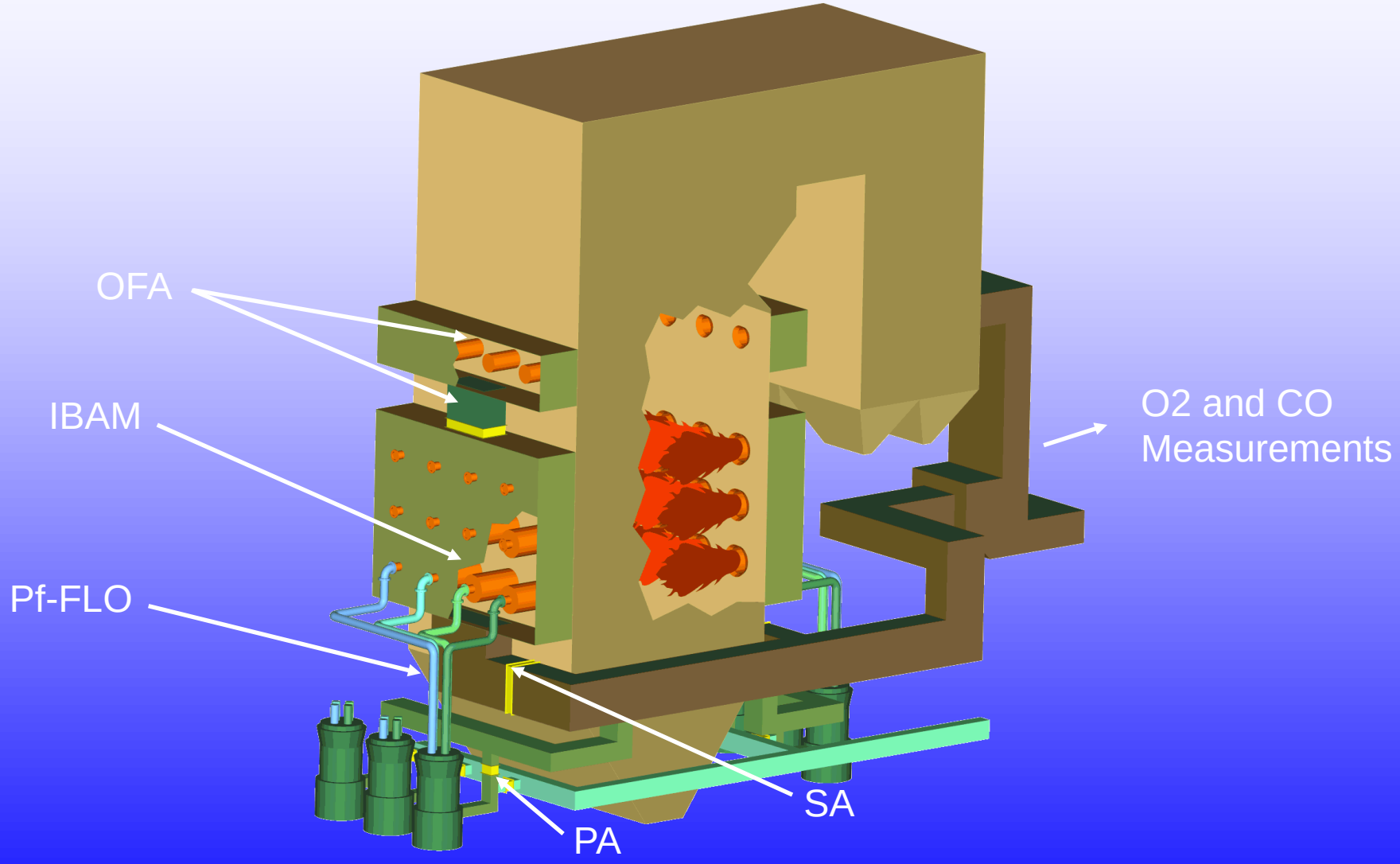
AIR MONITOR
POWER DIVISION

DELTA
Measurement & Combustion Controls

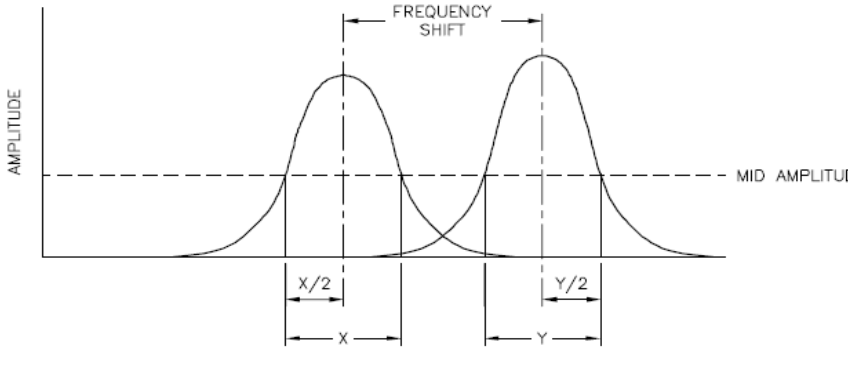
COMBUSTION
cleaner burning coal solutions TECHNOLOGIES

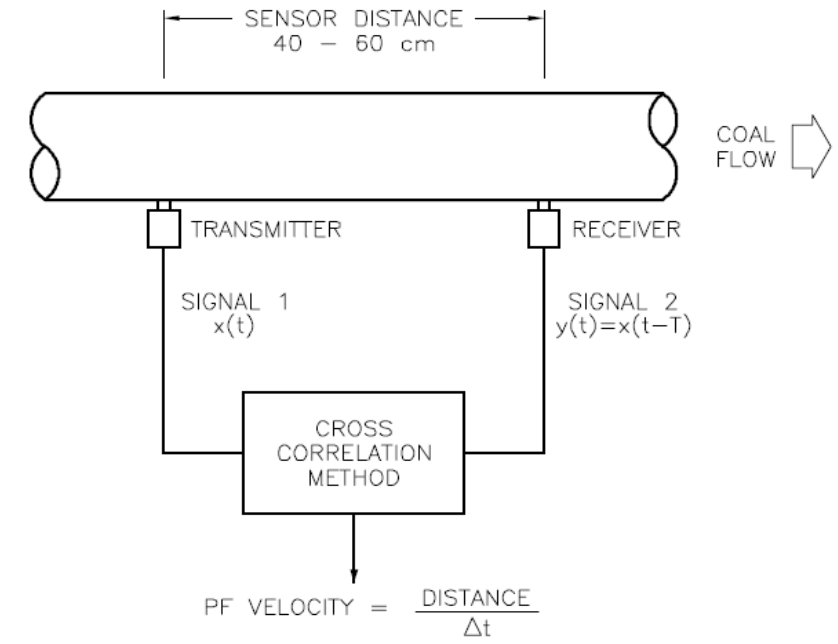
Instrumentation used to perform continuous Fuel / Air trim on coal fired Power Boilers, and the benefits of an Online Extractive CO/O2 Grid.

