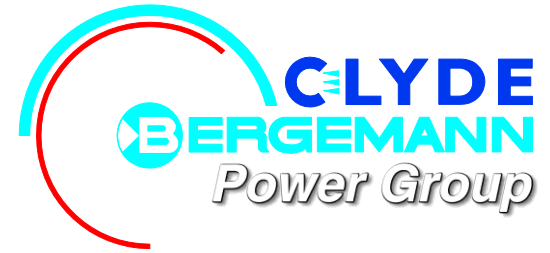


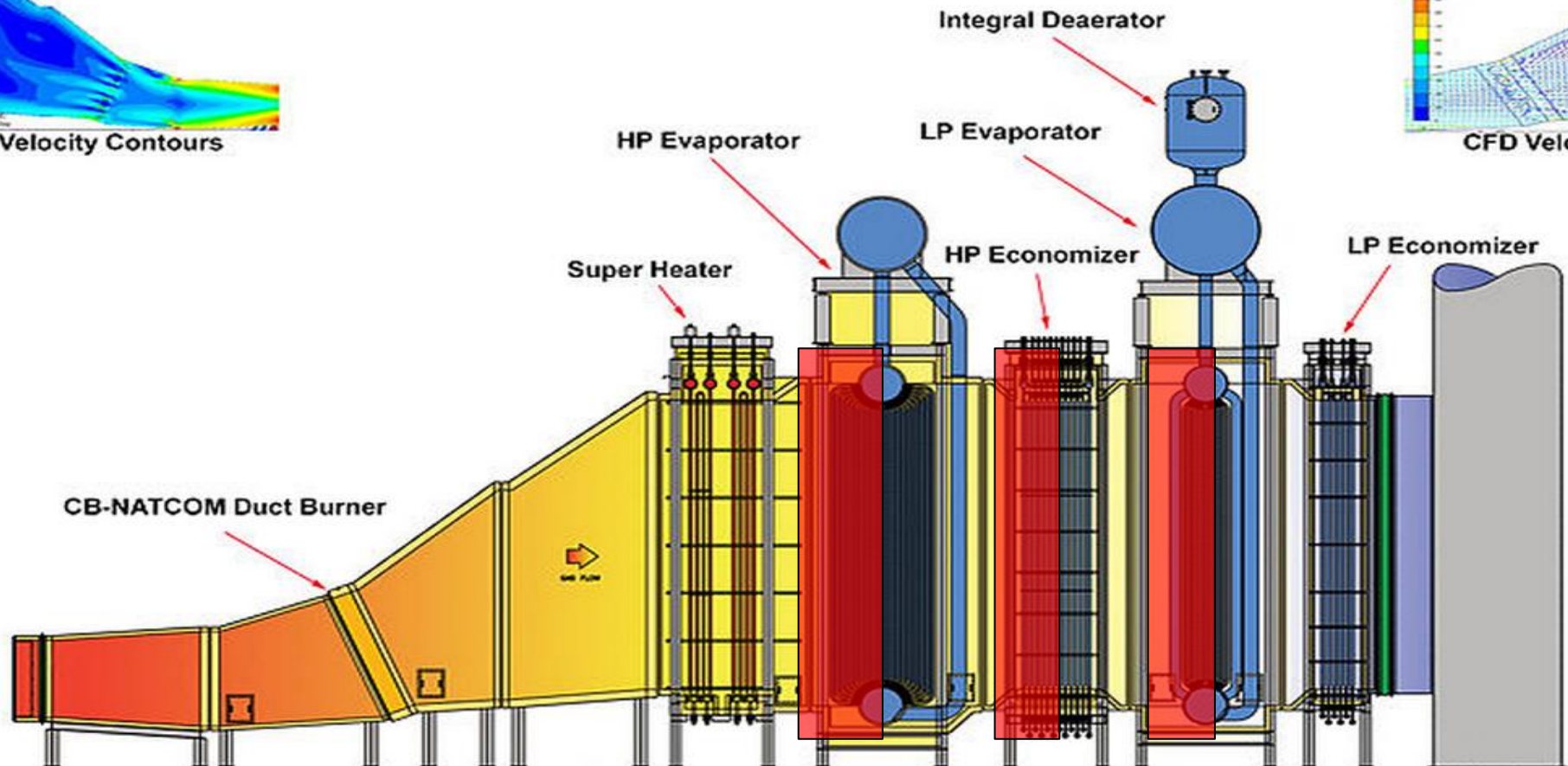
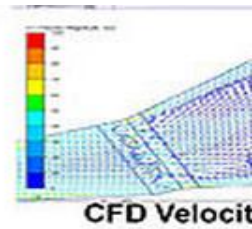
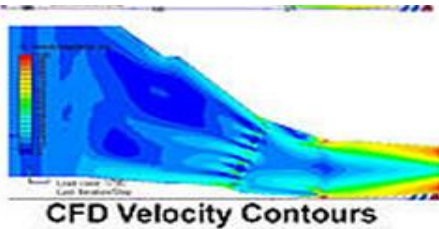
Effective On Load Cleanliness Control and Flue Gas Handling Techniques for HRSG Operation



