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----E-A/CV
- High temperature probe adapter: Z021P-H-Q-Q-Q-Q-A
- Auxiliary ejector for high temperature use: P/N E7046EQ
- Converter: ZR402G---E-A
- Flow setting unit: ZA8F-*B
- 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 ≤750 °C
  - Probe orientation: vertical or horizontal
  - Inconel: 750 °C < sample gas temperature ≤900 °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.