

Fluidized Bed Boiler Tubes

Plant Specifications

- Produces 9 billion kilowatt-hours of electricity annually
- Consumes 12,000 tons of blended coal daily
- 10 coal fired boilers
- 160MW Unit 10 was the nations first commercial scale atmospheric fluidized bed combustion boiler
- Unit 10 only burns predominantly high sulfur coal from Illinois
- Evaporator area for unit 10 utilizes SA210-1, 57.15mm OD x 5.59mm wall internal rifled tube
- Units 1-9 utilize low NOx burners
- Unit 1 is evaluating selective non-catalytic reduction technology



Erosion Issues

- Original unit 10 bubbling fluidized bed boiler tubes supplied with 1mm induction fused 15Cr, 4.5Fe, 4Si, balance Ni spray coating
- Uninterrupted service life expected five years
- After two years service, unit experienced tube leaks due to spray coating erosion failures
- Reoccurring forced outages due to tube leaks
- Spray coating failure due to poor erosion resistance, and coating disbonding exposing tube base material



Kennametal Conforma Clad® infiltration brazed cladding measured by eddy-current revealed thickness loss, in a localized area, in line with a catalyst injection nozzle at 0.002; remaining clad area had no measurable coating thickness loss



Kenametal Conforma Clad Solution

- Three alternative tube protection materials installed in unit 10 for evaluations: high chrome weld overlay 0.140" thick, thermal spray 0.040" thick, and Kennametal Conforma Clad® infiltration brazed cladding 0.030" thick
- Two year service exposure resulted in coating failure of the weld overlay and the thermal spray requiring the removal of test sections
- Kennametal Conforma Clad® infiltration brazed cladding measured by eddy-current revealed thickness loss, in a localized area, in line with a catalyst injection nozzle at 0.002; remaining clad area had no measurable coating thickness loss
- Fluidized bed tube life estimated at 15+ years service life

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