Continuous Combustion Management (CCM) is measurement and control of parameters previously ignored that are critical to efficiency and emissions reduction

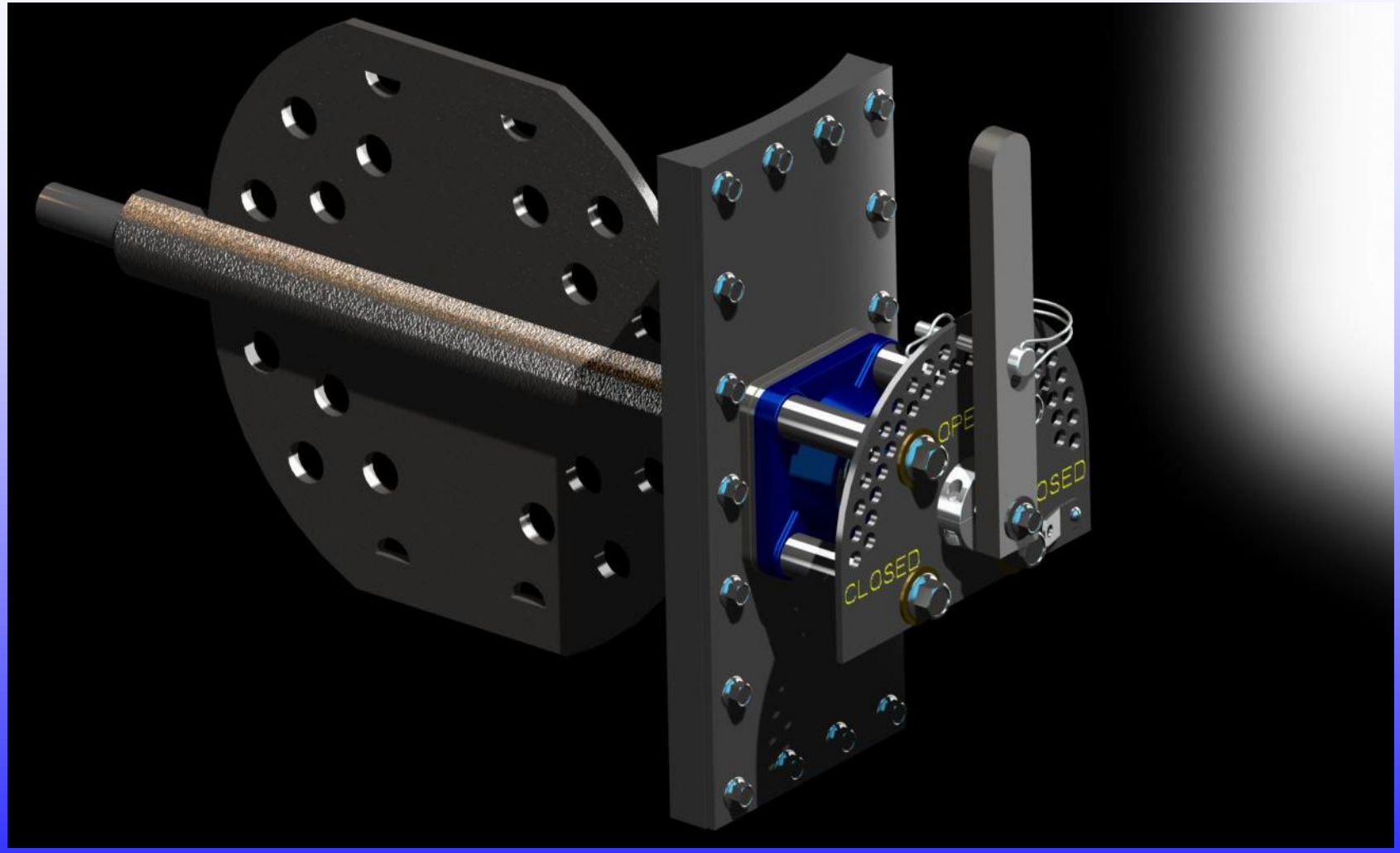


Accurate, Continuous, Real Time Coal Flow and Velocity Measurement

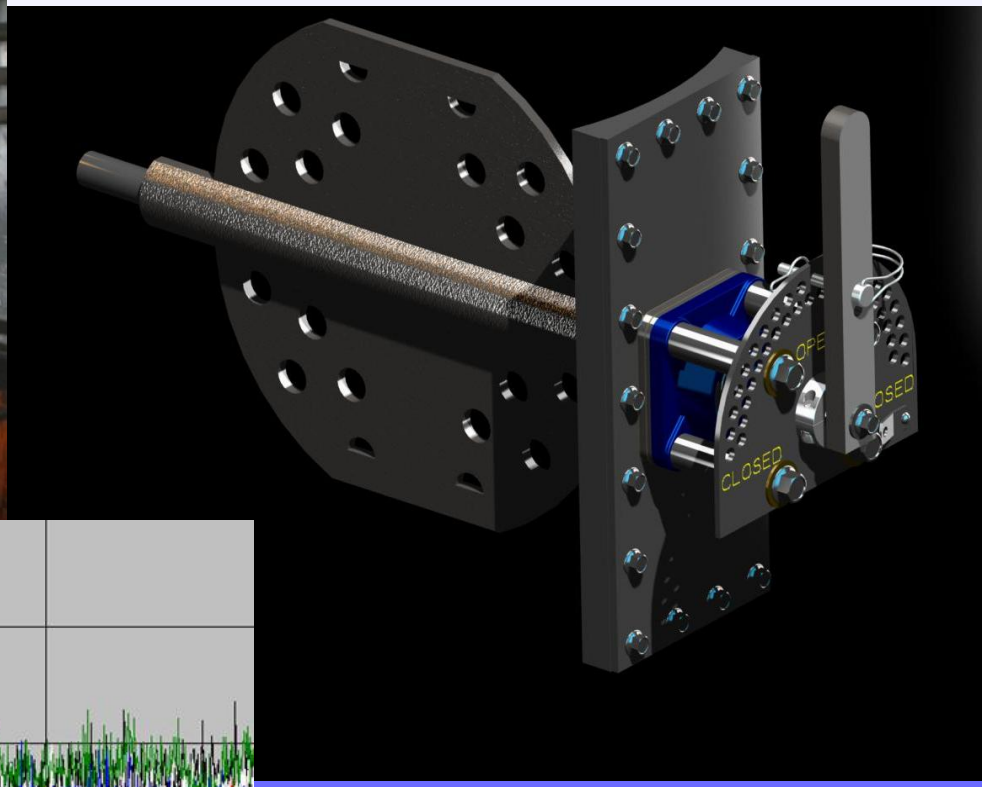


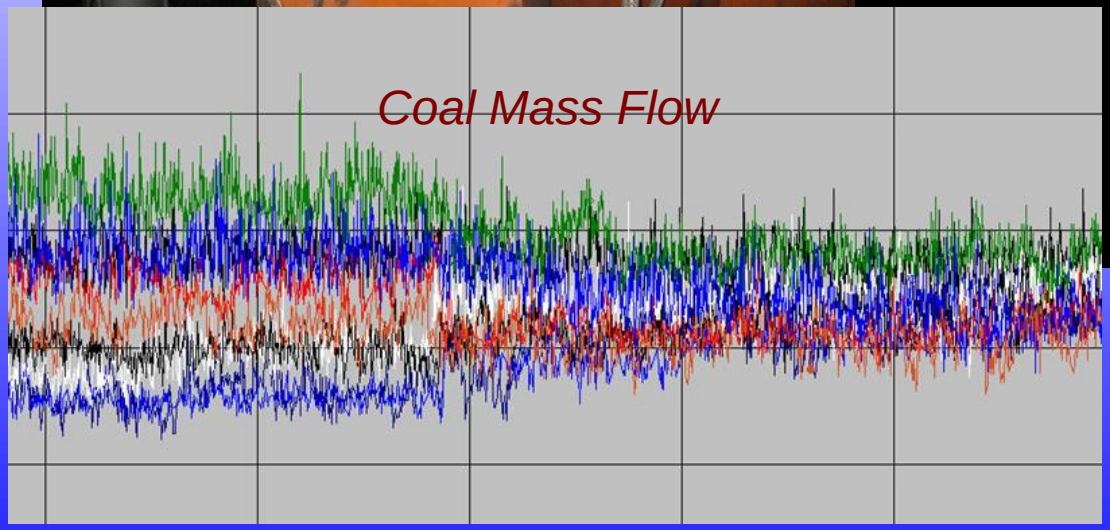


Adjustable Diffusing Coal Valves for Control to the Burners

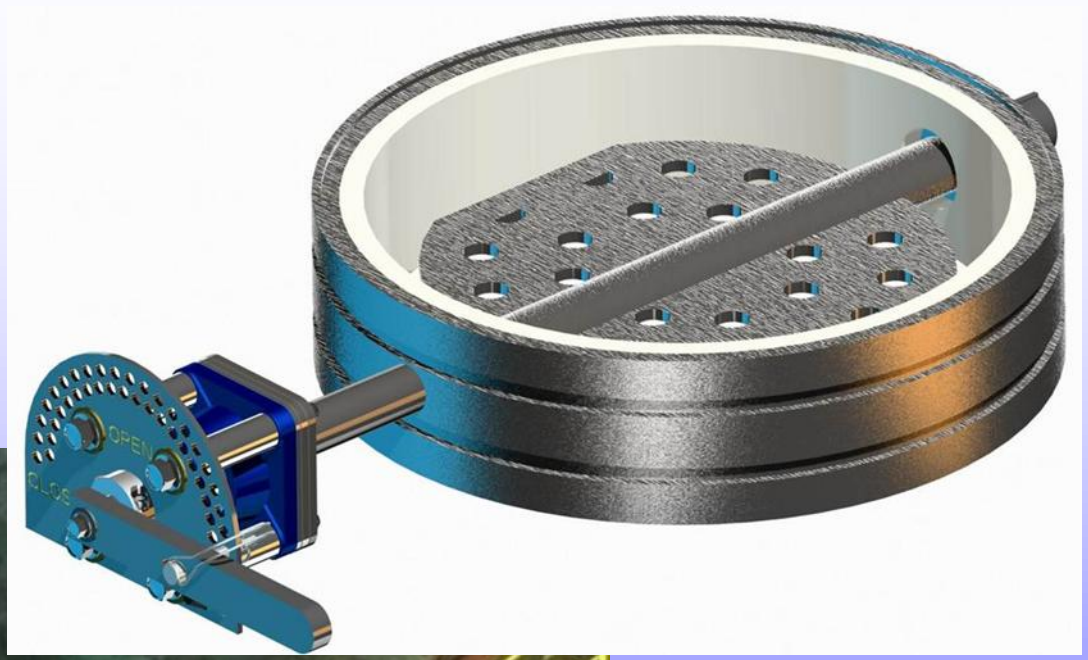


