

## Sandhopper Floor Installation

### Zeus (Sh 14)

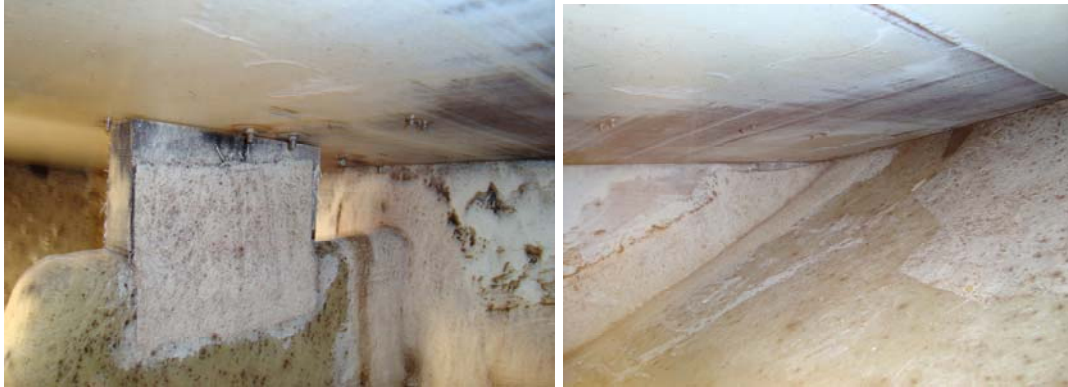
2008/9

*Thanks to all who helped, but particularly;*

*Paul Spratt, David Johnson,*

*Chas Gibson, Paul Farrall, Martin Binnindijk, Peter Thompson and, of course,  
Barry Duce.*

First things first; make sure you really do need to take the old floors out! Feel underneath the floor where it meets the hull for soft wood and delamination of the ply. The underside of the hatch could be a good indication, but this may be the only part that has been reasonably maintained and/or most battered. If your floor is original it will be a single sheet of ply, if it has been refurbished it will have a seam down the centre of the floor running aft from the hatch. A useful tool in determining the state of the floor is a small digital camera; as can be seen here, the condition of the front tank and mast support in Zeus is fine, the main floor wasn't! (Unfortunately I haven't any photos of it as I took all these later, after being told to by Barry – thanks Barry!)



Once you have decided to remove the floor and cleared away the clutter including seats, foot-straps and any cleats screwed into the floor, it is time to cut.

It is important to cut the floor as close to the hull as possible, which actually means cutting through the GRP bonding the floor to the hull, but as close to the hull as you can (or have the nerve to). A good cut here significantly reduces the amount of time spent later and gives you a better template to work from (although we now have a template based on Zeus's floorboards). At this point I am going to sound like a Bosh salesman, but I assure you that this tool, found quite serendipitously in a frantic dash to B&Q, is without doubt the best piece of gadgetry I have ever used (apart from the sailing boots from Peter T!!). It works in a similar manner to the saw they use to cut a plaster-cast off your arm in casualty with an oscillating blade that is not in itself very sharp, but vibrates through GRP, epoxy and wood, like a hot knife through butter and is a convenient size to get into tight places. Its main advantage over a grinder is the level of control one has and when you are that close to your precious hull, that makes for some great peace of mind! It is also a fantastic sander (honestly – I really didn't expect it to be, but it is!) and has other cutting attachments that make it wonderfully adaptable to a wide range of situations.



Great Tool!

It doesn't matter where you start your cut, but I did all the sides before doing the centre-line cut.

Hold the tool flat against the hull and work downwards cutting into the connecting glass, then work fore, or aft. Where the floor meets the front tank, cut down (there is a wooden support under the front, but not the aft; remove it afterwards; mine simply fell off in my hands), once cut around the hull, cut under the knees in all 6 positions, 3 per side. Then you simply cut down the length of the floor, from the hatch to the aft tank and then slide them out one at a time, to reveal something of a mess! It should be said that I wish I had weighed the old boards at this point for reference later, but too late now!



As you can see in the previous photos, the hull looks a bit of a state and at first I thought I was going to have to cut out the ribs and start there, but thanks to several conversations with various knowledgeable folk, I didn't.

