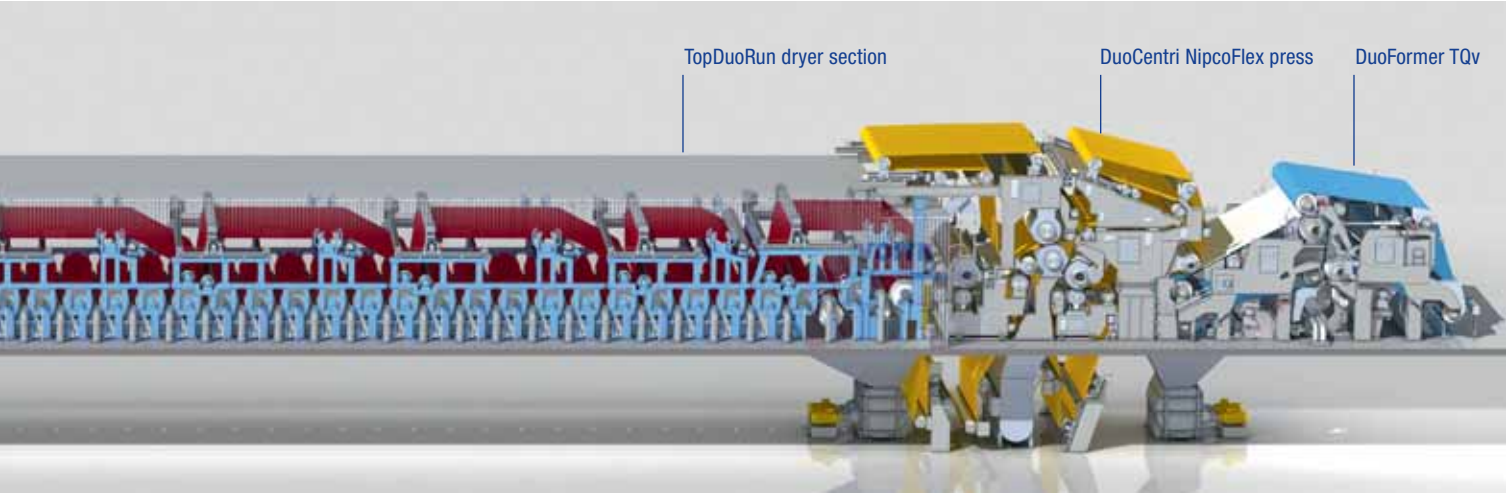


Fig. 4: The center winding principle of the two VariTop winders ensures good core-winding tightness, an important quality parameter for processing in fast-running printing machines.

through integration of all essential processes, consumption of resources was reduced to a minimum.

Important parameters were defined and established in the preliminary project phase. Printing tests and surveys of Perlen Papier AG's customers gave an exact overview of the quality requirements the new paper machine had to meet. High consistency, the best running characteristics and printability of the paper were the main concerns.

Before drawing up the first layout for the new PM 7, the project team determined its optimal location, on the company's premises. Advantage was gained from the hillside location, and the machine hall was built so that one side now has ground-level access to the PM floor and the other side has access to the machine pit. Even the dimensions of the building where the PM 7 is housed were reworked. Thus 35,000 m^3 of gross floor area were saved. Since the building was kept as small as possible, costs could be reduced.

In addition, the machine width and speed were adapted to the customer requirements, and the anticipated need for electricity, steam, water and chemicals was determined. Subsequently, the project team optimally assembled the corresponding system components and carried out the first calculations of efficiency.

Quality improvement using the center winding principle

According to Jörg Michel, the configuration of the press section and the winder with the center winding principle significantly contributed to improving the paper's quality. "Our customers made several test runs and always judged the paper quality positively," says Michel, who is responsible for the areas of production and technology. In addition, Voith integrated a special solution into its concept in the packing system area. Rolls that are delivered to Swiss customers no longer have extra packing at the front in a separate process step. This saves packing material, time and is in equal measure an ecological and economic advantage.

After an exemplary startup, the Perlen PM 7 began production in September 2010 and since then has been running to everyone's complete satisfaction. In close collaboration, Perlen Papier AG and Voith Paper implemented a system that adheres to the strictest environmental criteria, works efficiently and – with Swiss perfection – produces paper at the highest quality level.

In conversation: Jörg Michel on the new PM 7 at Perlen Papier AG

"Overall energy balance clearly improved"

Jörg Michel, certified chemist and member of management at Perlen Papier AG, says the paper market in Europe is very competitive. Those who want to hold their ground in the area of newsprint paper production over the medium and long term need efficient, economical systems.

Mr. Michel, why has Perlen Papier AG decided on a new production line?

We are, of course, constantly watching market developments. In our estimation, even with falling demand for newsprint in the markets of Switzerland, Germany, Italy and France, which we primarily supply within a radius of 600 kilometers, only those paper manufacturers that can keep up their margins can survive. The size and capacity of a system are of significance here. In our industry, those who don't invest die a slow death.

Why did your company decide in favor of a system from Voith Paper?

Already in the preliminary project phase, we could see that the Voith team was well ahead of its competitors in the project of recovered paper preparation and in de-inking technology. In addition, from our collaboration with Voith we expected a top-level performance with regard to deadlines, costs, product quality and reliability. All our expectations were fully met.

What are your experiences currently with the PM 7?

The PM 7 started up according to schedule at the beginning of September 2010 and since January 2011 has taken a big leap forward regarding running time efficiency. For 2011, we are planning 300,000 metric tons of paper, and soon we are expecting a final capacity of 360,000 tons. From the beginning, the PM 7 produced good to very good marketable qualities. We are thus meeting the highest customer requirements for newsprint papers.

Fig. 1: Jörg Michel, member of Perlen Papier AG management (left), and Johannes Rimpf, Project Manager at Voith Paper (right), look back on the successful course of the project.

Perlen Papier places a lot of importance on environmental management. How does the PM 7 contribute to this?

Due to closed water cycles, we consume about one-third less water throughout the paper mill with the water management system implemented by Voith Paper. In the case of thermal energy, we will certainly reach our goal of 10% lower energy use. The plant will clearly improve its overall energy balance, since we are massively increasing the amount of recovered paper used as a raw material. Preparation of recovered paper requires noticeably less energy than preparing paper pulp from wood.

Fig. 1: The new LowEnergyFlotation (LEF) at Perlen.

Fig. 2: High-efficiency LEF pump.

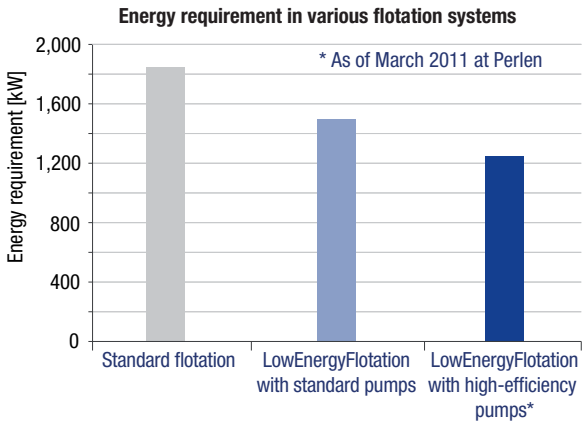


Fig. 3: Reduced energy requirement for flotation with the new LEF.

33% less energy thanks to LowEnergyFlotation

In the flotation stage of the de-inking system for the PM 7 at Perlen, flow characteristics and mechanical components are perfectly coordinated with one another. The key to success is LowEnergyFlotation (LEF); Through consistent further development of the fluid dynamics, the energy consumption in this flotation stage was immediately reduced by 33%. Currently it is 18 kWh/t – with the full potential of the LEF system not even utilized yet. For Perlen, the operating costs of the 700 t/day plant are already significantly lowered. Generally, flotation is one of the most energy-intensive areas of stock preparation for newsprint, using about 20% of total energy.

The primary aim of the research and development work on LEF was to clearly reduce the energy requirement for flotation while maintaining outstanding flotation results. This was achieved through a modification of the injector technology, optimization of injector and EcoCell hydrodynamics and use of high-efficiency pumps developed specifically for LEF.

Due to better flow characteristics, LEF reduces energy consumption on all levels of the flotation. This includes transportation of the de-inking suspension, feed-in of air to the system, air bubble separation, as well as skimming off and conveying of the flotation foam. The DIP plant of the PM 7 is the first new system to use LEF.

Scope of supply:

Complete de-inking system, from planning (pre-, basic and detail engineering), delivery and installation to startup	New development of nutrient storage and dosing, additional MBBR high-load reactor and rebuild of existing high-load reactor with new ventilation system
Feeding system for recovered paper with automatic de-wiring, pulping by means of TwinDrum	New sedimentation, rebuild of existing sedimentation as secondary clarification tank, gradual expansion of clarification system during ongoing production
Screening systems with MultiSorters and C-bar screen baskets, LowEnergyFlotation	Water, sludge and reject subsystems, sludge dewatering including transport system
Thune Bagless disc filters and screw presses, dispersing system with HC bleaching	
Comprehensive services beginning with pilot plant tests and extending to final system optimization	

Fig. 1: Field instruments in use.

Fig. 2: Constant monitoring from the control room.

Fig. 3: The Voith LSC Scanner checks paper quality.

From preparation to the packed roll

Perlen Papier AG decided in favor of a complete, consistent automation package for the entire production line, from preparation of recovered paper to the packed roll. The automation concept was developed in collaboration between Perlen Papier AG and Voith Paper and was tailored exactly to the needs of the customer.

Along with the machine control and distributed control technology, this package includes – among others – all field instruments used in the process. These consist of valves, armatures and various sensors such as pressure, flow or consistency transmitters. In addition, Voith also assumed responsibility for electrification, the multi-motor drives, individual inverters and robots at the packing system. For the customer this meant a delivery from one source, from basic engineering to system optimization. Collaboration between the mechanical engineers, process engineers and fabric experts from Voith Paper ensured the technological components were ideally coordinated with one another.

The project manager for the area of automation technology at Perlen Papier AG, Michael Nageler, is happy about the successful startup: “The entire delivery of the automation package really made the work flow easy. Problems onsite were tackled directly by the Voith specialists and competently solved. We are very satisfied with the entire package and the handling of the project.”

Scope of supply:	
Machine control (MCS) and distributed control system (DCS) for the ALPA 2 recovered paper recycling plant and PM	Quality control system with scanner, CD and MD profile controls
Expansion of existing DCS for wastewater purification system and sludge presses	Web inspection system and web break detection system
System engineering (basic and detail)	Information system with trending and reporting
Field instruments for ALPA 2, the approach flow system and paper machine	Complete electronic equipment including 12 kV level such as transformers, multi-motor drive, MCCs and frequency inverters
Controls and drive solutions for the winder and packing system	Robots for the packing system, adjustable machine drives for the PM and winder, ITV camera technology

Fig. 1: Wire section and pick-up felt.

Fig. 2: SkyLine doctor blades on the way to installation.

Fig. 3: Various roll coatings and covers in the finishing area.

Bundled expertise supports quick startup

With a start up speed of 1,662 m/min, the PM 7 had the fastest ever startup of a paper machine. Part of this success was due to the optimal interplay of fabrics, roll covers and doctors that was established in pre-testing. This took place at the Paper Technology Center (PTC) in Heidenheim, Germany.

The mixture of materials used in Perlen was replicated for extensive testing at the PTC. This was well worth it; Already during testing the fabrics could be precisely adapted to the future PM 7 with regard to quality and running characteristics. The actual startup onsite was therefore handled very quickly and smoothly. In addition, the first paper produced directly after startup in September 2010 met the customer's requirements.

Perlen Papier AG specified the fabrics, roll covers and doctors used according to the quality standards for its machine. Additionally, within the framework of total roll management, the paper mill decided not only to source all roll covers from Voith but also the complete roll service for the PM 7 over the next three years.

Scope of supply:

Top and bottom wires in the former	Polyurethane roll cover for the suction press roll
Press felts for all 4 presses	Thermal roll coating of the top roll in the 4th press and the center roll
Dryer fabrics for all dryer groups	Roll coatings and covers on various wire, felt and paper guide rolls
Cleaning and removal doctors on center rolls and the top roll in the 4th press	

Fig. 1: Roll transport to storage.

Fig. 2: Mobile-mounted winding head of the ClassicPlus roll packing machine.

Fig. 3: Outer cover robots at work.

ClassicPlus has the highest flexibility

For packing the finished rolls of the PM 7, Perlen Papier AG decided in favor of the newly developed ClassicPlus roll packing machine with an extensive roll transport system.

The ClassicPlus uses the principle of parallel packing with a water-proof kraft paper. For this, the roll is wound with parallel layers, a mobile winding head being applied several times depending on the roll width. For mutual sealing, the layers are glued to one another.

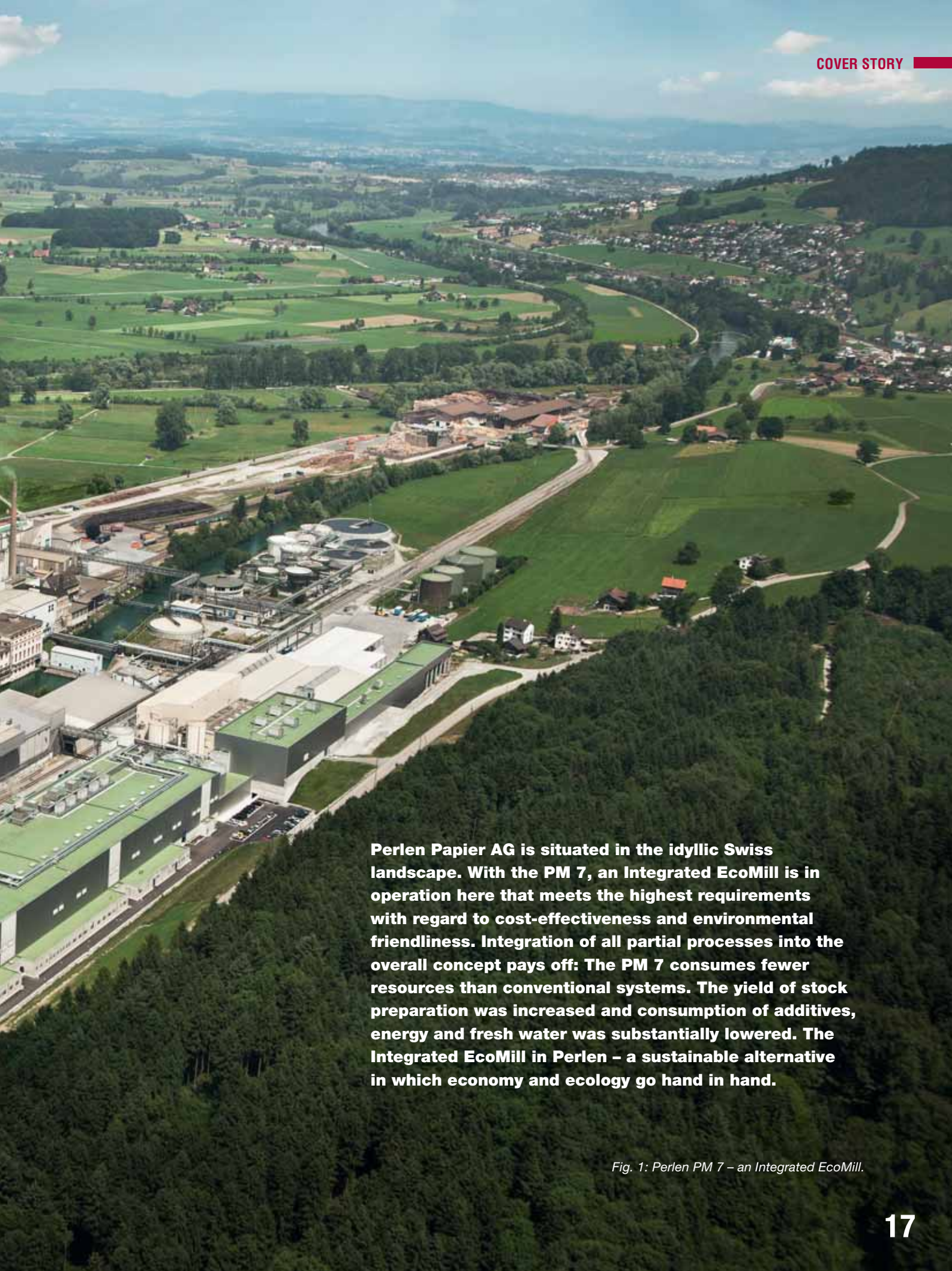
Currently, the ClassicPlus is designed for 70 rolls per hour from the PM 7; in the future, the rolls of the Perlen PM 4 will also be packed in it. Its modular concept allows an increase in capacity, with additional components, to 130 rolls per hour. Another advantage of the ClassicPlus is that it requires only 50% of the installation space of the classic packing system, e.g., with four fixed unwinders.

The system was designed to be fully automatic and uses industrial robots for attaching the inside and outside covers and for attaching the shipping labels. Only one employee is required for operation of the packing machine.

Full packs (circumference and ends) for international shipping and also an edge-aligned circumferential pack for customers within Switzerland are possible with the system. Packing material can thus be saved, providing an economical and ecological advantage for Perlen Papier AG.

Scope of supply:

Approach flow system with Hydromix, HCL5 cleaner system with EcoMizer, MSA MultiScreen, bleeding with the VoithVac	TopDuoRun dryer section allows energy-efficient drying with the best running characteristics
PowerTube turbine for energy recovery, Save-All disk filters, CompactPulper for broke pulping	2 EcoSoft Delta calenders provide for the best paper surfaces, Sirius roll-up system for maximum roll diameter of 4,000 mm
DuoFormer TQv with ModuleJet headbox for first-class formation	2 VariTop winders for production of large rolls with various core materials
DuoCentri NipcoFlex press with 4th press ensures the highest dry content	ClassicPlus packing system uses the principle of parallel packing and due to its modular concept gives the highest flexibility in roll packing



Perlen Papier AG is situated in the idyllic Swiss landscape. With the PM 7, an Integrated EcoMill is in operation here that meets the highest requirements with regard to cost-effectiveness and environmental friendliness. Integration of all partial processes into the overall concept pays off: The PM 7 consumes fewer resources than conventional systems. The yield of stock preparation was increased and consumption of additives, energy and fresh water was substantially lowered. The Integrated EcoMill in Perlen – a sustainable alternative in which economy and ecology go hand in hand.

Fig. 1: Perlen PM 7 – an Integrated EcoMill.

Quality paper for India and the world

New PM 3 provides increase in capacity at TNPL

Tamilnadu Newsprint and Papers Limited (TNPL), one of the leading companies in integrated pulp and paper manufacturing, recently started up its new PM 3 from Voith Paper. With a wire width of 6,100 mm and a capacity of 155,000 tons/year, the paper machine will expand the annual production capacity of TNPL to 400,000 tons of top-quality writing and printing paper.

Growth is nothing new for the dynamic TNPL. Since the start of operations in the 1980s, with a production capacity of 90,000 tons/year, the paper mill has gone through numerous expansions and upgrades. With the PM 3, TNPL is currently in the final phase of a big investment program, which envisions an increase in capacity for high-quality writing and printing paper from 245,000 to 400,000 tons/year. At the same time, efficiency measures are being implemented both in production as well as environmental considerations, which will help the company achieve an international quality level.

Along with integration of the pulp mill, which mainly processes bagasse as a raw material, installation of a new production line was one of the most important investments of the recent past. The new Voith paper machine with a wire width of 6,100 mm and a design speed of 1,200 m/min is built for a production capacity of 155,000 tons/year.

Fig. 1: Tamil Nadu PM 3 increases annual production capacity at TNPL to 400,000 tons.

Using bagasse requires experience and know-how

Through this investment the company has positioned itself as the largest paper mill worldwide that works from >>> bagasse. Beside short fibers, about one million tons of bagasse are to be processed annually. However, the use of bagasse raises a whole series of complex questions for the paper manufacturer and the supplier of the paper machine. Due to the dewatering characteristics of bagasse, the drying process lasts 40-60% longer than in the case of conventional production with wood pulp, i.e., a significantly longer dewatering section has to be installed. In addition, there is a higher shrinkage rate. In order to compensate for this, the machine has to be designed to be wider. Furthermore, bagasse tends to be more adhesive, which poses a challenge for the press section. Due to many previous projects, Voith Paper not only has an enormous wealth of experience in India but also the know-how to deliver machines for paper manufacturing using bagasse. From stock preparation to the winder, only proven components were used for the PM 3. The machine went into operation at the end of December last year and began producing copy paper for the growing domestic market.

Growth market India


Fig. 2

Everyone who visits India for the first time is impressed by the size and the population density of the country: 1.2 billion people live there, and around 20 million are added to that each year. This remarkable population growth is the same as the total number of Australia's current residents added every year. The state of Tamil Nadu alone, where TNPL is located, has over 65 million residents. This one state thus has more residents than most European countries. And where there are people, paper is also needed.

Tamil Nadu is in the south of India. The state is ideally suited as a location for a pulp and paper mill the size of TNPL. The reason is the ample supply of pulp and easy access to various markets, both domestic as well as export markets.

Why is TNPL interested in the export business when there is an intensely growing domestic market in its own backyard? Paper manufacturing experts on site assume growth rates in the range of 25% for some grades.

A. Velliangiri, Deputy Managing Director at the TNPL paper mill, explains: "Just because we have a rapidly growing home market doesn't mean there is a free-for-all to make a profit. Far from it, India is a highly competitive market with just as tough price competition as anywhere else in the free markets, so exports are extremely important and an area we are seeking to grow, particularly in the high-quality paper segment."

400th NipcoFlex shoe press goes to TNPL

One of the special features the PM 3 has is the Tandem NipcoFlex shoe press. TNPL received the 400th press of this kind, which emphasizes the success and the popularity of the component in the paper industry. Especially when high dewatering capacity is required during the paper manufacturing process, the advantages of this press concept are presented. Meanwhile, four NipcoFlex presses are now in use at the Indian company after the most recent delivery to TNPL.

>>> Info: bagasse – sugar cane waste product

The term "bagasse" comes from the word "bagazo", which means "waste" in Spanish. Bagasse is the pithy residue that remains after the sugar is removed from sugar cane. Paper manufacturing with a sugar cane waste product once again demonstrates the considerable capabilities of the paper industry for producing feasible quality products from residual materials.

