



filter management

particulate emission monitoring



# Particulate Emission Monitoring for an Integrated Steel Plant



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

# PCME solutions for

PCME's involvement with the Steel Industry has led to the development of many novel solutions for in-stack and plant particulate monitoring. Working worldwide in conjunction with the industry's major producers, PCME provides an unrivalled selection of Opacity, DynamicOpacity™, ElectroDynamic™ and ProScatter™ technologies to provide the most technically and regulatory appropriate particulate measurement systems for monitoring the sometimes aggressive situations found on Integrated Steel Plants.

## Coal Fired//



Accredited DynamicOpacity™ instrument monitoring Electro filters

Coal Fired boilers used on power generation plants have traditionally been monitored by using Opacity based systems. While this technique is still used in certain parts of the world, particularly those whose National Standards follow US EPA regulations, it entails high maintenance costs due to particulate build-up on the lens. Thus for these types of systems it is necessary to fit a constant volume large air purge and also to clean the lenses at regular intervals. This requires extra maintenance time and cost.

PCME offers a choice of monitoring technologies for coal fired boiler applications based on the type of filtration system used to reduce particulate emissions.

For plants employing Electro-filters, a DynamicOpacity™ system is used. DynamicOpacity™ instruments employ a ratiometric principle which offers the benefit of being able to measure much lower levels of dust than Opacity systems while at the same time running with up to 90% obscuration of the lens. This significantly reduces the maintenance time required and in many cases avoids the need for purge air systems which again reduces operator cost.



ElectroDynamic™ sensor for use where filtration is provided by bag filters

In order to measure the low emissions produced when filtration is provided by bag filters, an alternative probe based ElectroDynamic™ technology is employed. This has the advantages of working particularly well in smaller stacks with lower dust levels whilst the single point fitting provides easy installation and very low maintenance costs when compared to Opacity systems .

## Gas Fired//

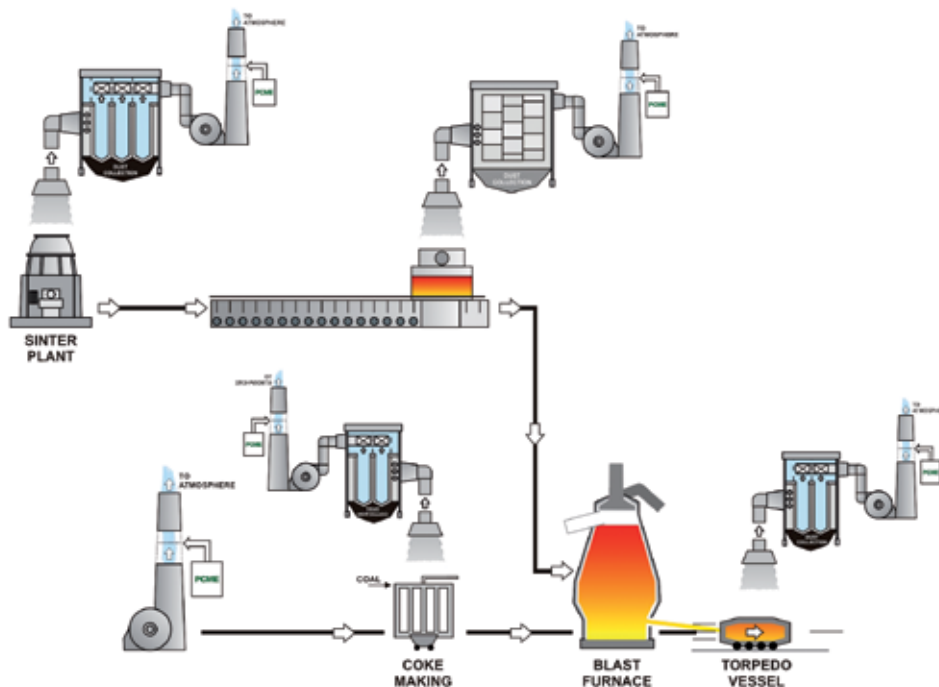


Gas Fired Boiler monitored by ProScatter™ Technology

Plants utilising Natural Gas as a fuel emit extremely low levels of particulate (typically <math><1\text{mg}/\text{m}^3</math>) when run under normal operating conditions. They therefore seldom employ filters.

PCME's ProScatter™ technology instruments will not suffer from any change in the charge on the particulate and are well suited for measuring these low particulate levels. They also meet the exacting requirements demanded in regulatory standards such as the European Large Combustion Plant Directive (EN 14181).

## Steel//Primary



# integrated steel plant

PCME's environmental monitoring range encompasses complimentary technologies to provide the best solution for every application and provide enhanced benefits for the user. 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.com or discuss your requirements with your local distributor.

## Sinter Plant//



Sinter Plant monitored by TUV approved ElectroDynamic™ System

In order to monitor the fine dust particles produced in the sinter plant, electro filters in combination with de-dusting systems are used. The dust is vented to atmosphere through the Sinter Plant stack.

Readings taken by Probe based Triboelectric systems are affected adversely by the electrical fields generated in electro filters which change the charge characteristics of the dust particles passing through them.

DynamicOpacity™ based instruments, which can be TUV or MCERTS approved, are not influenced by these electrical fields and also require only simple air purging thus eliminating the need for blower motors benefiting the end user by reducing cost of ownership.



