REPAIR OF SOFT SHOWER FLOOR IN 1999 FLEETWOOD DISCOVERY 36T

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The floor of our shower has seemed soft and spongy since the second-hand purchase of our coach in 2003. In 2005 we noticed a hairline crack in the floor. I patched the area with a fiberglass laminate, with the certainty that a more permanent repair would have to be done. The fiberglass patch around the crack slowly began to delaminate from the floor, as seen in the photo below. I couldn't put off the repair any longer.

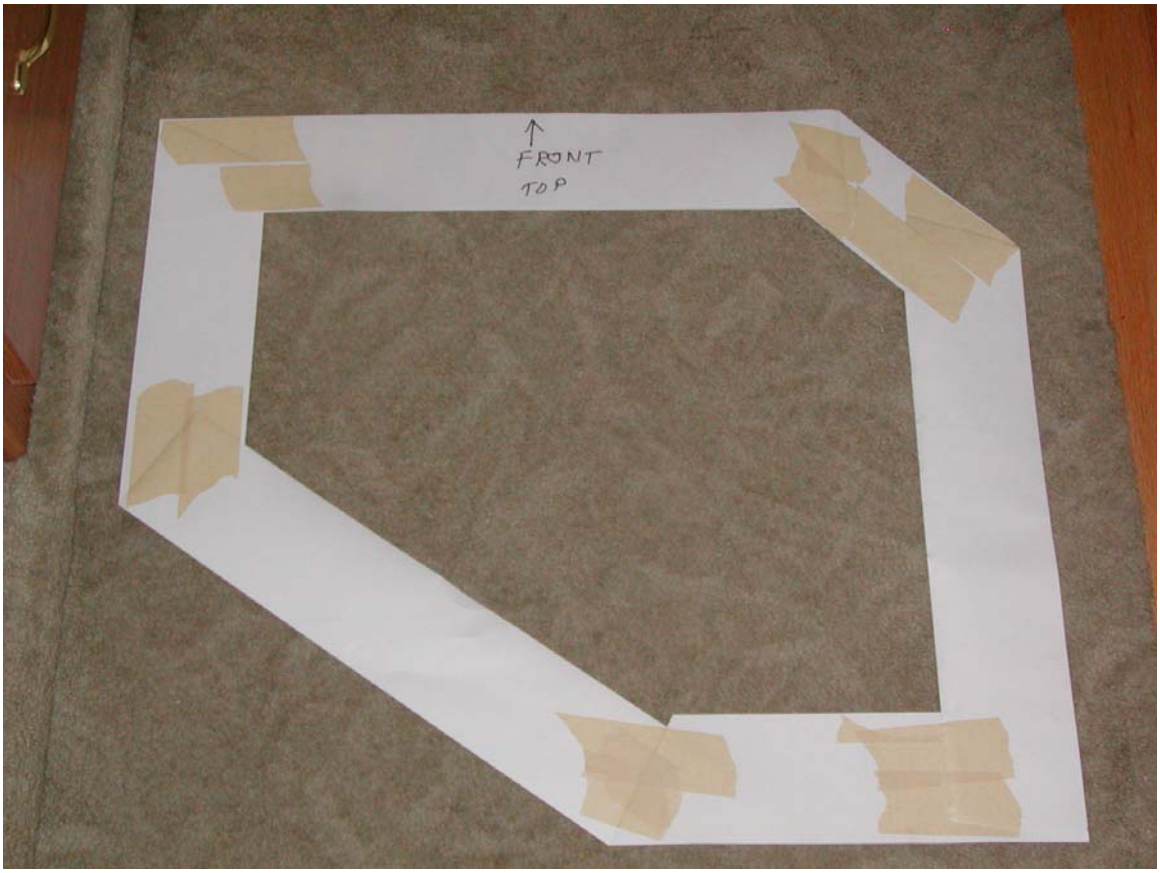
I considered several methods of reinforcing the floor. One would be to overlay a very stiff, waterproof panel over the entire floor, which would bridge the soft spots and prevent further cracking of the existing floor. However, I couldn't come up with a suitable material to use. I found a fiberglass panel sold at the local Lowe's Home Center. It's called a Fiberglass Reinforced Panel (FRP), 4' x 8' in size, and about 1/16" thick. It is pleasingly textured on one side and comes in an Almond color, almost a perfect match for the color of the shower. The only problem is that the panel is primarily a wall covering. It doesn't have the stiffness or strength to bridge the soft spots.