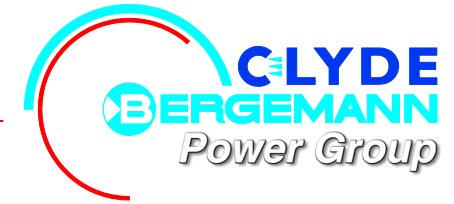
HRSG Cleanliness Control

Gas Side Fouling

- Areas typically susceptible to heavy fouling:
 - ➔ Sudden change in tube spacing
 - ➔ Sudden change in flue gas velocity
 - ➔ Entrance of the GB Section finned tube sections



The Importance of Sootblowers

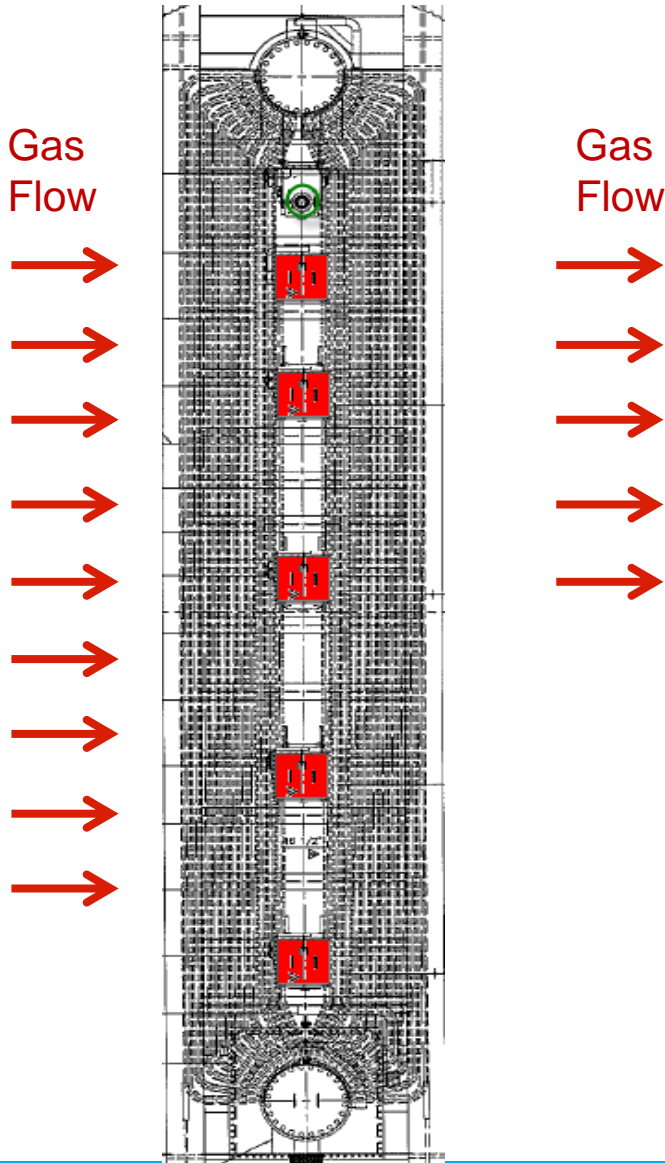


- When sootblowers fail to operate effectively, the results include:
 - ➔ Lost heat transfer and efficiency
 - ➔ Increased maintenance costs
 - ➔ Unscheduled outages
 - ➔ Inefficient operation
 - ➔ Lost revenue