Bagasse has a number of useful characteristics as far as the production of pulp is concerned: It is much easier to harvest than pulp wood and it requires significantly smaller amounts of bleaching chemicals in order to get a clean white paper web. Nearly all grades can be produced from bagasse pulp, including bank note paper and newsprint. However, producing high-volume paper with bagasse as the raw material continues to be a challenge.

Other highlights of the PM 3 include:

- High-turbulence headbox for Fourdrinier and hybrid formers, equipped with a CD basis weight control, which ensures even formation.
- For additionally improved form stability and minimized shrinkage, the first five dryer groups are built in single-tier design and the last two groups in two-tier design.
- Pre-dosed size press with on-line size and pigment application, to apply up to 1.5 g/m² of starch or up to 5 g/m² of color pigmentation per side.

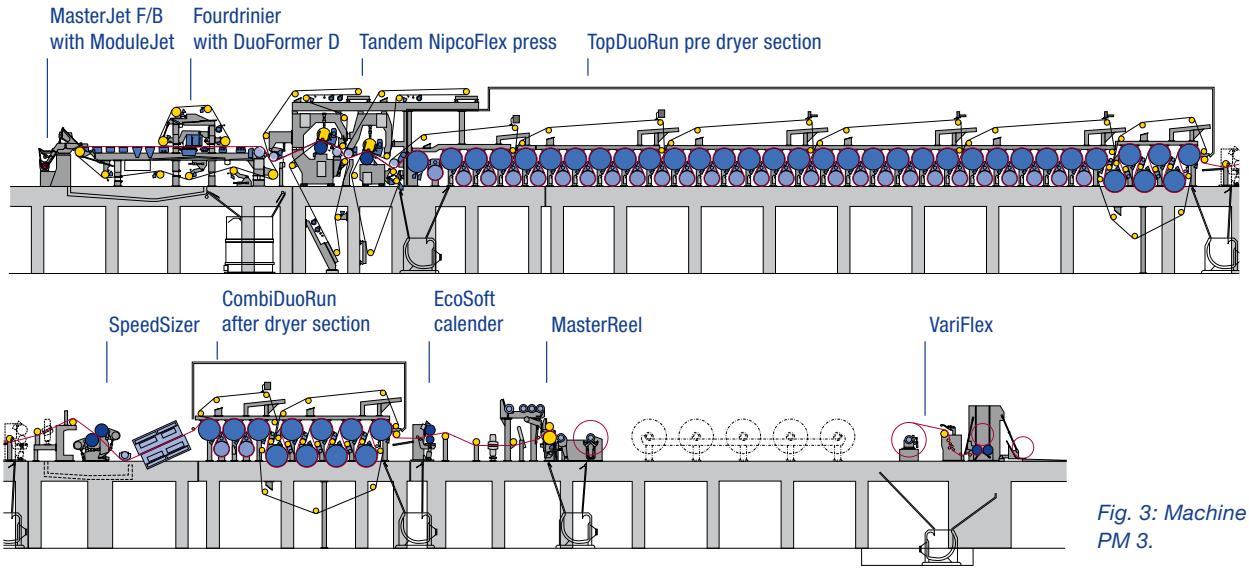


Fig. 3: Machine concept PM 3.

- EcoSoft calender with an elastic nip to ensure the required sheet smoothness and gloss levels for uncoated and pigmented grades.
- Fourdrinier former with TopFormer, which was specifically developed for counteracting two-sidedness with good form stability.

Since the startup of the PM 3 at the end of December 2010, TNPL has been producing copy paper for the domestic Indian market. T. K. Ramachandran, Managing Director at the TNPL paper mill, stresses that "without the active participation and involvement of Voith, the quick startup of the new PM 3 would have been impossible."

Quality requirements of printing plants met

Along with copy paper, other grades are also planned that should provide TNPL with a competitive advantage. A. Velliangiri, Deputy Managing Director explains: "With PM 3 now, we have all sorts of opportunities to reach other markets and supply other products. For instance, this area of India is increasingly gaining a reputation as being a center for high-quality printing, and printers here are installing all the state-of-the-art printing presses from the likes of Heidelberger Druckmaschinen and manroland. These machines are running very high-quality output at very fast speeds and demand a paper that not only allows ease of putting ink on paper, but one that has unquestionable runability qualities. That is what we can do with our paper made from bagasse, particularly with the tandem shoe press and EcoSoft calender features on the PM 3."

The company is currently also considering other countries as possible export targets. A. Velliangiri explains: "Last year we exported around 50,000 tons of various grades, and we expect this to increase going forward. Although we have a growing market, exports are massively important particularly in the quality areas."
Installation of a de-inking system with a capacity of 300 tons/day for supplying its paper machines with color-stripped pulp is the next project pending at TNPL.

Location

India

The location for the new paper machine is Kagithapuram in Tamil Nadu, the southernmost state of India. Covering an area of 130,058 km², this state is almost as large as Greece.

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Dandeli PM 6 successfully started up

A new age of paper production at the Kali River

The Dandeli PM 6 of >>> West Coast Paper Mills Ltd. (WCPM) successfully started up in May of 2010 in Dandeli, India, and already in December the Final Acceptance Certificate was signed. The PM 6 produces high-quality writing, printing and copy paper in the basis weight range of 45-90 g/m² at a wire width of 5,850 mm and a design speed of 1,200 m/min. The investment of WCPM in a sixth machine at the Dandeli location should almost double paper production and open up new levels of quality.

From the beginning, the paper quality of the PM 6 was impressive and the planned production quantity was exceeded only a few months after startup. Saurabh Bangur, Director of WCPM, is very satisfied with the course of the project: "With Dandeli PM 6, one of India's most modern graphic paper machines was installed in record time. This is the best start-up I have ever experienced or even heard of, and we achieved its rated operating speed of 980 m/min within a very short span."

Bangur continues: "After some optimization and fine tuning work with this latest production line, we have produced high quality copier grades efficiently and cost effectively, which have been very well accepted in the market. All the quality expectations have been achieved and very well established with very close teamwork between our team and Voith. With a combination of automation, plant engineering and services along with state-of-the art technologies in our new PM 6, Voith has truly acted as our partner in this WCPM's Mega Expansion Project."

Simultaneous completion of all systems

One reason for WCPM's investment was to increase the annual production capacity from 163,000 tons to 320,000 tons. The higher need for pulp was covered by construction of a new facility for production of bleached pulp. Another component

Fig. 1: Dandeli PM 6 – convincing paper quality from the beginning.

>>> Info: West Coast Paper Mills

Commercial paper production at the current West Coast Paper Mills Ltd. in Dandeli, India, began in 1959. Today WCPM, which belongs to the S. K. Bangur Group, is one of the largest paper manufacturers in India. At the Dandeli location, graphic paper and board are produced on several machines. Annual production, which in 1959 was still at 18,000 tons, was increased to 163,000 tons in 2003 and 2004 through various expansion and modernization measures. Now annual production has nearly doubled with the new PM 6.

Fig. 2: DuoFormer D and DuoShake ensure high paper quality in the forming section.

Fig. 3: Strong cooperation between Voith Paper and WCPM allows smooth startup.

of the project was modernization of the existing power plant.

The big challenge for everyone involved was the nearly simultaneous execution of projects. Completion of the pulp facility thus overlapped with construction of the paper machine and expansion of the power plant. Behind all the planning was the goal of having sufficient pulp and electrical power available for the startup of the Dandeli PM 6.

Machine concept meets high requirements

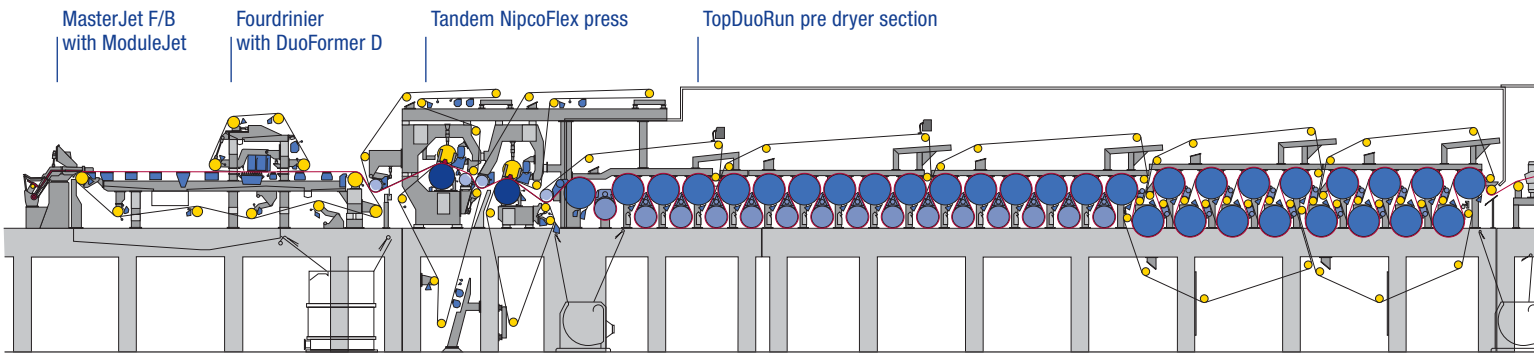
Since premium writing, printing and copy paper was going to be produced on the new paper machine, the requirements were high from the very beginning. Along with very good profiles, excellent formation and a low MD/CD tensile ratio, a low level of roughness and high volume were especially important.

Since long fiber pulp would have had to be additionally purchased, use of 100% short fiber pulp was required for all grades and speeds, as was above-average efficiency and runability of the paper machine. A future increase of production speed to 1,200 m/min was also to be taken into account.

The optimal machine concept was finally developed together with the customer and included tests at

Fig. 4: Dandeli PM 6 scope of supply

Along with the whole paper machine, including the stock preparation and the approach flow system, Voith Paper delivered an automation package that includes the entire machine-oriented control, process control technology and a quality control system. By means of the roll covers, fabrics and doctor blades, high system efficiency was ensured beginning with the startup of the PM 6. In addition, the accessories of the PM such as the hood, process air technology, plant air technology, mechanical drives and the central lubrication system were also included in the delivery from Voith Paper.



Voith Paper's Heidenheim Paper Technology Center. In the area of sheet formation, the proven DuoFormer D and a DuoShake provide for paper quality that even exceeds the high expectations of WCPM. The installed Tandem NipcoFlex press has two advantages: first of all, high dry content and thus high production potential; and secondly, it is attractive due to the closed web run with the best runability. The dryer section, SpeedFlow and soft nip calender are state of the art for the paper qualities produced.

At the customer's side from the beginning

The intensive collaboration between WCPM and Voith and competent project management were critical to the project's success. The demanding task of simultaneously working on several systems could thus be accomplished. Together with the PM 6, the new pulp facility and the modernized power plant went into operation on time. For WCPM this was a clear economic advantage, since there was no downtime.

But this was not the only challenge during the project. Due to the monsoon that started in June of 2008, work on the building advanced only slowly since the heavy rainfall put the site under water at times. Nonetheless, the first specialist from Voith Paper was already on site in March of 2009. The specialist was there to ensure that no time was lost and that as much work was done as early as possible. At the same time, the specialist supported WCPM in the final preparation of the building and with logistics in the area of machine assembly.

Only half a year after startup of the paper machine, WCPM had its first discussions with Voith Paper about an increase of production speed to 1,200 m/min. Due to the potential, especially in the press section, that was possible without any additional large investment.

For further support with optimizations and with troubleshooting, a team of automation and process engineers will be available to the customer on site until the end of the first production year.

Location

India

The Dandeli location is in the province of Karnataka, ca. 650 km southeast of Mumbai. Surrounded by a dense forest, the location on the banks of the Kali River was selected due to its favorable situation. The state of Maharashtra's promise to provide a continuous supply of wood as the raw material, the availability of water from the Kali River and power supply from the state network, among other things, were reasons for the location decision.

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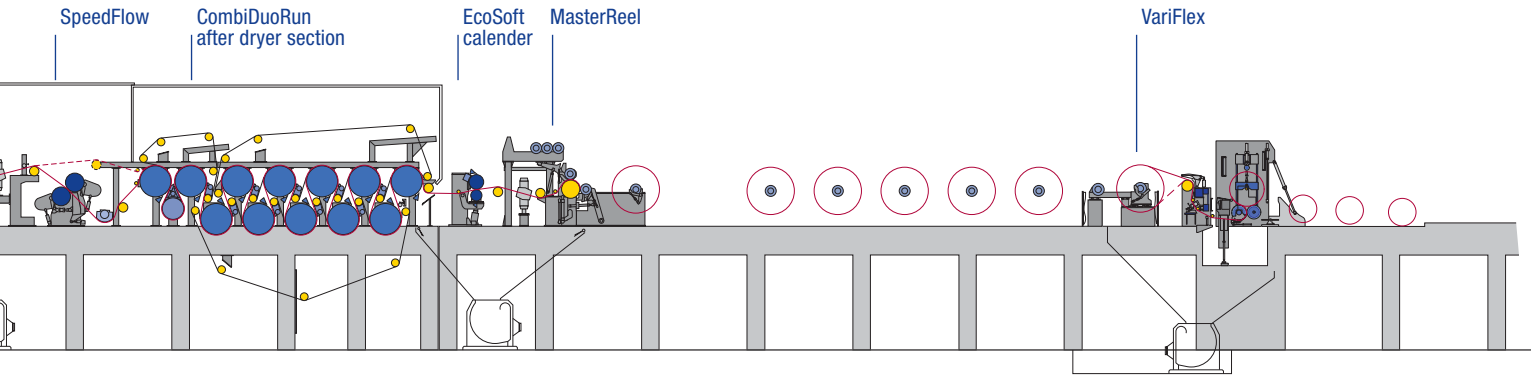


Fig. 1: A free benchmark test for an initial energy efficiency evaluation of screening systems is available online: www.ScreenFitNavigator.com.

ScreenFit Compass 2011 analyzes screening systems

Study: 70% worldwide waste energy

In the benchmark ScreenFit Compass 2011 study, Voith Paper analyzed 80 fine-screening systems of various generations, makes, models and sizes. The results were clear: 70% of screening processes analyzed worldwide use energy inefficiently. That is an ailment Voith "ScreenFit Doctors" can help cure. They offer expert advice and support to papermakers about rebuilding projects to avoid wasted energy. Voith also offers, via the Internet, a quick analysis of how well or poorly a paper manufacturer's existing screening system performs with regard to energy efficiency.

The ScreenFit Compass process identified only 24 of the 80 systems as energy efficient. Twelve were in the mid range for energy efficiency and have clear possibilities for improvement. The remaining 44 systems proved inefficient, with a very high optimization potential. For such cases, Voith Paper ScreenFit Doctors can provide sustainable solutions for an energy efficient screening process in stock preparation.

In the study, the designs of 80 stock preparation systems worldwide were compared to the current state-of-the-art technology.

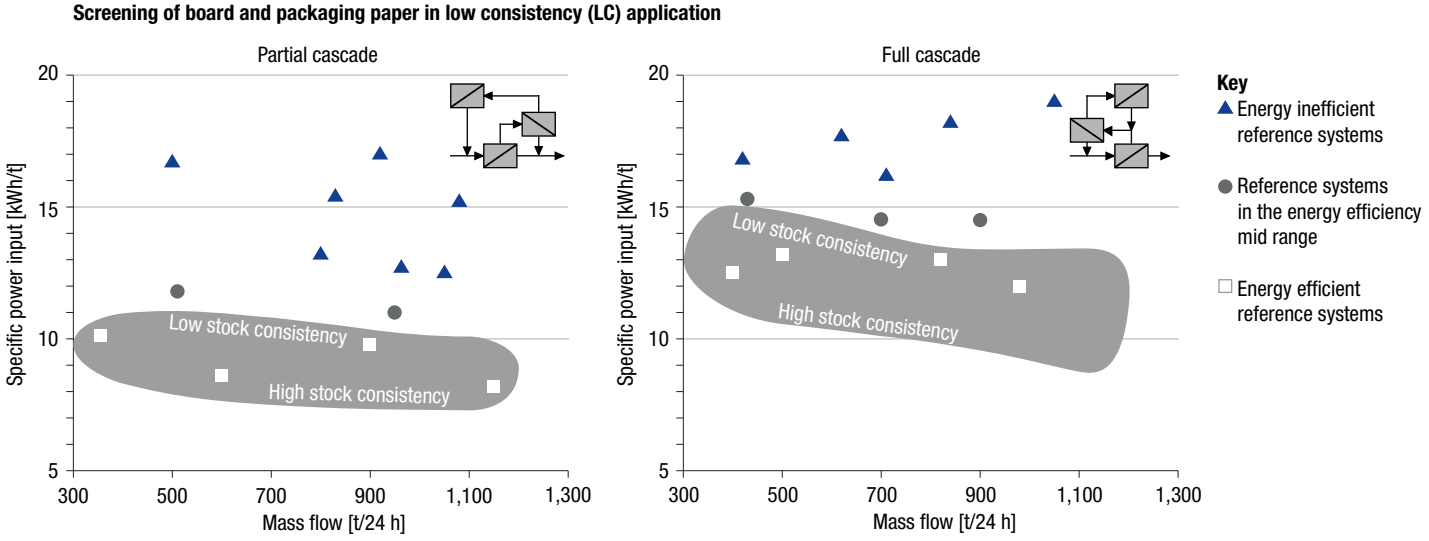
The findings rated the energy consumption of various manufacturers based on stock consistency, screening efficiency, operating mode and paper grade. A full cascade system consumes more specific energy than a partial cascade system because the full cascade returns stock to the upstream stage. Operating in full or partial cascade, however, depends upon technical factors such as screening efficiency and cannot be made dependent on the specific energy requirement. The specific power input refers only to the screening machines in the study. Pumping energies were not taken into account in the calculation.

The trend is toward innovative bar profiles

The wrong choice of screening concept or operation of obsolete systems appear to be the main causes of the poor results in the ScreenFit Compass 2011. To counter those poor results, Voith Paper offers its C-bar screen basket line, which continues to be enhanced with ongoing innovations. Over the past few years, the relationship between screen basket size and screen surface has constantly increased with C-bar family baskets while slot widths have stayed constant. As the latest screen baskets get smaller in size, production capacity increases, and screens once operated in parallel can be switched off. Investment and operating costs can thus be substantially reduced.

Along with the right choice of screen baskets and rotors that match them (e.g., the MultiFoil rotor), stock consistency and the interconnection of the individual screening stages contribute considerably to specific energy consumption. For this reason, modern Voith stock preparation concepts aim at increasing stock

Fig. 2: Significant examples from the ScreenFit Compass 2011 benchmark study of screening systems for board and packaging paper. The study clearly shows how often specific power input is well exceeded. Systems in the gray fields correspond to the current state of technology.



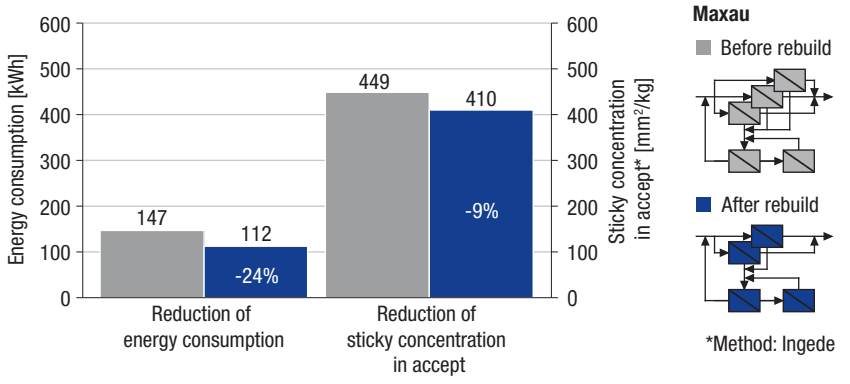


Fig. 3: Reduction of sticky concentration and energy consumption after conversion to C-bar R in the first stage and to C-bar Q in the final stage of the screening system in Maxau. One of the three first-stage screens could thus be shut down.

consistency and improving the relation between energy input and screening efficiency.

The compact design of the new screening systems reduces the size of the stock preparation, which in turn leads to lower investment costs. However, choosing the right screen basket depends not only on open screen surface but also on stock parameters, such as fiber length.

ScreenFit Doctors already successful in practice

The ScreenFit Doctors have proven successful several times, such as in the southern German StoraEnso Maxau paper mill, where graphic paper is produced. The full cascade screening, with three Voith vertical screens working in parallel in the first stage and one screen each in the second and third stage were all equipped with Voith C-bar S baskets.

The intake stock consistency in the fine screening can be classified as low. The conversion to C-bar R for the first two stages and C-bar Q screen baskets for the final stage meant the entire open screen surface of all screens increased nearly 50% – with the same slot width. After shutting down a vertical screen in the first stage, sufficient screen surface still remains. With improved stickies removal, the annual energy saving is about 300,000 kWh. A future throughput increase remains an option for the operating company.

Free benchmark test on the Internet

Voith Paper has now created a way to subject the fine screening for brown and graphic paper to a quick, non-binding self test via the Internet (www.ScreenFitNavigator.com). The calculation for this initial check is based on the results of the screening system study. System operators need only name the system type, identify a few parameters, and give information on the main quality focus for the screening. The program then draws up an initial energy evaluation of the screening system. The energy efficiency of the system becomes visible on a color bar from green to red.

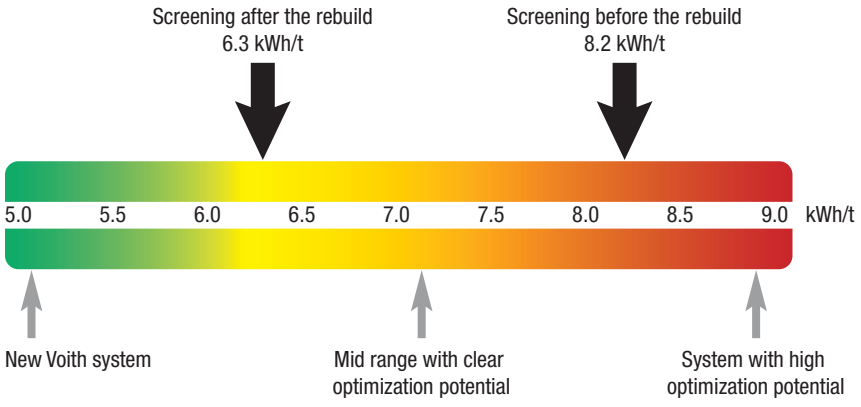


Fig. 4: As a result of the self test with the ScreenFit Navigator, every user gets a first estimation of the energy classification for the system.

