twogether

Paper Technology Journal

Contents

Frontispiece: Republic Paperboard Company – the first parent rolls produced on the new machine with two gap formers.

Hans Müller,
President and CEO
Voith Sulzer Paper Technology

Dear Customer, dear Reader,

We have pleasure in introducing you to Issue No. 10 of our popular twogether Paper Technology Journal for the pulp and paper industry. The positive feedback we continue to receive from around the world encourages us to keep up the high standard of articles published in this truly international communications tool.

We are fully aware that the consolidation trend among our customers has not ceased and this continues to have a damping effect on worldwide order placement for complete new production lines, particularly in the graphic papers section. On the other hand, demand for rebuilds aimed at product quality improvements, especially for finishing equipment, remains buoyant. Our Board and Packaging Paper operations also show a healthy level of activity, pointing to a record booking level for the current business year. Similarly, we can see positive trends in demand for our stock preparation product lines.

In the meantime, our leading position in shoe press technology has been further substantiated with the order for the 200th NipcoFlex Shoe Press since market introduction of this innovative product.

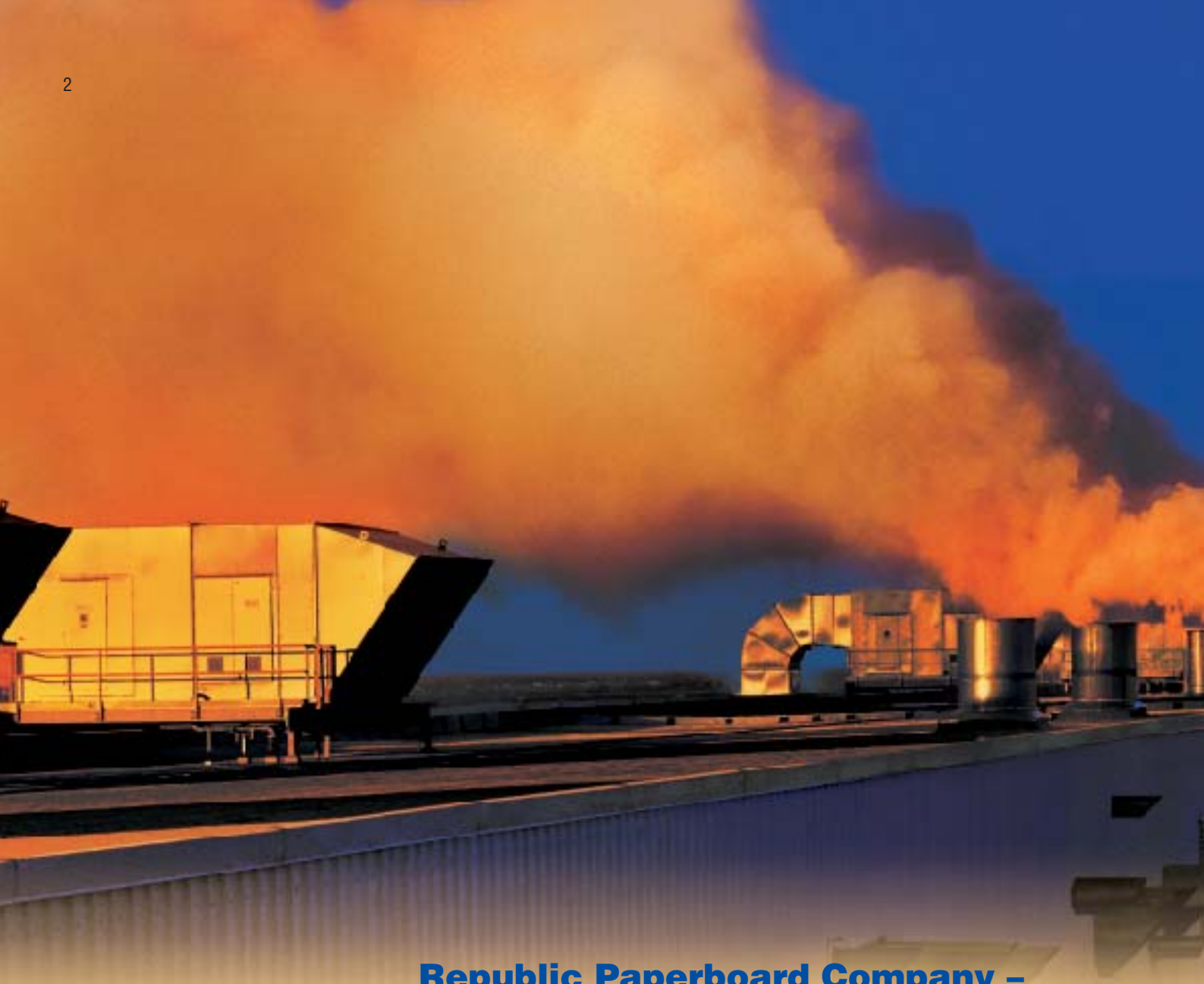
The second calender generation of our Janus Concept line – Mark II –, has been successfully introduced to the paper industry and the performance of our Janus technology in Port Hawkesbury, Canada, has been stabilized, providing a significant contribution to the record-breaking production levels for SC-A grades on PM 2 at this mill.

Successful integration of the Scapa Plc roll covering line into our Service Division confirms the merits of this decision to add to the overall competence of our system supplier approach. Our customers likewise benefit from the close link between Voith Fabrics (now incorporating the complete range of Scapa's fabrics activities) and Voith Sulzer's development of new paper machine processes and components.

In short, we see an exciting time ahead of us and we have full confidence in the continueing fine performance of the industry we serve.

Yours sincerely,

Hans Müller
on behalf of the Voith Sulzer Paper Technology Team



Republic Paperboard Company – the world's first paper machine with two gap formers

The author:
Christoph Merckens,
Paper Machines
Board and Packaging

On November 27, 1999, Republic Paperboard Company, Lawton, Oklahoma, USA, brought about a revolution in paper manufacturing: A new gypsum-grade paperboard machine was brought on-line – the world's first paper machine with two gap formers. This milestone in board and packaging paper production illustrates the technological leadership and innovative spirit of Voith Sulzer Paper Technology.

The Republic Group Incorporated – a company looking to the future

Headquartered in Hutchinson, Kansas, Republic Group Incorporated (NYSE: RGC), the parent Company of Republic Paperboard Company, is comprised of three business segments, namely paperboard manufacturing, gypsum wallboard manufacturing and paper recycling. The production of gypsum-grade paperboard and gypsum wallboard has always been

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Fig. 1 and 2: Republic Paperboard Company in Lawton, Oklahoma, USA.

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core businesses of Republic. To offer gypsum-grade paperboard also in the lower basis weight range, it was decided to supplement the Company's paperboard mills located in Hutchinson, Kansas; Commerce City – Denver, Colorado; and Halltown, West Virginia, with a new greenfield paperboard mill. In a press release, Phil Simpson, Republic's Chairman and President, declared that the group had set a goal to become a leading manufacturer of lightweight gypsum-grade paperboard in the USA. To achieve this goal, they were interested in new, innovative technologies, some of which were already being used successfully in Europe.

Lawton, Oklahoma was chosen as the site of the paper mill due to its central location in relation to both Republic's internal and external customers. A large part of the production is sold to other domestic gypsum wallboard manufacturers through long-term delivery contracts.

Gypsum-grade paperboard as a product

Gypsum wallboard is made of a gypsum core and two sheets of paper, accounting for both strength and appearance of the wallboard. The two-component creamface (white top layer and gray filler) is used for the face of the gypsum wallboard; whereas, one-component gray board is used for the back (grayback). Both products can be manufactured on Lawton's PM 1. The requirements to be met by both grades are complex; however, the most decisive properties are high strength, a hydrophobic top layer (achieved by sizing) to shield the product against humidity from outside and a hydrophilic back layer to achieve optimum bonding between gypsum and paperboard. Currently, basis weights range between 190 g/m^2 (39 lbs/MSF) and 200 g/m^2 (41 lbs/MSF), but are to be reduced to 180 g/m^2 (37 lbs/MSF) in the years to come. Apart from the two gypsum-grade paperboard products, the mill can produce a variety of other products. The machine is designed to produce basis weights from 127 to 244 g/m^2 (26 to 50 lbs/MSF).

An ambitious project is taking its course

Republic Paperboard's vision was clearly defined right from the start – to double

Fig. 3: Pulper in the stock preparation.

Fig. 4: Scheme KM 1.

Fig. 5: Final section of KM.

Fig. 6: DuoFormer Top with ModuleJet.

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the group's paper production with a new, high quality, low cost production plant. In the summer of 1997, Voith Sulzer was contacted as one of several renowned suppliers to work on a project for the manufacture of three or four-layer gypsum-grade paperboard. One of the customer's basic requirements was to use only components that had already been tried and tested. Therefore, a design with three fourdrinier wires was developed for the wire section, which was being tested on the Voith Sulzer test paper machine for board and packaging papers at Ravensburg, Germany.

At the same time, the Voith Sulzer project team presented a configuration with the two gap formers especially developed for board and packaging papers, DuoFormer™ Base and DuoFormer™ Top, which seemed to be ideally suited for the production of gypsum-grade paperboard. Both gap formers were installed on the test paper machine at the time when the tests for the fourdrinier wire design were performed. The customer became interested in running tests with the gap formers as well, which then prompted another series of tests. These extensive field tests determined that fitting the new machine with gap formers was the correct choice. The dedicated teamwork of Republic Paperboard and the Voith Sulzer team helped to create the trendsetting design for the world's first paper machine with two gap formers.

On February 19, 1998, Voith Sulzer Paper Technology finally obtained the order to deliver two complete stock preparation lines, the paper machine and a slitter-winder.

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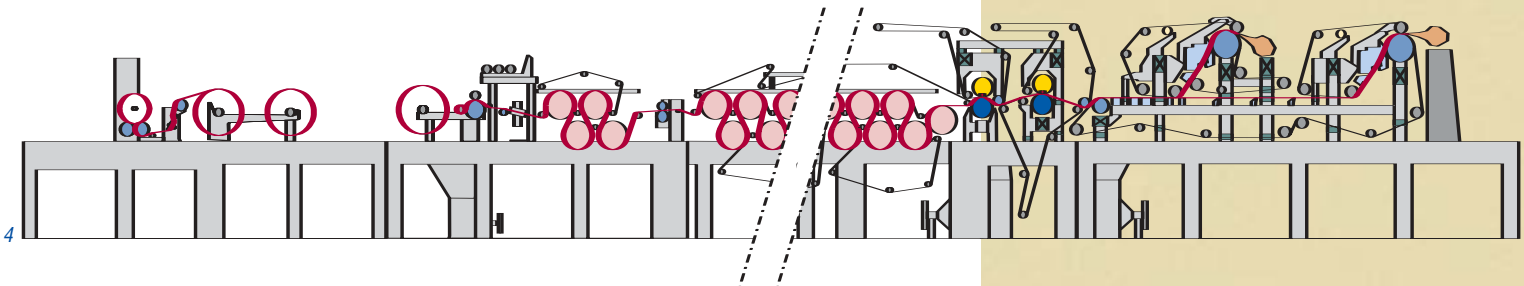
Stock preparation

The stock preparation system was delivered and started up by Voith Sulzer Paper Technology, Appleton, Wisconsin, USA. It consists of two lines, one for the white top layer of the creamface and another one for the gray filler and backlayers of creamface and all layers of the grayback.



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6 To achieve excellent results in slushing and cleaning of the recycled paper, the design for both lines was developed in close cooperation with the customer and on the basis of tests performed at Ravensburg, Germany, and Appleton, Wisconsin.

The white line is fed with primarily unprinted white grades of paper and has a capacity of 240 tons/day. It consists of a continuous pulper, as well as pressure screening, cleaning and refining systems. The gray line is primarily fed with ONP and OCC and has a daily capacity of 745 tons. After the continuous pulper, the stock is supplied to a coarse and fine screening system. The cleaner system for separating heavy and lightweight contaminants is followed by fractionation and refining equipment for short and long fiber components. In addition, Voith Sulzer's scope of supply included Meri rejects handling units, as well as Andritz refiners and disk filters.

Paper machine: two gap formers and other state-of-the-art components

The paperboard machine's former design sets new standards for the board and

Facts and figures
Working width: 4,000 mm (161 inches)
Maximum roll diameter: 3,000 mm
Annual production: 220,000 t
Operating speed: 762 m/min (2,500 fpm)
Products:
Gypsum-grade paperboard:
Creamface 180-200 g/m²
Grayback 170-190 g/m²
Packaging grades: 127-244 g/m²

packaging paper machines of the new millennium. In the future, not only in gypsum-grade paperboard production, but also for many other liner and board grades, two or more gap formers will be used in one machine.

Two gap formers were used in the wire section on the Republic machine. The first former, DuoFormer™ Base, produces a top layer. The second former, the world's first DuoFormer™ Top, forms a bottom layer. The most important advantage of the gap formers is to achieve good formation within a wide MD/CD ratio range. Compared to the fourdrinier wire, higher consistencies can be run while obtaining a comparable formation and the bond strength is better, which makes spraying starch unnecessary. To achieve optimum CD profiles, the headbox of the DuoFormer Top is fitted with a ModuleJet™ dilution water control. And last, but not least, little space is required for a gap former, compared to alternative designs.

The Tandem NipcoFlex™ press (a double shoe press) was chosen to obtain maximum strength values while ensuring high porosity at the same time. Additional benefits of the press configuration are high runnability and simple transfer. The entire dryer section is two-tiered, the fabrics of the first two dryer groups are fitted with Voith Sulzer DuoCleaners™ for cleaning. – After the dryer section, a hard-nip calender with heated bottom roll and EcoNip top roll is installed, and finally, a cooling unit is installed consisting of four cylinders which helps to keep the temperature on the reel operator-friendly. The paper is wound on a horizontal reel with reel spool magazine.

The paper machine was delivered and started up by Republic and Voith Sulzer Papiermaschinen AG, St. Poelten, Austria.

Installation and start-up

Fluor Daniel of Greenville, South Carolina, was selected as general contractor for installing the complete plant. Excavation work started in late June 1998, and as early as January 1999, the first paper machine foundation plates were installed.

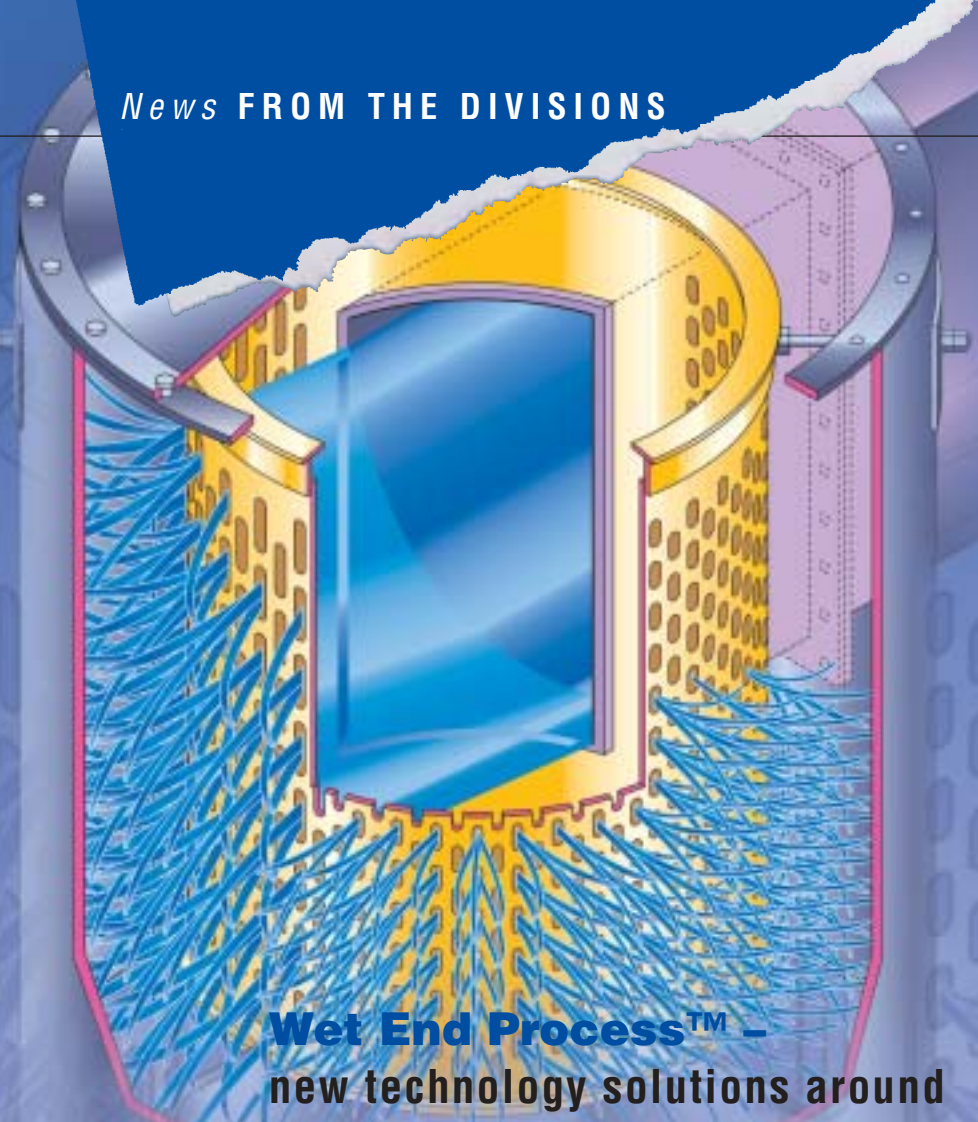
In March 1999, the installation of the paper machine and the stock preparation plant was started under the supervision of Voith Sulzer personnel. The electro-mechanical testing of the entire plant, first of the stock preparation system and then of the paper machine, was started in August.

The common goal of completing such an innovative project required rapid and constructive cooperation between the highly motivated teams of Voith Sulzer, Republic Paperboard and Fluor Daniel.

The machine is running

Finally, in November 1999, the time had come: "stock on wire" was attained on November 21. Six days later, the entire paper machine was put into operation (paper on the reel). Start-up can be described best by a short comment of Republic Paperboard's most important customer in Lawton: *"Don't change anything!"* Already, the second roll of gypsum-grade paperboard was salable quality!

Voith Sulzer Paper Technology and Republic Paperboard are proud to have set this milestone in paper production together. The thanks and congratulations of the Voith Sulzer team go to the staff of Republic Paperboard who have put their trust in us, which was absolutely needed for putting an entirely new concept of such dimensions into practice.



Wet End Process™ – new technology solutions around the paper machine wet end

The authors:
Dr. Michael Schwarz,
Anton Gmeiner,
Stock Preparation

Both for graphic grades and packaging papers, the trend towards higher operating speeds continues unabated. At the same time, the dilemma of higher quality at lower cost is being solved by using a broader mixture of furnish components.

In this context, a decisive role is played by the process technology around the wet end of the paper machine. The Wet End Process™ (WEP) plays a critical role in paper production due to the immediate vicinity of the sheet formation zone and the complex interfaces with other process subsystems.

Main functions in the Wet End Process™

The Wet End Process™ mainly consists of three subsystems: the approach flow, fibre recovery, and broke handling. These subsystems in turn can be broken down into clearly defined functions *(Fig. 1)*. At the beginning of the approach flow, the various furnish components are mixed in the right proportions. Apart from a correct solids ratio of the individual components, the papermaker also needs to ensure a constant stock consistency. Return stock flow from broke treatment, the extraction of sweetener stock and filter thick stock return flows all have to be taken into account, – in conventionally arranged systems by arranging the mixing and machine chests in series.

Fig. 1: Functions in the Wet End Process™.

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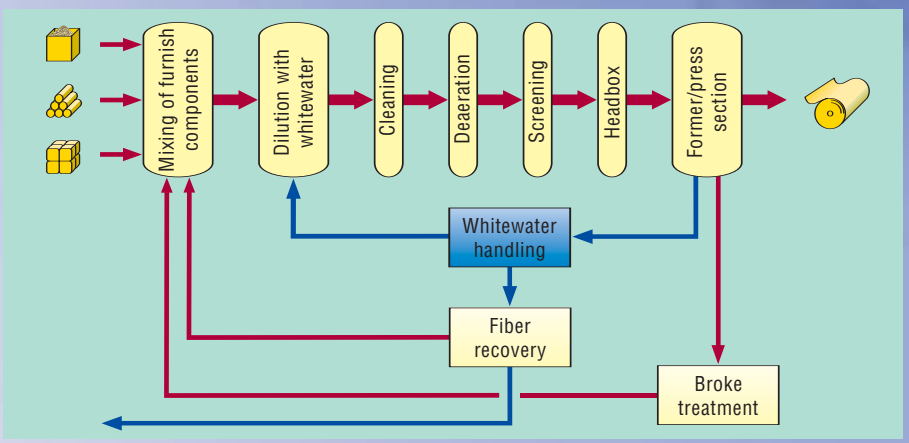

The subsequent dilution with whitewater plays a key role, since from this mixing stage onwards, the stock is in a pressurized closed-circuit loop right up to the headbox slice. In other words, any pressure fluctuation or change in stock consistency immediately affects headbox mass flow, and therefore the basis weight of the finished paper product.

The approach flow directly before the headbox is an extremely sensitive area where it is essential to keep all parameters stable. Pressure variations are propagated in the pipework at sonic speed through to the headbox, where mass flow at the slice outlet changes simultaneously across the entire machine width. This only influences the MD, and not the CD basis weight profile. On the other hand, stock consistency deviations affect both the CD and MD basis weight profiles because they show up staggered across the machine width depending on flow velocity in the pipework and headbox distributor. All machines and design measures in the approach flow should be judged on their ability to stabilize stock consistency and pressure.

On all high speed paper machines and for certain speciality grades, mechanical deaeration is undertaken together with stock cleaning in the LC range, although cleaning at this point is not mandatory. Screening is installed immediately before the headbox, usually mainly as a policing measure.

In the former and press sections, space available for water removal is steadily decreasing with modern new paper machines. Special attention must therefore be paid to optimum whitewater collection.

Whitewater I surplus is passed to fibre recovery together with whitewater II, while heavily contaminated flow components and the press filtrate are directly cleaned by microflotation. Broke treatment has to accommodate the various broke flows (coated or uncoated), and it has to offer sufficient storage capacity.

Voith Sulzer has critically investigated the functionality of all WEP subsystems and redesigned them where necessary. The result is a “toolbox” of optimum subsystem designs on a modular basis, enabling customized, favourably priced system solutions for all individual needs. Some of the less familiar components as well as certain new developments in the approach flow are presented here.

Furnish mixing

Apart from high installation costs, conventional stock mixing in mixing and machine chests has a further serious drawback. The large stock volumes result in control system deadtimes which delay stabilization *(Fig. 2)*. With smaller volumes and more efficient mixing, the ComMix™ system ensures more stable mixing and consistency than conventional mixing and machine chest systems.