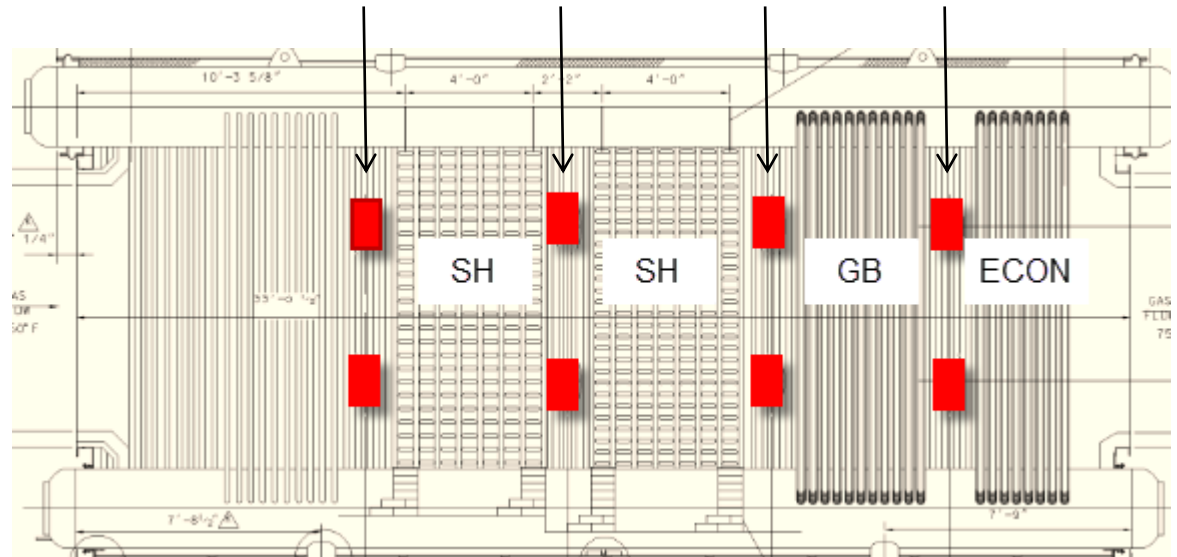


Examples of Sootblower Arrangements

Mid Section



Flue Gas Leading Edge



On Load Cleaning Devices

- US Retractable Sootblower

- Pros

- Effective cleaning (cleaning radius up to 8 feet)
- Low maintenance cost
- Easy maintenance (more space and service openings)

