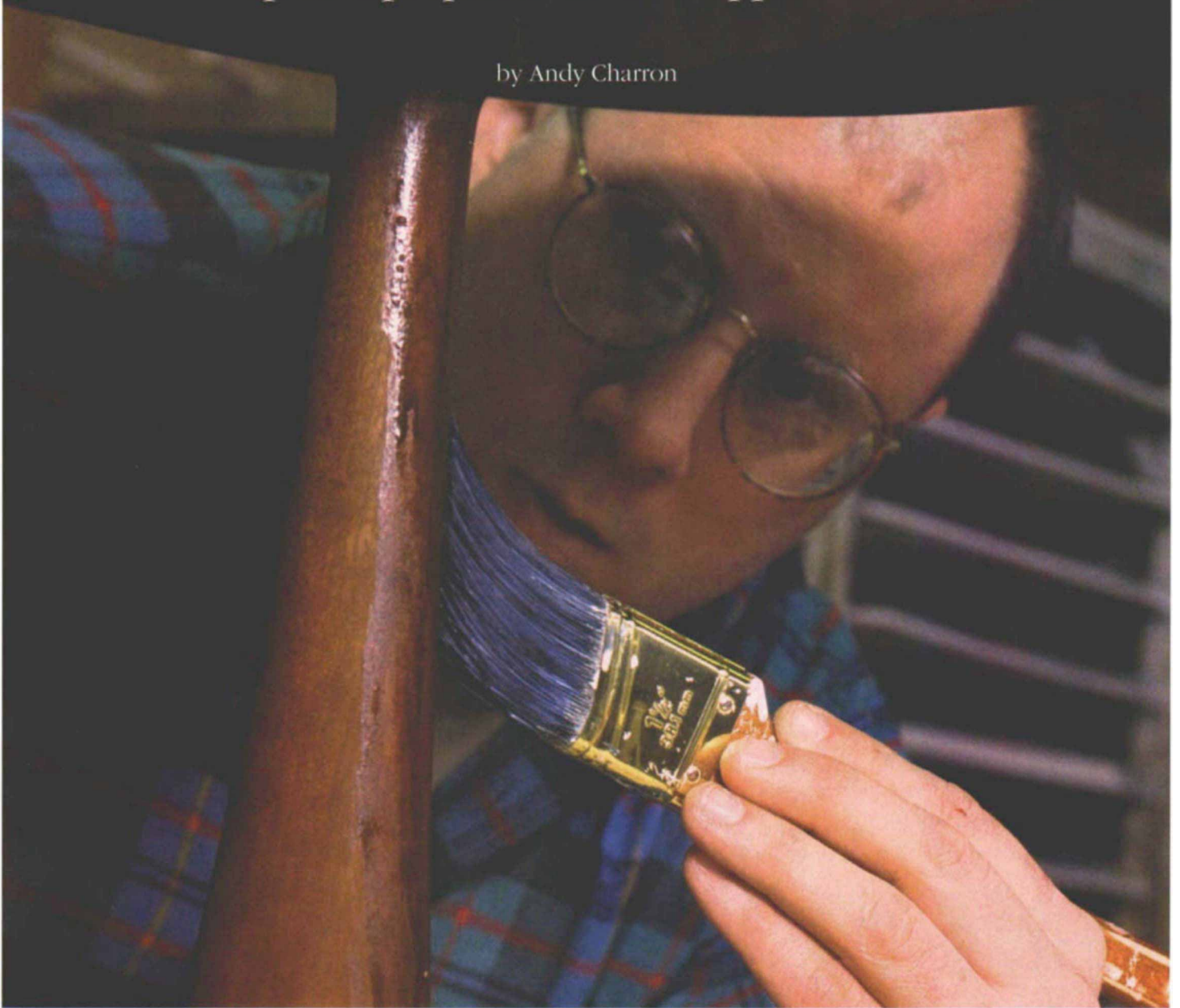


Using Waterborne Finishes

Products keep getting better, but they require special preparation and application

by Andy Charron



Before I owned any spray equipment, I used brushes or rags to apply solvent-based finishes. When I finally purchased a spray gun, I had a limited amount of money and very little shop space, so I could not set up a proper spray booth. I sought out finishes that were nonflammable and relatively safe to use. Waterborne lacquers were the obvious choice. All I needed was a fan for air circulation and a clean place to spray.

