

filter management

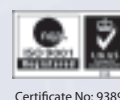


# Particulate Emission Monitoring for a Steel Mini-Mill

particulate emission monitoring



US-EPA  
MACT



# PCME solutions

For over 15 years, PCME have been supplying particulate monitoring systems for use in the high temperatures and the harsh and dusty environments found in the steel industry. PCME provide a selection of different measuring technologies which not only protect the environment but provide reliable and hard wearing solutions for your requirements not only in terms of compliance with legislation but also by reducing the amount of filter maintenance necessary aids in the reduction of process downtime and operator costs.

## Furnace Monitoring//



Electrodynamic Instrument monitoring stack on primary extraction system for Electric Arc Furnace



Fugitive emissions on the Furnace Doghouse can also be monitored



Stacks can be monitored by multi-channel Electrodynamic systems

The fourth hole extraction system used on many Electric Arc Furnaces produces very fine dust particles. These can be reliably monitored using PCME's Electrodynamic probe-based system on the stack after the bag filters.

Although much of the CO gas is burned in the evacuation system leading to the baghouse, the gas at the filters can still be at elevated temperatures leading to the possibility of bag failure. Employing multiple indicative Electrodynamic sensors allows each chamber of large multi-chamber baghouses to be constantly monitored to determine the deterioration of filter elements, potentially saving premature bag wear and emission issues.

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.

In order to filter the fugitive emissions from the Furnace Doghouse, fabric filters are often used. It is common for regulatory authorities to look closely at these emissions. Electrodynamic instruments are favoured for this application since they are able to monitor these very low dust levels found. They are featured in a wide range of accredited systems (MACT, TUV, MCERTS) to provide both indicative and calibrateable devices and since they are immune to the effects of dust build-up on the probe and have only a single mounting point, the costs of ownership are kept low.

Since the emissions from the Arc Furnace are of a conductive nature, in order to provide the utmost confidence in the integrity of the measurement, PCME's advanced monitoring systems incorporate not only patented zero and span checks but also a unique patented secondary contamination ring which monitors any leakage currents or signals across the insulator thereby proving the measurement integrity of the sensor.

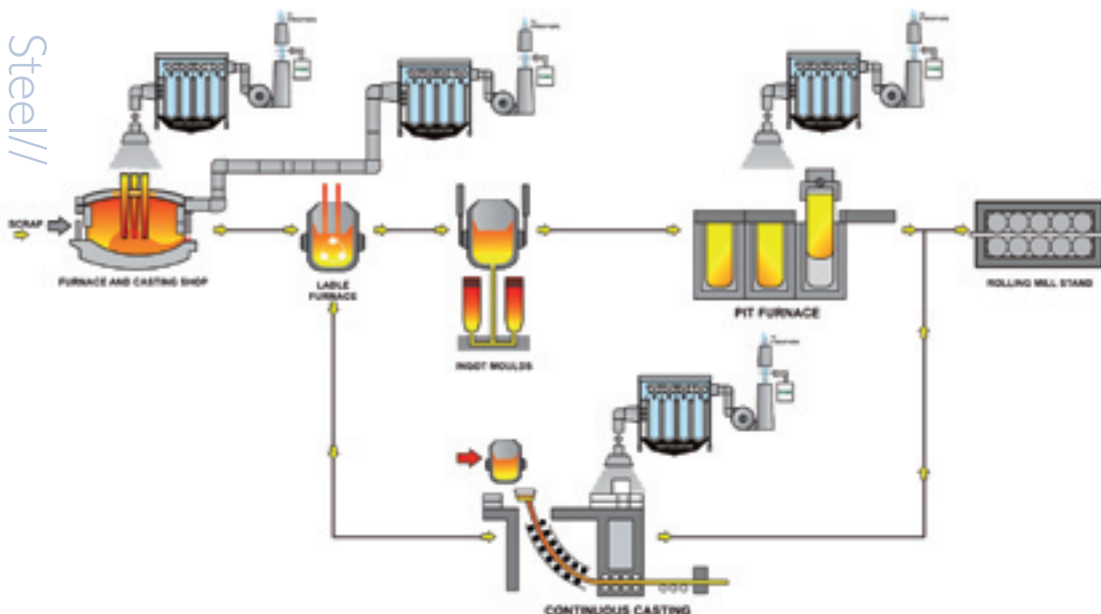
On plants where pit furnaces are used instead of re-heat furnaces to reheat the steel for rolling, the hot aggressive nature of the flue gas emissions causes increased filter wear. This can be recognized using the advanced monitoring techniques of PCME's Electrodynamic instruments.

