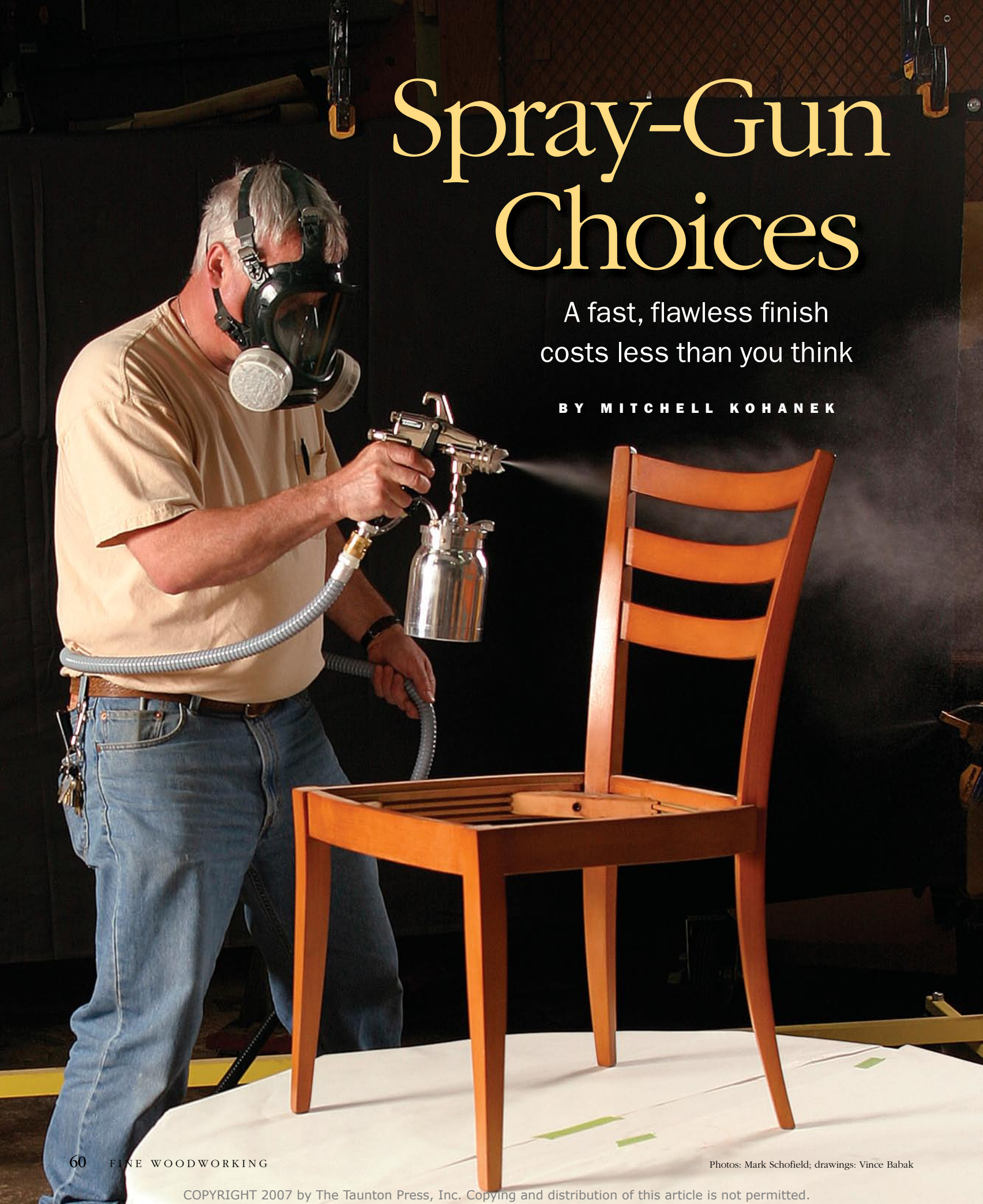
Spray-Gun Choices

A fast, flawless finish costs less than you think

BY MITCHELL KOHANEK



Photos: Mark Schofield; drawings: Vince Babak

When professional finishers talk about an "off-the-gun finish," they are describing a finish so smooth that it doesn't require sanding. Achieving this state of finishing perfection requires practice and knowledge of finishes, but above all, the right equipment.

If you've been thinking about making the leap into spray finishing and have started to research equipment, it might seem that the choices are endless. In fact, the basic technologies are not that complicated, and they may be a lot easier to understand than some of those fancy dovetail jigs!

