

Smart Wireless Technology Improves Productivity of Rotating Kiln at Russian Alumina Plant

BENEFITS

- Reliable temperature measurement
- Off-spec cake production reduced by 96 tons per year for each furnace
- Maintenance frequency, time, and operating costs reduction



CHALLENGE

RUSAL is the world's largest producer of aluminium and alumina. The RUSAL Boksitogorsk refinery uses seven 5m diameter, 100m long rotating kilns to produce 165,000 tonnes of argil (a type of clay) a year from bauxite. Kiln temperatures are critical to process efficiency and the quality of the processed material. They are measured using thermocouples attached to the surface of the furnace. Because the kiln rotates the wired devices were connected directly to a slip ring assembly with cylindrical carbon brushes. Due to bearing lubrication thickening in the high temperature environment, the slip rings were not making contact all the time. This led to off spec argil being produced that needed to be reworked. In addition, the furnace had to be shutdown for three hours twice a month to clean the slip rings, reducing overall production volumes.

SOLUTION

RUSAL Boksitogorsk identified wireless as an alternative to the unreliable split ring connection and applied Emerson's Smart Wireless technology as part of a field trial. During a planned shut down of a kiln Emerson's Rosemount® 648 wireless temperature transmitter was connected to the existing thermocouples. The device was mounted on heat-proof ceramic seal to provide protection from temperatures ranging between 240-280°C (460-540°F). The Rosemount wireless device transmits measurement data to a gateway that is connected to a local network via an Ethernet interface. Authorised personnel are able to view this data via a web interface and can ensure the correct kiln temperatures are maintained.

“The wireless solution has uncovered new opportunities for increasing throughput and reducing costs. We have also been able to significantly reduce our maintenance costs associated with temperature monitoring by excluding the use of slip rings.”

Vitaly Nikonov
Head of Metrological Department
RUSAL Boksitogorsk

RESULTS

The installation and configuration of the wireless network was very simple and took just one and a half hours to complete. The wireless solution has improved measurement reliability leading to a reduction in off spec product, a reduction in the time spent on maintenance and an increase in availability. This has resulted in an additional 96 tonnes of throughput per year. This first application, now proven successful, is expected to lead to wireless being implemented on the six remaining rotary kilns in the plant.

“Despite a tough environment of metal constructions and electro-magnetic interference, we concluded that the wireless network was extremely reliable with transmission reliability greater than 99%.”

Vitaly Nikonov
Head of Metrological Department
RUSAL Boksitogorsk



Rosemount 648 Wireless Temperature Transmitter connected to the kiln's existing thermocouples on a heat-proof ceramic seal.

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