

Electrical Switchgear Manufacturer Realizes Exceptional Savings in VSD Implementation

Through the Department of Energy's Industrial Assessment Center (IAC) located at Tennessee Technological University, Schneider Electric, a company that specializes in medium voltage switchgear, was able to save a significant amount of money from reductions in energy costs. Through recommended actions such as installing variable speed drives (VSDs) on parts washer pumps, recovering waste heat from furnaces, and replacing old lighting, Schneider Electric will be able to save approximately \$27K annually. About half of the recommendations from the assessment have been implemented while other recommendations are projected for future implementation. Further results from this assessment are highlighted throughout the case study.

Applications

The IAC assessment team discovered opportunities to decrease energy usage and thereby increase capacity, improve product quality, and enhance corporate competitiveness. In order to decrease energy usage, the assessment team focused primarily on the parts washer pumps and drying and curing ovens. The results at Schneider Electric will guide IAC assessments at facilities with similar parts washing, drying, and paint curing processes, where savings can be replicated.



Schneider Electric, located in Smyrna, TN, is a manufacturer of medium voltage switchgear. Photo credit Schneider Electric.

Company Background

Schneider Electric, located in Smyrna, TN, is a manufacturer of medium voltage switchgear. The facility is approximately 200,000 ft² in size, has a workforce of 300 people, and uses approximately \$536K of electricity and natural gas annually. Schneider, as a company, has dedicated itself to a mission to be an industry leader in energy efficiency and environmental responsibility. Schneider is currently working towards ISO 50001 certification, and is a Better Buildings Better Plants partner. The Smyrna location is considered Schneider's "flagship" for energy efficiency. Prior to the IAC assessment, Schneider had reduced its energy usage by revamping its compressed air system, replacing many outdated light fixtures, and installing a building automation system capable of demand shedding. Schneider had installed a solar field on its property capable of producing 1 MW.

Assessment Approach

A team of students and faculty from the IAC at Tennessee Technological University performed an industrial assessment at Schneider Electric in Smyrna, TN, on September 27, 2010. The assessment was led by Director and Associate Professor of Mechanical Engineering, Dr. Glenn Cunningham, Assistant Director Dr. Kenneth Currie, and Lead Student, Randall Hodges.

Assessment At A Glance

- Identified four recommendations with overall potential annual energy cost savings of \$27K
- Recommendations saved approximately 5% of total annual energy costs
- 57% of recommendations implemented

Energy Conservation

The assessment team identified energy consumption awareness practices for the employees at the facility as a cost-effective way to significantly reduce energy consumption. The team recommended that the facility replace all of the old lighting with newer, more efficient lighting.

The team also recommended rerouting the exhaust gas from the paint curing oven into the drying oven to reduce natural gas usage and installing VSDs on the pumps that supplied water to the parts washer.

Installing Drives on the Parts Washer Pumps

While assessing Schneider’s parts washing operation, the team discovered that there were 7 pumps ranging from 7.5 HP to 20 HP, and

installed on each pump discharge line was a butterfly valve that was closed considerably. Each valve was closed at least 40% with the worst case being a 15 HP pump with a valve 70% closed. The recommendation was made that each pump be retrofitted with a VSD. Since Schneider also manufactures drives, the plant was able to obtain and install VSDs for each pump shortly after the team submitted its report. Schneider measured the current and voltage of each pump before and after the VSD implementation and found that the total energy usage decreased from 60.82 kW to 16.51 kW; thus, the energy consumption of the pumps was reduced by almost 73%, saving the company \$5,760/yr. The assessment team had calculated larger savings, but plant personnel decided to increase the system flow rates after

the drives were installed; however, the actual energy savings of the project were still significant. The total cost of the project was \$5,306, resulting in a simple payback of 11 months.

Results

The table below shows the annual cost savings to accrue at the Schneider Electric facility by implementing the energy conservation opportunities identified by the IAC team during the assessment. Based on the results, the facility can reduce its energy consumption by approximately 497,871 kWh/yr. These reductions will consequently reduce utility costs by \$27,200.

Implemented Recommendations

Assessment Recommendations	Annual Resource Savings	Total Annual Savings	Capital Costs	Simple Payback
Install VSDs	201,360 kWh	\$13,400	\$3,000	3 months
Recover Heat from Oven Exhaust	157,017 kWh	\$4,100	\$7,000	21 months
Install Energy Efficiency Lighting	104,664 kWh	\$7,000	\$15,450	27 months
Install Energy Efficiency Lighting	34,830 kWh	\$2,700	\$15,000	67 months
Total	497,871 kWh	\$27,200	\$40,450	18 months