After giving the problem considerable thought, I felt that repairing the original problem was the way to go. The floor is soft because it isn't properly supported. I decided to cut out the shower floor, fix the support structure, and then cover the surgery with the FRP panel.

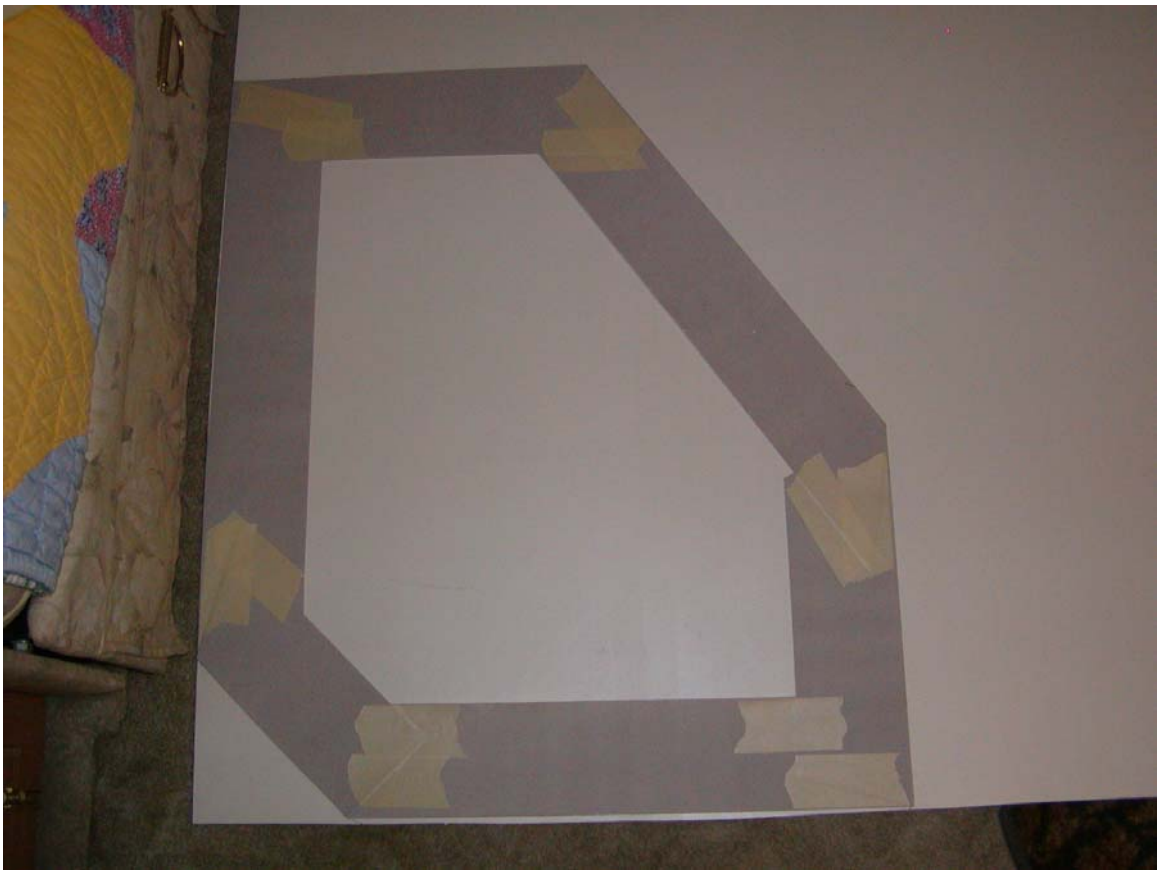
The first thing I did was shape the FRP panel. Once that was done I could then cut into the shower floor a few inches smaller all around than the FRP panel size.

I marked the shower floor with the outline I wanted for the FRP panel as shown in the photo below. These lines follow the outline of the textured area of the floor. Barely visible in the center of this photo is yet another crack in the floor that I didn't know was there until I started the repair.

The photo below shows a template made of poster board. The pieces were cut and taped together using the marks on the floor as a guide.



The template was laid upside down on the bottom surface of the FRP panel, and the panel was marked for cutting.



Below is a photo of the finished FRP panel.

Using the panel as a guide, the shower is marked for the cuts that will allow removal of the existing shower floor. As shown below, these cuts are inside the perimeter of the FRP panel by 2" all around. This will allow for the FRP panel to cover the cut lines after the original shower floor is put back into place. A dremel with a fiberglass cutting wheel was used to make the cuts. High speed and a firm plunging pressure were used to make the cuts. If you go slowly the floor material will just melt, with melt piling up behind the wheel and resealing the cut!

