

Coming Up for Air

Making the leap to air-powered tools

BY ROLAND JOHNSON

I launched my woodworking career with a few hand tools, some clamps, a used lathe bought at a garage sale, a borrowed belt sander and a brand-spanking-new 5-hp air compressor with a spray gun. The compressor was an extravagant purchase at the time, but for refinishing furniture, the spray gun gave me a competitive edge over other local refinishers. Twenty-two years later, that compressor is one of the most important tools in my shop.

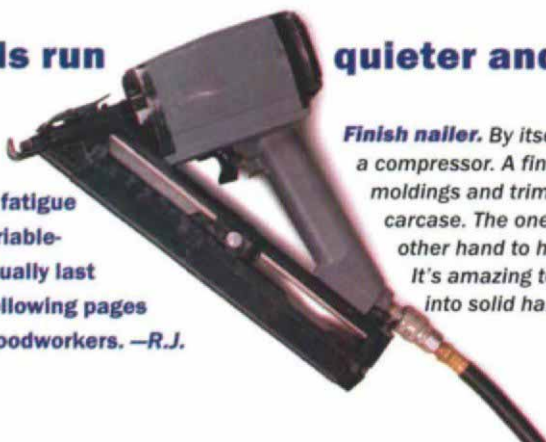
Nowadays, I use a compressor for more than just spraying finishes. I also use it to power my air-driven finish nailers (see the photo below), orbital and inflatable drum sanders, die grinders, blow guns, drills and a vacuum generator for my veneer press. Almost every electric tool you use has an air-driven counterpart with the advantages



Air-powered tools run

quieter and last longer

Most electric tools have an air-driven counterpart. Air tools, because they lack armatures of wound copper wire, are usually lighter in weight, reducing fatigue on the operator. Most air tools also have built-in variable-speed controls, run cooler and more quietly, and usually last longer than electric tools. Listed here and on the following pages are some of the more useful choices available to woodworkers. —R.J.



Finish nailer. By itself, this tool is excuse enough to buy a compressor. A finish nailer makes it easy to apply moldings and trim to cases without damaging the carcass. The one-handed operation frees up your other hand to hold moldings and trim in place. It's amazing to watch a 2-in. finish nail disappear into solid hardwood with the flick of a finger.

Pumping up the pressure:

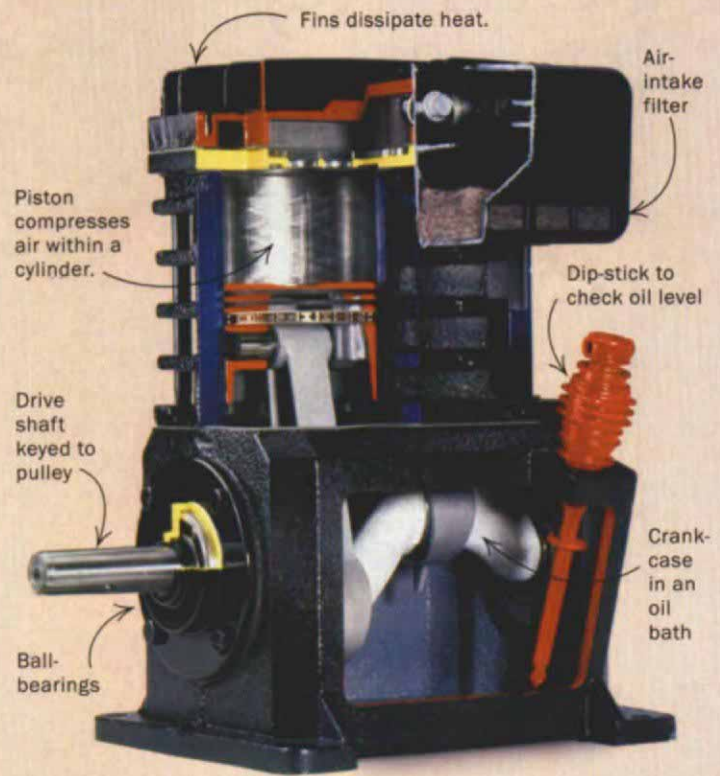
THE SAME PRINCIPLES THAT POWER AUTOMOBILES

Compressors force air into a tank with a pump powered by an electric motor (or gas engine) using pulleys and a V-belt. Pistons, like those inside of internal combustion engines, pump the air into a receiving tank for storage. A check valve at the tank, a pressure switch and a safety-relief valve control the air pumped into the tank.



