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FACT SHEET

STATE-OF-THE-ART INSPECTION TECHNOLOGIES

Impact of low NO_x modifications on reliability and heat rate

Our plant operation knowledge and low NO_x modification designs ensure cost-effective improvements to emissions, damage, and heat rate issues.

Potential Penalties

Addition of innovative low NO_x burner technology can often have unanticipated and undesirable side effects.

Boiler modifications that add low NO_x burners, in combination with overfire air ports and/or flue gas recirculation, result in significant changes to the heat flux distribution, gas temperatures, gas mass flow rate, furnace pressures, etc.

These modifications introduce new boiler damage mechanisms and will accelerate other mechanisms which, prior to the modifications, may not have been equipment life limiting.

Some of these damage mechanisms and other adverse impacts are briefly described below.

Departure from Nucleate Boiling (DNB)

Perhaps the most immediate and least understood threat to boiler reliability is this mechanism.

It is caused by the increased heat flux near the furnace exit in concert with high steam quality and low sized circulation ratio.

This damage mechanism usually occurs when the unit is running at or near its design capacity.

Accelerated Creep

The increased gas mass flow rates and gas temperature that are produced by increased furnace pressure and the staged combustion associated with overfire air ports and gas recirculation will increase the temperature of the steam-cooled tubing.

This increase in tube temperature will not produce immediate, short-term overheat failures, but will accelerate overheat/fireside wastage-type tube failures.

In addition, increases in steam temperatures in the primary superheat outlet header will accelerate header creep fatigue damage.

Heat Rate Effects

Increased superheater and reheater spray flows are generally a consequence of low NO_x modifications.

The increased flows (especially in the reheater) have a negative impact on heat rate and cycle efficiency.

Fireside Corrosion

Reducing combustion conditions associated with low NO_x modifications increase fireside corrosion of tubing.

Our Expertise

- State-of-the-art inspection technologies to detect problems
- Comprehensive models of boiler thermodynamics and damage mechanisms that are used to:
  - Predict modification impacts
  - Design corrective measures
- Practical engineers with detailed working knowledge of plant operation and low NO_x modification designs that can ensure cost-effective improvements to emissions, damage, and heat rate issues
- Design, implementation and evaluation of "damage-influencing boiler testing" including requirements for special instrumentation
- Proprietary and patented boiler tube assessment and life extension modifications
- A critical third party for review of design modifications

FOR MORE INFORMATION

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