Coal Flow Balancing

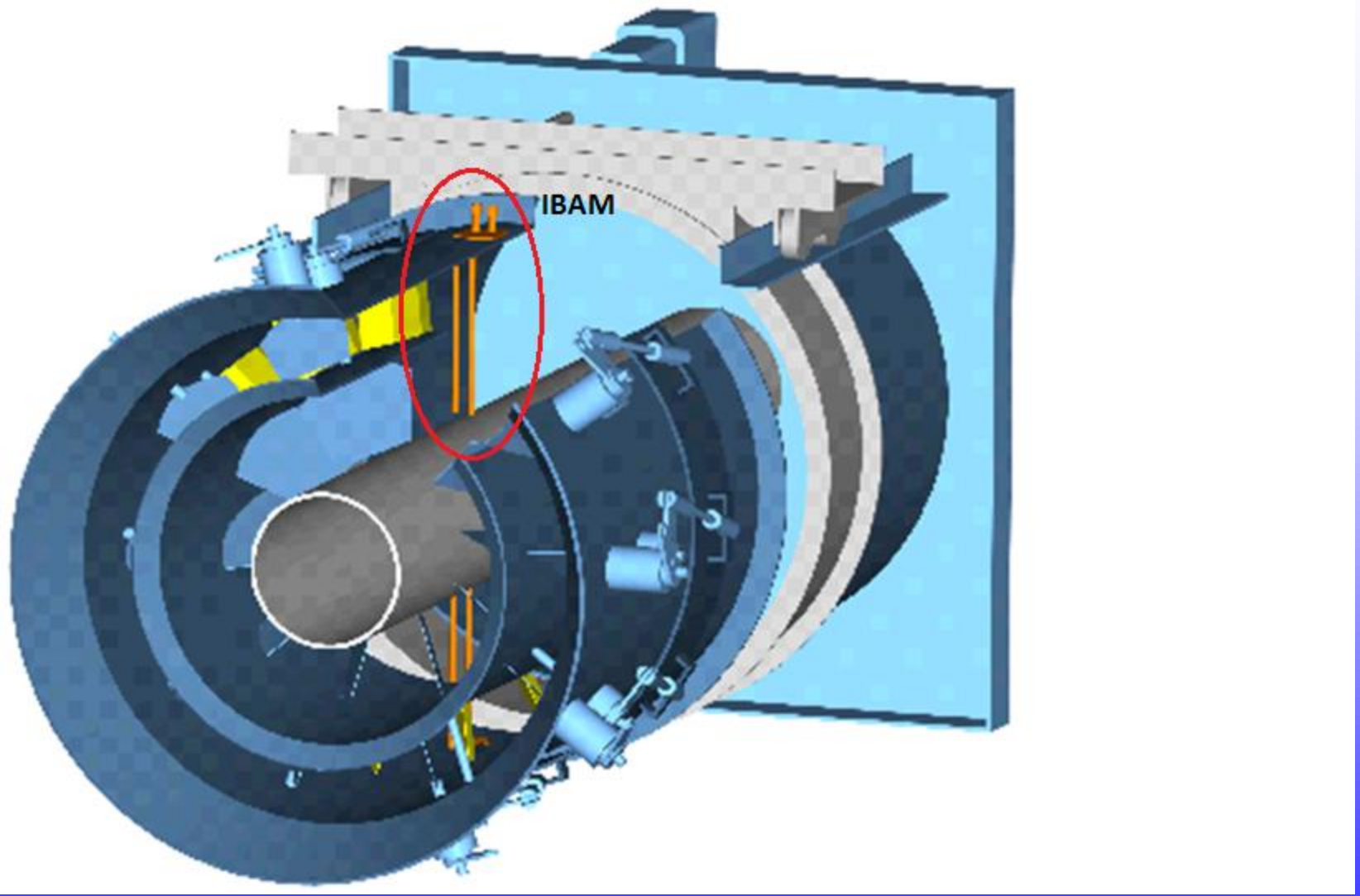




Adjustable Valves for Riffles



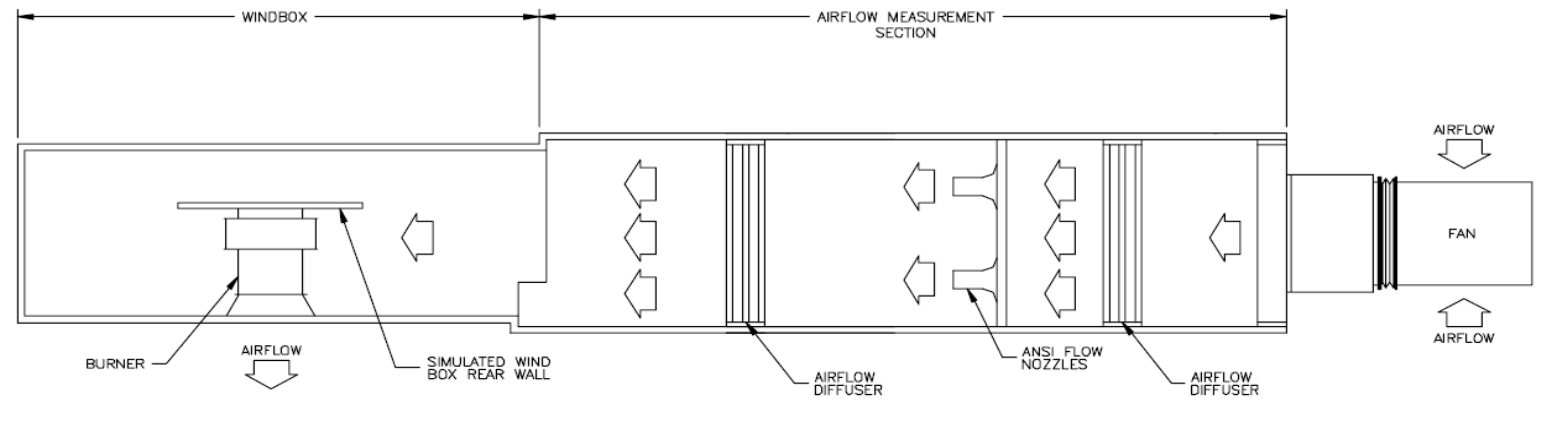
Individual Burner Airflow - IBAM



IBAM
Individual Burner Airflow Measurement

Secondary Air Measurement

- **Wind Tunnel Testing at Air Monitor HQ**



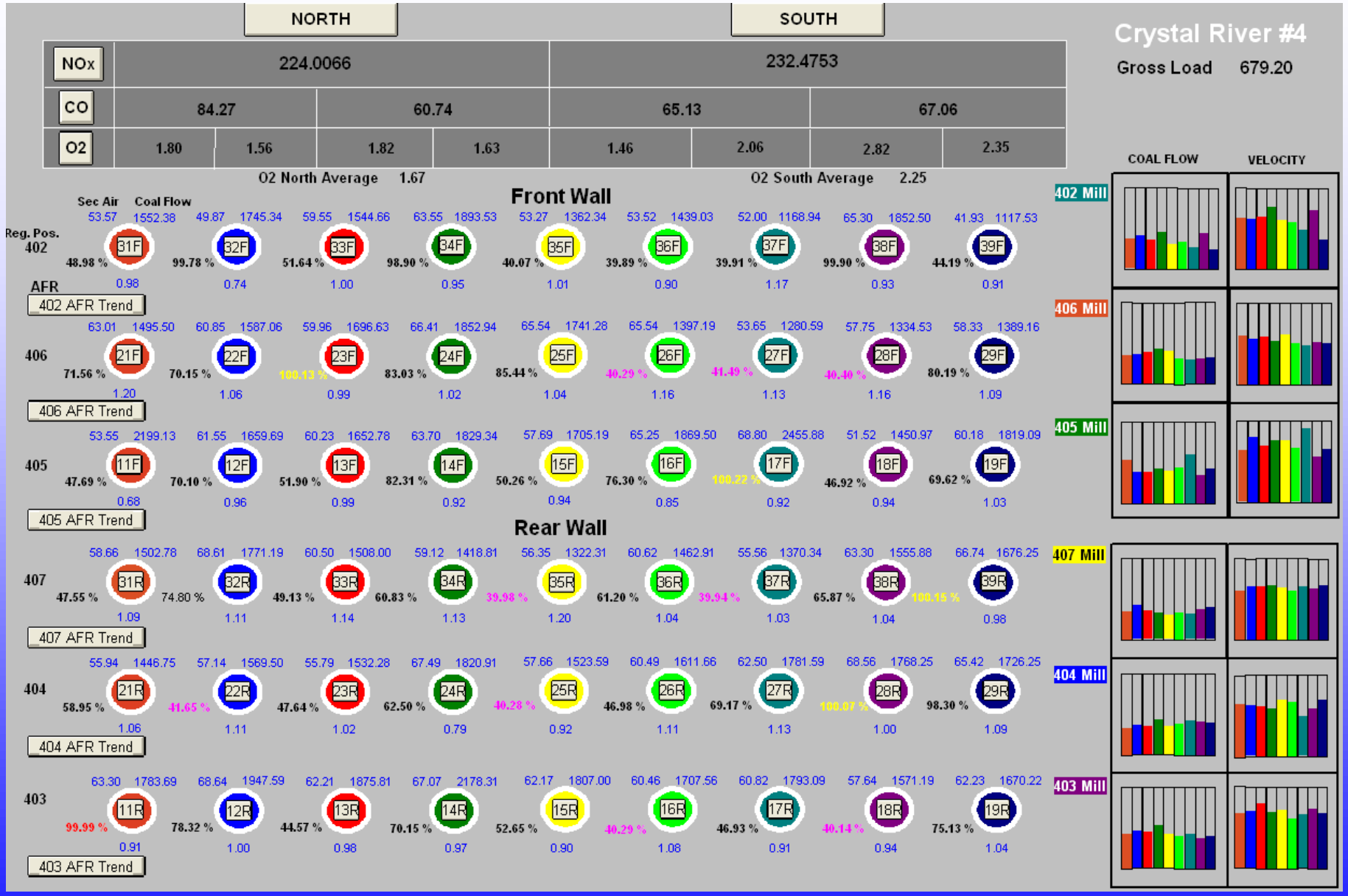
Equation 2: Inner Vane Position - 15° Open, Outer Vane Position - 55° Open

