



Six Articles
Curated from Various Sources
About Making Sails
for Model Ships

December 2020

Making Sails from Silkspan – Tom Ruggiero – Broadaxe, Jan. 2020

Silk span looks like tissue paper, but it is actually silk fiber. One of the biggest challenges when putting sails on a model is making sure they are appropriately scaled and hanging or draped as actual sail cloth would hang. In ships from the sail era, they were made from a canvas like material. In scales 1:48 and smaller, making sails from any cloth tends to look way over scale, especially if the sails are furled. Tom has done sails in 1:96 with cloth. The sails on his model of USS Hartford are furled. They look fine but getting them right required making the sails very small and rolling them into a furl (you can see pictures of the Hartford in the Model Gallery on the SMSNJ Website).

The method Tom is using isn't original. This is a technique that was developed by the late John Wisner from the Connecticut club. It appears in NRG Shop Notes II, page 197, Nautical Research Journal 41:126, and Justin Camarata's book on dioramas. It was also demonstrated by Nic Damuck of Bluejacket. Tom, though, has modified it slightly—frankly, to make it a little more straightforward. The silk span that Tom uses is the thinnest grade available (0-0). While there are other methods that work fine, Tom's opinion is that they tend to be a little thick in 1:96 scale. When making a sail, the initial step is to determine its shape and size. Tom demonstrated this with one that will be set, in this case, the Fore topsail. In making this sail, he laminated three layers of silk span. Tom noted that silk span, like wood, has a definite grain. He suggested that one make a small mark to indicate how the grain runs before cutting the pieces. Tom said that the silk span he was using has a color that is very close to canvas. He explained that you can show highlights and shading, or where repairs could have been made, with thinned acrylic paint. However, this should be done last and not overdone. Note that patches for repairs would have been whiter as they would be less weathered than the sail itself. Again, especially in smaller scales, you need to be careful to not overdo the effect.



The next step is drawing the outline and tabling of the sail. Sails were made with strips of material about 17" - 20" wide sewn together. Tom uses a 2 to 4H pencil for these lines. He created a tracing plan for the tabling by printing a blank spreadsheet from Excel, but there are other ways to do this based on what you have available. This step requires tracing the pattern on one side, turning the sail over and tracing the tabling lines on the sail again, leaving a 2" overlap. In 1:48, or 1:64 scale,

Tom might stagger the tabling on the reverse side to show the seam. In 1:96, he doesn't do this, as tracing on both sides gives the same effect. Cut the sail to the penciled outline. Next, cut two more pieces of silk span that are the same shape but slightly larger on all sides. Note that the outer plies are at a 90 degree angle to the center ply.

Now, thin some white glue roughly 5:1 or 10:1 with water. Since white glue is an animal product, it can develop spots of mold over time. To prevent this, put one or two drops of biocide into the diluted glue. You can get biocide from the paint department in your local home project store.

Next step: take one of the outer pieces you created and spread it out on glass (Tom does all his model work on glass). Now, with a brush, saturate the piece with your dilute glue taking care to smooth out any trapped air. Note that silk span will stretch, so this is another reason to spread it out on glass.

Lay the piece with the tabling (the center ply) on the saturated piece taking care to make sure it is centered on the bottom piece. Now, smooth it down, and, if necessary, add more of the glue mixture.

Next, put the final larger piece over your sail. Add more glue, smooth out the air, and lift it off the glass. It is now ready to hang and dry (it was dry by the end of the meeting).

Tom passed around a completed sail to show the effect, in this case, the Mizzen topsail. Sails have a bolt rope on all sides. In actual practice, the bolt rope is sewed to the edge of the sail. In 1:96, Tom glues the rope to the sail's edge by folding the edge of the sail over the rope and gluing it down. An important distinction here is that the gluing is done with acrylic matte medium. The reason is that you need something that will not come apart when the sail is wetted again to be shaped. Once dry again, you can add a strip of silk span to make the reef bands and reinforcements. Note that the reef bands are added to the fore side of the sail. The reinforcements are added on the side of the sail that is being protested. For example, the large reinforcement in the area of the fighting top is made on the aft side of the sail so that the sail isn't chafed by the top. Most sails have attachment places for rigging called "cringles." In full size practice, these are lengths of line that are seized to the bolt rope or lashed to the bolt rope by means of small holes in the sail at each end of the cringle. In a model, Tom takes a line and teases the end of the line to a fuzz. Using full strength white glue, he attaches the fuzz to the bolt rope. Once the glue is dry, he adds acrylic matte medium. Reef points are braids of rope fiber that were used to shorten sail. In a small-scale model, reef points are tan or off-white sewing thread. The thread is knotted and then sewed

