

Case Study



MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY • ENVIRONMENTAL ASSISTANCE DIVISION • 1-800-662-9278

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McNaughton & Gunn, Inc. *Saline, Michigan*

BOOK PRINTER REDUCES WASTE AT THE SOURCE



McNaughton & Gunn, a book printer located in Saline, Michigan, processes over two million pounds of paper each month into books. The process generates paper, film scraps, aluminum

printing plates, ink, and office paper waste. In an effort to reduce adverse impacts to the environment and to reduce disposal costs, the company strives to prevent or minimize the amount of waste being generated (source reduction). Source reduction strategies such as raw material input substitution, working with suppliers to reduce input packaging, and office management changes are key components in McNaughton & Gunn's approach to eliminating hazardous and solid waste.

EMPLOYEE SUPPORT KEY TO MCNAUGHTON & GUNN SUCCESS

McNaughton & Gunn realized that employee participation was critical to the success of its waste reduction program. In a 1990 effort to reduce anticipated landfill costs of \$19,000 a year, the company used a paycheck stuffer to

invite employees to form a volunteer committee that would brainstorm to develop and then implement new waste reduction strategies. The paycheck stuffer drew ten percent of the McNaughton & Gunn workforce into the committee, later known as the "Recycling Fanatics."

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SOURCE REDUCTION OPPORTUNITIES

Over the years, McNaughton & Gunn and its “Recycling Fanatics” have taken a number of steps to prevent the generation of waste during printing operations. The company has achieved source reduction in the following ways:

+ Purchased two new ink pumping systems:

- The first system pumps vegetable-based black ink from 55-gallon refillable drums through pipes in the ceiling to four sheet-fed printing presses.
- The second system pumps black ink from 3,000-pound totes to two web presses. The totes are returned to the ink manufacturer for refilling.
- The 55-gallon drums and the 3,000-pound totes replaced five- and ten-pound metal cans of ink that came in boxes with cardboard separators.

+ Modified beverage vending machine to eliminate disposable cups.

The company provides each of its 250 employees with a ceramic mug to use in place of Styrofoam cups.



+ Modified purchasing policies.

Janitorial supplies are purchased in bulk, and the use of aerosol cans has been eliminated.

+ Modified all three film processors so they are on a complete chemical recycling system.



· The developer (hydroquinone-free) is recycled through a loop where rejuvenator is added to prolong its life. The tank is replenished when it gets low and is now completely changed only once per month. This modification cut developer usage by 78 percent, saving about \$75,000 total a year in raw material purchasing costs for the three units, giving a six-month return-on-investment.



· The fixer goes through an electrolytic (Dynafix 2000) silver recovery unit and is then returned to the processor. This is a closed-loop system and the only replenishment needed is to compensate for oxidation. The reduction in fixer usage saves about \$25,000 total a year in raw material purchasing costs. About once a month, the silver level in the recycled fixer gets too high for processing use and needs to be changed. The waste fixer (meeting all silver discharge limits) is then discharged to the local wastewater treatment plant (WWTP). Recognizing that recoverable silver was being lost in the waste fixer discharged to the WWTP, McNaughton & Gunn undertook additional improvements in 1996. The company installed in succession a holding tank large enough for one change to enable slow (over a two- or three-day period) processing of the waste fixer, an electrolytic silver recovery unit (Dynafix 2000), and a chemical recovery canister. This system further reduced the silver levels being discharged to the WWTP.



In 1996, for the purpose of reducing washwater usage with the side benefit of also reducing water, sewer, and heating costs, a washwater recycling unit (Watermizer Plus with Silver Removal which also functions as a pre-filter for the City of Saline's tap water) was added on a trial basis to one of the film processors at a cost of \$2300 a unit. When it immediately proved itself with no loss of film quality, it was installed on the other two film processors. These three closed-loop systems reduced the amount of washwater used each year from 450,000 gallons total to 12,600 gallons total and reduced silver levels significantly. The savings from the water reduction were about \$5400 total. Additionally, McNaughton and Gunn receives a check for about \$800 every six months from their silver recovery systems vendor for the value of the recovered washwater silver minus the cost of recovering it, giving a return-on-investment of one year.

+ **Purchased** an office copier capable of two-sided copying. This resulted in a major reduction in paper use and a savings in paper purchase costs.

+ **Purchased** a Rachwal projection platemaking system that requires less film and fewer chemicals for developing.

+ **Implemented** an electronic communications system that eliminated the need for most memoranda. Also, all Requests For Quotes and purchase orders are processed electronically, thereby reducing paper use.



+ **Tested** an aqueous subtractive plate on the cover presses. Since it met the requirements of the highest quality print jobs, it is now being used for all presses.



+ **Switched** to electronic (computerized) pre-press and reduced film waste by 60 percent.



+ **Relamped** entire building with more energy efficient lighting systems. Lithonia low-bay metal halide lights were installed in the production and warehouse areas and T-8 fluorescent lamps and ballasts were installed in the office and production task lighting areas for a 50 percent reduction in energy costs.



+ **Installed** programmable thermostats on the HVAC system for a substantial energy savings as well as a 30 percent reduction on HVAC filter use. The office areas are set for a five-day week with the temperature set back between 7:00 p.m. and 6:00 a.m. The production areas are set for a 24-hour day, 6-day week.



