A Primer on Sealers

How and why you can benefit from these often misunderstood products used under clear finishes



SEALER COAT

ENCAPSULATED

EDGE OF POPLAR BOARD

A close-up view shows what a sealer can do. At left is a cross section of an edge of poplar lumber that has been coated with a sealer, before the sealer was sanded smooth. Appearing as a darker band across the top third of the image, the sealer coat encapsulates loose fibers on the surface of the wood. What appears as a small hill or bump at the very top of the image (made with a scanning electron microscope at 400x magnification) is a protrusion in the surface of the sealer caused by the captured wood fiber appearing slightly below and to the right. Once the sealer coat has been sanded, these small hills and valleys disappear, providing a smooth base for topcoats to follow.

BY JEFF JEWITT

Inishers call on sealers to perform two basic functions in the finishing process: to solve problems, such as a contaminated surface, and to speed things up by providing a flat base for subsequent topcoats. Most woodworkers understand what sealers do in the simplest sense—they seal the surface of the wood. Yet there remains a great deal of confusion about what that really means, when to use a sealer and which one to use in a given circumstance.

The first coat of any finish seals the wood, because it dries to a film (however slight) that allows you to build subsequent coats of finish on top of that. So theoretically, any finish can serve as its own sealer. And in many cases, a thinned version of the same finish you plan to use as a topcoat is a perfectly adequate sealer. However, sealers also perform a number of other functions, and to address special needs manufacturers have developed some products that work better than thinned finishes.

When faced with a contamination problem or to prepare for topcoats, finishers turn to any one of several specialty sealers. Sanding sealer, vinyl sealer, shellac and glue-sizing are the four most common choices. Of these four products, only shellac is adequate as a final finish. None of the other three can exist as finishes in and of themselves. They are used only underneath other topcoats.

Sanding sealer tends to be soft

Sanding sealers are available as lacquer based, varnish based or water based, and the first two of these varieties are the most com-

monly used. More often than not, they are simply thinned versions of lacquer or varnish to which zinc stearate has been added. Zinc stearate is a white powder that is soft, fluffy and soapy feeling, but in finishes it appears translucent. In fact, it is called a "soap" by finish formulators. Zinc stearate makes hard-to-sand finishes such as solvent-based lacquer and most varnishes easier to sand down to a level surface so that subsequent coats of finish lay on evenly.

The ability of sealers to make topcoats lay on smoothly is referred to by finish manufacturers as "good holdout." Holdout is an important feature to look for when you're finishing thirsty woods such as pine and poplar, figured woods such as curly maple and other porous woods such as oak, ash, mahogany and walnut.

The downsides? There certainly are a few. Sanding sealers are softer and less durable, because of the addition of zinc stearate, particularly in their resistance to moisture. So you should use these sealers with discretion in places where moisture resistance is an issue, such as cabinetry to be installed in a kitchen or bathroom. Also, you must sand them after application, or they won't do the job they are designed to do.

Some finishes such as polyurethane will not bond well to sanding sealer, and the catalysts used in highperformance lacquers and conversion varnishes will react adversely with the zinc stearate.

Vinyl sealer can be used between coats of different finishing products

These specialty sealers are available only in commer-

cial, fast-drying versions meant to be sprayed on, but it is possible to apply them by brush or rag if you work quickly. Don't confuse vinyl sealers with vinyl/alkyd-based varnishes, sometimes sold as a one-step sealer/finish to which the vinyl is added primarily to impart fast-dry qualities.

The prime ingredient in most vinyl sealers is polyvinyl butyrate, which endows the sealers with some rather unique qualities. Not only do vinyl sealers have excellent holdout—just as sanding sealers do—but they also are highly resistant to moisture and possess excellent adhesion properties. These adhesion qualities make

VINYL SEALER





One common use for vinyl sealer. Professional finishers often use vinyl sealer on furniture that has been coated with an oil-based glaze, because it adheres well to different finishes.



SANDING SEALER

Finish formulators call it soap. This lacquer sanding sealer (shown below being brushed on) contains zinc stearate, an additive that facilitates sanding by lubricating the surface of the sealer coat.



vinyl sealers a good choice to use when you need to "tie" or adhere different finishing products together. For example, professionals routinely use vinyl sealers between applications of oil-based glazes or paste wood fillers and solvent-based lacquers and conversion varnishes. The vinyl also will prevent natural oils and other chemicals (knots bleeding sap) in certain woods from causing finish problems. Teak, rosewood



and cocobolo are some of the woods that contain chemicals that will prevent oil-based products from curing. While some folks claim you can avoid this problem in the finish by first wiping the oil from the surface with a solvent such as acetone, my experience has been dicey with this technique. I prefer to seal in the oils with vinyl sealer. Unfortunately, vinyl by itself doesn't sand very well, so vinyl sealers usually contain other resins to make them sand out more easily.

Shellac is easy to find and apply

This natural resin has some of the same attributes as vinyl sealer, but it's more readily available and easier to apply. Shellac will seal off surface contamination and naturally occurring chemicals in the wood that prevent the curing of oil-based products. Shellac also provides good holdout for other finishes applied over it, as long

SHELLAC



Shellac is still the best candidate for some jobs. Sealing off a contaminated surface, such as that on this chemically stripped chair, is one of several tasks that shellac performs well.



as you use a dewaxed variety. When used under a water-based finish, shellac will prevent some of the raised grain you'd normally expect. Whether you mix your own (a 2-lb. cut works well as a sealer) or use the premixed, canned variety, most shellac imparts a warm, amber color that will optically offset the sometimes-cool tones of water-based finish resins.

