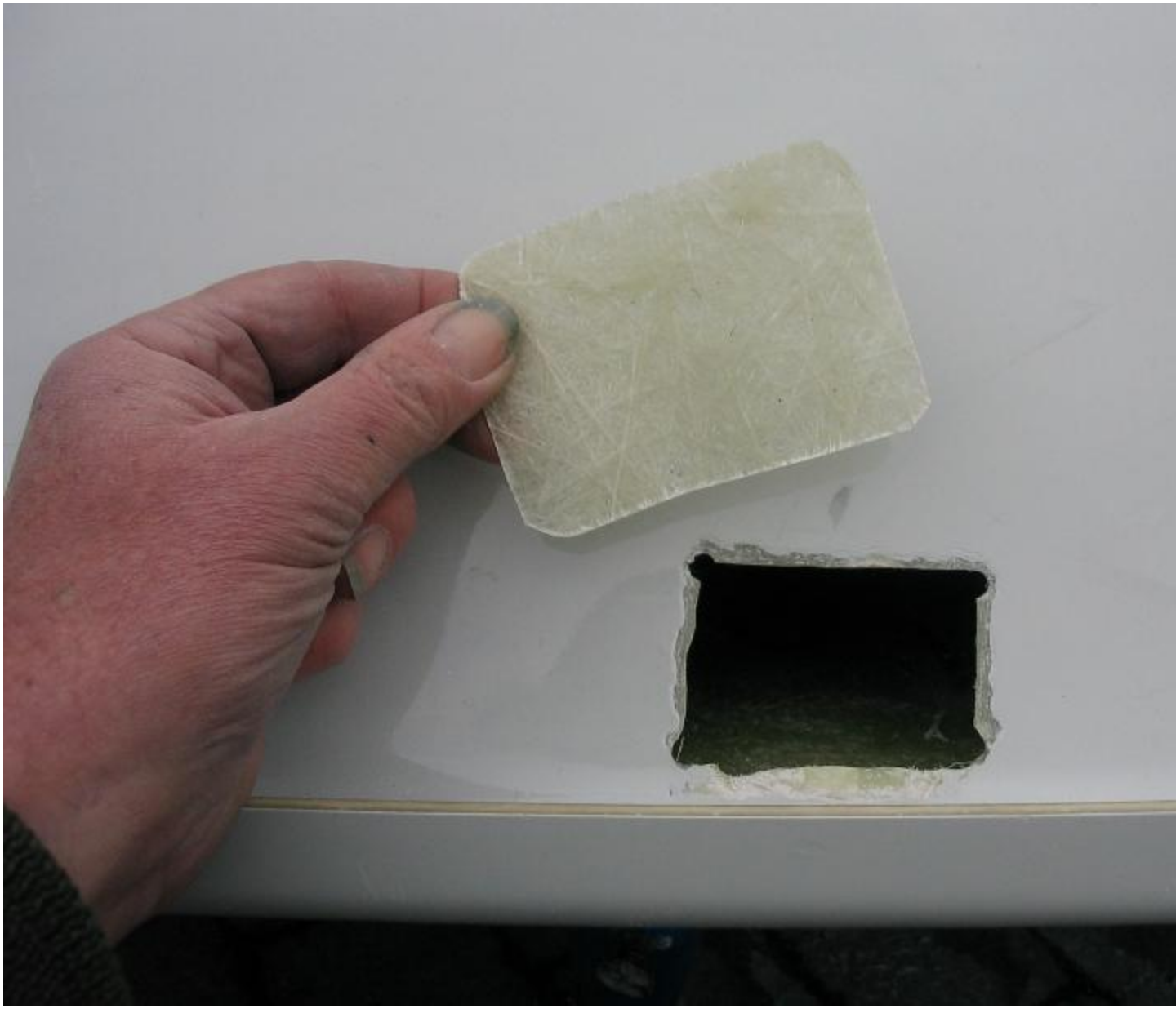
Repair to hole in Laser hull

This Laser suffered a hole in the hull, just beneath the gunwale. Not nice, but not too difficult to repair wit
backer."

After drilling four corner holes with a 6mm drill bit, Mr Dremel, with a grinding disc fitted, made short work
away all damaged fibreglass.

"Here's one I made earlier..." A single layer of chopped strand mat, glassed with polyester resin, cut out w
from a much larger piece. This will be the blind backer, about the size and weight of a credit card. You ca
the hole has been chamfered back along the surface with a sanding drum on Mr. Dremel. This provides a g
of adhesion for the fibreglass repair in a few minutes. The blind backer must be placed inside the hull and
the inside to provide a surface to build upon.



