NICOSYS CO SMOULDERING DETECTION SYSTEM

In the process of powder production, for example milk or coffee powders, industrial spray dryer installations are used. A great risk in these installations is the outbreak of fire, causing serious damage in these factories.

These fires can start relatively easily. They can start when a lump of powder, formed in the tower under the high drying temperatures, starts to smoulder internally. The inside of this lump becomes very hot (> 800 ºC) and when it breaks open sparks and flames are released. These sparks and flames can start a fire or explosion in the tower, causing damage or even destruction of the tower.

Sparks and temperature detection systems initiate alarms when the critical situation has already been reached; an early warning system will reduce the risk of dangerous situations caused by smouldering.

The NICOSYS system is such an early warning system. When a lump in the dryer is smouldering it generates CO as a result of the unfinished oxidation of the powder. Detection of this CO can be used as a preventive protection before flames or sparks are present in the installation. In fact, CO smouldering detection is the only preventive protection system available, and was developed by Hobré Instruments B.V. and NIZO, the Dutch Institute for Dairy Research.

Principles

The figure below depicts the temperature trend of the lump kernel and the exhaust air, as well as the CO concentration in the exhaust. It can clearly be seen that although the exhaust temperature is not affected by smouldering in the lump, the CO concentration steadily goes up for more than 30 minutes before the flames occur and the temperature in the tower starts to rise.
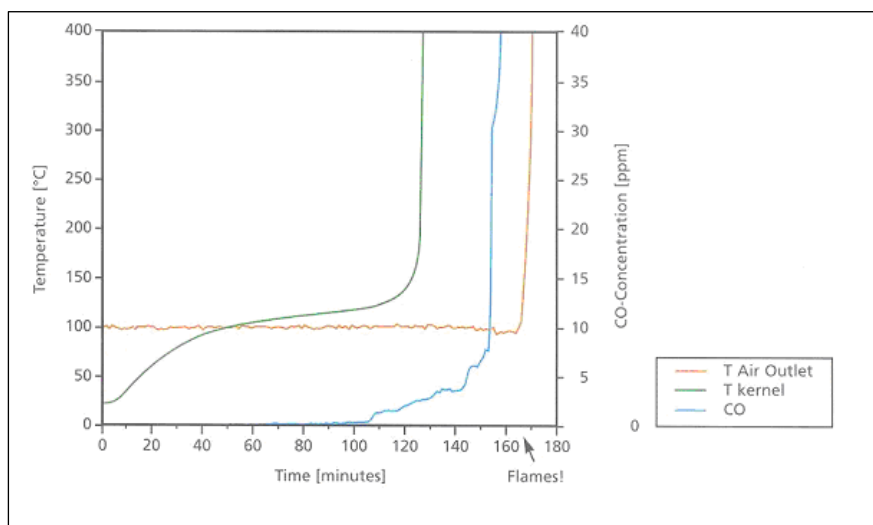
A reliable measurement of CO present in the exhaust will warn the operator on time for possible hazards. There are 3 consecutive alarm levels typically set at 0.5, 2 and 6 ppm CO. These points can be used to generate an alarm, shut off the system or start a fire extinguishing system.
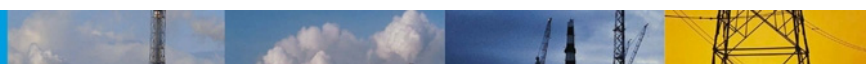
The NICOSYS system monitors the outgoing and the incoming CO concentration, to prevent false alarms due to high CO concentration peaks in the environment, caused by trucks, exhaust pipes etc. The trends of the ambient and exhaust CO concentrations can be stored so that they are available for evaluation at any time.

Crucial to the system is the conditioning of the sample. Inside the sampling cabinet a blow-back filter and dryer are installed. Drying is done without condensation of water if hygienic risk needs to be avoided (e.g. in case of dairy industry)

Hobré Instruments B.V. uses components that have proven themselves under the severe conditions in milk and coffee drying factories, and provides the service and maintenance that is necessary to keep the installation running.

System Performance

- Reliable measurement of CO presence in drying tower, fluid bed and bag filter, as well as in the ingoing air provides all the necessary information to monitor smouldering in the drying process
- 3 alarm levels (0,5 ppm, 2 ppm and 6 ppm CO). Alarms can be used as early warning, system, shut down and actual fire suppression
- Professional conditioning of the sample under hygienic conditions prevents clogging and condensation
- Sophisticated alarm handling makes system highly reliable

Dimensions and Installation Requirements

- Sample conditioning system
  Dimensions   :450 x 900 x 200 mm (HxWxD)
  Power supply :230/115 V, 50/60 Hz

- Analyzer cabinet
  Dimensions   :2045 x 600 x 900 mm (HxWxD)
  Power supply :230/115 V, 50/60 Hz

- Instrument air
  Flow   :30 Nl/min
  Pressure   :2 – 6 barg
  Dew point   :- 40 ºC