



7 STAGES OF BUILDING A PILOT CUTTER

Stage 2

Lofting and hull framework

Last month, Lance Whitehead ordered his replica pilot cutter from Cockwells and the timber was obtained. This month we see how lofting provides guidance in cutting the timber for the frames and the assembly of the skeleton. *By Nigel Sharp*

Once Cockwells had procured the timber to build the replica Bristol Channel pilot cutter, the next step was the lofting. The purpose of this is basically two-fold - to ensure that the lines of the boat are as fair as possible before any wood is cut, and to generate various bits of information to assist the tasks ahead.

The starting point was the lines plan, a series of lines in three dimensions - the waterlines, which are parallel to the Datum Water Line (DWL), the buttocks, which are the lines which cut through the boat vertically fore and aft, and the sections. From this lines plan, the elevation and plan views were lofted half size, and the sections and the detailed ends of the centreline structure were lofted full size.

At the position of each of the 30 frames, a full-size section was lofted. The thickness of the planks was then taken off, giving the exact shape of the outside of each frame at its biggest point - ie the forward face of the frame in the aft part of the boat, and the aft face of the frame in the forward part of the boat.



Cutting oak frames with a chain saw

A template was then made showing the profile of each half-frame section and also each of the timber floors which would join the port and starboard halves together. Each frame would also have a corresponding bevel board, showing the angle of the outside face of the frame at all of the waterlines.

Up to the sawmill

The templates were then taken up to the yard's sawmill a few miles out of Falmouth, where all the seasoned grown oak was already machined to the correct thickness. There then followed a process of trial and

error whereby the templates were offered up onto all the oak boards available to try to get the best match in terms of the grain following the shape of each frame. Usually it's not possible to make the half-frames in one piece, so there would have to be a butt joint with the two sections (known as futtocks) held together with a clamp.

The position of each joint would be determined by the timber available, and with due consideration to the joints in other frames - the joint in any frame would be a minimum of a foot (0.3m) higher or lower than the joint in its neighbour, with a minimum of two frames between two joints at the same height. The timber for the clamps was then allocated, to overlap both parts of the futtocks by 18in (0.46m).

As it happened, it was possible to find suitable timber to make the five forward frames and the two aftmost frames in one piece per side. This timber selection process shows the advantage of obtaining timber 'in the round' as Cockwells does - square-edged boards from timber merchants would just not give a good enough choice.

Once the pieces were selected, they were roughly cut out, oversize, with a chainsaw, then transported back to Cockwells' main yard where they were cut out more accurately on an angled bandsaw.

As the bevel on each frame changes over its length, the bandsaw was set to correspond with the least bevel in each case. The outside faces were then planed to match the varying bevels shown on the bevel board, created during the lofting process, and the inside faces were planed parallel to the outside faces.

The component parts of each frame were then assembled on the loft floor to ensure the result would accurately match the lofted



Far left: Sternpost and knee assembled and upright

Left: Cutting the mortise for the sternpost



Above: Frames stacked ready for assembly

Left: Framing almost complete, with temporary braces

process was carried out with the centreline structure lying on its side. Once it was complete it was lifted off the ground and set up vertically, with the waterlines, which had been previously marked on the components, level. It now stood proud and ready for the attachment of the frames.

Framing

One of the midships frames was the first to be fitted. Great care was taken to ensure that it was vertical in elevation, and that the waterlines were level viewed from forward or aft. When it was certain that this accuracy had been achieved, the frame was fixed with a single 3/4in aluminium bronze bolt through the floor and the keel.

Two separate teams, one forward and one aft, then fitted and fixed all the remaining frames, working from the midships frame. Temporary braces were fitted between frames and from the sides of each frame down to the workshop floor.

When this process was finished, the skeleton of the boat was complete and ready for the hull planking.

Next month: planking up



lines. The joining faces were bedded on a 50/50 mix of white lead and linseed oil putty (as all the joining faces in the whole hull construction would be) and they were held together with 1/2in copper rivets, of which a total of around 700 were needed. A temporary brace was put across from the top of one side of each assembled frame to the top of the other side to ensure stability during the subsequent processes.

Centreline structure

Meanwhile work on the centreline structure was progressing. This would be made up of the one-piece 40ft (12.2m) wood keel, the stem, sternpost and sternpost doubler (all in opepe), with substantial oak knees fitted in the angles between them. Further vital information from the lofting process was the changing angles at which the garboard plank would meet the wood keel, and the hood ends of all the planks would meet the stem and stern post. With this information, it was possible to cut the rebates into these three components before they were assembled, so that it could be done in a relatively easy, and therefore more

economical, position. Also at this time, the opportunity was taken to cut rebates into the sides of the keel at the bottom, to take the fixing tabs for the stainless steel band which would be fitted to the underside of the keel at a later date.

These centreline components were then assembled. The stem and sternpost were each joined to the keel with a mortise and tenon, and all the sections, including the knees, were fastened together with 7/8in diameter aluminium bronze bolts. This



Left: Lofting can be hard on the knees