



# COEN

Clean combustion. Powerful results.

# CASE HISTORY

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## CO-FYR RETROFIT - COAL SPREADER STOKER

### SITUATION

In October 1997, Ford Motor Company teamed with East Ohio Gas to retrofit one 100,000 lb/hr Riley-Union coal spreader stoker boiler with dual Coen Co-Fyr burners at the Brookpark engine plant in Cleveland, Ohio. In the past, Boiler No. 5 had been derated to 70,000 lb/hr to meet opacity and particulate emissions limits. The two primary incentives for cofiring were:

- Recover lost derate caused by excessive opacity and particulate emissions at high load
- Fire natural gas during summer months when plant demand is low, reducing operating costs normally associated with coal firing

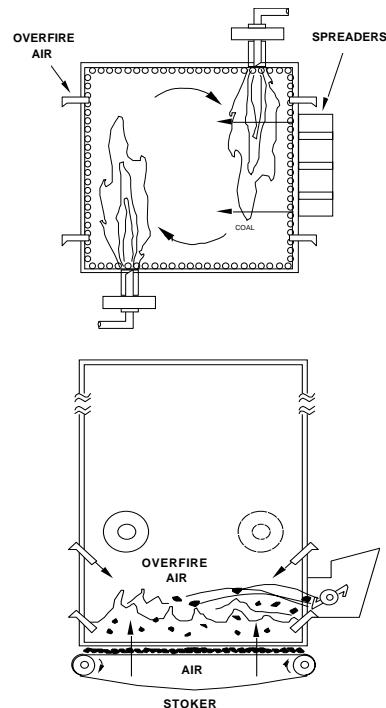
Secondary incentives included clean start-ups, extended low-load turndown, and increased efficiency.

**Name:** Ford Motor Company  
**Location:** Cleveland, Ohio  
**Boiler:** 100,000 lb/hr Riley-Union  
**Solid Fuel:** Coal  
**Stoker:** Detroit Spreader  
**Burner:** Coen Co-Fyr  
 Dual Opposed & Offset  
**Heat Input:** 65 MMBtu/hr Natural Gas

### SOLUTION

The boiler was retrofitted with two high pressure, high velocity natural gas Coen Co-Fyr burner packages, each complete with an integral fan, Coen BMS-2000 PLC based burner management system, fuel piping and instrumentation, and single-point positioning combustion controls for the air damper and Coen AC fuel valve. The Coen combustion controls were easily interfaced with existing boiler controls.

After start-up, the Co-Fyr burners were subjected to a series of performance and environmental testing. The test consisted of continuous monitoring of O<sub>2</sub>, CO, CO<sub>2</sub>, and NO<sub>x</sub>, EPA Method 5 for Particulate, and Andersen impactor train for particle sizing.

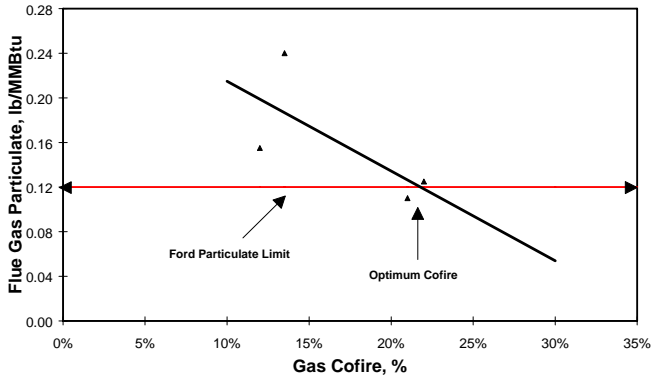


### RESULTS

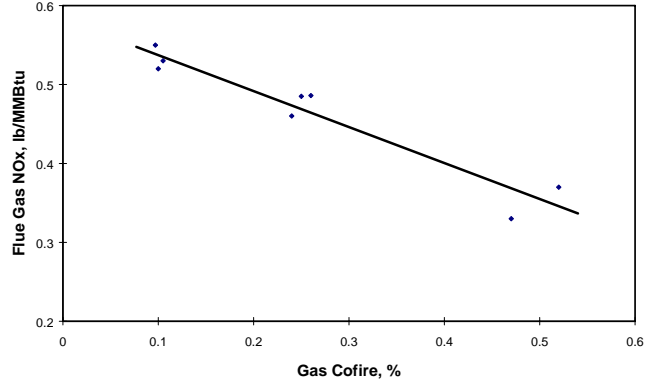
It was determined that at 20% gas cofire, optimum performance and emissions were achieved. The gas cofiring retrofit resulted in:

