

# Sails

There are many arguments for adding or omitting the sails on a model ship. There is no right answer and I decided to have a combination of set and furled sails on my model of HM cutter Sherbourne in 1/64 scale to provide 'life' to a static subject. This article is an extract from a much longer work on super detailing the Caldercraft kit of Sherbourne. Please contact the author if you want to purchase a copy.

Real sails were made from canvas cloths which in the Royal Navy in the 18th and 19th century were 2 feet wide. The cloths were laid next to each other and the seams were folded over and stitched with a double seam. Extra cloths were stitched over areas which were subject to heavy wear such as the corners of the sail and bands across the sail where the reef ropes were inserted. Around the edge of the sail was a bolt rope and a number of rope eyes known as cringles which were used to attach the running rigging to the sail. The bolt rope was stitched to the rear surface of a square sail and usually to the port side of a fore-and-aft sail.

Varieties of fine cloth such as cotton lawn have been used for model sails reasonably successfully in large scales. A thread pitch of at least 200 threads per inch is needed but this is still far from true scale size and is equivalent to a canvas with threads which are over 6mm diameter. Any sewing methods for representing the seams are unsuitable in a small scale since the stitch sizes and weight of thread will be far too heavy. One interesting technique is to pull out a thread from the sail material and the resulting gap forms a line which represents the seams between the cloths. Drawing with pencil or pen or computer printer are the only other alternatives I have seen. A spacing of 9mm between the seams is about right in 1/64 scale.

The method I chose is to design the sails on a computer drawing package and then print them with an ink jet onto cotton lawn sheets which have a plastic backing (US letter size sheets from EQ Printables, 240 tpi). The big advantage is that one can take the time to get the design right and make fine adjustments to line positions and colours on screen before committing to print. The ink soaks into the cloth and the printed lines are visible from the reverse side though not as crisply and clearly as from the front.

I drew my designs in Powerpoint because I am familiar with the package. Any drawing system will do but it is convenient to be able to measure distances on screen and change the line thickness and colour. I used mostly 1 point or 0.5 point lines in a brown shade having tried several line styles and colours on a trial first sheet which also became the home for my experiments in attaching ropes and cringles. Be aware that software such as Powerpoint occasionally tries to be helpful and does things which are not wanted, for example putting a margin within the paper size. I had to manually change the paper size in the software so that I could use the full extent of the sheets. If you normally use A4 paper then remember to tell the computer and printer that you have a different size of paper, it is often not sufficient to make the change in only one menu. Print onto paper until you are absolutely sure, before committing to the expensive material.

The sails are cut out with the plastic backing still attached. This gives a sail which is fairly rigid and easy to handle while the bolt ropes are glued on with thinned PVA

adhesive. When the glue has set firmly the plastic backing is peeled off. The sail can then be softened by working it between the fingers.

My model of Sherbourne has five sails and two flags made with this method but the descriptions here are for the two square sails: the top gallant is loosely furled and the topsail is tightly furled.



