

Fine specialty paper manufacturer reduces costs and increases efficiency with new retention measurement



Domtar’s integrated pulp and paper mill in Hawesville, Kentucky, USA has a production capacity of 596,000 short tons across two paper machines. With the goal of optimizing their process, the Hawesville mill chose ABB’s KPM KRA Retention Measurement System. This has since helped reduce costs and decrease downtime.

— Phil Hinchcliffe, Process Controls Manager at Domtar’s Hawesville Mill, with ABB team (Daniel Wright, Urpo Heikkinen and Blake Christian) after successful installation of KPM KRA system

Challenge

In late 2017, ABB partnered with Domtar’s Hawesville mill as a pilot site for ABB Ability™ solutions. Initial efforts focused on improving the stability of the wet end. ABB developed algorithms utilizing multi-variable methods focusing on ash and retention aid contributions to help control ash content during start-up and to address sheet break conditions.

Wet end operations

Precipitated Calcium Carbonate (PCC) is used as a filler and brightener to enhance sheet appearance and affects how much ash content the sheet has. There is a strong cost reduction incentive for papermakers to increase ash to reduce fiber usage. However, too much ash can result in a weaker sheet strength and has the potential to increase defects, which can result in more sheet breaks.

During start-up or break conditions, PCC and retention chemicals are continuously added and re-circulated through the paper machine water systems. Without intervention, the ash percentage will steadily increase due to added broke. Operators are then forced to make educated guesses to reduce PCC addition rates during startups and breaks.

Measurement improvement opportunity

The Quality Control System (QCS) uses the percent of ash and first pass retention values to control PCC flows during sheet break conditions. For tighter control of these flows, the QCS requires accurate measurements. As ABB was piloting solutions for wet end sheet break controls, bump tests proved that the mill’s previous measurement devices were inadequate.

ABB solution

ABB introduced the KPM Retention Measurement System, which monitors and can be used to control paper and board machine retention. Available in two options, the KRA unit measures whitewater and headbox total consistency as well as ash consistency, and the KRT unit measures total consistency only. Gaining access to continuous whitewater total consistency information can help stabilize retention by controlling retention aid flow(s) accordingly. Ash consistency measurement from headbox stock enables control of ash content during sheet breaks, when ash information from the scanner is not available. The mill chose to go with both total consistency and ash content measurement in the KPM KRA system.



Domtar was able to maintain wet end ash stability during sheet breaks by utilizing headbox and silo ash percentage measurements.

System setup

The mill added the KPM KRA Retention Measurement System, which also includes the KPM KC9-A optical consistency sensor and sampling systems. The system was installed on the headbox and whitewater silo on the H-2 paper machine in early 2018 and calibrated to ensure accurate measurement and control.

For the headbox unit, the sample is taken from the recirculation line immediately after the headbox. Line pressure with strong velocity is used to move the sample through the KPM KRA unit to discharge into a sample funnel, where the actual stock sample can be collected for use in initial and ongoing calibration. The sample is then returned to the wire pit of the paper machine.

For the whitewater silo unit, the sample is taken off the bottom of the silo and uses gravity to feed the sample to the KPM KRA unit in the basement. In order to get correct measurement results, the sample goes through a deaeration vessel to remove entrained air since large amounts of it will negatively affect sensor performance. The sample then flows through the KPM KC9-A sensor into a collection funnel and is returned to paper machine wire pit using a sample return pump.

Results

This initial calibration produced positive results almost immediately. Ash and consistency samples were collected over the course of a month to cover the full range of grades produced on the H2 paper machine. Calibration values were fine-tuned based on the results of lab ash and consistency data. When bump

tests and changes in ash addition rates were performed with the new ABB system, the results tracked closely with expected outcomes.

The mill has come to rely on the KPM KRA Retention Measurement System. Having accurate information has allowed operators to rely on the use of advanced controls and helped stabilize the wet end chemistry. This further results in faster break recovery times, ensuring that ash stays on target through upset conditions. Machine operating personnel find that they require the information provided by the KPM KRA Retention Measurement System to ensure the highest quality at the lowest operational costs.

System expansion

Phil Hinchcliffe, Process Controls Manager at Domtar's Hawesville Mill, indicated that they were so pleased with the performance of ABB's system that he recommended the purchase of an additional KPM KRA Retention Measurement System for the mill's H1 paper machine. The newest system was put into service in mid-2019. Installation went smoothly, and the unit was very responsive to changes in ash content and both headbox and tray silo consistency.

The success of the implementation has also led to other opportunities in the areas of sheet break detectors and consistency transmitters.

Benefits

You can't control what you don't measure. KPM's KRA Retention System has provided accurate, maintenance-free measurements that have allowed the mill to confidently control percent of ash during sheet break and start-up conditions. This allows operators to focus their time and attention on other important issues during upset conditions. Combining this measurement technology with ABB's advanced control solutions and on-site support has helped reduce variation and ensured a quality product with significant cost savings.

- Reduced downtime from sheet breaks
- Decreased chemical usage
- Reduction of fiber use
- Reduced variability of filler content
- Improved MD control
- Improved grade change rates utilizing MMD controls to change retention aid flows to achieve ash targets faster

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