

Norske-Skog Parenco – Water management system secures fresh water savings



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Eighteen months after implementing a millwide water management system, it is time to assess the effective fresh water savings and the influence on process water quality.

In summer 2002 the new DIP 6 deinking line for 620 t/24 h finished stock was successfully commissioned at Norske-Skog's Parenco mill in the Netherlands. Voith Paper was entrusted with the engineering of this line and various subsystems, and also with the delivery of key technological components. To ensure the faultless integration of all new sections, Voith carried out a millwide system analysis with the assistance of Parenco technologists. All production-relevant subsystems were checked on site and evaluated.

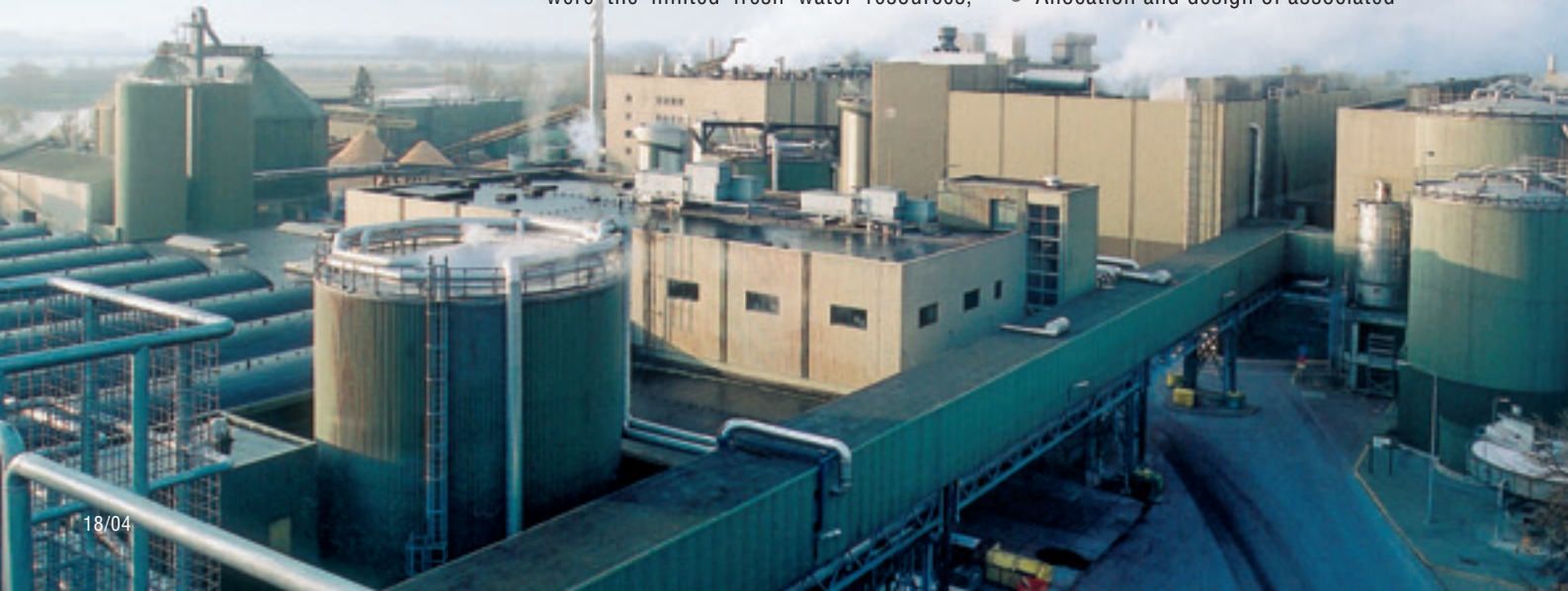
In view of the increased capacity and Parenco's quality strategy, the most important finding of this investigation was that **the entire process water system had to be optimized**. The main aspects were the limited fresh water resources,

limited capacity of the existing biological effluent treatment system as well as the need to comply with restrictions set by the local authorities. The technological objectives were to improve process water quality and quality constancy under all operating conditions, and to introduce an appropriate temperature profile for the stock-water system, taking account of the mill's overall heat and energy balance. To reach these goals in the complex mill environment, a **water management system** was developed once the "hardware" requirements had been met.