As shown in *Fig. 3*, the individual fresh stock flows, together with broke and thick stock from disk filtering, are fed into a horizontally arranged mixing tube. By tangentially staggered feeding, the kinetic flow energy of the individual stock components is efficiently converted into mixing energy.

Fig. 2: Furnish mixing
Conventional:
- *Large volumes*
- *Slow control response*
- *2 pumps*

ComMix™:
- *Volume reduction by 70%*
- *Improved control strategy (filler, consistency)*
- *1 pump.*

Fig. 3: Furnish mixing in the ComMix™.

Fig. 4: Stock mixing with whitewater
Conventional:
- *Large volumes*
- *Good mixing*

HydroMix™:
- *Volume reduction by 80%*
- *Space saving installation*
- *Fast control response*
- *Good mixing.*

Fig. 5: HydroMix™.

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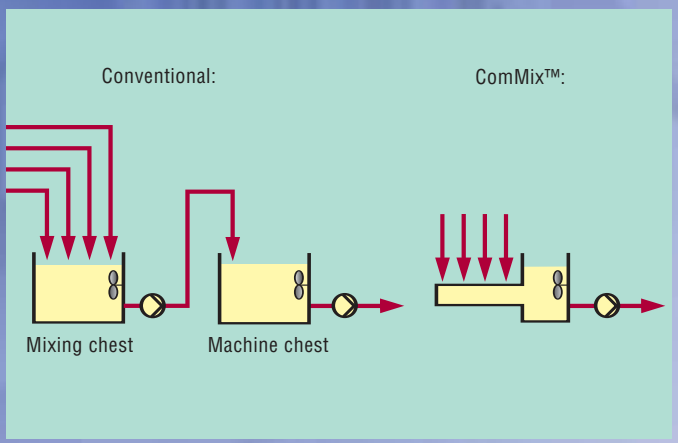

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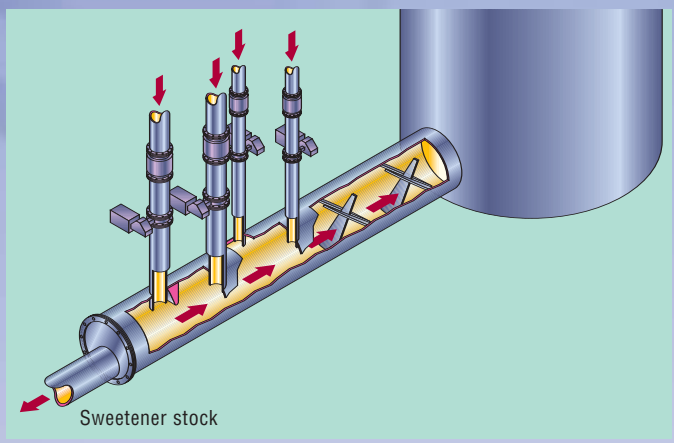

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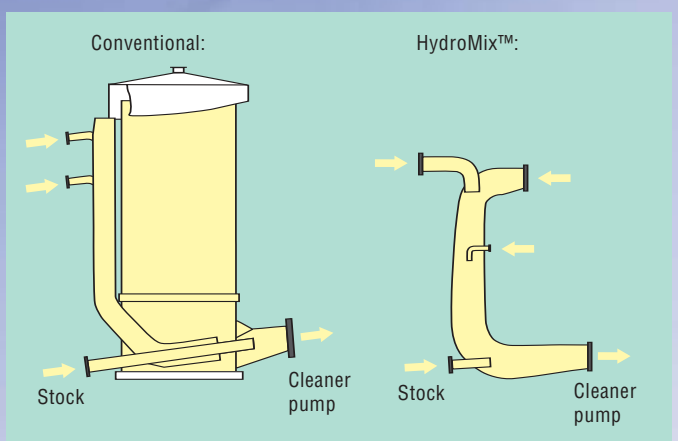

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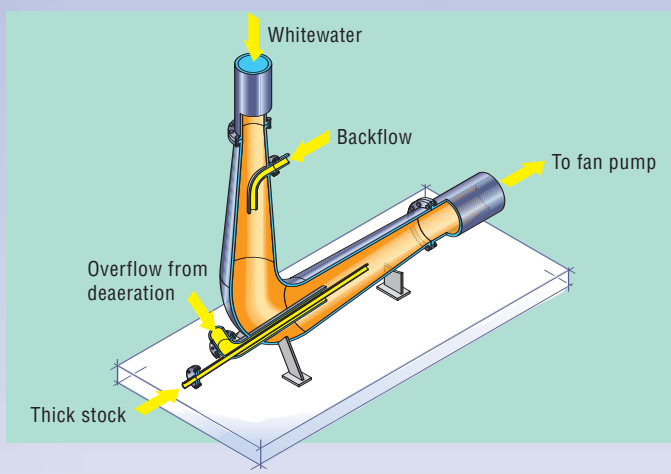

Subsequent static mixing elements are recommended where the ratio of furnish components fluctuates widely.

Stock mixing and whitewater

Conventional system technology is to store whitewater in a generously dimensioned tower, with fresh stock entering at the bottom for mixing *(Fig. 4)*.

HydroMix™ is a new development which has no storage capacity, but functions purely as a hydraulic flow mixing system. The individual flows enter and are immediately passed on. Exhaustive trials have enabled us to accurately define the optimum conditions for efficient stock mixing.

Fig. 5 shows a HydroMix™ installation operating for the last 2 years on an LWC machine. Since this rebuild and elimination of the whitewater tower, the mill has reported significantly reduced MD/CD profile variation coefficients.

Retention agent dosage

Given today's wide variety of furnishes and fillers, a correct choice of retention agent, and in particular correct mixing, are decisively important. To reduce costs and optimize effectiveness, additives need to be mixed in quickly and distributed evenly. We have therefore carefully investigated the hydrodynamics involved in the mixing process. The present state of technology is to introduce the reten-

Fig. 6: Mixing trials for retention aids.

Fig. 7: Whitewater handling with the VortexBreaker™.

Fig. 8: Whitewater handling with HydroPipes™.

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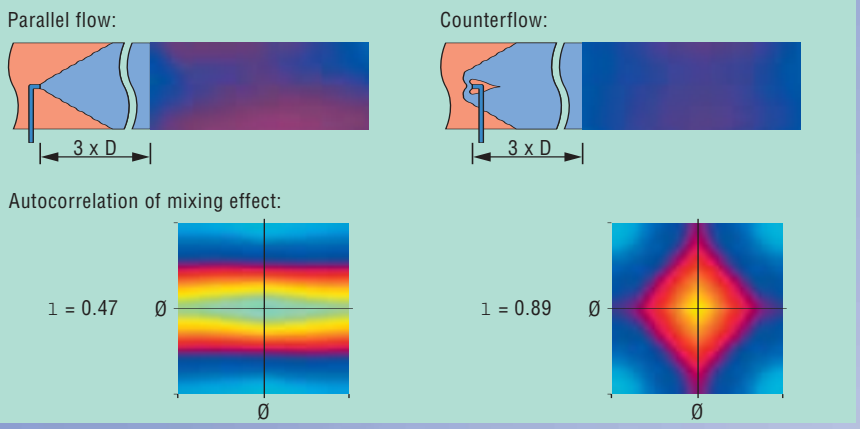

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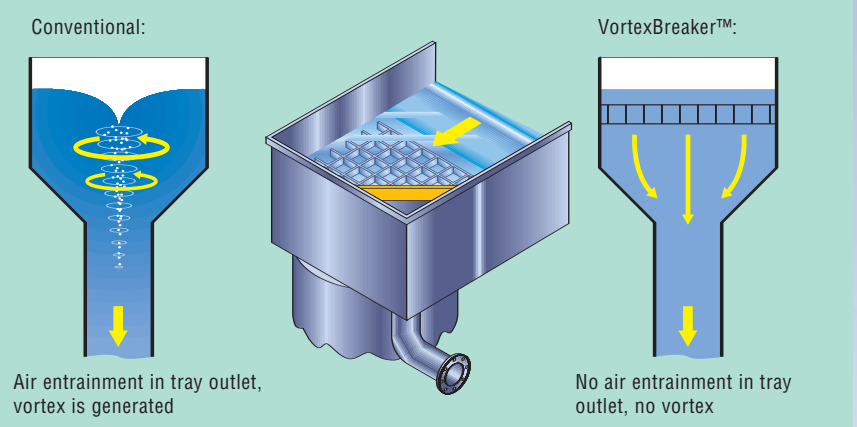

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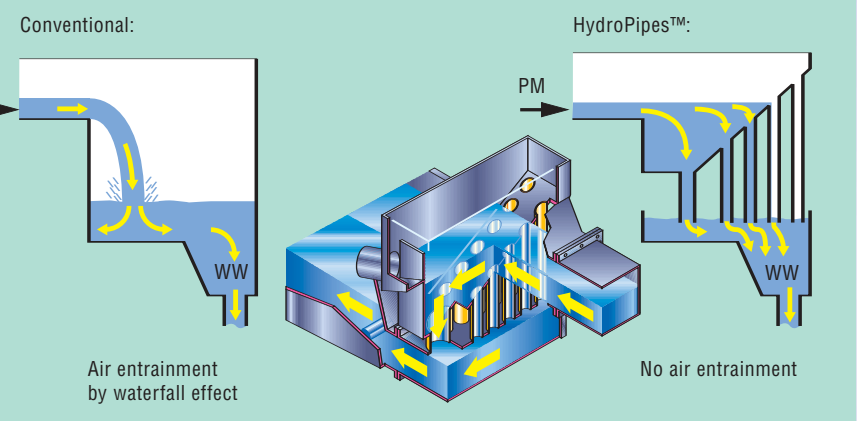

tion agent against the direction of stock flow, although introduction in the flow direction has also been recommended in recent times *(Fig. 6)*. Extensive tests were carried out to establish the conditions for optimum mixing kinetics. The mixing results were evaluated by digital photographic analysis (auto-correlation of the mixing image).

As expected, a high velocity differential between retention agent and stock flow is essential for the efficiency, and in particular, for the speed of mixing. The trials also showed significantly better mixing results with introduction of the retention agent against the direction of stock flow.

Whitewater handling

Voith Sulzer has developed a family of new components for efficient collection and removal of the large volumes of whitewater in the restricted spaces available in modern paper machines. The components can be used individually or in combination, thus ensuring reliable management of all process water flows.

VortexBreaker™

Where a horizontal flow is diverted into a vertical flow, the invariable result is vortex formation and risk of air entrainment. Installing flow equalizers to remove already formed vortices is costly, and in many cases impossible due to local con-

ditions. By installing a suitable lamellar grid just below the surface, vortex formation is prevented before it can occur in the first place *(Fig. 7)*.

HydroPipes™

The collection of whitewater on the drive side of the paper machine often involves considerable height differences *(Fig. 8)*. If no costly measures are taken – such as LIC controlled flow retention – the resultant waterfall effect can generate uncontrolled hydraulic flow conditions with air entrainment causing system disturbances. This can be avoided by designing the whitewater tray with an inclined sidewall and installing staggered drainage pipes so that any height difference can be accommodated.

CyclonAir™

The whitewater from the forming sections of high-speed paper machines often contains so much entrained air that it becomes very difficult to handle. Even highly efficient mechanical deaeration is not enough to ensure trouble-free operation, since the deaerator feed pump performance is often seriously affected by the high air content. In such cases, or for special applications as an alternative to mechanical deaeration, this problem can be solved by installing the CyclonAir™ *(Fig. 9)*. Located directly at the whitewater collection point on the drive side of the paper machine, the CyclonAir™ removes the majority of entrained air.

Fig. 9: Whitewater handling with the CyclonAir™
- *Water with entrained air from paper machine is distributed into small jets*
- *Entrained air bubbles can easily escape from the jets*
- *Entrained air is removed by low vacuum.*

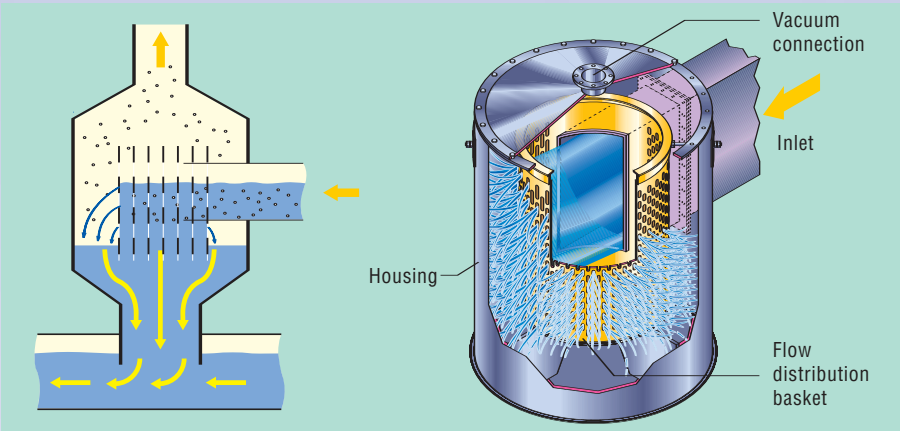

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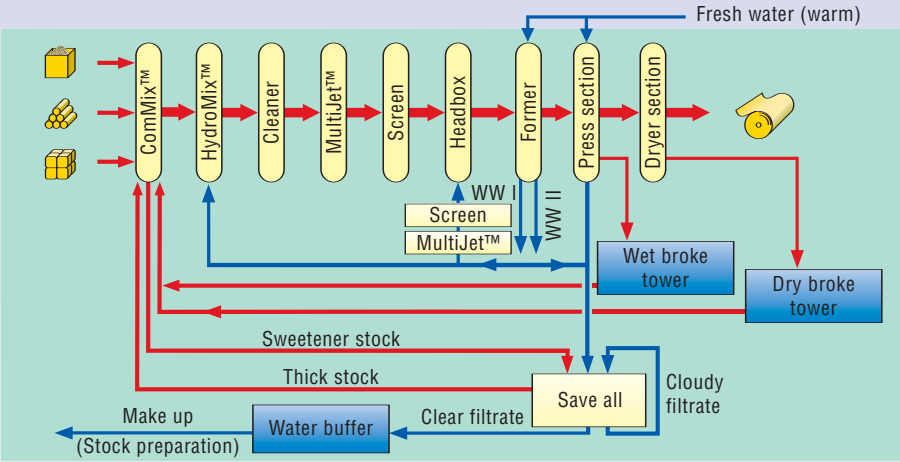
Fig. 10: New Wet End Process™.



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In the CyclonAir™ the incoming whitewater is directed tangentially into a stationary screen basket, which breaks it up into a large number of small individual jets. Free air bubbles can escape into the peripheral chamber, which is maintained at a slight vacuum. The deaerated water flows into a standpipe immersed in the whitewater tray.

For further details, please refer to Voith Sulzer Stock Preparation brochure VPR-SD-14-0003-GB-01.

New Wet End Process™ *(Fig. 10)*

The components described here compliment Voith Sulzer's comprehensive range of machines and equipment in the Wet End Process™. The units are carefully fine-tuned to each other, enabling modular design of any configuration using well-proven components. The benefits are faster grade changes, improved system stability, greater quality consistency and lower overall process costs.

Screening of recovered paper stock for the production of graphic papers

The author:
Reimund Rienecker
Stock Preparation

Since graphic papers are bulk grades produced on high-speed machines, operating economics have a high priority. For the higher quality grades, however, additional aspects must be considered. Although primary fibres are still preferred here, a certain content of recovered paper is not a bad idea since it brings advantages on the paper machine. This presents no problems with today's advanced technology for processing recovered paper, but specific criteria must still be met. Only white paper grades should be used and they should have a sufficiently high quality potential, and be available in suitably large quantities. The only reliable source meeting these needs is household collection. Recovered paper is, however, very different from primary fibres. It contains contaminants virtually unknown in primary stock and these can decisively influence production, and the end product itself. The main problem is stickies, which occur wherever recovered paper is used. The following statement is therefore fundamental in the screening of recovered paper: Using recovered paper means having to solve the stickies problem!

Although screening stickies is no easy task due to their inherent characteristics, removal can be facilitated under certain conditions. These include the choice of suitable screens, screen baskets and rotor design (see twogether Journal No. 1 and 4.). However, no measures on their own can guarantee optimum screening, since acceptable stickies removal is not possible with single screening systems or machines. Recovered paper processing therefore consists of several subsystems, of which screening is by far the most important. *Fig. 1* shows a typical recovered paper processing line. **Hole screening** removes problematic contaminants to protect the downstream systems and to make the stock suitable for fine slot screening. Although every effort is made to exploit all potential for optimum stickies removal, stickies removal rates (by number) in hole screening are rather low. An efficiency as high as 50 % for the complete hole screening system would be

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	Pulping	Protector system	MC Screening ø	MC Screening //	Flotation I	HW Cleaning	LW Cleaning	LC Screening //	Disk filter	Press	Dispersion I	Bleaching I	Flotation II	Disk filter	Press	Dispersion II	Bleaching II	Press	Refining	HW Cleaning	LC Screening
Newsprint																					
standard	+	+	+		+	+		+	+	+	+	+	+	+							
improved	+	+	+		+	+		+	+	+	+	+	+	+			+			+	+
SC papers																					
standard	+	+	+	+	+	+		+	+	+	+	+	+	+	+	+	+		+	+	+
improved	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
LWC papers																					
standard	+	+	+	+	+	+		+		+	+	+	+			+			+	+	+
improved	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+			+	+	+

Fig. 1: Schematic arrangement of recovered fibre stock preparation for various graphic paper grades.

Fig. 2: Hole pre-screening in DIP systems. Left: Normal stickies size distribution in the inlet Right: Stickies removal as a function of particle size.

Fig. 3: Comparison of stickies removal with various screening system concepts.

an extremely good result. Screening efficiency is critically dependent on various factors, above all on the stickies size distribution *(Fig. 2)*. On the left-hand side, a typical stickies distribution according to size shows that the stickies count increases asymptotically with reducing particle size, a trend which extends beyond the measurability limit. This indicates that many stickies pass through the relatively large screen holes, and also cannot be detected by conventional laboratory measuring methods. It is therefore difficult to make an objective assessment. The right-hand side of the graph summarizes the average stickies removal efficiencies of several screening systems (all with a hole diameter of 1.4 mm) as a function of stickies size. Removal efficiency falls off to a minimum of 10 to 30 % as particle size reduces to about 750 µm, and it remains constant until the measuring limit of 150 µm is reached. Efficiencies of over 70 % therefore cannot be expected, since most stickies are below 600 to 700 µm in size. It is therefore advisable not to demand too high a removal efficiency, since this just leads to reducing the stickies size below the measuring limit rather than removing them. This apparent good efficiency provides enviable removal rates but only makes things more difficult for the downstream systems. The next process stage is usually **slotted screening**.

Reducing slot size means more and more fine sand is retained. This is virtually impossible to remove in the MC range and leads to increased system wear. Stickies removal is also more difficult in the MC range (see twogether Journal No. 4). The usual practice in modern plants is to

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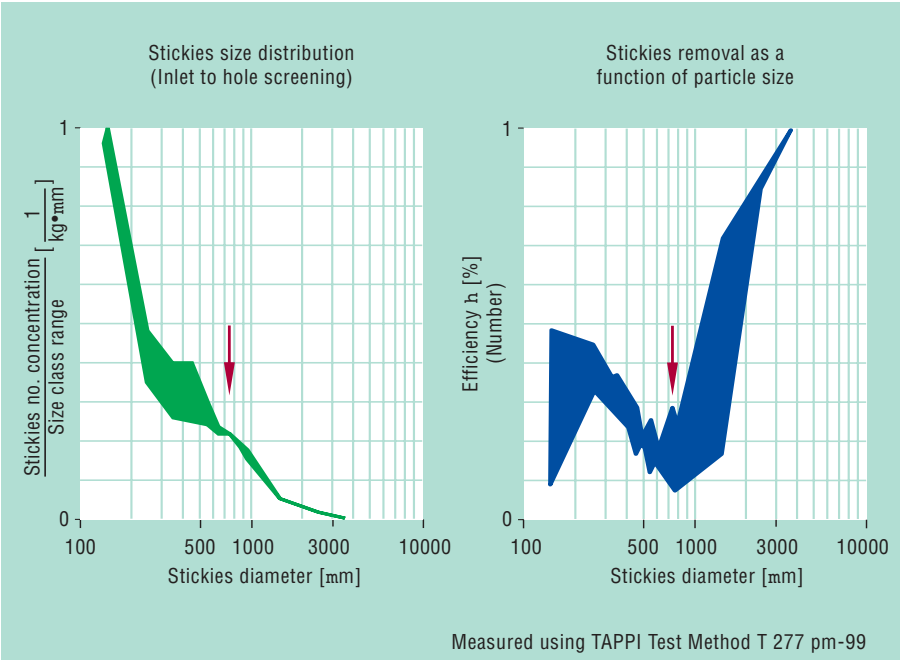

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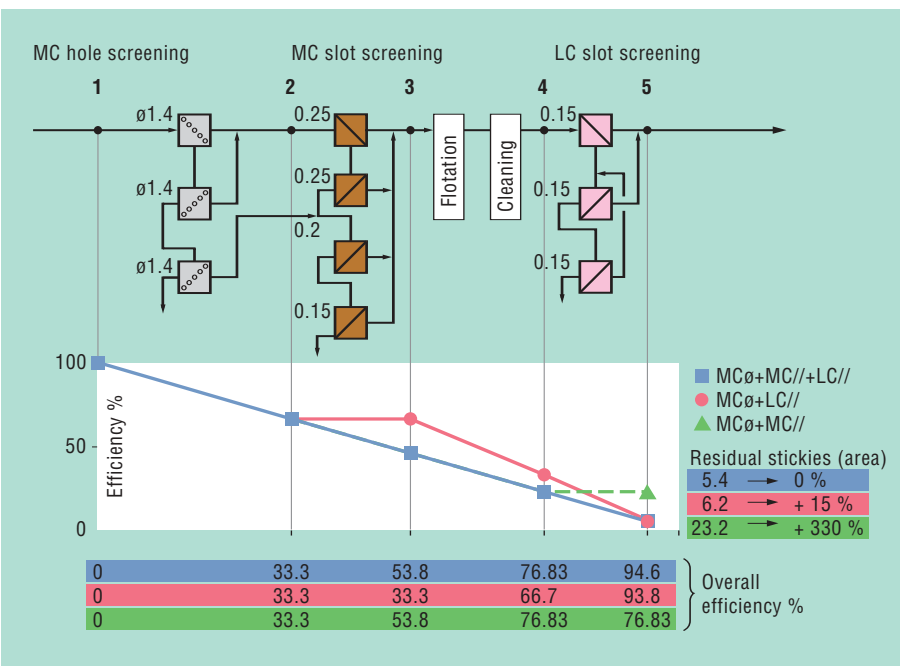

Fig. 4: Scale size comparison of fibres and shives from wood-containing DIP stock with the cross-section of a 0.1 mm C-bar® slotted screen basket.

Fig. 5: Effect of slot width changes on system operating reliability in a DIP fine screening system.

