

# Engineering for lime operations



# The challenge: My lime operation needs to be more efficient—how can I lower costs?



## The solution: Simulate. Measure. Control. And profit.

**In today's global economy, the lime industry is facing any number of challenges: rising energy costs, stricter environmental regulations, and customers demanding higher product quality in an increasingly competitive market.**

As you try to navigate these uncertain seas, you may find yourself pondering many difficult questions:

- I don't want a complete rebuild of my plant—is there a way to get more out of

my existing plant without huge capital expenditure?

- My vendor-supplied control system operates in "manual" mode most of the time because the "automatic" mode doesn't handle plant upsets adequately—is there a better solution available?
- Investing in a new technology means getting my personnel up to speed—will my operators be properly trained to understand the new controls?
- I need a solution provider that possesses the expertise in both the process and op-

erational aspects of my kiln—does such a team exist?

- I want to make sure my vendor doesn't walk away after handing over the new system—will I have long-term support after the project is complete?

The answer to all of these questions is "yes."

ANDRITZ AUTOMATION focuses on plant electrical, controls and instrumentation systems, helping you cross the rough waters between design concept and implementation so that you can achieve operational readiness and become a lower cost pro-



ducer—quickly, safely, reliably, and ahead of the curve.

From concept to realization, we can help you get the most out of your operation. We have the people, the patented technology, and the proven tools to ensure that you are operationally ready—so that when you press that “start” button in your lime plant . . . it runs more efficiently.

ANDRITZ AUTOMATION has been helping lime operations around the world bridge the gap between concept and production for over thirty years.

Our expertise in lime manufacturing is backed by a suite of advanced control products developed for the pyro-processing industries, including the patented BrainWave controller that is recognized as a leader in the lime industry. BrainWave is the backbone of our Kiln ACE optimization system, which allows lime plants to achieve new levels of process performance.

Our proven advanced control tools and systems are supported by ANDRITZ, a global

company that has the depth of personnel, purchasing power, and local presence to support a project, whether it's a lime plant in the middle of an urban industrial complex or at a greenfield site in the middle of the jungle.

Our battery limit covers plant-wide electrical, controls and instrumentation systems, including:

- High-voltage substations and assisting customer negotiations with power utilities
- Power distribution, including harmonics analysis and mitigation, protection coordination and Arc Flash studies
- Intelligent MCCs, DeviceNet and instrument fieldbus networks
- DCS and PLC/HMI based control systems
- Instrumentation
- Field cabling, including data networks, power, controls, and instrumentation
- BrainWave, Kiln ACE and Crusher ACE advanced process controls
- Process data, in a form ready for import into your Enterprise Resource Planning system

80% of North American lime producers use ANDRITZ AUTOMATION for electrical, control and instrumentation of their pebble lime kilns

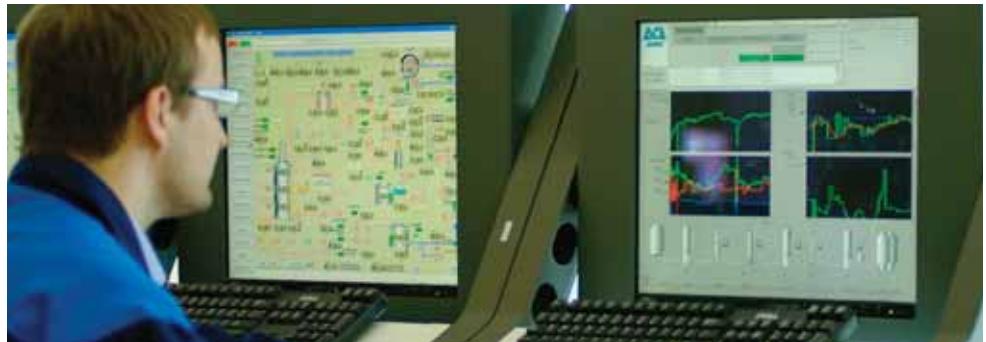
Our services:

- System studies
- Feasibility studies and preliminary engineering
- Detail design
- Control system programming
- Project management
- Commissioning and start-up
- Technical support and troubleshooting
- Operator training
- Optimization of existing plants

# The challenge: My control system can't handle conditions in my plant—is there a better solution?

## The solution: Advanced control tools

The control system in a modern lime operation touches every piece of equipment and instrument in the plant, like a nervous system touches every muscle and receptor in your body. Nothing will be conveyed, calcined or dried until the plant's "nervous system" is operationally ready.



