Spray Your Way to a Better Finish

By Joe May

Airless sprayers are a must for many contractors these days—and, for features and durability, the current crop of models is hard to beat. Today's sprayers are lightweight, versatile workhorses that can deliver a wide range of high-quality finishes in record time.

ASM

Little changes can make a big difference in your spray results. For example, keep the gun straight as you spray.

The only catch (and you knew there was one, didn't you?): No technology, bells or whistles can ever make up for careless application. No matter how good the sprayer, the quality of a finish remains largely in the contractor's hands.

So if you're not getting the results you want, take a fresh look at your application technique. Your old routine may not fit today's best practices or technology. Or, maybe you've forgotten a few fine points. In any case, the solution may be a simple refresher.

The basics

An airless sprayer is a system that atomizes (breaks up) paint and other coatings into small droplets without using compressed air. It pumps these fluids under high pressure from a paint pail through the sprayer, hose, spray gun and spray tip onto a wall or ceiling.

Airless spraying is far more efficient than brushes or rollers for large projects. Power rollers may also be used with airless sprayers, to eliminate overspray inside a home, institution or office for medium or large applications.

Airless sprayers can be used for a wide range of interior and exterior jobs — from stains, lacquers and latex to high-performance protective coatings. (For iron railings, decorative trim, wicker furniture or other fine finish applications, an HVLP sprayer might be better than airless.)

Airless flow rates range from 1/3 gallon per minute with small electric models to heavy-duty gas hydraulics that disperse more than 3 gallons per minute. Many sprayers offer multi-gun capabilities.

When used correctly, airless sprayers produce a high-quality finish—completely atomized and evenly distributed—on all types of surfaces.

When used correctly is the key phrase here. Among the factors that determine finish quality:

- Selecting the right spray tip
- Adjusting the pressure to optimize paint atomization
- Following basic application methods
- Maintaining coating thickness

All of these variables are in your hands.

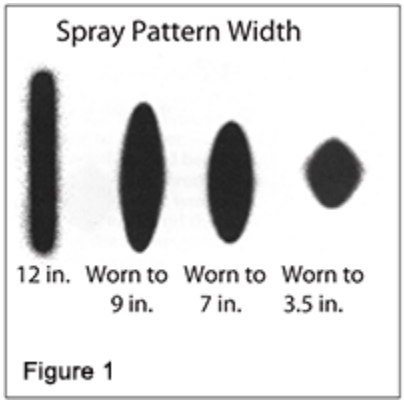

Figure 1

Tip selection

The spray tip is one of the most important components of an airless system. The tip determines the amount of material the sprayer applies (flow rate) and the width of the spray pattern. Together, the tip size and pressure setting determine how much paint flows through the sprayer onto the wall or ceiling.

Each sprayer is rated for a maximum tip size and flow rate (measured in gallons per minute, or gpm). Make sure that the sprayer can support the tips' flow rate necessary for the material.

Lacquers, stains, enamels and other light coatings can be sprayed with small

tips, while latex paints are heavier and require a tip with a larger orifice (see chart below). Many paint manufacturers recommend a specific tip size; check the label and product spec sheet. Multiple spray guns can be used with one sprayer, but make sure the combined flow rate of all the tips does not exceed the sprayer's maximum flow rate.

Finally, remember: Tips wear out! Paints contain abrasives that wear on the orifice. The more abrasive the paint, the faster the wear. When a tip wears, the size of the orifice increases and the fan width decreases (see Figure 1). Continuing to spray would result in a poor quality job and increase your material and labor cost.

When you install a new tip, spray a pattern on a piece of cardboard. As you work, occasionally spray another pattern beside it. If the fan size has lost 25 percent of its original size, it's time to replace it.

Spraying Tip Size

Coating Type	Tip Size Range*
Lacquer or Stain	.011 to .013
Oil Base Paint	.013 to .015
Latex Paint	.015 to .019
Heavy Latex & Smooth Elastomeric	.021 to .025
Elastomeric & Block Filler	.025 to .035+

Source: Titan Tool
*Tip sizes are calibrated in XXX/1,000 of an inch

with a smaller orifice or a larger sprayer. Test the quality of the pattern by spraying on scraps of cardboard or other waste material.

In addition to producing a better finish, using the lowest possible pressure will also help reduce pump wear, tip wear and overspray.

Application: Do's and don'ts
For best results, hold the spray gun about 12 inches from the surface and aim straight at it. (Painters using very large tips will need to move back farther.)

Flex your wrist to keep the gun pointed straight as it moves across the surface. "Fanning" the gun at an angle will cause an uneven finish.

Pressure pointers
Many painters automatically crank up the pressure control to maximum to get the job done. Don't give in to this temptation! For professional results, spray at the lowest pressure that completely atomizes the coating.

The pressure control should be set low and slowly increased until the paint is completely atomized. If the spray pattern has "fingers" or "tails," increase the pressure until they disappear.

