Measurement intelligence inline

Metso Brightness Measurement

metso
Expect results

Metso Brightness Measurement

Optical measurement intelligence for results

Almost four decades have passed since the first Metso brightness sensor started to shed light over chemical and mechanical pulps to reveal their potential as a raw material of high quality paper and board grades. Today, the pioneering Metso inline sensor technologies are globally recognized as mill standards for process optimization and control in all types of pulping processes. With over 3000 units delivered, Cormec provides accuracy and reliability in an easy to install, easy to operate measurement package.

Metso Brightness Measurements (Metso Cormec5) is the latest development of Metso's inline sensors which links the decades' experience with the newest smart platform technology. The new sensor technology provides the same proven and trusted equipment features as the previous versions but in a more versatile and compact package. It demonstrates higher measurement performance and flexibility to various process standards.

Light weight for heavy duty

The new mechanical design includes the dimensions and features with full match with the previous installations but also many improvements that make the new installations more cost effective. The higher process pressure standards, smaller size and dimensions, plus classified safety specifications make the new Metso Cormec5 the sensor suited for heavy duty applications. The sensor can be inserted and withdrawn safely when the process is running with the mounting tool and the safety chains attached.

Results from day one

The sensors are standardized using black and white references common to all Metso Cormec5 sensors in the mill. This provides interchangeability and the assurance that the sensitivity of all devices is the same. The initial calibration with a one point method is based on the recipes stored in the system. Once laboratory correlations for a particular sensor location have been finalized they never need to be repeated, unless process conditions change. This calibration method fulfills the requirements of most quality systems.

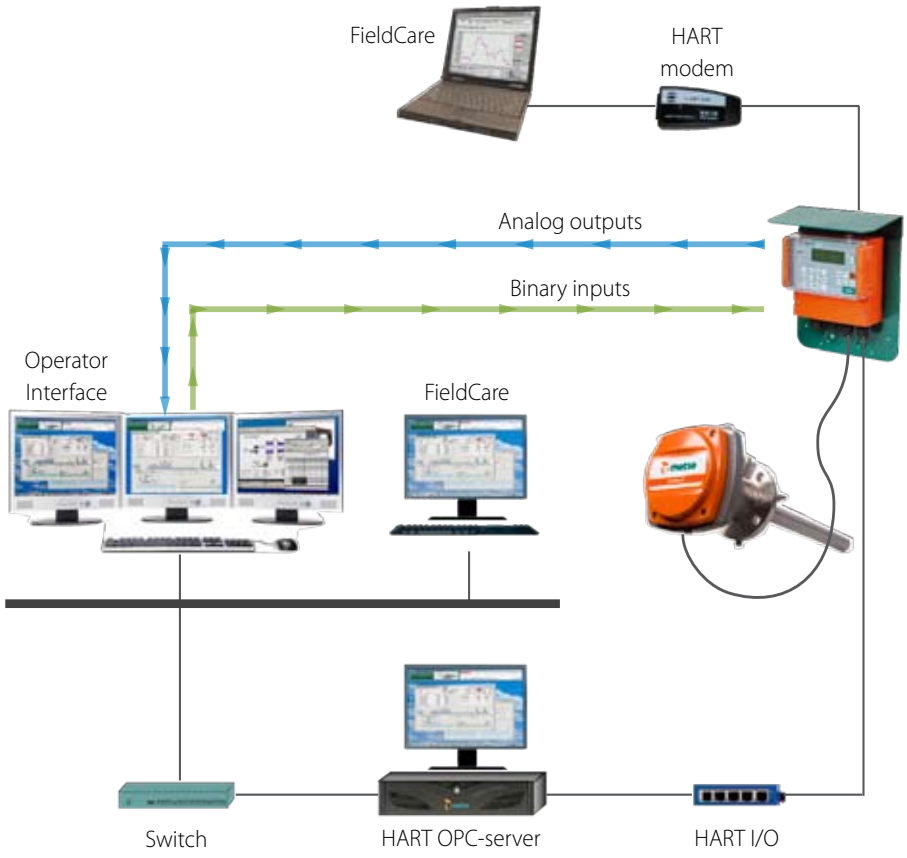
Easy path to efficient communication

One of the main design criteria has been to utilize the interfacing and diagnostics tools that provide a swift and easy path to efficient communication. The new platform provides the customer interfaces with the communication standards and diagnostics tools (FieldCare and DTM) similar to other Metso sensors and transmitters.

Intelligence inside

The new smart technology provides more capacity that makes the measurements five times faster. Integrated optics and measurement technology and the intelligent signal processing provide unsurpassed speed of measurement and accuracy.

