

Retail chain reduces HVAC energy consumption by 52% with VFDs

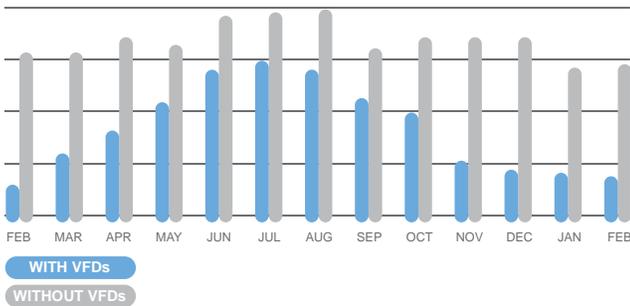


Result

Energy savings due to RPM reduction by operating mode:

- 15% input power – 50% RPM and flow
- 65% heating input power – 86% RPM and flow
- 73% cooling input power – 90% RPM and flow

AVERAGE ENERGY CONSUMPTION REDUCED BY 52%



Summary of results



78

VFD equipped stores

ENERGY SAVINGS



19,776 kWh

Average daily savings

7,218,317 kWh

Annually

COST SAVINGS



\$887,861

Annually
@ \$0.123/kWh

ENVIRONMENTAL IMPACT



11,177,344 lbs.

Avoided CO₂ emissions



4,531

Equivalent barrels of oil

Customer

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

Challenge

Reduce their stores' energy consumption without affecting customer comfort.



Solution

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.

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

Emerson's industry-leading Affinity VFDs were used to facilitate modulation strategies for the fan motors.

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.



“We quickly recognized the energy and expense savings benefits of Emerson's Variable Frequency Drive programs.”

How Emerson reduced operational costs for the client

