

# ACE (Advanced Control Expert)

Optimization solutions for kilns



# The challenge: To fully optimize kiln operations



## The solution: Kiln ACE

**Kiln ACE (Advanced Control Expert) is a control optimization system powered by BrainWave that is proven to improve product quality, reduce fuel consumption, maximize yield, and increase the effective production rates of rotary kilns.**

Lime kilns are a major energy consumer and it is a challenge for mill operators to run this process efficiently. The long thermal response time of the kiln makes it difficult to achieve stable operation, as the consequences of operator actions are not observed until several hours later. Frequent disturbances caused by changing production rates, mud solids content, and NCG waste gases prevent the kiln from running smoothly.

Due to these problems, operators typically run the kiln at high temperature and high excess oxygen to avoid producing under-burned lime or causing emissions violations. These practices lead to increased fuel consumption,

excess wear on the kiln refractory, increased firing problems, and poor lime quality.

### Our technology

BrainWave is our patented predictive multi-variable technology that simultaneously controls the feed end and firing hood temperatures and excess oxygen, while considering the effects each actuator move will have on all the measurements. Disturbance variables like mud flow, mud density, and NCG/SOG flows are also included in the BrainWave controller so that upsets caused by these variables are rejected. By keeping a tight hold on all targets, BrainWave provides stability to the kiln.

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.

Kiln ACE is not a black box. It explains its actions to the human operator so he is completely aware of any changes in strategy or constraints that are being respected. This communication from ACE to the operator is critical and gives the operator a view into the thought process of ACE (a virtual ANDRITZ kiln expert) and confidence in the actions being taken. ACE unifies operation shift to shift for consistently good results. ACE even emails a weekly report to your operations staff and ANDRITZ support team to track statistical information about the lime quality, fuel consumption, temperature and emissions variability, and system uptimes. ANDRITZ and Kiln ACE are your partners in optimizing operations, whether your goal is to maximize production or minimize costs; we guarantee success!



## Success story

**Customer:** Mondi SCP

**Control objective:**

- Stabilize kiln operations
- Maximize production
- Eliminate shift-to-shift variability
- Reduce purchased lime

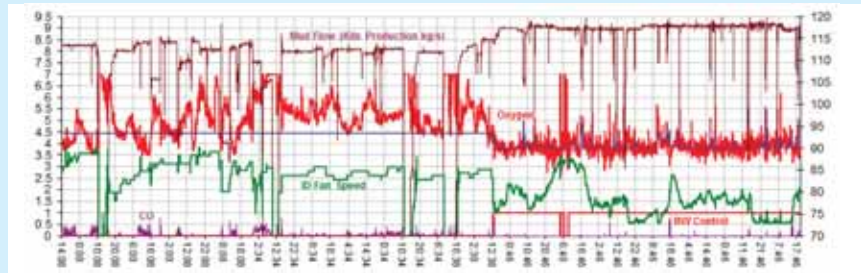
Increases in paper production at Mondi's mill in Ružomberok, Slovakia, has meant an upgrade to the kiln from the original design capacity of 250 t/d to 350 t/d.

Even with these upgrades, the kiln was unable to meet lime demand, resulting in excessive purchase of lime. This purchased lime reacted differently and upset the white liquor plant—and then the fiberline. The mill also experienced problems with ring formation and high dust loading in the kiln. To complicate the situation, every operator had his own method of running the kiln and there was a large variation from shift to shift.

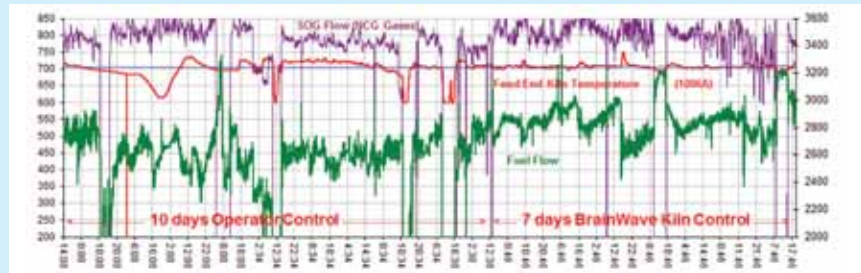
While some consultants proposed the erection of a new kiln, ANDRITZ AUTOMATION proposed the installation of Kiln ACE.



Oxygen control, manual versus BrainWave, at Mondi's Ružomberok mill (March - April 2009) ▼



Feed end temperature 1006 A, manual versus BrainWave, at Mondi's Ružomberok mill (March - April 2009) ▼



The benefits were realized immediately. The ring formation was dramatically reduced and the production was gradually increased until a gain of 24% was realized; this saving eliminated the need to purchase lime. A fuel savings of 7.7% was also documented.

“The control system is able to retain the kiln temperature in a narrow window so my operators can run high production and avoid the severe ringing we experienced before,” said Peter Scholtz, Mondi's recovery line production manager. “Solving this problem was the primary goal of the project. Even though we use about 20% NCGs, including stripper off-gases in our fuel mix, the control system can handle the variations in heating value.”

“We purchased the control package based upon an estimated six months payback,” adds Vladimír Krajčí, recovery line manager. “I can tell you that the payback was a lot quicker.”

## Benefits

- Better lime quality achieved by reducing variability of re-burned lime by > 50%
- Fuel typically reduced by 3% to 12%
- Operator is assisted during normal operation, production interruptions, and production rate changes, improving kiln operation
- Improved temperature control increases kiln availability and reduces maintenance

# Automation solutions

## Release your full potential



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

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- Brown Stock Washing ACE
- Digester ACE
- Evaporator ACE
- Kiln ACE
- O<sub>2</sub> Delignification ACE
- Pulp Dryer ACE
- Recaust ACE
- Recovery Boiler Combustion ACE
- Screening ACE
- Washing ACE

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