The control of your lime plant's system can mean the difference between meeting or failing to comply with environmental regulations. It can mean the difference between energy usage that is efficient or exorbitant. In short, it can mean the difference between profit and loss.

There are several questions that you may grapple with as you consider your plant's control:

- I need to blend from different feed stock-piles to meet my customer's quality requirements—how can I achieve higher production rates?

- My stone and fuel have huge variations in quality and chemistry—how can I stabilize my process?
- The dead time of the lime calcining process is so long that it often spans a shift change, and my operators are continually over and under adjusting control set points, resulting in poor shift-to-shift consistency. How can I make more product at a lower cost and reduce waste?
- I need to run more material through my crusher—how can I maximize throughput without overloading my material handling system?

Kiln ACE (Advanced Control Expert) is a unique and practical kiln optimization package that starts by closing loops and stabilizing operations using the patented BrainWave adaptive, predictive multivariable control technology. BrainWave tightly balances the front and back end temperatures of the kiln and preheater, while accounting for process disturbances such as feed size changes and fuel quality variations.

Kiln ACE combines the inherent robustness of expert systems on top of the BrainWave structure to manage the kiln. Kiln ACE is a rule-based expert system designed to emulate the supervisory response of a "best operator" to ensure that operation is always bound within safe, practical operating ranges. Unlike the 'black box' old-style APC solutions, Kiln ACE clearly tells the operator why the goals are shifting, what constraints are coming into play and what the new objectives are.

## Benefits

- Increase energy efficiency
- Increase production of kilns and crushing plants
- Achieve better lime quality
- Achieve smoother operation with more consistent control
- Increase refractory life and lower maintenance costs

Long dead times, nonlinear and time varying process dynamics, variable kiln feed properties, frequent production changes, and loop interaction are all challenges facing the efficient operation of rotary kilns and stone crushing systems. ANDRITZ AUTOMATION knows first-hand that every kiln is different. Control strategies and process models must be modified to suit each kiln's unique operating characteristics and raw materials feed.

Our expertise, combined with our advanced process control tools, will help your lime operation perform consistently and efficiently, even at very high production rates.

The communication structure of Kiln 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 and lime quality data. Kiln ACE is managing the rest.

## Environmental solutions and energy efficiency

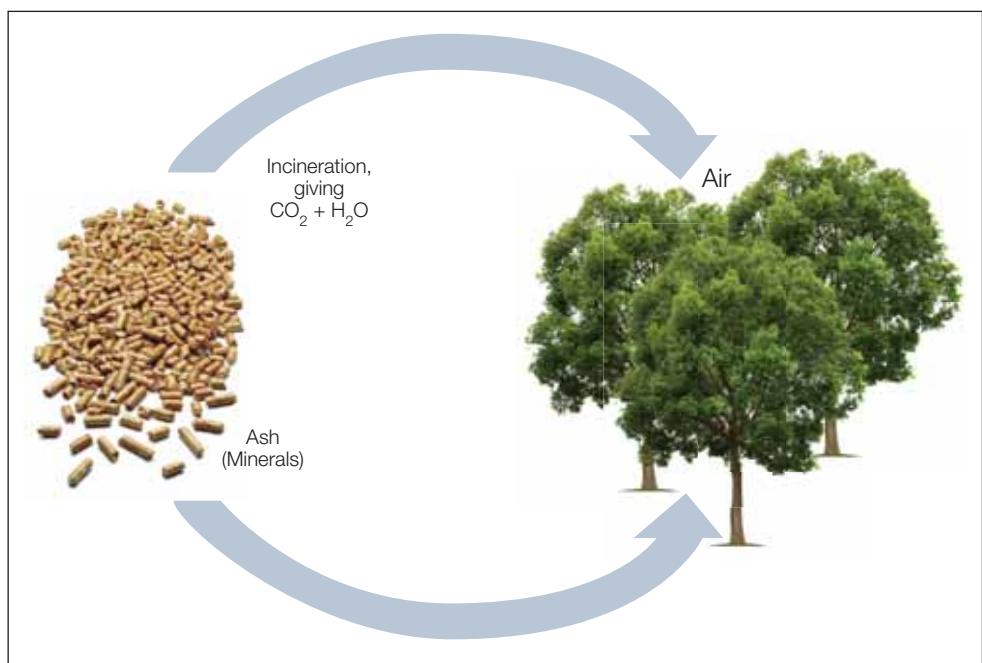
Even in an uncertain economy, industrial operations face the challenge of reducing greenhouse gases and becoming more energy efficient. As you try to find ways of meeting these challenges, you may find yourself faced with the following questions:

