WINNEBAGO INDUSTRIES

FOREST CITY

ALEX GEORGE
CHEMICAL ENGINEERING
IOWA STATE UNIVERSITY

COMPANY PROFILE

Winnebago Industries is one of the country's leading manufacturers of recreational vehicles (RVs). The company, headquartered in Forest City, Iowa, employs 2,680 people. Manufacturing takes place in three Iowa facilities (Forest City, Charles City, and Lake Mills), and in Middlebury, Indiana. The two million square-foot headquarter campus in Forest City includes 17 facilities. The majority of all RV components, such as holding tanks, bumpers, furniture and cabinets, are made from scratch on site.

PROJECT BACKGROUND

As a corporation, Winnebago Industries has committed to reducing its carbon footprint. Across its manufacturing facilities, 73 percent of all solid waste produced is recycled. This commitment to landfill diversion of solid waste led to further research into solid waste reduction strategies. Industry best practices related to waste sorting were compared to determine the best fits for the Forest City manufacturing lines.

INCENTIVES TO CHANGE

The target market for RVs is a consumer interested in enjoying the great outdoors. In alignment with the values of the population it serves, Winnebago's goal is to reduce and minimize its ecological impact, conserving the environment for generations to come.

As the industry moves toward a goal of "zero-landfill", Winnebago Industries pushes to be a leader in waste and landfill reduction at its plants. Reducing the amount of waste going to the landfill provides not only a positive environmental impact, but also a positive economic impact to the company's bottom line.

RESULTS

Waste Sorting on the Manufacturing Line: One third of the waste generated by Winnebago Industries comes from the primary motorhome manufacturing facility. A waste sort audit of the facility was conducted to identify opportunities for recycling. Following an audit of the plant, results indicated that 40 percent of the discarded material from the manufacturing line could be recycled.

Segregated waste containers allow recyclable materials like plastic, paper, and carpet to be diverted from the landfill stream and recycled appropriately. By separating the waste directly on the line, Winnebago can save $67,000 annually, and divert 741 tons of waste from the landfill each year.

Acrylic Recycling: A by-product of sink, shower and tub production, scrap acrylic is included in Winnebago Industries' current recycling strategies. However, acrylic with chrome, weave or wood appearance was not included in the recycling plan. By expanding the existing acrylic recycling program to include these three additional types, $6,554 could be recouped annually by selling the acrylic, and 18.25 tons of material would be diverted from the landfill.

Wood Recycling: Winnebago generates approximately 1,300 tons of scrap wood annually, including pallets, crates and plywood. With the installation of a grinder and biomass heating system, this wood waste could be used to provide heat to campus buildings, reducing the amount of natural gas required. The combined savings from reduced wood disposal and natural gas costs would be more than $95,000 annually.

Awning Tubes: Most motorhomes produced by Winnebago include an awning for shade from the bright summer sun. The majority of awnings arrive at the facility in plastic tubes, which are sent back to the supplier for re-use. Special-order awnings must be shipped in heavy cardboard tubes that may not be reused by the supplier. Because the tubes are too large to discard with the traditional cardboard recycling, they are currently disposed of at the landfill. A chop saw would provide an effective means of resizing the awning tubes to fit into the cardboard baler. Recycling the 70,000 pounds of previously discarded cardboard tubes would have an annual impact of $3,174 in savings.

Battery Recycling: An opportunity for improvement exists within Winnebago's battery recycling process. Currently, two different companies handle battery recycling for the corporation, and old or used batteries are not picked up with regularity. By selecting a different battery recycling company with a consistent collection schedule, Winnebago can save floor space in the recycling facility, and receive regular reimbursement for the recycled batteries.

CONVENTIONAL AIR POLLUTANTS AND GREENHOUSE GASES DIVERTED IN METRIC TONS
From Implemented and In Progress recommendations

TOTAL FOR ALL SECTORS								
CO_2	SO_2	CH_4	N_2O	CFC	NO_X	VOC	PM_{10}	$MTCO_2e$
								1,812.00

CONVENTIONAL AIR POLLUTANTS AND GREENHOUSE GASES DIVERTED IN METRIC TONS
From Recommendations in Recommended Status

TOTAL FOR ALL SECTORS								
CO_2	SO_2	CH_4	N_2O	CFC	NO_X	VOC	PM_{10}	$MTCO_2e$
27.00	0.07	44.57	0.16	0.36	0.08	0.17	0.01	72.02

PROJECT	ANNUAL COST SAVINGS	ENVIRONMENTAL RESULTS	STATUS
WASTE SORTING ON THE MANUFACTURING LINE	$67,063	741 TONS	IN PROGRESS
ACRYLIC RECYCLING	$6,554	18.25 TONS	IMPLEMENTED
WOOD RECYCLING	$95,468	1,344 TONS 67,916 THERMS	RECOMMENDED
AWNING TUBES	$3,174	35 TONS	IN PROGRESS
BATTERY RECYCLING	$6,400	—	IMPLEMENTED