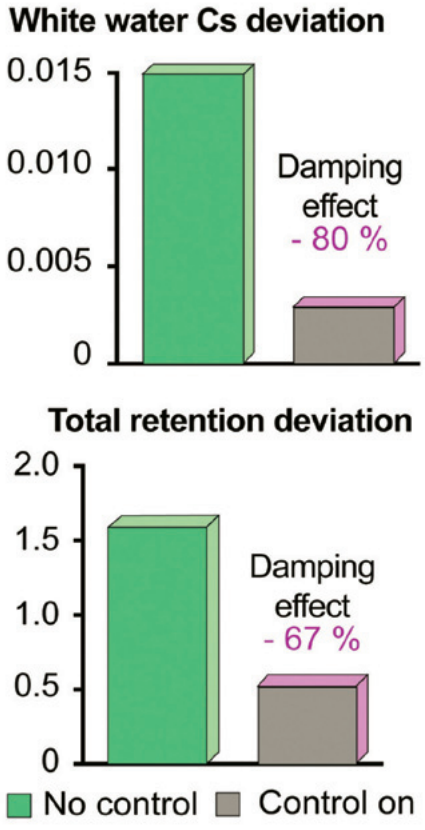
Retention Control on Newsprint Machines

White water consistency measurement brings newsprint machine wet end under control

The Challenge

Wet end control on newsprint machines has to deal with many challenges:

- high machine speeds
- required savings in energy and fresh water usage
- use of fresh filler
- recycled pulp and related problems: stickies, ash retention, effect of calcium



White water Cs control has a clearly stabilizing effect on wet end fluctuations

The Solution

The Valmet RM3 wet end measurement system is used on newsprint machines particularly for ash retention monitoring and wet end total and ash consistency control. It measures the total and filler consistencies in headbox and white waters with extremely high accuracy, even in varying conditions.

Results

The control is able to level out white water consistency variations, stabilizing and calming down the wet end operation. A more stable wet end gives more homogeneous paper in the machine direction. This is particularly obvious on machines using plenty of fillers and/or recycled pulps Continuous on-line measurements help to achieve quicker start-ups and grade changes. White water control is also a powerful tool for process optimization, often resulting in considerable savings in retention chemical cost.

Why Valmet?

Innovation leader with a wide range of measurement and control application references.

- Accurate, reliable ash consistency and total consistency measurements for both headbox and white water
- Proven control solutions: single loop and multivariable control
- Professional help at all phases of control system implementation
- User training based on real experience in the field

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Retention Control on Newsprint Machines: White water consistency measurement brings newsprint machine wet end under control – Read more detailed information on the topic here!

The process

Challenges for the wet end control of newsprint machines include:

- high machine speeds;
- required savings in energy & fresh water;
- use of fresh filler (ash retention);
- recycled pulp and related problems (stickies, ash retention, effect of calcium).

The measurement

Valmet RM3 sensors have proven their applicability in newsprint processes. The sensors measure the total and filler consistencies in headbox and white waters with extremely high accuracy, even in varying conditions. Figure 1 shows an example from a large (annual capacity 220,000 t) newsprint machine using recycled fiber.

Control principle and operation

The goal of white water total consistency control is to level out consistency variations within the short circulation and to prevent these from affecting the quality of the paper web. This improves paper quality in the machine direction by reducing the variation of basis weight, paper ash and moisture. A stable wet end also reduces the risk of sheet breaks.

Usually the control of newsprint machines is more straightforward than in many other processes; for instance the selection of white water consistency targets is easier, as the PM produces different grades with fairly similar basis weights. The example in Fig. 2 shows a one-month run after the white water consistency control was put on automatic control for the first time on this machine. The correct setpoint was first determined, and the same setpoint was then used for all grades run on this newsprint PM.

Effect of control on wet end operation

The control is usually able to level out white water consistency variations down to ± 0.005% or lower (Fig. 3), in other words clearly below the original variation range.

