

The Sutton Hoo Ship's Company, The Longshed, Tide Mill Way, Woodbridge, Suffolk IP12 1FP UK

Scarf joints on the Sutton Hoo Ship

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Abstract: The Sutton Hoo Ship found in Mound 1 was 27 m long. Continuous strakes are impractical, and planks have to be joined. The longest planks were between 5 and 6 metres long, and the joins used scarf joints, with three rivets. The rivets are in line, and across the direction of the strake. How should such joints be handled in a reconstruction?

Keywords: Sutton Hoo ship, scarf, scarph, joint, plank, strake, rivet

1 Introduction

The Sutton Hoo Ship found in Mound 1 was 27 m long. Continuous strakes are impractical, and planks have to be joined. The longest planks were between 5 and 6 metres long, and the joins used scarf joints, with three rivets. The rivets are in line, and across the direction of the strake. What was the nature of the joint?

2 Types of scarf joint

Bruce-Mitford, 1975, mentions two kinds of scarf joint for joining planks, and there is an element of contradiction in the references made.

2.1 Oblique Scarf

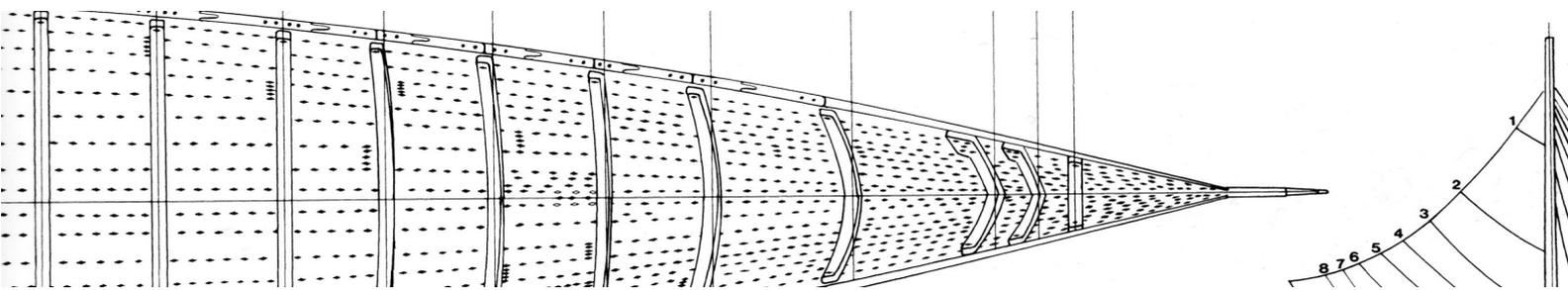
Bruce-Mitford (1975 p. 364) says: 'The wood grain surviving on the plank-joint rivets shows that the ends of the planks were planed off to a simple oblique scarf (fig. 277G and H).' No other words in the section detail the shape of the joint. The radiographs of the rivets are not easy to interpret. It might be seen to imply a scarf length of 6 times the plank thickness, perhaps more. But the reference makes it is clear that the scarphs were angled.

2.2 Halved Scarf (also called a half-lap scarf)

Another reference is indirect, and in a section relating to the gunwale.

Bruce-Mitford (1975, p. 402) says: 'A close examination of the many photographs which show the gunwale strakes in various stages of the excavation has totally failed to reveal any evidence for a plank-joint of similar construction to those in the rest of the ship - i.e. a *halved* scarf in a vertical plane joined by three one-inch rivets mid-plank and two standard rivets at the overlapping of the three planks involved (fig. 276).'

The words are rather confusing, but the photograph in fig. 276 is of planks joined end-to-end to provide a continuous strake, and of the rivets to the strakes above and below. The result includes a vertical line of five rivets.



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3 Orientation of the plank scarfs

There are two ways round for the scarf joint. It can be oriented with the trailing end of the forward plank either interior or exterior to the hull. Considering that the hull is a convex shape that is expected to move forwards through the water with minimum resistance, it would seem obvious to make the trailing end exterior to the hull. Bruce-Mitford (1975, p. 402) is unable to offer any information on the orientation of the plank scarfs, presumably because the archaeological evidence was not there.

(Defining a trailing end requires a decision on which end should be the bow and which end should be the stern. When a hull shape is almost symmetrical end-to-end there is a logical possibility that this decision was deferred until after it could be seen how the construction of the hull had turned out. The ribs, rudder and tholes could then be added accordingly. This may seem bizarre, and it presents an interesting question for the builders on how to orientate the scarfs, but the possibility should be considered. In the case of the Sutton Hoo ship, Handley, 2016, argues there was not end-to-end symmetry, but some deliberate additional buoyancy forwards.)

