



West Hernando Middle School felt effects of outdated HVAC technology chose Daikin for DOAS and VRV solutions that deliver comfort for occupants and a quick ROI for the school district.

## CASE STUDY

### K-12 Education

#### Name

West Hernando Middle School

#### Location

Brooksville, FL, USA

#### Building size

Building two - 25,514 ft<sup>2</sup>

Building five - 14,990 ft<sup>2</sup>

Building seven - 21,996 ft<sup>2</sup>

#### Issue

Replace outdated HVAC system with energy efficient VRV and DOAS solutions in a challenging building design

#### Solution

(4) Daikin condensing units

(4) Daikin Vision® air handlers

(40) Daikin VRV units

## Daikin Technology Makes the Grade at Florida Middle School Seeking Improved Comfort and Exceptional Energy Savings

### Issues

K-12 students face many daily challenges in school, but having to study and learn in an uncomfortable climate should not be one of them. However, while advanced building systems and technologies are available to eliminate this issue, many school districts struggle to secure funding to properly maintain and update school infrastructure.

A recent study from the National Center for Education Statistics found nearly half of public schools in the U.S. have reported issues with indoor air quality. Students, teachers, and administrators work and learn more productively when physical environments are properly controlled and comfortable. To address aging and outdated building systems and to improve the learning environment for its own students and faculty, Hernando County School District in Brooksville, Florida recently engaged Daikin for an HVAC system overhaul at West Hernando Middle School.

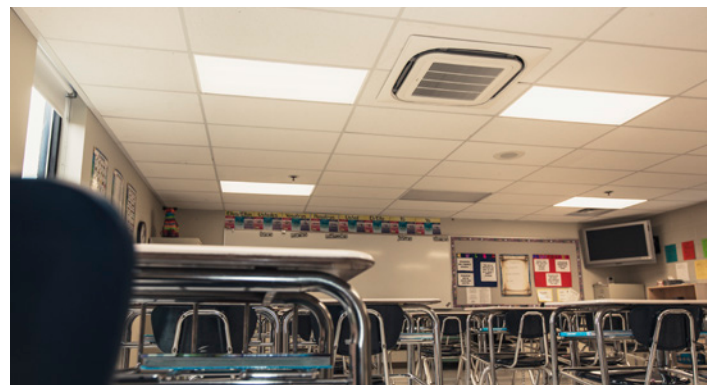
Before the project, infrastructure in the school district saw limited capital upgrades for a number of years. In 2013 capital investment began to increase. In addition, district board members, administrators, and community leaders secured passage of a ½ cent sales tax that also helped contribute to the increase. Erik Van de Boogaard, Hernando Country School District's facility operations director and the district set out to secure funding for critical updates to the middle school campus's building systems. West Hernando Middle School students and faculty were feeling the effects of the campus's outdated HVAC technology and the need to replace equipment at the end of its lifecycle was imminent.

"Our approach to selecting a contractor and HVAC technology for this project did not follow the traditional process," said Van de Boogaard. "We really wanted to hear from the HVAC industry about systems that will be the best fit for this particular campus. Daikin recommended a

split-system dedicated outdoor air system (DOAS) consisting of their rooftop condensing units and indoor air handling units, along with their variable refrigerant volume (VRV) equipment and technology, which we felt was the most innovative, cost effective, and practical solution. That's why we chose them."

In an effort to streamline the construction timeline and minimize costs for the school district, Daikin is acting as general contractor on this project. It is overseeing the design and replacement of the existing water source heat pump system that currently resides above ceilings in each building. Additionally, working closely with a local engineering firm and builder, Daikin will help upgrade building insulation and replace the electrical system with a modern, energy efficient option.

