



filter management

# Particulate Emission Monitoring in the Cement Industry

particulate emission monitoring

US-EPA  
MACT



Particulate  
0-15mg/m<sup>3</sup>  
0-30mg/m<sup>3</sup>  
0-150mg/m<sup>3</sup>



BImSchV 17 0-15mg/m<sup>3</sup>  
BImSchV 13 0-150mg/m<sup>3</sup>  
BImSchV 27 0-30mg/m<sup>3</sup>



Certificate No: 9389

# PCME and the

PCME's involvement with the Cement Industry has lead to the development of many novel and unique solutions for in-stack particulate monitoring. Working worldwide in conjunction with the industry's major producers, PCME provides an unparalleled range of instrumentation which work in sometimes aggressive situations to help not only to protect our environment by aiding legislative compliance but also in reducing operator costs by reducing filter maintenance and process downtime.

## Quarrying...

Operations such as crushing and milling using filters to prevent dust emissions can be successfully monitored using either simple filter failure devices or advanced calibrateable systems depending on local requirements. Electrodynamic systems are the best suited to monitor these relatively small diameter stacks with low dust loads of typically 5 mg/m<sup>3</sup> or less. These systems are virtually maintenance free and do not require additional services such as purge air.



Crusher plant filter protected by an advanced Electrodynamic unit



Kiln stack and electro-filter monitored by Dynamic Opacity Instrumentation

## Filter Management Systems...

Employing multiple indicative Electrodynamic sensors allow each compartment of large multi-chamber Baghouses to be constantly monitored to determine the deterioration of filter elements. These systems provide a proven method of not only reducing total environmental emissions but also allow preventative maintenance programs together with shorter plant down times and greatly reduced operating costs.

Advanced Electrodynamic units can be employed pre-filter, both Electro and Bag to ascertain filter performance.



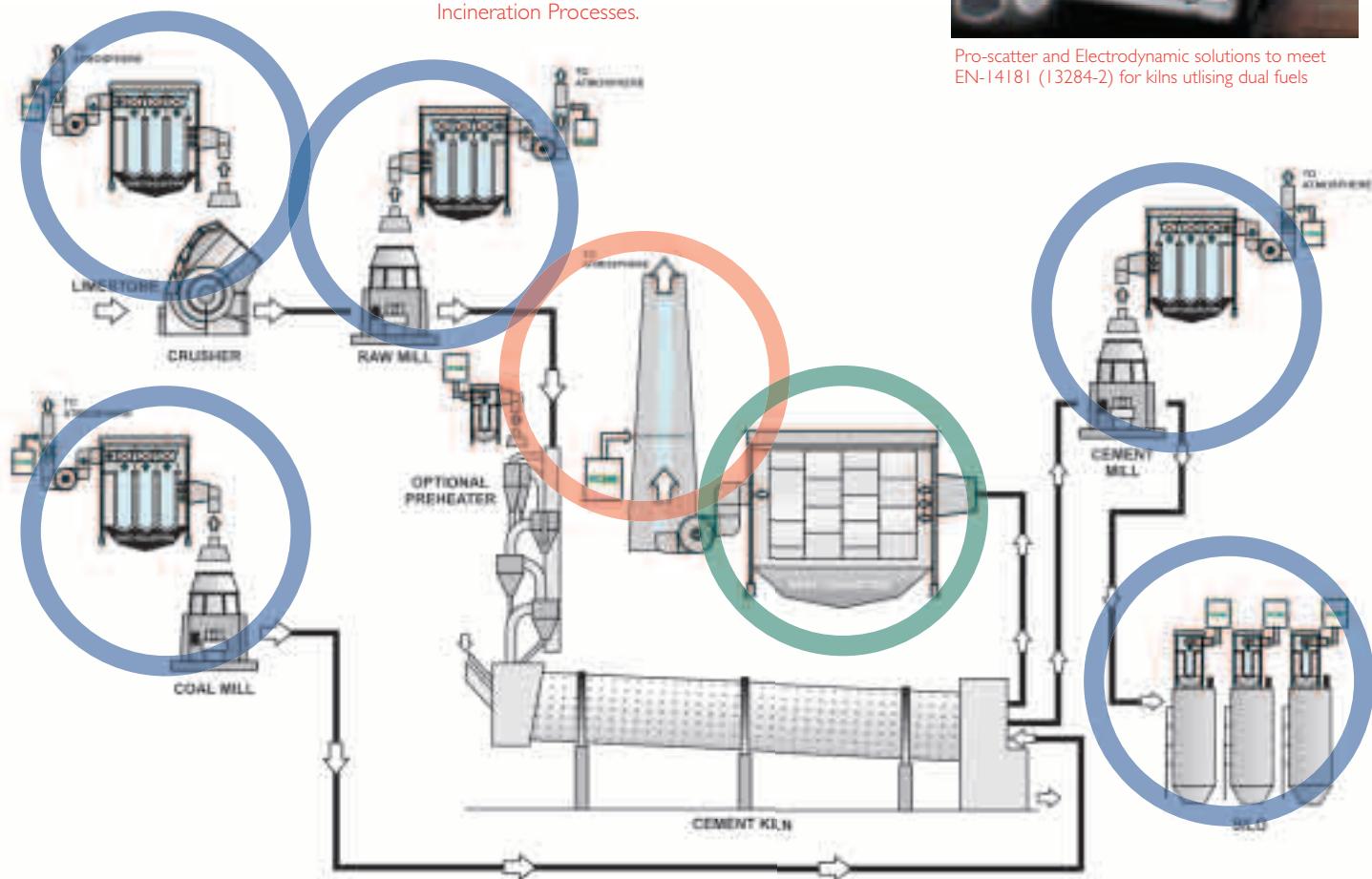
Filter chamber performance continuously monitored via a networked Electrodynamic system