$$\text{Coefficient} = 0.0000335938 * x^4 - 0.0013321146 * x^3 + 0.0179408814 * x^2 - 0.0886535541 * x + 0.8467944546$$

Equation 3: Inner Vane Position - 15° Open, Outer Vane Position - 60° Open

$$\text{Coefficient} = 0.0000718750 * x^4 - 0.0025442917 * x^3 + 0.0314481881 * x^2 - 0.1504645772 * x + 0.9413919352$$

Air / Fuel Ratio Control - Dashboard



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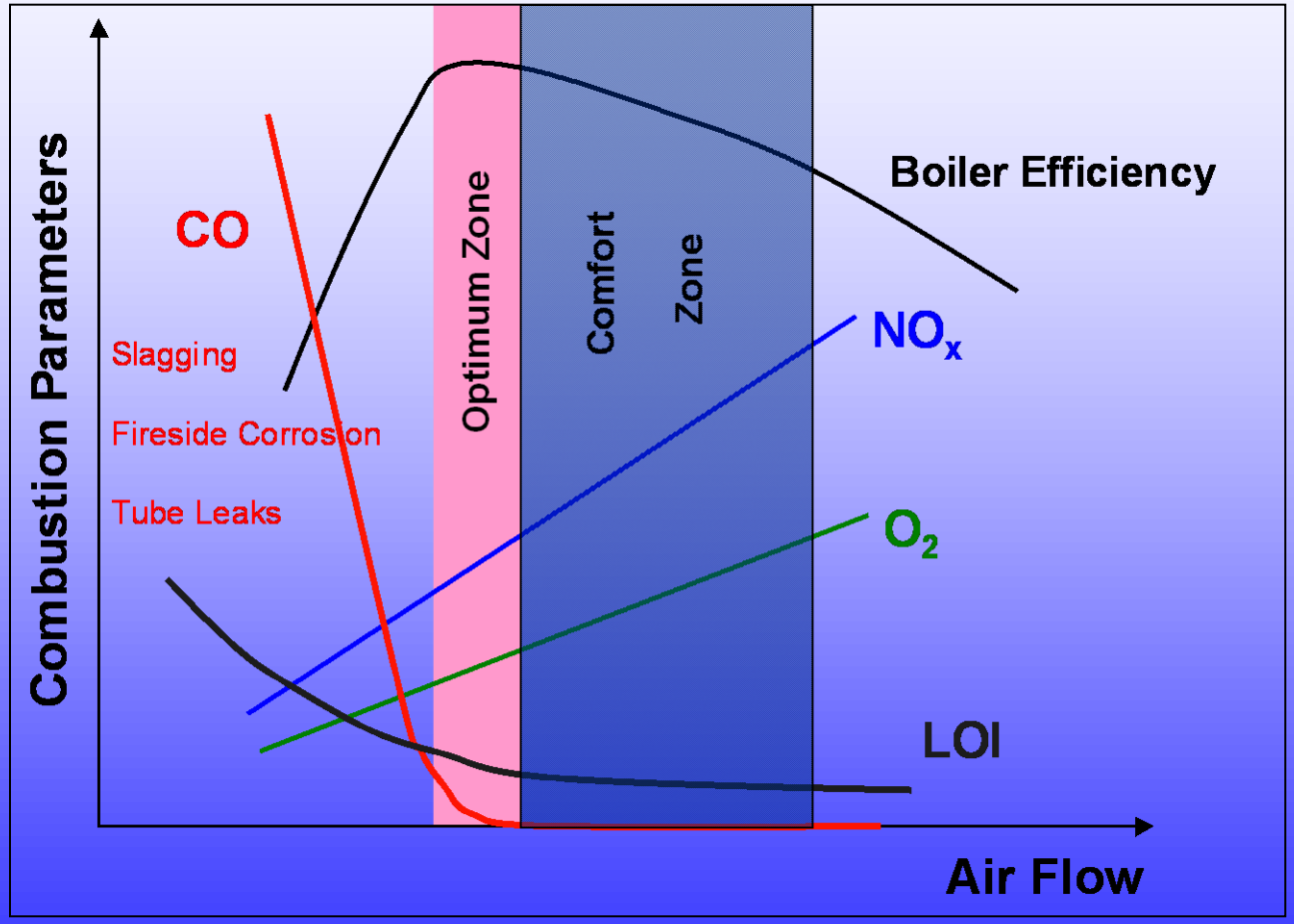
Optimize Combustion Using CO



