BACKGROUND RESOURCES for MODEL SHIP BUILDING

Part 1.v.01

The majority of photos used are taken (with permission) from ***Model Ship World*** postings.

piratepete007
2016

Useful Reference Texts

Anderson, R.C. (1955): ***Seventeenth Century Rigging*** [almost a complete copy of his earlier book ***The Rigging of Ships in the Days of the Spritsail Topmast, 1600 – 1720*** (1927)]

Goodwin, Peter (1984): ***The Construction and Fitting of the English Man of War 1650-1850***

Lee, James (1984): ***The Masting and Rigging of English Ships of War 1625 – 1860***

Mondfeld, Wolfram zu (1989): ***Historic Ship Models***

The following pages are a collection of comments that explain some methods used in model construction as well as in operating a ship. I have not presumed to be an authority in this area and so many comments will be lacking in both detail, time and country but this presentation grew out of a wish to educate *myself* in such matters. Hopefully, by sharing with others, some of this knowledge will prove useful.

Some of the comments and many of the photos have been extracted from posts made by various members of the Model Ship World Forum and I am indebted to their giving permission to do so (if I have overlooked somebody and not acknowledged their name, I sincerely apologise and please let me know).

In alphabetical order, they include …

Amateur
banyan
Brian C
Dan Vadas (especially from his posting for HMS Vulture)
DaveRow
Denis R
Doc Blake
GuntherMT
guraus
hornet
Janos
JerseyCity Frankie
J.P.
KeithW
Marktiedens
marsalv
Michael101
mikec
Mike Y
mtaylor
Navis Factorem
Ollagynot
Pucko (for assistance in creating some CAD's)
QA's Revenge
shopaholic
Tadeusz43 [from his collection of photos 'Art of Period Shipbuilding']
tlevine
Vince P
zoly99sask

[To navigate through the contents – use 'control + click']

Contents

Illustrations

[The figures below are not hyperlinked]

Euromodel Ships

Name	Era
Aiax [1:72]	late 18C
Derfflinger [1:80]	1780 +
Falmouth [1:75]	1752 – 1766
Friederich Wilhelm zu Pferde [1:48]	1684 – 1692
La Renommee (second of four named vessels) [1:70]	1744 – 1771
Mordaunt [1:60]	1681 – 1693
Pinco Genovese [1:36]	mid 18C – early 19C
Royal William [1:72]	1670 – 1813

Chapter 1: BASIC CONCEPTS

Bulwark Height

Builders often comment on the need for the bulwarks to be higher above the deck than is shown in the drawings. Part of Plan Sheet 'A' is shown below that explains the problem and provides the correction necessary.