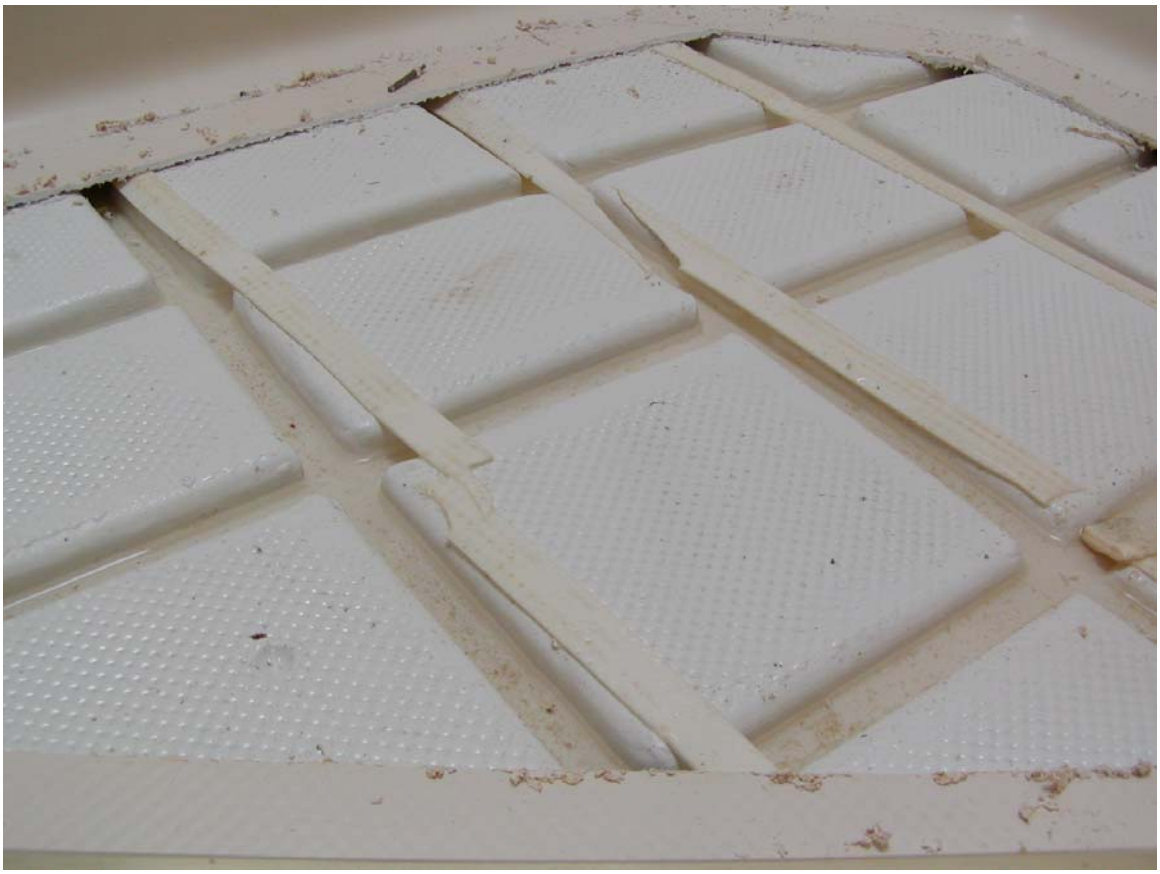
Here is when I discovered that the shower floor is made from un-reinforced plastic, about 1/8" thick. Unlike the FRP panel discussed above, the shower floor is pure plastic with no fiberglass (or other) reinforcement at all. Basically the same stuff that plastic models are made of. When stressed repeatedly, un-reinforced plastic WILL crack. It's only a matter of time.

Below is a photo of the support structure under the shower floor. This is a molded plastic structure, the sides of which wrap up the sides of the shower floor to also serve as the shower catch-pan. This is the part that you can see when you remove the inspection plate under the shower door.

The strips you see are double sided mounting tape, about 1/8" thick. This stuff contributes to the unsupported floor you feel, because it prevents the floor from seating firmly against the support structure. This structure is very flimsy; firm around the edges of the "pillows", but very soft in the center of the pillows. I pressed the center of one pillow and measured a ¼" depression, made just with the pressure of one thumb! This is why your shower floor feels so soft!