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Combined CO and O2 Measurement

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Why Delta CO ?

DMCC – CO Monitor Is Designed for Power Plants

Resistant to latent ash

- Probe purge purges the probe and flushes sample line
- Sintered filter at probe head

Multiple (3) stages of moisture and water vapor separation

Continuously, automatically zeroes the non-dispersive infrared analyzer.

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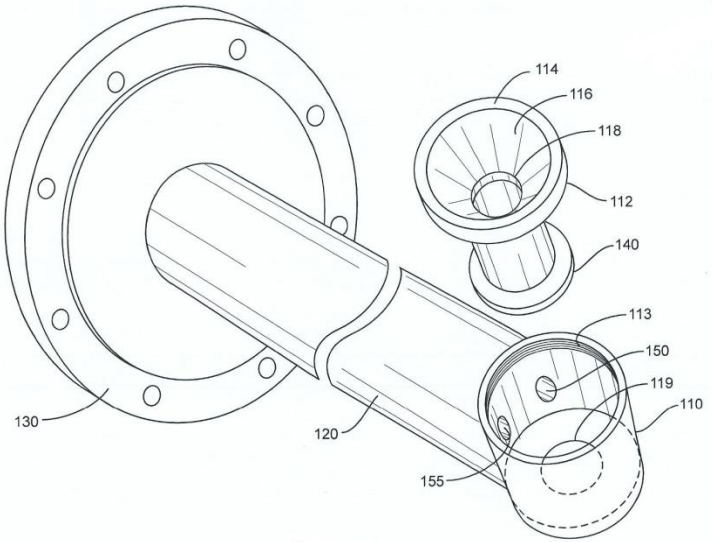
Probe Features

Patented " Extractive Venturi " Designed to keep ash out, Sintered Hastelloy filtration makes it last.



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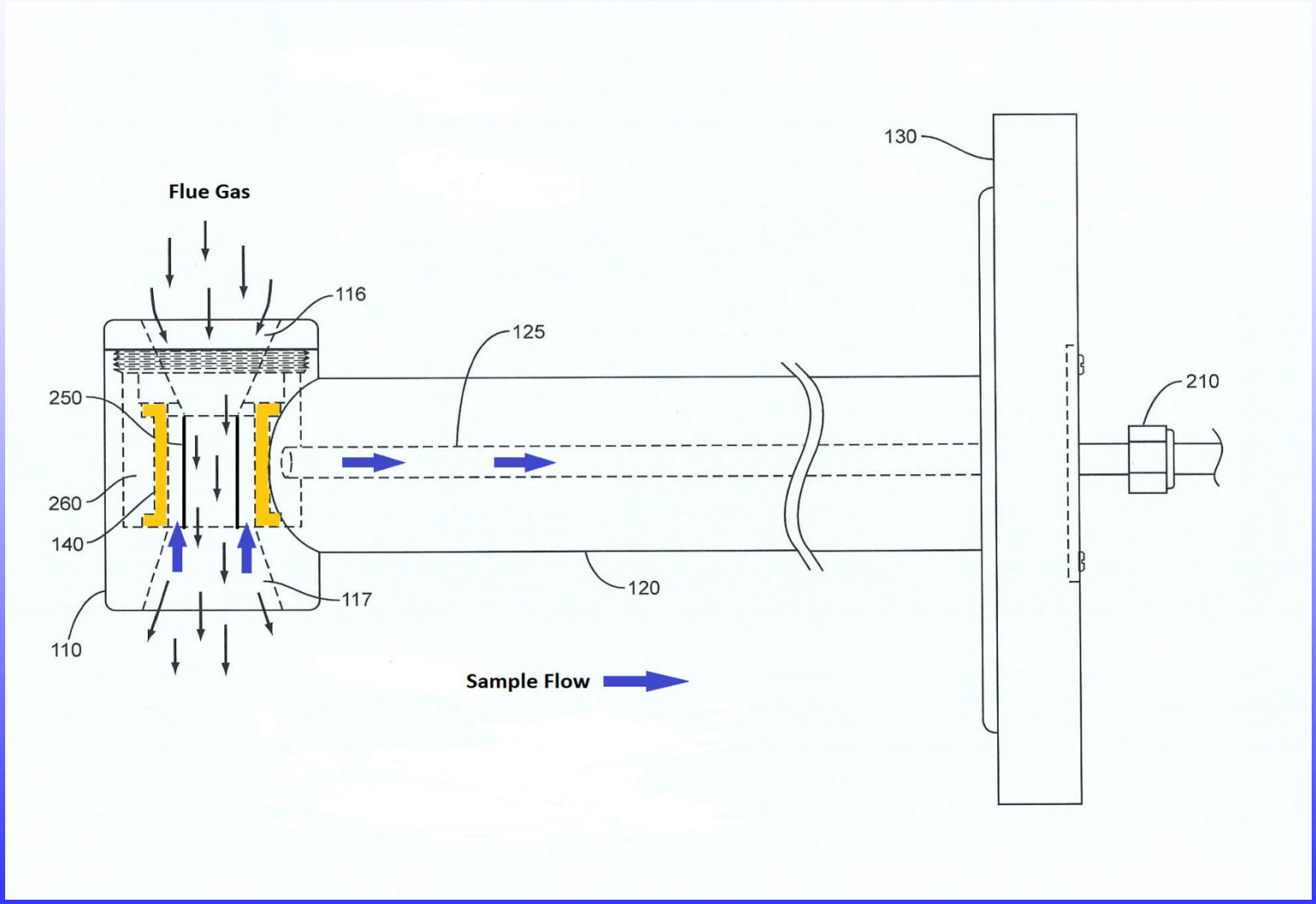
PROBE - Venturi Design, and Slip Stream (Inertia) effect, reduces ash contact with sintered filter



