



WORLD CHAMPION BOATBUILDER FOR OVER 40 YEARS

4737 Adams Road, Chattanooga TN 37343 (423)875-0740 Fax (423)875-4011

www.optistuff.com

9/2012

REPAIR OF GELCOAT AND OTHER SECRETS OF MAINTAINING YOUR BOATS FINISH

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We are here to help you. Please call us if you need further instructions: 800 784 6478

HELPFUL TOOLS

1. Gelcoat: from manufacturer of boat for perfect color match. Refrigerate or freeze for longer life.
2. MEKP: catalyst. Treat this as you would acid. If it gets in your eyes it could blind you.
3. Dremel tool with ball end cutter, nail, razor blade, knife or another method to clean out the repair.
4. Mixing Container: Waxed paper cup is the best. Wax dissolves & seals repair so it fully hardens.
5. Newspaper to keep everything clean.
6. Stir sticks: tongue depressors, Popsicle sticks, something small to stir with.
7. Paper towels or rag.
8. Acetone for cleanup.
9. Latex gloves to keeps your hands clean.
10. Plastic Tape: I prefer 1" green or yellow 3M fine line tape from an automotive store.
11. Nail, screw or other pointed tool for application.
12. Sanding block: hard, flat and sized to fit your repair.
13. 320, 400, and 600 grit wet / dry sand paper.

Optional:

Buffer and buffing compound such as 3M super duty or rubbing compound.

Preval sprayer. A \$10 compressed air sprayer found at hardware and auto body supply stores.

B: BASIC GELCOAT REPAIRS

1. **A CHIP**: Found along the rail, chine's and corners of the boat, leading and trailing edges of foils.
2. **SCRATCH**: Usually found on the bottom of the boat. If very shallow they can be wet sanded out and blended into the surrounding area. Deeper ones, especially with glass showing, should be repaired by filling with gelcoat.
3. **SHATTER CRACKS**: Many times shatter cracks are best left alone. A boat hitting a pilling very hard may have a chip. But if you look closely there maybe fine cracks going out in all directions. Shatter cracks usually go out much further than you originally suspect. 20 to 30 inch is not uncommon. These cracks usually go through to the fiberglass and require that the gelcoat be removed down to the glass. The repair can require spraying to make the boat look like new.
4. **A HOLE**: This requires a structural repair, removal and replacement of fiberglass then spraying the area with gelcoat.



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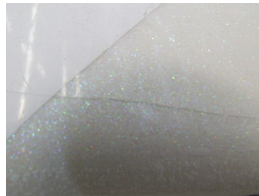
Both the **shatter crack** and the **hole** are **best done by a professional** who has the experience and equipment to do this type repair.

C: BASIC STEPS TO A REPAIR

1. **Protect unaffected areas.** Use newspaper on the floor of the boat for instance. Why mess up what is already perfect?
2. Using a Dremel tool **get out the bad gelcoat.** While the Dremel tool works best any device like a nail or knife will work. There may be large pieces that are no longer adhered to the sub-straight. These can be seen if you look closely. They usually go flying when the Dremel tool touches the defect. Bevel the edges to slope into the repair area so there are no ledges. If you see cracks take the gelcoat in that area down to the sub-straight. If you don't the crack may reappear. A chip or scratch does not require total gelcoat removal.



Hair line crack



Scratch you can sand out

3. **Remove dust and moisture.** If you suspect moisture dry with acetone or a hair dryer.
4. **Mix about ¼ to ½ inch of gelcoat** in the waxed paper cup with 3-7 drops of MEKP. Stirring mixes in the MEKP and dissolves wax off the cup. The paraffin rises to the top of the repair sealing it off. You can also use candle wax shavings for the same effect. Gelcoat is formulated so the surface remains tacky until the fiberglass and resin is applied when the boat is originally made. You may have heard of additives like “sanding aid” or putting tape, PVA and waxed paper over the repair. With the waxed paper cup the repair will harden without the surface staying sticky. Too much MEKP will prevent the gelcoat from hardening, change the color, and can generate air bubbles. Too little MEKP will just take longer to harden. With gelcoat from the manufacturer the repair should be a perfect color match.
6. **Fill the repair:** Use a nail, dipped in the gelcoat, to scratch around in the repair assuring good adhesion and filling all the voids. Sort of like a dentist filling a tooth. He doesn't just drop a big glob in place. Make sure you over fill the repair and that the gelcoat goes outside the edges. Gelcoat shrinks 25% by volume. If you do not over fill the repair area when you sand down to the original surface there will be low spots and the edge of the repair will show in some places. Look for air bubbles and pop them with the nail. Getting the air out is very



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important. The air bubbles will sand out as pinholes. Putting on too much gelcoat will require a little more sanding but is more desirable than doing the repair twice.