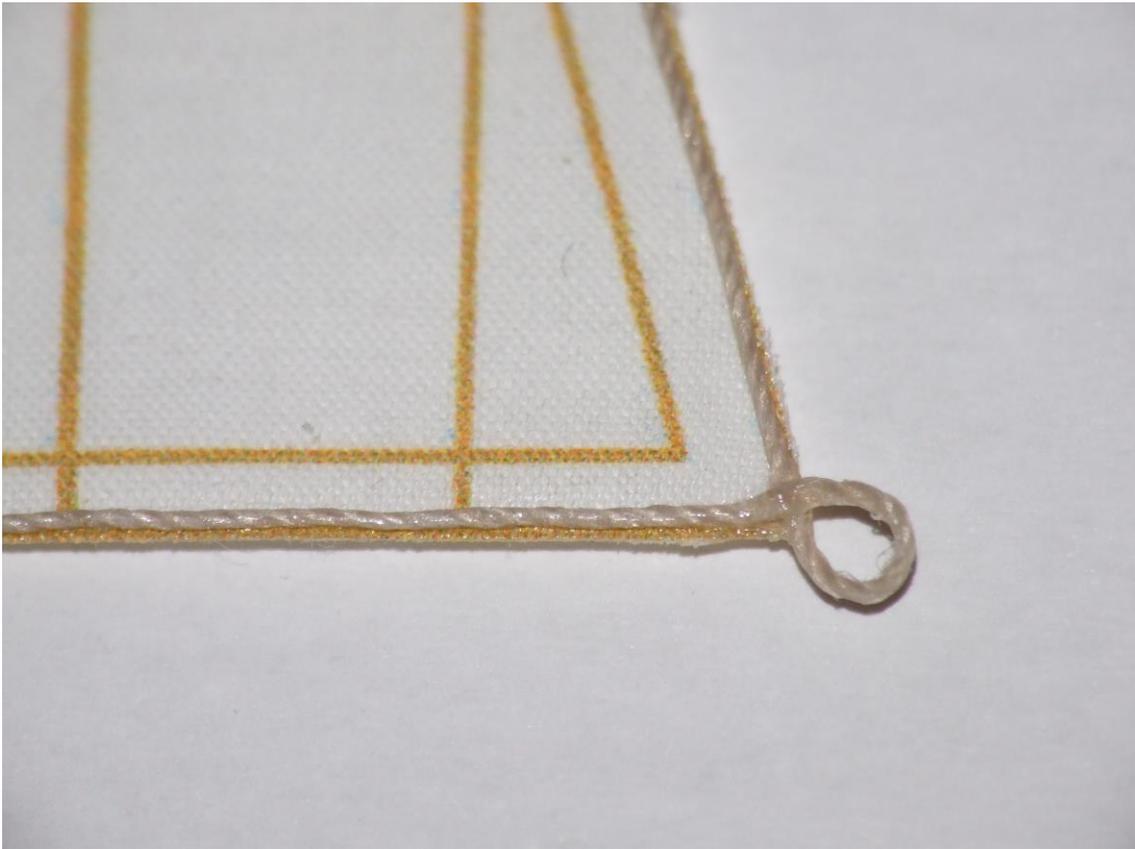
### **Top gallant sail**

The design I printed for the top gallant shows the seams, a border and the locations of the cringles. It does not indicate the positions of the robands for tying the sail to the yard but these can be added easily. I made a pin hole for each roband in the head of the sail. There are two for each cloth and most sources say that they are located symmetrically within the cloth which puts them about 2mm from the seam and 4.5mm apart. It is possible that the robands were placed on the seam and the centre of each cloth but this is less likely for Sherbourne.

The bolt rope borders are from 0.25mm natural thread. About 1cm of thread is held in place on one side edge of the sail, starting at the top corner, and the glue is applied with a fine paint brush. When the glue is holding move on to the next centimetre of thread. If the PVA is too thick then it does not flow into the thread, if it is too thin then it soaks into the material too quickly and too far. It is best to experiment on a scrap piece of material.

At a cringle it is necessary to be patient and hold the thread in the right position until the adhesive has grabbed the thread and the material. The clew cringles at the lower corners and the bunt cringle in the middle of the foot of the sail can be made as simple loops

which are bent to shape while the glue is setting, though their actual construction is somewhat more complicated.



The earring cringles at the top corners do have a more distinctive shape and are worthy of more effort than a simple loop. I glued on the head rope, leaving about 2cm hanging free at each end. This is then looped down and under itself so that part of it lies parallel to the rope at the side (leech) of the sail where it is glued. The result after a little pushing and pulling is a 'D' shape like an ear which protrudes from the side of the sail. The remaining tail of thread which is now pointing upwards from the top of the sail is trimmed off when the glue has set firmly.



The sail is attached (bent) to the yard in a reasonably authentic way. I first tacked it in place with a couple of clips (this part is not authentic) so that the top edge of the sail is near the top of the yard: according to most references the sail does not hang under the yard. The bolt rope is at the back of the sail.

The earrings are used to hold the ends of the sail in place. Tie a short length of 0.1mm natural thread to one earring cringle then take it out towards the yard end. Hook it behind the forward cleat, bring it over the top of the yard, down behind the other cleat and then back to the earring cringle. Feed it through the cringle and then repeat the operation so that there are two turns of thread which stretch the sail towards the tip of the yard. Check that you have not trapped any other threads between these turns and the yard. Pull the thread taut, working it round if necessary with tweezers, then secure it in place on the earring with a small drop of cyano acrylate. Now wrap the thread four times around the yard immediately above the earring, taking it through the earring at each turn. Secure the end by a simple knot to the earring and a drop of cyano acrylate. This is now repeated for the other end of the sail and yard and should give a symmetric shape. If the sail has moved to or from one end then pull off the thread and start again. The clips which held the sail to the yard can now be taken off.