It took trial and error, but now I get consistently even coats of finish that are smooth and free of defects. I've also discovered that I don't have to use spray equipment to get good results. A

number of waterborne finishes can be successfully applied with brushes or pads. Even though I now have the shop equipment to spray solvent-based lacquers and varnishes, I use waterborne finishes 90% of the time.

Many states now regulate the amount of solvent or volatile organic compounds (VOCs) that may be released into the air by professional shops. This has led to the development of more user-friendly and less-toxic waterborne finishes. However, waterborne products are still very different from their solvent-based counterparts. If they are not applied properly, they can be frustrating to work with and can yield disappointing



SURFACE PREPARATION



Waterborne finishes will raise the grain. Apply a sanding sealer over a stain or dye before any topcoats. Sanding sealers contain lubricants, which make them easy to sand.



Don't use tack rags to wipe off dust. They can leave chemical residues that will show up as blemishes under a waterborne finish. Use a rag dampened with water.

Waterborne dyes are rubbed on with a rag. Flood the workpiece when applying stains and dyes. Work quickly, and wipe off any excess to avoid lap marks.

results. Knowing what problems to expect and understanding how to overcome them will help make waterborne finishes easier to apply. (For help in choosing the proper waterborne finish, see *FWW#115*, pp. 48-530)

Success depends on several factors: surface preparation, compatibility of sealers, stains and topcoats, material preparation, application methods and even the weather. My methods are applicable to waterborne urethanes, lacquers, enamels, dyes, sealers and primers.

Prepare the surface by raising the grain

If you have ever spilled water on a freshly sanded piece of wood, you may have noticed how the grain stands up, creating a rough surface. All waterborne finishes have this effect on wood. Earlier versions contained more water than the newer formulations, so grain-raising isn't as bad as it used to be. The resins used today

are lighter, more viscous and require less water in their formulations. But no matter how much you sand bare wood, all waterborne finishes will raise the grain at least enough to require some additional sanding (see the top right photo).

The simplest way to deal with raised grain is to surrender to it. First, finish-sand workpieces as you normally would with a sandpaper in the 180-grit to 220-grit range and then intentionally raise the grain. You can use water, sanding sealer or dewaxed shellac. If you use water, lightly dampen a sponge or a rag, and wipe the workpiece. Or you can dampen the wood with a plant mister. Let the workpiece dry to the touch, and then sand with 220-grit to 400-grit paper. A waterborne finish, when applied over this surface, will not raise the grain very much. A light sanding after the first coat is required, but you would be performing this step when using a solvent-based finish, too.

I usually raise the grain with a coat of sanding sealer instead of

water. Most manufacturers offer sealers that are designed for their products. Sealers are usually formulated with stearates, which act as lubricants and make sanding easier. If you can't find a sealer, shellac works very well.

If the wood needs to be colored, I use one coat of water-soluble dye to raise the grain and then follow with a coat of sealer or shellac. When that dries, sand it. The sealer or shellac stiffens the fibers raised by the dye, making them much easier to sand. The sealer also gives you a buffer that keeps you from sanding through the dye to bare wood so quickly.

The amount of grain raised will vary with the type of wood. Open-grained woods, such as oak, will require more sanding than closed-grain woods, such as maple. I use wet-or-dry sandpaper in the 220-grit to 400-grit range, depending on how fine a surface I'm after. I don't use sandpapers that contain stearates. Small stearate particles that aren't cleaned off the workpiece surface will cause surface defects called fisheyes when waterborne finishes are applied over them. After sanding, use a slightly damp, lint-free cloth to wipe off the dust (see the bottom right photo on the facing page). By the time you get out your brushes or set up your spray equipment, the workpiece will be dry enough for a finish. Do not use tack rags because the resins in them can react with the finish and leave blemishes.