RECYCLING EFFORTS COMPLEMENT SOURCE REDUCTION STRATEGIES

Since McNaughton & Gunn began operating, the company has been recycling much of the waste that could not be prevented. In 1995 McNaughton & Gunn generated an income of \$280,000 by recycling film plates and paper. In 1996 expanded recycling programs and additional source reduction strategies reduced solid wastes by an additional 25 percent from 1995 (1996 total landfill costs were \$4,600) to

make a total reduction of 75 percent since the program began in 1990. This reduction was accomplished even while total sales per year increased by 50 percent from \$20 million in 1989 to \$30 million in 1996. The company is recycling in the following ways:

- Vegetable-based colored ink is still received in five-pound cans due to the small quantities ordered. The cans and lids, along with metal banding from other areas, are all recycled and the ink manufacturer picks up the cardboard boxes and separators for reuse.
- A large Cyclone Scrap Removal System was installed on the roof of the facility. The system creates vacuum points and picks up paper waste and trimmings that are generated by machines in the plant. The waste is transported through ceiling pipes to a paper baler where it is compacted and tied with wire into 1,500-pound bales. The bales are then loaded on semi-trailers and transported to a paper mill for recycling.
- Film scraps are sent off-site and are processed to reclaim their silver content.
- Over 125,000 pounds of aluminum printing plates are recycled each year.

- Each workstation has a recycling basket to collect office paper for recycling.



- Since late 1996, oil from large equipment, which needs to be changed occasionally, has been removed, filtered, and put back for reuse. Prior to that it was recycled off-site for use by others.

- Batteries used in the plant and in employees' homes are recycled.



- In 1996 the company began to recycle plastic, including strapping from web press bundles, jugs, and stretch and shrink wrapping.



- Scrap pallets are collected and sent back to the pallet manufacturer for refurbishing for reuse, if possible. Otherwise the wood waste from non-repairable pallets is recycled by the manufacturer.

- Waste in the dumpster goes to the Material Recovery Facility operated by Mr. Rubbish (an area waste hauler) where it is checked for any materials that could be recycled but were accidentally thrown out, as waste.



- Cold water for the heatset web press chiller rollers is cooled to 65°F by automatically routing it through an outdoor chiller unit anytime the outdoor temperature drops below 65°F, instead of through the indoor refrigeration unit. This has produced a considerable energy savings and an 18-month return-on-investment.

OTHER “ENVIRONMENTALLY FRIENDLY” ACTIONS

While not directly related to *source reduction* or *recycling*, McNaughton & Gunn has taken other steps that contribute to preserving the environment. They include the following:

- Changed to an environmentally friendly chemical system for printing plate developing.
- Now use vegetable-based ink on all sheet-fed presses.

·Totally eliminated isopropyl alcohol use from the dampening systems of all presses.

·Now use low volatile organic chemical solvents for blanket and roller washes.

 ·Testing vegetable-based ink for use on heatset web press.

 ·Switched from 55-gallon cleaning solvent drums to 245-gallon totes that are refillable.

 ·Will soon be switching from their current system of three film processors each with individual recycling loops for the fixer, developer, and washwater (nine recycling loops total) to a system of three film processors with three centralized recycling loops — one for fixer, one for developer, and one for washwater. It is expected that the change will reduce replenishment rates and, therefore, chemical and water consumption as well as reduce fixer and developer wastes while increasing silver recovery.

CHALLENGES

McNaughton & Gunn encountered several challenges while implementing its waste reduction efforts. First, it was necessary to educate employees on the proper separation of both paper and cardboard waste. For example, wax-coated cardboard and uncoated cardboard could not be placed in the same container. Also, film-laminated paper common to the company's operations often contaminated the recyclable waste paper. As a result, the company developed and posted explicit sorting guidelines.

If questions still remain after review of the guidelines, the company policy is to put paper in the lowest grade container rather than possibly ruining the value of the high-grade recyclable paper.

Second, technology needed to modify the vending machines was not available from the vendor until several months after the idea was first promoted. McNaughton & Gunn still faces challenges as it seeks high quality, low volatile organic chemical black ink for its web

presses to replace petroleum-based inks.



KEYS TO SUCCESS

- Employee participation in planning and implementing the waste reduction program.
- Employee education, including posting of directions for paper disposal by type and grade at each color-coded bin.
- Identification of new technologies that are necessary to implement a reduction program.
- Working with suppliers to reduce packaging and use returnable containers.

·Segregating all waste streams to reduce contamination of recoverable materials.

ADDITIONAL ASSISTANCE AND ACTIVITIES

In 1995, in their quest to further identify opportunities for waste reduction at the Saline facility, McNaughton & Gunn staff utilized the services of the Retired Engineer Technical Assistance Program (RETAP). This program provides free, confidential, non-regulatory waste reduction assessments for Michigan businesses and institutions. For more information on RETAP, contact the Environmental Assistance Division, Michigan Department of Environmental Quality at 1-800-662-9278.

McNaughton & Gunn has been providing input to the Great Printers Project since its developmental stages in 1994 and is still actively involved with the Michigan Great Printers Project task groups.



The Great Printers Project is a cooperative effort to make pollution prevention a standard practice in the lithographic printing industry.

Regionally, the project is sponsored by the Council of Great Lakes Governors, the Printing Industries of America, and the Environmental Defense Fund. State demonstration projects are moving forward in Michigan, Illinois, Minnesota, and Wisconsin. The Michigan pilot partners are the Michigan Environmental Council, Printing Industries of Michigan, and the Michigan Department of Environmental Quality. For more information contact the Environmental Assistance Division, Michigan Department of Environmental Quality at 1-800-662-9278.

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