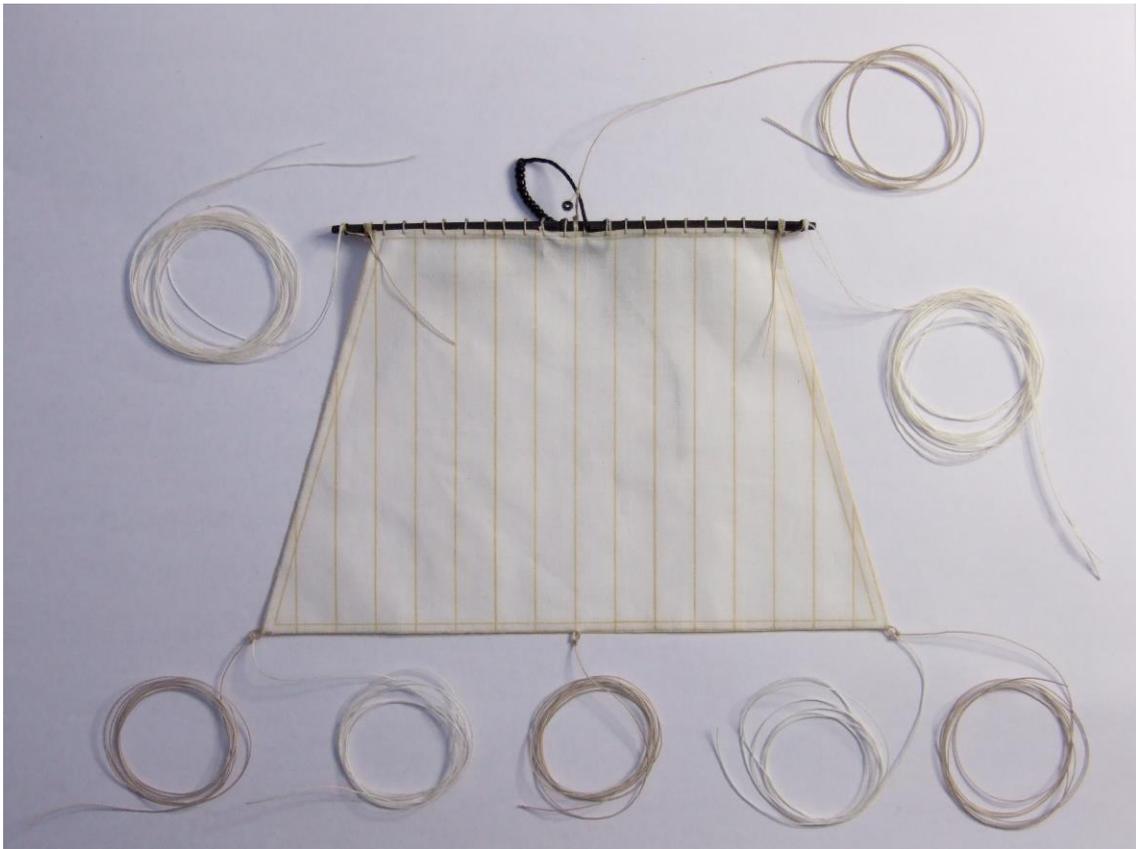


The robands tie the sail to the yard. The methods for tying them are very complicated but for Sherbourne I used a single turn of thread tied with a reef knot. Cut about 40cm of 0.1mm natural thread and give 1cm at one end a light coat of cyano acrylate. This hardens to give a natural needle which makes threading much easier. Push the needle end of the thread through the roband hole nearest to the earring from the front of the sail and pull the thread through until about 2cm or 3cm is left free. I then turned the sail over and laid it down with the rear face uppermost and the sail to the left of the yard. Tying the reef knot with the help of tweezers was then fairly simple, being careful to avoid trapping the foot ropes. Cut off the long end and seal the knot with a small drop of cyano acrylate so that the roband is not glued to the yard, then trim off the loose ends. Work steadily towards the centre tying the robands on alternate ends so that the symmetry is retained. The positions of the robands and the sail itself can then be adjusted by pulling and pushing as necessary.

Gaskets are ropes of plaited fabric which are tied around furled sails to hold them to the yard and when the sail is set they fall in front of it. On the top gallant sail there are two, one at each yard arm. Tie a length of 0.1mm natural thread with a reef knot over the earring turns so that about 6cm falls in front of the sail.