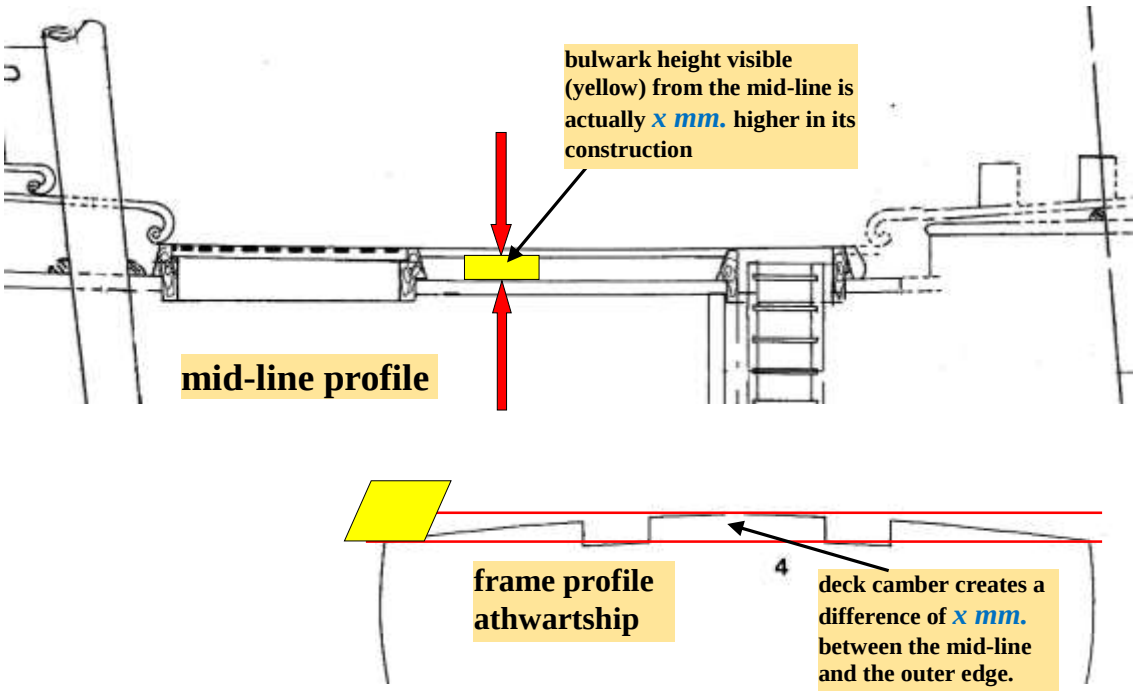


Figure 1: Bulwark Height Correction

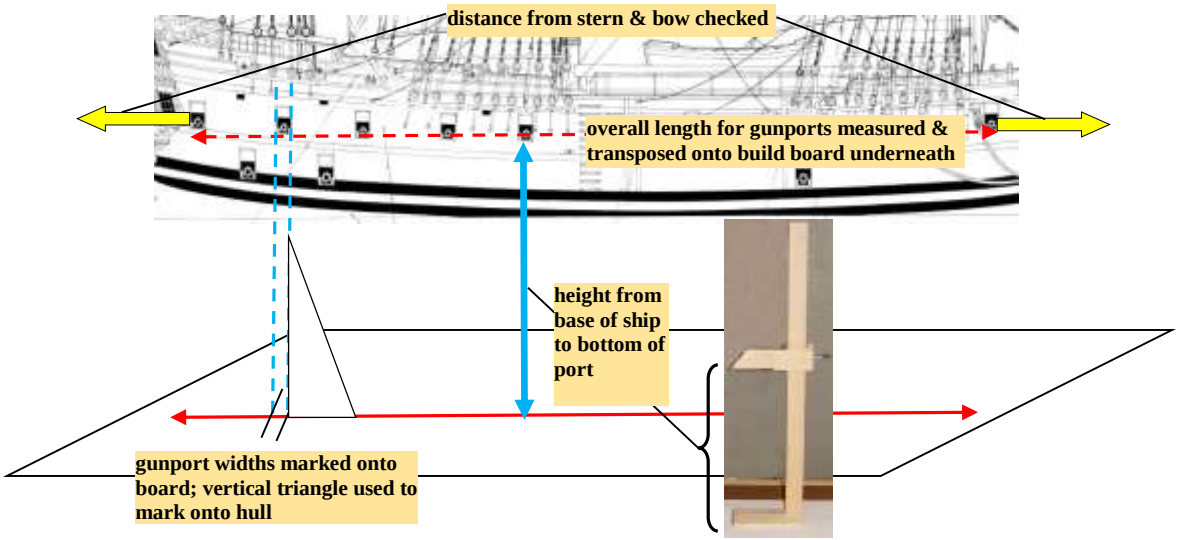
Measuring

The following commentary is about taking things to an extreme ‘measure’ and only represents a whim that I decided to follow. Maybe very few builders will ever go this extent ... but in order to interpret the plan drawings of the hull side view, it should be remembered that the drawings are a three-dimensional view shown in two dimensions. Allowances could be made for this ‘abberation’. The changes in dimension will be small and if this change is not followed, things will still fit into place. This particularly relates to ports and the wales.

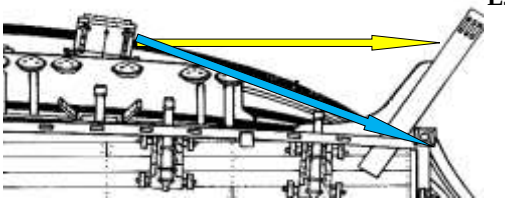
Remember though, the position of the ports was established early in the construction of the hull so what follows, for most, will be superflous !