These probe based systems utilize a patented induced, non-contact charge transfer technique, allowing them to be unaffected by dust build-up on the sensor and thus reducing the cleaning maintenance required. They offer accurate, repeatable readings on the low dust levels generally found after the Bag Filters at this point in the plant.

In addition, the efficiency of the plant can be improved and the individual filters can be maintained at optimum efficiency by monitoring each individual chamber of the Bag House. This will maximize bag life and reduce the replacement of filter media. (see PCME's "Advanced Bag Filter Diagnostics" document)

To monitor these filters, PCME's Electrodynamic instruments can be networked to a single controller unit using modbus technology.

## Steel// Furnace and casting shop



# for the steel mini-mill

PCME's environmental monitoring range encompasses complimentary technologies to provide the best solution for every application and provide enhanced benefits for users. Below are a selection of the ways in which PCME's instruments can be used by the Steel Industry both to meet the requirements of ever more stringent legislation and to provide continuous monitoring information to assist with the efficient running of the plant. For further details contact us directly on [sales@pcme.co.uk](mailto:sales@pcme.co.uk) or discuss your requirements with our local distributors.

## Steel Casting//



Emissions at hot rolling line can be monitored by PCME Electrodynamic Systems

While significantly lower than in areas of the plant which contain furnaces, particulate emissions from casting occurs when molten steel is poured into the moulds or into the continuous casting machine. Bagfilters are used to filter the particulates on this application and the preferred monitoring system is Electrodynamic instruments.

Employing probe-based instruments allows the system to be monitored not only for performance but by utilising PCME's unique Predict software package the monitor can be used as a powerful filter maintenance tool. This not only reduces maintenance time and costs but eliminates the dirty and difficult job of identifying row failure by permitting remote identification.

PCME's controllers may be connected directly to a LAN to allow remote interrogation of the monitor by a number of different users.

## Hot Rolling Mill//

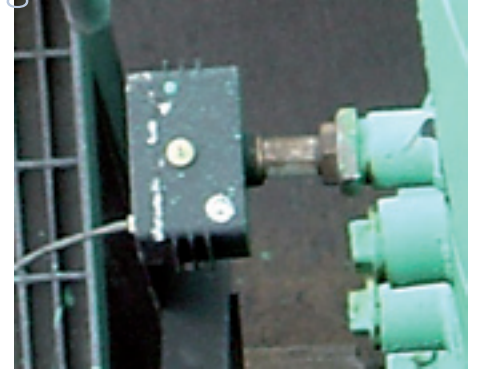


Filter chamber performance monitored via a networked Electrodynamic System

### Oxygen Scarfing Machine

The fine metallic dust particles in exhausts from scarfing machines are generally filtered using bagfilters and are best monitored using probe based Electrodynamic systems. This robust measurement technique requires very little maintenance since the onboard instrument self checks comprising zero, span and contamination, eliminates the requirement for the routine inspection of the sensor required by regulatory standards. This significantly reduces the amount of maintenance time required when compared to Triboelectric techniques leading to a lower cost of ownership.

Where Electro Filters are used as a type of abatement, Triboelectric systems can be adversely affected by the electrical fields generated. Dynamic Opacity systems employing a ratiometric principle are unaffected by these and are able to measure much lower levels of dust than traditional optical instruments as well as continuing to measure accurately with up to 90% lens obscuration. This greatly reduces the amount of maintenance needed for effective system operation.



