Introduction

A furnace for heating slabs needs to be operated under low-oxygen conditions at high temperatures of 1000 °C and above to prevent oxidation of the steel. The measurement of oxygen concentrations in the furnace is essential in this process. The ZR22/ZR402 Direct In-Situ Zirconia Oxygen Analyzer requires no sampling system and utilizes a long-life sensor, and is therefore ideally suited for measurement of oxygen concentrations in a high-temperature environment. The ZR22G detector with the ZO21P high temperature probe adapter can be used in gas furnaces at temperatures up to 1400 °C.

Expected Benefits

– Maintains high product quality by monitoring oxygen concentrations in steel mill reheating furnaces
– Ensures stable, continuous measurement of oxygen concentrations
– Reduces operating costs

Process Overview

Slabs are loaded on a conveyor and fed to a reheating furnace, which is heated to between 900 and 1400 °C by burners that use fuels such as by-product gas. In order to keep the oxygen concentration between 1 and 2%, it is monitored in the preheat, heat, and soak zones. The slabs are heated uniformly without being oxidized, and then sent to the next processing stage.
Solution Details

Field Data

Process conditions
- Measurement point: furnace reheat, heat, and soak zones
- Temperature: 900 to 1400 °C
- Pressure: 30 to 50 kPa
- Dust: Trace
- Fuel: Gas

Measurement system

Detector:
- ZR22G-015-S-Q-Q-Q-E-A/CV
- High temperature probe adapter
  - Z021P-H-Q-Q-Q-Q-A
- Auxiliary ejector for high temperature use
  - P/N E7046E

Converter:
- ZR402G-Q-Q-Q-E-A

Flow setting unit: ZA8F-Q*C

Calibration gas unit
- Pressure regulator for gas cylinder:
  - P/N G7013XF (inlet W22, outlet Rc1/4) or P/N G7014XF (inlet W22, outlet 1/4NPT)
- Case assembly for calibration gas cylinder: P/N E7044KF
  - Note: the calibration gas cylinder must be purchased locally

Utilities

Power supply: 85 to 264 V AC, 50/60 Hz
Instrument air (reference gas): pressure, 300 to 700 kPa

Notes

- The material selected for the high temperature probe adapter depends on the temperature of the sample gas. Follow instructions carefully when installing the probe.
- SUS: Sample gas temperature ≤800 °C
  - Probe orientation: vertical or horizontal
- SiC: 900°C < sample gas temperature ≤1400 °C
  - Probe orientation: vertical
- Note: When the probe is installed horizontally, bracings must be provided for mechanical support.