through the reef band from aft to forward using the smallest gauge needle that you can find. Add a spot of matte medium to hold the knot to the sail. There are two reef points per cloth! As ratlines, this process is very tedious, but you are in a rhythm, you'll get it done. Reef points need to generally hang down. Most thread has memory. That means that it curls and tends to lay in random directions. To prevent that and have the thread lay generally down the face of the sail, you need to stiffen it. To do that, Tom slides a steel ruler or piece of acetate under the reef band. Then, he paints the reef points with matte medium. Once these are painted and before they dry, he slides the ruler out from under them. He



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lets them dry and then trims them. They are about 2' 6" long on the fore side and 3' on the aft side. Tom uses a cuticle scissor to trim them. He then does the same thing on the other side of the sail.

Once you get the reef points done, the next step is to attach the sail to the yard (bend the sail to the yard). In the mid to late 18th century, sails were attached to the yard by ribands. Again, there are two per cloth, and they wrap around the yard. When jackstays were added in the 19th century, the sails were attached to the jackstay rather than the yard. Again, with off white or beige sewing thread, the line is pierced through the sail around the yard, back through the same hole, around the yard, and finally knotted on the aft side of the yard.

Now, comes the time to shape the sail. Tom fixes the yard to a jig (you've seen this many times and it is described in the NRJ). He then attaches the lower edges of the sail to the legs of the jig with doll house clothes pins. He positions the jig so that the sail hangs over the edge of the table. Finally, by rewetting the sail, the extra weight of the water causes it to bulge as if it were drawing the wind.

If you want to furl a sail, you do the same thing. However, the sail should be about 30% of its actual size. In this case, the bolt ropes are only put on the head and foot of the sail. In the period that Tom was demonstrating, British practice was to bring the sail up to the yardarm with the clew lines first. Then, the sail was pulled up to the yard with the last piece covering over the rest of the furled sail. In modeling this, it's done by rewetting the sail with a small brush. Tom showed the furled Fore and Main Courses, and the spritsail on his model of HMS Liverpool.

To get the correct effect, the sail handling lines are first rigged with the yard arm and sail in the jig. The sail is wetted and then folded a few times. Next step is to pull in the clew lines and bunt lines. Squeeze the wet sail at the bunt lines and pull them a little tighter while allowing the center portion to show a nice bulge. In this case the sail is being shown when it is first furled to the yard or is being readied to set. If you were doing a sail that is completely furled it would be tighter to the yard, and in port have "Harbor Gaskets" wrapped around it.

There are several sources showing what these sails looked like in actual practice in the age of sail. Steel is okay for vessels that used the 1790 establishment. However, to Tom, the most comprehensive reference is The Masting and Rigging of English Ships of War 1625 – 1860, by James Lees.

A METHOD OF MAKING SAILS by Paul Brewer (36:105)

As I was building a model of the Brixham fishing smack *Misty*, from a kit . . . , I ran into a problem I've never had before. I've built over 100 models but never one with sails. I made up my mind that I would try to make sails for this model, as the cloth and patterns were included in the kit. After six or seven tries, none to my liking, I had used up the cloth supplied in the kit. Taking a small piece that remained, I went to a local dry goods store for matching material and found what I wanted. While looking around the store, I also found a package containing four sheets of tracing papers in different colors: navy, red, yellow, and white. These tracing papers are much thicker than carbon paper used for typewriting. The package also contained a tracing wheel with a handle. As I looked at the tracing wheel, I realized that the length of the spikes and the spaces between them were the same. This was just what I needed.

