Press Cleaning

COMMONLY OBSERVED PRACTICES

Currently many printers are still using highly volatile traditional solvents for press cleaning. Another common cleaning practice is pouring the cleaner over the parts to be cleaned and not reusing this solvent. This unnecessarily consumes large quantities of cleaner. Some facilities are using disposable wipes; although, launderable towels are becoming more common.

POLLUTION PREVENTION OPTIONS

Many options for pollution prevention are available for press cleaning. They can be as simple as behavioral changes and product substitutions, to as complex as adding equipment.

Procedural Behavior Changes to Reduce Cleaning Wastes

The obvious area to begin identifying pollution prevention opportunities is with procedure. Changing habits, nevertheless, is difficult. When identifying areas of behavioral change, always evaluate why the procedure is performed in its current manner. In terms of cleaning, it is important to know why the cleaning is necessary and how clean is clean enough. EPA studies estimate that almost 50 percent (by volume) of high VOC cleaners evaporates before cleaning. Over cleaning adds expense and possibly more stringent environmental compliance issues.

Identified below are three easy procedural changes to reduce waste and optimize resources.

1. Clean presses as needed, not on a schedule. Immediate cleaning and using automatic systems will minimize cleaner consumption and prevent buildup of ink, paper dust or lint that will affect print quality. When ink does build up, stronger cleaners become necessary.

2. Use the least amount of cleaner possible. Apply the cleaner to the rag instead of pouring it over the part. Much cleaner is wasted when it is poured onto the press.

3. If cleaners must be poured over rollers or press parts, use a catch pan beneath the part (like roller trays) and empty the used cleaner into a closed container as soon as the rollers are wiped. Store used cleaner by color for future blanket and roller cleaning.

Reduce Air Emissions

The waste stream of most concern in printing facilities is often air emissions. To help reduce air emissions from storage:

1. Store all volatile cleaners in closed containers. Make low VOC cleaners readily available at each press. Store high VOC cleaners in another area, reinforcing that the press operator is to use it only for specific purposes such as color change.

2. Do not leave an open funnel in the waste drum. Open funnels allow the container to continually emit VOCs. This is also considered an open container under hazardous waste regulations. Closable funnels are available, but most regulators expect the bung to be kept in the drum when waste is not being added.

3. Collect used rags in a self-sealing, flame-resistant can.

Reducing Solid Waste

Many printers are currently using disposable towels for cleaning. These towels can only be used once and then must be discarded. Because they contain residual ink and cleaners, they are potentially hazardous and require laboratory testing to characterize whether they are hazardous or non-hazardous. This characterization will determine the proper disposal method.

As an alternative, laundry service towels can be used. Most laundry services will accept towels dirtied with industrial and commercial wastes as long as they are not saturated. Using a laundry service will decrease the volume of solid waste going to the landfill as well as eliminate the need for laboratory testing. Launderable towels are not considered a waste because they are laundered and reused. However, the liabilities associated with waste ink and cleaners is not eliminated, it is transferred to the laundry.

Pressroom P2

Other means of procedural changes can prevent pollution on the press. The following practices require only planning and can save time and money by decreasing cleaning costs associated with products, ink, cleaner, and down time.

- Schedule jobs by color. Clean the ink tray only when changing colors.
- Sequence colors from lightest to darkest: yellow, magenta, cyan, black. Sequencing reduces cleaning and prevents a darker color from bleeding through the lighter color. Sequencing also reduces fountain solution changes if the press doesn't have a filtration unit.

Product Substitution

Many control technologies include equipment to capture and destroy emissions. If a company can reduce emissions using product substitution or process change, the expense of the air pollution control equipment may be eliminated. Substitute cleaners, containing no more than 30 percent VOCs by weight, have lower vapor pressures and higher flash points than traditional cleaners, but may not effectively clean all areas of the press.

Chemical manufacturers that supply cleaners are developing low VOC cleaners. Just as there are many different presses, there are many different cleaners. Most low VOC cleaners continue to contain naphtha, average 3.5 pounds per gallon of VOCs and have a flashpoint greater than 200°F. "Quick drying" cleaners may have slightly higher VOC contents and usually have a flashpoint below 140°F, making them hazardous. Some substitutes present a two step approach by first using a cleaning solution with a high VOC content followed by a low VOC rinse as the second step. Refer to proposed and enacted regulations regarding low VOC cleaners to ensure compliance.

