

How to Troubleshoot a

Learn to handle the typical problems

BY JEFF JEWITT

As the technical troubleshooter for my business, I've been asked to solve just about every spray-gun problem imaginable, from a new gun that just hisses air to an old gun that used to spray perfectly and now leaves a horrible finish.

The good news is that in most cases, you can diagnose the cause of the problem by analyzing the spray pattern. In a few other situations, a slight change in your spraying technique can help. Even if you're just considering taking the leap into spray finishing, knowing how to achieve and maintain a good spray pattern will give you the confidence you need.

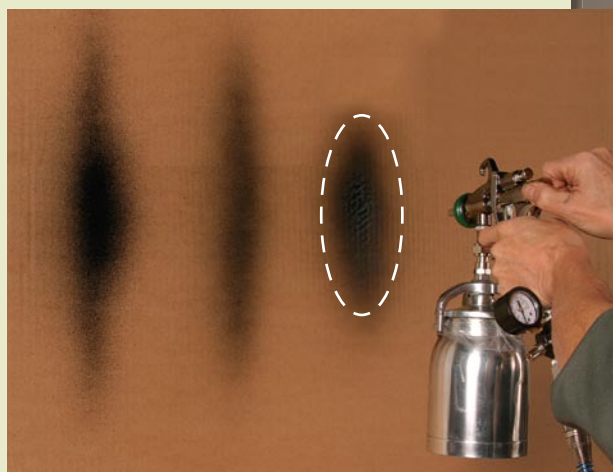
Since all spray guns operate on the same basic principle, it doesn't matter whether you have a high-volume, low-pressure (HVLP) gun or a non-HVLP gun, a turbine-driven system or a compressor-driven system. When differences exist, I'll call them out.

Most of the time some finish comes out of the gun, just not in a manner to give that thin, even coating that makes spraying so worthwhile. One of the most common problems is uneven coverage, which leaves a repeating light/dark effect when the finish dries. You can study the spray pattern with a light shining through it. If you find this difficult, spray some dark finish or stain onto cardboard. If you substitute a dark finish for a clear one just to test the pattern, be sure that it has a comparable viscosity.

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Test your gun

You want the gun to spray an elliptical pattern consisting of fine, even-sized droplets (far right). Most of the time, spraying clear finish onto cardboard will give you a legible spray pattern while the finish is wet. For an even clearer pattern, spray black stain or paint onto the cardboard as shown in this article's test panels.



Spray Gun

and enjoy carefree spray-finishing

Pattern heavy on one side



The typical culprit for this is a plugged or partially clogged air-cap port. It's easy to diagnose: Just rotate the air cap 180° and if the problem side reverses, then it's the air cap. Remove the air cap and soak it in lacquer thinner. Use micro-brushes to clean the air-cap ports as best you can. The ports meet inside the air cap at a 90° angle, so come in from both sides. A blow gun that has a protective rubber tip can be used to blow out the ports, but wear eye protection in case some thinner splashes out (I speak from painful experience).

If the pattern does not reverse when you rotate the air cap, then it is the fluid nozzle that is clogged, causing the spray to veer to one side as it exits the gun. If you have a gravity gun, you can easily diagnose a partially obstructed nozzle by unhooking the air line and pulling the trigger completely back with solvent or finish in the gun. The liquid should come out in a steady stream if the nozzle is clear. If you have a compressor-driven pressure cup and the gun has a cheater valve (an internal air shutoff), simply close the cheater valve and pull the trigger. Again, the finish/solvent should come straight out the front. On suction and turbine-driven pressure cups you can't do this, so you'll just have to see if cleaning the nozzle helps.



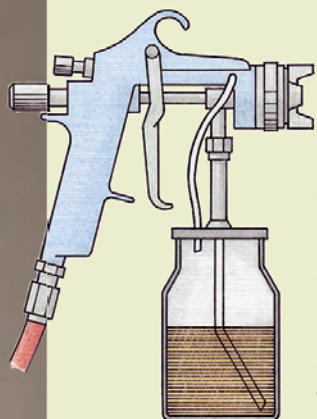
One side clogged. To find out if a clogged port on one side of an air cap is causing the spray pattern to be heavy on one side, rotate the air cap 180° and see if the heavy pattern also changes.



Blow out the problem. Air ports have a 90° turn in the air cap, so the easiest way to clean them is to blow out any obstruction with compressed air.

Which type of gun do you have?

Spray guns come in two basic designs. Siphon cups (also called suction cups) have the storage cup under the spray gun, while gravity guns put it on top. To troubleshoot correctly, you need to know which type you have.