These techniques allows for a closer reproduction of that shown in the plan drawings.

Fig. 2 indicates how the bottom edge position of the port might be determined.



Establishing Gunport Positions



Yellow Arrow:
the 3-D view measurement shown on the drawing

Blue Arrow:
the 2-D length along the hull will be greater than the observed 3-D length

One aspect to double check on is the width of the ports as the bow curves – particularly the end port (chase port). On the drawings, these will appear to narrow due to their being a three-dimensional representation. In fact, all ports will have the same width.

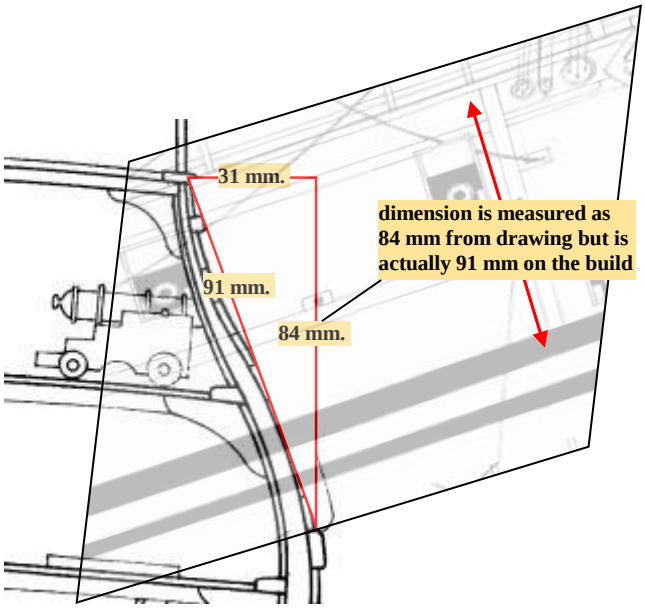


Figure 3: Making Adjustments for Three Dimensions

Fig. 3 illustrates a common problem faced by builders – the drawing illustrates what is *seen* but not what is *measured* … it is a three-dimensional view presented as a two-dimensional view.

The figures shown in Fig. 3 were taken straight off the computer screen but the *ratio of figures will remain the same*.

84 mm. from the drawing is actually 91 mm. on the model.

For gunport and wale readings, the figures obtained would be multiplied by 91/84.

(i.e. increasing measurements by a factor of **1.083**)

e.g. ***28 mm***. becomes 28 x 91/84 = ***30 mm.***

Metal Bending

A number of kits – especially those of Euromodel - are supplied with metal decorations such as stern window sections and beakhead rails. Whilst they are usually formed somewhat to the required shape, further bending is required to fit the model being built. The following procedure, outlined by *marktiedens* [MSW], is a straightforward one that avoids the metal becoming brittle and breaking ...

Figure 4: Heat Gun

"Using thick leather gloves to keep from burning my fingers, I found that holding the metal ... in the heated air from the heat gun, I could bend the metal pieces quite easily.
During the bending I did not let the metal cool too much. When I felt I could start the bending I just backed away from the heat gun - the metal would stay hot, but not too hot. I didn`t want it to cool too fast in the middle of trying to make a curve. I did the heating several times because I had to hold it up to the ship to check the curve and it would cool down. Re-heating several times did not seem to affect the workability of the metal. It was a trial & error kind of thing, but it seemed to work out ok. I probably spent 30 minutes bending each piece.

Even after all the filing I had to do to make them conform to the curves of the hull, I had to tweak the bends I made earlier. Just had to be careful not to get the metal too hot - just enough so it can be bent. The temperature at the nozzle of the heat gun is about 500 degrees (F), so it wouldn`t take long to overheat the metal & destroy it. I held the pieces close to the gun only about 7 or 8 seconds then backed away. When I could feel the metal not wanting to bend anymore I moved a little closer to the gun to warm it more. Kind of hard to explain - I just did it by "feel".