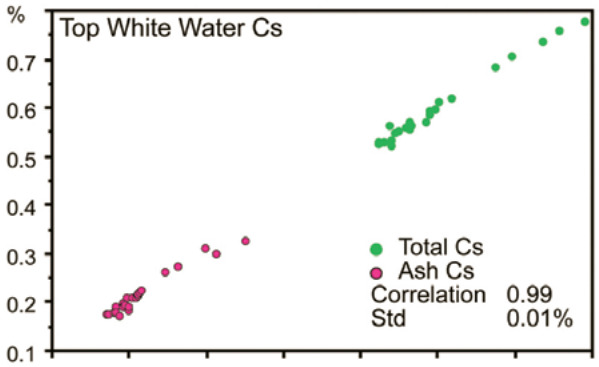

Fig. 1. Valmet RM3 white water consistency as a function of laboratory results.

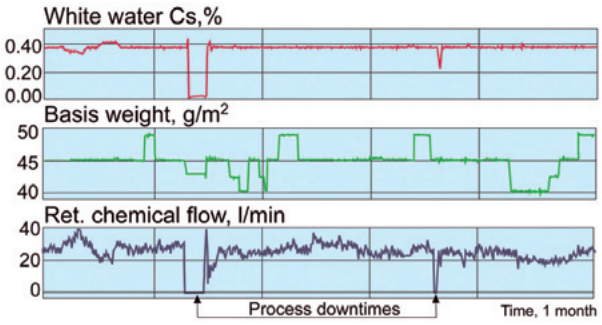

Fig. 2. White water Cs, basis weight, and retention chemical flow; one-month period on a newsprint machine.

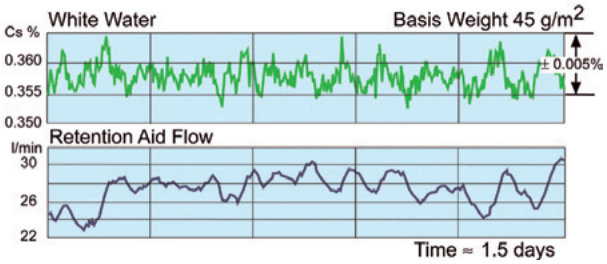

Fig. 3. Example of how the white water consistency control operates.

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Figure 4 shows results from a trial period, comparing wet end variations before and after control installation. Although the initial situation on this particular PM was rather good, a visible improvement is still to be seen. The control has stabilized and calmed down the wet end operation.

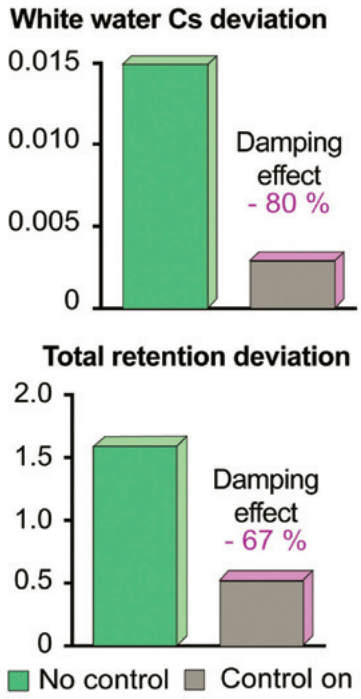

Fig. 4. Stabilizing effect of white water Cs control on wet end fluctuations

Effect of control on paper quality

A more stable wet end gives more homogeneous paper in the machine direction. This is particularly obvious on machines using plenty of fillers and/or recycled pulps: particularly the MD ash variation in the paper web is reduced, but improvements can also be seen in the other MD quality variables.

Figures 5 and 6 show results of dry end quality measurements, both before and after white water consistency control installation. As all of the measurements indicate, the control has improved MD web quality by 20–40%. Such developments ensure the papermakers more stable operating conditions and enable process optimization (higher ash target, tighter quality limits, etc.). The examples come from two different paper machines, neither of which had any paper ash control based on dry end measurements.