The unique symmetry of the measurement head optics uses both refracted and reflect-



ed light over a relatively large area for the best possible results. The light source with specially selected light emitting diodes is hermetically sealed and temperature controlled. The measurement head, body and associated electronics have all been designed to minimize resonance and withstand pipe vibration.

And, to ensure long term stability and faultless measurement operation diagnostics controls and a special warning shield will supervise the operational conditions inside the probe all the time.

The best is even better

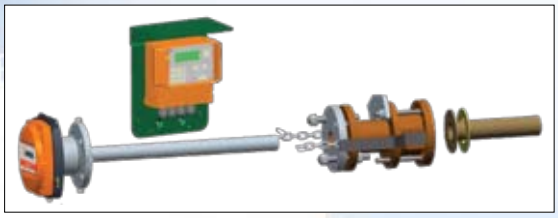
To extend the product life cycle and to lower the cost of ownership Metso uses Failure Mode and Effect Analysis (FMEA) as a base for product and maintenance programs development. The analysis results are based on the systematic cumulation of components and product assembly fault and failure information gathered in development and field tests as well as in normal mill running conditions. It identifies the potential failure type, location and expected frequency with planned proactive actions to avoid operational interruptions.

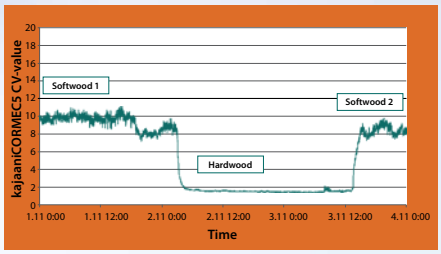
Metso inline sensors have a proven track record of being stand alone and service free products for decades. Metso Cormec5 and its performance has been developed even further by utilizing FMEA analysis programs already in an early phase of the new product specification.

Metso Cormec5 highlights:

- Measures brightness, ERIC, color and fluorescence
- Five times faster measurement speed provides unsurpassed accuracy
- Cost effective installation up to 25 bar
- Small dimensions and integrated optical measurement technology enhance robustness and vibration endurance
- Classified safety and secured installation
- 100 % match with the existing
- installations
- Results from day one
- Measurement conditions secured inside the probe by an active warning shield
- The customer interfaces with efficient calibration and diagnostics tools (DTM) similar with the other Metso sensors and transmitters

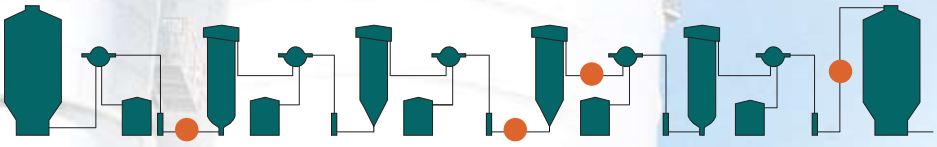
PN16 installation package for standard bleaching pressures in chemical pulping.





Hardwood and softwood transitions measured by Metso Cormec5

Metso Cormec5 typical locations



Metso Brightness Measurement

For chemical pulping

Metso is the original inventor of the inline brightness and residual measurement technology released in mid 1970s. The Cormec and Polarox inline sensors and Compensated Brightness Control became global kraft mill standards for bleaching stage control in 1980s and still today the product names belong to the standard packages of the bleaching controls in most of the latest fiberlines built in the world.

Since the early days of the bleaching controls, the process technology and chemicals used have changed quite a bit to meet the current tough specifications of environmentally safe and economically sound process solutions. Capacity of the new process equipment has increased dramatically and the fiber supply turned more towards the areas where fast growing hardwoods play the major role. All these changes have made the fiberline management and process operation very challenging. Fortunately, new measurement and automation technologies have become available to cope with the challenges and to provide a more holistic view of the process from cooking and recovery to bleaching and baling.

Fast Kappa and Brightness feedback for bleaching controls

During the years of fiberline process evolution the role of the inline brightness measurement has become more versatile from the sole control signal to a member of more sophisticated optimization solutions. Compensated Kappa Factor Control, including discrete Kappa and Brightness measurements from online analyzers, need a continuous process signal that provides fast indication of Kappa and/or Brightness changes in the process. Metso Cormec5 provides the continuous measurement of kappa and brightness variation during the minutes as the Kappa analyzer is sampling, washing and measuring kappa and brightness. This more precise measurement result is then used to calibrate the continuous signal in a way that the accurate and continuous D2C measurement signal can be formed for controls. The mill experiences have proven this approach to be the best choice for tight and effective D0, D1 and D2 stage bleaching controls.