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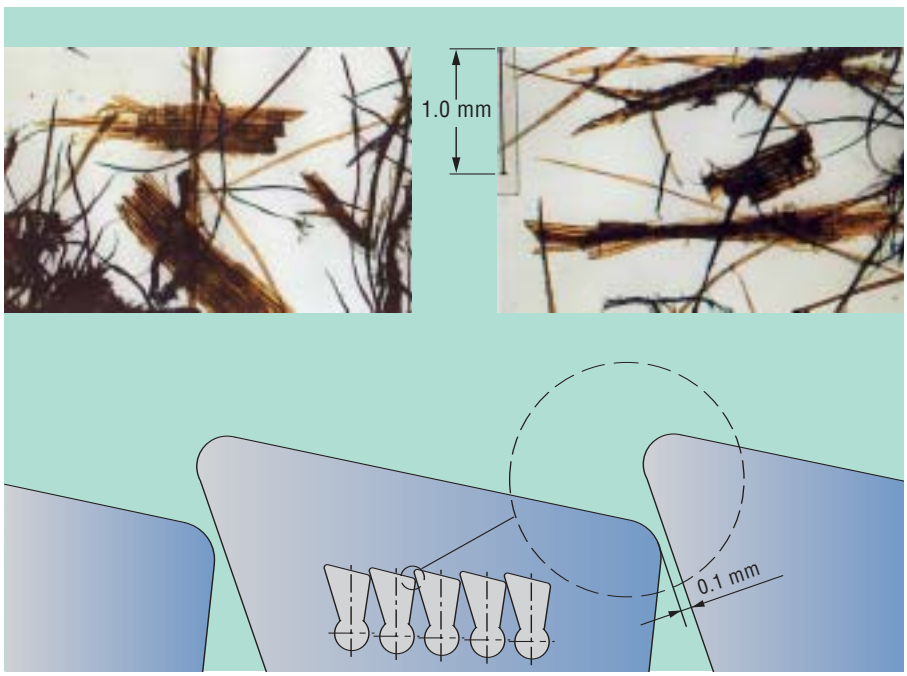

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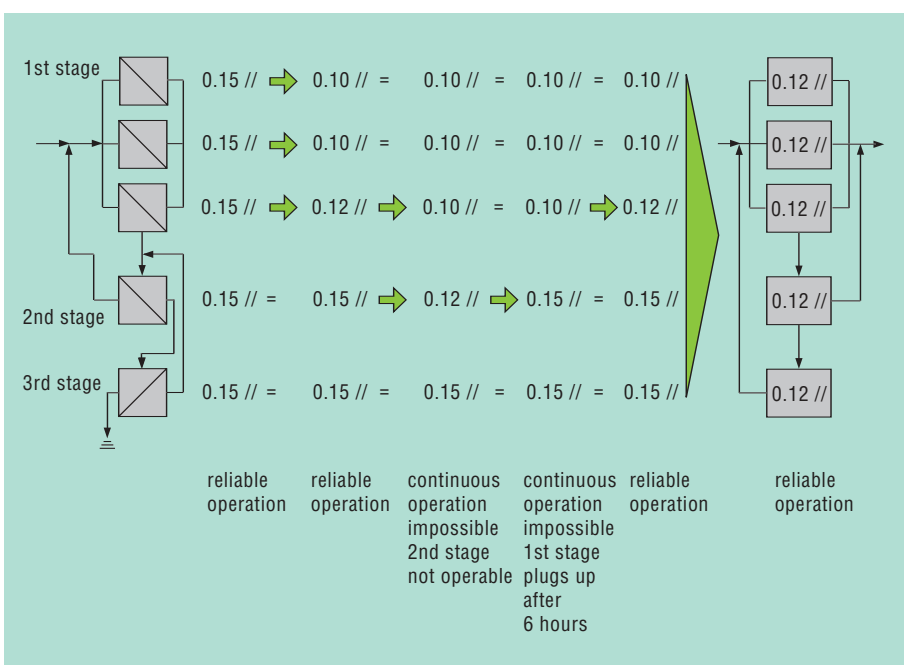

install LC cleaning after deinking and this is then followed by fine slot screening with today's standard slot width of 0.15 mm, although the trend is towards even finer slot widths.

Voith Sulzer had the rare chance of examining various screening systems in a DIP line (schematic arrangement shown in *Fig. 3*) for graphic papers made from 100 % recovered paper. Their direct influence on paper machine runnability was assessed. The system was originally operated exclusively with MC hole and slotted screening. An LC slotted screening stage was added at a later date. Stickies removal then improved from 76.8 % to an overall system screening efficiency of 94.6 %, and sheet breaks on the paper machine were reduced from about three per day to only about one in six weeks. This drastic improvement underlines the need for a well-designed and sensibly operated LC slotted screening stage.

How far can slot widths be reduced?

Today, slot widths of 0.15 mm are standard practice, but particularly for improved qualities, requirements are much more demanding and the trend is therefore towards even finer slots. Here there are limits. *Fig. 4* shows a cross-section through a C-bar® basket with a slot width of 0.1 mm, and on the same scale, fibres and shives from a deinking line for processing wood-containing recovered paper grades. Clearly, even normal TMP fibres or fibre bundles can only pass through such fine slots when they are forced through. This means accepting either large rejects quantities and/or a reduction

Fig. 6: Scale size comparison of scanning electron microscope photographs of calendered paper made from various furnishes with the cross-section of a 0.1 mm C-bar® slotted screen basket.

Fig. 7: Comparison of standard and A/B screening concept (single stage).

Fig. 8: Comparison of 3-stage forward-flow concepts with different stickies size distributions.
System A: Standard arrangement with simple screening in all three stages.
System B: First stage with simple screening, second and third stages with A/B arrangement.

in stickies size. The tolerance between required efficiency and operating reliability is very narrow with fine slots, particularly on wood-containing grades, as shown in the following mill example.

A fine screening system *(Fig. 5)* consisting of five machines in three stages, originally with 0.15 mm slot widths (system on the left), was systematically converted to finer slots. One can easily see how even the slightest modifications can heavily influence operating reliability of the overall screening system. In the meantime, this plant has now been completely fitted with 0.12 mm slotted baskets and some changes have also been made in the loop layout as well. This arrangement also operates completely trouble-free like the arrangement before it. Although these measures increased slot velocity, the measurable number of stickies has been reduced by 32 %, and the stickies area by 51 %. With wood-free furnishes, the use of ultra-fine slots is less critical. This is illustrated in a DIP line for wood-free copy paper production, where a complete fine screening system has been installed. All screen baskets have 0.10 mm slots. This four-stage system with the first two stages arranged for forward flow is extremely effective and has been in trouble-free operation for several years.

SC and LWC papers

SC papers require the highest possible surface quality, in particular smoothness. Prerequisite for high surface quality is a fine-grade stock, free of shives and fibre bundles. If recovered fibres are used,

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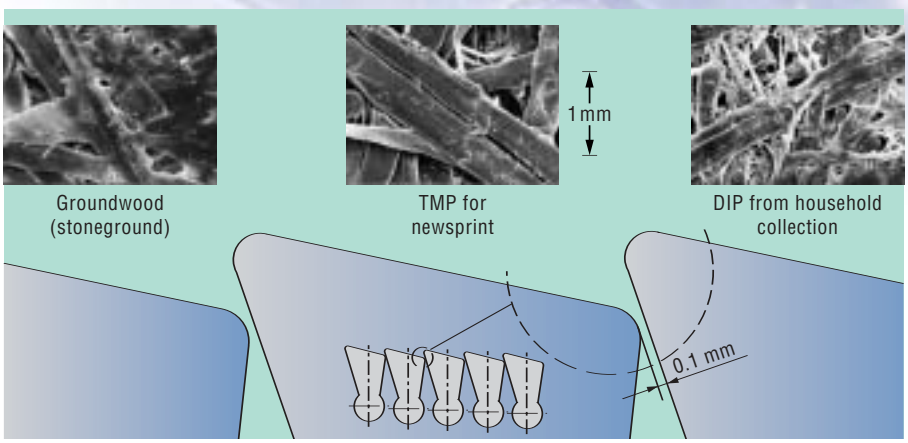

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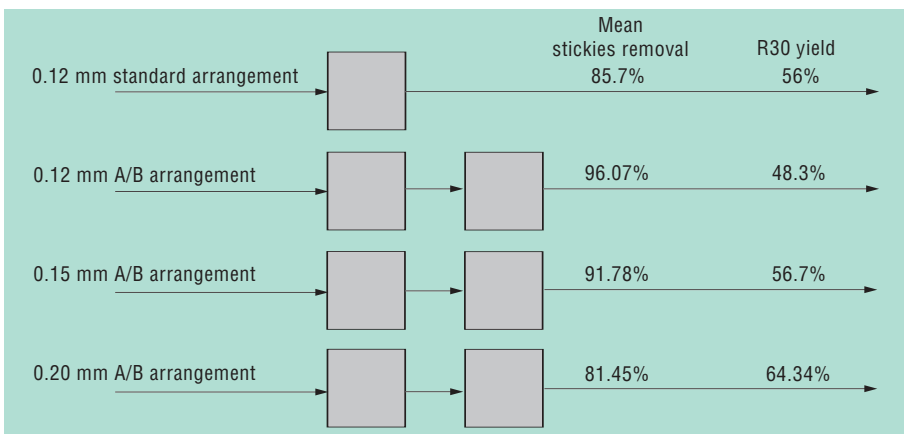

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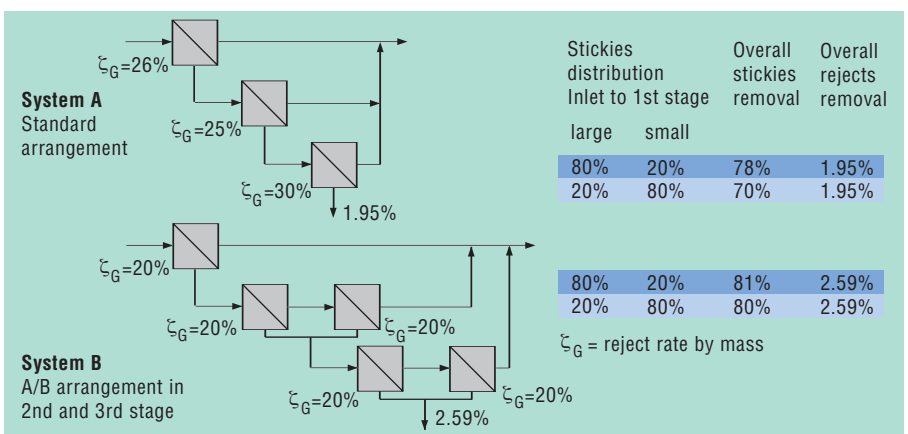


Stickies distribution Inlet to 1st stage		Overall stickies removal	Overall rejects removal
large	small		
80%	20%	78%	1.95%
20%	80%	70%	1.95%
80%	20%	81%	2.59%
20%	80%	80%	2.59%

ζ_G = reject rate by mass

problems may arise due to the contaminant content. For this reason, today's recycled fibre content hardly ever exceeds 30 % for top quality grades. With LWC grades, these requirements are not quite so extreme. On the one hand, the R14 fraction should not exceed certain limits due to the risk of fibre rising when the sheet is re-wetted during coating. On the other hand, R30 fibres are desirable for strength reasons. This situation is best illustrated by the comparison in *Fig. 6* which shows a cross-section through a 0.1 mm C-bar® screen basket and same scale microphotographs of calendered lab sheets made from various stocks. Clearly, the TMP fibre size in particular can greatly exceed the slot width. Such fibres have little chance of passing through such fine slots without considerable help.

Although such fine slots have a favourable influence on stickies removal – and manufacturing C-bar® baskets with slots under 0.1 mm is no problem today – slot widths do have their natural limit. This limit is determined by a practical compromise between throughput and acceptable conditions. Narrow slots alone are no general cure for stickies problems. Another possibility is the A/B arrangement.

A/B arrangement for improving efficiency

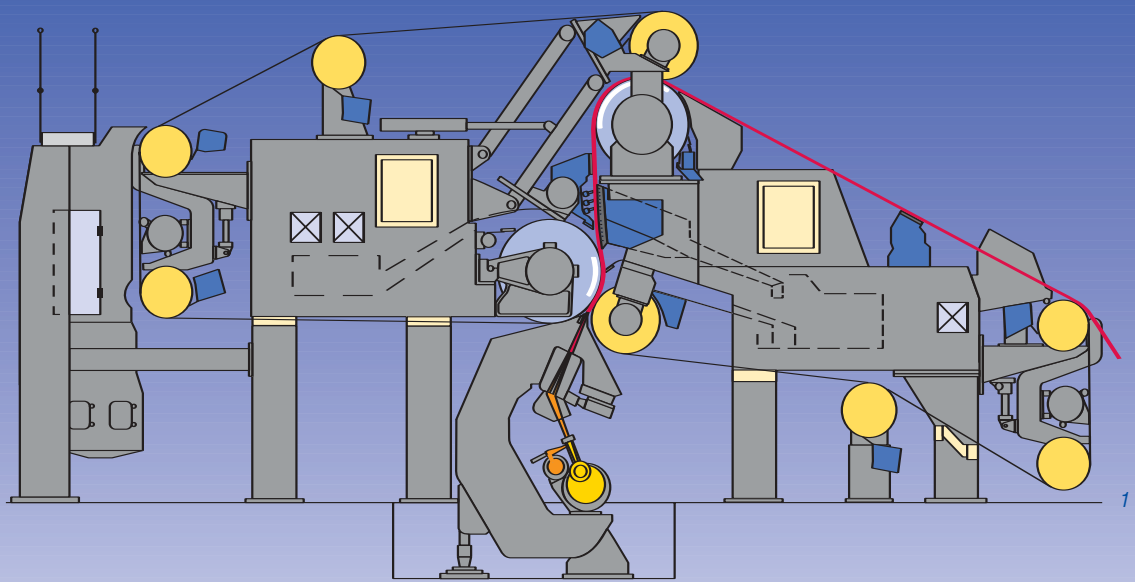
An A/B arrangement consists of two or more screens in series, where accepts from the first machine A are screened again in machine B. Stickies removal efficiencies and R30 yields with standard and A/B arrangements are compared in the following for various slot widths *(Fig. 7)*. Individual efficiency values for each size class are used instead of overall average efficiency values. An overall rejects rate of 25 % is assumed, i.e. 15 % in the A stage and 12 % in the B stage of an A/B arrangement.

For the single screen with 0.12 mm slot width, mill data reveals an average stickies removal efficiency of 85.7 % with an R30 yield of 56 %. In the second case, the A/B arrangement with 0.12 mm slot widths increases the stickies removal efficiency to 96 % and reduces R30 yield to 48 %. The third example shows a stickies removal efficiency of almost 92 % with the A/B arrangement and 0.15 mm slot widths. The R30 yield here is around 56 %. In other words, we have a significantly higher stickies removal efficiency than with the single machine, yet roughly the same R30 yield. If the A/B slot width is increased to 0.20 mm, the average stickies removal efficiency is 81.5 % with an R30 yield of 64 %. These examples show that even with a larger slot width of, for instance, 0,15 mm, the stickies removal efficiency can be significantly increased for the same long-fibre yield.

In another example the effect of the above arrangement variants when using several stages was investigated. Removal efficiency is based here on two stickies size classes. To calculate the overall stickies removal efficiency in each case, a higher efficiency is taken for the large particles and a lower efficiency for the smaller ones. This method was used for comparing two 3-stage screening systems *(Fig. 8)*. System "A" consists of "simple screening" with only an "A" machine in each stage, while system "B" has an A/B layout in the second and third stages. Both systems were computed twice, using different stickies size compositions each time: in the first case 80 % large and 20 % small stickies, and in the second case vice-versa. In system A, 26 % rejects were assumed in the first stage, 25 % in the second stage and 30 % in the third stage. This gives an overall substance loss of 1.95 %. In system B, 20 % rejects were assumed for all stages, the resultant substance loss being 2.59 %. With a stickies size distribution of 80 % large and 20 % small, system A has a stickies removal efficiency of 78 % compared with 81 % for system B. These examples show that with an above-average proportion of large stickies, the influence of system arrangement on stickies removal efficiency is only slight. But with a predominant proportion of small stickies, the picture is completely different. In this case removal efficiency in system A falls steeply from 78 to 70 %, while in system B it falls only by one percent from 81 to 80 %.

In other words, an A/B arrangement provides a high removal efficiency even if a large number of smaller particles are present, and, above all the arrangement ensures a high quality consistency. This is therefore a good way to attain optimum removal efficiencies.

For further details, please refer to Voith Sulzer Stock Preparation brochure st.SD.05.0004.GB.01



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Paper Machines Graphic

DuoFormer TQv – a new twin wire former

Many paper properties are determined at the former section. For this reason forming sections are critically important in papermaking. But today's highly demanding markets want more than excellent paper properties. Simultaneously, productivity and expenses for a forming section must be handled with great care. Productivity is strongly affected by machine speed and web width.

If productivity and paper quality is foremost then the DuoFormer TQv is first choice. The DuoFormer TQv represents the latest generation of Voith Sulzer gap formers. The former can be applied for all mass papers.

DuoFormer TQv *(Fig. 1)*

The former comprises the well-known roll and blade forming concept. A ModuleJet headbox delivers the stock into the forming gap created by the top and bottom wire. The initial drainage starts on the forming roll. The forming roll promotes retention and enables a far less critical headbox jet positioning in comparison to a pure blade former. The roll is followed by the well known D-Section – a blade section – which delivers excellent formation. A wet suction box further increases the dry content before the web arrives at the couch roll. The wet box, placed in the top wire loop, ensures that almost no free water is left on the top wire. Water splashing at the couch roll is reduced to a minimum and thus means a big save-all pan at the drive roll (top wire) is not needed. The large couch roll wrap and a high vacuum flat suction box deliver a good dry content of the paper web before the web enters the press section.

Due to the vertical arrangement of the forming elements, the white water handling is most simple. Suction deflectors and weirs can be avoided.

Fig. 1: DuoFormer TQv.

Fig. 2: DuoFormer TQv and different furnish.

Fig. 3: D-Section and drainage down the table.

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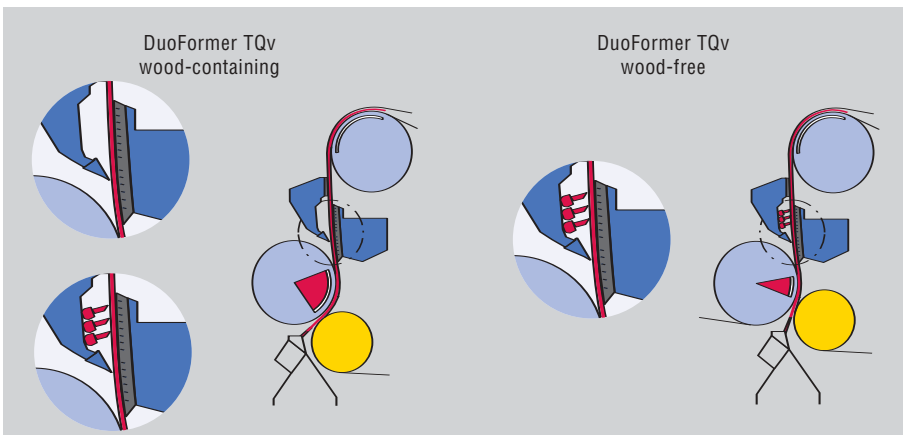

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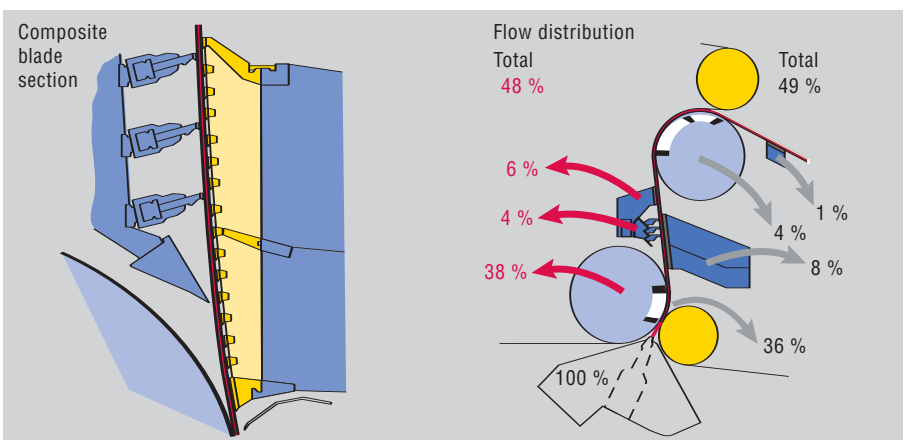

DuoFormer TQ v for different paper grades *(Fig. 2)*

The stock for wood-containing grades has normally high drainage resistance and low shear resistance. For those grades, the TQv is designed with a large forming roll wrap angle and no forming blades.

However, for wood-containing grades, based on a slow stock with a significant amount of long fibre required for good strength properties, forming blades are recommended. Stock for wood-free grades drains quickly and shows high shear resistance. The wrap angle is small in order to allow enough water into the blade forming section. For excellent formation up to three blades are installed. Additional blades will result in a minor improvement of formation however, simultaneously wire wear will be increased markedly. Indeed too many blades are a disadvantage.

DuoFormer TQv, major benefits

Paper properties

A curved suction box and forming blades (counter blades), also known as D-Section, are a prerequisite for excellent formation *(Fig. 3, left hand side)*. The box has two chambers and vacuum is applied for controlling sheet structure in Z-direction. The forming blades are loaded against the suction box by a pneumatic system and they are well protected from white water thrown off at high speed at the forming roll .

Hydrodynamic forces increase with high machine speed. For efficient water removal and good sheet properties, the blade geometry should be perfect. In order to install or remove ceramic blades, conventional T-bar holders require a certain clearance. The clearance leads to faulty geometry; i.e. the blades do not skim the water off properly. To correct this at high-speed machines, a composite blade section replaces single blades. All single ceramic blades are embedded in a reinforcement structure which forms a single cover of blades with high precision. This cover is connected to the suction box by a clamping mechanism.

Fig. 3, right hand side illustrates the flows down the table. All flows are based on the headbox flow, which is set to 100%. De-watering is almost equal through the top and bottom wires which

Fig. 4: Dry content and wire life.

Fig. 5: Wire change.

Fig. 6: Maintainance.

results in a symmetric sheet. About 48% of water is drained through the top wire and 49% through the bottom wire.

Approximately 74% of the drainage occurs at the forming roll. This means 36% passes through the bottom wire and 38% passes through the top wire into the void volume of the forming roll. The curved suction box and the forming blades remove about 12% of the water. The wet suction box further increases the dry content. Approximately 6% of the water is removed at this drainage element. With the large couch roll wrap, 4% of the water is removed. Finally, entering the press section, the high vacuum flat suction box removes a further 1% of the water.

Dry content before pick up

A large couch roll wrap plus a Hi-Vac-Box are very efficient tools to improve the dry content before the web enters the press section *(Fig. 4, left hand side)*. A box, running at 60 kPa, boosts the dry content from 14% to 18%. This excellent improvement in dry content was measured on SC-paper. A second couch roll would be much less effective.