Compressed air is available from the tank through a threaded bung with a shut-off valve attached to it. In a single-stage compressor, a piston pumps the air directly into the receiving tank. In a dual-stage compressor, the air is compressed first in one large cylinder, then

compressed a second time in a smaller cylinder about half the size of the first. Dual-stage compressors run more quietly at slower speeds and generate less heat. Lower operating temperatures translate to less moisture condensation in the system. Maximum operating pressure for a single-stage compressor is usually about 100 to 130 pounds per square inch (psi). Dual-stage compressors operate at much higher pressures—usually around 200 psi—meaning the storage tank will hold and deliver more air. —R.J.



CUTAWAY OF A CAST-IRON PUMP

of lighter weight variable speed and longer life. To convert to air-powered tools, the most expensive investment you'll have to make—if you don't already own one—is a compressor that can handle the demands of delivering enough air.

If you're planning to buy a new compressor or trying to decide if the one you already own will meet your needs, you can cut to the chase by knowing what to look

for (see the box above). The size of the compressor you'll need will depend on which tool you use that demands the most air. All pneumatic tools are rated by how much air they consume. You'll see that listed in a catalog or on the tool as a ratio of cubic feet per minute (cfm) of air used at a specified tank pressure, listed as pounds per square inch (psi). For example, an average spray gun uses only about 11 cfm at

50 psi, but an orbital palm sander consumes about 12 cfm at 90 psi. A compressor has to deliver enough air for the tool with the highest rating—in this case, the orbital sander.

If you plan to operate more than one air-powered tool at a time, you can calculate the combined air consumption simply by adding the cfm totals for both tools. (A compressor for a spray gun and an orbital

TOOLS



Brad nailer. Same benefits as the finish nailer, but the smaller gauge nails leave smaller holes to fill. Brads are also less prone to splitting fragile moldings. The smaller size makes it easier to get into tight spaces and causes less fatigue if you're using the tool for a long period of time.



Crown stapler. Once you have stapled the backs into cabinets or put together a jig with an air stapler, you will never pick up a hammer to do the same job again. Crown staples hold plywood much better than nails, and the thin tines on the staples cause fewer cases of splitting or blow-out.



Air router. Compact and powerful with variable speed, this is a great detail or inlay router. It's about the size of a laminate trimmer, but heavier. Adjustable base tilts in both directions, which expands the range of profiles router bits can cut.