- How do I reduce my energy costs?
- What is biofuel, and how can it help me?

ANDRITZ AUTOMATION is at the forefront of new technology and trends, including biofuel and waste heat recovery. We have the tools and systems to help your lime operation reduce its carbon footprint, lower fuel consumption and maximize energy efficiency at the same time.

By co-firing with wood waste (biofuel), your lime operation can achieve significant benefits, including:

- High heat value when biofuel is dried (for example, 8,600 to 9,500 Btu/lb [20 to 22 MJ/kg])
- Lower cost fuel source in some areas
- Lower fuel sulfur content, helping to reduce SO<sub>2</sub> emissions
- Lower fuel nitrogen content, helping to reduce NOx
- Less environmental impact—biofuel is carbon neutral



### ▲ Carbon dioxide neutral thermal utilization

When incinerating biomass, the same amount of carbon dioxide is released into the atmosphere as absorbed in the life cycle of the new plant that is grown to replace the one harvested.

# The challenge: To train operators on your process—without impacting production

## The solution: IDEAS Instructor

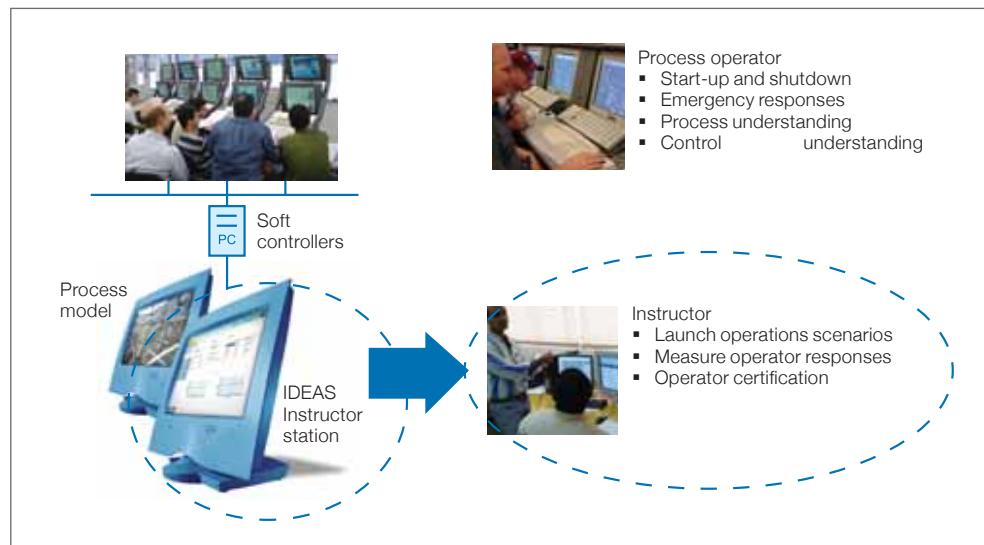
**IDEAS is an essential tool for operator training; it works like a flight simulator, allowing trainees to gain realistic, hands-on experience without inflicting harm to themselves, the environment, or the plant.**

The IDEAS Instructor module can help train operators months before the actual plant is up and running. It helps produce better trained operators—operators who will start up new processes faster, react more wisely to plant upsets, and be more productive.