Key measurements for chemical pulping:

Metso Cormec5
Brightness, color

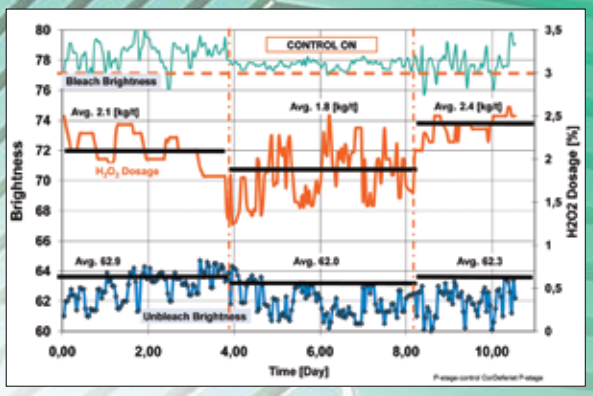
Metso Kappa Q
Kappa and brightness with fiber and shive measurements

Metso Polarox5
Bleaching chemical residual measurements

Metso DCD
Dirt count and brightness at the baling line

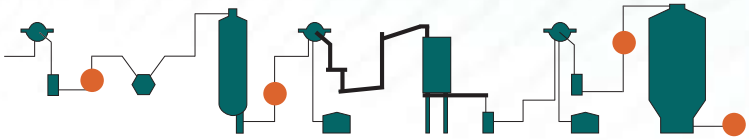
Metso Rotary and **Metso SP**
Consistency measurements

PN25 installation package for mechanical and chemical pulping.



Bleaching control based on inline brightness measurement reduces chemical costs with better brightness stability.

Metso Cormec5 typical locations



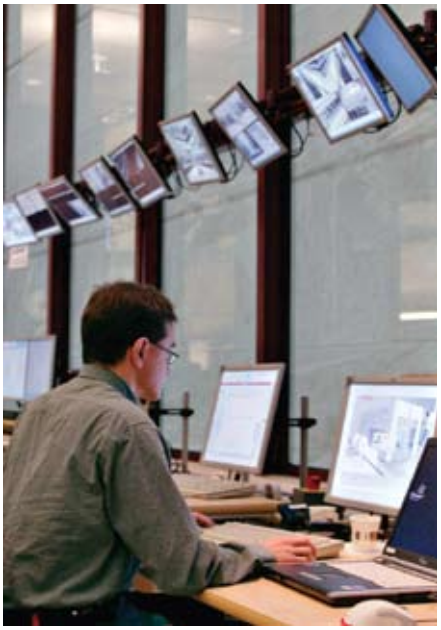
For mechanical pulping

The paper producer's challenge is to ensure high product quality and at the same time to improve productivity by optimizing efficiency and production costs. When mechanical pulping is discussed, high bulk and high brightness have been the traditional main quality goals to be achieved. Metso brightness sensors have been used for mechanical pulp brightness monitoring and bleaching controls for decades.

The process configurations for mechanical pulping are many and diverse including GW, PGW, TMP, CTMP and BCTMP processes. Depending on the process concept, pulping is carried out in medium and/or high consistency. When aiming for higher brightness sodium hydrosulphite and peroxide are used for bleaching. To be sure the bleaching agents perform efficiently and cost effectively measurement-based controls are needed.

Feed forward brightness for bleaching controls

The typical role of the Metso Cormec5 is to provide continuous brightness signal from pre-tower and post-tower locations for feed-forward and long-feedback bleaching controls. This concept has frequently been reported to improve final brightness stability and reducing chemical consumption for lower costs.



Key measurements for mechanical pulping:

Metso Cormec5
Brightness, color

Metso MAP
Freeness, fiber and shive measurements

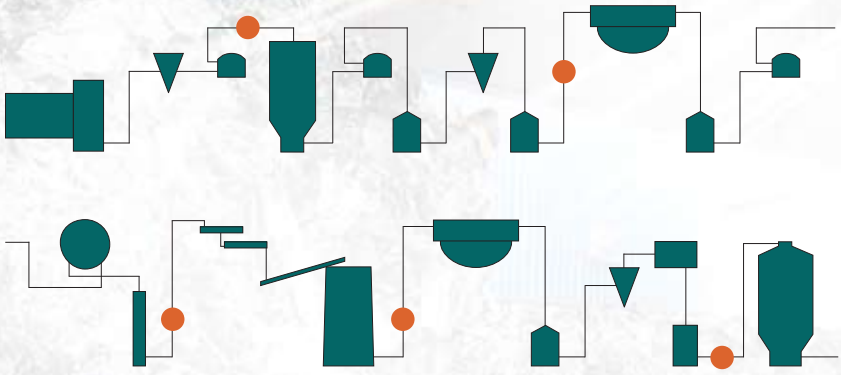
Metso Polarox5
Chemical residual measurements

Metso Pulp Expert
Complete pulp and fiber quality analyzer

Metso Rotary, Metso SP and Metso MCA
Consistency measurements

PN25 installation package for RCF/DIP pulping.

