

# Using Particulate Emission Monitors to Reduce the Cost of Operating Bag Filters

Presented by  
Matthew Evans



# BAG/CARTRIDGE FILTER OPERATION

Principle workings of a bag or cartridge filter:

- The dirty air from a process enters the filter. The dust laden air is deflected evenly through the filter by an internal baffle
- The dust is then captured on the outside surface of the filter media and the clean air is then forced out, normally past a fan and to atmosphere but can be returned back into the plant/process



# BAG/CARTRIDGE FILTER OPERATION AND TYPES

There are two main types of filters:

- Single compartment filters: these will have numerous bag/cartridges within one enclosed compartment
- Multi-compartment filters: these will have numerous bag/cartridges within a number of compartments



# BAG FILTER OPERATION AND TYPE



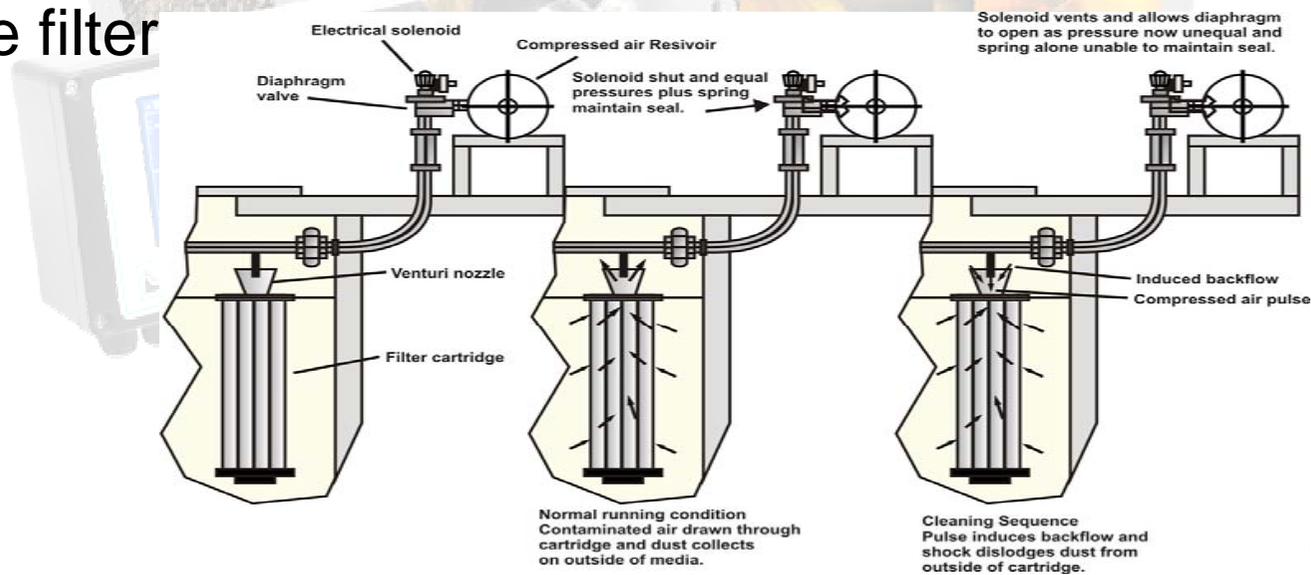
SINGLE COMPARTMENT  
FILTER

MULTI-COMPARTMENT  
FILTER



# CLEANING CYCLES

- The most common way of cleaning the filter media is through reverse jet cleaning
- This is when air is forced down the inside of the filter media, which causes the dust to fall off the outside of the filter



# CLEANING CYCLES

Cleaning cycles can be either:

- Sequential – cleaning rows or compartments 1 to 10
- None sequential – cleaning rows or compartments when needed



# CASE STUDY



# CASE STUDY

## PCME Ltd:

- Utilise our emission monitor to investigate the potential savings in lost production and filter maintenance costs
- Help the customer achieve their goals

## Customer:

- **Save** down time
- **Increase** filter performance
- **Stop** production loss
- **Gain** a greater understanding of the filters operation
- **SAVING MONEY**



# APPLICATION

- The UK site we chose has over 60 bag and cartridge filters
- PCME equipment chosen was located on the outlet of a cartridge filter
- The filter had 40 cartridges, split into 10 rows of 4
- Each cartridge costs £55
- The cartridge was cleaned using a sequential cleaning cycle



