

ADVANCED RTU CAMPAIGN

Overview

JCPenney is a major apparel and home furnishing retailer with approximately 1,020 locations throughout the United States. JCPenney integrates many opportunities for increased energy efficiency with electrical and mechanical systems, and their stores are equipped with modern monitoring and control equipment.

In order to streamline efforts for eliminating inefficiencies, JCPenney pursued a pilot program for RTU variable frequency drive (VFD) technology. Following the successful pilot program, JCPenney retrofitted 1,330 rooftop units in 130 additional stores with the VFD retrofit solution. The company recognized savings of as much as 47,800,000 kWh, a 22% reduction from before the VFD retrofit and a monetary savings of as much as \$5 million.

Project Drivers

The management team at JCPenney was tasked with uncovering inefficiencies and pursuing projects that would manage costs. The engineering, energy management, facilities and maintenance teams identified 131 of their current prototype standalone stores as ideal candidates for these RTU retrofits. The sole purpose of the retrofit was simple: decrease energy consumption and maintain or increase occupant comfort and environmental conditions.

Prior to a national rollout program JCPenney chose a prototypical store in Flower Mound, Texas for a pilot test. Built in 2006, this store is approximately 100,000 square feet and conditioned with 12 RTUs. The retrofit package had an estimated simple payback of 1.7 years.

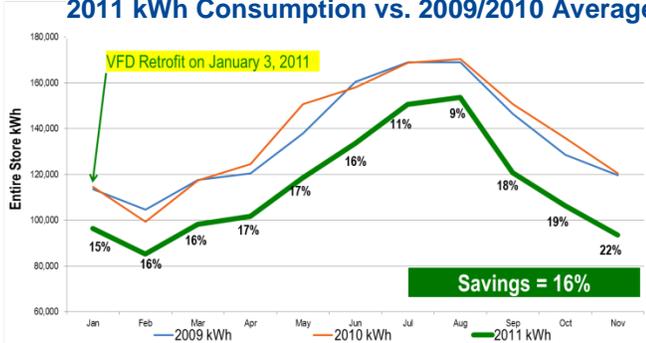


VFD Retrofit Results	
Energy Savings	47,800,000 kWh spread over 131 locations, a 22% reduction from before the VFD retrofit
Utility Savings	As much as \$5 million in annual utility costs
Simple Payback	Less than one year.
Installation and Maintenance	Each RTU is equipped with a variable frequency drive and a control interface board that matches fan speed to each RTU's particular air flow requirements for cooling, heating and ventilating. During installation on each RTU, air flow measurements are used to determine the best air flow settings for each operation mode. VFDs perform a "soft start" on electric motors, extending motor and belt life.
Overall Performance	Additional energy savings were achieved with no compromise to customer comfort.

Texas Pilot Test Store RTU Details

The pilot store RTU retrofits resulted in energy savings of 16% compared to the total electricity consumption from the previous two years. Preliminary results from the pilot test convinced the JCPenney team that the retrofit project would yield even greater savings than the preliminary expectations. The pilot store paid for itself after only 8 months.

Texas Pilot Test Store: 2011 kWh Consumption vs. 2009/2010 Average



Implementation

JCPenney's interval data recording plots displayed the immediate benefit and savings at the pilot store. Based on better-than-expected results, the decision was made to implement the VFD retrofits at the 130 remaining stores within the next few months.

RTU's less than 10 years old can be given new (efficiency) life by retrofitting with a load-matching fan control technology. Each RTU is equipped with a VFD and a control interface board that matches fan speed to each RTU's particular air flow requirements for cooling, heating and ventilating.

During installation on each RTU, air flow measurements are used to determine the best air flow settings for each operation mode. This customized approach provides additional energy savings while ensuring no compromise to customer comfort.

The VFD's also perform a "soft start" on electric motors which has several benefits that include extended motor and belt life as well as improved power factor.

Results

The entire RTU retrofit rollout resulted in a simple payback of less than one year. Over the course of 19 months, JCPenney reduced their total kWh usage an average of 14% per month with an annualized cost

JCPenney Organizational Profile

Established	1902
Number of Facilities	1,020 stores
Employees	114,000 associates
Project Scope	RTU retrofit pilot expanded to 131 stores with 1330 RTUs

savings of \$3.6M by simply installing the VFD technology with on-site air flow calibration to existing RTUs. Also worth noting, utility rebate programs added an additional 10 percent cost reduction which was not included in the payback.

The most recent report, comparing energy and cost data from prior to the VFD installation to 2014 data shows savings of as much as 47,800,000 kWh, a 22% reduction from before the VFD retrofit and a monetary savings of as much as \$5 million.

Next Steps

Since the VFD rollout, JCPenney has added the following conservation measures in each of the 131 stores:

- ▶ "Store Scheduler" (an energy management system (EMS) scheduling tool for JCPenney store leaders)
- ▶ "emap" (an energy management training and awareness program for stores)
- ▶ "AEM" (advanced energy management for stores)
- ▶ EMS revision upgrades.



VFD Retrofit Technology installed on an RTU at the Flower Mound Pilot Store (source: NexRev)