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C-bar M screen basket completes screening portfolio

Stability is key

Maximum screening quality and minimum energy use are the hallmarks of a screening system that works well. Screen baskets provide the key to unlock such effectiveness. With the C-bar M, Voith Paper expands a proven series that already includes five high-capacity models. Exceptional stability distinguishes the new screen basket – stability achieved from cambered profile bars and reinforced trussing rings.

The C-bar M is suitable for all centrifugal pressure screens in graphic or brown-screening systems, and it can be used not only for stock preparation but also in broke and pulp screening. Its strength is its maximized open screening area, yielding above-average screening results. C-bar M complements aggressive rotors and can replace conventionally milled slotted screen baskets.

While the profile bars are clamped in the case of C-bar S, Q and R, the bars of C-bar M are cambered as well. The design is more stable and thus suitable for applications where clamped designs cannot be used, such as high stock consistencies and high rotor peripheral speeds.

More throughput and 15% less energy required

The success achievable by converting to a C-bar M screen basket is illustrated by Weig Karton, a leading producer of recycled board in Mayen, Germany. Before the rebuild, two conventionally milled slotted screen baskets were installed in the company's two-stage screening system. By replacing a basket in the second screening stage with a C-bar M screen basket, the open screening area was doubled. Consequently, daily throughput increased from 35 to 41metric tons. At the same time, rotor speed was reduced by 2 m/s to 22 m/s. As a result, energy consumption fell by 15%.

Along with an increase in efficiency, Weig Karton also noticed improved final quality. Further, the paper manufacturer achieved these results by purchasing the C-bar M baskets for 30% less than a milled screen basket would have cost – a convincing fact.

The positive results persuaded Weig Karton to also replace the basket in the first-stage screen with a C-bar M in order to take advantage of the remaining potential for the entire screening line.

Contact

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Fig. 1 and 2: More stable than the others: With its cambered profile bars and reinforced trussing rings, the new C-bar M is especially suitable for challenging screening applications.

Fig. 1: The VariTop winder, a milestone in winding technology.

Complex rebuilding projects in three to seven days

Getting winders moving again

If the large reels pile up at the end of the paper machine, it's often due to obsolete, slow winders. Here a rebuild brings the technology up to state-of-the-art in just a few days. In the last three years, Voith Paper has done about 40 such rebuilds. New controls are particularly successful in leading to noticeable increases in production.

Since paper machines are being built with more and more capacity, the winder – often an older one – cannot keep up with the pace. The higher volume of paper produced is not wound quickly enough onto transportable rolls. In addition, the old winders may cause significant downtime and are difficult to repair with replacement parts often being unavailable and expensive. A rebuild can rectify these disadvantages with minimal production stoppage and low costs, because usually a time frame of three days or at most a week is involved when a stoppage is required. For an optimal result, automation, mechanics and technology have to be perfectly coordinated with one another.

Voith Paper offers customized rebuild solutions for the various single-drum and two-drum winders and supplies all related products and processes from one source. In the process, the technological know-how from the new

Fig. 2: The individual roll structure of the VariTop.

Fig. 3: The commissioning engineer takes a scrutinizing look at the pressure rolls.

machine business is incorporated in the planning and execution of rebuilds. Thus new technical developments also come to fruition. At the same time, further developments for new machines arise through the work on rebuild projects. In the last three years alone, Voith Paper has carried out about 40 small and large rebuilds of winders.

Controls like with new machines

Winders that are now having to be rebuilt or replaced were generally built sometime between the early 1980s and mid 1990s. Since then, controls and computer technology have become highly developed. In the area of controls, the availability of replacement parts for S5 components, specific electronic assemblies and frequency converters is no longer assured.

In the case of a rebuild, modern controls and drives are used with which the customer is familiar based on existing systems in the paper mill.

Fig. 4: The slitter section, one of the core components of the winder.

Always under time pressure:

Success depends on the commissioning engineers

Along with sophisticated technology, the competence of the commissioning engineers is essential in the successful rebuild of a winder. This is evident in the rebuild of VariTops that Voith Paper undertook in Japan. At issue were single-drum winders built in 1989 onto which each roll is individually wound. Before the rebuild, positioning of the knives and winding stations and line load control of the machine was done with a separate electronic unit. The electronic unit was connected to the machine control via a hardware interface.

In only five days, Voith Paper Automation replaced the machine control, performed a hardware upgrade from S5 to S7, and integrated the functionality of the old electronic unit in the machine control.

"In order to make such comprehensive changes in such a short time, detailed planning, reliable technology and good coordination and communication onsite are needed," says Sven Franke, Project Manager for winder rebuilds at Voith Paper Automation.

In a first step, many customers will require only a comparatively small rebuild such as a computer upgrade, he explains. But Franke has also done a complete replacement of the control or system. According to him, the biggest challenge is doing the rebuild in the specified short time. Experience is therefore critical. "In each case, it is important to know the old system and to have an exact idea of how the new one should work," says Franke. Then, time is also on his side.

Fig. 5: Commissioning engineer, Sven Franke, checks the winding quality of the roll.

This guarantees trouble-free maintenance of the machine in the future.

The solutions delivered by Voith Paper are certainly not just replicas of old systems. Rather, the technology used is based on that of new machines. The current standard is open control systems, i.e., integration of black boxes and digital controls in the machine control. The safety technology is integrated in a safety PLC (programmable logic control), which allows a smaller hardware outlay and better, easier service.

There are numerous possibilities, not only for ensuring availability, but also for further developing the components both technically and technologically. Therefore, by increasing the degree of automation, productivity and machine safety can be increased. Automatic sequences at unwinding and/or wind-up, end sheet gluing or automatic knife adjustments can serve as examples of this. If coatings for the winder drums are necessary, this can be tested in advance by Voith Paper. Drives are likewise calculated and replaced by motors with more capacity, if necessary.

Rebuild or a new machine?

For paper manufacturers with bottlenecks at the winder, there is of course also the option of investing in a new winder. Deciding in favor of a new machine often means higher productivity. But production undergoes a longer downtime due to dismantling, foundation work and subsequent new construction and startup. In many cases, the downtime and higher investment costs are points that make a rebuild a more attractive option.

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IntensaMaXX reliably removes contaminants

Trouble-free pulper detrashing operation

A kidney has the task of removing foreign material and purifying the body. Working in much the same way, the new patented IntensaMaXX is the kidney of the TwinPulp pulping system. As a component of stock preparation, it separates up to 80% of contaminants out and thus prevents the much-feared "pulper infarction."

Like a kidney, the stock preparation can also suffer from colic – namely, when unpleasant contaminants obstruct the detrashing system. Especially pernicious are spinnings that can arise in a matter of seconds due to wires, strings, nets or large films. For the paper manufacturer, that usually means expensive and nerve-wracking maintenance work, since the spinnings have to be carefully removed from the pulper detrashing machine.

The IntensaMaXX offers a promising solution to this problem. As the newest product in the proven Intensa line, it guarantees outstanding pulper detrashing and nearly total malfunction elimination.

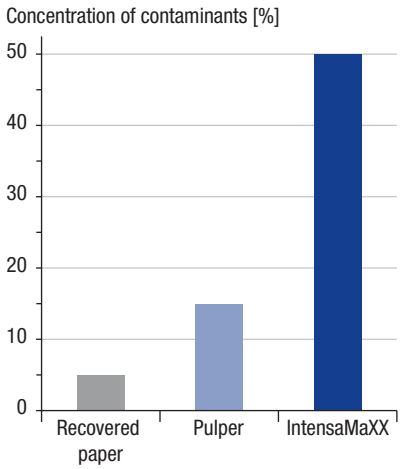

Fig. 2: Typical portion of contaminants in preparation of recovered paper.

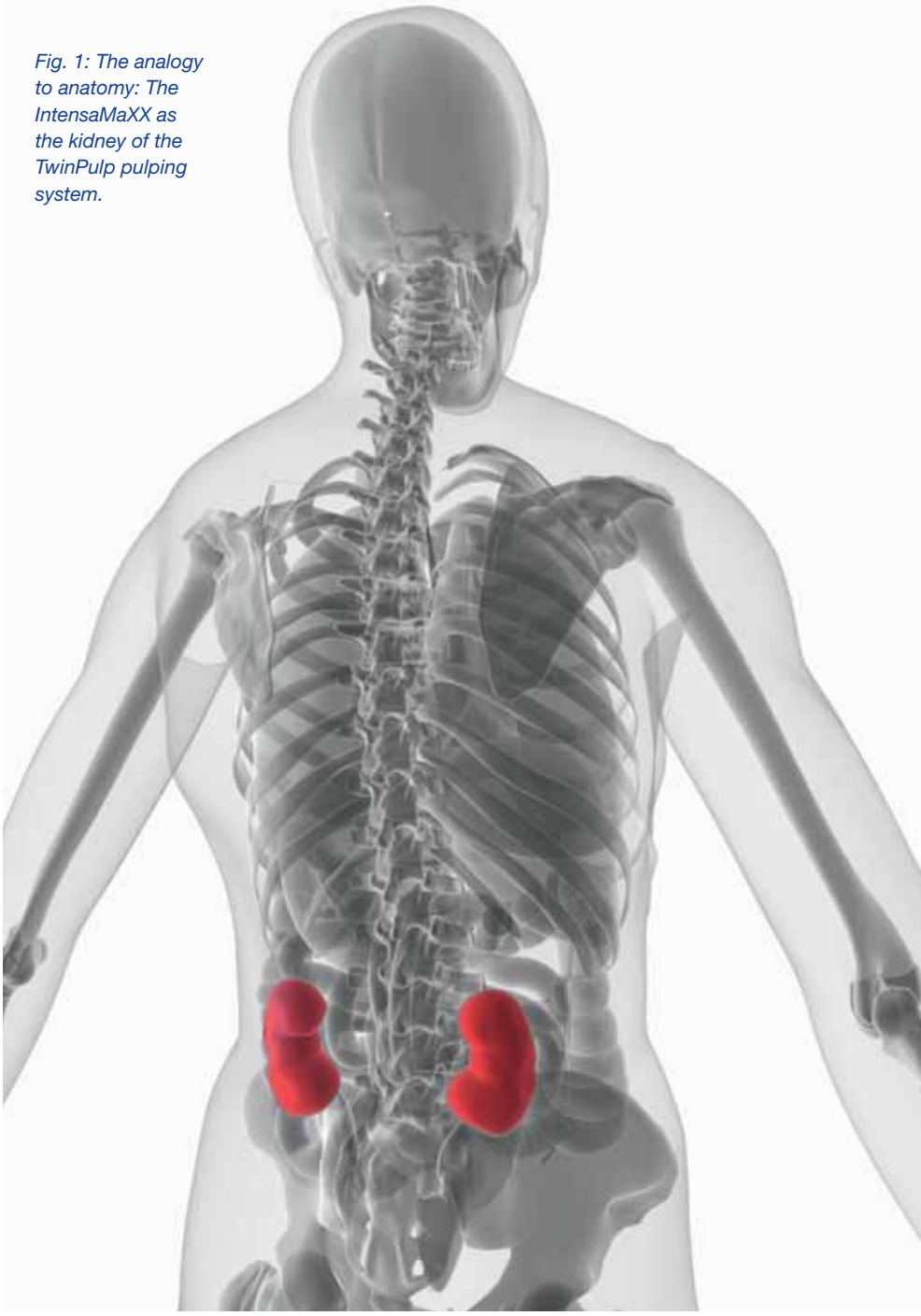

Fig. 1: The analogy to anatomy: The IntensaMaXX as the kidney of the TwinPulp pulping system.

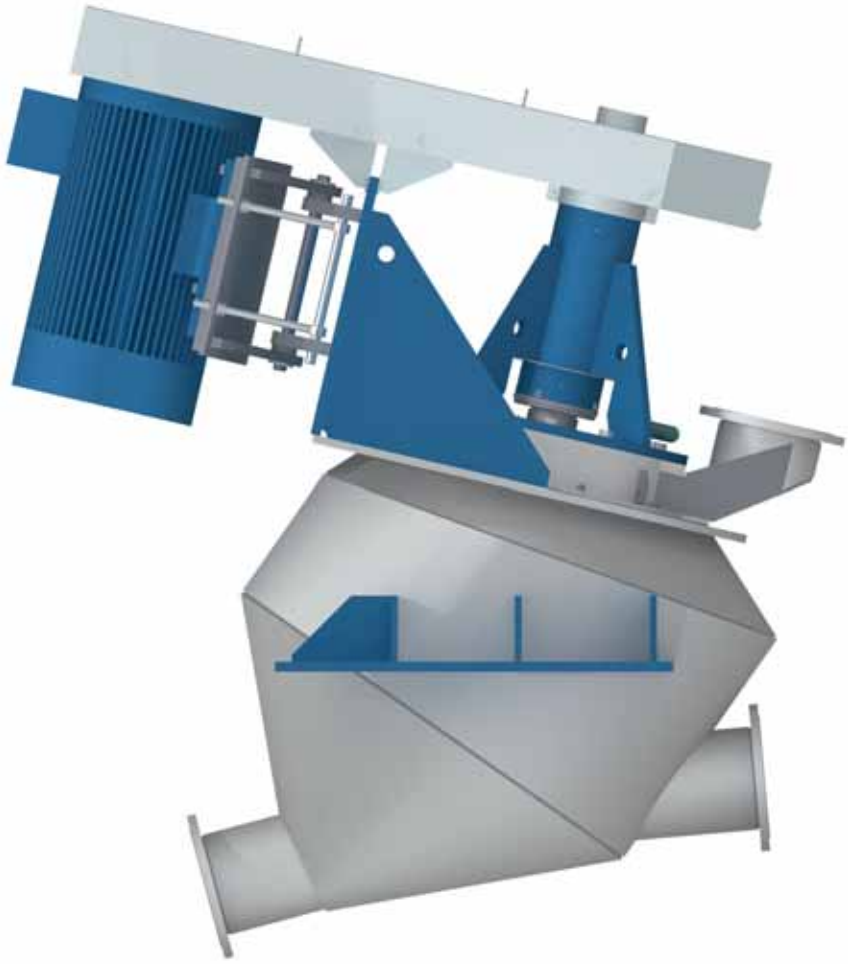

Fig. 3: Three-dimensional model of the IntensaMaXX.

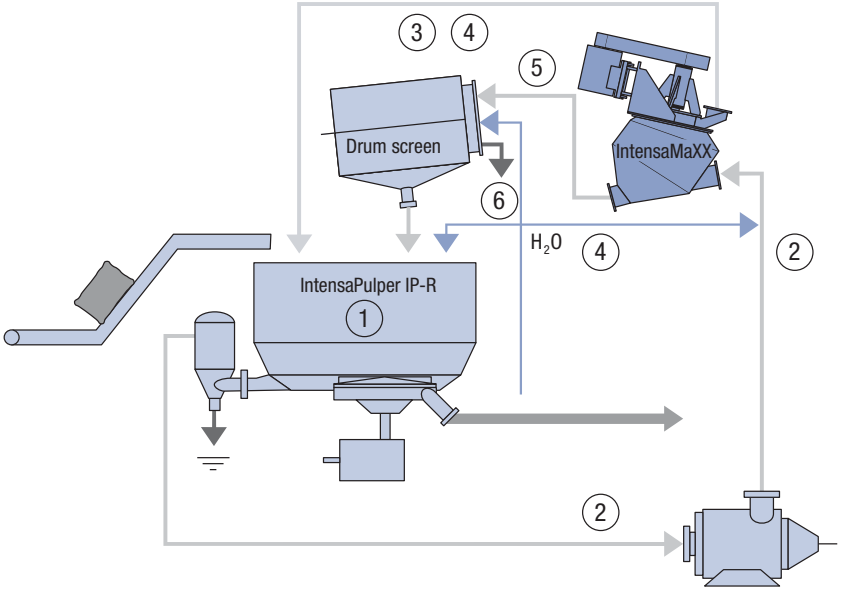

Fig. 4: IntensaMaXX in the TwinPulp system, the continuous LC pulping system for recovered paper grades containing contaminants.

The eccentricity already seen in the IntensaPulpers IP-R and IP-V is even more strongly pronounced with the IntensaMaXX. The particular orientation of the rotor-screen unit in the asymmetrically shaped tank ensures that no vortices form in the IntensaMaXX. Development of spinnings is thus successfully counteracted.

Contaminants do not impair operational reliability

The IntensaMaXX is a component of the TwinPulp system that removes contaminants from the paper. While recovered paper fibers are dissolved in the pulper, indissoluble contaminants accumulate in it until they reach a concentration of ca. 15%. For comparison: At about 5%, the raw material fed in at the start of stock preparation has a noticeably lower impurity content.

The accumulation of contaminants in the pulper can substantially impair its capacity. As the TwinPulp diagram shows, a portion of the accumulated contaminants is for this reason continuously pumped out of the pulper (1) into the IntensaMaXX (2). Here they further accumulate while the purified partial stream (3) flows back to the IntensaPulper. Starting at a contaminant concentration of ca. 50%, the washing water washes the fibers out of the IntensaMaXX and back into the pulper; afterward, the contaminants are routed to the drum screen (5). From there, excess water goes back into the pulper while the largely fiber-free,

pre-dewatered contaminants (6) are further dewatered in the reject press.

The asymmetrical tank form of the IntensaMaXX ensures smooth operation during the entire pulper detrashing process. Stoppages due to spinnings are a thing of the past, even at the highest concentrations of contaminants. Through the downward discharge of contaminants, heavy parts are particularly well managed: They are reliably discharged at intervals without endangering operational reliability.

Clean pulpers and fiber-free rejects at Varel

At Varel, the German paper and board mill, an IntensaMaXX has been reliably detrashing the recovered paper pulp for two board machines since December 2010. There, two pulpers of the AP type pulp mixed recovered paper and supermarket OCC with a total capacity of 600 metric tons/day. The IntensaMaXX is responsible for the detrashing of the two pulpers simultaneously "through process sequencing." The result has convinced the customer: The pulpers are cleaner than ever and the rejects fiber-free.

Thanks to its impressive performance in contaminant removal and operational reliability, in the future the IntensaMaXX will be preferably used by Voith Paper in all new systems. Together with the IntensaPulper IP-R, it forms a high-performance unit in the TwinPulp pulping system. A retrofit is also possible in existing systems.

On Focus: IntensaMaXX

ProRunability ++++

Section: stock preparation

Paper grade: all recovered paper grades

Contact

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Fig. 5: IntensaMaXX successfully used in practice for stock preparation at the Varel GmbH & Co. KG paper and board mill, Germany.

Fig. 6: Normal contaminants, which the IntensaMaXX separates and which are removed from the downstream drum screen.

Fig. 7: Strange contaminants often have to be removed from pulping systems.

DuoShake and CarboForm – an unbeatable combination

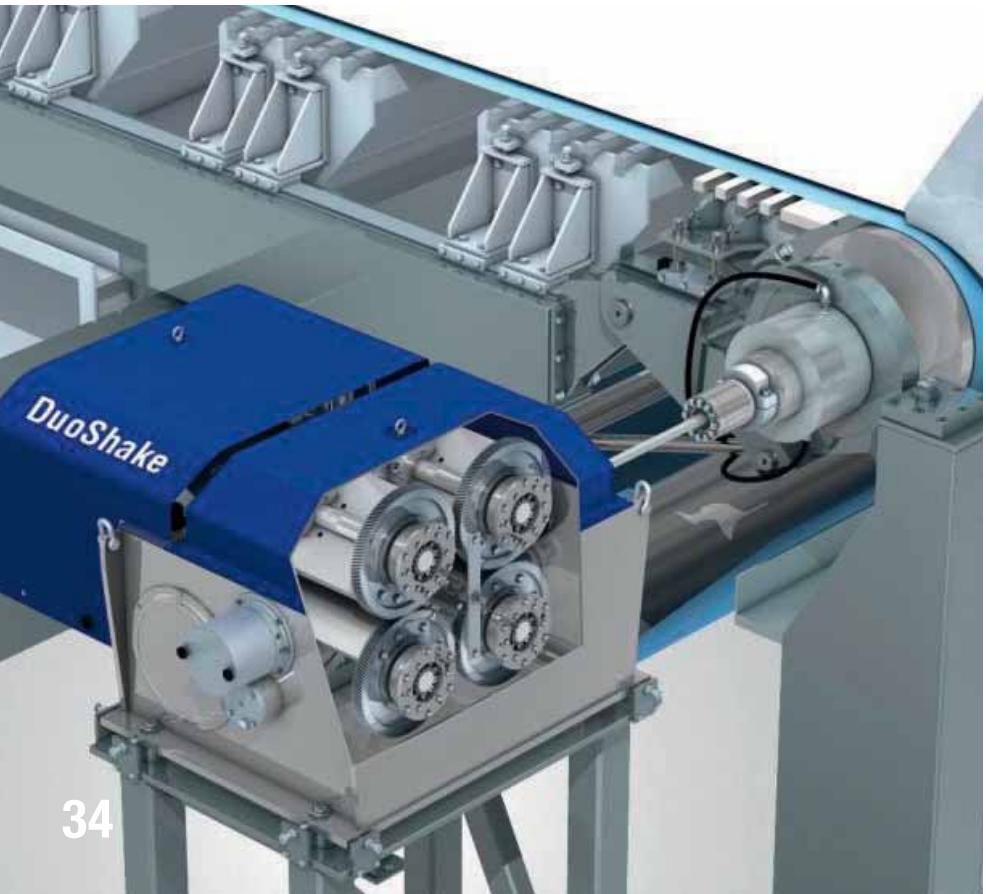
High-frequency shaking preserves resources

The interaction between the light CarboForm roll and the DuoShake shaking unit has already proven itself more than 30 times worldwide. And with noticeable success: The combination lowers resource consumption and saves operating materials. In addition, paper quality is even further improved.

