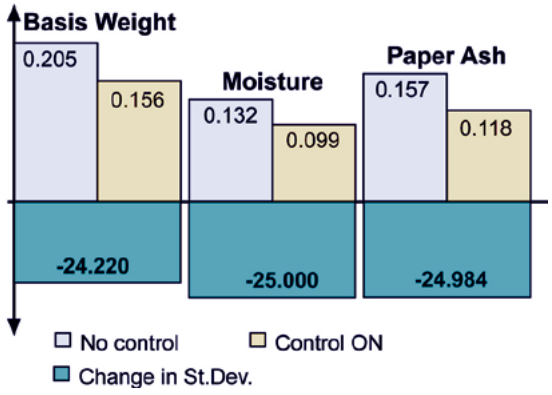
Retention Control on LWC Paper Machine

Keeping ash variation in check with white water Cs measurement

The Challenge

The biggest challenge for retention control on LWC is broke. The components and characteristics of coated and uncoated broke are very different, and coated broke is particularly problematic for wet end operation. Most of the ash in LWC base paper comes with the broke, and the remaining ash is added as fresh filler. Fresh filler differs from the pigments of coated broke in many respects, both chemically and physically, and therefore their retention and chemical consumption are normally far from similar.

Manual retention control cannot eliminate rapid disturbances and fluctuations caused by the varying quality and feed rate of broke. The ash contained in broke is the primary source of retention disturbances on LWC paper machines.



Quality measurement results from the dry end clearly illustrate the beneficial effect of white water Cs control.

The Solution

Valmet RM3 measures total and ash consistencies reliably in all situations. Consistency control based on this measurement reduces consistency fluctuations and stabilizes the wet end.

Results

A more stable wet end gives more uniform paper quality in the machine direction. This in turn means better PM runnability and enables process optimization.

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
- Proven results

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Retention Control on LWC Paper Machine: Keeping ash variation in check with white water consistency measurement – Read more detailed information on the topic here!

The process

Retention control on LWC machines faces many challenges. Coated and uncoated broke differ greatly from each other with regard to their components and characteristics, and coated broke is particularly problematic for wet end operation. Manual retention control cannot eliminate rapid disturbances and fluctuations caused by the varying quality and feed rate of broke. However, the retention control system of a LWC paper machine must respond quickly to the various changes in reten-tion chemical demand, and it must always, in all situations, give the correct amount of chemical. The ash contained in broke is the primary source of retention disturbances on LWC paper machines.

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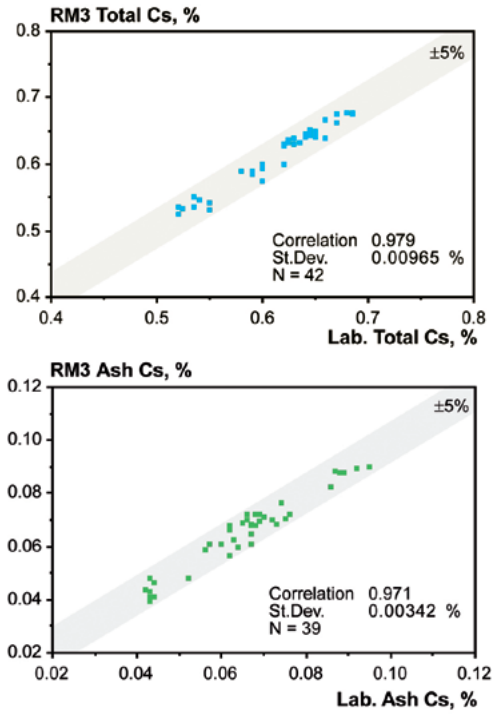

Fig. 1. Valmet RM3 headbox consistency measurements on LWC paper machine.

The measurement

A large variety of pigments are used for LWC base paper, and this is a great challenge for consistency measurements. Valmet RM3 measures total and ash consistencies reliably in all situations (Fig. 1).

How the control operates

White water total Cs control aims to reduce consistency fluctuations in the wet end and to prevent them from showing up in the paper web. The result is improved PM runnability and more uniform paper quality in machine direction. On LWC machines the control is implemented in the normal way, with emphasis on the retention chemical system. As mentioned above, the LWC process chemistry contains a large number of variables; this makes it very sensitive and demanding with regard to control. Particular attention must therefore be paid to the operation and limitations of the retention chemical system. If the control system is to give good results, the retention chemical – the cornerstone of control – must be effective in all situations.

