

Water Conservation at Delta Air Lines: Significant Water and Wastewater Reduction

Chris Shannon¹, Paul Dellinger², and Adrienne Thorpe³

AUTHORS: ¹Chris Shannon, Project Manager: Water Conservation, Delta Air Lines, Inc. TechOps Safety and Environmental, 1000 Aviation Blvd, Atlanta, GA 30320; ²Paul Dellinger, Manager: Safety and Environmental Programs, Delta Air Lines, Inc. TechOps Safety and Environmental, 1000 Aviation Blvd, Atlanta, GA 30320; ³Adrienne Thorpe, Pollution Prevention Engineer, 7 Martin Luther King Jr. Drive, Atlanta, GA 30334

REFERENCE: *Proceedings of the 2005 Georgia Water Resources Conference*, held April 25-27, 2005, at the University of Georgia. Kathryn J. Hatcher, editor, Institute Ecology, The University of Georgia, Athens, Georgia.

Abstract. Delta Air Lines' Technical Operation Center (TechOps) and Environmental Services Department have partnered with the Pollution Prevention Assistance Division on a project to reduce water usage in TechOps' Plating Shop. Since implementation, this partnership has reduced the water usage in this Plating Shop by approximately 50 percent (37,000 gal/day) and has resulted in substantial cost savings.

BACKGROUND

Delta Air Lines' Atlanta operation is a major consumer of water in the City of Atlanta. Wastewater generated from aircraft maintenance/overhaul operations at the Technical Operations Center (TechOps) is pre-treated on site at Delta's Wastewater Treatment Facility (WWTF) and then discharged to the city collection system at an average rate of approximately 600,000 gallons per day (GPD).

In January 2004, the City of Atlanta increased the water/sewer rates by 45 percent. Additional rate increases will be implemented by the City over the next five years. TechOps and Delta's Environmental Service Department (ESD) have estimated that based on historical rates of water usage and wastewater discharge associated with TechOps' operations, Delta's costs would triple over the next five years. Without steps to reduce water usage/wastewater discharge, the cumulative incremental costs due to the planned rate increases could exceed ten million dollars over the next sixty months.

The planned rate increases would have a significant negative impact on Delta and TechOps' maintenance costs unless Delta instituted an action plan. In evaluating the potential financial impact, Delta saw an opportunity to improve its efficiency, and at the same time, benefit the environment by reducing water usage and discharge.

Delta's plan to reduce water usage and wastewater discharge promotes Delta's philosophy of protecting the environment in the communities it serves. Delta and TechOps continuously strive to be responsible corporate

citizens and stewards of the environment. This is echoed in TechOps Environmental Mission:

Technical Operations is committed fully to protecting the environmental health and safety of its employees, customers, and neighbors, and will conduct all of its operations as a responsible corporate citizen.

In order to minimize water usage and discharge, TechOps and ESD partnered with the Pollution Prevention Assistance Division (P²AD) of the Georgia Department of Natural Resources. The focus of this partnership was the "Delta Air Lines Technical Operations Center: Plating Shop Water & Wastewater Reduction Project". This partnership was TechOps' initial step in instituting a plant-wide Water & Wastewater Conservation Program. The relationship is being continued through the P²AD Partnership Program.

PROJECT APPROACH

The focus of this project was to reduce the daily water consumption of TechOps' Plating Shop. The first step of this project was to establish an accurate baseline of the Plating Shop water usage. The baseline was measured from February 15, 2004 to April 29, 2004, using ultrasonic flow meters from GE Panametrics. The daily baseline water usage was determined to be approximately 71,000 gallons per day (GPD). This level of water usage equates to water, sewer, and pre-treatment costs of approximately \$2,500 per day, or approximately \$930,000 annually (based on 2004 rates).

After establishing the baseline for the Plating Shop process water usage, process changes designed to reduce water consumption were implemented. First, all rinse tank bypass valves were secured. A rinse tank bypass valve manually controls the incoming water to the tank. In addition, the entire department was educated regarding water usage through postings of daily water usage and

associated costs. These postings were continued throughout the project and are still preformed weekly in departmental meetings.

Additionally, the entire project team visited Warner Robins Air Force Base to conduct benchmarking. This benchmarking trip allowed the project team to evaluate another metal plating department's water conservation activities. Also, the team obtained ideas and techniques that could be utilized within the department. These ideas and techniques are currently being reviewed for implementation in the department.

The Plating Shop's preventative maintenance (PM) programs were expanded to cover additional activities and processes that involve significant water usage. For example, the team identified the Air Scrubber System and the float valves, which control water levels used to clean the air inside the Plating Shop, as a major source of water usage by using flowmeters. The float valves were found to be functioning at sub-optimal levels, causing the Air Scrubber System to use more water than necessary. To mitigate this situation, the department's maintenance employees began a daily check of the float valves to confirm they are functioning properly. If not, the float valves are adjusted.

In addition to increased awareness and expanding the department's PM program, the project team worked with Tetra Tech EM, Inc. to provide the department with additional water conservation training on dragout reduction techniques. Dragout is the residual process chemicals on a part that are being cleaned in a part-rinsing tank. This training educated employees as to the importance of reducing dragout in rinse tanks and the savings associated with such reductions.

Finally, a closed loop system on chrome process tanks and subsequent dragout tanks was installed to enable operators to replenish the process tanks with dragout water instead of City water. This closed-loop system encourages water conservation and promotes recycling of process chemicals.

Each process change was categorized by four different samples of the department's water usage. These samples were analyzed using boxplots to interpret the differences between samples. A boxplot is a visual tool used to describe the average, variance, and distribution of the sample data sets. Figure 1 uses the boxplots of each sample to compare the changes of water usage over the life of the project.

