Retail chain reduces HVAC energy consumption by 52%

Result

- Intelligently optimized air handler fan speeds and air volumes to meet demand.
- Reduced the energy consumption of roof-top HVAC Fan motors by 52 percent.
- Saved $887,861 in one year across 78 stores.

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.

Solution

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

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.

Emerson first installed our industry leading Affinity VFDs 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 dur-

Case Study
Box Retail – Department Store

EMERSON
Climate Technologies

ing 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% 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% 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.

Process

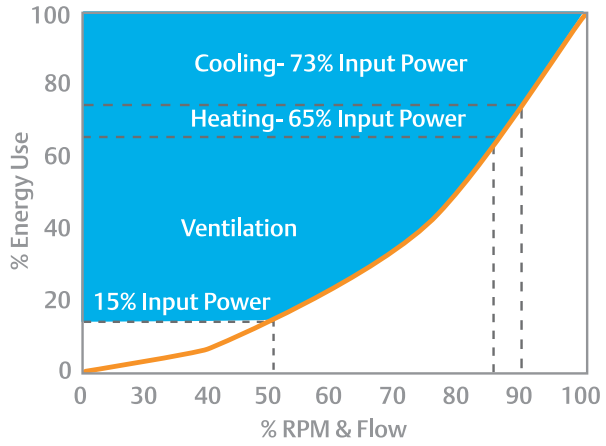
The improvement process begins with a rigorous analysis of enterprise energy data. Emerson engineers review/analyze your operations for savings opportunities and design a pilot program that yields quantifiable results to meet your objectives. By using an engagement approach where the results are proven through a pilot program and then deployed across the enterprise, Emerson effectively and systematically reduces your operational costs.

- Pilot store selection
- Establish baseline
- Initiate services
- Measure and report impact
- Periodic results assessment
- Enterprise agreement and deplayment

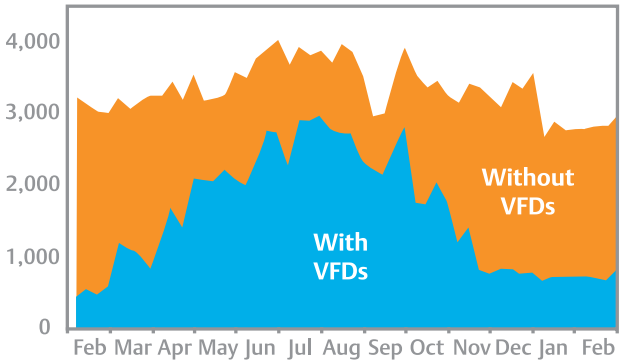
Results Summary

VFD Equipped Stores	Avg Daily Energy Savings	Annual Energy Savings	Annual Savings @ $0.123/ kWh	Avoided CO_2 Emissions	Equivalent Barrels of Oil
78	19,776 kWh	7218,387 kWh	$887,861	11,188,344 lbs.	4,531

Energy savings due to RPM reduction by operating mode



Average energy consumption reduced by 52%



EmersonClimate.com