# HISTORIC FILTER CHANGE

- The site's standard filter media change would be every 9 months
- Based on visual assessment or complaints from manufacturing regarding loss of suction
- At a cost of £2,200 in cartridges per filter
- 9 man hours per filter
- **Loss of production due to unplanned breakdowns £30,000 per filter**

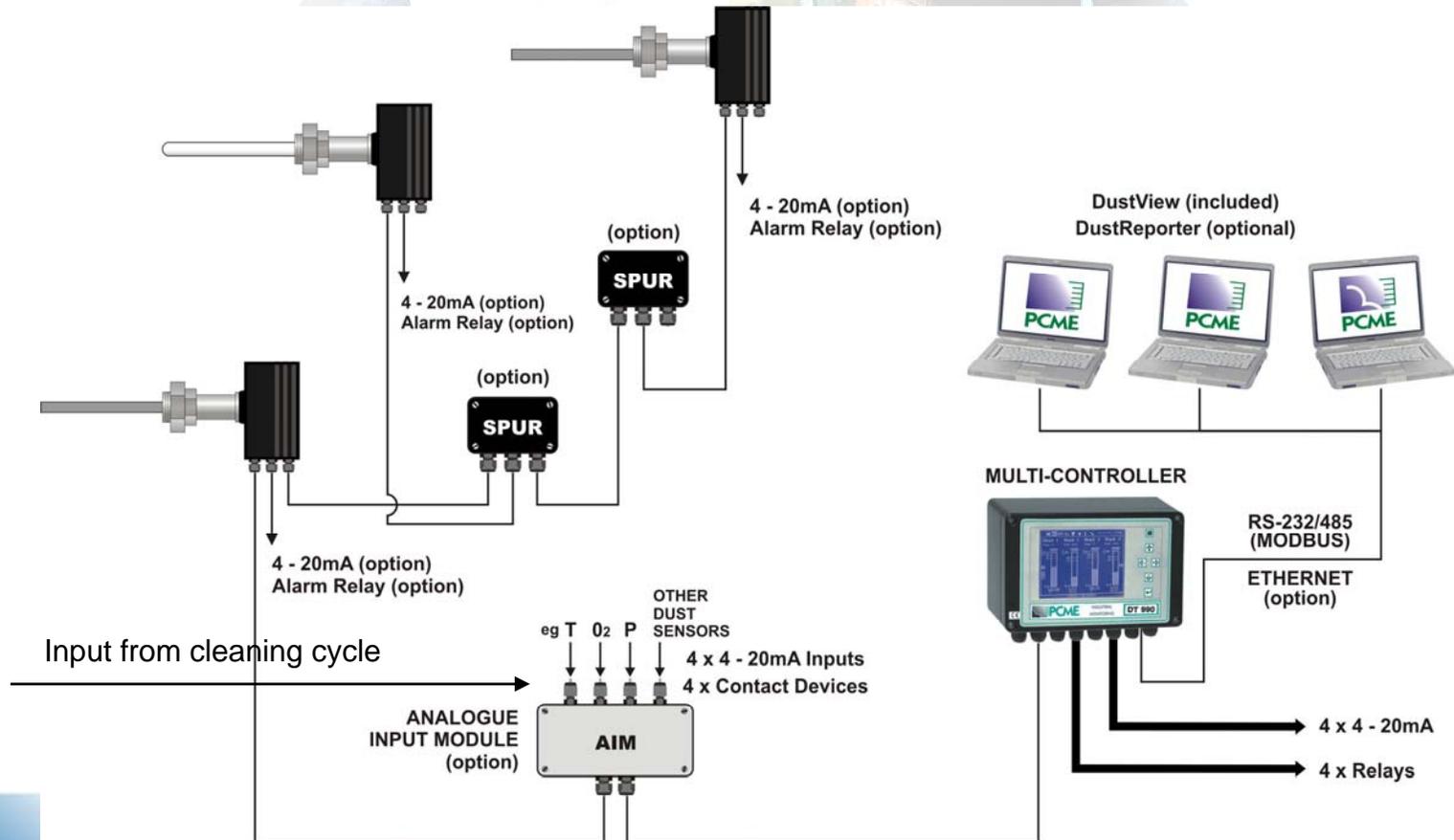


