In operation of the causticizing process, the main objective is to maintain stable white liquor production rate and quality. The specific challenge is to achieve optimal chemical conversion in the causticizing reaction, enabling a high causticizing efficiency while ensuring easy separation of the lime mud.

Disturbances such as changes in green liquor quality, lime availability and production rate add to the complexity of the problem. Poor performance of the causticizing process can have significant impacts on the white liquor quality, which can cause larger quality and production rate disturbances throughout the cooking process.

OPT800 Caust, an ABB Ability™ Advanced Process Control (APC) solution, solves these challenges by providing tighter control of the causticizing process, reducing variability for better white liquor quality while also increasing capacity by up to 7%.

Features

• Production change control
• Green liquor TTA control
• Causticizing efficiency control
• Real-time adaptive modelling: Automatic adjustments based on process changes
• Higher-order model support: Captures process dynamics accurately
• Cost optimizer: Looks for ways to optimize operational costs within process constraints
• KPI dashboard and control usage reports by day/shift
• Performance monitoring, with both on-site and remote access for customer and ABB

Benefits

• Increased causticizing efficiency by 0.5-1.5 units
• Decreased causticizing variation by up to 60%
• Improved white liquor quality and strength
• Increased capacity by 3-7%
• Decreased lime consumption
• Optimized lime mud separation and washing

How it works – Maintaining white liquor quality, efficiency and costs

The OPT800 Caust control application stabilizes white liquor production and quality by controlling the green liquor TTA, causticizing efficiency and production rate changes. The APC solution maintains a stable causticizing efficiency by optimally adjusting the lime-to-green liquor ratio and green liquor density while simultaneously accounting for the slaker differential temperature. Production rate changes are carried out smoothly as the production rate control coordinates the various operating parameters (i.e. flows and temperatures) to ensure minimal disturbance to the system. Control performance will not degrade over time with always-on monitoring and analysis of the APC solution.

The program maintains a stable causticizing efficiency by optimally adjusting the lime-to-green-liquor ratio and green liquor density while simultaneously accounting for the slaker differential temperature. Production rate changes are carried out smoothly as the Production Rate Control coordinates the various operating parameters (flows and temperatures) to ensure minimal disturbance to the system.
Real-time adaptive modelling
Dynamic model adjustment and adaptation in real time is a unique feature to ABB’s APC platform. It means process models are dynamically updated if the process conditions change for things like production rate changes, lime quality changes, etc. If any important process condition or property changes, the models can be updated automatically, keeping production and quality smooth and consistent.

Causticizing Efficiency Virtual Measurement
OPT800 Caust includes the Causticizing Efficiency Virtual Measurement. Also known as a soft sensor, this Virtual Measurement utilizes models generated from machine learning technologies to predict an online calculation in order to increase the frequency of measurements.

These real-time calculations provide insight into the causticizing efficiency at a faster rate than standard measurement devices and at additional locations, such as after the slaker or first causticizer.

These more frequent measurements enable the balancing of the lime-to-green liquor ratio with a closed loop control strategy—reducing variability and rejects while improving overall operation of the causticizers.

Operator displays and reports
Highly-intuitive, task-oriented and easy-to-access operator displays are provided to monitor real-time, historical and prediction trends data as well as modify tuning parameters. OPT800 Caust allows customization of the user interface to meet a wide range of project needs. The reports module calculates the key performance indicators such as controls utilization, white liquor quality and lime consumption, and presents them in the day/shift report. OPT800 Caust is delivered as a subscription-based service and consists of the state-of-the-art APC installation, start-up, and training, as well as tuning and monitoring services.

OPT800 Caust helped a European kraft pulp mill reduce causticizing efficiency variability by 61.7%.

Recausticizing process overview

Multivariable control and optimization
1. Quality controls
   a) Green liquor TTA
   b) Causticizing efficiency
   c) White liquor effective alkali
   d) Slaker temperature differential
2. Production change
3. Grade/recipe change
4. Reports
5. KPI dashboards

Supervisory control
1. Lime/green liquor ratio
2. Green liquor temperature
3. Green liquor density
4. Lime and green liquor flow

The information provided in this data sheet contains descriptions or characterizations of performance that may change as a result of further development of the products. Availability and technical specifications are subject to change without notice.

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