After a bit of filing to fit the curves of the hull, they were painted gold & glued in place. The low setting on the heat gun is all that is necessary to heat the metal to be bent."

Plank Bending

I like this machine although I do not have one (as yet). From the Micro-Mark Catalogue comes the following description ...

‘ Professional Quality Bending Machine Forms Smooth Curves in Wood, Plastic and Metal’

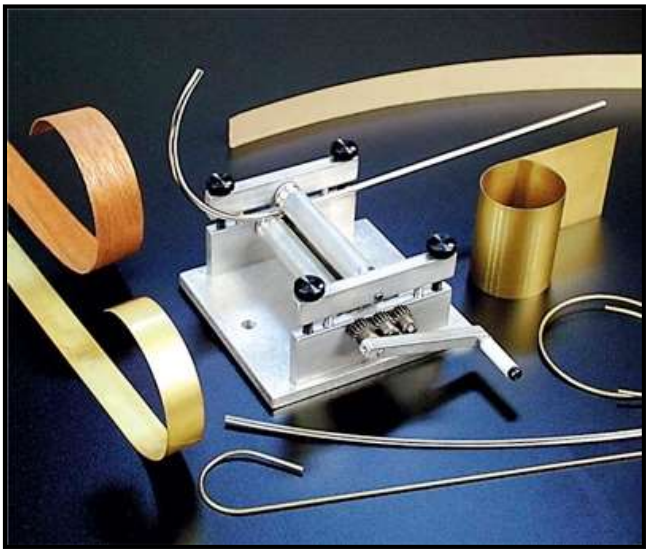


Figure 5: Micro-Mark Bending Machine

‘There's never been a better, easier-to-use tool for making perfect bends in ship model planking. ***Works on wood strips up to 2-1/4 inches (approx. 57 mm.) wide and 1/8 inch (approx. 3 mm.) thick***...even plywood! ... ... Simply set the rollers for the desired radius and turn the crank to feed and form the material. ... ... Precision machined of aluminum with steel gears. Rollers are 1/2 inch (12.7 mm.) diameter by 3 (76.2 mm.) inches long.’

Planking Tutorial

In planking a ship, there are a number of basic preparatory steps to be taken before adding the first plank and all of these are important.

As to the planking itself, there are techniques that have been well tried over time and can be presented in simplistic or advanced terms. The link to the MSW forum shown below is a very useful tutorial in itself – clicking on the URL suggests it might not be safe but it is !

http://modelshipworldforum.com/resources/Framing_and_Planking/plankingprojectbeginners.pdf

The following tutorial only attempts a very basic approach.

Figure 6: Keel Taper

This is a planking tutorial based on the Euromodel *La Renommee* but the elements are there for any ship.

Bearding

By this stage, the bearding or tapering (Fig. 6) of the keel would have been done at both the aft and forward ends. This tapering is essential if the first and second planking are to fit within the false keel width dimension.

Wales

Fig. 7 shows how the wale (soaked in ammonia, held in position for some days and had its shape set) was fixed in position.

Figure 7: 'Ammoniated' Wale Held in Position to Dry

Bulkhead Fairing

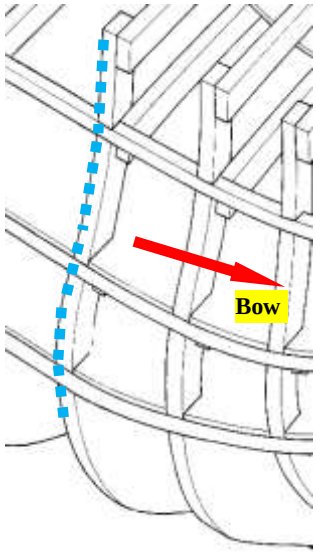


Figure 8: Fairing Edge

If there is one important rule to follow in planking preparation it is that of fairing (i.e. bevelling to create a longitudinal uniform flow of the surface edges of the supplied bulkhead frames). The edges are sanded but *always retaining just a fine edge (broken blue line in Fig. 8) on the aft side of the bulkheads approaching the bow and the forward edge for those approaching the stern.*

That way, the original and intended shape of each bulkhead frame is retained. This will happen even if the edges are angled too much although the fixing of planks onto such a surface will be more difficult.