Make sure all finishing products are compatible

Waterborne topcoats must be compatible with any other fillers, stains or dyes that are applied. Most waterborne materials have improved and many are now compatible with solvent-based products. That does not mean that all materials will be compatible in all cases.

If, for example, you plan to apply waterborne lacquer over pigmented oil stain, give the oil-based product enough time to cure fully. Before applying the waterborne product, rough up the surface with a very fine-grit sandpaper so the first coat has a better chance to bite into the stain. Sometimes, two products demonstrate their incompatibility immediately and the topcoat will bead up or not flow out. Problems such as blistering can manifest themselves several days later. If you're unsure about compatibility, experiment on a piece of scrap.

The best way to eliminate any doubt about the compatibility of two products is to apply a barrier coat of sealer between them. The best sealer I have found is dewaxed shellac. Although you can buy shellac that has the wax already removed, often referred to as blond shellac, it can be hard to find and usually comes in large quantities. I buy clear, pre-mixed shellac in a 3-lb. cut and keep it undisturbed for a day or two until the wax settles to the bottom of the can. Then I pour off the clear, top fluid. I thin it down to 2:1 with denatured alcohol. Then I apply a fairly heavy, even coat of this, let it dry for about a half hour and lightly sand with 220-grit (or finer). The shellac not only seals in the first coat but helps the two potentially incompatible materials bond. It's never failed for me.

Thoroughly mix and strain finishing materials

Most waterborne finishes are designed to be used straight from the can and do not require thinning. The only thing you need to do before applying them is to stir up the solids that settle to the bottom of the can. These solids have a tendency to separate or settle out over time and may require a lot of stirring to get back into solution. The older the material, the more likely it contains

BRUSHING THE FINISH



Let the excess finish drip off the brush. Rubbing the brush against the edge of the container may cause the finish to foam.



Other causes of foaming—If you shake a can of waterborne finish instead of stirring it, you'll have a problem with bubbles.



Once you've started, work from a wet surface to a dry section. Brush quickly and with the grain; let the bristles skate off the workpiece surface to lessen brush marks.



Get the lumps out. *Waterborne finishes have a high solids content, so it's important to strain the material before spraying.*

lumps. As a final precaution, I always strain it through a plastic, paper or nylon-mesh filter (see the photo above).

Occasionally, you may need to thin a finish such as a thick, pigmented primer because it doesn't flow or spray well. Unlike traditional nitrocellulose lacquers, which can be thinned almost indefinitely, waterborne finishes are extremely sensitive and don't respond well to thinning. Waterborne materials contain carefully measured amounts of various chemicals including solvents, water, defoaming agents and resins. Adding another material to the mix can upset this balance. When that happens, the finish may be prone to runs and drips because it takes too long to dry.

If the finish isn't flowing out properly after brushing, check with the manufacturer to see if a flow-additive is available. As a last resort, try adding small amounts (3% to 5% by volume) of clean water. Ideally, you should use distilled water, but I have used plain tap water without any noticeable ill effects. If the finish seems to go on too dry when spraying in hot, dry conditions, you might want to add a retarder (the surface will look and feel fuzzy).

Choosing an application method

There are differences between waterborne topcoats made for spraying and those meant for brushing or padding. A spray finish is just that. If you try brushing it, the material may foam or dry too quickly. But I've found that any finish made for brushing can be sprayed with good results.

Most waterborne stains and dyes don't require any special application equipment and can be wiped or sprayed just like solvent-based stains. However, because waterborne products dry so quickly (in particular, water-soluble dyes), you will have to move rapidly when wiping them on. Be sure to flood the surface with a full, wet coat to avoid lap marks.