4 Position of the row of rivets

The three transverse rivets do not necessarily have to cross the joint halfway along it. The radiographed rivets seem to pass through equal thicknesses from each plank, and for a half-lap scarf this is consistent with a wide range of positions along the joint, although obviously not too close to one end. For an oblique scarf, the rivets must go through fairly close to mid-way if the thickness of wood on each side is to be roughly the same. Again, there is no archaeological information about the position of the row of rivets to help us.

5 Current practice

The way we scarph today is oblique, and relies heavily on glue. The ends of the planks become wafer thin, and unless glue was used these edges would be especially vulnerable to damage.

Modern scarph lengths vary from about 8x to 13x plank thickness, according to material and situation. The method uses proportional dimensions and depends on the experience/inherited skills of the master craftsman.

To try to fix such a scarph with rivets alone would seem to require two separate rows across the plank. The ship has only single lines.

As a matter of interest, *Sæ Wylfing*, a half-scale model of the Sutton Hoo ship (Gifford, 1997), used:

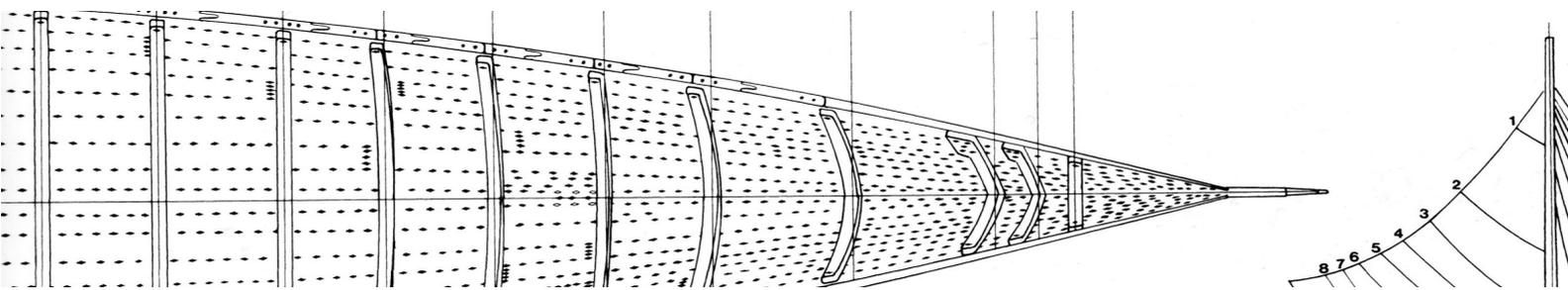
- glued oblique scarfs
- with the trailing edge of the scarf outboard
- a single transverse row of three rivets
- with the row of rivets somewhat biased towards the bow (presumably the inboard ends of the joints were felt to be more vulnerable)

Today's skill-set classes the oblique scarf as a form that does not lend itself to axe work, while the half-lap scarf would be acceptable.

6 Another interpretation of the rivet radiograph

There are other ways to account for the angle seen on the radiographed rivets of (Bruce-Mitford, 1975, fig. 277G and H). Bear in mind that their original positions on the ship is unknown.

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- It is somehow a result of the position of the rivet in the ship. Fig. 277G shows an angled rove which could be part of the story.
- The rivet was hammered in at an angle in the first place, maybe through indifferent craftsmanship.
- The angle could be caused by plank ends moving relative to each other lengthwise. This could be by shrinking or expansion of the planks. For one-inch planks, and an angle consistent with a 6x oblique scarf, the movement required would be a maximum of one sixth of an inch. For wood in a general sense, this is not much at all. However, for a plank joint between two ribs which are 3 feet apart, it is quite a lot. The movement would be along the grain of the wood, which is very stable in that direction. Such a rivet would have two neighbours which would experience very similar movement, but such information is unavailable.
- The angle could be caused by plank ends moving relative to each other across the joint. This may be more plausible, as wood expands or shrinks considerably across the grain.

7 Conclusions

We are left with a question. What type of scarf was used to join the planks on the Mound 1, Sutton Hoo ship? The half-lap seems the practical way to go. The oblique scarf is suggested by the evidence of the rivet radiograph, but is not compelling. There is no archaeological evidence concerning the orientation of the scarf or the position of the transverse row of rivets.

8 Sources of information

BRUCE-MITFORD, R., 1975. *The Sutton Hoo Ship Burial, Volume I*. London. British Museum.

HANDLEY, P., 2016. The Sutton Hoo Saxon Ship – Development and Analysis of a Computer Hull Model Prior to Full Reconstruction. In: *Proceedings of Historic Ship 2016, London, December 2016*. London. Royal Institution of Naval Architects.

GIFFORD, E., and GIFFORD, J., 1997. *Anglo-Saxon Sailing Ships*. Woodbridge. Sutton Hoo Society.