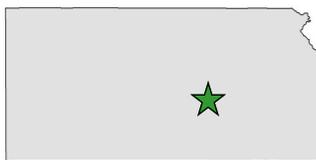


2021 Case Study

Spirit Aerosystems, Inc.

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Company Background

Spirit AeroSystems, Inc. is an aerospace manufacturer headquartered in Wichita, Kansas. It is one of the world's largest first-tier aerospace manufacturers responsible for supplying commercial airplanes, business/regional jets and defense platforms. Spirit manufactures several structural components for airlines, including fuselages, integrated wings/wing components, pylons and nacelles. With 14,500 total employees worldwide, this company has several facilities within the U.S as well as in the United Kingdom, Scotland, Northern Ireland, France, Malaysia, and Morocco. The Wichita location is 12.8 million sq. ft., which represents over 75% of the total square footage across all of Spirit's manufacturing sites. It is currently a primary supplier for Boeing aircrafts. Additional customers include Airbus, Rolls-Royce, Mitsubishi Aircraft Corporation, Bombardier, Lockheed Martin, and Northrop Grumman.

Project Background

Spirit AeroSystems, Inc. partnered with the K-State Pollution Prevention Institute to host a source reduction assistance, or SRA, intern to investigate opportunities that could reduce solvent use, resulting in raw material savings, reduced waste, emissions and costs. This was the first year of a two-year project funded by the EPA. In addition to reducing its environmental impact and costs, these actions will also increase efficiency, improve health and safety conditions for employees and potentially improve the environment and public health of their surrounding environmental justice community. The intern identified and investigated four projects with the potential for solvent reduction.

Incentives to change

Spirit has demonstrated a strong commitment to protecting human health and the environment. According to its published social responsibility statement, it is their policy to conduct and manage business in a manner that protects the

environment and promotes the health, safety and well-being of their employees, customers and surrounding community. In addition to waste reduction goals, Spirit has published greenhouse gas reduction, or GHG, goals, targeting a 30% absolute reduction in Scope 1 and 2 emission from 2019–2030. This solvent reduction project is one of its many sustainability projects and will help Spirit reduce hazardous materials, hazardous waste, costs, air emissions including GHGs, and minimize associated health risks to employees and the community. The overall two-year project goal is to reduce toxic solvents, hazardous waste and emissions by 10% per airplane built, saving more than \$270,000.

Projects reviewed for P2 potential

Overflow Solvent Reduction

Spirit decants bulk quantities of solvent into hand-held bottles for employees via an electronic liquid filling machine. The machine-filling process caused the overflow of solvent, resulting in loss of raw material that was then disposed of as hazardous waste. Using a 55-gal drum gauge, the intern was able to calculate overflow quantities to determine annual costs. The intern researched alternative options and recommends purchasing a new liquid-filling machine. In a typical production year, prevention of raw material loss and hazardous waste by upgrading to a standard base model would result in annual cost savings of \$48,000. This would also result in the reduction of 11.53 tons/yr. of VOCs, 2.71 tons/yr. of HAPs, and 3,300 gallons of hazardous waste. It would also reduce some labor costs and improve health and safety in the workplace.

Returned Solvent Waste Reduction

Hand-held solvent bottles are reused throughout Spirit's facility to avoid unnecessary waste. These bottles are refilled when empty and redistributed. The intern found that, due to various circumstances, the bottles were not always returned empty. This returned solvent waste is

disposed of as hazardous waste and is a loss of raw material. The intern was able to use a 55-gal drum gauge to quantify this waste and estimate annual costs. After further investigation, the intern recommends increasing employee awareness and accountability and minor procedural changes. A training program planned for year two will likely address these recommendations. During typical production rates, these changes are estimated to result in a cost savings of at least \$10,100 annually as well as a reduction of 2.4 tons/yr. of VOCs, 0.58 tons/yr. of HAPs, and 700 gallons of hazardous waste.

Paint Gun Cleaning Solvent Reduction

The company uses solvents to clean its paint guns. The intern calculated solvent usage for this process for a typical production year to evaluate costs and find feasible solutions. Based on calculations and discussions with the vendor, an aqueous paint gun cleaning system was recommended, which is also compatible with solvent in case the aqueous solution does not clean sufficiently. If the aqueous cleaner can be used consistently, the recommended unit would eliminate the need for solvent and also eliminate

the hazardous waste created. Therefore, purchasing this unit would save an estimated \$144,000 annually as well as result in the reduction of 34.3 tons/yr. of VOC emissions, 9.3 tons/yr. of HAPs, and 7,500 gallons of hazardous waste for the company.

Line Flushing Solvent Reduction

The intern evaluated implementing a solvent recycling system to recover the solvent used to flush and clean paint lines in one of the company's paint booths. The intern researched and evaluated the suggested options. Although not strictly considered source reduction, the recommended recycling unit will result in raw material savings. The process is estimated to return 60-70% of recycled solvent, which will be used instead of raw material. Furthermore, this unit was found to produce bulk hazardous waste, meaning less waste is produced, and disposal is cheaper for this form of waste than for the liquid waste currently generated. Implementing this recommendation is estimated to result in an average net annual savings of \$118,200 and a reduction of 5,200 gallons of flammable liquid hazardous waste.

Summary of 2021 SRA intern recommendations for Spirit Aerosystems, Inc.

Project	Annual estimated environmental impact	Estimated cost savings (\$/year)	Status
Overflow Solvent Reduction	11.5 tons/yr. VOCs 2.71 tons/yr. HAPs 3,300-gal hazardous waste reduced	\$48,000	Recommended
Returned Solvent Waste Reduction	2.4 tons/yr. VOCs 0.58 tons/yr. HAPs 700-gal hazardous waste reduced	\$10,100	Recommended
Paint Gun Cleaning Solvent Reduction	34.2 tons/yr. VOCs 9.3 tons/yr. HAPs 7,500-gal hazardous waste reduced	\$144,000	Further research needed
Line Flushing Solvent Reduction	23.3 tons/yr. VOCs 1.2 tons/yr. HAPs 6,900-gal raw material 5,200-gal hazardous waste reduced	\$118,200	Recommended
Total^{1,2}	37.2 tons/yr. VOCs 4.49 tons/yr. HAPs 6,900 gal raw material 9,200 gal hazardous waste reduced	\$176,300	

¹Does not include projects “not recommended” or with “more research needed”

²VOCs and HAPs emissions calculated using relative densities and chemical’s weight % reported on SDS