IDEAS Instructor contains preconfigured scenarios that teach, train and challenge trainees on process upsets, including two of the most intensive and complex procedures—start-up and shutdown. We can all imagine this scenario: a relatively new operator is on shift when suddenly a tailings line starts to sand-out. In most cases, such a scenario would have significant safety, environmental, or production consequences—but your new operator, who

## Benefits

- Teach plant operators safely and reliably
- Have personnel practice intensive and complex procedures
- Monitor trainee progress and assess performance
- Standardize and create consistent training



▲ Where IDEAS Instructor fits into an operator training system

has practiced start-up and shutdown on the IDEAS simulator, immediately makes the correct decisions and your operation continues without incident.

## Operator interface

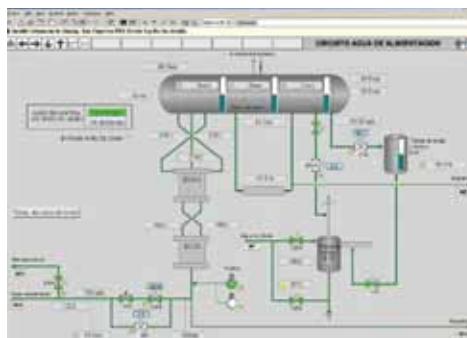
The simulator allows the actual plant configuration to be loaded into the training system, so that operators will be trained using the same interface (including the same logic, keyboard, and graphics) as the real plant. The simulator enhances the learning process by actively involving the operators and

providing immediate feedback without risk to production.

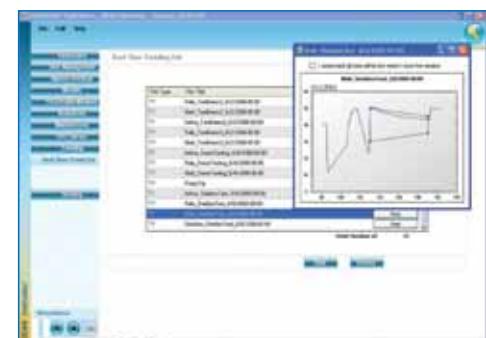
## Instructor interface

IDEAS Instructor software enables you to track individual employee performance, including login and fault scenario management. The operators' performance in executing start-up, shutdown and normal operating procedures is assessed by tracking selected process variables (for example, temperature, pressure, and flow).

The view from the simulator is identical to the real DCS screen. ▼



A screen shot from IDEAS Instructor demonstrates the easy-to-use interface. ▼



## Proven experience

ANDRITZ AUTOMATION has served the lime industry for over thirty years, providing electrical, control and instrumentation solutions. Because we work closely with major lime kiln manufacturers, including Polysius/Maerz and FLSmidth Minerals, we are able to identify and implement the best solutions for our customers, which include:

- Carmeuse
- Lhoist North America
- Graymont
- Pete Lien & Sons
- Linwood Mining & Minerals
- Western Lime

*"I would like to bring to your attention the tremendous efforts demonstrated by ANDRITZ AUTOMATION personnel during the lime plant outage. Their level of dedication to the success of this project was remarkable and greatly appreciated. Not only did they persist through many long hours, day after day, but also endured two intense South Dakota blizzards. Neither of them ever complained about the hours, conditions, or numerous changes, which had to be made . . . I am truly grateful for their efforts and dedication."*

Kenton Brannan, P.E.  
Pete Lien & Sons

*"ANDRITZ AUTOMATION's people are professional, knowledgeable, take pride in their work and do an excellent job from design through start-up."*

Bryan Nielson, VP Production, US  
Graymont

*"The whole mill was operating like it was 'real' a full two months before start-up. The IDEAS simulation software for our new pulping line gave our operators a head start. The simulation was so close to the actual running of the line that start-up was easy, and the ramping up process was unusually fast."*

Renato Guéron, Project Director  
Aracruz Celulose



# Automation solutions

## Release your full potential



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