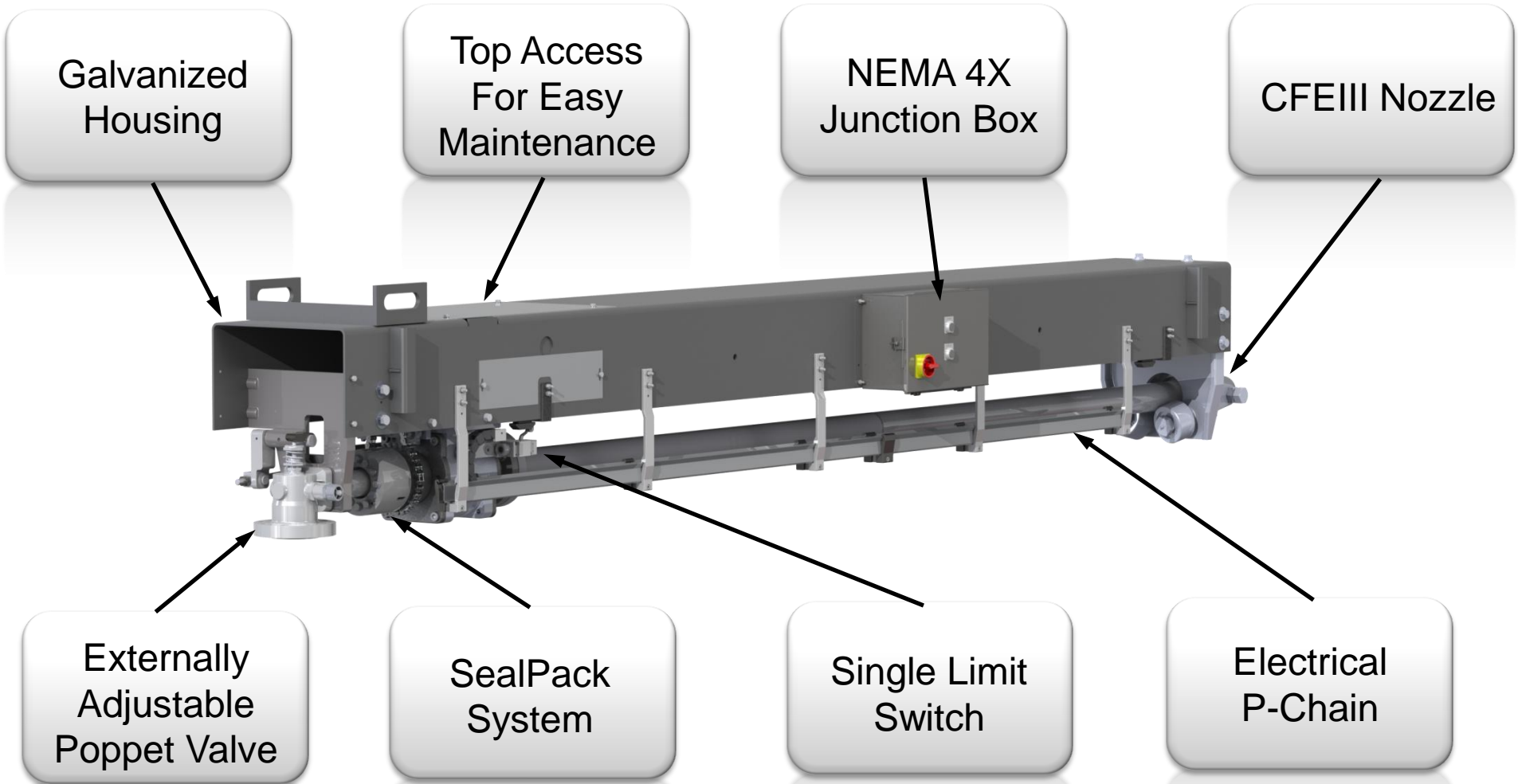
- Cons

- Need space outside of the boiler (roughly travel + 6')



