

Businesses demonstrating the Power of One®—with effective energy choices

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### Innovative HVAC System Offers Comfort, Control, and Energy Savings

Elderly residents of St. Otto's Care Center in Little Falls, Minn., consider the 93-bed nursing facility their home—a place where they receive the best in medical care and personal attention. Their comfort and wellbeing are top priorities for both staff and owners Jim and Kathy Birchem, who bought St. Otto's in 2008 and almost immediately embarked on a major remodeling project.

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*Gary Pallansch, Project Estimator  
Central Minnesota Refrigeration (CMR)*

Over the past two years, St. Otto's has been transformed from a tired and worn facility to a bright, cheerful environment with fresh paint, new flooring, energy-efficient lighting and windows, and attractive furnishings. It also has been retrofitted with an advanced, energy-efficient heating, ventilation and air conditioning (HVAC) system that utilizes cutting-edge technology called variable refrigerant flow zoning (VRFZ).

St. Otto's researched numerous options before choosing a VRFZ system by Mitsubishi, called City Multi®. It offers many benefits conducive to a care center environment, such as simultaneous heating and cooling, individual room controls, a centralized master control system, whisper quiet operation and easy-to-remove, washable filters that improve indoor air quality.

The technology is fairly straightforward. Small heat exchangers installed throughout the building capture excess heat from areas (zones) that are too warm and transfer it to those that are too cold, using refrigerant piped through small-diameter, flexible tubes. Larger centralized units manage the flow and send refrigerant to where it is needed, heating and cooling different parts of the building at the same time for maximum efficiency.

At St. Otto's, thermostats and heat exchangers in each room let residents control the temperature. Owners felt this was important, since some elderly people need their rooms very warm to be comfortable and others prefer them cool. Minimum and maximum set points were programmed into a centralized control system to prevent dramatic fluctuations.

VRFZ has been used in Asia, Europe, and other countries for 30 years, but it is relatively new to the United States and particularly to northern regions. Minnesota Power is studying its cold-climate potential at a pilot commercial site in Cloquet. Based on that system's strong performance, the utility is planning to retrofit some of its own facilities with VRFZ technology.

"I had some concerns (about VRFZ) because it was more expensive than traditional heating and air conditioning systems, but once we looked at the potential efficiency, it made sense," said Jim Bellefeuille, maintenance supervisor, St. Otto's.

Top to bottom: Tanuj Gulati of Energy Management Solutions, Gary Pallansch of Central Minnesota Refrigeration, Jim Bellefeuille of St. Otto's Care Center, and Tim Gallagher and Craig Kedrowski of Minnesota Power; Gary Pallansch of Central Minnesota Refrigeration and Tim Gallagher of Minnesota Power discuss the value and performance of VRFZ; air filters are easy to remove and clean; St. Otto's Care Center in Little Falls, Minn.



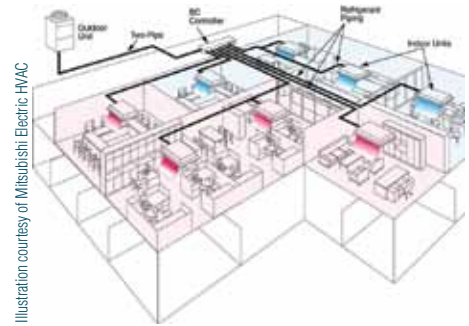


Illustration courtesy of Mitsubishi Electric HVAC



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“Cost was an issue for me, as well, because we really didn’t know how the installation would go or how the system would perform in cold weather,” said Gary Pallansch, project estimator, Central Minnesota Refrigeration (CMR).

Minnesota Power representatives spoke with the project team at St. Otto’s before the remodeling began. They shared their knowledge of VRFZ and discussed **POWER Grant** rebates for the new HVAC system as well as energy-efficient lighting.

Retrofitting St. Otto’s six-wing, 1960s-era concrete building was CMR’s first experience with VRFZ technology. A staff member underwent manufacturer-provided training on the Mitsubishi system prior to the installation. Crews completed one wing at a time, working quickly to minimize disruption to residents.

“The ease of installation helped keep costs down; it went very quickly once we figured it out,” Pallansch said, noting the small-diameter, flexible refrigerant tubes were run through six-inch holes punched in the concrete and hidden in the walls and ceilings without bulky ductwork or soffets. Actual installation costs came in below the original bid. “I can’t think of a better choice for this type of building.”

Minnesota Power energy consultants estimate the VRFZ system, along with the new energy-efficient lighting and windows, will save St. Otto’s nearly 600,000 kWh in electricity per year and reduce monthly demand by almost 130 kW. The improvements qualified for thousands of dollars in **POWER Grant** rebates, based on projected energy savings.

The first units were put in service late in 2009, and early performance results are exceeding expectations. St. Otto’s has backup steam heat through a district energy system owned by the adjacent St. Gabriel’s Hospital, but the VRFZ system has dramatically reduced its dependence on that external heating source.

In addition to energy savings, maintenance personnel appreciate how quiet and easy-to-maintain the system is proving to be. It is a far cry from the facility’s former HVAC “system,” which included radiant heaters in each room and more than 100 window-mounted air conditioners that had to be installed each spring and removed in the fall.

“It was not very efficient,” Bellefeuille said. “By the time we got all of the window units in, we were taking them out again.”

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Clockwise from top left: Centralized controls and rooftop units in each wing manage the flow of refrigerant; the CITY MULTI® system by Mitsubishi Electric HVAC Advanced Products Division, shown in illustration, captures and redistributes heat to areas where it is needed in a building; each room has its own ceiling mounted heat exchange unit and thermostat for resident control and comfort