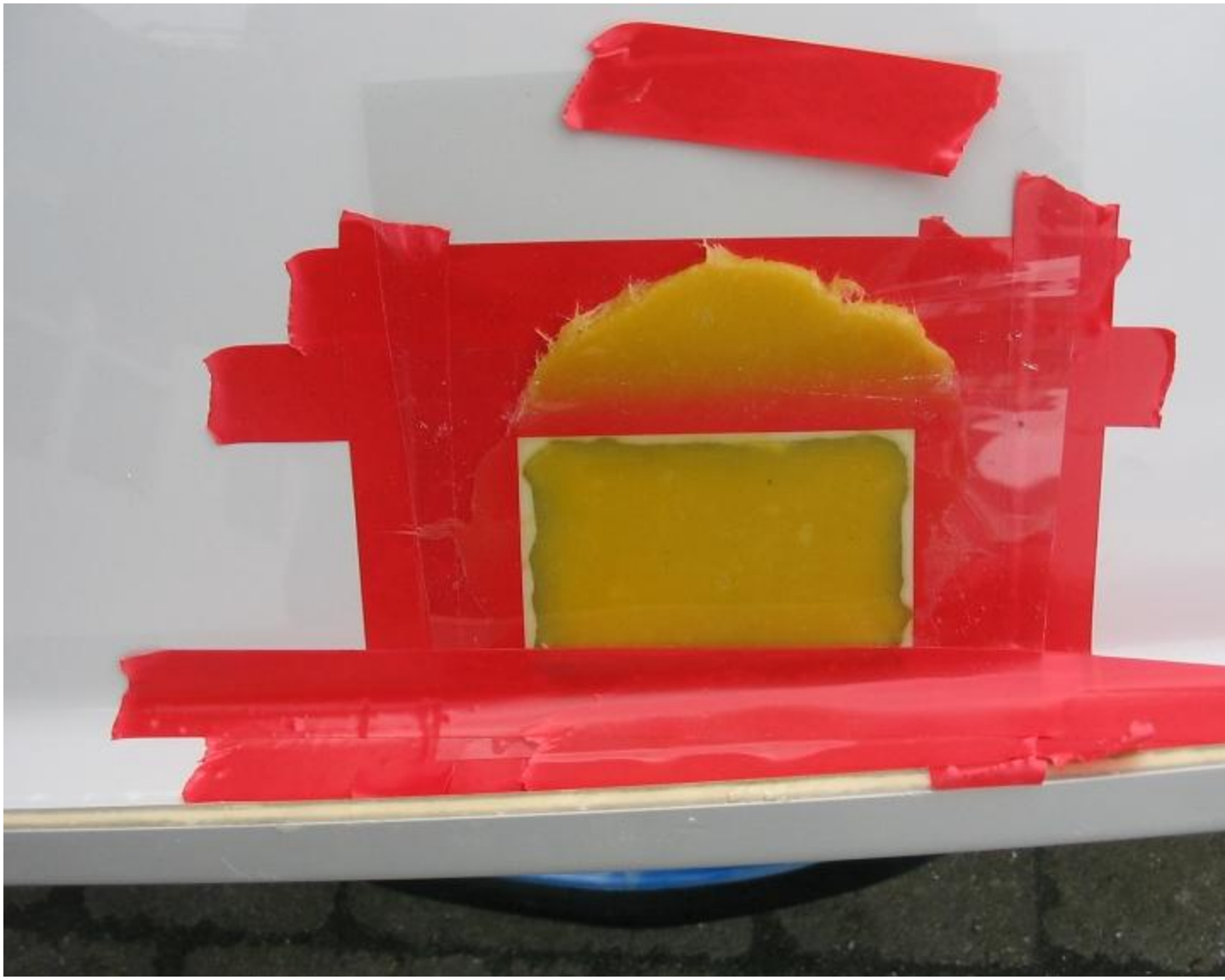
Four small holes were drilled in the blind backer and two lengths of strong string passed through from behi
the edges of the backer and the inside edges of the hole were smeared with "Five Minute" epoxy resin. Th
was carefully angled inside the hole and the string pulled taut to hold the backer tightly in place while the e

This most excellent and ancient copper headed lump hammer provides sufficient weight to keep the backer
place as the epoxy cures.

