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Clean Lines:

Strategies for Reducing Your Environmental Footprint

Surface Coating Operations

As a partner of the Green Suppliers Network, you might choose to review your surface coating operations as part of your program activities. Many suppliers commonly employ surface coating processes, such as adding paints, varnishes, enamels, oils, and waxes to protect manufactured parts from corrosion and improve overall appearance. Products used in conventional surface coating processes frequently contain toxic volatile organic compounds (VOCs) and other hazardous air pollutants (HAPs).

Further, surface coating sub-processes, such as surface preparation, stripping, and equipment cleaning, often use potentially hazardous chemicals. While these pollutants trigger both cost and regulatory requirements to reduce fugitive emissions, they can also be addressed successfully through sound pollution prevention and lean manufacturing best practices, such as those provided by a Green Suppliers Network review. Partners with the Green Suppliers Network receive customized, onsite technical reviews of materials and processes that couple lean manufacturing techniques with sound environmental management strategies. Pairing economic and environmental benefits is the *Lean and Clean Advantage*—the hallmark of the Green Suppliers Network.

STEPS TO A CLEAN COATING PROCESS

Below are just a few of the many strategies you might explore while participating in a Green Suppliers Network technical review. The Green Suppliers Network provides technical experts in *Lean and Clean* manufacturing techniques who will help you visualize a future look for your operations, such as the enclosed process map—one that will save you money and reduce your environmental footprint.

Increase Transfer Efficiency

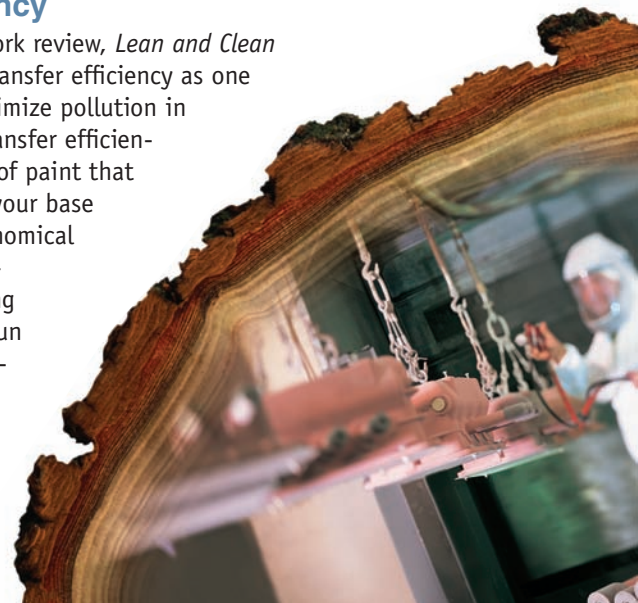
During your Green Suppliers Network review, *Lean and Clean* practitioners will likely point to transfer efficiency as one of the most effective ways to minimize pollution in the coating process. Improving transfer efficiency—or increasing the percentage of paint that gets applied to the part—during your base coats and top coats has both economical and environmental benefits. Training employees on improved coating practices, such as optimal spray gun setup and calibration, proper overlap of spray pattern, and proper speed of spray gun movement, can increase transfer efficiency significantly.

A Green Suppliers Network review can help you:

- **Reduce costs and air emissions.** A 10-percent increase in transfer efficiency reduces coating use and organic hazardous air pollutants (HAPs) and volatile organic compounds (VOCs) emissions by 25 percent.
- **Ease regulatory burden and liability.** Using alternative non-HAP coatings for your coating operations could reduce your federal requirements, such as meeting certain National Emission Standards for Hazardous Air Pollutants (NESHAP).
- **Increase competitiveness through efficiency and attract new customers.** By reducing your environmental footprint, you will help meet your customers' corporate environmental goals and potentially generate new business.

