The viscosity of gel finishes varies from the thick, paste-like consistency of Bartley's Paste Varnish and Stain, top left, to the pourable gel of Flecto's X-3D Wood Stain, top right. Nonetheless, all have been blended with thixotropic, or thickening, agents to keep the pigments, resins and solvents from separating. Since stirring is not required and convenience for the do-it-yourselfer is one of their selling points, the brands at left package their gels in plastic squeeze bottles.

Gel Stains

Producing even color with less mess

by Jim Boesel

When I first noticed advertisements for new, improved gel stains and clear finishes, I was skeptical, but not surprised. In the last year or so, everything in my bathroom, from toothpaste to shaving cream, has "gelled," so why shouldn't this new advertising buzzword make its way into the shop? Next year, I had speculated, they'd be coming out with new, improved polyurethane *light:* covers great, less filling.

After awhile my skepticism gave way to curiosity and I tried these gelled finishes. They are available in the usual variety of wood stain colors, which can be intermixed to produce additional shades. There are also white and clear gels that can be tinted with most pigments, including Japan colors, artists' oils and universal colorants from your local paint store. White gels can also be thinned to create a limed or pickled effect. The latest entries in the gel marketplace are premixed pastel colors that subtly tint tight-grain woods and color the open grain in woods such as oak and ash.

To my surprise, these gels delivered what they promised. They were easy to apply, with little mess. They produced an even color coat without requiring you to continually stir the pigment into suspension. They were fast drying and didn't raise the grain enough to require sanding between coats. And they covered more area than a comparable portion of conventional oil-base stain. I was also surprised to learn that gel stains are not new. As Dick Fitch, finishing consultant to The Bartley Collection Ltd., pointed out, pigmented

stains in paste form are at least as old as war paint, and wood finishers have been using them for centuries. Heavy-bodied wiping stains, which are thickened with additives that act something like cornstarch in gravy, have been a staple in professional finishing shops for decades. The thick consistency of these wiping stains keeps the pigment in suspension to provide predictable and repeatable results, but they have never been readily available to the weekend woodworker. Then about 20 years ago, gel stains made their appearance on the market. These new wiping stains owed their thick viscosity not to the addition of a thickening agent, as the earlier wiping stains had, but to rheology, the science of the deformation and flow of matter.

Thickness through thixotropy—Gel stains consist of basically the same ingredients as conventional oil-base stains: pigments suspended in a vehicle of alkyd resins (often alkyd-modified linseed or some other vegetable oil), driers and mineral spirits. Gels contain about twice as much pigment and resin as regular stains, but this higher solids content has little to do with their thicker consistency. So, what makes gel stains different from conventional wiping stains? The gels are thixotropic. Webster defines thixotropy as the property of various gels of becoming fluid when disturbed, as by shaking. In other words, gel stains are thick to begin with, but when disturbed, either by shaking, stirring or even just the action of applying them with a cloth, they become fluid and easy to work. When the materials are left alone again, they return to their gel state. In contrast, a conventional wiping stain will stay thick unless it's thinned with solvent.

Gels are made thixotropic by adding a polyamide-modified thixotropic alkyd resin and/or other thixotropic agents (such as bentonite clay) to the usual recipe of pigment, resin, driers and solvent. These ingredients are placed in large drums and then mixed together for about 20 minutes by a high-speed dispersion machine that looks just like a giant milk-shake mixer. The mixer blades spin at about 3,000 RPM and blend the ingredients evenly throughout the mixture. When the mixing stops, weak hydrogen bonds are formed between the thixotropic agents and the other ingredients, binding the mixture together to a uniformly thick consistency, which can be varied from a pourable gel to a thick paste. These weak hydrogen bonds break down when shear forces are applied, such as the mechanical action of applying the gel with a cloth, and then re-form shortly after the rubbing stops.

