Pollution Prevention Alternatives for Auto Refinishing

COMMONLY OBSERVED PRACTICES

Vehicle maintenance facilities that specialize in auto refinishing generate hazardous liquid paint waste (i.e. waste paint/solvent) and solid paint-related waste such as paint filters, paintbooth arrestors and masking. Regulated air emissions from spraying operations is also an area of concern. Waste generation rates and air emissions vary considerably depending on a facility's size, throughput, equipment and spray operation practices.

POLLUTION PREVENTION OPTIONS AND COST/BENEFITS

Several pollution prevention alternatives are available to vehicle maintenance facilities that refinish vehicles as part of their collision repair services. These alternatives, if implemented properly, will also improve productivity, lower product purchase costs and reduce waste generation rates. Some of the pollution prevention practices that can be used include the use of high volume-low pressure (HVLP) spray guns, enclosed gun wash units, improved employee practices, and paint mixing systems.

HVLP Spray Equipment

While conventional spray guns atomize paint using high pressure (approximately 35-65 psi at the air cap), HVLP spray guns use a high volume of air (13-30 cfm) at low pressure (10 psi or less at the air cap) to atomize the coating. Depending on the make of the gun, HVLP systems have the following advantages over conventional spray guns:

- According to spray gun manufacturers, the transfer efficiency of HVLP systems range from 55 to 75 percent. Conventional spray gun systems may have a transfer efficiency as low as 35 percent. Increased transfer efficiency means less paint is required to do the same job. It also correlates to reduced overspray, lower booth maintenance and less paint related waste.
- Use of HVLP spray gun systems reportedly results in a paint material savings of 15 to 50 percent over conventional spray guns, reducing product purchase costs.

Enclosed Gun Wash Units

Enclosed gun wash units provide a safe, quick way to effectively clean paint equipment including HVLP spray guns. With proper use and maintenance, these units reduce the amount of thinner used during the cleaning process by more than one-half (some manufacturers boast a 75 to 90 percent reduction). Gun wash systems also reduce the labor time needed for equipment cleaning by over 60 percent.

To maximize the cleaning life of the solvent in a gun wash unit, the following precleaning steps should be performed prior to placing equipment in the gun wash unit:

- Remove all the remaining paint from the cup.
- With the air hose removed, pull the trigger of the gun to remove all remaining paint from the siphon tube and body of the gun.

- Rinse the cup with a small amount of thinner.

Although volatile organic compound (VOC) emissions from gun washing systems have yet to be accurately measured, the reduction should be substantial. In addition, some solvent manufacturers offer a low VOC gun wash solvent to further reduce emissions from cleaning operations.

Improved Employee Practices

Reviewing employee practices and providing employee training in waste reduction techniques are simple and effective pollution prevention alternatives for vehicle maintenance facilities performing refinishing operations. A common source of excessive waste at a body shop facility is employee practices. This is especially true when it comes to the generation of waste thinner and paint waste. The practice of mixing up an excessive amount of paint for a specific paint job or placing a paint cup containing excessive amounts of paint residue into the gun washer results in excessively high paint waste generation rates.

To assess whether an excessive quantity of sprayable material is being prepared for a particular job, the amount of sprayable material added to the spray gun should be compared to the amount actually used to complete the job. This can be easily calculated by measuring the volume or weight of material added to the cup before spraying and comparing it with the amount left in the cup after completing the spraying process. This simple monitoring provides spray technicians with immediate feedback on their material usage efficiency. It also provides spray technicians with a reference for adjusting and optimizing the amount of product used for subsequent jobs with similar coating requirements. Appendix K contains a material usage form that can be used by spray technicians to track the amount of coating material required to complete a particular job.

As material usage efficiency increases, a reduction in product purchase costs and liquid paint waste generation rates should be realized by the facility. Vehicle maintenance facilities should set a goal of reducing its paint waste generation rate to 25 percent or less of the total material sprayed.

The efficiency of a technician's spray technique is also an important consideration toward pollution prevention, productivity and cost savings. Advantages associated with improved spray application efficiency includes reduced material consumption and purchase costs, less overspray (paint-related) waste and reduced air emissions. Health risks are also reduced while still providing a high quality finished product. The following are some general recommendations for improving spray application practices:

- Prior to an actual coating application, it is advisable to perform a "dry run" practice spray. This allows the technician to identify potential problem areas (i.e. obstructions such as the floor, mirrors, etc.) and ensure proper gun clearance is maintained during the actual procedure.
- Use the suggested air pressure and tip sizes for the specific product and equipment being used.
- Always hold the gun perpendicular to the surface being sprayed, using parallel strokes. Never arc the gun.
- Feather the trigger at the beginning and end of each pass.
- Use a 50 percent overlap for each pass. Note: This technique may need to be altered slightly when applying high-metallic, high solids basecoats and some three stage systems.
- When painting small- and medium-sized panels, make each pass the full length of the panel.

