

Project Overview

Industrial Placement

Intern: Sean Brozek

Major: Chemical Engineering

School: University of Nebraska – Lincoln



The Company

Duncan Aviation is the United States' largest family-owned aircraft support organization. Duncan Aviation operates 23 facilities in 13 states, the largest of which is located in Lincoln, Nebraska. The Lincoln facility offers services in air frame, avionics, engine, interiors, painting, propellers and accessories, and upholstery.

Project Description

The numerous processes used at Duncan Aviation are monitored to ensure that the work environment remains safe, and that the environmental impacts and financial costs remain minimized. In the summer of 2007, the industrial solvent chemicals used within the work processes were investigated to determine process modifications or material substitutions which would enable the processes to be more sustainable. The investigation involved producing an algorithm to determine the relative amount of risk of each industrial solvent in order to prioritize the products for research opportunities; investigating the top risk industrial solvents and the associated processes; and researching alternative opportunities. In addition, a reassessment of a previous intern's recommendation regarding towel usage was conducted, and opportunities for technician training and equipment upgrades which could increase pollution prevention were determined.

Pollution Prevention Benefits

Replacing the high risk products with alternative industrial solvents and minor process modifications will reduce: hazardous air pollutant and volatile organic compound emissions, hazardous waste generation, and hazards to the employees. Using a reusable towel will reduce hazardous and non-hazardous waste generation. Training and equipment upgrades will reduce: wasted raw materials, air emissions, and waste generation. Additionally, labor and resources will be conserved, and Duncan Aviation will maintain sustainable processes.

Results

The pollution prevention recommendations presented in Table 1 below represent the alternatives providing the greatest overall benefits for the company. Quantified savings and benefits of each pollution prevention opportunity are identified.

Table 1. Pollution Prevention Opportunities and Potential Benefits

P2 Opportunity	Potential Annual Waste and Emission Reductions	Annual Financial Savings and Other Benefits
Chemical Product Risk Determination Algorithm	<ul style="list-style-type: none"> ▪ Indirect reductions from identification of pollution prevention opportunities 	<ul style="list-style-type: none"> ▪ Time and labor saved from quick identification of high risk chemical materials
Replace Enamel Reducer 3812S	<ul style="list-style-type: none"> ▪ 1,500 lbs HAPs* ▪ 1,800 lbs VOCs** ▪ 1,500 lbs hazardous waste 	<ul style="list-style-type: none"> ▪ \$2,900 ▪ Safer work environment ▪ Reduced regulatory burden
Replace Environmental Cleaner and Degreaser S00749	<ul style="list-style-type: none"> ▪ 500 lbs HAPs ▪ 3,000 lbs hazardous waste 	<ul style="list-style-type: none"> ▪ \$19,000 ▪ Safer work environment
Replace Lacquer Thinner A-2420	<ul style="list-style-type: none"> ▪ Reduced HAP ▪ Reduced VOC 	<ul style="list-style-type: none"> ▪ Financial not quantified ▪ Safer Work Environment
Replace Acetone	<ul style="list-style-type: none"> ▪ 84,000 lbs hazardous waste ▪ Potential VOC reduction 	<ul style="list-style-type: none"> ▪ No financial savings ▪ Safer work environment
Use Reusable Towels	<ul style="list-style-type: none"> ▪ 700 lbs hazardous waste reduced per year 	<ul style="list-style-type: none"> ▪ Equivalent to current cost ▪ Improved functionality
Training	<ul style="list-style-type: none"> ▪ Reduce raw materials by 13% ▪ Reduce emissions by 12% 	<ul style="list-style-type: none"> ▪ Financial not quantified ▪ Increase transfer efficiencies by 19%
Upgrade Spray Equipment	<ul style="list-style-type: none"> ▪ Reduce energy requirement 	<ul style="list-style-type: none"> ▪ Financial not quantified ▪ Increase transfer efficiencies 15 – 40% ▪ Reduce worker fatigue

*HAPs = Hazardous Air Pollutants

**VOCs = Volatile Organic Compounds