## Kiln Monitoring...

Techniques are determined by the type of abatement plant used, dust levels and stack diameters. For plants using Electro-Filters, Dynamic Opacity systems are preferred. This cross-stack optical technology accurately measures particulate levels in mg/m<sup>3</sup> whilst employing one of the least maintenance dependent technologies available. For plants utilising Baghouses, Electrodynamic sensors employing an induced, non-contact charge transfer technique designed to monitor the low dust levels normally associated with Fabric Filters are favoured. The selection of the appropriate monitoring technique is especially important in applications utilising dual fuels regulated under EN-14181, 13284-2 (Waste Incineration Directive). To comply with these stringent regulations, PCME supply two complimentary systems employing Electrodynamic and Pro-scatter technologies. Details of these systems can be found in the PCME publication Particulate Monitoring for Incineration Processes.



Pro-scatter and Electrodynamic solutions to meet EN-14181 (13284-2) for kilns utilising dual fuels



# Cement Industry

PCME's environmental monitoring range encompass many different technologies to provide the best solution for each application and provide enhanced benefits for users. Set out below are a selection of proven solutions for the Cement industry, for further details please contact us directly on sales@pcme.co.uk or discuss your requirements with our experienced team of local distributors.



Filter condition assessed remotely

## Cement Clinker Mill...

Stacks are not always dry. Many locations have very moist conditions which prevent the use of most technologies. PCME's unique, patented, fully insulated Electrodynamic sensors overcome this problem to provide accurate calibrated data. In some instances, instruments have been continually used in these aggressive applications for over ten years with little or no maintenance.



Product loss prevented by silo monitoring

## Coal Mills...

Employing probe-based systems can be monitored not only for performance to comply with environmental legislation but by utilising PCME's unique Predict software package, the monitor can be used as a powerful filter maintenance tool. This not only greatly reduces maintenance time and costs but eliminates the dirty and difficult job of identifying raw failure by permitting remote identification.



Damp cement mill monitored utilising a fully insulated sensor

## Silo Filters...

Can be monitored with single sensor units or multi-channel networked systems. These devices log data on board to accurately assist the setting of alarm levels, to facilitate warning of silo filter leakage or rupture avoiding environmental impact and product loss.

## Recommended Products

### Bagfilter Monitoring



#### DT Series

- Simple installation – no alignment
- Contamination resistant
- Insulated option for moist stack applications
- Quality measurement from 0.01 to 10,000 mg/m<sup>3</sup>
- Stack sizes from 50 – 3000 mm
- Ethernet connectivity
- TUV and MCERTS Accreditation
- Zero, span and advanced probe contamination checks

### Electro Filters



#### SC Series

- Ease of installation – minimum alignment
- Quality low level measurement from 5 mg/m<sup>3</sup>
- Low running costs compared to traditional opacity systems
- Instrument not damaged if purge air fails
- Operates with heavy lens contamination
- Approved to TUV BlmSchV 13 & MCERTS
- Minimum effect from changing particle colour, shape due to ratiometric measurement
- Zero, span and advanced contamination checks

