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LESS (Waste) = MORE (Profit)

T. Green inspects the tank of electrochemical equipment used to treat coolant in a metalcutting shop.

Bill Kennedy

Environmental responsibility and operational profitability don't have to be mutually exclusive with a proactive environmental management program.

The metalworking industry must comply with a myriad of environmental regulations enforced by local, state and federal agencies. The challenges include, but are not limited to, the management of regulated waste, air and water quality, spill control and information tied to the community's right to know.

A proactive environmental management program is an effective way to meet these challenges. It can reduce operating costs, improve part quality, increase profitability and provide access to new and growing markets. Pollution prevention and waste reduction programs can be structured to increase revenue via resource recovery at the same time as they facilitate compliance and reduce liability.

Environmental Responsibilities

Instituting a proactive environmental management program helps a shop fulfill its environmental responsibilities. Metalworking operations produce several types of regulated waste, which are typically categorized as municipal, residual or hazardous. Federal, state and local regulations define each category. Municipal waste includes corrugated materials, containers, packaging materials and office waste. Residual waste includes spent coolant, grinding swarf, wastewater and petroleum-contaminated absorbents.

Municipal and residual wastes are also referred to as nonhazardous wastes. Hazardous waste, as defined by the Environmental Protection Agency, exhibits one or more of the following characteristics: ignitability, corrosiveness, reactivity or toxicity. These wastes are normally processed by a licensed treatment, storage or disposal facility.

The generator of any waste stream, whether it is hazardous or not, is responsible for it from "cradle to grave." Therefore, it is important that the generator properly characterize each waste stream and prequalify a contractor to handle it. For every waste-disposal contractor, a shop should maintain a qualifications package that includes, at minimum, copies of the contractor's compliance history, operating permits and a current certificate of insurance. In addition, training may be required for employees who work with waste classified as hazardous under the Resource Conservation and Recovery Act.

Even waste storage is regulated. Containers must be properly labeled, stored in approved accumulation areas (in secondary containment, if required) and not stored on-site beyond regulatory limits.

Clearing the Air

Regulations exist that address waste emissions as well. Under the Clean Air Act, the EPA limits the amount of pollutants allowed in the air. Because controlling pollution problems often requires special understanding of local industries, geography and housing patterns, the EPA gives states first responsibility in enforcing the Clean Air Act. Each state maintains an EPA-approved state implementation plan (SIP), which is a collection of regulations used to manage and clean areas polluted by airborne contaminants.

A state-issued air-quality permit includes information on the type and volume of pollutants being released and the steps the owner or operator is taking to measure and reduce pollution. Under normal conditions, the shop owner monitors the various sources that release pollutants into the air, such as external exhaust systems for welding areas, quench tanks, evaporators, paint booths and process equipment. Review of the SIP enables a shop to determine which of its emissions are subject to regulation.

Water Ways

Waste released into water is also under government scrutiny. The Clean

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Outdoor storage of untreated chips can result in contamination of soil and water through leakage and storm water runoff.

Resource recovery raises revenue

Fulfillment of environmental responsibilities, managed correctly, can boost a shop's bottom line. Extracting maximum value from machining scrap is a good example. The volume of metal removed from a workpiece during machining can be far greater than that of the part produced, and chips have value as raw material.

Scrap recyclers usually offer only nominal return for this secondary metal when the chips are loose and laden with coolant. But through densification, such as briquetting, these chips can command prices approaching that of solid scrap, with pricing premiums ranging from 20 to 200 percent, depending on the material and market conditions. In most cases, briquetting also provides a means to recover expensive coolant.

B. Kennedy

Densification makes chips more manageable and squeezes out residual coolant, raising the scrap value of the chips and also facilitating coolant recycling.

A typical case involved a small shop that installed a briquetting system during the summer of 2004. The shop generates about 18,000 lbs. of 6000 and 7000 series aluminum chips each month. A local scrap dealer was paying $0.46/lb. for the chips, loose and soaked in coolant.

In briquette form, the shop now stores a full 48,000-lb. truckload of chips and transports the metal directly to a primary melt facility, which pays $0.62/lb. for the material. The $2,880 per month increase in payback is accompanied by a $1,062 monthly savings in lower coolant costs, because the briquetting process recovers coolant previously lost in undensified chips. The new system also eliminated housekeeping problems and environmental liability issues that resulted from outdoor storage of the loose, coolant-laden chips.

