twogether

Paper Technology Journal

Global economy and the paper market:
An Attempted Prognosis.

News from the Divisions:
Stock Preparation, Paper Machinery,
Finishing, Service.

Corporate News:
Service presence in North America,
Dörries, Düren renamed.

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Hans Müller,
President and CEO,
Voith Sulzer Papiertechnik GmbH

Dear Customers, Dear Readers,

"By the way, congratulations on your new customer magazine – quite a source of information. But what else could we expect from the 'twogether company'?". This comment by a reputed customer in the USA reflects the overwhelming response to our first edition of "twogether" magazine. Not only the paper industry, but also professional associations, academic institutes and the trade journals were unanimous in this acclaim. Bearing in mind today's flood of printed media and pressure of time, we were delighted with such a positive response. And it is nice to be called a "twogether company" – a sign of acceptance as partner in the paper industry.

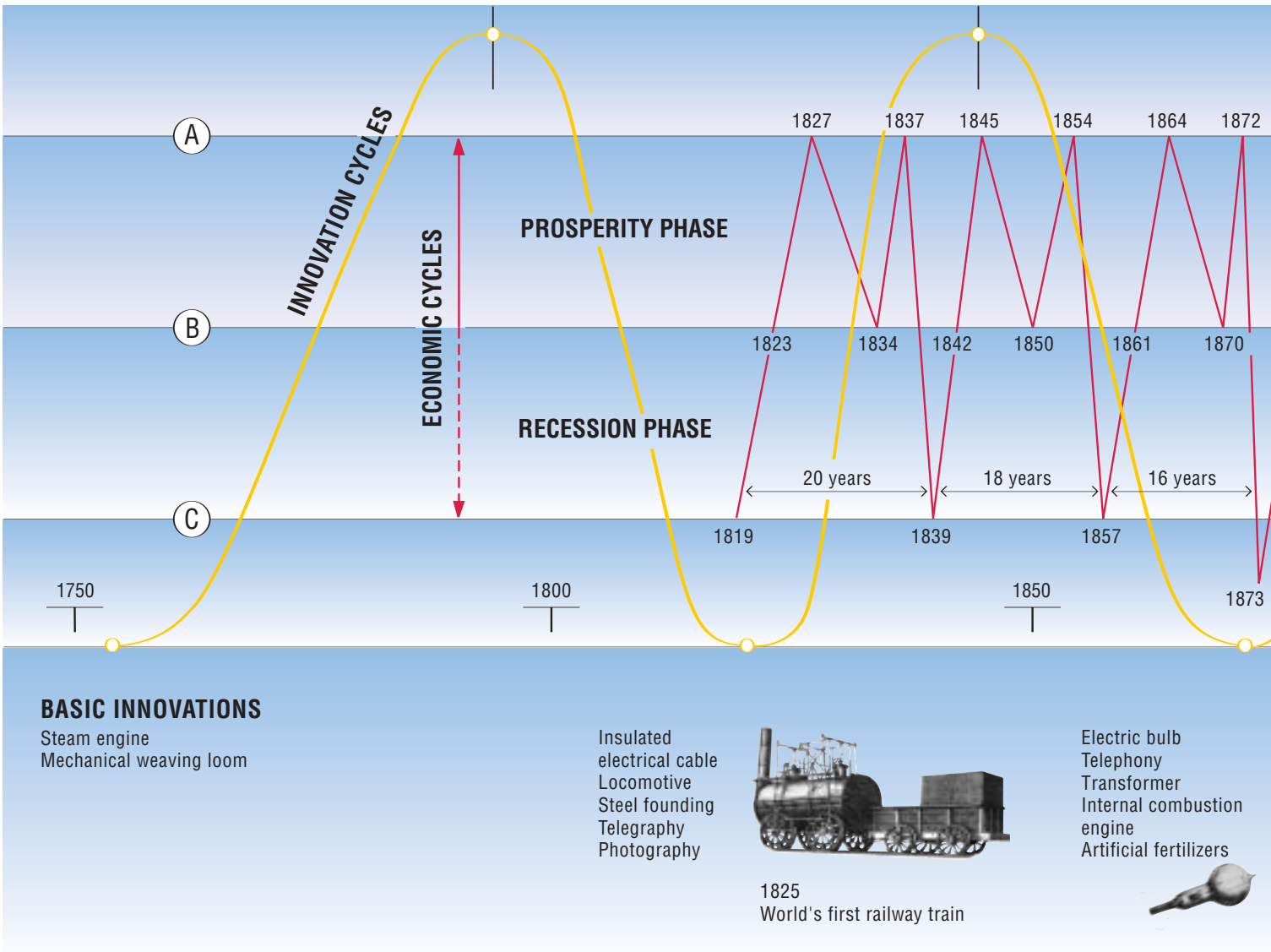
Keeping you up to date in this way is another step in our strategy of closer customer contact. What are the next steps? How will the situation of papermakers and machinery manufacturers develop in the context of increasingly rapid global market changes? A dependable way of foretelling the future would certainly be the dream of all investors.

Some weeks ago we received an interesting paper on this theme by Riccardo E. Moeschlin, an expert not unknown in the paper industry. How valid are such forecasts? Since no recipe exists for reliable prognoses, and as human beings we are all prone to error, this theory based on repetitive economic cycles seems particularly interesting. Read on and judge for yourself!

One again, we trust that "twogether" No. 2 brings you interesting reading and some useful technical information.

Sincerely

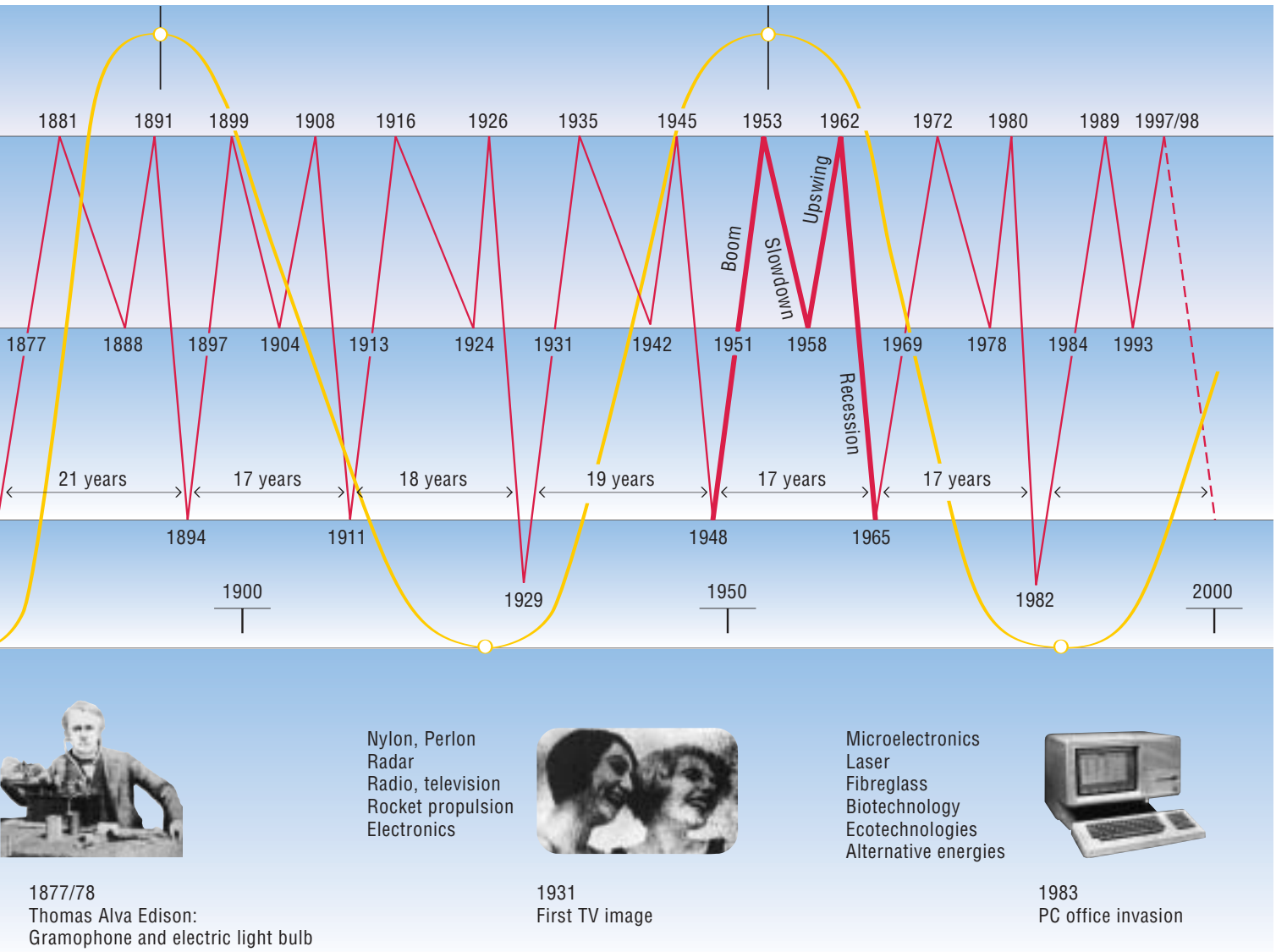
Hans Müller



Global economy and the paper market:

AN ATTEMPTED PROGNOSIS

Boom or recession – what can we expect? Investment planning and market strategies depend on analyses and forecasts of global economic developments. Which parameters can be used as a basis for such prognoses? Thanks to ever-improving methodics and above all faster data availability, short and middle-term forecasts are becoming more reliable. Long-term prognoses always involve a residual risk, since not all influencing factors can be fully evaluated – particularly the human factor. History repeats itself with surprising regularity, however, with cycles such as the "seven fat years and seven lean years" of the Bible. The paradox here is that reviewing the past is not a bad way of anticipating future trends.



1877/78
Thomas Alva Edison:
Gramophone and electric light bulb

Nylon, Perlon
Radar
Radio, television
Rocket propulsion
Electronics

1931
First TV image

Microelectronics
Laser
Fibreglass
Biotechnology
Ecotechnologies
Alternative energies

1983
PC office invasion

There is no need to go back to biblical times, however, or to resort to Eastern philosophies. A glance at the last two and a half centuries is enough to show that history repeats itself in cycles. And economic cycles follow the same pattern, as shown in the diagram above.

Discovered in 1902 on an old yellowing document, this chart is regarded by experts as going back to the American War of Secession in 1861-1865. If this is true, it forecast the recessions of 1873 and 1894 and the 1929/30 slump with amazing accuracy. The paper industry as a whole was confronted with these findings in 1982 when they were published in "Pulp and Paper International". The diagram is divided into three levels. A is the boom level, B corresponds to economic slowdown, and level C indicates recession and slump phases. As we can see, the highs and lows of economic cycles generally occur every nine years on average.

The repeated "M-shape" (see example above from 1948 to 1965) shows that economic recession occurs with alarming regularity every eighteen years on average. Not surprisingly, the 1982 recession followed this pattern, and it was logical to predict a boom afterwards from 1982 to 1989. Not only did this actually occur, but it was also followed by the recession forecast for 1993.

Based on this trend, it is logical that the next peak can be expected in 1997/98. It also seems that another recession is likely to follow around the turn of the millennium.

The author:
Riccardo E. Moeschlin,
Zürich, Switzerland

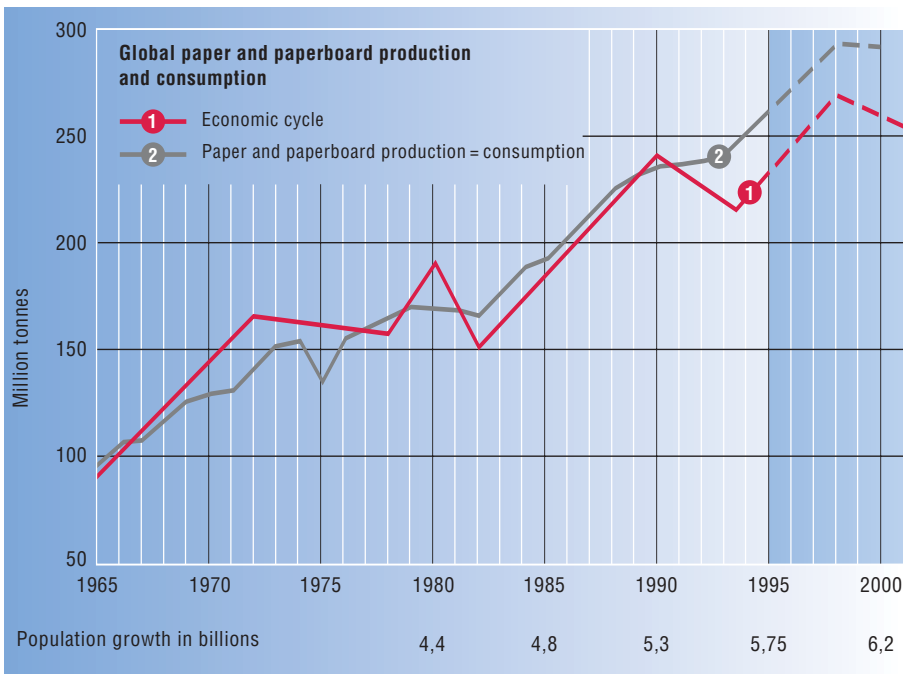


Diagram 1

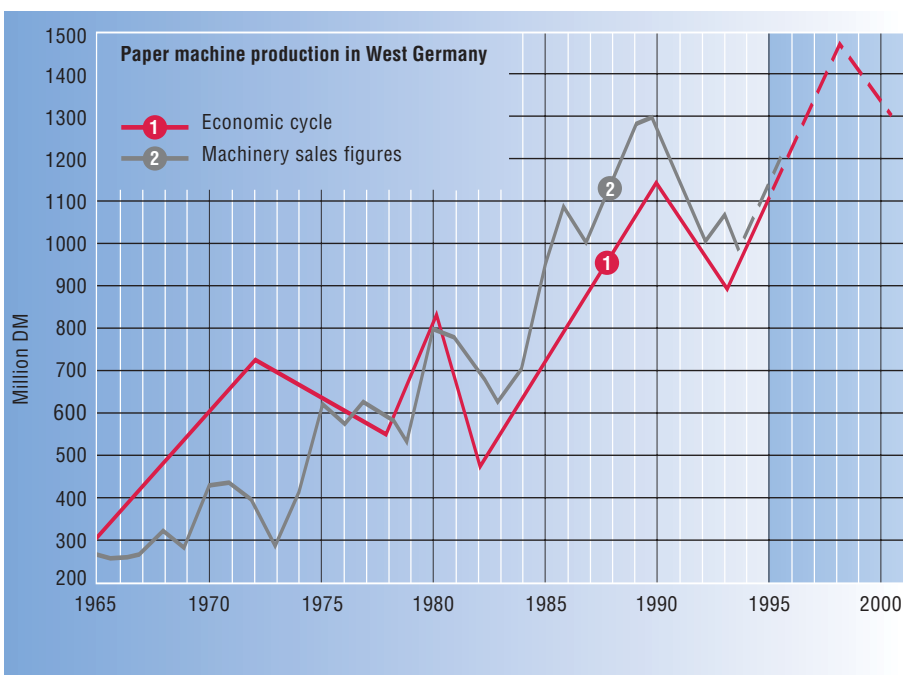


Diagram 2

A further point here is that economic cycles in North America generally precede those in Europe by one or two years.

Another interesting aspect of economic trends is innovation intervals (Kondratieff cycles). The low points of this curve correspond every 50 to 60 years with fundamental innovations which always herald a new era and influence the economy accordingly. In 1819, for example, the railways and wireless telegraphy were born, in 1873 the telephone was invented, in 1929 rocket propulsion, and in 1982 came the massive breakthrough of microelectronics.

To what extent can historically documented global economy cycles be compared with the equally extreme cyclic behaviour of the paper industry? To answer this question, let us first compare the two cycles. In *Chart 1* worldwide production and consumption of paper and paperboard are compared with global economy cycles. The concurrence between the two is impressive. Another comparison is equally conclusive. In *Chart 2*, the figures (values) of paper making machinery in West Germany are likewise plotted against world economy cycles. Here again, the two curves concur astonishingly well.

These two comparisons from different points of view clearly confirm that – as

Notes to Chart 3:
The three economy systems are made comparable by country and region using the following formula:
C = a x b + d (1000 t).

Specific factor land/region (b) for calculating consumption (C):
b = consumption in 1990 minus consumption in 1965, divided by 10.
d = consumption in 1965.
a = multiplier.

	b	*d*
Free market economies		
France	*530*	*3600*
Germany	*850*	*5700*
Finland	*590*	*3100*
Japan	*2150*	*6700*
Semi-free market economies		
China	*1200*	*2750*
Korea	*410*	*200*
Indonesia	*130*	*80*
Taiwan	*310*	*200*
Thailand	*110*	*100*
Planned market economy		
USSR	*550*	*4500*

mentioned above – historical cycles in global economies can be a quite reliable basis for forecasting developments in the paper industry. The only limitation is that these cycles only apply to free market economies, i.e. to industrialized countries such as North America, Europe, Japan, Australia New Zealand, South Africa and some of the Latin American countries.

On the other hand, global economies at the present time can be divided into three different systems. Firstly the free market economies of the abovementioned countries, secondly the semi-free market economies of the Far East and some Latin American and African nations, and thirdly the planned economies of the former communist countries. The latter no longer exist, but are included for historical comparison, particularly with a view to developments after they were abolished. All three systems are shown in *Chart 3*.

Since the absolute figures for paper and paperboard consumption in various countries vary widely within these three market economy systems, they have to be adjusted to make the development dynamics comparable. The unusual parameters used for this diagram thus serve primarily for illustration of these development patterns.

A glance at the parabolic market development in the Far East (except Japan, Australia and New Zealand) shows how far

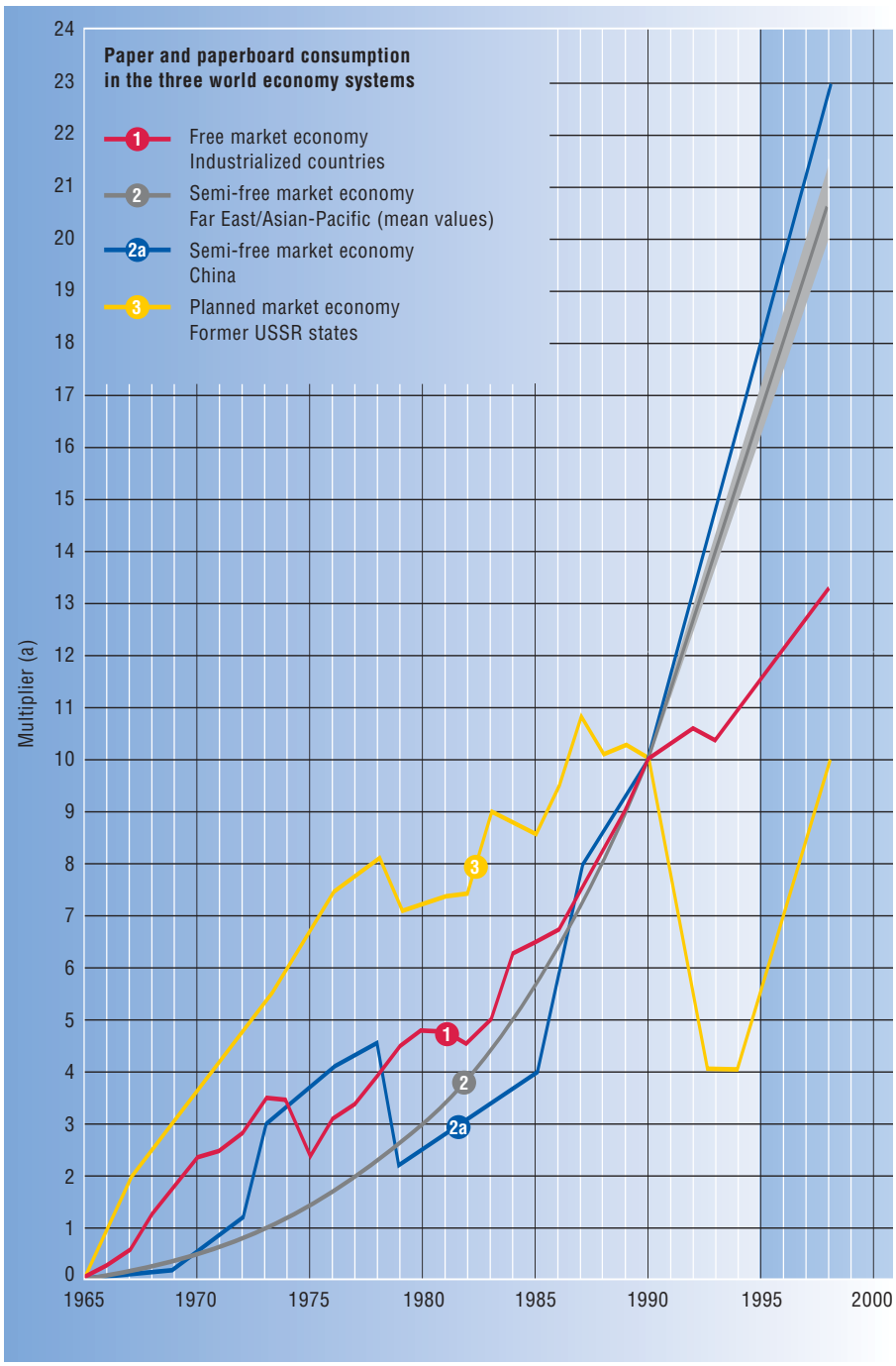


Diagram 3

the semi-free market economies of these countries deviate from the pattern in free market economies. This part of the world is undergoing a boom unprecedented in the history of global economics, with annual growth rates of 8 to 15% and even more in some cases. Even if there are already signs of decline here and there, such as in Taiwan or Korea, this growth trend in Asia is not likely to change decisively during the next decade.

Markets with growth potential also include the Indochina countries of Vietnam, Laos and Cambodia. With a total population of some 85 million (70 million in Vietnam alone) the mean per capita paper and carton consumption at the present time is 1.1 kg p.a. in this region. The main characteristics of these markets are their favourable geographical situation, large hardworking population with low labour costs, and emerging economies with direct investments from abroad on the increase – facts which clearly underline the future importance of this region.

Only just over ten years ago, the global share of the free market economies corresponded to a population of one billion. "Today it is hardly an exaggeration to say that this is the era when three billion people are on the rapid elevator to the heights of modernity" – this statement by a reputed economist sums up what is happening in Asia today tersely but accurately. Nevertheless, it would probably be a risky extrapolation to maintain that Asia's semi-free market economies allow greater progress than in the free market economies of the industrialized nations. The error in this hypothesis is that the Asian boom has started at an altogether lower standard of living. Annual per capita consumption of paper and paperboard (which is an effective measure of prosperity) averages 25 kg at the present time in Asia. The average for Europe as a whole is 95 kg, while in Western Europe and the USA it is 170 kg and 320 kg respectively. Are we therefore approaching the saturation limit? In some areas of publishing and advertising, paper will certainly be replaced to a growing extent by electronic media. As a result, the long-term saturation limit is likely to stabilize rather below 300 kg per capita.

If more than three billion people in Asia are in the fast lane to modern living standards, then their paper consumption per head is moving toward Western levels, although not necessarily to the US level. This means that Asian market potential for the industrialized countries will remain attractive for years to come – likewise for countries such as Korea and Taiwan, which can now be regarded as industrialized nations. In actual fact they have special opportunities in connection with their regional trading. The same applies to some developing countries which are on the way to becoming suppliers and not only customers, above all China, not to speak of India which has been trying to achieve such a status for some years. Consequently, there are also excellent prospects for licensing business, joint ventures and other cooperative arrangements.

Another hypothesis which undoubtedly applies here is that in the wake of the Asian economy boom, the subcontinental countries (India, Pakistan, Bangladesh and Sri Lanka) will profit. And the world's industrialized nations will also be taking their share of the cake, as confirmed by the above-average production growth rates for 1994 of 4.7% in North America (normally about 2%) and 8.2% in Europe – where even the boom years of 1982-89 brought no more than 3.9%.

The reservation must be made, however, that this growth in European production is largely due to better utilization of existing capacities, while the 8.4% growth rate in Asia is related to newly installed production capacities. Excluding Japan, this growth rate would even be 12.4%, appreciably higher than the 11.2% growth in demand. As shown in *Table 1* below, in fact, capacity growth in Asia in the five year period from 1993 to 1998 is likely to exceed the total capacity growth of the rest of the world – which speaks for itself. What about Latin America and Africa? 1994 production growth in Latin America countries (mainly Brazil, Mexico,

Table 1:
Paper and paperboard production capacities worldwide (in million t.)

Slowdown phase					Build-up phase		
5-year growth	Capacity		Region		Capacity	5-year growth
8	94 102	1988 1993	North America	1993 1998	102 113	11
8,5	84 93,5	1988 1993	Europe	1993 1998	93,5 106,5	13
14	64 78	1988 1993	Asia/Pacific	1993 1998	81 110	29
2	13 15	1988 1993	Latin America	1993 1998	15 17	2
0,5	3 3,5	1988 1993	Africa	1993 1998	3,5 4,5	1
34	258 292	1988 1993	Global	1993 1998	295 350	56

≤ 20 ≥ 27

Argentina, Chile and Columbia) averaged 3.5 to 6.5% (in Columbia as high as 11%). Although moderate compared with the rest of the world, this is significantly higher than the growth rates formerly registered in these countries. Brazil and Mexico achieved this rise mainly through better operating rates.

According to experts, the aftermath of the Asian economy boom should have started to take effect in Latin America in 1995. And despite the lack of pertinent statistical data, there are already clear signs that this is happening.

With the exception of South Africa, the African economy as a whole still seems rather depressed, with negative development rates throughout. Here again, however, trends are expected to change to the positive. South Africa has already achieved a commendable growth rate of 12%.

Eastern Europe appears to have passed the point of lowest ebb. Following the 1993 decline of a further 1.3 million tonnes, production figures of the CIS countries have now stabilized. Poland, the Czech Republic, Slovakia, Hungary and even Slovenia are increasingly adopting the principles of free market economy, with resultant production growth which is substantial in some cases. Here again, this represents a market potential for Western industries, not least due to the need for renewal and replacement in the existing machine parks.

After this general overview of global markets in the paper industry, let us now return to the main theme. Is a reliable prognosis possible not only of trends, but also with a view to global economy cycles? As mentioned at the outset, this hypothesis seems quite reasonable. Based on statistics and data published by reputable institutions such as the FAO, PPI, Asian Papermaker, Jaakko Pöyry and others, chart 4 showing consumption of paper and paperboard – worldwide and by continent – until 1993 was compiled. This is enxtended by a forecast until 1997/98. For the sake of interest and comparison with other trend prognoses, we have also attempted an extrapolation until the year 2006 based on the cyclic pattern described in this article. Preconditional for this is a fundamental rule of economics: extrapolations into the future are of little value unless they are based on long-term historical data.

We have deliberately shown this data in the concentrated graphical form, since in contrast to tables this gives a better overview of historical developments and all the parameters involved. Conclusions can thus be drawn more clearly and rapidly. Global paper consumption in this chart is summarized into the regions North America, Europe, Asia/Pacific, Latin America and Africa.

Moreover, the countries in these five regions can be classified as follows:

- About 80 countries are leading producers at the present time

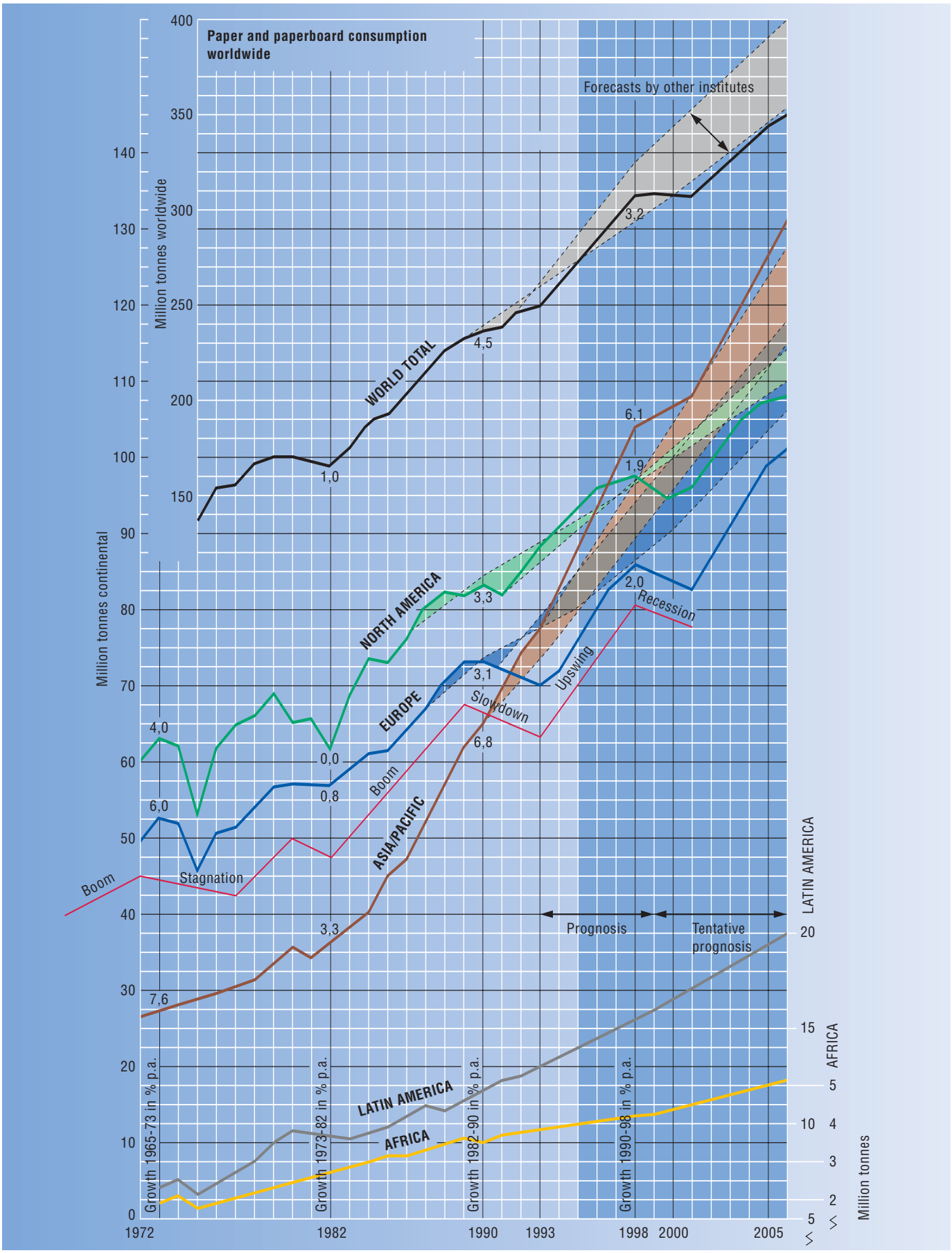

Paper and paperboard consumption worldwide
Forecasts by other institutes
Million tonnes worldwide
Million tonnes continental
WORLD TOTAL
NORTH AMERICA
EUROPE
ASIA/PACIFIC
LATIN AMERICA
AFRICA
1,0
4,5
3,2
4,0
0,0
3,3
1,9
6,1
6,0
0,8
3,1
2,0
Recession
Upswing
Slowdown
Boom
Stagnation
Boom
6,8
7,6
3,3
Prognosis
Tentative prognosis
Growth 1965-73 in % p.a.
Growth 1973-82 in % p.a.
Growth 1982-90 in % p.a.
Growth 1990-98 in % p.a.
1972
1982
1990
1993
1998
2000
2005
Million tonnes

Diagram 4

- Some 140 countries (including the 80 mentioned above) are significant paper consumers
- Production is concentrated in relatively few countries
- The five largest paper manufacturing countries (USA, Japan, Canada, China and Germany) cover more than half global production
- Four of these paper producing countries (USA, Japan, China and Germany) account for more than half the world consumption
- Although twelve countries export more than one million tonnes of paper and paperboard each year, most of them are net importers. Only five are net exporters of more than one million tonnes annually (Canada, Finland, Sweden, Norway and Austria).

