Safety measurements of coal bunkers and mills for power plants and cement plants

Components to be measured
- CO, O₂

ABB solutions
- AZ30
- LS25
- LS4000
- ACX

Measurement made easy

Introduction
Many plants like coal fired power plants, cement facilities and cogeneration industries employ coal bunkers to store coal and coal mills to crush the raw material into fine particles before being injected into the boiler.

• AZ30 – economic point in-situ oxygen ZrO₂ probe
• LS25 – fastest cross-stack carbon monoxide laser measurement
• LS4000 – fastest cross-stack oxygen laser measurement
• ACX – complete pre-engineered analyzer cabinet to monitor CO with optional oxygen measurement, back-purge and stream switching or multi-point sampling
Motivation
Fires and explosions in these facilities are of increasing concern. With increasing liability insurance premiums and a growing need to increase productivity, it is essential to employ preventive rather than reactive measures. Rather than merely react to fires once they start, plant engineers should focus on proactively minimizing the potential for fire through early detection.

By minimizing the risk of fire in coal-handling facilities companies can see an increase in personnel safety as well as a decrease in downtime and loss of resources.

Pulverized coal is typically used to fire a boiler. Under certain conditions regarding temperature, filling level, moisture content etc. smouldering fires may originate in coal bunkers and cause the danger of open fires or even dust explosions. Smouldering fires are followed by an increase in CO concentration in the headspace area of the bunker. CO is an odorless and very toxic gas and imposes a serious explosion threat at levels above 8 Vol% in air. Consequently, monitoring CO in this area allows an early detection of those fire sources and enables respective safety countermeasures, for example flushing with an inert gas (e. g. CO₂).

Additionally, O₂ concentrations provide significant information for coal mills which are operated under inert purging conditions. An increasing oxygen concentration value monitors the entrance of false air into the system and thus protects against the risk of explosion.

Measuring CO and O₂ with our analyzer is an improvement of your personal safety and a prevention of explosion. In short, they can save money and improve your safety.

Task: Prevent smouldering fires and explosions
Monitor CO / O₂ concentrations in coal bunkers and mills

Typical measuring ranges
- CO: 0 to 0,5 / 1 Vol%
- O₂: 0 to 10 / 25 Vol%
**ABB alternative solutions**

**ACX** is a complete system for extractive continuous gas analysis. The system can be fully operated from the outside, inside, the well-established reliable analyzers of the Advance Optima series work with the proven components for sample conditioning. The ACX system is particularly easy to maintain as a result of the standardized design. Comprehensive digital communication allows global remote maintenance and control with AnalyzeIT Explorer. For this application the ACX is equipped with a back-purge unit to prevent clogging of the sample probe due to the dust load. Optionally ABB offers:

- dual sampling for simultaneous measurement at two different sampling locations
- dual switching for measurement at two sampling locations or for uninterrupted measurement at one sample location during the back-purge phases

**LS25** is an in-situ laser analyzer which selectively measures the oxygen (O₂) and carbon monoxide (CO) concentration. LS4000 is an in-situ analyzer which measures oxygen (O₂). The laser operates according to the principle of single-line spectroscopy. For measurement purposes a single absorption line is selected from the gas to be measured in the near infrared spectral range, at which no cross-sensitivity from other gases occurs. The absorption line is scanned and the receiver located opposite detects the absorption caused by the sample gas and calculates the gas concentration from this.

**LS4000** is a stand-alone analyzer, whereas LS25 is a module of the AO2000 series. Up to four LS25 analyzers can be integrated into an AO2000 based or ACX system. Hence, all options for connectivity and powerful software solutions of AO2000 can be used.

Cross-stack installations ensures more representative measurement than single point measurement. Local concentration spots in the duct can be detected. Due to the in-situ installation at the process, the LS25/LS4000 achieves T90 times within few seconds. As a result, critical situations can be detected faster and the security of the facility is increased significantly. In addition to the augmented security, sample gas is not extracted from the process. With no sample handling components required, number of moving parts and therefore lifetime costs are reduced.

This solution is preferable if

- maximum dust load does not prevent cross-stack measurement
- ABB offers special technical solutions such as insertion tubes in order to reduce the impact of high dust loads please contact for a detailed feasibility check
- the customer prefers a cross-stack averaged concentration
- response time within few seconds (T90) is required
- minimum maintenance due to missing sample handling components
- remote maintenance via Analyze IT Explorer is required

**AZ30** (O₂) is an explosion-proof / flameproof oxygen concentration gas analyzer system designed for use in hazardous areas. The sensor, based on a zirconium oxide cell, is mounted at the tip of the probe that is inserted in the process. The resulting direct, in situ measurement provides accurate and rapid oxygen reading for inert gas purged processes.

**Customer benefits**

- improve insurances premiums
- decrease downtimes
- avoid loss of resources