This water management system was engineered and carried out in the following stages:

- Installation of additional MC towers for a more flexible finished stock storage
- Allocation and design of associated

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- dynamic stock and water storage facilities
- Optimization of water flows and cooling in the water loops
 - Rebuild of the saveall disc filters of both paper machines, and optimization of disc filter periphery
 - Changeover from whitewater storage to clear filtrate storage for both paper machines in July 2002
 - Implementation of an overriding control strategy for the entire process water system in September 2002
 - Training of mill personnel and commissioning.

Parengo production profile

On two paper machines Parengo produces standard and improved newsprint with basis weights from 42 to 56 g/m², as well as SC grades. Gross annual production totals around 460,000 tons per year. The furnish used is on the one hand thermomechanical pulp (TMP), produced on three TMP lines with a share of 10 to 25%, and on the other hand deinked stock prepared from a mixture of recycled newspapers and magazines on three deinking lines (DIP 4-6) with a share of 75 to 90%. Different oxidative and reductive bleaching lines also enable TMP and deinked stock to be used for improved paper grades.

Fig. 2 shows the new central treatment system for all deinking sludges together

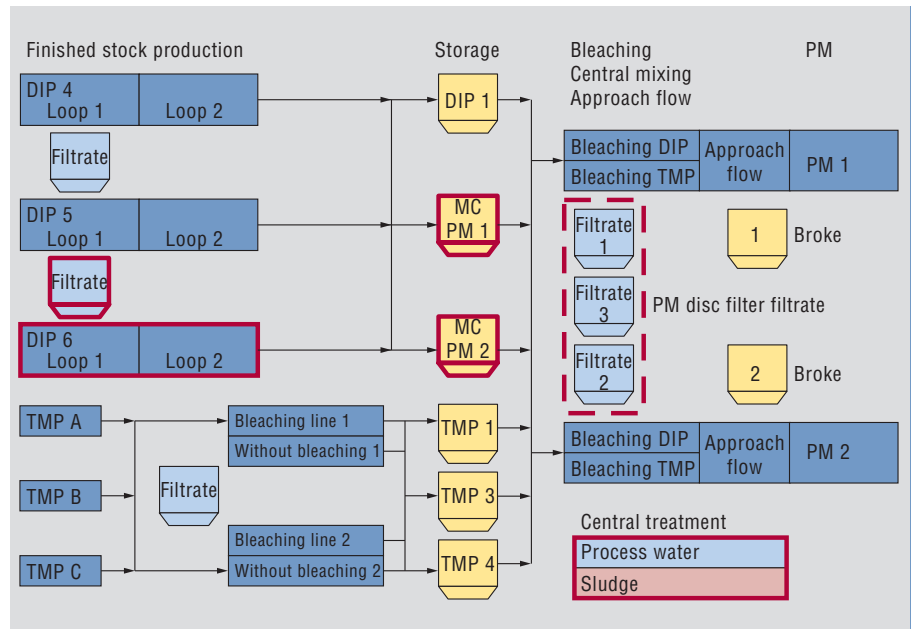


Fig. 1: Norske-Skog Parengo mill, Netherlands.

Fig. 2: Millwide system concept at the Norske-Skog Parengo mill.

with the central process water clarification. The rebuild of the whitewater storage system including the saveall disc filters into a systematic clear filtrate system is also shown.

Results

After establishing specific water consumption figures, numerous engineering alterations were undertaken, involving whitewater and filtrate management, disc filter design and control, fresh water allocation and control, balancing of associated stock and water storage, heat exchanger systems and effluent discharge and control. Without increasing the capacities of the four existing saveall disc filters, these measures enabled the re-

moval of solids from the entire excess whitewater, which is now stored as clear filtrate with a defined low solids content. The previous whitewater towers now store exclusively clear filtrate, which is used as make-up water in stock preparation, for broke pulping and to replace fresh water in the paper machine shower water system.