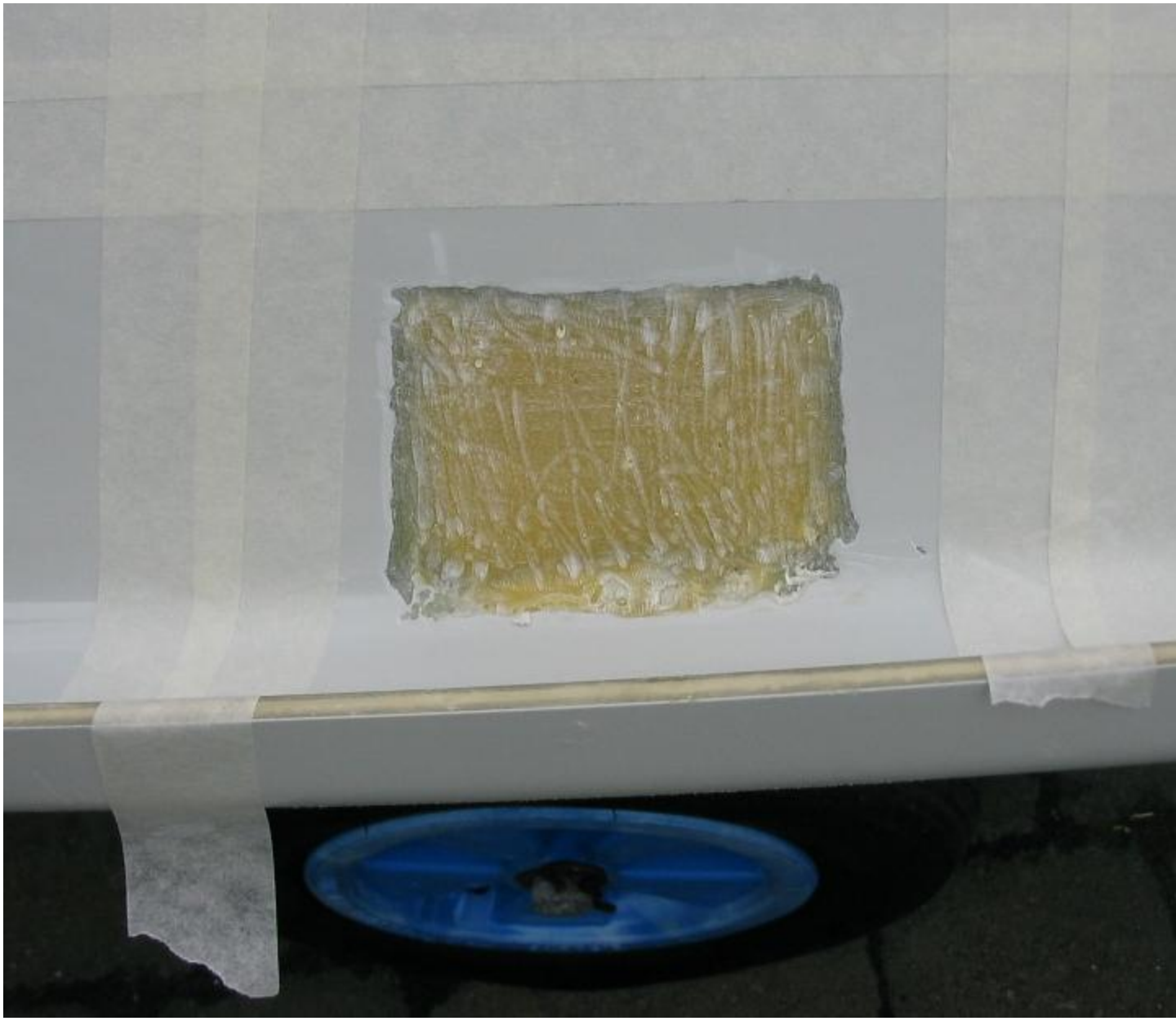
After the epoxy has cured (30 minutes) the strings have been cut away and the area surrounding the wour
masked with electrical tape ready for glass fibre. The tape does not leave adhesive residue on the hull and
resin will not stick to the tape, an important time saver after the next step. At the bottom, a sheet of aceta
been hinged in place.

A quantity of polyester resin and fibreglass strands was mixed to the consistency of sauerkraut (sometimes "kitty hair") and spread into the wound. Then the sheet of acetate was overlaid, taped at the bottom, and plastic card was used to squeegee any excess material to the top, smoothing and consolidating the repair. polyester has cured the acetate sheet will peel away and any excess will simply fall off of the red tape.

Time so far: 90 minutes.



Here the cured (three hours) fibreglass repair has been sanded to a level of 2mm below the surrounding hu
order to allow space for new gelcoat. Masking tape has been used which will be peeled away, carrying any
when the gelcoat is half cured.



