

DIY FIX IT

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This is part two of a two part article on making basic repairs to your PT. In this part, repairs to foam composite boats are addressed.

FOAM SANDWICH SKINS

This method describes how to repair punctures in skins from small holes up to large fist sized fractures. Larger areas larger will be repaired in a similar manner, but become problematic due to curvature of the hull. You will require basic skills in GRP work. It is also very handy if you can spray paint and collect some specialist items.

Firstly you will need a piece of "Divinicell" foam sheet the same thickness as the core, probably 4 to 6mm thick. Try any "boat builder type" and you should be able to pick up a suitable offcut. Next, some polyester resin and hardener, and for the top coat, "Flowcoat" coloured to match the boat. The last thing needed is fibreglass cloth, around 100 gsm (grams per square metre), four times the area of the repair. Also required are some mixing containers, small brushes, eye protection, masking tape, a bit of plastic sheet, and some acetone would be handy. A 100mm angle grinder with a diamond blade will be very useful, otherwise a new sharp hacksaw blade will do the job.

To begin, mark around the fracture with straight lines to encompass all the broken bits and get back to pristine structure. Make the markings in a random pattern (not square) and try to keep each line about a minimum 75mm long, which will allow the grinder to penetrate efficiently. The less complicated the shape of the cut out, the easier the next steps will be.

Take the grinder and plunge it into the hull on the marked lines at an angle of about 45 degrees to the hull surface, cutting all around to remove all the broken pieces. Inspect inside [torch and mirror] to make sure all the fractures are removed. If not, re-mark and re-cut. The precision of this cutting will make fitting of the patch easier.

The next step requires a very delicate hand, as you will find diamond saws are not forgiving when used. Veery carefully, feather the existing gel coat and fibreglass back away from the cut to expose a margin of around 10mm to 15mm of bare virgin foam, another 10mm to 15mm of the fibreglass laminate, and finally the same margin of gel coat. Be extremely careful not to cut into the surface of the foam.



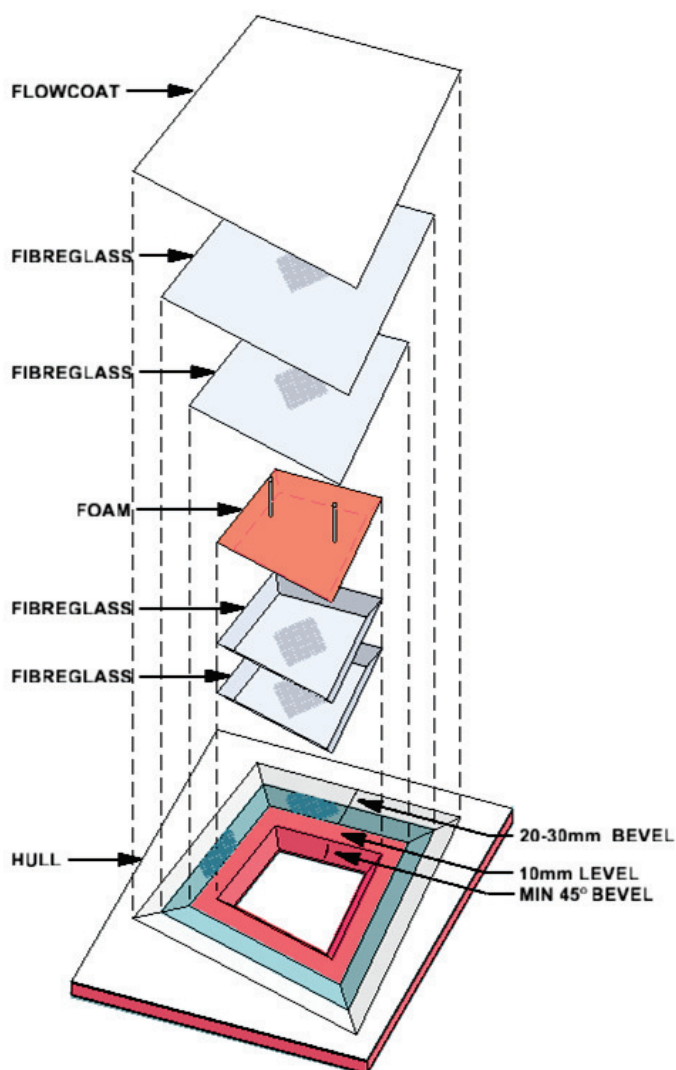
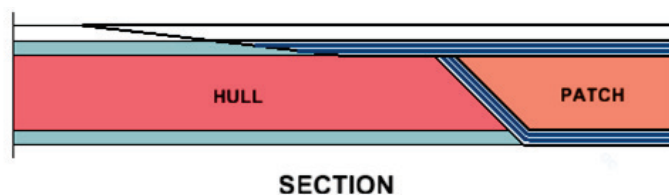
Now cut the foam sheet to intimately fit the cut out. The accuracy of the fitment of the foam will determine the overall integrity of the repair, so be very careful and do it bit by bit to achieve a perfect job. When the patch is placed in the cut out, you need the surface of the patch about 3 thicknesses of paper lower than the already exposed surrounding foam.

