

FINISHES



Clear Finishes for Wood

Attaining a flawless surface always takes work,
but it may be much easier than you think

BY MARK LUZIO

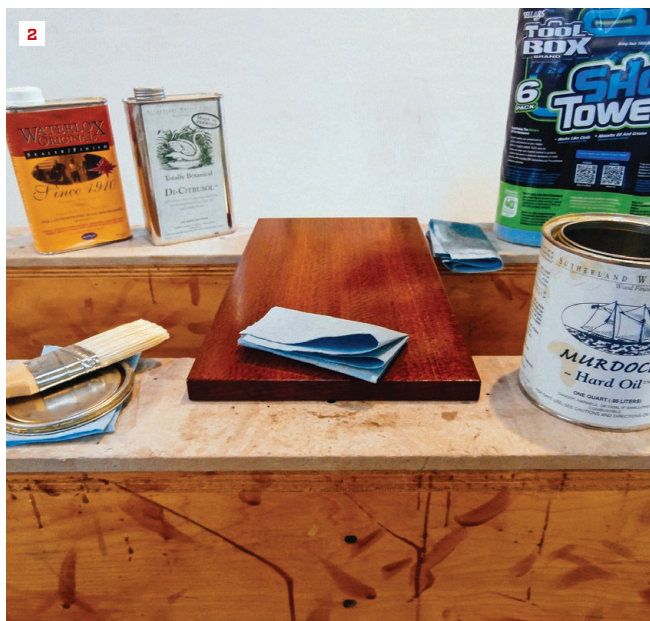
There are four basic choices for clear coating bare wood: oil, varnish (including polyurethane), sprayed lacquer, and shellac. For most of the architectural millwork I do, I lean on the first three, and those are what I will focus on in this article.

The fourth finish—shellac—is usually used for fine reproduction furniture. Its solvent is denatured alcohol, which can create problems (think spilled drinks) for architectural millwork. But while I avoid its use in homes, I will cover French polishing techniques, which are traditional methods for applying shellac, that can be easily adapted for the other three finishes to provide a sought-after rubbed, or waxed, look.

SANDING

I have a quote on the wall of my shop: “The test of devotion to a craft is being comfortable with the drudgery of the task.” I don’t know who first said it, but I sometimes read it before I get ready to sand a large project.

There is no way to achieve a fine finish without taking great care during sanding. It needs to be a progression. I start with 80- or 100-grit, which I follow with 120, then 180, then 220, and finish with 320. It is important to stop after 180 and hold each part at an angle in even light (a north window works best) to check for scratch marks. If you can see obvious scratches, work them out. This will



For sanding bare wood, the author relies primarily on a random orbit sander, but on most projects he can't avoid hand sanding. Then he uses Preppin' Weapons—colored rubber blocks (each color is a different grit). For detail work, he uses a spray adhesive to attach sandpaper to a variety of wood blocks **(1)**. For applying all oil finishes, he brushes on a thick coat, lets it soak in for several minutes, and then rubs it out with blue shop towels, which don't leave annoying lint behind **(2)**.

save time, because the finer papers won't be able to get them out easily. If you get to 320-grit with underlying 120 scratches, you have to start over. Modern random-orbit sanders attached to a good shop vacuum are the best choice. The combination of vacuum and sander clears the dust and allows you to sand across any changes in the direction of the wood grain without creating obvious scratch lines. The vacuum also helps reduce the buildup, or "loading," on the paper. The flatter the surface, the better the final finish, so a delicate touch is sometimes better than brute force.

I do my hand sanding with colored rubber blocks sold under the name "Preppin Weapon" (Time Shaver Tools; timeshavertools.com). They are available online and from supply catalogs. They hold a quarter sheet of paper, using a quick-change clamp that never fails.

For detail work (for example, getting into tight corners of a profile or rabbet), I spray the back of a sheet of sandpaper with a multi-purpose adhesive and stick it to a block of wood or MDF. I trim the edges flush with a utility knife.

For sanding bare wood (by machine or by hand), use only the best open-coat paper and avoid the less-expensive garnet paper. Closed-coat papers, which have 100% of the paper surface covered with grit, clog up too fast. I prefer ProSand paper from Norton/Saint-Gobain. Festool also has some good-quality papers. And never use dull paper. It's cheaper to change the paper—the extra labor needed when sanding with dull paper costs more than new paper.

I use foam-backed 400-grit and 600-grit pads for sanding between coats of finish. This sanding is done by hand and should be done with a soft touch. That allows me to catch any small defects; it is a quality-control step that also prepares the surface for the next coat.

FILLER

For most work, you need to fill the pores to create a top coat that reflects light evenly. This can be done with clear finish or with a grain filler.

From a finisher's perspective, there are two types of hardwood. Oak, mahogany, walnut, and ash are examples of woods that have open pores. Examples of woods with small or closed pores are birch, maple, beech, and cherry. With small pore woods, sprayed lacquer or brushing varnish is sufficient. It will take at least four coats on a counter or tabletop. For vertical surfaces, like trim and panel jobs, three coats are often enough.