If you look carefully you can see how closely you can cut the floor away from the hull with that Bosh tool. You can also see how saturated and rotten the ribs were at their ends. The construction of these early boats was to paint the ribs, then stick them in with sheets of chopped mat, on each side, leaving the ends and centre of each rib exposed to whatever was sloshing around in the bilges. It is these parts that were in a bad way and some simply fell apart in my hands, particularly when scrubbed to clean the grease off. They had also enabled water to penetrate far up the ribs as confirmed by drilling at various points and investigating the sodden, dark, wooden swarf.



Taking advice from various sources; the solution to the damp involved a fix and ignore approach. I cut away 3" squares of the glass covering the ribs to expose the damp wood and then dried out the boat using a greenhouse heater borrowed from Chas (I later

purchased one of these excellent heaters myself and would add one to the ‘essential toolbox’). The ribs dried far faster than expected and once dried, a couple of coats of epoxy sealed and strengthened them sufficiently. Unless they are really unstable, I would not consider removing and renewing the ribs as, although not too difficult, would add several hours to the project. Now you can sand off all the bits that didn’t come off with the Bosh cutter and ensure the hull is smooth and ready for glassing and the knees and clean and sanded. At this point I also sanded down the entire inside of the boat ready for painting.



You need one sheet of 8’x4’, 12mm 7-ply (Marine Grade) and as you can see below it is a very tight fit. You also will need space to move around, a good jig-saw, a plane/s, a drill with a 35mm (ish) circle cutting disk and some sandpaper. Our space, tools and expertise, came courtesy of Paul Spratt which was very handy. Once you have drawn round the old boards (being careful to remove anything sticking out of the bottom of them) you can start to cut. We do now have a template of my floor and Paul is intending to enter the measurements into a CAD machine, which may make life even easier (this will be available for the forepeak floor as well). It is important to use a jig saw as the cut is thinner than that of a circular-saw, so although you have to concentrate when doing the hatch cut-out; it looks neater at the end.



Do not try to use a clamped guide to get the cut straight as jig-saw blades always veer slightly and you need to be able to make small, but significant, adjustments to the cut in both directions which you can't if you are up against a fixed guide (top tip from Spratty). The order; start with the edges, not too much concern for accuracy here as they will be under glass in the boat (leave the front with an overlap as shown in the picture, having used the other end as the 'square'), then the hatch – spend time and get it right, and lastly the cut down the middle, again this does not have to be too accurate as it will be covered in glass and paint. In fact slight wiggles might help when lining it up in the boat later – not that there were any in our one Paul!



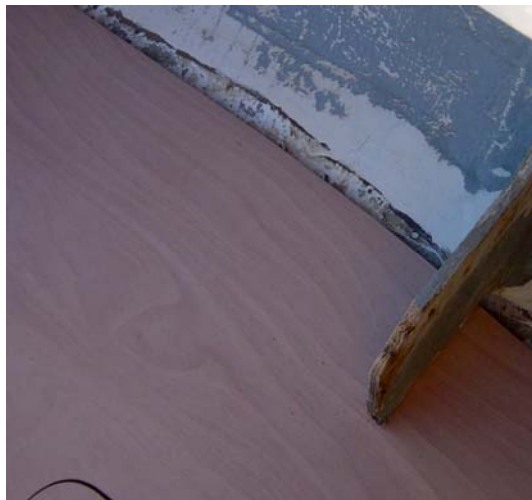
The only thing to do then is to cut the drainage/opening holes into the hatch and floor. Best to follow what was on the old floor – so one in the hatch and two at the rear for us in Zeus. Smooth, or rout as you wish. Once the floor is cut out, simply ensure lines are smooth and straight (or curved as appropriate) using a plane and smooth off all the sharp edges (as paint and epoxy adheres better to rounded edges).