Cut 2 layers of fibreglass cloth to mimic the shape of the patch and allow no more than 10mm extra all round. Place the two layers of cloth on the inside of the foam patch, mix the resin and apply to the cloth, moulding them over the 45 degree edges. Wet the edges of the cut out with resin, then pick up the patch (holding it with a couple of strategically placed dressmakers pins on the outside). Now place it into the cut out so that the foam surfaces of the patch and the boat are flush. The patch might stay in place, otherwise pin it around the edges as required. When the resin gels sufficiently, (don't be too anxious here) trim the excess cloth away with a new blade to be flush with the foam surface. After the resin sets, this margin can be carefully sanded to remove any fibres left sticking up.

Now cut the outside pieces of fibreglass. Make the first layer big enough to overlap the join in the foam up to the original lamination, then cut the second layer to come up to the margin of the gel coat. Place these on together dry, so positioning can be achieved accurately, then wet out with resin using just enough resin to only fill the weave. Remember that you can add resin to the job easily, but to take it off after is much more difficult. The best way of applying the resin is to wet the brush and stipple the bristles directly onto the job. This way the fibreglass will not move around, and resin application can be controlled specifically without puddles of resin in between each layer. After this cures (24 hours), sand off any wayward fibres, which might be protruding, to above the finished gel coat level.

Finally, the finishing gel coat is applied. You will find this the most difficult step in achieving a fair and cosmetic result. Spraying is the preferred method, otherwise brushing can be done, but this will require more sanding and polishing. Either way, firstly mask the surrounding area about 50 mm away from the repair with packaging tape or good old office sticky tape (this is nice and thin) and newspaper for another 1 metre all around. If spraying, cover any other bits and pieces nearby with drop sheets as, when sprayed, the resin mist in the air stays wet and wafts around to fall on things. Yes it will stick to anything around that you do not want it to, including your lungs, so wear a mask. Sand the exposed existing hull gel coat, with no coarser than 400 grit paper, up to near the masking tape. Be a bit more aggressive with the sanding toward the new

laminations to take the surface down a couple of thicknesses of paper, then wash the surrounds with acetone.



Without going into a spraying lesson at present, spray the area with successive applications, "wet on wet", covering the low parts first to "build up" sufficiently to make good to the surrounding original gel coat level. It would be preferable to have the sprayed surface horizontal if possible to avoid an uneven thickness of spray due to runs, even to the extent of putting the boat on its side. Take the masking off immediately spraying is finished.

Let the gel coat cure for a couple of days before you sand with 600 grit wet at the margin then 1200 grit overall before polishing with "Brasso". If the spray finish is OK to the eye, then sanding is only necessary around the outside to feather to the original gel coat finish.

MINOR SURFACE DAMAGE

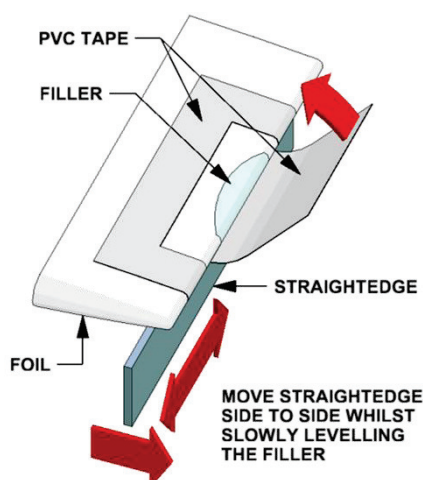
Minor dings, which only damage the gel goat and perhaps the top layer of glass, can be repaired in the same way as described for surface damage repairs in the previous article on timber boat repairs.

