

Intern reduces powder coating waste and raw material use

A MnTAP Intern helped Ultra Image Powder Coating reduce the amount of waste material generated through the painting process, thereby reducing the raw material used and costs associated with purchase and disposal.

Company Description

Ultra Image Powder Coating of Big Lake, Minnesota, is a custom powder coating job shop that finishes large and small metal parts for a variety of companies.

Process Overview

Ultra Image Powder Coating was operating a conveyORIZED powder coating system in a spray-to-waste mode. The company has a wide variety of part profiles and several of the parts are able to be coated by automatic powder application. However, a significant percentage of the company's products are deep parts with complex geometries that can only be hand-sprayed.

Incentive for Change

Prior to the MnTAP intern project, Ultra Image was spraying an average of 55,000 lbs. of powder each year, while almost 32,000 lbs. of the sprayed material was wasted. This corresponds to a transfer efficiency of 42.3%, which means that over half of the powder purchased and sprayed by Ultra Image was wasted. The company determined that significant changes were needed as the dust collection system was oversized for the work space and created poor plant airflow around the powder coating spray area. Additionally, maintaining the dust collector and removal of waste powder was labor intensive. Therefore, Ultra Image purchased a used powder coating line and then applied for a MnTAP intern to help economically justify operational changes in the powder coating process.



The MnTAP intern at Ultra Image tested the air flow in the powder coating booth to determine transfer efficiency.

Waste Reduction Project

Ultra Image had an old powder coating system, with a high air flow which pulled much of the powder away from the parts. The powder that was pulled from the system was not able to be reclaimed. The high air flow from the system to the dust collector resulted in poor overall transfer efficiency and wasted powder. Therefore, Ultra Image developed a MnTAP intern project to conserve raw materials and reduce waste while not affecting the quality of the finished project.

Through research and observation, the MnTAP intern identified two major causes of low transfer efficiency for Ultra Image's coating process: high booth airflow and poor operator training. Several different options were suggested and implemented to address the low transfer efficiency. These options included precise airflow control, powder room pressurization, and suitable manual operator training. Each option was viable for increasing transfer efficiency, and an early goal was set to see

Benefits Overview

Waste Reduction Option	Waste Reduced/ Materials Savings	Annual Cost Savings
Airflow control with deflector plates, powder room pressurization, operator training courses	11,000 lbs/yr	\$30,000
New powder booth* * Resulted in reduced booth maintenance labor and filter replacement parts	4,000 lbs/yr 230 hours/yr	\$33,000

an increase of 20% by the end of the project. The MnTAP intern also investigated the feasibility of purchasing a new powder booth to increase transfer efficiency.

Airflow Control and Powder Room Pressurization

The MnTAP intern determined that ducting the air conditioner unit intake air supply to the outside would place the powder room under a positive air pressure, and reduce the costs associated with changing filters. A positive pressure in the powder room and outside air source for the air conditioner unit reduces the amount of wear that is experienced by the intake filters. Prior to the intern project, the filters were changed once a week, costing Ultra Image over \$3,200 annually in replacement costs. By pulling cleaner air into the air conditioner units, Ultra Image is extending each filter's life and potentially saving \$2,500 annually on filter costs. This savings almost covered the costs of installing the duct work and resulted in a payback period of nearly one year. Additionally, with the assistance of Ultra Image staff members, the MnTAP intern trialed several positions of air deflection plates, which are used to reduce the flow of air in the area of the part. The deflectors that were installed change the airflow and prevent the collection of powder before it reaches the parts.

Operator Training

Through this project, the MnTAP intern determined that an important method to improve paint efficiency is ensuring that operators understand the process. Proper set-up of the fluidized bed, spray techniques, part grounding, gun setting, and booth maintenance are all factors that can determine how much powder is applied to the part. Therefore, the MnTAP intern recommended operator training at Ultra Image. The company worked with its spray equipment supplier to hold a customized operator training class at Ultra Image's facility. This training allowed the painters to practice with and ask questions about the equipment and parts they work with on a daily basis. Several of the company's lead painters also attended a training program hosted by Ultra Image's powder coating material supplier.

New Powder Booth Installation

In addition to evaluating the causes of low transfer efficiency, the MnTAP intern explored the feasibility of installing a new powder booth to further increase transfer efficiency. From the recommendations, Ultra Image purchased a new custom powder booth, which allows the company to reduce its waste powder. The booth that Ultra Image installed was developed to accommodate the company's need to both automatically and manually apply powder to parts.

Benefits

By implementing the procedural and equipment changes from the MnTAP intern project, Ultra Image estimates their annual powder savings to be 15,000 pounds a year. The new powder coating spray booth has also reduced the time spent on booth maintenance. The raw material savings, lower booth maintenance labor, and reduced disposal costs save them approximately \$63,000 annually.

Several additional benefits were realized through the purchase of the new powder coating booth. These include:

- Better product quality, which has reduced the number of defects and amount of scrap material.
- Better booth lighting and more work space for painters and operator training.
- Less cleaning time for the booth, which has reduced the time required between color changes
- Fewer garbage pickups due to the reduction in powder waste
- More floor space due to the smaller footprint of the system. This space is now a well-organized, air conditioned powder storage area.



For More Information

MnTAP has a variety of technical assistance services available to help Minnesota businesses implement industry-tailored solutions that maximize resource efficiency, prevent pollution, increase energy efficiency, and reduce costs. Our information resources are available online at <mntap.umn.edu>. Please call MnTAP at 612.624.1300 or 800.247.0015 for personal assistance or more information about MnTAP's Intern Program.

This project was conducted in 2004 by MnTAP intern Mike Heier, a junior in chemical engineering at the University of Minnesota.