- ☑ **DERATE RECOVERY** - 30% boiler capacity was regained with only 20% gas use.
- ☑ **LOWER PARTICULATE** - Total and fine particulate (PM<sub>2.5</sub>) emissions were reduced.
- ☑ **LOWER OPACITY** - Opacity was greatly reduced especially during coal light-off.
- ☑ **LOWER NO<sub>x</sub>** - NO<sub>x</sub> emissions were reduced commensurate to the displaced coal.
- ☑ **SEASONAL GAS USE** - Different capacity spuds were used for low capacity cofire and high capacity summer gas use.
- ☑ **IMPROVED EFFICIENCY** - Overall boiler efficiency increased due to reduction in excess oxygen by 1.5% and improved carbon burnout in fly ash.

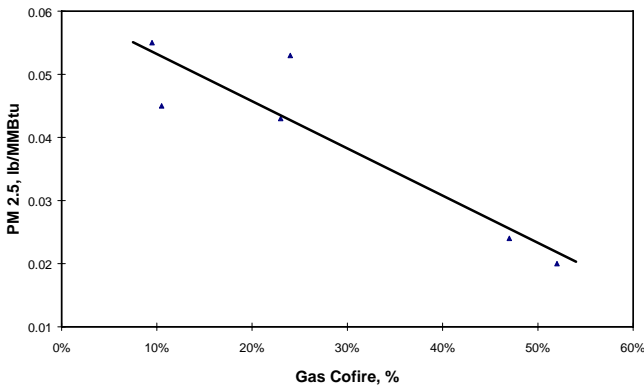
**Ford Total Particulate Results**



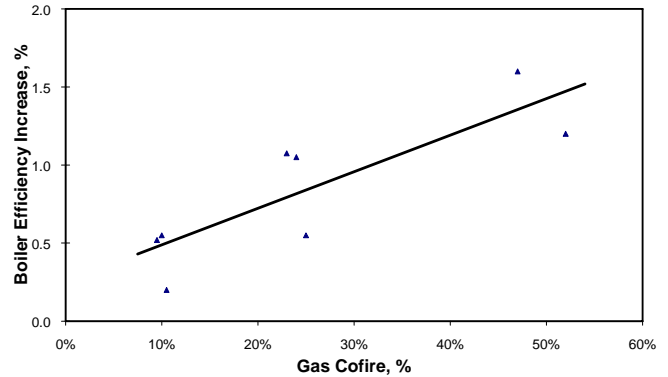
**Ford NOx Results**



**Ford Fine Particulate Results**



**Ford Efficiency Results**



**COFIRE LESSONS LEARNED FROM THE FORD RETROFIT**

**CUSTOMER NEEDS**

- ✓ Met Emission Limits
- ✓ Easy Retrofit
- ✓ Quick Installation
- ✓ Factory Support
- ✓ Operating Flexibility

**OPERATIONS**

- ✓ Derate Recovery
- ✓ Cleaner Start-ups
- ✓ Faster Response
- ✓ Lower Turndown
- ✓ Summer Gas Use

**AIR QUALITY**

- ✓ Lower Particulate
- ✓ Lower NOx
- ✓ Higher Efficiency
- ✓ Lower PM 2.5
- ✓ Lower Excess Air

“Cofire” for industrial and utility boilers 30 years ago meant placing a burner in one of the boiler sidewalls to provide warm-up or standby assistance. The burner system was very rarely designed to complement the solid fuel system or to provide sustained service. Today, the Coen Co-Fyr burner system is tailored to

your application to address your needs, whether you require improved efficiency, relaxed solid fuel specifications, lower emissions, capacity derate recovery, lower turndown or overall improved operational flexibility.

