2017 Case Study

CST Storage

Intern: Carolyn Countess
Major: Industrial Engineering
School: Kansas State University

Company background

As a global leader in constructing and manufacturing factory-coated metal storage tanks, aluminum domes, and specialty tank covers, CST Industries has installed more than 350,000 tanks and 1,800 covers in more than 125 countries. CST Storage is a branch of CST Industries, which specializes in manufacturing bolted-steel storage tanks for industrial and agricultural uses. Like its parent company, CST Storage has multiple locations, but this study focuses on the Parsons, Kansas, site.

Project background

CST Storage is committed to continual process improvement. One avenue of improvement pursued is application of pollution prevention (P2) projects. As a five-time host company of the P2 intern program, CST has already implemented P2 projects recommended by past interns, including re-routing water in the wash/rinse system, implementing an annual compressed-air-leak audit, installing soft starts on air compressors, and updating lighting in the plant and office areas. These projects led to CST receiving a P2 award at the Kansas Environmental Conference in August 2017.

Projects for the 2017 intern focused on auditing compressed-air lines for leaks, comparing water heaters and heat exchangers, increasing e-room energy efficiency, and researching new paint-curing oven technologies.

Incentives to change

As a large manufacturing facility, CST consumes an estimated five million kWh of electricity and 52,000 MMBTU of natural gas annually. CST acknowledges that improving process and equipment efficiency reduces energy use, resulting in conservation of natural resources and cost savings. As with most manufacturing plants, management does not always have time to research and evaluate P2 opportunities, so CST has hosted a PPI intern for four of the past five years. The fresh perspective of an intern dedicated to reducing CST's environmental impact is something the company values, while in continual pursuit of economic growth, process improvement, and sustainable operations.

Projects reviewed for P2 potential

Compressed-air-leak audit

The intern conducted a compressed-air-leak audit throughout the facility, resulting in the detection of 18 air leaks. These leaks were tagged, marked on a facility map, and indexed on a spreadsheet detailing leak severity. This was then provided to the maintenance staff for repair. Fixing these air leaks would result in saving 84,758 kWh of electricity and $9,444 annually.

Heater vs heat exchanger

CST Storage currently uses a tank water heater to heat water pumped to the parts washer. The water is pumped at 600 gallons per minute and heated to 140°F. The parts washer needs replacing and the intern was asked to research a more energy-efficient technology to heat water. The alternative the intern recommended was a tankless system that allows for heated water on demand, by forcing water through a plate-and-frame heat exchanger. Compared to maintaining a set volume of hot water, installing the recommended heat exchanger would yield an estimated annual savings of 12,091 MMBTU of natural gas and $52,718.

E-room door and air curtain

The E-room is the environmentally controlled room where CST applies a powder coat to parts. The room must maintain a constant temperature of 75°F to store the powder properly. With this requirement, the room is a continual source of energy loss due to entrance and exit openings for the paint line. The intern observed that 97 percent of downtime energy losses could be saved by installing a door. Additionally, the intern determined that installing an air curtain over the parts entrance could save energy during operating hours, without the risk of blowing the powder coat off before it cures. The combined recommendations yield a possible energy savings of 301,116 kWh of electricity and $27,100 per year.

Curing-oven technology

The intern was asked to research new oven technology to either extend or replace the powder -coat oven. Two requirements for the replacement were that it be powered by natural gas and increase CST's paint-line speed. Four possibilities were explored: a new convection oven, an ultraviolet (UV) oven, a gas catalytic infrared (IR) oven, and a combination convection/ IR oven. The UV and IR options use less energy overall, but the combination oven would best suit CST's processes and products. Switching to a combination oven would save an estimated $30,137 per year, reduce air emissions by 367.77 MTCO2e, and decrease natural gas usage by 6,912 MMBTU.

CST STORAGE

Summary of 2017 P2 Intern Recommendations for CST Storage

Project Description	Annual Estimated Environmental Impact	Annual Estimated Cost Savings	Status
Compressed-air-leak audit	84,758 kWh	$9,444	Recommended
Heater vs. heat exchanger	12,091 MMBTU	$52,718	Recommended
E-room door and air curtain	301,116 kWh	$27,100	Recommended
Curing-oven Technology	6,912 MMBTU	$30,137	More Research Needed
Total Savings[1]	**385,874 kWh 12,091 MMBTU**	**$89,262**	
GHG Reductions[1,2]	**1,021 metric tons CO_2e**		

[1] Excludes projects with "more research needed."
[2] EPA P2 GHG Calculator with Cost, May 2014