Back in the boat offer up the boards, sliding them gently under the ribs/seats etc, so as to avoid marking them too much. They will almost certainly need shaping a little to get them to fit; mostly at the ends and rear quarters in our experience. Get them so they sit down on the ribs evenly, rather than onto the walls of the hull; they will be short of the hull at the widest point by as much as 15 to 20mm and too wide at the rearmost point. Shaping allows for that 'personalised fit' which will ensure your floor is stiff and strong. Take time to level the board where the two halves meet at the hatch so that you know everything fits and is flush to the ribs. It is not the objective to get the floor to lie against the hull, but it must sit on the ribs to be strong. Walking on the floor at this stage makes it wobble and flex awfully, but do not fear! Just get it to lie flush, without any weight on it.



Your options at this stage are threefold; you could choose to go for a clear epoxy finish if you have a piece of ply with a pattern you wish to preserve (although you will need to think about non-slip additives, which often mask the wood in any case), or a coloured epoxy which can then be painted over, or primer/paint option. Since epoxy adds significant stiffness, I would recommend that option as a great waterproof barrier to all sides of the floor. We were fortunate in that Chas Gibson has a friend who could do the epoxy as a favour (his last job before ripping out the spraying booth!), as such the colour was 'whatever was available', in this case cream.



If you are not so lucky, apply the epoxy with a squeegee, working the first coat well into the ply and consult David Johnson (our West Systems guru). Once epoxied (I know its

not a verb), get the boards back into the boat to check they measure again – if they don't, shave off what you need to and then remember to re-apply epoxy to that bit so you still have watertight boards. Jobs to do whilst boards are drying – paint Danboline International bilge paint – or similar, to the bilges and then create and secure 'noggins' to the ribs down the centre and at both ends of the floor compartment. I epoxied these and then screwed through the ribs into the noggins – Chas bolted his. Make and secure enough so they support both sides of the floor along the centre-line, following the cut-out round the hatch to the front, which basically means on every rib, you will need a noggin to screw into. You can simply screw into the top of the ribs, but if you are not sure of the quality of the ply the screws will bite into...your call. At this point it is a good idea to screw in the corner supports for the hatch cover on the underside of the floorboards.

Another thing to do whilst the floor is away being epoxied is to paint inside the hull. Dauntless do great deals on International (51 Toplac white for £28.00 and £4.00 extra for colour – see Barry – no relation to our one - probably!). Only paint the forepeak, the underside of the deck and the hull sides down to where you will be attaching epoxy (about 120mm from the floor), as you need to be applying the epoxy to GRP, not to paint.

Once the floor is ready, offer it up again and then you can screw it down to the noggins and fill the screw holes with epoxy filler. I also ran epoxy down the central line to ensure this was secure and strong. Do not worry at this stage if the edges of the floor still seem a little unstable – they will become rigid once glued to the hull.



Once you have all the materials and time at your disposal to epoxy the floor to the hulls, sand away a good 'key' for the epoxy to adhere to all round the floor edges and down the centre. Hoover / dust carefully, but do not clean with acetone or similar.



West systems epoxy is lovely to work with and even a complete numpty such as myself, found it relatively straight-forward. There are several components you need;

1. Epoxy resin
2. Epoxy hardener
3. Mixing pots – several although these are re-useable if careful
4. Lolly sticks – for mixing resin and applying filler
5. Mixing stick – large and strong stick for mixing filler
6. Talc-free rubber examination gloves
7. Tube of West Systems 410 Microlight
8. Biaxial glass cloth
9. Tear-off tape (polyester tape with red lines through it)
10. Decorators cloths
11. Cheap brushes for epoxy – throw away
12. Sharp scissors
13. Cardboard, or similar, to rest resin and mixing pots on



The West System epoxy comes with an excellent pump system that helps deliver the exact mixture (5:1) without needing to think. Once the pumps are inserted, you simply

use 3 pumps of resin to 3 pumps of hardener as the pumps are pre-calibrated – brilliant! The bi-axial glass is lovely to use; it cuts easily, is sewn together with 2 layers of cloth whose weft and warp run at 45 degrees to the join and at 90 degrees to each other. This not only makes it far stronger than chopped-strand-mat, but also extremely easy to fold around irregular shapes without losing its inherent properties.

The Microlight filler is amazing stuff, being extremely light and unbelievably strong. It bridges the gap between the hull and the floorboards to provide a flat area to support the cloth as it goes off (and helps ensure there is no trough in the finished product).