Table 2:
Export-import balance (in 1000 t) of paper and paperboard worldwide

Regions	Net exports		Net imports	
	1993	1998	1993	1998
North America	6.250	5.100		
Europe	3.800	3.700		
Asia/Pacific			7.900	5.900
Latin America			1.200	2.000
Africa			950	900
Global	10.050	8.800	10.050	8.800

Table 2 shows the continental balance of exports and imports worldwide. Clearly North America (mainly Canada) and Europe are net exporters, while all other continents are net importers including above all Asia. A notable but hardly surprising aspect is the 2 million tonne (about 25%) reduction of Asian imports predicted by 1998. If this trend continues into the future, it will affect above all the large western exporters such as Canada and Northern Europe. Intrasectoral trade among the paper producing countries currently amounts to some 65 million tonnes p.a. Since global consumption is about 260 million t.p.a., this means that every fourth tonne of paper and paperboard crosses a frontier at some time or other.

Following the trend toward globalization, the world of paper and paperboard is dominated by three large economic areas: North America, Europe and Asia. Latin America and Africa only account for 6% of world consumption, while on the other hand their populations total 1.2 billion or 21% of world figures at the present time. This discrepancy constitutes a potential opportunity for paper suppliers, particularly in Latin America, since with increasing globalization and interdependence of world economies the wealth of the richer will be distributed sooner or later to the poorer.

As shown in *Chart 4*, the current market position of the three leading economies North America, Europe and Asia can be summarized as follows: Market developments in the industrialized nations have confirmed all forecasts for 1982 to 1993. The boom predicted until 1989 fully materialized, likewise the subsequent recession until 1993 (in North America one year earlier in each case).

Likewise the upswing expected to reach its peak in 1997/98 has now started, as shown by the above-average growth rates of 1994 and 1995 (although already flattening off to some extent). If this upward trend until 1997/98 continues, albeit perhaps at different rates according to region, it will again confirm the aforementioned cyclic pattern of the economy in the industrialized countries.

According to the prognoses of all reputed forecasters, the parabolic growth of Asia's semi-free market economies will continue beyond the turn of the millennium. In 1994, as shown in *Chart 4*, paper and paperboard consumption in Asia was mid-way between Europe and North America. Within the prognosis timeframe, Asia will become the biggest consumer by about 1998, exceeding North Ameri-

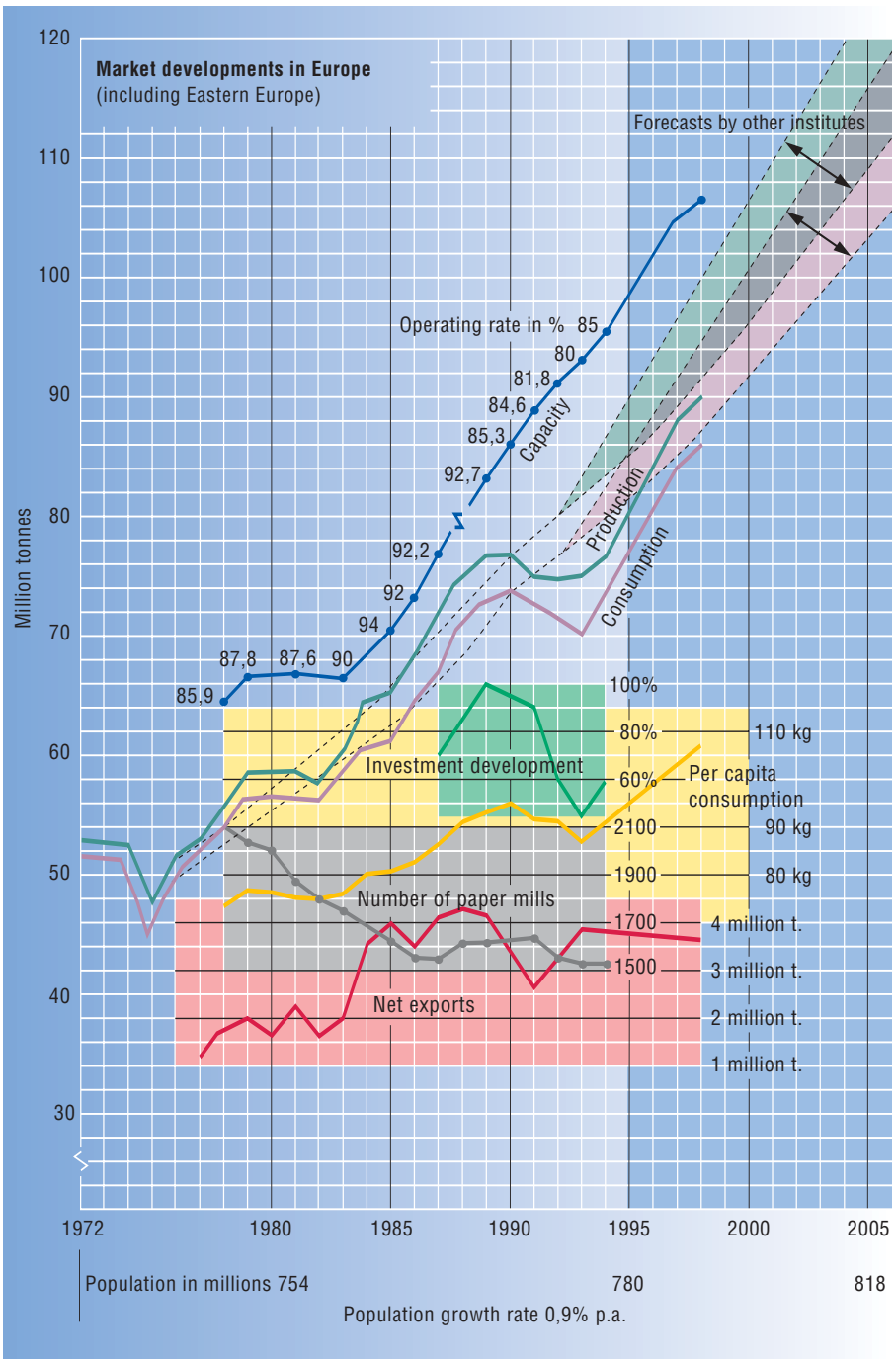


Diagram 5

can consumption by 6 million t.p.a. and overtaking Europe by far, with a difference of some 18 million t.p.a.

If economic cycles do in fact repeat themselves, as confirmed by the charts and tables in this article, then they can be used as a basis for quite realistic forecasts. This should allow decisions and measures to be taken in good time against the effects of recession. Here are two examples of how this can be done:

From our analyses of the paper industry and its regional developments worldwide, based on statistics published periodically by the national Paper Associations, we have chosen Europe (see Chart 5) as representative of the free market economies. The semi-free market economies of the Asian-Pacific region are represented in *Chart 6*. Both these charts incorporate all the parameters affecting economic developments in the paper industry. The correlation and interdependence of these parameters allow easy comparison and clear conclusions. One point is particularly interesting in this respect: over the last few years (since 1987) annual investment figures have been published for a number of relevant countries by "Pulp and Paper International" (PPI), and wherever available we have compared these figures (see example for Europe) with paper consumption cycles. This comparison confirms that investment patterns likewise correspond with consumption cycles.

Paper and paperboard in Asian/Pacific regions

Production in 1.000 t	1993	1994
Far East*)	37.475	
China and Hong Kong	18.375	
ASEAN**)	5.020	
Subcontinents***)	2.805	
Pacific	2.965	
Other regions	1.860	
Total	68.500	74.600

Consumption in 1.000 t	1993	1994
Far East*)	37.925	
China and Hong Kong	22.235	
ASEAN**)	6.475	
Subcontinents***)	3.145	
Pacific	3.390	
Other regions	3.230	
Total	76.400	82.800

*) Japan, Korea, Taiwan; **) Malaysia, Thailand, Philippines, Indonesia, Singapore, Vietnam (new)
***) India, Sri Lanka, Bangladesh, Pakistan

Taking investment figures as 100% at the peak of the last boom, they fell during the recession to 45% in Europe (35% in Canada and 60% in the USA). Notable in the case of Europe is the practically linear growth of production capacities despite recession. This is the reason for overcapacities and their well-known consequences.

Delivery and processing times for investment goods in general are relatively long, and this particularly applies to plant and machinery for paper and paperboard production. As a result, there is a considerable time delay before investment figures affect production capacities. This brings us to the widely discussed and often controversial question of "anticyclic investment as a means of counteracting recession effects", which would exceed the scope of the present discussion.

In contrast to the prognoses published hitherto in many international journals as linear trends, this article represents a first attempt at an empirical approach taking account of the boom slowdown – upswing – recession "M" patterns which occur with inevitable regularity in the industrialized economies. As shown in the above, this is a valid possibility.

The extent to which the ongoing boom in Asia will change this cyclic pattern remains to be seen. In any case, we can look forward to an interesting future.

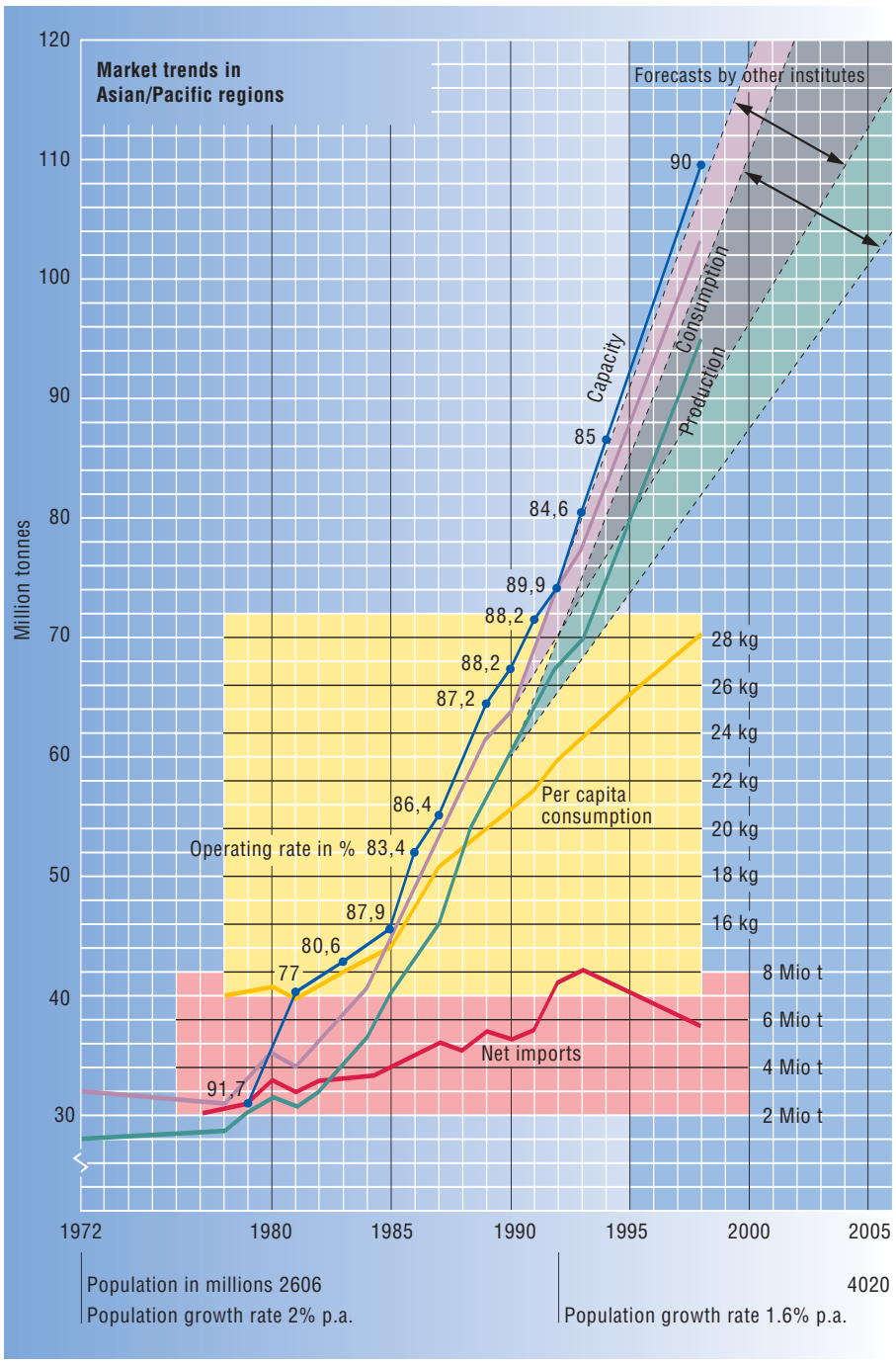
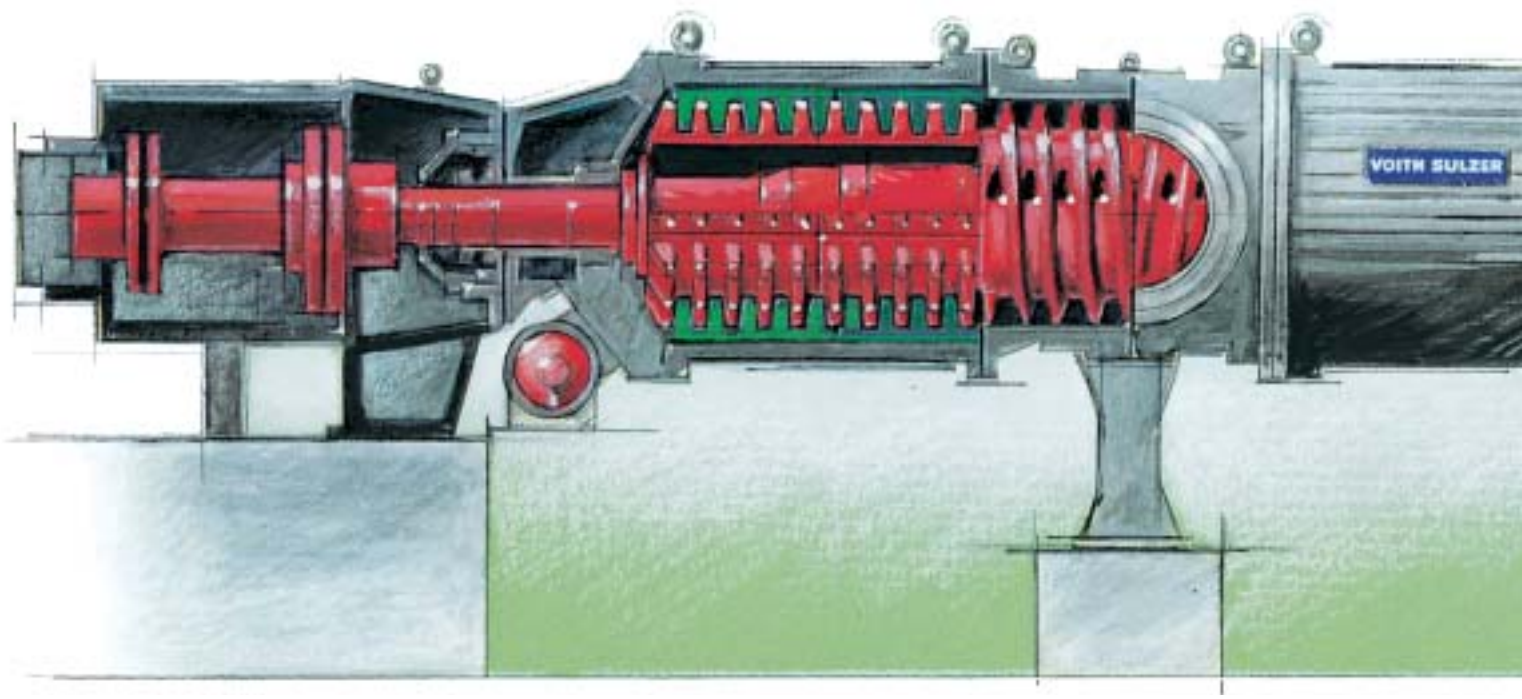


Diagram 6

NEWS FROM THE DIVISIONS

Stock Preparation Division:
Further development of a well-proven disperging system

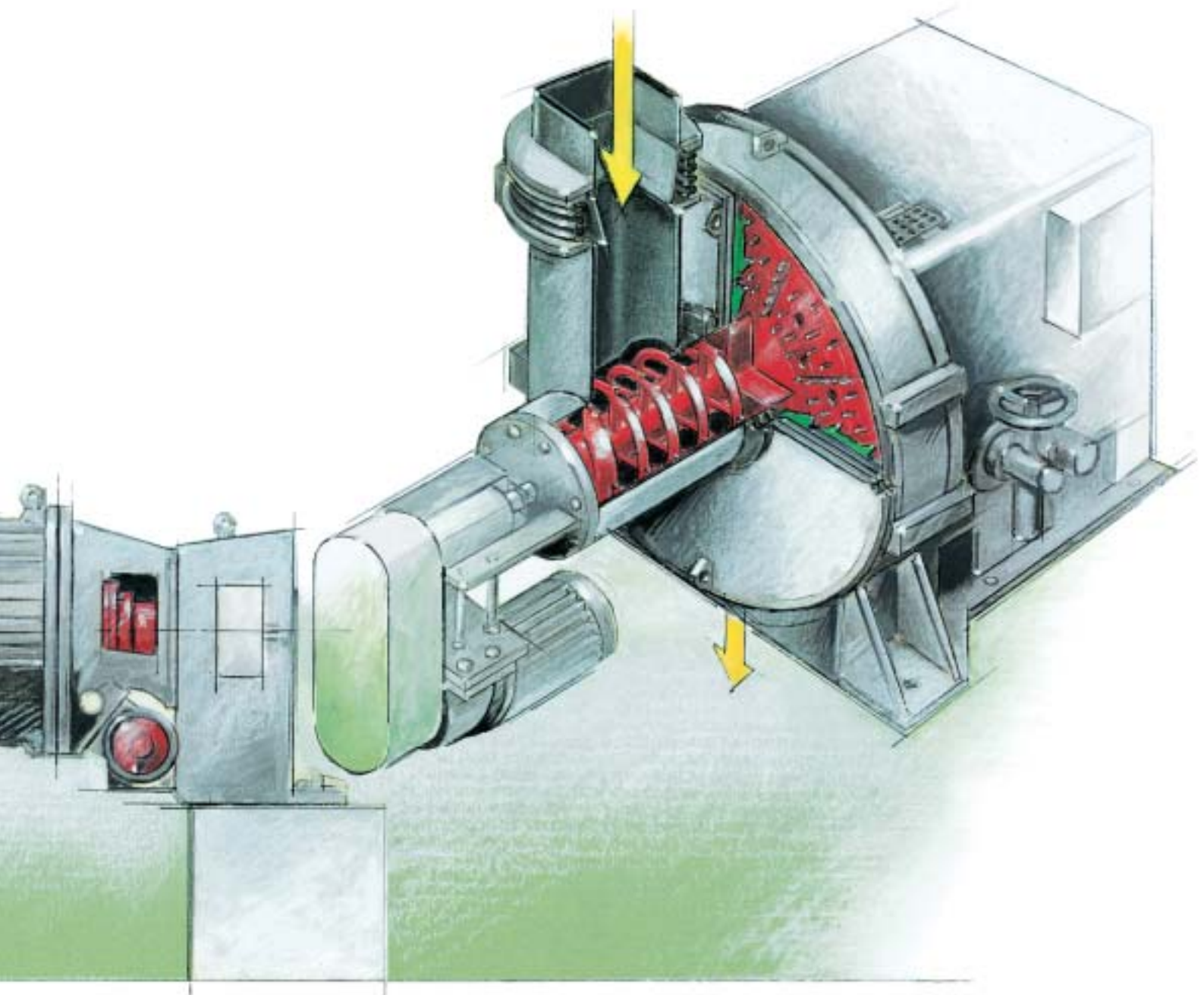


The author: Volker Niggl, Product Group Disperging

Without disperging, waste paper stock preparation hardly seems possible today – as reflected by 28 dispergers sold in the first year of Voith Sulzer Stock Preparation. Disperging greatly improves optical homogeneity, the floatability or screenability of rejects, and paper characteristics as a whole.

Another benefit is that rejects removal after disperging increases paper machine availability. Since the various products making greater use of waste paper today place highly specific requirements on disperging, Voith Sulzer offers two versions: the Disperger and the Kneading-Disperger.These further developments are based on the vast experience and know-how accumulated by Voith and Sulzer Papertec. At the present time, the product range is undergoing expansion. By the end of 1996. Dispergers and Kneading-Dispergers will be available with capacities of up to 2500 kW and outputs up to 700 tpd.

The new HTD Disperger *(Fig. 1)* can be operated at temperatures up to 130°C. Both pressurized and non-pressurized conditions are possible. The screw system with plug screw and heating screw required for pressurized operation



is supplied by B+G Fördertechnik, a 100% subsidiary of VSPT. Various system combinations are possible, ranging from high-consistency output (>30% stock consistency) for subsequent bleaching, to low-consistency output (4-7%). Two types of housing are available to cover this range:

- Open housing with gravity chute
- Enclosed housing with pipe connection.

With closed housing, the stock is diluted while still in the Disperger – although after the actual disperging process – to form a pumpable suspension. This machine thus takes over the transport function as well. The new Kneading-Disperger is based on the well-proven Voith single shaft disintegrator technology. Output requirements up to 700 tpd are met by the machine shown in *Fig. 2*. Due to the special advantages of kneading technology, such as cold running with good dirt speck reduction (no heating screw required), it was decided to modify the entire product range accordingly. The prototype of the new Kneading-Disperger generation, with a capacity up to 250 tpd, should be running by the end of this year.

For good disperging, adequate shear forces are required. These are generated in the VSPT Disperger and Kneading-Disperger by various organs which transmit them very efficiently to the stock. As shown by the fillings segment in *Fig. 3*, the stock is forced through the labyrinth formed by the intermeshing rotor and

Fig. 1
HTD Disperger.

Fig. 2
Kneading-Disperger.

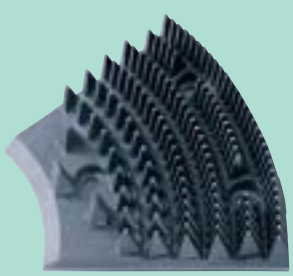
Fig. 3
Comparison of Disperger with Kneading-Disperger.

stator teeth, and well-disperged despite the short dwell time of only 1 to 2 seconds. The fillings of the Kneading-Disperger *(Fig. 3)* comprise bars which have a square cross-section on the rotor and circular cross-section on the stator. The high statistical reliability of stock treatment is given here by the significantly longer dwell time. For consistent high quality, the specific disperging power consumption must be regulated. In the Disperger this is done electromechanically as a function of gap width, and in the Kneading-Disperger by a speed-controlled output screw or pneumatically loaded flap valve. In order to meet specific technological requirements while optimizing energy consumption at the same time, both machines can be operated over a wide specific power range from 30 to 80 kWh/t by appropriate selection of fillings. If necessary, power can be increased to over 120 kWh/t. The Kneading-Disperger runs relatively slowly at 7 to 13 m/s peripheral speed, while the disperger runs at 50 to 60 m/s.

Due to their different operating principles, these two machines offer distinctive advantages as well as common benefits with regard to product quality and application ranges. Dirt speck reduction is efficient with both systems, as shown for example in *Fig. 4* on mixed household waste paper. Stickies reduction in hotrunning mode (>90°C) is likewise efficient. Both machines can also be used for homogenizing coating materials in rejects

1

2

		Disperger	Kneader-disperger
			 
Temperature	[°C]	90-130	< 100
SD output	[%]	5/17/35	25-35
Specific energy	[m/s]	30-80 (120)	30-80 (120)
✤ $v_{rotor/stator}$	[m/s]	50-60	7-13

3

Fig. 4
Dirt speck reduction by disperging.

Fig. 5
Comparative efficiency of coating materials disperging.

Fig. 6
Increase of burst strength by disperging.

Fig. 7
Change in SR value by disperging.

Fig. 8
Development of porosity by disperging.

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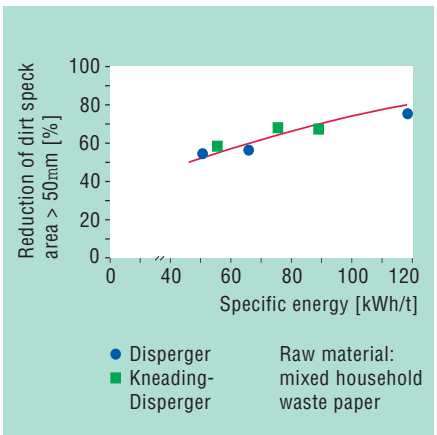

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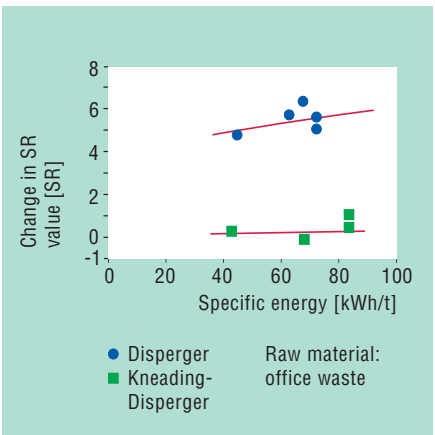

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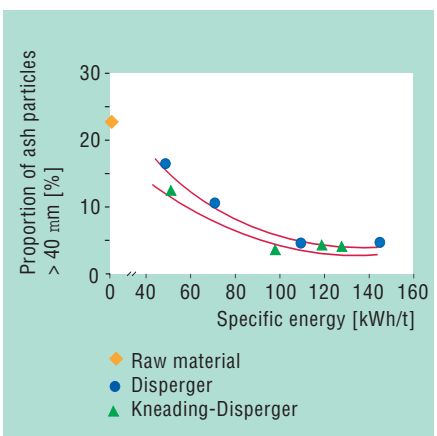

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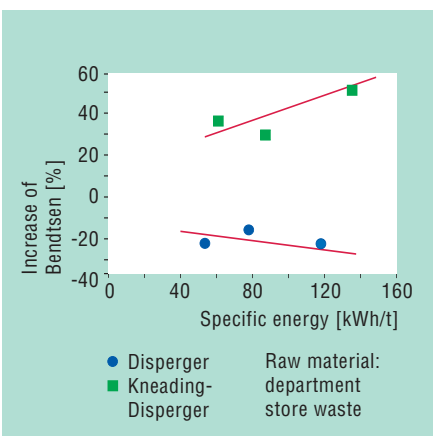

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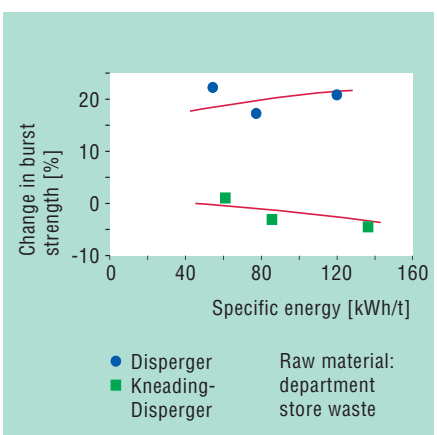


processing *(Fig. 5)*. Bleaching chemicals are mixed in very efficiently at high stock consistencies, both in the Disperger and Kneading-Disperger.

.With so many common benefits, selection criteria depend largely on the paper characteristic requirements. A strong point of the Disperger in this connection is strength development, for example, as shown in *Fig. 6* by, the increase of burst strength in department store waste. For removal of "soft" printing inks – important with regard to stock floatability – the Disperger is slightly more efficient than the Kneading-Disperger. On the other hand, the Kneading-Disperger is preferable if no increase in refining degree can be tolerated. Even at high energy input, the refining degree remains constant *(Fig. 7)*, which is not the case with the Disperger. For products with high bulk value with linerboard, for example or for tissue which also requires softness, the Kneading-Disperger is preferable. This is clearly shown by the rise in porosity compared with the Disperger *(Fig. 8)*. The Kneading-Disperger can be run cold without any increase in SR-value, while maintaining good dirt speck disperging. This means that stickies size can be retained practically unchanged for efficient removal afterwards by slotted screening.

In future the entire disperging system will be tailored even more to requirements by varying the parameters specific energy, stock temperature and fillings design. Voith Sulzer is the only manufacturer at the present time supplying both types of disperging system used in the market. Moreover, these products are tailored to the highly specific requirements of our customers in the paper industry. For optimal system selection, the smallest sizes of Disperger and Kneading-Disperger are available to customers for simultaneous trials in our Ravensburg (Germany) and Appleton (USA) pilot plants, likewise for development testing (see report on page 65).

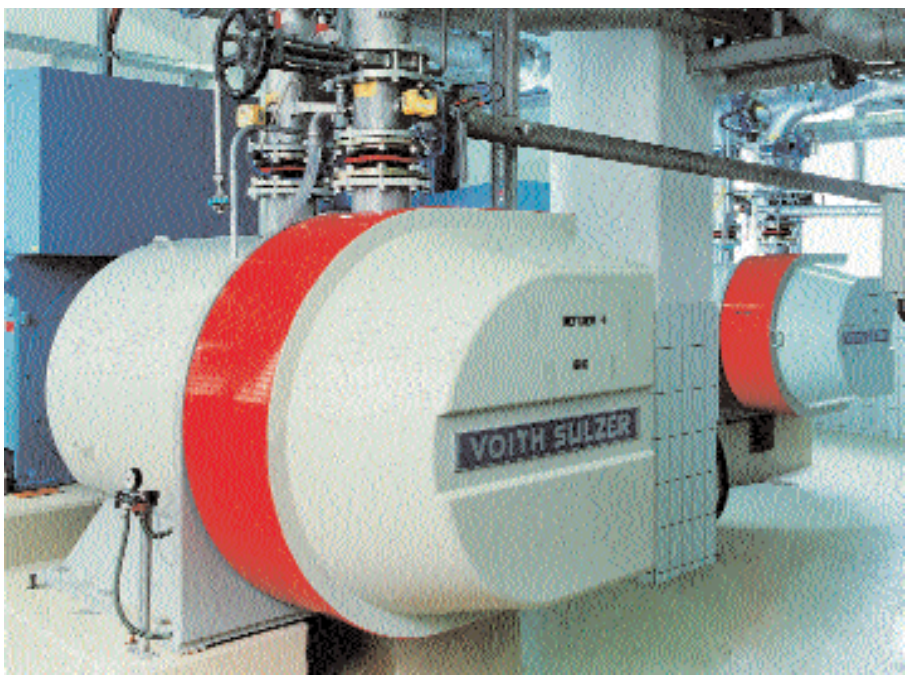
Stock Preparation Division:
Optimal fibre processing with the TwinFlo D

If good paper was traditionally made in a Hollander, then better paper is made today in the TwinFlo D. This new VSPT double disk refiner combines all the experience gained with numerous Sulzer Escher Wyss, Andritz Sprout-Bauer and Voith generations, and optimizes their combined advantages. Voith and Sulzer have always been leaders in double disk refiner development – as reflected in names such as SDM and DSR, with more than 1200 installations worldwide. We are confident that with its even greater advantages, the TwinFlo D *(Figs. 1 and 2)* will continue this tradition.

The author:
Dr. Frank Meltzer, Product Group Refining

The primary target of this joint development has been reached: a new type of refiner which not only offers greater customer benefit, but is considerably lower priced than its predecessors. It incorporates far fewer components – only half as many moving parts – and is much more efficient and easier to service.

