

2011 Case Study

CST STORAGE

Intern: Edgar Alvarado
Major: Mechanical Engineering
School: Kansas State University



Company background

CST Storage (CST), a part of CST Industries, Inc., is a global leader in the design and manufacture of above-ground storage tanks. The Parsons-based manufacturing plant specializes in epoxy-coated bolted tanks. With more than 100 years of experience, CST is a trusted brand that has delivered more than 150,000 tanks in more than 125 countries across numerous industries. The 140,000-square-foot facility has a wide range of capabilities, including metal fabrication, welding, and a world-class paint room. As an ISO 9001-certified company, CST prides itself not only in its technical capabilities, but also in the complete quality process that ensures customers receive a product that meets any and all required specifications.

Project background

CST Storage consists of a 140,000-square-foot manufacturing facility with an adjacent 9,000 square feet of office space. The manufacturing process is very energy extensive as it includes receiving raw materials, metal fabrication, welding, powder coating, liquid-paint coating, and shipping of the final product. CST's management is very concerned with making the site more energy efficient to not only reduce the costs associated with energy use, but to also become more environmentally friendly neighbors to the community. In an effort to identify and determine potential energy savings, CST participated in the Pollution Prevention Institute's internship program for the first time. The intern completed a compressed-air -leak audit, a lighting replacement study, a waste stream audit to determine the potential benefits of cardboard recycling, a study to determine the potential energy savings of a new burn-off oven, a water conservation analysis in the paint-line wash and rinse water, and an energy savings study of the powder-coat room that is kept at a cool temperature throughout the year.

Incentives to change

CST Storage participated in the Pollution Prevention Program in order to become aware of more efficient ways to conserve energy and gain tighter control of its waste streams. The intern program allowed CST to have a dedicated resource to focus on improving its waste streams, while also performing cost analysis for potential changes to production equipment.

Projects reviewed for P2 potential

Compressed Air Audit

The intern performed an air-leak-detection audit to locate as many air leaks as possible with an ultrasound gun. In all, the intern found 17 leaks that if fixed, amount to energy savings of 173,250 kWh per year and \$10,395 in annual cost savings.

Water conservation

The intern also worked on a water conservation project in the paint line's washer/rinser system. Currently, the used rinse-water runoff is sent directly to the drain. An opportunity exists to reuse the rinse runoff to replenish the wash tank throughout the day that would save 1 million gallons of water per year. In addition, the rinse water is heated by the parts as they come out of the hot wash water, so reusing it would reclaim some of the energy used to heat the wash water. This would result in an annual savings of 267 MMBtus per year. The total cost savings are \$9,105 per year.

Production lighting

The intern also analyzed the potential energy savings of replacing the production lighting from high-pressure sodium lights (HPS) to T5 fluorescent lights. The plant currently uses 355 HPS fixtures to provide the manufacturing plant's lighting. The current lighting consumes 1.36 million kWh per year at an annual cost of \$116,079. The proposed T5 lighting would result in energy savings of 289,800 kWh per year and annual savings of \$24,720.

Implementation update

In June 2015, CST began replacing 12 fixtures per month. The 2016 intern evaluated implementation of

production lighting upgrades and found an annual reduction of 14,930 kWh and a cost savings of \$1,314. (See 2016 case summary)

PPI Staff followed up in 2017 and the implementation had resulted in a cost savings of \$53,807, a reduction of 497,802 kWh, and 524 MTCO_{2e}

Cardboard recycling

The intern performed a waste audit on the plant's waste to determine the amount of cardboard that can be recycled. By visual inspection, it was seen that cardboard takes up about half the volume of the dumpsters on any given day. Based on the audit, the intern determined that cardboard accounts for approximately 1.5 times the volume as the rest of the waste, which adds up to 75 tons of recyclable cardboard per year. CST would benefit not only by selling the cardboard to a recycling company, but also by reducing the amount of city dumpsters currently used. The project would result in \$14,238 in annual savings.

Burn-off oven

The intern investigated possible replacements for a natural gas, convection burn-off oven. Infrared ovens are more energy efficient because they heat the part directly, rather than heating the air as convection ovens do. The intern determined that a new oven would result in annual savings of 720 MMBtu of natural gas and cost savings of \$1,159 per year.

E-room enclosure

The intern analyzed the potential energy savings available in the powder-coat room (e-room). The E-room must be maintained at 75 °F to prevent the powder from clogging in the paint lines or guns. The area surrounding the room is always at a warmer temperature due to curing ovens nearby, which results in the air conditioning units operating throughout the entire year in the e-room. In addition, the parts entrance and exit must remain open during the work day, which allows cold air to escape into the warm environment. By closing the entrance and exit while the paint line is not operating, the intern estimates energy savings of 144,440 kWh per year and annual savings of \$8,806.

Summary of 2011 P2 intern recommendations for CST STORAGE—UPDATE 2021

Project description	Annual estimated environmental impact	Annual estimated cost savings	Status
Compressed air audit	173,250 kWh	\$10,395	In progress
Water conservation	1,000,000 gal 267 MMBTU	\$9,105	In progress
Production lighting	497,802 kWh	\$53,807	Implemented
Cardboard recycling	75 tons solid waste	\$14,238	Recommended
Burn-off oven	267 MMBtu of natural gas	\$1,159	Recommended
E-room enclosure	144,440 kWh	\$8,806	Recommended
Total savings¹	1,000,000 gal of water, 572,390 kWh of electricity, 267 MMBtu of natural gas, 75 tons solid waste	\$95,510	
GHG reductions^{1,2}	879 metric tons CO_{2e}		

¹Excludes projects “not recommended” or with “more research needed”

²EPA P2 GHG Calculator with Cost, April 7, 2016.