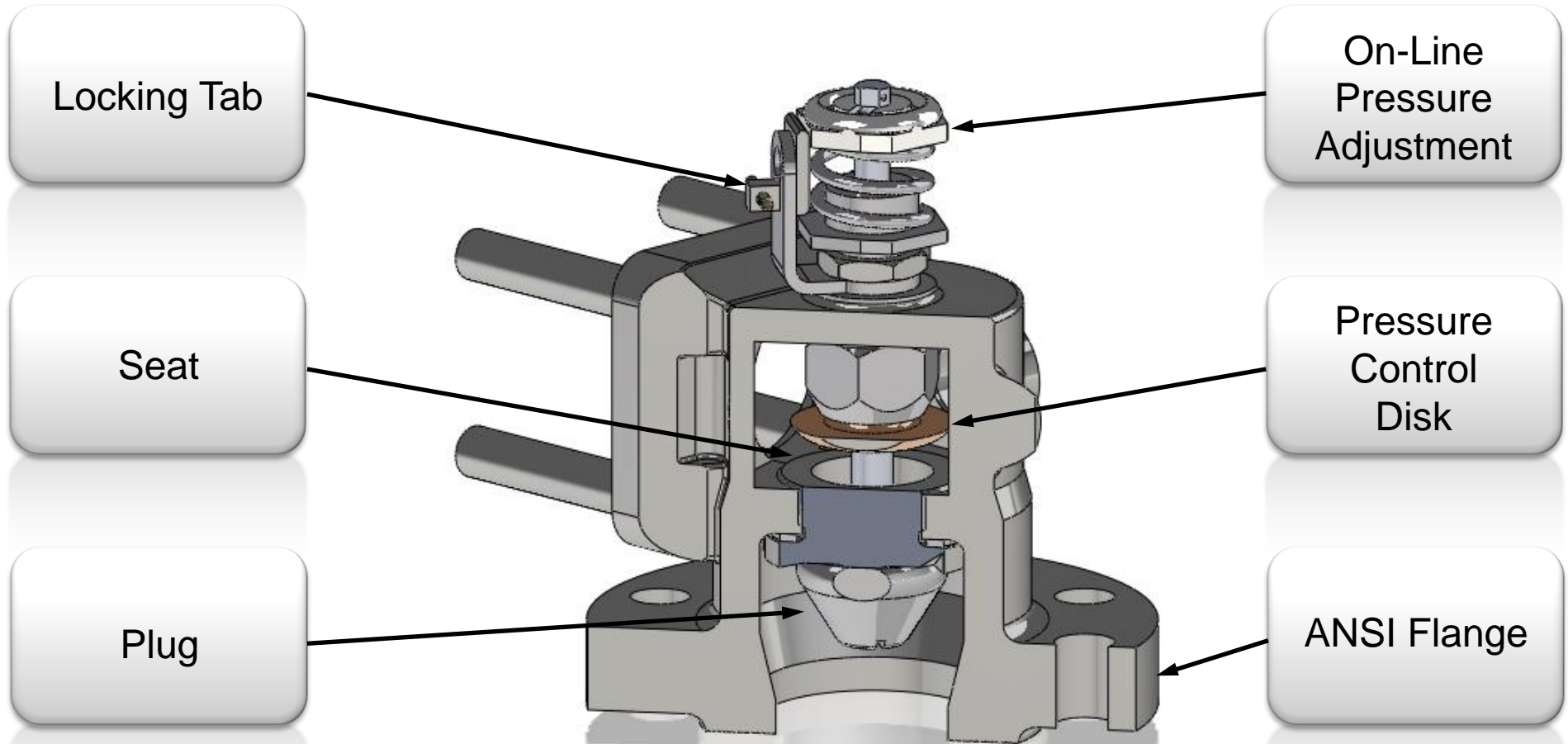
On Load Cleaning Devices

US Retract



On Load Cleaning Devices

US Poppet Valve



On Load Cleaning Devices

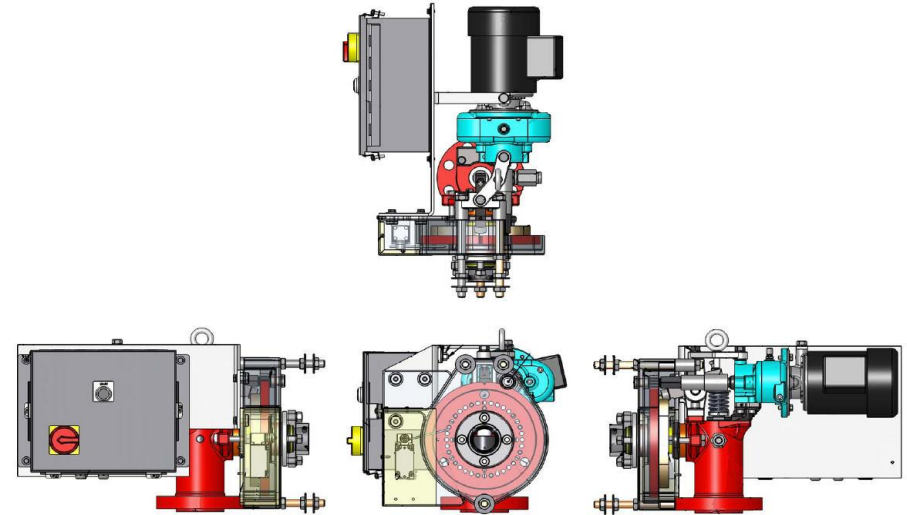
● D5E Rotary Sootblower

→ Pros

- Lower initial investment cost
- Minimal clearance requirement

→ Cons

- Light cleaning with moderate cleaning coverage
- Not too effective with dense tube spacing, finned tubes, and heavy fouling.

