



filter management

enhanced performance

increased efficiency



Bagfilter Performance Monitoring

using

Particulate Monitors



Pro-active maintenance solutions reduce costs and increase production

The maintenance of modern bag and cartridge filter systems is normally both a time consuming and costly activity especially where multi-compartment baghouses are concerned. Maintenance of both pulse jet filters (on-line cleaned) and reverse air filters (off-line cleaned) is often undertaken in unpleasant conditions with limited available time. To help overcome these maintenance issues, PCME supply a range of advanced Predictive Monitoring Solutions utilising the world's most advanced particulate monitoring systems which comply to International Standards including EN-15859 and US EPA MACT. Combined with PCME's 'Predict' PC software package, a total preventative maintenance solution for both on-line and off-line cleaned bag filters, this enables filter maintenance and Process operators the ability to optimise filter performance, extend bag life and reduce operating costs.



Bag House control enhanced by ElectroDynamic™ filter management system

Particulate monitoring systems are generally purchased to monitor environmental emissions to atmosphere, although many instruments are also used as preventative maintenance tools for filter plant.

The ability to predict when a filter is likely to fail and to be able to identify which row or chamber is at fault provides a method to not only reduce the environmental impact and clean-up costs associated with emission events, but also to make **significant savings** in spares, maintenance times and lost production.

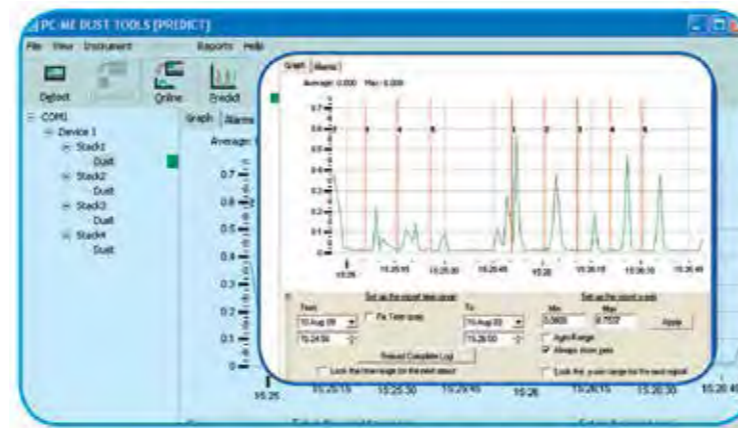
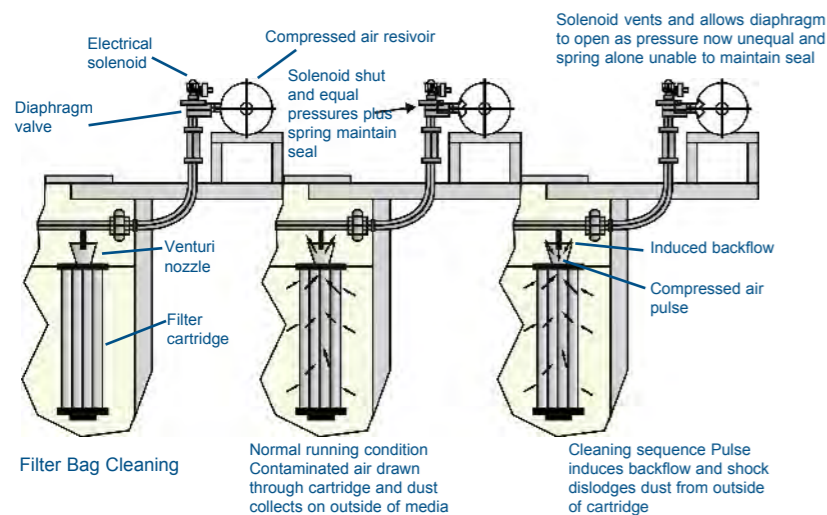
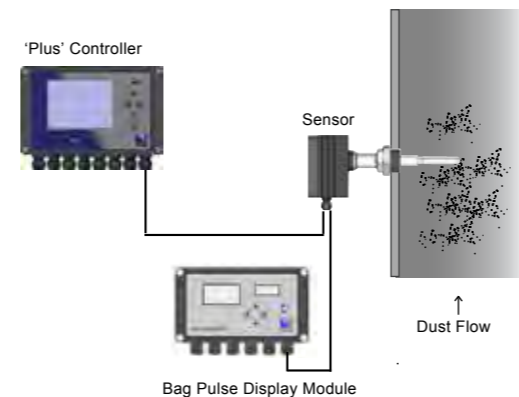
Filter media is normally changed on a regular basis, typically based on experience or on the filter manufacturers recommendations. This can be both costly and time-consuming, resulting in either filter elements being changed when there is still serviceable life to be had or alternatively the bag house is run too long resulting in particulate leakage and eventually gross filter failure due to excessive bag wearing. Quite often, bagfilters are operated with leaks unknown to operators.



PCME's patented ElectroDynamic™ sensors offer the most dynamic sensing technology currently available for bag filter emission monitoring. Their unique patented non-contact charge-induction measurement technique provides the capability to remotely access the filter's cleaning signature by accurately tracking the very dynamic dust emissions created during a bag filter cleaning cycle. Other techniques struggle to provide the same quality of data required to either detect small leaks or retain a stable enough base line (e.g. Opacity and Triboelectric dust monitors).

During the pulse-jet cleaning cycle, the pores in the filter media temporarily expand and allow dust to pass through resulting in peaks in the measured dust level. Over time, these pores deteriorate and increase in size. This leads to a reduction of the filter's efficiency which results in 'leaks'. If a pore deteriorates so much that it brakes/tears, then much higher than expected emissions are produced in a relatively short period of time. This increase in emissions is clearly observed by the Sensor System (as shown in the graph below), and the differences between a 'Leak' and a 'Broken bag' can clearly be displayed.

