

## VIEWS FROM THE FIELD

**Editor's note:** This is a series of commentaries from powder coating industry experts serving on the magazine's Editorial Advisory Board and coaters in the field. Each commentary expresses the opinion of a board member, a coater, or an organization member about an issue or trend affecting the industry. To contribute, contact *Powder Coating* magazine, Views from the Field, 1155 Northland Dr., St. Paul, MN 55120; email atyznik@cscpub.com.

# Reducing your chemical, water, and effluent expenses

**Myles Compton, process consultant, Electro-Steam Generator**

**C**hemical waste reduction has become an even more important issue for the powder coating industry in recent years. In many areas, zero discharge is now a strict requirement. In consideration of this, plant and job shop owners must seek a method to handle all chemical effluent in their facility, with the ultimate goal being the least amount of waste possible.

Pressure washers have been used for many years to remove heavy and tenacious soils from trucks, heavy machinery, and rail cars. For this removal process, pressure washers are the method of choice because high pressure and a large volume of water will rapidly remove these soils.

Pressure washers are also frequently used to clean and iron phosphate metal prior to powder coating. When using this method, there is a high amount of chemical and water used, resulting in the creation of a high volume of effluent. These high levels of effluent must somehow be discharged. Neutralization (pH adjustment) and discharge into municipal systems is frequently accepted. If heavy oils are present, there can be a biological oxygen demand (BOD) content. This may result in a surcharge on the effluent discharge. Some shops prefer to use an approved waste hauler.

## A less expensive method

Plant and job shop owners continue to seek methods to reduce chemical, water, and effluent costs. One alternative method for achieving these objectives is to use high-pressure dry steam, which has a moisture content so low that it instantly evaporates.

In a high-pressure dry steam system, the dry steam is created in a steam generator (boiler) by a mixture of heat and pressure. As the pressure inside the vessel increases, the temperature of the steam increases proportionately. The system uses a siphon wand, whereby the venturi within the wand obtains the chemical and water mixture at the steam unit at a rate of 1 gallon per minute. This is the least amount of water and chemical mix usage of any manual cleaning system. Testing has shown that two-thirds of this cleaning and iron phosphate mixture immediately evaporates from the metal

surface being cleaned. Under these conditions, time tests have indicated that 20 ft<sup>2</sup>/min of metal surface is covered in the cleaning cycle. In the rinse cycle, 30 ft<sup>2</sup>/min is covered and no water is used. In contrast, a fossil-fuel high-pressure sprayer uses 3 to 5 gallons per minute in both the cleaning and the rinse cycle. The *only* effluent created by a dry steam generator system is the chemical and water mixture that is required to clean and create the conversion coating for adhesion.

Job shops using hot, dry steam systems in their powder coating applications have reported consumption of approximately one-fourth the amount of chemicals compared to high-pressure units. Also, the low amount of effluent from the steam systems is frequently pumped into a drum that contains immersion heaters that "boil away" the effluent, leaving zero discharge. Compared to a closed-loop system, the dry steam systems have no pH adjustments, no filters to change, and allow chemical additions during the conversion coating process.



*Electro-Steam Generator's model LB 40-60 cleaner's design consists of a high-pressure chamber filled with water that is heated by one or more submerged resistance-type electric heating elements. Automatic controls maintain a pre-set operating pressure and water level.*

## A few installation examples

The following are examples of installations by Electro-Steam Generator, a manufacturer of electric steam generators, electric boilers, and small electric boilers for a wide range of commercial and industrial processes and applications.

A manufacturing plant located in North Carolina was using four 55-gallon drums of cleaner and iron phosphate each year with a gas-fired, high-pressure unit. After some research and a visit to a current steam pressure unit owner, this company decided to purchase an electric dry steam generator system. The following year, the company's cleaning and iron phosphate purchases were for only one 55-gallon drum. Using a current price of \$20 per gallon for this material, this is equivalent to a \$3,300 savings in one year on chemical costs alone — a tremendous return on equipment investment.

Recently, a dry steam system was purchased by Suburban Steel Supply, Gahanna, Ohio, for its fabrication cleaning and iron phosphating process prior to powder coating. This company typically filled its waste container with 300 gallons in a set period. After installing a dry steam system, the company only filled its container with 50 gallons during the same period. Taking only the cost of waste discharge into consideration, the cost of the new dry steam system will be completely paid off in about 5 years. In addition, the company now purchases its chemicals for use in the system in 5-gallon pails rather than the standard 55-gallon drums.

A plant located in Milwaukee, Wis., uses a dry steam system for metal surface preparation prior to powder coating. The company reports that this system has been in use at this plant for more than 20 years, a testament to its long service life.

## A boiling summary

The dry steam system's all-electric boiler method meets boiler requirements in the US and Canada. Since it is all electric, it does not generate fumes, has no open flames, and requires no flues. Because of these features, many insurance companies require lower insurance coverage than fuel-fired methods.

All-electric, dry steam, pressurized generator cleaners provide a proven method of preparing metal surfaces for excellent powder and paint adhesion. The safety and cost savings of dry steam cleaning remain unchallenged, and several well-known companies have been using this method for over half a century. **PC**

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