# SYSTEM SUPPLIED

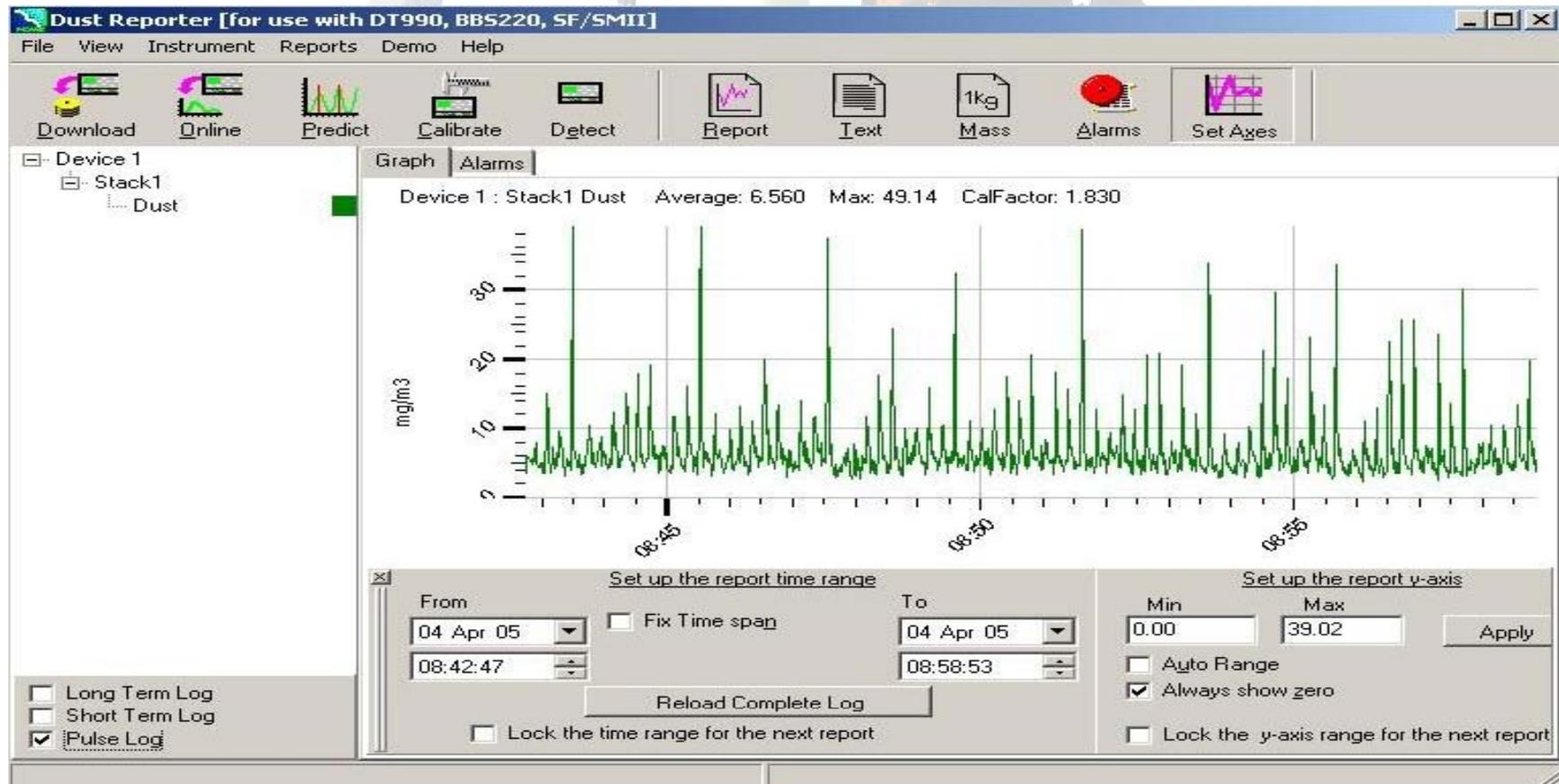
- DT990 Electrodynamical instrument (MCERTS)
- Ethernet function within the DT990
- DustReporter 2 with Predict which enables you to:
  - Download historic data remotely through the local area network
  - View the DT990 in real time remotely
  - Predict will identify leaking or broken filter media
  - Multi-user remote access



