

Dust Monitoring to Detect Damage in Coke Oven Walls

Industry: Iron & Steel
Product: Dust Monitor

Introduction

When cracks proliferate in the fire-resistant bricks that are used in the walls of a coke oven's combustion chamber, exhaust gases leak into the flue and the dust concentration increases there. Continuous dust monitoring in the flue enables the early detection of damage to the wall, and accurately indicates how far a coke oven's physical deterioration has progressed. By continuously measuring the dust concentration, emissions to the atmosphere can also be controlled. The easy-to-install DT450G

Dust Monitor has been designed for these applications and requires minimal maintenance.

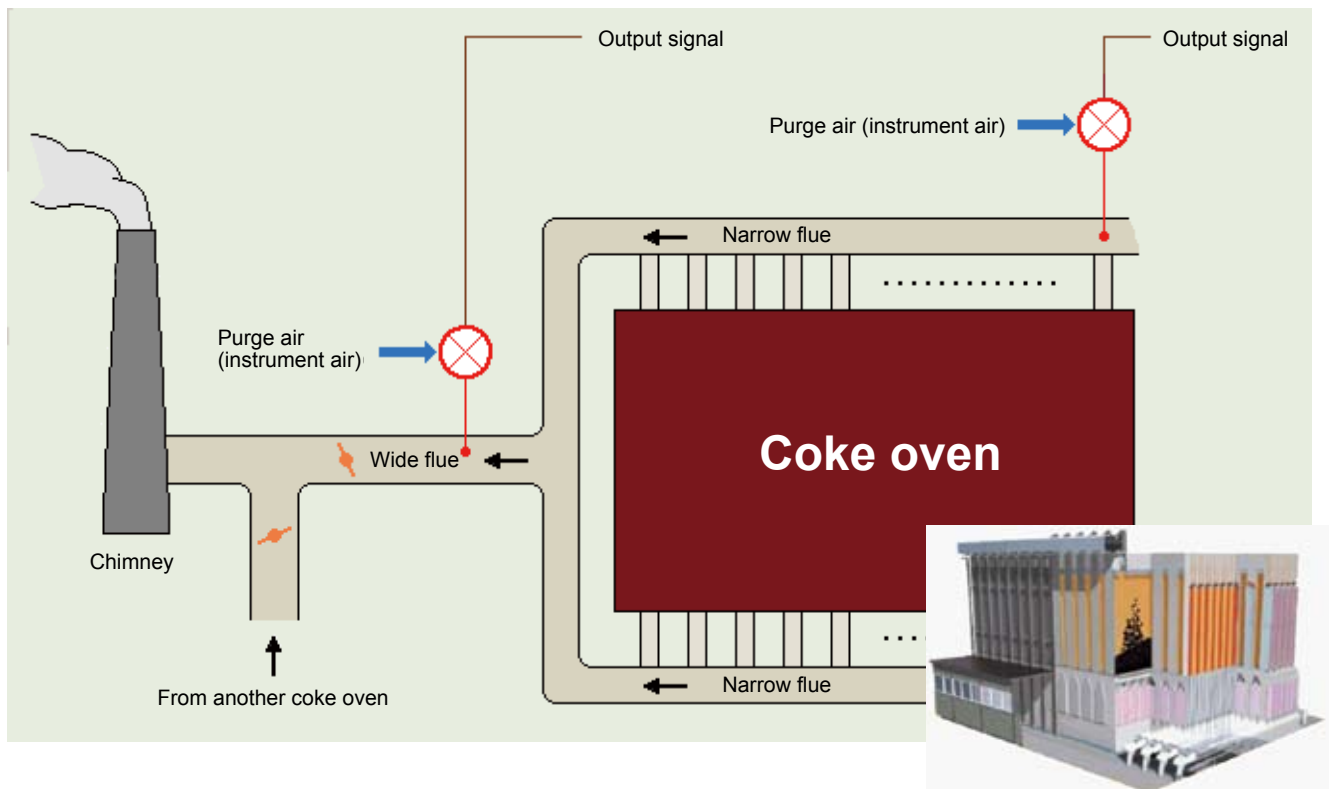
Expected Benefits

- Spots potentially dangerous situations before a safety hazard can develop
- Quickly detects cracks in fire-resistant bricks

Process Overview

Gases in a coke oven's combustion chamber are exhausted through a regenerative chamber to narrow flues on the right and left sides of the oven. These gases mix with those from another coke oven in a wide flue, and the mixed gases pass up into the atmosphere through a chimney.

The dust concentration is monitored in the wide chamber (refer to the following figure). The temperatures of the exhaust gases at the measuring point peak at 220 – 230°C. Since the interior surface of the wide flue is made of bricks, the dust monitor probe must be at least one meter in length.

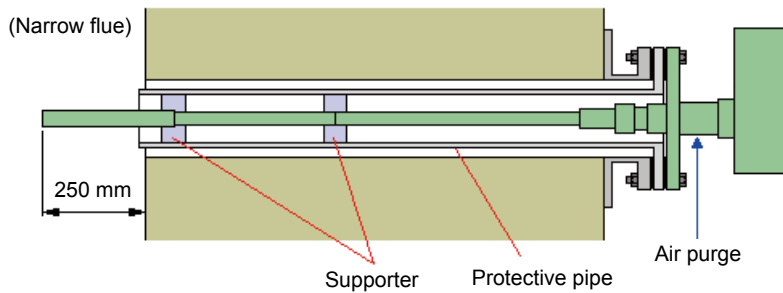


Solution Details

Monitoring System

DT450G/Z (Z: special length for probe section)

- The fire-resistant bricks in the flue wall are thick, so the minimum length of the sensor (probe) is one meter.
- Long sensors tend to bend, so protective pipes are needed to augment the strength of the sensor.
- Continuous purge is required to prevent the sensor's insulation properties from deteriorating due to dust accretion.



DT450G Dust Monitor

Utilities

- Power supply: 90 – 110 V AC or 180 – 250 V AC, 50/60 Hz
 - Power consumption: approx. 3 VA
 - Air purge: clean, dry air equivalent to instrument air
- Pneumatic pressure: process pressure + 50 kPa (continuous purge)
Air consumption: approx. 50 NI/min

Conclusion

The following chart shows the monitoring results when the combustion chamber wall is in a sound condition and when cracks have proliferated in the wall, allowing exhaust combustion gases to leak.

