

# Fill the Grain for a Glass-Smooth Finish

*Simple steps are key to success with porefillers*

by Chris A. Minick

**W**oods like mahogany, ash, walnut and oak, which have large pores, give a natural open-grained appearance to furniture. But to get a glass-smooth surface on these woods, you have to fill the pores with a grain filler before applying the finish. Tight-grained hardwoods, like maple and most softwoods, usually don't require grain filling.

You need only a few tools to use grain fillers (see the photo at left), and grain-filling is pretty straightforward: Thin and tint the filler, prepare the surface, brush on the filler and pack the pores, remove the excess before it hardens, sand to the wood once the filler is dry, and clean off any residue. But though the process is straightforward, filling grain takes time, is messy and is generally

not much fun. Even so, the results are well worth the effort, as the left side of the butternut board shows in the photo below right.

## Oil-based and water-based options

Don't confuse grain fillers with the wood putty used to fill nail holes. Grain filler, also called paste-wood filler or pore filler, is a thick clay-like mixture of solvent, resin binders and finely ground minerals, often called silex. Fillers come in oil-based formulations, like Behlen's Pore-O-Pac (available from Woodcraft Supply, 210 Wood County Industrial Park, P.O. Box 1686, Parkersburg, W.V. 26102; 800-225-1153) or in water-based formulations, like Hydrocote's Fast Dry (available from Highland Hardware, 1045 N. High-



*Surface imperfections are magnified by pore filler, so it's critical that the wood be properly scraped and sanded beforehand. The rust-colored filler used on this piece of butternut reveals even small surface blemishes (top right corner).*

*Grain fillers are essential for open-pored woods. Here, Minick applies water-based filler to a mahogany tabletop. Using a disposable brush, he packs the pores. He masked the edges with tape to avoid scraping filler from the routed profile.*

land Ave. N.E., Atlanta, Ga. 30306; 800-241-6748). Both varieties can be purchased as a thick paste that must be thinned before use, or in a pre-thinned, ready-to-use consistency. Even though oil-based grain fillers have been around longer, I prefer water-based fillers because they work easier, dry faster and are easier to clean up. In addition, water-based fillers, once completely dry, are compatible with virtually all finishes.

### Tinting the filler

Pore fillers come in a variety of wood tones, so you can match your project. They also come in off-white and in a neutral color, which can be custom-tinted in your shop. The choice of tint is a matter of taste. You may want a light, unobtrusive filler color on oak, or you may want to contrast the grain by using a dark filler. I almost always go for a darker filler because I like to bring out grain patterns. Similarly, you can pick up highlights in the wood—reds in mahogany or maroon in walnut, for example. I usually stick with earth-tone pigments, such as burnt umber (chocolate-like color), ochre (yellowish), burnt sienna (reddish) and lamp black. To my eyes, colors that are bright and bold look artificial on wood.

If you decide not to tint your off-white or neutral oil-based filler, be aware that the binders in the mixture will likely cause the filler to yellow or darken with age. This is not a problem if you use a water-based grain filler. Pigmented universal tinting colors (UTCs), available from most large paint stores, and dry fresco powders work well at coloring water-based and oil-based fillers. Japan colors (pigments ground in a varnish base), artist's oil colors and the pigment sludge found on the bottoms of oil-based stain cans are only useful for tinting oil-based fillers. For more on tinting, see the photo and story at right. In any case, make sure your coloring medium is a pigment. Transparent dye stains will not adequately color the quartz particles found in most grain fillers.

### Preparing the surface

Sloppy sanding and pore fillers don't mix. That's why I usually power-sand the wood with a random-orbit sander through 180-grit sandpaper. Then I hand-sand with 220-grit to remove pesky swirl marks. Likewise, tearouts, gouges or other defects must be puttied and sanded flat before applying the filler. A poorly prepared surface will be magnified a hundred fold once the blemishes are packed with pore filler (see the photo at right on p. 57).

Pore fillers tend to seal the wood surface, which makes staining after filling difficult. If you plan to stain the wood, do it before you fill the grain. I like to use water-based dye stains under the filler because the inevitable sand-throughs are easily repaired by reapplication of the same strength dye stain. Once the stain is dry, you should seal it (I prefer shellac or vinyl sealer). There are three reasons for sealing: First, the sealer protects the stain layer from scratches during the filling process. Second, sealing before filling

eliminates an undesirable smudging effect that commonly occurs (for more on this, see *FWW* #107, p. 85). Third, because sealers smooth out surfaces, they allow easy removal of excess filler.

### Applying the filler and removing the excess

Once thinned to the consistency of heavy latex paint, pore filler is ready to apply. Paint on a fairly thick coat of filler (see the photo at left on p. 57), and then pack the filler into the pores using a forceful circular motion of the brush. (This is why I like to use disposable brushes.) Stir the filler frequently because filler particles are heavy and rapidly settle to the bottom of the can.

## Working oil-based fillers

by Andy Charron

Before you apply oil-based paste filler, you need to tint it to the right color for your project. The filler not only plugs up pores but also helps color the immediate surrounding areas of the wood (see the article on p. 72). Because the silex in the filler does not accept stain, you cannot readily change filler color once it's dry. But the color can be adjusted beforehand by blending different fillers together or by adding pigments to neutral filler. You can achieve the wood tone you want through trial and error (see the photo).



**Start with neutral grain filler and add pigments, such as universal tinting colors (UTCs), to get the color you like.**

Besides needing tint, oil-based filler usually has to be thinned as well. If the filler is too thick, you'll need lots of elbow grease to brush it on and to rub off the excess. If it's too thin, it will be easy to apply and clean up, but it won't fill up large pores well and it will take longer to dry. Once you've thinned the filler to a creamy consistency, apply it in stages over small areas. I like to use an inexpensive stiff bristle brush to work the filler into the wood, applying it with the grain first and then going back over it perpendicularly to the grain.