Emissions at hot rolling line monitored by PCME ElectroDynamic™ System

New regulatory pressures have led to the increasing use in recent years of Bag House filters in order to clean the process gases from sinter plants. These filters emit low levels of dust and are best monitored by an ElectroDynamic™ probe based instrument which offer low installation costs as there is no requirement for additional services such as air purges. They require little maintenance and have the ability to cope with the hot aggressive flue gas conditions typically found in the Sinter Plant.

PCME's ElectroDynamic™ instruments utilise a patented, induced, non-contact charge transfer technique allowing them to be unaffected by dust build-up on the sensor and reducing the cleaning maintenance required.

The hot and aggressive nature of the flue gas can often lead to increased filter wear. This can be readily identified using PCME's advanced monitoring techniques. (see PCME's Bag House Data sheet for details) The outcome of all these features is a simpler and lower cost operation for the user.

## Coke Ovens//



Filter chamber performance continuously monitored via a networked ElectroDynamic™ System

Heavy dust loads and high carbon content in emissions from the coke ovens are often filtered by large multi-chambered Bag Houses. ElectroDynamic™ systems are used to monitor the environmental emissions from these Bag Filters on both the coke discharge and coal charging operations since they are not susceptible to build up from the heavy dust loads in the same way as Optical Systems.

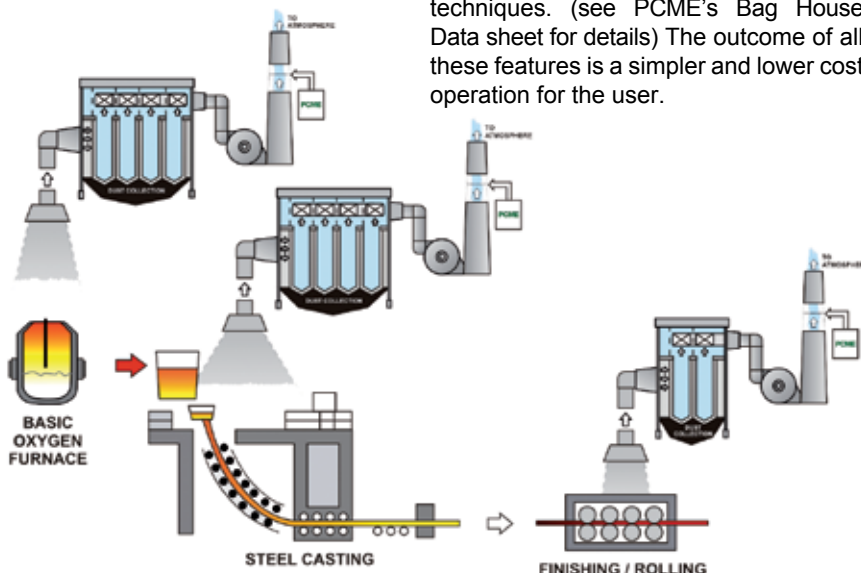
The efficiency of the plant can be improved and the individual filters can be maintained at optimum efficiency by monitoring each individual filter chamber. A Filter Management System using individual ElectroDynamic™ instruments will provide the users with full knowledge of their filter system.

Replacement of filter media can be greatly reduced. Bag life is thereby maximised and the period between filter replacement is greatly extended. This has the effect of reducing operating costs. (see PCME's Advanced Bag Filter Diagnostics data sheet).

Monitoring filter performance in plants using Electro Filters can also be useful to the user since it allows improvement of plant efficiency and reduces operating costs by maximising particulate removal without over driving plate current. This would lead to wear of the filter plates and a reduction in efficiency.

DynamicOpacity™ instruments are best used here since they are unaffected by the electrical fields generated by Electro filters whilst continuing to operate despite high levels of lens obscuration.

Steel//Finishing



# Blast Furnace//



Blast Furnace monitored by ElectroDynamic™ Instrument

ElectroDynamic™ instruments are used to monitor the low dust levels emitted by the filters servicing the blast furnace. This robust measurement technique requires almost no maintenance. The on-board instrument self-checks comprising Zero, Span and Contamination eliminate the requirement for the routine inspection of the sensor required by regulatory standards (MCERTS, TUV). This significantly reduces the amount of maintenance time required compared to Triboelectric techniques.

PCME provide ATEX and IECEx approved instruments which are suitable for hazardous zone classified applications. Instruments are available which can operate at pressures up to 50bar. For applications using wet scrubbers where water droplets may be present in the flue gas, PCME provide an extractive system which evaporates water leaving only the particulate which is monitored by a ProScatter™ light scattering probe.

## Secondary Steel Processes in Rolling Mills

Fine dust produced by many of the processes in the steel rolling mills is often filtered for environmental purposes. Most of these applications use bagfilters, however, in some cases cartridge filters or cyclones are an alternative. ElectroDynamic™ instruments installed post filter enables not only compliance with legislative monitoring requirements but also facilitates the identification of failure of filter elements before serious levels of emissions occur.

### Continuous Casting

Air emissions of particulate matter arising from the transfer of molten steel to the mould and from cutting of product to length using oxy-fuel torches are again mostly filtered using bagfilters. PCME's unique patented ElectroDynamic™ instruments are best suited for monitoring these applications where low dust levels of less than 5 mg/m<sup>3</sup> are encountered. These systems are virtually maintenance free and do not require additional services such as air purges.



Cartridge filters fitted on rolling mills at stainless steel plant

### Shot Blasting Machines/Grinding Machines

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.