

Varnish over epoxy

A look at the benefits of undercoating with epoxy

By Tom Pawlak

The appeal of well-maintained, varnished wood trim on boats is hard to deny. It evokes our past and we respect the owner because of all the time and effort it takes to apply and maintain the varnish.

Historically, “the look” was achieved by applying twelve or more coats of spar varnish. This required a period of weeks because only one coat of varnish could be applied per day. Each coat had to be sanded before the next coat could be applied. Applying more than one coat per day caused the varnish to dry slowly, and in some cases to alligator and wrinkle.

Varnish manufacturers now formulate products that speed up the process by allowing recoating the same day. While this reduces the total days required, applying all the layers still takes a great deal of time.

Battling the forces of nature

When varnish is used alone as a coating, it is constantly fighting two distinct battles. One is to stay attached to a substrate that is expanding and shrinking as the moisture content of the wood changes. Seasonal changes in moisture content occur because varnish is not a particularly effective moisture barrier. When the wood changes dimensions, it forces the varnish to stretch and shrink in order to stay attached. Given enough stretch/shrink cycles, the coating will eventually crack.

The other battle is oxidation from exposure to the sun’s UV light, a phenomenon that contributes to loss of gloss and cracking.

Good varnishes are designed to address both stretch/shrink cycles and UV degradation, but eventually the two forces in combination will break down varnish and cause it to fail.

The benefits of epoxy

Another method to achieve “the look” is gaining popularity and cuts labor time. Professional yacht refinishers now use WEST SYSTEM® 105 Resin/207 Special Coating Hardener as a clear base over wood trim before applying coats of varnish.

Three coats of epoxy followed by three coats of varnish can achieve the same depth and look of twelve or more coats of varnish. Because there are no solvents evaporating away from the epoxy, it builds thickness faster per layer than varnish and it doesn’t shrink when it cures. In addition, three or more coats of 105/207 can be applied per day.

More importantly, sealing wood with an epoxy moisture barrier dramatically lessens its stretching and shrinking. Varnish benefits from being applied over a stable substrate. High-quality marine varnish is formulated with UV filters. So, the epoxy coating benefits by getting the protection from UV radiation that it needs. WEST SYSTEM 105 Resin/207 Special Coating Hardener and varnish complement each other synergistically. The two in combination last longer than each coating by itself.

Epoxy with two-part polyurethanes

Two-part clear polyurethanes are known for superior UV resistance and scratch resistance compared to traditional varnishes, but they have shown mixed results when applied directly to wood. They also tend to develop cracks due to expansion/contraction of the wood. Two to three coats of epoxy also provide a stable base for clear two-part polyurethane finishes. Applied over epoxy, they perform beautifully together and outlast either coating used by itself.

Coating new trim and removing/refinishing existing trim

In new construction or when existing trim is removed for refinishing, we recommend that you encapsulate the piece with two to three coats of epoxy on all sides prior to installation and prior to applying varnish. (Three coats on surfaces that will be sanded.) This seals the wood, effectively protecting it from water. You can install the trim with commonly used bedding compounds or glue it in place with epoxy. To eliminate places where water can get in, coat all drilled installation and hardware attachment holes with epoxy just prior to running the screws in. Wood surfaces completely coated in epoxy and protected with varnish or two-part polyurethane clear exterior finishes significantly outlast traditionally applied and maintained varnishes.

Refinishing existing trim without removal

Many people refinish their wood trim in place by stripping the old finish, sanding and applying two to three coats of epoxy before applying varnish. For this method to work, it is important that the bedding compound beneath the trim be in good shape so water does not find its way into the wood behind the coating.

On fiberglass boats with wood trim, an in-situ method that works well is to undercut the wood trim all around the perimeter by ¼" and glue the edges down with epoxy to eliminate places where water can get in. The undercut area should be free of all bedding materials, leaving the wood and gelcoat clean and abraded. Strip the trim of all old finishes and dry it well before coating the undercut area with unthickened epoxy. Then fill with epoxy that has been thickened with 406 Colloidal Silica and colored



A typical piece of trim after years of weathering



Applying the first of three coats of epoxy



After three coats of 105/207 and three coats of varnish.