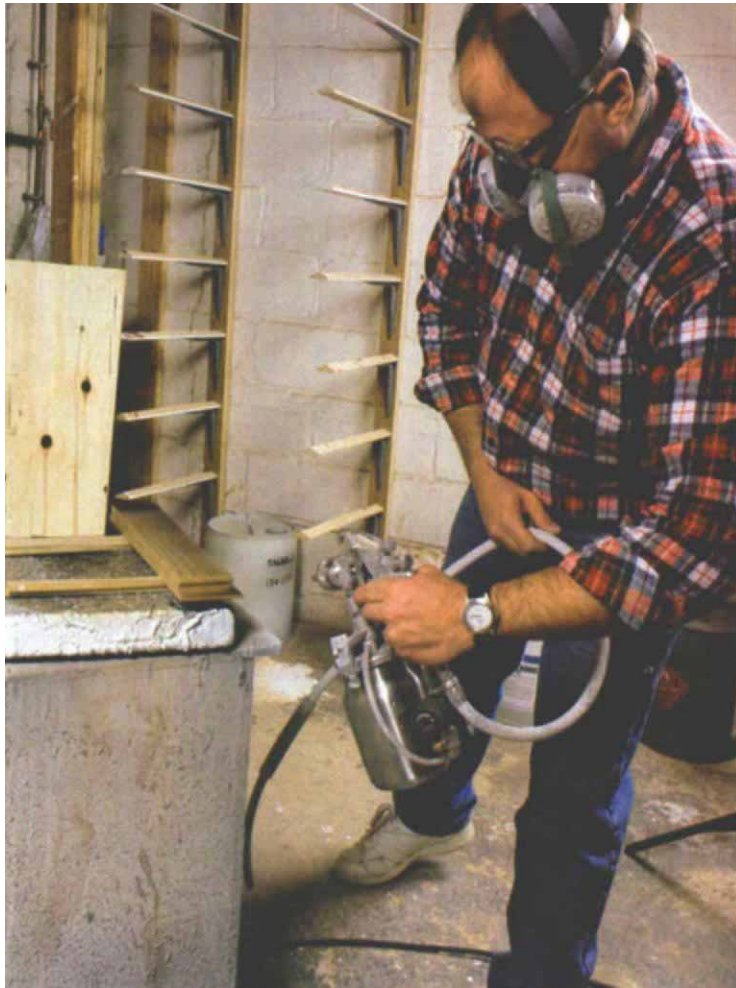
palm sander would have to deliver at least 23 cfm at 90 psi.) Also, you should add at least a 25% margin over the rated consumption, just to be sure the system will run efficiently. If you intend to use a second pneumatic device only intermittently, the compressor could be a bit smaller.

Compressors are commonly rated by the horsepower capacity of the electric motor or gas engine powering the compression pump. Although this may be a way to get an approximate idea about the output of the compressor, it's not all you need to know. The real criterion by which to judge a compressor's output is the amount of air it delivers. Some manufacturers refer to this figure as free air.

Look for durable materials and practical sizes

Compressors made with cast-iron cylinders and crankcases (belt driven and lubricated with oil) are stronger and will last longer than those made from aluminum. My main shop compressor is a cast-iron Campbell Hausfeld unit that I bought in 1976 (see the top right compressor in the photo on the facing page). With the exception of my having to spend \$36 to replace four reed valves in the head, that unit has required no other repairs, and it's still running fine. If it does ever need to be rebuilt, I know it can be done at a reasonable cost. Most aluminum compressors are not designed to be rebuilt, so essentially they become throwaway units when their service life is up.

You can also buy smaller, oil-less, direct-drive compressors that boast a respectable air delivery for about half the cost of a standard belt-driven, oil-lubricated unit. But direct-drive compressors are quite noisy. I



Spray guns are fast and efficient. There's one good reason most professional finishers use spray guns: You can apply better finishes faster than you can with any other application method. Period. Shown here is a standard-duty, non-bleed, external mix, siphon-feed gun with a 1-qt. aluminum cup.

do have a small direct-drive portable for occasional job-site use, but I wouldn't consider a larger one for shop use.

How you intend to use the compressor affects the orientation of the air tank. Vertical tanks have a smaller footprint, making them more desirable when floor space is at a premium, but they are difficult to move around. Horizontal tanks work better as portable compressors because the lower

center of gravity makes them less prone to tip over. They can also be placed under a workbench to help free up floor space. The most common size tanks are 20 to 30 gal. for portables and 30, 60 and 80 gal. for heavier, stationary compressors.

Choose your hoses carefully

Whether you plumb a system in copper pipe from a stationary compressor or work

Die grinder. This is a great tool for doing cleanup work on carvings and moldings, a kind of infinitely variable hand-held shaper. There are many grinding burs and special bits commercially available for this tool. The author often uses interchangeable abrasive cones.

