Versatile Varnish

A reliable finish for a small shop

by Craig Deller

Brushing varnish can yield good results. To avoid air bubbles in the finish, don't scrape the brush on the side of the can, but allow excess to run off, as shown by the author.

One difficulty of running a small shop, either as a hobby or a business, is producing a flawless finish without a huge investment of time or money. Lacquer is first choice in many operations, but the potential health and fire hazards of lacquer mist require special booths, exhaust fans and spark-proof electrical components for spraying this highly volatile material. Varnish is not as explosive, although it doesn't set or cure as quickly as lacquer. Also, varnish can be applied easily with a pad, brush or by spraying, making it an excellent, reliable finish well suited for use in the small shop. You can also mix varnishes of various sheens to create the exact gloss and toughness needed for a particular job. Even though it's less explosive than lacquer, varnish should be sprayed only with adequate ventilation, and users should always be aware of any local fire codes.

Modern varnishes offer advantages over other traditional finishes as well. I prefer it over shellac and lacquer because it's more durable and more resistant to heat and alcohol damage. A kitchen table in a house full of "wee ones" demands the tough, elastic finish of varnish that shellac cannot achieve. Oil finishes, due to their deep penetration, are irreversible and therefore unsuitable for restoration work I do on historic objects. Linseed oil is the worst because it darkens the wood initially and continually darkens it until the piece is almost black. My ethics will not allow me to use a urethane—no plastics in this shop—so a high-quality varnish fits the bill perfectly. A purist may argue that synthetic resins are, in fact, ingredients of plastic, but I don't consider them in the same category of liquid plastics as urethane.

The long and short of varnishes—Although varnishes have been used for more than 2,000 years, early varnishes were mainly spirit varnishes, such as shellac, dammar or mastic dissolved in alcohol. These spirit varnishes were brittle, susceptible to alcohol and water damage, and difficult to polish to a high gloss. It wasn't until the middle ages that a German monk, Theophilus Presbyter, developed a way to heat and mix amber, a fossil resin, and linseed oil to create what I refer to as drying-oil varnishes. Based on oils such as linseed, safflower or other vegetable-based oils, these varnishes dry by chemical change through oxidation, polymerization and evaporation. The fossil-resin varnishes have two major disadvantages: the resins are rare and expensive, and the linseed oil yellows and darkens the wood. Fortunately, the mid-20th-century development of much cheaper and cleaner syn-

thetic alkyd resins in a soya, safflower or china-wood oil vehicle has given the use of drying-oil varnishes a new lease on life. (For further discussion see *FWW* #35, pp. 54-57.)

All modern drying-oil varnishes can be divided into two groups: long oil and short oil. Long-oil varnishes, commonly known as spar varnishes, have a high proportion of drying oil in relation to resin. High oil content retards the curing of the varnish, but makes the cured film tougher and more elastic, rendering spar varnishes ideal for exterior work and boats. Short-oil varnishes, with lower proportions of oil to resin, are more appropriate for furniture. They are the only type I use because they produce harder, faster and more completely cured finishes and thus polish better. Cured varnishes are impervious to their original solvent and removable only with methylene chloride or a similar caustic solution. Such a harsh removal procedure would be unacceptable for an object of historical value, making varnish an inappropriate finish for these pieces. The insolubility of varnish, however, offers some distinct benefits, especially when spraying.

I have been spraying a variety of off-the-shelf and commercial varnishes in my restoration work for years. I've found that Pratt & Lambert's #38 Clear Finish works best. It can produce nearly any effect from a subtle, waxed glow to a hard, mirror-like shine by mixing various sheens. All varnishes come in a naturally glossy state. Manufacturers make varnishes satin or dull by adding flatting agents, such as aluminum stearate and silica, to break up the, light reflection and produce the softer look. Even though all commercial varnishes are prepackaged as gloss, satin or dull, the amounts of the flatting agents can be adjusted simply by mixing gloss with satin or satin with dull in various combinations. I buy varnish in gallon cans, but break it down into quart containers because they are easier to work with and increase the varnish's shelf life by decreasing its exposure to air. I also mix various sheens to achieve the desired degree of gloss. I have found a 50:50 mix of gloss and satin is best for most situations. A straight satin is good for projects with lots of turnings and carvings. You can steel wool and wax the finish to produce a good luster without beating your brains out trying to tone down the shine from the gloss or even the 50:50 mix. If you are looking for the simple elegance of a soft, waxed glow, apply a thin coat of dull varnish to seal the wood before waxing. By using the same mixture of varnishes for each coat of a project, you can eliminate variations in sheen and the possibility of rubbing through one layer to a different sheen.