I placed the new cloth on a hard surface, put the navy tracing paper over it, placed the pattern from the plans over the tracing paper, and with a straight edge, I traced the sail outline, allowing 1/8" for the seam to be turned back. Be very careful to keep pattern and cloth from shifting, so straight and unbroken lines can be traced. With very sharp scissors, cut the sail from the cloth along the traced outlines. Next, fold the navy-colored tracing paper in half, carbon to carbon, and place it on a hard and smooth surface. Place the sail between the carbons, lining up one edge of the sail with the edges of the carbons (use the leach of a fore and aft sail; the head of a square sail). This places carbon on both sides of the sail and will insure a much neater appearance.

Now decide on the proper distance between the seam lines to be traced from either the plans or your research. My plans called for seams 10mm apart. I glued two 5mm strips edge to edge, and used this as a ruling guide. I then placed the 10mmwide strip along the edge that I had previously lined up with the carbon edge. With the tracing wheel, I traced the first seam line. Moving the strip over and lining it up with the line I'd just traced, I traced the second line of the seam. I continued until all lines were traced.

I removed the sail from the carbons, and folded the tablings (the hems), using the 1/8" overlap. I cut the corners square and with the top of a [hobby] knife handle, I made a sharp crease. Any flat object will do, but I found the top of the knife handle to be flat and I later found that the glue does not stick to the metal. Next, I cut #28 black annealed wire (or a brass wire if you prefer), for each seam, about 6" longer than the seam length.

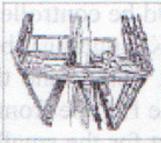
I placed a paper towel on a flat surface, and put the sail on the towel. Laying a wire in the center of each crease, leaving 3" beyond each end, I applied aliphatic glue to the inside of the seams, folded them over and pressed tightly. Blot off any excess glue with another paper towel. The bottom towel will absorb any excess glue from the underside of the sail. Again, I ran the top of the knife handle along each seam to make a sharp crease.

I made the other tablings in the same manner, then set the sail aside to allow the glue to dry.

When the glue had dried, I placed the navy tracing paper on a flat surface, carbon side up, and placed the sail on the carbon. With the tracing wheel and a straight edge ruler, I traced the insides of all the tablings, turned the sail over, and repeated on the other side. The wires in the corners could then be attached to small rings, or twisted into grommets, or become straps for a block. To bend the sail to a yard or a stay, small holes can be put in the head seam for robands, or hanks can be seized to the luff or a staysail.

I use #28 annealed wire so that after bending the sail to a spar or stay, the combination of the glue and the wire allows me to shape the sail so it won't hang flat. By applying lacquer or varnish to both sides of the sail, it will bring out the carbon lines and convey the looks of sewn canvas.

THRU THE LUBBERS HOLE



Rice Paper Sails By Robert Hewitt

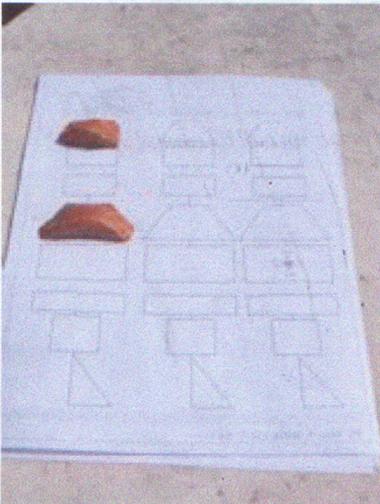
The first step is to measure the sails from your sail plan. A drawing is then made on the computer. If you don't have a computer, just draw the sail outlines on a sheet of rice paper. A cross section of each sail is then made and an arc is drawn to indicate the billowing of the sail. This distance is measured and transferred to the drawing of the sail. The head of the sail does not change. This increase is no more than 5% of the length and foot of the sail.

All of the drawings of the sails are placed on one or two sheets of your paper as close as possible. I always make extra copies. The drawings of the sails are oriented so the sewn panels on each sail are on the same parallel. Tick marks are then drawn on the top and bottom of the sheet. These represent two-foot wide panels to your scale. At this stage it is advisable to run a copy and check the sails to the model you are building. Another copy is made and a sheet of rice paper is glued to the copy along the top border only. When the glue is dry, place the two sheets in the printer, rice paper either face down or up, depending on your printer. The glued end is the leading edge as fed into your printer. Run the print again and the sail images and tick marks are now on the rice paper. Make an additional copy of the sails on plain paper.