Wire life

The life depends heavily on the number of edges in the loop *(Fig. 4, right hand side)*. In this example fast newsprint machines, running with DIP, have been investigated. Every ceramic blade has two edges, one upstream and one down-

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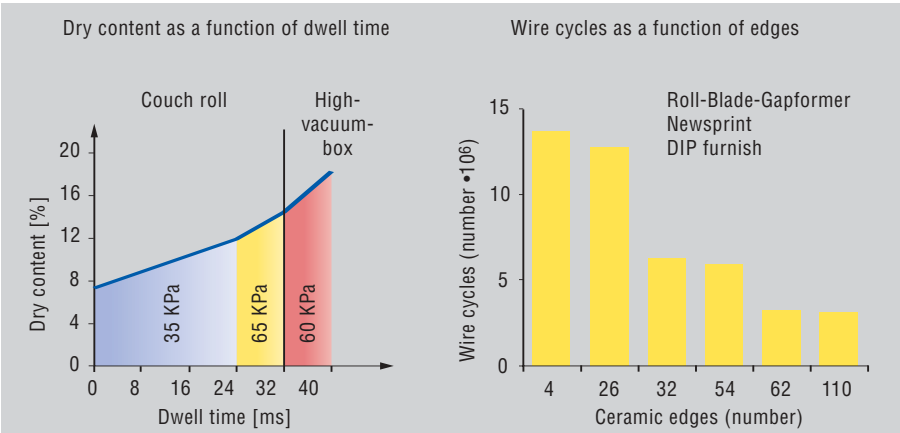

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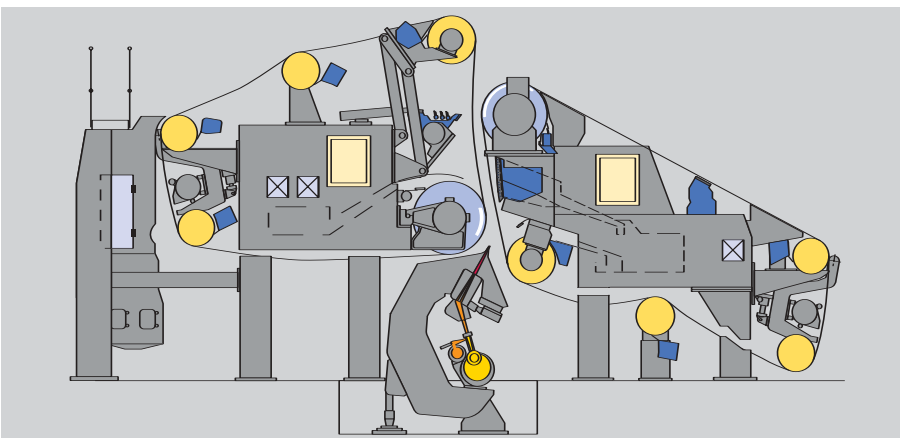

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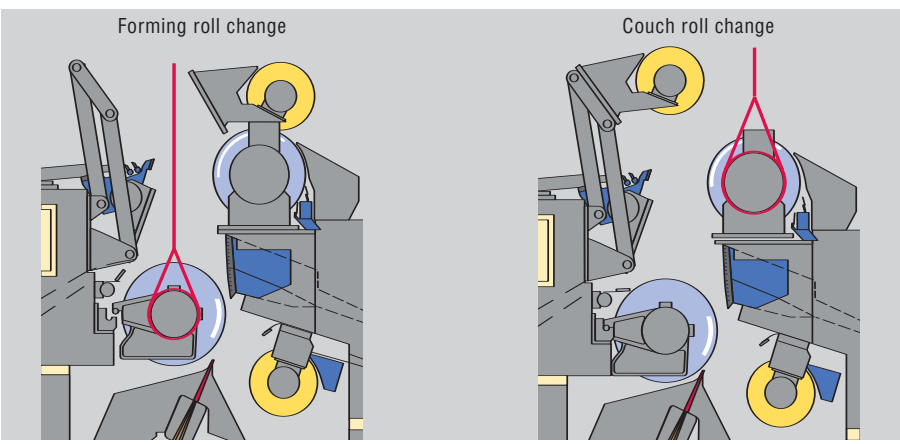

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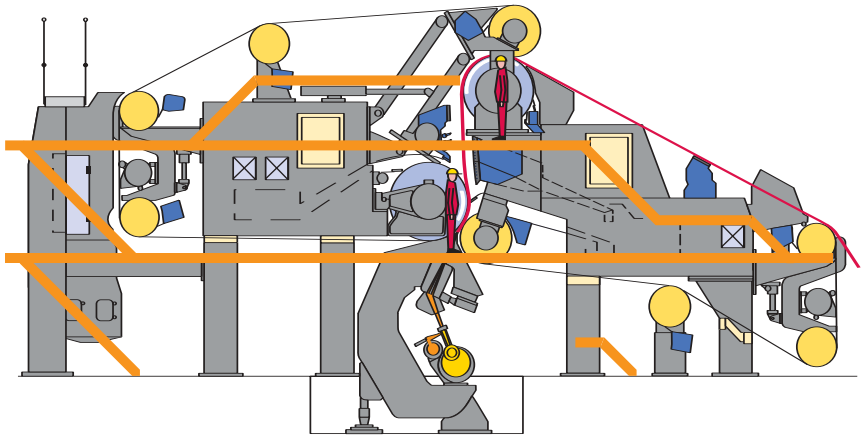

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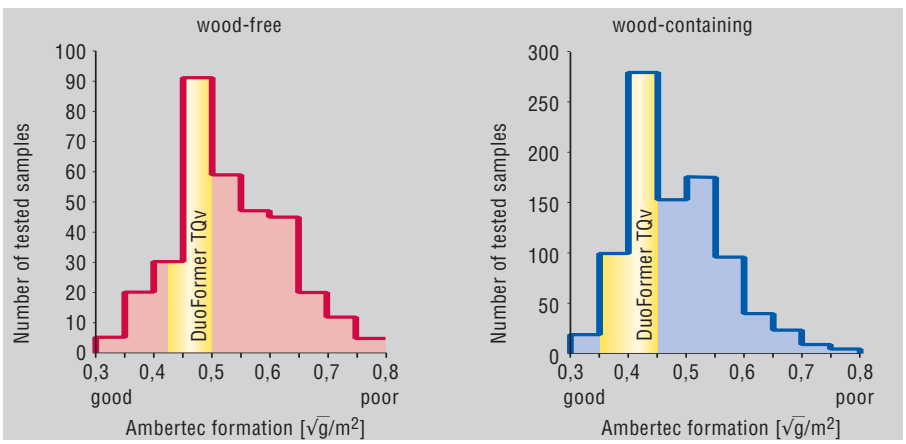

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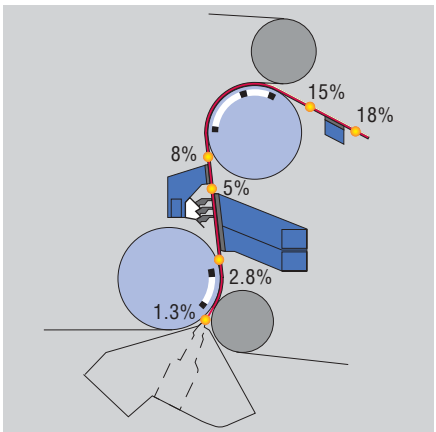


Fig. 7: Inspection of forming zone.

Fig. 8: Graphic paper, distribution of formation and DuoFormer TQv performance.

Fig. 9: SC Paper dry contents. DuoFomer TQv, 52 g/m², 30-34 % filler.

stream tip. Both edges create wire wear. The number of blades has an significant impact on wire life or, in other words, wire cycles. In order to optimise wire life for the DuoFormer TQv, the number of blades in the top wire and bottom wire loops has been reduced to a minimum.

Wire change

The top and bottom wire loop structures are fully cantilevered. In order to prepare the former for wire change the breast roll is moved away from the forming roll *(Fig. 5)*. A mechanism rotates the top wire drive roll and the wet suction box, along with the forming blades, away from the wire run. The curved suction box is moved back towards the press section. These measures provide free access to the top and bottom wire. Both stretcher systems are adjusted to minimum wire length. Replacing old wires with new is a most simple procedure due to the shape of the top and bottom wire loop when the former is fully prepared. Bends are reduced to a minimum.

Maintenance, roll change

The forming roll and couch roll are key components in a state of the art gap former. To prepare the machine for the forming roll change the top wire drive roll-bearing house is disconnected from the rotating mechanism while the roll is resting on the couch roll-bearing house. *(Fig. 6, left hand side)*. The mechanism rotates away from the drive roll with the wet suction box and forming blades. The curved suction box and the breast roll are placed at the wire change position.

Direct access for the crane is provided in order to carry the forming roll. With the top wire drive roll in the wire change position the crane can immediately access the couch roll. *(Fig. 6, right hand side)*.

Maintenance, forming zone inspection

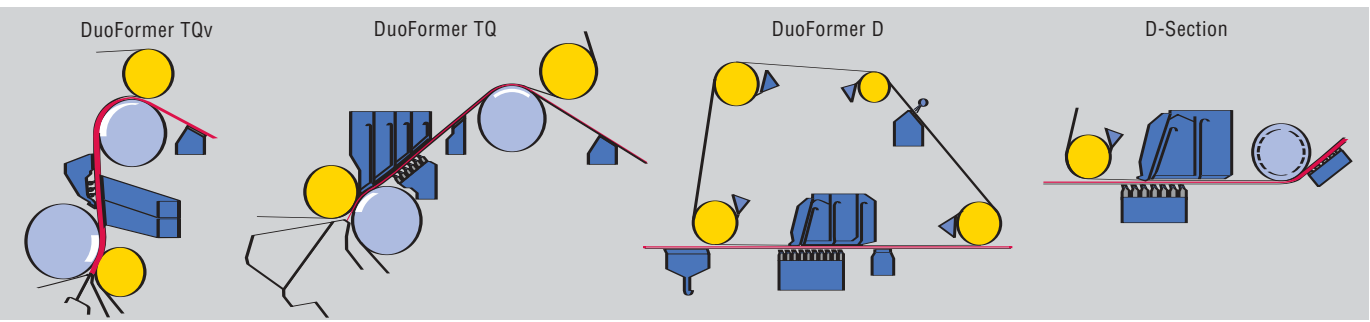
The curved suction box and wet suction box can be taken off the forming fabrics during crawl and shut down for inspection. During this procedure the forming fabrics do not become slack. Therefore the risk of damaging the forming fabrics (wrinkles) is reduced to a minimum *(Fig. 7)*.

Graphic Paper Formation

Formation is always a matter of interest *(Fig. 8)*. The graphs depict the formation distribution of graphic paper. Paper samples from fourdrinier, hybrid and gap former concepts were tested. High-normalised Ambertec values represent poor formation and low-normalised Ambertec values represent good formation.

Ambertec values were most frequently measured between 0.45 and 0.50 $\dagger\overline{g}/m^2$

Fig. 10: Voith Sulzer forming systems.



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on wood-free paper. This represents average wood free paper quality. Owing to the powerful D-Section, the DuoFormer TQv delivers Ambertec Formation below 0.5 †g/m² Ambertec.

On wood-containing grades, average quality is between 0.4 and 0.45 †g/m². The TQv former delivers formation values between 0.35 and 0.45 †g/m².

All results were obtained from pilot trials on Voith Sulzer's new pilot machine number 4. The type of furnish has a strong impact on sheet properties. Therefore, pilot trials are strongly recommended in order to determine formation quality when applying a new former.

DuoFormer TQv, flows and solids down the table

Many pilot trials have been made for SC paper. Mass balances and gamma gauge measurements delivered consistencies down the table *(Fig. 9)*. At a headbox consistency of 1.3% a consistency of 2.8% was achieved ahead of the D-Section. The wet suction box increases the dry content from 5 to 8%. Due to the large wrap of the couch roll a dry content of 15% is achieved ahead of the high vacuum flat suction box. With 60 kPa in the box, the dry content is about 18% before entering the press section.

Voith Sulzer Forming Systems *(Fig.10)*

The DuoFormer TQv is Voith Sulzer Paper Machinery's forming section for high speed paper machines. The new former is tailor made for wood-free and wood-containing grades.

For machine speeds above 1,200 m/min and for rebuilds, the DuoFormer TQ is the prefered forming system. The TQ utilises many components of a fourdrinier or hybrid former which means cost savings for the rebuild. This results in a gap former design with a horizontal or inclined twin wire section.

For special paper and all mass papers, to be made with a machine speed below 1,200 m/min, a hybrid former is prefered. At present, almost 190 DuoFormer D's are in full scale operation. The key components are an inverted suction box inside the top wire loop and flexible loaded counter blades inside the bottom wire loop (D-Section).

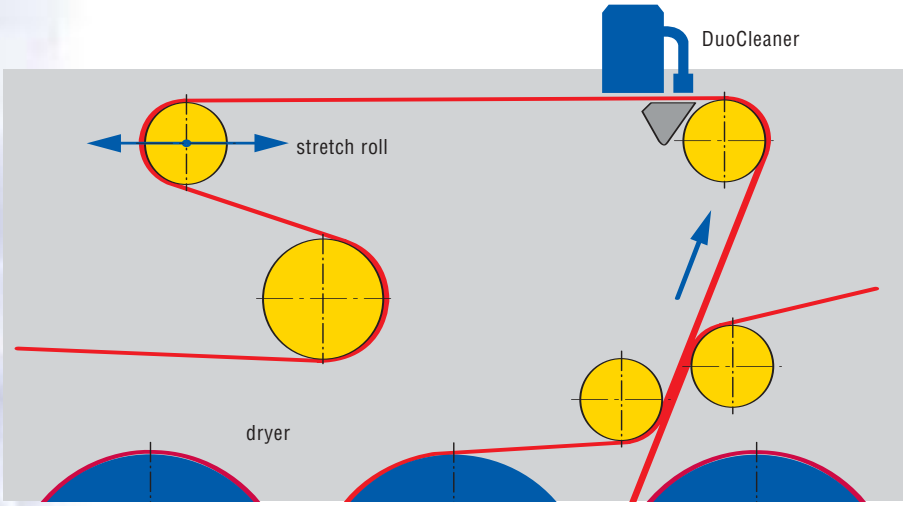
The well known D-Section, which is a key element in the Duo Former D, can also be installed into existing wire sections. Quite often, the section is installed ahead of an existing forming roll.

Summary

Voith Sulzer Paper Technology delivers tailor made forming equipment. By selecting and implementing the right equipment, paper mills can achieve the optimum balance of technological performance, productivity and expenses for their machinery.

DuoCleaner – the optimal fabric and felt cleaning system

The author:
Hans Ruff,
Paper Machines
Graphic



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Modern high-speed paper machines, together with the growing use of recovered paper, demand intensive conditioning of the fabric and felts. The DuoCleaner meets this demand with an unexcelled cleaning efficiency. Felt and screen properties are maintained at uniformly high level during ongoing production, without affecting paper quality. The DuoCleaner is also highly reliable, and the investment pays back in only a few months.

Concept

The DuoCleaner comprises a traversing system with cleaning head, a high-pressure pump aggregate, and the electrical controls.

Traversing system

The electrically driven traverse trolley carries the cleaning head. The limit switches with signal and control cables are encapsulated in the rear wall of the beam to protect them from water, chemicals and temperature effects.

All components of the DuoCleaner traverse system are made of stainless steel, heat-resistant, generously dimensioned and practically maintenance-free. Great attention was paid during development to a compact design insensitive to dirt and optimally maintenance-friendly.

A typical example of such an installation in a dryer section is shown in *Fig. 1*.

The lower part of the cleaning head swivels, and is rotated by reaction forces from the tangential drive nozzles.

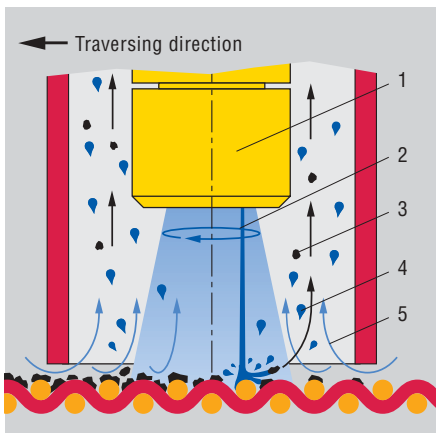
At the bottom are one or more water spray nozzles for removing dirt. The cleaning head can be replaced in a matter of seconds, and without the need for any

Fig. 1: DuoCleaner – Dryer section.

Fig. 2: Traversing cleaning head
1 Cleaning head
2 Rotating water jet
3 Separated dirt particle
4 Reflected water drops
5 Suction air flow.

DuoCleaner system for the entire paper machine

	Max. operating pressure	Water consumption	Nozzles per cleaning head	Cleaning head rotation speed	Vacuum suction
Wire section	250 bar	6-10 litres/min	-10	1000-2500 rpm	No
Press section	200 bar	3-10 litres/min	2-10	2000-3500 rpm	No
Dryer section	350 bar	2- 4 litres/min	1- 2	500-2500 rpm	Yes



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tools. To this purpose the head is moved to the parking position outside the machine frame. This facilitates maintenance and nozzle replacement.

Rotation is monitored by sensor which shuts down the DuoCleaner if the cleaning head comes to a standstill. This reliably prevents fabric and felt damage. Typical operating data for papermachine clothing are shown in the table.

High-pressure pump aggregate
Water is supplied to the DuoCleaner by a self-regulating high-pressure pump aggregate with intelligent control system which automatically adapts the water pressure and flow to operating conditions. This smooth operating mode ensures optimal pump service life. The entire pump aggregate is designed on a maintenance-friendly basis. Appropriate filters and treatment aggregates are provided, according to water quality.

Control system
All functions are controlled and monitored by a programmable control system. Apart from automatic mode, all functions can be operated individually for maintenance and overhaul purposes. Operation is clear and simple. Faults are automatically detected and displayed in clear text.

Operating principle

The pulsing water jets from the rotating cleaning head impinge on the dirt particles in the fabric from various directions. The jet operating pressure of up to 350 bar removes even the smallest particles.

If DuoCleaners are used on forming fabric, high-pressure showers can be reduced. For use in the dryer sections, the DuoCleaner cleaning head is surrounded by a vacuum chamber sealed against the fabric by a membrane. The loosened dirt particles and reflected water spray are sucked into the chamber, thus preventing sheet striping or collection of dirt particles *(Fig. 2)*.

Part of the water jet flows right through the fabric, thus thoroughly cleaning even the bottom side. In case of heavy contamination, a dirt trap is installed underneath the fabric.

Benefits

By continuous cleaning during operation, outstanding results are attained. *Fig. 3* shows the visual effects of cleaning.

Even fillers and fines are efficiently washed out of thick press felts.

Former section benefits
- Less tearing than with high-pressure showers

Fig. 3: Cleaning results on a forming fabric, press felt and dryer fabric (from top to bottom). Left: before, right: after.

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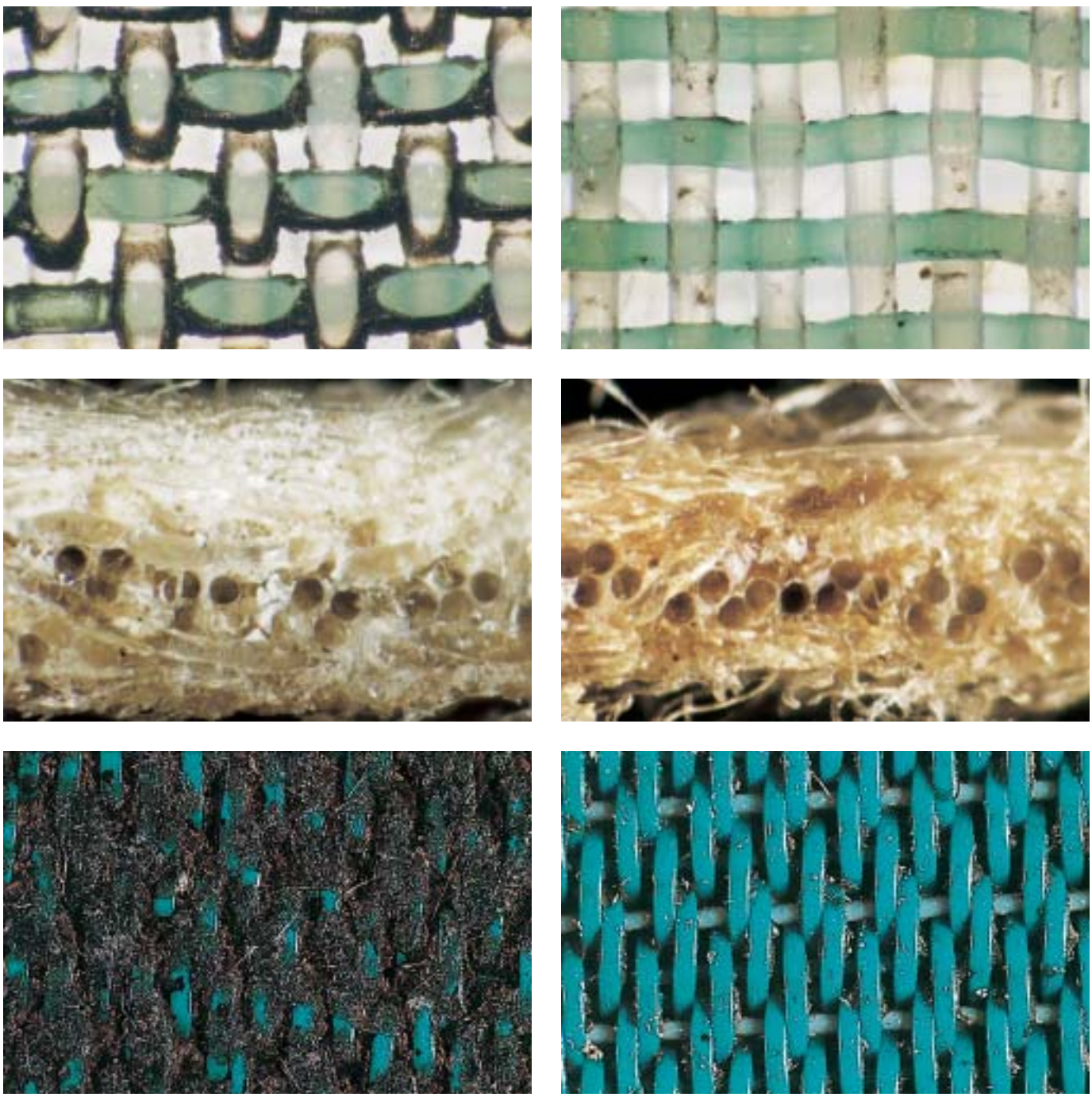


- Less mist generation and fines deposits
- Less formation interference and paper sheet damage by stickies removal
- Uniform drainage thanks to permanently clean fabric.

