Waterborne Finishes for Hardwood Floors

Basic Coatings

by Michael Purser

These new coatings can provide a hard, non-yellowing finish — with the right tools and techniques

Few new products have shaken up the wood flooring industry the way waterborne coatings have. Some tradesmen resent the fact that tougher air quality laws, not better performance, are dictating the use of the new coatings. Others can't imagine working with a finish whose primary component is water — woodworkers' enemy. And yet, to still others, the product is the greatest thing to come to market since the electric sander. But whether we like them or not, waterborne coatings will undoubtedly play a major role in the future of the wood flooring industry.

Without question, the most widely used waterborne floor finishes are the waterborne urethanes. Though they've been used on residential floors in the U.S. for only about five years, they've been around for much longer. The two primary manufacturers of waterborne urethanes (Bona Kemi of Sweden and Basic Coatings of Des Moines, Iowa) have both been manufacturing waterborne coatings for about twenty years.

Until recently, waterborne urethane has been used mainly for recreational floors — basketball courts, for instance — or large industrial floors. The product is more expensive than conventional finishes, but because it dries quickly — within two hours under normal conditions — and can be recoated in a few hours, the cost is offset by the time saved. Waterborne urethanes also have stable color and do not yellow when used over light or white backgrounds. This has become an important factor in the residential market, with the popularity of bleached, whitewashed, and natural finish floors.

Another plus for the product is its lack of strong and offensive solvents. Waterborne coatings certainly have solvents, but they are nothing like the volatile hydrocarbons found in more conventional coatings. Although this has always been a bonus for those who worked around the product, it did not become a significant sales advantage until the 1980s. With more stringent air quality laws being enacted in certain areas of the country, waterborne manufacturers promoted the coatings as a logical alternative to conventional solvent finishes (varnishes, oil-modified urethanes, synthetic lacquers and shellacs, acid curing systems, etc.).

In the can, waterborne urethane has the appearance of skim milk — an opaque look with a slight grayish tint. It has a watery consistency and flows out rapidly — too rapidly for some.

Waterborne urethanes are emulsions, not true solutions like conventional solvent finishes. Water is the carrier, not a solvent. Particles of the urethane resin and its solvent are suspended and evenly dispersed in the water. Upon application, the water evaporates and the solvent breaks down the resin particles to form a film.

Virtually all waterborne systems used on wood floors are two-part systems. In the larger, gallon container, you have the coating itself. In the small four-ounce container you have the catalyst, which is mixed with the coating prior to application. Once the coating has been catalyzed, you have 24 hours to use it. There are some one-part systems available on the consumer market, but I don't recommend them for residential floor finishing.

Early Problems

Since waterborne urethanes were introduced, they've had to battle two image problems that

have nothing to do with the quality of the product. First is the presence of the water itself. If there's been one article written on the adverse effects of water on wood, there must have been a hundred. To promote the virtues of water as the base of a wood finish was like the Woman's Temperance League praising the virtues of hard liquor.

The second problem was new environmental regulations that effectively mandated the use of these products in some states for anything larger than quart containers. (see "Coping with Low-VOC Paints," 6/90). Wood flooring contractors, like most tradesmen, cherish their independence and this intrusion into their work habits was not well-received. Waterborne products were, after all, an answer to an environmental problem — not a wood finishing problem.

In areas where VOC compliance had to occur by a specific date, the problem was compounded by a sense of urgency. Many floor finishers resented having to quickly make changes they would like to have made on a more leisurely timetable.

With two strikes against waterborne urethanes, manufacturers needed to make a very good first impression when they introduced the product to the residential market. Unfortunately, this was not the case and contractors faced a multitude of field problems from the very start. Typical problems were

- excessive raising of the wood grain;
- discoloration and darkening of wood, creating serious problems with natural, white-washed, and bleached finishes;
- poor durability — especially accounts of the finish being "walked off" too easily;
- difficulty in maintaining a wet edge during application;
- too little surface accumulation due to low viscosity;
- problems with conventional application techniques;
- and inadequate training and product information support.

In hindsight, most of the problems occurred because the manufacturers did not formulate the product properly for residential applications. Simply put, they had not anticipated the problems of their product on the one species of wood it had to work well on — oak. This was not a failure in research and development as much as poor planning in adapting the product to an open-grain hardwood and an environment much more demanding than a basketball court. It's unfortunate because some of the contractors I interviewed for this article experienced early problems and walked away with a curt "I told you so." They simply went back to their old products and missed out on a promising new technology.

