CASE STUDY: **Hamilton Beach/Proctor-Silex, Inc.**

Location:	Mount Airy, NC (Surry County)
Industry:	Household Toaster and Toaster Oven Manufacture (SIC: 3634)
Pollution Prevention Application:	Chemical Substitution, Recycling, Water Conservation and Reuse
Annual Savings:	$800,000
Payback Period:	1 to 2 years
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Background

Hamilton Beach-Proctor-Silex, Inc. (HB/PS), is the world's largest manufacturer of toasters and toaster ovens. The company facility at Mt. Airy employs 1,000 people and manufactures 35,000 toasters per day. Production processes include metal stamping, surface preparation/metal cleaning, electroplating, plastic injection molding, spray painting, and packaging. HB/PS's waste reduction efforts focused on process and material modifications and recovery/reuse of solid and hazardous waste materials.

Waste Reduction Activities

Elimination of 1,1,1-Trichloroethane

The HB/PS metal stamping operation creates parts for the toaster and toaster ovens. Lubricant residues from this operation must be removed prior to assembly. The company replaced a 1,1,1-trichloroethane vapor degreasing system with two aqueous-based cleaning systems, one of which was designed and constructed in-house from obsolete process equipment. The changeover to aqueous cleaning eliminated one source of volatile organic compound (VOC) emissions and spent halogenated solvent waste (F001).

Recycling of Aqueous Cleaners

The new aqueous cleaner is recycled through a ceramic crossflow ultrafiltration unit, which removes submicron contaminants and oils. Contaminants, which are 40 to 50 percent oils, are concentrated and collected before release of the aqueous cleaning solution to the wastewater treatment facility. Since the installation of the filtration system, cleaning chemical additions have been drastically reduced and cleaning solution life has been extended.

Hazardous Waste

HB/PS sought to reduce the quantity of hazardous waste generated at the facility. The pretreatment of electroplating wastewater generated substantial quantities of F006 hazardous waste sludge. It was necessary to dispose this sludge, a mixture of 20 percent solids and 80 percent water by weight, in a hazardous waste landfill. The company implemented a project to reduce the volume of sludge sent to the landfill.

A sludge dryer and a filter press were installed to reduce the quantity of sludge landfilled. By diverting the sludge through these devices, HB/PS produced a solid waste containing 85 percent solids and only 15 percent water. This equipment substantially reduced the volume of sludge generated. The water retrieved from the sludge press is reused in the electroplating rinse baths after on-site treatment. The dry sludge waste is shipped off site for nickel and chromium recovery.

Recycling/ Material Reuse

In response to increased production efficiency, disposal costs, and regulatory requirements, the company implemented various recycling/reuse projects:

- Decorative toaster ends are produced from phenolic resin in an injection molding process. Mold and buffing scraps were formerly disposed in the landfill. Process modifications now permit a percentage of this recovered scrap material to be reground, blended with virgin resin, and reused in the injection molding process. This practice substantially reduces raw material costs and landfill fees.
- Other reuse and recycling projects adopted at the facility include the purchase of a baler to handle cardboard waste. Aluminum, steel, and bronze metal scrap from the pressing operations are collected and recycled, and metal and plastic drums used to ship materials to the facility are returned to the vendors for reuse or recycling.

Waste Reduced

- The aqueous-based cleaners completely eliminated the use of approximately 90,000 pounds of ozone-depleting 1,1,1-trichloroethane and the generation of 80,000 pounds of VOCs and 2,200 gallons of F001 hazardous waste each year.
- Prior to the installation of the crossflow ultrafiltration system, the facility each week consumed and disposed of approximately 1,400 gallons of spent cleaning solution. With the extended life of the cleaning solution, less than 100 gallons of spent cleaner were utilized during the first six months of operation.
- The volume of F006 sludge waste was reduced by 65 percent after the installation of the sludge dryer/filter press despite a 10-percent increase in plant production.
- Water reuse conserves 18,000 gallons per day.
- Recycling programs divert approximately 1,000 tons of solid waste from the landfill each year, and recycle approximately 4,000 tons of scrap metals.

Annual Savings

Overall annual savings for the waste reduction projects implemented at the facility are almost $800,000 per year. The new aqueous degreasing system cost $90,000. HB/PS now realizes net annual savings of $95,000 from eliminated solvent purchases and hazardous waste disposal expenses. Thus, the simple payback period was less than 1 year.

Prior to the installation of the new sludge handling system, the annual cost of F006 waste disposal was over $35,000 per year. The capital cost of the sludge dewatering/drying system was approximately $55,000. The cost of reclaiming nickel and chromium is $10,000 per year. Thus, the F006 hazardous waste reduction efforts saved the company over $25,000 per year. The payback period for the project was approximately 2 years.

Reuse of phenolic resin saves the company approximately $250,000 annually in raw material purchases.

The company saves approximately $18,000 each year on landfill fees from its solid waste recycling programs. Also, the recycling of cardboard and scrap metal generates substantial annual revenues of $6,500 and $300,000, respectively.

Additional benefits that were not included in the cost savings include reduced liability for proper disposal of hazardous waste and reduced ozone depleting potential.

Other Activities

Hamilton Beach/Proctor-Silex was recognized for Outstanding Achievement in the Large Business Category of the 1994 Governor's Award for Excellence in Waste Reduction competition.