Process optimization

White water control is a powerful tool for process optimization. In some cases the step tests done prior to control start-up, have shown that the normal chemical dosage level has been far too high: large amounts of chemical have been used to keep on the safe side even during major variations. This means, however, that the short circulation contains so much chemical in any case that smaller changes in dosage do not produce any response at all in the white water consistencies. Hence, when the chemical dosage is reduced to a suitable level for control, savings are achieved in the average retention chemical cost.

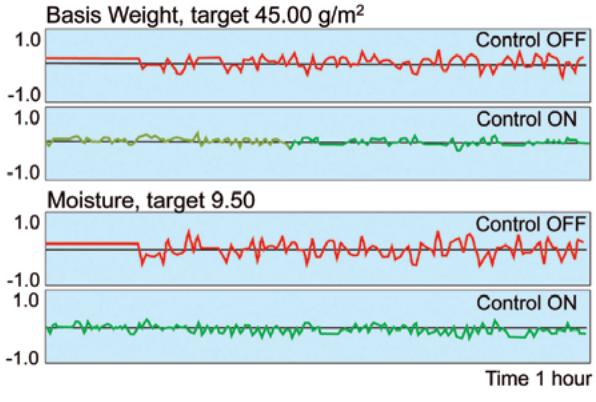

Fig. 5. MD variations of basis weight and moisture, measured in dry end.

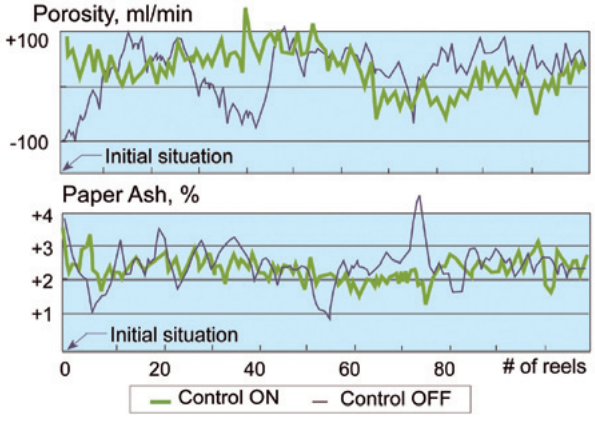

Fig. 6. MD variations of porosity and paper ash, measured as reel averages in the dry end.

Continuous on-line measurements provides the PM operators with more in-depth information of the process and helps them to determine suitable consistency targets. PM start-up situations can be run with an inter-rupted or reduced retention chemical injection, and the control is then switched on once the consistencies are close to the normal level. This ensures quicker start-ups and lets the process reach the normal consistency range in a shorter time.

PM settings can also be effectively adjusted by using the white water control. Figure 7 shows a situation where the control has maintained a stable white water consistency while adjusting the headbox slice for optimum paper quality and headbox stock consistency. Similarly, the slice can be kept stable and the white water consistencies adjusted when searching for optimum quality or PM runnability

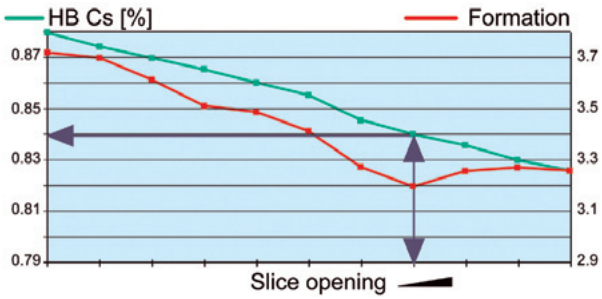

Fig. 7. Adjusting headbox slice at constant white water consistency.

Benefits of Valmet RM3

- more stable wet end operation
- more information of the process
- continuous data flow – less need for routine laboratory work
- smaller machine-directional quality variations
- even retention chemical savings
- more controlled grade change and start-up situations
- tool for optimization of retention / formation / dewatering

For more information, contact your local Valmet office. www.valmet.com