About the Green Suppliers Network

Working in collaboration with the U.S. Department of Commerce's Manufacturing Extension Partnership (MEP), the U.S. Environmental Protection Agency (EPA) established the Green Suppliers Network to help small- and medium-sized manufacturers stay competitive and profitable while reducing impacts on the environment.



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Transfer efficiency can also be increased by changing the way the coating is delivered to the part. Your Green Suppliers Network review team can explore technologies such as electrostatic or high-volume, low-pressure (HVLP) spray guns, product dip tanks, powder coating, or other efficient delivery systems that might be appropriate for your operations.

Reduce Rework

Many specialty coatings depend greatly on quality control, precision thickness, precise application rates, and controlled spray environments. Rework generates unnecessary wastes in the form of used solvent strippers, air emissions from overspray, and spent filters from pollution control technologies. Green Suppliers Network representatives use *Lean and Clean* techniques such as value stream mapping to show the root causes of the need for rework. You should involve operational personnel in your review team because they are the most likely to know how to dramatically improve quality and reduce rework.

Reduce Hazardous Solvent Use

Solvents serve many purposes in a surface coating facility, such as altering the viscosity of coatings, cleaning areas that are to be coated, and cleaning coating spray equipment. Most commonly used solvents contain high percentages of HAPs and VOCs, but alternative non-HAP and low-VOC solvents are readily available, and your Green Suppliers Network review could assist you in determining whether they are appropriate for use in your process.

Facilities can also incorporate strategies, such as solvent recycling and recovery, to minimize solvent use and the amount of waste solvent. Cleaning spray guns in enclosed cleaning units is one

way to reuse and recover used solvents. Such units reuse the same solvent instead of disposing of it and also limit fugitive emissions. Other ways of limiting solvent use include avoiding unnecessary cleaning, dedicating a spray gun to a specific coating or color, and cleaning equipment immediately after use. Decreasing or eliminating harmful solvent use can cut disposal costs for spent solvents, used rags, and worn personal protective equipment.

Substitute Non-HAP or Low-VOC Coatings for Conventional Coatings

Many surface coatings contain toxic substances, such as lead and hexavalent chromium to provide corrosion protection. Advances in coating technologies now allow for many non-HAP coatings to perform as well as existing, more hazardous coatings. Alternative non-HAP and low-VOC coatings are also readily available, and your Green Suppliers Network review can assist you in determining if they are appropriate for use in your process. Reducing or eliminating HAP-containing coating use can lead to reductions in disposal costs from waste coating containers and spray booth filters.

Reduce and Capture Overspray

Overspray is the largest potential source of air pollution from the surface coating process. At least 50 percent of the volume of coatings from a typical spray coating line becomes overspray. The clean strategies previously mentioned help reduce overspray, but facilities should capture remaining overspray by spraying base and top coatings in a filtered enclosed spray booth or filtered workstation; in fact, many NESHAP regulations require emissions to be captured. Your Green Suppliers Network review team can examine your overspray control measures to ensure that they are performing as effectively as possible.