Spraying varnish requires a minimum investment in equipment, is easy to do and yields extremely good results.

Ease of application—Varnish is a good brush-on finish because its 15-minute working time is sufficient to do a fairly large table top. Although I prefer spraying whenever possible, brushing is the only choice for some jobs, such as on-site finishing of cabinets or paneling. The first consideration here is the brush. I prefer a well-broken-in china-bristle brush; I've been using one for years and I'm comfortable with it. You might prefer a foam brush because it doesn't generate as many air bubbles and it eliminates problems with brush marks and loose bristles. Although I use the varnish straight from the can, thinning with a good-quality turpentine will slightly retard setting time.

Air bubbles are a major concern when brushing varnish because they leave little pockets in the finish. Bubbles can be introduced when mixing sheens, stirring the varnish or loading your brush. While the big bubbles go away fairly quickly, it may take the little ones overnight. I stir the varnish gently with a regular paint stick. Proper loading of the brush, as shown in the photo on the facing page, however, is dependent upon the quality of the brush you are using. Better brushes will hold more varnish without dripping, allowing you to apply a more even, consistent coat with fewer trips to the varnish can. Start off by dipping your brush into the varnish about 1 to 1½ in. If the varnish runs from your brush, you have too much and will end up with runs and sags. Don't put so much on that you must scrape the brush along the edge of the can as this will fill the brush with air bubbles. Too little varnish will result in more frequent trips to the varnish can. I've always found it best to brush against the grain, then lightly "tip-off' with the grain using long, light, even strokes. This helps to work the varnish into the open grain, provides a more even distribution and avoids trapping any air bubbles. Remember, applying a number of thin coats, rather than a couple of thick ones, avoids the sags, runs and wrinkles that are sure signs of an amateur.

Since drying-oil varnishes polymerize, the subsequent coats do not "melt" the previous layers as the spirit varnishes do. I hand sand between coats, starting with 220-grit silicon carbide paper for the first coat and then use 320-grit and 400-grit for subsequent coats, which levels the finish and provides a physical "key" for the next coat. An electric palm sander works well if you stay with light grits to avoid orbital marks. I wipe off the sanding dust between coats with a homemade tack cloth, which is made by spraying a small amount of varnish on a lint-free cloth, and lightly dust the piece. Don't blow the sanding dust off because it will just land on something else. Avoid commercially prepared tack cloths as some contain non-drying oils, like mineral or raw linseed oil, and any residue may impede the drying of the next coat. I generally allow 16 hours to 48 hours between coats depending on drying conditions. If the surface is still a bit soft (the sandpaper clogs), I lightly sand the surface using the current grit paper to break open the skin and allow further solvent evaporation and oxidation before proceeding with the next coat. You will find curing from the outside in, known as "skinning over," to be a problem if you try to speed up drying with a fan. Without driers, standard short-oil varnishes require about 30 days for a full cure.