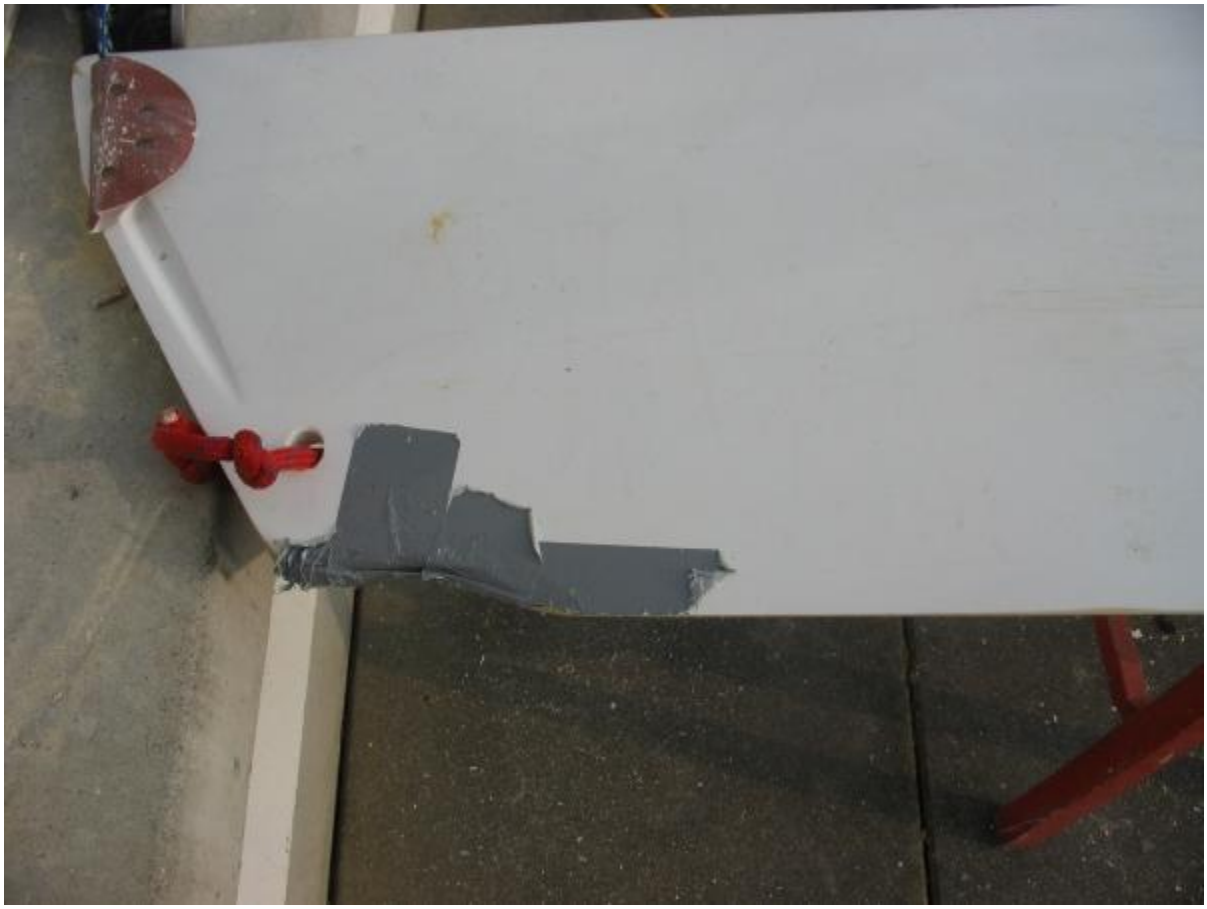
I didn't get a chance to photograph the gelcoat application and finishing with wet and dry paper 400 grade
grade then 1200 grade followed by rubbing compound to return the shine. There is a very slight colour dif
completely sealed and finished. Total work repair time of three hours (excluding cure times).

Laser Daggerboard Repair - 5 hours over 2 days

This broken and abused daggerboard/centreboard from a nice Laser 1 was repaired by its owner, I'll call hi
to spare his blushes.

Ben used a fibreglass repair kit to fashion a new trailing edge tip. I'm amazed it fits into the boat. Anothe
repair to the trailing edge. So much for a shape.

Another trailing edge break at the top of the board has been covered with duct tape.
I HATE DUCT TAPE! It does not belong on boats! Too difficult to remove!

