

# ADDRESSING OPERATING CHALLENGES OF EXISTING AQCSs



**Babcock Power**  
ENVIRONMENTAL

a Babcock Power Inc. company

With dispatch requirements resulting from changing generation portfolios, coal-fired generating units are facing challenges running their Air Quality Control System (AQCS) to meet emissions regulations. Maintaining flue gas and temperature distribution is important to maintain permitted emissions and the marketability of fly ash and byproduct with the minimization of reagent feed and wastewater purge. The keys to addressing these challenges are a comprehensive understanding of the design and operation of the equipment, as well as technology and expertise to resolve these issues. Original Equipment Manufacturers (OEMs) that supply boiler and AQCS systems understand the entire process and its impact and can partner up with owners to find the best solutions to these challenges.

## Operating Challenges

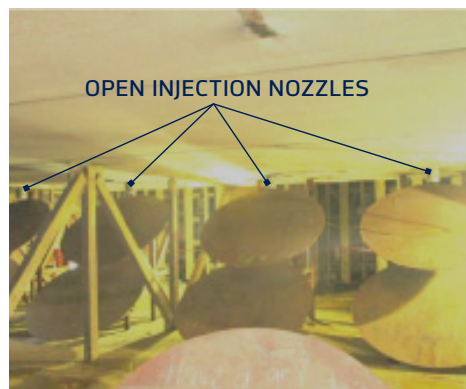
- Maintaining emissions at lower loads and through constant load swings
- Optimizing operation with variable fuels including gas and coal/gas blends
- Maintaining/increasing reliability with fewer outages
- Eliminating Process Safety Management (PSM) programs if staff is limited
- Understanding and evaluating entire process and impacts of changes across entire process systems

## IMPROVED MIXING BENEFITS

- Reduce effects of unit firing & flow configurations
- Homogenous mixing
  - Flow
  - Temperature
  - Reagent
  - Ash
  - NH<sub>3</sub>/NO<sub>x</sub> ratio
- Eliminate variability upstream of ammonia or sorbent injection
- Maintain ash entrainment and distribution
- Maintain mixing at reduced load operation
- Optimize air heater operation
- Reduce pressure drop/power consumption
- Maintain ash & byproduct marketability
- Optimize removal and reagent consumption at reduced loads
- Eliminate corrosion issues



Original AIG: 40 Risers & 720 Nozzles



Upgrade: 8 Risers & 8 Nozzles with Mixers



### Approach

The first step to address these challenges is to improve distribution of flue gas, ammonia and sorbents. For Selective Catalytic Reduction (SCR), poor mixing results in high NOx emissions, high ammonia slip, ammonium bisulfate formation, particulate accumulation, higher pressure drop if additional catalyst is required, and low load restrictions due to poor temperature distribution.

Maintaining distribution of ammonia is often not enough to optimize SCR operation. Tuning the ammonia injection system at full load and one fuel condition is not adequate at reduced loads or other fuel conditions. Removing mal-distribution upstream of ammonia injection has been demonstrated to be just as important to account for firing and draft system variations. In addition, replacing traditional ammonia injection systems with static mixers reduces the number of lances and injection nozzles required.

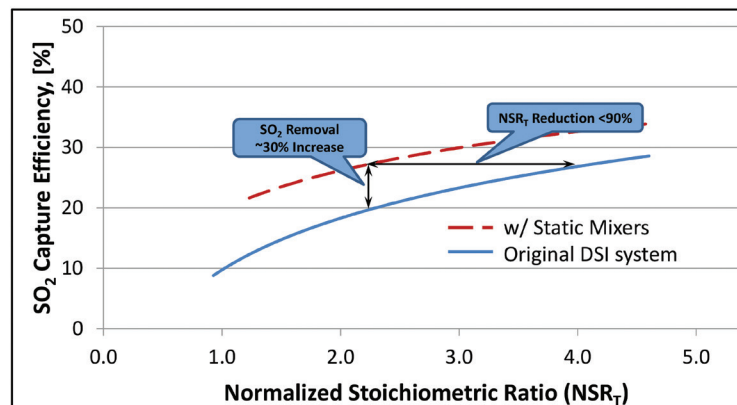
Flue Gas Desulfurization (FGD) mixing is completed in the reaction zone and is dependent on maximizing the contact of flue gas and reagent. Poor mixing results in high SO<sub>2</sub> emissions, particulate emissions, high reagent consumption, unmarketable byproduct, and higher power consumption and pressure drop.

To overcome the less dense spray pattern along the absorber perimeter in wet FGD systems, wall rings can be

installed on a couple of the spray levels in the absorber. Wall rings provide a physical barrier to re-direct the flue gas into the denser spray section. Maintaining flue gas and temperature distribution in dry FGD systems is critical to prevent spray hitting the absorber walls and causing corrosion and to maintain performance at reduced load conditions.

### UTILIZE BABCOCK POWER'S EXPERIENCE AS OEM

It is important to understand process and process impacts across the system to properly address the challenges facing utilities and meet future regulations. Original Equipment Manufacturers (OEMs) supplied the original technology and equipment based on the conditions at the time of installation. With changing conditions and a better understanding of operation, OEMs are best qualified to optimally evaluate the process and process impacts to provide the most cost-effective, environmentally responsible generation solutions available today. Detailed specifications are not required for this type of work and tend to be difficult and expensive to develop. Babcock Power understands the entire process and will partner in a collaborative fashion with the owner, will develop the solution from identification to installation that provides the best overall approach.



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