Applying gel stains—It's safe to assume that the proliferation of gel stains in the past few years is directed at the convenience or do-it-yourself market. Gels are well suited for small projects. And because they're wiped on and off almost immediately, they are especially handy where a dust-free environment for finishing is not available. Their thick viscosity makes them great for finishing in-place vertical surfaces, such as built-in cabinets or pre-hung doors. In fact, their thicker viscosity solves most of the common complaints associated with oil-base stains. They can be applied without splattering or running and, because the pigment stays evenly blended, they produce an even color coat. In addition, their higher solids content reduces their penetration into the wood, which increases the area that can be covered with a given amount of stain and makes it much easier to control the problem of splotchy color on irregular grain.

Unfortunately, even with gels, the final finish will only be as good as your surface preparation. Staining will accentuate any scratches or rough spots, so sand all wood surfaces thoroughly. Because of their high solids content, gels will help fill wood pores better than regular stains. But if you want a smooth, highly polished finish on open-grain woods, such as oak, ash or mahogany, you must still fill the pores with a paste wood filler before staining. After sanding or filling, blow the sanding dust from the wood's surface with an air compressor and then clean the entire surface with a tack cloth.

In preparation for finishing, gather a good supply of clean cloths; old T-shirts or terry cloth work well, but avoid any cloth that gives off lint. Brushes are handy for working the finish into intricate carvings or other tight spots. Have some mineral spirits on hand for lightening the color or blending lap marks when staining. As user-friendly as gel finishes are, don't forget that they contain mineral spirits or other solvents that are potentially hazardous. Rubber gloves are advisable and it's essential to provide proper ventilation, such as a window fan blowing out one end of the room and a door or window open at the other end.

Instructions for applying gel finishes are pretty much the same for all brands. Apply a small amount to a clean cloth and wipe it on the surface with the grain. If possible, cover a whole area, such as a cabinet side, at one time. On large tabletops and similar surfaces, work in logical areas—treat one leaf or one half of the table as a unit. You can blend lap marks with a little mineral spirits, although it isn't usually necessary if you work quickly. The recommended waiting time before wiping off the gel with another clean cloth varies from immediately to between two and five minutes. Again, when wiping off excess finish, work with the grain.

As with conventional stains, most common clear finishes can be used over gel stains that have dried thoroughly. The exceptions are brushing lacquer and other finishes containing high-boiling active solvents like ketones, which evaporate slowly and might redissolve the stain. The drying time before topcoating varies, depending on the final finish, but 24 hours seems to be the average. Up to 72 hours is recommended for spray lacquer.

What about the drawbacks of gels? For large areas such as a floor, it would be faster and easier to brush or spray on a liquid finish. And for most production situations, applying a gel is just too slow; they can't compete with a spray gun or dip tank for moving multiples out the door. Their lower solvent content, which prevents them from penetrating as deeply as conventional oil-base finishes, could be a disadvantage in some cases. However, this reduction in solvents is most likely one of the reasons for the finish industry's current interest in gels, because it will help them meet the tighter government restrictions on volatile organic compounds (VOCs) that have already been enacted in California and New Jersey and which promise to be the trend in the future.

So, in spite of my original skepticism, I have to conclude that for most small projects, the advantages of gels tend to outweigh the disadvantages. And if you dread the mess, and that feeling of uncertainty that often accompanies the finishing process, gel finishes might be just what you've been looking for.

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Sources of supply

The following companies manufacture gel finishes:

Bartley Collection Ltd., 3 Airpark Drive, Easton, MD 21601; *stains in wood tones (stain and topcoat in one) and clear.*

H. Behlen and Brothers, Inc., Route 30 N., Amsterdam, NY 12010; *stains in wood tones, white and clear.*

Fabulon Products, Box 1505, Buffalo, NY 14240; *stains in wood tones, white and tung-oil varnish.*

Flecto Co., Inc., 1000 45th St., Oakland, CA 94608; *stains in wood tones and clear.*

Minwax Co., 102 Chestnut Ridge Plaza, Montvale, NJ 07645; *stains in wood tones, white and pastels (stain and topcoat in one).*

Thompson and Formby, Inc., 825 Crossover Lane, Memphis, TN 38117; *stains in wood tones and tung-oil varnish.*

Wood-Kote Products, Inc., Box 17192, Portland, OR 97217; *stains in wood tones and white.*