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## **A Dry Idea**

by Cheryl Salerno

Today, as more and more businesses recognize the money lost to inefficient use of solvents and grapple with safety and disposal issues related to solvent-based cleaning techniques, they seek out recycling vendors for guidance and state-of-the-art products to provide not only peace-of-mind in terms of hazardous waste reduction, but significant cost savings in terms of solvent reclamation.

### **Laundering Leads to Innovation**

Cleaning with solvents poses a number of challenges in terms of waste management—a business must ensure not only that chemicals are disposed of safely but that such disposal does not become cost prohibitive. The printing industry is one market segment that depends heavily on solvents for cleaning. Liquid solvent and liquid-soaked wipers are the tools of choice for most printers, offering an easy and efficient way to get grimy presses and other printing equipment clean. Unfortunately, many print manufacturers struggle with safety and cost issues concerning disposal of solvent and laundering of wipers.

Back in 1993, a company called Transcontinental Printing RBW Graphics (Ontario, CANADA) faced such concerns and decided to take a long, hard look at the way in which solvents were being used at their facility. A full-service manufacturer of printed products (catalogues, magazines, directories, etc), the 312,000-square-foot plant purchased 60,000 litres of cleaning solvent annually to clean parts, rollers, blankets, and equipment. The facility was generating 50 to 75 gallons of waste solvent and 15,000 dirty solvent-laden wipers per week.

“The printing industry utilizes large quantities of both liquid solvent and liquid-soaked wipers in the cleaning of their equipment,” explains Dale Schnurr, who was RBW Graphic’s Plant Engineer in charge of Health & Safety, Quality and Environmental Management. “The disposal of solvent and laundering of wipers represents a significant environmental concern and cost to any print facility.”

In RBW Graphics’ case, the waste solvent was disposed of as Subject waste by a licensed waste hauler. The wipers were collected twice each week by a Toronto-based laundry facility that used a water-based process to clean the wipers. The

solvent present in the wipers was of concern to the laundry facility, as solvent extracted during the cleaning process would enter the facility's wastewater discharge.

RBW faced an additional concern in that, the storage of solvent-soaked wipers awaiting pick-up resulted in a considerable quantity of solvent dripping on the floor. The solvent then represented a safety hazard, resulting in a slippery floor and posing an environmental risk should the solvent reach one of the floor drains or catch basins.

The company turned to Omega Recycling Technologies (ORT) for help in developing a more efficient method of managing the lithographic solvents used in their operations—one that would allow them to extract and reclaim waste lithographic cleaning solvents from solvent-laden cleaning wipers. ORT manufactures systems to handle certain solid waste problems such as sludge solidification, compactors of contaminated cans, drum cleaners and recyclers, contaminated shop towels etc

#### **A Novel Reclamation Process**

After two years of cooperative development with ORT, RBW installed an innovative system—known as the STOR system. STOR (*Shop Towel on site Recycling*) is an integrated system that uses the production process' own solvent to clean the towels for reuse and purifying the excess solvent also for reuse. STOR captures and recycles the lithographic cleaning solvents that had been previously wasted.

The waste solvent recovery system consists of:

- a petroleum based dry-cleaning machine (used to clean the dirty wipers and extract the waste solvent);
- a 500-gallon holding tank;
- a 60-gallon/hour vacuum distillation unit to reclaim the solvent; and
- a 340-gallon recycled solvent holding tank.

“Early in the design process, the initial version of the system featured a solvent extraction system,” says Schnurr. “This resulted in approximately 150 gallons of waste solvent, which had to be disposed of through a licensed waste hauler. This was revised to include a vacuum distillation system and a solvent-based dry cleaning system.”

Omega, a company who started out as a manufacturer of dry-cleaning machines, brought considerable experience to the table in regard to that cleaning technique. Still, applying the techniques of dry cleaning to a system designed not to clean, but to recycle was no easy task.

“We faced some considerable challenges in the design process—one could not adapt a straight-forward dry cleaning system to the printing industry when cleaning the

rags was only a secondary goal, the first of which was recovering the solvent," remarks Sam Suissa electrical engineer and VP of at Omega. "Working with solvents that carried high water contents and integrating the system were just some of the stumbling blocks along the design and manufacturing process. RBW Graphics provided crucial input during the commissioning of the first STOR system."