Before starting the repair, the surrounding area should be protected with adhesive plastic sheet or PVC tape. Remove any loose or cracked material and lightly sand and bevel back the damaged area to give a good bonding surface for the filler.

Mix just enough colour matched gelcoat to fill the damaged area and apply it carefully up to the edge of the repair. Toothpicks, matches or kebab skewers are good tools for this job. Avoid forming bubbles in the mix as these will spoil the surface finish. Stick the edge of a piece of wide PVC tape to the hull adjacent to the filler, then use a straightedge to work the tape over the filler, moulding it to match the hull surface as you go. Once the resin is set, check that there are no depressions. Sand and top up if necessary. Once the filler has set, sand and polish the repair as described earlier.

FOIL REPAIRS

Minor damage to the centreboards and rudders is dealt with in a similar way to minor hull surface damage. If the damage is on the leading or trailing edges, bevel the edges of the damaged area to give a longer bond area. Now mix filler and pigment to match the foil colour and proceed as above to fill the damaged area, using PVC tape and a straightedge to form the filler around the edge to match the shape of the board. When the damage is properly filled, carefully sand level with the foil surface, then polish.



If the damage is more severe, rebuild the foil with foam (or lightweight timber) then repair the surface fibreglass and gelcoat layers as described in the section on foam sandwich skin repairs.

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OLDER BOATS

If you have an older foam sandwich boat that spends a lot of time outdoors, you will find that gelcoat has a limited life. Once re-polishing is no longer effective, or variable colour fading between the original hull and previous repairs leaves your pride and joy looking a bit ordinary, it may be time to consider painting. One of the advantages of paint is that any fibreglass repairs that you have to do don't have to look immaculate, they just have to be finished off smoothly enough to be invisible once painted over.

Two-pack polyurethane paints give an excellent, durable, finish and are being used by some boatbuilders instead of gelcoat these days. However, they require good spraying equipment and a skilled operator (as well as serious health precautions) to achieve a good finish. There are simpler ways though to achieve an acceptable finish with conventional marine paints.

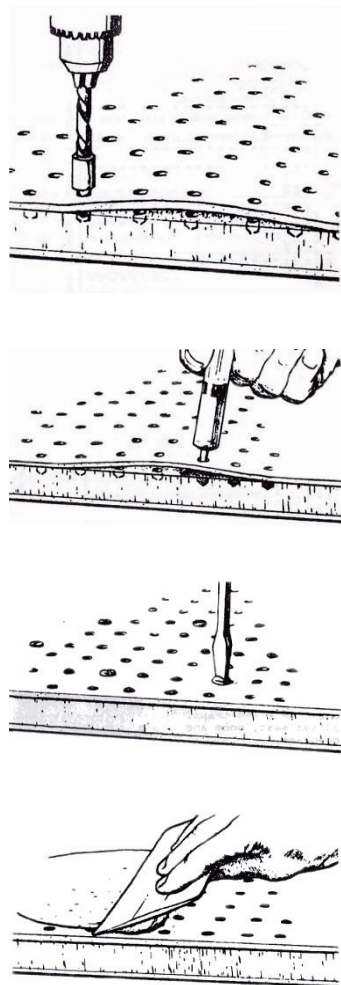
The "Norglass Paints" website (for example) <http://www.norglass.com.au/how-to> explains how to deal with perished gelcoat using paint finishes. Unfortunately, a lot of modern paints have ridiculously fast setting times, which make a good brush finish difficult to achieve. Adding "Penetrol" to oil-based paints slows the drying process down and helps the brush marks to level out. Paint adds weight, so sanding off some of the perished gelcoat (without going right through it), will help reduce the weight gain.

So, how might repairs to painted boats differ from those for unpainted ones? Well, as the repair is protected from sunlight by the paint, epoxy resins and fillers can be used. Epoxies create strong bonds with the resins used in foam sandwich construction but don't like ultraviolet exposure. Also, there is not the need to leave a gap between the repair and the hull surface for a layer of pigmented gelcoat (a fiddly exercise). This makes repairing and finishing off an easier operation; definitely an advantage if you are not a craftsman.

