

2021 Case Study

WEBCO MANUFACTURING, INC.

Intern: Demilade Akinbile
Major: Biological and Agricultural
Engineering
School: Kansas State University



Company Background

WEBCO is an employee-owned company specializing in equipment manufacturing of steel products for heavy machinery. Established in 1980, the company's customers cut across major companies in aviation ground support, construction equipment, industrial cooling equipment, mining, structural products, rail, trucking and data centers, producing an average of 2,200 equipment parts daily. The major areas of manufacturing and specialization include laser and plasma cutting; computer-programmed braking and machining; robotic welding; submerged arc and gas metal arc welding; sand blasting and deburring; and liquid and powder painting, including zirconium-primed powder coating.

Project Background

The company has become a competitive force within the industrial parts manufacturing industry with the pledge to continuous improvements through the employment of best practices, ethical principles, innovation, operational efficiency, quality consistency, greater competitiveness, and the most positive customer experiences and satisfaction.

The company has grown by over 20 percent in the last five years. Energy-efficient technologies, processes and practices have resulted in a reduction of resources used. WEBCO has continued to grow over the past years and prioritized continual improvement in its industrial operation by employing pollution prevention, or P2, strategies to reduce its financial and environmental costs.

Incentives to change

The company has a new business opportunity for significant expansion. Specifically, the new business would result in expanding the amount of liquid painting performed. The benefits would include the growth of the Kansas workforce and increased profit. The evaluation of the expansion examines the toxic air emissions and evaluate best strategies for the proposed new painting operation. With previous intern recommended projects implemented, WEBCO

wanted the 2021 P2 intern to assess the challenges that come along with the growth by using pollution prevention strategies.

Projects reviewed for P2 potential

Compressed Air Leak Audit

The intern completed a leak audit of compressed gases in the production areas of the facility to identify electricity and potential cost savings. Using the Ultraprobe 9000 leak detector, which measures decibel (dB) values, the intern estimated the environmental, financial and energy avoidance from the 33 leaks. By fixing the leaks around operating areas, \$27,248 potential cost savings and 89,965 kWh energy savings per annum are possible.

Excess Powder Paint Reuse Upgrade

The intern evaluated the financial burden of overspray powder paint on the facility to increase the recycling efficiency from 50% to 90%. An average of 30,062 pounds is wasted annually, which costs approximately \$162,258. After thorough evaluation of the existing conditions, more efficient powder recovery equipment was recommended, which will save nearly \$47,100 annually with a payback period of 13 months.

Replace HVLP Paint Gun with Electrostatic Spray Gun

The intern conducted an analysis on the replacement of the existing high-volume, low-pressure HVLP paint gun with a more transfer efficient electrostatic spray gun. At 60% transfer efficiency, about 220 gallons of liquid paint and \$10,626 are lost every year through use of the HVLP paint gun. Switching to an electrostatic gun with transfer efficiency of 85% will result in cost savings of \$6,744 per annum and avoidance of 179 gallons of liquid paint waste. Additionally, the electrostatic paint gun would reduce the cost of hazardous waste disposal by \$235 and emissions at the facility by 0.2 ton per year of combined hazardous air pollutants, HAPs and 0.62 tons per year of VOCs. The payback period for this project is 26 months.

Toxic Air Emission Reduction

The intern completed baseline monitoring and compliance reporting for WEBCO’s toxic air emissions for the expansion of the liquid paint facility permit. This process entails comprehensive evaluation of safety data sheets and purchasing orders of liquid paint and weld wire. The intern prepared a toxic organic management plan, or TOMP, including spill prevention, containment and cleanup, or SPCC, plan. Replacement of solvent-based liquid paint with water-based liquid and Vietek wash thinner with acetone was recommended. Water-based paints and acetone would reduce emissions at the facility by one ton per year of HAPs and 1.8 tons per year of VOCs using the existing liquid paint usage quantity, easing the compliance burden under the KDHE VOC rules for Johnson County, Kansas.

Implementation of the project resulted in 39% reduction in lighting. This results in an approximate annual savings of 278,158 kWh, \$27,816 and a reduction of 312 MTCO_{2e}, with a payback period of less than four years.

High Volume/Low Speed Fans

A 2016 P2 intern (see 2016 case study) examined the fans’ potential to improve airflow during the summer months and heating efficiency during the winter. He recommended installation of high-volume, low-speed, or HVLS, fans to improve air circulation and destratification due to less heat in the working zone and better air quality in the production area. The 2021 intern evaluated the estimated environmental impact and cost savings of the project. Implementation of the project resulted in 11,632 therms saved and average cost saving of \$4,024 per year.

Lighting Upgrade

A 2016 P2 intern (see 2016 case study) recommended change of lighting in production area. The lighting project involved installation of 375 Litetronics 220W/30,800 lumen LED in the production area completed in May 2020. The 2021 intern evaluated the environmental impact and cost savings of the project.

The combined effects of the six projects totals a reduction of 3.6 tons air toxic emissions, 368,123 kWh electricity, 9,341 pounds of powder paint, 179 gallons of liquid paint and 11,632 therms of natural gas. The total estimated savings for these projects is \$118,240. Using the Environmental Protection Agency’s greenhouse gas (GHG) calculation tool, these projects total an annual reduction of 674 metric tons carbon dioxide equivalent (CO_{2e}).

Summary of 2021 P2 intern recommendations for WEBCO Manufacturing, Inc.

Project	Annual estimated environmental impact	Estimated cost savings (\$/year)	Status
Compressed Air Leak Audit	89,965 kWh 94.7 MTCO _{2e}	\$27,248	Implemented
Excess Powder Paint Reuse	9,341 lbs. of powder paint 13.48 MTCO _{2e}	\$47,045	Implemented
Electrostatic spray gun	179 gallons hazardous waste 0.8 tons of VOCs/HAPs	\$6,979	Recommended
New liquid paint facility	2.8 tons VOCs/HAPs	\$328	Recommended
Lighting Upgrade	278,158 kWh 312 MTCO _{2e}	\$32,616	Implemented
High volume/low speed fans	11,632 therms 359 MTCO _{2e}	\$4,024	Implemented
Total ¹	3.6 tons VOCs/HAPs, 368,123 kWh, 9,341 lbs. solid waste, 179 gallons hazardous waste, and 11,632 therms natural gas	\$118,240	
GHG reductions ^{1,2}	785 metric tons CO _{2e}		

¹Does not include projects that are “not recommended” or “further research is needed.”

²EPA P2 GHG Calculator with Cost, 7 April 2016 & EPA WARM Tool- Version 14, Mar. 13, 2018