

Lime Kiln Throughput Improves with Wireless Solution

RESULTS

- 5% throughput improvement in lime kiln
- Minute-by-minute mid-zone temperature trending
- Self-powered transmitters were sending temperature updates within 24 hours of delivery
- Communication of devices on opposite sides of a rotating kiln to one Gateway

APPLICATION

Lime Kiln, rotating kiln, high temperature, radiant heat, dusty ambient environment

CUSTOMER

Pulp and Paper Mill in North America

CHALLENGE

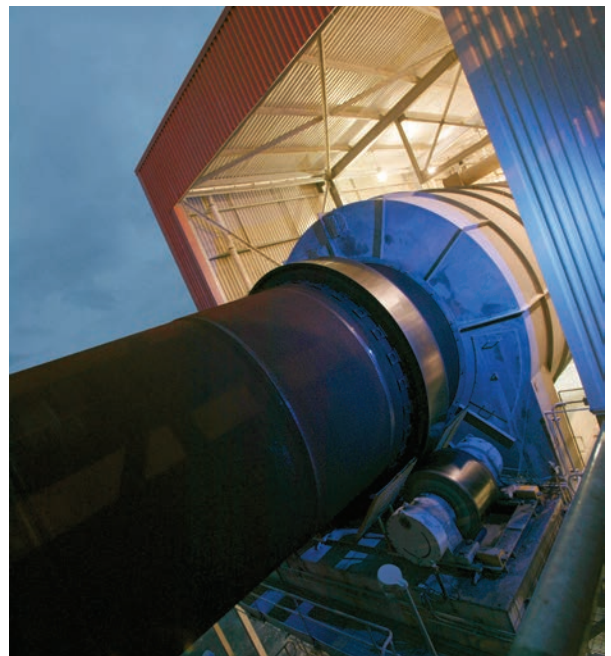
A Pulp and Paper Mill in North America struggled to properly control calcining in the lime kiln. In fact, the kiln was operating so poorly that it had become a choke point. The mill bought a new burner system and adjusted the flame profile to improve heat transfer at the mid-zone, where calcining of the lime mud takes place. The burner system is fired at the hot end (2000 °F [1093 °C]) of this long, cylindrical, rotating kiln and a draft is induced at the feed end (400–500 °F [204–260°C]). The flame is adjusted through the draft to provide the optimum shape and achieve the right mid-zone temperature. For this mill, however, the mid-zone temperatures could not be measured reliably and were inferred through the firing and feed end temperatures.

Unfortunately, the new burner system did not solve the problem. The mill suspected a new chain system was needed on the inside of the kiln to break up the lime mud and promote heat transfer. The Pulp Mill Leader did not want to invest the money, however, until the mid-zone temperatures for the center of the kiln (the air temperature) and the inside wall (where lime mud tumbled around chains) could be measured and actual heat transfer could be confirmed. The temperature measurement that had accompanied the purchase of the kiln, which relied on a brush system, had never worked and had not been maintained. A wired solution could not handle the rotating equipment, so the customer approached their instrument partner—Emerson—for a solution.



“...four days after the order was placed, we could see minute-by-minute mid-zone temperatures trending on the control system.”

Pulp Mill E&I Leader



Lime kiln application

ROSEMOUNT™

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SOLUTION

Emerson proposed a Wireless solution that included two Rosemount 648 Wireless Temperature Transmitters with thermocouples and a Gateway arrived at the plant three days later. The sensors were installed on opposite sides of the kiln's mid-zone, 180° apart, without thermowells to provide the fastest possible response time. One was positioned toward the center of the kiln to pick up the air temperature, and the other was positioned at the outer extremity to pick up radiant heat from the brick, indicating lime mud temperature. The self-powered transmitters were mounted on a pipe that extends away from the kiln and were sending temperature updates to the control room through the Gateway within 24 hours of delivery. "We had a Modbus® address available, so it was easy to add the Gateway as a slave to the control system," said E&I Leader for the Pulp Mill and Lime Kiln. "In fact, four days after the order was placed, we could see minute-by-minute mid-zone temperatures trending on the control system."

Immediately the mill recognized the inferred temperatures were off by 350 °F (177 °C), and confirmed that a new chain system was required to break up the lime mud. "Since the wireless system has been installed, we can tell if there's build-up of lime in the mid-zone area," said the Pulp Mill Team Leader, "You can see fluctuation in the temperature, which is an indication of build-up. Overall, we have improved operation of the lime kiln, and increased throughput by 5%." The Pulp Mill Team Leader concluded by saying, "I think it's a pretty good achievement to have two different devices communicating with one Gateway, when they are on opposite sides of a rotating kiln."

RESOURCES

www.Emerson.com/Wireless

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"Since the wireless system has been installed, we can tell if there's a build-up of lime in the mid-zone area... Overall, we have improved operation of the lime kiln, and increased throughput by 5%."

Pulp Mill Team Leader

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