The DuoShake shaking unit has been demonstrating its advantages in 170 systems worldwide. Its functional principle allows shaking frequencies that cannot be achieved with conventional shaking units. A more homogeneous fiber distribution is thus achieved, even with fast-running machines. In addition, the formation is improved, and the tensile strength ratio is reduced, which is indispensable for good dimensional stability. Other advantages result with further processing, coating, impregnating and printing of the paper.

With the three different DuoShake sizes, Voith Paper has the ideal component for every application – from smaller, slower machines all the way up to machines over 9 m wide with speeds as high as 1,200 m/min. The potential of the DuoShake can be fully utilized in combination with a CarboForm roll. Many advantages result from this, such as the improvement of paper quality.

Fig. 1: DuoShake unit allows the highest shaking frequencies for the breast roll.



Higher shaking frequency and better paper formation

The fiber composite design of the CarboForm was specifically developed for the requirements of high-frequency shaking with the DuoShake. The high form tolerance of the roll, for example, makes a decisive contribution to its success. The CarboForm is lightweight: With only about 40% of what a comparable steel roll weighs, it allows higher shaking numbers and leads to better formation of the paper. In addition, lower shaking forces are needed with identical shaking parameters.

The CarboForm and DuoShake combination is already used in over 30 installations worldwide and is very successful in each one of them. A paper manufacturer in North America that produces testliner on a 4.7-meter-wide, two-layer Fourdrinier machine installed two DuoShakes together with CarboForm breast rolls in 2008 and 2009. The result was a clear reduction of the basis weight with identical strength values and increased machine speed.

Lower consumption of resources pays off

Along with an improvement in quality parameters such as formation,

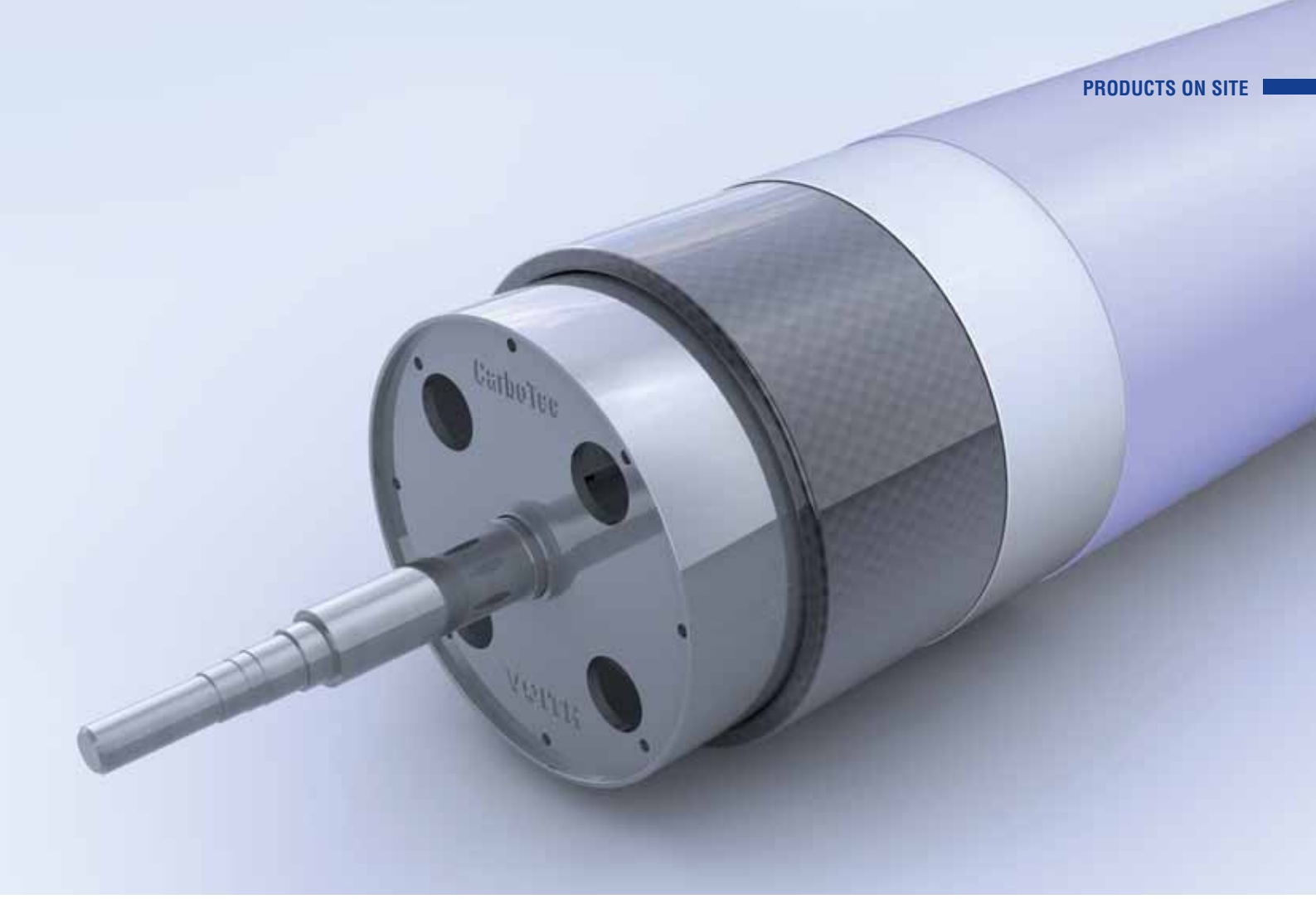


Fig. 2: CarboForm carbon fiber reinforced plastic roll is lightweight.

MD/CD tensile ratio, tensile strength, energy absorption and transverse strain, fibers and operating materials can be saved. The DuoShake and CarboForm roll combination reduces fiber use, refining and use of starch, for example, while maintaining quality parameters. In addition, the machine speed can be increased. Especially good results are obtained with brown papers such as corrugated cardboard base paper, board or sack paper.

All in all, this leads to lower consumption of fibers and operating materials, so that such an investment pays for itself very quickly and at the same time preserves resources.

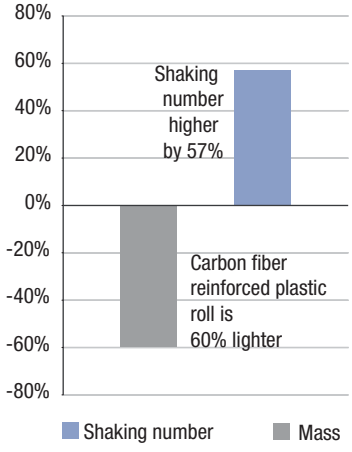


Fig. 3: Advantages of a carbon fiber reinforced plastic roll as compared to a steel roll.

On Focus: DuoShake and CarboForm

ProEnvironment +++
ProRunability +++
ProQuality ++++
ProSpeed ++++

Section: former
Paper grade: all

Contact

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Tailored automation package enhances process stability

Rondo Ganahl saves costs with new quality control system

As a premium manufacturer of testliner and white top linerboard >>> Rondo Ganahl invested in a new quality control system for its PM 2 in Frastanz, Austria, in order to increase paper machine efficiency and consistently meet its customers' quality demands. The previous model needed extensive repairs and only limited upgrades were possible due to the age of the system. With a view to leveling the interfaces of the diverse automation environment and making the system easier to service, Rondo Ganahl opted for a rebuild in collaboration with Voith Paper.

The rebuild allowed Rondo Ganahl to achieve considerable improvements in its efficiency. Before the rebuild, the measured moisture content was too low because there was no ash measurement, and this consumed unnecessary drying energy. Using the ash sensor, combined with the basis weight sensor it is now possible to accurately determine the final moisture content. This reduces fiber consumption by about 1%, while drying energy is reduced by about 2.5%.

Installing a color sensor allowed the amount of broke to be reduced when switching paper grades from brown to white testliners. The display of the chromaticity coordinate on the monitor also allowed for a faster response time. In addition, the measurement system reduces the response time in the event of process fluctuations, ensuring consistent quality. The system has been running smoothly since it went on stream.

Lower maintenance, servicing and training costs

The existing measuring system was replaced by a new Voith LSC scanner with moisture, ash and basis weight measurement and a color sensor. The very limited space available upstream of the winder necessitated high-precision workmanship when installing the scanner. The rugged, easy-to-maintain features of the Voith LSC measurement system will reduce maintenance and servicing costs for the PM 2 in the future and will pay dividends in the long term. The complete integration of the

>>> Info: Rondo Ganahl AG

The headquarters of Rondo Ganahl AG, a company steeped in tradition, are located in Frastanz, Austria. They have been making paper here since 1911, and the company will celebrate its centenary this year. Today, Rondo Ganahl AG produces corrugated board in the basis weight range of 120-200 g/m² on its modern PM 2 paper machine. At a machine speed of up to 900 m/min and a web width of 2,500 mm, it produces an average of 100,000 t/year high-quality white and brown testliner grades from 100% recovered paper. With its white testliners, the company occupies a leading role in the key markets of Germany and Austria.

Fig. 1: Using the Voith LSC scanner allows maintenance and servicing costs to be reduced.

Fig. 2: OnQ ModuleTap actuators control the existing dilution water headbox.

Voith Paper automation package into the existing PCS 7 environment makes the system easy to maintain.

Thanks to the standardized platform, the delivery of training and consolidation of know-how among operating and service personnel have been greatly simplified.

To allow optimum basis weight CD profiles to be achieved, the automation package also included OnQ ModuleTap actuators that control the existing dilution water headbox. These actuators are known for their reliability and ease of use. Whereas previously the process control system did not provide error messages, Rondo Ganahl's papermakers now get a status message if there are any failures. This forms the basis for a diagnosis of the problem in order to improve process stability. Optimization is done automatically via the adaptive control of the OnQ Profilmatic control software, ensuring a consistently high paper quality. It is perfectly tailored to the OnQ ModuleTap actuators and the quality control system and thus achieves optimum measuring and control performance. In addition, the speed of the control function is enhanced by the fast traversing speed of the basis weight sensor.

Fig. 3: View of PM 2 in Frastanz, Austria.

5.6 metric tons more per grade change

Also included in the automation solution were various OnQ GradeControl MD controls, such as a multi-ply controller and jet-to-wire-speed ratio controller. The highlight is the OnQ GradeManager; this automatic grade changer substantially reduces grade change time and the broke resulting from start-up waste. The optimum transition during a grammage change is achieved by the map-based, feed-forward control of the relevant process variables. In the process, moisture is kept constant and no longer has to be ramped down. A grade change involving a difference of 5 grams can be carried out without producing any broke whatsoever. Where the difference is 10 g, the optimum quality is achieved after just 3 minutes. Even a grade change involving a difference of 30 g can be carried out in a very short time, in as little as 6.5 minutes. In total this amounts to an additional production volume in A-grade quality of 5.6 t per grade change.

"We would choose to partner with Voith again any time."

Maik Willig, Plant Manager, Rondo Ganahl Frastanz, Austria

"The commissioning phase was incredibly fast. Right after startup the measuring systems were functioning and the machine produced paper in saleable quality. I have seldom experienced such a smooth startup. The cooperation between Rondo Ganahl and the Voith team was excellent and very congenial – in my view this is why the launch was so successful. We would choose to partner with Voith again any time."

"I would not have thought the whole process would go so smoothly. Well I was wrong: Startup – widen – run! Voith Paper demonstrated extensive expertise and delivered high quality." Maik Willig, Plant Manager, Rondo Ganahl Frastanz

This allows Rondo Ganahl paper-makers to respond flexibly to customer requirements and at the same time produce efficiently. In addition, the automation has considerably improved handling for the paper machine operators and leaves time for changing the headbox aperture manually during a grammage change.

Challenges mastered together

The initial quality control system was originally installed on the PM 2 in 1998. In 2003, as part of a retrofit, the dilution water controller was adapted to the new machine concept. The existing measuring system required extensive repairs that left little scope for improvements. The high level of servicing and maintenance required increased costs for spare parts and training, as well as a greater number of servicing operations. In addition, Rondo Ganahl was striving to continually improve its paper grades and also minimize broke during grade changes.

The company therefore opted for a new quality control system guaranteeing a standardized, integrated operating and engineering interface. The contract award process focused on a solution offering complete integration into the existing PCS 7 control system. In addition, the entire project was designed to use familiar programs running in German. Even in the preliminary phase, Rondo Ganahl was very mindful of the potential risks such as quality issues or customer complaints when resuming production after the rebuild, Voith Paper still stood out as the partner that could best meet all of Rondo's requirements. The intensive, focused cooperation between the relevant parties at Voith Paper and Rondo Ganahl meant the rebuild could be carried out successfully within three days of downtime. Both sides were very happy with the results.

On Focus: Quality Control System

ProSafety	++
ProEnvironment	++
ProRunability	+++
ProQuality	++++
ProSpeed	++

Section: entire paper machine
Paper grade: all

Contact

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Fig. 4: With the new quality control system, the PM can be controlled entirely from the control room.

Fig.1: Integrated drive solutions ensure ease of operation, fewer web breaks and improved machine safety.

Synergy between mechanical engineering and automation

Fewer web breaks thanks to integrated drive solutions

Much can be achieved by a drive concept perfectly tailored to the paper machine: It enables simple operation and ensures fewer breaks and a greater degree of machine safety. Furthermore, as all components are supplied from a single source, the paper producer has only one point of contact, paving the way for on-schedule, problem-free commissioning.

Integrating the drives into the machine design is very important for modern, efficient paper production. One of the many benefits, for example, is a well-coordinated drive control system that reduces the number of web breaks. Process technology know-how is crucial in order to specify the interaction of the various drives in combination.

In its capacity as a paper machine manufacturer, Voith Paper has always specified the mode of operation of the drive systems for paper machines and winder systems. A large number of projects have provided Voith with extensive expertise in electrical drive technology. This know-how is necessary to optimally design the switchgear and to program and define the parameters of the inverters.

In Voith, papermakers have a partner capable of supplying a paper machine with a complete drive system comprising drive controller, converters with associated switchgear and electrical motors.

This guarantees faster commissioning as well as quicker optimization of the drives and the machine itself.

Drive control integrated into machine control system

In the past, the machine movements and drive functions were designed separately, although they have an impact on one another. OnC DriveCommand now incorporates the drive control into the machine control system. Handling is simplified due to the uniform operating interface and machine operation, as all controls are located on one and the same system. This means that optimization and troubleshooting are faster and more reliable. The software library developed by Voith Paper is used for both the machine control and for OnC DriveCommand, meaning that there is no need to maintain different controls and software libraries and the programming philosophy is identical.

As a result of the close cooperation between experts from the drive technology, mechanical engineering and process technology sectors, new drive modules are also being conceived and implemented. They are immediately put to the test worldwide on the pilot facilities at Voith's paper technology centers, ensuring fast development processes. The focus of all these innovations is on machine availability, paper quality and the safety of machine operators.

For example, a newly developed load distribution algorithm reduces the susceptibility to vibration of critical drive positions, while controlling modeled paper web tension in critical machine sections improves runability. This results in fewer web breaks and therefore greater machine availability. Highly dynamic converters are used for particularly challenging control tasks.

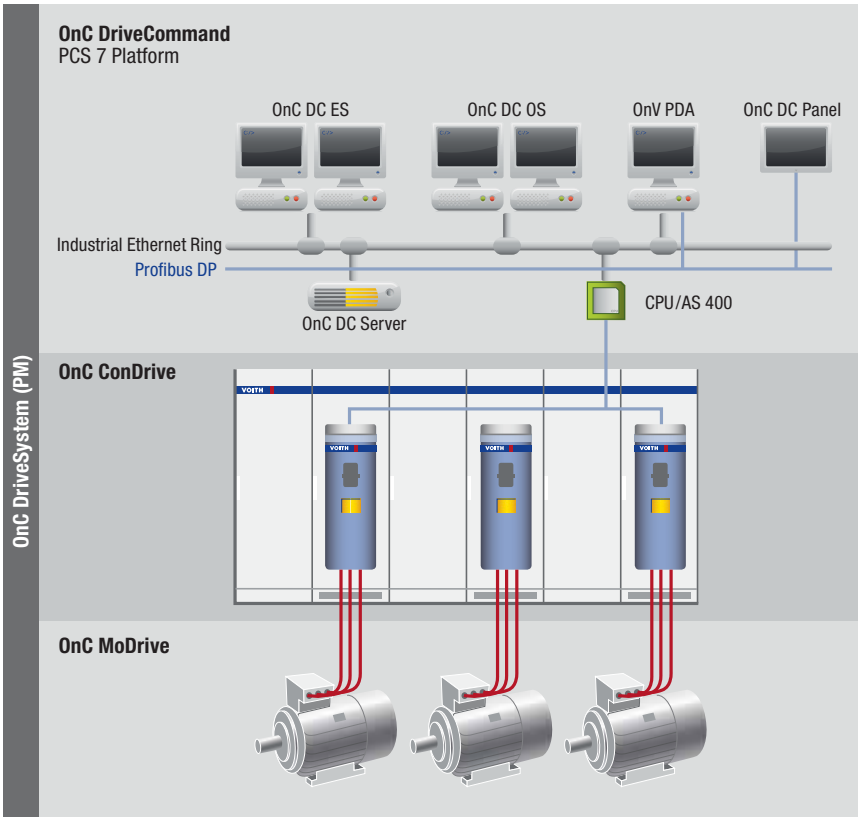

Fig. 2: The OnC DriveSystem comprises OnC DriveCommand, OnC ConDrive and OnC MoDrive. OnC DriveCommand integrates the drive control into the machine control system, allowing faster and more reliable optimization and troubleshooting.

New emergency stop concept enhances machine safety

However, drive technology is not just about modern control concepts; machine safety is also playing an increasingly important role. The switchgear supplied by Voith Paper includes tried and tested components.

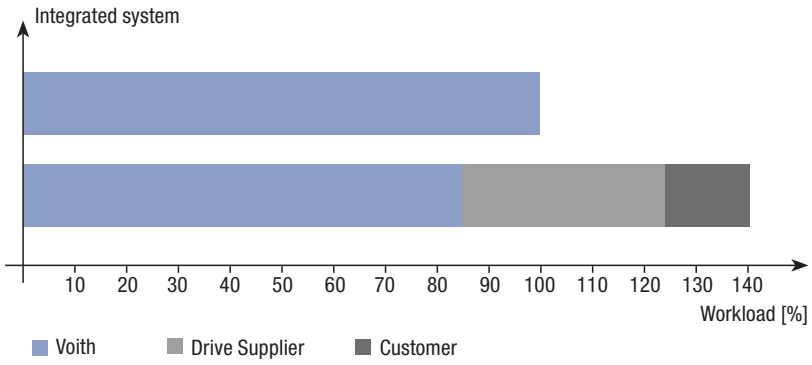

Fig. 3: The lower bar in the chart shows the increased workload for the paper mill where separate systems are installed. Using Voith's integrated solution entails much less work, as the upper bar shows.

Enhanced safety is provided by the emergency stop feature that Voith Paper has been using in turn-key systems for some time now, where the emergency stop system has been isolated from the drive technology. This now means that the operator can identify, just from the display on the machine control monitor, where the machine came to an emergency stop and why. A false alarm is often the reason for an emergency stop. For the papermaker, this innovation also represents improved operator and machine safety.

Motors for lower total cost of ownership

The drive solutions also score highly in terms of economy, as particular emphasis is placed on the energy efficiency of the entire drive train with motors. This allows savings amounting to 2% of the entire energy consumption of the drive system. Various drive concepts with different configurations were compared and investigated back in 2009, and this study is now the basis for selecting motors. One improvement in this area has been the VoithDrive, which is designed as a torque motor and does not require a reduction gear, so that there are no gear friction losses. In addition, the permanent magnet synchronous motor is highly efficient. VoithDrive takes up very little space, making it ideal for retrofits too.

Total cost fixed from the very start

A fixed price for the entire system including drive concept allows the papermaker to avoid budget overruns. As everything is supplied from one source there is no need for separate tender and award processes for the drives or for coordinating interfaces with other suppliers. Voith Paper takes charge of coordinating the personnel for commissioning and ensures that the various project sub-phases are completed on schedule. Even during the optimization phase there is only one point of contact, thus avoiding communication issues between suppliers. This allows production increases and quality enhancements to be achieved sooner.

On Focus: OnC DriveSystem

ProSafety	✚✚✚✚
ProEnvironment	✚✚✚
ProRunability	✚✚✚✚
ProQuality	✚✚✚✚
ProSpeed	✚✚✚✚

Section: entire paper machine
Paper grade: all

Contact

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"Voith Paper supplied a complete electrical and mechanical drive system including a complete automation package for the Štěti PM 6. The drive system is working very reliably and fully meets our expectations. We would opt for this solution again."

Lars-Erik Mellgren, Technical Director, Mondi Štětí a.s., Czech Republic

Breakthrough with tissue fabrics

Evolution improves dewatering in the press

In the fall of 2010, Voith launched a high-performing press felt for tissue machines. Through the use of polymers, this press felt provides for optimal nip dewatering over its entire life cycle.

In order to keep up with the competition, tissue manufacturers depend upon continuous improvements in performance of consumables for their machines – such as fabrics and rolls. Energy consumption, machine efficiency and stable operation are just a few of the major concerns. All this is substantially influenced by the press felts, which play an important role in the production of tissue paper.

Therefore, as the first step in developing a new press felt, Voith analyzed all the possibilities for the performance and structure of felts. Thanks to a new software program, it was possible to simulate the various physical conditions within the press section.