I usually get a good finish with two applications of topcoat. For added durability, such as you might need on a tabletop, I'd recommend three or more coats. Although waterborne finishes don't release the kind of noxious fumes some solvent-based finishes do, they still give off some vapors. So I take precautions. If I'm brushing finishes, I make do with some cross ventilation. When I'm spraying, I wear a respirator with organic vapor filters and ventilate the work area.

Select a synthetic bristle brush for finishing—*Natural* bristles will absorb the water in waterborne products and begin to splay and lose their shape. Synthetic bristles won't. When applying a finish, keep the brush wet, and don't scrape the bristles against the edge of the can (see the top left photo on p. 55). Let the excess material drip back into the container. This takes a little longer, but it will help prevent foaming. Then apply the material on the workpiece in a thin coat. Put it on too thick and you will get runs and sags. Always work quickly and from a wet edge to avoid lap marks (see the bottom photo on p. 55).

The more you brush the finish, the greater the likelihood it will begin to foam and bubble. If you experience foaming, add a flow additive for the finish, if one is available. If not, as a last resort, try adding a few drops of lacquer thinner, mineral spirits or milk to the finish. These additives can reduce the surface tension of the finish and improve flow. Disposable foam or sponge brushes and paint pads also work with waterborne materials. Apply the finish over the surface using quick, light passes.

Spraying gives the best results—A spray gun allows you to apply a full, even coat over an entire piece in a manner of minutes. The finish dries so quickly that, in most cases, you will be able to apply several coats in one day.

Because waterborne finishes contain a higher percentage of solids than most other finishes, they have a tendency to run or sag if applied too heavily. When spraying, lay on just enough material to leave a shiny, wet sheen on the surface of the wood, but not so wet that it begins to run.

If you catch a run or drip while it is still wet, wipe it off with a clean, lint-free cloth, and recoat the area immediately. Otherwise, use a razor blade to cut off any dried or skinned-over trouble spots, sand and recoat (for more on correcting spray finishing problems, see *FWW*#117, pp. 74-75).

Spray equipment that's made of plastic or stainless steel is best for use with waterborne products because those materials won't rust. But if your gun is made of metals that can corrode, you can ward off rust by drying it thoroughly after use by blowing compressed air through it. You can also remove any residual water by running a few ounces of denatured alcohol through the gun.

Weather conditions affect finishes

The cooperation of Mother Nature can certainly make a difference when applying finishes. When waterborne materials are applied on dry, warm days, they flow out smoothly, level quickly and dry to the touch in less than an hour, sometimes in a matter of minutes when spraying. Under ideal conditions (around 70°F with 35% to 50% relative humidity), you can apply several coats in one day. However, if your finishing room is cold or the humidity is high, waterborne products can become downright ornery.

When waterborne products are cold, they don't atomize

SPRAYING THE FINISH



Begin spraying before you reach the workpiece. Hold the gun 4 in. to 6 in. away from the workpiece, and spray at a speed that makes the surface wet and shiny but not runny.



Don't stop before the edge. Keep spraying until the pattern falls off the edge of the workpiece. On the next pass, overlap the previous section.

Many waterborne finishes look milky white when first applied. The section closest to the author already shows signs of clearing up as he works toward the center of the table (right).



properly, don't flow out well and take longer than normal to dry. Ideally, you should heat your finishing room. But there's another way. I've found that if I heat the finish to about 75° right before using it, I can apply topcoats in a room as cold as 45 °F. All I do is place the can of finish in a sink or bucket full of hot water for a few minutes. (Never use a stove or open flame to heat any kind of finish material.) Warm finish is easy to spray, flows out well and dries quickly.

Lowering the humidity can be more difficult. In a small room, a dehumidifier can reduce the moisture content. But I have a large shop near the ocean and no equipment to reduce humidity. I have

found that a fan blowing warm air over the piece being finished can offset the negative effects of high humidity.

Waterborne finishes, like other topcoats, can be rubbed out to increase or decrease their sheen (for more on rubbing out finishes, see *FWW#119*, pp. 46-49). Just remember to avoid steel wool, which can cause black spots if pieces of it lodge in the finish and rust.

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