Baghouse Filter Monitors

The maintenance of modern bag and cartridge filter systems is normally both a time consuming and costly activity often undertaken in unpleasant conditions with limited available time. To overcome these problems, PCME supply an advanced Predictive Monitoring Solution used in conjunction with some of the world's most advanced particulate measurement systems.

Preventative, Cost-saving, Maintenance Enhancements

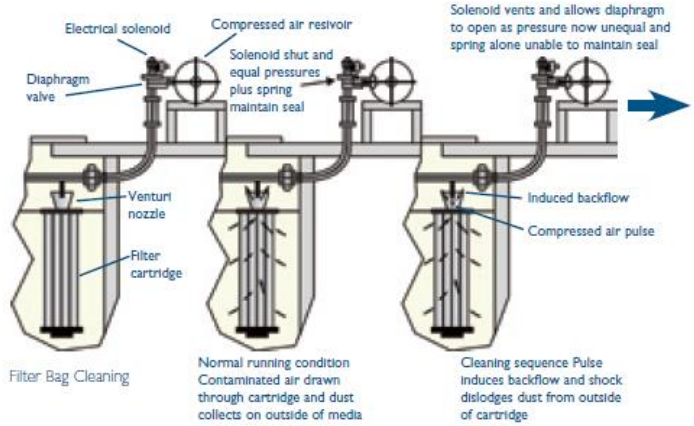
Bag House control enhanced by Electrodynamic filter management

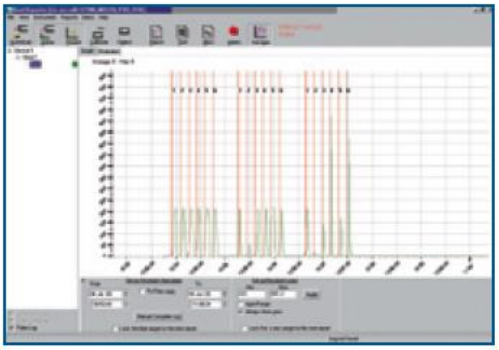
Although particulate monitoring systems are generally purchased to monitor environmental emissions to atmosphere, many users also utilise these instruments as preventative maintenance tools.
The ability to predict when a filter is likely to fail and to be able to identify which row or chamber is at fault has provided users with a proven method to not only reduce the environmental impact and clean-up costs associated with large-scale emission events but also to make significant savings in spares, maintenance times and lost production.

Normally filter media is changed on a regular basis, typically based on experience or on the filter manufacturers recommendations. This can be both costly and time-consuming, resulting in either filter elements being changed when there is still serviceable life to be had or alternatively the bag house is run too long resulting in particulate leakage and eventually gross filter failure.

To enable users to achieve the longest possible service life from their filters without the worry of catastrophic failure, PCME has developed a suite of advanced software to be used in conjunction with selected Electrodynamic-based particulate monitors.

PCME's patented Electrodynamic sensors offer the most dynamic sensing technology currently available. Their unique non-contact charge-induction measurement technique provides the capability to remotely access the filters cleaning signature by accurately tracking the very dynamic dust emissions created during a bag filter cleaning cycle.





Faults in filter elements identified before full failure

ECM ECO Monitoring, a.s., Nevädzová 5, 821 01 Bratislava, Slovak Republic

Phone: +421 2 4342 9418
+421 2 4342 7408
Fax: +421 2 4342 7465

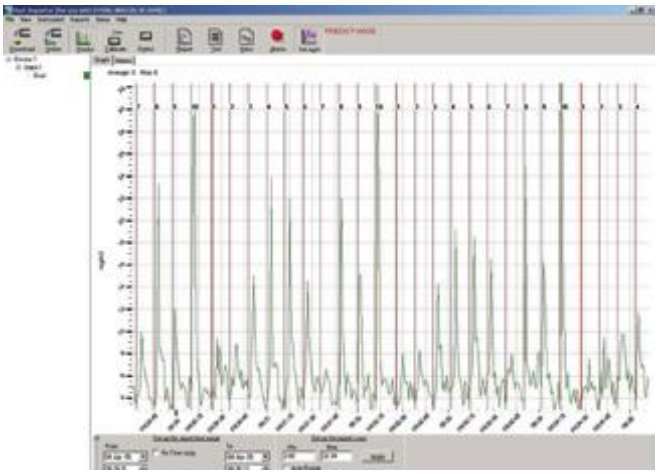
E-mail: ecm@ecm.sk
http:// www.ecomonitoring.com

Company Reg. No.: 17312094
VAT No.: SK2020317244

As a filter is reverse jet cleaned, any defects in the filter membranes are exposed resulting in relatively high dust peaks. By monitoring these peaks in realtime using PCME's Predict software package, it is possible to identify potential problems within the filter before they result in breaches of environmental limits. Marker pulses generated from the filter's cleaning system allows easy identification of damaged rows.

Electrodynamic Sensor used for Predictive Filter Maintenance

The use of filter performance monitors in conjunction with Predict and Ethernet connectivity allows for the first time the possibility of truly remote observation of the condition of both bag and cartridge filters. Used in conjunction with low level emission warning alarms, it allows the remote inspection of filter elements before dust emission levels breach regulatory limits, thereby allowing scheduled maintenance and eliminating the lost production time normally associated with unplanned plant stoppages.



