Passionate about Particulate

Application Note

Increasing Bag Filter performance, reducing emissions and Meeting ISO14000 requirements

Industry Sector: Chemical
Specific Industry: Tyre

Process: Boiler
Filter Type: Bag Filter

Instrument Supplied: DA50
Software Options: Not required

Typical Emissions: 7-10mg/m^3
Emission Limit: Not known

Stack Diameter: 0.9m
Velocity Range: 15m/sec
Flue Gas Composition: Carbon Black

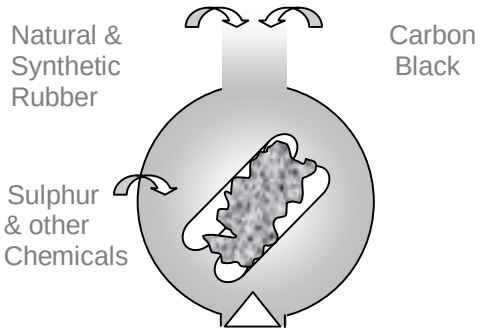
Certification Requirements: None

Overview

The most common use (70%) of carbon black is as a pigment and in the reinforcing phase in automobile tyres. Carbon black also helps conduct heat away from the tread and belt area of the tyre, reducing thermal damage and increasing tyre life. The primary sources of particulate emissions during tyre manufacture are from the mixing and grinding processes. These emissions are controlled by bagfilters. Since carbon black is used, monitoring emissions becomes more demanding.

Process Description

The mixing process takes a number of ingredients and blends them into a homogeneous substance. Internal Mixers are often equipped with two counter-rotating rotors in a large housing that shear the rubber 'charge' along with the additives. The mixing is done in three or four stages to incorporate the ingredients in a logical order. The shearing action generates considerable heat, so both rotors and housing are water cooled to maintain a temperature low enough to assure that vulcanization does not begin.



Installation Considerations

The sensor was installed at the outlet of the bagfilter from the mixers prior to the outlet stack. In addition competing technologies - a local manufacturer of Side Light Scatter sensor and a European Triboelectric manufacturer, were installed in close proximity to each other. Care was taken to ensure location of mounting positions did not cause cross interference and that the DA50 mounting socket was installed such that the probe rod was pointing slightly downward so as not to 'fill' with contamination.

Carbon Black Bag Filter

Sensor In-Situ

System Recommendations

From the guidelines given by the customer, and considering installation, competition and pricing issues, PCME recommended the DA50 sensor for the trials. In order to confirm the correct instrumentation the customer ran a 3-month trial with the output of each system being monitored and logged under normal process conditions. As a test

to confirm response of each system, the customer injected 'Talc' up-stream of the sensors and the response of each device was recorded against the dust injected

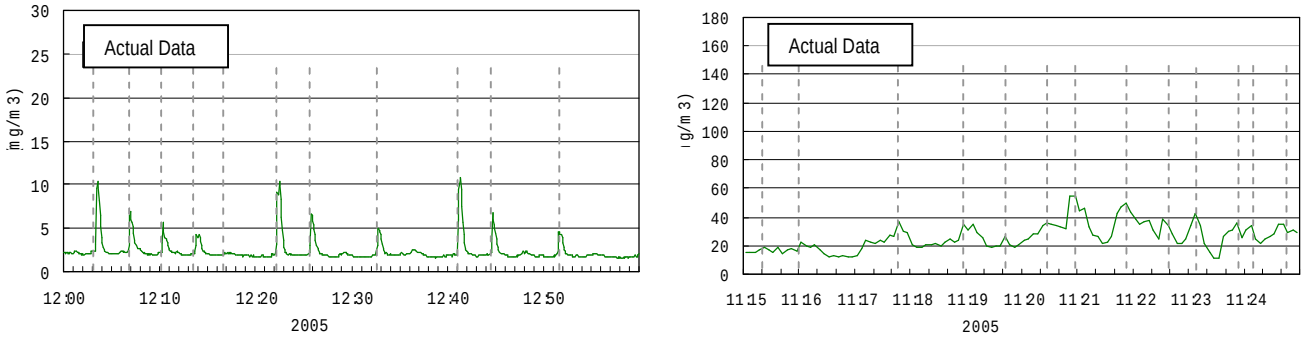
Results and Validation

The Talc injected between 11:15 and 11:24 caused a rise in the background level of dust. This can be seen in the traces of the Light Scatter device and the PCME *Electrodynamic*™ Probe Electrification Technology sensor.