Electrodynamic instrument fitted on stack at secondary steel plant

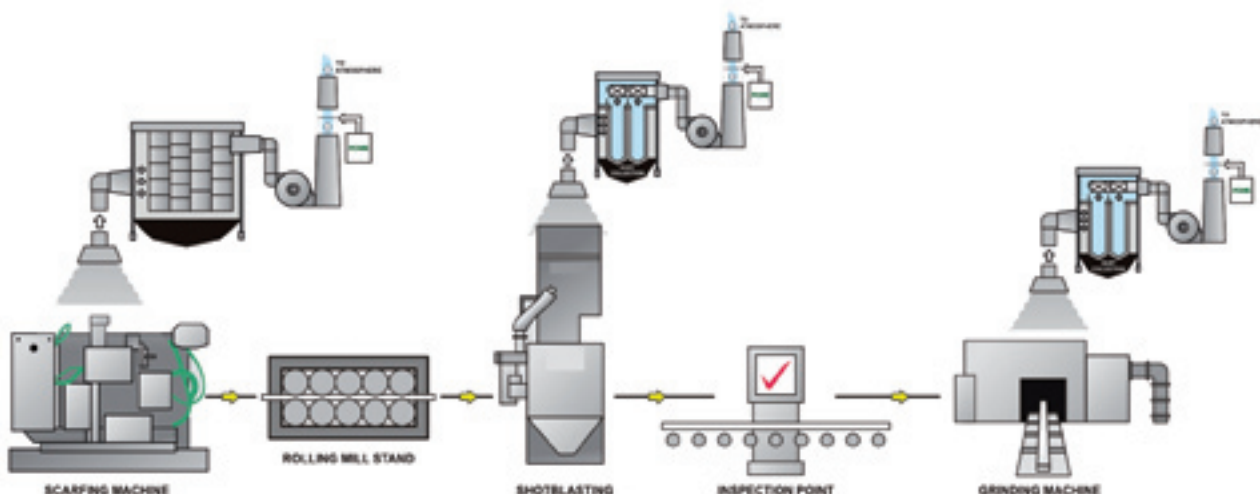
### Shot Blasting Machine Grinding Machine

Multi-chamber Baghouses are commonly used on applications in the Finishing Shop which use various kinds of abrasive blasting or grinding operation. To monitor these filters, PCME provide a wide range of Electrodynamic instruments ranging from single channel units to multi-channel (up to 32 sensors) systems which are ideal for monitoring the extremely low dust levels normally associated with modern high efficiency fabric filters.

These sensors use Modbus technology to network to a single control unit. The control unit logs historical data for environmental reporting and process control, displays emission values and allows easy configuration of the system.

The controller may be connected directly to a LAN to allow remote interrogation of the monitor by a number of different users, environmental, process and maintenance. Both historical and real-time data can be displayed simultaneously on different PC's.

## Steel//Rolling Mill



## 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.

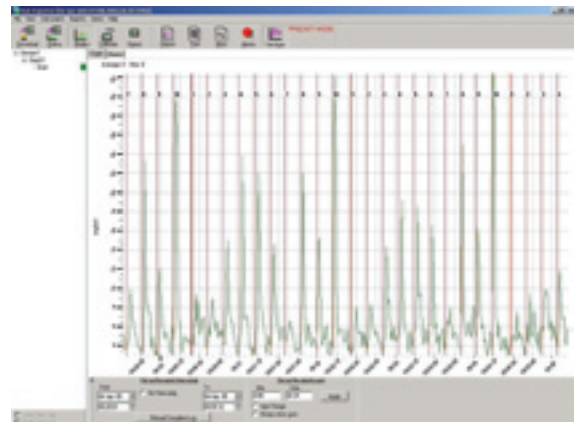
As a filter is reverse jet cleaned, any defects in the filter membranes are exposed resulting in relatively high dust peaks. By monitoring these peaks in real time using the Predict software package, it is possible to identify potential problems within the filter before they result in breaches of environmental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

[www.pcme.co.uk](http://www.pcme.co.uk)

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