Anticipating and Avoiding Problems

Manufacturers soon realized that some serious problems had to be overcome before waterborne urethanes became the success story they had envisioned. One by one, the problems were identified, isolated, and addressed. Much to the manufacturers' credit, in five short years most of the initial problems have been successfully dealt with. You can fault the manufacturers for being a little short-sighted initially, but since then they have tried to squarely address contractors' concerns.

Many contractors have not only shown a willingness to work with waterborne urethanes, but have even helped resolve some of the problems by changing their work habits and techniques. Here are some recommendations from contractors and manufacturers for resolving some of the more persistent problems.

Keeping down the grain. As mentioned earlier, waterborne urethanes have a very low viscosity — i.e., are watery. Consequently they have a tendency to penetrate deep into the wood, causing the grain of open-grain hardwoods like oak to really pop. Manufacturers sought to resolve the problem with a more balanced formulation that prevents the finish particles from penetrating so deeply and causes more accumulation on the surface of the floor. Makers also came out with high-build sealers that have the same effect.

These measures helped, but the most effective methods to control grain raising came from contractors who altered their surface preparation. Most simply tried to reduce the grain itself by screening the floor thoroughly after using the drum or belt sander. The logic here is simple: Remove the excess grain before it becomes a problem.

I have carried this approach one step further with very good results by using the following technique. First, measure the moisture content of the wood with a moisture meter. Next, use a sprayer that can mist water — I use a simple two-gallon garden sprayer that has an adjustable nozzle — to *lightly* mist the work area with tap water. Do not allow any moisture to pool or puddle. If you have any standing water, immediately tack it with a dry rag or towel. By using good ventilation, adjusting the heat or air conditioning, or just using some fans to increase air movement, you can totally dry the surface in an hour or less. Once the surface is dry, test it with the moisture meter to make sure you have the same reading in the wood as before. (I usually try to mist the floor just prior to leaving the job site for the day so it has 12 hours to dry.)

After the floor is completely dry, take a worn screen-back disk or a reasonably abrasive scrubbing pad and disk off the raised grain. Now you can proceed with your coatings application.

This technique involves some risk. To avoid any problems, make sure you practice on sample flooring before you attempt it on the job site. And remember, you are lightly misting the floor, not putting out a fire! I should point out that I have tried this many times with both white and red oak flooring and have not had any problems with discoloring the wood or increasing the amount of separation between boards.

Manufacturers warn about burnishing the wood from excessive fine screening. Evidently, they feel a surface that is too smooth will not perform as well once the coating has been applied. I have always tried to create a very smooth work surface, and have never noticed any deterioration of performance, or intercoat adhesion failure. Quite frankly, I don't think a smooth work surface causes any problems, but will gladly change my thinking if I can see any concrete evidence.

Reducing the discoloration of light floors. With waterborne urethanes it is very important to get an even application with no areas of excess accumulation. When the thin waterborne urethanes penetrate the wood, a chemical component called N-methyl pyrrolidone reacts with the tannin and darkens the wood considerably. This typically occurs when the coating is allowed to puddle or collect during application. Working on your application technique to avoid the puddling will usually resolve the problem.

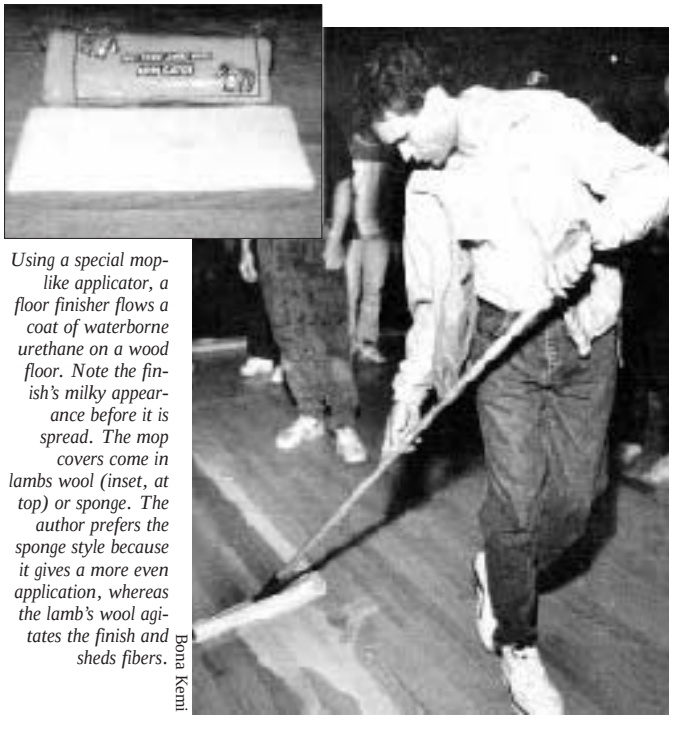
Another option is to use Basic Coatings' Hydrolite (P.O. Box 677, Des Moines, IA 50303; 515/288-0231) as a first coat after the stain has been applied. After an application of Hydrolite you get more accumulation with the first coat of finish, which reduces the potential for discoloration problems.