What are the main features of the TwinFlo D? One of the chief advantages, in contrast to all other refiners, is that it is entirely welded. The well-proven cantilever construction has been taken over,



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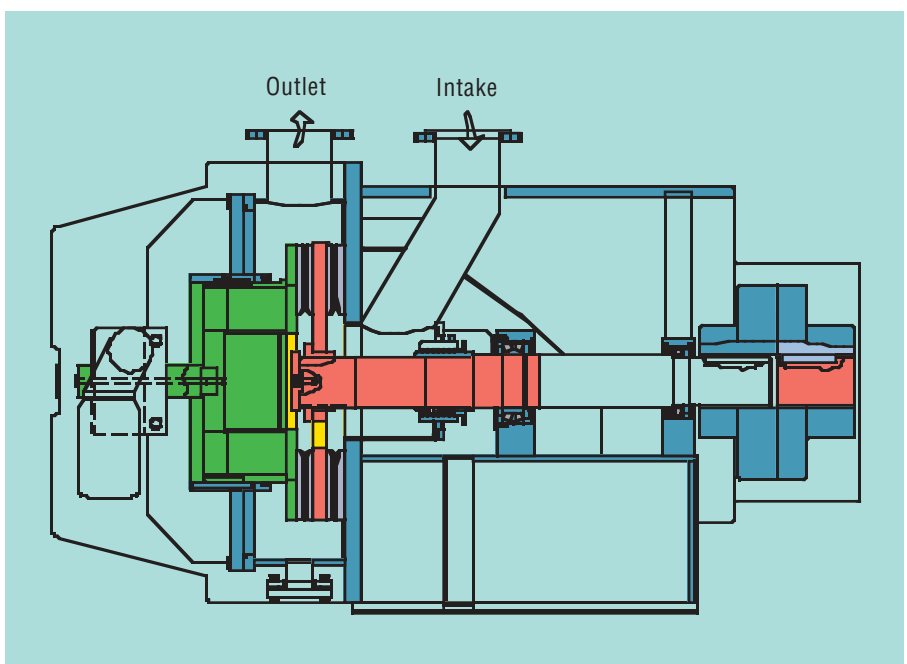

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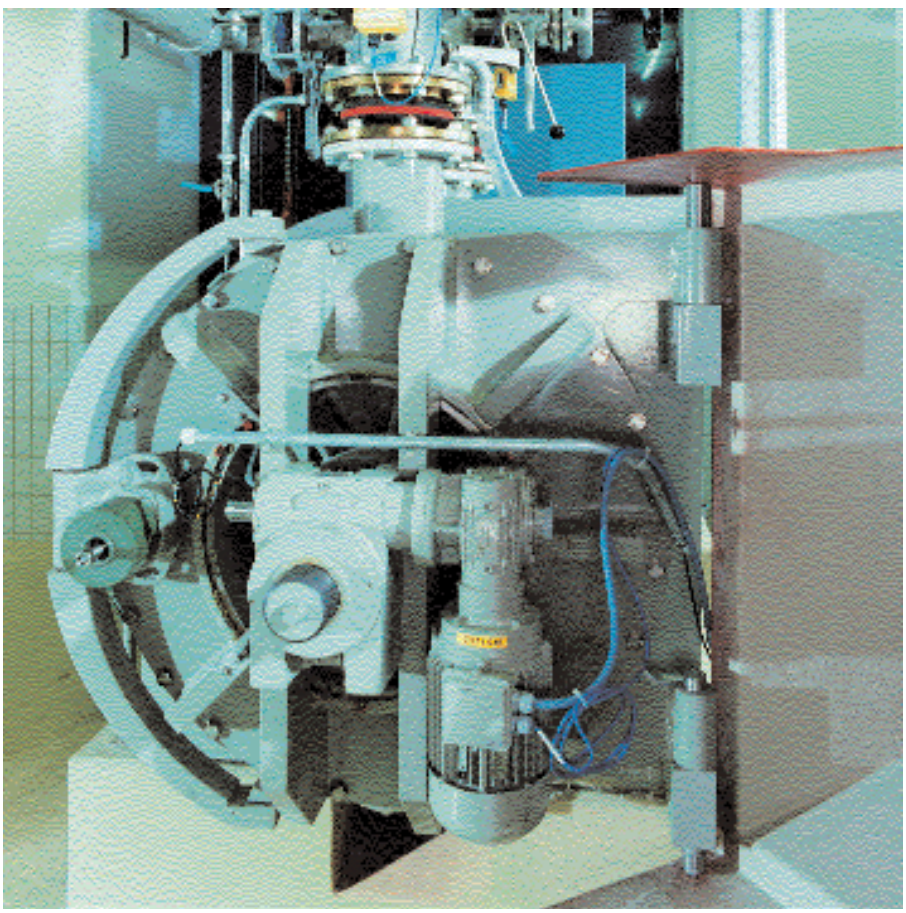
Fig. 1:
Refining line comprising 2 TwinFlo D refiners, each with 900 kW installed power.

Fig. 2:
Longitudinal section through the TwinFlo D.

Fig. 3:
TwinFlo D housing with swivelling cover, showing the plate gap adjusting mechanism and integral hinged arm for fillings change.

Fig. 4:
TwinFlo D refiner with opened cover.



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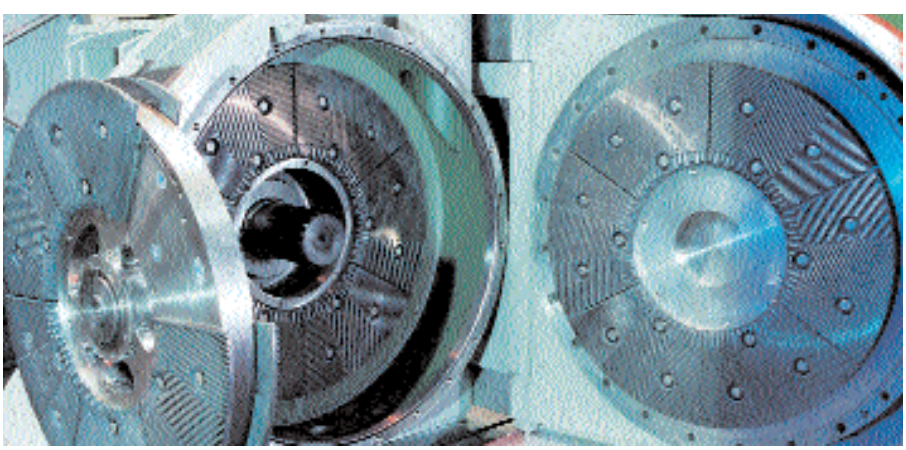

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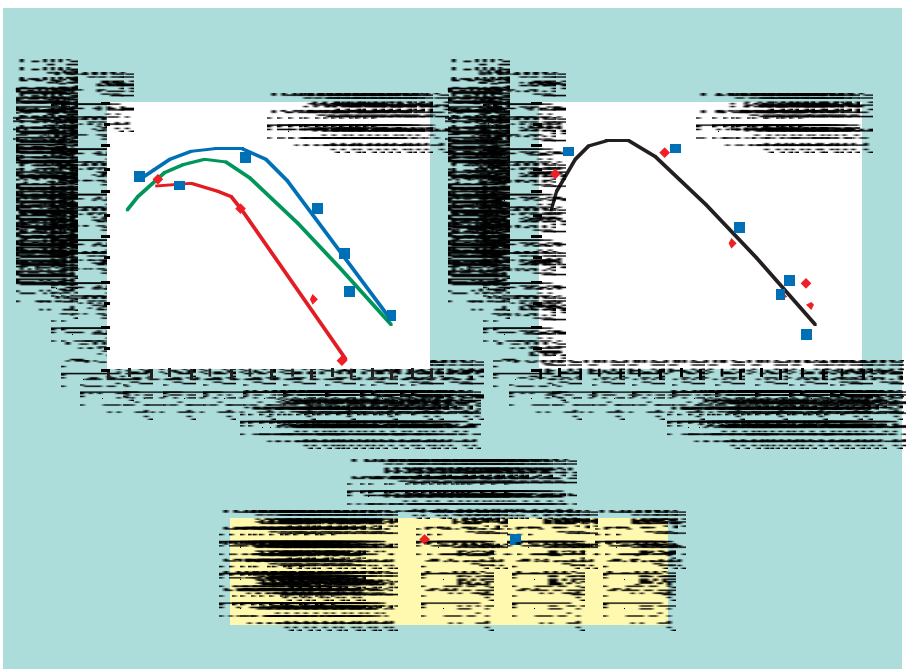
complete with swing door. The refining gap, and thus the power consumption, are precisely adjusted by an electromechanical system *(Fig. 3)*. The centralized force transmission ensures uniform fibre treatment, thanks to precisely parallel refiner fillings.

Due to its axial movability on the shaft, the rotor is hydraulically self-centering, thus eliminating the need for complex axial bearings and sliding couplings. As shown by the view inside the refiner *(Fig. 4)*, the rotor is already fixed to the fillings changing device integrated in this machine. Clearly visible are the special shaft splines on which the rotor runs.

The TwinFlo D is so flexibly designed that all the Sulzer Escher Wyss, Voith and Andritz Sprout-Bauer fillings can be used. A unique advantage is that fillings with radial overhang of up to 3 inches can be used. Low maintenance, easy accessibility, totally enclosed and dirt-proof – together with its attractive modern design, these are the main characteristics of the TwinFlo D. The product range covers power capacities from 300 kW to 3 MW, and outputs from 20 to 1200 t/day.

Thanks to the extremely favourable ratio of no load power to installed power and the wide choice of fillings diameters, technical requirements for product quality demands are met with fewer

Fig. 5:
Based on the modified edge load (MEL), the refining intensity of different fillings designs can be adjusted to give identical results. The specific edge load (SEL) is only applicable to fillings with identical bar width and angle.



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machines. This optimizes investment costs. The key component in screens is the basket, in flotation cells the aeration element – and in refiners it is the fillings. This "tool" is decisive for the attainable product technology and thus forms the heart of every refiner. The development of new fillings concepts is therefore one of the main priorities of our R&D programme.

As a golden thread linking refiner and fillings, a comprehensive knowledge of the refining process is of course indispensable. Precisely what happens, for example, to the fibres in the refining gap which may be only some hundredths of a millimetre wide? And every papermaker knows the specific edge load according to Brecht Siewert. Together with specific energy consumption, this measure of refining intensity is still one of the key criteria for assessment and control of the refining process.

On this basis we developed a new parameter which goes one step further: the modified edge load (MEL). This enables technological refining results to be forecast as a function of SR value, taking account of the fillings parameters bar width, groove width and bar angle *(Fig. 5)*. The practical advantages of this new parameter from the user's point of view are that know-how accumulated so far using specific edge load SEL can be fully exploited white retaining the conventional units J/m or Ws/km. In view of these findings, we started to develop a new range of fillings which optimally implements the combined effect of the above-mentioned parameters. A relatively small number of different fillings thus covers all refining re- quirements.

Apart from design, a decisive role in the refining process is played by fillings materials, which greatly influence technological characteristics and energy consumption.

Although basalt fillings are optimal from the technological and energy consumption points of view, they disappeared from the market due to technical problems in the past. They now serve as a structural model for new developments, but full account must be taken of the fact that their efficiency is subject to continuous fluctuation due to abrasion.

In practice, this means slowly changing refining results during production which make it difficult to compare results. Regular sampling and evaluation is therefore indispensable. For this reason one of our development targets was to arrive at an abrasion-resistant, non-corroding material with an easily shaped basalt-like structure.

We found the answer in the form of ceramics *(Fig. 6)*, or alternatively in compos-

Fig. 6:
Fillings made of a composite ceramic material. Only a closer look shows the variations in surface structure.

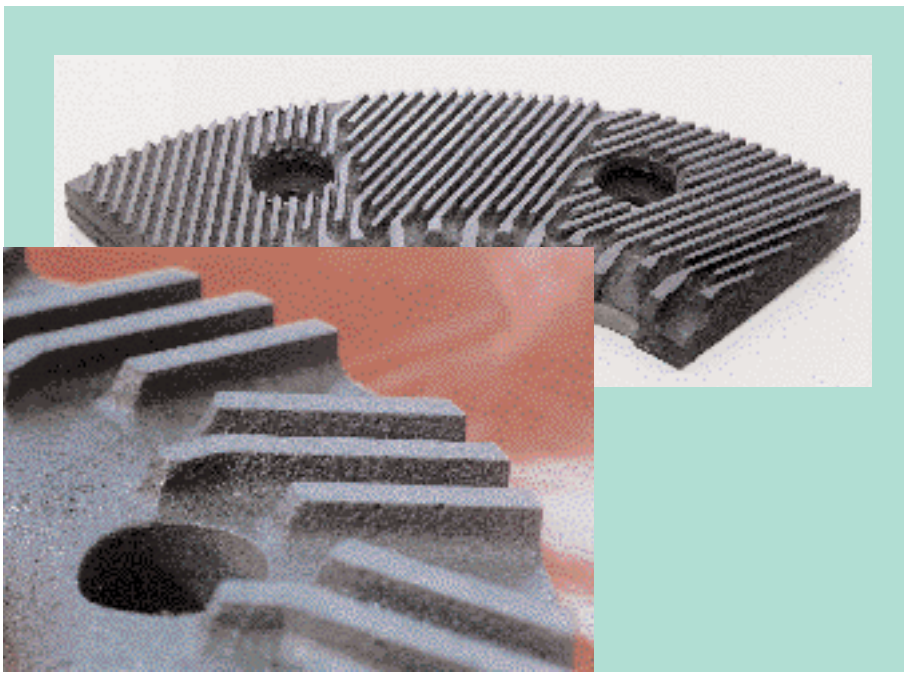
Fig. 7:
The adjustable surface and bar structure of ceramic fillings gives up to 20% energy savings compared with conventional cast fillings.

ite materials systematically compiled according to need. Industrial trials on ceramic fillings showed the same technological results as conventional cast fillings, but with up to 20% reduction in specific energy consumption *(Fig. 7)*. Furthermore, the much greater durability of these ceramic fillings allowed a reduction of bar height which also cut no load power by 30%. Thanks to the unvarying bar edge and surface conditions, refining results remained unchanged over the entire operating period following installation.

Apart from this example, Voith Sulzer Paper Technology is continuously working on refining process improvements in order to optimize energy consumption and technological results according to the latest research findings.

Modern refiners have to fulfil a wide variety of demanding requirements. Not only must they accommodate a large number of different stocks, which are subject to continuous change (e.g. due to developments in pulp making and bleaching), but as a decisive requirement they must also make better use of raw materials potential while at the same time reducing energy consumption.

The new TwinFlo D with its innovative range of fillings meets all these requirements optimally, thus contributing to our common goal of ongoing improvements in papermaking.



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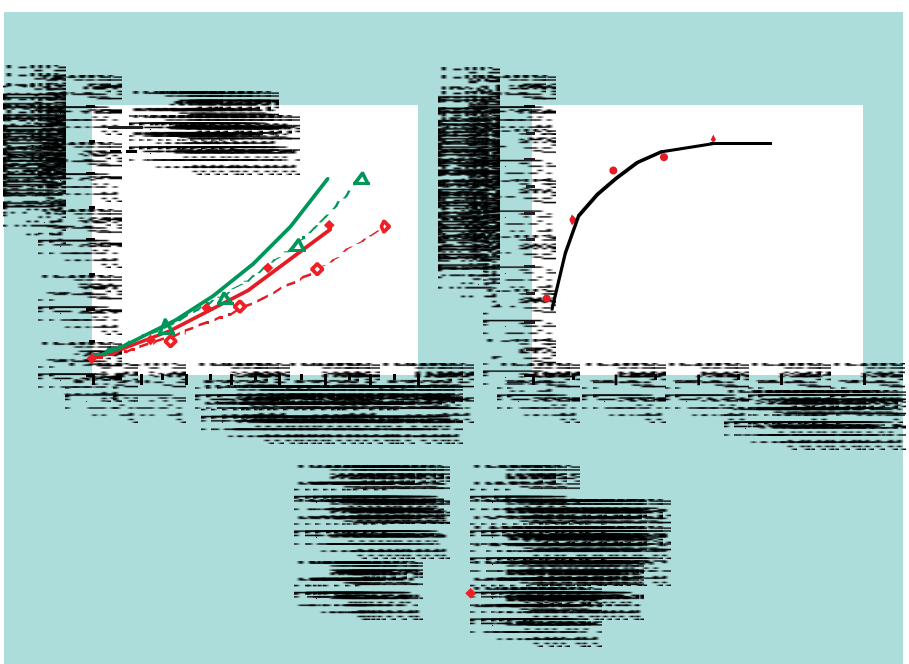

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Stock Preparation Division:

New power on the periphery – integrated treatment for water, sludge and rejects

For greatest possible market presence and customized service at the same time, Voith Sulzer Stock Preparation GmbH (VSR), Ravensburg and Meri Anlagentechnik GmbH, Munich have formed a joint venture known as Meri Entsorgungstechnik fur die Papierindustrie GmbH (Meri Disposal Technology Ltd).

Objectives

The paper industry is constantly optimizing new and existing stock preparation systems, paper machinery and related processes. For optimal production technology, these processes must also take account of increasingly important environmental factors. These particularly concern water consumption and waste treatment.

The author:
Lucas Menke,

The growing use of waste paper as raw material makes these environmental factors even more important. Water plays a central role here as indispensable transport medium for stock fibres and accompanying substances between the various stock preparation stages and the paper machine. Likewise in the treatment of waste materials (rejects and sludges), filtrates have to be included in the water loops. On the other hand, the sludges resulting from water clarification are led back to the sludge residue treatment stage. It was logical, therefore, to combine existing know-how and technologies for treating water, sludge and rejects. The result is a well-balanced integral technology known as WSR subsystems.

The main benefit of WSR subsystem technology is that it comprises a single-source comprehensive solution. Not only does it included all the individual process components required, but also the complete system engineering.

History

The decisive importance of water treatment was recognized back in the eighties by Sulzer Escher Wyss, who successfully developed suitable systems accordingly. More than 100 Purgomat installations speak for themselves in this connection, and since the early nineties rejects machines have also been developed. In recent years a series of Voith rejects treatment machines jointly developed with Meri has met with great success on the market. Voith's joint venture with Meri in water and sludge treatment follows the leading position built up by Meri over the last five years with some 140 installations.

Synergies

It was only logical to combine the well-proven concepts already existing with joint know-how and experience, thus developing an even more successful product range.

For efficient marketing of the new product range and WSR subsystem technology, Voith Sulzer Stock Preparation GmbH and Meri Anlagentechnik GmbH, Munich have formed a new joint venture known as Meri Entsorgungstechnik für die Papierindustrie GmbH (Meri Disposal Technology Ltd). This slender, flexible and powerful organization with offices in Munich, Ravensburg and Mansfield (USA) not only supplies complete WSR subsystems, but also individual machinery and upgrades for existing disposal systems.

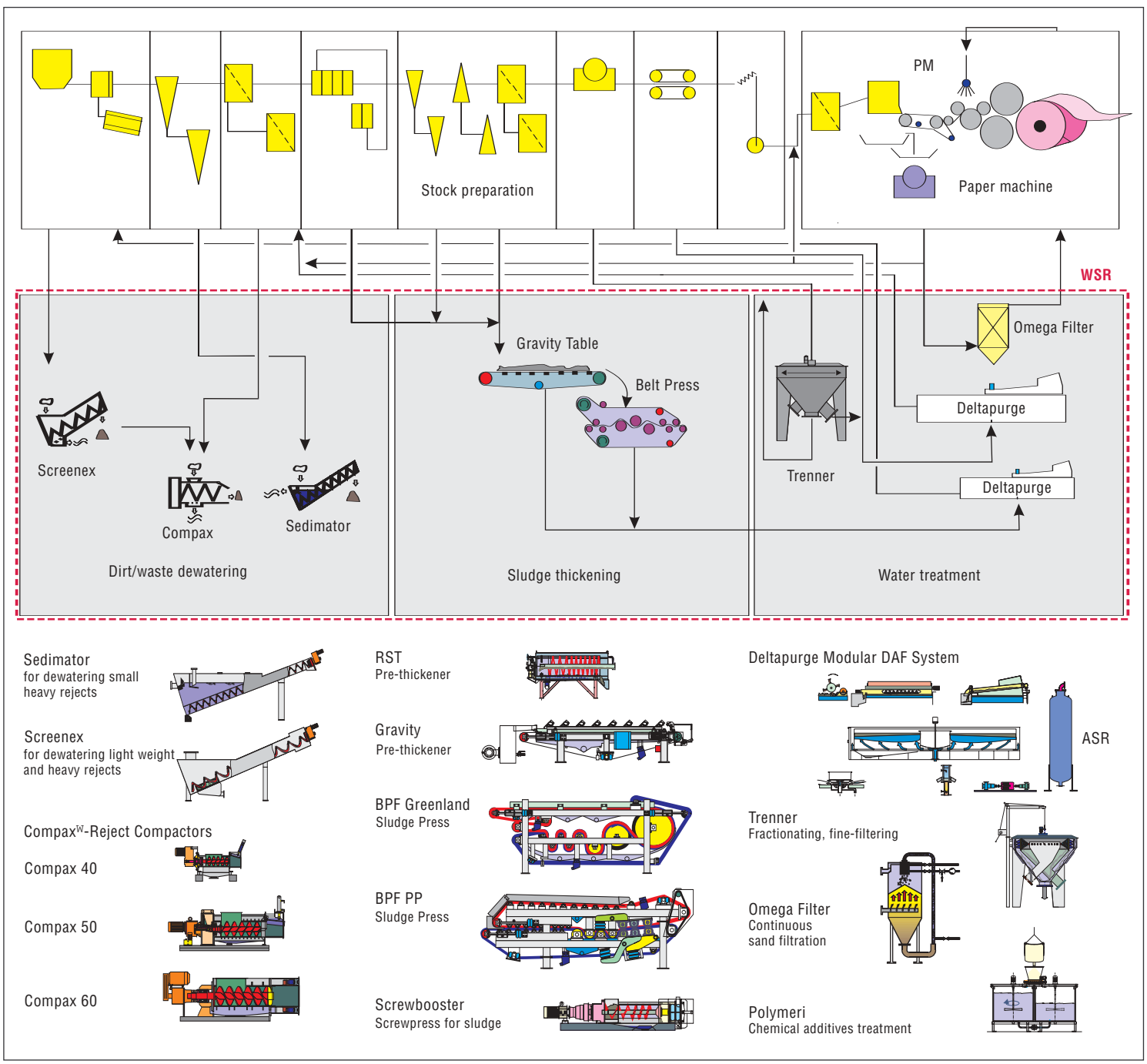
WSR subsystems

WSR subsystems incorporate water, sludge and rejects treatment for stock preparation lines using waste paper. Systematic selection of individual aggregates from the versatile new product line enables optimal balancing both within the WSR subsystem, and with regard to each stock preparation stage.

The advantages of this concept are very clear:

- A single-source comprehensive system.
- Optimally balanced process stages and aggregates.
- WSR subsystems can be designed from the outset for shortest possible loops and transport times.

Fig. 1:
WSR subsystem technology.



- Integral concepts minimize operating/maintenance personnel requirements.
- WSR subsystems can be controlled by an environmental quality system (EQS). This process control technology keeps track of all environmentally relevant data, thus providing complete records and statistics for ensuring compliance with legal limits and minimizing costs.

Close cooperation between Meri and Voith Sulzer ensures optimal balancing of peripheral processes with stock preparation requirements.

Optimization

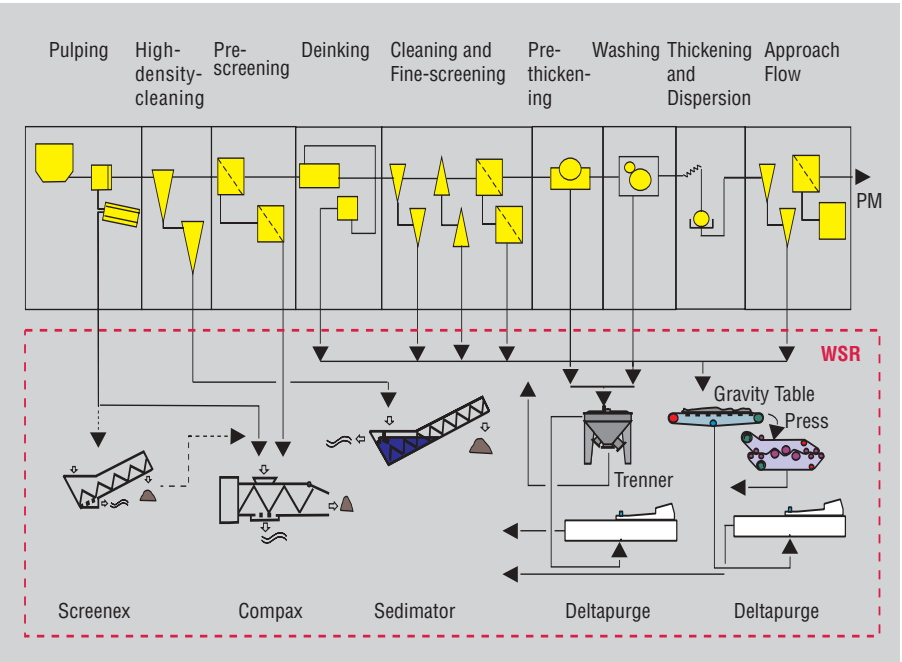
Based on extensive experience accumulated from numerous projects, Meri also offers optimizing services for existing systems.

Substantial savings often result from optimizing water, sludge and rejects systems, while at the same time optimizing the process as a whole and improving product quality.

For most WSR subsystem machinery, optimizing tests can also be carried out in the Meri laboratory or locally on mobile pilot plants. These test results then form the basis together with numerical simulations for plant optimization measures.

Fig. 2:
Typical deinking system for white papers.

Fig. 3:
Typical stock preparation system for brown papers.



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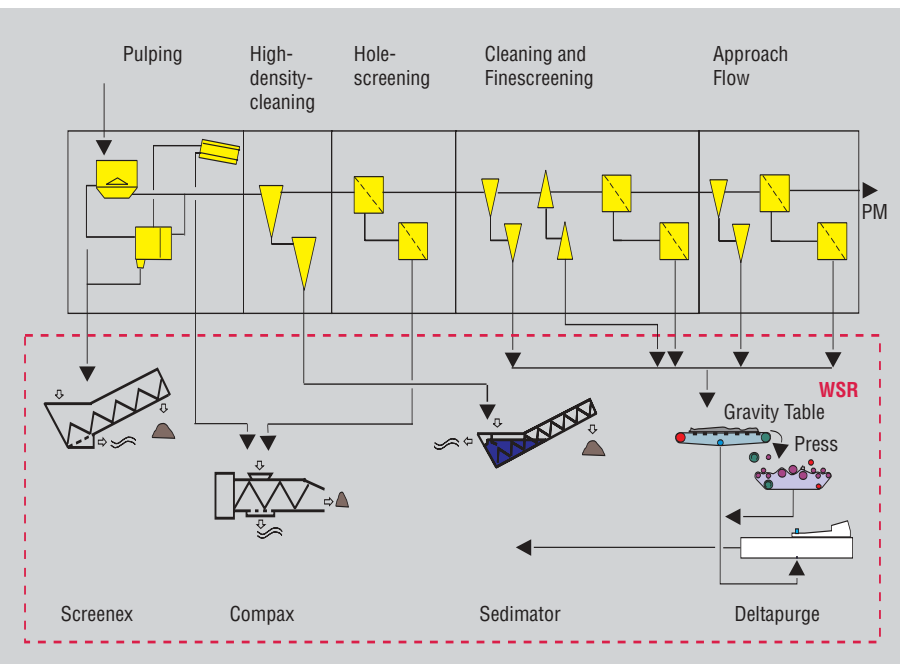

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Fig. 4:
3-D layout of a WSR subsystem including freshwater treatment, sludge dewatering and effluent treatment.

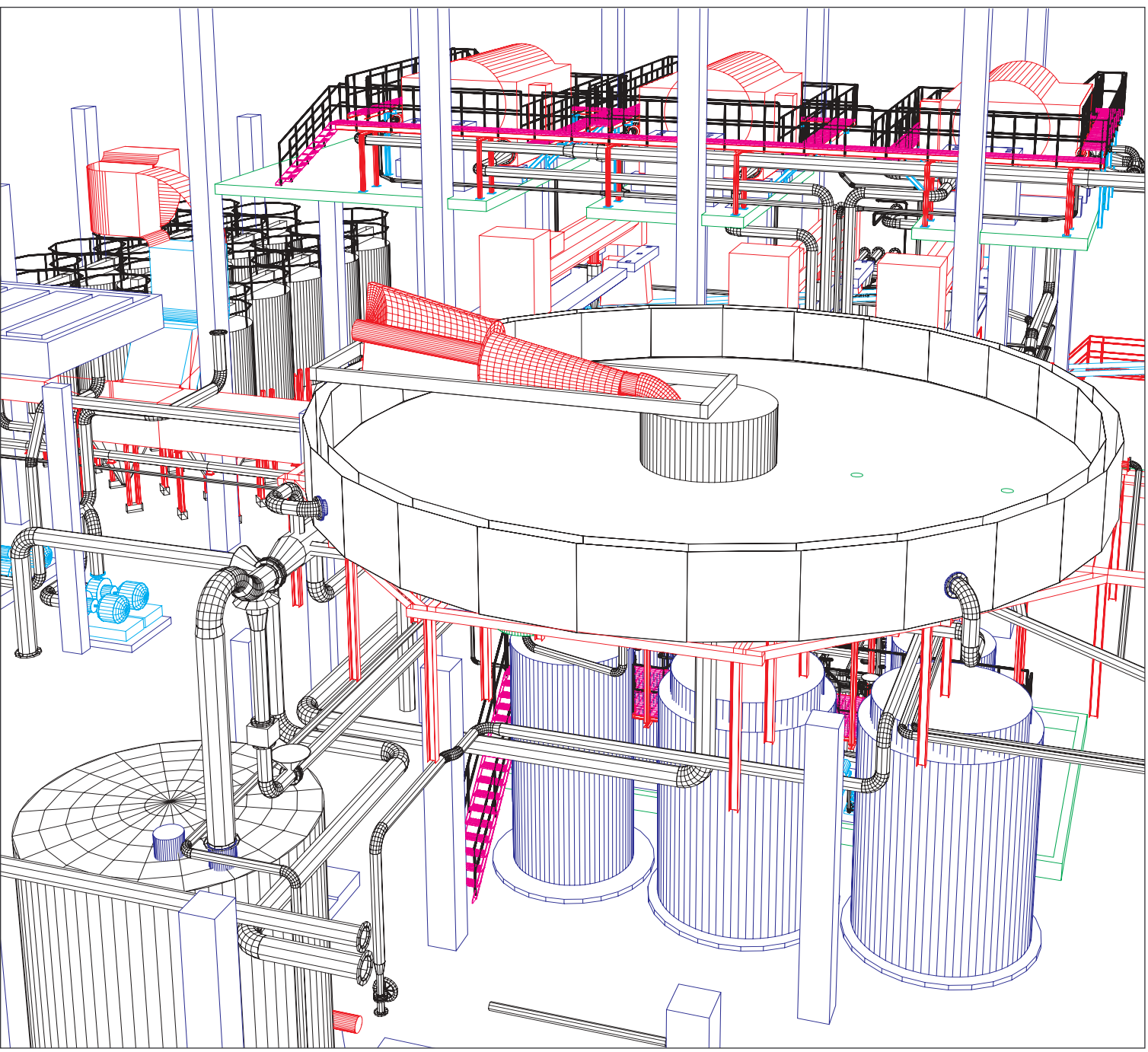

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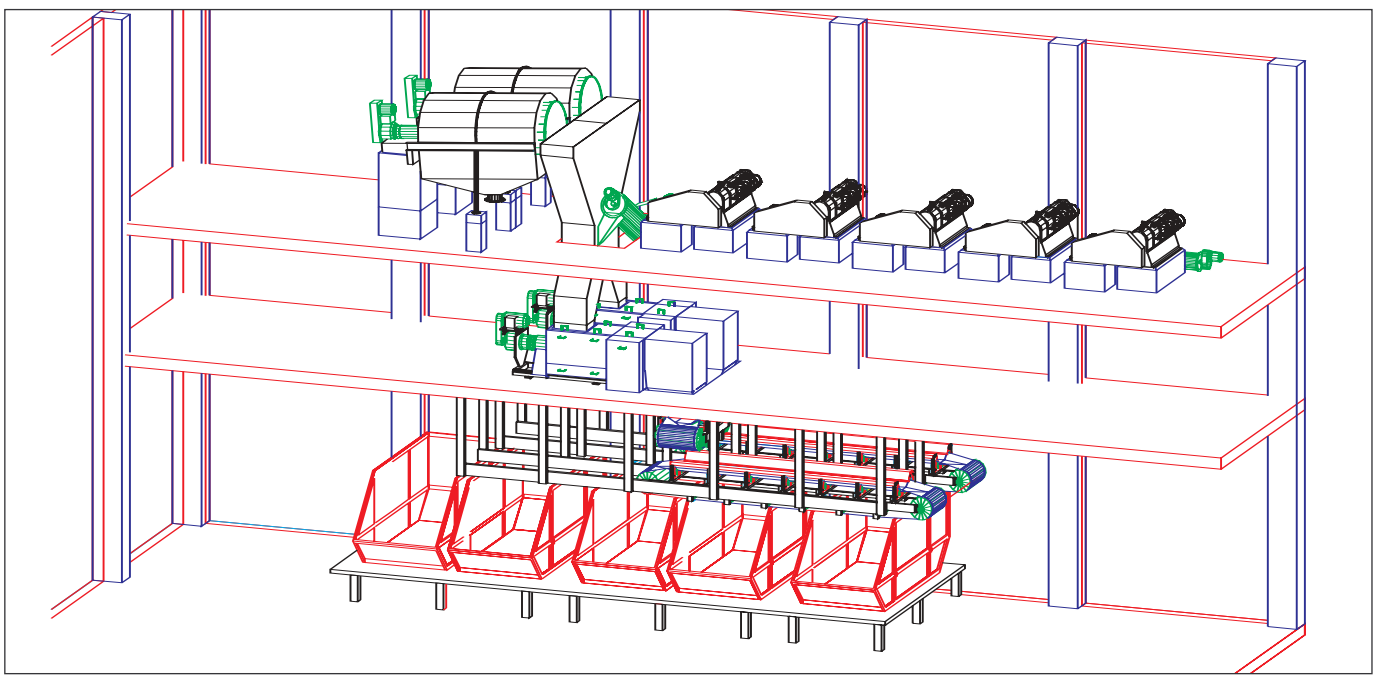
Fig. 5:
Part of a WSR subsystem, showing rejects transport and dewatering with automated container distribution station.



