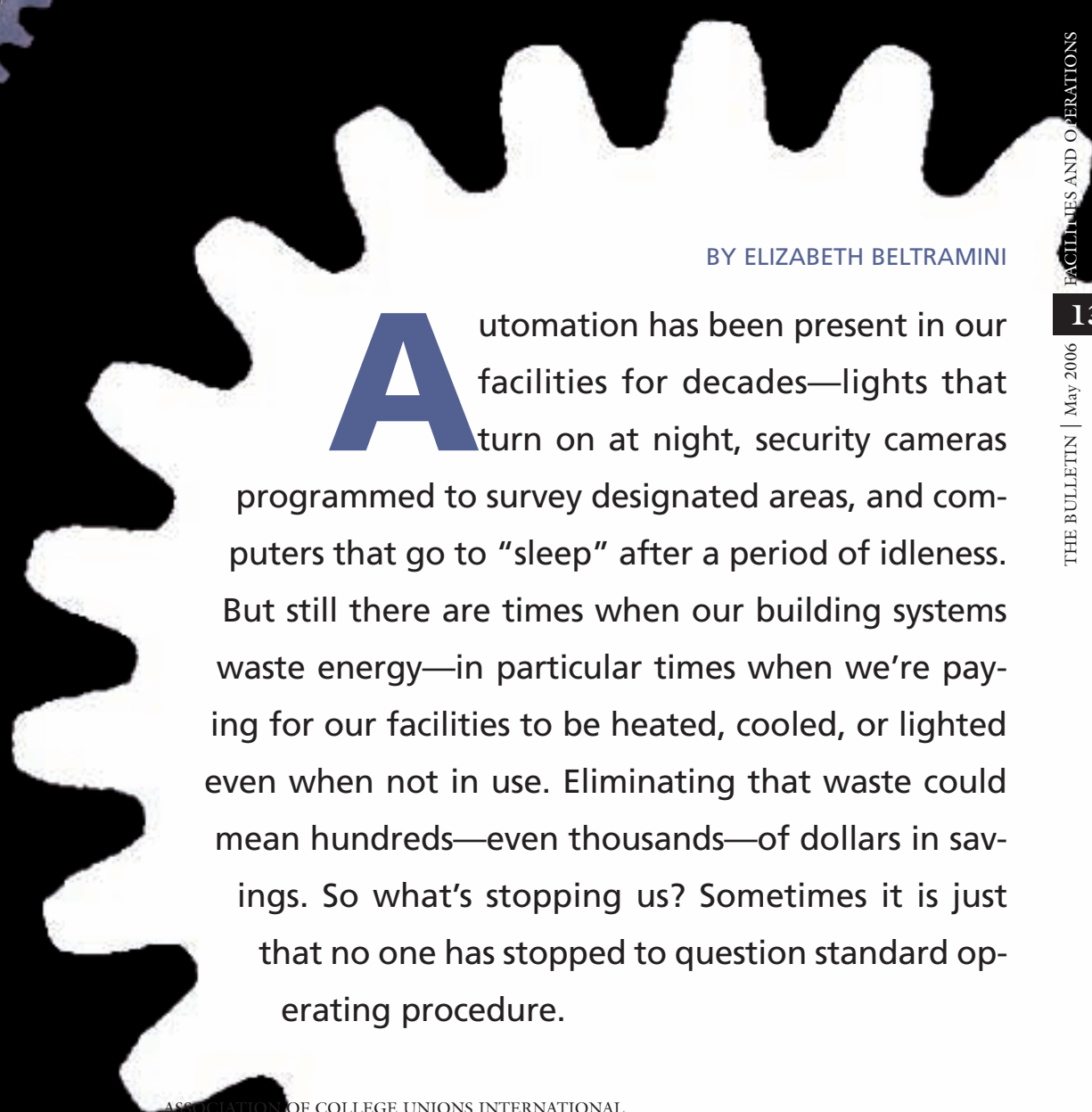




AUT**MATION INNOVATION:**

HOW THE UNIVERSITY OF KANSAS IS SAVING THOUSANDS IN ENERGY COSTS



BY ELIZABETH BELTRAMINI

Automation has been present in our facilities for decades—lights that turn on at night, security cameras programmed to survey designated areas, and computers that go to “sleep” after a period of idleness. But still there are times when our building systems waste energy—in particular times when we’re paying for our facilities to be heated, cooled, or lighted even when not in use. Eliminating that waste could mean hundreds—even thousands—of dollars in savings. So what’s stopping us? Sometimes it is just that no one has stopped to question standard operating procedure.

