

Innovative approach to wet end control translates into substantial savings for Stora Enso Anjala

Important wet end control projects are often consigned to the back burner because of onerous capital investment and installation costs and high total cost of operation. But a unique tailor-made solution based around a single BTG Müttek™ TSS-71 Filtration Sampler has helped Stora Enso's Anjala Mill dramatically improve wet end control – and reap substantial annual savings.

Over the past decade, advanced wet end control systems have come to be seen as an essential element of 'state-of-the-art' papermaking. Simple management of functional and process additives is no longer sufficient – instead, constant measurement of cationic demand and turbidity in filtrate across a range of different process points helps ensure rapid troubleshooting and accurate adjustment of chemical dosages. For mills looking to optimize performance in an increasingly competitive market, closed loop control of retention aid based on white water consistency and ash levels in the process is quickly becoming a must.

With three paper machines producing a range of high quality grades, Stora Enso Anjala was looking for a way to maximize efficiency and cut unnecessary overheads. The plant's PM 3 currently produces about 250 t/y of improved newsprint and printing and writing grades. PM 2 produces some 140 t/y of LWC, but will be converted to uncoated grades in 2008.

Because the mill's production process involves a mix of groundwood, TMP, kraft pulp and broke, Stora Enso Anjala faced a challenge when it came to efficient chemical dosing and production stability. In order to convert the PM 3 unit from an acid to a neutral process, the Anjala production team required continuous monitoring of driving process parameters. The same was true for the planned production change at PM 2, which will see the machine switch from LWC to higher-value printing and writing grades.

Founded back in 1872, Stora Enso's Anjala Paper Mill is located on the Kymi river in the eastern Finnish town of Anjalankoski.

The world's largest pressure groundwood mill, the plant efficiently exploits synergies between the supply of raw material and energy, producing superior quality papers for demanding customers.

Anjala Mill is one of the world's largest producers of book paper from mechanical pulp, and specializes in white printing paper. The mill also boasts extensive experience manufacturing special grades, including high brightness and bulky paper, offering a versatile selection for a diverse range of end uses.

BTG's solution not only saved on installation costs by using existing piping and wiring, but eliminated the need for additional lab measurement of consistency, charge and turbidity.

The mill's first wet end control project was launched at the end of 2006 with the installation of retention control, charge control and turbidity control equipment on PM 3. The success and cost-effectiveness of BTG's innovative solution saw a similar strategy quickly applied to Stora's PM 2 machine, which was upgraded to take advantage of the same system just 10 months later.

The installation process

1. Retention

For BTG, cost-effective wet end control must be based on reliable, low-maintenance equipment. Using a Müttek RET-20 Retention Inline dual-sensor device, a mill can monitor both white water and headbox consistency. While unpressurized samples must be fed by a pump as bypass solution, the use of pressurized samples allows for direct mounting of the sensor into the process pipe, resulting in the lowest possible installation cost and virtually maintenance-free operation. Continuous monitoring of total consistency and ash allows operators to respond quickly, and enables closed loop control of retention and drainage aids.

Headbox:



White water:



Figure 1 - Installation of Müttek RET-20 inline sensors

2. Charge and Turbidity

When designing the initial project for Stora back in 2006, BTG engineers pioneered an idea that's set to become a future industry standard: the use of a single TSS-71 Filtration Sampler to process multiple thick stock lines, producing a filtrate that can be used to analyze various wet end control parameters (see Figure 2).