Fig. 3 shows the success of these rebuild measures as a function of the total suspended solids content (TSS) measured in the three clear filtrate towers. Prior to the rebuild, the total solids content was 2000 to 4000 mg/litre, with considerable fluctuation. Afterwards, it fell to less than 500 mg/litre, with only slight variations. This represents a significant contribution

Fig. 3: Solids content in the process water system of PM 1 and PM 2.

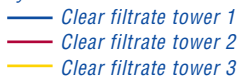
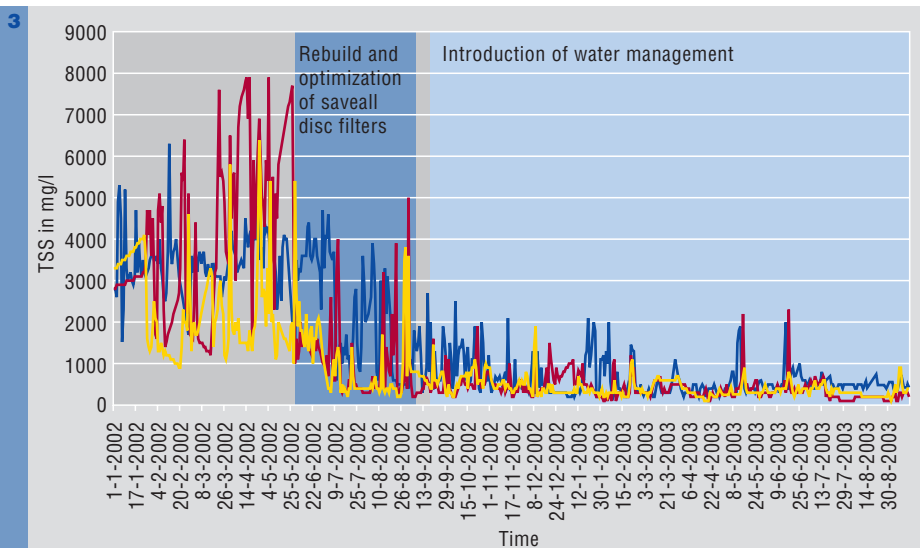
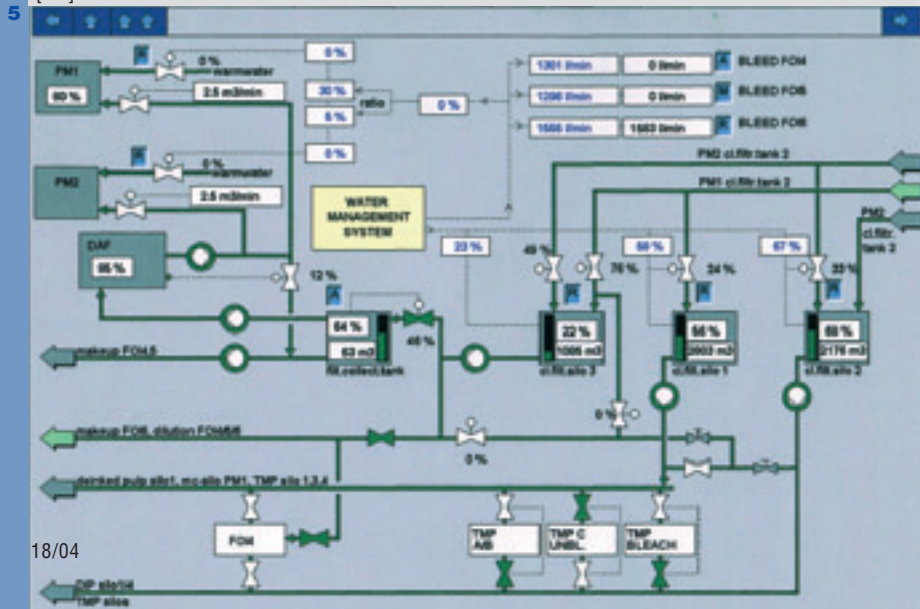


Fig. 4: Savings and process stability thanks to the water management system (WMS).

