HIGH TRANSFER EFFICIENCY PAINT SPRAY SYSTEMS

Revision: 05/95
Process / Product: Spray Paint Systems
Process Code: ID-06-04, ID-05-02, ID-05-01
Substitute for: High Velocity Spray Paint Systems
Waste Stream: Excess Paint Use Resulting from Overspray
Applicable EPA Hazardous Waste Codes: D007, D008, D035
Applicable EPCRA Targeted Constituents: Toluene, Xylene, Methyl Ethyl Ketone, Acetone, n-Butyl Alcohol, Lead, Chromium, Zinc Compounds

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Introduction: In conventional paint spray systems, paint atomization occurs via high-velocity air jets, forcing paint through small air holes in the paint gun face caps. Air pressures used range from 40 to 80 psi, with air volumes of 8 to 30 sqfin. The atomized paint particles travel at high velocities and tend to bounce off the object being painted rather than adhering to the surface. In addition, the expanding high pressure air (as high as 70 psi) passing through the small face cap openings causes turbulent flow of the paint stream following air currents within the paint booth. The amount of paint that bypasses the workpiece (overspray) is relatively high for air pressure atomized spray painting. Transfer efficiencies of 15 to 30 percent are associated with conventional painting systems.

Description: There are four basic types of high transfer efficiency paint guns: high volume/low pressure (HVLP), airless (also called pressure atomized), pressure atomized air-assisted, and electrostatic. Electrostatic spray paint systems are discussed in a separate Pollution Prevention Opportunity Data Sheet, 'Electrostatic Finishing;" the others are described below.

High Volume Low Pressure (HVLP) paint systems atomize paint via a high volume of air delivered at a low pressure (less than 10 psi). In some HVLP systems, the air supply is turbine generated; in others, shop air (100 psi) is converted to less than 10 psi. Because the atomized paint particles are delivered at low speeds to the object being painted, less paint is lost as overspray, bounce, and blow back. Typically the transfer efficiency with HVLP is 50 to 65 percent. To achieve high quality finishes at normal production rates, the temperature, pressure, and volume of air used by the system must be properly controlled. Some HVLP paint guns allow the air pressure to be adjusted. If operated at pressures above the manufacturer-specified limits, the paint gums transfer efficiency could be lowered; the gun could be made into a conventional high-pressure gun.

Airless spray painting systems atomize paint by forcing it through a small tip orifice at high fluid pressures (1,500 to 3,000 psi). Typical transfer efficiencies with airless spray painting are 20 to 40 percent. Large areas can be painted quickly by pressure atomized paint systems. This technology is, however, inappropriate for fine finishing work, because a large quantity of paint is delivered with particles that are less finely divided.

Pressure-atomized, air-assisted systems combine the features of the air atomized (conventional) and airless systems. An airless fluid spray tip is used to atomize the coating into a fan pattern at moderate pressures (400 to 800 psi). A second, low-pressure air stream (10 to 30 psi) is injected after the nozzle to improve atomization and the spray pattern. This system is reported to provide the fine control of air-atomized spray guns and the improved transfer efficiencies of airless systems. Typical transfer efficiencies for pressure-atomized air-assisted systems are 25 to 40 percent.

Materials Compatibility: High transfer efficiency spray painting systems can be used in a wide variety of painting applications. Each technology has advantages and disadvantages, depending on the viscosity of the paint used, the part painted, the type of finishes desired, and production rate required. Higher production rates can be achieved with airless paint guns. The finer atomization of HVLP and pressure atomized air-assisted systems produce smoother surface finishes. There are many different paint gun models, with a variety of tip sizes to accommodate most coatings, including solvent-based paints, water based coatings, fine finish metallic, high-solids polyurethane, contact adhesives, varnish, top coats, lacquer, enamel primer, latex, primer, epoxy, and vinyl fluids. The efficiency of these systems is reduced if painting is done in exposed areas.

Safety and Health: Proper design, separation, and maintenance of the equipment is required for its safe use. The spray booth must be well ventilated. Proper personal protective equipment should be worn, if required.

Consult your local Industrial Health specialist, your local health and safety personnel, and the appropriate MSDS prior to implementing any of these technologies.

Benefits: The significant reduction in overspray, paint bounce, and blow back can significantly reduce the amount of paint materials required to coat a part. The quantity of paint used can be reduced by 50 to 70 percent. Less overspray also results in a reduction in paint booth maintenance (filter changeouts, etc.), since less paint is deposited on paint booth

surfaces. In addition, if a water-wall paint booth is used, less paint sludge will need to be removed from the scrubber and disposed as hazardous waste.

Economic Analysis: Costs will vary depending upon specific applications: painting/coating type, paint volume, workpiece specifications, and technique. Generally, HVLP paint spray system equipment costs approximately $1,000 for a gun, hose, and paint pot. Airless or air-assisted airless paint spray systems range from $2,000 to $3,500. Installation costs will also vary, depending upon location.

Major Assumptions: **NA**

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Vendors: The following is a list of HVLP spray painting system manufacturers. This is not meant to be a complete list, as there may be other manufacturers of this type of equipment.

Accuspray, Inc.
23350 Merchantile Rd.
Cleveland, OH 44122
Phone: (800) 618-6860 or (216) 595-6860, Fax: (216) 595-6868

Binks Manufacturing Co.
9201 W. Belmont Ave.
Franklin Park, IL 60131
Phone: (708) 671-3000, Customer Service Fax: (708) 671-3067

The DeVilbiss Co.
1724 Indian Wood Circle
Maumee, OH 43537
Phone: (416) 470-2169, Fax: (800) 338-0131

Smith Eastern Corp. (AirVerter)
5020 Sunnyside Ave.
Beltsville, MD 20705
Phone: (301) 937-4548, Fax: (301) 937-7295

Grace Inc.
P.O. Box 1441
Minneapolis, MN 55440-1441
Phone: (800) 367-4023, Fax: (612) 623-6777

Approving Authority:	Approving authority is controlled locally and is not required by the major claimant.
N o t e :	This recommendation should be implemented only after engineering approval has been granted by cognizant authority.

Source: **Vendors.**
Reducing Waste in Railcar Coating OPERATIONS Graco Equipment and Emissions Update, June 1994, pp. 8-9.