A large percentage of campus buildings have regular hours of occupancy, making it relatively straightforward for facilities staff to program HVAC schedules and update them seasonally. This is not the case, however, for the Performing Arts Center (PAC) at Cal Poly. The PAC hosts a variety of different events, each with distinct ventilation requirements determined by the type of event, the duration, and the duties of the stage crew.

Managing a highly variable schedule of operations in an energy-efficient manner proved to be a time consuming task for Cal Poly’s Engineering Services. Operating the building on a fixed schedule that encompassed all possible operating hours was not an option, as building systems would be run for significantly longer than necessary. Instead, Engineering Services and the technical staff at the PAC developed a system that more closely coordinated the events schedule with the HVAC schedule. In this process, the PAC reported all events and the anticipated ventilation requirements to Engineering Services one month in advance. This schedule was updated and refined numerous times throughout the month and resubmitted to Engineering with each revision.

Cal Poly won a 2005 Best Practice Award in the Load Management category for relocating and integrating two of the PAC’s oversized chillers into the campus’s centralized energy distribution loop.

While this process conserved more energy than a fixed schedule, it was difficult to forecast the building’s variable needs with great accuracy. It was not uncommon for the main hall to go unused one day, and have the stage crew unloading the same room until 3:00 am the following day. Constantly re-programming the time-of-day schedule as changes were submitted was time consuming. Furthermore, Engineering usually incorporated additional hours into the schedule to decrease the likelihood that the HVAC equipment would shut down too early.

With these issues reducing the building’s energy efficiency and absorbing time from both departments, Engineering Services developed a new plan. Dennis Elliot, the campus Energy Manager, says that an alternative was designed to “empower the PAC staff to schedule their own systems” by “cutting out the middle man.”

A dedicated control panel was installed to provide PAC technical staff with direct control over the building’s HVAC systems. Staff can now select the zones that require heating or air conditioning and program the duration that HVAC systems will run. Staff can also respond to unprogrammed demand for heating or cooling more effectively. The panel allows staff to immediately start up HVAC equipment at any time, day or night, and offers a manual shut-down feature as well.

The administrative offices and other zones with regular operating schedules and fixed hours of occupancy are still managed using the time-of-day programming. Engineering Services is responsible for adjusting these zones seasonally.
Enabling the building staff to manage the PAC’s variable demand for ventilation on a daily basis and from directly inside the building saves hundreds of operating hours annually. Jim Chernoff, the PAC’s Technical Services Manager, has found the new panel to be a great success, stating that it “has been a major improvement for our operations; my staff and I use it constantly. It has saved us a lot of trouble and improved energy use.”

**The panel cost $8,500 to design and fabricate, and saves $13,400 each year. The energy savings achieved by this project are equivalent to taking six households off the electrical grid.**

Jack Houston and Mike Harris of Engineering Services designed, fabricated, installed, and programmed the control panel. It builds upon the concept of a wind-up bypass timer. This simple concept is often applied to restroom exhaust fans, but has been adapted and customized in this project to apply to a digital control system.

A user control panel can be applied in several different types of facilities to reduce the number of hours that building systems operate unnecessarily. Gymnasiums, theaters, or auditoriums with variable usage schedules and dedicated HVAC systems may benefit from the installation of control panels. By optimizing system scheduling in these buildings, campuses can save money on utility bills and extend the useful life of their HVAC equipment.

The PAC celebrated its tenth year of serving Cal Poly and the greater San Luis Obispo community in 2006. Photo: PAC website.

In the summer of 2006 the Performing Arts Center celebrated its ten-year anniversary. The PAC has hosted nearly 1500 public events in its first decade of operation. It has become a vital cultural center that serves both the college and the surrounding community. A survey conducted by Opinion Studies of San Luis Obispo County reports that over a typical one year period, about one third of the county’s residents attend performances hosted by the Performing Arts Center.

**LESSONS LEARNED**

Opening a dialogue with building users is an often unexplored path to achieving long term energy cost savings. Cal Poly’s Energy Manager, Dennis Elliot, notes that the partnership between Engineering Services and PAC staff has accomplished more than either party could do alone. He suggests that campuses draw building staff into conversations about energy management and work together to determine the most effective ways to optimize building operations.