



Industry Requirements Demand Improved Ultra-Low-NOx Boiler Burner

Coen Company's Cell-Rapid Mix Burner Delivers a **30 – 40% NOx Reduction** Compared to the Industry Standard

○ THE SITUATION

California's Central Valley region recently passed a regulation requiring that many existing industrial boilers be upgraded to meet a NOx requirement of less than 9 parts per million (ppm). As part of the rule's implementation, an extension was given to users who agreed to meet a NOx level of 6ppm. The current versions of Coen Company's *Rapid Mix Burner (RMB™)* operate at 6 to 7ppm, which easily meets a 9ppm NOx requirement. In order to meet a 6ppm NOx requirement, a burner was required that would operate at 5ppm or less.

○ THE SOLUTION

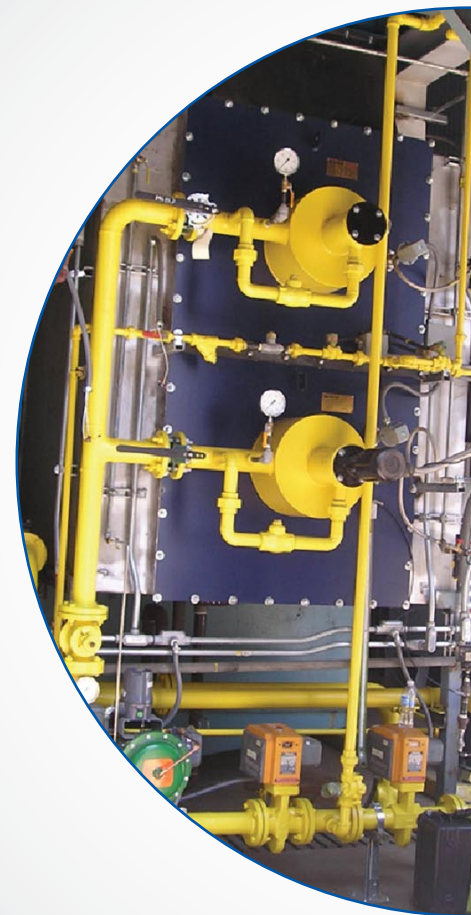
Engineers developed a variant of the Rapid Mix technology, the *Cell-Rapid Mix Burner (C-RMB™)*, which consists of multiple burners operated in unison. In this way, combinations of smaller single zone registers could be used in configurations like one over one, or three rows of two, to meet the required capacity, maintain the fully swirling flow through each burner, and fit within the confines of the given furnace geometry.

○ INDUSTRIAL INSTALLATION

The first commercial application of the burner was installed at TomaTek, a tomato processing facility in central California. The application involved the retrofit of two (2) 80,000 lb/hr "D" style package watertube boilers. The customer was required to meet an emission limit of 6ppm NOx and 90ppm CO on both boilers.

The system's design incorporated two burner cells in a vertically stacked configuration with each cell having a heat release of 50 million Btu/hr. A new combustion air fan was supplied to provide up to 25% excess air and 45% flue gas recirculation (FGR), and was mounted directly above the burner windbox. No boiler modifications were required to allow operation at these ultra-low emission levels, and the burners were installed into an existing windbox. A new burner management and combustion control system was installed to allow precise control of fuel, air, and FGR during operation.

The burners demonstrated the ability to operate at less than 5ppm NOx between 35% and 45% FGR. The burner excess air levels ranged from approximately 35% at low fire to 25% at high fire. Both units were set up to operate below 5ppm NOx and have been operated in automatic with a ramp rate from 20% to 100% firing rate within three minutes.



C-RMB INSTALLATION

CUSTOMER NEEDS	OPERATIONS	AIR QUALITY
• Easy to Install	• Simple Controls	• Meets BACT
• Quick Start-ups	• Excellent Turndown	• Ultra-Low-NOx
• Lower Cost	• Fast Ramp Rates	• Low CO
• Trouble-free Design	• No Moving Parts	• Low Emissions Over Turndown Range

INDUSTRIAL INSTALLATION (CONTINUED)

A picture of the burner flames taken through the rear site port of one boiler is shown in Figure 1 and operating data from the emissions source test is shown in Table 1. The testing demonstrated that the burners were able to operate at NOx levels as low as 3.5ppm before CO emissions would exceed 50ppm.

THE RESULT

The two-cell concept has proven extremely successful for operating at less than 5ppm NOx, and can accommodate boilers with heat inputs up to 120 million Btu/hr. The C-RMB not only reduces costs and space requirements, but it is a proven alternative to the catalytic control of NOx emissions. Based on the success of the first two units, TomaTek ordered another C-RMB to retrofit a third boiler at this site.

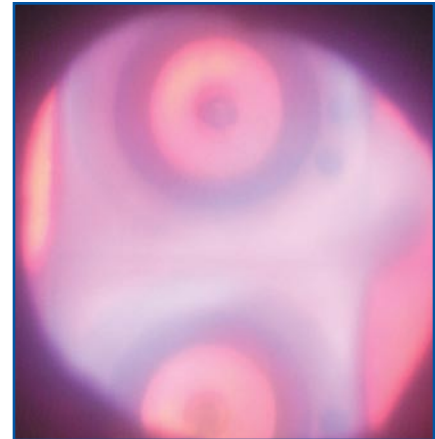


FIGURE 1: BURNER FLAMES SEEN THROUGH THE REAR SITE PORT OF ONE BOILER

BOILER 1				
	33% BOILER LOAD	55% BOILER LOAD	76% BOILER LOAD	99% BOILER LOAD
STACK O ₂	5.7%	4.4%	5.8%	4.8%
FGR RATE	41%	44%	40%	43%
NOx	4.1ppm	3.5ppm	3.5ppm	4.4ppm
CO	32ppm	27ppm	46ppm	20ppm
BOILER 2				
	33% BOILER LOAD	55% BOILER LOAD	76% BOILER LOAD	99% BOILER LOAD
STACK O ₂	5.6%	5.1%	4.9%	4.9%
FGR RATE	44%	41%	40%	40%
NOx	4.6ppm	3.6ppm	4.7ppm	4.7ppm
CO	40ppm	42ppm	38ppm	42ppm

TABLE 1: EMISSIONS SOURCE TEST OPERATING DATA

Contact your Coen representative

about designing a dependable, integrated system to your company's specifications using the Cell-Rapid Mix Burner (C-RMB) or any of Coen's other outstanding products.

Customer Testimonial

"I am 100% satisfied with Coen's C-RMBs. Our NOx levels went from 30 ppm to 6 ppm. The burners are very efficient, and I would definitely recommend them for 80,000 lb/hr boilers."

— Ron Arnbrister,
Boiler Room Manager, TomaTek



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