



COEN

CASE HISTORY

Clean combustion. Powerful results.

COEN COMPANY, INC.

1510 TANFORAN AVE.

WOODLAND, CA 95776 USA

(530) 668-2100

WWW.COEN.COM

COEN GAS BURNER UPGRADE IS SUCCESSFUL AT BELL BAY UNITS 1 & 2

SITUATION

Coen's Utility Combustion Systems team was competitively selected to furnish retrofittable gas burner equipment to eliminate boiler vibration and load derating at Bell Bay Units 1 & 2 in Tasmania, Australia following a conversion from heavy oil to natural gas firing. The OEM burners were originally designed to fire oil only, but had previously been converted to 100% gas firing. The gas burner equipment retrofitted to the burners caused severe boiler vibration. Coen proposed modifications to the burners that would replace critical components responsible for the vibration while preserving the burner air register assembly. This approach minimized the time required to solve the boiler vibration problem.

Discussions with the customer indicated that to avoid damage to the boiler from excessive vibration, load was restricted to approximately 40-MWe (80-MWe derating). Also, reliability of the gas igniters was very poor. The project award was based on a cost-effective Coen solution that could be engineered, fabricated, and shipped to the job site within eight weeks.

Name:	Bell Bay Units 1 & 2
Location:	Tasmania, Australia
Boiler:	Babcock & Wilcox El Paso
Capacity:	2x120-MW
No. Of Burners:	Nine (9) per Unit
Equipment Supplied:	Custom-Engineered Gas Burner Components for Retrofit to the Existing Burners: Gas Injectors, Gas Igniters, and Flame Stabilizers (Swirlers)
Fuel:	Natural Gas
Guarantees:	Eliminate Burner-Induced Vibration and 80-MW Derate



Coen Modified Burner



Igniter Flame

SOLUTION

Limited downtime was most essential for this project. Due to constraints imposed by the plant owner, it was mandatory that the boilers be able to deliver maximum load no later than 12 weeks after authorization to proceed with engineering design. Coen kept the retrofit cost to a

minimum by re-using the existing burner air register and replacing the critical gas firing components with custom-engineered gas injectors and a matching flame stabilizer (swirler). Further, new gas igniters were furnished. The existing flame scanners were re-used, further minimizing cost.

The retrofit was difficult because of its distant location and unavailability of the boiler for a furnace inspection before initiating the design. Consequently, Coen worked remotely with customer engineers located at the job site to obtain critical dimensions needed to design gas burner components and new igniters that could be easily retrofitted. The first unit retrofitted was Bell Bay Unit 1.

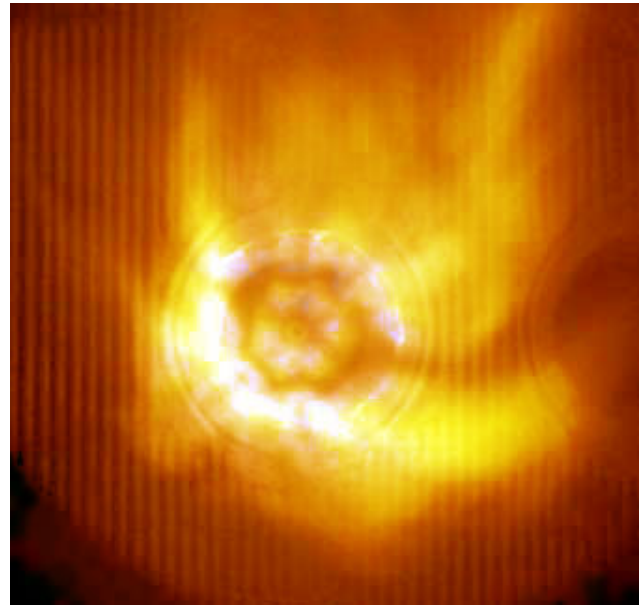
All equipment for Bell Bay Unit 1 was shipped to the job site within the eight-week period specified by the customer. Coen supplied an engineer for installation supervision, startup support, and combustion optimization services.

RESULTS

Startup exceeded customer expectations. Igniter performance was characterized by consistent and instant light-offs. The igniter flames were very stable and the flame detector signals were strong.

The main gas burners also lit-off immediately when the gas supply valve was opened. All burners were cycled through to verify light-off, and all burners lit instantly. Subsequently, each burner was cycled over a wide range of gas pressures and excess air levels to confirm stability. The main flames were very stable and the flame signals from the UV flame scanners were very strong.

Two days after the initial light-off, the turbine was rolled and the boiler began to ramp to full load. Due to vibration problems experienced with the original gas burners, the boiler was fully instrumented by the customer with sensors and probes to monitor potential vibration. Further, boiler load was increased slowly. The load ramp was without incident and maximum load of 120-MWe was achieved 12 hours later. No vibration was experienced.



Bell Bay Main Flame

Subsequent tests were performed to document flame stability at maximum load by varying excess air and operating with one burner out of service. The burners were very stable under all conditions and no boiler vibration was evident at any operating condition.

Although the primary purpose of the retrofit was to achieve maximum load without boiler vibration, it was necessary to maintain NOx emissions below the limit for Bell Bay Units 1 and 2 of 1,000 mg/Nm³ (0.63 lb/MBtu). Results showed that NOx emissions were 750 mg/Nm³ (0.47 lb/MBtu) at full load. Using staged combustion techniques, NOx emissions were reduced to 500 mg/Nm³ (0.31 lb/MBtu) at full load.

Following the successful retrofit at Bell Bay Unit 1, Bell Bay Unit 2 was retrofitted six months later with the same combustion equipment. Results were identical to Unit 1.

CUSTOMER NEEDS

- Eliminate Boiler Vibration
- Eliminate 80-MW Derate
- Convert From Oil to Gas-Firing
- Reliable, Class 1 Gas Igniter
- Rapid Design, Fabrication, Delivery

OPERATIONS

- Reliable Igniter Light-Off
- Stable Main Flames
- No Boiler Vibration
- Rapid Load Changes
- Good Turndown

AIR QUALITY

- Low-NOx Emissions
- Low CO Emissions

For reliable igniter light-off and smokeless performance, contact Coen today.

Coen Company, Inc. • 100 Foster City Blvd. • Foster City, CA 94404 USA • Tel: 1 (650) 638-0365 • Fax: 1 (650) 638-0355

www.coen.com