What tools should be used ... ?

There are a variety of tools such as simple files through to flexible painter-type pads to rotary sanding drums on devices like the Dremel. In the end result, the required outcome can be achieved by many different methods.

To produce the finished product, a hand-held sanding board or stick could be used as illustrated by any of the following. The suggested devices can vary enormously and two contributors to MSW have quoted their own tools measuring 120 x 20 x 1.5 mm. and 200 x 70 x 40 mm. Whatever is used, the dimensions should certainly be sufficient to cover 2- 3 frames. To this end, some builders utilise curved sanding boards when working on the bow or stern. This is a very open-ended approach and much is left to the individual.

Figure 9: Small Multi-Purpose Sanding Stick

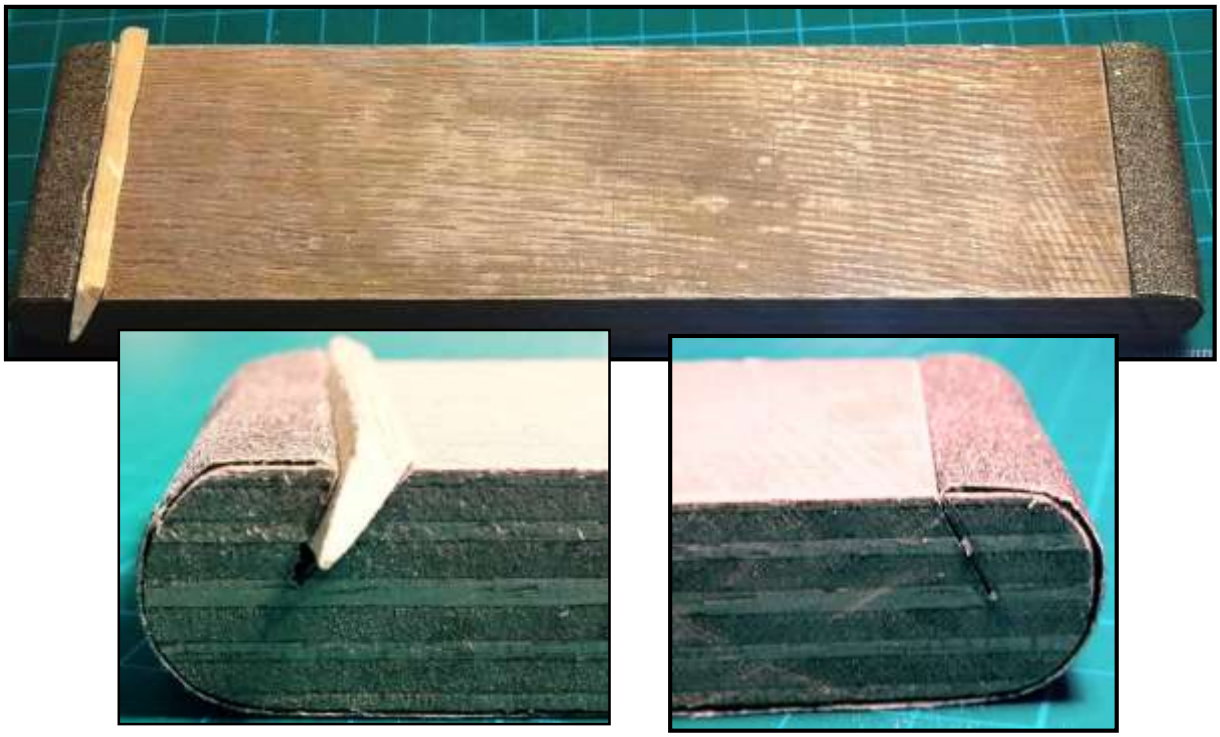


Figure 10: Larger but Effective Sanding Board

There are a number of commercially-prepared sanding 'sticks' – small flat boards with a different grade of sandpaper on opposite sides. MSW members frequently refer to sanding sticks they have made using *rubber cement* as the adhesive. This allows for the easy replacement of the sandpaper strips.

