WATERPROOF Fiberglass Decks

by Eric Borden

This site-mixed two-part resin provides a seamless, watertight deck surface over living space

We build along the Jersey shore, and whether a house fronts the ocean, the bay, or the river, our clients want to enjoy the view. To give them a good view from inside the house, we might have to go up three stories. But for the view from outside, we add a deck or two.

The project discussed in this article is typical of most of our jobs, because the decks serve double duty — as both outside living space, and as a weatherproof cover for rooms below. At the rear of the house, we added a deck off the second-floor kitchen that overlooks the pool and creates a covered patio underneath. At the front of the house, we removed an existing first-floor exterior porch to make room for an

enlarged great room. We extended this deck to one side to cover the entrance to the garage and to provide an additional 12x20-foot covered carport with access from the dining room through a new slider. We also extended this deck 8 feet to the other side to create a covered entrance to the house.

Both of these decks had to protect the spaces below from water. We could have used EPDM single-ply rubber, which is easy to install, but has to be replaced eventually. And because EPDM can't be walked on directly, we would have had to install deck boards on top of it.

The option we prefer is fiberglass, which does not need any additional decking to protect it and, if re-coated every 7 to 10 years, will last forever. A fiberglass deck covering is also relatively inexpensive and, in most cases, can be completed in two days. Costs in our area range from $6.50 to $8.00 per square foot, including the second layer of plywood and all labor.

Figure 1. Fiberglass resin is mixed on site with a hardener (methyl ethyl ketone peroxide) in a ratio that can be varied to extend or shorten set time. The base coat is applied over plywood with reinforcing mesh at joints and penetrations, then finished with a gel coat.

Figure 2. On the day the fiberglass will be applied, a clean, dry layer of 1/2-inch AC plywood is laid over the base layer of 3/4-inch T&G plywood. Joints are staggered and the sheets are fastened with 8d ring-shank nails.

Sound Substrate

Polyester resin fiberglass has a solid track record — it's been in use since the 1950s in the boating industry — but it's messy and somewhat finicky to install. To avoid problems later, we spare no expense preparing a sound deck structure.

First, we step up one size on our joist sizing, because we rip a pitch (1/8 inch per foot, minimum) into the deck framing. You can also create a pitch by adding sleepers to the top of the joists, but I feel that this increases the odds that the finished deck will squeak.

Next, we sheathe the deck with 3/4-inch tongue-and-groove Douglas fir plywood, glued with construction adhesive and fastened with 8-penny ring-shank nails placed 8 inches on-center. If you use square-edge plywood, be sure to block all seams; any movement in the plywood substrate will stress the fiberglass. When the sheathing is complete, we through-bolt any railing posts to the framing at the intersection of the joists and the inside of the rim board. We add blocking so that the post is secured on three sides, because any movement could cause the fiberglass to crack and leak.

Applying the Resin

I leave the application of the fiberglass coating to the professionals. Former boat builders Dan and Rick Winkle take great pride in their finished product and are knowledgeable about the quirks of fiberglass.

Polyester resin fiberglass is a two-part product. The general-purpose resin is mixed on site with a hardener (see Figure 1). The mix ratio determines how long the resin remains workable, and may need to be adjusted for weather conditions and other variables. Humid weather will delay drying, so we increase the amount of hardener added; conversely, dry weather will cause the resin to set up too fast, so we use less hardener. Open time can also be affected by the surface area of the container used to make the mix; a larger container disperses the heat of the chemical reaction, delaying the chemical reaction and extending open time.

The resin is applied over a fiberglass mat, which acts as a binder and adds strength to the coating. Essentially, the mat serves the same function as wire mesh does in a concrete slab. Various other components, such as ground silica and microballoons (small glass beads) can be added to the resin for filleting or patching.

Double plywood layer. When Dan and Rick show up on site, they bring with them the second layer of plywood for the deck. They use 1/2-inch AC fir plywood, which provides a smooth sur-

Figure 3. A 1x4 fastened to the rim joist will be wrapped with fiberglass to provide a clean termination at the deck perimeter. Fiberglass doesn't bond well at 90-degree corners, so the top outside edge of this trim piece is eased with a 1/2-inch round-over router bit. A 20-degree ripped undercut serves as a drip edge.

Figure 4. A 45-degree cant strip keeps water from ponding in the corners and prevents cracking in the fiberglass where it turns up the wall (top). At door sills, a narrow trim strip serves as a backstop for the fiberglass, which will create a seamless waterproof pan under the door (above).