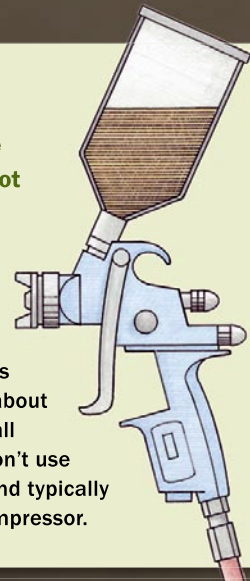


SIPHON CUPS

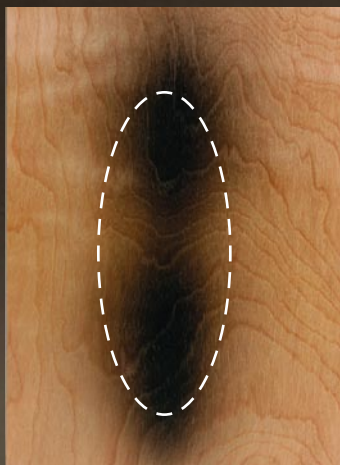
In a standard siphon cup, air exiting the front of the gun creates suction, pulling the finish up into the gun through a metal tube. With a pressurized siphon cup (usually called a pressure cup), the cup is pressurized by an external or internal tube that diverts a small amount of air from the gun. This pushes the finish up into the gun. All turbine systems use pressurized siphon cups.

GRAVITY CUPS

With the cup on top, gravity alone pushes the finish down into the gun. Gravity guns range from full-size cups (about 20 to 25 oz.) to detail guns (about 4 to 5 oz.) used for touchup and small projects. These small gravity guns don't use much air (4 cubic feet per minute) and typically can be run with a small portable compressor.



Pattern split in the center



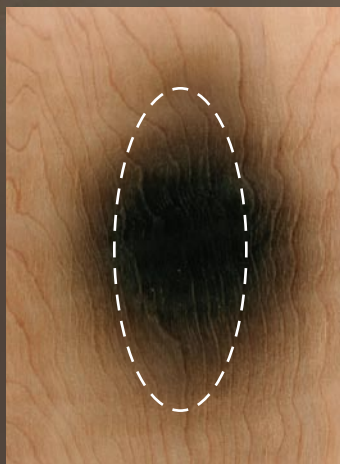
Less pressure. If there is no finish in the center of the spray pattern, try turning down the air pressure on the compressor or turbine.

If there is no finish in the center of the spray pattern, more than likely the air pressure is too high. Lower it and see if the problem gets better. On the few turbine models that lack air regulation, switch to a smaller fluid nozzle.



Adjust the nozzle. If adjusting the air pressure doesn't solve the problem, switching to a smaller fluid nozzle may help.

Pattern heavy in the center



Thin the finish. If you can't turn up the pressure, try thinning the finish in 10% increments.

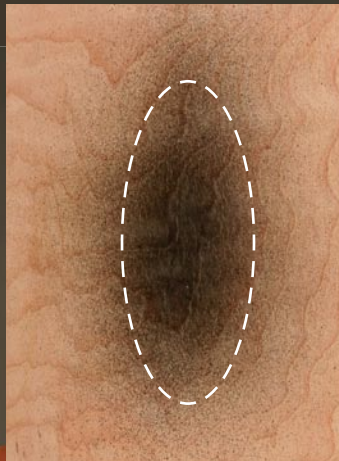
If most of the finish is in the center, the air pressure is too low. If you can adjust the pressure, turn it up. On a compressor-driven system, turn down the atomizing air using either the compressor output regulator or a secondary supply regulator. This regulator can be wall-mounted if you have a metal air pipe, or a mini-regulator attached to the base of the gun. With turbines, all you can do is to turn down the atomizing air with an air-control valve mounted on or near the base of the gun. If your turbine has a speed control, you can adjust it for a slower speed, which reduces the air. If you can't adjust the pressure, try thinning the product or switching to a larger fluid nozzle.



You can't get a wide fan pattern

On a suction-feed gun, try thinning the finish, or even just spraying some solvent to see if you can get a wide pattern. If that doesn't help, try increasing the atomizing pressure. If both these steps fail, then install a larger nozzle.

Though unlikely, both air ports on the aircap may be clogged, so remove and clean them as explained earlier. As a final cause, the fan-width adjustment valve assembly may be damaged or faulty, in which case you should return the gun if it is under warranty or seek out a repair shop. On gravity and pressure-cup guns, follow the same sequence of steps, but don't increase the atomizing pressure.



Coarse spray pattern

If your dried finish has little dimples all over it resembling the skin of an orange, you have "orange peel." Poor atomization (large droplets) is the main culprit, and this is often easiest to see if the spray pattern is backlit.

On all compressor-driven guns, try increasing the air pressure and see if the coarse pattern improves. If it doesn't, you can try thinning the product in 10% increments until it improves. If neither works, try a smaller nozzle.

With a turbine gun, make sure the air control (if you have one) or the speed control for the turbine is opened all the way. If this doesn't work, try thinning the material and then switching to a smaller nozzle.

Too much overspray

HVLP systems should limit overspray to 20% to 30% of the finish. If you think you're getting more, you can reduce it by turning down the air pressure. Just keep in mind that when you do this, the finish quality will start to suffer, at some point resulting in the orange-peel effect described above.

Bounce back. Old-fashioned spray guns created large amounts of overspray (right). Modern HVLP guns are designed to avoid this.



