HVAC/R ENGINEERING

profile

Hospital saves space and dollars with YORK® prescription

Founded in 1861, Providence Hospital is the oldest continuously operated hospital located in Washington, D.C. But like most non-profit institutions, Providence Hospital faces modern-day pressures to contain costs.

Today, the facility encompasses 1.2 million square feet, including a 382-bed hospital and 242-bed nursing home. Energy use throughout the campus is carefully monitored by hospital officials to minimize costs. In 1996, the mechanical-cooling equipment became an area of concern because of its age and relative inefficiency. That's when YORK was called upon to give a money-saving diagnosis.

"At the time, the HVAC plant consisted of three Cleaver-Brooks high-pressure boilers, two low-pressure-steam absorption chillers (powered by the boilers via a pressure-reducing station), and one electric centrifugal chiller," say Jim Carloni, YORK Sales Engineer. "But the hospital needed to upgrade the plant's cooling equipment. The 600-ton, CFC-12 electric centrifugal chiller was replaced with a 1200-ton, HFC-134a electric centrifugal. The big question was what should replace the two 700-ton absorption chillers."

The hospital was looking for the best balance between first cost and energy cost. Initial plans called for replacing the chillers with two new low-pressure absorption units, increasing their capacity to 1200 tons each to allow for redundancy and future expansion of the facility. However, this option did not significantly improve energy costs. On the other hand, switching to electric centrifugal chillers was cost-prohibitive, because the size of the electric service would have had to be increased.

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Ultimately, YORK prescribed a novel treatment, which included financing the entire project. “YORK presented a comprehensive solution that completely satisfied our needs,” explained Andy Fox, Providence Hospital’s Engineering Manager. “Having YORK as the sole source for the chillers, construction, project management and financing meant we could be sure of the project’s success. Plus, financing the project through a two-year lease let us divert the capital allotted for this project to other critical needs.”

Shown are the two 1200-ton, steam-turbine-drive, HFC-134a, centrifugal chillers. The condensate systems are installed above the chillers in order to meet space constraints.

The YORK prescription called for employing two 1200-ton, steam-turbine-drive, HFC-134a centrifugal chillers operating with high-pressure steam from the boilers. New cooling towers and condenser-water pumps were also incorporated into the contract.

“We took total, turn-key responsibility for engineering, manufacturing, construction, project management and financing,” says YORK District Service Manager Robert Sundell. “By taking that approach, we had the flexibility to meet some complicated jobsite requirements.”

One challenge was to fit the two steam-turbine-drive chillers and their condensate-handling systems in the space voided by the absorption chillers. “To save space, we built a platform above the chiller shells to get the condensate-handling system off the floor,” says Wes Burns, YORK Regional Manager, Contract Operations. “That gave us a footprint that fit the plant site.”

Once installed, the chillers began saving energy. Patented, microprocessor-based, variable-speed controls regulate the turbine speed, compressor-vane positioning, and several other variables to obtain the optimum operating point for each chiller.

The hospital also saves energy because of the YORK chillers’ ability to use 55°F entering condenser water. “This low-temperature entering condenser water, combined with varying turbine speeds, substantially increases the overall efficiency and capacity of the chillers,” says Fox. “We can run just one chiller, when before we’d bring a second chiller on-line to get the 200 to 300 tons of additional cooling.”

Additional energy savings occur because YORK uses open-architecture control technology that is compatible with a wide range of building automation systems (BAS), allowing the chillers to “talk” with the plant’s BAS. This link allows hospital engineers to monitor critical chiller operating conditions, so they can operate a chilled-water-reset schedule to maximize energy savings.

Carloni notes that the installation represents a state-of-the-art cooling solution for high-pressure steam plants. “When the system went on-line in late summer of 1997, it produced boiler-fuel savings of $25,000 in August and $33,000 in September, versus the low-pressure-absorption plant. Year-long savings are expected to total $150,000 to $200,000.”

Further out in time, the savings could be substantial as electric utilities are deregulated. Under deregulation, expected price changes will favor users who can avoid buying electric power during expensive peak periods when electricity is most in demand. Providence’s hybrid plant provides the flexibility to run the steam chillers when electric prices are high, then switch to the electric chiller to take advantage of low, off-peak electric rates.

With two YORK steam-turbine chillers alongside the 1,200-ton electric chiller, Providence Hospital is well positioned to meet its 2,400-ton cooling load with minimal need for electricity. According to Carloni, “The steam chillers are performing very well. Considering current electric utility costs, the hospital feels good about not having to depend on their electric chiller. The energy savings are great now, and with deregulation right around the corner, the prognosis is excellent for the future.”

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