

# Community College Controls Costs and Temperatures with Modular VAV Systems

*Seven SMC™ Modules and PIM™ Units Control Modular VAV Systems*

SCOTTVILLE, Michigan – West Shore Community College located about seven miles east of Lake Michigan in Scottville, Michigan, was founded in 1967 to meet ongoing educational and training needs in the five-county area surrounding Scottville. There are four primary instruction facilities on the picturesque, 360-acre campus: the Recreational Center, Media Center, Campus Center and the Technical Center.

When the college upgraded and added new facilities, it installed modular VAV systems supplied by Acutherm. Now, several years later, the college finds that the systems—including Therma-Fuser TF-HC modular diffusers, System Control Modules (SMC™) to control rooftop units and Pressure Independent Modules (PIM™) to control static pressure—have more than met its expectations.

## Big Spaces, Limited Budget. Big Savings.

In the early 1990s, it became evident that the school needed more room. Prospective students clamored to get into the popular nursing program, but physical space limitations precluded many. In addition, the ad-

vent and rapid growth of computer technology required the addition of computer laboratories, including those for computer-aided design and computer-aided manufacturing.

According to Dan Yanna, director of the physical plant for West Shore, the school decided to expand the Technical Center by adding 46,000-square-feet. Unfortunately, like most

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publicly funded educational institutions, West Shore also faced tight budgetary restraints, in terms of both the remodeling effort itself and subsequent service and maintenance costs. The school had \$3.984 million available to upgrade and expand the Technical Center in three phases. However, the availability of funding for the final phase was uncertain.

"The new wing actually came in slightly under budget," says Yanna. "Siraj Khan, PE, CIPE, the project engineer for Giffel's Consultants, the architect/engineering firm selected for the project, recommended mov-

ing to a Therma-Fuser™ modular heating and cooling system. This was a contributing factor in meeting budgetary constraints. In addition, the Therma-Fuser modular VAV units have cut by half, both the time and costs required to maintain and service the HVAC system."

## Cost and Comfort Concerns

An HVAC design concept was required that would accommodate the planned utilization of the funds and building expansion in phases. Moreover, the design concept had to provide the maximum comfort level in the individual spaces—in terms of temperature, humidity and minimal noise—while reducing energy costs. The school also wanted to simplify potential maintenance problems and operational costs.

To control costs and facilitate energy savings, the college first considered expanding its existing boiler plant and adding constant volume air handling units with hot water coils and separate thermostats in key areas. Unfortunately, this option was prohibitively expensive and offered little, if any, promise for lower maintenance costs or energy savings.

The college offers both day and night classes. The HVAC systems also had to satisfy day and night heating and cooling requirements for many different types of spaces: empty classrooms, crowded classrooms, and heat-generating computer equipment, among others. Controlling the temperature within these different spaces would accomplish two key goals.

First, it would ensure a comfortable learning environment for both students and teachers. Recent research by the Building Owners and Management Association (BOMA)

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West Shore Community College — Technical Center.



indicates that a comfortable temperature and good air quality within the workspace actually increase worker productivity. The same holds true for students in the classroom. In the existing building, the school relied on thermostats that responded only to the temperature of the room in which they were located, leaving other rooms either too hot or too cold.

In addition to the comfort factor, smaller zones would yield energy savings, by delivering air to the space only when necessary. Yanna estimates that the modular VAV system cuts energy costs by 15 to 20 percent, when compared to the conventional constant volume system in the older part of the building.

"Therma-Fuser modular VAV units provide much smaller zoning," says Yanna. "And, within those small zones, they maintain the temperature to within one and a half degrees of the set point. They shut down when it is too cool or too hot which means that the school doesn't pay for air conditioning that isn't needed."

Space was an additional concern. Every foot of floor space was needed for classrooms and labs: the college did not want to waste precious square footage for mechanical equipment. In addition, to maintain the same aesthetic look, only 12 to 14 inches of ceiling space was available for the ductwork, making it difficult to use standard variable volume boxes.

## Modular VAV

To manage these problems, Khan recommended seven separate packaged constant volume heating and cooling rooftop units to serve seven separate areas within the new addition: five teaching areas comprising classrooms, offices and a laboratory for nursing; a business area including four additional laboratories and offices; and a teaching and counseling area with a lobby, a conference room and additional offices.

Khan further recommended 145 Therma-Fuser TF-HC units to control supply air to the spaces, seven SMC modules to control the rooftop units, and seven PIMs to control static pressure. The result: each area would be serviced through a modular VAV system based on a design concept offered by Acutherm, the designer and manufacturer of Therma-Fuser systems.



*Dan Yanna, Director of the Physical Plant,  
West Shore Community College.*

The cost for the modular VAV system was also substantially lower than for the constant volume system originally proposed. The school decided to proceed with Acutherm's modular VAV design concept.

In this concept, supply air is delivered through low-pressure ducting to the TF-HC Therma-Fuser modules. These self-contained units automatically change to heating or cooling in response to supply temperature. Room temperature can be adjusted individually for heating and cooling within a range of 70° to 78°F. The air volume supplied to a space is only the volume required to maintain the space temperature, and a minimum

*"I have been more than pleasantly surprised with the Therma-Fuser modular VAV concept."*

quantity of supply air maintains good quality ventilation. This helps cut operating costs in addition to maintaining a comfortable room temperature.

Return air is ducted back to each rooftop unit. Static pressure in the supply duct is held constant by modulating a PIM located in a bypass duct between the supply and return air ducts. The PIMs are set to hold the supply static pressure at 0.30 wg. Upon fan shut down, the bypass dampers close and remain closed until the fan restarts. This means that

the fan starts with an open system, which contributes to energy cost savings.

Each SMC module monitors the temperature in its defined area. Therma-Fuser modules equipped with sensors are located in classrooms, laboratories and selected private offices. The SMC module enables Yanna and his team to establish cooling, heating, night set back and night set up temperatures. They can also program the module for 24-hour, 7-day occupancy patterns—for pre-occupancy, occupied and unoccupied modes.

In addition, the SMC module can be preset to determine whether heating or cooling should take precedence in a given area. The system will switch from heating to cooling to ventilation based on the selected priority. Finally, the SMC unit monitors discharge air temperatures and controls the required stages of heating or cooling.

"The Acutherm system came in slightly under budget," says Yanna. "Since its installation, there have been few, if any, complaints in the new part of the Technical Center, despite fluctuations in occupancy and the temperature and humidity extremes experienced in Scottville."

The Acutherm system is estimated to save 15 to 20 percent in energy costs, when compared to the older part of the center running on conventional constant volume systems. Installation costs were low, because no pneumatics and very little wiring was required and the SMC module eliminated the need for complex and costly controls.

"When Giffels first proposed modular VAV, I was skeptical," Yanna continues. "I have had experience with VAV systems in the past that simply didn't perform satisfactorily. I have been more than pleasantly surprised with the Therma-Fuser modular VAV concept. It works well beyond my expectation and has accomplished the goals we set out to achieve."



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