CASE STUDY 4 THE BUSCH STUDENT CENTER

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PURAFIL PROVIDES THE ENERSAVE PROGRAM

4 THE BUSCH STUDENT CENTER AT ST. LOUIS UNIVERSITY

ABOUT THE BUSCH STUDENT CENTER

Since 1967 the Busch Memorial Center, located in the heart of the campus at 20 North Grand Boulevard, has been the core of St. Louis University, serving numerous students and visitors. After nearly four decades of use, an extreme renovation was needed to modernize and expand the facility. A larger, more comfortable place was needed for students and visitors to socialize and relax.

THE PROBLEM

In May 2001 the St. Louis University board of trustees approved a proposal for the renovation and expansion of the Busch Memorial Center into a modern student and alumni center. Renamed the Busch Student Center, the expanded building would be large enough to host major events and provide a central point for campus extracurricular activities.

Construction on the 42,000-square-foot design-build expansion and 110,000-square-foot renovation began in June 2002. All three floors of the existing student center were renovated, and a two-story section was added on the west side. The Busch Student Center now features 20,0000-square-feet of conference center meeting space, breakout facilities and a ballroom large enough to host concerts, small theatrical productions and dinner parties.

Part of renovating the student center into a state-of-the-art facility included upgrading the HVAC systems. The challenge was making the building more efficient (conserving energy) while also maintaining indoor air quality per ASHRAE standards.

PURAFIL PROVIDES THE SOLUTION

According to the Department of Energy, space conditioning – heating, cooling, and ventilation – represents the single largest energy use in buildings. Fortunately, ASHRAE Standard 62, Ventilation for Acceptable Indoor Air Quality, addresses the need to conserve energy and permits the use of innovative ventilation practices.

TABLE 1

TOTAL AREA (ft^2)	OCCUPANCY	SUPPLY AIR (cfm)	OUTSIDE AIR (cfm)	
			VR	IAQ
3,925	400	400	6,000	2,000

Prior to implementing Enersave, the Busch Student Center used the Ventilation Rate Procedure (VR) to provide adequate space conditioning for its occupants. While much attention has been given to the VR Procedure, the less known Indoor Air Quality (IAQ) Procedure is a more valuable tool in balancing IAQ and energy consumption. The VR Procedure allows for outdoor air to be used to dilute indoor pollutants and sets the minimum rate at 15 to 20 cfm per person. However, flushing the indoor environment is only an indirect solution for improving IAQ (assuming the outdoor air is of acceptable quality), and the subsequent demand in energy required to condition the outdoor air is far from cost efficient.

Alternatively, the IAQ Procedure allows for a reduction in outdoor airflow rates, providing recirculation air is properly cleaned. The required recirculation rate can be determined based on contaminant concentrations, the efficiency of the air-cleaning system and other factors defined in the ASHRAE Standard. The IAQ procedure is intended to provide a direct solution for improving IAQ, while reducing HVAC system operating costs.

Mechanical contractors from Murphy Company asked local Purafil representative John Waites of Waites Company to help with the new building design in terms of energy usage. As an alternative to the VR Procedure, Waites Company implemented Enersave, an energy-savings program that reduces the need for outside air and still meets ASHRAE 62's IAQ requirements. Purafil's Enersave program is the result of 24 years of experience in troubleshooting IAQ problems and continued investments in product development. Based on the revised ASHRAE 62 standard, Purafil is able to provide the backup documentation necessary for compliance with the standard. Enersave is an all-inclusive program encompassing:

- Superior Purafil filtration
- ASHRAE 62 supporting documentation
- Monitoring for ongoing compliance with the standard

With the Enersave program, building owners can reduce the amount of outside air brought into the building for significant savings on energy and operational costs.

As part of the Enersave program, Purafil also used Purafilters®, a combination chemical and particulate filter designed to replace existing particulate filters, thus eliminating additional costs. Purafil engineers are the first to successfully suspend sodium permanganate adsorbents in a bi-component fiber matrix. Chemical filtration systems utilizing sodium permanganate remove a broader range of contaminants than carbon-only filters and exhibit higher efficiencies. Because of the Purafilter's broad-spectrum removal capabilities, it is the only chemical filter capable of meeting the stringent requirements of ASHRAE 62's Indoor Air Quality (IAQ) Procedure.

