Reduce Wastes from Your Screen Reclamation Processes

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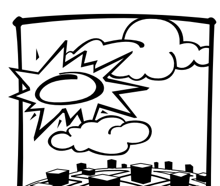
Screen printers use many different kinds of inks: solvent-based, water-based, UV-cured, and thermoplastic or plastisol inks. Each of these inks has distinct advantages in different applications, but all can become a hazardous waste or serious wastewater contaminant if they contain color pigments from regulated metals, or are contaminated with a regulated solvent such as xylene or toluene, or other material. The ink industry has worked closely with printers to remove most regulated metals used as ink colorants such as silver, barium, cadmium, chromium, and lead.

Pollution prevention (P2) opportunities exist at every step of the screen reclaiming process, beginning with initial ink removal at the end of the run. Plastisol and UV inks can be left in the screen because they don't contain solvent that "dries"—the ink will only become hard if cured by heat or UV light. Water- and solvent-based inks, however, must be carefully managed to prevent the ink from drying in the screen during press room use or at the end of the run. If water-based ink is left in open mesh for even a short period of time, it can clog the mesh and ruin the screen.

Screen reclamation begins with ink removal, then the emulsion is removed. Sometimes another step is required to remove the haze or ghost image from the screen. Even though water-based inks are removable using water, many printers still use a solvent because of its fast cleaning action. The traditional method of screen reclamation involves use of an ink degradant to help release the ink from the screen, mechanical cleaning by operators to further loosen the ink, and then removal of the ink with a high-pressure water wash, sometimes followed by a degreaser. Workers are exposed to solvent during the application process, while hand-cleaning the screen, and by the water wash-off process, which sometimes aerosolizes the solvent and ink in the air. Ink removal may also be done at the press throughout the day to keep the screen clean or to prevent ink from drying during breaks. The following P2 practices are recommended for the ink removal process:

- Never allow inks to dry on screens at press side.
- Card out as much ink as possible from the screen and store for reuse; use re-usable cards made from Formica.
- Reclaim screens as soon as the run is finished. If a screen is to be reused, it can be stored after the ink removal step; however, the longer an image is left on a screen, the more likely a "ghost" image will result.
- Use less- or non-hazardous solvents for press-side and screen reclamation.
- Use an adjustable spray nozzle to apply ink remover for better coverage with less solvent. Limit nozzle discharge to reduce solvent used.
- Use more mechanical action with cleaning brushes to loosen the ink.
- Collect wash solvent, filter, and reuse.

Traditional emulsion-removal systems contain sodium metaperiodate or a weak corrosive compound. Haze removers may need to be applied to remove the



"ghost" image sometimes left in screens. Haze removers normally contain potassium hydroxide and aliphatic ether alcohols, and are hazardous to workers' health.

Screen printers may choose to change the technology used to clean screens and remove the emulsions. Although this usually means more up-front costs, the returns are usually high, creating very short payback periods. The following technologies can reduce or eliminate solvent use and wastewater contaminants leaving the facility, as well as greatly reducing employee exposures to hazardous materials:

- Install an enclosed/automated screen cleaner. These units act much like a dishwasher—you put the screen in, close the door, turn it on, and walk away to do something else. Solvent losses are greatly reduced, lowering VOC emissions and employee exposure. Employee exposures can be reduced by as much as 70%. Solvent is filtered to remove ink and emulsion particles and then reclaimed for reuse. Cost analysis indicates that the equipment pays for itself in reduced chemical savings alone; labor reductions also increase savings.
- Recycle used solvent. Collect solvent wash-off, filter out ink solids, and recycle solvent through a distillation unit (still). If the solvent is hazardous before being recycled, the amounts must be tracked each time before being put in the still and counted towards monthly hazardous waste generation rates.
- Install a high-pressure water wash system with a filtration system. These systems use a high-pressure stream of water (3000 psi) and some reclamation chemicals to blast the ink and emulsion off the screens. The screens must be cleaned immediately after the run. This can greatly reduce the use of solvent and chemicals for ink and emulsion removal, while reducing associated health risks. VOCs, hazardous wastes, and wastewater contaminants are reduced; however, testing may be needed to verify if filtrate is a hazardous waste. Cost estimates indicate a savings of 30% over traditional screen reclamation methods.

Filter wastes and still bottoms may be hazardous if inks with regulated metals are used, or if toxic solvents, such as toluene or methyl ethyl ketone (MEK), are used. For more information on testing for regulated metals in waste ink or ink-related materials, see the fact sheet: *Regulated Metals: The Rule of 20*.

Case Study 1

T.S. Designs, a textile screen printer, replaced its traditional screen-cleaning system with a closed-loop automatic screen washer. The new washer applies cleaning chemicals in a closed environment which recycles the cleaner many times. The company eliminated 1,000 gallons of solvent from its wastewater and saved over $20,000 in labor and cleaning chemicals yearly.

Case Study 2

Romo Inc. implemented a waste-reduction program to eliminate or reduce environmental impacts from its operations as much as possible. Their P2 program involved installation of a solvent recycler for a savings of $20,750 in yearly solvent purchases; a 70% voluntary toxic chemical-use reduction plan for toluene and methyl isobutyl ketone; and installation of a high-pressure water blaster for emulsion removal, which reduced chemical purchases by 75%, saving $3,800 per year.

Resources

http://www.epa.gov/opptintr/dfe/pubs/screen/ctsa/scbook.htm (EPA Design for the Environment study: a detailed evaluation of alternative screen reclamation systems)

http://www.pneac.org/sheets/screen/ctsaexecsummaryscreen.pdf (same as above; more detail)

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The Small Business Environmental Assistance Program's (SBEAP) mission is to help Kansas small businesses comply with environmental regulations and identify pollution prevention opportunities. SBEAP is funded through a contract with the Kansas Department of Health and Environment. SBEAP services are free and confidential. For more information, call 800/578-8898, send an e-mail to SBEAP@ksu.edu, or visit our web site at http://www.sbeap.org. Kansas State University is an EEO/AA provider.