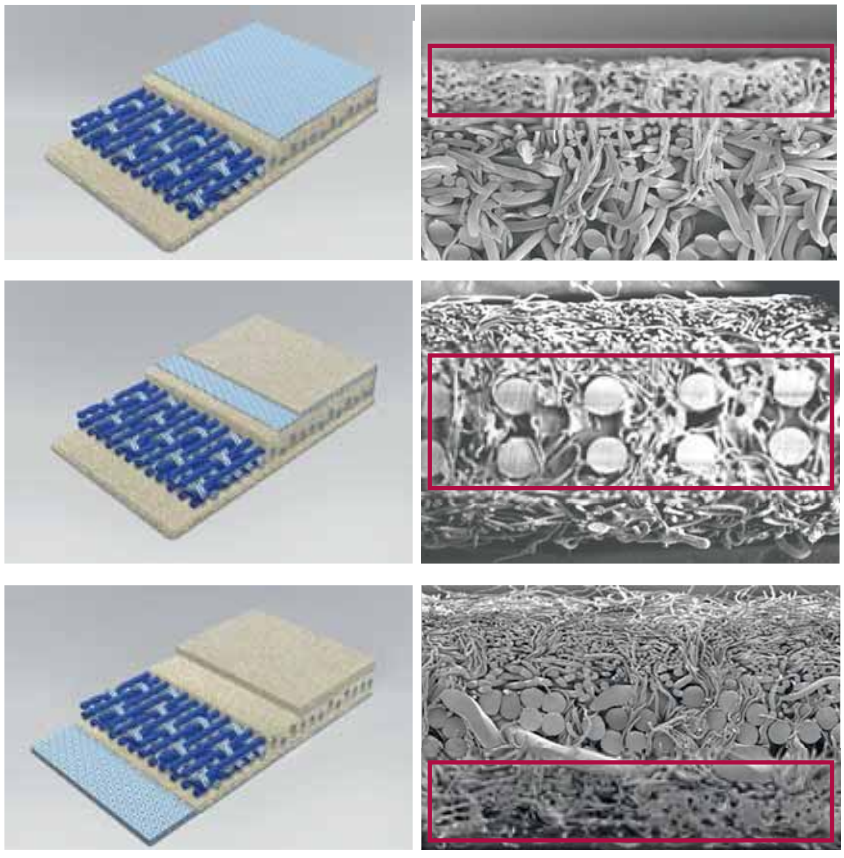

Fig. 1: Three-dimensional felt structure.

An investigation of the performance curve for conventional felts compared to the ideal capability of tissue felts revealed important behavioral characteristics with regard to energy consumption and life. The positive change in felt porosity due to the compression forces and the flow of water through the felt can also be observed here.

Polymers keep felt density at an ideal value

Building on these new findings and insights, Voith Paper developed the Evolution press felt. It combines existing technologies with a complex new process that adds special polymer particles to certain zones of the felt (Fig. 1). The polymers are able to adjust the felt density to an ideal value and keep it there. Outstanding dewatering characteristics are thus achieved in the nip. Consequently, starting up with new Evolution press felts requires almost no break-in time.

In order to be able to determine the most efficient use of the new material, Evolution was extensively tested in the Voith pilot tissue machine in São Paulo, Brazil.

Various felts with different polymers were operated under identical conditions, so that differences in startup behavior could be observed. After several customer tests all over Europe, Evolution had undergone extensive testing under genuine production conditions. The feedback from tissue manufacturers was extremely positive.

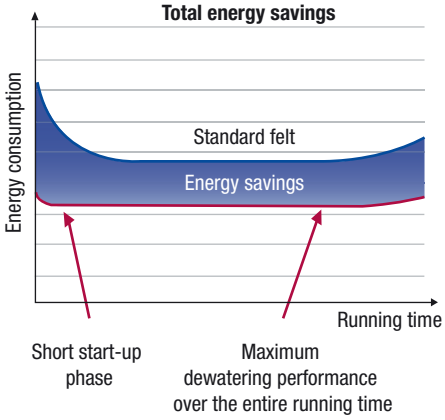

Fig. 2: Energy consumption.

Less drying energy and fewer chemicals

Along with the advantages of improved dewatering in the nip and quicker startup times, Evolution can reduce the thermal drying energy required for the tissue web. It is kept at a low level over the entire life time of the felt (Fig. 2). Running stability and performance are impressive. In addition, it was demonstrated in several tests under real production conditions that fewer chemical cleaning cycles were required – in some cases they were even completely unnecessary.

The successes with Evolution so far are springboards for further developments. Voith Paper is currently working on expanding the test runs to other tissue machines. In addition, tests showed that Evolution in combination with the new SolarSoft polyurethane roll covers, which have a special surface texture, can achieve even better results.

On Focus: Evolution press felt

ProEnvironment ++++
ProRunability ++++
ProQuality ++++
ProSpeed ++++

Section: press
Paper grade: tissue

Contact

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"For us, Evolution is clearly the best felt that we have ever run."

Jordi Goma Camps, Mill Manager at Goma Camps, Spain

"We first tried Evolution felt in our PM5. The performance was very good in terms of startup, energy savings, speed increase, flat profiles, stable runability and less chemical wash. Then we tried it in PM6, where we manufacture our DIP paper, and the performance was very similar, with better performance compared to the rest of the felts.

Furthermore, usage of Evolution felts, have helped us to work towards the reduction of the paper carbon footprint, which is one of our main targets."

A new class of polyester monofilaments

More effective dryer fabrics thanks to SynStron

Heat and moisture – both are a challenge for polyester yarns of fabrics used in the dryer section. Thus Voith Paper developed the SynStron yarn, a polyester monofilament (PET) that ensures a longer service life of the dryer fabrics. This is achieved through higher strength and hydrolysis resistance.

The SynStron yarn was developed by Voith Paper at its R&D center that works exclusively on materials for use in paper machine fabrics. This expertise brings successful products to customers. For example, a paper producer set a record life by using the new SynStron monofilament in a PrintTech-S Q2 dryer fabric from Voith Paper. The fabric ran in the third single-tier dryer group of a paper machine that produced offset and coating base paper at a speed of up to 1,300 m/min. While the customer had previously changed standard polyester fabrics every 12 months, in contrast the dryer fabric with SynStron monofilaments achieved a fabric life of 446 days (15 months). This is equivalent to an increased life of 30%.

Tests on fabrics that have already run on paper machines include the measurement of remaining seam strength and air permeability. In the case of the fabric mentioned above, the seam strength remained high at 72% of its initial value. This confirms the performance capabilities of fabrics that are made from SynStron (Fig. 1). In addition, a contaminant release additive within the monofilament resulted in the used fabric having 76% of the original air permeability. This provided effective performance of the sheet control system and optimal run of the paper web.

Higher resistance

Dryer fabrics made from standard PET monofilaments are normally removed from the machine due to damage, abrasion or degradation. Seam failure can occur due to fibrillation of the loops or binder yarns causing a tear in the seam. The SynStron monofilament is more resistant to fibrillation; this restricts the penetration of chemicals and moisture into the monofilament resulting in a stronger fabric and seam for higher potential life.

Seam strength profile

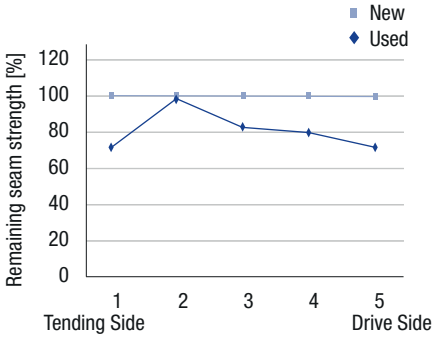

Fig. 1: After being used by a customer for 446 days, the SynStron dryer fabric still had 72% of its original seam strength.

Laboratory test – seam loop load capacity

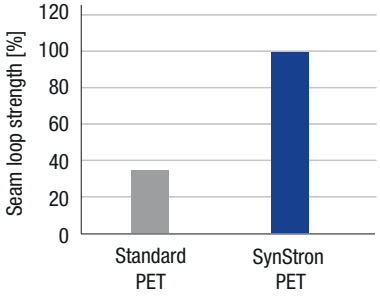

Fig. 2: High resistance: SynStron can withstand a substantially larger amount of energy before a seam tear.

Wear test

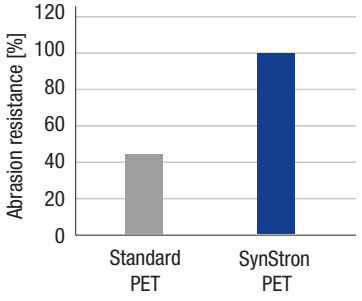

Fig. 3: In comparison to standard PET, SynStron achieved, on average, 56% higher abrasion resistance.

Fig. 4: The SynStron yarn filament is less prone to fibrillation. In contrast, the standard PET filament (left) has numerous small fibrils after a sudden break.

In addition, SynStron offers higher resistance to sudden increases in fabric tension. These increases are normally caused by cylinder wraps during tail threading or paper wads following a break, causing damage and removal of the fabric. A SynStron dryer fabric reduces the risk of damage by absorbing 160% more energy compared to a standard PET fabric (Fig. 2).

Increased fabric life due to less abrasion

A Voith Paper laboratory test clearly showed the higher abrasion resistance of the SynStron yarn (Fig. 3). The material achieved 56% higher wear resistance than standard PET yarns, leading to a longer potential life of the dryer fabric. Exposure to wear by adverse machine conditions is one of the reasons that dryer fabrics are prematurely removed from the machine. The SynStron fabric has greater resistance to the causes of wear, such as rough or contaminated roll surfaces, filling materials or contact with stabilizer seals. This helps to achieve cost savings for the paper producer.

Laboratory test – hydrolysis resistance

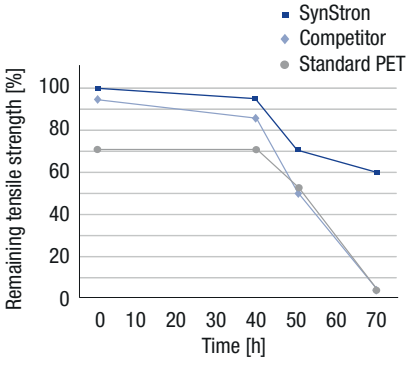

Fig. 5: While standard PET filaments have already torn, after 63 hours in a laboratory test, SynStron still has 60% of its original tear strength.

Hydrolysis resistance improves tear strength

Heat and moisture in the dryer section are the most difficult environmental conditions imaginable for polyester. Their combined effect weakens standard PET and ultimately leads to failure of the material. Again, SynStron monofilaments out perform standard PET. In laboratory tests, degradation can be accelerated in order to simulate paper machine conditions over the life of a fabric. After 63 hours exposure to saturated steam at 140°C, the standard material had degraded. In contrast, SynStron had retained 60% of its original tear strength to confirm its superior performance (Fig. 5).

SynStron: summary of advantages

- Resistance to fibrillation
- Higher seam loop strength
- Greater abrasion resistance
- Hydrolysis resistance
- Cleaner running

SynStron yarns are used exclusively in dryer fabrics from Voith Paper (PrintTech-S and MultiTech-S). They are available worldwide as of mid 2011.

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Fig. 1: A Voith technician installs and tests the Voith LSC TecoScan system in the factory.

Voith LSC TecoSens for tissue manufacture

Sensor measures fiber weight and moisture without radioactive source

For safety and cost reasons, a major objective of the paper industry has been to measure moisture and fiber weight without using radioactive beams. Using the Voith LSC TecoSens sensor this is now possible for tissue production.

Currently, online basis weight in tissue manufacturing is usually measured with radiometric basis weight sensors. Using radioactive beta rays, the basis weight of the tissue web is determined in units of g/m². Although this technology has long been proven, paper manufacturers were nevertheless seeking a reliable alternative without radiometry.

With the Voith LSC TecoSens, for the first time a new infrared optical sensor is now available for tissue manufacture that uses one unit to measure both the moisture and fiber weight. It measures these two physical measuring variables of the tissue web simultaneously using a modular sensor unit integrated into the quality control system. The measuring process used is based on infrared spectroscopic methods and is particularly suited to tissue manufacture, which uses fibers only and no fillers. This method is superior to conventional radiometric measurement in both ecological and economic terms.

Not sensitive to dirt

The characteristic absorption bands in the NIR optical wavelength range are used to measure the fiber weight and moisture of the tissue web. The degree of penetration of the light through the tissue paper is measured at appropriate locations in the NIR wavelength spectrum. Simplified, the basic principle is as follows: The higher the moisture or fiber weight, the less infrared light can penetrate the tissue material at the corresponding wavelengths. The measuring system features a very good signal-to-noise ratio, enabling a high measuring resolution.

The sensor is part of the Voith LSC TecoScan measuring system, which has been specially designed to meet the requirements of tissue manufacturers. It can be integrated completely into Voith's quality and process control systems.

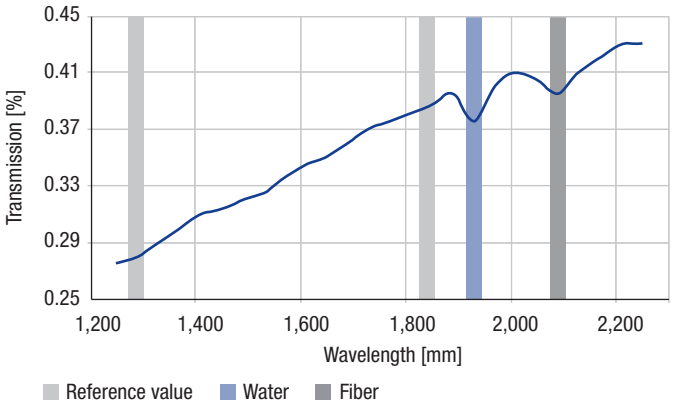

Fig. 2: NIR (transmission) spectrum with the measuring wavelengths used in TecoSens.

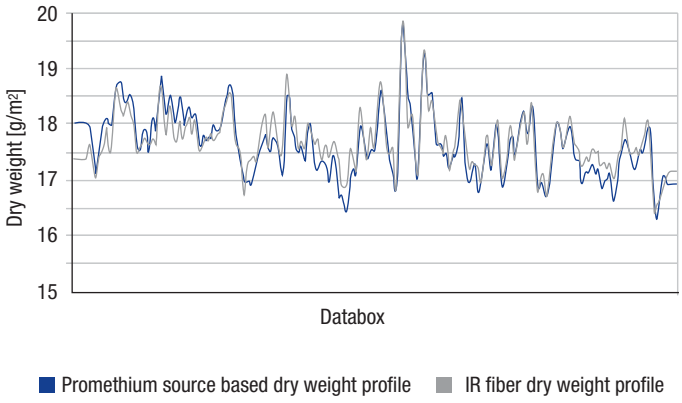

Fig. 3: Comparison of mean values (reel) derived from a conventional radiometric measurement and using Voith LSC TecoSens.

When developing the measuring system, particular attention was paid to making it non-sensitive to dirt, an important criterion especially in tissue manufacture. The system is fitted with integrated cleaning nozzles that periodically remove from the measuring gap any fiber residues and other contaminants that have accumulated. This guarantees high availability without extra cost and effort for cleaning.

Voith LSC TecoSens is pre-calibrated in the factory before delivery. This means that the measuring system can be used immediately after commissioning and delivers accurate and reliable measured values without the need for time-consuming correlations.

Comparison confirms accuracy

A direct comparison between a Voith LSC TecoSens and conventional radiometric sensor confirms the accuracy and quality of the new measuring system. In a test over several weeks, the basis weight trends (oven-dry) of a conventional promethium source basis weight sensor were compared with a Voith LSC TecoSens that was installed at the same time. In addition, a comparison was made between the reel mean value profiles of the promethium sensor and the Voith LSC TecoSens (Fig. 3). Both comparisons indicate an excellent measuring consistency, impressive testimony to the accuracy of the Voith LSC TecoSens. This means that it can replace a conventional radiometric sensor without having to make any concessions.

Fewer regulations, more safety

Compared with conventional radiometric measurement, the Voith LSC TecoSens offers the user numerous advantages: As all the statutory regulations for radiometric measuring systems do not apply, there is far less cost and effort involved for the company. In addition, not using radiation improves workplace safety for operating personnel. It is much easier and less expensive to replace the infrared beam in the Voith LSC TecoSens than when using radiometric measuring systems. Furthermore, the signal-to-noise ratio remains constant over the entire service life of the sensor and does not gradually dissipate as is usually the case with radioactive sources.

>>> Info: Sensor measuring principle

Fig. 2 shows the transmission spectrum in the NIR optical range by way of example for a tissue paper. The light transmission is recorded on the characteristic absorption and reference wavelengths using “same spot” technology, i.e., the individual optical transmission measuring values come from the same geometric measuring spot on the paper web moving under the sensor. This eliminates interference caused by measuring the individual signals from different points on the paper web. The result is a much better signal-to-noise ratio of the measurement and thus a visibly higher measuring resolution. In conjunction with proven measuring models, the fiber weight and moisture of the tissue web can be measured accurately without using radiometric sensors.

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DuoFormer D II impresses thanks to extended application limits

Market leader further improved

After more than 230 installations, the DuoFormer D is the market leader and most successful hybrid former in the world. It provides superior paper quality and stable operating behavior for graphic paper grades as well as board and packaging paper. In the development process of this former, the particular focus was on maintaining the existing benefits of the design while achieving a substantial increase in production capacities.

The improved DuoFormer D II ensures stable sheet formation at maximum speeds. Thanks to the proven flexible inlet zone with three flexible loadable inlet blades, the top wire and the surface of the suspension are merged gently. The advantage over stationary, curved inlet elements is that dewatering pressures are lower and can be better adapted to requirements. This allows the formation of the top initial fiber mat to be controlled in a systematic way.

In the area of the top wire suction box, the DuoFormer D II, unlike the previous model, has a curved wire guide from the start. This stabilizes the wire run at high speeds without having to load the forming blades. This therefore allows the functions of wire guiding and forming to be separated. Depending on basis weight, more or fewer forming strips can be used (Fig. 1).

In the case of low basis weights, the dewatering in the twin wire section is completed quickly. The main forming zone is therefore located around the first forming blades. In the case of high basis weights, on the other hand, the forming zone extends to the back section of the forming blades. The combination of flexible inlet zone and curved forming zone in the DuoFormer D II allows substantially faster speeds and higher production rates.

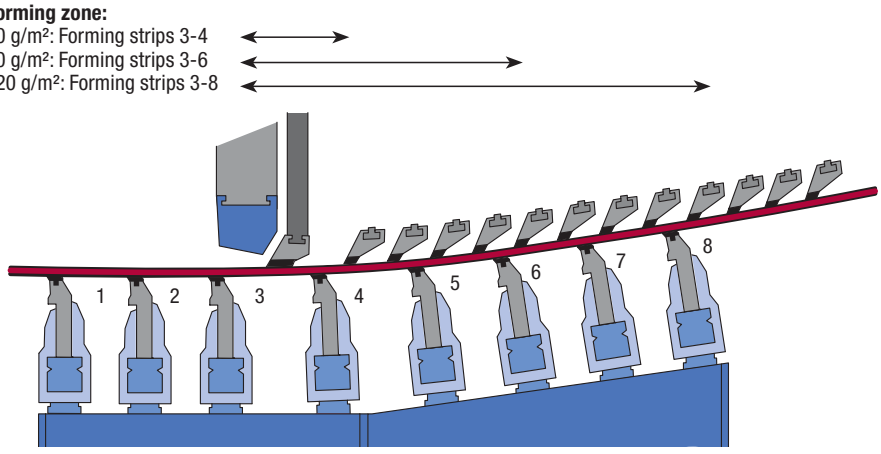
New applications for board and copy paper machines

Thanks to the extended range of applications for the DuoFormer D II, board machines with a basis weight of more than 400 g/m² and an operating speed of up to 1,200 m/min can be designed as a three-ply machine (Fig. 2). The DuoFormer D II can increase production rates for the middle ply by up to 30%.

In the case of wood-free paper, the DuoFormer D II extends the available speed range by a considerable amount upwards (Fig. 3). For example, the production speed for a typical 80 g/m² copy paper can be increased from its previous 1,350 m/min to 1,600 m/min. The typical sheet structure for the DuoFormer D, i.e., soft formation and comparably low MD/CD tensile ratio, has been maintained in the upgraded version.

In addition, the dewatering section from the forming board to transfer to the press section has been optimized regarding an energy efficient dryness

Fig. 1: Location of forming zone for various basis weights.



increase. Drainage boxes are fitted, tailored to the paper grades produced. Furthermore, instead of a suction couch roll, a high vacuum suction box is used as the last dewatering element. The first full scale installation confirms that this results in considerably lower investment costs and also reduced energy consumption.

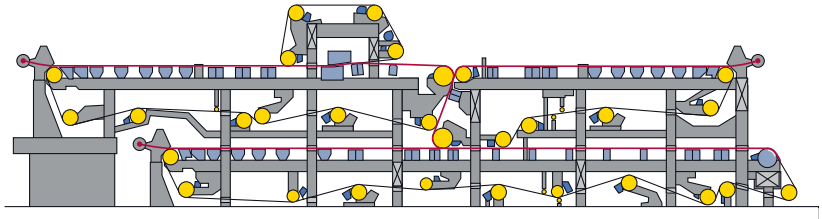


Fig. 2: Multi-ply concept with DuoFormer D II.

Listening to market demands

The further development of the proven DuoFormer D takes into account current market developments in board and packaging paper machines and in wood-free graphic paper machines.

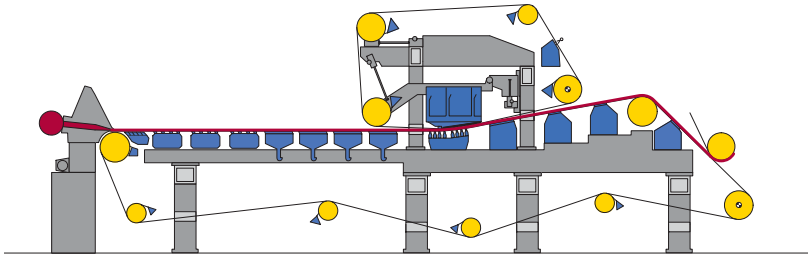


Fig. 3: DuoFormer D II for wood-free paper with extended speed range.

Until now, board and packaging papers have normally been produced as multi-ply products on wire sections with several Fourdriniers. There are two trends on the market for this machine concept: On the one hand, projects for new board machines are being designed for operating speeds at up to 30% above the previous typical levels. On the other, the number of Fourdriniers is being reduced from five to four or even three, in order to cut the specific investment costs. As the basis weight of the end product is to be maintained, more pulp has to be dewatered in the intermediate ply, which is usually equipped with a hybrid former. This market trend demands a hybrid former that can produce a substantially higher ply weight at a higher speed.

In the wood-free graphic paper segment, a wide range of basis weights is generally produced on a paper machine. Experience has shown that in this kind of application the control of the sheet formation is substantially more flexible using the DuoFormer D than when a gap former is employed. Thanks to the improvements to the DuoFormer D, it is now possible to benefit from a more flexible sheet formation at higher speeds than before. At the same time, this reduces the specific investment costs. Furthermore, when upgrading the design, consideration was given to achieving as low as possible specific energy consumption for the former.

