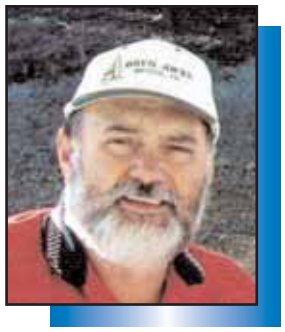


Dealing With Blisters

Paul Esterle has been building or repairing watercraft, of all descriptions, for longer than he cares to admit, from hovercraft to power and sail boats. Paul specializes in boat improvement and repair projects utilizing wood, epoxy, and fiberglass. If you have any questions about your boat project, contact Paul at pesterle@comcast.net.

by Paul W. Esterle

I knew I had a blister problem as soon as I pulled the boat in Tennessee to prep her for hauling there - not a catastrophic problem but a problem nevertheless. There were about two dozen or so large blisters on each side. It wasn't unexpected; she had been sitting in warm, fresh water for almost eight years. That environment is the worst possible situation for developing blisters in a fiberglass hull. I decided to put her on the hard when she arrived here so that I could get started on the blister remediation.

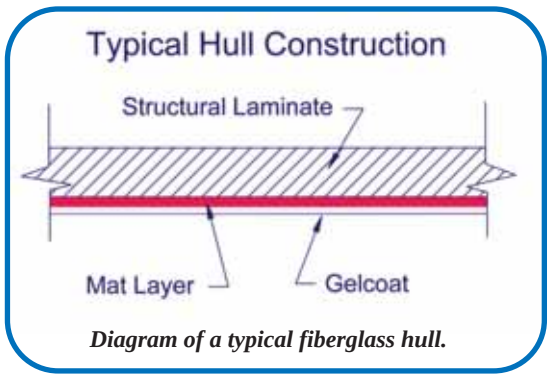
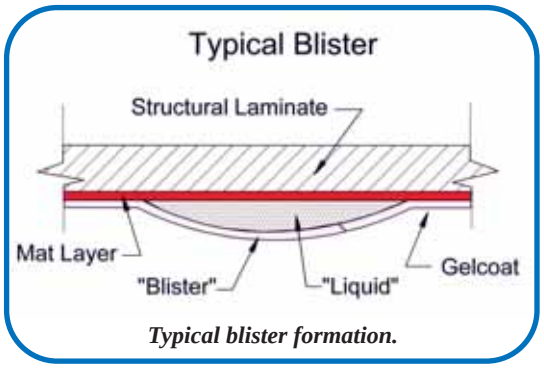


Diagram of a typical fiberglass hull.

Blister Causes

Blisters have been blamed on just about everything including sunspots. The blisters typically develop between the gel coat and the initial layer of fiberglass mat. Fiberglass construction is not as impervious to water as first thought. Water vapor can migrate through the pores of the gel coat. When that water vapor finds a weak spot in the bond between the gel coat and the mat layer, it forms a blister.

That weakness can come from a host of problems: resin poor laminations, improper resin mixtures, contamination of the gel coat before the mat lay-up, and poor resin quality, to name a few. The water vapor mixes with chemicals in the fiberglass and forms the liquid in the blister. That liquid is under pressure and forces the gel coat away from the mat layer. (The layer of mat is used to keep the fiberglass woven reinforcements from "printing through" or showing on the outer surface of the gel coat.)



Typical blister formation.

Many modern boats use vinylester resins below the waterline to prevent blister formation, quite successfully. Those of us with older boats aren't so lucky. The blisters can range from a few on each side to massive numbers covering the complete bottom of the boat. There are a few instances (certain models of Valiant sailboats, for example) where the blisters affect the topsides,/ as well. Luckily, these are few and far between.

Mild cases of blistering can be fixed by repairing the individual blisters. In a worse case scenario, the gel coat and mat layer are removed by grinding or "peeling" and new bottom reinforcement is applied. The reinforcement is needed to build the hull back up to its original thickness and strength.

Blister Remediation

I started the repair process as soon as the boat was out of the water and on jack stands. The blisters were evident as bulges in the hull. I circled them with a magic marker. It is important to mark them while the hull is still wet and the blisters at their largest. As soon as the hull is out of the water, it begins to dry and the blisters will shrink and be harder to spot.