Streamlining operations and looking for innovative solutions to save money are ongoing processes for any college union. The unions at the University of Kansas dared to ask the question: “Can this be done?” in an attempt to achieve these goals. The answer turned out to be affirmative and ended up saving Kansas Memorial Union and Burge Union a minimum of \$20,000 annually.

Manual labor

In 1994, Kansas Unions decided to take a giant leap with their reservations booking system. The previous “system” was a 40’ long by 14’ high piano-hinged book that listed all reservable rooms across the top of the pages and hours of operation on the left side. Each page of the “Big Book” represented a day in the year. As one can imagine, this system was cumbersome to manage as one had to flip the pages to reserve space in the future, it had no good failsafe for double bookings, and it had only a small box to pencil in all details. It also required rewriting information from the book to produce the daily schedule, set-up notes, confirmations, invoicing, etc., which then had to be matched with the event in question. Obviously, the system was less than effective and left much room for error. Something needed to be done.

After researching available options, staff determined that the Event Management System (EMS) from Dean Evans and Associates had all the features necessary to meet their needs. They proceeded with its purchase and installation. Dean Evans EMS offered the following benefits:

- With the Big Book, the event and organization names could have been manually copied as many as 22 times (e.g., initial contact, handwritten confirmation, retyped to send, new form for audio-visual needs, new form for catering, new form for changes, invoice worksheet, and invoice). With EMS, the event name could be typed in once and there was no need to re-enter

the organization if it was already in the database. This meant less clerical drudgery and more time to devote to real customer needs.

- The search tool (Reservation Wizard) made it easy to find and book available space using a variety of filtering options. The graphical Reservation Books and a Calendar Inquiry offered virtually limitless ways to view room use and check availability.
- EMS also provided features for tracking set-up information, audio-visual equipment inventory, catering requirements, ticklers, personnel, and other resources to support an event.

The unions enjoyed the next six years with the Dean Evans EMS system, at which point another building operations system upgrade became necessary. This time, Kansas Unions decided to replace the Energy Management System (the other EMS), installed in 1987. These antiquated heating, ventilation, and air-conditioning (HVAC) units were being managed manually:

... by an employee who walked around the facilities with an event schedule in hand and physically flipped switches on for areas in which events were scheduled. Those [air-handling units] would then run until the union buildings closed, some 18 hours later, regardless of how many events were scheduled in that area. At midnight, another employee had to make the rounds in the buildings and turn the [units] off. Not only was it a labor-intensive process, it was one in which there was great potential for error, leaving the meeting and event scheduling staff with an ever-present concern that something might be overlooked. None of them wanted to receive a call from an

angry reservation holder whose room was not properly heated or cooled. (Beard, 2005, ¶ 4)

Staff researched energy management systems and decided that Johnson Controls’ Metasys system offered what the union needed at a reasonable cost. Metasys had many more features than the previous system, such as the ability to program the daily start/stop times for all major air-handling units, chillers, and heating systems. Other amenities included:

- It allowed the unions to trend many points of a system in regard to trouble-shooting. Many problems that would have required a technician to go to the unit to solve are now solvable at the Metasys workstation.
- More features per unit to report and adjust room temperatures.

The only major concern with the Metasys was that it, like the previous energy management system, required that maintenance/operations staff manually enter all start/stop times for air-handling units for all meeting rooms. With rooms being used several times per day, staffing shortages, and late additions happening almost daily, staff began cheating and entering start/stop times that encompassed the entire day, or worse yet, setting the units in “hand operation” mode and taking their operation and any potential energy savings totally out of Metasys’s control.