Switch to Powder Coatings

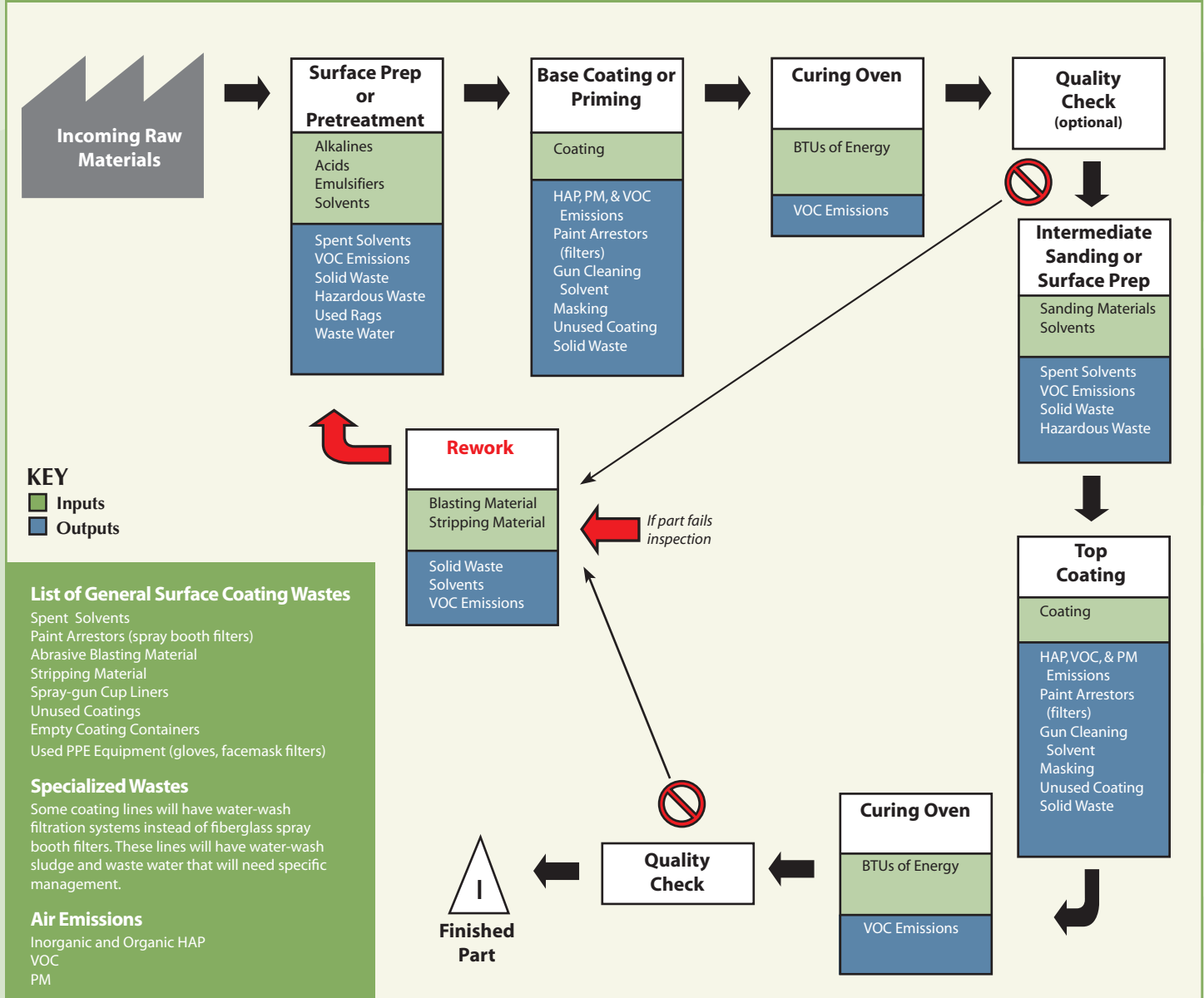
Because powder coatings are generally the lowest polluting of all coatings, you should give them serious consideration. Powder coatings emit virtually no VOCs, do not require the use of organic solvents in the coatings, and retain the benefits of traditional coatings. Powder coatings are charged by static electricity when the coating leaves the spray gun, which causes them to be statically attracted to the part, reducing waste and leaving behind a more even finish than conventional coatings. Increased protective qualities also make powder coatings more desirable when a resistant finish is required. Powder coatings also eliminate the need for multiple-stage coatings.



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Sample Surface Coating Process Map Customized for Green Suppliers Network Partner



If customer product **SPECIFICATIONS** and performance **REQUIREMENTS** are keeping your facility from implementing changes to your surface coating **PROCESS LINES**, the Green Suppliers Network can help. By working with Corporate Champions—your customers—the Network can **EASE** barriers and **FACILITATE** process improvements specific to your situation.