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Product line for water treatment

Together with precipitation and flocculation, microflotation is long-established as an efficient clarification process for thickening filtrates and cleaning up water loops. Two existing systems – the Sulzer Escher Wyss Purgomat and the Meri/OMC Deltafloat – have now been combined into the new Deltapurge system.

The Deltapurge system is built up on a modular basis using various components. The circular clarification tank can be fitted with two different extraction systems according to need: a spiral scoop or a paddle with screw conveyor. Flow is from the inside to outside in the clarification tank, which is either a self-supporting stainless steel structure, or with base or the entire tank made of concrete. Microflotation bubbles are generated by an air saturation reactor (ASR), optionally available with turbo-dissolve system for energy recovery. Further modules include a direct expansion system for special applications, and a pipe reactor for optimal dosing of chemical additives.

The Deltapurge thus derives from two leading concepts, with more than 250 systems installed over the last few years, which have been combined into an even better concept.

Typical applications include clarification of whitewater II, thickening and clarification of filtrates (such as washing and thickening filtrates), and waste water thickening and purification such as in preclarification, press filtrate, deinking foam, etc. For processing the residual sludges from waste water clarification, the fully automatic Polymeri treatment station ensures efficient dosing and preparation of chemical additives, either solid or liquid.

The Omega sand filter continuously recirculates and cleans dirty sand in a closed circuit. It is particularly suitable for treating freshwater, spraywater and sealing water, as well as for paint removal systems. Another new product is the Trenner, a filter which can be used both

Fig. 6:
Final clarification station at a newsprint plant using 100% waste paper stock.

Fig. 7:
Microflotation used for loop clarification and filtrate thickening in a deinking plant.

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for fine filtration and fractionating. The stock suspension to be filtered is sprayed on to a special multilayer metal filter screen (20-300 ❍m) which thus serves two purposes – fibres and fines fractionating e.g. for recovery from washing filtrates, or for removal of ash, etc.

As a fine filter, the Trenner can be used for spraywater and highly clarified water down to 20-80 ❍m particle size.

Product line for sludge treatment

Waste products from stock preparation occur in the form of low consistency sludges (from deinkers, cleaners, washers, etc.) which are usually thickened in several stages. Prethickening is either by gravity table or rotary sludge thickener. According to need, the prethickened sludge can be compacted using belt screen presses of various types, or in screw presses. In many cases cascade installations are a good idea (e.g. gravity table with belt screen press, or gravity table with screw press).

For large-scale sludge dewatering, machines and equipment supplied by Maschinenfabrik Andritz, Graz (Austria) are to be used, the filtrates being returned to the clarification stage. Apart from the machinery required, auxiliaries such as screw conveyors and belts are also available.

Rejects handling

Waste paper stock preparation produces a wide range of coarse rejects, including plastics, staples and other metal fragments. Rejects handling covers the dewatering, transport and compacting of such materials.

The Screenex is a machine for dewatering coarse rejects and lights such as plastics, etc. with continuous or intermittent feed e.g. from pulper dumpers. The machine is designed for the largest pumping heads, with dewatering through an integral slotted screen.

In the Sedimator, small heavy rejects (e.g. staples, glass, etc.) from the heavies cleaners are dewatered, and dumped separately into a container.

Light rejects (plastic, etc.) can then be compacted to about 65% stock consistency in a Compax screw press. This is available in various sizes (Compax 40, 50, 60) and two versions – the standard (65% Tsr) or lower-cost ECO machine (55% Tsr) – for rejects capacities of 10-75 tonnes per day.

The new Compax compactor line was developed from existing Voith-Trumag and Sulzer Escher Wyss machines. It is an extremely robust high-quality unit, guaranteeing long service life and low wear with minimum maintenance.

Depending on requirements and system conditions, individual rejects machines can be fitted with suitable conveyor units for transporting rejects to specially designated zones. Cost-effective layout and inclusion of additional conveyor elements is an integral feature of WSR subsystem technology.

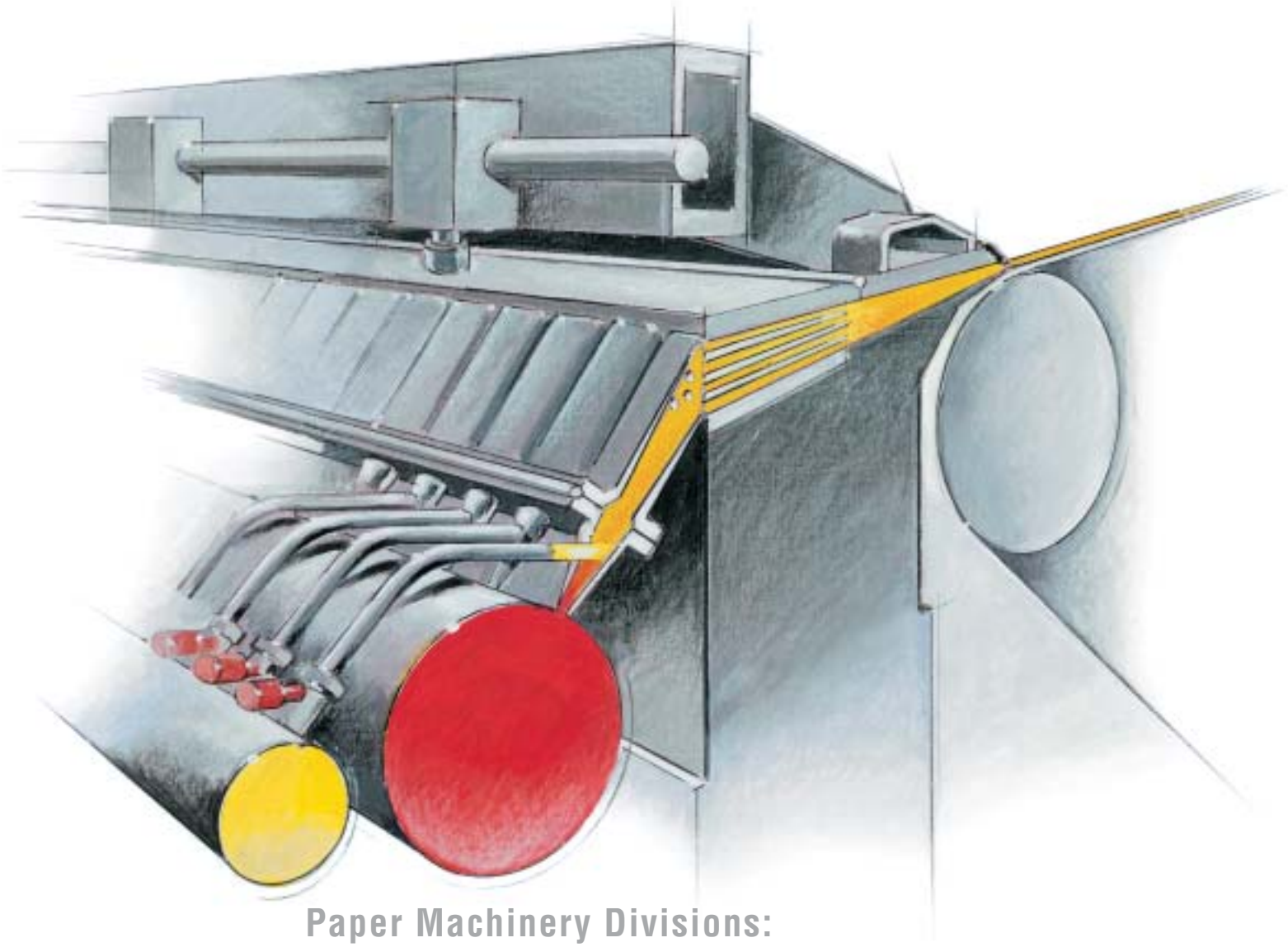
New products

At the present time several new products are under development and test. These include a new “elephant filter” for water clarification, and an additional microflotation unit for small throughputs. Modifications are also being made to certain types of rejects machinery and some sludge presses.

Service and engineering

The Meri Entsorgungstechnik joint venture supplies complete service and engineering, both for new WSR systems and for upgrading existing water, sludge and rejects systems. Included is a detailed inventory of the existing system, together with engineering studies and site testing, likewise engineering for individual machines or entire systems.

Test facilities are available in our Ravensburg (Germany) and Appleton (USA) development centres, as well as mobile pilot plants for on-site testing.



Paper Machinery Divisions:

The ModuleJet – a breakthrough in headbox technology

On January 3, 1994 the first ModuleJet headbox went into operation on a Fourdrinier machine for writing and printing papers. After retrofitting the second reel of paper produced on this machine already met market quality requirements. 2▲ values of 0.16% for basis weight CD profiles were consistently achieved.

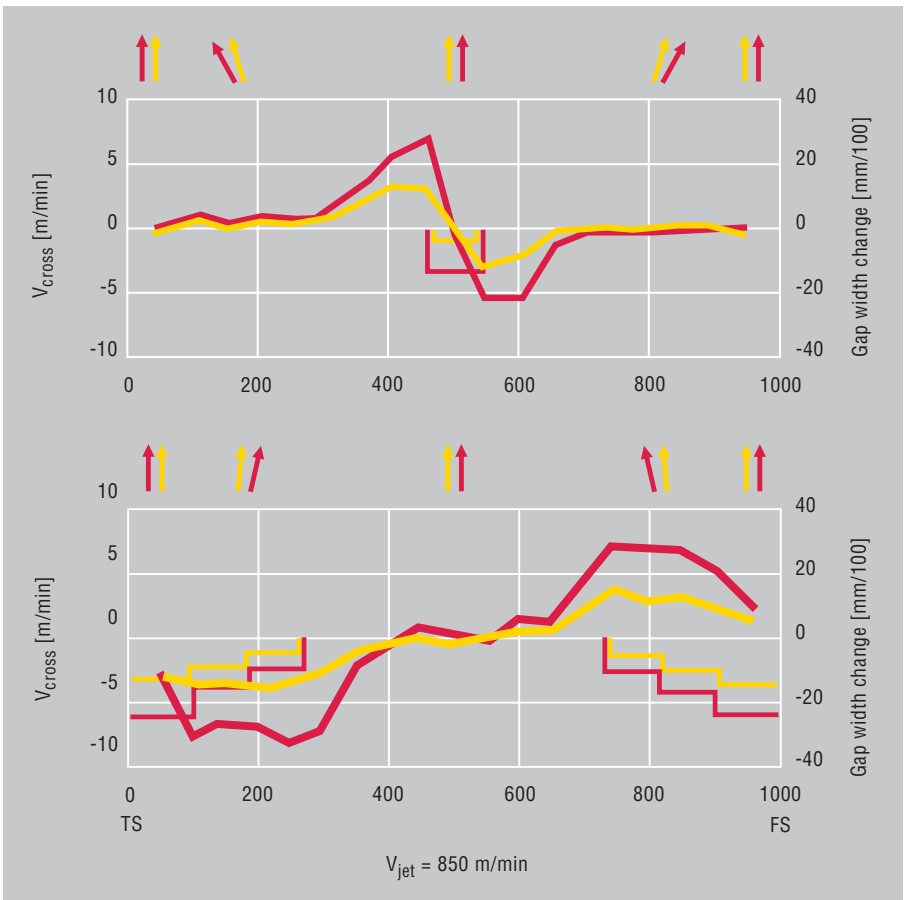
Since this first ModuleJet headbox had given such good results right from the beginning, the customer ordered a second one a few months later. Several interesting ModuleJet retrofits followed this first start up, for example a newsprint machine with CFD gapformer, a machine with multilayer headbox and an SC paper machine likewise with CFD gapformer to mention only a few.

The latest ModuleJet headbox installations were set up on a newsprint machine, two LWC and an SC machine in Finland, all of which are more than eight metres wide. Additionally, a good many narrower machines have been equipped with this new technology, such as a rectifier roll headbox on a machine 1750 mm in width.

All 28 of the Mod-

The author:
Ulrich Begemann,
Headbox Design
and Project Planning

Fig. 1
Gap geometry of a pilot headbox and cross-flow in the jet.



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uleJet headboxes put into service ar now reliably operating to the complete satisfaction of each customer.

Basic disadvantage of conventional headboxes

One of the most unwelcome characteristics of conventional headboxes – bad fibre orientation due to slice blade distortion for basis weight adjustment – was reproduced on a pilot machine. The results are shown in *Fig. 1*, where cross-flows in the headbox jet are plotted together with the gap deformation versus machine width. The first deformation stage is shown in yellow, the second in red. The determined cross-flows are of course responsible for interferences in the fibre-orientation profile.

ModuleJet valves for optimal whitewater I control

Fig. 2 shows a schematic view of a ModuleJet headbox on a Fourdrinier machine. Whitewater I is fed to the individual zones through the small header and a large number of specially designed valves. The zonal flow rates are constant, but individual mixing concentrations can be varied.

This allows basis weight profile corrections with a the parallel slice opening, thus eliminating cross-flow and ensuring a first-class fibre orientation profile.

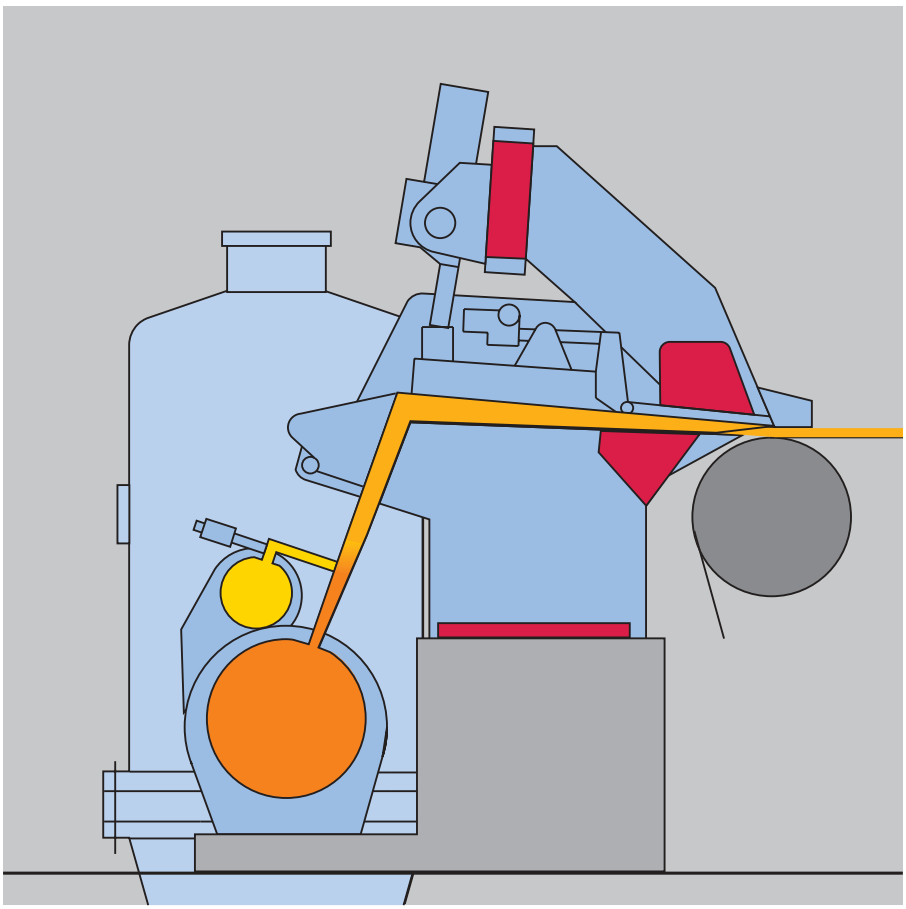
What is the most suitable dilution fluid? According to experience, whitewater I has clear advantages as a dilutant, for the following reasons:

- Self-regulating cross-profile despite retention fluctuations
- Substantially reduced time for grade changes
- Closed-circuit primary loop: no additional load on disk filter
- Whitewater is the only diluting agent with identical chemical and physical properties to the stock itself
- By using a diluting agent containing fines and fillers, the fines and fillers profiles are unaffected.

In order to ensure trouble-free operation of all the valves fed with whitewater I, a special valve design was developed for the ModuleJet. *Fig. 3* shows the continuous rotary flushing principle of these valves, which prevents any deadwater zones.

Fig. 2
Fourdrinier headbox with ModuleJet.

Fig. 3
ModuleJet whitewater feed valve.



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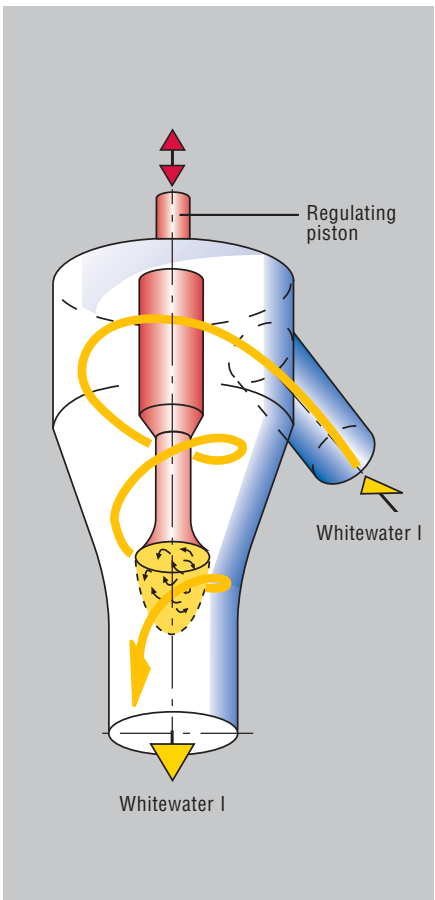

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One of the basic reasons for the high reliability is the well-arranged design of the ModuleJet with its shortest possible flow paths *(see Fig. 4)*.

Additional design refinements

Apart from using whitewater I for dilution as described above, further design refinements were necessary in order to take full advantage of this dilution technology without affecting other quality parameters:

- With competitor's systems 2-sidedness can be generated or increased by feeding dilution water asymmetrically to the turbulence generator. In the ModuleJet, there are no concentration differences in the Z direction.
- In order to ensure that the jet is always free of cross-flow by operating the headbox with a parallel gap, the maximum basis weight adjustment range should be at least 7%. At the same time, the mixed flow through each valve must always remain absolutely constant. The good results achieved in practice with the ModuleJet confirm the validity of this concept – no additional adjusting devices for the CD basis weight profile are required in the headbox.
- The dilution system must be operated with cross-profile software suitable for this control concept. The Profilmatic M system developed for the ModuleJet meets all necessary prerequisites.

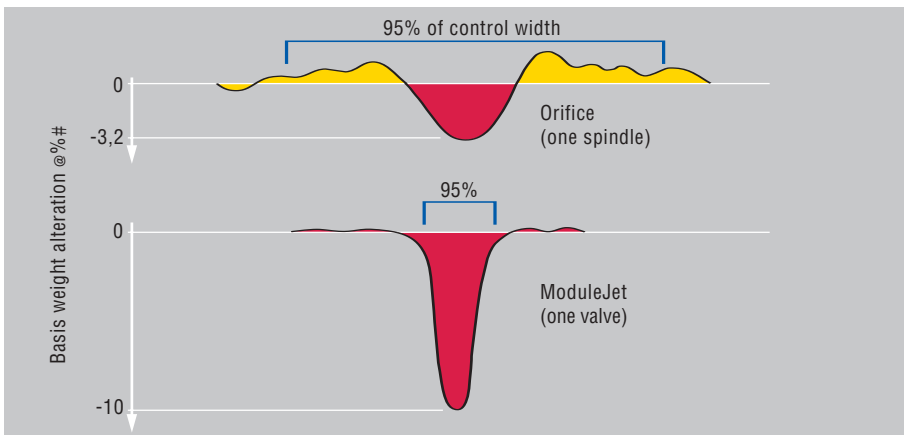
Fig. 4
ModuleJet mixing units.

4

Fig. 5
Basis weight response functions (January 1994).

Fig. 6
Fibre orientation cross-profile.

- Due to the substantially narrower range of each basis weight adjustment element, a model-oriented control algorithm with adaptive mapping should be used. The Profilmatic M system incorporates online shrink identification. Since the first tests by Voith Sulzer on stock consistency controlled headboxes, a good many improvements have been patented.



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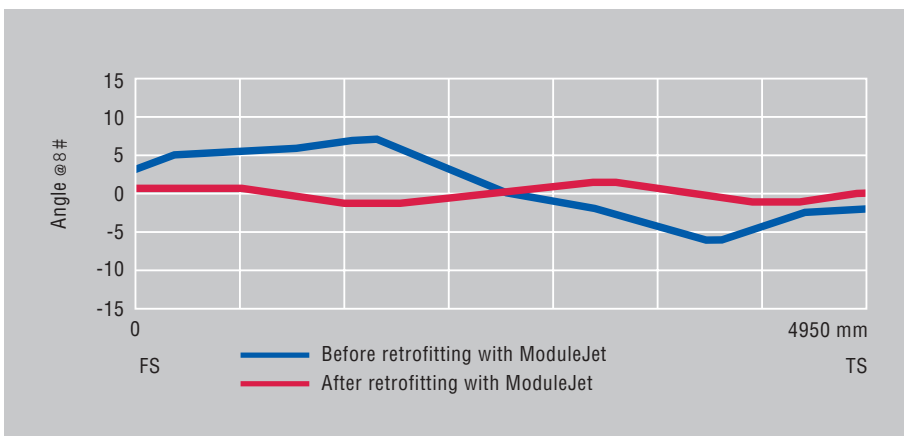

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Conclusion

With the ModuleJet concept and C-clamp design, headboxes can be built for Fourdrinier and gapformer machines. The design ensures absolutely uniform hydraulic characteristics and consistent mechanical loading across the machine width, irrespective of operating conditions.

A jet with uniform velocity, direction thickness and impingement conditions results from this. This equalizes not only the basis weight and fibre orientation CD profiles – but is bound to result in more uniform sheet formation.

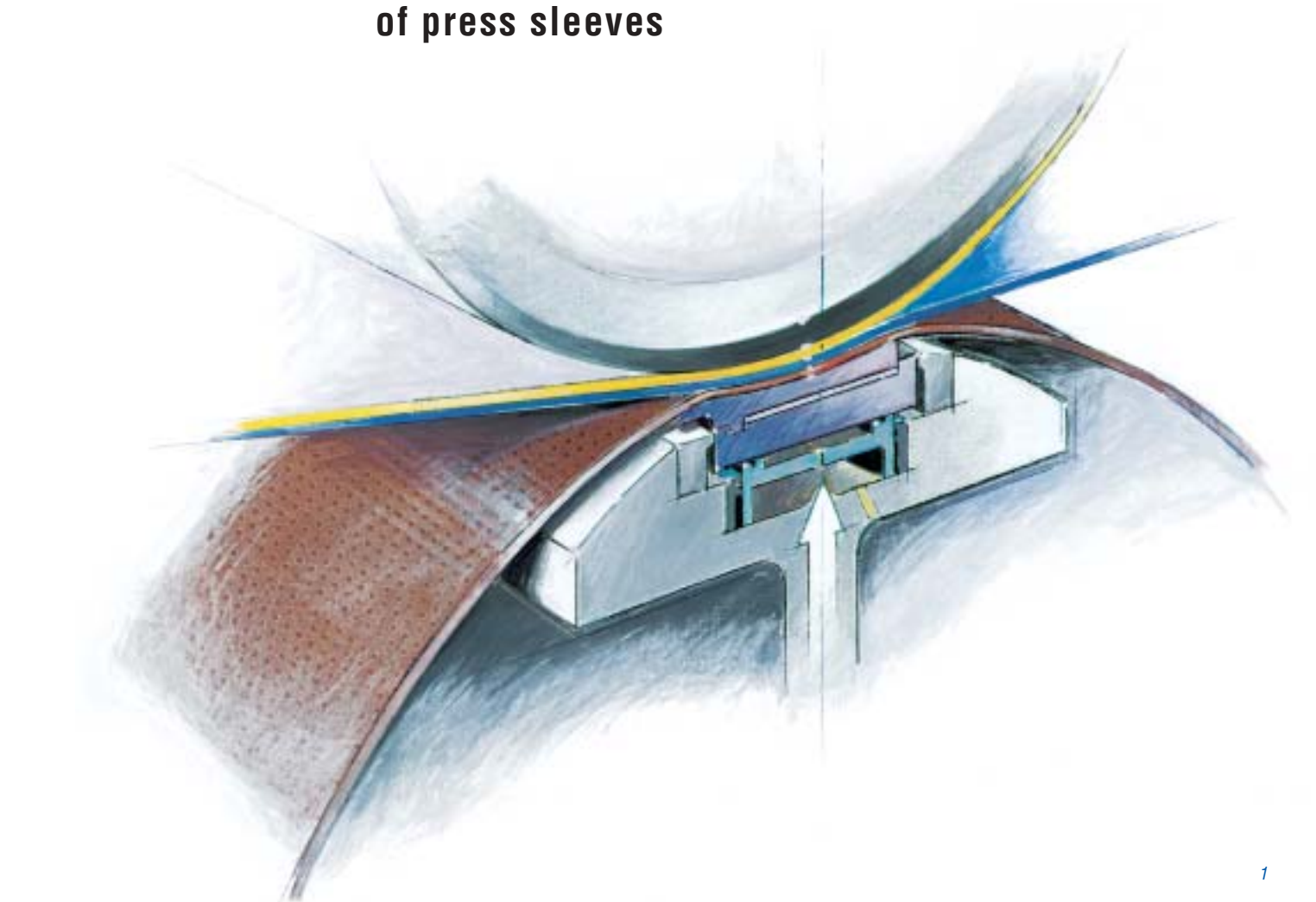
Depending on measuring method and other parameters, the 2▲ values of basis weight cross-profile lie between 0.1% and 0.2%, much lower in most cases than in slice bar headboxes. *Fig. 5* compares the basis weight response functions of slice bar and ModuleJet on the same headbox. It goes without saying that the narrow overswing-free response band of the ModuleJet gives better control results under these optimal conditions.

Operating experience has shown that the closely spaced profile fluctuations in edge zones, caused, for example by wire waviness, can be effectively reduced as a result. The retrofitting of a modern gapformer headbox with a ModuleJet clearly shows the advantages of a parallel gap compared with a variable orifice. As shown by profile measurements at various operating speeds after retrofitting *(Fig. 6)*, the headbox flow characteristics are independent of interferences, not being influenced by correction interventions.

These results, together with the large number (50 so far) of ModuleJet headboxes sold in the two years since introduction, clearly show the advantages of this concept and the dilution technology incorporated in it. In fact this Voith Sulzer development has already started a revolution in headbox design.

Paper Machinery Divisions:

QualiFlex – the new generation of press sleeves



1

The author: Andreas Endters, QualiFlex press sleeve development

Only three years after making its debut in a Flexonip press, the QualiFlex press sleeve is now state-of-the-art in numerous shoe presses worldwide. The long service life of this sleeve design sets an important milestone in Flexonip and Intensa presses – sleeves can now be changed during scheduled shutdowns instead of losing valuable production time.

Another advantage is that on new NipcoFlex presses *(Figure 1)* QualiFlex sleeves come as standard equipment.

Voith Sulzer is the only manufacturer supplying shoe press and sleeve on a single-source basis, thus ensuring trouble-free commissioning.

Development of the QualiFlex press sleeve

After the world's first closed shoe press went into operation in Nettingsdorf in 1984, Voith Sulzer gained extensive joint experience with a fabric producer on more than 600 fabric-based press sleeves. Operating results showed that the service life of fabric-based sleeves was mainly limited by fabric fatigue failure (due to stretching), and partially by fabric wear. Since the production process hindered reproducible quality and dimen-

Fig. 1:
Nip of a NipcoFlex shoe press.

Fig. 2:
Arrangement of the Voith Sulzer QualiFlex press sleeve.

sional accuracy, service life was very difficult to forecast.

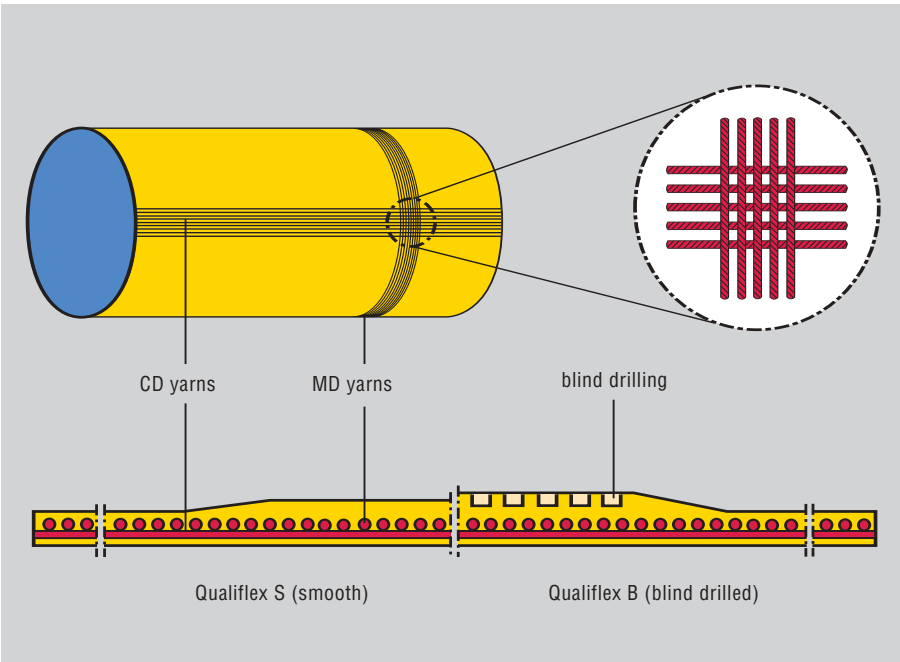
In view of these findings and the comprehensive shoe-press know-how accumulated by Voith Sulzer, it was decided to develop an entirely new proprietary design – the QualiFlex press sleeve.