Fig. 5: Process control visualization.



Period	1-8/2002		2003		1-5/2004	
	without WMS		with WMS		with WMS	
	Value	Standard deviation	Value	Standard deviation	Value	Standard deviation
Spec. fresh water intake [m ³ /t]	13.6	3.7	11.9	2.4	12.1	2.0
Effluent [m ³ /24 h]	11,600	2,500	12,990	1,700	12,570	1,270
Saveall capacity [m ³ /24 h]	44,600	-	63,400	-	63,400	-
Stock-water volume [m ³]	18,700	2,830	17,000	945	17,000	890



towards reducing uncontrolled solids and contaminants recirculation, thus improving stability in the production process.

The improved **process stability** is clearly documented by the variation in fresh water intake, the active system volume (stock and water volumes actually stored) and effluent volumes. As shown in **Fig. 4**, the scatter band for these consumption and system parameters has been decisively reduced, expressed here as absolute standard deviation. This logically results in a more uniform content of disturbing substances and useful process chemicals in the water, which has a positive effect on process constancy and controllability as well as on product quality.

Operator acceptance of a millwide water management system intervening into automation systems and into the responsibilities for various production areas is critically dependent on the simplicity of handling the process control system. That is why Voith placed great emphasis on complete automation, clear visualization of stock and water storage systems, consumption data and parameters, as well as overall functionality of the process water control. The process control system information serves for operators in all system areas, with selected access rights for operator intervention. **Fig. 5** shows, for example, a typical process control monitor display visualizing a part of the water management func-

tion important for the paper machine operator. Visible are the clear filtrate towers controlled via the central system module, and the remote controls for mill water intake and effluent discharge. User-friendliness also means that all operating situations deviating from the stable production conditions are regulated by the water management system to minimize resource consumption and ensure optimum process stability. At sheet breaks, this lets the paper machine operators concentrate fully on the situation in the press and dryer sections, since the peripheral stock-water system adequately responds, in other words it is fully in control of the situation!

Savings

Eighteen months after optimizing the water system and implementing the water management system in September 2002, the Norske Skog technologists drew a balance. The requirement by the authorities for a maximum fresh water intake of 5.7 million m³ per year at the Parenco mill was easily met in 2003 with only 5.1 million m³ per year. For a net paper production of 427,000 tons per year this corresponds to an average specific fresh water intake of 11.9 m³/ton. Compared with the average freshwater consumption of 13.6 m³/ton in 2002, this is equivalent to a 12.2% reduction. Not included in this comparison are the positive effects of optimization at the end of 2002, so that the actual improvement is even greater.

Remco Feijten

Process Engineer,
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“Right from the beginning we realized the importance of a millwide system analysis at our Parenco mill in order to minimize risks on integrating the new DIP 6 deinking line. That is why we fully supported our partner Voith in collecting and evaluating all the necessary data. Our existing water system would never have met the new requirements after installing the DIP 6 with its more flexible stock production and storage philosophy.

Our wide product range, with the necessary grade changes and frequent starting and stopping of the TMP and deinking lines, demanded frequent manual intervention and individual operator communications to master the water household. After optimizing the process water system we prepared ourselves thoroughly for implementing the millwide water management system. It was important to me that the people operating our production lines understand how the system works.

That is why I carried out training courses with my production colleagues to cover the new process water management system prior to commissioning.

For the functional engineering, several different process control systems of different generations had to be linked up. Nevertheless, the commissioning and control system detailing were trouble-free. Meanwhile we have gained adequate experience with this new system, and our plant operators are very satisfied with the automated water management. Shut-downs, sheet breaks and occasional manual interventions are now compensated very efficiently.

Previous daily peaks in our fresh water intake or effluent volume have been greatly reduced.

Specific fresh water intake was reduced between 2002 and 2003 by 1.7 m³/tons. We are currently working hard on further improvements to our stock preparation system and paper machine runnability. This will open up further potential for reducing our future fresh water intake at Parenco.

For us, water management is an important module and tool for achieving and maintaining our systematic cost reduction and quality enhancement strategy.”