Using an un-reinforced plastic shower floor would be adequate if the floor was firmly supported. But with the flimsy support shown below, it's a recipe for failure.

Note the water in the troughs of the pan. About ¼" of water was in the pan, most likely originating from the first crack I patched a year ago, and the new crack I didn't know I had. Once water gets in the pan it has nowhere to go. The pan fits too snugly around the shower floor sides for evaporation to take place.



I thought long and hard about how these pillows could be firmed up. No easy solution presented itself, so I cut out the entire support structure (seen below) with the intent of replacing it with a SOLID structure.

This photo below also shows:

(1) Evidence of water leakage in 4 places. It turns out that the support structure also had stress cracks!

(2) Where the wooden supports are that support the plywood shower pedestal (shown with the X's).

(3) Where I intended to put additional wooden supports under the plywood to add further support to the pedestal. I never did add these additional supports. For my coach, I didn't think they were needed.

This photo is shot looking forward. It shows that the plywood support pedestal is short by about 3". The forward 3" of the shower floor is completely unsupported!

Now that I got to the "bottom" of the problem, so to speak, it was now time to fabricate a SOLID support structure for the shower floor. Instead of the plastic pillows of the original structure, I decided to build up the space with wood. These wooden pieces were sized to come within 1/8" to ¼" of where the bottom of the shower floor will sit when it is bonded back in place. The remaining ¼" or so of space will be made up with an epoxy filler material. An epoxy-based filler was selected because it has several features that are desirable for this repair:

(1) It is impervious to water. Wood coated with this material also becomes impervious to water.

(2) It cures via a chemical reaction, not by evaporation of solvents. In this application I will be sealing the material in enclosed areas. A conventional solvent-based material would never fully harden in this situation, but epoxy will cure in an enclosed area. It will even cure under water.

(3) This material cures with virtually no shrinkage. Because of this I could fill the void under the shower floor, set the floor into place, and be assured that the floor wouldn't be displaced by material shrinkage.

(4) This material is a relatively thin, fiberglass laminating epoxy. Used "straight", it works very well in wetting out fiberglass. Better yet, it can be mixed with a variety of dry fillers to make materials ranging from a lightweight sandable filler to an extremely hard, dense, reinforced filler with seemingly the strength properties of granite, but without the weight. Very versatile stuff!

I'll discuss the materials used in more detail at the end of this document.

The next photo shows the wooden pieces I used to build up the floor support. Three wood thicknesses were required because the shower floor slants toward the drain. ¾" thick pieces were used far opposite the drain, 5/8" thick pieces were used in the center, and ½" thick pieces were used in the area of the drain. Note that 2" wide wooden pieces were fitted under the rim of the shower floor, with any voids filled with an epoxy/glass bubble mixture. The wooden pieces along the upper left perimeter (where the plywood pedestal was cut 3" too short) extend 3" under the floor area to provide the missing support. All wooden pieces were bonded to the plywood floor and to each other with a mixture of epoxy resin and glass bubbles. Glass bubbles were mixed with the premixed 2-part epoxy to get the consistency of honey.

In the photo you can see that I attempted to approximate the channels in the original support structure, so that if any leak occurred, the water would have a place to go. This idea didn't turn out so well as you'll see later.

The next step is to overfill the remaining void above the wood pieces with a thick epoxy/glass bubble mixture. This filler was mixed to the consistency of cake icing. The filler was piled high on the wooden pieces, and the shower floor was set into place. The excess epoxy will be pushed into the channels and will be ground out later.

The whole purpose of this repair is to eliminate all voids under the floor. Since it's difficult to know whether enough filler was used to completely fill the voids, I covered the bottom of the shower floor with duct tape as shown below. The epoxy filler won't stick to the shiny surface of the duct tape, and will allow me to remove the floor after the filler cures to inspect for voids. Any voids will be filled before the floor is permanently bonded into place.

Below is a photo of the area after the filler cured and the floor removed. Note that there are many voids to fill. Also note that the channels between the wood pieces are nearly filled with the excess filler. I attempted to grind out the channels but gave it up as a lost cause. This filler is hard! I decided to completely fill the channels with filler. That means that any water leakage will have no place to go. But I figure that if I do this repair well enough, there won't be any possibility of leakage. I hope!