QualiFlex press sleeve structure

The patented QualiFlex press sleeve is not built up on a fabric base like its predecessors. Its reinforcing yarns are entirely embedded in polyurethane, and are therefore completely free of wear and tear *(Fig. 2)*.

As a unique feature, precisely reproducible quality and dimensions are ensured by manufacturing each sleeve on the same cylindrical mandrel.

Thanks to the high tensile strength of the yarns, QualiFlex press sleeves retain their exact dimensions throughout service life. Since the sleeve does not have to be reversed during manufacturing, any associated errors are eliminated. And perfect sealing is guaranteed by pressure-testing to 2 bar. Due to the endless reinforcement yarns, QualiFlex sleeves have no weaving seam – formerly a weak point liable to cause unexpected failure. This also eliminates the annoying noise caused by the seam passing through the nip. Thanks to all these advantages, QualiFlex sleeves run extremely smoothly and are thoroughly reliable. This is reflected in the long service lives of all these sleeves so far in operation.



2

Versions

90% of QualiFlex press sleeves are delivered with blind holes drilled in the surface. This is because operating experience has shown that the additional void volume increases drainage capacity in the nip. The result of this may be improved dry content, steam savings or longer felt life. This water storage capacity of 440 cm^3/m^2 exceeds that of grooved press sleeves, and the boring depth of 2 mm allows enough wear tolerance for the longest operating times. Even at the highest line pressures, these blind holes remain open and prevent crack formation. Smooth surfaced (undrilled) QualiFlex-S sleeves are used in presses with low drainage requirements.

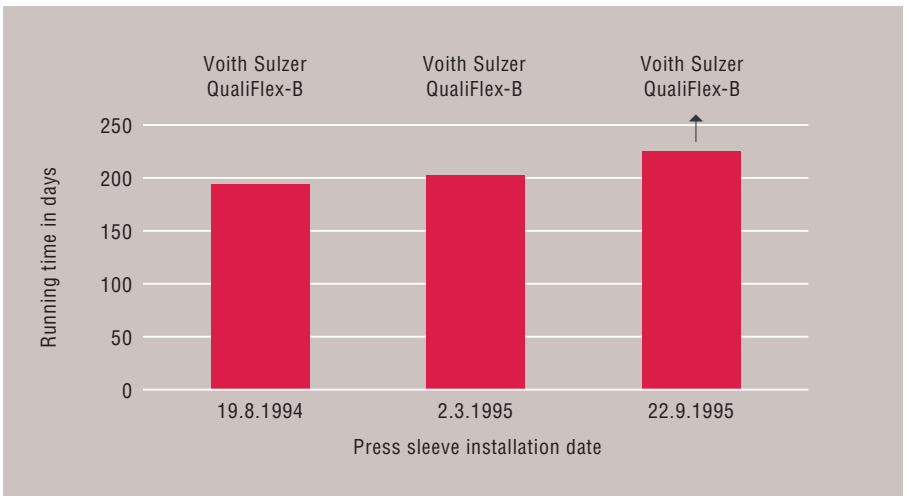
Operating results

The cost-effectiveness of this new press sleeve generation is clearly assured by extremely long service life:

On a corrugated board machine at Schoellershammer Industrial Paper Mills, a blind-drilled QualiFlex sleeve operated for 308 days. At 650 m/min and 1000 kN/m, this is equivalent to almost 50 million nip passes or 210,000 km of paper production.

Fig. 3:
Press sleeve running times on VP 6 in Sydney.

Fig. 4:
Press sleeve running times on Hoya PM 2.



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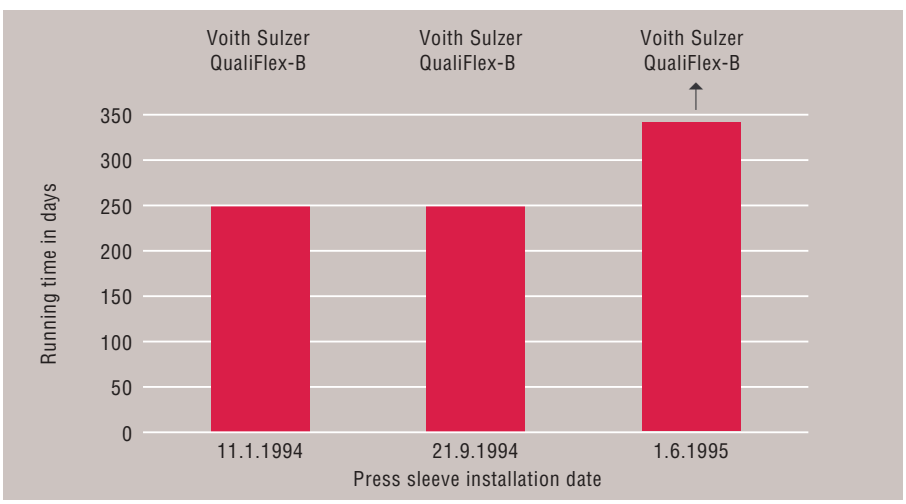

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The troublefree commissioning of QualiFlex press sleeves was demonstrated on the VP 6 machine in Sydney and PM 2 at the Hoya mills.

At Visy Paper in Sydney, Australia, the first two blind-drilled QualiFlex sleeves installed on a linerboard machine operated for about 200 days at 800 m/min and 1150 kN/m. This corresponds to 51 and 53 million nip passes respectively *(Fig. 3)*. The third QualiFlex-B sleeve has been operating for more than 225 days at the time of writing. This represents more than 60 million nip passes. On PM 2 in the Hoya mills, the first two blind-drilled QualiFlex sleeves ran for 253 days each at 460 m/min and 990 kN/m. The third one has now been operating for more than one year. *(Fig. 4)*.

On the world's first newsprint machine with shoe press, a QualiFlex-B sleeve operated in Switzerland for 175 days. At a mean speed of 1140 m/min and 800 kN/N line pressure, this is equivalent to 70 million nip passes.

On the world's first machine (in Austria) with shoe press for producing woodfree copying paper, the first QualiFlex sleeve ran for 231 days straight after commissioning. At 1060 m/min this corresponds to about 62 million nip passes. All these QualiFlex sleeves were changed during planned shutdowns.

The newsprint machine with 9650 mm wire width commissioned in May 1996 represents a real quantum leap. Operating at a speed of 1700 m/min, this machine is likewise fitted with blind-drilled QualiFlex press sleeves.

As shown by these examples, the QualiFlex sleeve enables running times of 40 to 60 million nip passes with troublefree operation. These outstanding results reflect the consistently high quality of sleeve materials and manufacturing.

This experience forms a solid basis for meeting the high demands placed on shoe presses in the paper industry today.

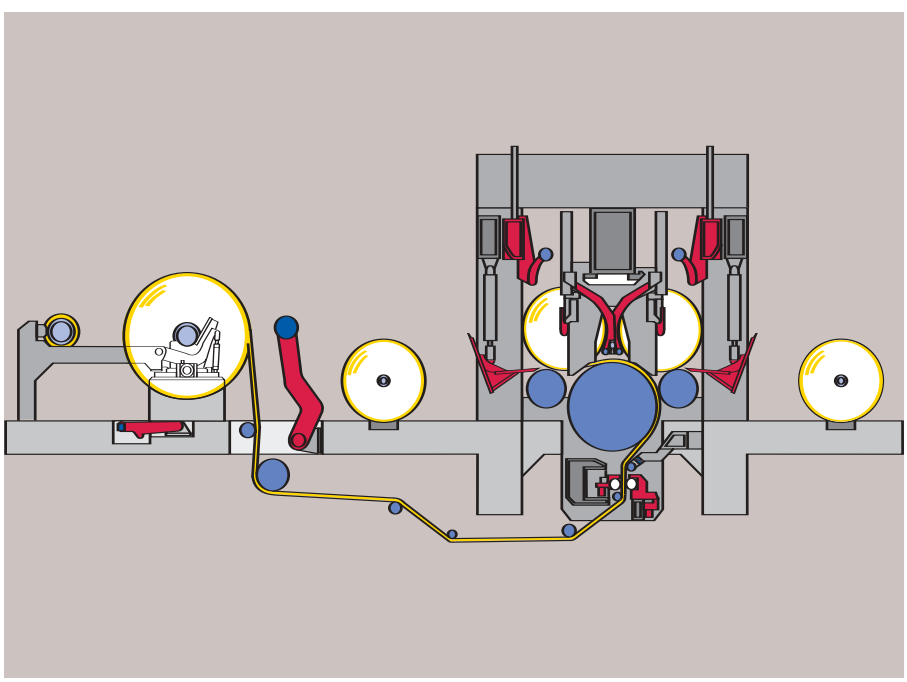
Paper Machinery Division:
DuoRoller II – a star in winder technology

Where will it all end? With ever-increasing press speeds, the printing industry is also demanding jumbo rolls of unprecedented size. These have already reached diameters of 1500 mm, widths of 3800 mm and weights of 8 tonnes or more. To take account of such requirements, the paper machinery industry must also develop suitable winding technology.

1

VSPT is meeting this growing challenge with winning concepts such as the DuoRoller II. Since the founding of Voith Sulzer Paper Technology, this slitting and winding system has developed into a market trend-setter. All the DuoRoller machines in service so far not only operate to complete satisfaction, but have exceeded all expectations. Among the growing list of reference installations and orders on hand are some interesting examples: Two DuoRoller II with a working width of 8900 mm together with a salvage winder for Braviken PM 53, currently the world's largest newsprint machine. Two DuoRoller II 8500 mm wide for the Halla mill in Korea, and two with a width of 7900 mm for Selangor in Malaysia, both of which are likewise newsprint machines. Furthermore, one

The author: Rudolf Beißwanger, product line winder technology



2

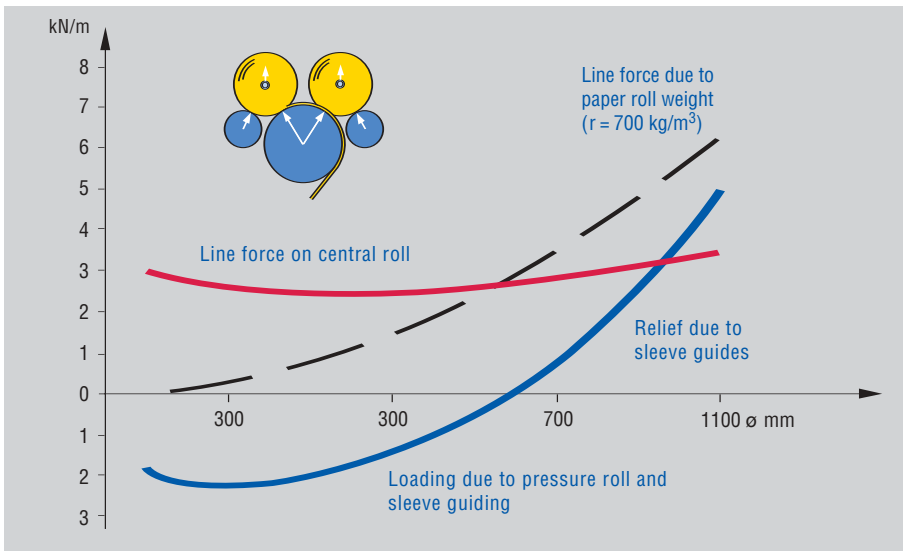
Fig. 1 (page 35):
DuoRoller II, on Schongau PM 7.

Fig. 2 (page 35):
DuoRoller II with Splicematic and web end gluing.

Fig. 3:
DuoRoller II line force characteristics.

Fig. 4:
Roll core loading due to sleeve forces.

Fig. 5:
DuoRoller II unwinder splice: automatic web joining.



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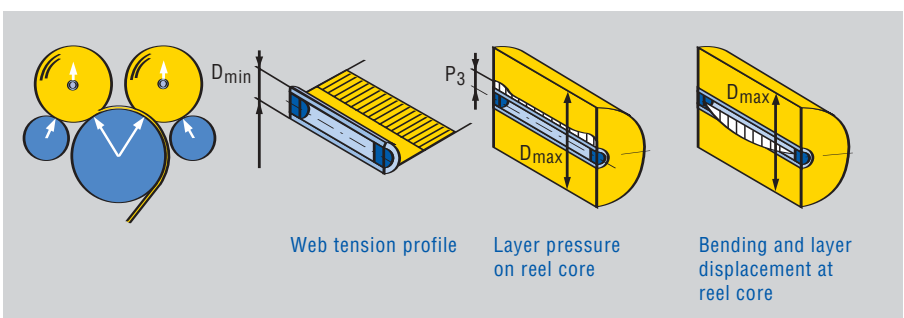

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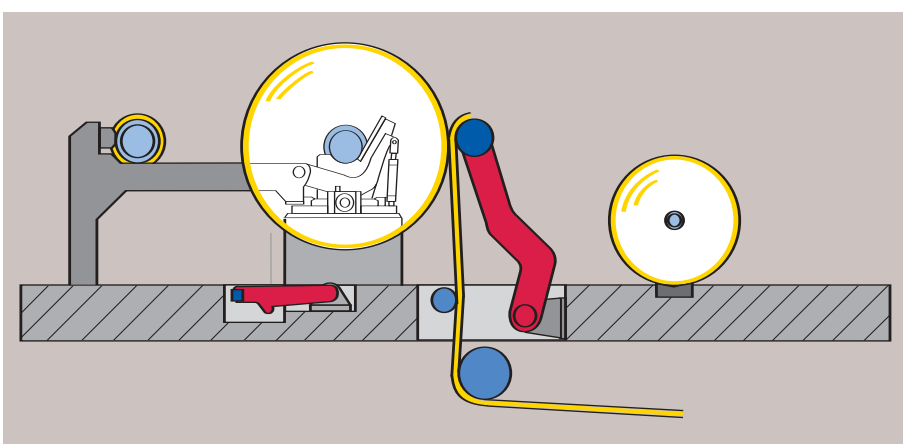

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DuoRoller II with a working width of 6100 mm for PM 6 at the Schongau mill in Germany, which produces high grade newsprint suitable for rotogravure printing. Haindl Paper now has six DuoRoller II installed at its Schongau and Schwedt mills – an excellent reference for the cost-effectiveness and technical superiority of this winder concept.

Free choice of modules

What are the reasons for this outstanding success? One of the chief advantages of the DuoRoller II is its modular concept, which allows great flexibility with regard to customized layout. A dependable feed system brings the web from the unwind stand through the slitter section to the rewind section *(Fig. 2)*. Two carrier drums, one on each side of the central roll, form a winding bed. The paper reels are wound to the required size in individual winding stations with end guides, which are supported by the carrier drums. Various degrees of automation for unwinding, slitting and roll changing allow perfect adaptation to production line requirements.

Superior winding concept for high-quality paper rolls

The ideal combination of a two drum and single drum concepts guarantees first class paper roll quality with low line forces. Thanks to precise winding control based on torque distribution between the central drum and carrier drum, winding

Fig. 6:
AutoSet II.

Fig. 7:
DuoRoller II: completion of web end gluing and reel changing.

density is optimal *(Fig. 3)*. Furthermore, high-precision core and roll guides in the winding bed prevent any core bending and ensure level web tensioning, optimal layer pressure distribution and extremely small layer displacement with respect to the roll core *(Fig. 4)*.

Further developments

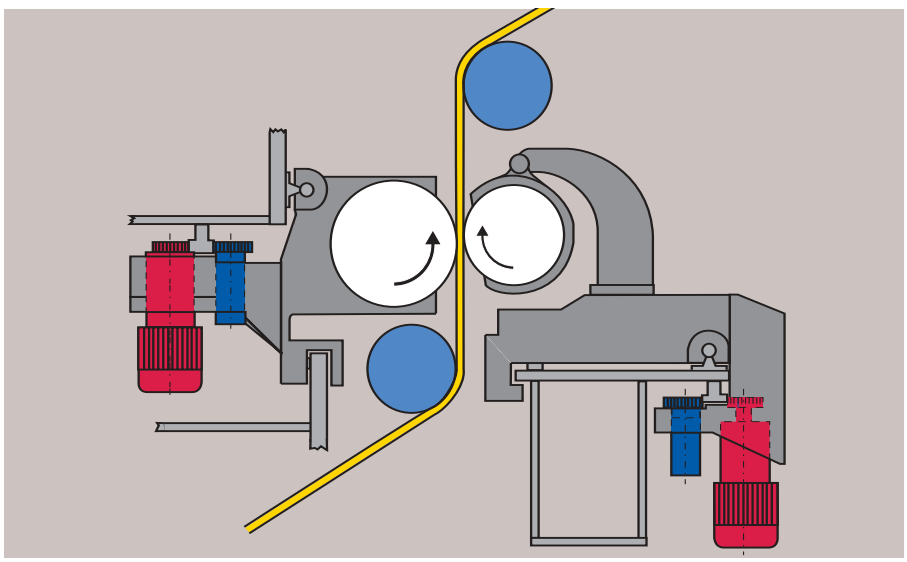
The first DuoRoller II generation was outstandingly successful since it was the first Multistation concept with fully automated reel changing system, thus allowing about 15% higher machine availability than other systems. In the meantime the second DuoRoller II generation has reached maturity, again with trend-setting improvements in automation and productivity as shown by the following three examples:

Splicematic

The Splicematic *(Fig. 5)* automatically joins the beginning of the new web to the end of the previous one. This is done by an adhesive tape fixed to the reel. The automation of this previously manual task not only reduces operation time, but increases overall machine availability.

AutoSet with automatic calibration

The AutoSet *(Fig. 6)* ensures high-precision setting of the knife and winding station to the given slitting format. The calibrating device also corrects the knife position after regrinding. The entire procedure is controlled very simply by keyboard and monitor screen.



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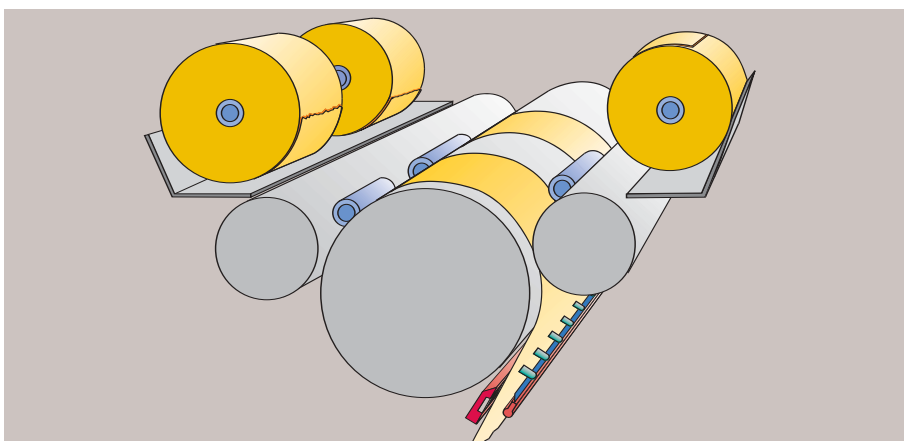

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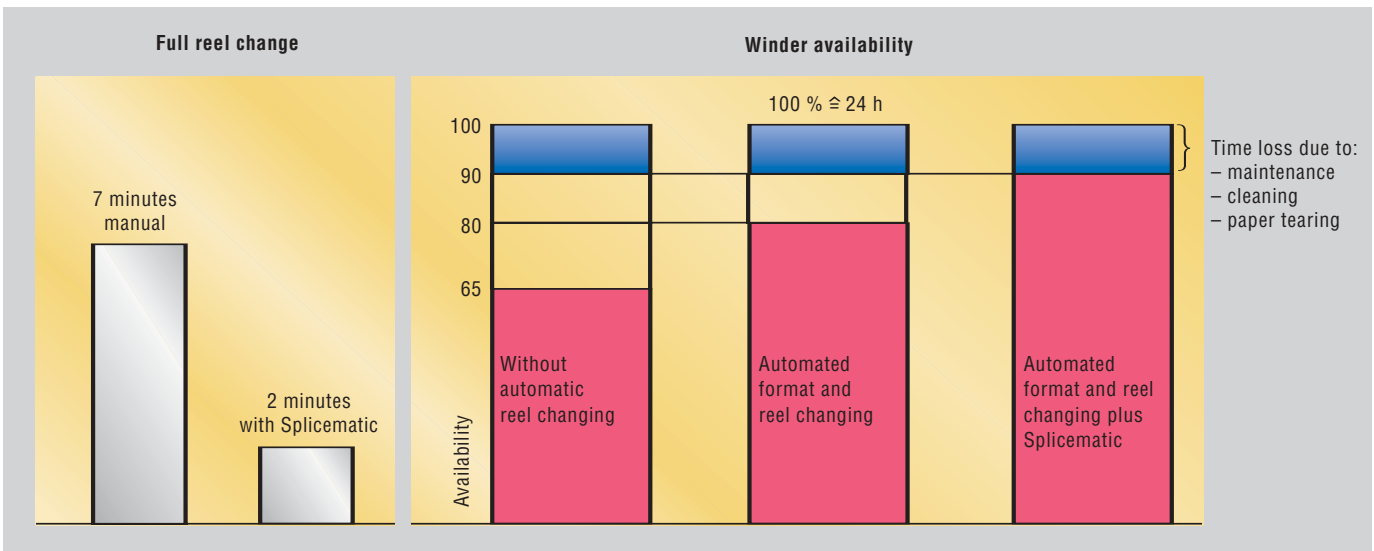
Roll changing and web end gluing

Two of the most important functions have been elegantly combined: automatic roll changing and web end gluing. The finished paper rolls are thus made ready in a single step for transport to the packaging station. Web end gluing takes place during the deceleration phase for each roll set, and requires no additional time outlay. As a result, automatic reel changing and web end gluing take less than 60 seconds.

Fig. 8 shows the time savings resulting from these new developments. The middle column represents the first DuoRoller II generation, and the right hand column shows the second generation with the

Fig. 8:
Availability improvement due to automation.



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Splicematic and web end gluing modules. As a comparison, the left hand column shows a Multistation concept without the automatic reel changing so important for machine availability.

Promatic

The degree of automation can be increased even more than this, thus enhancing quality and performance still further, by using a ultra modern computerized control system known as the Promatic. Thanks to this new system, some ambitious dreams have now become reality:

- Maximum productivity through greatest possible automation of all procedures
- User-friendly control
- Low-maintenance control system with continuous diagnostics.

The Promatic system combines programmable controls with networked high-availability industrial PCs, thus enabling keyboard control and screen monitoring with immediate response times. The Promatic is linked to the machinery via an equally rapid and reliable field bus (Interbus) as shown in *Fig. 9*. This brings the following advantages:

- Wiring is kept to a minimum
- All components are works tested for shorter commissioning times
- Simple troubleshooting during operation thanks to self-diagnostics.

Rollmaster winding density control

By reproducible control of winding structure, the Rollmaster control system brings a further significant improvement in paper roll quality. The Rollmaster incorporates a production data module with statistical evaluation of winding structure.

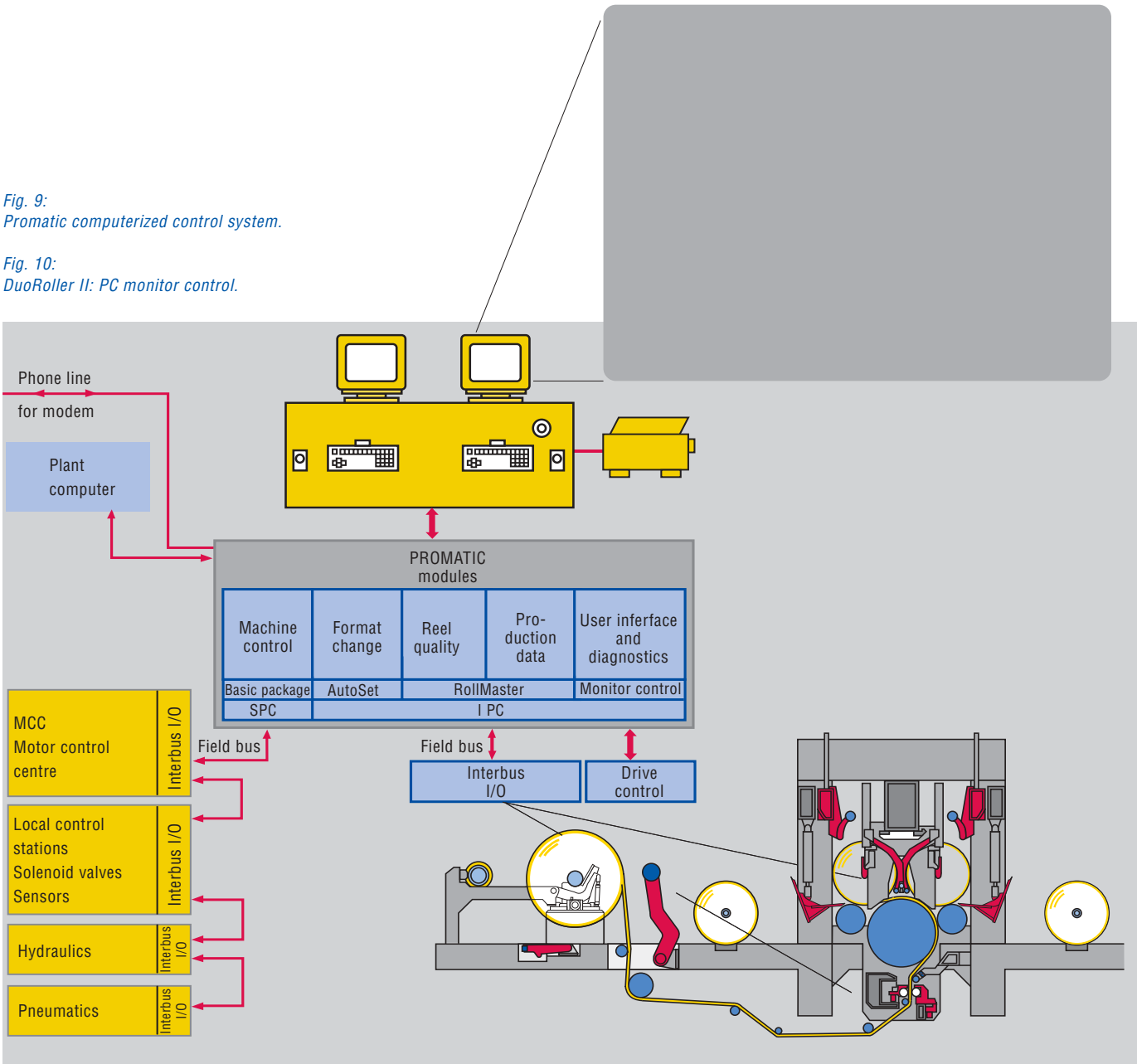
PC user interface

All operations are controlled and monitored from PC stations with windows interface and full redundancy. Commands are entered by function keys and trackball. Comprehensive troubleshooting support is provided by diagnostics software, and a modem connection is included as standard for remote diagnostlcs.

In summary, the DuoRoller II is currently the most up-to-date winding concept in particular for graphical papers. It enables customized systems to be set up which not only meet today's ever-increasing demands, but also allow for future expansion.

Fig. 9:
Promatic computerized control system.

Fig. 10:
DuoRoller II: PC monitor control.



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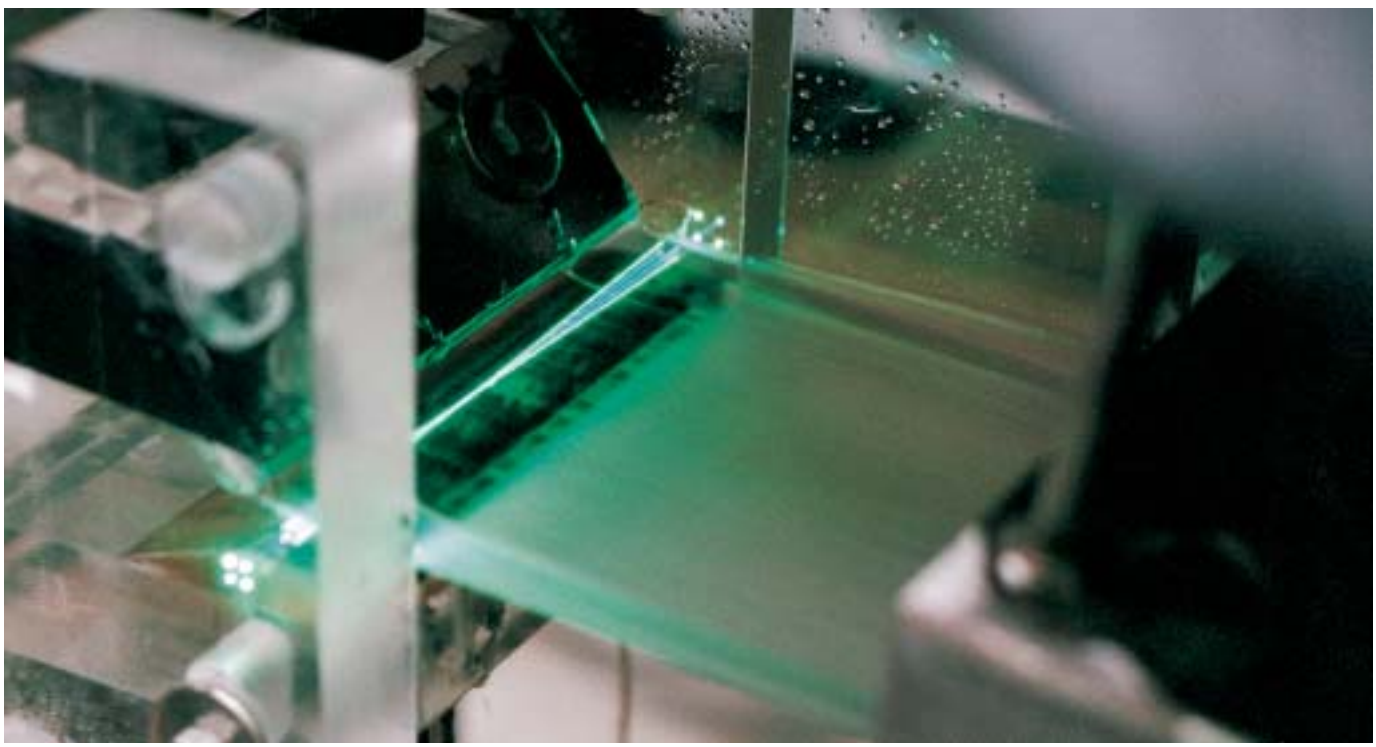
Paper Machinery Divisions:

Voith Sulzer Paper Technology benefits from Sulzer Innotec resources

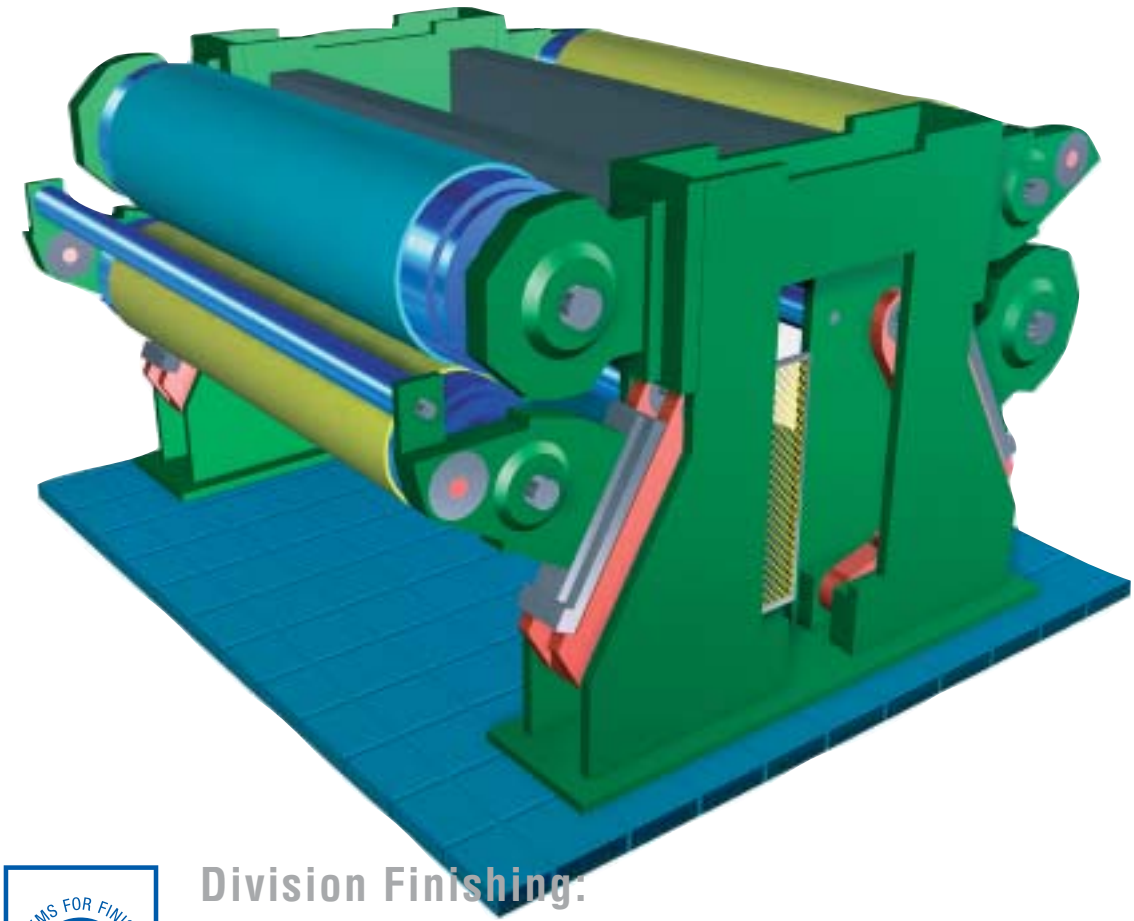


The Sulzer Technology Corporation, Winterthur, maintains its worldwide leadership through ongoing activities in basic research.

