

ACE (Advanced Control Expert)

Optimization solutions for recaust systems



The challenge: To fully optimize recaust operations



The solution: Recast ACE
Recast ACE (Advanced Control Expert) is a recaust optimization system powered by BrainWave that is proven to improve white liquor quality, eliminate over-liming, reduce dead load (and thereby energy consumption), while automating all control in the recausticizing area.

Recast ACE starts by closing loops and stabilizing operations with the patented BrainWave adaptive, predictive multivariable control technology. BrainWave automatically accounts for dead time and measured disturbances. Recast ACE will manage the production rates and liquor quality to ensure excellent quality and adequate inventory at all times.

Recast ACE includes a TTA/EA predictor that allows operators to enter their ABC

lab test results. ACE will then set the correct targets for the control loops using inexpensive and reliable conductivity meters. ACE will use the lab test data to calculate, using Goodwin's curve, the current "best possible" causticizing efficiency and set a target just below that to prevent over-liming. Mills that receive more frequent test data from online white liquor analyzers can integrate this information into ACE as well.

ACE's maintenance manager unifies operation when conductivity probes are cleaned or changed. ACE's quality manager adjusts the slaking and causticizing process to hold white liquor quality on target.

Recast ACE expert supervisor

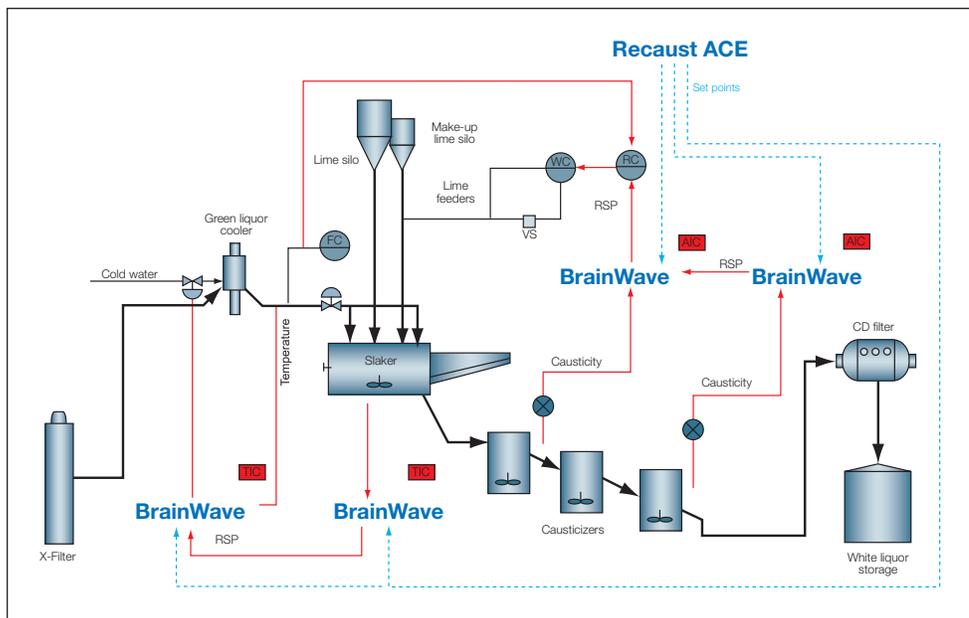
Recast ACE is a rule-based expert system designed to emulate the supervisory re-

sponse of a "best operator" to ensure that operation is always bound within safe, practical operating ranges. Unlike the 'black box' old-style advanced process control solutions, Recast ACE clearly tells the operator why the goals are shifting, what constraints are coming into play and what the new objectives are.

The communication structure of Recast ACE reassures operators that everything is as it should be while the responsive BrainWave controllers keep the system on target. The operator now is entering only desired production rates, liquor inventories and white liquor quality data. Recast ACE is managing the rest.

Our technology

BrainWave is a patented predictive multi-



▲ Recast ACE control schematic

variable technology that simultaneously controls the green liquor temperature and density, slaker temperature, lime addition and causticity after the first and last causticizers, while considering the effects each actuator move will have on all measurements. Disturbance variables like green liquor flow and green liquor density are also included in the BrainWave controller and any upsets are rejected. By tightly holding all the targets, BrainWave provides stability to each measurement.

ACE is our virtual expert operator that manages a process area with the goal of keeping costs as low as possible while continuously delivering product that meets specification. ACE manages all the operational constraints and limits, reconciles lab test data with operational goals while validating instruments, and provides shift-to-shift stability. ACE advises the operator what is occurring, and why, while sending all operational targets to BrainWave.

Success story

Customer: Klabin SA

Control objective:

- Stabilize white liquor plant operations
- Keep white liquor quality high
- Eliminate shift-to-shift variability
- Reduce costs

Klabin has made a significant investment in its Monte Alegre facility in Brazil to increase capacity and minimize productions costs. In particular, the mill wanted to achieve substantial energy savings.

Klabin's R&D team determined that providing consistently high quality white liquor with low solids could provide tremendous benefits to all of the fiberline and utilities areas. Klabin decided to pursue this solution for its recausticizing plant at Monte Alegre.

The ACE approach was studied and then applied by ANDRITZ Automation to the mill.

Benefits

- Always have an expert operator on the job
- Maximize production and achieve stable, excellent white liquor quality
- Keep human operators informed about constraints, issues, strategies
- Fully automate production manager inventory of green and white liquor
- Unify operation when conductivity probes are cleaned or changed
- Adjust slaking and causticizing processes to hold white liquor quality on target
- Decrease operator workload and achieve more consistent operation

The results were dramatic. Stability was improved and the plant optimized. The new stability and liquor quality was recognized by the fiberline and the mill continues to be one of the lowest cost operations in the world.

Automation solutions

Release your full potential



We offer a full range of advanced control and optimization solutions for pulp operations, including:

- Bleaching ACE
- Brown Stock Washing ACE
- Digester ACE
- Evaporator ACE
- Kiln ACE
- O₂ Delignification ACE
- Pulp Dryer ACE
- Reconstituted ACE
- Recovery Boiler Combustion ACE
- Screening ACE
- Washing ACE

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