ElectroDynamic™ Sensor System



Monitoring emissions peaks during the cleaning process using PC-ME Dust Tools 'Predict' PC Software

By monitoring these emissions peaks in real time using PCME's 'Predict' PC software, it is possible to identify potential problems within each filter compartment before they result in breaches of environmental limits. Marker pulses generated from the filter's cleaning system allows easy identification of damaged rows. The fast moving dust peak with short time duration is typically not identified by dust monitors used for main stack Compliance monitoring where longer-term emission averaging is required and slow responding analogue outputs (4-20 mA) are used primarily for emission data collection and not filter performance monitoring. Typically, it is not possible to manage filter cleaning data using analogue outputs which do not have the right resolution or data update rates.

Data: Display and Management Options

As well as being able to display data on the system's control unit, PCME also offer options to view and manage data in locations across the site either next to the bag compartments or in a remote control room.

'Plus' Controller and 'Filter Display Module'



Display on 'Plus' Controller showing dust pulses from each bag row being cleaned 'on-line'



The performance of single compartment bag filters can be observed at the filter by employing a 'Filter Display Module'

'Predict' PC Software

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 PC software to be used in conjunction with selected particulate monitors.

The use of 'Predict' allows:

- Scheduled maintenance
- Reduced maintenance times
- Lower labour costs
- Reduction of spare filter inventories
- Longer bag life
- Increased production time
- Reduced environmental emissions due to better filter control



'Predict' software: the deterioration of row 10 is highlighted in real time before environmental limits are breached

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. Visibility to Leaking bags vs Broken bags can clearly be identified.

For more details on PCME's bagfilter monitoring systems please visit our website www.pcme.com.

Direct Connection to PLC/SCADA

The monitoring network can also be connected to PLCs or directly to the user's own control systems via several readily available communication protocols including Fast Ethernet, Modbus ASCII, RTU and TCP. These options provide seamless integration into existing operating systems.



Multi-compartment filter management

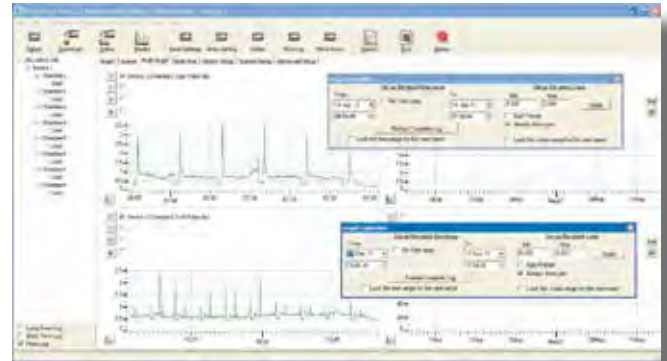
Both Reverse Air and Pulse Jet Multi-chamber Bag Filters are becoming more and more common throughout industry. Regulatory demands reducing the amount of particulate emitted from a wide range of processes are resulting in their installation to both replace Electro-filters on existing sites and to provide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

The decision to install filter management systems is driven by the need to not only minimise emissions and be complaint to regulatory standards but also to maintain optimum performance of the filter and in turn increase plant process efficiency. New US EPA **MACT** rules now also make the use of **Bag Leak Detectors** compulsory in many industries to assure individual filter and bag chamber functionality.

Reverse Air Filters (Off-Line Cleaning)

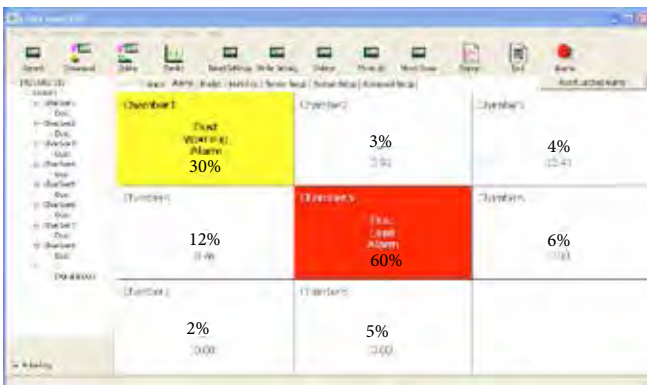
At present, the investigation of compartment failure on a Reverse Air Bag Filter System usually takes place after large-scale dust emissions are evident at the main stack, either by visual analysis or from the response of a main stack Continuous Emission Monitoring System (CEM). The issue with this is that it is an after the event notification of failure normally resulting in high levels of environmental pollution and it cannot highlight which compartment is at fault. The use of an ElectroDynamic™ monitoring system on each compartment outlet together with the use of advanced PC software ('PC-ME Dust Tools') allows the identification of compartment deterioration before high levels of environmental emissions become apparent.

PC Software Options of 'PC-ME Dust Tools'



'Predict View' provides the capability of both real-time observation and the recording of emissions from each chamber allowing the assessment of filter media performance over time and also the comparative performance of differing filter bag materials

Pulse Jet Filters (On-Line Cleaning)



'Online' highlights the deterioration in filter media in each individual chamber (yellow) and when preset levels are breached (red) advises which compartment should be taken off-line and re-bagged

In processes using Multi-Chamber Pulse Jet Filters, the performance of each individual filter compartment can be observed in even greater detail. 'Predict Plus' 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. It is now possible to observe each chamber's cleaning cycle in real time to identify which row is starting to fail before high emissions occur.

The cost benefits of networked filter management systems have been proven on large Baghouse applications in differing industrial settings worldwide. These systems have in many instances provided **payback in less than 12 months** through increases in plant efficiency and reduced maintenance costs.



'Predict Plus' allows the historical comparison of filter row performance

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