Throttle back the air. To reduce overspray, simply reduce the air pressure. If you build a dedicated spray booth, consider installing a combination regulator and air cleaner attached to the wall (above). The cleaner ensures that no contaminants reach the finish.

Dry or rough spray, or no spray at all

If the finish feels rough when it dries, there are some possible causes common to all guns. You may not be depositing enough finish: Try slowing down your motion as you spray to leave more finish on the surface. Likewise, the gun may be too far from the surface. The correct distance is 4 in. to 6 in. for HVLP and 6 in. to 8 in. for non-HVLP.

It could be that the overspray is landing on your work after you spray. Use a fan to remove the overspray. Last, the finish may be drying too fast because it's hot and dry. Use a retarder specified by the manufacturer to give the finish a longer time to flow out into a smooth film.

In extreme circumstances, you may get no finish coming out of the gun. You pull the trigger and hear air coming through the front but no finish comes out, or it sprays a little and then stops. All standard siphon and gravity cups have a small vent hole that allows air to enter the cup to displace the finish volume as it's pulled out through the fluid nozzle. Use a toothpick or micro-brush (see opposite page) to clear the vent hole. If there's a fair amount of hardened finish in the hole, soak the top in lacquer thinner, but be sure to remove any gaskets first.

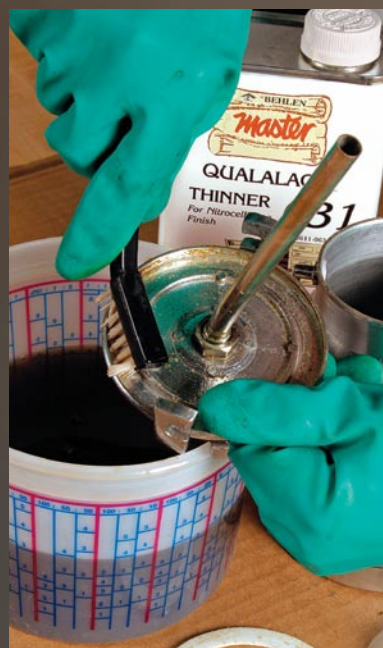
If that doesn't work, remove the fluid nozzle and see if it's clogged. Soak it in lacquer thinner to soften any dried finish and ream it clean with a micro-brush. Finally check the fluid pickup tube and see if it is clogged.



Get closer. If you use an HVLP gun more than about 6 in. from the surface, you run the risk of creating a rough surface.



Slow things down. A finish that dries before it can flow out will leave a rough surface. Adding a suitable retarder slows the evaporation and lets the finish dry smooth.



Remove dried-on finish. Soaking gun parts in lacquer thinner is the best way to remove hardened finish, but first remove non-metal parts.



Trouble in the tube. If the tube that pressurizes a pot is clogged, finish will not fully flow to the gun. Remove the tube from the base of the gun and the top of the pot (above), and then blow through the tube to see if the check valve or tube is blocked (below).



Clean the splash guard. The small pressure vent can get plugged with dried finish, interrupting the flow. Use micro-brushes in a spray-gun cleaning kit to clean the hole.

Regular cleaning prevents most problems

If you are spraying a fast-drying finish such as shellac, solvent-based lacquer, or a water-based finish, each coat is likely to be 1 to 2 hours apart, so leaving finish in the gun between coats doesn't cause problems. However, if the finish needs to dry overnight, or if you change to a different finish, you should clean the gun.



Buy a full cleaning kit. To keep spray guns working properly, a cleaning kit should contain special brushes and needles to access the different parts of the gun.

When you use solvent-based lacquer and shellac, any new finish in the gun will re-melt any dried finish, so you typically don't have to clean the gun thoroughly. Just run some lacquer thinner or denatured alcohol through it, depending on the finish.

Finishes that require more diligence in cleaning are water-based and oil-based products (including latex and oil paint) because the cleanup solvent won't remove the dried finish. Therefore you should clean the gun soon after use. When cleaning guns that sprayed paints, remove the air cap, fluid nozzle, and needle so you can clean more thoroughly. The chart below tells you which solvent works best to clean the different finish types, or you can check the finish container for the proper solvent. Note that some products require a different cleaner once they have dried.

FOR CLEANUP, MATCH SOLVENT TO FINISH		
Finish	To rinse/clean	To remove dried finish
Shellac	Denatured alcohol	Denatured alcohol
Solvent lacquer	Lacquer thinner	Lacquer thinner
Waterborne finishes and latex paint	Water followed by denatured alcohol	Acetone/lacquer thinner
Oil-based finishes and oil paint	Mineral spirits/paint thinner/naphtha	Lacquer thinner

Let fluid flow. Use a large brush to clean the main nozzle in the center of the air cap where finish exits the gun.



Air supply. The small holes on either side of the fluid nozzle supply air that atomizes the finish. Clean them using thin needles.



Don't forget the needle and nozzle. After removing the air cap, unscrew the nozzle (top), and then use a micro-brush to clean inside it.



A thorough going-over. After spraying waterborne or oil-based finishes, guns need to be stripped down and thoroughly cleaned right after use.