

## 2021 Case Study

# DUCOMMUN AEROSTRUCTURES

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### Company Background

Founded in 1849, Ducommun Incorporated manufactures products for commercial aircraft platforms, mission-critical military and space programs and industrial applications. With divisions in eight states and two countries, Ducommun employs 2,500 people worldwide and was valued at \$628.9 million in 2020. The Ducommun location in Parsons, Kansas has 130 employees, and focuses on structural systems, involving processes like stretch-forming, thermal-forming, chemical milling, precision fabrication, machining, finishing processes, and subassemblies. Over 4,000 different parts can be produced in the shop.

### Project Background

Management expressed they wanted to reduce the volume of chemical waste associated with their chemical milling process, which was responsible for 65% of the facility's toxic releases and more than 85% of the facility's hazardous waste. Three projects were investigated to reduce toxic releases and hazardous waste, two of which are recommended by the intern, and one of which needs more research. Management also expressed a desire for the intern to reduce energy and water usage. The intern explored three projects to accomplish this, of which all are recommended. In addition to these projects, the intern identified two more recommended projects to reduce plastic usage across the shop.

### Incentives to change

Ducommun has been attempting to reduce waste associated with chemical milling and etching since 2018. From 2018 to 2019, the product used in maskant was switched from high concentration tetrachloroethylene mixture to a less toxic toluene-based mixture. From 2019 to 2021, liquid hazardous waste production was reduced by 70%. However, liquid hazardous waste removal is still projected to cost more than \$28,917 in 2022. Management is seeking to reduce expenses associated with hazardous waste, toxic releases, energy and water, as well as to leave their processes less environmentally taxing and hazardous than when they started.

### Projects reviewed for P2 potential

#### Liquid Hazardous Waste Reduction

The chemical etching and milling processes were analyzed for liquid hazardous waste reduction options. The waste is hazardous due to caustic pH, chromium and lead. It was determined that hazardous waste extractions occur when the concentration of dissolved metals-- mostly titanium-- begins to increase and causes a slowed etch rate and staining on parts. Efforts to decrease the concentration of dissolved metals were explored, in addition to methods of treating the hazardous waste on-site under RCRA exemptions. No annual estimated impact was able to be calculated due to complexity and missing data, but suggested future research was outlined for the company. An acid filtration module using gel exclusion chromatography, elementary neutralization, and the source reduction of chromium and lead are likely solutions. Savings were calculated based on reductions from hazardous waste disposal.

#### Maskant Process Change

To reduce Hazardous Air Pollutants, or HAPs, and Volatile Organic Compounds, or VOCs, associated with the maskant process, changes were identified to reduce overspray. An experiment was conducted which showed a current transfer efficiency of 44% achieved in the process. Experienced operators were interviewed for their techniques in reducing overspray, space-conscious thinking was recommended as a means to reduce gaps which cause overspray and airless sprayer tip parameters were examined. However, because airless sprayers have a maximum transfer efficiency of 60%, only a 16% reduction of VOCs and HAPs could occur, reducing only \$280 annually and 2,490 lbs. of VOCs and HAPs. This project is recommended by the intern due to the immediate payback, despite low cost-savings.

#### Maskant Chemical Substitution

To reduce toxic releases by up to 65%, the potential of replacing the HAP used for maskant was explored. Three potential substitutions were identified, including a water-based maskant, a PCBTF-based maskant, and UV-light curing maskant. Switching off of the HAP

-based maskant was determined to save 14,414 lbs. of HAPs and VOCs annually and eliminate the need for a Title V Air Permit. The maskant recommended is more expensive than what is currently used, but is likely to reduce costs due to decreased labor with the proposed process, reduced compliance work, eliminating the need for certain types of control equipment and PPE and lower risk of injury or illness in employees caused by exposure to toxic substances. There is a possibility of slightly increased expenses with the proposed process, but sustainability measures like these also make the company more competitive in the marketplace as buyers put more emphasis on greener supply chains.

Plastic Water Bottle Substitution

The waste generated by providing free plastic water bottles for all employees was found to be between 4,000 to 6,000 bottles per month. The savings from switching to reusable water bottles and installing water bottle refill stations were analyzed. A payback period of 0.25 years was determined, a savings of \$11,568 in the second year of implementation, and 0.65 tons of low-density polyethylene.

Packaging Material Reduction

In shipping, poly tubing bags cut to length on-site were determined to have an average of six inches extra length per part, leading to 23,257 cubic

inches of excess plastic each year. A spreadsheet was created for packaging operators to reference to cut correctly-sized bags, and a soft-tape measure was implemented. Eliminating excess plastic could save \$4,751 and 1 MTCO<sub>2e</sub>.

Compressed Air Leak Repair

The intern identified 30 compressed air leaks throughout the facility. Repairing these leaks could save \$2,984 and 35 MTCO<sub>2e</sub>.

Energy Reduction Process Changes

The intern compiled a list of machines that were running when not in use and examined whether these machines could be turned off between uses, and if their power usage and mechanical issues that could affect and shutdown. This solution was not profitable due to increased labor costs associated with turning the machines on and off, and is not recommended by the intern; however, it would save 34 MTCO<sub>2e</sub>.

Lighting Survey

The intern reexamined a previous lighting survey conducted in 2019 using updated data and analyzed the potential update of 383 fluorescent tube fixtures to LEDs. Annual savings after the four-year payback period were determined to be \$63,405 and 669 MTCO<sub>2e</sub>.

*Summary of 2021 P2 intern recommendations for Ducommun Aerostructures*

Project	Annual estimated environmental impact	Estimated cost savings (\$/year)	Status
Liquid Hazardous Waste Reduction	--	\$28,917	More research needed
Maskant process change	2,490 lbs. VOCs/ HAPs	\$280	Recommended
Maskant chemical substitution	14,414 lbs. VOCs/ HAPs	\$0	Recommended
Plastic water bottle substitution	1,300 lbs. 1 MTCO <sub>2e</sub>	\$11,568	Recommended
Packaging material reduction	800 lbs, 1 MTCO <sub>2e</sub>	\$4,751	Implemented- 5%
Compressed air leak repair	33,158 kWh 35 MTCO <sub>2e</sub>	\$2,984	Implemented- 5%
Energy reduction process changes	31,831 kWh 34 MTCO <sub>2e</sub>	No savings	Not recommended
Lighting survey	635,206 kWh 669 MTCO <sub>2e</sub>	\$63,405	Recommended
Total <sup>1</sup>	706 MTCO <sub>2e</sub> , 2,100 lbs. solid waste, 33,158 kWh, and 16,904 lbs. VOCs/ HAPs	\$111,905	
GHG reductions <sup>1,2</sup>	706 metric tons CO <sub>2e</sub>		

<sup>1</sup>Does not include projects “not recommended” or where “more research needed.”

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