SUCCESS STORY

Fluidized Bed Boiler Tubes

THE CHALLENGE

• 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.

THE RESULT

• 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 infiltration brazed cladding 0.030" thick.
• Two-year service exposure resulted in coating failure of the weld overlay and the thermal spray required the removal of test sections.
• Kennametal 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 of service life.

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 nation's first commercial scale atmospheric fluidized bed combustion boiler.
• Unit 10 predominantly burns 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.