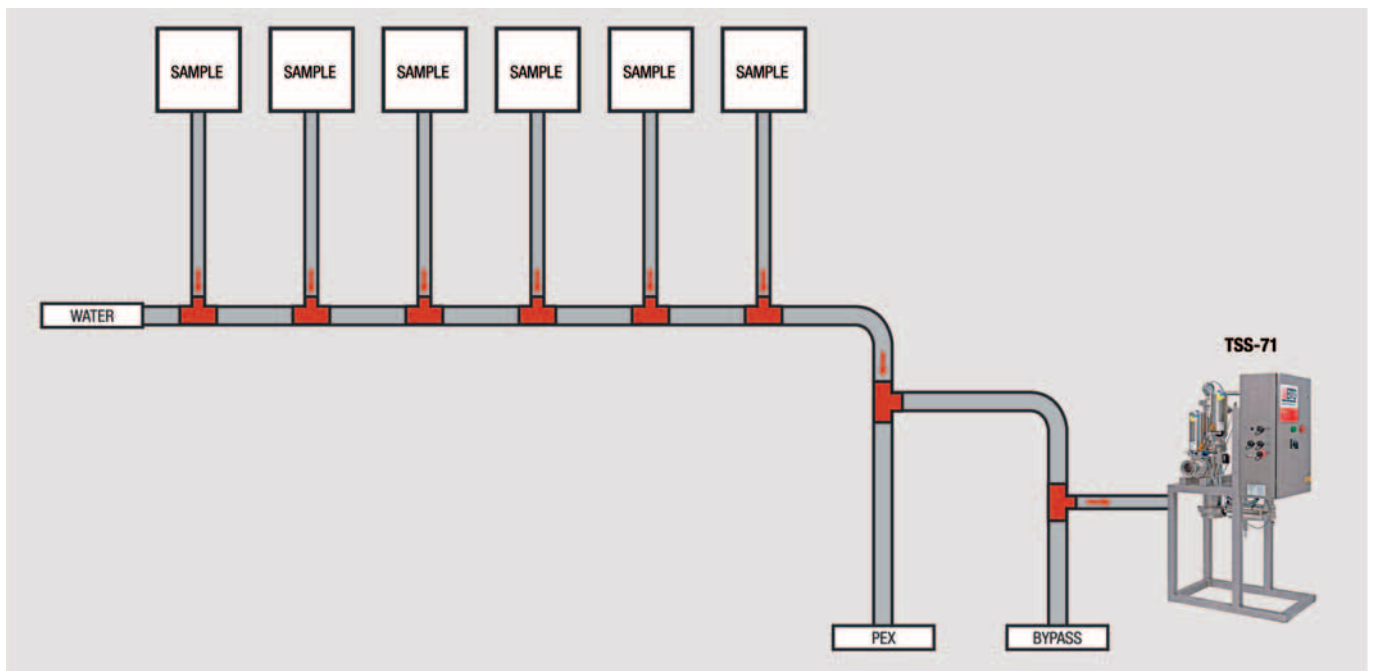


Figure 2 - BTG's cost-effective single filtration approach

Installation of BTG's Mütek PCT-20 Charge Analyzer in combination with the TSS-71 Filtration Sampler allows thick stock samples from GW, TMP, the broke line and the machine chest to be processed, with the filtrates used to generate important wet end control parameters (see Figure 3).

The Mütek PCT-20 is a proven high-performance analyzer that measures cationic demand. Widely known throughout the industry as the 'Mütek Number', this parameter is one of the driving process parameters when it comes to chemical efficiency and stable PM process. While the origin of cationic demand can be manifold, at Anjala it's largely driven by peroxide use in the GW line and various broke amounts.

Turbidity in filtrate – expressed in NTU – is another process parameter that needs to be carefully controlled, and is measured by the 'TIF' sensor within the filtration unit. A combination of managed turbidity and accurate charge control delivers the highest possible performance of coagulants in thick stock.



Figure 3 - Installation at PM level

At the Stora Enso Anjala plant, an analyzer measuring various fiber properties was already installed and has been running for several years. The addition of the new TSS-71, with its inbuilt turbidity in filtrate sensor, takes advantage of this existing installation, and is now producing filtrates of several pulp lines. Four thick stock pulps are currently filtrated: groundwood, TMP, broke and mixing chest, with each filtrate analyzed for turbidity, then forwarded for charge analysis. At the same time, the Mütek PCT-20 measures the white water and other process waters directly, resulting in five sample points for PM 3.

Combined benefits

The subsequent installation of a second Mütek PCT-20/TSS-71 combined system at PM 2 also processes samples from PM 1. With this installation layout, nine different thick and thin stock samples can be measured by the PCT-20, replacing arduous, time-consuming laboratory measurement of charge and turbidity in filtrate for both PMs. And because the application of closed loop control requires samples of one process line to be analyzed more frequently, the Mütek PCT-20 allows for sequencing of sample lines, so that less important process points are analyzed only rarely.

Total Cost of Operation

Because BTG's solution uses a single filtration system for all PM samples and capitalizes on the existing DCS configuration and thick stock feed lines, capital investment and installation costs were kept to a minimum. Since this same process configuration is widely deployed throughout the industry, many mills are already in a position to take advantage of this low-cost approach to improving wet end control.

That said, capital investment is clearly just one part of the puzzle; to stay profitable, mills also need to factor in long-term operational costs. Recognizing this, BTG's approach prioritizes very low total cost of operation through robust systems that need little or no maintenance.

The TSS-71 filtration system is not only self-cleaning, but is the only system of its kind on the market that comes bundled with no-charge annual maintenance agreement.

Reliable control from the DCS is a cornerstone of the system's high performance. Availability is guaranteed at over 99.5%. The inbuilt cleaning of turbidity probes does not require any calibration or drift compensation, and patented ultrasonic cleaning of the charge control measuring cell ensures the longest possible maintenance intervals. The consistency sensors in the headbox and white water are also self cleaning and extremely sturdy. And just so the Stora Enso Anjala team enjoys complete peace of mind, BTG also undertakes a yearly on-the-fly checkup.

The Mütek PCT-20 Charge Analyzer allows up to four thick stock filtrates to be analyzed, providing a much better understanding of wet end interactions.