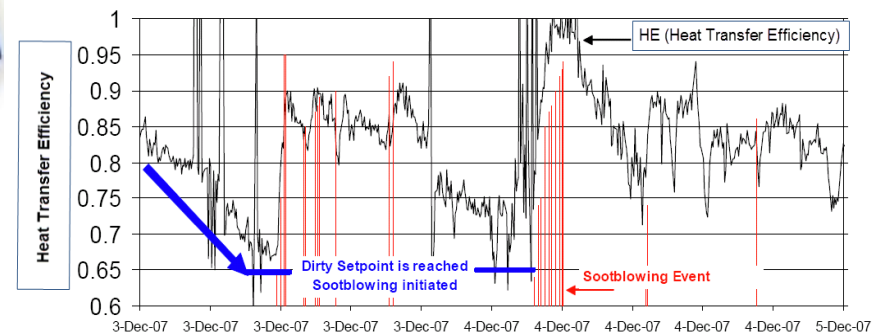




- Execute required cleaning strategy

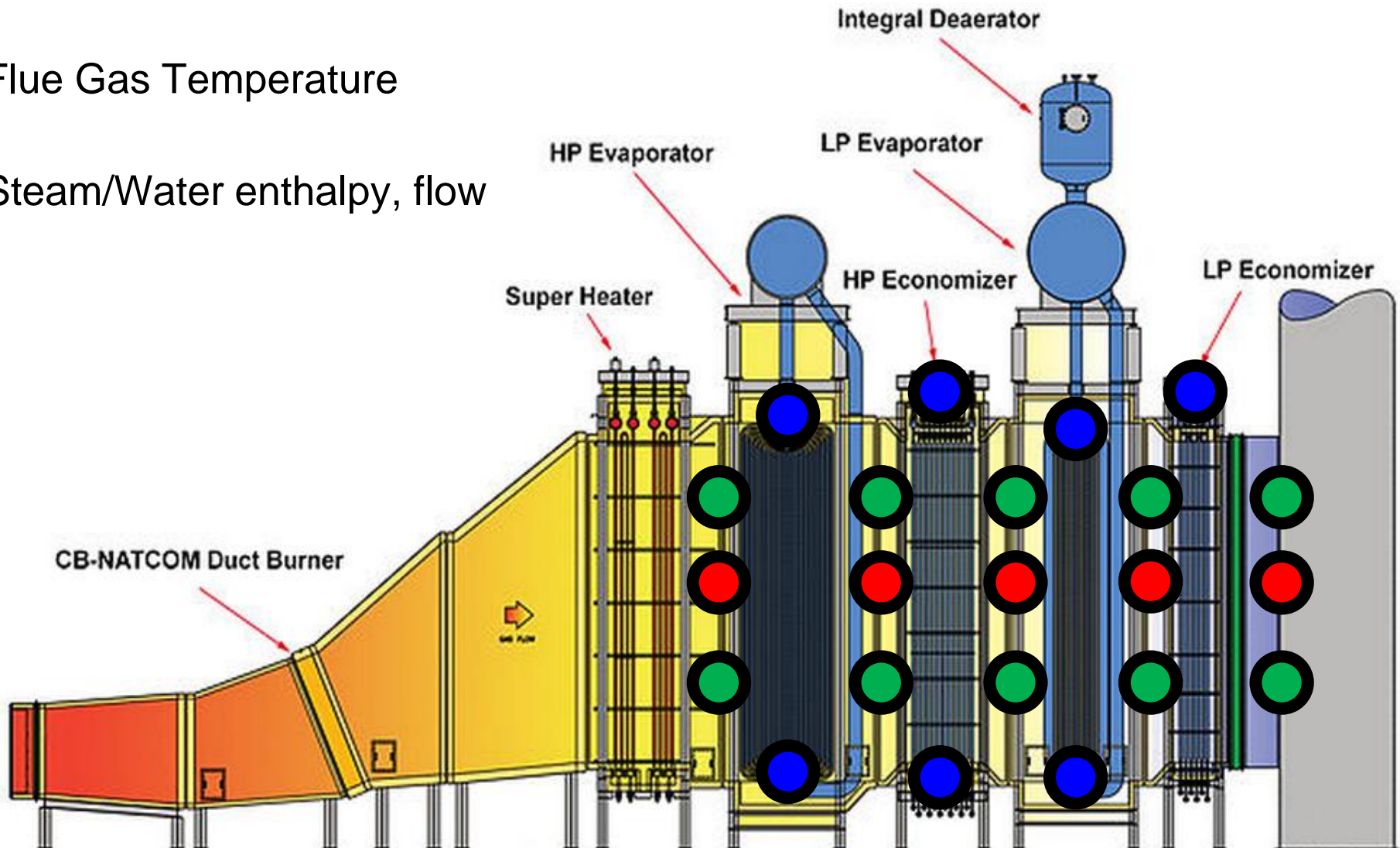
- Determine accumulation rate
- Determine required cleaning intensity

