Containers Southwest: A Plastic Beverage Bottles Maker Implements All Recommendations

ASSESSMENT DATE: DECEMBER 7, 2001

BENEFITS:

- 100% of recommendations implemented
- Recommendations identified savings in the areas of energy, waste, and productivity
- Overall simple payback will be seen within 5 months
- Savings to currently accrue at plant are over $677K

APPLICATIONS:

The Containers Southwest assessment team discovered opportunities to decrease energy usage and increase productivity, thereby increasing capacity, improving product quality, and enhancing corporate competitiveness. In order to decrease energy usage and increase productivity, the assessment team focused primarily on the manufacturing process as well as lighting and waste management. The results at Containers Southwest will guide energy assessments at similar plastics facilities where the savings can be replicated.

Summary

Through the Department of Energy's Industrial Assessment Center (IAC) located at Arizona State University in Tempe, Containers Southwest, a plastic beverage bottles maker, was able to save a significant amount of money from reductions in energy and waste, and improvements in productivity. Through recommended actions in scheduling changes, compressed air systems, lighting, and waste, Containers Southwest was able to save approximately $677K annually. All recommendations made by the assessment team were implemented at the facility.

Company Background

Containers Southwest is a custom manufacturer of plastic beverage bottles. The raw material for this process is pre-formed bottles. This form allows the handling of high volume of raw material in a relatively small space. From there, the pre-formed bottles are loaded into different air blowing molding machines, where a combination of heat and air pressure gives the bottles their final dimensions. The bottles are then loaded onto a conveyor belt that transports them to the product packaging area. In the product packaging area, the bottles are stacked in the appropriate number and wrapped up. From here, the final product is ready to be shipped out of the manufacturing site. Annual utility bills for the 130,000 square foot facility totaled $685,920 (3% of total sales), with annual sales of $20 million.

Assessment Approach

A team of faculty, staff and students from Arizona State University's IAC performed an Industrial Assessment in the fall of 2001. The assessment was led by Center Directory, Dr. Patrick Phelan and Assistant Director, Dr. Jong-I Mou, both Associate Professors in the Ira Fulton School of Engineering at Arizona State University.

Productivity Enhancement

Analysis of the operation revealed that it takes one operator to prepare each batch of finished product for the next operation, that is, the wrapping of the lot. Once a certain amount of finished product has accumulated, the operator places a cardboard sheet over it, so the next batch can be stacked on top of the previous one. Automating the stacking of the finished product would produce savings over $516K from this productivity improvement due to a reduction in labor cost. With the acquisition of a machine that performs this cardboard feeding task, the operators can be relocated to other production areas of the facility.

Energy Conservation

The assessment team made recommendations in three areas where energy savings could be recovered:

- Switch Off the Idling Conveyor Belts: The facility has several conveyors for handling of material. During the audit, it was seen that the automatic conveyors were running even when they were not in use. If the conveyors are switched off when they are not in use, then energy can be saved in the form of electricity needed to drive the motors that drive the conveyors.
- Install High Efficiency Motors: Depending on the horsepower rating of a high efficiency motor, approximately 1% to 4% increases in operating efficiencies can be achieved over the existing standard motors.
- Install Occupancy Sensors: Installing occupancy sensors in the areas designated for each building will eliminate lighting during unoccupied periods, and energy savings will result. With reduced lighting usage, the mixtures also produce less heat. The energy saved due to cooling load reduction is included in the energy savings calculation

Waste Minimization

A cooling tower is used to cool hot water generated during the plant process, with evaporation. As water in the cooling tower system continues to evaporate, dissolved solids continue to increase in concentration. These solids must be held below a certain concentration so that the cooling tower is not harmed. By changing the setting on the TDS meter, which controls the bleed-off rate for the two 125-ton and one 200-ton cooling towers, the amount of make-up water used to replenish the system can be reduced by 2.5 million gallons/yr with cost savings of nearly $7K.

The facility was also using wooden pallets both for internal movement of goods and supplying product to customers. The number of wooden pallets that needed replacement was 600 per month. By switching to metal pallets with a long useful life, the facility can reduce the waste almost entirely, for annual cost savings of $147K.

Results

The table below shows the annual cost savings to accrue at the facility from implementing recommendations of the IAC team during the assessment. Based on these results, the facility will experience savings of reducing its energy consumption by over 97MWh/yr, and by over $677,000/yr associated cost.

Table 1. Opportunities at Containers Southwest Tucson Facility

Recommended Action	Annual Resource Savings	Annual Cost Savings ($)	Implementation Cost ($)	Payback (months)
Switch Off the Idling Belts	65,594 KWH/yr 362 KW-mo/yr	$4,443	$600	2
Install High Efficiency Motors	13,998 KWH/yr 19 KW-mo/yr	$1,055	$2,106	24
Install Occupancy Sensors	1,606 KWH/yr 36 KW-mo/yr	$155	$600	46
Use Metal Pallets	N/A	$147,420	$166,600	14
Reset TDS Meter on Cooling Tower	16,203 KWH/yr	$8,172	$720	1
Automize Palletizer	N/A	$516,637	$100,000	3
Totals	**97,391 KWH/yr 417 KW-mo/yr**	**$677,882**	**$270,626**	**5**

FOR ADDITIONAL INFORMATION, PLEASE CONTACT:

Industrial Assessment Center
Arizona State University
Box 876106
Tempe, AZ 85287
Phone: (480) 965-1625
Fax: (480) 965-1384
phelan@asu.edu

Center for Advanced Energy Systems
640 Bartholomew Road,
Piscataway, NJ 08854
Phone: 732-445-5540
Fax: 732-445-0730
http://caes.rutgers.edu

Industrial Technologies Clearing House
Phone: 800-862-2086
Fax: 360-586-8303
clearinghouse@ee.doe.gov

Industrial Technologies Program
Energy Efficiency and Renewable Energy
U.S. Department of Energy
Washington DC 20585-0121
http://eere.energy.gov/industry/

A STRONG ENERGY PORTFOLIO FOR A STRONG AMERICA

Energy efficiency and clean, renewable energy will mean a stronger economy, a cleaner environment, and greater energy independence for America. Working with a wide array of state, community, industry, and university partners, the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy invests in a diverse portfolio of energy technologies.