Huge thanks to David Johnson for providing his time, energy and experience, amongst other things, to ensure the project didn't fail at its most crucial stage. He gave us a master-class in the noble art of The Epoxy Flinger and is always generous to a fault with his professional wisdom. What I will try to do is synthesise his advice which I found it easy to follow, implement and execute. I am very happy with the results and this is a direct result of his stewardship – so a huge thanks David!



Biaxial Glass Cloth



Firstly ensure you have all the bits listed earlier and that it is not blowing old boots, as the Microlight will go everywhere! Set out all the paraphernalia and sort out your position in the boat. Start forward on one side sitting with your feet in the bilges. Aim to complete one front short section first. Firstly cut the glass cloth to size and the required amount of rip-off tape (you need 2 lengths of this for each length of cloth and they need to be a bit longer at each end). Next lay the cloth into the area and get your head around how it will fold and where it will sit etc (you can't play with it so easily once the filler is in place as the cloth will disturb it). Now mix up some filler (or get someone else to be your mixer, a good idea if available, but not essential). All measurements will be the same; only mix up a maximum of 3 pumps of resin and 3 pumps of hardener – this be the word of David -and he knows - and it works – so do it! This is mixed with a lolly stick until properly mixed, you have plenty of working time so more mixing, rather than less, is good. Then add the Microlight a handful at a time and mix with a sturdy stick. When you think it is ready, it is not; if you can still mix it with a lolly stick, it is too runny. It has to almost look like it did before you added it to the epoxy and be so sticky it really hurts to mix. Just before it cures, it heats up and goes runnier than the mix, which leads to it becoming very smooth, but can also create sagging fills, which is not good – so make it thick.



Not Ready!!



Ready!!

Spread the filler paste into the gap between the hull and the boards using the lolly sticks to get the paste to act as a continuation of the floor and avoid any trough. The paste is lovely stuff to work with and you can get it very smooth, but be careful about stuffing too much down the crack. Get the feel of how to use the edge of the floorboard to build a bridge between the floor and hull without too much getting pushed down below the floor, into the bilge. You can do this effectively if you started on the recommended section, because you can feel with your hand underneath the floor via the hatch. This means you can get the hang of it before tackling the next section, which you can't access from underneath.



The other thing to remember is to ensure you get the paste under the knees to create a solid join here and prevent water ingress from behind and under the floorboard.



In another mixing pot (you keep one for the filler and one for the glassing), mix up the resin and hardener, with 3 pumps of each. Mix with the lolly stick, never with the brush you are going to use to work with as you can not be sure that you have mixed the substances properly and it goes all bubbly – good in Bolly – bad in West! Then brush on a layer of mix to the areas above and below the join, not onto the filler as this already has epoxy in it and you will distort the lovely finish you have just achieved. Then lay the glass cloth over the area, pour on the mix and work in with the brush, brushing the cloth into the corners and ensuring an equal coverage of both the hull and

floor. Keep adding and brushing gently, until the cloth goes clear to show it is properly wetted. If you need more, mix up another batch of epoxy, but only as much as you need (eg. 1 pump of resin and 1 pump of hardener – mix well with the lolly stick – not the brush!). It is very tempting to continue if you make too much and add more glass, then realise you need more filler, so mix some up, then realise you haven't cut enough glass and so on – until you get into a right old mess – at which point David will appear out of nowhere and laugh at you, or worse, Barry will discover you a day later because you have stuck yourself to the inside of your precious boat! It was the fear of either of these situations that kept me following the sage advice of David J...and I think it went well because of it. Following the demo section which he completed, as you can see, without a drip out of place, I managed to complete one section working with the onlookers and film-crew, then returned on New Year's Day when I completed the rest on my own, in about 4 hours with a serious dehydration problem and no Aspirin!



Once you have completed a section, try for a more complex stage and attempt one of the knees! Actually the cloth is wonderful and you can see here how well it takes the

shape you offer it into, or around, so easily that there is none of the frantic stippling needed with recalcitrant chopped-strand-mat.

Cutting shorter lengths, start at one side and tie the knee to the hull/floor on one side, then wet in the piece wrapping it round the front of the knee (or over the smaller knees). The next piece will be one end of your next section and so-on. You only need one layer of cloth, so try not to overdo the overlaps, but avoid gaps as there is little strength in resin without the cloth!