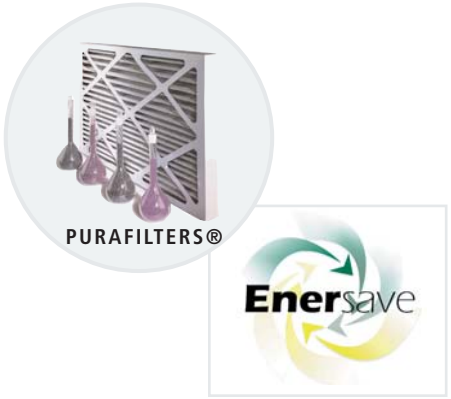
CUSTOMER SATISFACTION

The Enersave program took just two months to implement, and St. Louis University was very pleased with the application. The school reduced outside air requirements while saving thousands of dollars on potential capital and operational costs.

Representatives from Murphy Company were also extremely satisfied with the results, and they plan to work with Purafil on upcoming projects.

ONGOING SERVICES

Purafil offers several value-added services as part of Enersave. On a regular basis, representatives change out the Purafilters to monitor the installation. They also provide a documentation package that includes a report comparing the Purafilter's efficiency against each contaminant in each zone of the building.



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CASE STUDY 4 UNIVERSITY OF VIRGINIA'S SCOTT STADIUM

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PURAFIL PROVIDES CLEAN RECIRCULATION AIR

4 UNIVERSITY OF VIRGINIA'S SCOTT STADIUM

ABOUT SCOTT STADIUM

Located approximately 120 miles from Washington, D.C., the University of Virginia's (UVA) Scott Stadium is considered one of the most beautiful stadiums anywhere, with the Monticello Mountain as a backdrop and the Blue Ridge Mountains on the horizon. After a landmark $25-million grant in June of 1997 from the UVa alumnus Carl W. Smith – a lineman during the late 1940s and early 1950s – the university embarked on a three-year plan to renovate Scott Stadium, home of the Virginia Cavaliers, and increase its capacity from 40,000 to over 60,000.

THE PROBLEM

After a landmark $25-million grant in June of 1997 from the UVA alumnus Carl W. Smith – a lineman during the late 1940s and early 1950s – the university embarked on a three-year plan to renovate Scott Stadium, home of the Virginia Cavaliers, and increase its capacity from 40,000 to over 60,000.

The renovation presented a unique challenge to Heery International Engineering, the project's head firm. Each of the stadium's 44 existing restrooms relied on ventilation ductwork to dilute odors and provide fresh indoor air. Expanding the stadium's seating capacity would require Heery International Engineering to build new and more sophisticated ductwork.

Instead, the firm instructed Southern Air, the project's appointed contractor, to install ventilators with an "air cleaning" capability. Southern Air called Purafil's representative in Virginia.

"It would have been difficult – and costly – to duct the restroom exhaust air out of the stadium," explained Joe George with Southern Air. "We had worked with Purafil on previous projects and knew that with their expertise we could find a more efficient and economical solution."

PURAFIL PROVIDES THE SOLUTION

Purafil, Inc. is one of the leading manufacturers of gas-phase air filtration systems. Purafil's technology is based on the use of dry chemical, air cleaning pellets, or "media", which eliminate airborne pollutants via adsorption, absorption, and/or chemisorption.

Purafil engineers designed a custom air purification unit to meet the specifications outlined by project engineers. The result was a self-contained unit that sits above the restroom ceiling, with only the air inlet grille (the size of a ceiling tile) visible from the room. Sized to meet an airflow of 75 CFM (127 m^3/hr), the unit itself measures approximately 16 inches in height and contains a disposable module with Purafil® Select CP Blend media.

The unit draws air from the room, through an inlet grille, and into a small plenum area. Next, air is forced through a single pass of Purafil Select CP Blend media, where a chemical reaction occurs and odorous pollutants are transformed into non-toxic solids.

This process is essentially instantaneous and irreversible. Lastly, clean air is discharged back into the environment. Purafil's systems allowed the university to clean and recirculate air that would previously have been exhausted. The Indoor Air Quality Procedure, outlined in ASHRAE Standard 62.01-2004, allows for ventilation air to be reduced to below standard levels, so long as recirculation air is acceptable for human occupants.