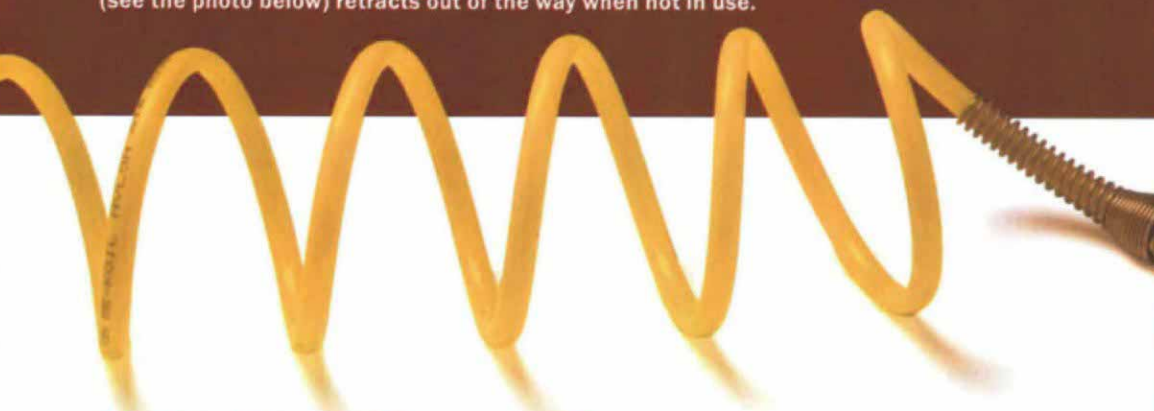


Straight-line sander. Often used in auto-body shops, this sander makes easy work of sanding a panel. It is a good substitute for a belt sander. It will not remove material as quickly as a belt sander, but it is much easier to control and less prone to gouging.



Flexible hoses

Sized by their inside diameter (ID), hoses vary in strength and flexibility. Most air tools run off hoses from 3/4 in. to 3/8 in. ID (see the photo at right). The thickness of the outer wall and the quality of the material from which it's made can affect the flexibility of the hose. Recoil hose (see the photo below) retracts out of the way when not in use.



Making the right connections:

NO TWO MANUFACTURERS MAKE THE SAME COUPLER DESIGN

Although some small portable compressors have hoses that are permanently connected to the compressor outlet, most systems have detachable hoses that connect to the compressor by means of a male and female coupler assembly. The female coupler—usually mounted on the compressor—has a spring-loaded collar on the body and can be attached to the hose a number of ways (see the photo below). When the collar is pushed back, the male plug—mounted on the hose—is locked in place with an airtight seal. This same method is used to connect tools to an air hose.



Amflo, Aro, Bedford, DeVilbiss, Grayco and Milton (see the photos at right) are some of the more common brands of couplers. Most of them are not interchangeable. Your best bet is to choose one brand and stick with it. I find few shop scenarios more frustrating than grabbing a hose to power one of my air tools, discovering the wrong combination of fittings and having to scramble around to find the right hose. —R.J.

COUPLERS

Milton, M-style



Milton, T-style



Aro #210, push-on series

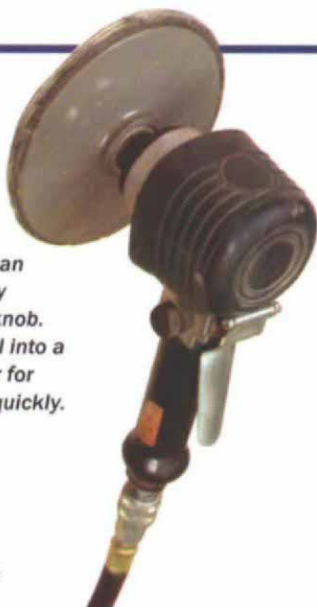


Lincoln, long-stem style

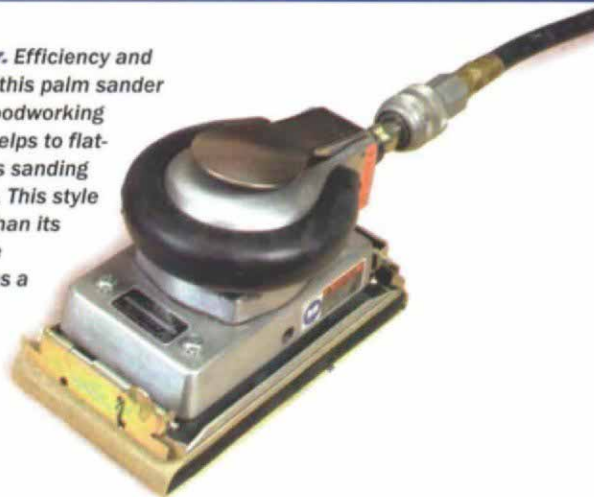
TOOLS CONTINUED

Dual-action sander.