The effectiveness of low VOC cleaners continues to improve, but, because the first cleaners performed poorly, the industry is not readily accepting them. EPA research has demonstrated successful substitution of low VOC cleaners using an integrated approach. Cleaning equipment, targeted product substitution, and changing operator practices can reduce VOC emissions from cleaning.

Low VOC blanket and roller washes generally contain naphtha, inorganic phosphates and proprietary compounds. Some contain a fine abrasive to enhance ink removal. Many formulations are totally proprietary and ingredients are not listed. When selecting a low VOC cleaner, contact manufacturers to discuss your cleaning needs. Be sure to consider ink, paper, fountain solution and the type of press the cleaner is to be used on.

Do not judge low VOC cleaners by the performance of one product. Try a variety of different formulations and target cleaners for a specific purpose. A low VOC cleaner effective on ink trays and metal parts of the press may not be effective as a blanket wash.

When selecting a new product, determine the specific pollution prevention goal to be attained. Review the product's material safety data sheet for hazardous constituents (i.e. naphtha, 1,2,4, trimethylbenzene), the flashpoint (if less than 140°F the material becomes an ignitable hazardous waste when discarded) and the VOC content, either expressed as a percent (preferably less than 30) or in pounds of VOC per gallon of solution.

Measure the amount of new product necessary to clean the press and compare it to the amount of traditional cleaner used. If it takes twice as much low VOC cleaner (3.5 pounds VOC per gallon) to effectively clean the press, the actual VOC emissions may be equal or slightly more with the low VOC cleaner. Properly using traditional cleaner with attention to operational changes could better reduce VOC emissions.

It is important to follow manufacturers' cleaning directions for new products. If the products are not used as intended, more will be necessary to clean the press. Low VOC cleaners tend to be water-soluble or water-miscible, and often have a water rinse following cleaner application. Though this may take more time than traditional cleaner, this rinse is also removing paper dust and lint.

Take care when cleaning directions indicate "immediately rinse" or "let product work into ink." Rinsing immediately may be necessary to prevent a blanket wash from leaving a film on the blanket. For effective cleaning, low VOC roller cleaners may need time to loosen excess ink to effectively clean.

Warm water generally is more effective for rinsing cleaners than cold water. If minerals build up, look at rinse water quality before blaming the cleaner.

And finally, remember that allocating time for employees to experiment with substitute cleaners and create press procedures that use low VOC cleaners is an investment in decreasing control technology costs to meet air emission standards. Feedback from employees and constructive suggestions will create a pollution prevention program that produces less waste and is responsive to the company's needs.

Equipment to Reduce Cleaning Needs

Automatic cleaning systems remove excess ink that would otherwise saturate the cleaning solution and require more cleaner to perform adequately. These systems also prevent ink buildup, decreasing the need for stronger cleaning solutions.

Additionally, automatic blanket cleaners reduce the amount of solvent used and waste generated. When used properly, automatic blanket cleaners can also reduce wasted time and lost impressions. One report cites that lost impressions were reduced from 1,200-3,000 to 250-350 when using an automatic blanket wash.

Elements of an automatic blanket cleaner include a control box, a solvent metering box for each press unit, and a cloth handling or brush unit. Many larger presses are equipped with automatic blanket cleaners and older presses can be retrofitted. The automatic blanket cleaner uses less solvent to clean the blanket (because of its metering system) and is faster than manual cleaning.

One company manufactures a unit that employs a rotary oscillating spray and brush device with solvent recovery to collect and reuse the cleaner. The unit is an enclosed system designed to reduce overspray and eliminate wipe-up towels.

Roller wash-up blades and ink blades remove residual ink from specific rollers, reducing the amount of cleaner needed. The roller and wash-up blades' condition influence how well both stay clean. The blade's angle against the roller should be adjusted to apply sufficient pressure without being grabbed or pulled under the roller. Press speeds should be just slow enough to allow for thorough cleaning. The slower the press speed, the more cleaner is used.

Presses can be equipped with specialized form rollers in place of standard form rollers, such as oscillating or hickey-picking, to respond to special needs of the lithographer. Using specialized rollers reduces press operator dependency on cleaners.