- Thermodynamic Model
- Flue Gas Draft Pressures



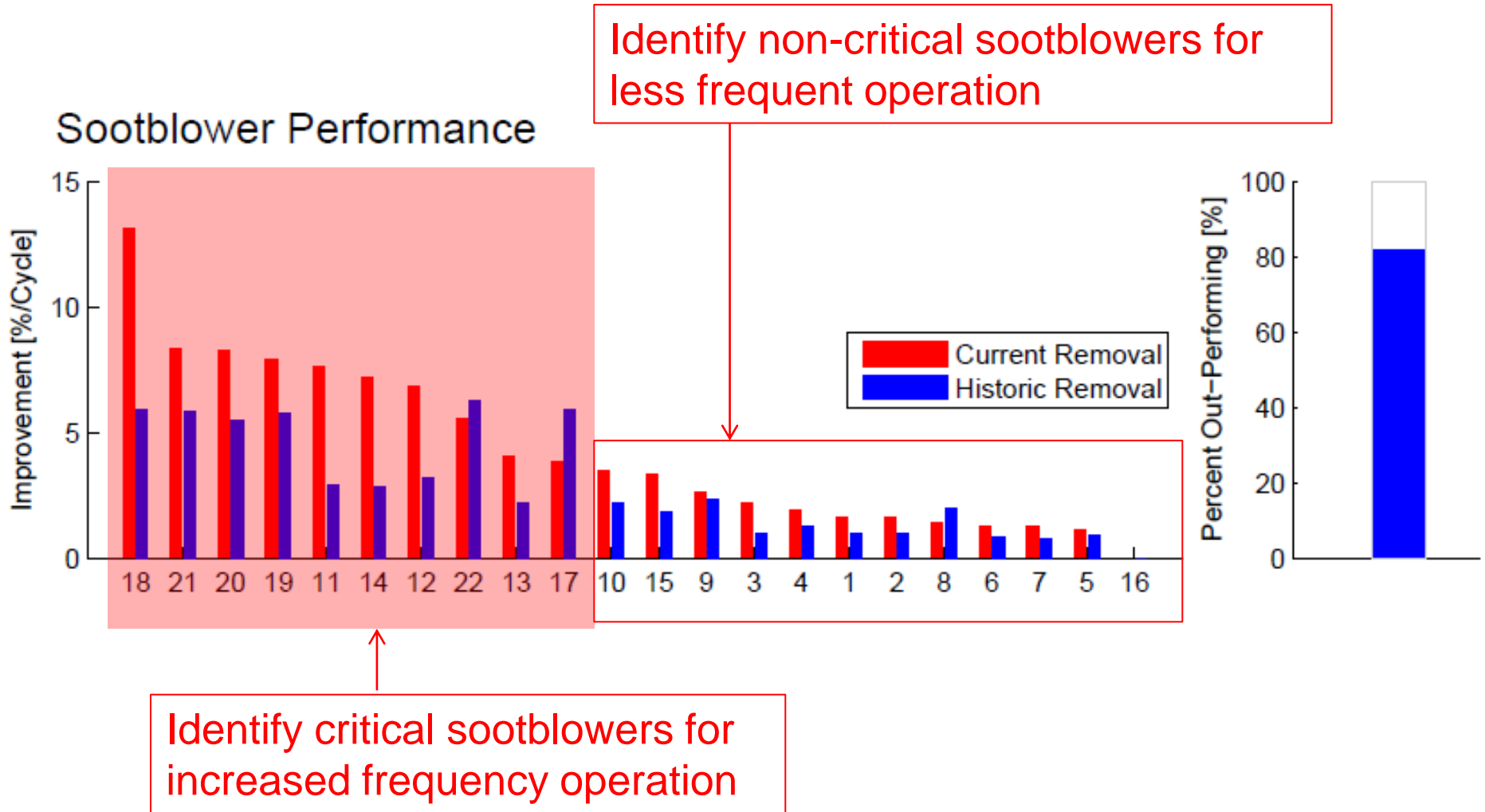
Dynamic Cleaning Optimization Boiler Feedback