If the maximum pressure is still not sufficient to achieve a good spray pattern, you'll probably need either a tip

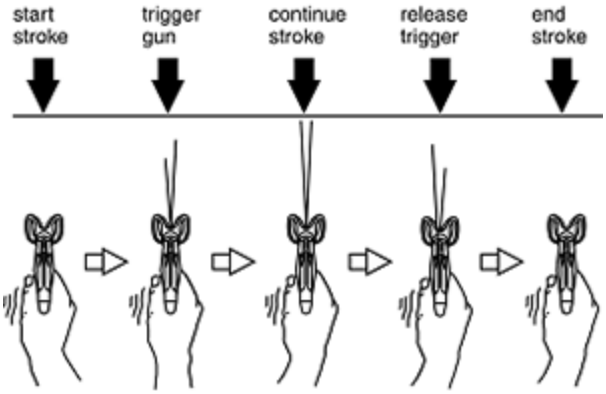

Figure 2

Also, resist the urge to hold down the trigger for long periods. Always release the trigger before changing direction. If you don't, you will have at least twice the thickness at each spot where you changed directions. These heavier areas will become visible over time or in a strong light.

For best results, trigger the gun after beginning the stroke and release the trigger before ending the stroke. The gun should be moving while you squeeze and release the trigger, to prevent buildup at those points (see Figure 2).

Aim the gun so that the tip points to the edge of the previous stroke, overlapping each stroke by 50 percent. To maximize efficiency when spraying ceilings, walls and other broad, open surfaces, spray the outside edges first. The middle requires less precision and can then be sprayed quickly.

For inside corners, aim the gun into the corner rather than spraying back and forth across it.


Graco
Resist the temptation to spray at the maximum pressure. You'll get better results if you use the lowest pressure that atomizes the coating.

Controlling thickness
Controlling the coating thickness (mil build) is the key to proper coverage. If

the coating is not covering properly, after adjusting the pressure to optimize atomization, try one of these:
• Move the gun more slowly.
• Use a larger tip (be sure the sprayer is rated to handle that tip size).
• Make sure the gun is close enough to the surface (about 12 inches).

If the coating is too thick or running down the surface, try one of these:
• Move the gun faster.
• Choose a tip with a smaller orifice or wider fan pattern.
• Move the gun farther away from the surface.

Learn more
These are basic concepts and techniques that all painters should know and follow. If you have questions, ask the store rep where you buy paint and equipment or contact your equipment manufacturer.

Good spraying!

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Troubleshooting: 3 Problems, 3 Solutions

By Ron Joseph

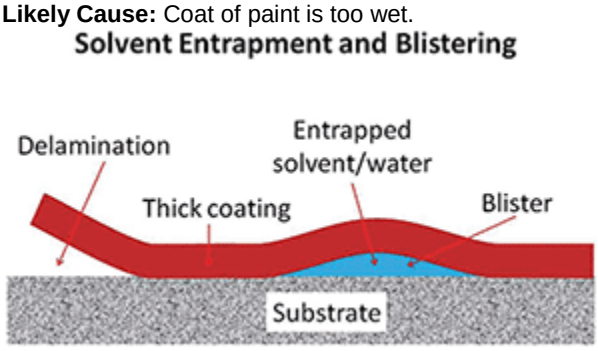
Airless spray guns are excellent for painting architectural surfaces, but some problem results seem to occur over and over. Here's how to slay three common spray demons.

Problem 1: Orange Peel
Likely Cause: Paint is not adequately atomized. The paint droplet is too large to smooth out and flow into a uniform, smooth film.

Solution: Increase the airless gun's hydraulic pressure. But be careful: Too much pressure can create large shear stresses that might damage the paint.

Another option: Reduce the paint viscosity so that the paint is easier to atomize. With a waterborne paint, adding too much water will cause the paint to run and become transparent; therefore, add as little water as possible. With a solvent-based paint, do not add thinners unless you have checked with your environmental manager that it is permissible to add solvent without violating local environmental regulations.

Problem 2: Blisters and Delamination
Likely Cause: Coat of paint is too wet.



Solution: When paint is applied thicker than the vendor recommends, solvents and/or water may not be able to evaporate before the paint starts to form a film. And once the film has formed, it becomes even more difficult for the solvents and/or water to evaporate. Over time, they can migrate slowly to the substrate and loosen the bond. Months after application, the paint's adhesion to the substrate can become so poor that the entire film delaminates, or peels off the surface. Sometimes, both the primer and topcoat will delaminate.

Ambient humidity during paint application can also lead to the formation of blisters. On a dry day, the blisters will appear to have flattened, but the damage will have been done. The next wave of humidity will make the blisters reappear.

Avoid this problem by applying thinner coats of paint and allowing sufficient time for the solvents and/or water to evaporate.

Problem 3: Bénard Cells and Mottling
Likely Cause: Coat of paint is too wet.