The author:
Dieter Egelhof,
R & D, Heidenheim

Voith Sulzer Paper Technology has unrestricted access to the latest advances in modern measuring technology during the course of this research work. In the Sulzer Innotec fluid mechanics laboratory, for example, state-of-the-art laser methods are used for flow measurement and analysis. The data thus obtained can also be applied to the further development of headbox designs, and this is one of the ways in which Voith Sulzer Paper Technology benefits from the pioneering work of Sulzer Innotec. The laser doppler anemometer (LDA) is a case in point – it measures the 3-dimensional flow velocities and turbulences in headbox nozzles and pulp jets much more precisely than all known methods so far. To this purpose four laser beams penetrating inside the headbox are precisely focused on predetermined measuring points.

Another technical innovation is the laser particle image velocimeter (PIV), which generates an image of flow conditions at the measuring point. We shall be reporting in our next issue on the results obtained with this new concept.



1

Division Finishing:

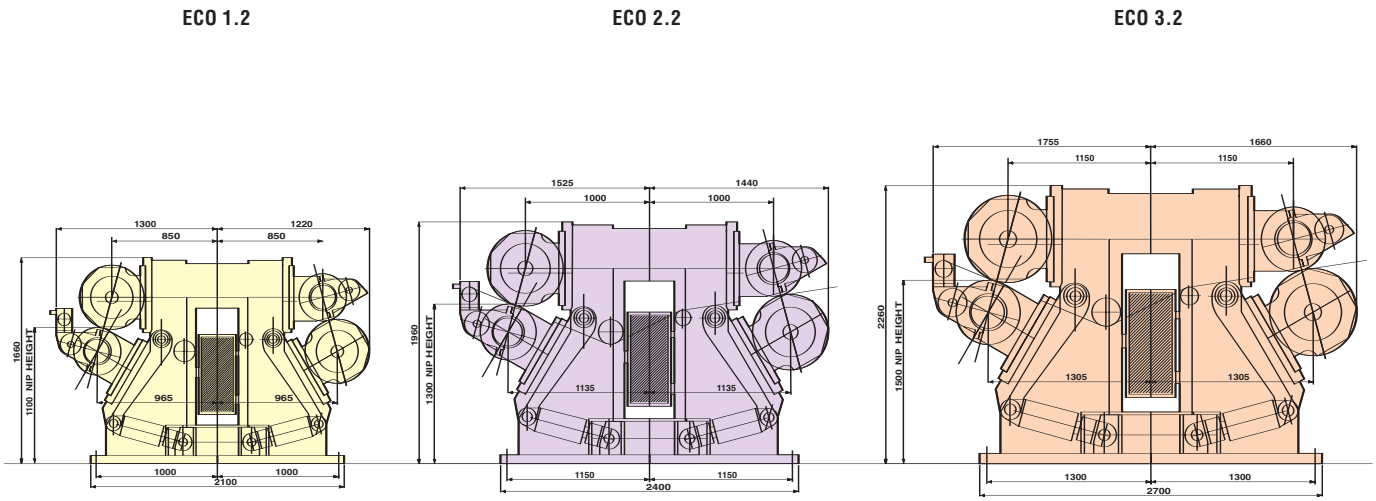
Ecocal – the modular system for soft calendering

Soft Nip Calendering has become a well established method for finishing a wide variety of paper and board products, with the ability to achieve much higher levels of smoothness, gloss and printability over hard nip calendering widely recognised. To illustrate this point, two thirds of all the calenders sold since the middle of 1990 by companies now within the Voith Sulzer Finishing Division have been Soft Nip Calenders.

To satisfy the demands of the end user, Calender manufacturers have been constantly extending the operating capabilities of their machines and the Voith Sulzer Finishing Division is at the forefront of this technology with Soft Calenders supplied and in manufacture to operate at up to 200°C roll surface temperature, linear pressure of 450 kg/cm and speeds of up to 1800 metres per minute. The Janus Concept was developed to provide finishing capabilities beyond the current soft calender design limits whilst at the same time requirements of other sections of the market, where paper and board finish qualities are not as demanding, have also been considered by the introduction of a new generation of finishing calenders.

Since 1980 Hunt & Moscrop as a member of the Voith Sulzer Finishing Division have supplied over one hundred Soft Nip Calenders, with each Calender being designed and manufactured to suit the customer's particular requirements. The design range o the Calenders manufactured by the Voith Sulzer Finishing Division includes roll face-width from 600 mm to 9600 mm, maximum operating speed from 60 to 1800 metres per minute, maximum

The author: Stan Heal, applications Hunt & Moscrop



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thermo roll surface temperature from ambient to 200°C and maximum linear pressures from 80 to 450 kg/cm to provide maximum specific nip pressures from 21 to 41 N/mm^2. This has meant many hours of engineering involvement and specially produced equipment from sub-suppliers on an individual contract basis, with associated high costs, to satisfy these particular customer requirements. To cope with the increased demand from paper and board producers it was decided to take a new approach by developing a standard range of Calenders – the Ecocal *(Fig. 1)*.

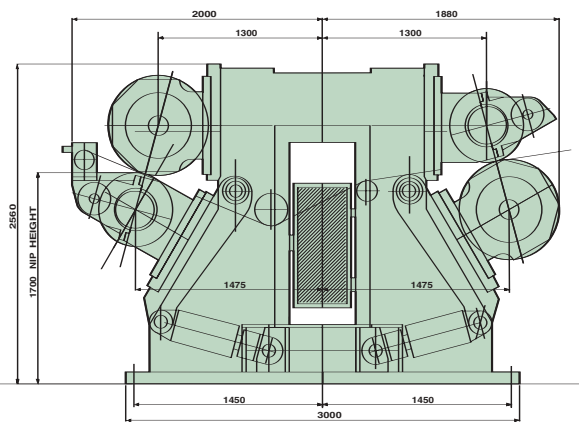
The operating conditions and customer requirements from the two hundred Soft Nip Calenders installed world-wide by the Voith Sulzer Finishing Division were analysed, as were the results of several hundred customer trials carried out on the Hunt & Moscrop pilot Calender and it was found that a large number of applications felt within the operating limits of 150°C roll surface temperature and 35 N/mm^2 specific pressure. These operating limits were then selected as the design parameters for the Ecocal range of standard calenders. There are five sizes of Calender in the range, in double nip and single nip design, for finishing both sides or just one side of the sheet. There is also a double nip design with compact frames for installations where space is limited.

The Ecocal range is based on a modular design concept with one size of loading arm and hydraulic cylinder for each of the five sizes of Calender frame. Each frame and pivot arm assembly can accomodate two sizes of rolls. For the nominal design conditions the roll sizes change with 250 mm changes in maximum sheet width and the frame size changes with 500 mm changes in maximum sheet width to give a maximum sheet width processing range from 1500 mm to 4000 mm.

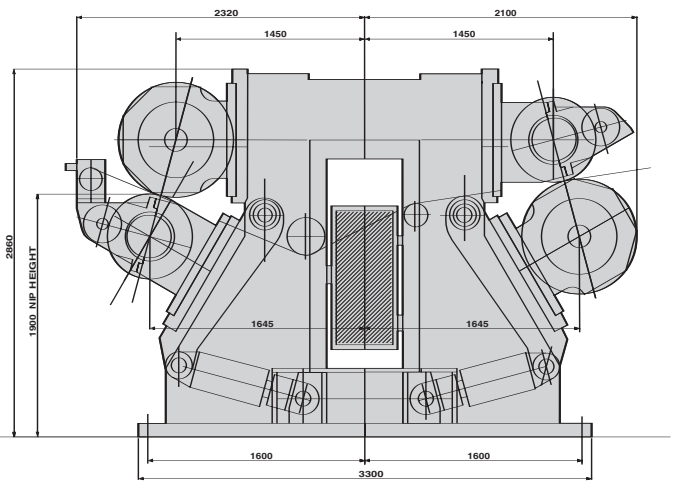
This standardised, modular design concept means that considerably less engineering design and drawing time is required for each contract and because standard drawings exist information can be made available for manufacturing departments much earlier in a contract than is normal for a custom built machine, therefore enabling shorter delivery times to be offered for an Ecocal than for a specially designed Calender *(Fig. 2 and table)*.

Although the Ecocal was originally conceived as a lower priced range of Calenders several advanced design features have been incorporated to provide the customer with a high quality machine suitable for finishing a wide variety of paper and board grades. The latest development of thermo roll utilising direct steam heating is included, for roll surface temperatures of up to 150°C, eliminating the need for a separate oil heating system with it's associated installation and main-

ECO 4.2



ECO 5.2



Ecocal – Standard Design Range

Calender Reference Number	Maximum Sheet Width (mm)	Maximum Operating Speed	Maximum Linear Pressure	Maximum Specific Pressure Toptec 3	Toptec 4	Maximum Operating Temperature
ECO 1.1	1500-1750	600 m/min	175 kg/cm	33 N/mm^2	35 N/mm^2	150°C
ECO 1.2	1750-2000	600 m/min	190 kg/cm	33 N/mm^2	35 N/mm^2	150°C
ECO 2.1	2000-2250	600 m/min	205 kg/cm	33 N/mm^2	35 N/mm^2	150°C
ECO 2.2	2250-2500	600 m/min	215 kg/cm	33 N/mm^2	35 N/mm^2	150°C
ECO 3.1	2500-2750	600 m/min	235 kg/cm	33 N/mm^2	35 N/mm^2	150°C
ECO 3.2	2750-3000	600 m/min	250 kg/cm	33 N/mm^2	35 N/mm^2	150°C
ECO 4.1	3000-3250	600 m/min	262 kg/cm	33 N/mm^2	35 N/mm^2	150°C
ECO 4.2	3250-3500	600 m/min	280 kg/cm	33 N/mm^2	35 N/mm^2	150°C
ECO 5.1	3500-3750	600 m/min	295 kg/cm	33 N/mm^2	35 N/mm^2	150°C
ECO 5.2	3750-4000	600 m/min	310 kg/cm	33 N/mm^2	35 N/mm^2	150°C

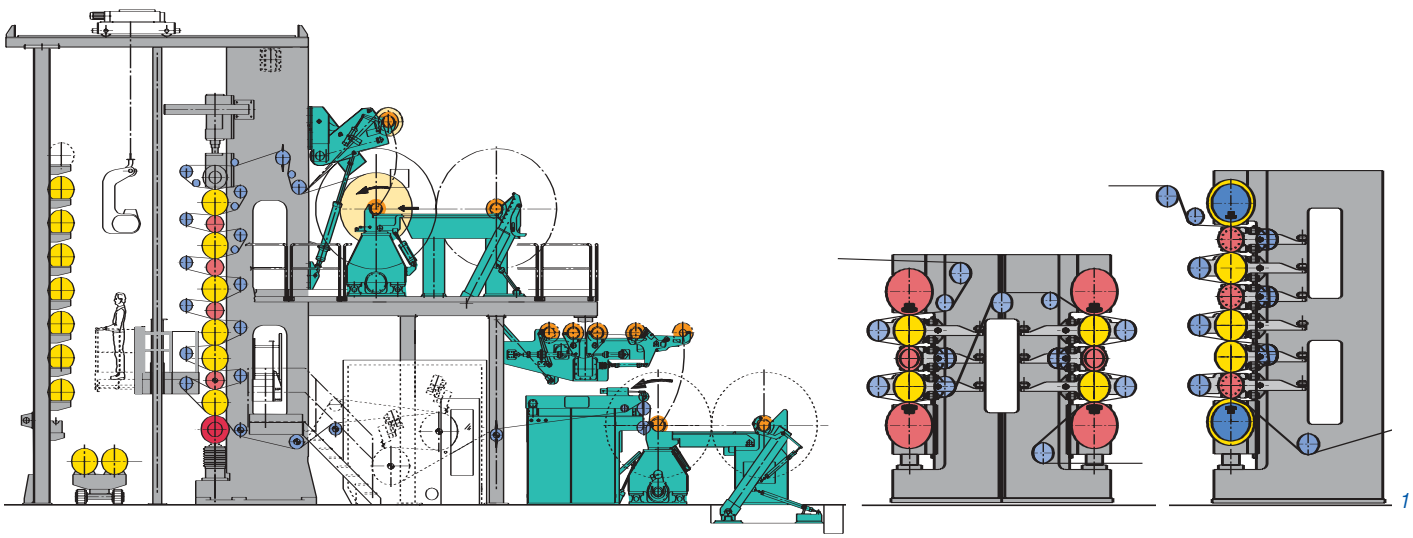
tenance costs, whilst at the same time providing and extremely good temperature profile across the roll face. Improvements have also been made to the traditional Hunt & Moscrop Swimming Roll, of which over 3500 have been supplied world-wide. By extending the internal bearing centres the Econip-X roll gives an accuracy of line force distribution which is the best possible of any single zone deflection compensating roll.

At the initial design stage careful consideration was give to the stresses created in the roll soft cover and the loading arrangement was designed to reduce the tangential stresses in the roll cover as much as possible. Because of the good line force distribution and the reduction in cover stresses it is anticipated that the periods between cover regrinds will be longer than those for existing Soft Nip Calenders although, of course, because of other factors affecting cover wear rates it is not possible to quantify this.

Another design target for the Ecocal team of engineers was to make roll changing and routine maintenance as easy as possible, to reduce scheduled (or unscheduled) downtime and permit productivity from the Calender. The design of the Ecocal is based on the experiences gained by Hunt & Moscrop from over fifteen years of Soft Calender manufacture and is an evolutionary rather than a revolutionary design. The Ecocal Concept is intended to satisfy a section of paper and board producers and as previously mentioned it is the base for further Ecocal versions which are designed for higher speeds, higher linear loads, higher temperatures and increased facewidths also, to enable the Voith Sulzer Finishing Division to cover all paper and board finishing requirements by out comprehensive range of equipment.

Finishing Division:

The Janus Concept – a supercalender with plastic rolls?



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Ever since the Janus technology centre in Krefeld was opened, there has been wide discussion on the Janus calendering concept. In view of the fantastic possibilities opened up by this concept, the following question arises again and again: does the Janus Concept simply mean fitting a supercalender with plastic roll covers? At first sight this question appears perfectly justifiable – as shown in *Fig. 1*, one of the many possible Janus layouts looks very much like a supercalender seen from the side. The only way to answer this question properly, however, is to compare test results on supercalenders where the rolls are replaced one by one with plastic covered rolls. *Fig.2* shows the reduction of sheet smoothness after replacing a certain number of roll covers, and *Fig. 3* shows the effect on gloss. In both cases the test material was LWC of European origin. The trend is clear: as the number of plastic covered rolls increases (up to 4 in this case), sheet smoothness reduces by 10% and gloss by 3%. The reason for this significant drop of supercalendering results, solely due to installing plastic roll covers, is shown in *Fig. 4*. Four of the five cotton-covered rolls on a 10-roll supercalender for wood-free coated paper in a US mill were replaced by plastic covered rolls. As a result, the main drive power consumption immediately fell by about one third. In other words, flexure of the cotton-covered rolls in the nip had previously converted one third of the drive power consumption into heat. This also means that one third of the calendering energy is missing when plastic roll covers are used. So the Janus Concept is certainly not as simple as the question asked at the outset.

The author: Franz Kayser, Marketing, application, R & D

An examination of gloss and smoothness development in each individual supercalender nip *(Figs. 5 and 6)* clearly shows that optimal smoothness and gloss is already reached after just over half the available roll nips. This also applies to the other paper parameters involved. In actual fact, many nips would be unnecessary in the supercalender if cotton roll covers were not so sensitive to marking. This brings us to the first principle of the Janus Concept – keep the number of nips down to the minimum necessary. A flexible roll cover is therefore required which is extremely resilient to marking. The plastic material development together with roll cover experts is compared in *Fig. 7* with cotton covers, showlng the enormous difference in marking sensitivity.

Fig. 1:
Left: supercalender for art paper.
Right: Janus calenders with 2 x 5 or 1 x 8 rolls.

Fig. 2:
Smoothness development.

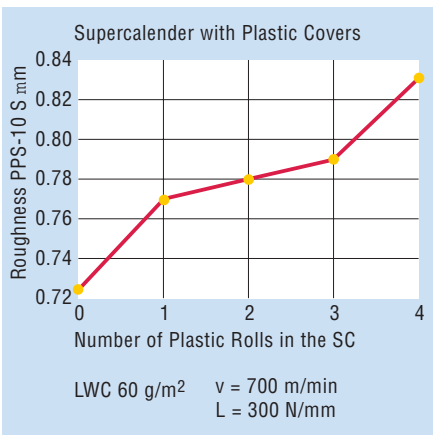
Fig. 3:
Gloss development.

Fig. 4:
Drive power as a function of elastic roll cover material.

Fig. 5
Effect of number of nips on paper surface roughness.

Fig. 6
Effect of number of nips on gloss.

Fig. 7
Sensitivity of roll cover materials to marking.



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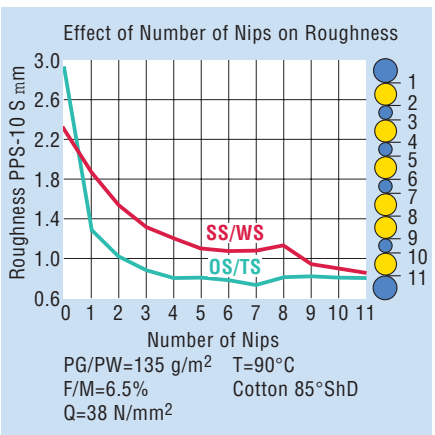

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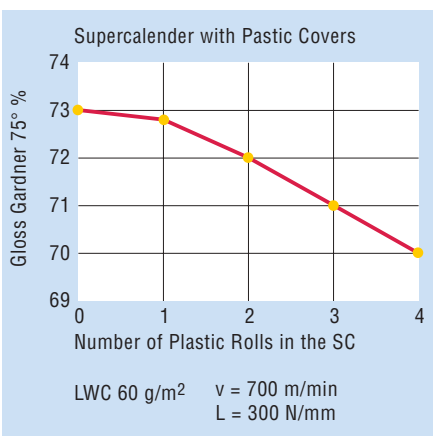

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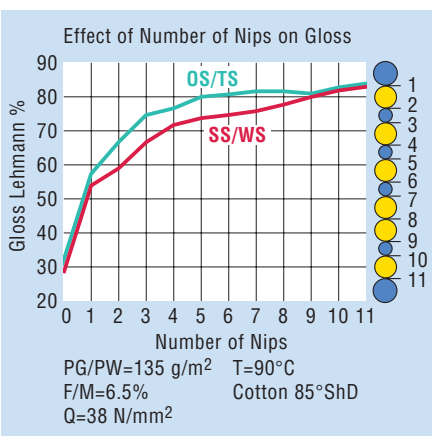

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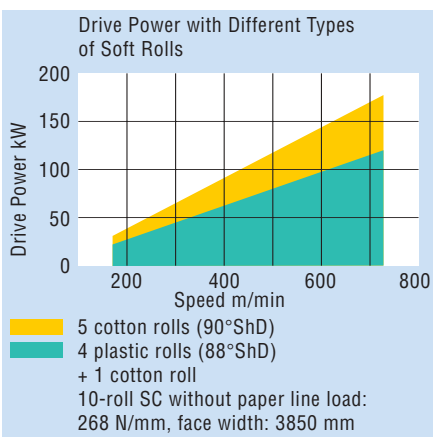

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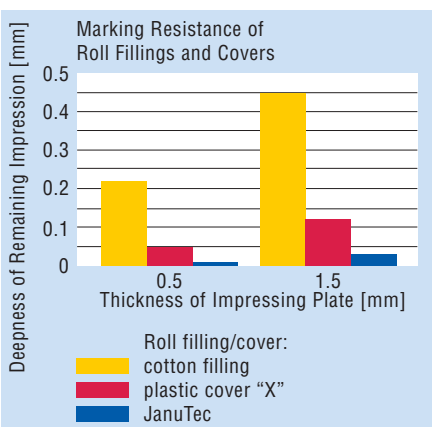

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To convert an 11-nip supercalender into a 7-nip Janus calender, not only must the roll covers be insensitive to marking, but also to mechanical loading and high-frequency load reversals. The comparison of a supercalender plastic roll with a JanuTec in *Table 1* shows very clearly that the JanusTec must be twice as resistant to thermal loading as well as to mechanical loads and loading frequencies.

The same applies to the metallic side of the nip, i.e. the heating rolls. Here again, new materials had to be developed. On one hand to allow temperatures of about 140-150°C (between soft calender and supercalender levels). On the other hand to develop enough wear resistance for reasonable roll grinding intervals under the tough conditions of the Janus conditions.

Table 1: High loadable soft covers for Super- and Janus Calenders

Use for	**Super-calender**	**Janus concept**
Hardness °ShD	91	91
Long time operation temp. °C	110	140
Max. line load N/mm	350	500
Max. spec. pressure N/mm²	42	60
Max. load change frequency Hz	7-9	25

Fig. 8:
Microstructure of a cast chilled iron roll, hardness KT 550, magnified 100x.

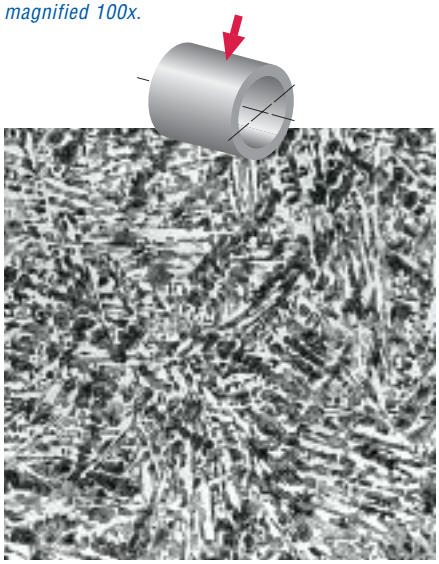

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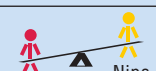
Table 2: Surfaces of Thermo Rolls

Surface material:	**Chilled Iron**	**Chromium**	**SUME^{cal} GD 02**
Hardness HV	530	800	1400
Application system		galvanic bath	High-Velocity Oxygen Fuel
Roughness Ra, ❍m	0.08	< 0.04	< 0.04
Coating thickness		150❍m	150❍m
Notes	chilled cast iron, surface roughness increasing during operation	no doctors, very dangerous at high temperatures	latest technology, with doctors especially for coated papers

Table 3: Technology comparison

	Supercalender 11 nips 70°C, 700m/min	**Janus Concept** 7 nips 150°C, 1500m/min	**Softcalender** 4 nips 200°C, 1500m/min
Gloss	–	++	++
Smoothness	++	++	–
			

As shown in *Fig. 8*, the structure of the chilled cast iron calendering rolls traditionally used for almost a century is totally inadequate for this purpose. The distribution of hard and soft materials on the roll surface would lead too quickly to a roughness completely precluding efficient smoothing. Neither was it possible to fall back on the well-tried solution of chromium plating, which is too soft for the Janus nip. Another drawback is that chromium is too sensitive to scratch marking by the all-important doctors.

In close cooperation with surface coating specialists, the new surface material Sumecal was developed. This raises no problems with doctors, and meets all smoothness and gloss requirements. *Tab. 2* shows a comparison of chilled cast iron rolls with chromium and Sumecal.

As mentioned above, the supercalender temperature level is too low for these requirements. On the other hand, although the temperature level of the soft calender is high enough at 200°C, it reaches its limits all too often and too early.

Particularly in the case of paper qualities which require densification such as LWC rotogravure printing or SCA-paper, the meryless smoothing of the soft calender shows up in the form of compression stripes, a kind of miniature corrugation on the surface. Since this effect can influence printing results, soft calendering is often not possible.

In any case, a comparison of supercalendering with soft calendering shows that temperature and mechanical nip capacity are out of balance. And wherever conditions are unbalanced, there is always a deficit in one respect or another. During the test series which finally led to the Janus Concept, a clear optimum was established between mechanical deformation energy and the corresponding temperature effect in the nip.

Since this optimal balance between temperature and mechanical deformation differs according to paper grade, the limits

Fig. 9:
Comparison of line force distribution.

Figs. 10 and 11:
Janus and supercalender tests with comparable results but at different maximum speeds.

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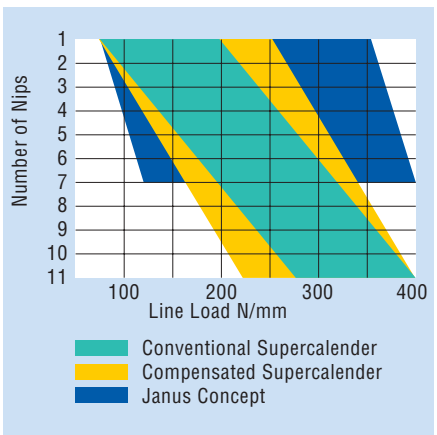
Fig. 11:
Janus calender in the Krefeld Janus technology centre.



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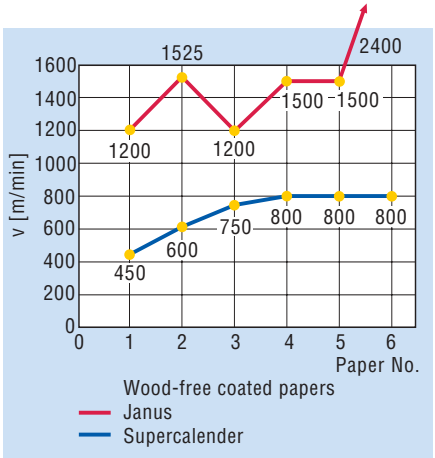

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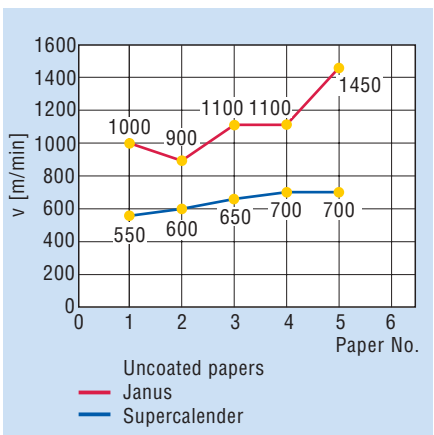

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for the Janus Concept were fixed so that all the optimal combinations required can be set at a specific pressure of 60 N/mm^2 and a maximum heating roll temperature of 150°C *(see table 3, technological comparison).*

In a study published at the end of the nineteen-eighties, *("The SNC, the Supercalender of the Nineties"),* the importance of smoothing in the upper supercalender nips was emphasized. The relationship here is quite simple: the lower the roll weight in a multiroll calender, the higher the smoothing potential, since a greater proportion is taken over by the upper roll nips. So it could seem to be the best, having the same line load in the lower part of a calender and in the upper part – for having the highest possible smoothing effect.

Various systems are known in this direction, such as horizontal roll arrangements, or the total relieve of the roll weight. Here again, however, only one optimum is possible between maximum smoothing effect of the roll stack and – in this case – web running characteristics. In other words, the line force should vary to a certain extent from one nips to the other in order to generate the web tension between the nips which is essential for wrinkle-free running.

The physical rules involved were established during development of the Janus Concept and are taken into account in the loading diagram shown in *Fig. 9.*

Apart from plastic rolls, heating rolls and their coatings, a good many other studies and developments have been carried out in this connection, but they would far exceed the scope of this article.

Fig. 10 summarizes the results of all these developments in the Janus Concept. The blue curve at the bottom represents the maximum speeds possible on a supercalender with various types of paper. The red curve at the top shows the speeds reached on a Janus calender for the same gloss and smoothness results on the same papers. The speeds attainable with the Janus Concept are twice or three times as high – in clear contrast to the results shown in *Fig. 2 and 3* for a supercalender with plastic rolls.

The answer to the question asked at the beginning of this article is definitely NO, therefore. As explained above, the matter is not so simple. In actual fact, the Janus Concept is a totally new form of calendering which exploits all the advantages available today.

A supercalender can of course be upgraded into a Janus calender – but it takes a lot more than simply installing plastic covered rolls.

Finishing Division:

Twister – reel packaging for the future

A lot of effort goes into producing and finishing paper, so it has to be properly protected against mechanical damage and climatic effects on its way to the printers. This is precisely the job of the reel packaging and transport systems marketed since 1968 by Voith Sulzer Finishing GmbH, Krefeld, together with all kinds of surface finishing machinery.

Optimal reel handling means transporting, storing and packaging the finished rolls of paper without damaging the high product quality achieved at so much outlay.

Voith Sulzer Finishing GmbH supplies comprehensive systems for all reel handling needs in the paper and printing industry, ranging from reel removal after cutting to completely automatic paper loading on printing presses. Our decades of reel handling know-how are not only available to customers in the paper industry, but also to the printing and other associated industries.

The author: Volker Schölzke, packaging and transport systems.

