Boiler Combustion Optimization

Advanced Instrumentation for Improved Plant Operation

Headquarters in Germany
Privately Held
PROMECON USA Inc.
Sales & Service in North America
On-line Real Time UBC Measurement

Optimize mill/boiler performance
Accurate (+/- 0.6 percentage points)
With density compensation (+/- 0.2 perc. Pts.)
Certified ash for sale
Minimal maintenance & calibration (1 moving part)
Easy installation & operation
Dependable with high market share
Over 160 sensors operating worldwide
Many advantages over extractive systems
Efficiency Optimization Principle

Minimize energy losses from unburned carbon & flue gas -- function of excess air levels
Dielectric constant of fly ash is a function of the carbon content. Measuring the shift of frequency (microwave) in a resonator ($\Delta f$) enables the carbon content to be calculated.

UBC = A + B \cdot \Delta f

A and B are the calibration coefficients
MECONTROL UBC Design

- Measurement Cabinet
- Sensor box
- Sensor

- Power supply
- Signals
- HF-signals (Microwaves)
- Power supply Motor
Particle Size Analysis (PSA)
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Technical Data:

Measurement range:
Particle Size 30 - 6000 µm, Velocity 0.01 - 50 m/s

Materials
316L SS for In-line probe, Sapphire, epoxy resin optics
Pressure-cast aluminium for electronics enclosure

Data rate:
Up to 10,000 particles per second, dependent on process conditions

Max Operating Pressure
4 bar

Operating Temp
-20°C to 130°C at measuring point, -10°C to 60°C on housing

Dimensions
Tube length = 280 mm (11 in), Tube diameter = 25 mm (1 in)

Air Supply
adjustable air flow meters, Pulse flow with adjustable timer or continuous air, Flow Requires instrument grade compressed air

Maximum cable length:
100 m
Particle Size Analysis (PSA)
Test Data: PS Reuter West, Berlin

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MECONTROL Coal Measurement with Feedersignal and Particlesize Distribution

Massflow [t/h]

Particle Frequency [%]

Sum Burner 1-4 [t/h] Feeder [t/h] > 200 µm [%] 90 - 200 µm [%] < 90 µm [%]
Air/Gas Flow Measurement

Strength is hot dusty applications
Time of flight (no pressure or temperature)
No calibration, no pressure drop
Very small amount of particulate required (5-10 mg/Nm³)
With no particulate emitter installed upstream of sensor
Solid stainless steel sensor rods, on-line installation
Average velocity over sensor length
Accurate (within 2%)
No influence from fouling & erosion
Each measurement requires 2 sensors 14” apart
Much less inflow length (2-3 diameters)
Central measurement cabinet for multiple applications
**MECONTROL Air/FG**

**Measurement Principle**

- **Air Duct or Pipe**
- **Sensor 1** $X(t)$
- **Sensor 2** $Y(t) = X(t-T)$
- **Signal Sensor 1**
- **Signal Sensor 2**
- **“Signature”**
- **“Correlation”**
- **Optimum of correlation** $T = 26$ ms

**Example**
- $S = 54$ cm
- $T = 26$ ms
- $w = 20.8$ m/s (average velocity of the air)

**Figure:**
- Air mass flow: 8.5 Kg/s
- Cross correlation
- Distance of the two sensors: 54 cm
  - Measured velocity: 20.77 m/s
  - Previously measured velocity with Prandtl's pitot tube: 20.52 m/s
Emitter
Contact Information

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