Seeing the inefficiency of entering events into the Dean Evans EMS software program, while circumventing the same data entry in the Johnson Controls Metasys program, staff began to visualize an ideal operation in which the two systems could be merged. Their reasoning was that because events had starting and ending times that the reservations coordinator entered at the time of a reservation, why couldn’t the Metasys system be

ENERGY MANAGEMENT SYSTEMS

What can you do to reduce HVAC costs?

programmed to read this same information from Dean Evans EMS and apply it to the start/stop time for the air-handling units?

EMS + EMS

Staff posed the question to Dean Evans and Johnson Controls and were told that as long as the systems were compatible, this merger could work. Because the unions were still in the planning phase of the energy management upgrade, staff asked that Johnson Controls include this as a part of the total project. Tim Swope, Kansas systems sales manager for Metasys, said: "Originally we helped install Metasys at the Kansas Union and after it was installed, [the interface] was more of an afterthought to see if we could make the systems work together—it was kind of a 'Gee, wouldn't this be nice'" (personal communication, April 2, 2004).

Brian Russell, a former Johnson Controls engineer, had been writing software for Johnson Controls branches across the United States as president of Colorado-based Streamside Solutions. Johnson Controls contacted Russell to write the software that would allow the Dean Evans EMS to talk to Metasys EMS (EMS + EMS). Because both systems are based on Microsoft Access, Russell was able to write a custom interface. "In just over a month, Russell wrote and tested the new 'EMS Scheduler' interface, and in January 2000 he installed it in the Kansas Union" (Beard, 2005, ¶ 5).

The EMS Scheduler interface allows for both standard daily schedules and flexible scheduling for additional events:

Once a day, the EMS Scheduler will retrieve the confirmed scheduled events for the current day from the Dean Evans EMS system and automatically create temporary schedules in Metasys ... for the air-handlers that serve the event rooms. A daily printout can also be generated to let the facility operators know when the [units] are scheduled to start and stop. The temporary schedules in Metasys will override any regular weekly scheduling that has been programmed. The temporary schedules are deleted automatically at midnight on the following day. (Streamside Solutions, 2004, ¶ 3–4)

The Kansas Memorial Union staff said it took only about an hour to be trained on the system, which also has since been connected to the HVAC units at the Burge Union. Because each facility is different, there is a one-time set-up to configure EMS Scheduler so it knows which rooms correspond to which air-handling units. Russell did caution that the interface only makes sense for larger facilities (i.e., the more air handlers), because in a smaller facility with only one air handler, that one unit would need to be on at all times (personal communication, April 2004). The interface will work with most Johnson Controls systems, though it might require more customization for systems older than 15 years (T. Swope, personal communication, April 2, 2004).

■ **Install a programmable thermostat.** Seven-day thermostats work well when your heating and cooling needs differ daily. These thermostats also typically can be programmed for holidays/vacations, to change during daylight saving times, and to restore settings in case of power outages. Similarly, 5/2 thermostats allow for one setting during weekdays and a different one for weekends.

■ **Reduce early-morning surges.** If your HVAC system has an "optimal start," ensure that your energy company does not bill for demand. For example, if your heating system turns on in the morning at the same time as most other facilities in your area, you might not be saving much over an earlier, slower temperature increase.

■ **Use an economizer.** Many air-conditioning systems use a dampered vent called an economizer to draw in cool outside air, when it is available, to reduce the need for mechanically cooled air. If not regularly checked, the linkage on the damper can seize up or break. An economizer stuck in the fully opened position can add as much as 50 percent to a building's annual energy bill by allowing in hot air during the air-conditioning season and cold air during the heating season. Have a licensed technician check, clean, and lubricate your economizer about once a year and repair it if necessary. If it's still operating, have the technician clean and lubricate the linkage and calibrate the controls.