COST SAVINGS PER YEAR	
Difference per month via briquetting ($2,880 x 12)	$34,560
Reduced coolant ($1,062 x 12)	$12,744
Total	$47,304

Another enviromentally conscious way to fatten the bottom line is with electrochemical treatment. It facilitates recycling of mop water and enables recovery of water-soluble coolants without affecting coolant quality. The system typically has no moving parts, other than those in the fluid transfer pump, and does not require filtration or the addition of any chemicals.

COST SAVINGS PER YEAR	
Coolant recycling ($1,579 x 12)	$18,948
Reduced coolant ($1,241 x 12)	$14,892
Total	$33,840

Through the use of an electrochemical treatment system, one shop achieved significant savings in coolant purchase and disposal costs. Prior to installing the system, the shop bought 275 gal. of fresh coolant concentrate each month at a cost of $1,550. By recycling the coolant on-site, coolant purchases were reduced to one 55-gal. drum costing $309. Monthly savings amount to $1,241 per month. In addition, prior to installing the system, the shop spent $1,625 per month disposing of 2,500 gal. of spent coolant. Now the coolant is recycled and less than 70 gal. of miscellaneous tramp oils and solids are disposed of monthly at cost of $46. Recycling coolant saves the shop $1,579 per month.–*T. Green*

ulations prohibiting the release of waste into lakes, rivers or other waterways. Wastewaters can include mop water and contact and noncontact cooling waters. Pathways of release include floor drains leading to municipal sewer systems and storm drains leading directly to bodies of water.

Most facilities are required to maintain a National Pollutant Discharge Elimination Systems (NPDES) permit. This defines discharge parameters, including sampling and monitoring of wastewater by the generator and the local, state or federal regulatory agency.

Regarding storm water runoff, the EPA lists 11 categories of "storm water discharges associated with industrial activities" that result in the discharge of storm water to a municipal storm sewer system or directly to a body of water. For example, some shops' material-handling and chip storage areas are located outdoors and, therefore, are exposed to storm water. Runoff can carry industrial pollutants into storm sewers and nearby bodies of water. These types of shop activities require authorization under an NPDES industrial storm water permit.

Spill Prevention and Control

The prevention and control of spills is another key environmental responsibility. The EPA maintains regulations intended to prevent spills from reaching groundwater, navigable waters or adjoining shorelines. Facilities that produce, store, process, transfer or use petroleum-based products need to comply.

The regulations apply to nontransportation-related facilities with a total aboveground (i.e., not completely buried) storage capacity greater than 1,320 gal., or a completely buried storage capacity greater than 42,000 gal., regardless of whether the tanks are completely filled. It is not uncommon for a shop to maintain aboveground or belowground tanks for storage of petroleum-based products such as hydraulic oil, coolant concentrate, spent coolant or wastewater.

Machine collection sumps, drums and storage containers for oil, coolant premix, spent coolant, mop water and other wastewaters can quickly add up to a quantity greater than 1,320 gal. of storage capacity, requiring a shop to maintain a fully prepared and implemented spill prevention, control and countermeasure plan. This plan gives a shop better control of regulated materials and tends to contain information that can improve a shop's safety programs. Although lengthy, a plan is relatively inexpensive to implement and can be designed by an environmental consulting/engineering company. The cost to assemble such a plan ranges from $1,000 to $1,500.

Govermental Aids

The regulatory climate is not totally adversarial. EPA's Waste Minimization National Plan of 1994 established national goals for reduction of constituents in hazardous waste, and identified regulatory, nonregulatory and organizational tools to accomplish the plan's objectives. The plan provides flexibility in complying with environmental regulations, enabling companies to set goals for their own facilities and track their progress.

Environmental compliance assistance goes beyond the federal level. State grants and related initiatives are available to support the purchase of pollution prevention and control equipment, and certain equipment manufacturers offer programs that allow installation of resource recovery equipment without capital expense through arrangements that share the savings and revenue from the process.

Centralizing all compliance information within one proactive environmental management program allows management more time to focus on pollution prevention, waste management and resource recovery. This integrated approach allows a shop to more efficiently plan, manage and communicate compliance information, while reducing liability and enhancing its image as a solid corporate citizen.

About the Author

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