Robert Winters

Refinishing existing trim

1. Remove trim piece and clean all bedding compound and contaminants from the wood. Allow to dry thoroughly.

2. Sand the piece to remove stained and weathered wood.

3. Apply three coats of WEST SYSTEM 105/207 epoxy. Second and third coats can be applied while the previous coat is still slightly tacky. At room temperature, all three coats can be applied in the same day.

Allow the last coat to cure thoroughly. At room temperature, the coating will be sandable in about 24 hours, sooner at higher temperatures.

4. Wet sand the epoxy with 120-grit paper. 120-grit–150-grit provides a good tooth for varnish adhesion, and scratches are easily filled by coats of varnish. Use finer grits with thinner finish coatings.

5. Apply two or three coats of varnish following the manufacturer's recommendations.

6. Reinstall trim. Be sure all fastener holes are sealed with epoxy. Bed in epoxy or flexible bedding compound.

Using stains with epoxy

Some stains are better suited for use under epoxy than others. We recommend using water-based aniline dye stain if you plan to apply epoxy. WD Lockwood in New York City (212-966-4046) is an excellent source and offers a variety of different wood-colored stains which can be blended together to achieve a specific color. Their stain is sold in powdered form which must be added to water the day before you plan to use it so all the crystals will dissolve. Aniline dye stains, when dry, allow the epoxy to penetrate through the dye and attach to the wood itself.

Many oil-based stains compromise epoxy adhesion because the pores of the wood are plugged by these stains. If you plan to use oil-based stains, be sure to experiment to verify that adhesion is adequate. This should include varying how long the stain dries before you apply epoxy. (See Joe Parker's article on testing paint adhesion in *Epoxyworks* 17 to show how to set up test samples.) Some professional boat restorers report good results applying epoxy over certain oil-base stains if the stain is allowed to dry for several days. Scuffing the stain with a soft abrasive pad before applying epoxy will usually improve adhesion. However, the appearance of the stain may be adversely affected.

Conclusion

If you plan to use epoxy prior to applying varnish, be thorough. If the application is poor, moisture will find its way into the wood and the moisture barrier qualities of epoxy will work against you, increasing the chance of rot and of premature failure of the coatings.

If everything is done right and water is kept out of the wood, coating wood trim with epoxy prior to applying varnish works extremely well. Coating with three coats of WEST SYSTEM 105 Resin/207 Special Coating Hardener has the potential for dramatically reducing the effort needed to maintain that beautiful wood trim over time. ■

with wood sanding dust. Apply two or three coats of epoxy and eventually protect the trim with three or more coats of varnish.

Keep the moisture out: sealing screws with epoxy

It is important to eliminate places where moisture can find its way into the wood. This includes applying epoxy to screw holes prior to running the screw in place. If you will need to remove the screw in the future, you can apply a wax or mold release to the screws. If you forget to apply mold release to the fasteners, you can use a soldering iron to heat the fastener head for removal.

We recommend sealing holes with epoxy because varnish typically breaks down first near hardware. This occurs because moisture finds its way in through screw holes as a result of thermal cycling. Sunlight warms the wood, causing air in the wood to ex-

pand and create pressure. The air escapes through poorly sealed screw holes and unsealed end grain. As the wood cools due to declining evening temperatures or daytime rains, the air inside the wood shrinks, creating a negative pressure which draws air and moisture in from the same places it escaped. Moisture from dew and rain is drawn into the wood as the pressure equalizes inside the wood. Once inside, it is trapped and causes the wood to swell and discolor, which eventually causes the varnish to lift and peel from the wood.

This is why we feel it is so important to seal the screw holes with epoxy before installing the screws. Simply apply a few drops of epoxy to the pilot holes or use a pipe cleaner to quickly swab the screw hole with epoxy before running in the screws. This will stop the air from escaping and prevent water from getting in.