

TECHNIQUE FOR MAKING MODEL SAILS by Bruno Orsel (Translated from the French by Keith Harrison 6 June 2007)

The making of sails & producing rigging is one of the most delicate phases of model shipbuilding. Many excellent modelers using wood & metal should be able to realize the same excellence & good workmanship in their sails, as they do in the hull & fittings. It is perhaps the reason some models only present part of the story. This “gap” is not hard to fill up if one knows the technique herein explained. Throughout one should remember that the original sails were made with cloth about 760mm. (30”) wide, sewn together with overlapping seams.

Let's commence by analyzing the faults that one sees usually in the making of sails:

The colour: It's the most striking thing. It is often too white. The sailcloth used (on the original sails) was hemp or cotton, & if almost white to begin with, it very soon became unbleached with the effects of air & salt water, going from clear to dark & then becoming grayish.

The cloth: It is too thick. As with all the details of the model, it should approach the scale of the ship.

The sewing: It is here where we see the greatest fault. It is often done on the machine. There one hits a problem of scale. The sewing thread is too large & also the needle.

Let's imagine that for sewing the sails, you use glove thread 0.2mm (0.008”), the finest thread on the market, which represents at a scale of 1:50, a thread of 10mm. (0.39”)dia. on the real ship. I think you understand! As for the length of stitch made on the machine, the closest & tightest would be too big. At a scale of 1:50 it should be 0.06mm. (0.0023”)

The problem essentially is a bad appreciation of the scale. It's necessary therefore to make a good choice of fabric & finding a good technique to regulate the difficulty of sewing at the scale of the ship.

The method best adaptable to confront this difficulty, is “pulling the threads”. The technique is not new, & several loyal authors of this subject have already described it. Reprising it is always good, but the most interesting part is to pass on improvements, which you can use for your particular experience. I have personally used this technique several times & the results have always been successful.

A SIMPLE PRINCIPLE

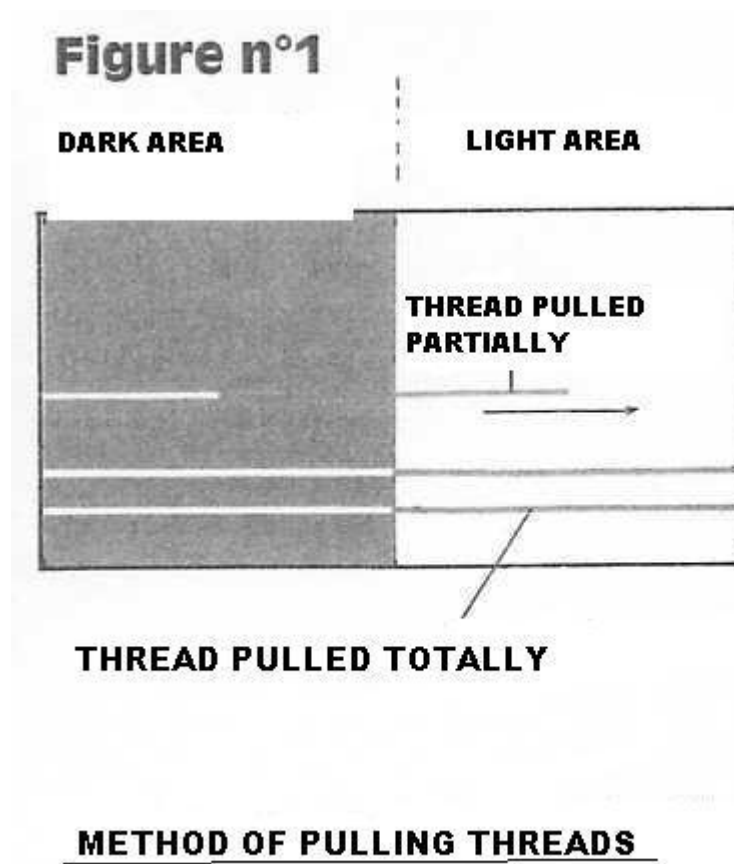
It has been stated by a well-known modeler Mr. Dailly a few years ago: As we have seen above, the main difficulty is to represent to scale the joining of two cloths sewn with two parallel lines spaced about 30mm.(1 1/8”). To do this at the scale of 1/50 or 1/75 is pretty impossible. It's necessary to find another way to make the model sewing look real by playing on the contrast of two colours. As we cannot simulate thickness, we are going to dye in the sewing of the cloths slightly darker than the real sail, & with a parallel spacing of about 0.6mm. (0.024”).

For that, proceed as follows:

Use an amount of cloth about double the height of the sail;

Dye the material above the outline of the sail a slightly darker brown than the sail itself.

At the bottom of the lighter coloured material (the future sail) engage & hold a thread. Pull down until the dark area is aligned with the lighter portion. It is this way that we “fool the eye”.



(fig. 1).

CHOICE OF CLOTH.