- 7. Repair of Metal Flake Gelcoat** This is a 2-part repair. First Dremel out the repair as above. Then apply the background gelcoat being careful to not fill in the repair completely but just give the repair the background color. Once the background gelcoat is fairly hardened, add the clear gelcoat with the glitter mixed in. Make sure you over fill the repair as it shrinks as mentioned above. From this point sand and buff as normal.
- 8. Clean up any mess** you made with a paper towel and acetone. Save the mixing cup to see how well it hardens. The cup will harden before your repair because of the volume of material.
- 9. Wait for gelcoat to harden.** Over night is best. Heat, such as a hair dryer on low will accelerate the hardening. Over heating to shorten the hardening time can cause discoloration and shorten the life of the surrounding gelcoat. When hard you should not be able to indent the repair with your fingernail. If you sand too soon the gelcoat will shrink below the surface, the edges of the boundary area will show and dirt can get imbedded in the repair surface.
10. If the **surface is still sticky** on top but the gelcoat is hard underneath, as shown by the finger nail test, wipe off the tackiness with acetone. This will keep your sand paper from gumming up.
11. **Tape off the area around the repair.** The purpose of the tape is to protect the area around the repair from the sand paper. A professional works without tape but for novices the repair will come out better with it. It will also help keep you from sanding too deep and going through the gelcoat in the surrounding area. Stay close to the repair. Make sure the tape extends outside the sanding area or it will curl up.
12. **Choose your sanding block** well, a small block for a small repair. The block should be hard and smooth. A small block of wood or hard plastic is best. 3 X 5 inch commercial rubber sanding blocks are for fairing something that is already smooth like the boat bottom and they are too large for repairs. The rubber is too soft and flexible to recreate a flat surface. It will cause dishing out or low spots around the repair. Inside corner repairs are difficult and usually require special shaped blocks, dowel, pencil or hard thin rubber in the case of large inside curves. You will need to put more thought and time into this type of repair. Cut the sand paper so it fits the repair. Your objective is to limit putting anything but 600 grit scratches outside the repair area. An oversize block or large uncontrolled piece of sand paper will not achieve this. Shown below is a good way to fold the sandpaper and hold the block. As you go over the repair the exposed wood on the ends of the block will hit the good gelcoat so the sand paper does not put unnecessary scratches on the original surface. The paper can be folded and refolded to use its entire surface.



Leave the tape in place and start sanding with the 320-grit paper. A little dish soap in the water will help cleanse the sand paper as you work. Use lots of water. Note: You want the sanding to end up at the original surface, not above or below it. Watch what you're doing as **this is the critical part of the repair**. Dry the area frequently as you approach the tape so you can see and feel where you are. Stop the 320 just before reaching the tape. Use 400 to get



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down to the tape. Remove the tape and expand your area of sanding with 600 grit to come down to ground zero and blend in the repair. The purpose of the grits in wet sanding is speed. Each finer grit must remove previous coarser grit scratches to the point that they are totally removed. 600 grit-sand paper scratches can be removed with buffing compound bring the area to a shining luster. 400 grit scratches cannot be buffed out. Sand randomly or you can cut grooves and dish out the repair area. White is the most forgiving color. Dark colors like blue, black and red may require sanding with grits up to 1200 to allow the buffing to totally bring back the gloss. Edges like the outside edge of the boat tend to sand through the gelcoat easily because half your sanding block is unsupported in the air. If you mentally think about not putting pressure on this edge and apply more pressure above the edge you can avoid sanding through. On a two side corner repair like the bow or chine's, sand the two flat surfaces first than recreate the shape or roundness of the corner last.

If you see a shadow below the sand area you are about to go through the Gelcoat and into the glass and resin. Since the gelcoat originally was sprayed on it varies in thickness. 18 mils is standard but sometimes the gelcoat is thin and once you get outside the repair it is very easy to go through. In this case leave well enough alone or the area may need to be sprayed. At McLaughlin we always spray black gelcoat behind lighter colors like white. Black helps us visually see entrapped air and get it out. So if you come to black you are just about to go through the gelcoat.