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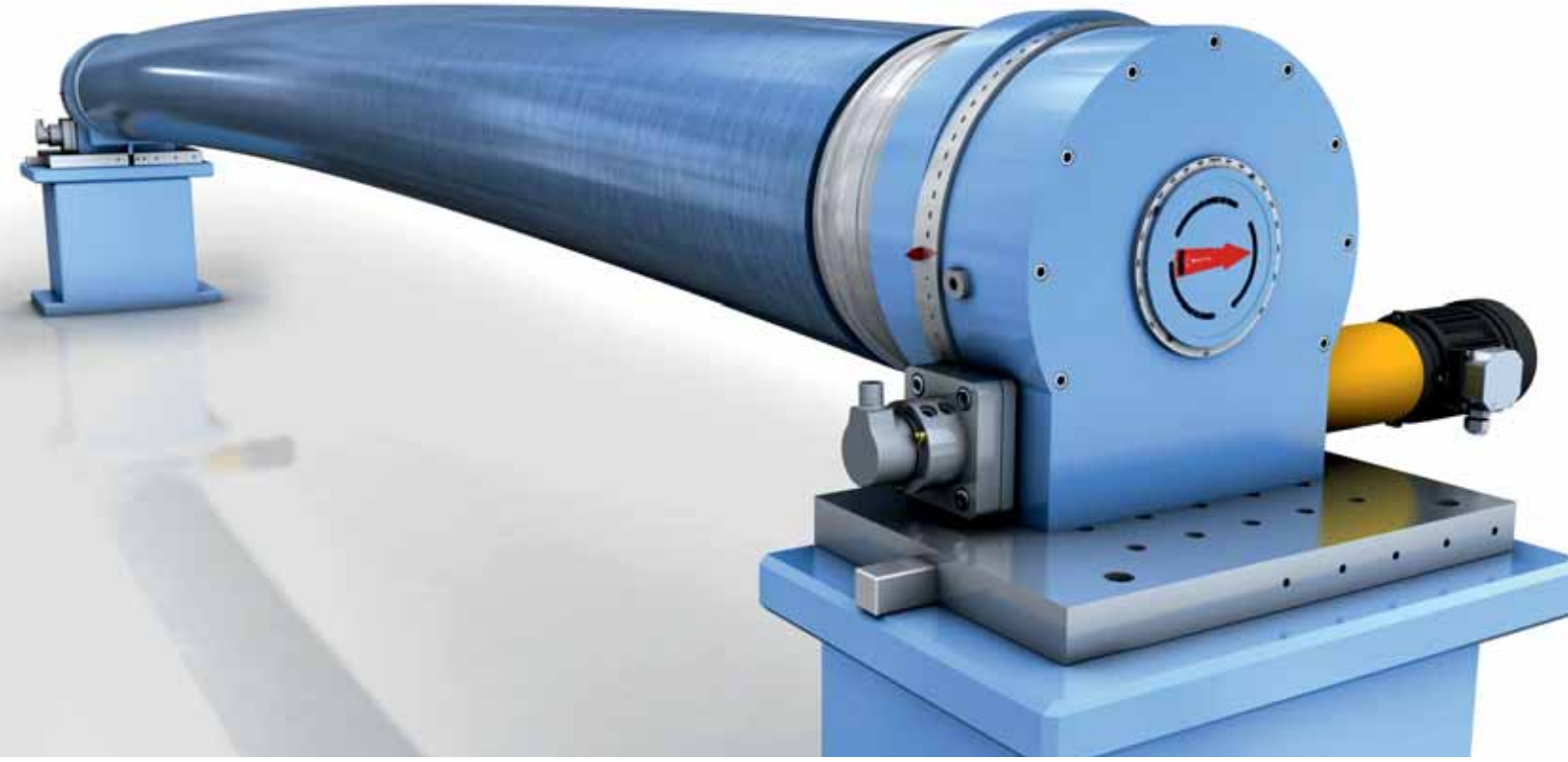

Fig. 1: An optimum spreading effect is achieved with its continuous bow.

CarboStretch can do much more than conventional rolls

Spreader roll reinvented

The operating principle of a CarboStretch roll is simple: solid on the inside, flexible on the outside. Thanks to this sophisticated solution, the conventional spreader roll has been reinvented – and now comes with continuous bow adjustment.

The principle of the CarboStretch spreader roll is based on a solid inner tube and a flexible outer tube, both of composite fiber material. The inner tube is highly rigid and functions as a supporting structure. The outer tube, on the other hand, is flexible and is curved over its entire length in an almost uniform bow. This very precise curvature, resulting from the composite material and an intelligent bow adjustment mechanism, produces an optimum spreader effect in the web in cross-machine direction.

The CarboStretch roll stays much cleaner and is more operationally reliable than its predecessors. Thanks to the continuous outer tube over the entire width, there are no joins where dirt can accumulate or roller bearings that tend to overheat.

At last – continuously variable bow adjustment

One of the advantages of CarboStretch is the continuously variable adjustment of bow height and direction, achieved by means of a multi-ring bearing at both ends of the roll. The direction and height of the bow can be selected as required, allowing the spreading effect to be adapted to any operating situation. Thanks to the multi-ring bearing, the bow direction on tender and drive side can also be adjusted separately. This allows adjustment of the spreader effect to optimize the web tension profile in cross-machine direction. If the draw is somewhat asymmetrical, it can be corrected using this spreader roll.

Fig. 2: The second CarboStretch has been running perfectly since commissioning.

Thanks to the modular design, the bow height and direction can also be adjusted remotely in the future to meet customer requirements.

The CD temperature and tension profile is improved thanks to the clever design: The roll is not segmented, nor are there any heat-inducing roller bearings from the CarboStretch coming into contact with the paper. This is particularly important for delicate paper grades such as coated paper, and during the smoothing process.

The new spreader roll produces only minimal external forces. As the high curvature forces are absorbed within the roll itself, it is not usually necessary to provide the machine frame with additional reinforcement.

"Although heading in a completely new technological direction with the CarboStretch roll, this project has demonstrated what motivated partners are capable of achieving."

Heinz Pall, Head of Coating at Sappi Gratkorn, Austria

The roll is lubricated either with oil or grease. At high machine speeds, oil is generally used, as the maximum speed for grease lubrication of the roller bearing has been reached.

Various surface qualities possible

As a coating specialist, Voith Paper can provide the roll with special surface qualities depending on application. For maximum abrasion resistance, a fiber-plastic composite cover (e.g. AironGuide) is available. For higher machine speeds or non-permeable papers, Voith offers a special grooved cover design to eliminate the air cushion between paper web and roll.

Easy-to-maintain design

In particular, the fact that the CarboStretch does not have any roller bearings inside the roll tube makes it easy and inexpensive to maintain. The adjusting mechanism

Fig. 3: Heinz Pall is Head of Coating at Sappi Gratkorn.

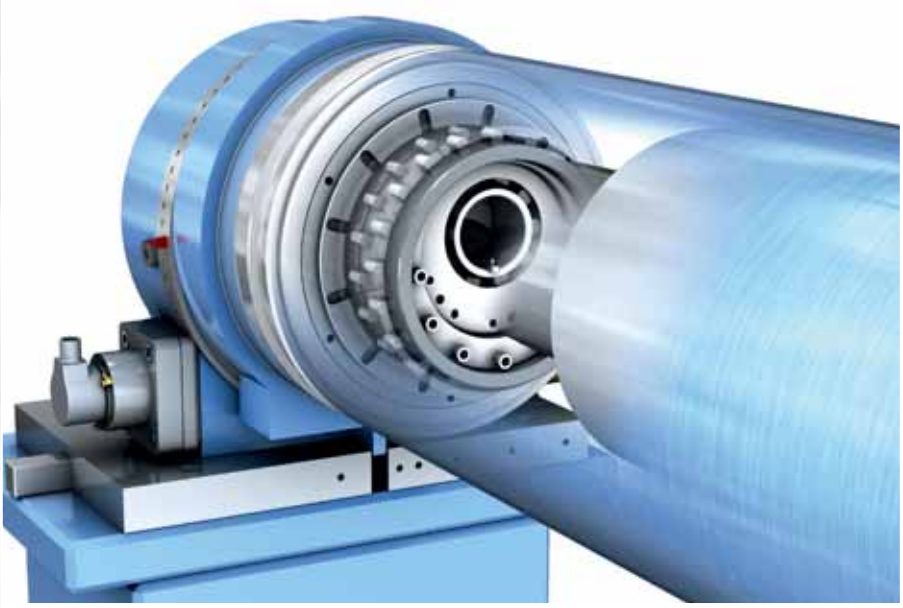

Fig. 4: The newly developed eccentric bearing is the centerpiece of the CarboStretch.

is located at the roll ends and is readily accessible for maintenance. The CarboStretch does not have to be taken to a service center to have the bearings changed and is characterized by high operational reliability and low maintenance costs.

CarboStretch rolls can be used in the coater, calender or winder. The possibility of using it in the press section is currently being tested. The two initial field tests are being carried out in Austria, in production line 9 at Sappi Gratkorn where, in March 2009, the first CarboStretch was installed upstream of the winder in the calender, and in January 2010, a second unit was installed in the coater.

"In principle we were not dissatisfied with our segmented spreader rolls and are, of course, still using a large number of them," explains Heinz Pall, Head of Coating at Sappi Gratkorn. However, the complicated design with a large number of segments, the associated risk of downtime and related high maintenance costs led Sappi to consider other options.

What motivated partners can achieve

"We were very keen to carry out the project with a competent machine vendor. After many discussions with Voith's highly motivated young team – backed by a number of 'old hands' – we decided to install the first roll in the calender of production line 9," says Heinz Pall. He continues: "The decision to opt for the calender was initially a way of minimizing risk, as we were moving into completely new technological territory. We reasoned that this was where we could easily cope with any operational interruptions."

However, even the very first CarboStretch roll ran according to expectations. The experience from calender operation was incorporated into the design of the second prototype. On the basis of the results obtained so far, Sappi then showed confidence in the new technology and installed the second roll directly in coater 9. There, a breakdown would have had much more serious consequences for the production line than in the calender. But here too, everything ran smoothly. "The launch of the CarboStretch in coater 9 was a model start. The bow, jointly determined beforehand by Sappi and Voith, was correct. Likewise, the alignment of the bow line led to a completely problem-free commissioning of the roll. The technology allows separate adjustment of tender and drive sides – offering even more potential to influence the web run," reports Pall.

The two years of operating experience have convinced Heinz Pall. He sees a multitude of application options for the CarboStretch: "Installing it in the press section would be for me the next logical step."

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New rubber roll covers for the press section

Increased service life through longer grinding intervals and high reliability

In order to prevent unplanned shutdowns due to overloading of the roll covers in the press section, Voith Paper has developed new polymer matrix compounds. The MajorPress, MajorFlow, MegaPress and MegaFlow rubber roll covers, available summer 2011, have this unique bonding layer that ensures an extremely high level of reliability. The MegaPress and MegaFlow covers are also equipped with a further-developed rubber polymer in the functional layer that offers less abrasion, better dewatering and the highest running times.

For papermakers, it is unfortunately a familiar problem: An overload due to contaminants, lumps of dirt and paper or skewing in the press area can lead to damages on the roll covers. In the worst case, failure of the rubber roll cover and thus shutdowns of the paper machine are the result.

In order to prevent such unplanned stoppages of the paper machine because of tears in the functional layer and detachment of the press roll covers from the roll, Voith Paper has technologically modified the manufacturing process for its rubber roll covers. Specifically, the polymer matrix of the base layer and the intermediate layer were changed, with the rubber roll covers built up in three layers.

Unmatched reliability

Modification of the polymer matrix has the advantage of providing substantially more contact points between and within the individual layers. The adhesion and bonding forces are thus increased. This ensures a safeguard against failure that so far is unmatched.

The innovative polymer matrix was subject to numerous destruction tests in the laboratory. For this reason it is called Secure Technology. On the roll test stands, rubber roll covers built up in such a way had no failures with a level 6 nip load, in contrast to prevalent covers (Fig. 1). Only with a nip load from 10, which corresponds to 100% massive overload in the press section, did detachments and thus failure of the roll cover occur. If the roll covers are operated up to this highest load level in the test stand, a completely homogeneous failure pattern can be detected in the functional layer. Secure Technology has withstood this massive overload without damage.

Bonding layer three times as resilient

In order to further verify the bonding stability, Voith Paper engineers developed another test procedure

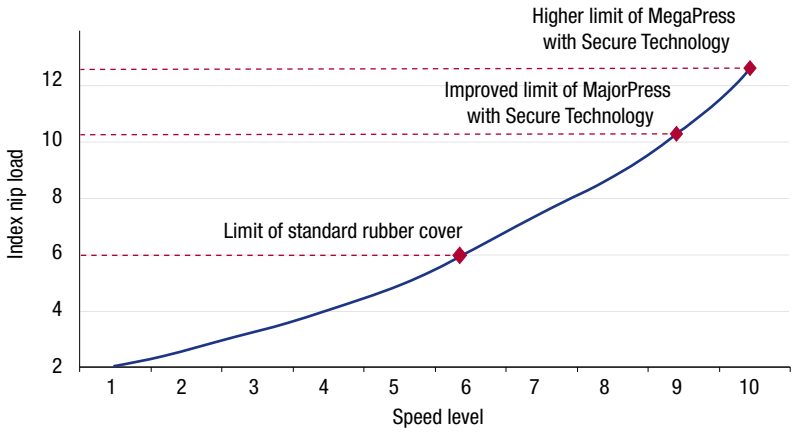

Fig. 1: The roll covers equipped with Secure Technology withstand noticeably higher nip loads than comparable rubber roll covers.

called the crowbar test (Fig. 2). A load at selected points was applied here to the bonding layer in the rubber roll cover with a kind of crowbar. This test simulates the shearing forces appearing in the cover when used in a paper machine.

Conventional rubber roll covers and covers with Secure Technology were again compared with one another. The conventional roll covers were already destroyed at 1,950 N, whereas the covers equipped with Secure Technology did not fail until approximately 6,000 N.

In addition to the laboratory tests, Secure Technology was also tested on paper machines. The new covers achieved another secured running period without problems (Fig. 4). In addition, Secure Technology allows a higher line load. Depending on the paper grade produced, this also facilitates more dewatering. Positive consequence: lower energy consumption in the dryer section.

Starting this summer, there will be a total of four new rubber roll covers for the press section. All of them have Secure Technology but can be used for various roll types. The MajorPress and MegaPress covers were developed for press rolls and long nip style press rolls (jumbo). MajorFlow and MegaFlow are ideally suited for suction press rolls. The new rubber roll covers are an inexpensive alternative to polyurethane covers.

Fig. 2: A load at selected points is applied to a bonding layer in the crowbar test. This test simulates the shearing forces appearing in the rubber cover when used in a paper machine.

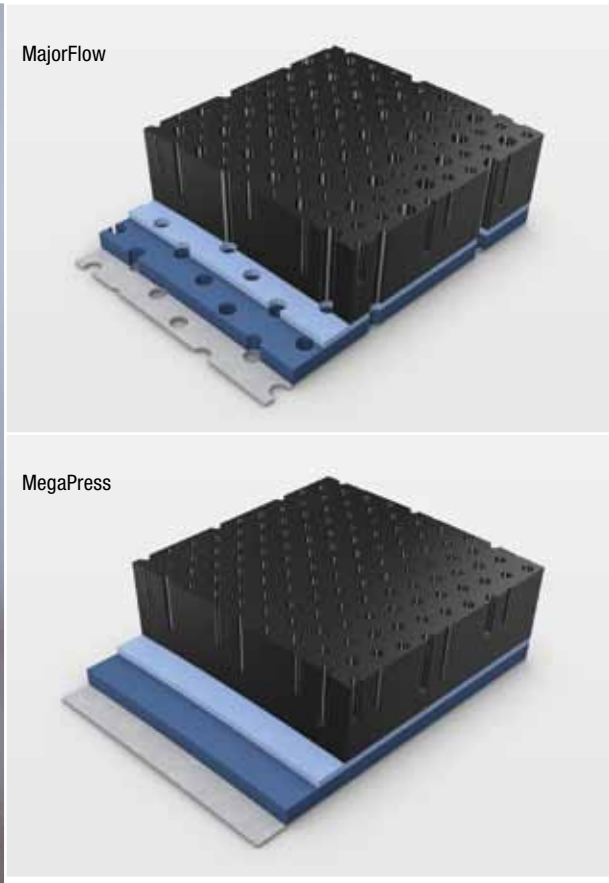

Fig. 3: Major and Mega roll covers with different surface qualities.

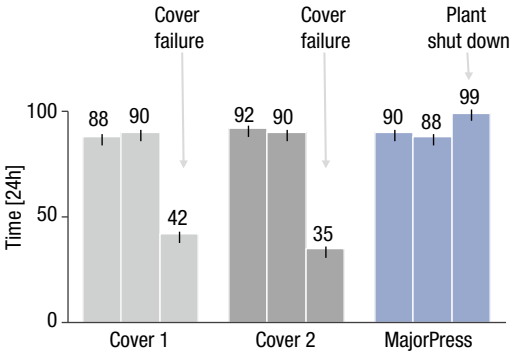

Fig. 4: The new rubber roll covers Major and Mega achieve longer running times in operation without problems.

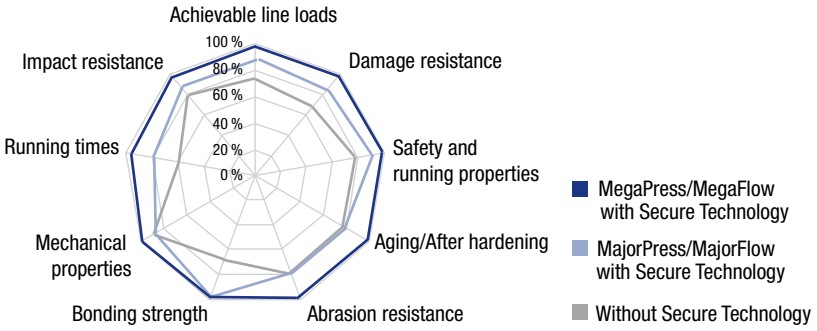

Fig. 5: Comparing the characteristics of the new Mega covers to Major and standard rubber covers shows impressively that the development goal of extending the service life was achieved.

Major and Mega – depending on operating conditions

MajorPress and MajorFlow have Secure Technology and an adapted functional layer in which blind drilled holes can be implemented 1 mm deeper – this results from the increased adhesive strength of the 3-layer structure. Deeper blind drilled holes allow another regrinding of the roll cover. This means that the usable functional layer of the roll cover is increased by 25%, and the dewatering performance increases.

Conventional rubber roll covers show heavy abrasion or signs of wear under the harshest operating conditions. In this case, MegaPress and MegaFlow are the right choice. In addition to Secure Technology, these roll covers have a newly developed functional layer that consists of an improved rubber polymer matrix. The clear development goal here was to extend the service life during critical and high-stress operation.

The advantages of Mega covers are:

- Outstanding stability
- Resilient surface qualities (stable hole volume)
- Best nip dewatering
- Excellent mechanical characteristics
- Outstanding wear resistance
- Low heat development for reduced aging and less wear

Altogether, these characteristics lead to longer running times and an extension of the grinding intervals, and this results in lower grinding costs. Also, the usable functional layer is not reduced by additional grinding procedures. The open surface can be increased from approximately 28% with the Major covers to 35% with the Mega covers. This also brings about increased dewatering performance and energy reduction. Along with Secure Technology, the Mega covers offer even more reliability, making unplanned stoppages due to external overload a thing of the past.

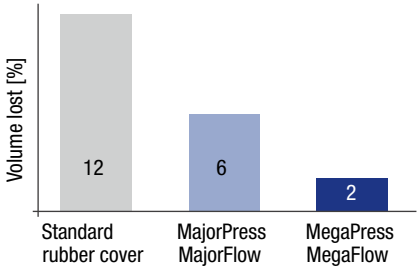

Fig. 6: Comparing the abrasion behavior of various rubber qualities.

