CASE STUDY

ensuring environmental integrity

Greening the Maroon and Gold

The Biodesign Institute at Arizona State University

Background

At a cost of nearly $150,000,000, the 350,000 square foot, award-winning Biodesign Institute at ASU represents the State of Arizona's largest research infrastructure investment in bioscience-related research. ASU is the first university in the U.S. to create an interdisciplinary research Institute entirely devoted to bio-inspired innovation principles. This facility represents a vast expansion of ASU's state-of-the-art research capacity while still serving the core mission of finding solutions to some of society's largest challenges.

Biodesign Institute at ASU

The Situation

Arizona State University needed a scientific research space where experts from a variety of scientific disciplines could seamlessly collaborate on attainable solutions to global challenges. With a hands-on approach, the design team and university researchers sought to understand the unique ways in which researchers work and the way the facility operates. The goal was to create a ground-breaking facility meeting the needs of researchers while achieving the University's ambitious operating goals for the Institute. That goal was achieved in 2006 when they received Lab of the Year recognition.

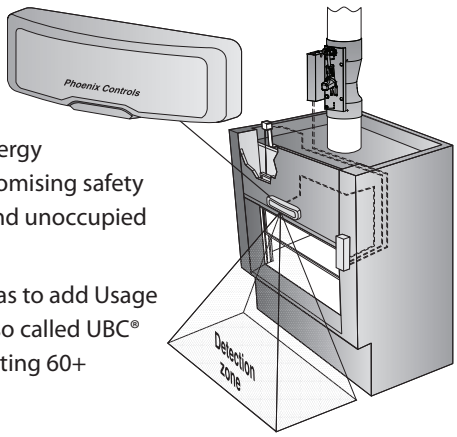
ASU did not stop at The Biodesign Institute. The University created a program called Greening the Maroon and Gold. They recognized that even though The Biodesign Institute achieved many sustainable awards including *LEED Platinum* there was still more that could be done. Starting in 2007, Facility Operations set out to meter, monitor, and manage operational performance. Although their focus was on all things sustainable, including recycling programs, reducing energy consumption was a primary target. Through their monitoring program they quickly found out that the lab HVAC systems contributed to nearly 74% of the operating costs. Proposals to reduce energy use with a focus on lab airflow were quickly set in motion.

The Solution

Lab ventilation design requires flexible precision devices capable of coordinating safety with energy conservation measures, while reducing HVAC maintenance. Fortunately, precision airflow control devices like Phoenix Controls Accel® II valves possess the accuracy and turndown capabilities that can enable energy savings and maintain safety for critical spaces.

According to Michael McLeod, Director of Research Infrastructure at The Biodesign Institute, "The Phoenix Control valves were chosen for their known reliability in operation. Since installation, their flexible capacities have helped facilitate and propelled our sustainability programs".

The first step was to target the airflow control strategy converting constant volume (CVV) airflow to variable volume (VAV) airflow. This conversion allowed the facility to manage conditioned air more effectively and take advantage of demand-based ventilation systems in the general labs and vivariums. Phoenix Controls valves can achieve up to a 20:1 turndown with ± 5% error of commanded flow; helping to ensure reduced energy use but not compromising safety during occupied and unoccupied times.



The second step was to add Usage Based Controls® also called UBC® solution to the existing 60+

VAV fume hoods. "It was a very natural kind of control systems evolution," says McLeod. "The Phoenix Controls supporting devices gave us the accuracy and dependability that allow us to manage our airflow right down at the user level." UBC solution includes a Zone Presence Sensor® also called ZPS® sensor and a Fume Hood Monitor (FHM):

The ZPS sensor - Identifies occupancy in front of the fume hood. When the fume hood is unoccupied the face velocity and airflow is turned down and reduced by 40%. When the fume hood becomes occupied, the face velocity is increased to its specified level, creating a safe environment for the researcher. Since occupancy in front of the hood is minimal for most experiments, there is a significant opportunity to save energy.

The FHM - Supports additional energy saving benefits at the fume hood; providing visual and audible indications of face velocity and fume hood status. Especially for energy savings, the FHM provides an indication of energy waste based on sash position or if the sash has been left open. It can also put an unused fume hood into Hibernation mode, if no chemicals are being stored in the hood cabinet or in the hood itself.

The third step was to add Fan Static Reset (FSR) kits to the lab HVAC duct work. The FSR allows the BAS to monitor the fan static across a few select valves to ensure proper static is being achieved during operation. If the BAS sees that the static in the duct work is too high it can trim the fan; allowing the facility to operate with only the fan static necessary to maintain proper air pressure.

The Result

The benefits of upgrading from CVV to VAV and VAV with UBC, was more than financially rewarding – it helped the institute meet their goal of reducing carbon footprint. With VAV airflow

control, they could take advantage of the demand-based ventilation system. As a result, on average the general lab areas air changes per hour (ACH) were decreased from 12 to 4 during occupied times. In the vivariums, going from CVV to VAV with demand based ventilation reduced the ACH from 20 to 10. In addition, the 66 hoods upgraded with UBC controls contributed to nearly $4000 of annual savings per hood — a 30% reduction in carbon footprint from the hoods alone. All the upgrades preformed to the HVAC system at the Biodesign Institute created dramatic savings trending to more than $1 Million dollars over the next 4 years.

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