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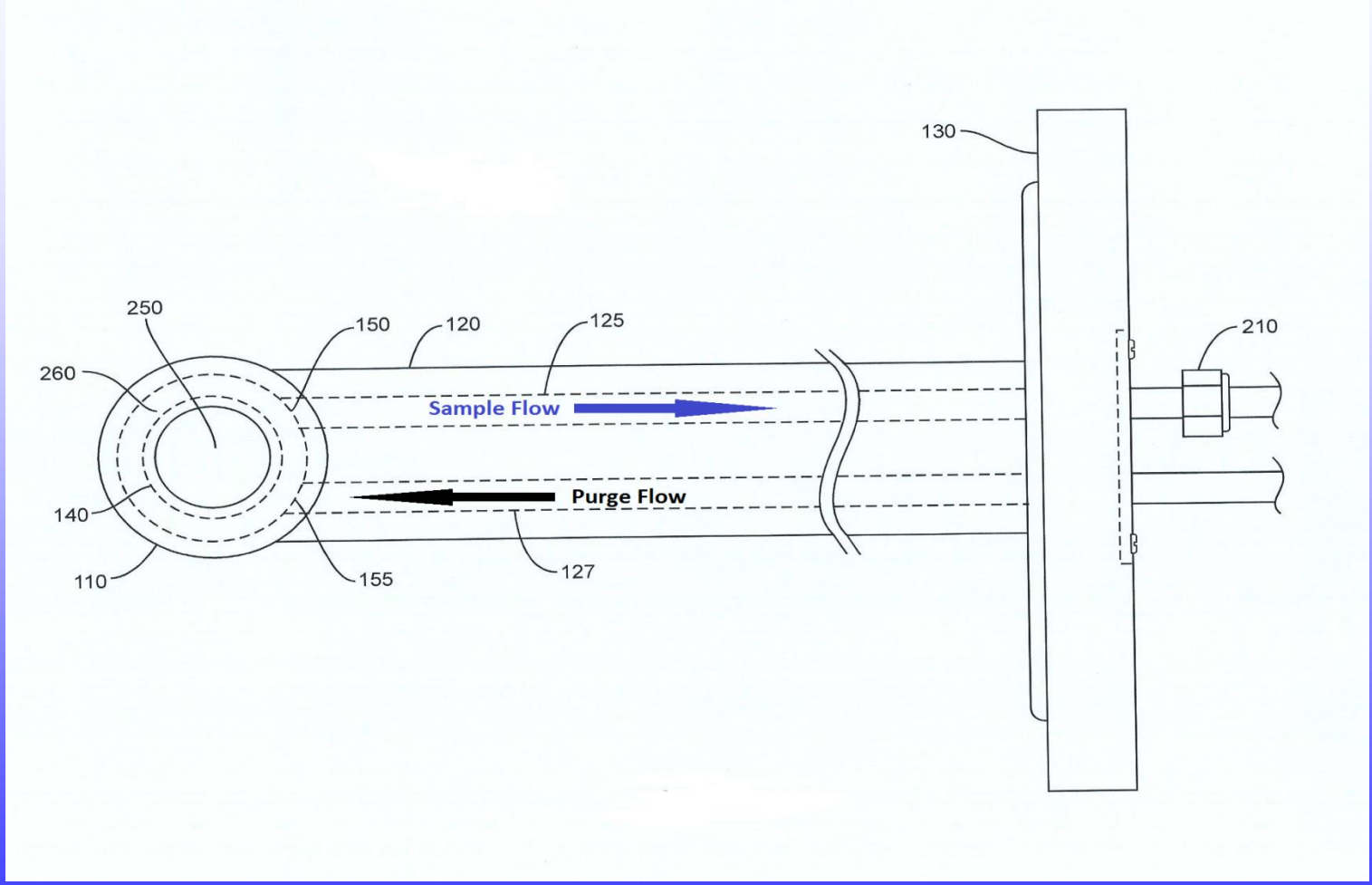
Separate Sample and Purge Lines, ensures lines and sintered filter are kept clean.



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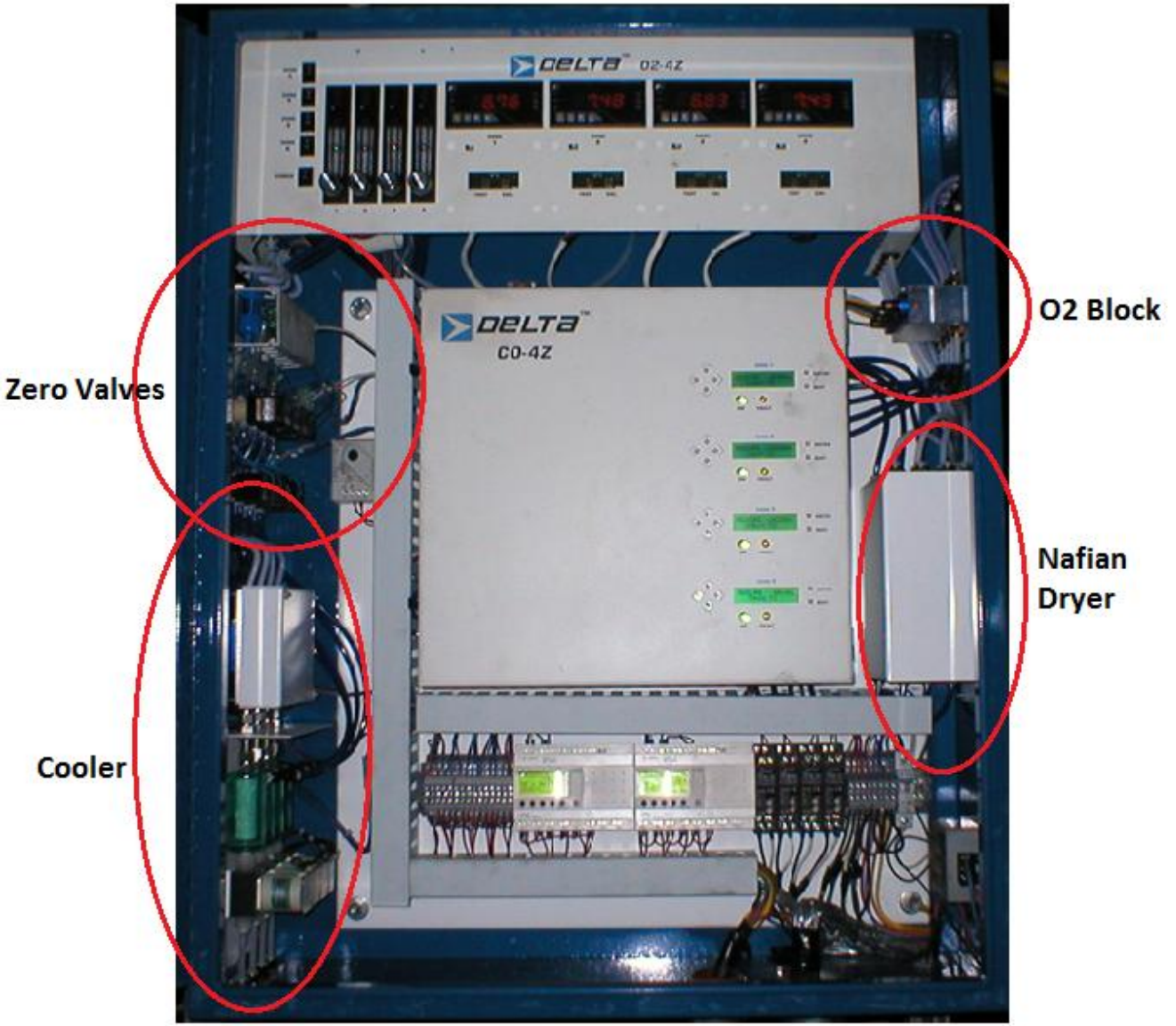
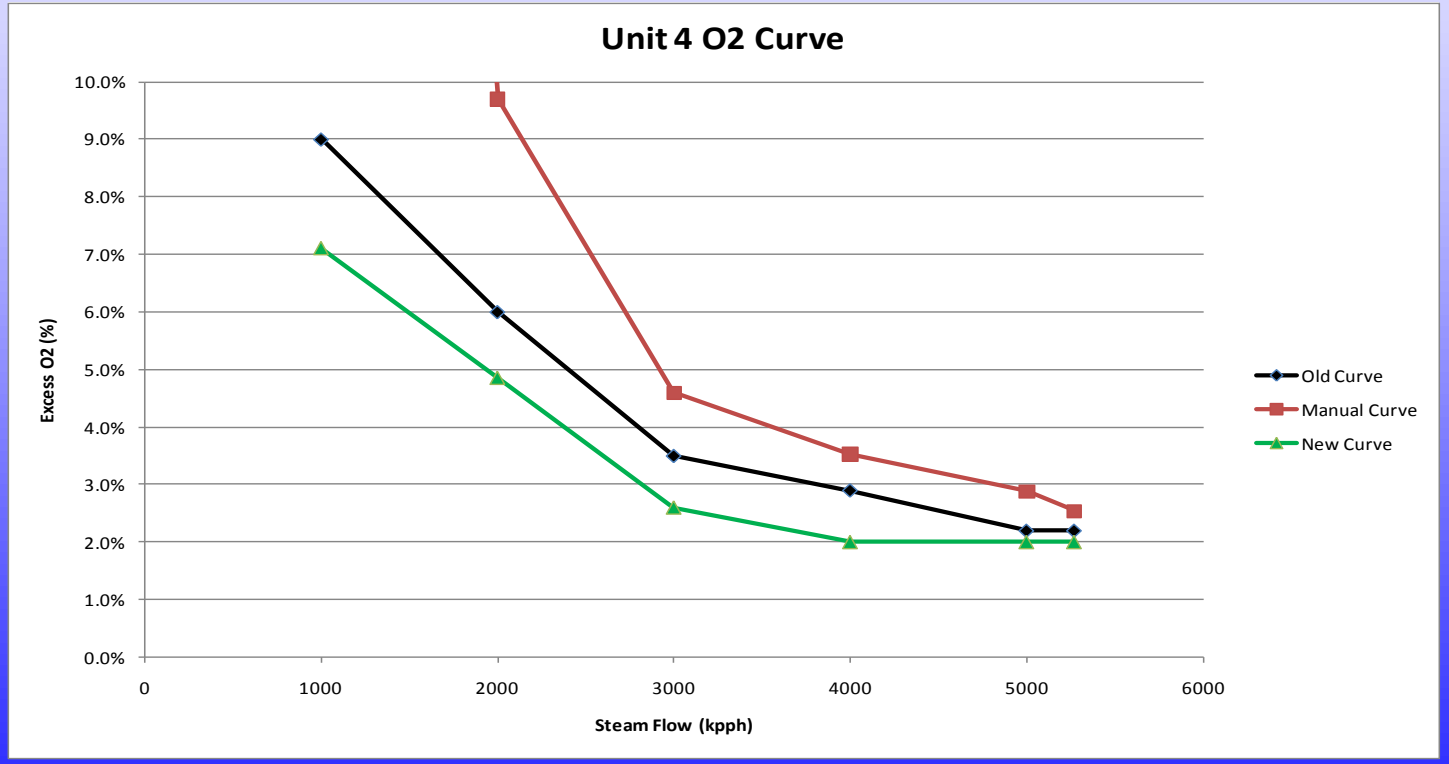
Multi-Points in Common Enclosure