Press section benefits

- Less tearing thanks to constant clean felt surfaces
- Good CD profile thanks to intensive and uniform cleaning
- Long felt service life thanks to less deposits of abrasive fillers and less felt hair losses.

Dryer section benefits

Fig. 4 shows definitive cleaning results on dry section felts and fabrics. The air permeability of a new fabric is compared here with that of a conventionally cleaned fabric and one continuously cleaned by the DuoCleaner. The uniformly high air permeability of the dryer section felts and fabrics, and the removal of stickies, result in the following benefits:

- Less tearing
- Less sheet perforation
- Lower energy costs thanks to improved sheet evaporation
- Uniform CD profile
- Outstanding effectiveness of web stabilizers
- No shutdowns required for cleaning, no chemicals.

Furthermore, fabric life is often extended by a factor of 4 to 5. *Fig. 5* shows a typical example of this.

With conventional cleaning systems, this fabric had to be changed every 5 months on average. The DuoCleaner extended the service life to more than 20 months.

Prospects

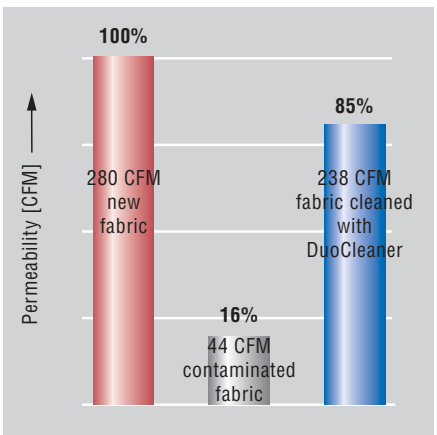
Today more than 250 DuoCleaners worldwide are improving the production efficiency of paper machines including tissue, pulp and board. DuoCleaner sales figures since market launch in 1995 are shown in *Fig. 6*.

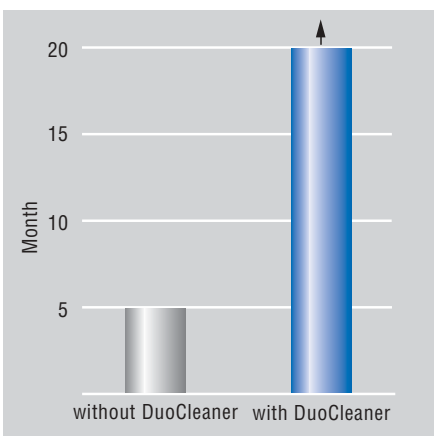
It goes without saying that all new Voith Sulzer Paper Technology machines are equipped with DuoCleaners, but the success of the DuoCleaner so far is mainly due to rebuilds and retrofits. With ongoing development and extension of the application range, the DuoCleaner will continue to improve papermaking efficiency and cost-effectiveness.

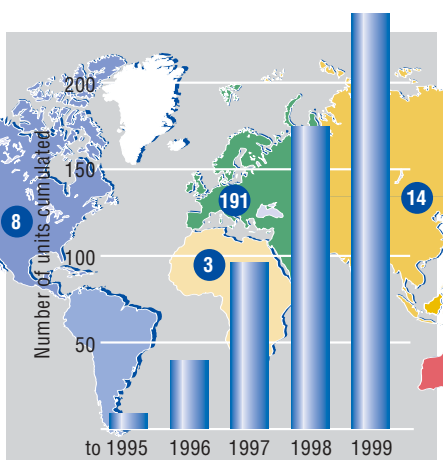
Fig. 4: DuoCleaner – Perlen PM 5. Second dryer group top double tier, operating time 11 months.

Fig. 5: Fabric lifetimes at Dachau PM 8.

Fig. 6: DuoCleaner sales figures.







Kehl PM 6 –
a new production line for laminating papers

The author:
Dieter Blaschka,
Paper Machines
Graphic

In April 1999 August Koehler AG, Oberkirch/Germany ordered from Voith Sulzer Paper Technology an additional production line for laminating papers. Founded in 1807, August Koehler AG has expanded in the meantime into a papermaking group still headquartered at the original location of Oberkirch in the Black Forest, but with four other mills in Germany at Kehl, Ettlingen, Bensheim and Greiz. Products range from carbon copy papers, thermo and fine papers, to recycling board and special papers as well as wallpaper base. With this successful specialization and expansive development, August Koehler AG regards itself today as "a world company with a family character". This description aptly fits the company structure and culture: largely family-owned and run, with close customer contact, high reliability and quality, ongoing success through specialization, and open to innovative developments.

Innovative paper applications these days include the increased use of special-purpose laminating papers for laminating chipboard surfaces in the furniture and

Fig. 1: The Kehl plant of August Koehler AG, showing the new PM 6 building in the left foreground.

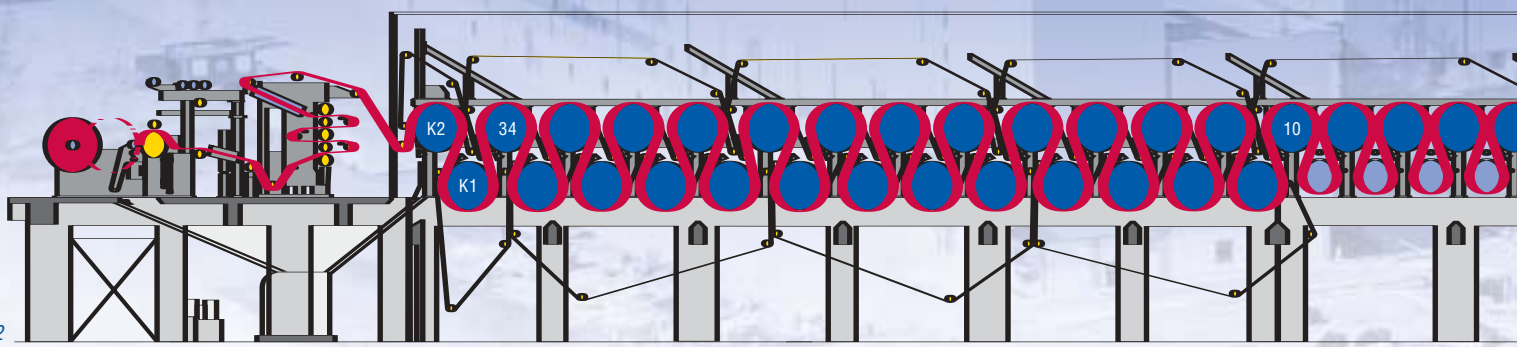
construction industries. The paper is rotogravure colour printed with a wide variety of imitation wood graining, masonry textures or other patterns, then impregnated with resin and pressed onto the chipboard surface.

The paper properties required for this application are exacting: excellent printability and dimensional stability, yet at the same time good ink absorption and uniform resin penetration. On top of this, high strength and good wet tensile strength are required to stand up to the printing and impregnation processes, as well as high opacity for adequate covering of the base material. Although laminating paper production needs only a relatively modest machine width for the subsequent processing requirements, the stringent quality criteria involved require modern high-speed paper machine technology. The new production line for the Kehl mill, which already has a Voith machine for carbon copy and thermo papers, is the first complete new production unit to be built in Germany for laminating papers.

The production concept and integration into the existing Kehl plant buildings and infrastructure is the result of close teamwork between the project engineering groups of August Koehler AG and Voith Sulzer Paper Technology. Scope of supply for Voith Sulzer Paper Technology is as follows:

Stock preparation

- Pulper charging, including virgin pulp bale conveying system
- Pulper for virgin pulp



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- High density cleaning
- Deflaking
- Low density cleaning
- MultiScreen fine screening

Dry broke preparation

- Pulper charging system
- Slat conveyor with roll slitting and weighing
- High consistency pulping
- High density cleaning
- Deflaking
- EconoMix mixing propellers

Broke pulpers

- Couch broke
- Press broke
- Dry broke

Paper machine

- *MasterJet F*

headbox with ModuleJet for thermal stability during operation and Constatherm water circulation system for use during production stoppages.

Together with the Profilmatic cross machine profile control system, these ensure ideal conditions for optimum cross machine basis weight and fibre orientation profiles.

Any pulsations coming from the approach flow system are dampened directly ahead of the headbox using our well-proven pulsation damper.

The distributor and turbulence inserts are easily accessible for cleaning purposes by swinging off the headbox back wall.

- *Sheet formation*

Fourdrinier with dandy roll and drainage elements (designed and supplied by August Koehler).

– Suction couch roll
– DuoShake high-intensity shake unit for optimum formation. DuoShake has no reaction forces so that foundations are simplified since they only have to carry the weight of the shake unit.

DuoShake shake units have been operating successfully for a number of years in Koehler's Oberkirch and Ettlingen mills.

- *Press section*

3-roll Nipco press with separate pick-up, followed by a Nipco straight-through press.

This concept has the following advantages:

– Uniform drainage on both sides
– Uniform sheet consolidation on both sides
– High dry content

A press of this type has been operating at the Koehler mill in Ettlingen since 1998.

- *Dryer section*

Particular attention has been paid to a reliable web guidance for low-strength webs and high operating speeds. The

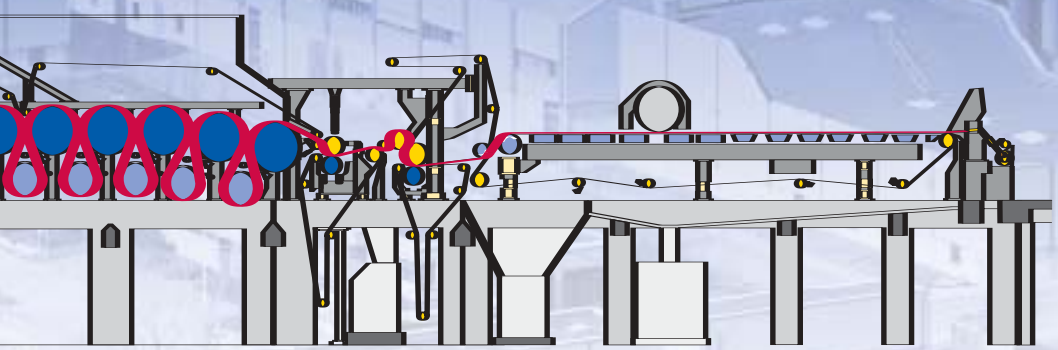


Fig. 2: Technical data of the new PM 6:
Wire width: 2,750 mm
Sheet width at reel-up: max. 2,300 mm
Reel diameter: max. 2,000 mm
Design speed: 1,000 m/min
Drive speed: 1,000 m/min
Product: laminating papers from 50 to 110 g/m²
Production capacity: 42,000 tonnes per year.

Fig. 3: The August Koehler AG management:
Klaus Furler, member of the board and commercial director (left),
Wolfgang Furler, member of the board and technical director (right).

first two TopDuoRun dryer groups are therefore equipped with vacuum rolls and DuoStabilizers. Web stabilizers ensure smooth running of the sheet in the remaining dryer groups. A cooling cylinder group incorporating high performance cooling cylinders is located at the end of the dryer section.

A rope-free feed-up system ensures fast feeding up of the sheet, thus helping to maximize overall machine efficiency. The steam, condensate and cooling systems precisely control web drying behaviour and web temperature.

■ *Janus calender*

This consists of a vertical five-roll arrangement. Trials with laminating papers at the Voith Sulzer test facility in Krefeld/Germany confirmed that this calendering concept is ideal for optimum printing results. A disengageable rope system was selected for reliable sheet transfer through the Janus calender to the reel drum.

3

■ *Reel-up*

with reel-spool magazine for automated spool transport and changing.

A combination of perforated reel drum and winding tension control ensures perfectly wound reels from the core out.

■ *Roll wrapping machine*

Type: Twister Combi 1

The advantage of this concept is that only one width of wrapping paper roll is required for various reel widths. A wrapping machine of this type is already in operation at the Oberkirch mill.

■ *Engineering*

– Machine and system engineering
– Basic and detailed engineering for process, paper machine and auxiliaries
– Basic and detailed engineering for the control and instrumentation systems.

The topping out ceremony for the new PM 6 building was held on September 3, 1999. Paper machine erection started in January 2000, and commissioning is planned for August 2000.

Klaus and Wolfgang Furler, board directors of August Koehler AG, commented on their decision to place the order with Voith Sulzer Paper Technology:

"This was certainly the right decision. The project is running very smoothly, and above all the technological optimization teamwork is outstanding."

1

Dongying Huatai successful start up

The author:
Frank Opletal, Voith Sulzer Paper Technology, Beijing Central Representative Office

Clear blue sky in northern Shandong Province – close to the scenic view of the Yellow River mouth where it flows into the Beihai sea a huge new expansion project is underway. Approaching the vicinity of the mill the new impressive power generation plant and right after this the new papermachine building are beaming into once eye.

As reported already in our twogether No. 7 under the topic "Speedcoater for Chinese market leadership" the Shandong Huatai Group in Dongying, did not stop to invest in Top technology in buying a speedcoater and a softnip calender only. To stay ahead with technology and paper quality and be a leader to let the Chinese paper industry prosper, Director Li Jianhua (see separate comment from him), decided to go even further and purchase a state-of-the-art ModuleJet headbox – computer controlled with the Profilmatic M from Voith Sulzer Automation, this headbox controls a perfect basis weight profile by means of 42-Control zones.

Voith Sulzer Automation delivered the whole QCS system including

- the complete headbox control function,
- the CD caliper control actuator ThermaJet with 34-zones,
- two AdvantagePlus frames, each comprising sensors for basis weight, moisture and caliper, and
- the brandnew technology: the InfoPac Papermachine Information System, which allows papermakers as well as mill management rapid access to, and

3

Fig. 1: Paper machine Dongying Huatai.

Fig. 2: ModuleJet stock preparation.

Fig. 3: Speedcoater.

Fig. 4: Ecosoft calender.

2

4

powerful analysis of paper quality and machine performance. Moreover, the function of the archives also allows for storage of quality datafor the mill's internal quality control system. This is the first such system to be in operation in China.

All in all the installation and commissioning went very well, even the very cold winter brought some obstacles to circumsail. Using 70% pulp made from rice straw and 30% bleached market pulp, the new paper created is first class LWC, coated simultaneously with a speedcoater of the newest generation. In the future Reed pulp will be used instead of the bleached market pulp. The final finishing touches are performed with a new two nip Ecosoft modular calender.

Li Jian Hua,
President Dongying Huatai

To face up the challenge of world market competition after China enters into the world trade organisation, Chinese paper mills have to strengthen themselves with input of modern advanced paper technology equipment, to produce the high grade value added products. With this vision in mind, we decided to purchase from Voith Sulzer the most advanced equipment. We are very much satisfied with the machinery supplied by Voith Sulzer and we are looking forward to co-operate with each other on other projects in the future.

Zhuhai BM 2
started up 2 weeks ahead of schedule

The board mill of Hongta Renheng Co. is located rather close to the downtown area of Zhuhai City, which is, as locals say, a "bright pearl among Chinese cities" regarding quality of life and environmental surroundings. Its outstanding geographical location directly at the South China Sea and its proximity to Macao and Hongkong make it not only the ideal place for a vacation, but also a strategically perfect business location.

Zhuhai S.E.Z. Hongta Renheng Co. Ltd. is the leading supplier of cigarette-box cardboard in the Chinese market, and is part of Hongta Renheng, the joint venture between Yunnan Hongta Industrial Co. Ltd. and Hongkong Renheng Investment Co.

The Yunnan Hongta Group comprises 50 enterprises, with tobacco being the largest and core business, and thus it is the third largest manufacturer of cigarettes worldwide. Other businesses include power generation, paper & board manufacturing, printing, construction materials, banking and insurances as well as light trucks.

On February 25th, 1998, Zhuhai S.E.Z. Hongta Renheng Co. Ltd. and Voith Sulzer Papiermaschinen AG St. Poelten signed the contract for the delivery of board machine No. 2 during a customer's visit to St. Poelten in the presence of high-ranking political officials from the People's Republic of China. The project was entirely financed by Zhuhai S.E.Z. Hongta Renheng Co. Ltd.

The follow-up order for the supply of another new board production line from Zhuhai S.E.Z. Hongta Renheng Co. Ltd. can be regarded as the direct success of board machine No. 1, which was also supplied by Voith Sulzer St. Poelten. At that time, the main structural parts came from Liaoyang Paper Machinery Works. BM 1 was taken on stream in 1993. These facts, combined with the leading position of the Voith Sulzer Board and Packaging Paper Division worldwide and in China, resulted in the delivery of the fourth fully imported board machine to China. While BM 1 has been run over its design capacity by almost 50% for quite a long time,

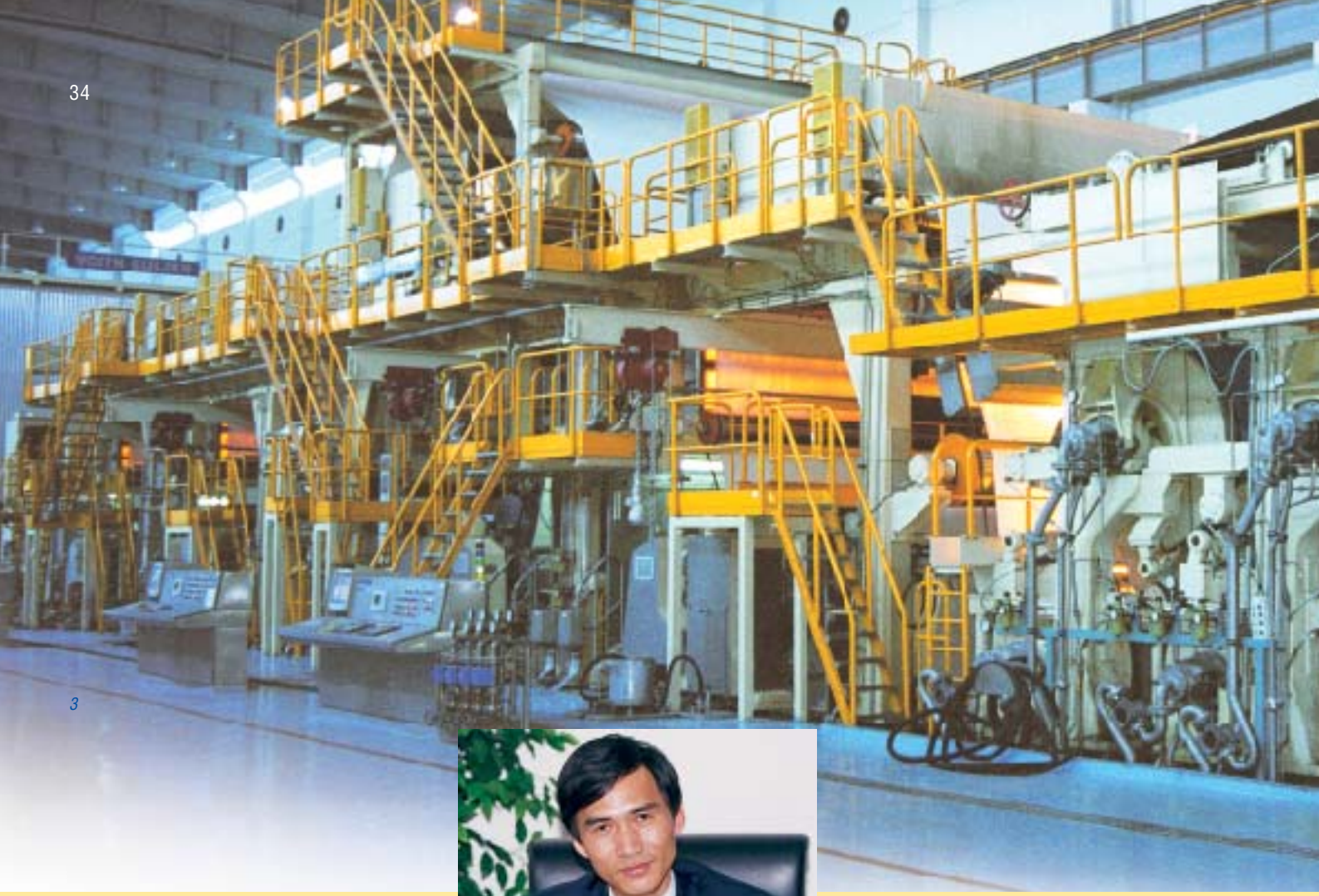
The authors:
Robert Adolf Dokter,
Paper Machines
Board and Packaging;
Frank Opletal, Voith Sulzer
Paper Technology Beijing
Central Representative Office

Fig. 1: Board machine 2. 1

Fig. 2: Press section with Flexonip press.

2 the new BM 2 is currently steaming ahead from one record quality production to the other. This being the case, the quality parameters have been reached already in early March 2000 – merely two months after going into continuous production. The taking-over certificate was soon signed thereafter.

By making every possible effort to see the project through within the shortest possible time, the civil construction works started on August 1st, 1998 with the first pile being driven into the earth.



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Zhao Wanli, General Manager Zhuhai Hongta Renheng Paper Co., Ltd.

We have been enjoying a relationship of good cooperation with Voith Sulzer Paper Technology for several years, based on mutual trust and assistance. After comparing many suppliers, we chose Voith Sulzer for board machine No. 1 (BM 1). Our choice proved to be wise and correct in practice. This machine has been running to our full satisfaction since it was put into operation, and its machine speed reached 270 m/min 1 1/2 years ago, far exceeding its design speed of 250 m/min. The key point is that the quality of the coated board produced by BM 1 has reached international first-rate level: our products are welcomed to the Chinese market for top-quality board and demand for it exceeds supply. The success of BM 1 has set new technological standards, which positively influence product quality and help to strengthen our market position.

Voith Sulzer was again chosen as the supplier for the key equipment (board machine) and began to execute the BM 2 project in 1998. BM 2 has an untrimmed working width of 4200 mm, a design speed of 600 m/min and produces 150,000 tons/year. Construction of BM 2 started in August 1998, and start-up took place in December 1999. As early as March 2000, board was produced, which fully met the quality requirements. Our qualified engineering personnel and the other technical personnel, together with Voith Sulzer Paper Technology's experts, contributed to the success of this project. The BM 2 project, including design, manufacturing, tests, installation and start-up, was completed, achieving high quality and efficiency. The high design speed of BM 2 caused a great sensation among the board producers in China. We believe that choosing Voith Sulzer as the supplier for BM 2 will again prove to be a wise decision.

We are making plans for a BM 3 project, which will increase the production capacity by 300,000 tons, and hope to continue our good cooperation with Voith Sulzer.

Zhuhai Hongta Renheng would like to take this opportunity to express their heartfelt thanks to Voith Sulzer's management and all engineering, technical and service personnel involved in BM 1 and/or BM 2 projects.

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Fig. 3: On-line coating equipment.

Fig. 4: Speedsizer.

Fig. 5: Horizontal reel.

Fig. 6: Winder.

