

# Print Shop Goes All Green with New Equipment

Minuteman Press of Foxboro eliminates the use of solvents

## Summary

The Doshi family has managed Minuteman Press of Foxboro for nearly ten years. The shop operates with one full-time and one part-time employee. Minuteman Press of Foxboro provides a wide variety of printing and binding services. Most of the printing services are done digitally, except for one offset press used for printing envelopes. The offset press uses solvents for cleaning. A few years ago, the Doshi family decided they wanted to eliminate the use of solvents at their shop and convert completely to digital printing. However, they could not retire the offset press until more affordable alternative processes for envelope printing were available. Until recently, digital envelope printers could not match the price and quality of an offset press. Increased production costs would make Minuteman of Foxboro less competitive in a very cost competitive industry. With improvements in the technology, digital inkjet printers can produce a product quality similar to offset with a minimal increase in cost.

Approximately 20 gallons of a solvent-based “blanket wash” were used each year to clean and maintain the offset press. An additional ten pounds of petroleum-based ink were used per year. With installation of a new digital printer for envelope printing, all petroleum-based inks have been replaced with water-based options. Other digital equipment used in the business also uses water-based ink.

A motivating factor to move forward was the ability to eliminate the hazardous waste stream generated by cleaning the offset press with a solvent wash and the associated labor intensive maintenance.

Taking advantage of a special promotional offer from the manufacturer, a new system was purchased for \$18,000, which included the computer hardware and software, plus an additional \$300 for shipping and handling. A set of ink cartridges for the unit costs approximately \$1,000.

***“We wanted to switch completely to digital to minimize the use of environmentally harmful chemicals and so that we can market our shop as an environmentally friendly business”***

– Chan Doshi

***“With advancement in technology and a grant from TURI we were able to achieve our goal to convert our shop to a work place that is better for our environment and health.”***

Chan Doshi, Owner, Minuteman Press of Foxboro



Minuteman Press of Foxboro is located at 123 Washington Street, Suite 8. One full-time and one part-time employee work at the shop that offers multiple printing and document preparation services. Through a small business grant from the Toxics Use Reduction Institute of UMass Lowell, the shop replaced their offset envelope press with a digital printer to completely eliminate their use of solvents at the shop.

## Regulatory Overview

Printers in Massachusetts must report under the Department of Environmental Protection's Environmental Results Program (ERP). The ERP streamlines existing pollution control requirements for printing shops by replacing individual air quality, industrial wastewater and hazardous waste permits with industry-wide standards. Shops submit an annual certification of compliance with the standards. All printers with a primary Standard Industrial Classification (SIC) Code of 23, 26 or 27 or a primary North American Industry Classification System (NAICS) code of 323110, 323111, 323112, 323113, 323119, or 5111XX are subject to the ERP standards. Each covered facility submits the ERP certification along with a fee of \$275 each year.

The only exceptions for not certifying under the MA ERP are if:

1. No offset lithographic, screen, flexographic, letterpress or gravure printing is done;
2. The facility only does photo processing;
3. The facility is a major source of air pollution and therefore is required to have a Title V Air Operating Permit;
4. The facility is subject to the Operating Permit Program under 310 CMR 7.00 Appendix C; or,
5. The facility is a manufacturer and does printing as an auxiliary component of its operations.

By eliminating all offset presses, and converting completely to digital printing at their shop, Minuteman Press of Foxboro is no longer required to certify under the ERP. The shop would need to apply for a separate air permit if their digital printing emissions were equal to or greater than one ton per year of VOCs or HAPs, however, this small shop does not trip that threshold. Digital printing facilities should keep sufficient records of purchase or use of VOC containing material if below one ton per year to demonstrate to a regulator that an air permit is not required.



*The old offset press took up significant space*

## Material Use

### Offset Press Inks

For the offset press, the shop used petroleum-based lithographic inks from the Patriot Ink Series. A review of the Safety Data Sheet for the series shows that the petroleum distillates in the inks may cause irritation through eye contact and, in poorly ventilated areas, vapors from the heated product may cause temporary dizziness, headache, nausea, vomiting and drowsiness. Also, dermatitis may be aggravated by contact and ingestion may cause local irritation of the mouth, esophagus and stomach.