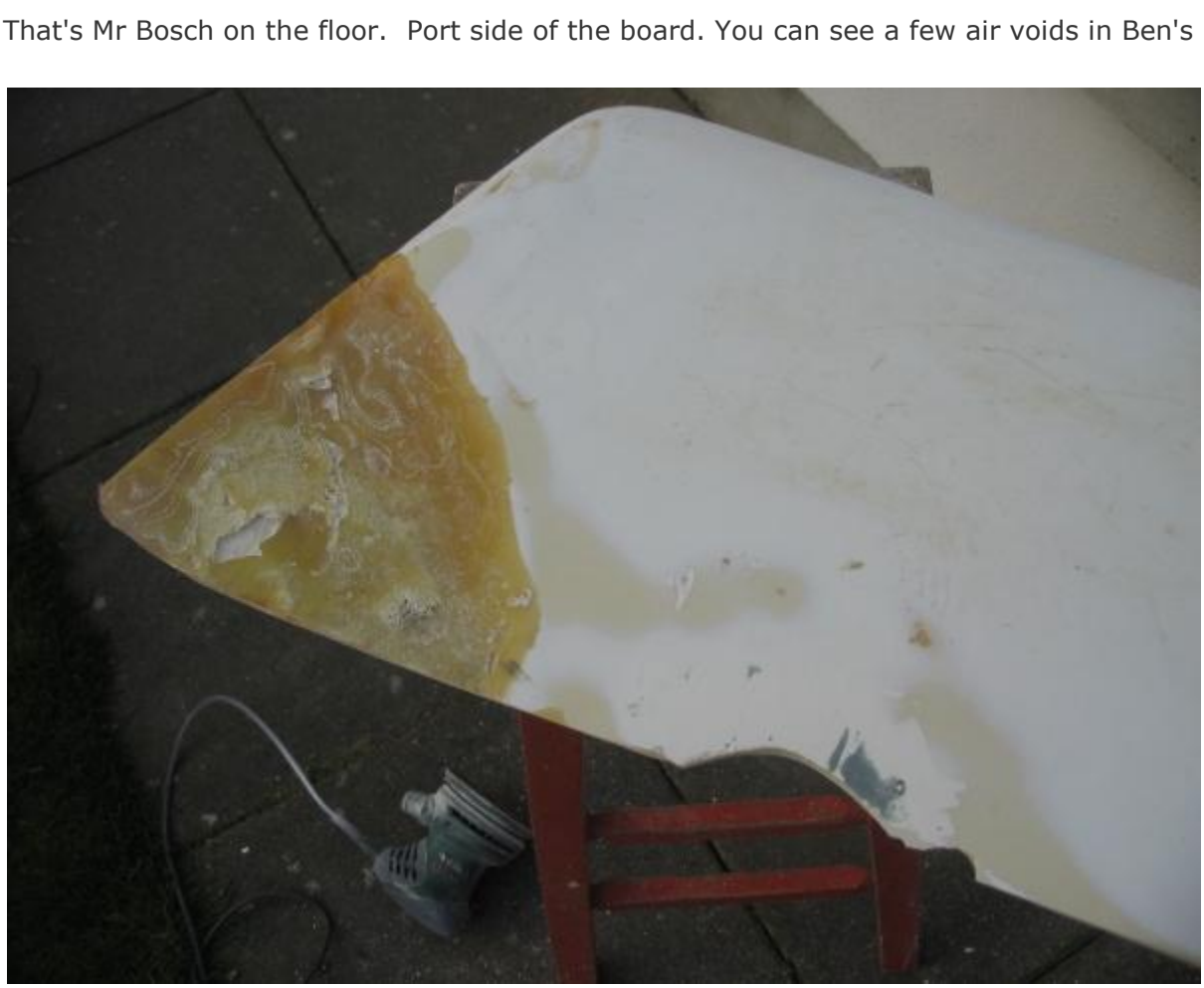


Here is t'other side of the board. A nice day, I'll work outside rather than dust up the workshop.

Having stripped off the duct tape and cleaned the sticky residue with petrol (the only substance I know of t
job) we are left with this. Shows the polyurethane foam that the board is made of. The white is sprayed p
not gelcoat. A lattice of skinny steel rods inside the foam provides a skeleton-like support.

