Phillips Distilling Company

Nathaniel Scherer,
Chemical Engineering,
University of Minnesota, Duluth

Company Background

Phillips Distilling Co. started in 1912 as a candy and magazine distributor that grew to become America's largest alcohol distributor by 1945. Today, Phillips produces a large variety of popular, high-quality alcoholic beverages. Some of their most popular brands are UV, Phillips, and organic Prairie vodka. Their headquarters is in Princeton, MN where alcohol is distilled, flavored, blended, bottled, and packaged for shipping. Today, the Phillips plant in Princeton employs over 275 people and ships 7 million cases annually.

"Everyone at Phillips was committed to helping me reduce energy and wastewater, which made this a fun and successful project. I learned a great deal about both industry-tailored sustainability solutions and real life production practices. I really enjoyed this rewarding internship, and I know the experience will carry with me forever." ~ NS

Project Background

Products are blended and stored in large tanks before being sent to a production line to be bottled and packaged. All equipment on the production line utilizes compressed air, making compressed air a large, crucial, expensive utility. It is important to optimize such a large system to maximize compressed air efficiency. Due to the nature of the bottling process, there are high flows of wastewater from cleaning tanks and piping. Because of its high sugar content and alcohol levels, this wastewater is expensive to dispose. Finding ways to reuse and minimize water usage will also minimize water discharge, providing significant savings.

Incentives To Change

Phillips created a sustainability committee, "One Team: G.R.E.E.N." to carry out their goal to move toward a more sustainable culture. This team saw a great opportunity to be environmentally responsible and reduce costs by improving their compressed air systems and minimizing water usage and discharge. Facility wide, compressed air costs more than $90,000 annually while industrial wastewater discharge costs are $280,000 annually. With plans to continue expanding, it is important that Phillips develops methods to improve their compressed air efficiency, reduce and reuse their water throughput.

"We wanted an outside source with experience and knowledge to help us reduce costs and our carbon footprint. Our Sustainability program includes a key value to have positive impact on the community. Having an intern to work toward our goals has allowed us to focus on key tasks. MnTAP is well thought out, supported, and executed, allowing companies to better themselves and the community while offering work experience to our emerging workforce. We will definitely look to using this resource for future projects."

~ Larry Jurik, Manufacturing Technical Manager, Phillips Distilling

Solutions

Leak Prevention Program

As part of the compressed air audit, 35 leaks were identified and a plan was developed to fix them. Phillips purchased an ultrasonic leak detector, and implemented the "Leak Prevention Program" which named several leaders from different departments as "Leak Champions." These champions are responsible for holding each other accountable for identifying, reporting, and fixing leaks. This largely includes awareness and training. Implementing these improved compressed air maintenance procedures should save up to $15,500 annually.

Regulating Air Use

Improving procedures and training for minimizing air use will yield high savings. If equipment is shut down but the air supply valves are left open, air continues to flow like a large leak during periods of non-use. New shutdown procedures will reduce this air waste in most cases, though for certain equipment automated valves may be required. This will save up to $14,000 annually. New procedures to raise awareness on air costs, time, and regulation of all air used for tank agitation could save up to $3,000 annually.

Pressure/Flow Controller

Equipment requires air supply at 90psig, but system pressure fluctuates from 76 to 126psig. Thus, compressor must supply higher pressure air to compensate for potential pressure drops. A pressure/flow controller will moderate pressure throughout the compressed air system so that the compressor can be set to supply air at a lower pressure without the system falling below the 90psig required by equipment. Lower pressure air takes less energy to produce, providing about 1% energy savings for every 2psi reduction- in this case, approximately $3,700 annually.

Install Electric Dunnage Bag Blowers

Dunnage bags are inflated and placed between pallets to reduce vibration during shipping. A 25 hp compressor currently supplies air exclusively to dunnage bag blowing. An electric blower could be used to quickly inflate the bags with low pressure air and completely eliminate the need for this compressor. Phillips could purchase an electric blowers to replace the current system and would save $1,000 per year.

Replace Tank Rinse Spray Balls

Tanks are currently rinsed with stationary spray balls where pressurized water is scattered through orifices to cover the walls inside the tank. Current spray balls have high volume flows with low pressures, making rinses take longer and require more water. Replacement spray balls have smaller orifices and therefore provide more pressurized water and is more efficient at cleaning tanks. By design, these new spray balls also rotate with fluid flow to maximize their effectiveness. In practice, these new spray balls save around 50% of tank rinse water, or approximately 156000 gallons per year.

Reusing Final Rinse Water

Tanks are rinsed several times until the rinse water meets quality specifications that dictate the tank is clean and ready for another product. This clean final rinse has very low amounts of contaminants and could easily be used is other applications, such as first tank rinses or water to flush product out of transfer piping. With opportunity to reuse 160,000 gallons annually, implementation strategies for capturing and storing the rinse water are still being investigated.

Recommendation	Annual Reduction	Annual Savings	Status
Leak prevention program	158,000 kWh	$15,500	Implemented
Regulated air use	186,000 kWh	$18,100	Implemented
Pressure/flow controller	38,000 kWh	$3,700	Recommended
Electric dunnage bag inflators	11,000 kWh	$1,000	Recommended
Insulating boiler water pipes	10,000 therms	$6,000	Implemented
Reusing low-proof final tank rinse water	160,000 gallons	>$10,000	Investigating
Replacing tank rinse spray balls	156,000 gallons	>$9,000	Implemented

MnTAP Advisor: Michelle Gage, Assoc. Engineer