Immediately after you've filled the grain (while the wood is wet), remove all the excess by scraping the surface at a 45° angle. One filler manufacturer recommends using a plastic credit card. A thin ripping of the project's scrapwood also works well. I cut one end of the filler scraper to a point, so I can get filler out of hard-to-reach places like inside corners.

Once you've scraped the surface clean, allow the residual filler to dry until it takes on a flat, crusty look (usually 5 to 10 minutes). At this point, start rubbing with a piece of burlap. When the burlap begins to weigh down with excess material, shake it out, and it will be ready to wipe some more. Finally, polish the wood with a soft cotton cloth. After the surface has been wiped off, you may need to sand it lightly. But I've found that just a firm rubbing with a clean rag usually will shine the wood to a perfectly smooth surface. □

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Remove excess filler from *the* surface with a stiff rubber squeegee (available from a glass-cleaning supply store) for water-based filler or a plastic putty knife for oil-based filler. Pulling the squeegee or pushing the putty knife diagonally across the grain minimizes the chance of removing the filler from the just-packed pores (see the top photo). If you're using oil-based filler, use coarse burlap rags to clean residual filler off the wood before it dries. The more filler you remove now, the less sanding later.

Getting a feel for the proper drying time takes practice. Generally, you can begin removing an oil-based filler when the surface starts to look dull or hazy. A light sprinkling of mineral spirits over

the filler will slow down the drying and allow a bit more working time. But water-based fillers dry so rapidly that if you wait for them to haze over, it's too late. Instead, work on small patches at a time and immediately squeegee the excess filler from the surface as soon as pore packing is complete. Because the filler won't leave lap marks, you don't have to fill the entire surface at once. But sprinkling water on hardened water-based filler is no help. If you wait too long to squeegee, you'll have to sand off the excess.

While the squeegee method works quite well at removing the bulk of wet filler from large flat surfaces, turned pieces and intricate moldings are different matters. I've had some luck removing excess filler from turnings using a terry-cloth towel. I've also been marginally successful at removing dried filler from molding nooks and crannies using a shaped scraper. But I often avoid the problem by not filling turned pieces and moldings. The visibility of the pores in these regions is usually disguised because the end-grain wood will finish darker (more absorption) and because of shadows made by the profiles. To prevent filler from getting on these areas, I simply mask them off beforehand (see the photo at left).

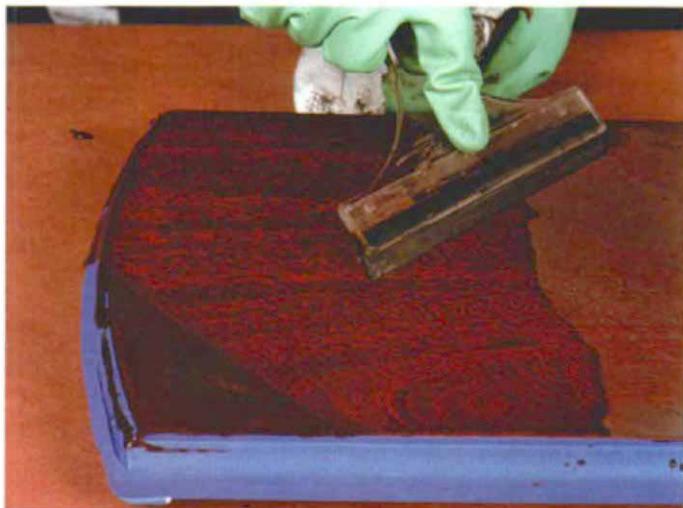
### Sand, clean and seal before you finish

Dry time (or more appropriately, cure time) of pore fillers varies significantly. While water-based fillers can usually be sanded and finished within three or four hours, oil-based fillers require two to three days to dry thoroughly. The residual solvents and oils in uncured oil-based filler can cause tiny white spots in the finish if top-coated too soon. This is particularly true when waterborne finishes and some nitrocellulose lacquers are used.

Once the filler is completely dry, sand down to the sealer, removing all the filler residue from the surface (see the center photo). Leave filler only in the grain pores. Sand carefully: It's easy to sand through the sealer coat into the base stain. Oversanding can also open up unfilled pores, which will force you to start the whole process over again. Periodically, wipe down the wood with a rag dampened with mineral spirits to inspect your progress. You should wind up with a surface that looks somewhat like the left tabletop in the bottom photo.

Because grain fillers shrink about 10% as they cure, your freshly filled and sanded wood is probably not going to be silky smooth. You can repeat the process to fill the pores completely, but I prefer to fill the small sink holes with sanding sealer (it's a lot easier). I apply a coat or two of sealer and sand it back to a flush surface. The sealer also provides a good base for the finish (see the tabletop on the right in the bottom photo). Finally, always make sure your topcoat, sealer and filler are compatible by testing your finishing sequence on scrapwood from your project. □

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**Scrape off the grain filler while it's still wet.** Wearing rubber gloves, the author drags a rubber squeegee diagonally across the grain. The scraped area to the right has already hazed over.



**Sand down to the wood (or sealer) once the filler is dry.** Minick uses 120- and then 220-grit paper to produce the fine powder shown. If the paper starts to gum up, it means the filler is not quite dry.



**Clean and seal the surface.** Wipe off filler residue, and dust with a soft cloth. Then reseal the wood before the topcoat. The mahogany top on the left has been cleaned; the right top has been shellacked.