“Once OEMs **RECOGNIZE** that **YOU** put in additional effort to **REDUCE** their **ENVIRONMENTAL FOOTPRINT**, it gives you a leg up on the competition – and you can’t place a dollar **VALUE** on that!”

–John Whalen, Facility General Manager, Sermatech

THINKING INSIDE THE BOOTH: CONTROLLED ENVIRONMENT SPRAY BOOTHS

Sermatech Connecticut, a Green Suppliers Network Partner, specializes in developing and applying engineered, high-performance protective coatings for the aerospace industry. Sermatech initially planned for a lean kaizen event to coincide with the purchase of new equipment, but after learning about the Green Suppliers Network, the company decided this would be a good opportunity to address *lean and clean* in a single event. The facility general manager, John Whalen, noted that, “We, at Sermatech, had not yet looked at waste minimization as a cost-reduction opportunity. It just made sense to hold a Green Suppliers Network review in place of the scheduled lean kaizen event.”

Sermatech: At a Glance

Location: Manchester, CT

Number of Employees: 86

Annual Revenue: \$10,000,000

Green Suppliers Network Review Findings

- Potential annual savings: \$1.2 million
- Annual savings from waste reductions: \$35,000
- VOC emission reductions: 66% (>65 lbs/yr/booth)
- Hazardous waste reductions: >2,000 lbs annually
- Hazardous waste disposal cost reductions: \$600 annually

The Results

Sermatech estimates it will reduce hazardous waste, including hexavalent chromium and aluminum from the coating and acetone solvents, by more than 30 percent, equal to 2,000 pounds; it will also save more than \$600 in disposal costs annually. Furthermore, Sermatech expects to reduce VOC emissions by 66 percent, or more than 32 pounds per year per booth, by installing the new spray booths. Sermatech expects to realize more than \$35,000 in annual savings from implementing these recommendations.

Whalen stated that an unexpected benefit of undergoing the Green Suppliers Network review occurred when one of Sermatech’s major customers learned of its efforts through a manufacturing forum. Previously unaware of Sermatech’s efforts to reduce environmental risk, the customer has now signed a preferred supplier agreement with Sermatech. Whalen said, “Once OEMs recognize that you put in additional effort to reduce their environmental footprint, it gives you a leg up on the competition—and you can’t place a dollar value on that!”

The Situation

The Green Suppliers Network team reviewed a Sermatech surface coating process line that sprayed helicopter rotor hubs. The process required the parts to travel a considerable distance, which increased the risk of damage to the coating and required large amounts of rework. The rework cost Sermatech approximately 2 percent of its profit margin, or about \$46,000 annually. Wastes identified for this process included coating overspray, air emissions, spray booth filters, solvent, masking tape, and protective gloves.

The Solution

To improve product movement and reduce travel distance for the parts, the Green Suppliers Network review team recommended that Sermatech install an enclosed environment workstation. This workstation would include new “controlled environment” spray booths that would optimize the facility work space and eliminate the need for the part to travel in the ambient air. By installing these new workstations, Sermatech expects to reduce rework by 75 percent.

SURFACE COATING QUICK LINKS

Coatings Guide

<http://cage.rti.org/index.cfm>

A pollution prevention tool for paint and coating users.

Solvent Alternatives Guide

<http://clean.rti.org>

A comprehensive guide designed to provide pollution prevention information on solvent and process alternatives.

Finishing Today Magazine

www.finishingtodaymag.com

Highlights the evolution in paint and powder coatings technology.

Joint Service Pollution Prevention Opportunity Handbook

http://p2library.nfesc.navy.mil/P2_Opportunity_Handbook/12_5.html

An overview of the surface coating industry and pollution prevention techniques provided by the Department of Defense.

National Paint and Coatings Association

www.paint.org

A nonprofit trade association that provides a forum for the exchange of ideas and information relating to surface coating operations.



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