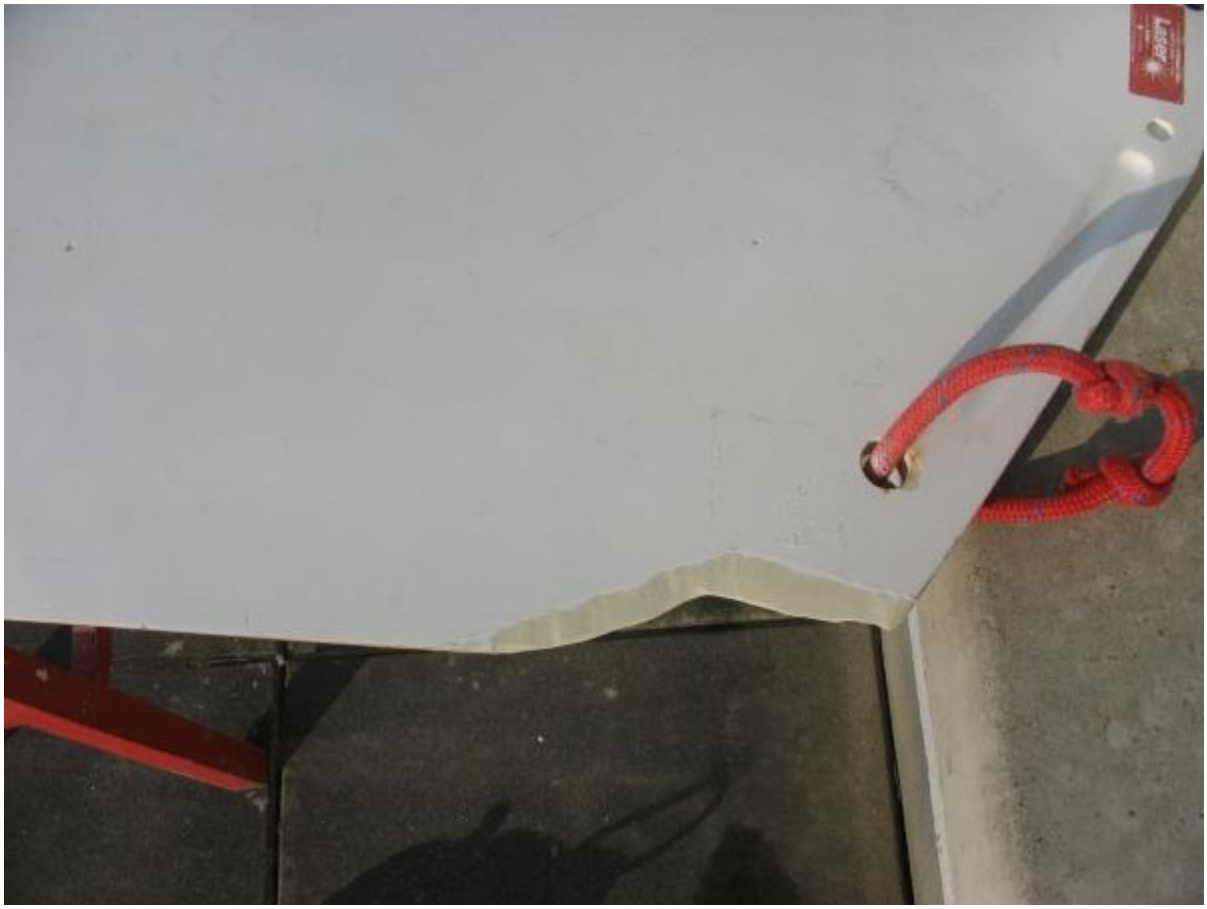
I started sanding...some of the filler simply fell off!

That's Mr Bosch on the floor. Port side of the board. You can see a few air voids in Ben's repair, full of wat



After another five minutes of sanding/grinding away with 80 grit...

Back at the top, the wound has been chamfered back to allow plenty of grip for the repair.



Mr Dremel is the man for this job, on both sides.

Starboard side, sanded and ready for Mr Dremel.

Dusted down and then washed with acetone (take care). The toothbrush was used to clean sanding dust o

the voids.

Now inside, ready to create moulds for the epoxy repair. The blue tape provides a border, the clear acetat
beneath the board provides a smooth surface for epoxy, the hinged white plastic strip provides support. Th
starboard upper.

Here is port side middle, the board is resting on a book which helps provide support for the underside, a se
acetate sheet is ready on the topside.

This is a piece of CSM - Chopped Strand Mat, individual strands of glass held in place by a binding agent to
mat. Polyester resin will dissolve the binding agent, but epoxy resin can not. So, the scissors is used to cu
mat into very small pieces.

The very small, individual short pieces of glass are in the bowl, epoxy resin is mixed, a bit of glue powder w
added to the mix before adding the bits of glass.

Here the epoxy-glass mush has been filled into both sides of the board and the acetate smoothed with a st
edge until excess oozes out, making sanding and shaping easier.

Here is the other end, same idea. The brown stuff is fine fairing powder mixed with epoxy resin, good for f voids and very easy to sand. No good for structural support, but great for filling holes.

Thus far: two and a half hours.

The next day, the epoxy has had 24 hours to cure (more than enough in the heated house) and back outsi
two pieces of cardboard protected the books that were used to balance the board and help pressurise the e
filler.