The two main types of spray gun are those powered by a turbine and those that run off an air compressor. I limited my search to guns that can get reasonable results when spraying a water-based finish, as most woodworkers don't own explosion-proof spray booths and thus are not set up to spray solvent-based finishes (see "Spraying water-based finishes safely," p. 64). Also, water-based finishes are among the most difficult to atomize, so if your gun can spray them well, it should be able to handle most solvent finishes. This requirement ruled out the $100 hardware-store spray guns, but I discovered that furniture makers can get a beautiful finish for around $500—and spend far more for inferior results. This article will help you zero in on the system that is right for you.

What happens when you mix air and finish

To understand spraying, you need to grasp two conflicting concepts: atomization and transfer efficiency. Atomization is forcing a liquid to become small, round particles; the smaller the particle, the better the look of the coating. Large particles can produce an effect known as "orange peel." There are many reasons for this pebbly look, but poor atomization is one of the most common.

Early spray guns used air at high pressure (45 to 90 lb. per square inch, or psi) at the tip of the gun to blast the liquid finish into a fine mist of tiny particles. This produced a beautiful, smooth finish, but only about 25% of the liquid ended up on the object being sprayed. The rest missed the target or bounced off because of the high air pressure. In order to improve on this 25% transfer efficiency, high-volume, low-pressure (HVLP) guns were developed. HVLP technology reduces to a maximum of 10 psi the amount of air needed to atomize liquid. This increases the transfer efficiency to between 65% and 90%, but it comes at a price: You spray more slowly and the quality of atomization varies among the various systems.

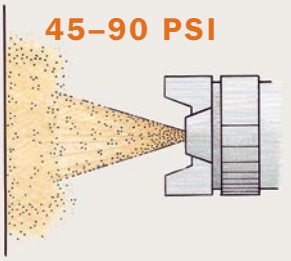
This conflict between optimum atomization and maximum transfer efficiency is particularly acute with water-based finishes, which are generally thicker and harder to atomize than traditional solvent-based ones. That's why budget-priced HVLP guns generally cannot achieve the atomization needed for a smooth water-based finish. However, water-based finishes continue to be improved

Choose a low-pressure gun

High-volume, low-pressure (HVLP) spray guns use enough air to atomize the fluid into small, even-sized particles, but not so much that the spray bounces off the target.

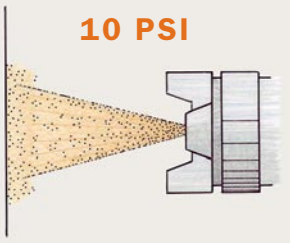
HIGH-PRESSURE GUNS

Old-fashioned high-pressure spray guns atomized the finish into a fine mist. This gave a good finish, but only about 25% of the liquid ended up on the workpiece.



LOW-PRESSURE GUNS

Sophisticated HVLP guns also give good atomization, but their lower pressure means that far more of the finish ends up on the workpiece.



Cheap gun equals bad finish

Budget-priced HVLP spray guns cannot properly atomize heavy water-based finishes. They spray a stream of large droplets, leaving a rough finish.

Two ways to propel the finish

Your first decision is whether to buy a turbine system or a spray gun that uses a compressor.

TURBINE: ONE-STOP SHOPPING BUT SLIGHT ORANGE PEEL

Turbines are rated by their number of fans (or stages), ranging from two to five. The higher the number, the greater the volume and the pressure of air they can pump out. All turbines are considered HVLP because they don't shoot more than 10 psi at the tip of the gun. A good-quality three-stage turbine with around 6 psi will spray the majority of water-based finishes and set you back around $750; a four-stage model with 8 psi gives you the flexibility to spray thicker water-based finishes and paints, and to spray faster, but costs about $200 more.

The turbine package. *The advantage of buying a turbine is that you get everything you need to start spraying, with good instructions.*

A newcomer in the turbine market is the two-stage Earlex HVLP spray station. Priced around $300, it comes as a handy little unit, but unfortunately, with a water-based finish it was tough to find an optimum fan pattern that didn't just spatter the finish.

Turbine technology demands larger, heavier guns and hoses than compressed-air guns, so consider the ergonomics of each type before you buy. The main advantage of turbines is that they come as complete spray systems—air source, hoses, and gun—so their instructions are far more comprehensive than stand-alone compressed-air guns.

I tested three- and four-stage turbines from Apollo and Turbinaire, two leading manufacturers in this category, and could see little difference between the finishes. All the sample boards had very slight orange peel and needed a light sanding before the next coat.

An underpowered turbine. *This two-stage turbine doesn't produce enough air pressure to spray a water-based finish successfully.*

COMPRESSED AIR: FLAWLESS RESULTS—GOT A COMPRESSOR?

If you already have compressed air in your shop, you probably will opt for a compressor-driven gun. The capacity of the compressor, in terms of how much air it can deliver in cubic feet per minute (cfm) at what psi, will determine which gun is compatible. A 2- to 5-hp, 20- to 25-gal. midsize model ($350–$600) is adequate for many guns, and I even used a Sata Minijet successfully with a portable 1.6-hp, 4.5-gal. compressor.