I should point out that creating the light or white look that is now popular has always been more difficult and requires very good woodworking skills. I would advise anyone to practice these procedures before using them on a job site. If you still feel uncomfortable, don't do it.

Increasing the performance of the coatings. The initial reports of poor performance of the waterborne urethanes were traced to three specific problems. First, due to the low viscosity, the floor finisher simply did not get the same amount of surface accumulation. As a result, even with multiple applications, you ended up with about half the accumulation of a conventional coating. When I first started working with waterbornes, it took five applications to equal the build of three applications of oil-modified polyurethane.

As I've mentioned, manufacturers have worked with the formulations to increase the surface accumulation and this aspect of the problem has been reduced.

A second factor in poor performance was excessive disking between applications. In an attempt to take down any raised grain and get a smoother surface, contractors literally disked the finish off the



Using a special mop-like applicator, a floor finisher flows a coat of waterborne urethane on a wood floor. Note the finish's milky appearance before it is spread. The mop covers come in lambs wool (inset, at top) or sponge. The author prefers the sponge style because it gives a more even application, whereas the lamb's wool agitates the finish and sheds fibers. Bona Kemi

The highest quality waterborne urethanes are two-part systems, such as Pacific Strong, by Bona Kemi, and Hydroline, by Basic Coatings. The small bottles contain the system catalyst, which accelerates the drying and curing process. The other products shown, Hydrolite and Pacific One, are lighter-duty waterborne urethanes that the author sometimes uses for a sealer coat.

wood. This problem can be addressed by following the recommendations for reducing grain raising, and by substituting a less abrasive scrubbing pad for a screen-back disk for the disking between coats. These scrubbing pads are color coded, and the green pad seems to give the best results for this particular phase.

The third reason for excessive wear came from overzealous marketing of the finish's fast-drying ability. Manufacturers really jumped on this characteristic, and pictures of happy families gathering in their dens within minutes after the coating dried gave the public the impression they could run full bore on that floor with no threat of damage. Wrong again, marketing guys! Waterbornes are just like any other coating and they do have a curing time. During this curing time they are more susceptible to abrasion and should be treated a little more tenderly. Sure, they can be walked upon and furniture can be set up, but it's a good idea to avoid putting the house on tour or holding a square dance to celebrate the new floor. Typical curing time is anywhere from 14 to 21 days.

One other piece of useful advice: Do not put carpet pads down for at least a week. These pads can trap water in the finish, which may discolor the floor.

Keeping a wet edge. The quick drying time of waterborne systems is an advantage, but you may find you have to slow down the drying process to keep a wet edge. Basic Coatings offers a retarder that helps control the drying time of its waterborne urethane, but I don't recommend you use it with other manufacturers' products. You may also want to keep all doors and windows closed, and the heat and air conditioning off, while the coating is being applied. By reducing air movement, you'll extend the drying time slightly. Once the finish has been applied, then activate the heat and air to help accelerate the drying.

Application techniques take practice. One way to avoid problems with waterborne finishes is to experiment with various application techniques. For example, I have always preferred brushing finishes down, but the results I got with a nylon brush when I started testing waterbornes was anything but satisfactory. Just for fun, I tried out my old natural china bristle brushes, and I discovered a vast improvement. If you're accustomed to other methods, I suggest you try out the applicators made specifically for waterbornes. Allow adequate time to practice with them before taking them to the job site.

Improvements in instructional material. Let's hear it for the guys in marketing on this one. Seminars, demonstrations, classes, videos, technical data — you name it, they now have it. Educating contractors has become an obsession for the key players in this market and I'm all for it. Product support has improved tremendously. Ask your local distributor about sponsoring a demonstration to help troubleshoot some problems. It's in everybody's best interest. Do not hesitate to get on the phone and find out what will work best for you. And hey, Mr. Manufacturer, how about an 800 number to give us a little break when we do have a question or run into a snag?

Providing the Option

Working with waterborne products requires patience and practice. Patience to sit down and listen, read, and learn about the idiosyncrasies of a good product that is getting better. And practice to make sure you don't come up against anything you cannot handle on the job. If you had a bad experience the first time around, you might want to give these products a second chance. Chances are that you will enhance your competitiveness by making this coating an option for your clients. ■

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