"4-Pack" Model

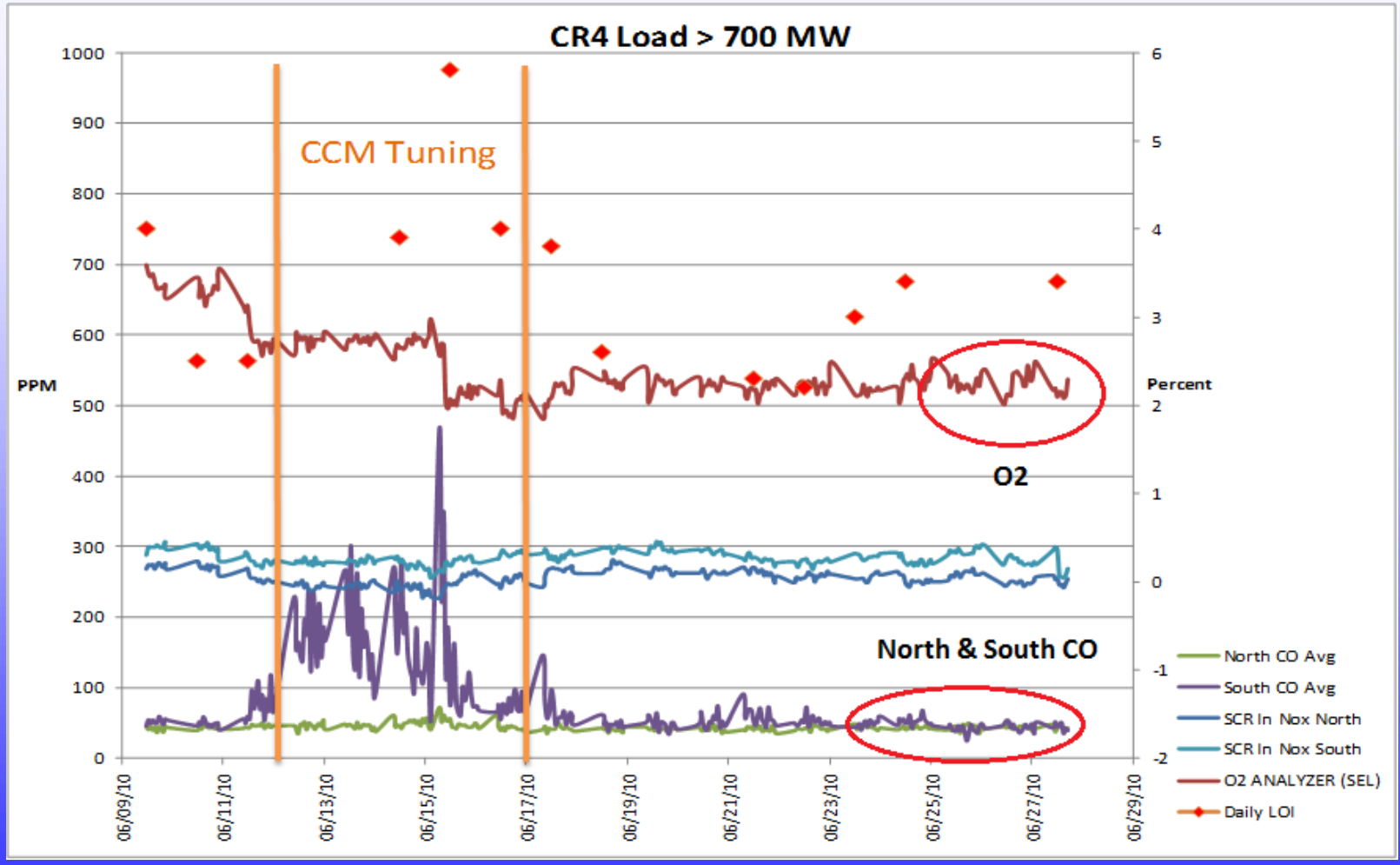


Reduce O2

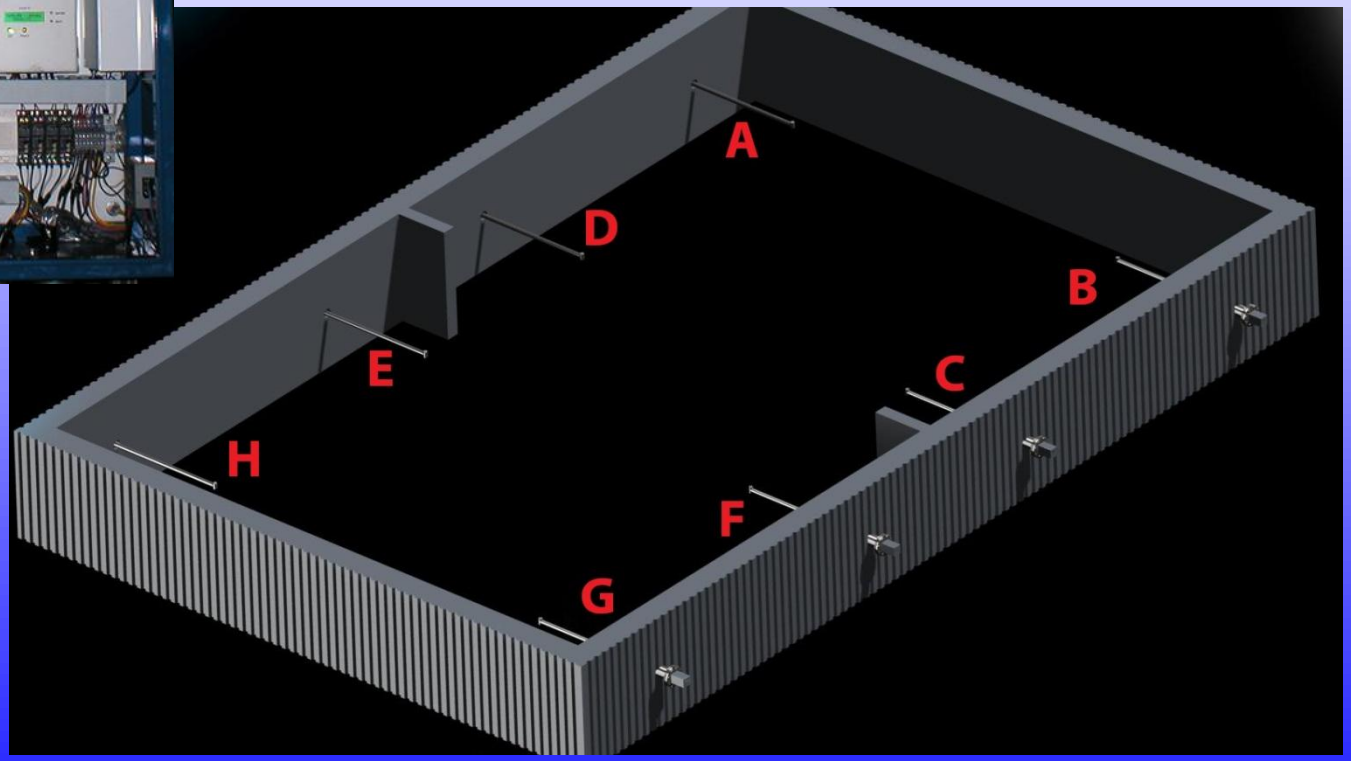
- LOI benefits
- Nox benfits
- Efficiency benefits



CCM Tuning


CR4 Load > 700 MW
CCM Tuning
O2
North & South CO
PPM
Percent
1000
900
800
700
600
500
400
300
200
100
0
6
5
4
3
2
1
0
-1
-2
06/09/10
06/11/10
06/13/10
06/15/10
06/17/10
06/19/10
06/21/10
06/23/10
06/25/10
06/27/10
06/29/10
North CO Avg
South CO Avg
SCR In Nox North
SCR In Nox South
O2 ANALYZER (SEL)
Daily LOI

CO / O2 Grid on a T-Fired Unit



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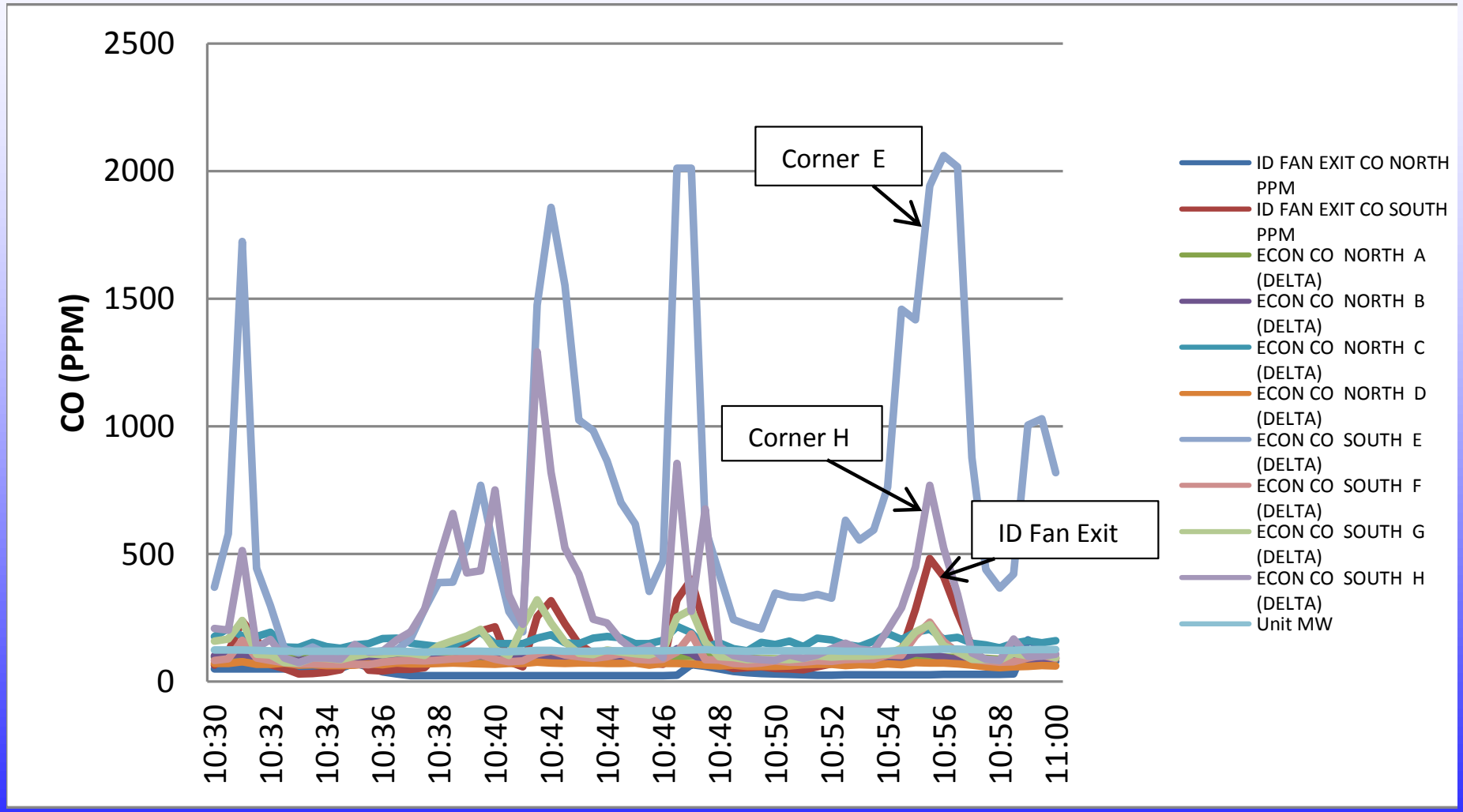
Locate WHERE CO is being produced



CCM Benefits

- Reduced emissions
- Improved Efficiency
- Reduced (SCR) Ammonia Consumption
- Reduced LOI
- Reduced pulverizer wear
- Reduced wear on Coal Yard equipment.
- Reduced boiler tube & non-pressure part erosion due to lower flue gas velocities. Less Fan required.
- Improved ESP performance due to lower flue gas velocities.
- Reduced potential for slagging and fouling events
- Improved Pressure part life due to improved temperature profile
- Reduced ash disposal costs
- Reduced boiler tube failures due to reducing atmospheres