Learning from the Longships

Part 2: The Ties That Bind

Furniture maker David Jones continues his saga of a backyard boatbuilding project inspired by Viking vessels.

With photographs by the author

In my background research, I was restricted by time and finance. Though I visited the Viking Ship Museum in Oslo – see W49 – I would also have dearly loved to travel to Roskilde and sail aboard one of the Skuldelev replicas, reconstructions of five ships of various sizes which had been sunk in a channel to provide a barrier against some imminent invasion.

However, I have learned over the years that even the most unlikely encounter can reveal a new lead and to that end, I bore everyone I meet with my latest project. One such conversation led me to call on Council members in Broadstairs in Kent who had just approved the spending of a large sum to restore a gift from Scandinavia from some 50 years ago. This was a Viking longship which sat in a concrete cradle overlooking the coast. I wanted to see how the interior fittings were arranged – in the Oslo museum, you can only view the interior from a distance – and this gave me an opportunity in this country to get up close and personal with a real longship

The Danish replica longship Hugin *at Broadstairs in Kent was built in 1949 at Frederikssund, Copenhagen.*

On the day, a large ladder was provided and I clambered aboard. As there is too much to take in and you never know what might turn out to be important at some later stage, I photographed everything in sight. Everything was there: sails, oars, spars. But sadly all the components were in a very bad state of repair. I don't know whether to envy or commiserate with those who get the job of restoration as its removal will be almost as hard as getting the Gokstad ship out of the blue clay!

Back to the birds beak

Readers of W49 may recall that my aim is to create a miniature longship; at 22' (6.9m), obviously not a replica yet a craft built combining modern materials with Viking techniques. Once the keel, hog, stem and stern post were raised into position, I was ready to begin fitting the planks. Each plank is made up out of 4 or 5 pieces of timber approximately 8" (200mm) wide. My computer drawings showed the shapes of the lower planks deviated by as much as 12" to 16" (300/400mm) from their centrelines. The number of joints reflects the multiple changes in direction. As I glue all my planks prior to them joining the hull, my method of interlocking along the grain with the double double birds beak joint – see W49 – in preference to a scarf is quite easy. Having been pre-machined in my furniture workshop, at my backyard boatshop the planks are pasted with glue and pushed together over the drawing making sure no lines peep out from beneath the timber. Small strips of paper are strategically placed to prevent premature gluing of the drawing to the timber. The birds beak joint is then held in place with stretched masking tape before a shanked screw is driven through the joint at an angle into the floor below, pulling both pieces together and down tight.

When both the pair of planks have been assembled, the drawing is then brought to the top and positioned above the two planks, guided by a taut string which aligns with a straight line pre-printed through the plank drawing so that even if the drawing is badly damaged or affected by water, a true check on the straightness of the paper can be achieved. The drawing is then spray mounted onto the planks and the planks secured to one another with small screws. The two planks are then cut to shape with the jigsaw and fettled to the line on the lower edge – closest to the keel – as this will be hard to shape at a later date. The ends of the planks are left 1" (25mm) or so overlength because with such complex curves there is always the possibility of error..

The first four planks required little or no fettling or shaping of their lands in the centre 75% of their length. However, at the ends where they join the pre-carved stem and stern posts, they have to feather down to almost half their thickness, otherwise the stem and the stern would become fatter as each plank is added. The plank is reduced not as you might expect over its whole width but on one side, the back edge, because the Gokstad and other Viking ships present the whole of their lands along their full lengths.

Gluing the planks

I am using two different means of bonding, neither of which is traditional in any way – as I am not creating an historical copy and am much more interested in how Viking vessels performed on the water than how watertight they were, I would prefer to stay dry in the process!

When the previous plank has been prepared by planing away any edge defects to give a smooth sweep from stem to stern and the lands have been slightly tapered – but only at the very ends, as I believe these lands help to drive air underneath the hull – the next plank has a gauged groove routed out to take a bead of Sika compound. Compounds which have to stretch require some main body or volume to provide the flexibility – tight smear joints just tear.

The planks are fairly ungainly when unattached and are vulnerable if held rigid in only a few places. For this build I required clamps that would hold the planks generally in position and be easy to move on my own and very forgiving.

A trial assembly after coating just one of the joint faces with glue confirms good contact.

Slim crosshead screws, available from most builders' merchants, locate the joint and...

... then driven in at an angle, their smooth shanks help pull the joints together properly.

Looking down on the joint with the Sika marine mastic at the top of the picture and the RS12 resorcinol adhesive lower down.

Above: *To maintain an adequate curing temperature, the resorcinol glued joint gets its own hot water bottle.*
Right: *Home-made clamps fabricated from bedding slats have enough reach to hold the plank lands together.*

I considered slit 'collars' of plastic pipe but could not find pipe large enough in diameter to give sufficient reach. So I used curved laminate bed slats, cut them to the required length, hinged them by driving a screw in at one end and then I applied the strongest rubber bands I could buy – sold by camping shops to hold guy ropes to tent pegs. These clamps have quite a strong grip but the pressure is easily adjusted and when over-stressed by an incorrectly placed plank, they give first.

When the correct position is obtained, gluing can commence. I used resorcinol marine adhesive for the end of the plank where it meets the stem, holding it in place with traditional speed cramps. Then as the plank progresses, the gauged out hollow of the plank being offered is filled with the Sika compound which eventually dries on the surface but remains virtually in a thixotropic state where not exposed to the air. This is not a glue as such but a very flexible caulking compound with Sika's impressive water resistant properties. The plank is secured using fine 1¼" (32mm) screws with smooth shanks which allow the outer plank to be pulled down firmly on to the previous one. They are of such a size that they require no pre-drilling in cedar and provide a perfect preliminary tight fitting hole for subsequent riveting, This combination of easily removable clamps, gun applied compound and self-driving screws means that I can glue and secure a 22' (6.9m) plank in just one hour. The riveting, using copper roves and nails, takes somewhat longer!