A compressor-powered spray system. *A midsize compressor is enough for many HVLP spray guns, but you also will need a hose and a filter.*

sor (similar models cost $100 to $250). The compressor ran continuously but it never affected the spray pattern. An advantage of compressor-driven guns is that they generally have a greater maximum pressure at the tip than a turbine gun. This means you can increase the psi to achieve better atomization of thicker finishes, but at the cost of lower transfer efficiency. Using a midsize compressor, I've had good results from HVLP guns made by Binks, Kremlin, and Sata, among others.

Compressed-air guns also come in an LVLP (low-volume, low-pressure) category. Because they use less air, you can get by with a smaller compressor, but you generally pay the price in slower speeds. Better guns are constantly being developed, however. In the spray test, all the compressed-air guns received an A grade for producing excellent off-the-gun finishes.

You'll need the right supply hose ($10 to $50) to connect the compressor to the gun. The smaller the internal diameter (ID) of the hose and the greater its length, the more the pressure will drop between the compressor and the gun. It is recommended that an air hose with a 5⁄16-in. ID be limited to no more than 20 ft., a 3⁄8-in. ID hose to 50 ft., and a 1⁄2-in. ID hose to 100 ft. On many occasions the wrong hose size is to blame for a poor finish, not the gun or the coating. A good way to make sure that you have sufficient pressure is to attach a pressure gauge ($15 to $40) at the base of the gun. Alternatively, some guns such as the Sata Jet 3000 come with a built-in digital readout in the handle.

YOU'LL NEED A FILTER

Compressed air leaving the tank contains small amounts of water, oil, and other contaminants. If allowed to pass through your gun, they create unpleasant finishing defects. You need to invest in some kind of filter. Disposable filters attached between the gun and the air hose are worthwhile if you only spray occasionally ($27, www.pacificaircompressors.com). The crystals inside turn from blue to mauve as they become saturated (above). If you intend to spray regularly, invest in a coalescing filter (right) made up of a series of filters you change every six to 12 months depending on the amount of use. These run $75 to $175 depending on the specifications.

CHECK THE PRESSURE AT THE GUN

Long or small hoses cause the air pressure to drop between compressor and gun. To measure the exact air pressure at the gun, attach a pressure gauge or regulator.

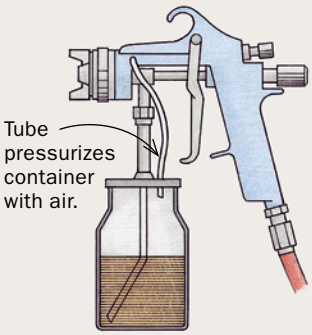
Small investment for good results

If you don't mind spraying slowly, you can achieve a great finish for under $500 with a portable compressor and a small spray gun.

Three containers for finish

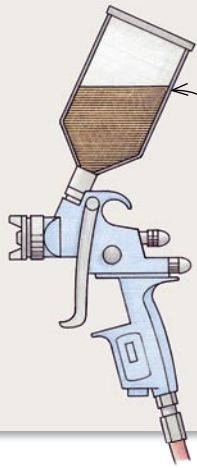
1 SUCTION-CUP GUN

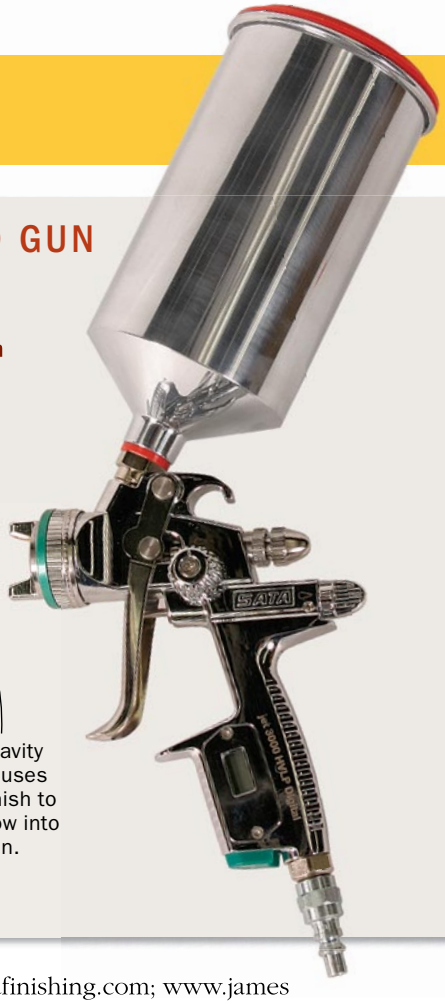
The most common type of spray gun has the finish in a cup underneath. The fluid can be sucked into the gun or, as in this case, the cup can be pressurized by a plastic tube from the gun. This type tends to spit finish when it runs out.



