



## CASE STUDY

### K-12 Education

#### Facility at a glance

##### Name

Chaparral High School

##### Location

Scottsdale, AZ USA

##### Facility size

320,000 ft<sup>2</sup> facility

##### Issue

A fast-track, multi-phased construction schedule with energy efficiency goals

##### Solution

Daikin Modular Central Plant equipped with two 475-ton centrifugal chillers

*Since the commissioning of the Daikin Modular Central Plant in early summer 2007, Chaparral High School has seen electrical savings of \$8000 a month over its old system, even with the expanded size of the school campus.*

## Daikin Modular Central Plant Improves Efficiency and Reduces Construction Costs at Chaparral High School

The ability to meet a fast-track, multi-phased construction schedule and energy efficiency goals were critical factors in the selection of a Daikin Modular Central Plant to air condition Chaparral High School in Scottsdale, Arizona. Beating the desert heat and quiet operation were also key considerations for the large school rebuilding project. The central plant delivers on all bases, bringing significant operational savings to the new campus.

When all phases are complete, the new Chaparral High School campus will span approximately 320,000 ft<sup>2</sup> across nearly a dozen buildings, some old and some new. David Peterson, assistant superintendent of the Scottsdale Unified School District, explains that demolition started in June 2006 on many of the 1970s-built campus facilities. "Construction is multi-phased over a three-year period in order to allow the school to be fully operational during the school year."

### Critical Timing and Cost Control

During the summer of 2007, the installation and start-up of a Daikin Modular Central Plant equipped with two 475-ton centrifugal chillers, was made within a short time frame. This allowed newly constructed buildings to be cooled, even during finishing stages, and to serve existing buildings until their replacement or refurbishment. Peterson says Daikin demonstrated it could meet the tight construction schedule. "With having to keep 2,000 students in their seats to learn, we didn't have the luxury of the plant not functioning. And with construction costs continually increasing, it's critical to get our projects built on time and within budget."

Peterson credits Daikin and installing contractor Tri City Mechanical for the successful installation and commissioning of the Modular Central Plant following its delivery to the school in May 2007. "It's important that you look at all aspects of a project. We just felt very comfortable that we had a good contractor and a good equipment manufacturer."

The Scottsdale School District's initial experience of packaged central plants was not positive. Units from another manufacturer were installed at another school within the district. Quality problems, delivery delays and a time-consuming installation process caused the district to turn elsewhere when the next construction process arose.

Daikin Modular Central Plants are delivered pre-engineered and pre-assembled, complete with chillers, pumps, cooling towers and interconnected piping. Units are shipped to the job site for final assembly, bypassing the need for traditional "site built" cooling plants. According to the Daikin sales representative on the project team, Daikin's ability to have a full plant delivered on time and with minimal on-site assembly drove the school district's decision to specify the unit in its energy efficient design plan.

"Daikin launched the Modular Central Plant design in 2005 and since then, school districts all over the country are talking about the systems because of quality of workmanship and continued design improvements," says Tom Marek, project director at Tri City Mechanical in Chandler, Arizona.

## Meeting the Schedule

The project team seamlessly integrated the Daikin Modular Central Plant with all new underground piping and valves. Marek explains the entire installation process took about three weeks for bolting, wiring and piping hookups. "It was complicated because installation needed to be completed in a short amount of time and we had to coordinate with other contractors such as electricians." The plant runs on a decoupled primary-secondary pumping system without heating functionality. The Chaparral buildings use electric heaters, given the minimal heating requirement for the Arizona climate.

Starting up and commissioning the Daikin Modular Central Plants to serve the new campus over a multi-phase construction schedule upped the service and timing ante, Marek notes. For example, initial start-up of the equipment in the summer of 2007 included a temporary hookup so the new gymnasium and other buildings could be finished. "The gymnasium had to be climatized first so the gymnasium flooring could be installed," Marek says.



*The Modular Central Plant at Chaparral High School features two energy efficient, 475-ton Daikin centrifugal chillers.*

The Daikin Modular Central Plant is internally controlled, and is run from a single control panel using the BACnet® open standard communication protocol, tied into the school's Alerton® building automation system. With an eye on fighting high humidity and heat while ensuring energy efficiency, Peterson says the controls integrate well with the school's demand ventilation system. "Indoor air quality for us is a major concern. We develop our systems for demand ventilation which brings in fresh air as needed when we have elevated CO<sub>2</sub> levels. We open outside air dampers as needed to balance the air."

The plant and two cooling towers are situated next to a large gymnasium and the athletic field on the compact campus. The design of the Daikin Modular Central Plant helps contain noise and its overall low noise rating was a selection consideration. "You don't want to have a machine roaring while parents are at a varsity baseball game or having noise travel across the field to homes," Peterson says.

## Double-Digit Savings

Since the commissioning of the Daikin Modular Central Plant in early summer 2007, Chaparral High School has reaped savings compared to its prior system in the old facilities, even given its larger footprint. "To date, we've added 30,000 square feet and we've reduced electrical usage by approximately 100,000 kilowatt hours on a monthly basis which equates to saving \$8,000 in electrical costs the first month," Peterson says.

The Chaparral High School construction project will be completed in August 2008, ready for the new school year. Upon completion of all the new or refurbished buildings tied to the Daikin Modular Central Plant – six new buildings and three refurbished buildings, including an expanded auditorium – the school anticipates savings of 12 percent annually. "And that's with a total of 70,000 additional square feet over the old facilities," Peterson adds.

## A Well-Schooled Customer

The Scottsdale Unified School District wasn't reluctant to try its first Daikin Modular Central Plant because it's already a Daikin customer with a dozen other Daikin chillers in use throughout the district. As a result of the installation at Chaparral and past experience with Daikin equipment, the school district remains sold on Daikin, Peterson says. He notes that scalability played into the decision to select the modular central plant given any future expansion. "The fact that we can expand the plant and add more capacity to it is important," he concluded. "The advantages with Daikin are you are getting a superior, quality piece of equipment that's good for the long term."



*The Modular Central Plant at the school includes a plate-and-frame heat exchanger with secondary pumping.*