Below is a photo of all the voids filled, just prior to permanently bonding the shower floor into place. Then about a 1/8" layer of epoxy/glass bubble filler was laid down, the filler having the consistency of thick honey. I also put about 1/8" of filler on the floor piece. Once the floor is set into place for the last time, any excess filler will have no place to go, and the result will be a floor that is higher than the surrounding area. The solution is to drill many ¼" holes in the floor piece. Once the floor is set into place and weighed down, the excess epoxy can escape through the holes.

The floor piece is set into position by starting at one side and laying the piece down so as to eliminate any air entrapment. The floor piece is pushed down to the level of the surrounding floor structure as shown below. You can see the excess filler being squeezed out through the holes.

For cure, the floor was weighed down with a case of Pepsi and a 50-pound sack of rocks. My floor piece had a slight concave shape, so I only had to weigh down the center of the piece. Before walking away, check to ensure that the floor piece is sitting flush all around.

Next, the floor is prepped for the addition of the decorative FRP panel. The excess epoxy on top the floor was sanded down with 36 grit sandpaper on a sanding block.

Since there will be epoxy squeeze-out when the panel is weighted into place, I covered the perimeter of the floor with grey duct tape as shown below.

Not shown are the 3 locating holes I drilled through the panel and shower floor. Once the panel is set into place, nails will be pushed through the holes to keep the panel in place for the cure.

The next photo shows that top side of the FRP panel is protected also with duct tape and plastic.

Next, about 1/8” layer of epoxy/glass bubble mixture is troweled onto the bottom side of the FRP panel. This was mixed to the consistency of thick honey. The panel is then bent into a slight curve and set into place along one edge, with the nails set into the locating holes along that edge. Then the panel is rolled down into place from one edge to the other. This minimizes any air entrapment under the panel. Then the whole floor area is covered in plastic sheeting. As shown below, approximately 200 pounds of gravel was poured on top of the plastic sheeting to evenly compress the panel into place for the cure.

The plastic was pulled up around the edges periodically to scrape the excess epoxy from the perimeter of the panel. Once the epoxy mixture starts to get gummy, it’s important that the duct tape around the panel perimeter be removed. Otherwise, any epoxy that managed to seep under the tape will bond it into place and make removal a real pain.

The final step is to fill the locating holes with epoxy/glass bubble mixture. You can't see them here, but there were two locating holes along the right side edge, and one on the left side edge.

I used no silicone sealant along the panel edge, but you can if you want. Since I'm recommending this repair to others, I used no sealant because I want to test the repair under the worst possible scenario.

The photo below shows the completed repair. My shower floor now feels as if it's sitting directly on concrete.

If you decide to do this repair, please contact me at kayeness@earthlink.net first. I'll let you know how the repair has held up over time.

MATERIALS

In a prior life I used many of these materials in the construction of a 2-seat experimental composite airplane. Although I'm very familiar with the use of these materials, using them isn't very difficult for the beginner.

The epoxy I used for this repair is West Systems epoxy made by Gougeon Brothers. This material is primarily used in the boat building and repair industry. As such, it can be found primarily in boating supply houses along the coasts. Being in Albuquerque, I was unable to find it locally, so I purchased it from Aircraft Spruce and Specialty Supply in Corona, CA. They are the biggest aircraft supply warehouse in the U.S. They primarily cater to individuals who build their own airplanes and are an experienced mail order business. The only problem with purchasing the epoxy from them is that they charge a $30.00 hazardous materials shipping charge.

I carry a kit of West Systems epoxy in the RV, along with a little fiberglass and the filler materials. This epoxy great for repairing or gluing almost anything. For example, my fridge vent cover on the roof had an unfortunate encounter with a tree limb. The hopelessly cracked cover was repaired with West Systems epoxy and a little fiberglass. I'd do the same thing with the AC covers if/when they start to crack.

I know you can purchase fiberglass resin down at the local auto parts store. Can you use this instead? Well, maybe. But that is a polyester resin, not an epoxy resin. Polyester resin is a totally different beast, and it usually has a very short pot life. I have no experience with that stuff. If you use it, you're on your own.

Below is a photo of the epoxy I used.

You can buy any one of several hardeners along with the resin. The different hardeners primarily differ in their cure time. I use the 206 slow hardener exclusively. This hardener will give you enough time before setting up (if you don't dawdle!) to accomplish all steps shown in this document. Pot life is 30-40 minutes if you avoid exotherm. (See exotherm under Hints and Tips.)