Figure 5. Before applying the fiberglass mat flashing, all edges — including the bottoms of railing posts, the edges of door openings, and all plywood joints — are knocked down with a coarse-disc grinder.

face for the resin to adhere to (Figure 2). They prefer to provide the plywood because they can be sure of the moisture content of the wood. Moisture is probably the biggest problem at this stage of the game. The resin does not soak into the wood very well, so any moisture in the pores of the wood prevents the resin from penetrating and destroys the bond. The key is to never install more plywood than can be covered with fiberglass in a day's work: Two experienced workers can cover about 600 square feet in a day.

Joints in the second layer are staggered over those of the first. The two layers of plywood are not glued together; they're only nailed with 8-penny ringshanks, 6 inches on-center at the joists and 4 inches on-center at the edges. This makes it easy to remove the top layer of plywood if there is a problem down the road.

Edge work. After the plywood is installed, a 1x4 pine drip edge is fastened flat against the outside of the rim joist, flush with the deck (Figure 3). This trim piece is undercut at 20 degrees to create a drip edge.

Where the deck meets the wall, a cant strip, made by ripping a kiln-dried fir 2x4 at a 45-degree angle, is installed against the sheathing (Figure 4). Any species of lumber will do so long as it's dry, but we prefer fir because the better quality material gives us fewer problems. The cant strip keeps the glass, which extends approximately 6 inches up the wall, from pulling away from the corner. The cant strip also prevents water from ponding in the deck-wall joint. Wood strips are also installed at the sills of any door openings to serve as the backstop for the fiberglass, which will create a seamless pan.

Once all the edge pieces and cant strips are nailed in place (again, glue is not necessary), the outside corners, including the drip edge, are rounded using a 1/2-inch rounding-over bit in a router. Because fiberglass doesn't adhere well to a 90-degree corner, all edges must be knocked down. Joints in the plywood are lightly sanded with a coarse disc in a grinder, as are the bottom few inches of the posts where they meet the plywood and the edges of door openings (Figure 5).

While one person completes the sanding, the other mixes the "fairing" — a boat-building term for a compound used to smooth and level a

Figure 6. A site-mixed fiberglass and silica leveling compound is applied to all joints and nail heads, and is used to fill in gaps around posts and other penetrations (left) and at cant strips and door sills (right). When dry, any lumps and high spots are hand-sanded.

Figure 7. At cant strips, a band of fiberglass mat is pressed into a bedding coat of resin (top left), then coated with more resin (top right) and rolled with a small steel roller to force out any trapped air (above left). Door sills get the same treatment (above right).

curve. Made from resin, hardener, and finely ground silica, the fairing is spread on all joints and nail heads, and is also used to fill any voids around posts and deck-wall joints (Figure 6). The fairing compound takes about 30 minutes to dry, after which any lumps are hand-sanded.

Polyester resin is nasty stuff, so it's important to take safety precautions from the moment the fiberglass is first mixed. Make sure the work area is well ventilated, and always wear gloves and goggles. A respirator is standard equipment during sanding as well.

Glass mat flashing. Next, a bedding coat of resin is applied at the cant strips, then a 9-inch strip of 2-ounce fiberglass mat is pressed into place (Figure 7). Then, more resin is used to "wet it out," and the whole thing is rolled with a small (1-inch-diameter) grooved steel roller to force out any air trapped under the mat. Excess resin is cleaned off the roller periodically with acetone.

After all of the cant strips are treated, the same process is repeated at all of the railing post bottoms. Strips of glass mat are also wrapped over the 1x4 drip edge at the rim joist (Figure 8). The edge of the mat strip is lined up with the backcut bottom edge of the drip edge, "wet out" with resin, and rolled over on top of the deck. Particular care is taken where the drip edges meet the walls to prevent any voids from developing that might lead water into the structure. About 100 linear feet of edging can be flashed in 1 1/2 hours.

Base Coating

When all the edges are complete, the main field areas of the deck can be coated (Figure 9). Using a new batch of resin and hardener, the deck is coated in 4-foot sections. First, resin is rolled onto the plywood using a paint roller with short-nap throwaway covers; then a 4-foot run of 2-ounce mat is laid, "wet out," and rolled to remove any air. The mat is precut to save time, and the edges are frayed to feather the joints and make them less visible. The mat is non-woven, so fibers can be pulled out by hand to thin or fray the edge. Before

Figure 8. At the railing posts and perimeter drip edge, fiberglass mat flashing is bedded flush with the backcut bottom edge and wrapped up onto the deck surface, then coated and rolled.

moving to the next 4-foot section, clean sand is broadcast by hand over the still-wet surface to create a nonslip texture. Work proceeds in 4-foot increments until this first coat is complete.