### Filter Management Systems



#### BBS Series

- Simple installation into baghouse chambers or ducts
- Network solution for bag filter control and chamber monitoring
- Bag failure predict capability
- Detects leakage and broken bags
- Simple visual display of relative dust levels
- Separate alarms for leakage and broken bag detection
- Reduces plant downtime and maintenance costs

### LMS Series

- fully EN-14181 compliant
- insensitive to varying particle sizes
- adjustable insertion length
- no moving measurement components

### DT Series

- Installed pre-filter (bag and electro filter) to monitor filter efficiency in conjunction with main stack monitor
- Suitable for locations with high levels of particulate

## cost and environmental nuisance reduction using filter failure prediction

Although particulate monitoring systems are generally purchased to monitor environmental emissions to atmosphere, many users also utilize 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.

To achieve this the selected monitoring technique must be able to accurately track the very dynamic dust emissions created during a bag filter cleaning cycle. To these ends we recommend Electrodynamic units in preference to Optical or Triboelectric systems.

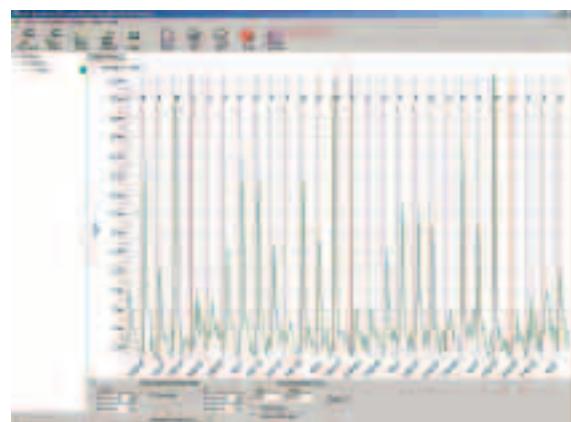
As a filter is reverse jet cleaned, any defects in the filter membranes are exposed resulting in relatively high dust peaks. By monitoring these peaks in real time using the Predict software package, it is possible to identify potential problems within the filter before they result in breaches of environmental limits.

The cleaning signature of the bag house is made easily identifiable by the input to the monitor of the filters cleaning pulses via Auxiliary Input Modules. Additionally further outputs maybe taken from pressure sensors within the bag house to assess the caking of the filter elements, thereby allowing the operator to reduce bag wear and compressed air usage and allowing the optimisation of the filter system.

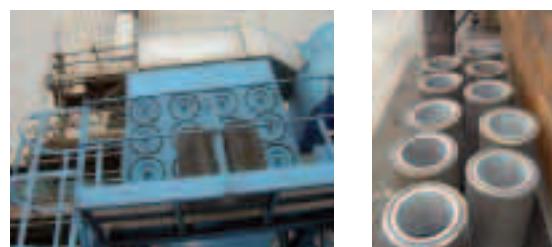
Predict provides the possibility to observe filter problems remotely and check maintenance work to ensure correct performance of the filter. The use of Predict has proven the ability of a monitor not only to be used for environmental compliance but also to be used as a significant aid to plant maintenance and to also enable users to greatly reduce the instances of catastrophic filter failure.

### 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 data identifying damaged bag rows (row10)**



**Predict offers the possibility of shorter maintenance times and the replacement of fewer filter elements**

## electro-filter efficiency monitoring

To optimise the performance of electro-filters it is important to fully understand how much particulate the filter is actually removing from the gas stream. PCME's unique capability to provide a single monitoring system incorporating two separate sensors utilising Optical technology for use post filter for use post filter and Electrodynamic Technology pre filter allows users to successfully measure Electro-filter efficiency. These two complimentary monitoring techniques are used as they offer the best monitoring solutions in the widely different conditions found in these two locations. Electrodynamic sensors have a proven capability to monitor the extremely high dust loads found Pre-filter, providing a reliable, rugged monitoring solution whereas Optical sensors are chosen for use Post filter as a result of their capability to measure extremely low dust levels ( $0.1 \text{ mg/m}^3$  utilising pro-scatter techniques) and their low maintenance requirements.

The ability to observe in real time the performance of the filter allows the operator to adjust operating parameters to optimise not only filter efficiency but also reduce operating costs, extend the filters operating life and decrease the environmental impact of the process.



**Effective electro-filter monitoring utilising PCME's Optical and Electrodynamic technologies**

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