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Hospital Achieves Top Efficiency With Hybrid System

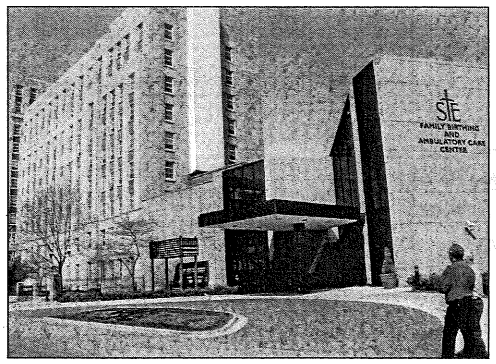
Richard Gilligan has been chief engineer at Chicago's St. Elizabeth's Hospital for 23 years. When he took the post in 1976, two steam-fired, single-effect absorption chillers provided the hospital's air conditioning. By the mid-1990s, with that system pushing age 35 and on its last legs, Honeywell was called in to assess and boost the hospital's energy efficiency. In addition to initiating the usual measures, such as a lighting retrofit, Honeywell studied replacements for the absorption chillers. Ultimately, the company suggested a total revamp of the energy plant, leading to selection of a hybrid cooling system, with natural gas engine-driven chillers to peak-shave electric costs.

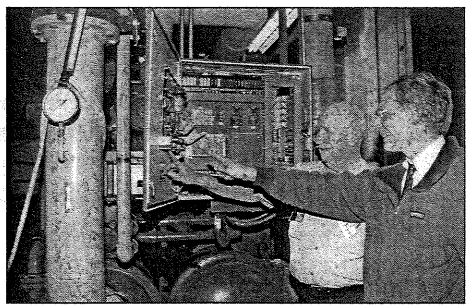
The renovation kicked off in 1994, with the introduction of a computerized Honeywell control system. In 1995, the hospital installed a 500-ton Trane centrifugal chiller, and in 1996, the facility added two 350-ton TECOCHILL® gas engine-driven chillers.

Gilligan, once a steam absorption expert, quickly became a proponent for gas engine-driven cooling technology. When the engine-driven equipment was first installed, the hospital was considered a pioneer, but Gilligan and his boss, Support Service Director Jack Manzella, say the system made a great deal of sense. Up front, the engine equipment cost less to install than absorption. Additional savings were realized in operation, because the four gasoline-derivative engines can come on in stages and only when needed. Gilligan and Manzella note that the equipment operates more efficiently at part-load than at full power. COP at full load is 1.2; at part-load, 1.7.

The flexibility of a hybrid system accounts for further operational savings. The hospital runs its gas engine-driven chillers weekdays, 6 a.m. to 10 p.m., then switches to the centrifugal chiller to take advantage of low night and weekend electric rates. Although the changeover from gas to electric equipment is computerized and automatic, the hospital is required by law to employ five stationary engineers, in addition to Gilligan, to rotate in shifts and cover equipment operations 24 hours per day. The cooling system operates from April 15 through October 15.

Manzella, who has also been at St. Elizabeth's for more than 2 decades, explains that the engines are maintained on a schedule stipulated by TECOCHILL,® in much the same way an automobile is serviced, but using "run hours" instead of miles. Tecogen's factory-authorized service technicians give the equipment a tune-up each spring before the cooling season begins. They replace spark plug ignition wires and change the oil. "The only real maintenance issue," says Gilligan, "is clean-





St. Elizabeth's Hospital, Chicago, as seen from its new OB/GYN wing (l.). Chief Engineer Dick Gilligan and Peoples Energy Product Specialist Mark Kruse (right) review details in the intricate Honeywell control panel, which monitors two 350-ton dual-engine TECOCHILL® chillers.

ing out heat exchangers. They get pretty hot, and scale forms on there at high temperatures."

Tecogen estimates that annual maintenance on a 350-ton TECOCHILL,® operating about 2,000 hours per year, costs the hospital from $10 to $20 per ton or $4,500 per year. This includes money set aside for engine replacement, which is needed about every 7 years. Replacement costs run approximately $6,000, including installation, and can be completed in about 2 days.

With the Honeywell control system, the TECOCHILL® chillers are tied into a computer network that can be monitored in several ways: on site; remotely by an engineer; and long-distance at Tecogen headquarters in Massachusetts. In the event of a problem — and even as a problem is developing — the software sends a warning, so corrective action can be undertaken immediately. "The machine is self-diagnostic — that's the part I like," says Gilligan. "You can see that your engine temperature is rising too fast, or that your rpms are too fast. It has a built-in brain. And it's connected by modem to the manufacturer, to our computer, and to anybody's home computer. We're pretty well covered if anything should go wrong."

The computer system also keeps a detailed alarm history, including snapshots of all operating parameters at the time of an alarm and at each of 40, 15-second intervals leading up to the alarm. Factory technicians can access these snapshots, identify the problem and quickly recommend a solution.

St. Elizabeth's is a 240-bed facility that serves neighbors in the Wicker Park area of Northwest Chicago. Founded in 1887 and still operated by the Poor Hand Maidens of Jesus Christ, a Roman Catholic religious order, the hospital originally ministered to a German-speaking population; today, it caters to a largely Spanish-speaking community. In addition to the hospital, the new energy plant also provides air conditioning to a five-story on-campus medical office building. Since the energy plant renovation, the hospital has added an extensive OB/GYN wing without any loss of efficiency.

"The chillers do a good job," says Gilligan, who now qualifies as an engine-driven chiller expert, with three-and-a-half successful TECOCHILL® cooling seasons under his belt.

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