A visit to an outlet selling beauty products will reveal a number of flexible sanding sticks used to shape finger nails. The larger ones are very useful.

Filler Blocks

With many ships, there are significant curves at the stern and/ or the bow. It is of enormous value to add in extra filler blocks (Fig. 11) apart from any provided forward from the stern and aft of the bow. The more blocks there are, the easier it is to obtain the correct curves in the strakes.

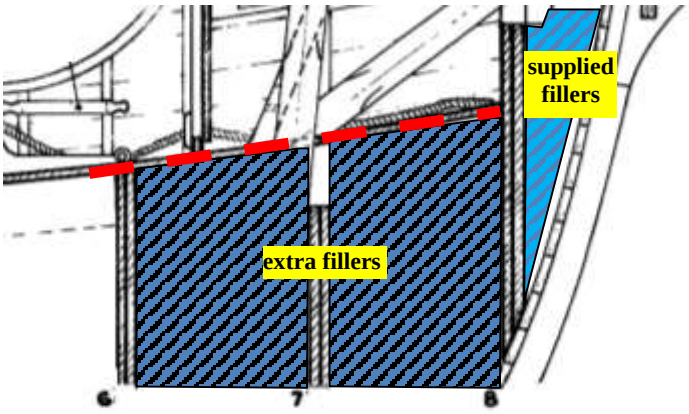


Figure 11: Diagrammatic Filler Blocks

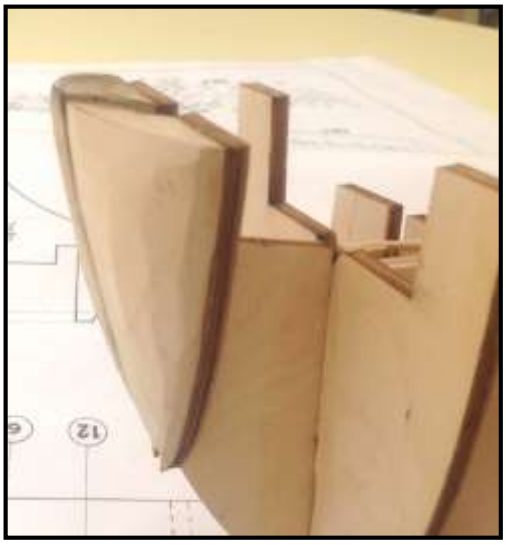


Figure 12: Preliminary Filler Block Shaping

The fillers can be of any timber and the trick is to place in position more timber athwartships than is required and then trim and fair back (Fig. 12) to produce a uniform flow along the bulkheads. Whilst there are a number of considerations to allow for such as gun ports, many a builder resorts to these filler blocks along the length of the hull.

Bulkhead Positions

Using a pencil, the thirteen bulkhead positions were drawn over the first planking.

Planking Bands

The next step was to install the garboard strake…

Garboard Strake

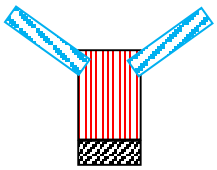


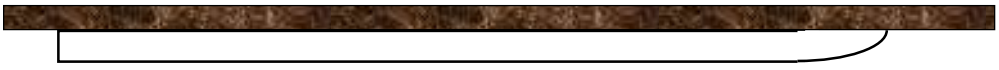
Figure 13: Rabbet

This is the plank (blue) adjacent to the keel (red) and is often tapered on its lower edge and fitted into the rabbet on the keel surface [rabbet is a groove, generally triangular, in the keel and posts]. *In many builds, this feature is omitted* and instead the garboard strake simply butts against the keel surface. From many models examined, this strake butts against the underlying false keel.