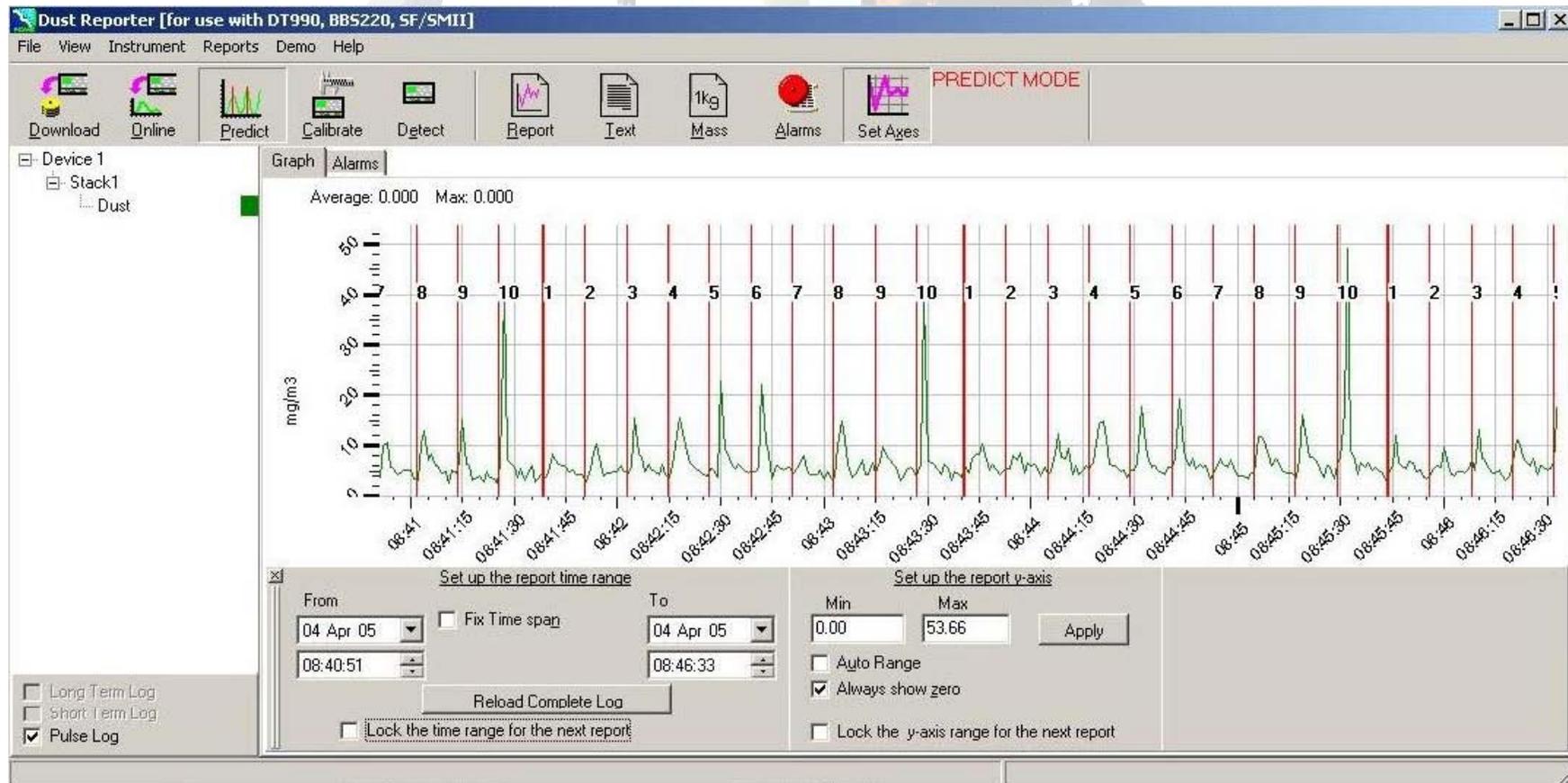
# SYSTEM LAYOUT



# FILTER PERFORMANCE



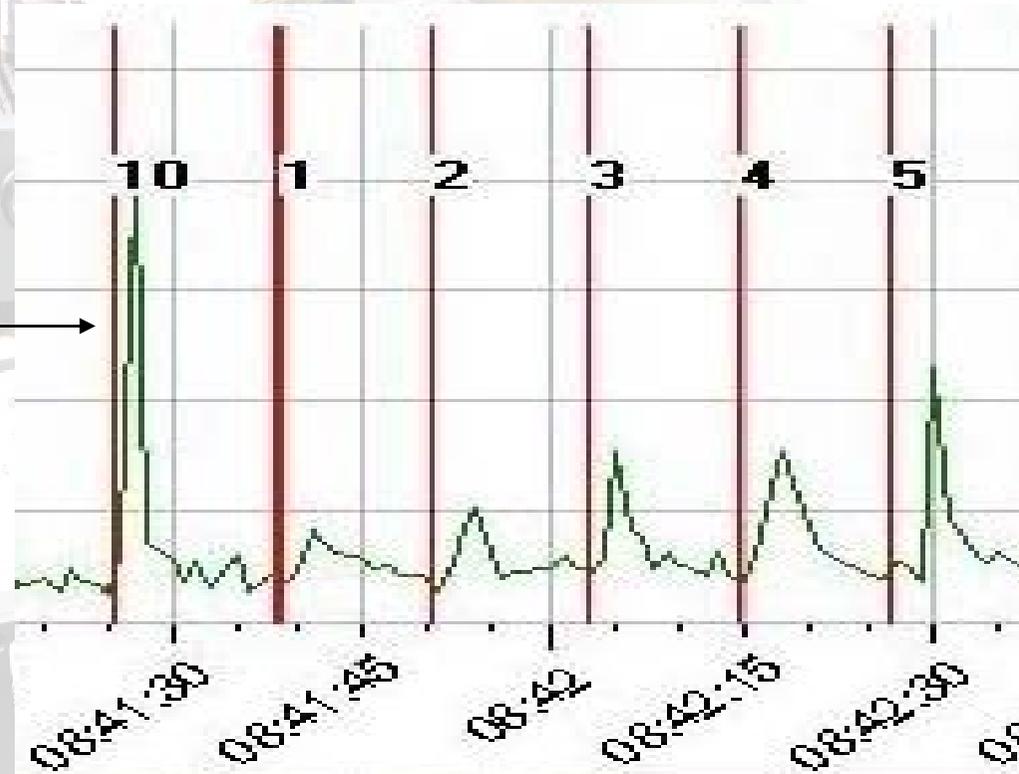
# FILTER PERFORMANCE



# FILTER PERFORMANCE

Predict software identified row ten as having a damaged filter media

Logged predict data  
Can be compared  
over a long time period



# RESULTS

## Cartridge replacement costs pre DT990

Filter Operation	9 months	18 months	27 months	3 years
No cartridges & cost	40 cart @£55 ea £2,200			
No of man hours	9m/h	9m/h	9m/h	9m/h
Total Pre DT990	£2,200 + 9m/h	£4,400 + 18m/m	£6,600 + 27m/h	£8,800 + 36m/h



# RESULTS

## Post DT990 Sensor

Filter Operation	3 months	12 months	15 months	27 months	3 years
No cartridges & cost	4 cart @ £55 ea £220	8 cart @ £55 ea £440	28 cart @ £55 ea £1,540	4 cart @ £55 ea £220	0 Cart
No of man hours	3m/h	3m/h	7m/h	3m/h	0m/h
Total POST DT990	£220 + 3m/h	£660 + 6m/h	£2,200 + 13m/h	£2,420 + 16m/h	£2,420 + 16m/h

# BENEFITS

- Lost production due to historic filter change over 9 months
- **£30,000**
- Lost production with the DT990 sensor installed was reduced by **60%** within the first 9 months
- **Saving of £18,750**



# SAVINGS

- Loss of production: cost saving
  - 9 months **£18,750**
  - 3 Years **£60,000**
- Cartridge replacement: cost saving
  - 9 months **£1,980**
  - 3 years **£6,380**
- Total cost savings
  - 9 months **£20,730**
  - 3 years **£66,380**
- PAYBACK FOR DT990 SENSOR BASED ON CARTRIDGE SAVINGS ONLY **13 months**

# SAVINGS

- Potential cost savings on 60 filters
  - 9 months **£1.2M**
  - 3 years **£3.9M**
- Actual number of man hours saved on 1 filter
  - 9 months **6m/h**
  - 3 years **20m/h**
- Potential number of man hours saved over 60 filters
  - 9 months **300m/h**
  - 3 years **1,200m/h**



# CONCLUSION

- Reduce the cost of operating your filters
- Improve on loss of production
- Save money
- The case study is available for people who would like to take one away
- Please visit the PCME stand (50) for online DustReporter 2 and Predict demo
- Any questions?