Controlling an LWC machine retention may require more than one setpoint for the white water consistency, to run paper grades with different ash target, basis weight, etc. The control strategy is selected on the basis of user experience, and it can be flexibly tailored to meet customer's requirements. The basic procedure is to try with different setpoints to find the one(s) that give the opti-mum paper quality, production cost and production rate. When this "optimum consistency" is found, it is given to the control as a setpoint. In other words, the control aims to stabilize the optimum situation whenever that grade is run.

Conditions dictate whether the control can be used during grade changes, breaks, or start-ups. As an example, some mills have observed that the most expedient way to handle major grade changes is to run them without control, using manual control to search the approximately correct consistency range, and then switch the control on again.

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Effect of control on the wet end

The control markedly reduces consistency variations in the wet end. Figure 2 shows how the control has stabilized total and ash Cs in the wet end. These results come from a trial period during which wet end operation with and without control was observed. The results show that the control calms down wet end operation, makes paper machine control easier and improves runnability.

Effect of Control on Paper Quality

A more stable wet end gives more uniform paper quality in machine direction. This is seen especially on PMs using fillers and/or recycled fiber.

Figure 3 shows the results of paper quality measurements from the dry end, measured with and without white water consistency control. These results have been calculated as averages from four periods (1 day each).

Process optimization

White water total consistency control is an efficient optimization tool. It gives the correct retention chemical dosage in all situations, in most cases reducing the total chemical consumption. With manual control, retention chemical dosage is usually kept rather high to always ensure a sufficient retention level; in practice this means chemical overdosages, and a reduced impact of dosage changes on retention or consistencies. Sometimes this may even reflect in paper quality or runnability, and poor formation caused by retention chemical overdosages is a relatively common phenomenon.

The control system is also a great help during chemical trials and other PM research. The measurement detects even quick process changes, allows the users to draw conclusions, and gives a more comprehensive idea of how the process operates.

The continuous measurement gives information all the time, during normal process runs as well as disturbances or special situations. When PM start-ups and grade changes are easier to monitor, the operators have the opportunity to improve the process running methods and to reduce the time required to make these process changes.

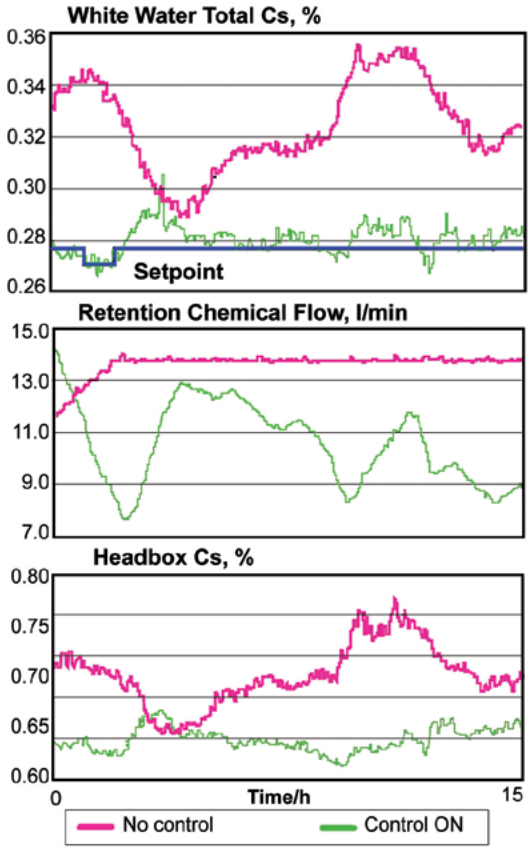

Fig. 2. Wet end consistencies, no control & control on.

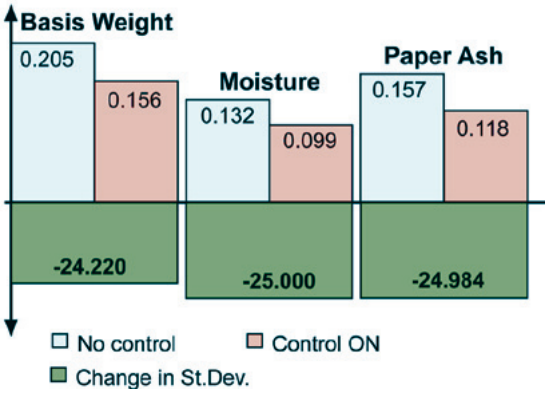

Fig. 3. Effect of control on quality measurement results from the dry end.

Benefits of Valmet RM3

- More stable wet end operation
- Gives more, continuous, on-line information and reduces the need for laboratory work
- Reduces machine-directional variation of paper quality properties
- In many cases also gives retention chemical savings
- Better control of PM start-up and grade change situations
- Efficient tool when optimizing wire retentions, formation and dewatering rate

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