Saint Leo University

Saint Leo, Florida

Growing Campus Converts to Central Plant

"In early 1997, our new president asked, 'What is on the top of your list of deferred maintenance items?'

Without hesitating, I told him air-conditioning systems. That's how this started seven years ago as we struggled to keep a hodge-podge of 30–45 year-old, direct-expansion and small chillers working." This is the way Frank Mezzanini describes the beginning of a process that has resulted in the installation of a new central chilled-water and campus-wide distribution and control system. Mezzanini is vice president and CFO of Saint Leo University in Saint Leo, Florida. This Catholic liberal arts school in west central Florida, about 30 miles from Tampa, has carved a reputation as a top-notch school, willing to try new programs to bring education out to those who want it.

Saint Leo University students enjoy an average class size of 15.1, with 24 undergraduate majors and specializations and four graduate programs: a master's in educational leadership, a master's of business administration, a master's in criminal justice, and a master's in psychology. The university now has an on-campus undergraduate enrollment of 1,083, plus an additional 800 students engaged in graduate, weekend, and evening curriculum.

Educational Outreach Programs

Through its School for Continuing Education, Saint Leo operates 10 Continuing Education Centers on United States military bases in Florida, Georgia, South Carolina, Texas, and Virginia, serving the needs of our armed forces as they balance the demands of careers and families. An additional seven regional centers have been created in conjunction with community colleges throughout Florida. Through its Center for Online Learning, 3,500 more Saint Leo students, each term, work to earn associate's or bachelor's degrees completely online via the Internet.

The stunningly beautiful campus was originally created by the Benedictine Order, which still has a residential abbey on the campus. Though steeped in the Benedictine tradition, the school has also found

With the startup of the central plant, the university was able to immediately retire an estimated 60 cooling units

new ways of teaching and learning. In 1997, a new president was named for the school, Dr. Arthur F. Kirk, Jr. He immediately began asking questions, not only about the educational program, but also about the physical plant. Mezzanini indicates that the president immediately understood the need for an attractive, comfortable, and secure campus. "He asked me to prioritize our physical plant needs."

Aging Air-Conditioning Systems

Mezzanini and his staff turned to Sodexho, an international facilities-management and service firm, to evaluate campus physical-plant priorities. "They came back to us and said the two most-immediate needs were facility roofs and air-conditioning." He notes that roof replacement was a fairly straightforward project, but more information was needed on the question of air conditioning.

One of the issues was that most campus buildings had standalone cooling systems—both DX systems and chilled water—and many of those systems were old and quite inefficient. Furthermore, there was an issue of reliability. "Systems had been added one building at a time, so there was no consistency. Many of the systems consisted of a single small chiller. When that failed for any reason, the building lost cooling completely."

Considering Central Plant

"We've had a close relationship with Tampa Bay Trane for over 20 years, so we looked to them for help, and they gave us a lot of useful ideas," notes Mezzanini. "One that we began looking at very seriously was going to a central cooling plant. That would give us several benefits." He indicates that the first was that they could then go to the most efficient type of chillers. "We knew that there was a lot more efficient equipment than what we were running."

Because of the diversity of the cooling load, the total capacity could be smaller than the sum of all the dispersed machinery the school was using. Finally, reliability would increase, not only because new equipment would be installed, but because of redundant capacity. "If we lost one chiller," says Mezzanini, "we could still supply some chilled water to every building."

Another advantage of the central plant concept is that it allows the university to get along with its existing electric distribution system for a considerable time into the future. "Our system had become over-burdened, particularly from all of this scattered air-conditioning equipment," remarks physical plant director Jim Killmeyer.

Central Plant Makes Sense

"With a central plant, a new electric service would be needed to that point only, and the rest of the electric system would be relieved of a good part of the load. We could kill a couple of birds with one stone." Mezzanini notes that the estimated cost of the new system was approximately $5 million, but that it came down to a choice of either making this investment or continuing to budget for individual system

Left: Climate Changer air handlers are among the types of equipment served by the central chilled-water plant.