Automated press control systems, usually purchased to improve productivity and reduce makeready, also reduce cleaning needs. Systems that adjust ink/water ratio, ink density and image density on the plate, eliminate the iterative cleaning between press operator adjustments.

High quality optics and computer control systems allow for automatic plate scanners to determine the relative density of the printing image across the plate's surface. This information can be transferred to an automatic ink key setting system, adjusting the ink profile for each ink slide position. Automatic registration uses optical scanners to locate the registration marks and set this position for the duration of the press run.

One manufacturer has developed an optical system that monitors the ink/water ratio. Because both the water feed and ink keys are part of the system, any deviation of the ratio detected can be corrected. The system correlates the refraction of light from the ink form roller with the amount of water emulsified in the ink. This system could also encourage the transition to successful alcohol-free printing.

Regulatory reminder...

- Manage petroleum-based solvents and inks as hazardous waste. Some inks may not be hazardous when discarded but are unacceptable for landfill disposal because they are liquid and contain hydrocarbons. Most states require that a waste be solid for acceptance at a landfill, or be tested to verify that it is nonhazardous.
- Disposable rags may be landfilled if laboratory testing demonstrates that they are nonhazardous. Launderable rags are not subject to a hazardous waste determination by the user because they are reused after cleaning.
- Press cleaning releases VOCs. Intentionally evaporating used solvent is illegal disposal of a hazardous waste and subject to penalty. Additionally, it exposes workers to poor working conditions.

COSTS AND BENEFITS

Procedural changes can decrease operating costs by decreasing the amount of cleaner that is consumed and disposed of. Additionally, using less cleaner will reduce the amount of VOC emissions from cleaning.

This example is using costs associated with traditional high VOC cleaners. Cost savings using low-VOC cleaners will be higher.

Table K Decreasing Cleaner Consumption			
ITEM	VARIABLE	EXAMPLE	YOUR FACILITY
A	Amount of cleaner previously used	10 gal/month	
B	Amount used by cleaning only as necessary	9 gallons	
C	Amount saved = A - B	1 gallon	
D	Amount of solvent decreased by using only as much as necessary for cleaning job[a]	1.5 gallons	
E	Total amount solvent saved = C + D	2.5 gal. saved	
F	Cost of solvent	$2.50/gallon	
G	Multiply volume saved by cost = E x F	$6.25 saved	
H	Decreased disposal costs	$22.75 (2.5 gal x $9.10[b])	

[a] This amount can only be determined by evaluating cleaning needs and quantifying the amount of cleaner necessary to adequately clean and subtracting that from the quantity of cleaner currently used.

[b] Disposal cost calculated based on $500/55 gallons = approximately $9.10/gallon. Consult manifests for actual hazardous waste disposal costs. Decreasing hazardous waste generation may also reduce hazardous waste generator requirements. Air emissions will also be decreased by decreasing consumption. This may have permitting advantages. Both are indirect costs.

Cost Benefit Analysis for wiping parts instead of pouring solvent over them.

Table L Cost Benefit Analysis - Wiping Parts Instead of Pouring Solvent Over Them			
ITEM	VARIABLE	EXAMPLE	YOUR FACILITY
A	Amount of cleaner used pouring	1 gal/month	
B	Amount of cleaner used wiping	.5 gal/month	
C	Subtract difference = A - B	.5 gal.month	
D	Cost of cleaner	$2.50/gallon	
E	Amount hazardous waste averted	$1.25/month	
F	Multiply volume saved by cost = C x D	.5 gal/month	
G	Cost of off-site disposal	$500/55 gal. (approx $9.10)	
H	Multiply volume by cost = F x G	$4.55 saved	

Adding direct and indirect savings will give the gross savings. Wiping parts instead of pouring solvent over them for cleaning may have other indirect costs, such as increased laundry fees for using more launderable rags. To calculate the net savings, subtract the increase in laundry fees.

Because many cleaners are highly volatile, wiping may also reduce air emissions and find cost benefit in reduced compliance requirements.

If pouring is necessary, collecting cleaner and storing it by color for reuse will also decrease the need for new cleaner. Cost benefits include decreased cleaner and disposal costs.