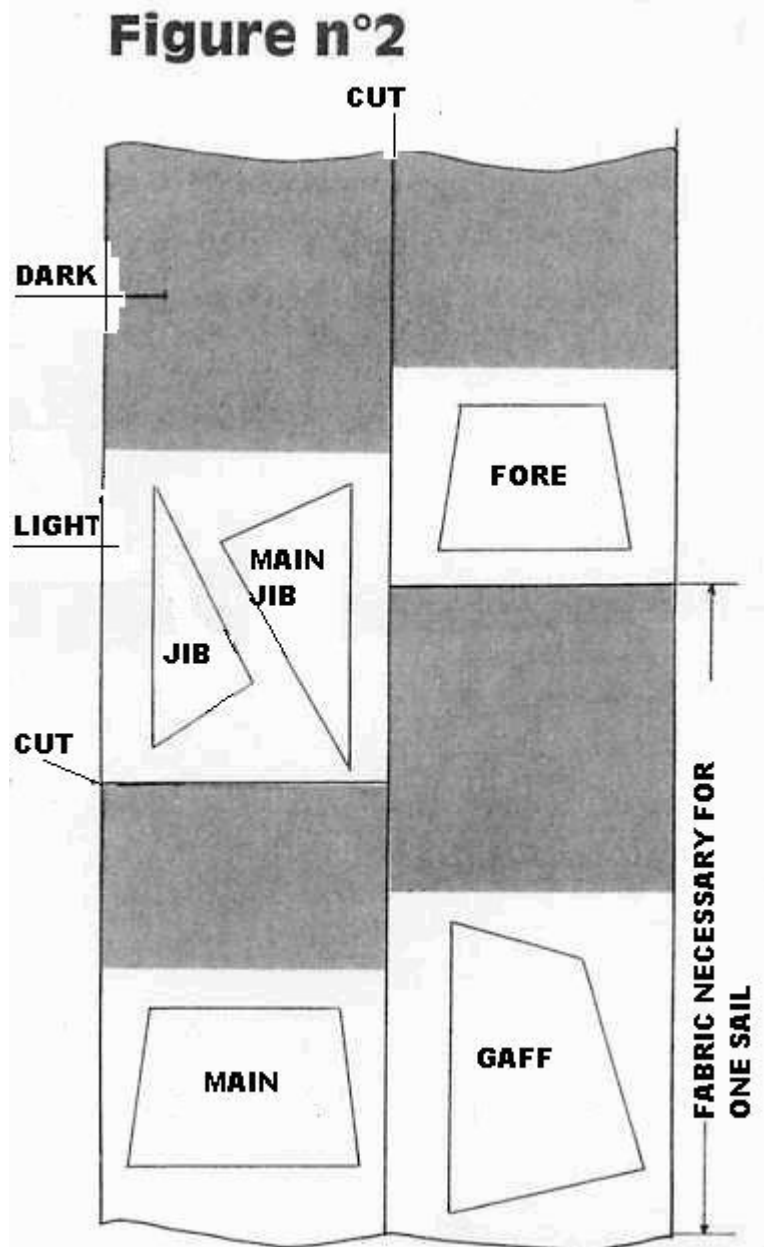
The key to success is in the choice of cloth. One of the most beautiful materials for making sails is Megaline?, good quality cotton, of fine weave, convenient for making sails at a scale of 1/50. The problem with this material is that the thread itself is irregular & it is very difficult to “slide” the thread without breaking it.

We are going therefore to use silk pongee. It is sold in fabric stores. Check local suppliers or see web sites at the end of this article.

This fabric has two advantages: it’s texture is very fine, & is close to the look of sails at a scale of 1/50 or 1/75; in addition, the thread making up silk is very regular in diameter & strong to withstand pulling without much difficulty. It is however a bit too shiny.

DYEING THE FABRIC.

Make, first of all a cutting plan for all of the sails & allow a bit more than double their height & a margin of 30mm. (1 1/8") each side. Then cut the material.



(fig.2)

The sails have one colour more or less “as bought”, but should be light tan. There are two ways to accomplish this: the first is buying the material already dyed in the colour desired. The second is to dye the material yourself to the colour desired. I prefer this solution, for the dye obtained by the amateur with his slight imperfections will give to the sails more “life”. It will also offer the possibility of shading the colours of one sail to the other, which will bring an air of realism to your model.

The products that you will use are some special dyes for silk which ensures they are “fixed” for ironing or steam ironing.

As an example I will give an idea of the proportions of mix which gave me satisfaction, but remember that the results can vary depending on the brand of dye that you use. One should always make test swatches.

For the clear part:

Decotissu dye (French) North America try RIT or DYLON

-0.75ml. sienna

-0.25ml. tint of tobacco.

-16ml.- of water.

As you understand, the idea of this technique is to pull a dark thread from the dark part, into the area of the lighter material. We are therefore going to dye the part of the material above the future sail a dark brown. Same as for the clear part, here are the proportions for the dark brown. Again it would be best to make trial swatches & there should not be too much contrast, one to the other.

