

Boilers Help Hospital Cut Energy Use

Enable more-efficient operation of sterilizers, kitchens

With energy prices going up, controlling the cost of running sterilizers, kitchens and laundries was a constant concern of John English, director of plant operations for Glenwood Regional Medical Center, a 365,000-plus-sqft, full-service, 257 bed hospital in West Monroe, La.

To meet its steam requirements, the hospital acquired two 125 hp fire-tube boilers during the early 1960s and two more 125-hp fire-tube boilers during the late 1970s. These four boilers connected converters and steam fired storage-tank domestic-water systems directly to the kitchen and sterilizer areas. The laundry was served by a 100-hp water-tube boiler acquired during the early 1990s.

English knew from experience that major savings could be realized with more efficient steam generation. The old fire-tube boilers were running constantly, even though the demand for steam was intermittent. In addition, they required ever increasing investments in maintenance and repair.

"Because of their age and configuration, the old boilers were estimated to have an 'in-service efficiency' of somewhere between 65 to 70 percent – if they were tuned up properly," English said. "We had to run our old boilers all the time because it would take at least 30 minutes to get them up and running."

Made of off the shelf components, including Honeywell controls and Grundfos pumps, and North American steel, Miura water-tube boilers were chosen to replace Glenwood's steam boilers.

Energy-Efficient Design

A 100 hp-fire-tube boiler has about three times the available surface area of a 1—hp Miura. This area radiates a constant amount of heat, whether the boiler runs at 100 percent or 10 per cent capacity. The lower the capacity at which the boiler runs, the higher the ratio of radiation loss to usable-steam production.

Floating headers make possible the small size and water capacity of Miura boilers without causing thermal shock to the water tubes and enclosure. These headers allow the water tubes to be short and straight, so the whole boiler can be very small, taking up 33- percent less floor space.

Additional energy savings result from Miura boiler's fast start-up capability. Most boilers are turned down, but not off, when steam demand drops. Miura's can be switched on and off like light bulbs. They go from a cold start to steam in five minutes. Because there is much less water to heat, less energy is required upon restart.

Efficiency Upgraded

"The old boilers we're running were in the 65-to-70-percent efficiency range, if they were tuned up properly," English said. "The Miuras are running at 86-to-88 percent efficiency. It's a tremendous difference. That's counting just when they are operating. But the advantage of the Miura boilers is that, when they are not needed, you can cycle (them) off and not use anything. Then you can be up and running in... minutes."

Three LX-5-0 SG dual-fuel boilers were installed to supply the kitchen and sterilizer areas.

"The demand for steam was a little bit more than one 50-hp could handle," Bob Sieve of Heatran Crop. Of Shreveport, La., said. "That's the reason we put in three Miuras – two to handle the load and one as backup. The Miura portion of this project is furnishing steam for the kitchen and for the sterilizers, and now we're in the process of replacing the boilers in the laundry, which will have two Miura LX-100 SG natural gas units. (These) will be installed before the end of the year."

The kitchen/sterilizers boilers are dual-fuel (propane and natural gas) to provide backup in the event natural-gas flow is interrupted. According to state law, boilers for hospitals above a certain latitude have to be dual-fuel.

Boiler Maintenance

Glenwood chose to install the online Miura Boiler Maintenance (MBM) system.

"We've got the controller on the boiler that tells you the alarms but we also have the software that analyzes the information from the boilers and shows us graphically on a computer the boiler's status," English said. "You can actually see what is going on with your flame and stack temperatures, etc. It gives you a lot of beneficial data. You can print out an alarm history. It tells you exactly what the alarms are about. And...we can monitor the boilers remotely."

With MBM, Glenwood can perform troubleshooting. Data are transmitted via a cable that is hard-wired in a daisy chain, going from boiler to boiler. The computer that formats and displays the data can be up to 3,000 ft from the boilers. Thirty-one days of boiler operating data can be viewed.

MBM uses an intuitive approach to the organization of data. Boiler settings are grouped on one screen, while another screen depicts real time and boiler status.

Once the current situation has been checked, an operator can monitor three aspects of boiler feedback: "alarms," "cautions," and "combustion." In other words, an operator can look through historical data for indications of a development requiring attention. The alarms, cautions, and combustion histories are on separate screens. The alarms history includes flame, water level, power, temperature and pressure-alarm totals. The cautions history includes times reminded about filters, blow downs, softeners, batteries, sensors, etc., The combustion history includes low and high firing, blow downs, and pump cycles.

A scrolling screen shows the various signal, pressure, temperature, conductivity, and SCF monitors day by day for the previous 31 days.

A monthly report screen provides a recap of the month, which comparative data from the previous month.

Results

We've seen a dramatic drop in the energy consumption over the last year," English said. "The gas price went up. But what I can control-the energy consumption-has gone down drastically."