### Offset Press Solvent Wash

The shop used approximately 20 gallons per year of a "blanket wash" named Color Rinse 2 from Printers Oil Supply Company Inc. to clean the offset press. Based on the Safety Data Sheet, the product is 70-90% solvent naphtha, a flammable liquid that creates a flammable vapor. It may be fatal if swallowed and enters airways. It can cause drowsiness or dizziness if inhaled. Symptoms of overexposure can be headaches, dizziness, tiredness, nausea and vomiting. It can also cause skin irritation and serious eye irritation.

The smell of the solvent wash was an issue for the shop employees and a motivating factor behind getting rid of the offset press. The offset press was in a workshop area that could be closed off from the main office area, but housed the bindery machines. The bindery area is used throughout the day and solvent fumes were noticeable.

## Digital Printer Inks

The shop now uses water-based ink in four colors, magenta, black, cyan, and yellow. The Safety Data Sheets for all four inks suggest that they could cause serious eye damage and may cause damage to organs through prolonged or repeated exposure. The magenta has an additional hazard notation that it may cause an allergic skin reaction upon contact. However, human exposure to the ink is assumed to be far less than exposure to offset press inks and cleaning solvents used in the old system. This is due to the fact that the wastewater-based ink is collected within the equipment – with little potential for exposure. The ink cartridges are also sent back to the vendor for recycling.

## Financial Analysis

Taking advantage of a promotional deal from the vendor, Minuteman paid a total of \$19,300 for the new envelope printer. Typically, this equipment could cost up to \$4,000 more. The new printer does not use any solvent and therefore the shop does not need to report under ERP, saving time and money.

The number of envelopes printed per order (job size) plays a significant role in the cost of offset press printing. For offset printing, the lower the volume per order the higher the cost of production. With the digital press, the printing cost remains consistent, regardless of volume. For smaller jobs, there is a significant saving using the digital press. The financial comparison between the two technologies is summarized below based on volume of production at this shop.

	Offset envelope press	Digital envelope printer
Printing cost for approx. 150,000 envelopes per year (includes inks and labor)	\$5,000	\$7,500
Annual maintenance + other parts and accessories used	\$1,500	\$0 (anticipated to be minimal)
Annual solvent costs	\$150	\$0
Annual hazardous waste disposal costs	\$50	\$0
Annual ERP certification costs	\$275	\$0
<b>TOTAL</b>	<b>\$6,975</b>	<b>\$7,500</b>

## Performance

The offset press worked best for one or two color printing. Since the offset press used at Minuteman Press of Foxboro was a 2 head press, it would require two passes to run a four color job, making it cost prohibitive. However, for one or two color jobs, offset can be less expensive, depending on the size of the job. It is important to note that small offset printing jobs produce the same amount of hazardous waste as large jobs.



*The new digital equipment is much more compact than the offset press*

Performance Summary		
Metric	Offset	Digital
Ease of use	More time consumed and waste generated for jobs with more than 2 colors	As easy for multicolor as for one color
Quality	Better quality, but only apparent to the trained eye	
Smudging/ Imperfections	Imperfection on a print screen could run through a whole job if not caught	Run the risk of smudging if they get wet
Rate of production	7,000 pieces per hour	2,000 pieces per hour (small jobs are the focus of this shop)
Space	Filled entire corner of bindery area including solvent and waste storage	Very small piece of equipment that fits in the hallway

## Conclusions

Minuteman Press of Foxboro now operates free of solvent use. They have eliminated the use of 20 gallons of solvent naphtha per year. This creates a safer and healthier work environment. The shop no longer has solvent storage, use, or disposal to deal with. Though the investment was large and the cost per piece higher for certain jobs, the owners believe that the switch to all digital systems was worth it, both for the business and its workers.

The Toxics Use Reduction Institute (TURI) at UMass Lowell provides the resources and tools to help Massachusetts companies and communities make the Commonwealth a safer place to live and work. TURI awards grants to industry and small businesses to help them reduce the use of toxic chemicals and to demonstrate innovative technologies to peers. For more information, visit <http://www.turi.org> or contact Joy Onasch at [joy@turi.org](mailto:joy@turi.org) or 978-934-4343.



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