Lay the sheet of rice paper on a clean flat surface. With a sharp hard lead pencil and a steel rule draw fine lines using the tick marks at the top and bottom of the sheet. Flip over the sheet and rule the other side. A light table may be used for this, or just tape the sheet to a window to see through the rice paper. The lines must match those on the opposite side. When the lines are complete, cut out each sail, leaving a tab to aid in grabbing the sail with your tweezers.

Using the additional print of the sail outlines, form a clay mold over each sail. I use Sculpy Clay, available at any art store. Form the clay to the shape of the billowing sail. Keep the areas that attach to the yards, stays and masts as flat as possible. A steel ruler will aid in doing this.

When all of the forms are made, separate the molds so you can work with each one individually. Now a good spot of tea is in order. Earl Grey seems to work best. The tea is poured into a shallow bowl and allowed to cool. You didn't actually think you were going to have a tea break, did you? The sails are then dipped into the tea to soften the whiteness of the rice paper. Left in longer, the tea turns the rice paper to a rich brown. A nice effect is to have a few different shades of sails, as all of the sails on a ship were never of the same age. Just soak them for different lengths of time.

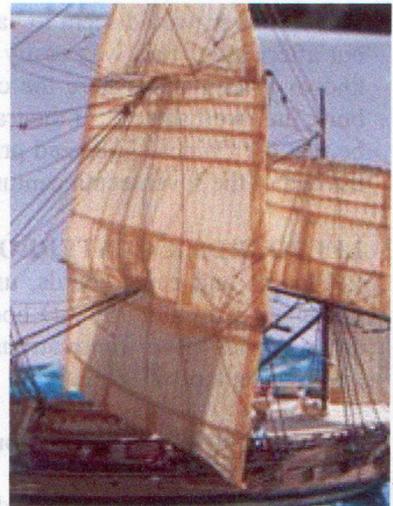


Each wet sail is laid over its Sculpy mold. Bubbles and creases are gently pushed out with a wet finger. You would be advised to try a few, no, many scrap pieces of rice paper until you are ready with the ruled rice paper. As soon as the sail is set on the mold, a toothpick is used to form creases in the foot of the sail where the stress point occur.

Allow the sails to dry on the molds. The drying time usually takes twenty-four hours or more. When the sails are dry, glue reefing bands, corner patches and strips on the sails.

Follow James Lee's book, *The Masting and Rigging of English Ships of War 1625-1860*. Trim the tweezer tab at this point. Short pieces of thread are then glued to the reefing bands fore and aft to represent the reefing lines. These are placed in the center of each panel and should be angled following the wind direction in a model placed in a sea. If the model is static on a stand they should hang straight down. The final touch is to glue lines to the edge of the sails to represent boltropes. The sails are now ready to attach to your model.

Good luck and good modeling.



Presentation

Sails

This presentation was focused on making sails for ship models, but first we had to cover different types of material for making sails and the problem with sail material and scale. David Steele in "Elements of Mastmaking, Sailmaking and Rigging" devotes 60+ pages to sails for the Royal Navy and merchant ships. He mentions that the main course was a #1 canvas, top course a #6 canvas and the small boat jib a #8 canvas with the lower number = to the heavier canvas. Nowhere did I find that he mentions the thickness of canvas in the 17th and 18th C. So, the unanswered question is how thick was sail canvas? I have a canvas awning and measured the thickness. It is .031" or 1/32". I am still confused.

We continued with the names of sail parts, boltropes, cringles, reef points and ended with some photos of models with sails.



All of the above are made from Model Expo's sail cloth (MS0567). The steps I used were:

- Stabilizing
 - Wash in hot water
 - Hang to dry
 - Iron it flat with a steam iron
 - Store flat or roll up loosely
 - Spray with a sizing "fabric finishing spray"
 - Iron it flat with a steam iron – again.