Spraying varnish is faster, speeds up drying time and eliminates brush marks, air bubbles and foreign matter that comes off a brush. And no, it does not destroy the spray gun. Basic equipment is all that's required (see photo at left). The air compressor doesn't have to be big and expensive, but should be rated at about 100 psi and have an in-line filter to prevent water and oil from mixing with the varnish. My compressor is about 30 years old and the

motor needs an occasional smack with a hammer, but it works just fine. The spray gun is important enough to warrant a good one, so stay away from the toys. I have a stainless-steel, siphon-feed type gun available from any of a number of manufacturers such as Sinks, DeVilbiss or Grainger (see sources of supply box on p. 67). In addition to the spraying equipment, I have constructed a room with an old furnace blower inside a sealed box to pull the air through a series of filters to trap the solids and prevent the overspray from settling on other projects. Again, you should check to be sure you are in compliance with any local fire codes. And even though the vapors aren't anywhere near as obnoxious as lacquer, you should have a high-quality face mask to protect yourself. I use a Pulmosan #10768 with a 17160 CAM charcoal cartridge, available from Reliable Finishing Products Inc.

Before pouring the varnish into the gun cup, it should always be strained, for even the smallest particles will cause the gun to clog and spit. The simplest strainer is made from panty hose. I use a relatively low spraying pressure (40 psi), which minimizes overspray, reduces the amount of material wasted and eliminates "pooling," which is caused by excessive air pressure pushing the varnish around. I spray in a normal crisscross pattern, about 12 in. from the piece, keeping the pattern tight to ensure even coverage. Although varnish, unlike lacquer, will build easily, it is still best to spray more light coats than few heavy ones. I find commercial varnishes spray quite easily without thinning even at 40 psi. If you prefer a thinner mix, I recommend adding a high-quality naptha until the varnish is thinned to the consistency of loose honey. It will take very little naptha, perhaps ½ oz. per quart, to achieve this consistency. The naptha will also speed up the drying process slightly. Because turpentine extends the drying time, it would be a mistake to use it as a thinner when spraying.

To further enhance drying, one of varnish's touted "problems," I add a metallic drier; I prefer Grumbacher's Artist's Oil Medium Cobalt Drier over the more common and inferior japan driers because it doesn't crack, crawl, alligator or darken. I add the drier to each quart container of varnish; one drop, maybe two, per quart is

Varnish finishes can also be colored to match old work or to achieve an antiqued appearance by adding oil-based stains before spraying.

plenty, as too much drier can actually retard the drying process. Then I mix thoroughly with an ordinary kitchen blender on low. Don't worry about the air bubbles because they'll be eliminated when sprayed. By shortening set-up time, the driers help eliminate sags and dust collection. Even with the drier I still allow 16 hours to 48 hours between coats, sanding as previously specified. I allow about a week before doing the final rub out.

The fact that varnish does not melt the previous coats allows greater freedom during spraying. By inspecting a piece after spraying, I can catch those drips, sags and fly tracks that may appear, level them with my finger without removing previous coats and lightly touch up with additional sprayed varnish. Although working time to catch these drips will vary depending upon the amount of driers or thinners used, I find about 10 minutes to be optimal. This allows time for the sags and runs to develop, but allows you to catch them before they start to set.

The non-melting advantage can also help in the constant battle against silicone contamination, the most common source being spray-on waxes like Pledge. Cleaning the piece with TSP (trisodi-

Silicone damage, shown at right, can be covered by "dusting," spraying several light coats, and allowing five minutes drying time between coats until the silicone is sealed in, as shown on the left. Additional coats can then be sprayed on without fear of fisheye and other defects.

Glazing is done by thoroughly sanding the first coat of varnish and then wiping with an oil-based stain (above, left). Remove any heavy build-up before spraying additional coats of varnish. The subtle tone change obtainable is evident in the photo above, right.

um phosphate), available from most hardware stores, will not solve the problem, but will lessen the severity of the reaction between the new finish and silicone. I never use commercial silicone eliminators, such as fish-eye eliminators, because these products are pure silicone themselves, merely making the finish compatible with silicone and contaminating your equipment. If silicone damage does show up, wipe off the offending coat and begin "dusting." Spraying very light coats from 18 in. to 24 in. will merely dust the surface, not allowing the varnish to flow and separate. After five minutes, dust again, then repeat until you have an adequate coat to seal the surface and any residual silicone. Once thoroughly dry, the dusting coats are sanded and leveled for the next coat. Since the fresh coat of varnish will not melt the previous one, the first coat will not flow and separate. But should the second coat still show some reaction to the silicone damage, simply wipe it off and dust again. Although the stability of any finish over silicone is unknown, I've never had any trouble with a finish I've dusted. The bottom photo on the facing page demonstrates the results obtainable by the dusting technique.