13. **When buffing** it may take 3 or more applications of the compound and buff offs. Do not burn the gelcoat, keep the buffer moving. Make sure there is compound present or you are just wasting your time. On small repairs you can put the compound on a towel and rub it with your finger. It will take a little longer but you can polish the repair by hand. A little wax on top will go a long way toward bring out the luster.

Do not use Epoxy and Marine Tex. except for non-visible structural repairs. Why? Epoxy sticks to polyester, but polyester will not stick to epoxy. Therefore all future repairs have to be made in epoxy. The epoxy is not the same color and does not look good. Why mess the boat up forever when you can make it look like new? Epoxy is much harder than the gelcoat. When you sand the epoxy the existing surface around the repair will dish before the epoxy is flattened. Last epoxy expands and contracts at a different rate than polyester as the temperature changes. Eventually you will be able to see and feel the edges of the repair.

Do not use 3M 5200. It is a good sealant and bedding compound but while it is called adhesive it does not perform anything like epoxy or gelcoat.



Spraying Gelcoat: With a Preval sprayer it is easy to spray gelcoat. The surface must be clean and sanded for the gelcoat to adhere. The problem you will encounter is the gelcoat is too thick to go through the nozzle. Put the un-catalyzed gelcoat in the bottle and add acetone to thin it until it sprays well and then add the MEKP catalyst.

When you go to **Sell Your Boat** and you want it looking its best. Wash it and then use Johnson's Pledge furniture polish to make it really shine and hide minor scratches. This works especially well on colored decks.



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Hull Deck Separation

A crack can form in the joint between the hull and deck when the rail receives a very hard impact, usually in the bow. McLaughlin uses Methacrylate adhesive in the bow and other high stress areas. The adhesive is flexible and will never break or crack. Still with a hard impact the fiberglass may break away from the adhesive. The remainder of the deck joint is filled with an adhesive specially formulated for decking to produce a high strength rigid hull. This is a structural repair. You want to use epoxy, Methacrylate or some other structural adhesive. The runnier they are the better to get into the joint.



Turn the boat upside down (See below). Protect unaffected areas. Using screw drivers or thin wedges like sharpened Popsicle sticks open up the crack about a 1/8 inch. Clean out loose material. Particularly any particles that might prevent the gap from closing up when clamped back together. Make sure the area is dry. Find a tool like a sharpened Popsicle stick that will act like a putty knife to force the adhesive into the crack. The better you can coat the 2 sides of the crack the stronger the joint. Normally the crack will close tight when you remove

the wedges. If the joint will not go together on its own use clamps to hold until the adhesive hardens. Cleanup as much of the area as you can. The excess epoxy will not release when hardened. After completion sand the rail to remove any roughness. Now do the gelcoat repair if there is any.

To add even more strength to the bow you can use overlapping, short, two-inch strips of fiberglass tape or mat to glass the hull and deck together on the inside. Sand the area first. While you can use polyester resin, epoxy is structurally stronger. This procedure can really cause a mess. Be sure to cover the inside bow area with newspaper to prevent this. To glass the hull and deck together you will need to get the boat high enough so you can get under the boat and work.

Midship Frame to deck connection

IODA made a poor design in this area. Initially the builders were not supposed to join these two parts. Then IODA changed their mind. McLaughlin used polyester adhesive and later switched to Methacrylate. If this joint separates it can be left unattached without doing structural damage. Fixing it takes a very strong adhesive like epoxy or Methacrylate adhesive. The material must be thick to stay in place and fill the gap. If you cannot find a thick adhesive try adding micro balloons or baby powder to it. 3M 5200 will not work. Do the repair with the boat upside down. Protect the deck from spillage.

Broken out Mast Collar See pictures below. This is not complicated or difficult.

