

Monitoring preheating of Aluminum Cells

In an aluminum smelter, the metal is produced in a large number of electrolysis cells, also called pots. Each cell has a limited lifespan and must be relined (change the cathode) to be used for a new period. The normal lifespan of a cell is 5-7 years.

To withstand molten aluminum at about 960 degrees Celsius, the relining, preheating, and startup of the cell are very important, and the materials used are very costly.

Challenge

- Proper preheating of the cell is a crucial part of the startup process to ensure optimal operation and extended lifespan.
- The lining material and cathode carbon in the cell must be heated slowly and controlled before the cell can be filled with molten bath.
- If bath is added to a cell with too low temperature, the lining and cathode can suffer from thermal shock, and the risk of crack formation is significant. This will reduce the cell's lifespan.
- Another effect of poor preheating is the risk of unwanted incidents such as startup anode effects (AE) and thus increased emissions of greenhouse gases (PFC and CO₂).
- Therefore, it is desirable to be able to monitor the cathode temperature during the startup process. The conditions at the measurement points are challenging with high heat and a lot of electromagnetic noise that the sensors are exposed to. In addition to this, manual reading of temperature is labor-intensive work where



operators must spend time connecting and disconnecting manual reading equipment.

Solution

- By using Neuron Thermocouple Type K sensors, stable temperature measurements are collected throughout the preheating process.
- You get an early warning as soon as the temperature is outside defined limits.
- This can be used to control e.g. the electrical load for optimal preheating.
- Neuron Thermocouple Type K provides accurate measurements wirelessly, so electromagnetic noise minimally affects the measurement results, as can happen with wired measurement points.
- Sensors are simply connected to standard Type K measuring probes already in use at most plants today.

What you get

1. Reduced risk of thermal shock when bath is added, extending the lifespan of the cell.
2. Proper preheating leads to fewer startup anode effects (AE) when the bath is added, which in turn reduces emissions of PFC and CO₂.
3. Optimal start temperature leads to faster normal operation in the cell, which in turn increases the cell's yield over its lifespan.
4. Early warning at temperature values outside set limits.
5. Continuous measurements provide a good data foundation for further optimization of operations, and historical data can be used for quality assurance.
6. Wireless sensors allow for faster and easier connection of sensors.
7. Connection via standard Type K contact on measuring probes.

Products in use

- Neuron Thermocouple