6

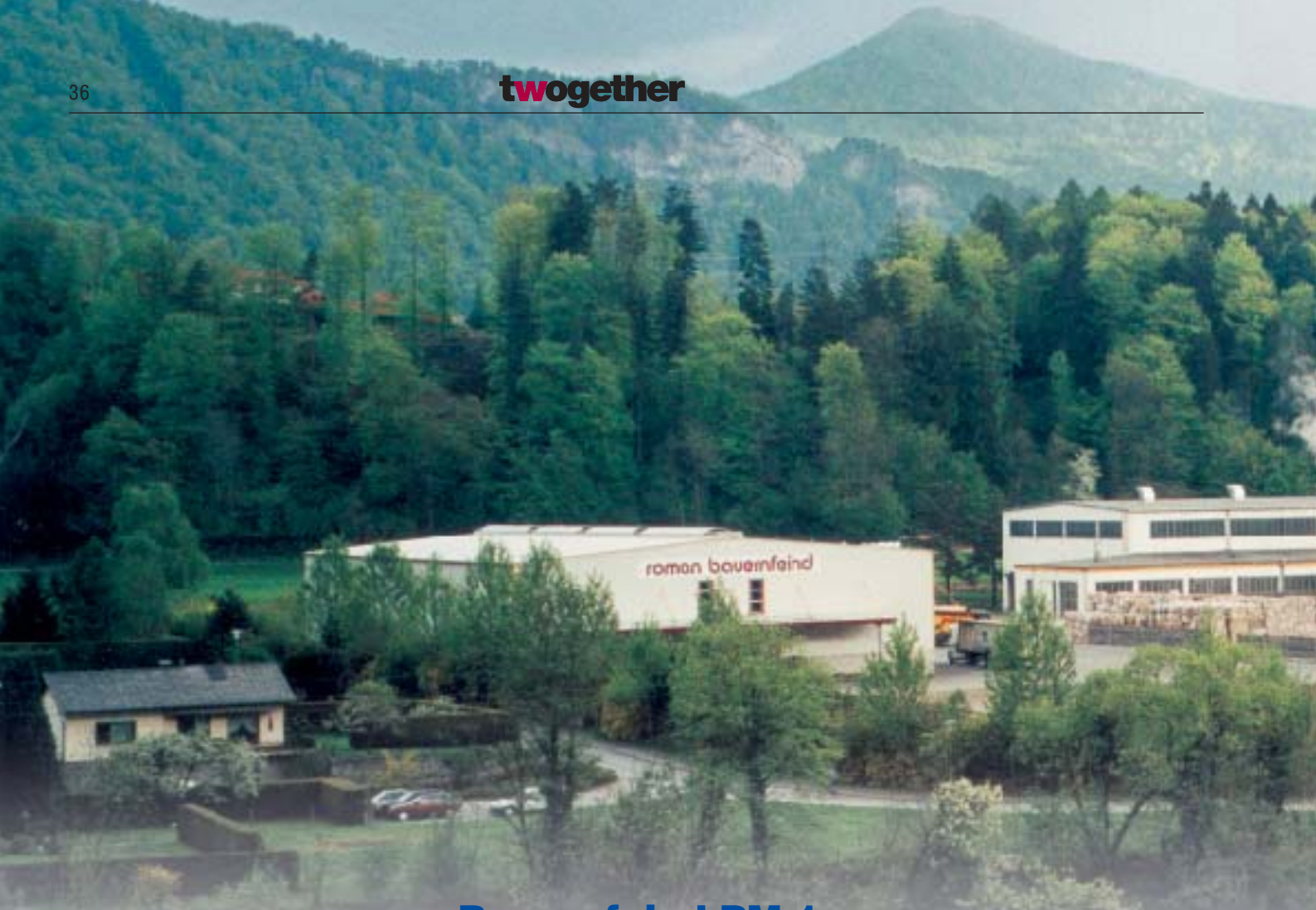
By February 1999, the installation of the board machine foundation plates could be finished so that the first components of the dryer section were installed early in March 1999. A highly qualified team of engineers assigned by the customer, locally hired construction firms with excellent previous experiences in installing paper machines and a team of Voith Sulzer experts were teaming up to meet the tight time schedules and high quality requirements during the installation period. Thus, no-load tests could be started by September 1999. On December 15th, 1999, the first board was produced at the horizontal reel after a very well organised commissioning period. – Two weeks ahead of the contractual schedule, Voith Sulzer delivered the complete multi-fourdrinier board machine, including shoe press, on-line coaters and finishing equipment like the slitter winder, as well as key equipment for all board machine-related auxiliary equipment.

The plant engineering was performed in close co-operation with the Changsha Design Institute, which had been nominated by the customer to provide the overall engineering scope. This co-operation had been proven successful on several other projects in China before.

The layout design of the board machine allows the customer to produce cigarette-box cardboard and liquid packaging board accounting for a yearly gross production of 150,000 tons. As raw material sources, Zhuhai S.E.Z. Hongta Renheng Co. Ltd. prefers to buy NBKP and BCTMP from North American suppliers, while LBKP is mostly purchased from Brasilian, Indonesian and Thai pulp producers.

Currently, the production still covers the local South Chinese market, like the provinces of Guangdong, Yunnan, Hunan, Hubei and Sichuan. But Zhuhai S.E.Z. Hongta Renheng Co. Ltd.'s future sales strategy is to ship high-class board also to other countries in South East Asia.

Voith Sulzer Paper Technology offers its heartfelt congratulations to the management of Zhuhai S.E.Z. Hongta Renheng Co. Ltd.



Bauernfeind PM 1 –
Strengthening of Frohnleiten mill

The author:
Petra Resch,
Paper Machines
Board and Packaging

After a major rebuild, PM 1 at Frohnleiten mill of Roman Bauernfeind AG was successfully put into operation in November 1999. The aim of the rebuild was to boost PM 1 production, tripling the output of corrugated board base papers from 100% recycled furnish.

The rebuild was accomplished in two phases. The first upgrade in the summer of 1998 included the installation of a state-of-the-art shoe press.

With the second phase being completed, including a renewal of the approach flow system and paper machine as far as the winder, the entire PM is now designed for a speed of 1000 m/min.

Roman Bauernfeind Verpackungswerk AG was founded in 1945. In a former comb factory, they started converting solid board, and in 1963, corrugated board. In 1972, they started producing corrugated board, and in 1984, when Frohnleiten Paper Mill was acquired, paper production was started. Today, Roman Bauernfeind Papierfabriken AG produces corrugated board base papers at 5 different locations: Frohnleiten (Austria), Raubling (Germany), Niedergösgen, Moudon (Switzerland) and Monza (Italy).

More than 500,000 tons/year of high-grade packaging paper from 100% recycled furnish are produced on these machines. Currently, 400,000 tons/year are converted at the group's locations in Germany, Belgium, Austria, Italy, Poland and China. The majority of exports from Aus-

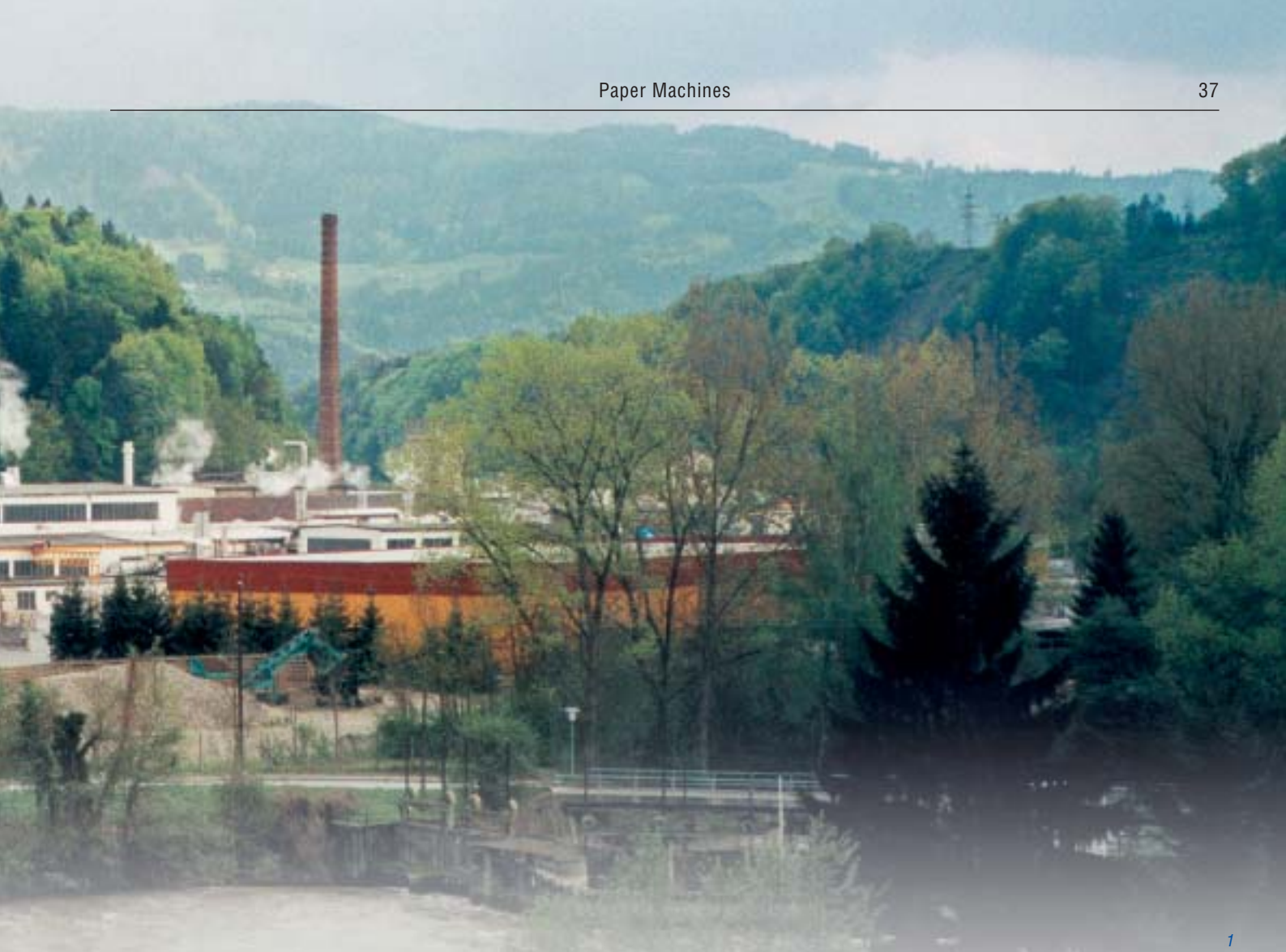


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Fig. 1: Roman Bauernfeind AG, Frohnleiten mill.

Fig. 2: Stock preparation MasterJet F/B.

tria goes to Germany, Czech Republic and Belgium.

2

The export share is about 60%. Roman Bauernfeind AG is the market leader in Austria and the second largest supplier in Europe for pre-print products. In addition, Bauernfeind is one of the largest privately owned paper and packaging groups in Europe.

After the successful rebuild of the press section in the summer of 1998, the follow-up order for the rebuild of the other components of PM 1 was placed by Roman Bauernfeind AG with Voith Sulzer in February 1999. Through these two upgrades, the paper machine was almost completely renewed, presently operating at 800 m/min working speed. The entire rebuild was completed in a record time of

Technical data of PM 1 after the rebuild:
Wire width: 2,950 mm
Maximum production speed: 800 m/min
Paper grades: Corrugating medium: 90-180 g/m²
Wrapping paper: 90-180 g/m²
Maximum capacity: 330 tons/day.

3 *3*

approximately 11 weeks with production stops of less than three weeks.

The main goal of the rebuild was to set new standards in paper production. At Frohnleiten mill, most of the corrugating medium is produced by PM 1. Especially in this product range, a new trend has become apparent in recent years. The general tendency towards thinner flute profiles requires lower basis weights. A product with thinner flutes will better meet the market requirements such as improved printability. Although a lower basis weight results in a lower specific output with constant speed, this is more than compensated by increasing PM 1's output. After the rebuild, its output increased to 300 tons/day of corrugating medium and 330 tons/day of wrapping paper.

The following basic components were renewed: The wet end was equipped with a MasterJet headbox (refer to twogether Journal No. 8, page 24). A special feature of this latest member of the headbox family is that no heating is required to ensure a parallel slice. Due to the quality demands made on the CD profile, precise adjusting units with oblong spindles are used to control the CD basis weight profile.

To optimally utilize the structural conditions and at the same time find an optimum solution to meet the high quality standards, a decision was made in favor of the topwire former DuoFormer™ D. The advantages of this two-sided drainage are an improvement of formation and a shorter drainage section compared to a conventional fourdrinier.

The press section rebuild was completed in the summer of 1998. The installation

Fig. 3: DuoFormer D.

Fig. 4: Final section.

Fig. 5: Mill owner Roman Bauernfeind and Otto Heissenberger, executive vice president of Voith Sulzer Papiermaschinen AG, St. Pölten.

of a NipcoFlex™ press was the first step towards an increase in PM 1 output, improving the dryness with constant quality.

The first group of the pre-dryer section has been designed as a serpentine group with DuoStabilizers™ – the remaining groups and the after-dryer section are of conventional two-tier design. DuoStabilizers™ and web stabilizers ensure a smooth web run. A ropeless transfer system is installed in the pre- and after-dryer sections.

A transfer doctor takes the tail off the last press, and the transfer foil directs it into the dryer section. The blowpipes installed at the blowing doctors ensure ropeless tail transfer. With speed and production increases expected, the size press and the reel also had to be redimensioned. In the reel area, the building had to be extended, but remained unchanged in the wire section area. This extension was necessary to allow for the required drying capacity and the installation of the new winder.

As installation work was completed on time, paper was on the reel again two days ahead of the scheduled start-up date. Just hours after start-up, salable paper was produced. The hybrid former improved formation by about 50%.

After a short optimizing phase, the desired strength increase and the reduction of the 2-sigma values of the basis weight profile have already met the expectations. Within the first three months, wrapping paper was produced at the design speed of 800 m/min.

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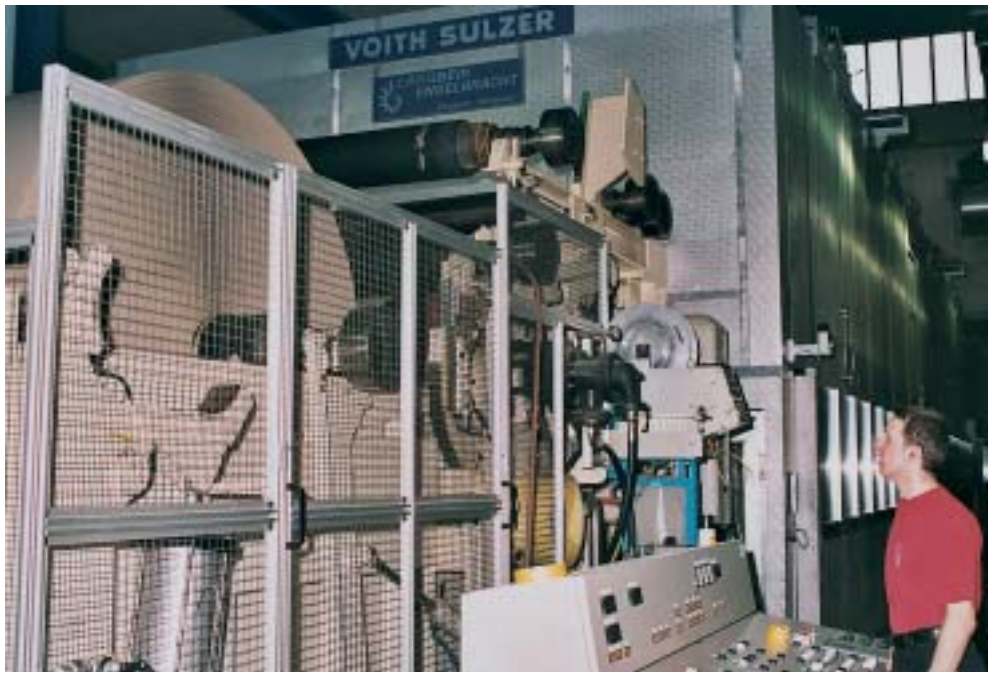

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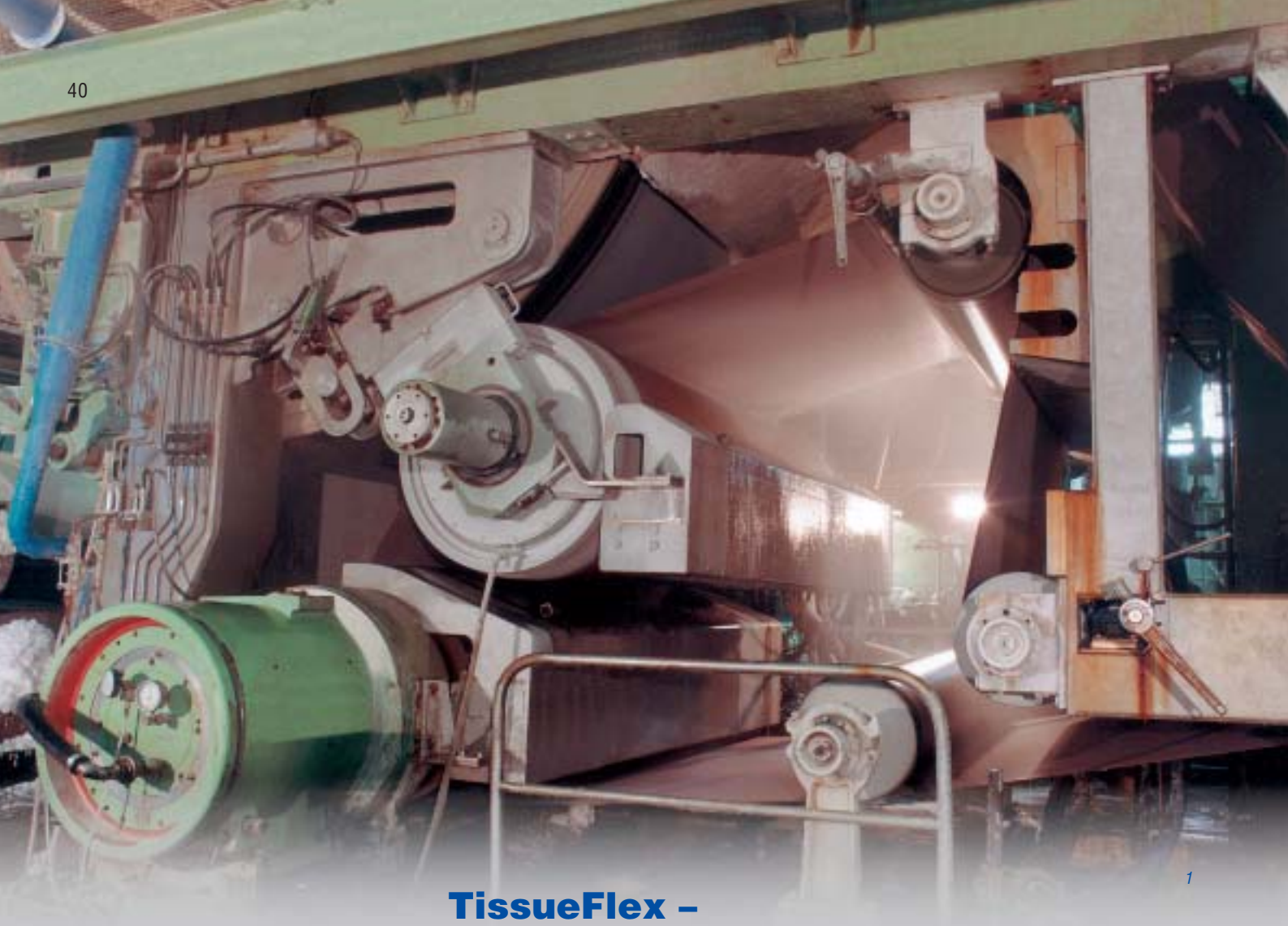

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TissueFlex – first application in America

The author:
Ronaldo Parucker,
Voith S.A. São Paulo

Late in January 2000, the first commercial application of the TissueFlex in the Americas and the second in the world started up successfully. The TissueFlex technology consists of a shoe press against the Yankee dryer surface.

This equipment was installed in Mogi das Cruzes, São Paulo, Brazil, at Companhia Melhoramentos de São Paulo, a long-established Brazilian tissue manufacturer.

Prior to the installation, the machine operated with two presses against the Yankee, at speeds limited to approximately 1,600 m/min. With the application of today's technology, the same speed can be achieved using only one shoe press against the Yankee.

The entire machine rebuild was completed over a 6 1/2 day shutdown period in which several other services were executed, including the Yankee dryer grinding. The installation of the TissueFlex™ itself took approximately four days.

The objectives of the rebuild, and the basis for return on investment were an operating cost reduction, saving 5% of fiber, and product quality improvement. Now, after a short period of approximately two months, this new technology has reached all the objectives that were set.

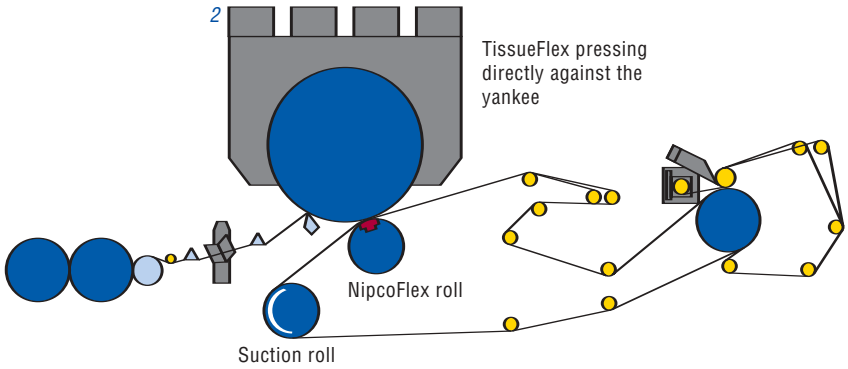


Fig. 1: General view of TissueFlex installation at Companhia Melhoramentos de São Paulo, Brazil.

Fig. 2: TissueFlex technology for tissue.

Fig. 3: Tissue machine Melhoramentos Papéis S.A.