A hybrid approach combining BTG's Mütek TSS-71 and Mütek PCT-20 delivers highly accurate closed loop fixative control while eliminating time-consuming lab work.

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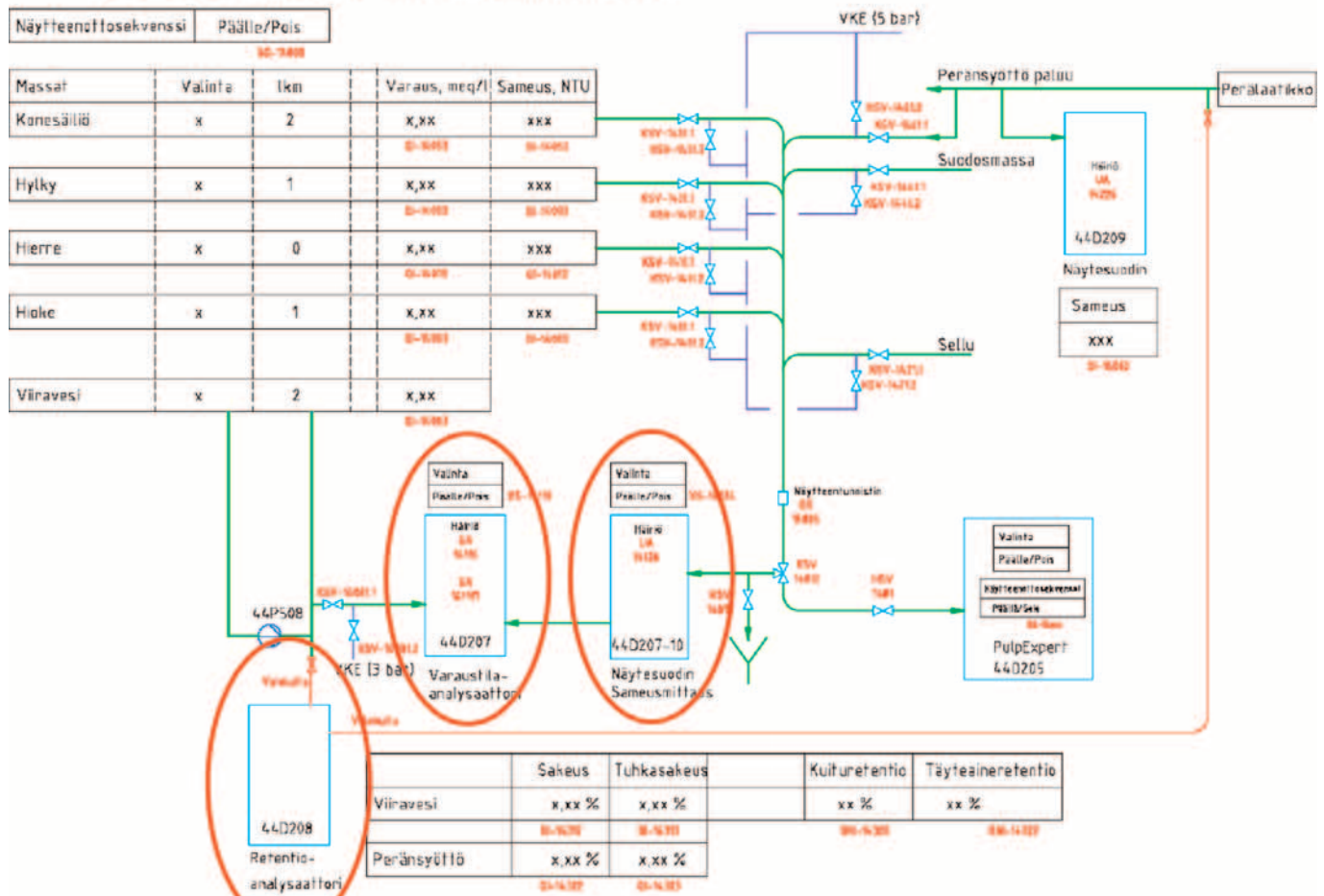


Figure 4 - Implementation of the TSS-71 (right), PCT-20 Charge Analyzer (middle) and RET-20 Retention Inline (left) in existing DCS configuration.

A host of benefits

The task of converting a PM from acid to neutral impacts most wet end parameters. During these turbulent times, only continuous measurement can provide the information needed to control the efficiency of newly-dosed additives and select the best-performing dosage locations.

BTG's project to improve wet end control on Stora Enso Anjala's PM 3 not only delivered substantial savings on installation through the use of existing piping and wiring, but eliminated the need for additional measurement of consistency, charge and turbidity, reducing lab staffing requirements.

Looking to the future, Stora Enso plans to implement closed loop control at PM 3 for retention aid dosage and fixative dosage. While a fixing agent is already compensating for process upsets caused by peroxide bleaching and broke usage, initial steps towards closed loop control of functional additives reveal great potential for further significant savings.