- Layout 1
 - Copy and cut out the sail shapes required
 - Layout your ironed fabric and align the weave so that it is perpendicular to your work surface and allows you to get the most sails from your fabric
 - Fasten the fabric to your work board
 - Determine the width of your panels
 - Mark the location of the panels at the top & bottom

- Position your sail shapes so that the weave aligns with the sail
- Draw or take a picture of your temporary lay-out.
- Panel Seams
 - Sew or draw your panel seams
 - I use thin Micron Pens (.05 mm) brown & black – double line
 - Draw the panel lines with the pens
 - Reverse the fabric & transfer the lines black & brown over the lines on the other side.
- Layout 2
 - Return to your drawings/pictures of your sail layout and place them on your fabric
 - Draw the outline of the sails and where the reef point will be located
 - Add an extension to the sides of the sail for a hem.
 - Cut out your sails and fold the hem over – square to the back of the sail, gaff/jib/staysail to the port side.
- Edge Seams
 - 2 choices
 - Glue the edge seam over and then glue your bolt rope on the edge seam.
 - Or glue the bolt rope to sail then cover with the excess edge hem.
 - Sew the edge seam

Silkspan sails.



At the last two NRG conferences, BlueJacket demo'd making sails using silkspan. Early this year, I re-rigged my model of the *Victorine*, a Hudson River sloop built from a kit by Marine Model in 1967. The model never had sails and only lately was put in a case, so during the process of rerigging I decided to add sails using silkspan. I sourced by silkspan from:

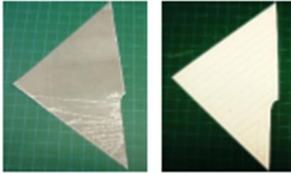
Silkspan Source:
Brodak, Carmichaels, PA
www.brodak.com
Med & Lite \$5.99 2 sheets 24" x 36"

Silkspan is also available from:
BlueJacket Ship Crafters, Searsport, ME
www.bluejacketinc.com
Silkspan fine, \$2.75/sheet 15" x 35"

The following are the steps I used to make the three sails for this sloop: Silkspan has a grain. It will tear easier one way than the other. At a corner, make a small tear to determine which way it tears easiest. Mark the direction. Your sail will consist of three panels. The middle one has to have a grain pattern 90 degrees from the two outside panels. The pattern demonstrated is for a topsail on a sloop.

Step one:

- Cut out the pattern for your sail from plans
- Outline the pattern on heavy card board
- Transfer the outline to the silkspan



Step two:

- Cut out three patterns
- Bottom (Outside) pattern should also have additional material on the outer edges



Step Three:

- Middle layer should contain:

Panel demarcation lines in pencil

Reef lines

Corner support lines



Step Four

- Prepare for Gluing: Mix a
- 50-50 mixture Elmer's white with water
- Add a little mildewcide
- Wax paper



Step Six

- Add boltrope, reef bands & supports
- Add boltrope – do leech edge last – join ends of boltrope in leech side

Fold over edge as you work your way around.

I use a tack at the clew, peak and throat corners to make the loop for rigging

Glue on support panels – both sides

Glue on reef band

Add reef lines

Let dry



Sail making by pulling thread – Olivier Bello

<http://www.arsenal-modelist.com/index.php?page=accessories&part=37&image=0>

Sail panels that are not represented with parallel seams detract from the esthetic look of a model. This is unfortunately seen too frequently, while the use of the drawn-thread technique solves this problem completely.



After one half of a surface that is twice the size of the sail has been died a dark shade, a thread is started to be pulled to mark its location.



Little by little, the threads of the dark part that are not needed are removed and the one that will be drawn is separated. The strength required of the thread is thus reduced by half. The thread is drawn by progressively crinkling the fabric.



Once a first thread has been pulled, a number of threads corresponding to the width of the panel being simulated is separated from the dark section and cut off. The next thread is then separated and drawn just like the first.



If the work has been successfully performed, the panel seams show up exactly even and parallel to each other. Needless to say, the break of a single thread means that the whole thing has to be done over.