Clew lines are 0.1mm thread and are attached to the cringles at the bottom corners of the sails. This could be done in a variety of ways but I used reef knots for the model. The sheets are from 0.25mm thread and are similarly tied to the same cringles. The bunt line is 0.1mm thread and is tied to the cringle at the centre of the foot of the sail. I used a buntline hitch since this is the right knot and it is not difficult to make. All the knots are sealed with cyano acrylate.

The yard with its sail is now ready for fitting to the mast.

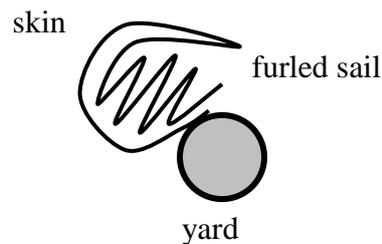


The yard is attached to the mast and levelled and its angle set with the lifts and braces. I then fed the clew and bunt lines through their blocks on the mast before taking them down to the deck. The lines are now pulled to bring the clews up at the back of the sail and the bunt up at the front. The edges of the sail are worked with fingers and tweezers to put the folds in the right places and make it look right. I experimented first with a towel over a washing line to get a better idea of how the material should hang because the folds are convoluted.



## Top sail

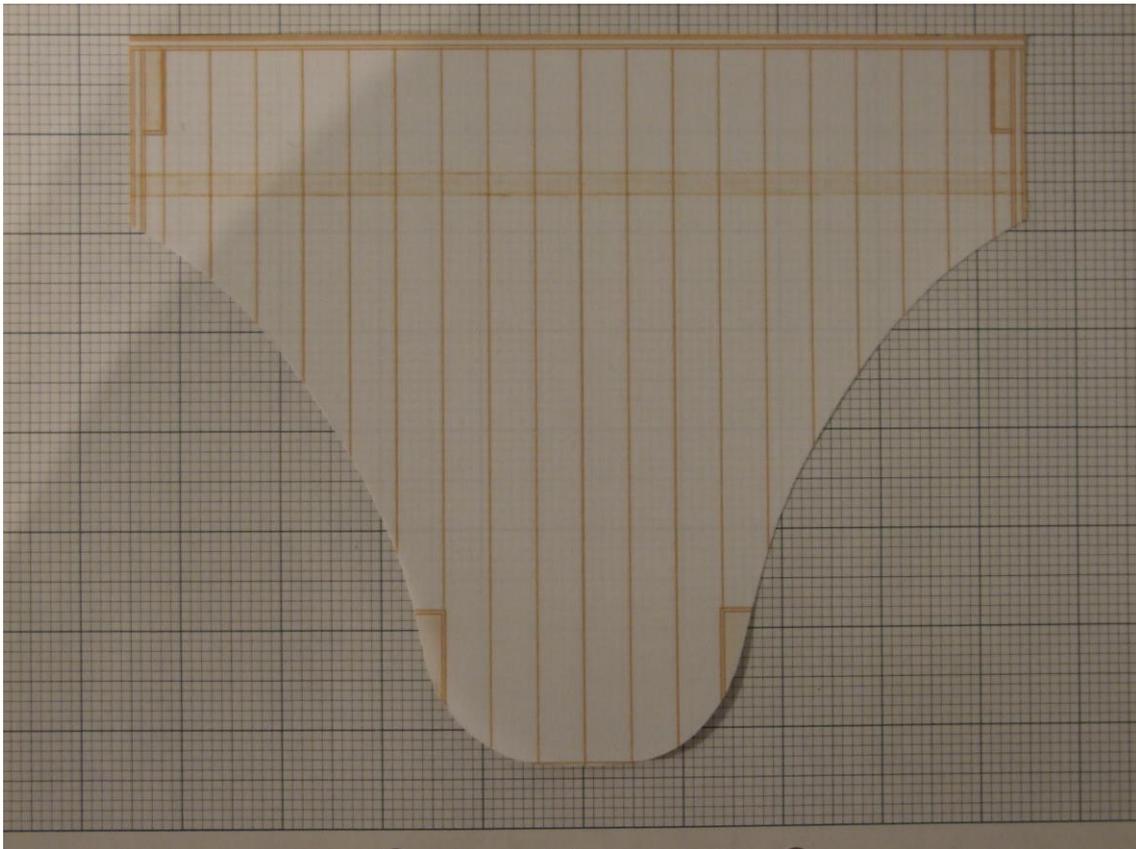
I chose to make the top sail tightly furled but it is not a simple matter of rolling it up. The bunt lines raise the bottom edge of the sail up to the yard, in front of the sail and tight against their blocks on the top of the yard. The sailors then catch hold of the sail at arms length below them, in front of the yard, pull up the section and lean on it to hold it in place. They then repeat this so that the sail is gathered up in a concertina fashion. The final piece of the sail, that which was at the top, forms a skin over the other parts. The whole assembly sits on top of the yard though the bulkier parts will droop down over the front.