After each spraying session, your spray gun should be cleaned thoroughly no matter what you are shooting. For cleanup after varnishing, I use the highest-grade gum-spirit turpentine because it effectively dissolves varnish in ways mineral spirits, or even naptha, cannot. Occasionally it will be necessary to thoroughly clean the gun with a mild, liquid, non-flammable methylene-chloride mixture by soaking, not spraying, then rinsing with lacquer thinner to remove all the dissolved residue. Don't allow the gun to sit too long in the methylene chloride as it may damage the seals.

Additional techniques—Varnish can also be colored with a certain degree of success by using chemically compatible oil-based stains, such as Fuller O'Brien's. Adding a small amount of additional oil to the varnish mixture may prolong the drying slightly. Dry pigments work well also, but require more mixing to achieve natural tones. Because it can be difficult to achieve the proper mix, 1 use dry pigments only when trying to match a finish or for custom work. Although not recommended for heavy coloring, this technique is helpful for subtle tone changes, as shown in the top photo on the facing page. If you do not wish to color the varnish directly, you can do a simple glazing. After a thorough sanding of the first coat of varnish, dip a paper towel into the desired color of oil-based stain and wipe down the piece; don't allow any heavy buildup to remain. Allow the piece to dry and proceed with the next coat of varnish. (See the two photos above.)

Another good feature is that varnish can be used as a light filler on open grain wood. I spray on a fairly heavy coat of varnish, allow it to set slightly, then, using a lint-free rag, work the varnish into the grain and wipe off any heavy excess. While this does not fill the grain completely, it doesn't change the color tone as most fillers do. Also, varnish can be used as a sanding sealer by thinning slightly before spraying. While some people will use alcohol-based shellac for this purpose, I feel it is chemically prudent to stick with a single class of finishing products throughout the project, such as the oil-based varnish for filler and/or sealer and the top coats.

I always rub out the finishes starting with fine-grit sandpaper, 320 for brushed finishes and 600 to 1200 for sprayed surfaces, using parafin oil as a lubricant. This is followed by buffing with any one of a variety of rubbing compounds, from pumice and rottenstone to automotive compounds. See Michael Dresdner's article "Rubbing out a Finish" in *FWW* #72, pp. 62-64 for appropriate techniques in applying these compounds. Even though varnish tends to be much tougher than shellac or even nitro-cellulose lacquer, it still needs proper care after rubbing out. The best protection for any finish is a superior-quality paste wax. After much experimentation in my shop I have settled on "Beauté Satin Creme Wax," available from Roger A. Reed Inc. It can be very easily colored by mixing in a bit of artist's oil colors, a particularly helpful trick for coloring marks and sealing leather. The wax can even be made into a rubbing compound by mixing in pumice or rottenstone for that final, satin-smooth shine. □

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Sources of supply

Fuller O'Brien and P&L products are available from most hardware stores or write for the location of the nearest distributor:
Fuller-O'Brien, 450 E. Grand Ave. S., San Francisco, CA 94087.
Pratt & Lambert Inc., Box 22, Buffalo, NY 14240.

For spray guns and pneumatic equipment, write to the following suppliers for the location of the nearest distributor:
Binks Manufacturing Co., 9201 W. Belmont Ave., Franklin Park, IL 60131.
The DeVilbiss Co, Box 913, Toledo, OH 43692.
W.W. Grainger Inc., 5959 W. Howard St., Chicago, IL 60648.

Cobalt driers are available from most artist supply houses or from the following supplier:
Grumbacher, M. Inc., 30 Engelhard Drive, Cranbury, NJ 08512.

Face masks and filters are available from:
Reliable Finishing Products Inc., 2625 Greenleaf Ave., Elk Grove, IL 60007.

Beaute Satin Cream Wax is available from:
Roger A. Reed Inc., Box 508, Reading, MA 01867.