Schnurr noted that the type and percentage of contamination in the dirty solvent made its extraction particularly challenging. The aggressiveness of the solvent on the sensors and control systems became another obstacle along the developmental path. A joint effort on the part of both Omega and RBW Graphics personnel allowed the STOR system design to persevere despite these difficulties.

### **Solvent Cleaning Solvent**

Once installed, the STOR system proved to be uniquely equipped for the job at RBW Graphics. The petroleum-based dry-cleaning unit, combined with a vacuum distillation unit, allowed the company to put their current cleaning solvent on "double duty": it not only served as an effective cleaning agent for their equipment, but it also became the laundering agent for their soiled wipers. This use of the identical solvent eliminated any contamination of the extracted process-cleaning solvent with a foreign dry-cleaning solvent. Instead, all of the solvent extracted during the washing cycle could now be distilled and re-used for washing or distribution to production personnel for cleaning equipment.

"The system basically has the objective of recovering the solvent from used shop towels, with the added benefit of cleaning these shop towels at the same time," says Suissa. "When it is sent to the STOR system, each rag holds dirty solvent—saturated with inks and other materials. Fresh, clean solvent—the same solvent as was used to clean the presses—is processed through the dirty rags within the STOR cleaning unit. This fresh solvent picks up the inks and other wastes from the dirty rags and is then directed to a distillation unit for refinement. The now clean (but still solvent-laden rags) are then dried with a recovery dryer."

The recovery dryer, notes Suissa, is a dryer that has no exhaust but is instead a closed-loop system that re-condenses the solvent vapors that are picked up from the wet rags.

### **Cost Benefits**

Since installing the waste solvent recovery system, RBW Graphics has seen significant cost benefits. The new system allowed:

- A reduction of annual purchases of new solvent by 80 percent (48,000 litres/\$42,240)
- The elimination of an outside laundering service for dirty wipers (625,000 per year/\$83,500)

- A reduction of annual liquid waste disposal fees by 95 percent (48,000 litre/\$23,000)

A summary of RBW Graphics' recycled and new solvent usage over a ten-month period:

**a) New Solvent Purchases**

- 10 Nov 97 purchased 20,000 litres @ \$.85/litre for a total cost of \$17,000
- 24 Aug 98 purchased 10,000 litres @ \$.85/litre for a total cost of \$13,600
- New solvent available on the 24 Aug 98 was 14,000 litres
- Total amount of new solvent used from 10 Nov 97 to 24 Aug 98 was 16,000 litres

**b) Recycled Solvent Usage**

- Pressroom Pump Reading 10 Nov 97 was 21,823 litres
- Pressroom Pump Reading 24 Aug 98 was 41,941 litres
- Total Pressroom usage: 20,658 litres
- Washing Machine Usage was 964 loads of wipers using 160 litre/load was 154,240 litres
- Distillation losses of 5 per cent of all recycled solvent was 8,745 litres
- Total amount of Recycle Solvent used: 183,643 litres

**a) Total Amount of Cleaning Solvent Used**

16,000 L new solvent + 20,658 L of pressroom solvent + 154,240 L of washing solvent + 8,745 L waste solvent; for a total of 199,643 L.

**b) Return on Recycled Solvent**

199,643 L divided by 16,000 L of new solvent = 12.5

**c) Payback**

- 16,000 L @ \$.85 = \$ 13,600 Wipers: 964 loads x 700 wipers = 674,800 wipers
- 199,643 @ \$.85 = \$169,696 Laundering of 674,800 x \$.12/wiper = \$80,976

**Total Cost Avoidance = \$156,096 + \$80,976**  
**= \$237,072**

**Actual Cost Savings = 31,160 solvent + 42,889 waste disposal + 80,976 wiper cleaning = \$ 155,025**

RBW realized savings on several fronts. Not only did it cut down on their solvent purchases, minimized their waste generation, eliminated outside laundry service, and reduced their environmental risk exposure, but RBW reduced their operating costs by a substantial amount.

"Installation and operation of this system resulted in a total cost savings of \$148,740 annually," says Schnurr. "The annual operating cost for the system is approximately \$18,500, making the net cost savings \$130,240 annually."

There are numerous methods by which waste management issues can be tackled and, according to Suisse, innovative alternatives such as the STOR system will help serve as a springboard for even more efficient techniques in the future. Since its "maiden" installation at RBW Graphics, the STOR system now resides in five other facilities in Canada and the United States.

**About the Author**

*Cheryl Salerno is a contributing author to CleanTech magazine.*