



NEBRASKA PUBLIC POWER DISTRICT

LOCATION

Beatrice, NE

PROFILE

The Beatrice plant helps eliminate the need for NPPD to buy expensive power in these situations which — in turn — means more reliable, lower cost power for its customers.

CHALLENGE

- Act as a hedge against an unforeseen extended outage occurring at one of NPPD's major power plants
- Help meet future electric load growth in NPPD's native service area
- Give NPPD's electric power generation added fuel diversity.

SOLUTION

Using steam generated by its Cleaver-Brooks 23,000 lb/hr, 335 psig operating industrial watertube, NPPD can seal its steam turbine in as little as 4 hours.

RESULTS

- Produces optimal quality steam for the turbine sealing process for faster start-up.
- C-B watertube boilers allow Beatrice to be online at full capacity in less than half a working day and makes it significantly more useful in its service applications.

Cleaver-Brooks Engineered Boiler Systems Division Delivers Results for Nebraska Public Power District

Mission Critical Steam Generation for Demanding Regional Power Needs

Engineered Boiler Systems, a division of Cleaver-Brooks, provides mission critical steam generation for Nebraska Public Power District's (NPPD) combined cycle electrical generating plant in Beatrice, Nebraska.

At 250 Megawatts, the Beatrice Plant has plenty of capacity, but a key factor is the plant's ability to start up quickly. This is where Cleaver-Brooks Nebraska Boiler's 23,000 lb/hr, 335 psig operating industrial watertube comes into play.

The Beatrice Power Station received provisional acceptance for commercial operation on January 7, 2005.

An important part of NPPD's long-term energy supply strategy, the Beatrice Power Station was built to:

- Act as a hedge against an unforeseen extended outage occurring at one of NPPD's major power plants
- Help meet future electric load growth in NPPD's native service area
- Give NPPD's electric power generation added fuel diversity.



FAST STARTUP

Using steam generated by its C-B industrial watertube steam boiler, NPPD can seal its steam turbine in as little as 4 hours — less than 1/2 the time needed to start the steam turbine conventionally. Critical for an intermittent use plant such as Beatrice.

The Beatrice plant helps eliminate the need for NPPD to buy expensive power in these situations which — in turn — means more reliable, lower cost power for its customers. NPPD-Beatrice, like all combined cycle plants, uses the heat from its (two) gas turbines to produce steam that drives its 90 Megawatt Siemens/Allstom steam turbine comprised of both low-pressure and high-pressure elements.

Under normal circumstances, getting both elements of the steam turbine to seal properly would take 8-10 hours. If only one gas turbine is in use, this would result in less than half of Beatrice's generating capacity being online.

If both gas turbines are needed, the lag time for the steam turbine could result in more than 1/3 of the plant's capacity being unavailable until the steam turbine seals.

If normal startup was the only option, the Beatrice plant could take as much as a full working day to produce full power in its combined cycle form. Even if the gas turbines were started immediately, the plant would not be able to operate at full efficiency because the heat energy of the gas turbines would be lost while waiting for the steam turbine to seal.

For an intermittent use plant such as Beatrice, fast startup time is critical since the plant may be called upon to produce electricity for the equivalent of 100,000 homes at very short notice. The bottom line is that the quicker the plant can be operating at full capacity, the better.

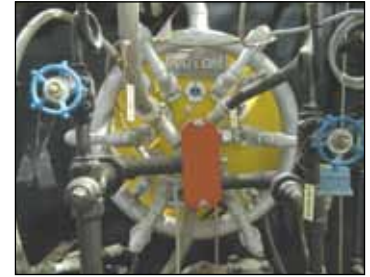
Using steam generated by its Cleaver-Brooks boiler, NPPD can seal its steam turbine in as little as 4 hours.

This allows NPPD Beatrice to be online at full capacity in less than half a working day and makes it significantly more useful in its service applications.

The key to faster startup is that the Engineered Boiler Systems package produces optimal quality steam for the turbine sealing process using its D-type IWT design, advanced C-B NATCOM burner and Cleaver-Brooks Spraymaster deaerator. Nebraska Public Power District benefits because the C-B Nebraska Boiler, C-B NATCOM burner, Cleaver-Brooks deaerator, and the Rockwell Automation (Allen-Bradley) PLC-based boiler and burner control are all manufactured and/or integrated by a single supplier, giving NPPD a single source for service, maintenance, upgrades and support.



Cleaver-Brooks Spraymaster Deaerator



Advanced C-B NATCOM Burner



250 MEGAWATTS — IN A HURRY

At 250 Megawatts, the Beatrice Plant has plenty of capacity, but a key factor is the plant's ability to start up quickly. This is where C-B Nebraska Boiler's industrial watertube comes into play.



OTHER APPLICATIONS

In addition to its role in plant startup, the C-B IWT boiler is used in more day-to-day applications including heating the buildings on the Beatrice site.

In this added role, the C-B Nebraska Boiler's fuel-to-steam efficiency and compactness help keep operating costs down.

MISSION CRITICAL STEAM GENERATION

C-B Nebraska Boiler, an operating company of Cleaver-Brooks, provides mission critical steam generation for Nebraska Public Power District's 250 Megawatt combined cycle electrical generating plant in Beatrice, Nebraska.

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