

Repair of a sandwich deck

10.9.09/JHo

The sandwich deck is built by laminating a 10 mm isolating layer – often plastic foam or balsa wood in end grain direction – as distance material between two layers of glass fiber. The resulting structure is strong and light, and has good isolation properties.

When a layer of teak planks is installed onto this deck with screws every 30 cm or so, every screw opens up a potential leak into the glass fiber sheet. Over time, the boat flexes in use, the screws move slightly, the rubber cement dries, and water will seep under the teak and into the distance material. In the winter, water freezes and expands, making room for more water.

Balsa wood as distance material is fairly rot proof, and the water in the distance material does not spread very fast. Over time, however, the balsa softens and finally rots, and the sandwich structure has lost its strength. Alternatively, open cell type of plastic foam was used in earlier years: it breaks down when subject to moisture and frost. The damaged spot of the deck starts to flex under your feet more than the areas nearby. Latest at that point, it is time to repair the damage.

The sandwich deck can be fixed from above or from underneath:

Fixing the damage is easier done from above, but you have to remove the eventual teak planks or other deck cover material, and the seams of the repaired area will remain visible unless you cover them again with teak or something else.

You may repair the deck from underneath, opening the ceiling in the cabin. No traces of work are left outside, but one has to remove ceiling panels and cabinetry in the cabin, and the repair and laminating work has to be made upwards: the working position is awkward and the epoxy easily smears the surroundings.

I know of one W55 where a badly delaminated front deck was sawn off completely as one piece and then repaired in the owner's garage over the winter. The repaired deck section was laminated back to the boat in the spring.

I had the teak taken up for repair, anyway, so fixing the damage in the sandwich structure was easily done in between the other work.

Locating the damage

When the teak planks were removed, I borrowed a humidity sensor and measured the humidity of the deck with a roster of 20 cm., marking the meter readings to the deck with felt pen. I found one area with quite high readings - 'to repair', some single high readings elsewhere - 'to check', and the rest of the deck was showing quite moderate readings which I interpreted as 'no leaks'.

Knocking the deck with the handle of a screw driver gave similar results: one area where delaminating had clearly progressed, and the rest gave the same 'solid' sounding.

I then opened up a hole in the worst section: the balsa core was soft and black and was swimming in water ("oh &#@!!.."). I marked the borders of the area with worst moisture readings and cut open the glass fiber with an angle grinder: the top layer of the deck came up easily.

At the other few single higher readings, I opened inspection holes: the deck's top layer was firmly glued to the balsa which seemed undamaged and reasonably dry. I laminated the holes closed. This left me with some 1 m² of sandwich deck to repair.

Repair

There are a number of descriptions about this repair on, e.g., the sites of West Systems and various boat magazines. Here just a brief summary of the steps::

- Scrape off all the wet and rotten balsa from the opened section /hole.
- Let the section dry completely
- Sand the bottom of the opened hole and the bottom of the deck section cover with nr 60 sand paper
- Grind a bevel, 1:8 to the top of the edge around the hole and the deck cover section to get more surface for the new seam
- Wipe the hole and the bottom of the cover piece with degreaser
- Cut a fitting piece from a balsa wood mat of proper thickness, to fill the hole completely.
- Wet the bottom of the hole and the bottom of the formatted balsa mat with thin epoxy
- Spread a 2...3 mm thick layer of thickened epoxy to the bottom of the hole. I used the same West Systems 105/206 epoxy as for the teak deck, and West colloid silica for thickening..
- Place the balsa mat into the hole. See that no air bubbles are trapped under the balsa
- Wet the top of the balsa with thin epoxy
- Wet the bottom of the deck section with thin epoxy
- Spread thickened epoxy over the balsa, to cover all cracks and 1...2 mm for gluing the top
- Put the top section into place; put some weights over it so that no air is left under it and some epoxy is oozing from around the seam
- Wet the beveled seam area with thin epoxy
- Take some ½ m of 20...30 mm wide woven glass fiber, wet it with epoxy and place it into the seam; push it with a brush or roller to remove all air from under it. A moist, well set glass fiber
- Add more layers of moistened glass fiber till the seam is on level or 1..2 mm above the surrounding deck.
- Let the laminate cure for 2..3 days
- Sand the seam to the level of the deck

After the epoxy has cured, you may continue with the rest of the deck repair by putting the teak back, painting it or whatever you want to do to the deck.

Summary

When the repaired spot will be covered with teak or another deck material, the work is easy to do for a hobby repair person (like myself). If the repaired patch will remain visible, one has to pay more attention to the finishing touches: top coat painting, anti-slip surface finish etc. In that case, I might consider doing a minor repair from inside the cabin.

The repair is not very demanding to do when the damage is local and not too extensive. Altogether, it took some 10 working hours; planning and getting the materials took considerably more time...

Had the damage been more extensive, the repair would have been more laborious but not more difficult.