

COAL-FIRED UTILITY BOILERS NEED RE-HEAT DUCT BURNERS

SITUATION

In the late 1980's, many coal-fired utility boilers in Europe installed Selective Catalytic Reduction (SCR) systems. Most installed the SCRs in a low-dust arrangement downstream of the particulate filter and the SOx scrubber. This arrangement produces temperature inlets to the SCR that are too low for efficient NOx removal and must be re-heated from approximately 550°F to 620°F.

In Mannheim, Germany, the GMK Power Plant's four boilers are ducted to a single SOx scrubber and particulate control system in a low-dust arrangement upstream of the single SCR. The plant required one flue gas re-heating system to control the SCR inlet temperature and another to control the stack temperature during SCR bypassing to prevent stack corrosion and poor plume rise.

Name: GMK Power Plant
Location: Mannheim, Germany
Boiler: 700 MW Coal-Fired Utility Boilers
Fuels: Natural Gas And Light Oil With Propane Pilots
New Burner: De Jong-Coen Re-heat Duct Burner

Emissions: lbs/MBtu	Inlet	Outlet	Removal Efficiency
SCR (NOx)	1.12	0.15	87%
Scrubber (SOx)	0.84	0.097	88%
Stack CO		0.03	

SOLUTION

The plant installed two De Jong-Coen Re-heat Duct Burner systems. One duct burner fired vertically with nine (9) burner elements to re-heat the flue gas flow of 4,600,000 lbs/hr to the SCR inlet from 536°F to 620°F (112 MBtu/hr, LHV).

Customer Needs

- ✓ Uniform Temperature Profile into the SCR
- ✓ Rugged Design
- ✓ Prevent Downstream Condensation and Corrosion

Operations

- ✓ Fire both Natural Gas and #2 Oil
- ✓ Vertical or Horizontal Firing
- ✓ Reliable Operation in a Harsh Environment

Air Quality

- ✓ 0.15 lbs/MBtu NOx
- ✓ No Visible Plume During SCR By-Pass
- ✓ 87% NOx Removal Efficiency



Burner Front at GMK Power Plant

The plant installed a second duct burner with seven (7) burner elements to re-heat the low temperature flue gas to the stack from 122°F to 185°F (82 MBtu/hr, LHV) when the SCR is by-passed. This duct burner prevents downstream condensation and subsequent corrosion; reduces a visible plume; and increases plume rise and dispersion of pollutants. This duct burner system is horizontally fired.

RESULTS

Inlet temperature to the SCR was controlled to 620°F with minimal variations in temperature profile. NOx out the stack measured 0.15 lbs/MBtu with a removal efficiency of 87%. During SCR bypassing, the stack re-heat duct burner increased stack plume rise and dispersion and prevented stack corrosion. The two original duct burner systems continue to operate well after 25 years of service in a very harsh environment.