Cardboard and acetate stripped away, ready for sanding with 120 grit.

The other end...the epoxy-glass mix is translucent enough that you can see the chamfered edges giving go
structural grip.

Panel saw used to cut away most of the excess.

Mr Bosch has done his thing...

I use the red sureform to cut away the last of the excess on the trailing edge, Mr Bosch can't do that. The
edge is a printer's "em rule" or "pica stick" from the days before computerised typesetting. It is a very ver
straight edge, used to provide a guide for the sureform at the bottom trailing edge. Use a very sharp penc

Sanding done, always a few voids, easily filled in a few minutes...

That little chip will be filled at the tip...

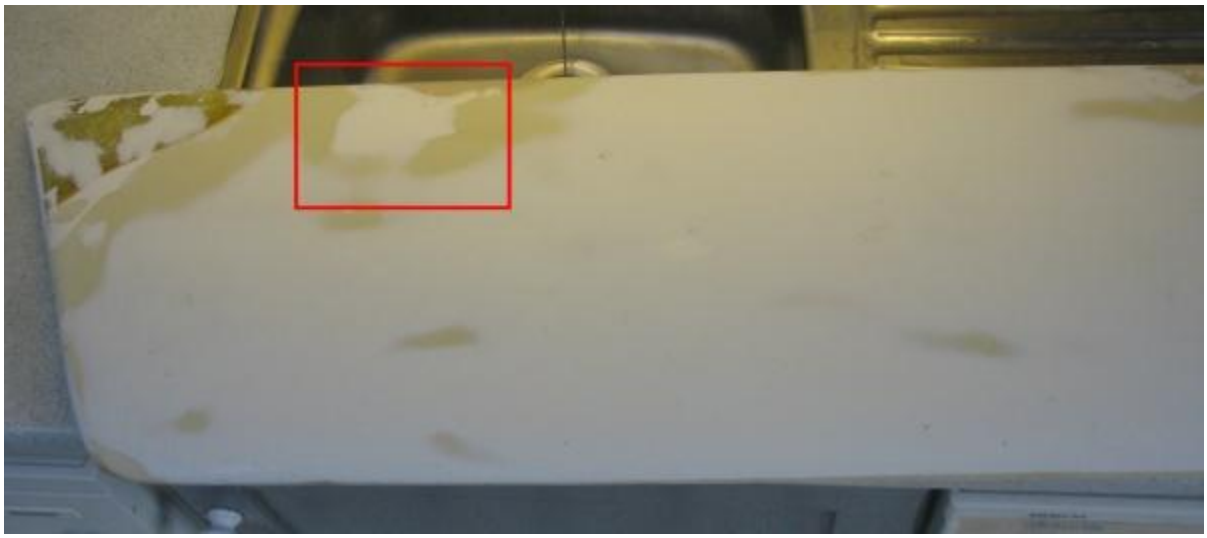
Gelcoat Filler is your only man, easy to mix, dries in 30 minutes, easy to sand. Good gap filling and smoot
properties, but brittle and useless structurally.

Later, I have been wetsanding, 320 grit, using a long block.

Remember the skinny steel rods that provide a skeleton for the board? Here are two of them poking to the surface. Very bad quality control!

Back inside, make a surround well of cello tape, hinged acetate sheet, a bit of Gelcoat Fill and a straight ed shape the stuff smooth.

After drying and wet sanding. Yes, that area is a micron or two proud of the surrounding area, but tough!



Every area wet sanded, washed, dried and cleaned with acetone, ready for spray painting in the garage. A quick drying primer followed by Plasti Kote top layer, each takes ten minutes to apply, two hours to touch d hours to cure.

All done. Back to Ben for Sunday's Frostbite.
Note: When recovering from a capsize, DO NOT climb the trailing edge of the board, climb onto the leading

Instructions for Applying Sail Numbers

Class Rule 4 (with 27(e) for Laser Radial and 28(e) for Laser 4.7) require that your sail numbers

(and National Letters if used) are a certain size and colour and are placed on the sail in a certain position. National Letters are only required at World and Continental Championships and other events described as international events in their notices of race and sailing instructions.

Numbers/letters drawn on the sail with permanent ink pens or similar are illegal.

Style and Colour

Each number/letter must be upright, solid (not outline), a uniform thickness and easy to read. Each number/letter must be one colour only. All the letters must be the same colour. The last 4 digits of the number must be the same dark colour (preferably black). Any preceding digits must be all red or a single different contrasting colour. The colours must be dense and contrast so that they are easy to read.