Gasket ropes are used to hold the furled sail in place. On the topsail one is tied to the yard at each end, through the earring cringle, one is half way along each yard and two (known as the bunt gaskets) near the centre of the yard. The gasket is wound around the sail and yard for somewhere between four and seven turns with the last few turns being closer together. The loose end is not tied with some fiendishly complicated knot but is simply wrapped round and round the last few turns.

Because the clew lines pulled the lower corners (clews) up and behind the sail the furled structure is not very simple. Most of the weight of the sails is near the centre of the yard with a relatively small amount near the ends which gives the furled sail its characteristic shape with a large, heavy centre or bunt. The clews stick out from the skin and fall forward, in front of the skin and yard, near the centre of the yard where they are known as dog ears. The clew lines from the dog ears loop under the yard to the clew blocks while the sheets and tacks fall down to their blocks. Bow lines which are attached to the edges of the sail also come out past the skin and lead to their respective blocks.

The various references for modelling furled sails say that the height of the sail should be reduced to a half or a third because the bulk of most materials is not to scale and is far too thick. This is not so critical for the material used here which is quite fine but I did still reduce the height. I experimented with an off-cut of the material and found the lengths which gave me the weights I wanted along the yard. At the ends of the yards the height is cut down to about 5cm while in the centre it is left at its full length with smooth curves joining these limits to give a tongue shape. When the sail is furled by gathering it up like a concertina there will be more material in the centre.



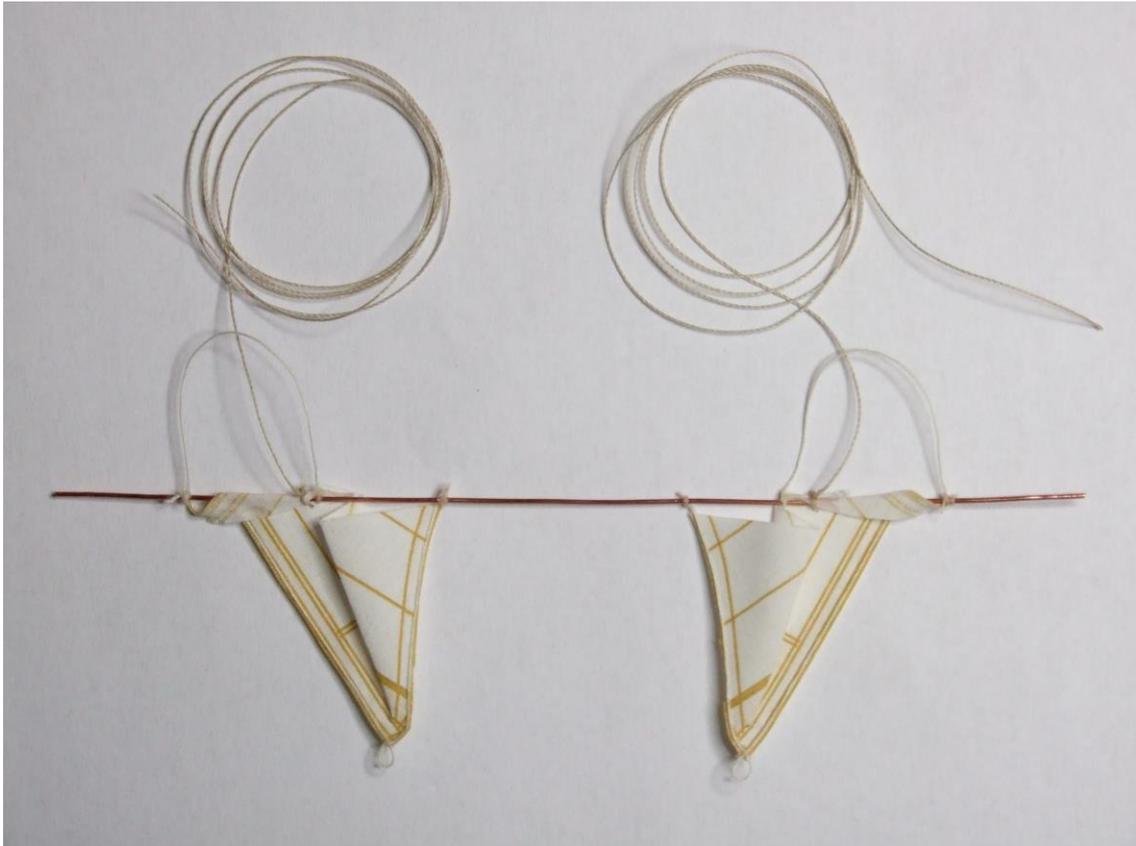
The bolt ropes on the shortened sides of the sail are from 0.25mm thread and are glued in position. The head rope is then glued on and the ends brought round to make the 'D' shape earring cringles. When the glue has set firmly the plastic backing is pulled off the material. I did not put on the reef ropes since these will be tucked away inside the sail and will not be visible. If you want this sail to be set or loosely furled then reef ropes will be needed and it is a tedious job to thread them all through and make them hang down.