To speed up the filling of open-pore woods, a grain filler can be used. It may seem like a huge, time-consuming step in the finishing process, but it actually ends up saving time. Without it, you'd have to apply multiple coats; and even then, in most open-pore woods, you would not achieve that flat, mirror quality that is the mark of an excellent finish.

Grain filler creates a mirror-like surface reflection because of



To achieve the flat, mirror-like sheen that is the mark of an excellent finish, the author filled the open pores of this mahogany with a grain filler before applying four coats of Murdoch's Hard Oil and then rubbing out with Behlen's Deluxing Compound. All the woodwork was prefinished before installation on site.

the extremely fine-ground silica (glass) in the filler. I use Behlen Pore-o-Pac natural filler and add the company's master color pigments to match my wood. (Woodworker's Supply is one source for Behlen products.)

Pigmented Behlen filler acts a little bit like a stain, in that as you rub it into the pores, it helps to even out the color. True staining, however, is an entire topic unto itself. Suffice to say here that if you need to stain the wood, you must do it before the filler step. I rarely stain my projects with oil-based pigmented stains. There are other ways to enhance the natural color of some woods with chemicals that react with the natural tannins in the wood. You can find references to these compounds in the books listed at the end of this article.

For large panel jobs, or for ceilings and walls done in T&G, try not to fall into the trap of installing all the woodwork first and then sanding, staining, and finishing it. Clearly, it's easier and faster to work in a shop or in another protected location at ground level rather than trying to stage the area on site.

The panels in my August 2016 article, "Curved Paneling for a Circular Room," were all filled and finished in my shop. After the install, I only had to fix nicks and scratches and fill nail holes, whereas sanding and finishing a job like that in place would have taken weeks. My goal on most projects is to be on and off the site as quickly as possible.

OIL

I lean heavily on tung-oil-based finishes for a lot of the work I do. I typically use those produced by Sutherland Welles (sutherlandwelles.com), which has a complete line of polymerized tung-oil finishes. Polymerizing is a cooking process that helps speed up drying. (Most people know about boiled linseed oil, which is similar.) I avoid pure, or raw, oils because the dry time can be a nightmare.

I generally use Murdoch's Hard Sealer or Murdoch's Hard Oil; both are from Sunderland Welles, and both are mixtures of tung oil and resin. The nice thing about the Murdoch's line is that it uses a citrus-based solvent instead of mineral spirits. If you have to finish a room in an existing house, the homeowners will appreciate this citrus base.

Completely read the label directions on any finish you purchase. Sutherland Welles has excellent one-page PDF instruction sheets for all its products.

Waterlox is another brand of oil-resin mix. This one uses a linseed- and tung-oil mix with phenolic resins, and while I don't use it as often as the Sunderland Welles oils, it performs well. I also use sealer and the oil-urethane top coat made by General. This is the least expensive of the three that I use; it is a good choice when you have large areas to finish on a limited budget.

With all these finishes, you should brush on each coat, wipe it off after letting the oil penetrate for 5 to 15 minutes, and then rub



While preparing sample boards, the author sands between coats of clear finish with foam-back 400- and 600-grit pads (the ones above are from Festool (4)). French polishing techniques work for all clear finishes (not only shellac, for which they were originally developed). For all final work, the author always tries to set up near a window for the natural light (5).

the surface bone dry. For the wiping off and rubbing, I use blue shop towels. They are widely available; I often use the ones made by Sellers, which are sold at Lowe's. Another brand is Scott's Paper, which is available on Amazon and from a number of large auto-parts and retail outlets. Blue shop towels are a huge modern improvement because they are lint-free, unlike 100% cotton white t-shirts cut into squares, which is what I used to use.

The great advantage of wiping oils is that you are able to speed up the dry time by rubbing. The surface does not attract dust particles that otherwise would fall to the surface during the dry time. Be aware that wiping oils do not have a flattening agent. If you lay on the final coats without wiping them dry, you get a high sheen. You can cut this sheen using the French polishing techniques to be explained later, but it takes a lot of elbow grease.

Typically, I lay down at least three coats. On surfaces, such as kitchen countertops, that need an extra layer of protection, I suggest brushing a satin tabletop varnish as the final coat over three or four coats of oil.

VARNISH AND POLYURETHANE

Technically, an oil finish, varnish, and polyurethane are all related on the spectrum of clear finishes—they all contain oil and resins in varying proportions. Essentially, an “oil finish” becomes a “varnish” when the amount of resin gets high enough that the

material has to be brushed on; wiping it on and rubbing it out becomes impossible because the resins would gum up on the cloth. Varnish, like oil finish, also contains solvents to help keep the resins pliable, and these evaporate during the drying process. Flattening agents can also be added to create a satin sheen.

Most “varnish” made for interior applications uses alkyd resins, while “polyurethanes” use a combination of alkyd and polyurethane resins. The overall effect of polyurethane is a bit more plastic. I do not use it a lot, preferring the warmer quality of alkyd- or phenolic-resin varnishes that contain tung oil.

The percentage of resin solids is lower in a waterborne polyurethane than in oil-based ones, so you need to lay on more coats—usually about four coats of water-based to match the performance of two coats of an oil-based poly. There are water-based grain fillers that are specifically made for these waterborne products.