I planned to remove the bottom paint, repair the blisters and then apply a barrier coat to the hull. This meant the markings would disappear when the paint was removed. So, once I had all the blisters marked, I drilled each blister with a countersink bit in my battery-powered drill. This accomplished two things. First of all it marked the location of the blister. Secondly, it opened up the blister and allowed the liquid inside to drain.

Be sure to wear eye protection when doing this. The liquid inside the blister is under considerable pressure and will spurt out. It is a nasty concoction and you do not want to get it in your eyes. I let the blister drain and start drying out. Actually, I left the boat to sit for well over a year as life, other projects and some medical emergencies occurred. By the time I returned to the project, the blisters had drained and the hull was smooth again. Only the countersink holes marked their locations.

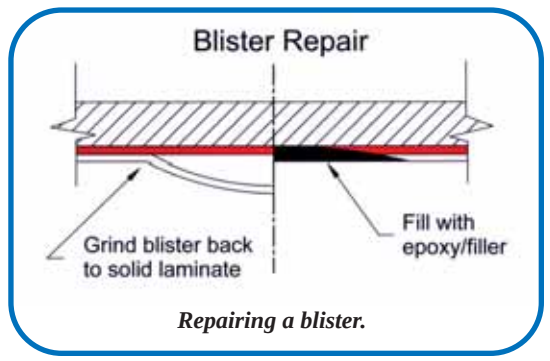
I originally had thought that I would remove the bottom paint using paint stripper and scrapers. I actually did about six feet of one side of the hull before I came to my senses. Apparently, the hull had never been stripped before and it had remnants of every coat of paint it ever had. I decided to have the hull blasted to remove the paint.

I had several choices for a blasting process. Dry ice blasting uses dry ice pellets to clean off the paint. It is probably the least aggressive method of bottom blasting and probably the most expensive. Soda blasting uses sodium bicarbonate (baking soda) as an abrasive. It is also less aggressive on the gel coat. The final option is sand blasting.

Sand blasting uses sand as an abrasive medium. It is more aggressive than the other two methods. Because of the blistering, I wanted the more aggressive method to attack the blisters. In the hands of an experienced operator, the sand blaster is almost a precision instrument. My yard did the sandblasting for me.

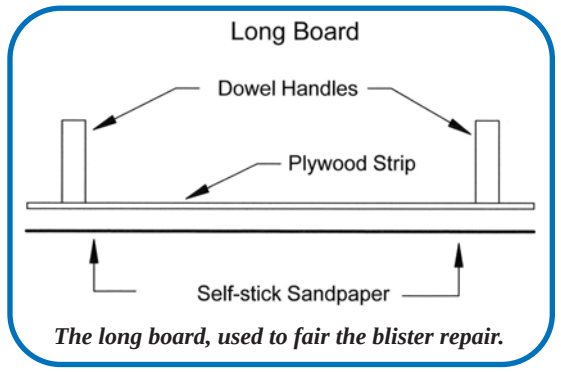
They did a small section of the hull at a time. They initially worked on each blister in the section, concentrating the force of the sand on the countersink mark. This opened up the blister and helped clean it out. Not all the blisters were completely dry. A few still contained remnants of the blister liquid. The high-pressure air forced the liquid out and restarted the drying process. They then did the remainder of each section, leaving the gel coat intact with a smooth satin finish ready for the barrier coat.

The next step is to grind out the blistered area. The rough size of the area to be ground out can be determined by rapping on the hull with a knuckle or a small hammer. An undamaged hull will sound one way, while the loose gel coat will sound hollow. Each blister is ground out in a dish-shape with tapered sides. The edges of the hole, where the gel coat meets the mat, should be firmly bonded. One way to test this is to try to insert a thin knife blade between the two. If you can insert the blade, you need to grind back a bigger area.



Repairing a blister.

Once all the blisters are ground out, wash them thoroughly with water and detergent to remove any remnants of the blister liquid. The hull is then left to dry. Attempting to patch the hull before it is dry is a recipe for having to do it all over again at a later date. Let the hull dry completely. If you have access to a moisture meter, take regular readings of various parts of the hull until the readings stabilize. If you don't have a meter, tape a square of plastic over a blister and let it sit. If there is still water vapor, it will condense on the plastic. When no more condensation appears, proceed with the blister repair.



The long board, used to fair the blister repair.

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