The sail is bent to the yard in the same way as for the top gallant sail. The sail is held in place with a couple of clips while the earrings are tied on. The robands are then tied on, working towards the centre of the yard to ensure that the symmetry is retained. The gaskets are from 0.1mm thread and are about 10cm long. There is one at each yard arm tied through the earring cringle and one half way along the yard on each side. At the centre of the yard the bunt gasket is tied around the rope which holds the tie block to the yard. The thread is 20 cm long so that 10cm hangs on each side. Coat the tip of each gasket with cyano acrylate to harden it since it will be threaded through a tight gap later.

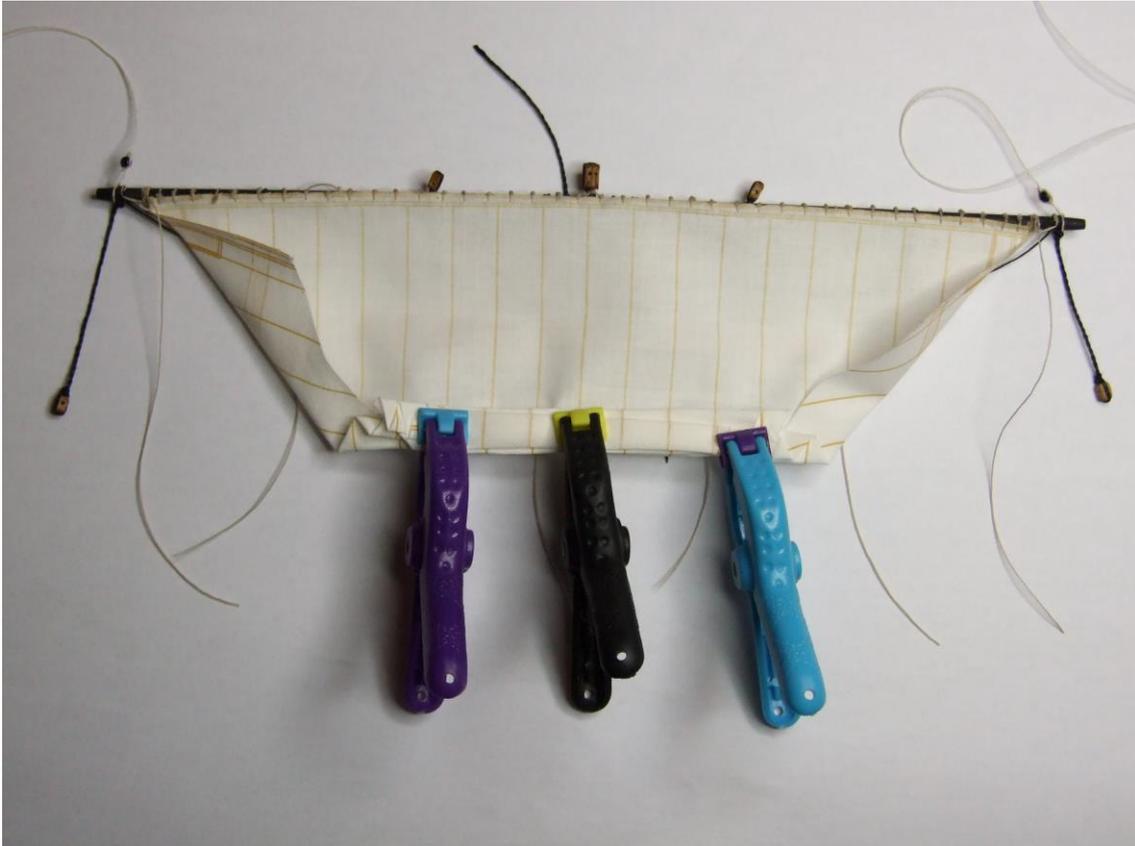
The dog ears with their clew lines and tacks and sheets protrude from behind the skin of the furled sail together with the bunt lines and bow lines. I attached them all to a piece of thin copper wire which can be tucked among the folds during furling and which will hold all the ends in the right places. The dog ears are the triangles from the lower corners of the sail, with sides of about 3cm along the foot of the sail and 5cm along the side of the sail. The bolt rope of 0.25mm thread is glued to these edges with a loop at the corner for the clew cringle. Leave a tail at each end which is used to tie the dog ears to the wire. The position and shape of the dog ears on the wire is not critical and would be a consequence of how the sail was bunched up during furling. I gathered up the dog ears slightly so that there is a pair of folds in them but they can be kept flat. It is

important that the edge of the sail on the dog ear is towards the ends of the yards and the foot of the sail on the dog ear is towards the centre of the yard. I tied the threads from the foot of the sail to the wire about 3cm apart. The other edge was too long and the dog ears did not hang as I wanted them so I wrapped the material around the wire to shorten the length.