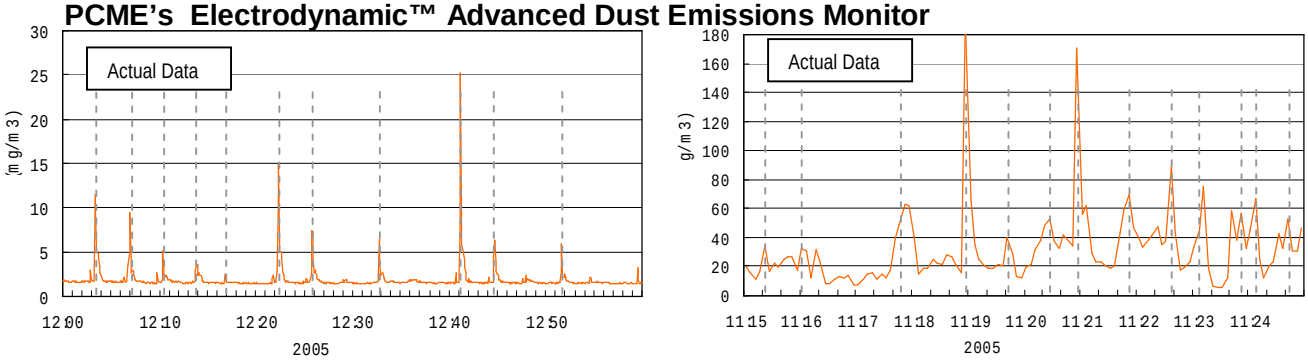
The Triboelectric sensor was not stable when the dust increased and did not respond accurately to the changes.

PCME's *Electrodynamic*™ Probe Electrification Technology sensor not only accurately followed the changing dust levels but also plotted the responses to the bag filter cleaning pulses, offering added value in the form of bag filter performance monitoring and prediction of filter failure.

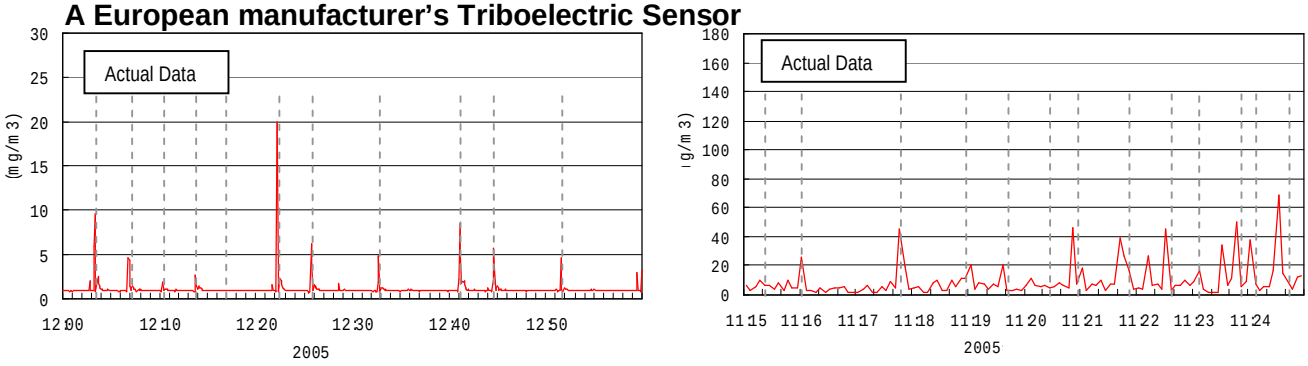
A local manufacturer's Side Light-Scatter Device



PCME's Electrodynamic™ Advanced Dust Emissions Monitor



A European manufacturer's Triboelectric Sensor



Conclusion

After extensive testing by the customer and an assessment of all purchasing considerations, multiple PCME dust emission monitors were purchased for this site.

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