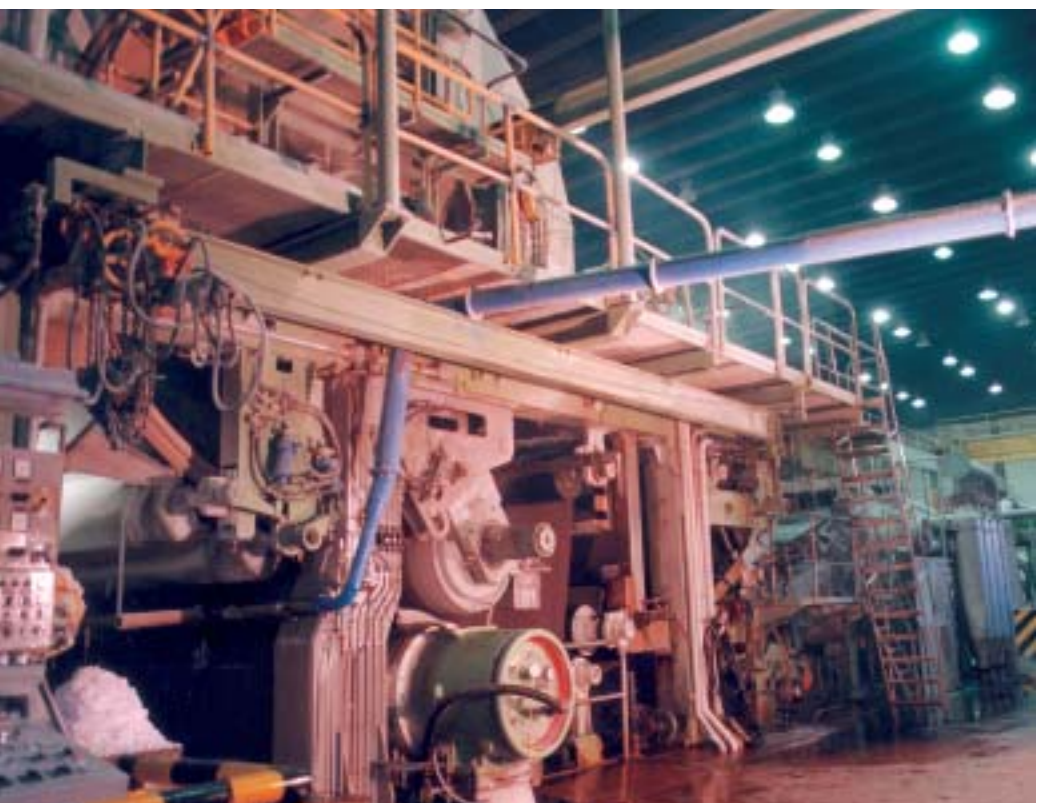
Fig. 4: TissueFlex control panel.

After the TissueFlex™ start-up, a bulk increase of approximately 20% was realized, and paper softness was greatly improved. After some analysis, it was also noted that fiber reduction would possibly be even greater than 5%. The conversion of toilet paper, now being manufactured with the new TissueFlex™ technology, presented no problems. The other main product of this tissue machine is napkin. The company now achieves the same package size with 50 units, compared to a package of 60 units before the rebuild.

Even with a basis toilet paper weight reduction of approximately 5%, the diameter of the converted paper roll increased approximately 2.5%.

As to production itself, Melhoramentos points out that after the felt compaction the machine already reaches the same production as before the rebuild. However, they feel that the next target will be to determine the best felt for this new technology, since the felt compaction time significantly increased.

There was a small increase in steam consumption with the production of papers with a higher basis weight. However, it is believed that this consumption will be significantly reduced through the use of the right felt. Consideration has to be given to the fact that the machine now operates with only one press, compared to the two presses against the Yankee before the rebuild. The consumption of water, vacuum and fuel for the hood remained unchanged. Total drive power consumption remained the same, the suction roll and the Yankee consume more power, but, on the other hand, there is no longer any blind drilled press.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Another important issue at Melhoramentos is that some items requiring frequent maintenance were eliminated, such as the suction press and the rolls for the second press. Previously, the press rolls had to be exchanged or serviced every four months, due to problems with the rubber covers (plugged shell drillings, total cover loss etc.), causing long down time, which resulted in lost production. With the installation of the new TissueFlex™ technology, the mill feels that these problems have now been solved.

Even considering the relatively small amount of time that the mill has been using the new TissueFlex™ technology, Melhoramentos is pleased, since the transition phase, as well as the learning curve was very short and the objectives set for this rebuild were fully achieved.

Sirius –
the online wind-up system

The author:
Oliver Rudolph,
Paper Machines
Graphic

When the first Janus calender was retrofitted to PM 4 at the Ettringen paper mill, Gebrüder Lang started considering the online concept for natural papers well before installing PM 5.

Since the design of this new machine was to set new milestones, including outstanding winding characteristics, the idea of using a Sirius wind-up system was immediately accepted. There were some very good reasons for this decision: not only had excellent winding results been obtained with the first four Sirius installations on the ***Triple Star*** line at Sappi/Gratkorn, but for online Janus calendering to SC-A quality standards, only the latest winding technology suits the dimensions of modern production lines.

In the meantime, the second Sirius generation had been developed at the winding technology COC (centre of competence) in Heidenheim. The mechanical design concept of the enormously large first installations in Austria had to be replaced with a much more compact solution – but of course without sacrificing the outstanding paper roll handling benefits of this well-tried winding principle.

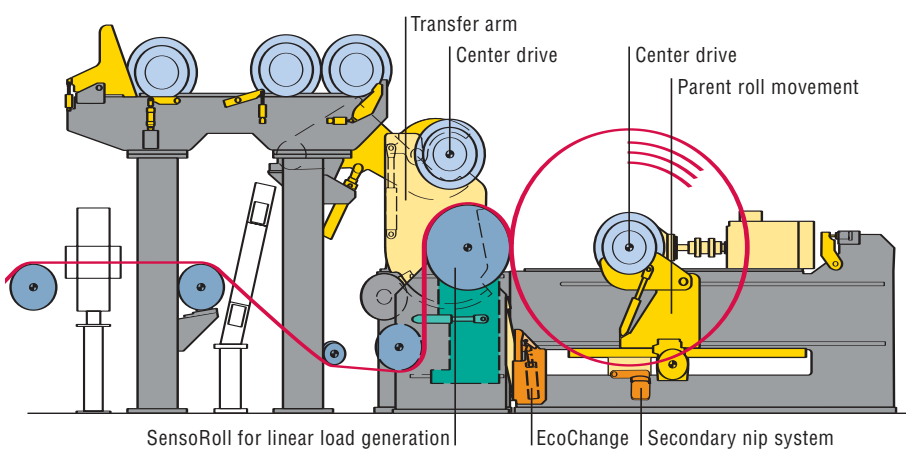
The basic idea of separate linear load generation and parent roll movement during winding – systematically implemented by the SensoNip control system – thus had to be retained.

As a result of this development work, the latest Sirius generation covers all requirements. Operation of the moving SensoRoll – the well-proven heart of the SensoNip control system – remains unchanged. Overall space requirements are much less, and the complex web guide system of the first generation has been considerably simplified. The new machine now fits almost like a conventional wind-up system into the paper machine layout. This is very important, since it makes the Sirius more suitable for upgrading existing production lines.

The commissioning of PM 5 in Ettringen was planned for September 1999, by which time the sister aggregate – a Sirius

Winding system design data

Design speed 2200 m/min
Max. operating speed 1800 m/min
Min. roughness 1.2 PPS
Min. porosity <20 ml/min Bendtsen
Max. parent roll diameter:
– newsprint 3700 mm
– SC grades 3100 mm
Reel spool diameter 1050 mm



Gebrüder Lang Ettringen paper mill.

with identical layout geometry – was also to be commissioned on the new PM 3 at Papierfabrik Palm in Eltmann. This produces newsprint from 100% recovered paper, and winding requirements with finished rolls 3700 mm in diameter are just as demanding (and perhaps record-breaking) as on PM 5 in Ettringen.

It was quite a challenge for Voith Sulzer Paper Technology to commission these two almost identical aggregates – both of them the first of their kind – but the risk was more than rewarded. Both the Ettringen and Eltmann units showed perfect winding results, even with the imperfect sheet quality to be expected during initial operation.

The two highly motivated commissioning teams, supported from time to time by our development and technology people, exchanged findings to ensure a really efficient optimization phase thanks to the resultant synergy effect.

Only shortly after startup, the winding parameters of web tension, centre drive torque and – most important of all – linear load control were finalized for the respective operating conditions of the two paper machines.

Both installations enable comparatively low free web tension. And as is well known, low web tension at the end of the line generally reduces the risk of web breaks – thus boosting the overall production efficiency.

Tail transfer in the area of the new Sirius wind-up system was quickly optimized. Even prior to actual commissioning, the Fibron vacuum tapes and related transfer equipment were pre-adjusted. Using a specially developed unwind, the tail transfer procedure was thoroughly tested. As a result, only slight adjustments were required for production startup when the paper machine was finally ready.

These are two examples of the efficient procedures – including new experiences – which led to the high reliability of the Sirius wind-up system in such a short time. Commissioning of both the new Sirius installations was completed without a hitch – thanks to careful preparations and the know-how gained from exhaustive testing on our R&D facility with all kinds of paper.

Both installations meet all requirements for residual slab and winding quality, thus increasing the efficiency of their respective production lines.

Operating experience so far with the Sirius wind-up system is very encouraging with regard to further development. Future applications will cover nearly all main paper grades such as LWC, copying papers, liner and coated board.

Papermakers will thus benefit increasingly from the advantages of our Sirius **SensoReeling** concept:

- Surface protection thanks to gentle contact with the **SensoRoll**
- Conservation of volume and elasticity by the **SensoNip control system**
- Optimal paper roll structure thanks to sensitive control of winding parameters: minimal residual slab even with the largest roll diameters
- Highest possible production speed thanks to the contour-adaptive **SensoCover.**

"A look behind the scenes" – preparations for the start-up of the **Janus MK 2** for Schongau PM 9

When the old PM 9 rolls in Schongau come to a standstill as scheduled at midnight on May 3, 2000, then the plant will have produced its last ton of newsprint. Within just 54 days, the existing PM 9 will be dismantled and the reconstruction of the new PM 9 carried out.

This article describes the preparations made at Voith Sulzer Finishing location in Krefeld during the planning phase to ensure this extremely demanding start-up. These include

- Setting up customer and supplier teams
- Installation of the calender in the production hall in Krefeld and
- Further internal start-up preparations.

The Janus MK 2 for Schongau PM 9

This new paper machine represents the second Janus MK 2 calender to go into operation. SCB+ paper can be produced from 100 % recovered paper with 2 x 5 rolls, four steam moisteners, a line load of up to 500 N/mm and a surface temperature of 160°C at 1,500 m/min. The paper width is 6,150 mm. The photograph on page 46 shows the MK 2 under pre-erection. The rigid frame arrangement can clearly be seen. One can also imagine, how short the free web draws and the web drying lengths upstream and downstream of the Janus will be after the calender's integration into PM 9.

Customer/supplier teams – the key to a smooth start-up

All the participants were aware at the beginning of the project that they had let themselves in for a demanding project. Thus, at the customer's suggestion, teams were set up to tackle the high objectives and devise optimum technical concepts.

The teams included staff from Haindl production, planning and maintenance as well as specialists from the Voith Sulzer Finishing Division's order team. The teams were kept small to facilitate goal-oriented solutions.

The requirements and possibilities were to be made to coincide within the concept without any loss of communication. Critical groups uncover weaknesses, develop new ideas and optimize concepts. Not least, they promote the integration of those who will later have to work with the machines, cause acceptance for the new equipment and accelerate familiarization among all participants.

CD Profile Control Strategy Team

The CD profile control strategy team had the task of optimizing the individual CD profile regulating units and integrating them into a closed control concept. The most important point for Finishing Division was to guarantee the 2-sigma values for caliper deviations. Coarse CD profiling is effected by the 14-zone Nipcorect, rolls, fine CD profiling using the 30-zone steam moistener.

Threading Team

The threading strips are slit on drying

The authors:
Peter Herbrik,
Christian Münch,
Finishing


VOITH SULZER
DEMAG

Fig. 1: Web transfer demonstration on the VPKR testbed.

Fig. 2: Nipcorect® roll installation.

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cylinder 38 by a twin tip slitter and guided through the Janus MK 2 to the pull-stack via 2 Fibron belts and ropes. From there, the strips are automatically transferred to rewinding using 5 further vacuum belts.

Rope arrangement and belt positioning were optimized and interruptive edges in the calender were reduced in numerous discussions. Successful transfer at 1,500 m/min was demonstrated in the Finishing Technology Center in Krefeld. *(Fig. 1).*

Roll Change Team

The restricted space available (low crane height, roll change with only one crane, no storage possibility at PM level) required an adjustment of the roll change concept.

A working group including experienced roll changers from Haindl Papier maintenance devised a roll change concept which ensures an ergonomic and rapid roll change using special swivel cross arms and clamps *(Fig. 2 and 3).*

Fault Finding Team

Shortening standstill times for maintenance represents a vast potential for improving efficiency. The concept of an extended fault detecting system is to open up this potential. Visualizing the status of the calender interlockings simplifies fault identification and accelerates fault elimination.

Roll Cleaning Team

The furnish from 100 % recovered paper causes increased dirt accumulation in machines and installations. Stickies on the surface of calender rolls or filler deposits covering the rolls result in gloss spots on the web and may even lead to roll damages. Successful developments by Haindl Papier were adapted for the Janus MK 2 to prevent this problem.

At the end of the day, the production experience of a notable papermaker and the knowledge gained from over 20 Janus applications were combined to form optimum calender planning, thanks to the Teams.

Fig. 3: Roll erection in the works.

Fig. 4: Just-in-time delivery on the site.

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Installation and preparations for start-up

After technical planning, the focus was on installation and preparations for start-up. Initially, the calender was subjected to internal audit. The PM 9 Order Team had to reply to questions by Voith Sulzer Finishing experts and "defend" the design. At the end, the Order Team had carried out about 100 interesting optimizations.

A second group was subsequently formed. It consisted of technologists, installation and commissioning engineers for Schongau PM 9. Experience with comparable installations was exchanged in order to prevent repetition of mistakes and to facilitate successive system improvement.

The Janus MK 2 was completely assembled at Voith Sulzer Finishing GmbH. In doing so, conditions at the site of final erection were reproduced as far as possible. Thus installation and alignment of the frame was carried out using only a crane hook. Since the frame had been divided due to the restricted lifting capacity of the crane in Schongau, this was not easy. Functional checks on the doctors and roll change processes as well as commissioning of the four traversers were carried out. At the beginning of installation, 25 requirement-oriented loaded trucks for just-in-time delivery were to be provided at the site of construction *(Fig. 4 and page 46)*.

Stand-by Team consisting of the specialists from all departments involved was established and is permanently on call via mobile phone. The installation and start-up groups working around the clock at the site of erection have to be assured of continuous back-up from "home".

In order to guarantee a continuous flow of information, conference calls are to be set up twice a day between the erection site and Krefeld. A permanent check on construction activities via a time registration system and a erection site secretary permit timely response to deadline deviations.

The previous good experience with teams led to the formation of the Start-up Team. It examined installation and start-up planning and discussed machine operation thus ensuring that all the companies involved are well-informed about the start-up phase. Check lists for operational tests and I/O checks support system start-up.

While the old PM 9 was still running, large auxiliary units, such as Nipco, combined hydraulic and thermo oil systems etc. were installed and piped subsequently flushed and started up with the control system. Start-up of the threading system is to begin 5 days before the first day of production.

When this article is published, start-up will probably already have taken place. We hope that sufficient preparation has been made so that paper of superior quality can be seen at the rewind according to schedule on 26th June 2000 despite any imponderables and surprises.

To be continued...

1

The authors:
Joe Asiala, Smurfit-Stone Container, Ontonagon, Michigan, USA;
Mike Woller, Voith Sulzer Paper Technology North America

Partnership with papermaker leads to innovative solution

Desperate to resolve runnability problems associated with the lumpbreaker position on its two fourdriniers, the Smurfit-Stone Container Corporation's mill in Ontonagon, Michigan, USA, turned to the innovators at Scapa Rolls, now part of the Voith Sulzer Paper Technology Service Division, for help.

Build-up on the roll was causing breaks and downtime. Steps taken previously to solve the problems had been ineffective. The innovative use of a polyurethane roll cover – the first application of its kind – to replace existing rubber covers solved the problem.

The two containerboard machines at the Ontonagon mill produce corrugated medium with a recycled content of 33%. Both paperboard machines have conventional fourdrinier wet ends with a steam box located approximately three feet ahead of the lumpbreaker roll position. Stock temperature is 170° F to 190° F out of the steam box. The mill loads its lumpbreaker rolls to between 40 and 90 pli.

Fig. 1: Smurfit-Stone Container's mill in upper Michigan produces recycled content corrugating medium.

Most mills that make this grade traditionally use a two-inch thick, 200 ± 50 P&J rubber cover on the lumpbreaker roll. The mill had tried to alleviate the build-up problems by trying a number of different cover compounds supplied by a variety of cover manufacturers, but with little success. All of these rubber covers would pick at one time or another.

Like many others, the Smurfit-Stone Container Ontonagon mill used showers and chemicals to limit or prevent stickeys from building up on the cover. This build-up caused the rolls to vibrate and bounce, leading to breaks and subsequent machine downtime to clean them. The chemical addition to the cleaning shower was adding cost and the cleaning showers were causing wet end breaks and housekeeping problems.

Voith Sulzer Paper Technology agreed to supply a polyurethane lumpbreaker roll cover for a trial. A technical team was dispatched to assess this new application for the possible use of a polyurethane roll cover.

Application

The decision to try a polyurethane cover in this position was based on results the mill had seen when rubber covers in the first and second press top roll positions on the No. 2 paper machine were switched to polyurethane covers. These rolls are located just downstream from the lumpbreaker roll on the fourdrinier and are in direct contact with the sheet. Previously, the rubber covered press rolls would pick and cause runnability problems. Switching to polyurethane covers in the first and second press positions eliminated build-up and picking problems.

The technical team wanted to be certain the polyurethane cover was soft enough to work in this application but hard enough to resist water permeation. A 50 P & J PolyMax cover was chosen as the best choice for a roll cover running in this position. Installing a 50 P & J cover where a 200 P & J cover had been running required adjustments by both the mill and the Voith Sulzer technical team's roll cover design element.

Voith Sulzer Paper Technology changed the surface finish of the PolyMax roll cover to a very smooth finish compared with the rather rough finish typical of a rubber lumpbreaker cover. To save costs, the cover thickness was designed at 1-inch instead of the traditional 2-inch thick soft rubber cover. The mill agreed to a one-month grinding interval until the effects of water permeation were determined. Keeping the polyurethane cover roll out of the machine for this time would allow the cover to dry out before it was re-installed in the machine.

Start-up

When the first PolyMax lumpbreaker cover was installed on the No. 2 paper machine, the roll was two inches smaller in diameter than it was when covered with rubber and required a spacer to be installed under the bearing housing. Dynamic nip impressions were taken and scanned with a Voith Sulzer NipScan unit to confirm uniform loading at the lower pli. Because of problems with the spare rubber covered roll, the PolyMax remained in the machine for three months before it was removed for regrind and inspection.

Together, the mill and the Voith Sulzer technical team found a way around the water absorption problem inherent with polyurethane roll covers. The mill agreed to leave the roll out of the machine for four weeks before re-installing it to give it sufficient time to dry out and prevent moisture from penetrating the bond layer and loosening the cover.

The idea of using polyurethane in this position has had little support in the industry because it was far different from what was considered to be typical. It should be noted that the nip width was reduced with the use of a polyurethane cover. After successfully running with no build-up, the loading and crown were brought back to where they were when the mill ran rubber covers. The nip width was still only a

Fig. 2: New polyurethane lump breaker roll cover has eliminated stickeys buildup problems and improved machine runnability.

Fig. 3: Ron Howard, general manager of the Smurfit-Stone Ontonagon mill.

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fraction of what it was before, but this had no ill effect.

Increasing nip pressure actually helped to increase machine speed without negative effect on sheet properties. Fears of sheet crushing and the possibility of sealing the sheet too early, preventing proper drying, were not realized.

Results

Detailed, specific cost savings data cannot be released, however, some of the positive outcomes realized include:

- The machine started up with no cleaning shower and no chemical addition to the lumpbreaker roll.
- No downtime to clean build-up off of the PolyMax lumpbreaker roll cover has been needed.
- The reduced dwell time in the nip has not affected sheet quality and improved off-couch sheet dryness has been achieved.
- Machine breaks were reduced considerably and the No. 2 machine is now producing record tons at record speeds.
- The grind interval of the polyurethane roll cover has remained at three months with no water permeation issues.
- The machine continues to run with no chemical addition and no shower on the lumpbreaker roll.

With the overwhelming success of the polyurethane roll on its No. 2 paper machine documented, Voith Sulzer was given the opportunity to cover the No. 1 paper machine lumpbreaker rolls in PolyMax. To date, all lumpbreaker rolls at the Ontonagon mill are covered in PolyMax and are achieving similar results.

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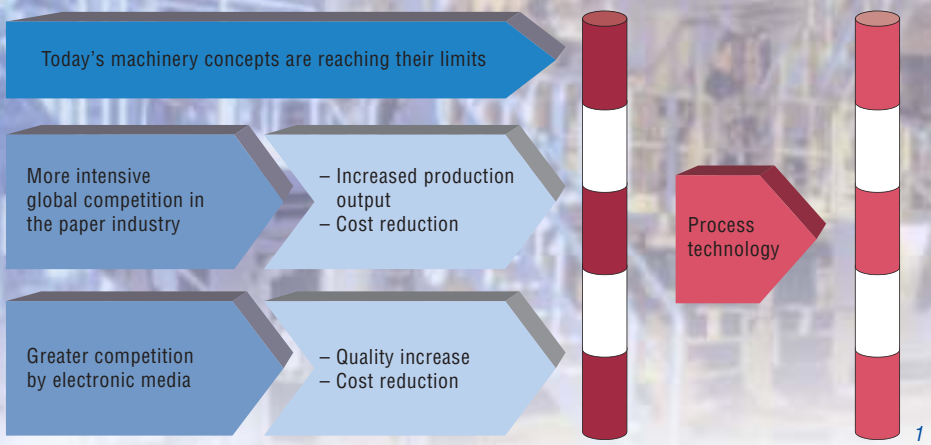
Ron Howard, general manager of the Smurfit-Stone Ontonagon mill, said *"Both Mike Woller at Voith Sulzer Paper Technology and Joe Asiala and Eugene Lewis, assistant superintendents at the mill, are to be commended for their innovations and development of new lumpbreaker operation technology. Few people in the industry supported this concept initially, but many mills will take advantage of it in the future based on the Ontonagon mill's success."*

Process technology –
Meeting current and future demands on system suppliers



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The author:
Bernd Güldenberg, Paper Machines Graphic

Currently there are two main trends decisively affecting conditions in the paper industry *(Fig. 1)*:

- More intensive global competition in the paper industry
- Greater competition to the paper industry by electronic news and PR media.

Growing competition in the paper industry is being countered by ongoing productivity increase and cost reduction. Rising operating speeds and the trend towards online finishing processes (coating and calendering), at the same time with decreasing paper strength due to lower basis weights, often approach the limits of today's machinery concepts. To ensure adequate process stability at these limits and extend them further, a deeper knowledge of all production processes is indispensable.

To compete successfully with the electronic media, paper must ensure an improved printing quality. The trend toward higher printing quality is already evident as can be seen in the growing number of 4-colour printed newspapers and the increased complexity of the presses used today. Since high grade wood-free graphical papers are printed on sheet-fed offset machines with up to 12 colour modules, they must fully comply with much higher demands on surface strength and dimensional stability. This cannot be ensured without a comprehensive knowledge of printing technology.