The main task of the reel transport system – moving the finished paper without damage – is assisted by optimal packaging. Apart from preventing damage, the packaging must also retain the specific product characteristics and quality features of the paper. At the same time, it has to cost as little as possible and be environmentally compatible. On top of all these requirements, the packaging also serves as publicity medium and has to stand up to normal wear and tear by reel grips. We have found that the best way of meeting these widely varied demands is to use packaging paper. Trials by some mills on plastic foil instead of packaging paper showed that many of these requirements – some of which are contradictory – are not met optimally by plastic packaging *(Table 1)*.

Table 1:
Quality demands on paper reel packaging

- Cost-effective
- Moisture-proof and unaffected by climatic changes
- Protection against mechanical damage by reel grips, resistant to dirt, dust, grease, oil, etc.
- Durable and crush-resistant
- Suitable as a publicity and corporate design medium (printed logo, etc.)
- Environmentally compatible and recyclable

Conclusion: the above requirements are best met by packaging paper, which in most respects is superior to other packaging materials such as foils, stretch fabric, etc.

Another point is that the ongoing increase in reel width – now already up to 4 metres – makes it necessary to redesign traditional packaging machinery, such as the Lowpack or Normpack concepts used so far according to mill space conditions *(Figs. 1 and 2)*.

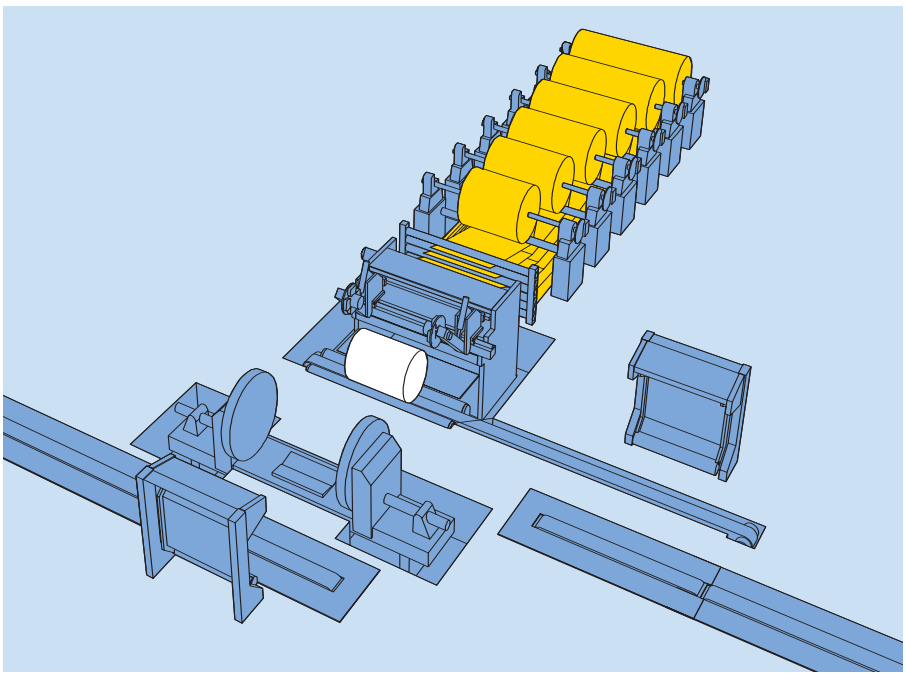
The handling alone of wide packaging paper reels is not without its problems, depending on space available. Although the number of reels to be packed per hour reduces with increasing width, there is a wider range of sizes between smallest and largest reels. This means that the manual and automated reel packaging machines existing at the present time have to be adapted to the needs of future markets.

The number of reeling stations required for conventional packaging machines depends on the width range of reels to be packed. Packaging paper has to be wide enough to cover the entire reel, including extra material for the fold overlaps at both ends.

In order to ensure sufficiently strong folds and a neat appearance, overlaps should be at least 100 mm but not more than 250 mm at each end. This wide tolerance of 150 mm means that for each step of 300 mm in reel width, an additional packaging paper winder is required. As a result, a packaging machine for reels up to 3 m wide already

Fig. 1:
Reel packaging machine type Lowpack Center.

Fig. 2:
Reel packaging machine type Normpack Line.



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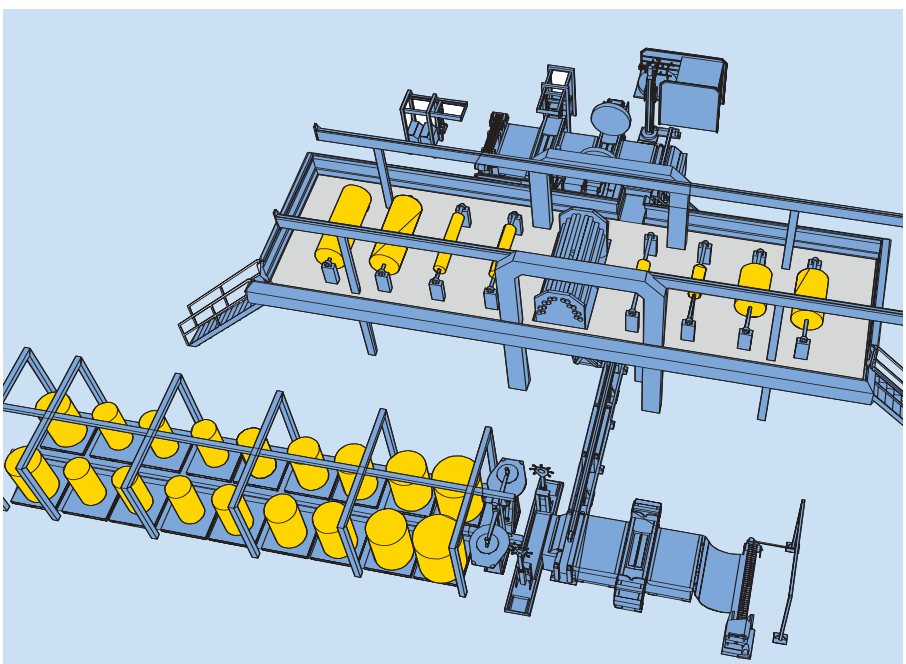

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has 10 winding stations. For wider reels, as many as 12, 14 or even more stations are required.

The associated drawbacks are high investment costs, complex machinery with intensive maintenance requirements, and high logistical outlay for the wide range of packaging paper widths. As leading partner to the paper industry, Voith Sulzer Finishing GmbH therefore felt obliged to develop a new reel packaging concept *(see Table 2)*.

This new concept is the Twister, a single packaging machine for reels of any size – whatever their width or diameter – using only one size of packaging paper.

Table 2:
Reasons why the paper industry needs a new reel packaging technology

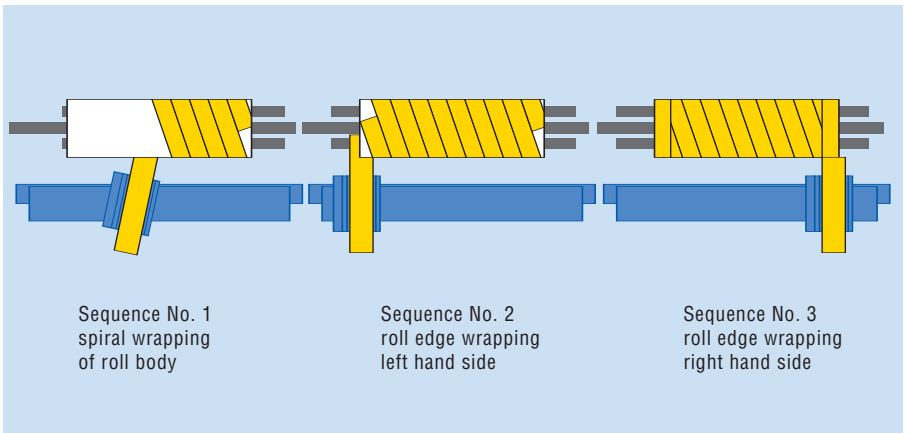
- The wide variety of reel widths and weights demands wide-range packaging capacity
- The ongoing increase in reel sizes demands a flexible, extendible packaging system
- Conventional reel packaging machines need too much space
- Logistics costs for handling and storage of packaging materials are high due to the wide variety of reel widths
- High dynamic loads due to reel handling on conventional packaging systems cause excessive wear on machinery components.

Fig. 3:
Spiral winding principle.

Fig. 4:
Twister layout.

The Twister reel packaging machine works on the spiral winding principle, using conventional packaging paper (i.e. without stretch effect), as shown in *Fig. 3*.

For all reel widths, the same packaging paper width is used (e.g. 500 mm). The spiral winding angle and the feed rate of the packaging paper dispenser along the reel are automatically adjusted to the number of wrapping layers required. The spiral overlaps are glued together to ensure high strength, form stability and good sealing against moisture and climatic effects. The overlapping folds – protecting the paper edges at the reel ends – are wound separately at right-angles to the reel axis, thus maintaining an optimal fold overlap width of 150 mm. The number of layers can be adjusted to the degree of edge protection required. The Twister is a compact automatic machine which takes up very little space, because it has only one feed line and a short winding shaft for the packaging paper *(Fig. 4)*.



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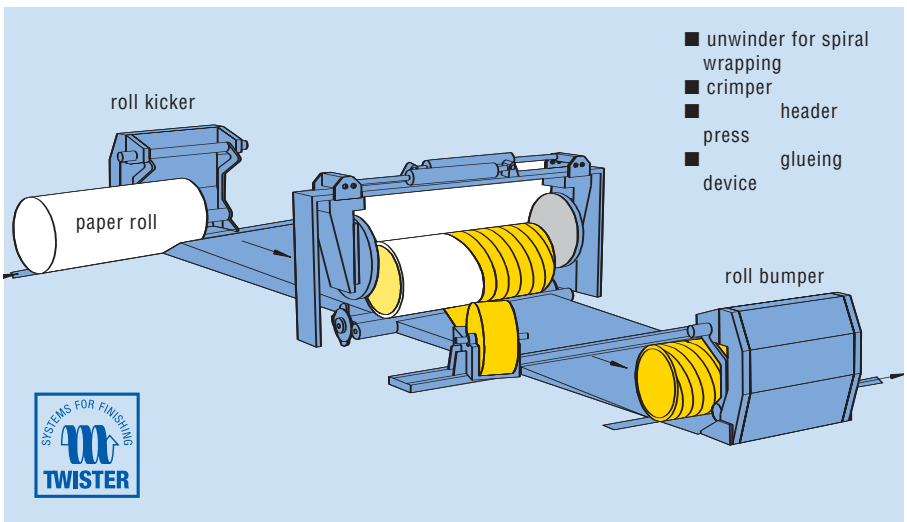

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Table 3:
Advantages of spiral winding instead of conventional reel packaging

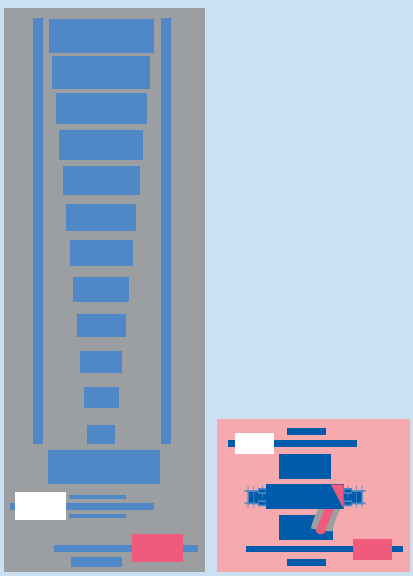
- Low investment costs – only one compact packaging unit instead of extensive system machinery.
- Less space requirements for machine and packaging paper storage
- Only one standard packaging paper width for all reel sizes
- Uses well-proven packaging materials
- Ideal for packaging all current and future reel sizes
- High degree of additional edge protection
- Variable packaging capacity thanks to modular design.

With constant packaging material costs per reel, Twister users benefit from numerous savings and technological advantages *(see Table 3)*. In particular, the cost-intensive outlay for storing and handling various widths of packaging paper is eliminated. With the Twister concept, packaging materials logistics are simple and cost-effective, since there is

Table 4:

Drawbacks of conventional reel packaging machines	**Advantages of spiral-winding reel packaging machines**
■ Complex winding mechanism with wide packaging papers ■ Large space requirements	■ Simple winding shaft with short travel. Only one packaging paper roll width required. ■ Small space requirements ■ Compact unit ■ Simple installation in the production line ■ Modular design covering all capacities
■ High dynamic loads because several packaging stations required ■ Complex control system due to large number of stations ■ Many different packaging paper widths according to reel width ■ Complex handling required for changing packaging paper rolls ■ Complex storage requirements for several different packaging paper widths ■ Ageing/drying-out of packaging paper in widths seldom used causes wide variation in packaging quality.	■ Low dynamic loads since only one compact packaging unit is required ■ Simple control system as a result ■ Only one packaging paper width required for spiral wrapping ■ Simple handling of only one packaging roll size ■ Low-cost procurement and storage since all packaging paper rolls are the same size ■ Continuous consumption of packaging paper ensures consistent packaging quality.

Fig. 5:
Comparative space requirements.



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no need to take account of the different widths of reels to be packaged. *Fig. 5 and Table 4* show the advantages of the new Twister compared with conventional reel packaging machines. Not only are space requirements much less and investment costs lower, but far less outlay is required for operation and maintenance. Due to the spiral winding principle, the packaging performance of the Twister depends on the reel diameter and above all on the reel width. The smaller the diameter and the shorter the reel, the higher the packaging speed. This corresponds exactly with day-to-day practice in the paper industry – either a large number of short reels have to be packaged, or a smaller number of long ones. Thanks to its modular design using standardized elements, the Twister is always a viable alternative to conventional reel packaging machines. It can replace semi-automatic machines with low packaging capacity per hour just as well as fully automated lines with an hourly capacity of 100 or more reels. Customized layouts can be prepared for each individual case.

Service Division:
Monitoring systems – the modern way of machine-minding

Papermaking processes are affected by an enormous number of parameters. Not only do these include mechanical and hydraulic vibrations above all, but also fluctuations of pressure, temperature, stock flow and consistency. The more precisely these parameters are measured on a long-term basis and the better their characteristics and interrelationships are known, the faster and more accurately can problems be analyzed and product quality and machine availability be optimized. Based on many years of experience in paper machinery optimization and troubleshooting, VSPT has therefore developed a comprehensive system for machine condition monitoring and analysis. This is made up of the two elements VMM 2000 (machinery monitor for mechanical condition) and VTM 2000 (technology monitor for process analysis and diagnostics). Each monitoring system is individually configured for the plant in question *(Fig. 1)*.

The author: Rolf Mösle, Measuring and Diagnostics

Machinery monitor (VMM)

The Voith Sulzer machinery monitor primarily keeps check on bearing condition. To this purpose all the paper machine bearings are fitted with vibration sensors. By this means not only is incipient bearing damage detected in good time, but also out-of-balance conditions or misalignment. Preventive action can then be taken during scheduled shutdowns to prevent serious damage without significant outlay.

Technology monitor (VTM)

The Voith Sulzer technology monitor is made up of basic modules for trend analysis, source detection by signal recovery, and frequency analysis. Trend analysis means keeping records of changes in individual parameters during the course of time. This forms the basis for efficient process analysis and optimization, and for detecting roll and cover wear. The important aspect here is that it must be possible to keep data records over long time periods. For this reason the VTM 2000 data base is designed for large memories. This means that not only short-term fluctuations can be shown up and analyzed, but also genuine long-term trends over several years.

The data base is basically compiled by storing all main readings directly from the process and quality control system. In addition, other important parameters are measured by vibration sensors, pressure transducers, flowmeters and a laser system for detecting short-term basis weight variations in the machine direction.

In order to derive reliable information from large quantities of data, particular attention is paid in trend analysis to simple operation and efficient evaluation methods.

With the signal recovery module, the causes of product quality fluctuations can be located. Typical examples of such fluctuations are variations in basis weight or sheet thickness. The signal recovery method links these quality signal readings with possible sources of fluctuation, such as pumps, screeners, wires or rolls. The result is a clear display of the components of the quality fluctuation in question due to each individual aggregate.

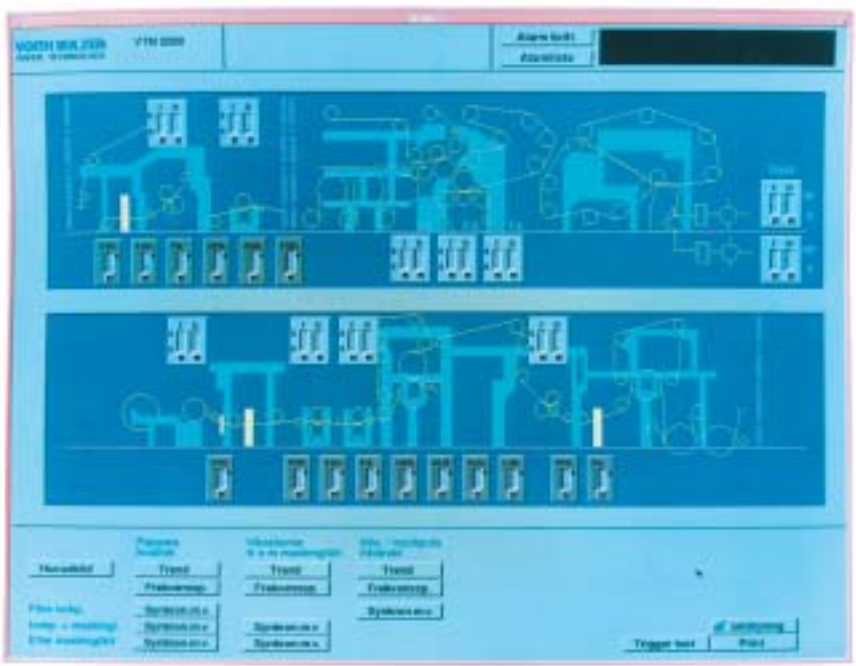
For systematic troubleshooting and accurate monitoring of all rotating elements, the frequency analysis module is used. This breaks down the time-based signals into their individual frequency components and displays them as a spectrum. The frequency analysis spectra are stored in the data base, and can thus be called up at any time for detailed analysis purposes. A wide range of analysis tools and functions are provided, such as 3D display of time-based frequency characteristics *(Fig. 2)*.

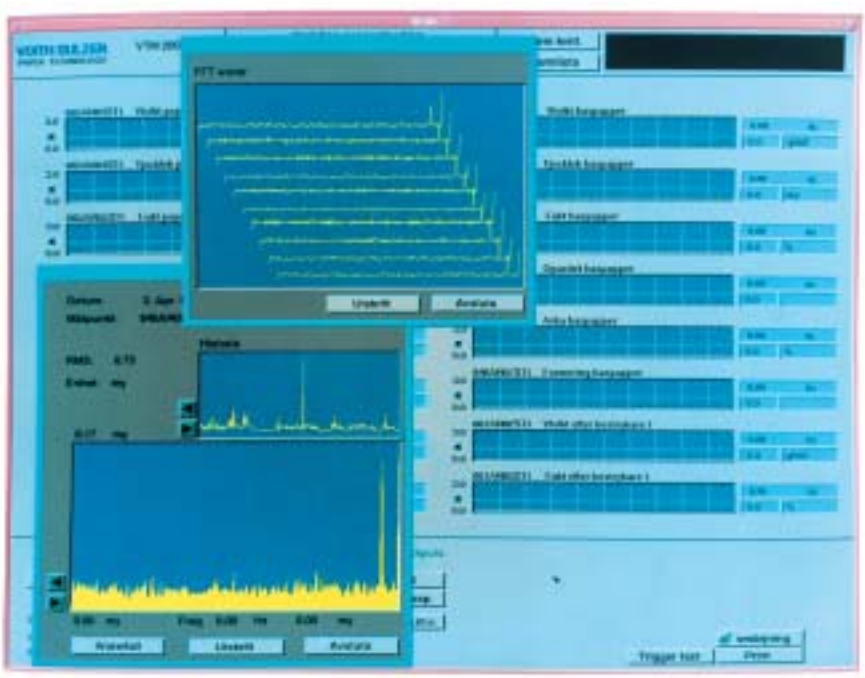
During development of the Voith Sulzer condition monitoring system, particular importance was placed on simplicity of operation and conclusive graphic dis-

Fig. 1
Monitoring System layout.

Fig. 2
Systematic signal analysis with the Voith Sulzer technology monitor.

plays. This ensures that the system can be used not only by the operating personnel for plant monitoring, but also by the maintenance and production personnel and diagnostics specialists for more detailed analyses. Furthermore, the modem incorporated in the system allows remote diagnostics by Voith Sulzer Paper Technology service specialists.





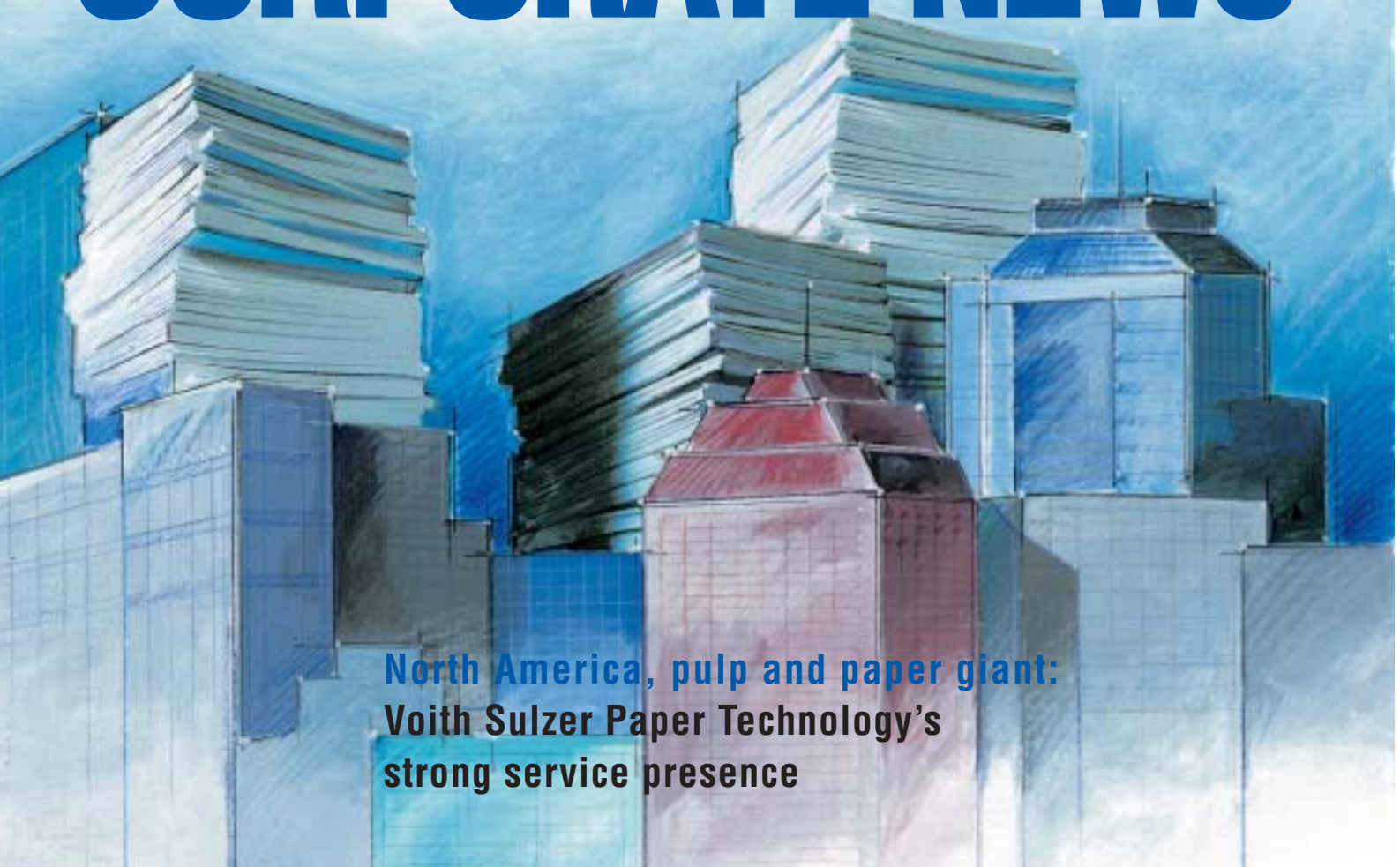
Advantages at a glance

Voith Sulzer monitoring systems not only serve for machine monitoring itself, but also for analysis and diagnosis of the production process. Based on findings, productivity can be enhanced and costs reduced. These systems offer the following benefits:

- Dynamic monitoring of machinery components.
- Wear analysis records for all wearing parts.
- Source detection of production interferences and faults.
- Data acquisition for optimizing plant operation.
- Clarification of main process parameter characteristics and their mutual interdependence.
- Long-term storage of process data for trend analysis and evaluations.

Voith Sulzer monitoring systems are currently supplying valuable information for machine optimization in three paper mills. Further systems will be commissioned shortly.

CORPORATE NEWS



North America, pulp and paper giant: Voith Sulzer Paper Technology's strong service presence

The vast North American continent is the world's largest pulp and paper producing region, accounting for almost 40% of global paper and board production – and more than 35% of consumption. Some 800 paper mills in Canada, Mexico and the United States turned out 11,000 tonnes of paper and board every hour during 1993. About one million people are employed in the North American pulp and paper industry, plus a good many more in the peripheral supply industries.

As the paper industry continues to focus on optimizing the use of manpower and machinery, there is an increasing trend in North America toward the use of cost effective outside service providers for the engineering, maintenance and support functions previously carried out by mill and corporate personnel. Technicians wearing the uniforms of companies producing everything from lubricants to process controls are a common sight these days in North American paper mills – and it is just as common to see the VSPT Service Division specialists there, repairing and maintaining a customer's asset investments. Voith Sulzer Paper Technology has established itself as technology leader in this important market, providing a growing number of North American customers with complete papermaking lines ranging from woodyard logistics to the wrapping and storage of finished rolls of paper. It goes without saying that from such a comprehensive system supplier, equally comprehensive service is expected.

It is not by chance, therefore, that the VSPT Service Division is located right in the middle – in Middletown, Ohio – of this enormous paper and pulp production region. Middletown is the headquarters for a constantly expanding global network of regional Service Centers. Five such service centres span the North American continent.

In accordance with the outsourcing trend in the North American pulp and paper industry, these VSPT service centres have long departed from the support of proprietary equipment alone. They carry out servicing and repairs for all kinds of machinery and components, whatever their make or version. This not only distinguishes VSPT from other service suppliers, but makes maintenance logistics much easier for customers. At many mills, VSPT engineers and project managers from the local regional service centre take part regularly in planning meetings with regard to maintenance, improved availability and production optimization. This input of experience and know-how is highly appreciated, and it has earned the VSPT Service Division a solid reputation as integral partner in the North American paper industry. Mill operating personnel profit from this close contact through a continuous updating on the latest advances in paper machinery technology, including developments in the service sector. Wherever required, VSPT service specialists make direct contact with the VSPT Stock Preparation, Paper Machinery and Finishing divisions to coordinate complex projects and large investments.

The author:
Chris Turner,
Voith Sulzer
Paper Technology
North America,
Middletown

Each VSPT service centre in North America is fully equipped to carry out all types of repairs and service. This includes roll and machine component rebuilds as well as the overhaul and repair of pulp processing and stock preparation line components such as feeder screws, conveyors, pumps and gear drives. Another advantage is that service centre personnel can draw on the worldwide resources of VSPT for additional engineering support, spare parts or specialized manufacturing capabilities. The vast size of the North American continent and the remoteness of some pulp and paper mills make it prohibitive or even impossible to move large machine components to a regional service centre. In such cases, VSPT brings the technology and expertise to the mill, carrying out repairs and service on vital components on-site or even in the machine. The Service Division has specialized portable equipment for in-machine grinding of even the largest rolls and dryer cylinders. A particular speciality is the on-site renewal by thermal spray coating of rolls, cylinders and bearing housings, for example. This can either be done with normal materials or using specially developed materials based on experience and specific requirements. Here is an overview of the five VSPT service centres in North America, with brief examples of their capabilities:

VSAU – Austell, Georgia

Serving the south-eastern United States, VSPT's Austell service centre is within three hundred miles of almost 25% of the total US paper and board production capacity. VSAU is a dependable service partner to some of the largest mills in the south-east. One example of VSAU's capabilities: an entire 1950's vintage dryer section, including 40 dryer cylinders and 65 felt rolls, was overhauled and modified. It was then set up section by section on the VSAU shop floor before being dismantled and shipped in 30 truckloads to the customer for installation.

Fig. 1:
VSAU – Austell, Georgia.

Fig. 2:
A VSPT service technician installing Sealpak™ sealing strips in a rebuilt suction roll.

1

VSDE – Delta, British Columbia

Acquired by VSPT in 1990, Tristar Industries primarily specializes in serving the pulp industry throughout North America by repairing, rebuilding and reengineering pulp machine components. With its large-scale facilities, VSDE is one of the few plants in Western Canada with the machining, cranage and testing capacities for refurbishing this type of equipment. VSDE also manufactures the large customized stainless steel components such as washer drums required by the pulp industry. Tristar has long been recognized by its customers as a dependable partner in the pulp industry.

2

VSMI – Middletown, Ohio

VSMI Middletown is not only world headquarters of the VSPT Service Division, but also a trusted service partner for nearly 100 paper mills in the north-east and mid-west of the USA as well as east-

Fig. 3:
VSDE – Delta, British Columbia.

3

ern Canada. VSMI provides technical assistance and support to mills from Maine to Michigan. In January 1996, VSMI shipped a completely refurbished Manchester Multiformer headbox to a customer in the north-east of the USA. The rebuild of this twenty-one year old unit included complete dismantling and cleaning, remachining and polishing of the flow surfaces, manufacturing new components where necessary, and restoring the entire unit to as-new condition.

VSPO – Portland, Oregon

Strategically situated in the Pacific Northwest, the Portland service centre provides a wide range of services both for regional customers and for the Service Division worldwide. VSPO is not only a service centre, but also divisional development centre for thermal spray coating technology. It produces polyurethane and GR™ roll covers for the North American market, and specializes in the repair and rebuilding of paper machine components. Recently, a VSPO customer called late in the afternoon, having damaged the surface of his Yankee dryer. Repairing this damage required one of VSPO's largest tangential grinders, which along with its auxiliary equipment had to be transported on a 45-foot truck. The project engineer who took the call arranged to have the equipment loaded and transported to the mill site 200 miles away, met the truck when it arrived, and started the job before handing over to his service techni-

Fig. 4:
VSMI – Middletown, Ohio.

4

cians. This rapid response subsequently brought VSPO a valuable contract: to supply all the customer's Yankee dryer refinishing worldwide.

VSWM – West Monroe, Louisiana

The south-east and south-central regions of the United States together contain over 50% of the country's paper and board production capacity. VSWM is fully equipped to provide state-of-the-art service and support for the large multi-machine mills in this area. One of VSWM's customers recently had the misfortune to destroy a critical 630 mm bearing fit on a suction couch roll. With no spare roll available and the paper machine shut down, he called the West Monroe service centre. Three hours later the customer's damaged roll head arrived at VSWM. Service technicians machined the bearing fit to prepare it for plasma arc welding, applied a 420SS thermal spray coating, and finish-ground the repaired fit to the manufacturer's tolerances. Less than 24 hours after the original call, the head was shipped back to the customer for installation in the machine. Such rapid, reliable response has earned VSWM a long list of loyal customers.

North America and worldwide – twogether for service

In today's increasingly competitive business environment, Voith Sulzer Paper Technology customers around the world

Fig. 5:
VSPO – Portland, Oregon.

Fig. 6:
VSWM – West Monroe, Louisiana.

5

must be able to utilize their asset investments to fullest potential. The VSPT Service Division is a focal point for ensuring the exploitation of that potential. Our people, know-how, technology and facilities are integral components of a sustainable partnership with customers both in North America and worldwide. The VSPT Service Division stands ready, around the clock, to provide customers with superior resources for keeping their asset investments profitable at all times.