The twist on each plank is very severe over the first 3' (1m) or so and in consequence, I soon fractured my first plank. So back to the wallpaper steamer. The curved shapes of these planks close to their ends means that they will not fit into my drainpipe steambox. So I used plastic sheet: fairly stiff, clear and since it is usually used as a release film for GRP and epoxy resin, more than able to cope with 100°C heat. The sides are secured with an aluminium foil tape which is also heat resistant. An added benefit of this method is that I can monitor the progress of the steam bending and test its flexibility, although it requires insulating to speed up the process. In fact, as the year and planking up has progressed, steam bending has no longer been required as the damp autumn air has made the timber more flexible.

As the work went forward, an error became slowly more apparent until I was forced to check my original drawings. When the design was created, I had to offset each second line to represent the thickness of the clinker planks. This in 3D is quite difficult, as offsetting in only one plane is correct just for one area. I thought I had managed to cope with the constant change in angle and from the front and side view, it appeared I had succeeded but in plan, a small gap of about 3⁄16"-¼" (4-6mm) in the midships sections of three planks became noticeable. Each plank has an additional ¾" (20mm) added for the overlap but forcing the planks into this position created a slight buckle. To redress this, by plank 5 an additional ¾" (20mm) in the centre area was added so that the plank lay more naturally and in the right place for future planks. Plank 5 required the first heavy planing as the angle increased to 45°. Plank 6, the last plank before internal framing is fitted, is called the strong plank and is 50% thicker than the rest to provide the stiffness and strength required to take the frames' first rigid fixing.

Plank 7 had to be glued on a very cold day, about 5°C. I

store the resorcinol adhesive in the house as storage below 10°C can cause permanent damage to many glues – for example, PVA adhesive becomes lumpy – but even with the adhesives stored in the warm, as winter came on gluing would inevitably become more of a problem. So the challenge was to maintain a degree of warmth in a number of locations at the same time in an unheated shed. My solution was to pour boiling water into a freezer bag and secure with an electrical plastic tie. Then, as this would cool far too quickly, I placed it in another bag, semi-secured the tie, then inflated it like a balloon, twisting the bag and using a second tie to make it fully secure. As the water sits at the bottom, a large proportion of the water's heat sits on the flat plank joint while the inflated bag provides insulation at the sides and the top.

Preparing for the frames

The boat is based on two types of craft. The style is that of a much larger ship, while the frames and cleats belong to much smaller faerings found inside the Gokstad. In faerings the frames are minimal and the hulls rely on the strength of the planks. Mine is a little more tender so will contain a couple more cross braces.These frames are cut from oak that has grown in the general shape of the hull cross section. There are a few knees and the clats are 135° grown timber crooks taken where a branch joins the tree. The latter were the hardest to obtain. In the end, West and Sons, a large oak supplier near Mydhurst, south of London, provided the answer. Peter Alderson invited me to visit a wood nearby in the Cowdray Estate where a number of oaks were being felled by two very helpful gentlemen, Rodney and Rodney. I took my templates and cross section drawings and explained what I thought I required. The result was a number of yellow marks to signify felled trees we had identified as potential candidates and one sample section to convert back at the workshop. This cleat was cut more or less 3" (75mm) thick with a flat base which was enough to allow me to cut it in two with a circular saw. I have reasoned that I should cut through the centre of the heart so that when the timber dries out, it can shrink without splitting. In years gone by, green oak would have been stored in the local harbour/bog/stream until needed, as in larger sections oak, like many other timbers, will tear itself apart by surface drying too quickly unless carefully monitored.

One of the differences between Viking craft, especially the larger vessels and more 'modern' clinker built boats was the flexibility of the lower parts of their hulls. This was most probably to allow for the expansion and contraction of the many planks. To this end, all planks below the strong plank were tied to the frames but the keel and the garboards, the first planks, were completely unattached.

The cleats originally were carved into the planks themselves but for me rivets and a small separate process were involved. I started with a strip of oak twice the height of the final cleat and bored holes every 4" (100mm) using a 1⅜" (35mm) cutter. This was then split down its length and a jig with a pin was used to dock each cleat to length. I then required a curve and a flat so that I could secure these with rivets and this was done using a jig and spindle moulder.

All this trouble was taken as I thought I would require a considerable number, of cleats – perhaps over 100. However, I have since decided to have only three frames in the boat, so I will require only 36. Does anyone want any Viking longship cleats?

Above: *Each plank overlaps the next by ¾" (20mm).*
Below:*Trying out the pattern for the grown cleat or keber on the first of the oak crooks from Mydhurst.*
Bottom: *The first finished frame cleat.*

CONTACTS

Sika Ltd, Watchmead, Welwyn Garden City AL7 1BQ
Tel: +44 (0)1707 394444 Fax: +44 (0)1707 329129
www.sika.co.uk

West & Son, Selham, Petworth, W Sussex GU28 0PJ
Tel: +44 (0)1798 861611 Fax: +44 (0)1798 329129
www.wlwest.co.uk

David Jones, David Jones Furniture Makers, Depot Road, Hounslow TW3 1SN. www.davidjonesfm.com
email: davidjonesfm@onetel.com