2 GRAVITY-FEED GUN

With the container above the gun, the finish flows into the gun by gravity alone. The gun can feel top-heavy, but will stop cleanly when the cup is empty.





to make them easier to spray (see A Closer Look, pp. 102-104).

Different ways to contain the finish

Whether you choose a turbine or compressed-air system, you have a choice of where the finish is contained before it enters the gun. With either system, the most common container is a cup located underneath the gun, but when the fluid level gets low, the gun starts to spit the finish.

If you have the cup on top of the gun (gravity feed), the gun simply stops spraying when the fluid runs out. One way around this is to adapt a disposable 3M cup system that comes in three sizes. Called PPS (paint preparation system), these cups, starting at around $30, are quickly interchangeable so you can shoot your dye, sealer, and topcoat from different cups with minimal cleaning (www.homesteadfinishing.com; www.jamestowndistributors.com). The system allows you to use the gun in any position, even upside down.

Better still is to remove the cup entirely and have a hose leading back to a pressurized container (pressure pot). No longer will the cup on your gun bump into the project as you try to spray the inside of cabinets. Pressure pots also allow you to spray larger amounts of coatings without stopping to refill. A 1- or 2-qt. pot, costing

Spraying water-based finishes safely

Assuming that most of your spraying will be done in the garage, you'll want to set up a temporary spray booth. A good design was shown in *FWW* #169 (Finish Line, pp. 117-118). Wherever you decide to spray, you will need a method of drawing in fresh air and directing the fumes and overspray outside. Some novice sprayers assume that just because a water-based finish can be sprayed without the risk of an explosion, it is safe to breathe. Even though some solvents have been taken out and replaced with water, these finishes still contain serious chemicals and solids—and you need to protect yourself. Always wear a cartridge-style respirator rated for organic vapors whenever you are spraying.

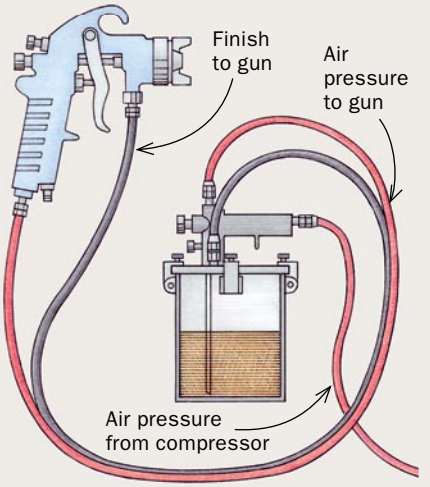
Online Extra

To learn how to make a simple spraying booth, go to **FineWoodworking.com/extras.**

Easy cleanup. *3M makes gravity-feed containers that have a disposable lining.*

3 PRESSURE POT

Without a cup of fluid attached to it, a spray gun is much more maneuverable and can access tight spaces. Small pressure pots can be carried or hung from a belt.



Pressurize the can. *When using a pressure pot, the finish can either be poured into the pot, or the can of finish can be placed in the pressure pot, which reduces cleanup.*

$100 and up, is common, while many of the cups hold a pint or less. Smaller pots can hang from your belt, while larger ones are on wheels.

A nice feature of some pots is that you can place the can of finish directly in the pot. When you are done spraying, remove the pressure in the pot and open the lid; place a rag over the gun's air cap, squeeze the trigger, and force the air back down through the fluid tube. Known as back flushing, this will push the finish out of the fluid hose and into the pressure pot.

Not much additional air power is needed as pressure pots normally operate at 2 to 5 psi, but by increasing the pressure you can atomize heavier finishes such as water-based types. You certainly should be able to supply a pressure pot and an LVLP gun using a midsize compressor. Turbines are not designed to divert their air via a pressure pot, so a separate source of compressed air is needed.

Making sense of this information

The first step is to decide if turbines or compressed-air guns are right for you. You may decide it's worth paying for a turbine system to get the simplicity of a whole system designed to work together. I recommend you save money and only go for a three-stage turbine. In my testing, I didn't see better results with a four-stager.

If you have a compressor, check its capacity and then have a retailer match it to a suitable gun. If you intend to spray only small projects, or a large piece in sections, you can team a small compressor with a low-air-consumption HVLP or LVLP gun such as the Sata Minijet IV (around $300) or Kremlin's M22 HTIG LVLP gun (around $400). If large tabletops are on your list of things to spray, use at least a midsize compressor and invest in a pressure pot. Whatever gun you choose, practice spraying on ¼-in.-thick plywood and sooner than you think you, too, will achieve an off-the-gun finish. Good luck and have fun. □

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