CUSTOMER SATISFACTION

"With Purafil's systems, we reduced the HVAC system load and eliminated the need to build complex ductwork – a major savings to the university," explained Mike O'Hare with Southeastern Engineering Sales, Purafil's local representative.

Also, by reducing the demand on the HVAC system to heat and cool ventilation air, the university would save on energy costs– another benefit of gas-phase air filtration technology.

"We chose Purafil's Select CP Blend media because it removes more odors than activated carbon alone," stated O'Hare.

The renovation project was completed at the beginning of the UVA's 64th college football season. All are pleased to report that Purafil's air filtration units are operating effectively. When it comes to clean air, the Virginia Cavaliers can expect a winning season.

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CASE STUDY 4 THE CENTURY CENTER

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PURAFIL SAVES OVER $300,000 IN CAPITAL EQUIPMENT PURCHASES

4 AN ATLANTA OFFICE BUILDING

ABOUT THE CENTURY CENTER

Owned and managed by Highwoods Properties, 1800 Century Center is an 18-story commercial office building in Atlanta, Georgia that faced possible upgrades in excess of $300,000 when a high-occupancy tenant moved into the entire facility. Constructed in the late 1970s, 1800 Century Center could not provide adequate outside air for the added number of people.

THE PROBLEM

To comply with current codes, including minimum outside air requirements for increased occupancy, Highwoods potentially had to make the following extensive renovations:

- adding a new make-up air unit (MUA) to the roof
- renovating the building's structure to handle the weight of the MUA
- installing new duct from the basement to the roof to accommodate more outside air.

Highwoods sought a feasible, cost-effective way to avoid purchasing new equipment and restructuring the facility. Engineers from McKenney's Mechanical Contractors and Engineers handled the tenant upgrade and brought in Purafil and local representative Kathy Nix (AirEnergy, Inc.) to help.

PURAFIL PROVIDES THE SOLUTION

Purafil representatives implemented Enersave, an energy-savings program that reduces the need for outside air and still meets ASHRAE 62-2001's indoor air quality (IAQ) requirements. Using ASHRAE 62's IAQ Procedure, Purafil engineers developed an IAQ model to verify that Enersave would work in Century Center from an environmental standpoint. They recalculated outside air requirements and accommodated building conditions that existed before the tenant change.

As part of Enersave, Purafil installed two-inch Purafilters® as prefilters on every floor's air handling unit. Each Purafilter had a MERV-8 particulate filter and contained Purafil CPS Blend™ media, a 50/50 volume blend of premium grade activated carbon (Purakol® media) and potassium permanganate-impregnated alumina (Purafil® Chemisorbant media) to remove a broad spectrum of contaminants.

CUSTOMER SATISFACTION

Highwoods Properties was completely satisfied with Enersave, which allowed them to reduce the amount of outside air brought into the building, control gaseous contaminants, and recirculate clean air. By using Purafil's energy-savings program, Highwoods saved over $300,000 in capital equipment purchases, and they resigned their contract at the end of the first year.

ENERSAVE

Enersave is designed for new, existing, or rework applications and uses the Purafilter, which contains air-cleaning adsorbents to control pollution. The Purafilter is made to replace existing particulate filters, thus eliminating additional capital costs. Complying with ASHRAE-62 2001, Enersave recirculates clean air and provides documentation and ongoing monitoring reports. The program's method of reducing outside air can be implemented for no additional capital and allows for significant savings on energy and operational costs.

ONGOING SERVICES

Purafil offers several value-added services as part of Enersave. On a regular basis, representatives change out Purafilters to monitor the installation. They also provide a documentation package that includes a report comparing the Purafilter's efficiency against each contaminant in each zone of the building.

ABOUT THE PARTIES

Purafil, Inc. develops gas-phase air purification systems that protect people, electronics, and priceless artifacts from the damaging effects of gaseous airborne contaminants. Contact Purafil at (770) 662-8545 or (800) 222-6367 for immediate assistance with your air quality concerns.

Highwoods Properties, Inc. is a self-administered real estate investment trust that provides leasing, management, development, construction, and other tenant-related services for its properties and for third parties. Highwoods is one of the nation's largest fully integrated real estate operating companies.

McKenney's, Inc. focuses on heating and air conditioning, plumbing, process piping, sheet metal, service, and energy management for buildings. The firm responds to mechanical design, construction, automation, and service requirements in the Atlanta, Charlotte, and Chattanooga markets.