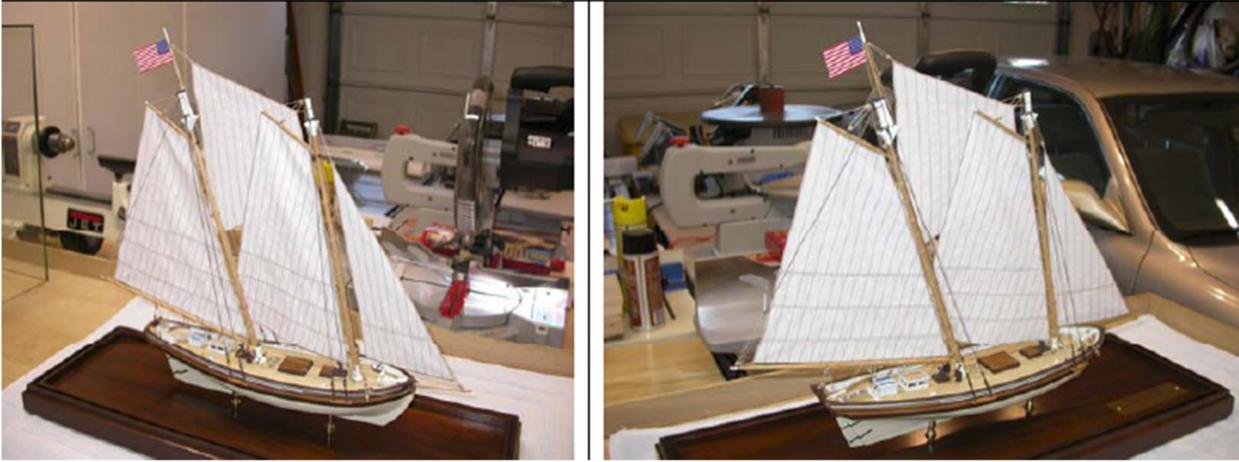
The boltrope is then sewn in after the sail has been hemmed all around. The sheet and brail cringles should not be forgotten. The reef bands are then put in as well as the rope-bands.



Making Ship Model Sails

By Peter E. Jaquith

The following techniques were utilized in preparing sails for my circa 1800 Virginia pilot schooner model:
Virginia Pilot Schooner KATY



Materials used in making sails included: sailcloth (BlueJacket Shipcrafters #R1350), .020 linen line stained hemp color (BlueJacket Shipcrafters #R1682), all purpose sewing thread (Coats & Clark hemp colored #543), and Dritz Fray Check liquid (available at fabric stores). Special tools utilized included: home sewing machine and high quality sewing shears (4" and 8"). References utilized include: ship model plans and *Steel's Elements of Mastmaking, Sailmaking, and Rigging*.

The sail outline, seams, and reef bands were laid out on the sailcloth using fine drafting pencils. The sail design was based on the ships drawings and reference to *Steel's Elements of Mastmaking, Sailmaking, and Rigging*. Final dimensions were checked and adjusted to suit the model's masts and spars. Note that the bottom edges and reef bands of all sails were curved and they were laid out using ships curves. Note that if the sail design is not shown on the model drawings, it could be drawn out on the rigging plan using data from *Steel's Elements of Mastmaking, Sailmaking, and Rigging*.

The seams and reef bands were sewn using hemp colored thread and a straight stitch (24-32 stitches per inch). The bolt rope (.020 linen line) was sewn along the sail outline using hemp colored thread and a narrow zigzag stitch (approximately 3/64" wide and 24-28 stitches per inch). Cringes were modeled by leaving small loops in the bolt rope at sail corners and reef points. Note that all sewing of seams, reef bands, and the bolt rope were accomplished prior to cutting out the sails.

A thin line of Fray Check liquid was run over the zigzag stitching and bolt rope prior to cutting out the sails. After allowing the Fray Check liquid to dry, the sails were cut out using high quality sewing shears. Reef points were sewn on by hand using the same thread used for sewing seams, reef bands, and the sail outline. After completion, the sails were ironed using a steam iron set on cotton.

Halyards, tacks, downhauls, sheets, and the jib traveler were seized to the sails, and the fore and main sails were laced to the gaffs prior to mounting on the model. Mast hoops were lashed to the sails using hemp colored thread after mounting to the model. All sewn attachments to the sails were secured with Fray Check liquid. Details of the model sails are illustrated in the following photographs:

Virginia Pilot Schooner KATY – Sail Details on Next Page

