ADVANCED MANUFACTURING OFFICE: INDUSTRIAL ASSESSMENT CENTERS

Phasing Plants into Modern Lighting Usage

Many manufacturing plants across America are still utilizing old, inefficient lighting fixtures such as metal-halide (MH) lamps. This case study addresses and quantifies the cost of using inefficient lighting, among 11 other cost saving recommendations.

An assessment team from the North Carolina State University (NCSU) Industrial Assessment Center (IAC) spent one day at the 300,000 square foot facility, examining its operations and collecting data. The team was comprised of NCSU IAC Assistant Director Dr. Stephen Terry, lead student Gopal Chaudhary, safety officer Joshua Poole, and student energy engineer Juliet Simpson.

Company Background

SpinRite LP is one of the largest producers of craft yarns in the United States. The company's extensive hand-knitting product line is sold under several brands and are distributed through mass merchants, needlecraft and hobby stores, and independent specialty stores. Dating back to 1952 in its current form, SpinRite acquired brands and the production facility in Washington, NC from National Spinning Company in 2011.

Spinrite provides craft yarns to merchants and retailers throughout the US. *Photo from Spinrite.*

Summary

The NC-IAC performed an industrial assessment at the SpinRite yarn production facility in Washington, NC. The energy survey yielded twelve recommendations, of which three have already been implemented just six months after the assessment. These three steps alone are estimated to save $17,557 per year, almost 6% of the total energy cost. The initial cost of the recommendations was $68,623 resulting in a simple payback period of less than four years. Additional measures are scheduled to be implemented next year for further savings.

Plant Operation

The process begins with yarn brought in on large cones. The yarn is treated in a steaming process, which shrinks the material to its final length. The steamed yarn is wound into smaller skeins for packing. The final process is packaging, where yarn skeins of various colors and lengths are assembled into a craft kit with other needed components.

Energy Conservation Awareness

Management and employees of the plant were keenly aware of the importance of energy conservation and had already replaced its metal halide lighting with fluorescent T5 fixtures, but wanted to do more. Management formed an energy team consisting of maintenance, production workers, and managers. The plant's energy team worked closely with the IAC team during the site visit to create a list of ideas to be pursued.

The IAC team analyzed the data collected and compiled the energy conservation recommendations into a report. The plant energy team then prioritized and started implementing the ideas.

Client's Feedback on IACs

"The IAC assessment functions as a roadmap on our journey for continuous improvement and sustainability in terms of energy consumption. My aim is to bring awareness to small to mid-sized manufacturers who may not have thought much about energy savings, or did not know there was help available. Contacting the NCSU Industrial Assessment Center is a great place to start." – Allen Scott

Compressed Air Assessment

Compressed air is a significant energy consumer in the facility. The IAC report recommended retrofitting the 75 hp compressor with a VFD, using low volume engineered nozzles, and using a smaller compressor for a machine that needs air after regular production hours, allowing the 75 hp compressor to be turned off.

Lighting Assessment

Most of the lighting in the plant had already been converted from Metal Halide (MH) lamps to fluorescent T5 fixtures before the visit. The IAC report recommended that the remaining metal halide fixtures be converted. The team also recommended converting older exit signs to new LED technology that reduce energy and maintenance costs, and installing occupancy sensors in several locations.

Steam and Process Equipment

Several recommendations were made with regard to the steam system and process equipment, including insulating a few steam lines and repairing some steam leaks in the 60 year old building. The process created hot humid air that flowed into the conditioned space. A recommendation was made to install a hood to collect these vapors and duct them outside. A gas heater was recommended to replace an electric space heater.

Tabulated Savings Quantified

Table 1 presents the annual cost savings that will occur at the facility due to the implemented recommendations. Energy conservation opportunities identified in the assessment that were implemented will reduce annual electrical usage by 620,259 kWh and natural gas usage by 757 MMBtu per year. This translates into an annual cost savings of $49,731. The estimated cost to implement these projects is $124,190, which yields a simple payback period of 2.5 years.

Implemented Recommendations

Assessment Recommendations	Annual Resource Savings	Total Annual Savings	Capital Costs	Simple Payback
Replace MH Fixtures with T5	152,248 kWh/yr	$14,592	$67,363	4.6 years
Install Occupancy Sensors	38,400 kWh/yr	$2,592	$1,388	0.6 years
Install LED Exit Signs	4,275 kWh/yr	$588	$160	0.3 years
Repair Compressed Air Leaks	22,546 kWh/yr	$1,312	$100	0.1 years
Retrofit 75 hp Compressor to Operate at Night	90,182 kWh/yr	$6,087	$19,400	3.2 years
Purchase a Smaller Compressor to Operate at Night	182,160 kWh/yr	$12,295	$9,000	0.7 years
Use Engineered Air Nozzles	1,668 kWh/yr	$113	$120	1.0 year
Insulate Steam Pipes	545 MMBtu/yr	$2,496	$659	0.3 years
Repair Steam Leaks	233 MMBtu/yr	$1,065	$1,000	1.0 year
Install Setback Thermostats	22,800 kWh/yr	$1,539	$1,500	1.0 year
Install Hoods Over Steam Bulkers	100,800 kWh/yr	$6,804	$22,500	3.3 years
Replace Electric Heater with Gas Unit	5,000 kWh/yr	$248	$1,000	4.0 years
Total	620,259 kWh/yr 757 MMBtu/yr	$49,731	$124,190	2.5 years