■ **Check air-conditioning temperatures.** With a thermometer, check the temperature of the return air going to your air conditioner and then check the temperature of the air coming out of the register nearest the air-conditioning unit. If the temperature difference is lower than 14° F or higher than 22°F, have a licensed technician inspect your air-conditioning unit.

■ **Change filters.** Filters should be changed on a monthly basis—or more often if you are located near a highway or construction site where the air is much dirtier.

SOURCES: Alliant Energy. (n.d.). HVAC systems: Night setback. Retrieved March 27, 2006, from: <http://www.alliantenergy.com/docs/groups/public/documents/pub/p012395.hcsp>.

The systems at the Kansas Memorial Union and Burge Union have been totally compatible and operate automatically. Whenever a room reservation is made, EMS Scheduler starts the HVAC unit 30 minutes before the event start time and stops the unit at its conclusion. Even if the event runs a little long the rooms tend to stay comfortable for some time. Additionally, there is no longer the need for multiple daily entries of start/stop times; at 1 a.m. the Dean Evans reservations system contacts Metasys with the next day's events.

In 2005, Kansas Unions upgraded from Johnson Controls Metasys to Web Metasys, giving staff members the added features of access through any computer, anywhere, with access codes. Maintenance techs can make adjustments from home as opposed to having to return to the facility, and with the facilities' wireless connectivity they will eventually be able to make field adjustments with a PDA (Personal Digital Assistant) upon Russell's completion of developing this feature. "This allows our technicians and event managers to adjust room temperatures while on the move or from the problem area instead of stopping what they are doing to go to the workstation for the necessary adjustments," said Pat Beard, Kansas Unions building services director (personal communication, March 27, 2006).

Also in 2005, Kansas Unions upgraded to the Enterprise version of Dean Evans EMS with added features, such as receiving requests or reservations online, allowing Web-savvy customers to book their own rooms. With the Virtual EMS module, staff can devote time to real event-planning details rather than

clerical reentry work. The only ultimatum with the Web Metasys and Enterprise upgrades was that the software continued to be compatible.

Savings

At minimum, the Kansas Unions have realized five hours labor savings per week in programming the event and air handler times. Energy savings are conservatively estimated to be a savings of 10 percent of the unions' annual electrical consumption from this merger alone (P. Beard, personal communication, March 27, 2006). Additionally, while in 2005 most campuses experienced double-digit percentage increases in utility costs, the Kansas Memorial Union and Burge Union were the lowest per square foot of unions in the Big 12. Beard said:

We credit the EMS systems being combined as a big part of why it is as low as it is. ... With today's utility costs going up and up, people are paying more attention to these types of energy conservation opportunities. Our original intent was geared more toward labor savings in that we had to assign a person to enter every start/stop time for each day. With the Johnson Controls EMS receiving these times from the Dean Evans EMS, it is done automatically. We reap both labor and energy savings. (personal communication, March 27, 2006)

Currently, the University of Kansas is the only institution using this particular interface, although other campus-

es have inquired about it (T. Scheck, October 4, 2005). Streamside Solutions does promote the interface on its Web site as a product, though some customization is required. A future version will be more of an "out of the box" solution (T. Scheck, personal communication, October 4, 2005).

As a professional at one of many campuses looking for innovative ways to lower utility and staffing costs in their facilities, Beard said:

This has truly proven to be arguably one of the best combined labor and energy savings projects we have accomplished, and these savings continue every day we operate with little or no tweaking beyond the initial reservation entry. ... We feel that this move has saved us more money than any of several energy management projects we have taken on over the years and it just keeps on paying us back more. ... We've come a long way from the Big Book and the 22 (over and over) rewritings of the customer name. (personal communication, March 27, 2006)

REFERENCES

- Beard, P. (2005). University of Kansas student unions save \$20,000+ yearly through "EMS Scheduler" HVAC interface: Facility heating and cooling automatically adjusts based on event data from EMS Enterprise, A case study. Available at www.streamsidesolutions.com.
- Streamside Solutions. (2004). EMS Scheduler. Available at www.streamsidesolutions.com.