Launderable Towels

Table M
Laundry Service Towels vs. Disposable Towels

ITEM	VARIABLE	EXAMPLE	YOUR FACILITY
	DISPOSABLE TOWELS		
A	Cost of towels	$0.08/each	
B	Volume consumed	$100/month	
C	Multiple cost by volume = A x B	$8/month	
D	TCLP[a]	$400.00	
E	Disposal fees (hazardous) Nonhazardous	Assuming TCLP indicates nonhaz - Negligible	
F	Violation for no TCLP	<$10,000/day	
	LAUNDERABLE TOWELS		
G	Cost of laundry towels	$0.10/towel	
H	Volume consumed	80 towels	
I	Multiply cost by volume = G x I	$8.00/month	

[a] Prior to the disposal of any commercial or industrial by-product, the generator is required to determine if the waste is hazardous or nonhazardous. In the instance of disposable towels, if ink and/or solvent are considered hazardous, the towels are considered potentially hazardous and require proper laboratory testing to determine proper disposal methods. The $400 is an average cost of the laboratory test.

Low VOC Cleaners

Equipment and product changes also reduce the amount of VOCs emitted. This not only can have environmental compliance advantages, it will increase the quality of the working environment.

Table N Cost Comparison - Low VOC Cleaners vs. Traditional Cleaners			
ITEM	VARIABLE	EXAMPLE	YOUR FACILITY
	TRADITIONAL CLEANER		
A	Cost of current cleaner	$2.50/gallon	
B	Volume consumed	10 gal./month	
C	Multiply cost by volume = A x B	$25.00/mon.	
D	Disposal fees (if applicable)	None[a]	
E	Total (Cost + Disposal) = C + D	$25.00/mon.	
	Low VOC		
F	Cost of appropriate alternative (3.5 #VOC/gallon)	$18.00/gallon	
G	Volume consumed	2 gal./month	
H	Multiply cost by volume = F x G	$36.00	
I	Disposal fees (if applicable)	None[a]	
J	Total (Cost + Disposal) = H + I	$36.00/mon.	
K	Fines for noncompliance in areas where printers may not use cleaners containing more than 3.5 #VOC/gallon	<10,000/day/ violation	

[a] Example assumes that cleaner is poured onto a launderable rag and parts are wiped instead of pouring cleaner directly onto the part. If pouring cleaner directly onto the part, include the cost of solvent disposal. For either practice, include all costs of the towels, including disposal of disposables.

When determining a cost benefit for using a low VOC cleaner also incorporate the costs of disposal (hazardous vs. nonhazardous) and possible air permitting costs. Compliance costs can be reduced tremendously by simply decreasing VOC emission rates. Low VOC cleaners offer an excellent opportunity to decrease VOC emissions. If a source is considered a Major Source under Title V permitting requirements, simply reducing emissions to under the Title V thresholds can eliminate Title V emissions fees as well as the fees associated with preparing the permit application. Many businesses have hired consultants to prepare permit applications and have paid tens of thousands of dollars for these services.

Table O
Cost Benefit Worksheet
Automatic Blanket Cleaners

ITEM	VARIABLE	EXAMPLE	YOUR FACILITY
A	Automatic blanket cleaner	$800 (for duplicator press)	
B	Amount of solvent used without automatic blanket cleaner	10 gallons	
C	Amount of solvent used with automatic blanket cleaner	9 gallons	
D	Amount of solvent saved = B - C	1 gallon saved	
E	Cost of solvent	$2.50/gallon	
F	Multiply cost by volume = D x E	$2.50	
G	Time spent cleaning prior to equipment installation	20 minutes	
H	Cleaning time with equipment	15 minutes	
I	Time saved = G - H	5 minutes	
J	Value of 1 hour operating time	$20.00/hr	
K	$ saved per cleaning = I x J	$1.67	
L	Raw materials savings[a]	$1.00/cleaning	
M	Savings per cleaning = K + L	$2.67/cleaning	
N	Number of times press is cleaned	10/week	
O	Savings x number of cleanings = N x O	$26.70/week	

[a] i.e. solvent, launderable towels, etc.

Automatic blanket cleaners are most effective on small presses and short press runs. This equipment tends to be restrictive to larger presses printing high quality images.

Automated press equipment designed as add-on equipment may not be available for all presses and is often not cost effective. Automated equipment is most cost effective when purchased pre-installed on a new press.