Right: Trane Tracer Summit control system ties the entire facility together and optimizes operation.

Many individual rooms have horizontal fan-coil units.

replacements every year. The university's analysis was that going to a central plant made the most sense.

Thus, with a detailed analysis of the costs and benefits of a central-plant installation, the university initiated a plan to do the conversion, beginning in 2000. The new central-cooling plant was sited in an addition to the existing central-plant building. The equipment chosen was two Trane CenTraVac™ centrifugal chillers; a 400-ton Model CVHE; and a 600-ton Model CVHF. According to Killmeyer, "This was the combination that would allow us to operate the chillers at their most efficient levels for the maximum number of hours of the year."

The other part of the project was burying chilled-water lines throughout the campus. A challenge in this process was frequent encounters with other undocumented underground services. "We found that many years ago, the record keeping on buried piping and cable was spotty. As a result, we had to proceed cautiously." Ultimately, most of the central campus area received service. A few outlying buildings kept their existing local cooling systems because of the expense in extending chilled water.

Electrical Demand Reduction

With the startup of the central plant, the university was able to immediately retire an estimated 60 cooling units, and thus reduce electric demand by 150 kW. According to Tampa Bay Trane's Doug Gillespie, who was closely involved in the project, chilled water serves a variety of air handlers and fan-coil units in the different buildings. With the lower chilled-water temperatures of the new chillers, one of the immediate benefits was much more effective dehumidification. Killmeyer notes that the campus has a master facility plan, and the chilled-water piping was sized to allow future growth.

Another element in the conversion was the installation of a campus-wide Trane Tracer Summit™ control system. Gillespie notes that this allows the physical plant staff to closely observe conditions in individual buildings, and even individual rooms, to ensure that the comfort and efficiency goals are being met. Killmeyer and his staff can check conditions from numerous locations on campus, as well as from remote locations if necessary.

Vice president Mezzanini followed the installation of the central control system with interest, and was intrigued with the individual room-comfort monitoring capability. He tells how shortly after system startup, he noticed one room in one of the residential halls being far out of spec for temperature with the rest of the hall. "I decided to investigate personally, and when I got there, I found a student sitting outside, in a chair outside the dorm room. The door to the room was wide open. The student smiled and said he was enjoying the cool breeze coming through the doorway." Mezzanini smiles, "I had to do some explaining to him about the purpose of air conditioning."

Adequate Capacity for Expansion

One of the newest projects on campus is two new buildings housing student apartments. With the cooling capacity now available from the central plant, the individual rooms have chilled-water fan-coil units. These facilities opened in fall 2003. According to Jim Killmeyer, there is still ample chiller capacity for additional growth. "And of course, if we need to, we can always add chiller capacity in the future."

One of the two central plant chillers that are dispatched for optimum efficiency.

Two Caterpillar® diesel engine generators were installed in the university's generator plant.

One of the immediate benefits was much more effective dehumidification

Electric Generation on Campus
Saint Leo University receives electric service from TECO Energy Corporation. Killmeyer notes that because of frequent electric outages and the need for reliable service, the school put in its own diesel-powered electricity-generating plant in conjunction with the central chiller plant. The facility consists of two Caterpillar® diesel engine–generator sets, rated at 1,000 and 600 kW. With these, the campus can carry its entire electric load, including air conditioning. In fact, the campus has been designated as an emergency hurricane shelter for area residents, including those with special needs for medical apparatus that require electrical power to operate.

As it grows and takes new directions in educational offerings, the University is changing, evolving. The installation of a central chilled-water plant allows it to move in different directions in terms of building utilization, an important benefit. In keeping with its tradition, the priority will always be quality educational offerings. Saint Leo University has learned that a comfortable and efficient campus is part of that picture.

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