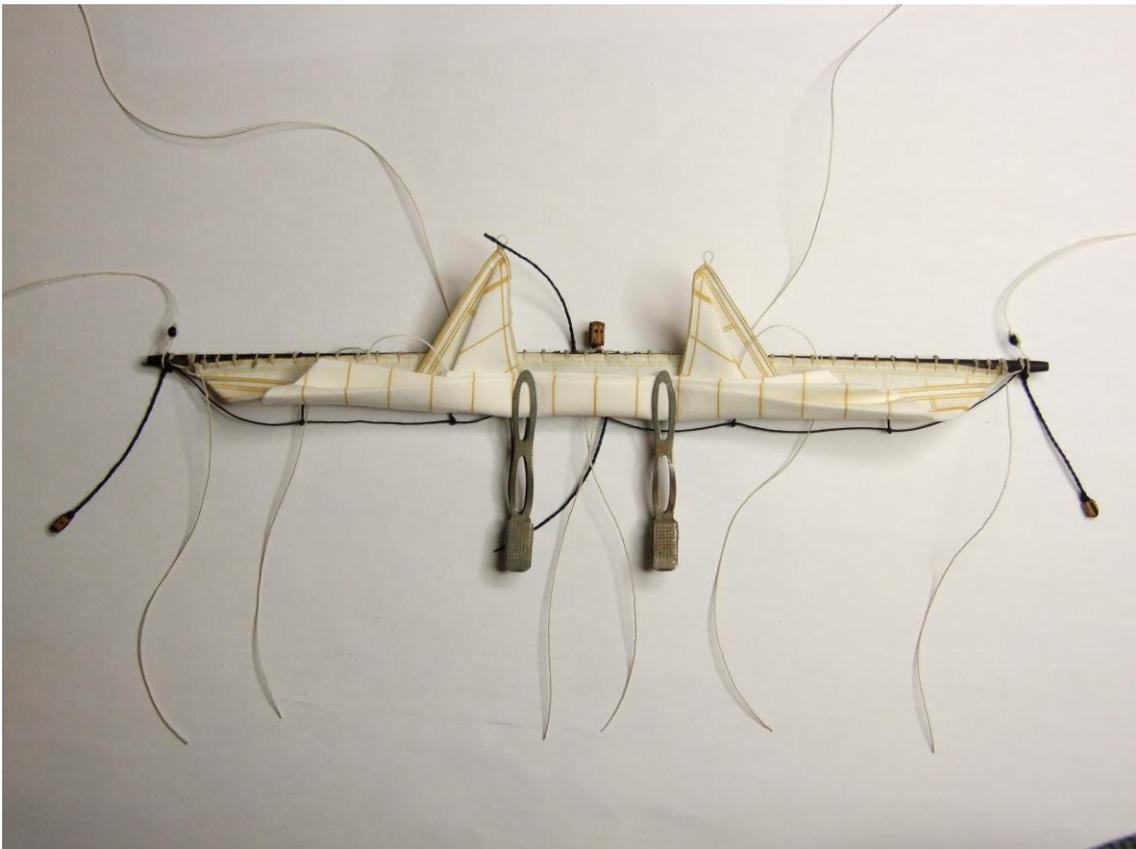
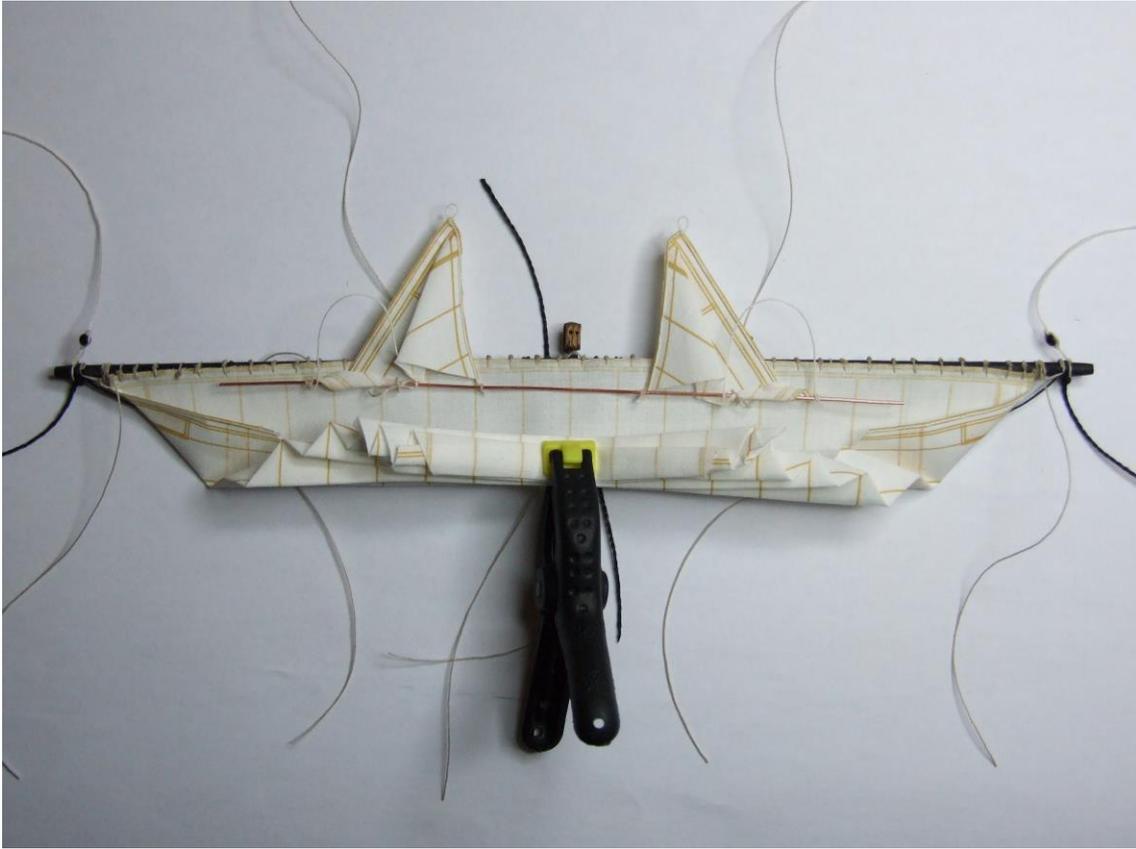
The bunt lines are 0.25mm natural thread and are tied to the wire. Their positions are the only critical ones since they line up with the bunt blocks which sit on top of the yard. The bow lines are tied to a rope which forms a loop between two cringles on the side edge (leech) of the sail. The bow line itself then leads down to the deck. I tied about 2cm of 0.25mm natural thread to the wire in two places to form a loop.