Contact

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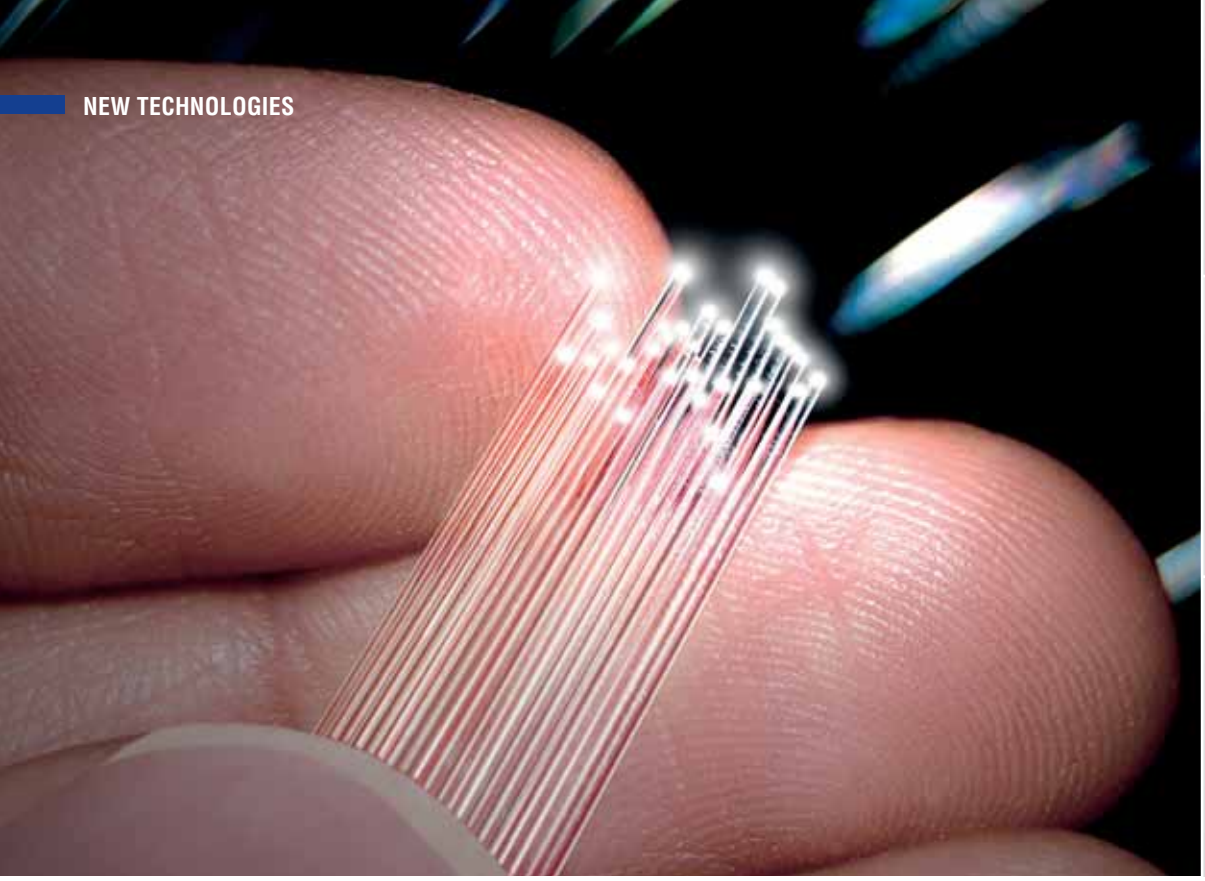

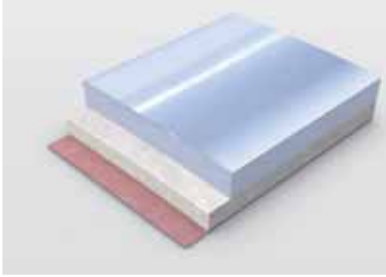

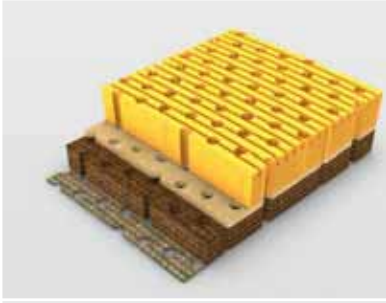

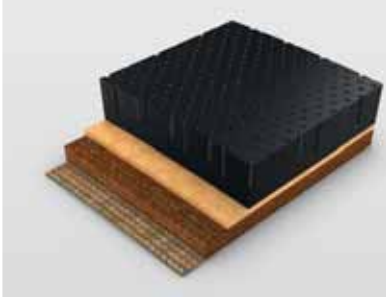

Fig. 1: Glass fibers are non-aging, flexible, weather resistant, chemically resistant and non-flammable.

Fig. 2: NipVision can be integrated into all roll covers, regardless of material or surface quality.

NipVision – for nip measurements while the paper machine is running

Making the invisible visible

The exact processes in a nip cannot be detected when a paper machine is running and until now also could not be measured. However, these processes are extremely important for producing high-quality paper. This is exactly where NipVision comes into play. Glass fibers embedded in roll covers make the invisible visible for the very first time and thus measurable as well.

The glass fibers allow online measurement of nip conditions while the paper machine is running. The fibers are very sensitive and can be integrated in the roll covers to whatever depth is desired, regardless of their material or surface quality. In contrast to piezo-sensors with which researchers have experimented so far, the glass fibers can also be used in the wet section of the paper machine, which is so important for paper quality. Misalignments and over or under load of one or two rolls are directly detected with NipVision, and a multitude of resulting problems are prevented. Examples include:

- Paper web breaks
- Production interruption
- Quality problems
- Unplanned paper machine downtimes
- Detachment of roll cover

Depending on the cover material and the area where the roll is used, glass fibers are embedded at various depths in the roll cover. Due to the specific arrangement of the fibers, the processes in the nip are shown simultaneously and synchronously. This is a definite advantage compared to piezo-sensors, which are arranged around the roll in spiral form and thus do not pass the nip simultaneously. Due to the lack of synchronization,

the interpretation of the data is noticeably more difficult.

Continuous data flow

The data obtained with NipVision is wirelessly transmitted to a computer equipped with customized software. The effect of setting changes on the paper machine can be checked live and if necessary corrected. However, NipVision does not just transmit information regarding the nip pressure, but also information about the roll cover itself. The continuous temperature measurements improve safety by giving an early warning about possible roll cover problems, so that sudden roll cover failures due to cover detachment are minimized.

NipVision is wirelessly and continuously supplied with power, and is always available and does not have to be pre-activated. Valuable knowledge can thus be immediately obtained, particularly with changes in the ongoing paper production process. An intelligent storage facility attached in the enclosure supplies NipVision with power even during a machine stoppage.

The thickness of the roll cover does not have to be changed due to the thin glass fibers. The glass fibers do not interfere with the structure of the roll, so that detachment of the cover in the area of the sensor is almost impossible.

Successful applications

Until recently, nip measurements could only be taken during a machine stoppage. A very experienced engineer was needed to analyze the results. The consequences of setting changes that were undertaken on the basis of the results could only be checked later, while the paper machine was running.

So as to facilitate nip measurements even while the paper machine is running, since the early 1990s development engineers have repeatedly tried to integrate piezo-sensors in the roll covers. Unfortunately the results obtained were not satisfactory, since the piezo-sensors are not sufficiently sensitive. Furthermore, due to continuous corrosion problems, applications in the wet area of the paper machine were not possible. Therefore, development projects using piezo-sensors were never concluded in the form of a marketable product.

NipVision, by contrast, has already been tested very successfully on the Voith test paper machine at the Paper Technology Center in Heidenheim. The first tests at customers' locations started during March 2011 in the Pacific region. From the very beginning, NipVision has reliably delivered valuable data for these applications and since then has been continuously available to the papermaker. The launch to all customers is scheduled for the last quarter of 2011.

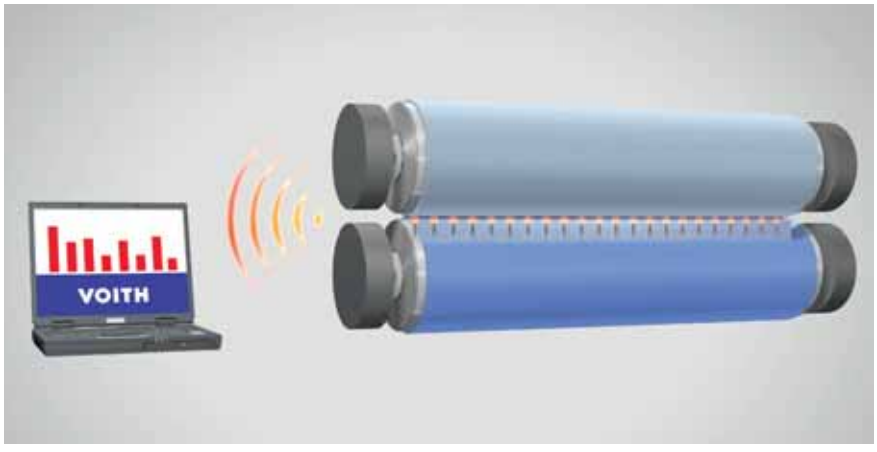

Fig. 3: A schematic diagram of the NipVision sensors.

NipVision can ...

... be embedded in the following roll cover materials: rubber, polyurethane and fiber-reinforced composite.

... be integrated in the following surface qualities: plain, grooved, blind drilled, grooved and blind drilled.

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Wastewater, sludge, rejects – On track to maximize waste potential

Converting sludge into valuable minerals and energy

Greater added value thanks to CTC technology

The hallmarks of modern Voith designs for paper mills are integrated and environmentally compatible processes with a high level of economic efficiency. The latest approach in this area is CTC technology: a process for converting paper sludge to valuable mineral products and thermal energy. This has allowed both high-cost waste disposal and energy consumption to be minimized.

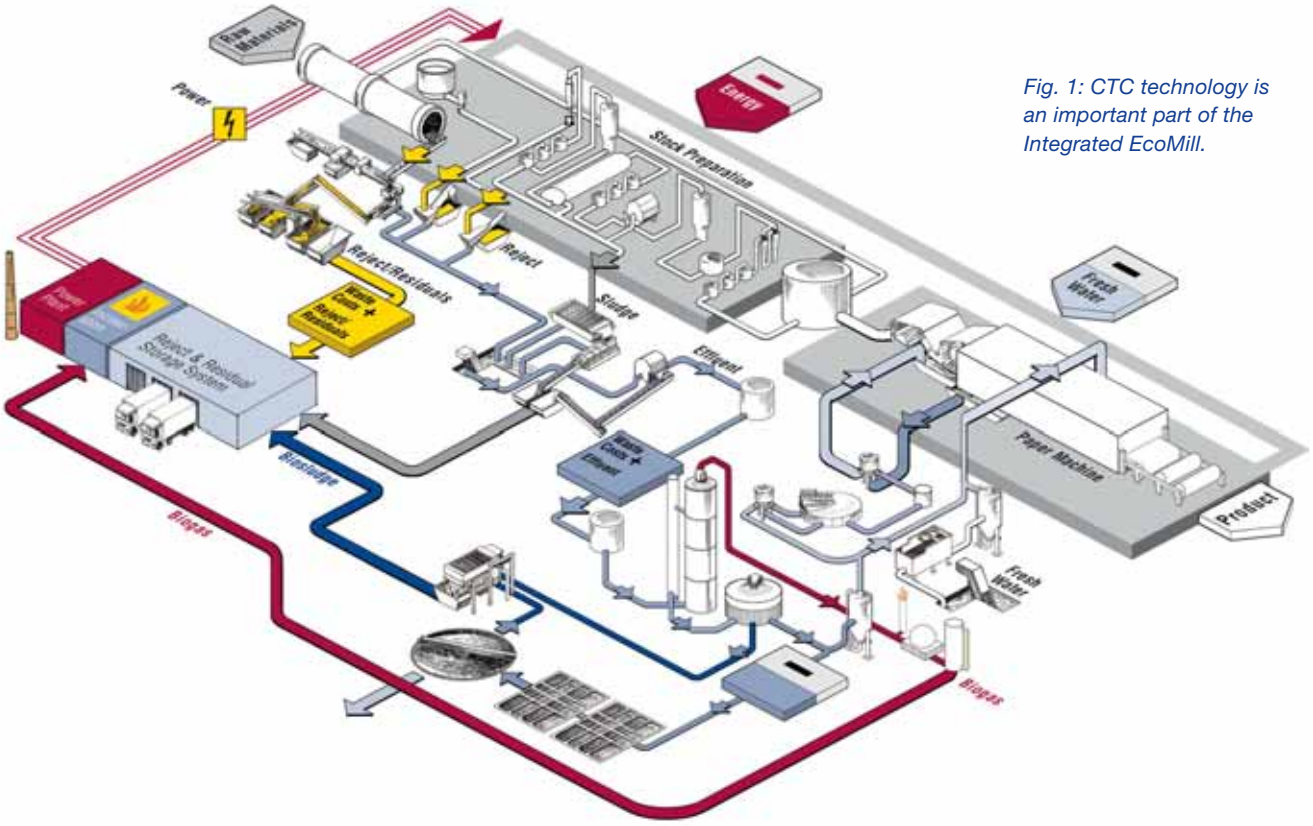


Fig. 1: CTC technology is an important part of the Integrated EcoMill.

Recovered paper processing currently produces more than 25 million metric tons of paper sludge waste worldwide. This is an increasing trend, as recycled fibers are being used more and more and for increasingly high-quality papers. This puts stringent demands on fiber quality that can only be achieved by means of a higher reject rate in the treatment process. The result: more paper sludge.

Whereas previously large volumes of sludge ended up in landfill or were even used as mineral fertilizers in agriculture, today it is mainly combusted in power plants with fluidized bed technology and therefore produces steam and/or electricity. However, the resulting calorific value is very low. In addition, about 25% of the sludge used occurs as ash, which in turn results in disposal costs.

CTC adds more value to sludge

Using CTC technology, it is now possible to convert the paper sludge into reactive minerals and thermal energy. CTC stands for “Controlled Thermal Conversion.” The minerals produced under controlled conditions have a large reactive surface and are ideal, for example, as hydraulic binders in various industries, e.g. for producing cement-like substances. CTC technology therefore produces a saleable product from the sludge occurring. It also yields electricity and steam, which can be used in the paper mill.

The amount of waste material to be disposed of, and thus the disposal costs, are substantially reduced.

CTC technology is another key component of Voith Paper's Integrated EcoMill (IEM), a cost-efficient and environmentally compatible paper mill (Fig. 1). The technology was developed by experts from the Dutch MinPlus-CDEM Group, which specializes in sludge recycling. In January 2011, Voith Paper acquired the technology including patents. Using a "full scale" pilot plant with a capacity of up to 200,000 t/year, the process was refined and developed to industrial maturity. Since 2007, sludge from several paper mills has been processed in the pilot plant. The CTC process has proven effective and has been extremely stable.

The minerals extracted are substantially more reactive

In the CTC process, combustion in the fluidized bed takes place under controlled conditions at exactly the predefined combustion temperature. In the process, the minerals contained in the sludge are dehydrated. Kaolin is converted to metakaolin, which is much more reactive. Part of the carbonate is extracted from the calcium carbonate. This corresponds to the process of lime or cement burning (calcining).

The minerals produced in this way have high pozzolanic characteristics, i.e., inclined to react with water and calcium to form a solid structure.

They are therefore suitable for adding to cement as they improve the binding

Feasibility study

To be able to illustrate the specific economic and ecological advantages of a CTC plant, we will use the practical example of a newsprint mill.

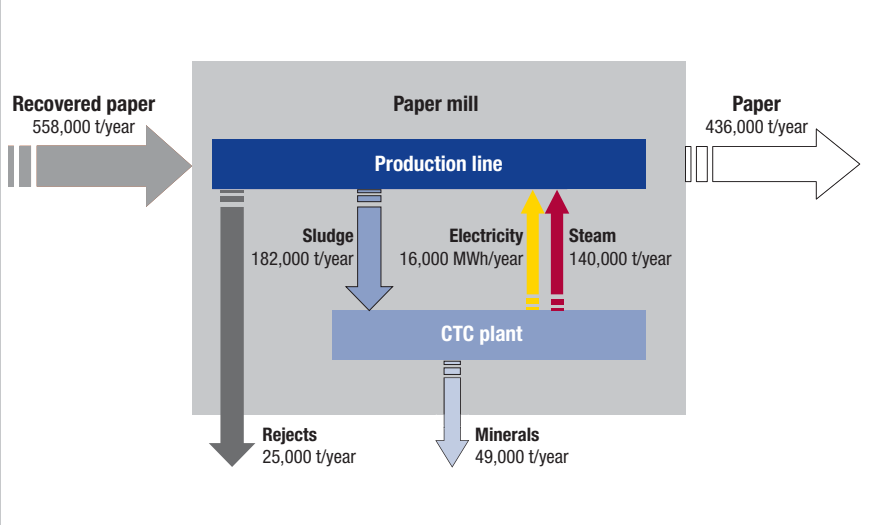
The paper mill has a production line for 436,000 t/year of newsprint paper from 100% secondary fibers. This requires around 558,000 t/year of recovered paper, which is prepared in the plant's own de-inking facility. As a result, the plant produces around 182,000 t/year of paper sludge and 25,000 t/year in rejects. There is no power plant on site. Electricity is bought from the grid, and the necessary process steam is produced by steam boilers. The rejects are sold.

In the CTC plant, screw presses increase the solids content of the sludge to more than 50%. This solid material in turn is composed of 50% organic fines and fibers combined. The other 50% is made up largely of calcium carbonate and kaolin.

As a result of the sludge conversion process in the CTC plant, the 182,000 t of paper sludge yield annually around 49,000 t of reactive minerals, 16,000 MWh electrical energy and 140,000 t steam used for paper manufacture and to relieve the load on the steam boiler. The transport and disposal costs for the sludge are dispensed with in their entirety.

The investment costs for the plant described are in the range of 25-30 million euros, depending on scope of supply. As the CTC plant substantially reduces or even eliminates energy and disposal costs, return on investment times of between four and six years are achieved. This does not take account of possible subsidies or CO_2 credits.

Fig. 2: The return on investment time of a CTC plant is between four and six years.



Figs. 3 and 4: In Duiven, Netherlands, 200,000 t/year of paper sludge are converted into reactive minerals.

and strength properties of conventional cement. Other fields of application are adsorption processes in the liquid and gaseous phase, for example in the binding of heavy metals, where the minerals with their large reactive surfaces function as sorbents. This covers just two of the known areas of application for these reactive minerals to date. There is the potential for further fields of application.

Thanks to the low combustion temperature, a major portion of the carbonate is retained and the emissions of the greenhouse gas carbon dioxide are reduced. The low calorific value of the paper sludge is also sufficient to operate the CTC process without additional fuel input.

Several years experience in pilot plant

Since 2007, the pilot plant in the Netherlands has been processing around 200,000 t/year of sludge from several paper mills to produce over 50,000 t of reactive minerals. As this is an exothermic process, more than 6 MW of electricity are produced at the same time using a steam turbine. The specific electricity generation is 120 kWh per metric ton of sludge.

For optimum operation of a CTC process, the sludge composition must be known. Over the years a lot of know-how and experience has been gathered about the effect of sludge composition on combustion conditions. The basis of this is a database containing data on more than 200 types of sludge from all over the world and a specially developed measuring procedure for analyzing sludge composition and combustion properties.

Interested paper mills can have their paper sludge treated at the Voith Paper pilot plant and have the recovered minerals analyzed with respect to their product qualities. In addition, the energy obtainable in the process can be established.

Reference plants allow customization

Voith Paper offers CTC plants worldwide. To this end, reference sizes were developed that can be adapted to the customer's individual needs. The largest plants process up to 200,000 t sludge per year. The smallest is designed for around 50,000 t, making it ideal for smaller and medium sized mills.

As a module of the Integrated EcoMill, CTC technology helps to sustainably improve the overall ecological balance of a paper mill. However, far more often a CTC plant is suitable for retrofits to existing paper mills. With this in mind, Voith has developed a complete package in which everything is supplied from a single source – from the preliminary phase through plant design and culminating in the complete installation and commissioning.

Although the investment costs are higher than for conventional combustion power plants, the revenue from the minerals makes them economically effective in a very short time. In addition, the ecological balance through the reduction of carbon dioxide emissions is considerably improved.

Contact

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In conversation: the co-developer of CTC technology

"The value of the sludge is in the minerals"

Dr. Joep Biermann achieved the breakthrough where others had been researching for years without success: He is one of the people who developed CTC technology. From the very outset he believed in the potential for sludge recycling – and the results have proven him right. In the meantime, he is bringing his experience and know-how to Voith Paper.

Where are the origins of CTC technology?

The technology has been developed over the last fifteen years. We followed the traditional route, starting with small tests under laboratory conditions to today's full-fledged pilot plant, which has been operating for more than five years.

What drove you to devote yourself to this issue?

The key spur to the development was the worsening problem of sludge disposal. In the Netherlands in particular, this was becoming more and more difficult and expensive. Against this backdrop, four Dutch paper mills joined together to develop a technology to fundamentally resolve this disposal problem and – most importantly – to do so in a sustainable fashion. It was obvious to us that a lasting solution could ensue only on the basis of new value creation. Accordingly, we recognized that the true value of the sludge lies in the minerals it contains.

What is the key element in the CTC process?

The most important factor is controlling the temperature. That is to say that a high level of temperature control is necessary to improve the value of the minerals contained in the sludge, as this is the starting material for the CTC process. This is why we also opted for fluidized bed firing, as this method has the great advantage of allowing the process conditions to be controlled in a targeted manner.

Only if the sludge is treated properly, i.e., thermally converted under the proper, controlled process conditions, will a highly reactive mineral product result. We therefore clearly defined and patented the spectrum for the optimum operating conditions. In addition, the thermal process produces energy in the form of steam and/or electricity.

And how do the minerals reach the customers?

That is not a problem. Voith supports its customers in this area and can provide contacts. Apart from its role as facilitator, Voith Paper is also developing additional sales markets for these mineral products.

Fig. 1: Dr. Joep Biermann's goal was to find a sustainable solution to the sludge disposal problem.

Fig. 1: Order for a clarification facility with E2E reactor in Belarus.

New generation of reactors for anaerobic wastewater treatment

Simple reactor concept, high level of performance

The new "effluent to energy" (E2E) reactor bridges a market gap by combining the advantages of high-load technology with those of UASB (upflow anaerobic sludge blanket) reactors. While the simple design is impressive, it is also clearly more efficient than the UASB reactors still often used. It also offers extremely robust operation.

Anaerobic technology has been used for more than 25 years for purifying industrial wastewater. The conventional UASB reactor is the most well-known product. It is still very prevalent even today, but has a decisive disadvantage: its low specific loading capacity. Modern high-load technology provides a solution here. After successfully applying the R2S reactor for highly loaded or calcium-rich wastewater, Voith Paper engineers developed the new E2E reactor line. Thus high-load technology can also be used with medium loaded types of wastewater. An essential requirement in the development of the E2E reactor was retention of the simple and rugged design that conventional reactors have.

Impressively simple technology

Like the UASB reactor, the E2E reactor also consists of a closed cylindrical flat-bottom tank. The tank can be made of steel, concrete or

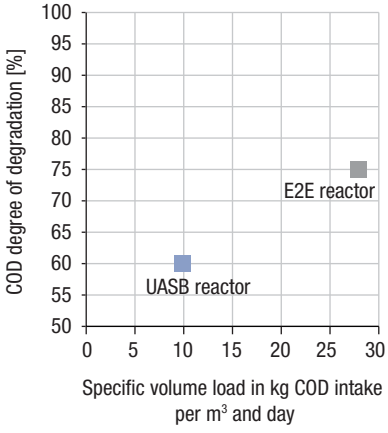

Fig. 2: Comparison of a UASB reactor with Voith E2E reactor.

glass fiber reinforced plastic. There are three phase separating units, simply called separators, in the upper part of the tank.

By means of a specially developed lamella configuration in the separators, the biogas is removed at first. After this, anaerobic sludge carried along with the draining water is retained. The decisive advantages of the E2E reactor, as compared to conventional reactors, are its smaller diameter and its higher specific conversion.

Inside the E2E reactor, a recirculation flow returns the anaerobic sludge to the high-load zone. Thanks to its simple design, the E2E reactor fulfills all important criteria expected from anaerobic reactors today.