The fiberglass doesn't fully set up for about 8 hours (faster if it's in direct sunlight), so the surface should be protected from all traffic, including children, pets, and curious passersby. The resin will cure completely in several days.

Gel coat. The next day's work begins with more sanding (Figure 10). Using a 36-grit sanding disc on a grinder, all of the frayed seams at the drip edges are sanded back to true the edges; the rest of the surface is sanded to remove any lumps and to rough up the base for good bonding. In final preparation for application of the gel coat, dust and residue from the sanding are cleaned off the deck using brooms and gas-powered leaf blowers.

The gel coat Rick and Dan use is formulated for exterior applications and contains UV inhibitors as well as additives to increase abrasion resistance (Figure 11). It is also available in several colors; on this job, we used beige for the decks and white for the continuous rail capping the 3-foot tall bulkhead walls that were used instead of posts (Figure 12).

Once the resin is mixed with hardener, application begins at the edges and proceeds to the field. As with the base coat, the gel coat is applied using throwaway paint rollers. The finished product looks similar to the surface of a fiberglass tub, except slightly

Figure 9. At the main deck, a bedding coat of fresh resin is applied in 4-foot bands using a short-nap paint roller, covered with a full-width sheet of fiberglass mat, then rolled again (above). Clean sand is then spread over the still wet mat to provide a nonskid surface (left).

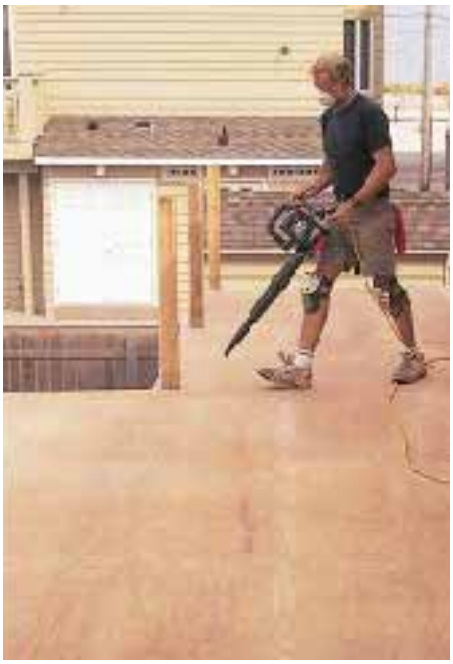

Figure 10. After the base coat has dried, sandpaper is used to knock down edges and rough up the whole surface to improve bonding with the finish coat (above). Brooms and leaf blowers are used to remove excess particles from the surface before applying the gel coat finish (left).



Figure 11. Tinted gel coat is applied first at edges and penetrations (left), then on the main deck (middle), using short-nap paint rollers. The final product cures in about 30 hours and looks much like the surface of a fiberglass tub (right).


Figure 12. On this job, the wood railings were also flashed with fiberglass mat (left), then finished with white gel coat to contrast with the deck color (right).

rougher, because it picks up the texture of the glass mat below, and also because of the nonskid surface provided by the sand. We allow the gel coat to cure for 30 hours before we set the doors. We always work while standing on sheets of plywood placed on the deck, because at this point the gel coat is not fully cured. Even after the surface is cured, we always work off of the plywood to protect the surface. The gel coat will take a lot of abuse, but early on it's still tender. Nothing will ruin a day faster than dropping your hammer off of a 6-foot ladder and putting a chip in the new surface.

Details & Maintenance

Siding is installed as usual, with the building paper overlapping and taped to the fiberglass where it runs up the wall. At railings, we have had problems in the past with checking of the wood posts, which allows water past the fiberglass counterflashing and into the building envelope. Now we usually wrap our posts with 1x6s, holding the boards 1/2 inch off the surface of the deck to prevent wicking of moisture. In the search for the perfect railing, we have tried a few vinyl systems. The vinyl post covers that come with some of these systems work fine.

Routine maintenance of the fiberglass deck surface is the same as any fiberglass boat. The surface should be cleaned periodically with a non-abrasive cleaner, such as Spic 'N Span, and visually inspected every year for signs of excessive wear, especially at the deck-wall junction and around the posts. We have decks out there that are 10 years old and have needed nothing more than an additional application of gel coat.

Repairs are fairly easy. The affected area is removed, the edges of the fiberglass are ground back, and the plywood is reinforced to ensure a sound surface. Then the fiberglass is reapplied to make the patch. The gel coat blends almost perfectly.

Eric Borden *owns ESB Contracting, a remodeling company in Forked River, N.J.*