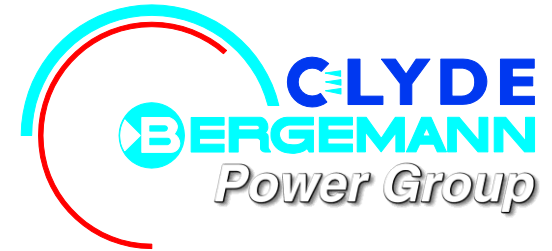
- Flue Gas Draft Pressure
- Flue Gas Temperature
- Steam/Water enthalpy, flow



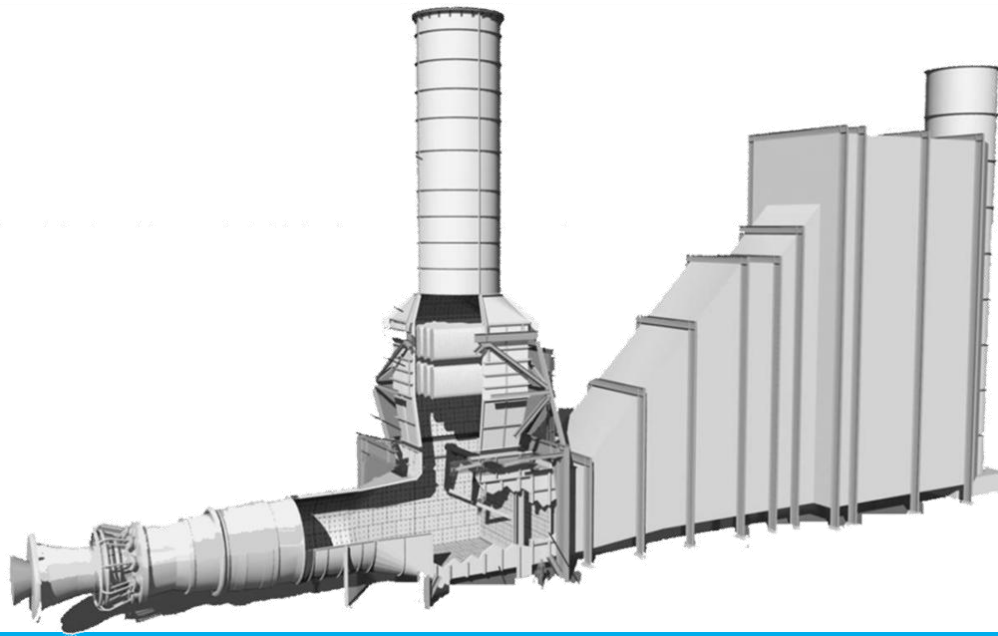
Dynamic Cleaning Optimization

SMART Clean Process





HRSG Flue Gas Handling



AGH Product Locations: Gas-Fired Power Plant



GAS-FIRED STATION
Simple Cycle and Combined Cycle



- Diffusers, Transitions, and Ducting
- Diverters/Dampers
- Expansion Joints
- Exhaust Stacks
- Stack Dampers
- Silencers