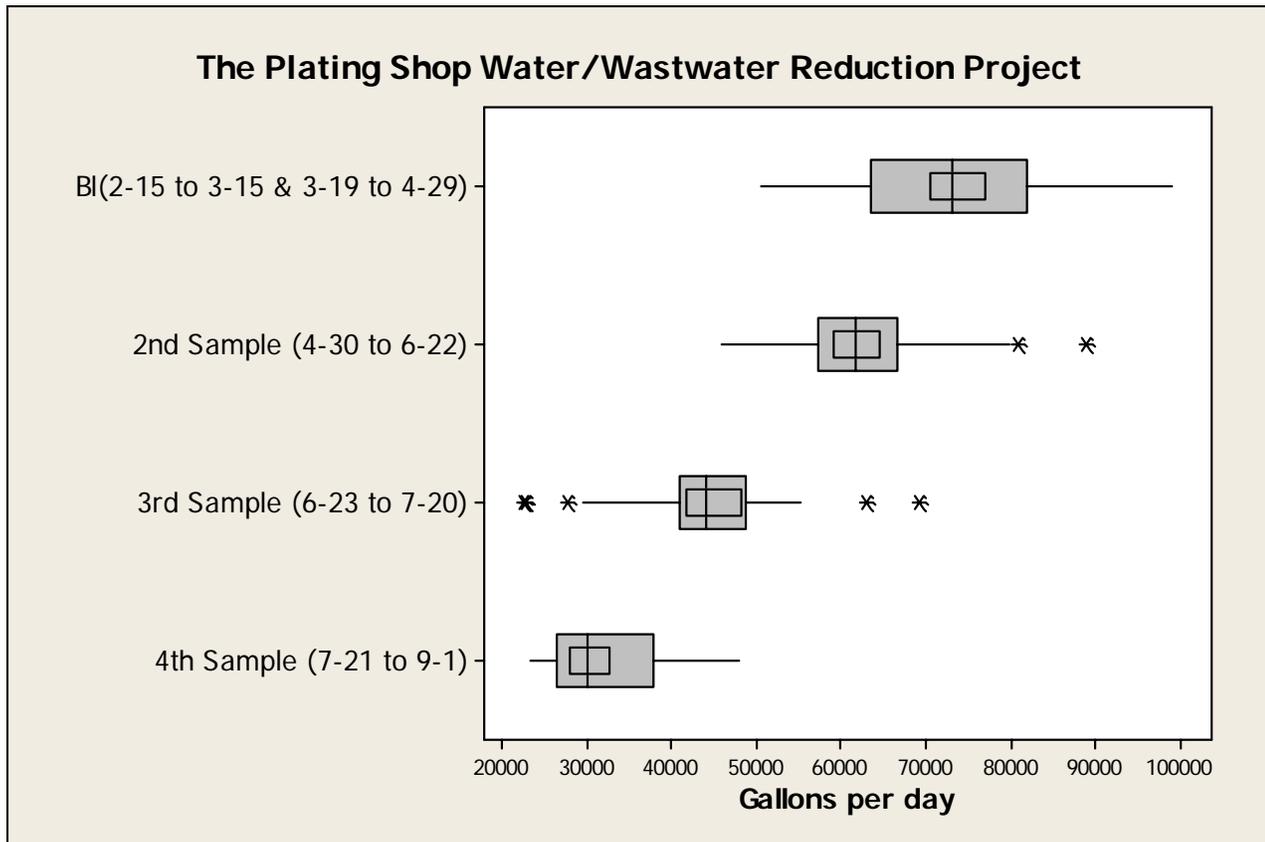


Figure 1: Boxplot of water conservation project.

Through increased awareness, training, and process improvements, the department has reduced water usage to approximately 34,000 GPD, as compared to the baseline of 71,000 GPD. This equates to a more than a 50 percent reduction (37,000 gal/day) on average.

SUMMARY

With the cultural, process, and maintenance changes implemented during this project, TechOps was able to reduce the Plating Shop's water usage by approximately 50 percent over an eight-month period. Delta's water conservation efforts have generated a savings of \$250,000 for 2004 (based on the initial 45 percent water rate increases in 2004) and a projected savings of \$610,000 in 2005 (based on 43 percent rate increases in 2005). These efforts were made possible through the P²AD partnership and operational experts who facilitated the change.

FUTURE

Due to the success of this project, the Plating Shop is slated to install a total automated Water Monitoring System early in 2005. This system will allow the department to track exactly how much water it is consuming at any given moment during the day.

In addition to this automated Water Monitoring System, the Plating Shop will be installing ultrasonic leveling devices on all of the Air Scrubber systems. These devices will minimize the need for a daily visual check on the operation of the float valves. Also, this will aid in minimizing water being used in this system.

Delta's efforts do not stop with the Plating Shop; other areas within the TechOps facilities are currently being evaluated for reductions. TechOps is beginning a long-term partnership with P²AD. This partnership will continue to investigate additional industrial applications throughout TechOps facilities to systematically reduce its usage of natural resources.

Early in 2005, TechOps will create a TechOps-wide Water Conservation Program. This program will utilize resources provided by P²AD and Delta Air Lines employees to continue to reduce TechOps' water usage. An integral step in reducing TechOps' water usage will be the TechOps Water Conservation Awareness Campaign beginning in 2005. This campaign will convey the importance of water conservation to all of TechOps employees.

In addition to water conservation, TechOps is currently investigating the feasibility of recycling its wastewater for reuse in specified industrial applications. This

recycling system could dramatically reduce TechOps' need to draw water from the City of Atlanta.

ACKNOWLEDGEMENTS

This was a total team effort with management support and front line involvement.