Air-driven, dual-action sanders tend to remove material faster than their electric counterparts. You can switch from orbital to rotary action simply by turning a knob. Rotary action turns this tool into a disc grinder, which is better for removing a lot of material quickly.



Orbital palm sander. Efficiency and variable speed make this palm sander a real asset to any woodworking shop. The large pad helps to flatten panels and makes sanding face frames a breeze. This style of sander is heavier than its electric cousin, so the weight of the tool does a lot of the work.



from a portable unit, you must use a hose for the final delivery of air to the tool. Air hoses come in a variety of sizes and grades (see the photo at left). I use $\frac{1}{4}$ -in. hoses for all my air tools, including my spray gun. If I were using a high-consumption tool, such as a sandblaster, or using hoses longer than 50 ft., I would use a $\frac{3}{8}$ -in. hose to help keep the pressure from dropping. The larger the air demand or the longer the hose, the more the pressure will drop in a small-diameter hose.

Most standard air hose is made from three layers: an inner tube, which is usually natural rubber or high-quality PVC; the carcass, which is a braided, high-tensile material bonded to the tube; and the jacket, which is the outer cover that protects the hose from damage. Recoil hose, also referred to as re-trak, is a hose made from nylon or polyurethane and wound into a coil that will stretch for use and spring back into a compact size when released (see the photo at left). These hoses work well when mounted overhead a workbench.

What I look for is a hose that remains flexible when it's inflated. I bought some bargain hoses a while back that seemed soft and supple, but I was surprised to find that they became stiff as frozen rope when filled with air at 90 psi. The better quality hoses cost more, naturally, but the extra expense is worth it to me.

Hoses that are more flexible do have one drawback. It's easy to interrupt the air flow by accidentally stepping on the hose. This can be disastrous if you are spraying a finish because you interrupt the smooth application of the topcoat. I get around that problem by using a different hose for my spray gun—one that has a significantly



Use two hands for this tool. Inflatable drum sanders carry out some tasks no other tool can accomplish—free-form sanding on flat or curved surfaces. Used here with a recoil hose mounted above the workbench, this tool is a workhorse.

larger outer cover to give the hose more resistance to kinking or being squashed.

Maintain your system to extend its life

Water in the system is always the biggest problem, causing rust inside tools and moisture problems in finishes. So you need to keep the air system as dry as possible. On a regular basis, drain the compressor tank of accumulated moisture. Also, store hoses with the ends coupled to keep contaminants, such as sawdust, from entering the lines. Clean the air-intake filter and any

other filters in the system on a regular basis. Empty water traps daily.

The oil in the compressor pump's crankcase should be checked monthly and changed annually—more often if the compressor sees heavy use. By following a maintenance checklist, your compressor and your air-powered tools will have a long life.

Roland Johnson spends an average workweek equally divided between woodworking and tending his farm.



Angle-head drill. This drill's small size is ideal for getting into tight spaces or drilling at awkward angles. There are even smaller angle-head drills on the market than the one shown here. Variable speed and high power make this a versatile tool, and it fits comfortably in your hand.



Drill. High power, variable speed and light weight make this a great production drill. Used all day, the drill will still be cool to the touch, and the reduced weight really does curtail fatigue. One drawback is that not all air-driven drills are reversible.

A little lubrication goes a long way.

Add a few drops of oil into the end of the male coupler regularly to prevent rust and keep tools in top shape. (For the absent-minded, installing small air-tool oilers will do the same thing.) One exception—do not add oil to the fittings on spray guns.