N.B. the term 'strake' is used for a single plank or a group of planks

For the garboard strake material:

- supplied planking timber
- wider timber purchased as extra material



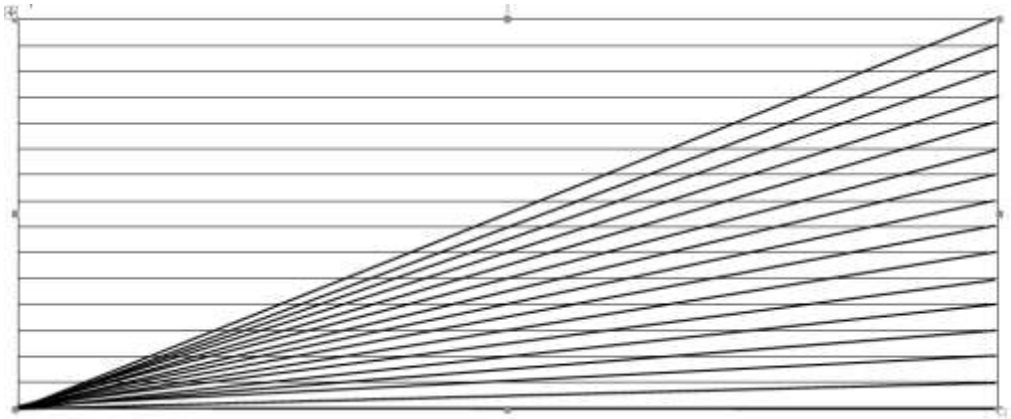


Figure 14: Planking Divider (1 - 15 planks)

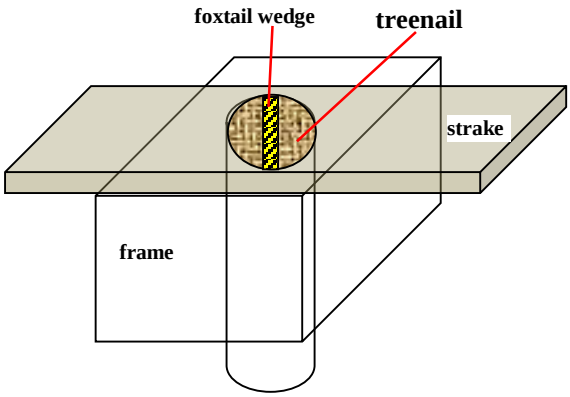


Figure 15: Diagrammatic View of Treenail

Treenail (also trenail, trennel or trunnel)

Instead of using metal fasteners to fix planks to the frames, it was common to do treenailing. This consisted of inserting wooden 'pegs' which were of a softer wood, into drilled holes and then expand their outer end with a wedge of much harder wood driven into them called a foxtail wedge. When the ship was immersed in water, the wooden pegs would swell and further tighten the pegs. This method worked extremely well to maintain the ship's physical integrity.

Nevertheless, this is an uncertain area in which some enthusiasts treenail expansively. The following two comments are worth reading …

An article by William Layman, (a Fleet Admiral at the time) *'Precursor to an Expose on Forest Trees' [January 1, 1813]* and archived by Google, made this following comment on p.19

'The use of tree nails in the ship-building not only consumes the very best oak in the making, - but very much diminishes the strength of the timbers transversely cutting the ligneous fibres in boring; and they are, after all, fastenings. On the same principle, any fastenings which require the timbers to be so perforated are objectionable.'

An interesting comment and one which cautions against the excessive use of treenails ?

Also, jbshan (MSW Forum wrote) … "Boudriot describes the outer appearance as being 'peppered' with trunnels and other fasteners. You have the plank fasteners, and far more of those than most modelers show, the knees, assorted through-bolts for eyebolts, ringbolts, belaying points, etc., and all of those somewhat smaller in diameter than most modelers depict. Most certainly there would not be lines of 3 or 4 inch diameter fasteners running up the hull at 8 or 12 foot intervals and nothing else, which is what you sometimes see."