The "West Systems" website (for example) <http://www.westsystem.com/ss/assets/HowTo-Publications/Fiberglass-Boat-Repair-and-Maintenance.pdf> gives a very comprehensive coverage of fibreglass repairs using epoxy/fibreglass techniques. Whilst a lot of the information is based on repairs to larger boats, there are certainly ideas which are applicable to PTs.

Section 2.2.1 addresses methods of matching gelcoat repairs to the original finish, while Section 2.2.2 addresses appropriate paint finishes if gelcoat matching is not effective.

Section 4.2.2 addresses the use of a fibreglass backing patch to reinforce hull and deck repairs (similar to the ply one described in the previous DIY article on timber hull repairs). This can also be a useful technique if a section of hull is to be removed and reinstalled in order to gain access to internal damage such as centrecase leaks or split decks (see pics opposite).

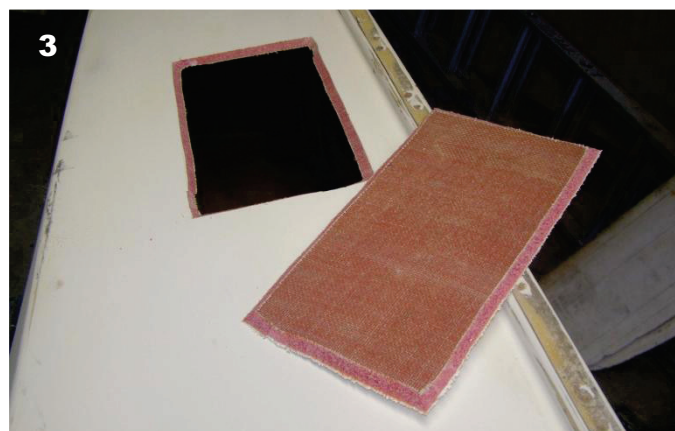
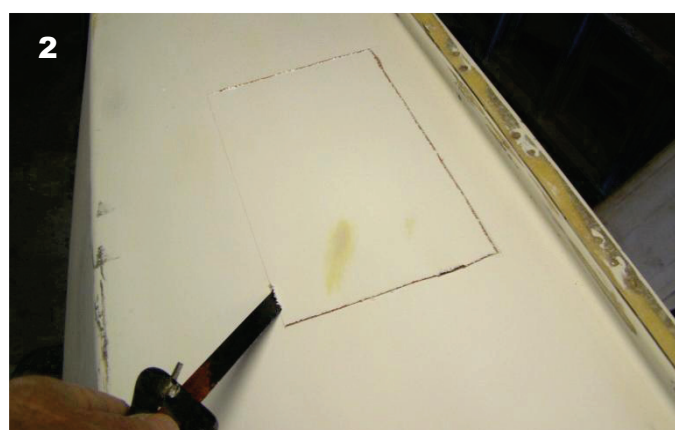


Section 5 gives information on repairing delamination of the fibreglass skin. Delamination tends to occur more often in older boats and is identified by flexible bulges in the hull surface. The method described is based on a balsa core material but is certainly adaptable to foam core boats, as I discovered years ago.

The process involves drilling a series of holes through the fibreglass to just beyond the loose area. Then thickened epoxy resin is injected into the holes, starting at the centre and working outwards. The skin is temporarily held down with self tapping screws until the resin sets. Then thickened resin is injected into the screw holes and a trowelled into the other holes with a plastic squeegee.

Section 7 describes methods for reinforcing the hull in areas where fittings are attached. Filling the core, where screws and bolts pierce the hull, is a good way to prevent moisture entry into the core material. It also prevents crushing of the panel and loosening of fittings that are under load.

If acquiring foam for your repairs is an issue, plywood can be used as the core material (and the backing piece, but seal it). If you don't have an angle grinder, GENTLY saw a 1.6mm drill sideways along the line to create a starter slot for the hacksaw blade (Pic. 1). Angle the



blade at the corners to allow for the bevel (Pics 2 & 3). A backing piece is recommended when replacing the patch. If the patch is in a high impact area, carefully sanding the gelcoat back to (not through) the glass layer along the patch joint and adding 25mm wide fibreglass tape is advisable. Then use epoxy filler to blend the patch with the panel.

Some older boats have plywood as the core material in the transoms. This can perish and fail over time if water is penetrating through the pintle attachment holes. Once wet, the ply is hard to dry out. Consider internally reinforcing this area with glass, ply or timber, and epoxy core fill around the pintle attachment holes.

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