If you tackle this project, purchase two, 1.2 quart kits of epoxy. I used a little over 1 ½ kits for the repair. Also purchase a set of pumps (shown above, and sold separately). You'll need the pumps to accurately measure out the epoxy.

West Systems has an outstanding website at www.westsystem.com. There you'll find hints and tips for using their materials. A free epoxy user's guide can also be obtained from Aircraft Spruce. If you've never used these materials before, you definitely need to read these guides.

These guides infer that you must use West System's filler materials (that are mixed with the epoxy), and they are very expensive. For this project the only filler you need are glass bubbles, and this material can be purchased very reasonably from Aircraft Spruce.

Below is a list of what you need. I've included the Aircraft Spruce part numbers so that you can purchase from them if you want. I'm also providing part numbers for other supplies that are needed, like mixing cups, mixing sticks, etc.

Place your order by calling Aircraft Spruce at 877-477-7823, or order online at www.aircraftspruce.com.

West Systems Epoxy with 206 slow hardener (2 kits), kit part nbr #01-08200, $39.00 each

Plus a $30.00 hazardous materials shipping charge per order. Purchase the epoxy at a local boating supply house if you can to avoid the shipping charge. See the West System website for vendors in your area.

Epoxy pumps, #01-00318, $11.50 (or purchase locally with the epoxy if possible)

Glass bubbles (1 pound bag), #01-14600, $6.95

This material is added to pre-mixed epoxy to thicken it to the consistency needed. Exact mix ratios aren't important. Just add the filler until the mix is as thick as you want.

8 oz mixing cups (50), #01-00416, $6.75

Mixing sticks (box of 500) #01-25800, $9.85 (or get tongue depressors locally.)

1" wide disposable paint brushes (10 or so), #09-21200, $0.47 each

Latex gloves (Box of 100), #01-36550, $10.40 (or purchase locally)

West Systems User Manual, #01-08750, FREE

While you're at it, also ask for a free Aircraft Spruce catalog. They carry a wide variety of hardware and raw materials that can come in handy to repair an RV. I particularly like them for metal. They carry a wide variety of formed metal, and most can be purchased by the foot.

If you also intend to make other repairs with these materials, I'd also purchase the following:

Flocked cotton fiber (1 pound bag), #01-14800, $3.85

Like the glass bubbles, this is a dry filler. Added to pre-mixed epoxy, it makes a very dense, very hard reinforced glue/filler that can be used for a variety of repairs. Can also be mixed along with glass bubbles to get a glue/filler with a combination of properties.

Bidirectional 8.8 oz fiberglass cloth (2 or so yards), #RA7725, $5.70 per lineal yard

This is a medium weight fiberglass cloth for making a variety of repairs. If needed, a lighter weight cloth can be purchased in most auto parts and home supply stores. You'll usually find it with the Bondo.

HINTS AND TIPS

This document is not a primer on the use of epoxy materials. However, I'll provide a couple of tips.

First, thoroughly read the guides on the West System's website and/or the free West Systems User Manual. They will give you the information you'll need to use these materials successfully.

Preparation of the surfaces to be bonded is critical. Epoxy primarily provides a mechanical, rather than a chemical bond. It's essential that any surface to be bonded be thoroughly cleaned of all dirt and oils. Then the surface must be scratch-sanded with 100-grit sandpaper (minimum) before bonding. 36-40 grit sandpaper is even better. If you're bonding to a previously cured epoxy coated surface, then that surface must also be thoroughly scratch-sanded.

Any surface to be bonded with an epoxy/filler material should be given a light brush coat of pure epoxy before the epoxy/filler is used for the bond. Pure epoxy gets into your properly scratch-sanded surface much better than a filler mixture, resulting in a stronger bond.

If you're bonding wood, really slather pure epoxy onto the wood before bonding. The wood will absorb much of it. The more it absorbs, the better the water resistance and the better the bond.

This epoxy will exotherm. Mixed 2-part epoxy gives off heat when it cures. Heat also speeds the cure. So if you mix epoxy and let sit in a cup, the heat generated will build up, which further accelerates the cure, which creates more heat, and so on, to the point that the epoxy can actually start to smoke. You'll have a bubbling, smoking cup of hardened epoxy on your hands in just a few minutes. The solution is to keep stirring the mixed epoxy, or add filler material to it, or remove it from the mixing cup and spread it out so that it can dissipate the generated heat.

If you have any questions, you can contact me at kayeness@earthlink.net.

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'99 Fleetwood Discovery 36 T