Usually this repair just requires replacement of the collar itself but if the glass and foam are broken or the hole is opened up to much use one of the epoxy clay bars to fill in the voids. You will find these at most hardware stores. The catalyst is internal to the epoxy. You just squeeze and blend it with your fingers to activate. In a sever case where the hole is really wide you can use a new collar inserted up from under the deck as a form to hold the perfect shape while the epoxy hardens. The epoxy clay does not stick to the plastic but be on the safe side take any type oil and wipe it on the plastic. Even olive oil works. Clean out the broken glass and foam. Make sure the area is dry. Push the epoxy into the voids and even the screw holes with your fingers. Wrap epoxy around the collar and shove it upward from under the deck completely filling in all the spaces and voids. Scrape the top surface so the epoxy is flush with the top of the mast thwart. Once hardened carefully tap the plastic collar and it

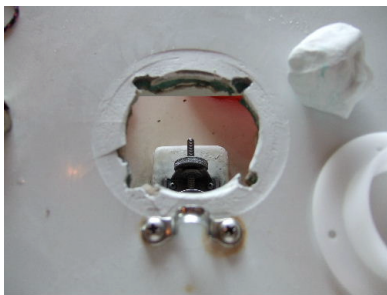


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will release from the epoxy and drop out below leaving a perfectly sized hole. The collar you just used as a form is your new collar. You may need to hand sand the hole a little to get the new collar to drop into place. But the tighter it fits the better. Use a block of wood and hammer to force the collar into place. Also make sure the upper deck surface is flat so the collar sits flush. **Caution:** The Optiparts/Optimax logo imprinted in the plastic should be parallel to the centerline of the boat. You may not realize it but this hole is not round but oval. This allows fore and aft movement while eliminating side movement of the mast. Drill the 4-holes at a slight outward angle so that the washers and nuts have space underneath to be attached.



Hull discoloration and cleaning

Many times you will return from a Regatta and find your white hull with an ivory tan discoloration. What cause this are oils and minerals in the water. From experience Lake Pontchartrain is one of the worst. Restoring the gelcoat to bright white is easy and effortless. Products such as On & Off, West Marine Heavy Duty Hull Cleaner and my favorite Starbrite Instant Hull Cleaner require simply wiping on and rinsing off. No elbow grease required! They contain an Oxalic acid that removes the rust and other stains without harming the Gelcoat. A coat of Teflon polish before the event will keep the hull clean and retain its color while increasing hull speed. (Never use wax!)

Maintaining the Luster and Restoring Oxidized Gelcoat

Oxidation on fiberglass occurs over time due to salt, water and sunlight hitting the surface. Using a boat cover also helps prevent this and is a good investment. The technology to prevent this is forever improving. A West Marine advisor, 800 621 6885, is an excellent place to learn the latest solution to your problems. If you can wet the surface with spit and the color returns you have a chance of restoring the original color and luster.



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Here is one of many solutions. Compound the surface with a polisher with a speed of 1000 to 3000 RPM. Faster speeds or staying in one spot too long will burn the gelcoat. The preferred tool used in the industry is a Makita. It may cost you \$200 or more. Use a compound such as 3M – 06044. It may take several applications. With compounding you are actually sanding off the surface oxidation without creating scratches. Next finish the buffing with a product like Finesse-it II 3M-09048 to really shine it up. Use a buffing pad such as 3M 05705 Super buff. This pad has 2 sides. Use one side to compound the other to finish. You can wash the pad in a washing machine but let it air dry. You will need an adapter mandrel for this type pad. Now wax with any automotive or marine wax. 3M-09030 Marine Ultra Performance wax is excellent. See below. The 3M products can be found a body shop supply store Wax the surface about twice a season to keep the shine and avoid repeating the process. If you start waxing early in the life of your boat you will help prevent oxidation dulling of the colors. **If you are a racer do not wax the hull bottom.** Wax creates surface tension and beads water, which creates drag. Teflon polish does not cause beading. Only wax the deck and the upper portion of the sides that see sunlight.

Hull Speed -To Wet Sand or Not?

From experience straight-line wet sanding the bottom of a hull with 800 to 1200 grit wet-dry paper is fast but not recommended. In a very short time the pores that open up from wet sanding will facilitate adhesion of algae, dirt and promote oxidation. It requires that you keep the hull super clean and wet sand several times a season. If you do not the hull will actually slow down. A much better solution is to use a chemical coating made for speed. In recent years several companies have brought out polishes with a Teflon additive. I am not positive these Teflon polishes make you faster. What I do know is the hull stays cleaner, nothing sticks to it and that is fast. **But Watch Out** when you capsize the boat (Not Fast!) you will have trouble climbing up on the centerboard, as it is very slick. Also the boat will slide off a trailer in a heartbeat. I have seen many MC Scows, including mine; end up on the ground as we were driving to the launch ramp. The polish is much easier to apply then normal car wax. Starbrite, West Marine and Harken/McLub are brands we are aware of.