"The building structures do not accommodate traditional HVAC systems and we didn't want to just replace air handling units," said Van de Boogaard. "The new Daikin HVAC equipment and electrical system



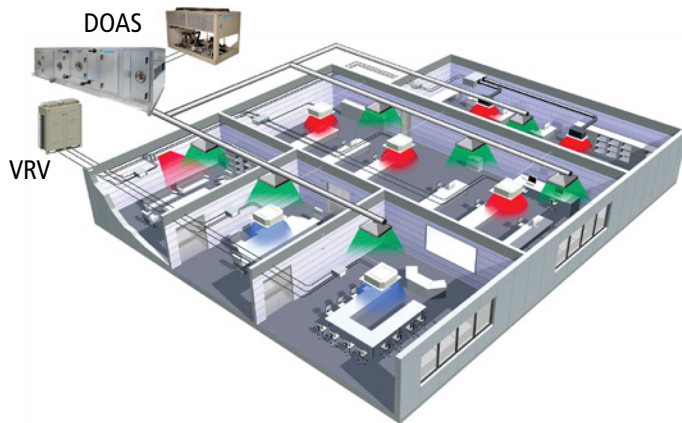
Daikin provides independent zone-based heating and cooling solutions to building structures that can't accommodate traditional HVAC systems.

will work together to better manage building comfort, humidity, and temperature, while also keeping energy costs down.”

## Solution

The project spans seven buildings, each with a different footprint. Incorporating Daikin split-system DOAS equipment for each building retrofit provides conditioned fresh outdoor air to the indoor air space at 70°F and 50% relative humidity. The DOAS equipment is essential to creating an enhanced, comfortable and productive learning environment, as well as meeting ASHRAE’s 62.1 standard for building and ventilation requirements.

The VRV equipment is ideal for the retrofit because it meets the district’s need for a highly energy efficient solution, and the flexible refrigerant-based system can accommodate various building designs. VRV heat recovery technology has been selected for the majority of the project because it allows for independent and simultaneous zone-based heating



*Daikin DOAS and VRV equipment create integrated solutions for buildings needing improved individual zone comfort control and energy savings.*

and cooling. This means that a teacher who has a room with southern exposure can have her room set for cooling while another teacher with a northern exposure could have his room set to heating—all simultaneously, from the same system. Also, the VRV equipment is under warranty for 10 years after install—providing peace of mind to district administrators that maintenance costs are covered for years to come.

In addition to the physical HVAC system, Daikin is building an energy web-based dashboard that enables the facility operations team to access and analyze system data from each building and the collective campus. The dashboard can be accessed remotely and lets users easily log-in to manage utility and electrical information, and make changes to system settings in real time based on trends in energy consumption, weather patterns, or other factors related to building inhabitants and climate.

The middle school project will be completed in three phases and timing for each is critical. Construction on each phase must start and be finished during the summer months, while students and teachers are on summer break and not occupying the campus.

In the summer of 2015, phase one kicked off with a system overhaul at building seven, consisting of 40 tons of added VRV units combined with a split-system DOAS.



*A complex maze of service catwalks needed for old HVAC equipment is removed as part of each building’s renovation process, exposing ample room for new Daikin equipment.*

This building previously contained an especially complex water source heat pump system that ran above the ceiling and stretched the length of the building. Maintenance technicians were forced to enter the attic and walk across a maze of catwalk mezzanines to access pumps, fix problems, or diagnose issues. By replacing the maze with VRV system technology, the ability to access and control the system is now as easy as logging into the web-enabled dashboard to determine settings that need to be changed, or diagnose and quickly address issues.

“The capabilities of HVAC technology have evolved significantly since the last time this campus system was replaced,” said Van de Boogaard. “The ability to remotely access and control the system introduces a user-friendly component that my team will find value in. The controller dashboard will also make training my staff easier. The intuitive features of this system are very beneficial.”

Phase two kicked off in May, 2016 and consisted of updates at two buildings primarily made up of classrooms. For this phase of the project, the school district again opted to install Daikin’s DOAS equipment for improved ventilation, as well as a VRV heat recovery system because it enables zone-based heating and cooling that the teachers can manage. Daikin DOAS and VRV equipment will also be used in the project’s final phase, scheduled to begin at the start of summer 2017.

## Outcome

At the beginning of each construction phase, energy monitors were installed one month prior to construction to accurately measure energy consumption of the existing water source heat pump system. As each DOAS and VRV retrofit phase is completed, the energy monitors again capture and calculate immediate results of the upgrade. The one-month monitoring and comparison of systems before and after the retrofit showed a 40 percent reduction in energy use.

Energy savings measurements were compiled one month before the old equipment was removed and one month after the new Daikin equipment was installed. The middle school realized 40% energy savings that is contributed to use of Daikin’s equipment, overall. These results are assets that Van de Boogaard and school administrators can communicate to the district leadership and school board, to clearly demonstrate ROI of this important and partnered investment.