Applying Sail Numbers

1. If your sail has been used it should be sponged clean with mild soap and warm water and allowed to dry completely.

2. Find a clean, large flat working surface (a table or clean hard floor).

STARBOARD SIDE NUMBERS

3. Spread the sail out flat on the working surface so that the starboard side of the sail is facing up. (To find the starboard side the luff sleeve should be on the RIGHT hand side of the sail when laid flat.)

4. Refer to the instructions below and sail diagrams of the Laser, Laser Radial and Laser 4.7 sail for measuring and drawing pencil Base Lines on the sail and for cutting a template out of cardboard or stiff paper both as a guide for the position of characters, spaces between each character and between rows.

5. Following the instructions below draw a pencil Base Line for the starboard numbers. This Base Line will locate the bottom edge of the starboard numbers.

6. Make a small pencil mark 100 mm from the leech on the Base Line.

7. Place the smaller edge of the template on the line immediately to the left of the pencil mark so that the template is at 90 degrees to the line. This is the starting point for the first number.

8. Peel and fold back 10 mm of backing from the base of the first number. Place the number on the sail against the right hand edge of the template with the base of the number just touching the pencil line. Check that the number is lined up with the Base Line and template and press the base of the number on to the sail. Lift the remainder of the number and slowly peel off the backing as you smooth the number on to the sail taking care to remove air bubbles and creases.

9. For the second and subsequent numbers on the starboard side place the template alongside the right hand edge of the previous number to space the next number correctly.

PORT SIDE NUMBERS

10. Turn the sail over and flatten the sail (the luff sleeve should now be on the LEFT hand side of the sail).

11. Following the instructions below draw a pencil Base Line for the port numbers.

12. Make a small pencil mark 100 mm from the leech on the Base Line.

13. Lay all the numbers on the sail using the spacing template and check that the full number is correct.

14. Apply the number closest to the leech (the last digit in the sail number) first using the base line and the

template working away from the leech.

STARBOARD SIDE LETTERS

15. Turn the sail over and flatten the sail (the luff sleeve should now be on the RIGHT hand side of the sail).

16. Following the instructions below draw a pencil Base Line for the starboard letters.

17. Follow instructions 6 to 9 above.

PORT SIDE LETTERS

18. Turn the sail over and flatten the sail (the luff sleeve should now be on the LEFT hand side of the sail).

19. Follow instructions 11 to 14 above.DRAWING BASE LINES AND

MEASUREMENTS

LASER

Minimum dimensions of numbers/letters: Height 300 mm; Width (excluding No.1 and letter I) 200 mm; Thickness 45 mm. Space between numbers/letters:60 mm.

Starboard Side Laser Numbers - Find the middle batten pocket and draw a 1600 mm line parallel to and 400 mm below the seam that runs through the middle batten pocket.

Port Side Laser Numbers - draw a 1600 Base line parallel to and 400 mm below the bottom edge of the starboard numbers.

Starboard Side Laser Letters - find the seam below the bottom batten pocket. Use the top edge of the seam as the Base Line.

Port Side Laser Letters - draw an 820 mm Base Line parallel to and 400 mm below the bottom edge of the starboard side letters.

LASER RADIAL

Minimum dimensions of numbers/letters: Height 300 mm; Width (excluding No.1 and letter I) 200 mm; Thickness 45 mm. Space between numbers/letters:60 mm.

Starboard Side Laser Radial Numbers

Find the middle batten pocket and draw a 1600 mm Base Line parallel to and 400 mm below the middle batten pocket.

Port Side Laser Radial Numbers - draw a 1600 Base line parallel to and 400 mm below the bottom edge of the starboard

numbers.

Starboard Side Laser Radial Letters - Measure the

height of the letters and draw a 820 mm Base Line parallel to and

the height of the letters below the bottom edge of the bottom batten

pocket (the top of the letters shall be just below the batten pocket).

Port Side Laser Radial Letters - draw a 820 mm Base

Line parallel to and 400 mm

below the bottom edge of the

starboard side letters.

LASER 4.7

Minimum dimensions of numbers: Height 220 mm; Width (excluding

No.1/letter I) 150 mm; Thickness 30 mm. Space between numbers/

letters and rows 40 mm.

Starboard Side 4.7 Numbers - find the seam below the

middle batten pocket. Use the top edge of the seam as the Base

Line.

Port Side 4.7 Numbers - draw a 1080 mm Base Line

parallel to and 270 mm below the bottom edge of the starboard side

numbers.

Starboard Side 4.7 Letters - draw a 650 mm Base Line

parallel to and 270 mm below the bottom edge of the port side

numbers.

Port Side 4.7 Letters - draw a 650 mm Base Line parallel to

and 270 mm below the bottom edge of the starboard side letters.