Metso Cormec5 typical locations



Metso Brightness Measurement

For recycling and DIP processes

Recycled fiber is increasingly being used as a raw material for many paper, board and tissue grades. The challenges the papermaker confronts when using waste paper as a fiber source are many. How to cope with variability of fiber types, inks, contaminants and still maintain high yield of fiber for final products are the most acute. Fortunately for on time decision making and process control, there are available solutions based on proven measurement technology and advanced control philosophy.

Improvements in process stability, better control of the mechanical and chemical processing and effective control of the raw material components all provide substantial economic benefits. The results are lower chemical and energy consumption, better machine runnability and improved end product quality. In recycled fibre processes, key measurements include consistency, ash, brightness, residual ink, dirt count, pulp quality and chemical properties. The relative importance of each measurement depends on the process and on the end use of the pulp. Metso Products Portfolio consists of inline and online measurements for all the previously mentioned process variables.

Metso Cormec5 possesses proven inline measurement capabilities in providing measurement solutions of optical pulp properties in the critical parts of the deinking and recycling process. The brightness of recycled pulp is dependent on lignin content, ink and dye concentration, ash as well as other non-fiber matter.

Flotation

The first practical process location for Metso Cormec5 is in the primary flotation where the major part of ink is removed from pulp. By measuring pulp brightness and Effective Residual Ink Concentration (ERIC), the degree of ink removal success can be determined and adjustments made for better efficiency. This will include waste paper feed and chemical dosages to the pulper and flotation as well as optimizing conditions in subsequent cleaning and screening operations. How well ink will be removed dictates the effectiveness of the next steps in the process to achieve target quality in cost effective way. Optical pulp quality measurements such as Metso Cormec5 can play a key role.

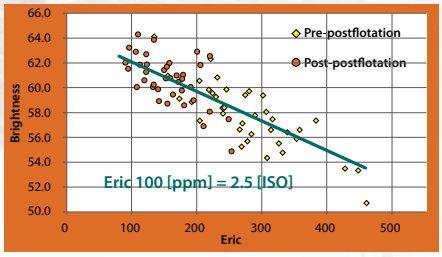
Bleaching

If the brightness requirement for the final paper product is below 60-65% ISO, adding peroxide into the pulper is often enough. For higher brightness multistage bleaching is needed, including both oxidative and reductive bleaching chemicals. Brightness and residual ink can be measured inline using the Metso Cormec5 brightness sensor which is also used for a feed-forward control. The brightness loss caused by ink in pulp is hard to counter by bleaching alone because the pulp brightness has to be much higher to counteract optical properties of the residual ink. So, the efficiency in removing ink in the previous stages of pulping is crucial to the bleaching success and economy.

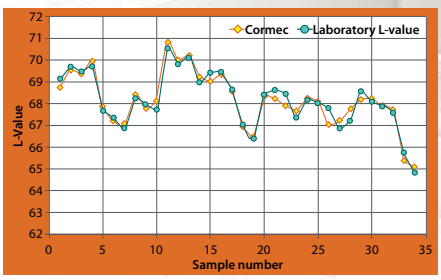
Post flotation and before pulp storage

Additionally, Metso Cormec5 can be used for a continuous brightness and ink content monitoring to control the final deinking steps.

Prior to pulp storage, brightness and residual ink will provide valuable information about quality to the paper machine. Overall trends can be identified quickly and adjustments made to the process. In extreme cases, deci-



Low ERIC ensures high pulp brightness.



Inline measurement can provide trending for color components.

sions to recirculate out of specification pulp or treat it differently can be made with confidence before it goes to the storage tower. If a final reductive bleaching stage is in use, Metso Cormec5 can provide feedforward correction to the hydrosulfite or FAS stage control with the continuous brightness, residual ink and L-a-b color indication.

Optical brighteners in raw material

Recycled papers may contain different amounts of optical brighteners (OBAs) which can be measured in paper slurry. Metso Cormec5 X has additional UV light source which enables continuous inline UV+ brightness, fluorescence or whiteness measurements and controls.

Key measurements for recycling and deinking:

Metso Cormec5
Brightness, ERIC, color and fluorescence

Metso Polarox5
Chemical residual measurements

Metso Pulp Expert
Complete pulp and fiber quality analyzer

Metso RM3
Ash content and consistency

Metso Rotary, Metso SP and Metso MCA
Consistency measurements

Metso Automation Inc., Kehräämöntie 3, P.O.Box 177, FI-87101 Kajaani, Finland
tel. +358 20 483 120, fax +358 20 483 121, www.metso.com/analyzers