Once you have done a section and are ready to mix up filler for the next bit, take a pause to admire your handiwork, stretch your back and have a chat with someone. There is nothing to be achieved by hurrying. Make sure your kit is all layed out and you are now ready for the final very clever bit...the 'Rip-Off-Tape!

This stuff is just marvellous.

One of the problems with epoxy is that when it goes off it normally creates a waxy sheen, which is impossible to paint/epoxy to. Thos means it needs to be sanded to provide a key which is a pain if you want to leave off your work and be able to bond to what you have done on your next visit to the boat. The solution is this material and it works wonders...

Firstly it smoothes out the glass cloth and feathers it beautifully, so there is far less

sanding to do than is usual, it helps to remove bubbles and cavities and helps to shape the cloth so as to achieve a professional finish (ok, a really good amateur one!). What it also does, once the epoxy has cured, is create a perfect, wax-free surface that can be painted, or epoxied immediately with no further preparation needed. Once dry, you simply pull off the tape and the surface below has a fine cross-hatching indentation that is the perfect key for further work. What is more, you can leave the cloth on for as long as you want and it will still rip-off to reveal a perfect working surface. As such apply a section of tape (that is the second piece being applied in the photo), ensuring an overlap with another sheet, or an area of epoxy-free boat and gently rub it from the centre to the edges with a scraper, to remove bubbles and feather the wetted cloth onto the floor/hull/knees etc.



Ensure the tape has reasonable overlap somewhere on it so that one of the edges remains free of all epoxy, otherwise you run the small risk of actually epoxying the whole section of tape into the boat! Ripping this stuff off is great fun and makes the next part so much easier. You only realise how much harder epoxy is than polyester resin, when you have to sand it off!

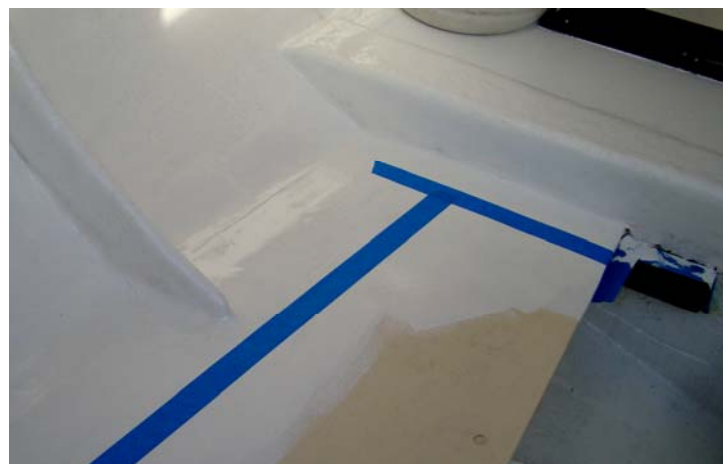
Once you have started continue the process of; cut lengths of cloth and tear-off tape; make epoxy mix (3 and 3); add Microlight and apply to gap; make epoxy mix (3 and 3); place cloth and pour on mix; brush in; apply tear-off-tape; gently scrape out bubbles; start again...

Once you have finished the edges, front and rear, do the same for the central crack

between the two floors. Firstly fill with Microlight as before. Then using a single length of glass cloth, complete the job and, once you have tidied up, get yourself to the bar for a well deserved beer! Do not overwork sections, especially if they are ones you did a while ago; better to let them go off and come back to them fresh, which thanks to the tear-off-tape, you should be able to do quite easily.



The only bits left should be a little sanding – there will be the odd lump, or bubble, you didn't quite feather in as you should – or there was with me anyway, followed by finishing the coats of Toplac down to cover the floor to wherever you want your non-slip to be, plus a little for overlap. Then, finally, to apply a couple of coats of Interdeck over the hatch and floor, having masked with the blue masking tape (can be peeled off no matter how long it is stuck down for).



The best way to do this is to roll it on, using a fluffy roller as this leaves an excellent surface which looks, dare I say it, quite smart (if a little swimming-pool-ish. Thanks Faz!)



THE END...next project