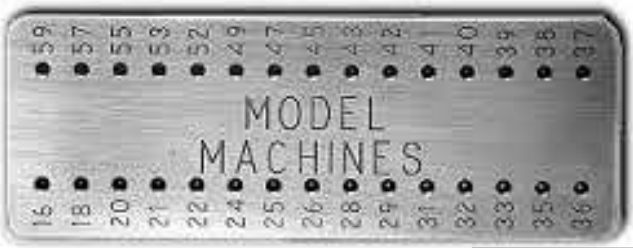
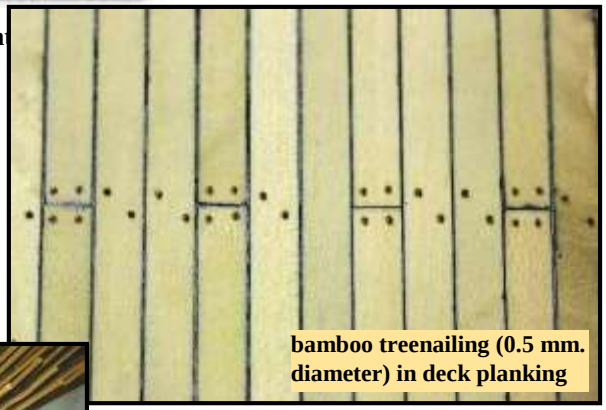


Figure 16: Byrne's Draw Pla

In ship modelling, it is common to manufacture these treenails from bamboo barbeque sticks by splitting them along their length and then passing them through a draw plate to create a specific diameter.



bamboo treenailing (0.5 mm. diameter) in deck planking

regular treenailing

One Particular Method (suggested by a MSW member)

1. Decide on what pattern to use for the trennels. Most seem to use 2 trennels diagonally across the plank lengths except 2 vertical at the ends of each joint.

2. Using a small pointed punch, gently mark the location of each trennel. They should be in a vertical line corresponding to the hull frames underneath.

Figure 18: Pointed Punch (above) & Pin Vice (below)

3. Using a pin vice with a 0.75mm drill bit set to a depth of 2mm. drill the holes over the marks.

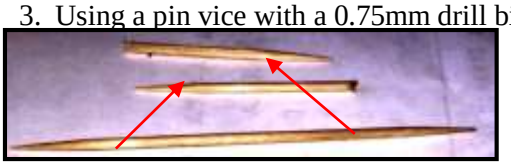


Figure 19: Half-Toothpicks

4. Using round toothpicks, cut them in half. They are usually made from bamboo which is a nice hard wood.

5. Mix some PVA glue with water (50-50).

6. Dip the pointed end of each toothpick half in the glue and gently push into each hole.

7. Wait about 4-6 hours for glue to dry and *snip* off the toothpicks flush with the hull.

8. Lightly sand over each one and finish off with a clear stain for unpainted hulls or the same color for painted hulls.

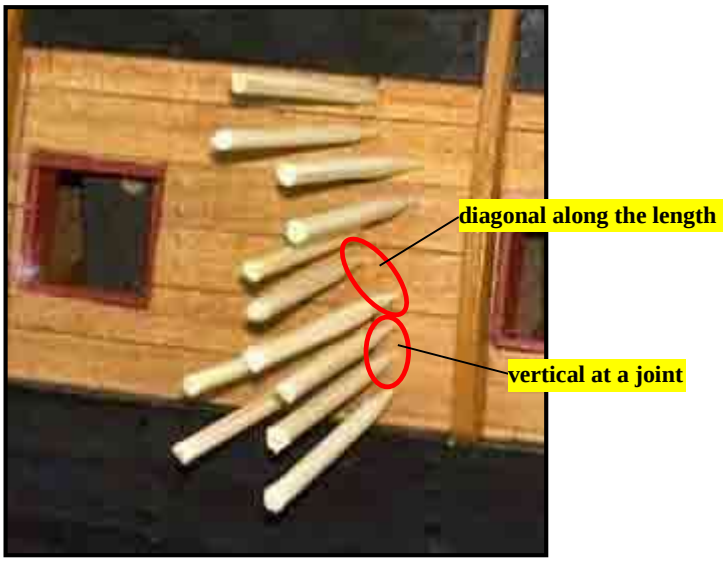


Figure 20: Vertical & Diagonal Treenailing