As system supplier and partner to the paper industry, Voith Sulzer Paper Technology takes pride in meeting these challenges in teamwork with our customers. To this purpose we have founded new Process Technology divisions for graphical papers, board and packaging papers and tissue papers. The Graphical Paper

Fig. 1: Trends affecting the paper industry.

Fig. 2: Focal points of the Process Technology departement.

Process Technology division is briefly described in the following:

Purpose of the Process Technology departement

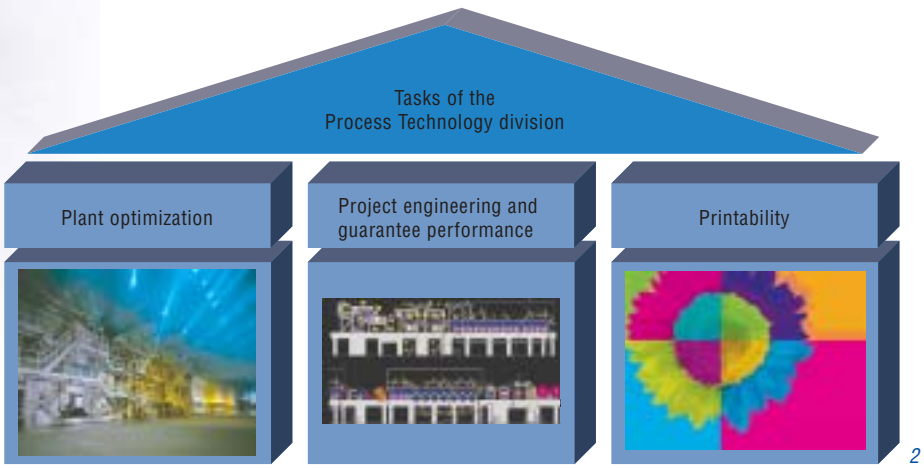
By systematic analysis of the entire process – from furnish to printed product – to deepen process know-how with the following goals:

- optimize new designs and rebuilds
- identify optimization potential in existing production lines
- ensure optimal printability.

Furthermore the analyses of new printing technologies in good time ensures that future requirements on paper products can already be incorporated in current paper machine developments.

To attain these goals, the **main tasks of the Process Technology departement** are as follows *(Fig. 2)*:

Plant optimization
In partnership with our customers, Voith Sulzer Paper Technology carries out plant optimization comprehensively – from furnish to printed product. The customer's product know-how and VSPT system know-how are fully exploited thereby to attain joint targets. As customer contact partner, our Process Technology departement has access to the entire expertise of all Voith Sulzer Paper Technology divisions.



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Project engineering and guarantee performance
Know-how supplied by the Process Technology departement provides a basis for conceptual machine design and guarantee performance.

Printability and runnability in the press
Optimal printability and runnability in the press is a common goal of the entire paper production process. The wide variety of parameters involved ranges from furnish characteristics and stock preparation to paper machine and finishing processes. Since in many cases not enough is yet known about their effects on printability, these parameters have to be optimized to suit the respective paper grade and printing process. In future the Process Technology departement will greatly expand know-how in this connection.

The following current projects are typical examples of Process Technology departement tasks:

- System partnership with Ettringen paper mill, Lang Papier AG
- Improvement of registration precision for 4-colour rotary offset newsprinting
- Investigation of raw paper effects on printability of double-coated woodfree papers.

Organization: the Process Technology departement is divided into two groups dealing with woodfree and woodcontaining grades. The woodfree paper group focuses on web and sheet-fed offset printing and office printing process requirements. Main focus in the woodcontaining paper group is on rotogravure and web offset printing needs. Special-purpose papers are dealt with by the Process Technology department in Ravensburg. This organization should ensure optimal support and product utilization for all our customers, whatever their needs.


ASSICURAZIONI GENERALI

Voith São Paulo, Brazil

The author:
Kurt Brandauer,
Voith São Paulo, Brazil

"We are wherever our customers are!" Long before the phrase Global Players was in fashion, the Voith Group was present in the main economic centers of the world with more than dozen production plants, and supported by many sales and service companies.

This previous global experience is now producing dividends in no uncertain terms since the more international markets merge, corporate cooperation around the world must be more intensive and focused in order to meet the demands of the Market. Voith is using the advantages of having a local presence to meet the competitive demands of the customer, while simultaneously using the strength of the Voith Group to supply equipment from the various Factories of the world.

Our story starts in 1964, when Voith S.A. São Paulo was founded. After Germany, Austria, Great Britain, Spain and India, this was the first Voith Group production plant to be established in the Americas. It was not by chance that the location selected in South America was São Paulo, since the city was an expanding industrial metropolis where Voith products had been manufactured under license since 1960. During the sixties, Brazil rapidly attained economic leadership among the Latin-American nations and Hugo Rupf, then Managing Director of J. M. Voith GmbH, convinced the owners of the company of the value of establishing operations on the other side of the South Atlantic.

During the past thirty-six years, Brazil has progressed to become the tenth

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largest gross domestic product (GDP) in the world, but this growth has not been linear. For example, when Voith S. A. was founded, São Paulo had a population of 4 million, while today this has grown to more than 17 million in the metropolitan area. This makes São Paulo the world's second largest population center after Mexico City. São Paulo also accounts for nearly 40% of Brazil's tax income, and half of the country's industrial complex, thus the headquarters of large private companies and banks are located in the region. Brazil is South America's largest exporter, with approximately 70% of the exports from the industrial products sector, and recently, responding to increasing global market pressure, Brazil revalued its currency and implemented the necessary measures to comply with international standards.

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These figures reflect the enormous development of Brazil from an agrarian exporter of coffee and cotton to a modern, industrialized nation. Voith S.A. São Paulo has played a key role in this development with Voith providing equipment in the Hydro Power, Propulsion and Papermaking Technology areas. One of the most spectacular projects during the course of this industrialization process was the construction of the Itaipu power

Fig. 1: The city of São Paulo.

Fig. 2: Inauguration of Voith S.A. São Paulo in 1964 by Governor Laudo Natel and Hugo Rupf.

Fig. 3: The Voith São Paulo site covers about 300,000 square metres.

Fig. 4. Paper machine production.

Fig. 5. Voith São Paulo locations in South America
- *Headquarters*
- *Service centres*
- *Representative offices.*

station on the Rio Parana, the largest Hydro Power facility in the world. The Voith water turbines generate 13.4 GW – enough to cover a large part of Brazil's power needs, including the industrial requirements of São Paulo.

In 1969 and 1970 the first two paper machines to be built by Voith São Paulo were commissioned: "Cocelpa 1" in 1969 for Kraftliner production, and in 1970 "Gretisa 2" for MG papers. These were followed in 1973 by "Suzano B6", a folding boxboard line with an output of 400 tons per day. Voith São Paulo was also delivering new Paper machines worldwide and successfully completed many conversions. The Brazilian paper industry not only satisfies the national requirements, but also is famous for exporting high grade products, such as wood-free writing and printing papers made of 100% Eucalyptus pulp to North America and Europe. Voith S.A. São Paulo has played a key role in providing the necessary paper machinery as well as the associated process technology, for these international market segments.

The Voith site in Jaraguá, a São Paulo suburb, utilizes nearly 300,000 square meters with approximately 1,500 highly trained employees. After 36 years as a jointly managed company, Voith S.A. São Paulo, as of April 2, 2000, has become three independent business units, comprising Voith S.A. Paper Technology, Voith Siemens Hydro Power Generation Ltda. and Voith Turbo Ltda. (propulsion technology), all maintaining headquarters in São Paulo.

More than 100 engineering specialists are employed at Voith S.A. Paper Technology, a modern plant not only from the technical point of view but also the quality of the workplace. Facilities include a foundry currently producing 850 tons of castings each month, thus Voith São Paulo is ideally equipped for manufacturing large rolls and drying cylinders, including Tissue and Yankee Dryers. Equipment for the largest order in the history of Voith Sulzer Paper Technology, Dagang PM 1 and 2, was supplied from Voith São Paulo including the 75 drying rolls which are 1.8 m in diameter, 10.3 m long, and weigh 21 tons each. This is an outstanding example of how well the corporate Production Capacity is integrated, with all components being manufactured to the same high quality Voith standards, whether being produced in Europe, the USA or Brazil.

In addition to conversions and modernization projects, current orders on hand at Voith Sulzer São Paulo include new machines for plants in Brazil and Argentina. Also being produced in Brazil is a complete Kraftliner machine for Visy Paper Australia, with a web width of 5.5 m and an operating speed of 1,000 m/min.

The Voith São Paulo foundry.

In May 2000 VP was awarded another Project as follow-up to the Procart board machine (see twogether No. 8) jointly delivered with Voith Sulzer Paper Technology, and conversion of the two Inforsa newsprint machines. Sao Paulo will be supplying the Chilean pulp and paper producer CMPC, with a complete production line for testliner on a turnkey basis, with an initial output of 140,000 t.p.a.

Voith São Paulo is basically able to supply the entire spectrum of paper technology, with comprehensive services covering plant design, stock preparation, water loop management and finishing. The amount of design and production work actually carried out at VP São Paulo depends on strategic circumstances and customer location, and logistically, São Paulo is favorably situated for deliveries to many points around the world.

Together with Andritz as licensee, Voith São Paulo also specializes in Tissue machines. In fact, Voith São Paulo is the Center of Competence (COC) for tissue technology within the Voith Sulzer organization. Research and Development projects are managed in Sao Paulo by 25 specialists, working in laboratories as well as operating a 2,000 m/min test facility. This facility was the cradle of TissueFlex technology, which has set new Tissue production standards for both quality and output.

The commitment that Voith São Paulo provides to Service, and recognizing the maintenance needs of its customers has been, and continues to be a high priority item. With existing facilities in Sao Paulo, Ponta Grossa in the south of Brazil, and Mucuri in the north, Voith S. A. is providing fast, efficient service to Brazil, and indeed, to all of South America. This service network is currently being expanded in Brazil, Argentina, and Chile in order to insure that Voith continues its leadership position and its commitment to Customer Service in South America.

Plaque awarded to Voith Sulzer Stock Preparation for the best paper for innovation at the TAPPI Recycling Symposium, Washington/ USA, March 5-8, 2000.

Stickies summit in Washington, D.C.

The North American paper industry perception is that stickies are still the No. 1 degrading culprit affecting recycled pulp. Stickies cost the U.S. paper industry $ 700 million a year, according to the American Forest & Paper Association (AF&PA). The personal computer revolution in the office and at home is creating not less paper consumption but more and unfortunately an increased percentage of adhesive products are included in this paper boom. Of all types of adhesives entering the paper recycling stream, pressure sensitive adhesives (PSA) give the recycling process technology the biggest challenge.

One of the biggest consumers of PSA's in the USA is the U.S. Postal Service. It is estimated that the U.S. Postal Service has a 12-15% PSA market share. This market share increases to 40% if the complete U.S. Federal Government is taken into account. Realizing its contribution to the problem, the U.S. Postal Service initiated an environmentally benign pressure-sensitive adhesive program in 1995 to develop pressure-sensitive postage stamps which do not adversely affect the recycling process. The ongoing efforts focus on both pre-consumer and post-consumer areas. The U.S. Postal Service was successful in implementing an industry-wide approach, promoting the concept of vertical teams to determine the requirements and the testing of a new generation of benign adhesives which can be easily screened out in the recycling process. The vertical teams consist of industry representatives from adhesive suppliers, converters, stamp printers, face and liner suppliers, fine paper recycling mills and equipment manufacturers. Voith Sulzer's project involvement also included pilot trials in their Stock Preparation Research Center in Appleton, Wisconsin/USA.

The author: Oliver Heise, Stock Preparation

From March 5-8th, 2000, TAPPI, the U.S. Postal Services, the U.S. Adhesive Council, the U.S. Forest Service and AF&PA presented a "success story" during the 2000 TAPPI Recycling Symposium in Washington, D.C. Since 1997 all stickies from U.S. self-adhesive postal stamps are screenable in the recycle process with a 99%+ efficiency. Pilot and mill trials provided unequivocal testimonies to this success story. The U.S. Postal Service is taking an additional path forward, now tackling labels and silicon release liners. It is expected that the new adhesive standards will carry over to other "sticky" markets such as Post-It notes, tapes, etc.

This proactive program of the U.S. Postal Service is receiving applause from Europe. During the international session at the TAPPI conference in Washington, Dr. E. Krauthauf from Haindl Papier, Schongau/Germany titled his paper appropriately: "Europe looks to the U.S. Postal Service PSA Project with Great Expectations".

At the TAPPI conference 70 highly technical papers were presented. Six papers were selected to receive the "best paper award" for various categories such as University, Innovation, Paper Mill, etc.

The paper by Heise, Cao and Schabel entitled "A novel application of TAPPI T277 to determine macrostickies disintegration and agglomeration in the recycle process" received the award for innovation. The authors, located at Voith Sulzer Paper Technology in Appleton/USA and

Ravensburg/Germany revealed in their paper the two different mind-sets which exist in the adhesive and paper industry when it comes to the screenability of PSA's. For the first time the detrimental impact of shear forces at higher consistencies in pressure screening equipment was presented. In addition, the authors discussed a statistical methodology to describe the disintegration and agglomeration probability of stickies in recycling equipment.

"Festas do Povo", Campo Maior

26th August through 3rd September 2000

Poured into place as if by a sensitive hand between the infinite brown of the countryside and the ocher fields in the North of the Alentejo region, it shimmers delicately in the blazing summer: the Campo Maior. And when the heat abates, when the month of August approaches its final days, life awakes to a new spring in this town close to the Spanish border, with its 12,000 inhabitants. It may last for only for one week, but it brings forth an unbelievable wealth of colors and shapes. A spring season called "Festas do Povo" that immerses the entire town in a sea of festoons, flowers and fruits. A rebirth of spring that disregards the fixed order of the seasons, since it is hand-made through and through, by people, out of paper and in millions of hours of work.

Chickpeas are Fátima's secret. They make the base of the blossoms stand out in three dimensions, they form a firm center for ten layers of paper, which, when appropriately shaped, make up the true masterpiece: A flower which is an absolute replica of the original, and this not only at first glance.

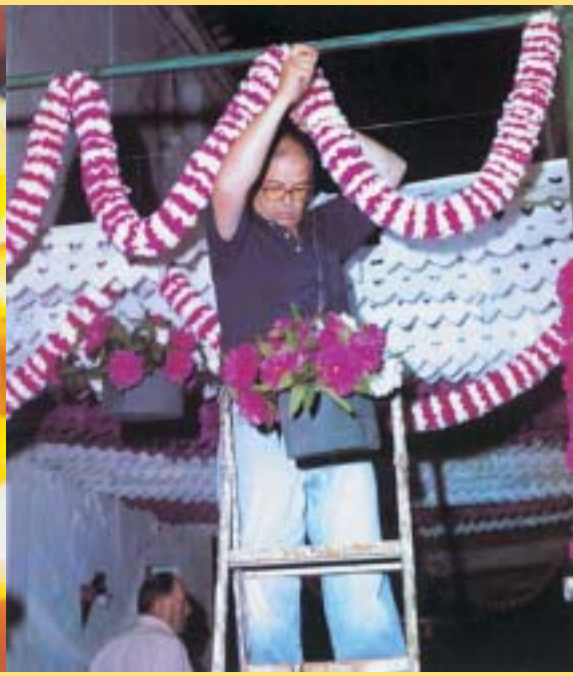
Fátima, assisted by Eduarda and Maria, will have completed around 30,000 of these flowers by the end of August, when the "Festas do Povo" are celebrated in Campo Maior: Roses, larkspur, bougainvillea, geraniums, orchids and many other plants are made by skilled slitting and cutting to shape, overlapping and slight curling of the delicate paper between forefinger and thumb – or through little tricks like wrapping a chickpea.

Since December the women have been working with untiring eagerness, night after night, seldom stopping before two o'clock in the morning. And this has not only been going on in Fátima's house. Up to 6,000 inhabitants of this town in the Alentejo region have been occupied with preparations for a festival that is unparalleled anywhere in the world.

During the "Festas do Povo" the blue sky above the streets will disappear – because the sky will then be made of paper, consisting of up to 50 million flowers and festoons in all the colors of the rainbow. Flower pots, arbors, lanterns, fences or pools of cardboard are arranged in the streets like trees and bushes, in the branches of which you hear the rustling of millions of green leaves, cut to match the last detail of the originals.

It is mainly the elderly women in town who have mastered this art of hand-made illusion, passing on their knowledge and skills to the younger generation. Nevertheless, the Festas and the preparations for this event are everyone's project: *"This makes us grow into a single large community, where all the doors are open."* What Eduarda describes in such simple words has been described by the press an "example of collective illusion", of "living equality" and as "a place where the people make the rules."

It is not only an abundance of colored paper that creates the fascination of the "Festas do Povo" but also this almost unique solidarity demonstrated by the 12,000 citizens when organizing their "Festival of the People". The festival is not scheduled to be held at regular inter-



vals, but only after a joint resolution that the time has come. From the moment the decision has been made, direct cooperation awakens to life and the planning, but also the secrets, begin.

Directed by a "leader" and taking into account all the ideas that the residents have submitted, every street designs its individual decoration, its share of the overall masterpiece, and keeps it under lock and key up to the very last moment. The men of Campo Maior are mainly in charge of the manual tasks such as attaching fastenings and illuminations to the buildings; it is the women who, in a total of three million hours of work, process about three million sheets of tissue and 60,000 sheets of crepe paper. The complete material was imported from the Werola company of Rastatt, Germany, weighing, including 5,000 kg of cardboard, a total of 28 tons. Enough material to decorate a area of 110,000 square meters.

Visitors arriving in Campo Maior as late as the eve of the festival will be disappointed when exploring the town's deserted streets. There isn't the slightest clue that a few hours later one of the country's most fascinating shows will take place. But as night falls, the doors open and gigantic rolls of festoons and baskets full of flowers are carried out of the houses. Quietly but without losing a second, the teams put up the festoons from house to house and drape them with flowers, fruits and ornaments. It is four, five or perhaps even six o'clock in the morning before all the decorations are in place. A joint meal is followed by an important ceremony: "em arruda". Walking arm in arm and singing, the paper artists wander through the 112 transformed streets of the town, survey the lavish creations, take in this collective work of art. Before they go to bed and dream of nothing but flowers, they will pray: that Campo Maior will be spared from the rain for one week. But in the event of these prayers remaining unanswered, they won't admit defeat: in a final display of collective determination they take off the flowers and festoons, dry them, hang them up again and continue to celebrate.

Amazing solidarity and the will to start all over again if necessary has characterized the inhabitants of this Spanish-Portuguese border town for many centuries. Conquered by the Moors, seized by the Spaniards around 1230, occupied by the

Portuguese in 1296, Campo Maior and its fortress was originally a symbol for “facing the Spanish enemy defiantly”. It reverted finally to the Portuguese crown in 1297. In the following centuries fierce fighting along the border flared up again and again. But just as often the courageous citizens were able to escape capture and even succeeded in defying Napoleon’s soldiers. This heritage earned them the official title “loyal and brave” in the year 1811. At that time, with their usual toughness, the people of Campo Maior had also survived prolonged epidemics and the consequences of a gigantic explosion.

As a result of the detonation of the municipal gunpowder magazine during a thunderstorm in 1732, two thirds of the roughly 1,100 houses making up the town at that time were destroyed and hundreds of people killed.

Peace has long since returned to Campo Maior. Today its inhabitants make their living from agriculture and a thriving coffee roasting industry. The latter also supplies us with the most popular of the numerous theories about the Festas do Povo’s origin: They are an extension of smaller, spontaneous celebrations commemorating the successful outcome of coffee-smuggling tours to Spain! Another theory sees the stimulus for the Festas in the worship of John the Baptist. It is certainly true that so far a procession has been organized in his honor as part of every “festival of the people”.

However, nobody cares much any longer about the precise origin of the feasts, which were organized for the first time on

a grand scale in 1893. The pleasure of creativity, of producing wonderful things, is what predominates: *"Preparing the festival is great fun, and the results are truly fantastic!"* says Eduarda with great enthusiasm, and Maria, shaping pink flowers with her usual tireless enthusiasm and placing them in a large box beside her, adds: *"The Festas are there to make life more beautiful. Thousands of people work hand in hand for a great idea!"* She recalls the tears in the eyes of the women of this town, when at the end of the "Festas" a huge fire is kindled and the entire splendor, the result of many months of tired, sleepless nights, is wiped out in a matter of minutes.

For Fátima, who has experienced as many as twenty "Festas do Povo", it is the power of the group that counts: *"Ownership is in abeyance. Everybody is free to go wherever he or she likes. Anyone who enters the house, owns it! The bigger the family, the greater the festival!"*

Such words may evoke spontaneous ifs and buts in those who do not understand the philosophy of the "Festas do Povo" – or are incapable of understanding it. This is because they have never participated in such living solidarity, which after all the designing, creating and decorating work is over is still far from having reached its peak. When the blazing midday heat abates, large tables are placed in front of the houses, the proud artists sit down at the tables in their streets, enjoy the admiration of the visitors, explain and tell stories. On the table there is bread, water and all kinds of food ready for anyone who needs a rest, who wishes to experience the town's awakening. People eat,

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talk and dance on several squares, and you can hear the sounds of the "Saias", songs about Campo Maior, its past and its future. Traditional songs, written in verse and composed during the long nights of the preparation period.

"When someone approaches you and invites you, don't be surprised – simply accept the invitation!" declares Maria, because hospitality and openness towards other people is part of Campo Maior's principle of life. However, for some years practicing the "tradition of the poor houses" has been almost impossible. This is because every festival attracts an increasing number of visitors to the little town north of Elvas. Those visitors not only stretch the residents' most generous hospitality to the limit, they need – since they arrive in up to 50,000 cars and 2,000 coaches – to be well organized down to the smallest detail. A 150-hectare parking lot has been provided, and hard-working catering booths do their very best to feed the tourists. Apart from a small parking fee, the splendid spectacle itself is still free of charge, regardless of the fact that the costs of the material alone amount to about 150,000 dollars for every festival. They are borne by the municipality and, in part, by private sponsors.

Accepting money from the tourists would contradict the basic principle anchored in all this commitment. But the exception proves the rule: Voices have already been raised calling for better marketing of the whole event, and the residents of various streets have threatened not to participate in the Festas.

The tissue paper rustles softly as Fátima shows the other two women how to create tiny red buds. Eduarda and Maria are among those, who have the skill and determination needed to pass on the tradition. It has of course come to Fátima's ears that some of the younger citizens foresee a profitable business in the Festas. But she does not believe that the Festas are threatened, not in the near future: It is the beautiful things that count, the masterpiece as a whole. There is a power for body and soul, anchored in this unique achievement. One gives to it, and one is rewarded in return.

Even though she only knows the latest flower and festoon motifs from her immediate neighborhood, Fátima is sure that the "Festas do Povo 2000" will eclipse all previous festivals. Not only to achieve the impossible, but to outperform it again and again, is a wish that the citizens of Campo Maior reveal in another motto: *"Show people heaven – and that you can share your heart!"*

Heidi Hahn

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