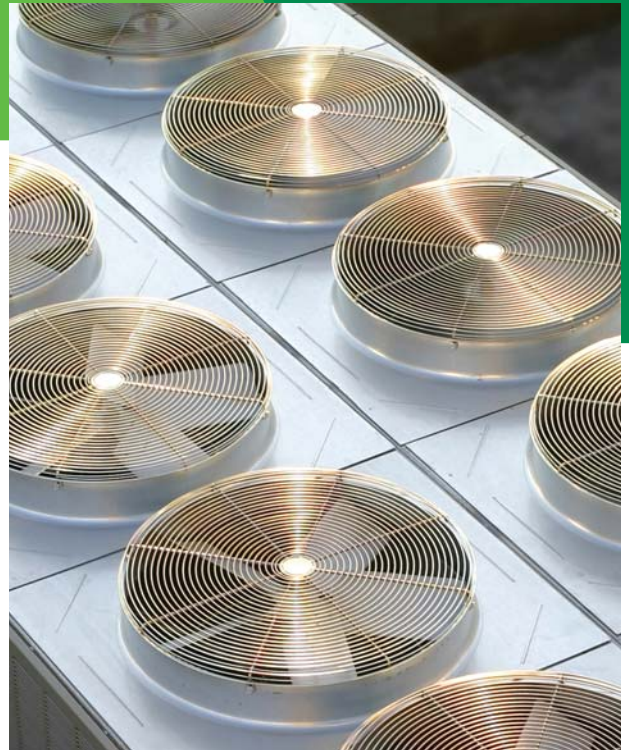


Retail chain reduces HVAC energy consumption with variable frequency drives (VFDs)



Result

- Intelligently optimized air-handler fan speeds and air volumes to meet demand
- Reduced energy consumption of roof-top HVAC fan motors by 52 percent
- Average daily energy savings of 18,776 kWh
- Saved \$887,861 in one year across 78 stores

Application

Retail HVAC

Customer

A department store chain with more than 1,000 stores in the United States.

Challenge

A department store chain with more than 1,000 stores in the United States wanted to reduce its energy consumption without impacting customer comfort.

HVAC air-handler blower capacity is sized for peak air conditioning requirements, but HVAC systems frequently operate at only a fraction of air-handler capacity during cooling, heating or ventilation periods. Without speed modulation, HVAC fan motors run at a constant speed and volume throughout the different operating modes, wasting energy and money. Continuously running at maximum capacity also reduces the lifetime of the equipment.

Building loads are not constant, but air flow must be adjusted to provide occupancy comfort. Mechanical throttling has traditionally been used in HVAC systems to reduce air flow, but the motors continue to operate at full speed regardless of the heating or cooling load on the system. Fan speed modulation is the efficient alternative.

System operating efficiency can be improved with variable frequency drives. Fan motors only need to run at full speed during peak load periods, and can be slowed down during other periods without sacrificing occupancy comfort. If a motor can be slowed

down by just 25 percent of its normal operating speed, energy use is reduced by 50-60 percent.

Solution

Seeing rooftop HVAC units as a source of significant energy consumption in the stores, Emerson devised an energy reduction strategy using variable frequency drives (VFDs) on air-handler blower motors in 78 California stores.

Through close collaboration with the stores, the drives were pre-programmed to intelligently modulate the fan motors' speed while ensuring optimum store conditions. VFDs can reduce fan speed and air volume by 10 percent during cooling periods, 15 percent during heating periods, and 50 percent during ventilation periods with no impact on customer comfort or equipment operation.

These fan speed reductions lead to substantial energy savings as a fan motor running at 80 percent of maximum speed consumes only half the power. This non-linear speed-to-power relationship manifests itself in energy reductions of up to 27 percent during cooling periods, 35 percent during heating periods, and 85 percent during ventilation periods.

The store quickly recognized the energy and expense savings benefit of Emerson's variable frequency drive programs. Their investment in VFDs led to a 52 percent reduction in HVAC energy consumption and saved them more than \$800,000 in the first year of deployment – equivalent to adding \$10 million in sales at an 8% percent margin! Ongoing consumption avoidance mitigates rising energy rates and directly impacts the bottom line. As a result, the chain is actively installing VFDs enterprise-wide.

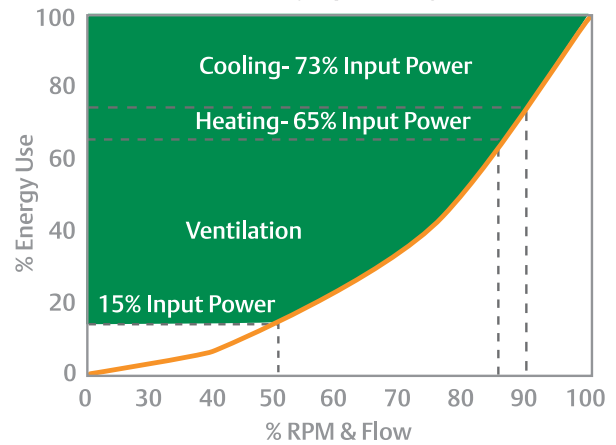
There are two platforms for the Copeland™ commercial HVACR VFD: EVM and EVH. The Copeland EVM VFD series, covering ½ to 30 HP, has single and three phase input options and is simple to use with Bluetooth® onboard.

The EVH VFD series, covering 1 to 250 HP, has three phase options including 575-volt and expanded control functions to handle applications requiring more advanced control functionality.



Copeland commercial HVACR variable frequency drive EVM Series

Energy savings due to RPM reduction by operating mode



Average energy consumption reduced by 52%