You need a lot of fingers to furl the sail. I started at the bottom of the sail and used successive Z folds which were between 5mm and 8mm deep. Pressing the folds hard to get a crease makes the job easier and clips can be used to hold them in place. The side edges of the sail are brought in after the bottom portion of the sail has been furled. I folded them forwards so that they met with the Z folds since this simplifies the furling though in reality they should go behind the sail. Whichever method you use the end result looks the same.

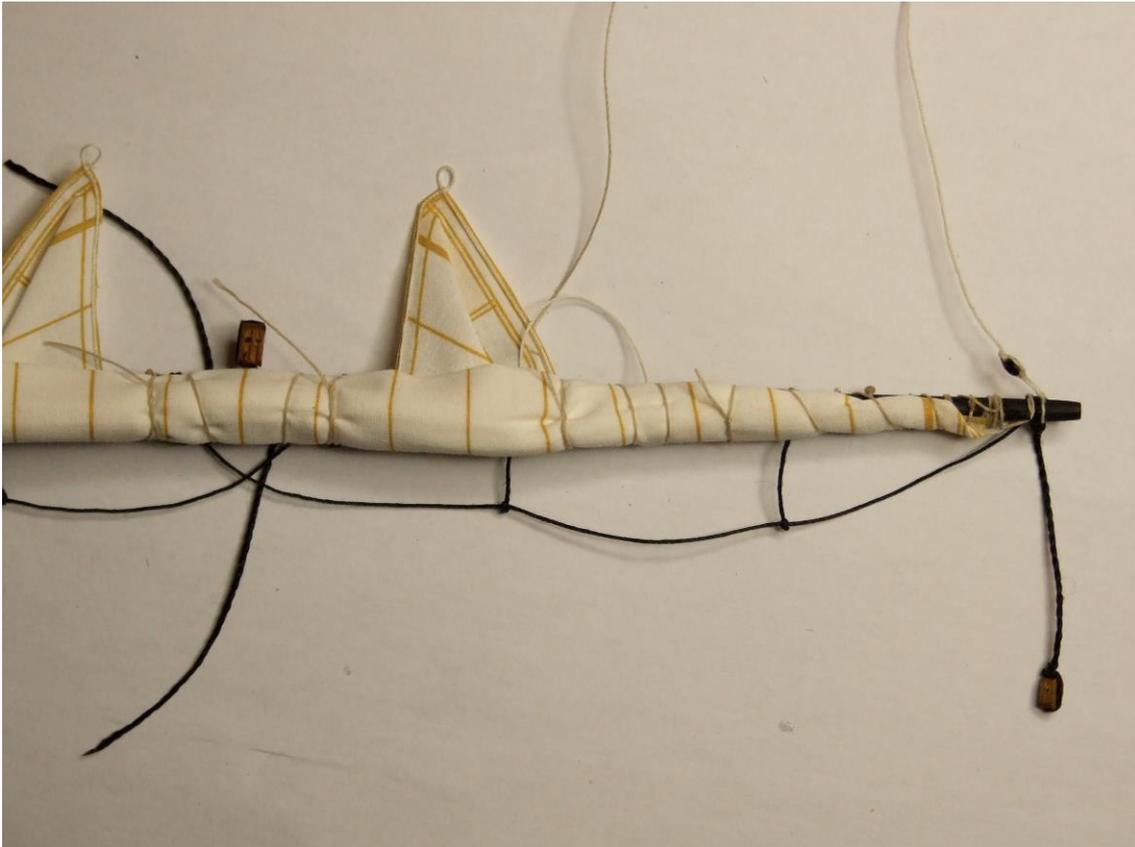


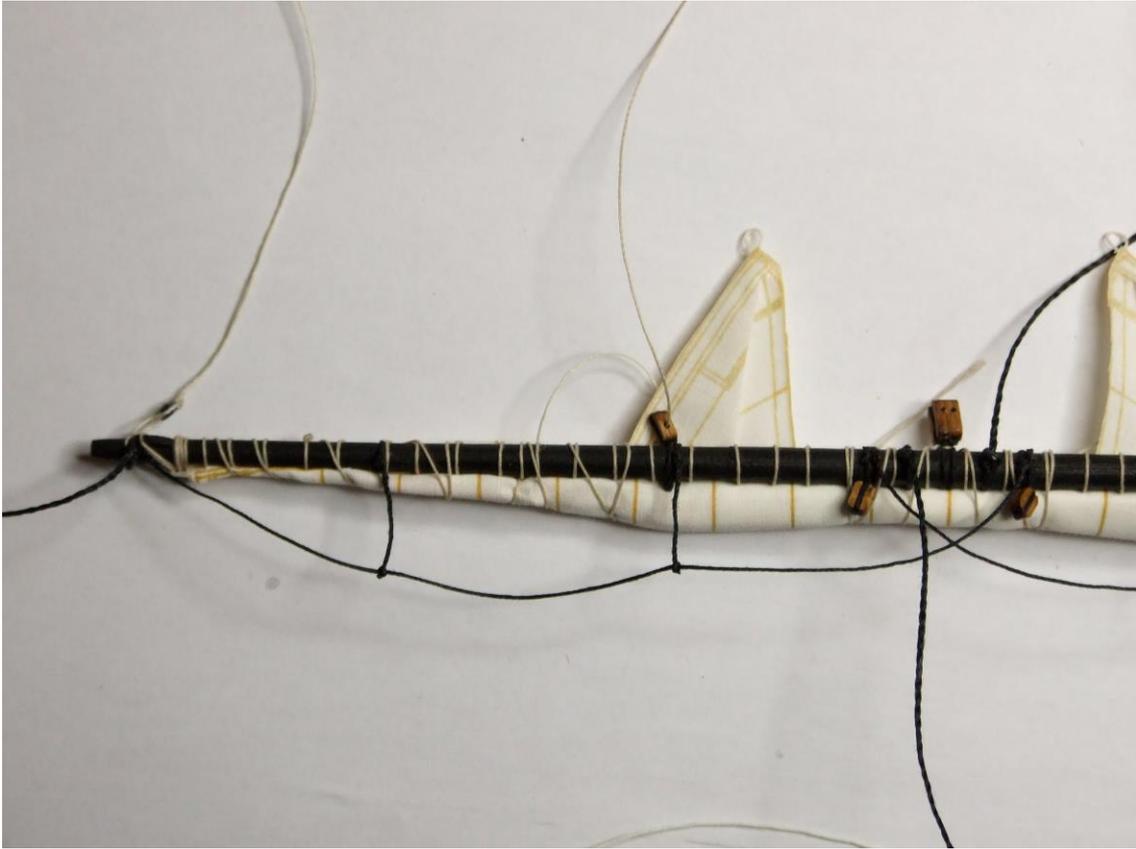
When there is about 10 to 15mm of sail left unfurled the wire with the dog ears and ropes is put in position. The dog ears should face in the right direction with the bolt rope towards the rear when the dog ear is hanging down. During initial positioning on the model the dog ear is pointing up and the face with the bolt rope is towards the front of the ship. Feed the bunt lines through the blocks which are on top of the yard and pull them snug. Position the loops for the bowlines so that they are not trapped in the folds of the sail and also ensure that the gaskets which hang down from the yard are behind the sail. The last portion of the sail is rolled rather than folded so that there is a single skin of material which encloses all the folds. I formed the centre between the dog ears first then got the rest of the sail right.



Now the gaskets at the centre of the sail are coiled around the sail: at the back the gasket hangs down, at the front it is pulled up and then over the yard. The second turn brings

the gasket outside of the bunt blocks and the third turn stays in the same position. The gasket is now wrapped around the previous turn three or four times and relies on friction against the sail to hold it in place. The gaskets which are half way along the yards are tied next. The first two turns are taken around the sail and yard towards the dog ears and the third is then used to hold the gasket in place. The gaskets at the yard arms are tied on last. I fitted in four turns for these plus a fifth to secure the gasket. Be careful that you have not trapped any other ropes when making the gasket turns. In theory the furled sail sits on top of the yard but mine came out in front, I blame the inexperienced crew. On many contemporary pictures the furled sails are seen hanging below the yards so the theory was not always put into practice.





The dog ears are folded forwards so that they hang vertically below the yard. The material has some spring left in it and I used a drop of cyano acrylate to hold it down onto the rest of the sail. I applied the glue behind the fold in each dog ear so that it would not show through the material. The loops for the bow lines are also pulled so that they hang down in front of the furled sail.

Three ropes attach to the cringle on the dog ear. The clew is used to pull the corner of the sail up during furling, the tack pulls the corner down and forwards, the sheet pulls it down and back. Because the sheet takes most of the strain when the sail is filled it runs through a block tied to the cringle so that it is doubled. The order for these on my model is, from the centre working outwards, clew then tack then sheet block. I tied them to the cringle with bowline hitches which is a gross simplification but a true replication in this scale would just look like a large knot. Examples are drawn in most of the references if you want to follow the real method.

