

Inner-Tite Corporation

Toxics Use Reduction Case Study

Switch to Aqueous Cleaning Eliminates TCE Use

Summary

Inner-Tite Corporation, which had previously replaced its standard vapor degreasing equipment with two entirely enclosed vacuum vapor degreasing units, has now completely eliminated the use of the solvent trichloroethylene (TCE) with a switch to aqueous cleaning. In a previous case study, OTA reported that replacing the original degreasing equipment with units designed to prevent emissions reduced the company's use of TCE by 97 percent. Four years later, Inner-Tite found the right combination of aqueous cleaner and equipment that was effective, but not too aggressive for the variety of metals and part configurations they produce. This allowed them to eliminate the use of TCE entirely and any potential for worker exposure or environmental risks from this "higher hazard substance". With the new system, the parts are first mechanically degreased, then agitated in an aqueous solution. The whole cycle takes less than 8 minutes. The new aqueous cleaning system, which performs just as efficiently as the solvent units, saved the company nearly \$2,500 per year in TCE purchasing costs, \$1,100 per year in TURA reporting fees, and the costs and time spent on biennial planning. Eliminating the annual use of 2,675 pounds of TCE has also reduced the amount of time spent complying with hazardous waste and air rules, preparing for emergency response, and complying with OSHA regulations.

Background

Inner-Tite specializes in the manufacture of anti-theft devices used by electric, gas and water utilities to secure meters, cables, pipes and other equipment (see right). The company maintains a staff of approximately 85 employees at its Holden, MA facility, which it has occupied since 1987.



**Meter Locking
Stainless Steel Ring**

Toxics Use Reduction History

In 1993, Inner-Tite sought to reduce the emissions and worker exposure levels to the methylene chloride used in the degreasing process. They contacted the Massachusetts Office of Technical Assistance and Technology (OTA) for a site visit and recommendations. OTA encouraged Inner-Tite to investigate alternatives to methylene chloride and to contact the Massachusetts Occupational Safety and Health Administration (OSHA) Consultation Program for specific guidance on their employee health and safety issues.¹

Over the next several years, Inner-Tite instituted a number of design changes that achieved reductions in emissions and worker exposure levels, including the replacement of methylene chloride with trichloroethylene (TCE). However, Inner-Tite was still unsatisfied with the level of air emissions and costs

¹ A non-regulatory health & safety assistance program, similar in nature to OTA, administered by the Massachusetts Division of Occupational Safety

they represented in the form of chemical purchases, regulatory reporting and monitoring, and impact the TCE emissions had on working conditions.



Locking Device

Inner-Tite replaced their degreasing equipment in 2000 with two units adapted from the dry cleaning industry. Similar to a washing machine, the units had four small load bins in which workers loaded the parts. After the door was closed and sealed, the automated 13 minute cycle would begin. Parts were loaded to a dry chamber and removed from a dry chamber. Small amounts of TCE were still used in this process. With TCE on its way to being designated as a higher hazardous substance and the price of the chemical steadily increasing, Inner-Tite wanted to stop using the chemical altogether. Additionally, the units had refrigerated condensers and carbon to steam regenerate. After a couple of years these units required more frequent maintenance and seals to keep emissions low; another reason Inner-Tite was exploring alternatives.

Toxics Use Reduction

In 2007, Inner-Tite installed two stationary aqueous cleaning units, which allowed the company to entirely eliminate its use of TCE. They subsequently purchased a mobile unit that could be attached to various CNC machines for parts requiring immediate cleaning. The company eliminated 2,675 pounds of TCE use per year, saved more than \$2,500 annually in TCE purchases and does not have to report TCE use, saving an additional \$1,100. Also, the air emissions status of the facility has declined below the (potential to emit) thresholds for a minor source.

One of the critical decision factors for Inner-Tite was a goal that the cleaning process be as efficient as the previous process. As noted, the low-emission TCE units were effective cleaners, but required maintenance and staff time. The aqueous cleaning unit requires additional drying time, but can wash twice as many parts at the same time, making the units equally efficient. The new machines require less staff attention, and have improved operating efficiency. The detergent wash and corrosion-inhibited rinse basins are recirculated, filtered, skimmed and reused for a period of time and then discharged to a pre-existing evaporator.

Aqueous Cleaning Process

First, the parts to be degreased are spun in a centrifuge that mechanically removes the oil. Then they are placed in one of two baskets in the cleaning unit. The baskets are loaded, covered, and inserted into the washing machine prior to each cycle, which lasts less than 8 minutes. During the preprogrammed cycle, the baskets are rotated in and out of the agitated solution while also being sprayed from overhead.

During the drying portion of the cycle, the reservoir is drained and the internal blower displaces the water from the hot parts. There is a brief pause before the doors can be opened and the tray removed. The wash used in the process has a pH of 11-11.5, which has generally been safe for the metal part, with extra caution being taken with brass and aluminum.

This case study is one in a series prepared by the Office of Technical Assistance and Technology (OTA), a branch of the Massachusetts Executive Office of Energy and Environmental Affairs. The Office of Technical Assistance and Technology (OTA), the Commonwealth's center for technical information and assistance, helps businesses and other organizations improve their environmental performance and conserve energy, water and other resources. This information is available in alternate formats upon request. OTA's **non-regulatory** services are available at **no charge** to Massachusetts businesses and institutions. For additional information about this or other case studies, or about OTA's technical assistance services, contact:

Office of Technical Assistance and Technology, 100 Cambridge Street, Suite 900, Boston, MA 02114
Phone: (617) 626-1060 Fax: (617) 626-1095 Website: <http://www.mass.gov/eea/ota>