6

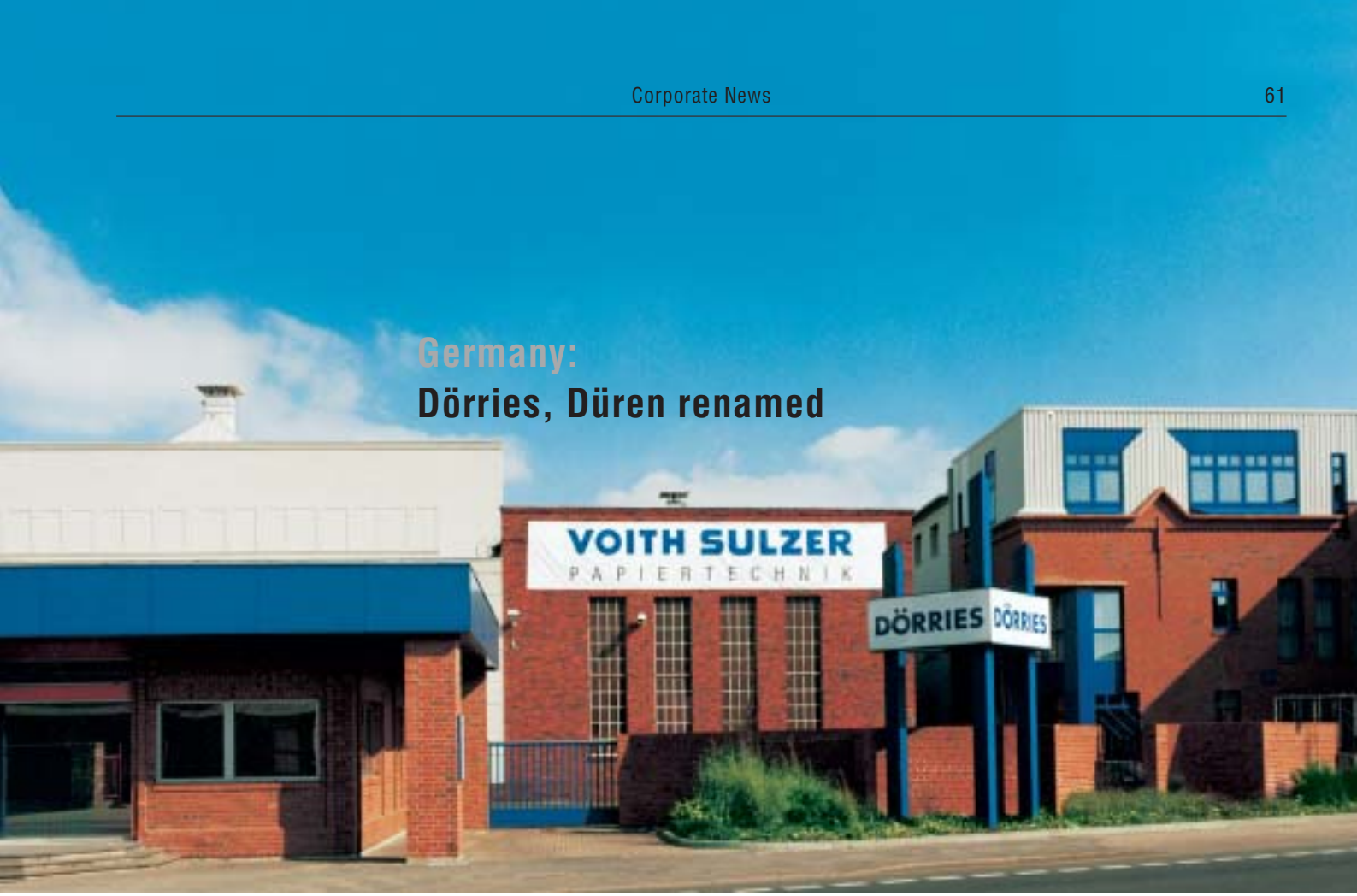
The Netherlands:
Another example of first-class service

Small is beautiful. In contrast to the "Pulp and Paper Giant" North America, here is another example of VSPT service in a much smaller country equally well-known for paper – the Netherlands.
Holland's 30 mills produce about 3 million tonnes of paper and board each year. Moreover, the waste paper recycling quota in this country is the highest worldwide. Together with the associated deinking requirements, this naturally makes extremely high demands on stock

preparation lines. The VSPT Netherlands service centre in Vaassen therefore specializes above all in fast on-the-spot maintenance and overhaul of stock preparation lines.

Since the VSPT Netherlands service centre was founded in 1991, three site extensions have been necessary. Particularly the workshops and machine park had to be expanded. This reflects the high demand for our service team in the Netherlands – which prides itself in being on call around the clock, 365 days per year.
Our experienced service technicians and erectors are well-versed in dealing with difficult situations. This is worth a lot of time and money when it comes to fast troubleshooting. And for them, troubleshooting is not limited to mere fault-fixing but means systematically searching for the real cause of trouble. By linking causes and effects, we give our customers genuine support in problem-solving. The high level of expertise typical of all VSPT service centres thus represents a very worthwhile customer investment.
Half the sales of Voith Sulzer Stock Preparation Nederland B. V. (VSVA) comprise service activities alone. The other 50% are made up of machinery and system sales. Among the most sought-after service activities is the regular overhaul of pulpers and screener rotors. In fact this kind of work with the expert welding required has almost become the main speciality of VSVA. Several hundred rotors have already been dismantled, repaired and reinstalled.

North America and the Netherlands – two examples of VSPT service activities which could not be more different as far as market conditions are concerned. But they have one very important aspect in common: the VSPT policy of providing service to match the high performance standards of VSPT machinery wherever paper is produced. That is the true meaning of "twogether" partnership.



Germany:
Dörries, Düren renamed

In order to make it clear that Dörries GmbH belongs to the VSPT Group, the company has now changed its name to Voith Sulzer Papiermaschinen GmbH, Düren. There have been no changes in the company management, which is still headed by Hermann Orth. We thought the change of name would be a good opportunity for us to tell readers something about this company, located in the traditional German papermaking centre of Düren. The firm was originally founded in 1885 by Felix Heinrich Banning, Otto Setz and Christian Seybold. Before the turn of the century, it was already supplying complete machines for producing fine-grade papers, writing, printing and packaging papers. In 1932 the company was taken over by Otto Dörries. In 1966 J.M. Voith GmbH acquired a shareholding in O. Dörries AG, which at that time was supplying new or rebuilt machinery to reputed papermakers for all kinds of products. These included bible paper, bond and decorative papers, cigarette and transparent papers, watermark papers and noncarbon copy papers.

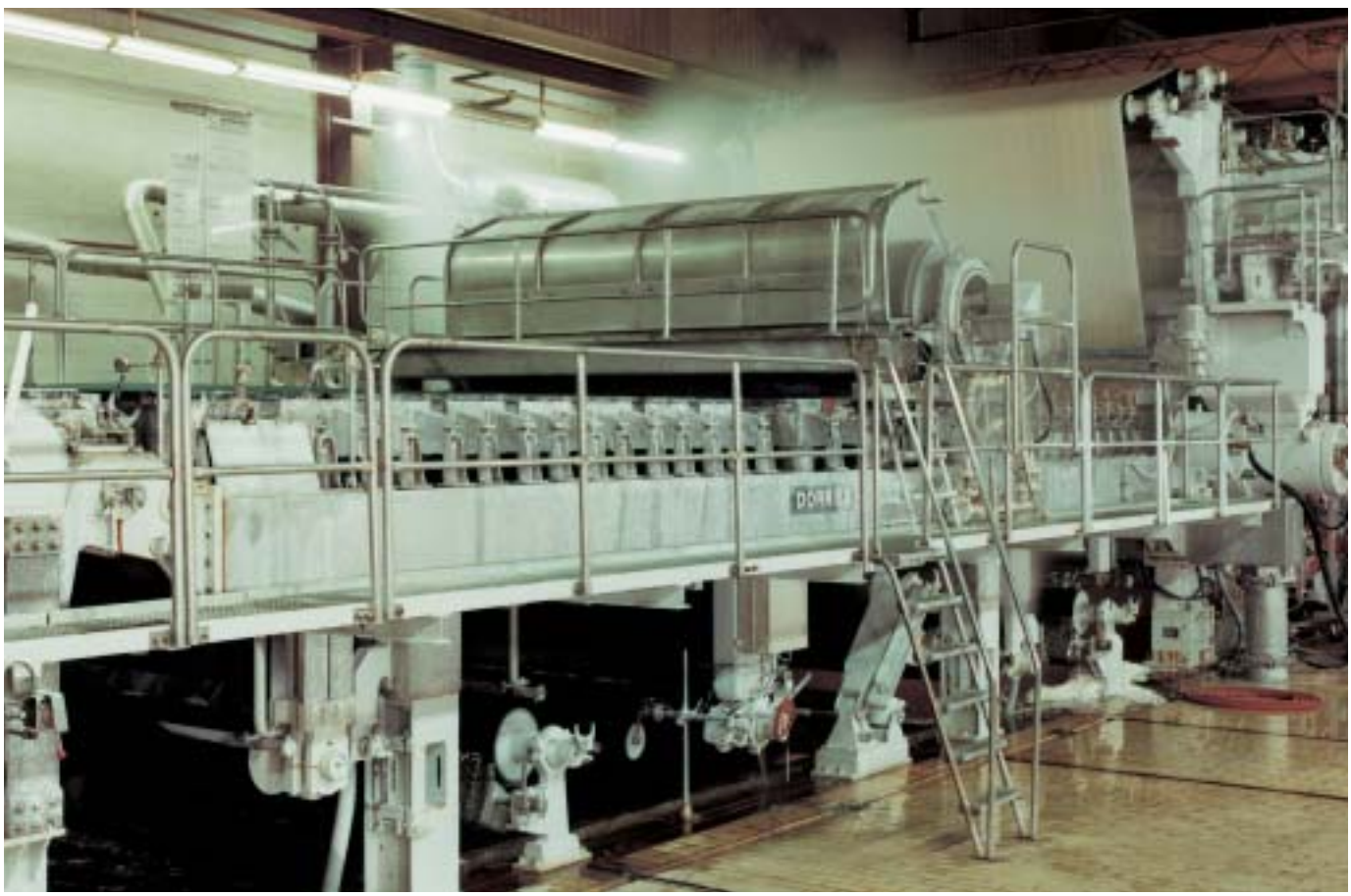
Joining the Voith Group gave Dörries a new vitality and a solid economic basis. The production facilities were extended, new shops built and large sums invested in numerically controlled machine tools, new developments and machine designs. At the end of 1995, Dörries Düren became part of the VSPT Graphical Paper Machinery Division. Activities comprise on one hand the production of small machines for graphical paper, banknote papers and bonded fibre products, and on the other hand conversions and rebuilds. Another speciality is enhancing plant reliability and restoring availability – a service for which the Dörries team has long been renowned. Düren is located in western Nordrhein-Westfalen, at the heart of the European market region comprising Germany, the Netherlands, Belgium, Luxembourg and France. Voith 1


2

Figs. 1 and 2 (page 61):
Voith Sulzer Papiermaschinen GmbH, Düren – formerly Dörries.

Fig. 3:
Wet section of a fine-grade paper machine 3460 mm wide operating at 450 m/min. Products include bond papers, copying, capacitor and noncarbon papers.

Fig. 4:
Situation plan of Düren, the company location.



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Sulzer Papiermaschinen GmbH, Düren has 350 employees at the present time, and sales for the current business year are estimated at about 100 million DM.

4

Centre of competence for small graphical paper machines

Within the framework of the Heidenheim centre of competence for small graphical paper machines, the Düren plant is responsible for machines up to 5200 mm wire width. This ensures that adequate attention is paid to the important business sector of small machines in accordance with their special features. Contact partners for customers are the familiar regional field service engineers of Voith Sulzer Paper Technology. As specialist for small machines, Voith Sulzer Papiermaschinen GmbH, Düren has access to the entire know-how of the Graphical Paper Machinery Division. The papers manufactured on machines produced by this division include the following:

Fig. 5:
Wet-strength bonded fibre plant with Hydroformer for producing single and double layer teabag papers. The Hydroformer has a closed headbox, with production speeds exceeding 500 m/min and wire width of 3100 mm.*

Fig. 6:
Hermann Orth, Managing Director of Voith Sulzer Papiermaschinen GmbH, Düren.

- Woody papers such as newsprint or LWC
- Wood-free papers such as coated and uncoated writings and printings
- Special grades, e.g. noncarbon copying paper or 1-sided smooth papers, as well as traditional Düren specialities such as banknote papers and wet-strength bonded fibre products.

5

Banknote paper machines

Banknote papers, generally incorporating highly sophisticated watermarks and security components, are certainly among the most demanding products in industrial papermaking. And the requirements on manufacturing technology and machinery are correspondingly high. This kind of machinery has been built in Düren since the beginning of the twentieth century, and the accumulated know-how together with ongoing development of the highestperformance machines in this sector have earned the company a leading reputation.

Hydroformer for wet-strength bonded fibre products

Whether for sanitary products, air and liquid filters, teabags or roof tile linings, wet-strength bonded fibre papers are gaining ground in all kinds of applications. The heart of the machinery used for manufacturing these products is the oblique wire hydroformer, on which single or multilayer wetstrength papers are produced from all kinds of dispergable fibre of natural, synthetic or mineral origin. Using a highly diluted water-stock suspension, the resultant bonded fibre papers are outstandingly homogeneous. By combining specific layer characteristics, multilayer wet-strength products can now be developed for completely new applications, so that the future for such papers is extremely promising. The Düren plant has all the latest test facilities for carrying out development work on new products and applications, hand in hand with our customers.

6

The Düren service team

Operating round the clock 51 weeks per

Fig. 7:
Bonded fibre production test facility. Manufacturers carry out their trials in close collaboration with our test engineers. We guarantee absolute discretion with regard to all tests and findings.

Fig. 8:
Our machining capabilities match the entire range of roll diameters, lengths, materials, surface finishes and weights. The Düren machine park can service the smallest and largest rolls existing.

Fig. 9:
Project drawing of the wet section for a fine-grade paper machine rebuild.

Fig. 10:
Consulting services by paper machinery experts: problems can often be solved at surprisingly small outlay.

Fig. 11:
Final inspection of a remachined calender roll after polishing.


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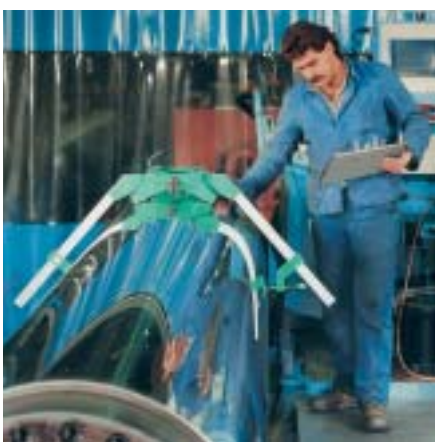
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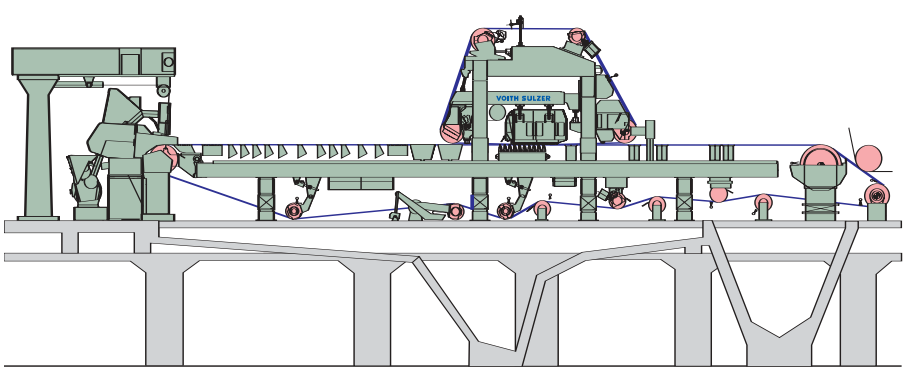

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year, with only one week set aside for overhaul and repairs, machinery in the paper industry has to be on the go practically nonstop. But this can only happen if all day-to-day maintenance and servicing work is carried out rigorously, and if all spare parts are delivered straight away for immediate installation. The Düren service team makes sure of this by standing in constant readiness for fast and dependable support, through field technicians in continuous touch with customers. Düren services include:

- Erection and installation exclusively by experienced fitters, hydraulics and pneumatics specialists, welders and metalworkers.
- Supply and repair of all kinds of rolls and cylinders up to 2500 mm diameter and 11 m long, with weights up to 60 tonnes and surface finishes down to 0.05 ❍m.
- Workpiece machining up to 2200 mm dia and 12 m long; boring up to 1040 mm dia and 6 m long.
- Complete overhauls of suction couch rolls, with automatic sleeve boring on multiple 240-spindle machines.
- Dynamic balancing of workpieces up to 60 tonnes, at several levels.
- Surface treatment including blasting, glass-beading, varnishing and plasma spray coating.
- Running-in and optimization of production plant machinery.
- Training of customers' operating personnel.

Germany:

The Ravensburg Stock Preparation Division's new test plant for machinery development

In March 1996 the Stock Preparation Division in Ravensburg had every reason for celebrating – the R&D centre inaugurated its new test facility for machinery development.

This new facility enables all the extensive testing work required for developing more efficient machinery and subsystems in waste paper and virgin stock preparation. It also allows more comprehensive prototype testing under conditions close to mill production.

Complemented by this new facility, the existing test plant for system development can now be used to a much larger extent for the development of waste paper systems which get more and more complex. In particular, the 40 or 50 customer tests carried out on behalf of the paper industry each year – mainly system tests – can now be extended still further. Or for example, greater use can be made of the system test centre to train customer personnel on VSPT stock preparation machinery and systems under operating conditions. Improvements have likewise been made to the system test plant itself, including the installation of a Kneading-Disperger parallel to the Disk Disperger. As a result, technological effects from both disperging principles can now be compared directly. Another example is the installation of a Deltapurge, incorporating the latest technology in loopwater clarification.

This multimillion DM investment in stock preparation test facilities underlines the importance attached by VSPT to the intensive development of machinery and systems and their thorough testing. The Stock Preparation Division's R&D team now firmly established in Ravensburg is already working on new and improved products for screening, flotation, bleaching, disperging and washing. And it goes without saying that international experience interchange is exploited to the full – the team members are in continuous touch with their US colleagues at the VSPT stock preparation technology centre in Appleton, Wisconsin.

1

Fig. 1:
The new test facility for machinery development was inaugurated by Lothar Pfalzer, Managing Director of Voith Sulzer Stock Preparation.
Fig. 2:
The new test plant for machinery development in Ravensburg.
Fig. 3:
The Disperger and Kneading-Disperger in the test plant for system development.

2

3

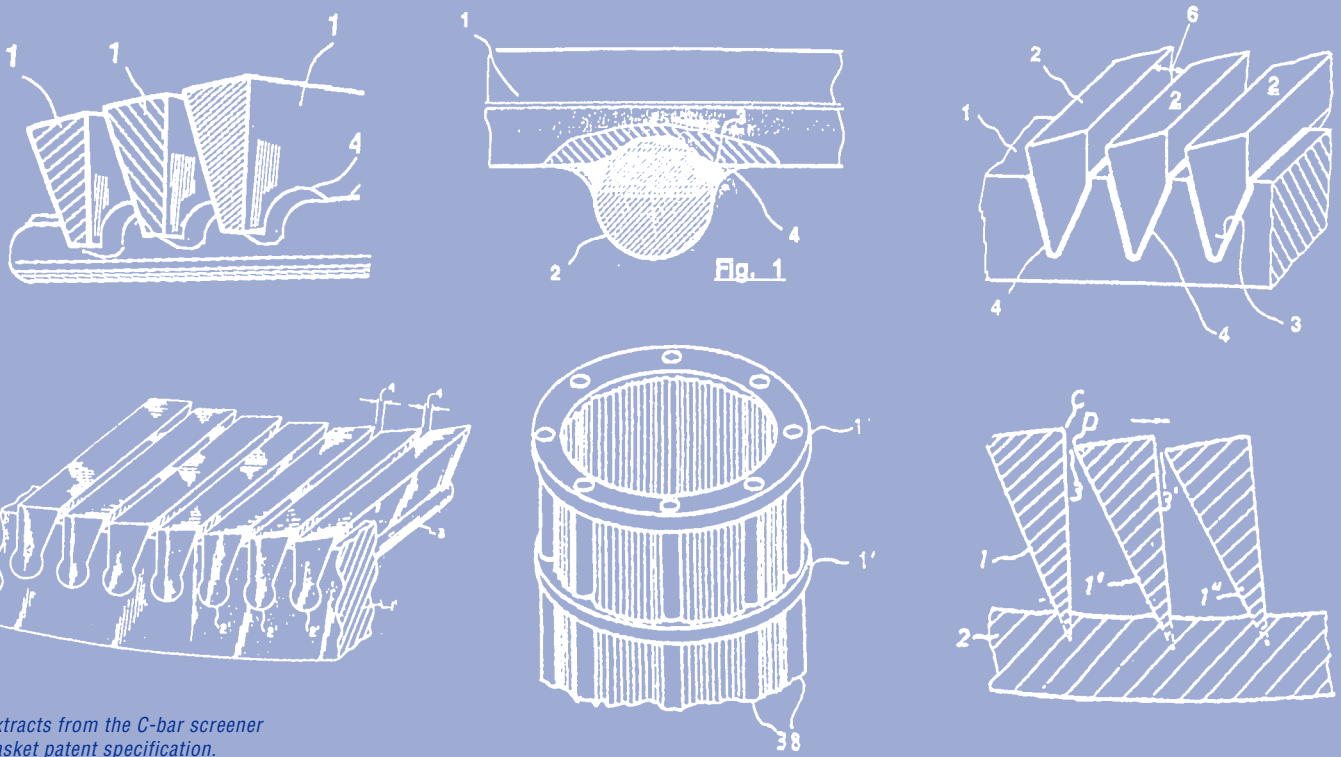
Patents – a mirror of innovations

In recent years a good many advances have been made in paper technology, and one of the results is significantly higher plant performance. Both operating speeds and the quality of the paper grades have been substantially improved, thus enhancing plant profitability at the same time. Voith Sulzer Paper Technology plays a decisive role in this development, and is now market leader with numerous innovations. In order to consolidate and expand this lead, intensive research and development is indispensable, also entailing substantial investments. Consequently, the fruits of these labours – our breakthroughs with new findings and processes – must be well protected. Special importance is therefore attached by VSPT to corporate patents. This is shown by the number of patents granted, which also reflects our high degree of innovation and development.

A considerable number of these patents were applied for after the founding of our joint venture, which concentrated the entire paper technology activities of Voith and Sulzer. The development potential thus unleashed brought an unprecedented flow of innovation and ingenuity. This fully upholds the VSPT pioneering policy – of setting worldwide trends in technology and progress.

Voith Sulzer Paper Technology patent statistics

1. Number of existing patent families	1,397
2. Total number of existing patents (including abroad)	5,030
3. Number of patent applications since VSPT was founded on October 1, 1994	221
4. Total number of new patents since October 1, 1994 (including abroad)	713



Extracts from the C-bar screener basket patent specification.

PAPER – ART – FASHION

Do you know what IAPMA stands for? Well, although we consider anything to do with the manufacture of paper, even in its broadest sense, as being part of our profession, we must admit that the International Association of Hand Paper Makers and Paper Artists (IAPMA) was not a name known to us until recently. A report on German television concerning an exhibition at the Baden State Museum – "Paper – Art – Fashion, Paper Clothes", introduced us to this international group of artists and the influence it exerts. The exhibition in Karlsruhe was to a great extent dependent on contributions from these same artists.

A permanent spot in our "twogether" magazine has been reserved for the topic of art, culture and history in connection with paper. Below, we take a short trip round the exhibits which were on show between January 20th and April 21st, 1996. Thanks to the friendly help and support of the museum's director and the IAPMA, we were able to reproduce photos and text taken from the catalogue accompanying the Baden State Museum's exhibition. We have also learned that the IAPMA is planning future actions and publications in the same vein. Next on their list is a topic called "Paper Money". Perhaps this report will encourage some of our readers to get in touch with this art association. Paper and the interpretative arts belong together. In the past they had a rich common bond and the future will surely wish to see this continue.

"The use of paper as a material for making clothes has enabled an entire fashion industry to appear out of the blue, as it were. The astounding results achieved by this new material give the lie to its origins. We're wrapped up in paper and float off into the spring as little surprise packages...". Flowery language such as this had been used previously to try and convince the population that paper was an adequate substitute for the shortage of textile raw materials during the First World War. However, even the most determined words of praise couldn't disguise its surrogate character. Ironic rhymes began to make the rounds. Back in the "Golden Twenties", declared a popular song, "I swear our officers in France, were wearing paper underpants".

2

Fig. 1 (Page 67) and Fig. 2:
A kimono from Ann Schmidt-Christensen's and Grethe Wittrock's Papermoon project (Copenhagen, Denmark, 1995). Woven material from Japanese paper thread with fine ramie fibre, pleated. "The Papermoon project is an experiment in clothing design. It seeks out new ways in form and function, but also in the aesthetic and technological areas".

Looking back, paper wasn't always used only as an emergency material. Paper collars, shirt cuffs and tuckers – fabric bonded to ensure that they were long-lasting – were in general use as long ago as the middle of the nineteenth century. But paper clothing and paper undergarments was never able to shake off the stigma of being an emergency solution, or even a sign of financial straits. Paper, as a working material, failed to capture the imagination. Only those who couldn't afford anything better turned to paper, for example, poor old Gepetto who made Pinocchio a fine suit out of floral-patterned paper.

What was it about paper that so fascinated artists? In spite of everything, they would sometimes use it as an atypical basic material for clothing creations which, occasionally, could actually be worn. On the one hand, it was probably the recollection of historical forms of usage; on the other, the singular aesthetic power possessed by this unusual material. The latter has assured it of a special place in contemporary art.

Whereas the role of paper clothing in European fashion has been rather secondary, in China – the country where paper

Fig. 3:
Poupée de papier by Carole Baillargeon, Quebec, Canada, 1995. Used tea bags, sisal, copper wire and acrylics. On loan from the Scheuffelen paper company's Museum for Paper and Book Art in Lenningen, Germany.

originated – it has an entirely different significance. As far back as the ninth century, magnificent gowns and decorative accessories made out of paper were worn for special occasions and various ceremonies at the Mandarins' courts. Japan too had paper clothing and miscellaneous ornamental trimmings made from this material, at a very early stage.

The main raw material used by both countries was the bark of a certain mulberry tree. An especially thin but particularly tough paper could be made from this bark. Today, the Far-East paper-making art dates back more or less successfully to this traditional paper processing method. Its products, in the form of jewellery boxes, umbrellas and lanterns, are known everywhere and have been an inspiration to people all over the world.

During the sixties, well-known artists began to use this material differently. Whereas up till then it had only had a decorative function, it slowly assumed an influential role in their work. Light, indeed even water and air, were rediscovered as a means of expression. Common

Fig. 4:
Gift wrap, dress and shoes by Susan C. Cutts, London, Great Britain, 1994. Abaca fibre paper. "To be able to work as a paper artist, is at the same time invigorating and frustrating. But, it is also a passion, in which I invest all my strength by using my own creative energy as the basis for exploring the material…
My sculptures are made from hand-made, hand-coloured paper – without using glue or supports for the finished item".

materials such as paper, wood, glass, ceramics and metals were apportioned tangible qualities of their own. Paper art shared in this new trend. and the rebirth of old creative skills was a decisive factor. Influential artists in the USA such as Robert Rauschenberg, Jasper Johns, Claes Oldenburg and others started working with this new medium and exploring its expressive possibilities. Europe, on the other hand, maintained the dominant artistic technique of cutting, folding and gluing industrially manufactured paper – leaning heavily on collages such as Picasso's "Guitar" from 1912, or art school teaching methods as developed by the Bauhaus in the nineteen-twenties. The various streams in paper art were brought together for the first time in 1981 in an exhibition at the Leopold-Hoesch Museum in Düren, where the Paper Art Biennale has been held since 1986.

Fig. 5:
Kimono by Viviane Fontaine, Charmey, Switzerland, 1989. Gampi paper, maple leaves inscribed as follows, "Paper, a fragile aid to memory which, in the hands of a female artist, is transformed into painting and sculpture; it takes on another dimension in order to express feelings, no longer assuming a communicative role but a more central one."

Artistic confrontation with paper clothing has given rise to interesting creative stimuli in costume and fancy dress. Oskar Schlemmer noted in 1928 in his Theory of Dance and Costume: "If even the small, daily objects and attributes adorning a person alter him and his mannerisms, beginning with cigarettes, ties, fashion and hats, then how much more would a costume do this – the very manifestation of change in the form of fabric". Time and time again ballet, opera and theatre performances have been attempted in experimental paper costumes, with the aim of lending the production a special expressive quality. These exceptional productions, enhanced by the use of paper as an exceptional material, acquired an ambivalence which stage and costume designers found particularly stimulating.

It is noticeable that the artists represented in Paper – Art – Fashion are mainly female. The majority of exhibits, of which we can only cover a small cross-section,

were created by them. Is this a negative reaction to male dominance of haute couture? There is no satisfying conclusion to this question. It is surely much more probable that intensive exploration of one's own self by means of tactile materials, to which paper undoubtedly belongs, is the main reason for the predominantly female preoccupation with the exhibition topic.

Today, paper is primarily used as an information carrier. Our lives, our decision-making processes are governed by the priority we give to what we see. The huge significance which we have attached to the sense of sight has to some degree tended to weaken the other senses of smell, touch and feel. When handling paper, however, it is these other senses that are called upon. The quality of varying types of paper cannot be ascertained purely by visual examination, indeed the optical impression barely suffices to penetrate the paper's surface. In order to discern all the possibilities and realise them creatively, paper must literally be "grasped", shaped and felt. This too is probably one of the main reasons why artists using paper as a means of expression are mainly female. Paper art as a whole, by providing its medium with a far more encompassing role to play than merely that of a background for words and pictures, has helped to open up new perspectives for the discovery and use of the possibilities which this traditional material affords.

Fig. 6:
Paper dress by Petra Landsknecht, Pfinztal, Germany, 1989. Coloured paper (combed marble) waxed, formed, sewed on to fabric. "Paper has character. Its living features are so multifaceted that it is a pity to use them only to convey information and images. The crackling of paper awakens curiosity, holds secrets, makes promises. ...Paper is a sensual experience...".

Fig. 7:
Paper necklace by Nel Linssen, Nijmegen, Netherlands, 1995. "My work is based on a mathematical viewpoint. Inspired by the rhythm and structure of nature, I'm searching for logical structure. Along with flexibility, the forms mostly contain a playful element. For me, using paper for my jewellery is a self-evident thing."

7

Fig. 8:
Clip-on jewellery by Janna Syvänoja, Helsinki, Finland, 1991. Newspaper. For some years now the artist has been creating paper art based on an ecological recycling concept. The materials she uses are old newspapers, telephone directories and roofing board.

8

Fig. 9:
Red under-arm handbag by Maria Verburg, Zusmarshausen, Germany, 1995. Wrapping paper, hand printing paper, shirting, Velcro tape. "Paper handbags are fun. Paper and cardboard are the most unsuitable materials for receptacles that, depending upon the occasion and needs, have to be comfortable, smooth, long-lasting and discreet but elegant."

9

Fig. 10 (back cover):
Poncho by Astrid Zwanzig, Halle, Germany, 1995. Paper, glued and sewed. The artist is lecturer in Cutting Design at the College of Art and Design in Halle.

IAPMA.
International Association of Hand Paper Makers and Paper Artists. Founded in 1986. Currently 400 members from 40 countries.
More information can be obtained through:
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