Advantages of the E2E reactor:

- Low tank volume due to high-load technology
- High hydraulic capacity of precipitators due to 2-stage separator concept
- No odor emissions and low profile appearance due to enclosed design
- Easy maintenance
- Low investment costs due to high space-time yield

Usable in many areas

The E2E reactor is designed for anaerobic pretreatment of industrial wastewater that contains dissolved organic contaminants. As with UASB reactors, it can be used in many branches of industry. In the area of paper manufacturing, it is used primarily for purifying wastewater from graphic paper mills on a DIP basis, TMP wastewater or bleaching plant wastewater and condensates originating from pulp production.

To demonstrate the capability of the E2E reactor under industrial conditions, the smallest reactor size was produced as a mobile unit and has been in use continuously since the end of 2009. Its capacity was chosen so that the unit can significantly disburden the clarification facilities present in many operations, or so that load-related wastewater costs can be noticeably reduced.

Even outside the paper industry, the E2E reactor is of interest for water-intensive industries. Thus, the first customer that Voith installed the

Fig. 3: Sectional view of an E2E reactor.

Fig. 4: E2E reactor in Kaufbeuren, Germany.

reactor for was an operation of the Nestlé food company in Holland. Ensuring stable continuous operation with heavily fluctuating wastewater compositions was the biggest challenge.

Such fluctuations are characteristic of the food industry due to the alternation of production and cleaning cycles. The E2E reactor mastered this task without any problems. In addition, by discharging the pretreated wastewater into the local clarification facility, the customer was able to noticeably reduce its wastewater fees.

Nearly three times the specific load

In a second installation, the E2E reactor was used at a paper mill in Kaufbeuren, Germany. The paper mill produces around 180 tons of testliner per day and has its own clarification facility, which consists of a primary treatment, a UASB reactor, an activated sludge system and final clarification. The E2E reactor was loaded with the same wastewater as the UASB reactor, so that the two reactor types could be directly compared with one another.

The results were convincing: While the approximately 540 m^3 UASB reactor of the paper mill was given a load of about 5.4 t/day, the mere 70 m^3 E2E reactor could handle a load of up to 2 t/day. The E2E reactor reaches a specific load that is more than 2.8 times that of the UASB reactor.

The advantages of the E2E technology were also evident in the case of a project in Turkey. Due to official specifications, installation of an anaerobic preliminary treatment stage was required at a company in the candy industry. Due to the low investment costs and also the low space requirement, the company decided in favor of the E2E reactor. Another reason for the decision was the hermetically sealed design that prevents annoying odors in the surrounding area. After startup, the system achieved efficiency factors of over 80% within the shortest time.

Rebuild brings energy consumption and costs down

No less important is the extension or retrofitting of existing systems with the E2E reactor. Previously, for cost efficiency, wastewater with COD loads between 1,500 mg/l and 2,500 mg/l was purified almost exclusively with aerobic high-load stages such as MBBR reactors, which Voith also has in its product portfolio. Today the replacement of such aerobic high-load stages by an anaerobic E2E reactor can definitely make sense. In this way, energy-intensive blowers are not needed, the degradation rate stays the same or is even better. In addition, biogas is produced that can be used for power generation. The accumulation of sludge is likewise noticeably reduced, thus ensuring low operating costs.

The simple design and high degradation rate – combined with its broad application possibilities – make the E2E reactor an important component for cost-optimized operation of wastewater purification systems.

Contact

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Fig. 1: Complete service: All maintenance tasks become our long-term responsibility.

From service provider to integrated service partner

Service contracts ease the load for papermakers

Repair, maintenance and technical optimization: What used to be well-established tasks of a paper mill are frequently, in today's competitive atmosphere more of a diversion from actual paper manufacturing. Voith Paper is thus offering long-term service contracts, with fair collaboration based on partnership, so that paper mills can concentrate on their core competences of manufacturing and sales.

Over the years, Voith Paper has grown from being a service provider to a complete service partner. The continuous further development of service products is characterized by integrating existing service potentials and individual adaptation to meet the respective customer needs. To utilize the advantages of a long-term service partnership, paper manufacturers can choose between several models.

Maintenance contracts ensure reliable operations

In the first model, Voith Paper takes over preventive inspection and maintenance of demanding units and machine sections. Mechanical engineering expertise, the most modern measurement and diagnostic tools, and a systematic method of testing and documentation all pay off here. Operational safety and reliability are thus monitored and ensured. "Execution or monitoring of specifically developed inspection and maintenance cycles is done on the basis of multi-year service contracts. This ensures the system areas in question run smoothly and reliably," explains Bernd Stibi, Vice President of Products & Services Europe at Voith Paper.

The necessary reserve and wear parts are included in the maintenance contract. In addition, Voith is committed to continuous further training for its service employees. Therefore, the paper manufacturer is relieved from the necessity of parts procurement and the sometimes expensive training of its own employees.

Partnership contracts uncover potential

Paper machines are reliably designed. However, the components are continuously developed due to research findings, improved materials and operational experience. In addition, paper manufacturers are exposed to challenges industry-wide, especially regarding the cost-effectiveness of manufacturing processes. Therefore, the potential for savings has have to be identified and used. Likewise, requirements for safety, environmental protection and sustainability are constantly changing. “Older paper machines almost always have the potential for making a decisive contribution. For that reason, we are offering our customers the opportunity to utilize this possibility by means of a multi-stage concept,” says Stibi.

First of all, a team of experts performs a systematic audit to analyze the respective system, machine or process, looking for any improvement. At the same time, suggestions are developed as to how this potential can best be used. Evaluation of the target contribution and estimation of the necessary expenditures give the operating company a first idea of the ROI (return on investment) as a decision criterion for the other steps.

Such an analysis can extend to specific system areas and operating processes or be applied as a multi-machine investigation. Voith Paper offers not only machine audits but also safety, process, quality and maintenance audits. “Our aim is always to issue a report for the customer indicating which measures can attain the formulated goals,” Stibi explains.

If necessary, in a second step, details of the technical feasibility of the measures are investigated within the framework of a preliminary project. The operator of the facility then receives a customized offer with technical specifications, project schedule and prices.

“We don’t primarily view the audit and preliminary project as a basic analysis of our own machine delivery,” says Stibi. “Rather, we offer our customers an independent service for decision making. Another thing that’s new: We supplement the price for this service with a success-dependent element. In other words, only when the project goals have been demonstrably achieved does Voith Paper receive its fair share of the success.” The implementation phase follows as the third stage. The paper mill can always choose to carry out this phase itself. However, Voith Paper is always available and if necessary will support implementation of previously defined measures.

Safeguarded over the entire lifecycle

A lifecycle service contract establishes a long-term partnership for servicing the paper machine, the production line or even the entire paper mill. Voith Paper takes over the entire technical responsibility. This service includes several elements that are individually arranged and adapted, depending on the customer’s needs.

The contracts regulate the classic disciplines for maintaining and increasing technical system availability. The latter are, for example, repair, maintenance and optimization. The paper manufacturer gets support in the form of service packages for resident maintenance and operational assistance. The range of services is not restricted to Voith’s own delivery. As the central service provider, the machine areas and services of other suppliers are also coordinated. Operational assistance means that experts from Voith Paper, for example, remain on site over the longterm after a startup or process adjustment. They support the paper mill’s own personnel in achieving the paper production targets for quantity, quality and cost-effectiveness. They monitor production and help optimize operation of the system in terms of mechanics, process technology and cost-effectiveness.

The paper mill is supported in dealing with the system as long as necessary – even over several years, if desired.

Depending on the service package, with the resident service Voith Paper takes care of maintenance, repair and replacement parts management, as well as provision of fabrics and roll covers. The contacts necessary for paper production are always available, and the required specialists are on site whenever necessary. Stibi explains: “From resource planning to procurement and logistics of the required parts, from the paper machine all the way to building management, everything goes through one contact point connected to the global Voith network.”

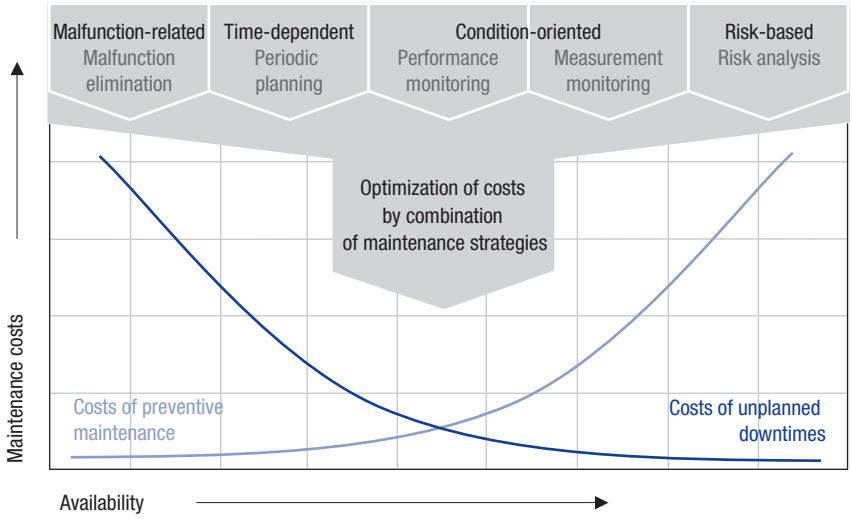

Fig. 2: Maintenance can be performed through various strategies. The right combination lowers costs for the paper manufacturer.

The customer profits from common interest

The lifecycle contract concept means that payment for services is linked to the capability of the system – whether it is a matter of production tons or another performance figure of technical availability. “In the end, the operator of the facility gets a calculable budget amount for maintenance and repair. The contract is thus transparent and fair. The partnership-based, long-term common economic interest sets obligations for both parties,” according to Stibi.

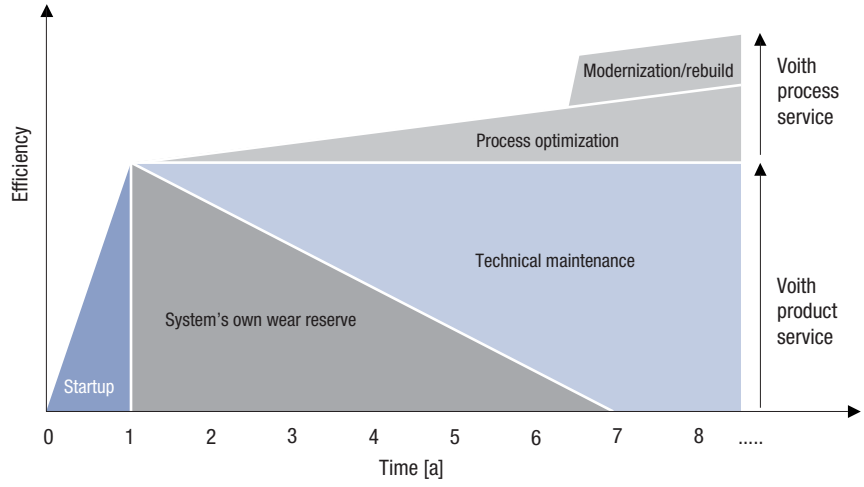

Fig. 3: Voith accompanies the paper mill through the entire lifecycle.

An important building block of lifecycle service is performance management. Similar to other service contracts, the goal is continuous improvement of the system over the entire lifecycle. Stibi summarizes: “Operational assistance is support in the first phase in the lifecycle of a paper machine. Resident maintenance service maintains the technical availability of the system. And finally, performance management is a long-term optimization process. Along with classic maintenance, these three lifecycle building blocks enable us to ensure that the requirements for system efficiency are met over the entire lifecycle.”

Contact

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Sustainability in practice at Voith Paper

Less energy, water and waste worldwide

Innovations from Voith Paper always target configuring customers' production facilities so that they are more economical and environmentally friendly. At Voith Paper's own facilities, it is also a matter of using resources as efficiently as possible. Specific measures at locations worldwide have already led to a significant reduction in CO_2 emissions, fresh water usage and a clear reduction of waste.

What began at Voith Paper as a complement to certified environmental management has become very successful: ecological business management. "For us, it's a question of creating economic added value for Voith's energy and resource use, for example, by closing loops and implementing efficiency measures," explains Torsten Kallweit, Head of Corporate Environment at Voith. "We want to implement ecological measures in a cost-effective way."

In order to achieve that, Voith Paper is analyzing its own production processes at several locations worldwide under sustainability aspects. These analyses especially take into account water and energy usage, as well as waste, effluents and emissions associated with the production processes. Therefore, the location is considered holistically.

Heating and cooling in an environmentally friendly way

Such an analysis of a Voith Paper location in the Chinese city of Kunshan has already led to the first measurable

Fig. 1: The vacuum distillation system in Heidenheim, Germany, means a reduction of 200 metric tons of emulsion waste per year.

Fig. 2 and 3: The combined heat and power plant in Düren, Germany, produces almost 500 MWh of power per year (top). In addition, consumption of natural gas was reduced by improving pipe insulation (bottom).

Fig. 4: Better light, 25% less energy: efficient lighting in West Monroe, USA.

Fig. 5: The São Paulo, Brazil, location treats more than 60,000 m^3 of effluents per year.

results. A simple and effective measure takes effect here: Rather than operating heating and air conditioning systems separately with fuel oil and natural gas, both systems now run with natural gas only. Around 800 metric tons of CO_2 emissions per year are therefore reduced due to the lower CO_2 emissions of natural gas. It is especially positive that the measure could be implemented without a large adaptation of the existing heating system.

Voith Paper has also achieved a lot in the last few years at the German location of Düren. Power and heat are produced there in an especially energy-efficient and low-emission way by means of power-heat cogeneration in its own combined heat and power plant. In addition, the insulation of more than 2,000 meters of piping was improved. Thus consumption of natural gas was reduced by approx. 30%; in addition, the power generated is fed into the location's own grid. Therefore, about 620 tons of CO_2 per year are saved.

As to the question of what the energy is used for at the locations, it turns out that lighting is a substantial portion, along with other uses. Simply due to a new lighting system in the workshop, the CO_2 emissions at the West Monroe location in the USA were reduced by 115 tons/year. The new, more energy-efficient halogen lighting consumes approx. 25% less energy with improved lighting quality.

Need for fresh water noticeably reduced

Efficient use of water as a resource also plays a central role. The best example of this is the reduced fresh water required for the production of roll covers at the São Paulo, Brazil, location. Here, water is primarily needed for cooling and cleaning processes. By switching to water from its own water treatment system, which Voith operates at the location, the need for fresh water was reduced by over 20%, or by about 8,500 m^3.

Reducing and preventing waste

Voith Paper also pays special attention to material efficiency in product manufacturing so as to reduce waste or, even better, to prevent it entirely. Thus the yarns produced in Summerville, USA, for paper machine fabrics are sent to other Voith locations almost entirely on reusable yarn reels and special reusable pallets. After being used, the empty yarn reels are returned for reuse. The loop makes sense both economically as well as ecologically.

Voith Paper found another way to reduce waste in the area of coolants. They are used for grinding and drilling on turning and milling machines, for instance, and have to be disposed of in an elaborate fashion. In order to reduce the amount of waste, the Heidenheim location relies on a vacuum distillation system. It removes water from the coolant so only a fraction has to be disposed. Approximately 90% of water content is filtered out. Altogether, the total amount of coolant to be disposed can be reduced by about 70%.

As Global Ecological Business Manager at Voith, Andreas Mayer has supervised some of the projects and is satisfied: "The success of our initiatives can be clearly measured and confirms our methods. And not just in the short term." According to Mayer, the know-how regarding resource-efficient processes available within Voith is used internally for economical and environmentally friendly production. Customers also profit from this: The knowledge gained from this process is used in the development of even more efficient products.

Two new orders for Voith Hydro

More hydropower for China

Two Chinese power plant operators have just commissioned Voith Hydro to equip their new hydropower plants. A total of 1,880 MW of clean, renewable energy will come on stream.

To expand the Yantan power plant located in the southern province of Guangxi, China, belonging to the Datang Yantan Hydro Power Company, Voith Hydro will equip two 340 MW units with new generators. The second order was placed by the Huanghe River Hydro Power Development Company, which will build the Yang Qu power plant on the Yellow River in northwestern China. For this project, Voith is delivering three Francis turbines with an output of 400 MW each. The total value of both orders is about 40 mio. euros.

Altogether, the two projects will generate 1,880 MW of new capacity from climate-friendly renewable sources. Today, China generates 16% of its electricity from hydropower. According to government plans, the existing capacity should be expanded by 50% to 300,000 MW by 2020. The use of hydropower enables China to pursue its goals for economic growth and in the process to take climate and environmental protection into account.

Fig. 1: Runner of a Francis turbine.

Fig. 1: Retrofitting with LED lighting pays off.

Voith Industrial Services lets the light shine

Saving energy with LEDs

Where bright light is needed, LEDs offer the best service. No other lighting system is currently able to produce such a high output of light with such low energy consumption and high color rendering. The Voith Industrial Services corporate division offers efficient lighting concepts for industry using LED technology.

LEDs (light-emitting diodes) have high energy efficiency: They consume 40 to 80% less power with the same or even better light output. That has a positive effect on energy costs. Subsequent disposal of the light bulbs is also simple.

LED lighting technology can be used in nearly all areas. It is also ideal for a pleasant work atmosphere and for true color representation of illuminated objects. Since the effective service life of LEDs is longer than that of conventional light bulbs, maintenance costs are also reduced. All services – from light planning and selection of the light bulbs to mounting and maintenance – are included in the offer.

Precision with Hirth couplings from Voith Turbo

Strong teeth for connecting and accurate positioning

Just imagine: 41,600 Formula 1 race cars reach their average torque of 360 Newton meters at the same time. Therefore, an unbelievable 15 mio. Nm thus come together. A torque volume with a frequently unappreciated machine component transmits without any strain: the Hirth coupling.

For the most part, it has an understated existence. There is hardly a connection element that is more versatile than the Hirth coupling. Transmitting high torques with comparatively small diameters – that is one of its major strengths. This means Hirth couplings can be found in pumps, compressors and fans, as well as in milling machines, gears and turbines. Voith manufactures these connection elements, but also undertakes the complete calculation and design consulting.

It was just this know-how that was needed in the case of the latest order from an American turbine manufacturer. At the end of last year, Voith Turbo had manufactured its largest turbine part so far: The diameter is 1,100 mm with a weight of 800 kg. The Hirth coupling connects the two turbine discs, which rely on extremely accurate centering with high true-running precision. Were this not the case, damage to the turbine would be inevitable. The face surfaces of the two discs have conical teeth all around. Screws and connecting bolts draw the discs into one another in self-centering fashion and thus fix them in a positive locking manner. Each tooth is fully brought to bear. That gives the Hirth coupling the ability to transmit enormous torques.

But the Hirth coupling used not only as a connection element for shafts, discs, wheels and cranks. It is also a positioning element with astonishing accuracy. The deviation is at most 1-2 angular seconds. With this precision, for example, the little horse on a children's merry-go-round with a diameter of 6 m could be exactly positioned to half a hair's breadth. In practice, accuracy like this is essential in machine tool manufacturing such as rotary indexing tables and tool carriers, among other areas. Medical examination couches and operation tables are other applications benefiting from exact positioning and fixing.

Fig. 1: Customers get complete service with the Hirth coupling: design consultation, calculation, manufacturing and quality assurance.

Briefly explained

Lime trap

Anaerobic reactor technology in combination with a lime trap makes the lime problem manageable. It enables biologically treated and decarbonized water to be recirculated into the production process. This recycling lowers the average water consumption in paper production.

Briefly reported

Queen in King's Lynn

In February 2011, Queen Elizabeth II and Prince Philip visited Palm Paper's mill in King's Lynn, England. The paper machine delivered by Voith is the widest for newsprint worldwide and produces 400,000 metric tons/year.

Did you know?

Voith is publishing its first sustainability report in 2011. For more information, visit: www.voith.com.

Conundrum corner

Put these scrambled letters in the right order to get four technical terms from the paper industry.

REDWNI
FESRENTCI
ABEIRACON OTCRERA
NGCRESIEN

Solution:
Winder, ScreenFit, anaerobic reactor, screening

twogether cultural tip

Cider, spring rolls and art

Manchester is one of the most important economic and cultural centers of Great Britain and also a place where Voith Paper is located. In one of Europe's most multi-cultural cities, spring rolls from China-town meet paleo-industrial romanticism and modern architecture.

It's a lively mix. No wonder the residents in Manchester live according to the motto: "Everything is possible." Whether it's the Gothic town hall (see fig.), modern Bridgewater Hall or the 168-meter-high Beetham Tower – the city center with its characteristic brick buildings can be comfortably explored on foot. Here, pub culture with cider and ale meets urban art and trendy bars, e.g., in the "hip" Northern Quarter. There is culture in the Manchester Art Gallery, among other places, and in M.E.N., Europe's largest concert hall. Soccer is played in the legendary Manchester United stadium, Old Trafford.

twogether book tip

“The Book of Paper”

“The Book of Paper” is part of a book series that researches the creative potential, characteristics and qualities of seemingly ordinary materials such as paper, wood, glass and stone.

The works of designer and sculptor Oliver Helfrich and photographer Antje Peters are shown along with essays by artists, architects and scientists who all have their own special relationship to paper. From tissues to takeaway coffee cups and milk cartons, without us even being aware of it, paper plays a central role in daily life. “The Book of Paper” develops the aesthetic value of this often ignored material through paper sculptures.

Title: “The Book of Paper”, ISBN: 9789460830334, hardcover, 48 pages.

Briefly Googled

“Paper Toss”

The free application “Paper Toss” is a fun game for your smartphone or tablet computer. In this entertaining game, you throw a paper ball into the paper basket that is sometimes closer, sometimes further away. To add difficulty, a fan influences the direction of the paper ball. A totally new kind of waste paper collection.

Download: http://itunes.apple.com/

Briefly queried

Wolfgang Klotzbücher

Area: development of machine controls

Works for Voith Paper in Heidenheim, Germany, for nearly 25 years.

Where would you like to spend your next vacation?

In a sailboat on the Mediterranean.

What do you do to avoid stress?

I try to plan my day realistically and to always include something that I enjoy. If an urgent job comes in though, I take it on in a sportsmanlike fashion.

Finally: What advice do you have for young people?

They should seek information and guidance from various sources and go through life with their eyes open.

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