Downsides of shellac are similar to those of sanding sealer. It's a less durable finish than lacquers or varnishes, so it can become a weak link in the total finish system.

Glue-sizing is typically used to seal end grain

Glue-sizings are available in premixed water-based versions, such as a recently introduced product made by Franklin. These are based on a water-soluble vinyl resin called polyvinyl alcohol that lacks the overall durability of the resins in solvent-based sealers.



GLUE-SIZING

Appropriate for painted surfaces. End grain on lumber and the porous edges of manufactured panels (such as this routed sample of MDF) are good places to use glue-sizing. The left half of the routed edge shown was coated first with glue-sizing, then with an oil-based white primer. The sized surface is much less porous.



Glue-sizings are used primarily to seal end grain and to promote even staining on wood. They're also marketed as a preconditioner for medium-density fiberboard (MDF) that will be painted. Though they are not sold as such, I've had good success using them to lock in chemicals, such as those in aromatic cedar and cocobolo, that prevent oil-based products from curing.

When, where and why to use a sealer

Opinions and die-hard habits among professional finishers may vary, but most agree that there are a few very good reasons to use a sealer.

To provide a barrier coat—Waxes, polishes and silicone residues encountered when refinishing furniture can cause contamination problems such as fisheyes, which are small craters in the finish film (see the top photo on the facing page). You can remove wax by wiping stripped surfaces several times with naphtha or mineral spirits, but silicone is impossible to remove completely. It has a tenacious ability to remain in the pores of wood.

To remove fisheyes, immediately wipe off any wet finishing product (oil-based stains will develop fisheyes, too) and wash down the piece with mineral spirits or naphtha. Then scrub it well with TSP (trisodium phosphate) or a TSP-substitute and the green col-

ored Scotch-Brite nylon pad. After that, apply a freshly made coat of dewaxed shellac to seal in the contamination,

To make a flat base for topcoats—If your goal is a sophisticated built-up finish, you'll need to sand at least the first coat of finish. When the first coat has absorbed into the wood and hardens, it is normal that a slightly rough or irregular surface will result. At this point some sanding is in order so that subsequent coats of finish will lay on smoothly and evenly. The problem is that some finishes don't sand well—most varnishes and lacquer gum up when you sand them—which is a good reason to use a sealer first. With the addition of stearates, sanding sealers overcome this problem. Some finishes sand perfectly fine, such as many water-based products and oil-based polyurethane, so sanding sealers aren't needed for these products.

To promote adhesion—In some finishing scenarios, there may be questionable adhesion between the wood and the finish or between different finishing products. Sealers are routinely used in such cases to promote adhesion. In the case of stripped furniture, a sealer coat of a 2-lb. cut of dewaxed shellac will allow any finish to flow out and grab properly. Although manufacturers of polyurethane say not to use it over shellac, they are referring to the premixed, canned variety of shellac that has wax in it. Polyurethane will adhere just fine to dewaxed shellac.

In other cases, you might run into adhesion problems when oil-based paste wood fillers and glazes are used between coats of finish. Manufacturers of highperformance solvent-based lacquers and varnishes al-



WHAT TO DO WHEN YOU SEE FISHEYES

Fisheyes are small craters caused by silicone residue. The preventive treatment is a three-step process. Wash the surface first with a rag soaked in naphtha or mineral spirits, follow that with a washcoat of trisodium phosphate (TSP) and then seal it with dewaxed shellac.



most always recommend vinyl sealers for this purpose, while shellac works well for water-based finishes.

To control stain migration—Sealers work wonders in situations where stains may possibly migrate up into a finish coat. This happens when the finish and stain share the same thinner. It isn't a problem with oil- and water-based pigment stains, because the binders in these are not dissolved by the next coat of finish. It happens typically when water-based finishes are applied over watersoluble dye stains, particularly when the dye is very dark. A barrier

SEALERS PREVENT BLEED-THROUGH



Keep the color from bleeding. After the black dye stain had dried, the right side of this sample was sealed with shellac. After the shellac dried, the entire sample was coated with a water-based sanding sealer. By viewing the sanded surface, one conclusion is clear: the shellac kept the dye from migrating into the subsequent finish coat.

coat of dewaxed shellac will prevent the solvents in the waterbased finish from pulling up the dye into the finish.

In conclusion, some recommendations

A sealer will never take the place of diligent finishing practices such as proper brushing techniques or good surface preparation. It won't get rid of brush marks or sanding scratches, and overuse of a stearated sanding sealer can actually cause more problems than it solves. I believe that a sealer is often used when it's not really needed.

In marketing literature, you'll see the term "self-sealing" used to promote a finishing product. This is mostly marketing mumbojumbo, because any finish can be used as its own sealer, as long as it has adequate holdout and sands easily enough. Almost all waterbased finishes, catalyzed varnishes and lacquers, oil-based polyurethane and many of the fast-dry varnishes now being sold fit into that category. A specialty sealer is required only in situations I've described previously.

If you want the most durability from your finish, and you don't have a problem with contamination, adhesion, moisture or migrating stain, use a thinned version of your finish as its own sealer. You won't run into any compatibility problems, and you don't have to buy a separate product. To get a smooth base, you'll have to apply several coats of thinned finish and then cut it back with sandpaper before you get a good base for the final coats. At the worst, you'll spend a little more time and use a bit more sandpaper, but the gain in overall durability may be well worth it.

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