- With larger panels, walk the full length when possible. Otherwise use a comfortable stroke with a 4 - 5" stroke overlap.
- If blending is necessary, keep the blend area as small as possible without jeopardizing tl appearance of the blend.
- Spray the border edges of the substrate first (banding). This will assure all edges are covered without extending the spray pattern well beyond the borders of the object.
- Use color hiding power labels to determine when adequate coverage has been achieved. Use mil thickness gages to determine the thickness of the coating applied.

More comprehensive information on pollution prevention practices is presented in the manual, "Auto Body Surface Coating: A Practical Guide to Reducing Air Emissions," available from the Iowa Waste Reduction Center at (319) 273-2079. The Auto Body Guide provides detailed recommendations for each step of the auto body refinishing process.

Employee Training Benefits

Preliminary findings of a pilot training program developed by the Iowa Waste Reduction Center at the University of Northern Iowa indicate spray efficiency is very important in reducing material costs, the generation of paint related wastes and air emissions. The IWRC's Spray Technique Analysis and Research (STAR) training program consists of a five hour "hands on" training session that focuses on improving the technician's spray technique to optimize the efficiency of manual spray coating operations. The efficiency of the technician's spray technique is evaluated both before and after completing the program to provide immediate feedback on the technician's spray technique. Special emphasis is also placed on the technician's spray gun setup and operation techniques. The technician's transfer efficiency, mil build thickness, mil build variation and amount of volatile organic compounds released are all evaluated as part of the program. The training is also performed using the technicians own spray equipment and a typical basecoat - clearcoat system.

To date, each of the 20 participants that have attended the training course have shown a significant improvement in spray efficiency after completing the program. Using data obtained for each participant, it is estimated that a technician (in what is considered a low production shop) would realize an average annual topcoat material savings of $2,500 or more after implementing the practices taught in the program. Material cost savings could easily double if the cost of undercoats were also included in the material savings. Greater savings would also be realized in higher production shops. For more information on the STAR program, contact the IWRC at (319) 273-2079.

Paint Mixing Systems

The addition of an in-house paint mixing system can greatly reduce the material costs of topcoat applications while increasing productivity. Industry studies indicate that topcoat accounts for 40 percent of the material costs in refinishing operations. Approximately half of that cost (or 20 percent of the total material cost) is basecoats. A facility can easily reduce its basecoat cost 33 percent by purchasing the tinting colors to mix the coating instead of buying the coating pre-mixed from a supplier. Additional cost savings of 5 to 10 percent can also be realized by mixing only the quantity needed to complete the job, as opposed to buying the product in pint quantities (most suppliers will only supply topcoats in pint quantities or greater). Payback times on such systems will depend

mainly on the refinishing production rate of the facility. The following summarizes the benefits of paint mixing systems:

- Topcoat material costs (per volume) are reduced.
- They allow the technician to mix the amount of topcoat required for the specific job, reducing purchase costs and paint waste.
- The amount of coating each technician mixes per job can be tracked and monitored.
- Color mixing may be performed as needed, improving the ability to accurately duplicate the pigmentation of the original finish.
- Dependency on the paint supplier is reduced (i.e. coatings are mixed or tinted as needed).
- Increased production rates.

Proper use and maintenance of these systems is very important. If mixing colors are not properly sealed, or if the colors are not agitated adequately, cost and productivity benefits will be lost. The following precautions should be taken when operating these systems:

- Always agitate the mixing colors for an adequate time period prior to removing material from any container in the mixing system. It is generally recommended that the system is run at least one half hour at the beginning of the work day, one half hour at mid day and a few minutes prior to the time a color is to be mixed.
- Ensure all the agitators are operating properly.
- Mixing container covers must be properly sealed at all times.
- Keep good inventory of the tinting colors on hand to reduce overstocking or understocking of materials.
- Regularly calibrate the scale to insure accuracy.
- Double check the paint code on the vehicle and the code in the mixing formulation prior to beginning the mixing operation.
- Carefully add mixing colors, verifying the tint and amount to be added.
- Only mix the amount of color needed for that specific job.
- Use spray out panels as a tool to insure proper color match.
- If the option is available, monitor the amount each technician is mixing for each job.