The Deterioration of Row 10 is highlighted in real-time before environmental limits are breached

The above graph, down-loaded from an Electrodynamic instrument illustrates some of the capabilities of this system. The sensor, which was originally fitted purely as an environmental monitor is installed in the outlet stack of a 10-row bag filter, each row comprising 20 bags.

The bags in this particular filter were traditionally replaced annually as recommended by the filter manufacturer, however, in this instance the plant's maintenance department fitted an Electrodynamic system instead and left the old filter elements in place. After several months, an increase in Bag Leakage Trends was identified and low-level alarms alerted plant operators to increased emissions from the filter. This information was made available to plant, environmental and maintenance departments simultaneously via an Ethernet connection to the instrument. The advanced warning of filter failure allowed the maintenance department to schedule the fitting of replacement filter elements.

ECM ECO Monitoring, a.s., Nevädzová 5, 821 01 Bratislava, Slovak Republic

Phone: +421 2 4342 9418
+421 2 4342 7408
Fax: +421 2 4342 7465

E-mail: ecm@ecm.sk
http:// www.ecomonitoring.com

Company Reg. No.: 17312094
VAT No.: SK2020317244

This has the following benefits:

- Reduction of lost production time
- Identification of row failure allows the use of fewer replacement filter elements
- Labour time and costs are both reduced
- Service life of the majority of filter elements has been greatly extended
- Filters are now checked post-maintenance to ensure that all bags are correctly fitted and have not been damaged during installation

Electrodynamic Sensor installed in bag house outlet

Over a period of time, Predict has helped to highlight a further problem with the filter. It was noted that gross filter deterioration was always apparent in the same two rows and as a result of this, the gas stream inlet to the filter was modified resulting in more even wear and extended filter life.
The ability of the instrument's control unit to input 4-20 mA signals from other devices has allowed the system to be used in conjunction with pressure drop devices to monitor the caking of the filter bags allowing the optimisation of the cleaning cycle reducing both compressed air usage and bag wear.
This instrument, although originally considered as just an Environmental purchase is now regarded as an integral filter maintenance tool and the system has been expanded to monitor a further 8 filter systems, providing not only environmental protection but also reduced costs and increased production.

A Cement Kiln Baghouse incorporating an Electrodynamic filter management system

Multi-chamber bag filters are becoming more and more common throughout industry. Regulatory demands reducing the amount of particulate emitted from a wide range of processes are resulting in their installation to replace both Electro-filters on existing sites and to provide the prime dust filter solution in new applications.

The decision to install filter management systems is driven by the need to not only be able to fully understand the operation of the filter system, but also to be able to improve plant efficiency and in particular to ensure that the functionality of these filters can be controlled and maintained so they may operate at their optimum performance levels.

Pro-Scatter and Electrodynamic Main Stack Sensors

ECM ECO Monitoring, a.s., Nevädzová 5, 821 01 Bratislava, Slovak Republic

Phone: +421 2 4342 9418
+421 2 4342 7408
Fax: +421 2 4342 7465

E-mail: ecm@ecm.sk
http:// www.ecomonitoring.com

Company Reg. No.: 17312094
VAT No.: SK2020317244

Modern high efficiency bag filter systems typically employed on such processes such as Municipal Waste Incineration, Cement Kilns and Steel Manufacturing emit very low levels of particulate, typically single figure mg/m3 levels. To effectively monitor such low levels PCME employ either Electrodynamic or Pro-Scatter technologies on the main stack. Both techniques are able to measure extremely low levels of dust, down to 0.01 mg/m3, but they are generally unable to indicate exactly where the leak in a multi-compartment filter has occurred. To overcome this problem, a secondary filter management system is used.

Employing Electrodynamic trending sensors in each compartment of a multi-chamber bag house allows plant operators to observe the real-time changes in base line emissions and to have instantaneous, plant-wide access to the functionality of their filter systems.
These systems also allow the potential for total control and performance optimisation of the bag house.

Both stand-alone systems and bespoke plc interfaced solutions to connect directly to users control systems are available. Communication protocols include AB DF1, Ethernet/IP, Modbus ASCII, RTU and TCP.
These options provide seamless integration into existing network operating systems.

Electrodynamic sensor installed directly in Baghouse compartment wall

The cost benefits of these networked filter management systems have been proven on large bag house applications in industrial applications worldwide, the systems providing payback in less than 12 months.

Benefits include:

- Remote sensor conditioning checks
- Diagnostic notification of failed valves (solenoid and diaphragm)
- Real-time leak detection by compartment or row
- Prediction of filter failure
- Suspension of individual filter row cleaning

(provides temporary decrease in emission base line trends)

- Reduction in compressed air usage/increase in compressor life
- Reduction of maintenance times/costs
- Potential for increased operational life of bag filter elements

ECM ECO Monitoring, a.s., Nevädzová 5, 821 01 Bratislava, Slovak Republic

Phone: +421 2 4342 9418
+421 2 4342 7408
Fax: +421 2 4342 7465

E-mail: ecm@ecm.sk
http:// www.ecomonitoring.com

Company Reg. No.: 17312094
VAT No.: SK2020317244