For exterior applications, spar varnish has a higher ratio of oil to resin, creating a more flexible finish that can better withstand dimensional changes. Marine varnish is a spar varnish with a lot of UV inhibitors to better withstand exposure to sunlight. I have made many mahogany entry doors and finished them with marine-grade spar varnish. For these and other exterior applications, I like the McCloskey line. Over time, all wood with a clear finish that is exposed to sunlight will bleach. An additional coat will be required every few years.

With all varnish, follow the label directions and you should not have any problems. I typically thin the first coat 30% to 50% with mineral spirits.

SPRAY LACQUER

If I have a large millwork project with a lot of surface area, I will often switch to spraying. This work needs to be done off site. Spray lacquer provides a durable clear coat, but you want to handle the work carefully during installation.

Spraying is a big subject that deserves its own article, but lacquer is an important clear finish in the finish carpenter's bag of tricks, so I'll touch on a few quick tips here.

Check the weather forecast. This is true for any clear finish, but it is doubly important for sprayed lacquer. All clear finish will dry (oxidize) when exposed to air, and the relative humidity of that air has a big impact on that process. If the humidity is above 75%, proceed at your own risk. Forget about finishing if there is prolonged rain in the forecast, or if it's a soupy, 90% humidity day in the summer. (On the humid days, I suggest spending a few hours sanding and then taking the afternoon off for a lake swim.)

HLVP systems are the best for a small shop. I stick with basic lacquer and stay away from the catalyzed versions.

Thin your lacquer to the correct viscosity and add enough retarder for your current humidity and air temperature (more for high humidity and hot weather). Retarder is a form of lacquer thinner that slows dry-time. When an atomized finish dries too fast, you end up with the dreaded "rough overspray." This overspray will require additional labor time.

Clean up periodically. The cleaner you keep your guns, the better your day will go.

Seal first. On each part of a large job, I spray sanding sealer on each part as I finish it. For example, with cabinets, I'll spray sealer on each piece when completed. The sealed surface can be left for weeks before I sand everything out. I spray final coats only on what I can completely coat in one day.

Don't wait until coats cure. Spray each finish coat as soon as the previous coat is dry to the touch. You don't want to wait for each coat to fully cure. The solvents in the next coat will eat into the base coat, creating a chemical bond. (With varnishes and oils, the coats bond mechanically; you need to sand lightly between coats.)

Ask your supply house for "fish-eye eliminator." I add two drops to every gallon as a precaution against silicon contamination, which can be a real heart breaker. If you haven't experienced this, just trust me and use the drops. My four-ounce eyedropper bottle is almost empty after 35 years and has saved many jobs from silicon contamination.

RUBBING OUT AND WAXING

There are three surfaces you can create with clear finishes—high gloss, satin, and a wax, or rubbed, effect. Clarifying these differences is an important discussion to have with your client. If the budget allows, rubbing out and waxing a clear finish will provide a high-end touch.

Once the finish has cured, I use "Behlen Deluxing Compound." It is a mix of cutting agents like pumice and rottenstone with carnauba wax. Follow the directions on the label and you can achieve a finish surface close to a true French polish on any clear finished project.

Most of the dust particles that have landed on a clear finish can

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be rubbed out. Sometimes I need to start with a micro-mesh finishing pad. These are color-coded, and grey (600- to 800-grit) is usually the best choice. The deluxing compound will create that waxed, or rubbed, effect to the finished surface. The finish must cure for at least 24 hours before you rub it out. Even better is to wait three to seven days.

Wax can be the final step, but often the deluxing compound is enough. If I use wax (for example, on a countertop where I want the extra layer of water protection), I stick with a true carnauba and bee's wax mix and use a clean cotton rag to apply it.

No finish will stick to wax, so make sure you buy a can of de-waxer. The wax must be removed anytime you need to go back and fix a finish (and trust me, after you bring the project to the site, you will need to go back here and there to fix any dings or spots you missed during prefinish). Wax is a great material to fix scratches, and it's also a good water repellent. The only downside is that it must be applied every few months to keep that glossy look, so you'll want to make sure the client knows this.

SAMPLE BOARDS

On almost all projects, plan on making sample boards to show your clients exactly what they will get. Making them is time-consuming, but it can't be avoided. I take advantage of these sample preparations to work out any problems with the particular wood I am using, so that I am confident with all the steps required to achieve my final finish. Make notes on the boards. Pick the three best and present them to your client.

As a final word of advice, I recommend reading a comprehensive "text" to form a broad understanding of wood finishing. The edition I keep on hand is "Staining and Polishing," by Charles Hayward (Evans Brothers Limited, 1946; several used reprint editions are available on the internet). The language is antiquated, but the knowledge is still sound. A more up-to-date and readable edition is "Understanding Wood Finishing," by Bob Flexner (Fox Chapel Publishing, 2010). The book I recommend the most is "Adventures in Wood Finishing," by George Frank (Taunton, 1981). It is not a complete how-to on finishing, but it does give an important overview on achieving a quality finish.

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