Solution: Pigments in paints are not always compatible with each other and may separate. You can often see this when you open a can of paint and see one pigment floating on top. Pigments can also separate if too much paint is applied and remains wet for a long time. When the paint eventually dries, pigments that separated can leave defects.

One such defect is known as Bénard Cells. As the paint dries, minute convection currents inside the film cause the pigments to separate into what looks like a honeycomb structure. You might only be able to see this using a magnifying glass; to the naked eye, the paint will appear mottled.

To avoid this problem, try applying thinner coats of paint and allowing the solvents and/or water to evaporate more quickly. Another approach: Increase the atomizing pressure so that solvents and/or water flash off, even as the paint droplets fly through the air from the gun tip to the surface.

Paint industry veteran Ron Joseph provides consulting and expert witness services on a wide variety of paint and coating issues, including coatings failures, personal injury and hazardous waste disposal. Contact him at www.ronjoseph.com.

Safety Alert: Inspect, Train to Avoid Disaster

Painters who use airless spray guns on a regular basis often become complacent about the potential dangers posed by the equipment. I have been involved in two cases where painters suffered terrible sprayer injuries.

In one, a painter almost sustained catastrophic injury because a screw cap had not been property tightened. When the equipment was pressurized, the cap exploded directly into his face.

In the second case, the high-pressure stream of paint burst from the spray gun tip at a sharp angle and injected into the painter's skin. It turned out that the painter had improperly inserted a washer behind the tip.

I have witnessed numerous examples of shoddy maintenance, and I shudder to think of the needless traumatic accidents that could occur due to neglect of this high-pressure equipment.

Painters must be properly trained to use airless spray guns and to follow the equipment vendor's safety instructions.

Maintenance should be a daily occurrence. Painters should follow a checklist of procedures, much like a pilot's checklist before take-off. Among many precautions, painters should ensure that:
• Screw threads are properly cleaned
• Components are screwed on tight
• Pressure hoses are replaced, regardless of the expense, when they start to show cracks

Most painters I have met remove the safety guard in front of the spray gun tip. Their supervisors should write them up for doing so; a severe injury is a given if a stream of paint enters the skin from a close distance. Just a few inches of

separation dramatically lowers the pressure of the paint stream.

Painters must give safety the highest priority or risk crippling, permanent injuries.

- Ron Joseph

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ADDITIONAL VALUABLE INFORMATION

Spray painting Principles Involved

To understand the art of spraying and to become an efficient operator, it is essential that the principles involved should be grasped. The success of the process depends upon the stream of paint or other type of finish being properly atomized, or, in other words, broken up into a fine mist. This state can only be obtained by two conditions working in harmony with each other; the flow of air from the pistol and; the viscosity of the material which is being applied. If the force of the air is insufficient to break up the paint into fine particles, then, instead of an even film of paint being deposited upon the surface, blobs will be spurted out, and this will happen also if the paint is too thick or a very high solids. These would require a larger orifice or tip size. Practice runs should help determine the correct balance of air and viscosity to produce satisfactory results. Different materials will require their own individual adjustments, but these will soon be determined with practice.

Common Faults in Spray Painting

Unsatisfactory results in spray application may be due to a variety of causes, such as faulty technique on the part of the operative, or again, spraying at an incorrect pressure. In some instances they may arise from failure to keep the gun clean and in good condition; the following are those which most commonly occur:

Distorted Spray.-This may be due to a dirty or damaged air cap or from the tip not centering properly; to remedy, remove and clean the cap, paying special attention to the air ports. Should one of these be blocked with dried paint, the shape of the air stream and atomized paint will be irregular. If any parts are damaged, see that they are replaced.

Split Spray.-This may result from too much atomizing pressure or from misalignment of tip and nozzle, or from an obstructed port.

Air Leakage from the Front of the Gun .-This is probably due to the air valve not seating properly and, provided no actual damage has been sustained by the gun, can be remedied by cleaning.

Fluid Leakage from Front of the Gun .-In this case the needle may not be seating correctly in the fluid tip, due to dirt or other impurities in the tip. Alternatively, the needle may be bent or of an incorrect size for the tip.

Fluttering Spray .-This is probably caused by an air leakage through the needle-packing gland; the trouble can be rectified by means of a new packing washer.

Pebbling .-This fault, in which the material is deposited on the surface too dry, as a kind of dust, is usually the result of spraying at too high an air pressure which causes the solvents in the finish to evaporate from the atomized particles before the latter reach the surface.

Orange-peeling.--This may be due to the material itself not possessing sufficient flow or to the use of unsuitable thinners. Again, it may be caused by the use of too low an air pressure in relation to the viscosity of the material with the result that atomization is imperfect.

Runs and Sags .-These occur when too much paint is projected on to the surface in any one area, due to incorrect handling of the gun, as when there is too much overlapping in succeeding strokes.