For the dark brown:

-0.75ml. sienna

-1ml. Burnt umber

-3ml. of water.

To avoid the mix of dye from light area to dark due to capillary action of the dye, separate the two areas by applying a band of melted paraffin wax to separate the two areas of the material.

Apply the dye by immersing the fabric or by paint brush. I prefer the latter, for it allows for slight shading of the colour.

TOOLS REQUIRED.

Before venturing into the pulling of threads you will need a few tools;

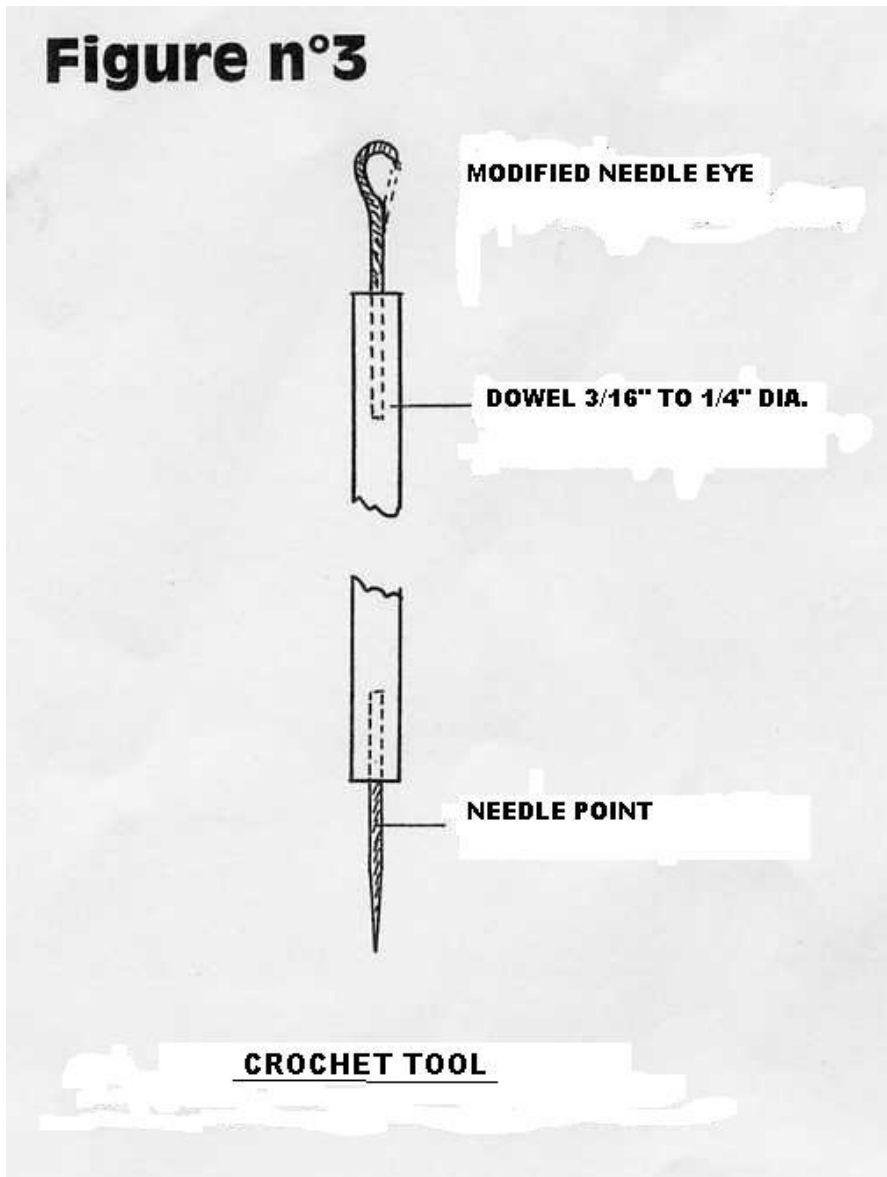
-A jeweler's loupe about 7 magnification, that you can attach to an old spectacle frame

-Drafting compasses

-A stemmed glass or a tall glass

-a tool of your own making, one end with a sharp point, the other end with a crochet hook.

This tool comprises a dowel, 5 to 7mm(3/16" to 1/4") dia. x 150mm.(6") long. On one end drill a hole & glue in, a needle whose point should extend about 15mm.(5/8"). At the other end, glue in the hook, with the same amount of extension. To make this hook, use a sewing machine needle of medium size & with a small grinding tool in the Dremel, remove part of the eye. See fig.3



WIDTH OF CLOTHS & WIDTH OF SEWING

The width of sail cloths that made up a real sail was about 570mm.(22 ¼"). The two parallel seams where the cloths were joined were spaced about 30mm.(1 3/16") from one another, which left a space between cloths of 21".

These sizes at a scale of 1/50, translate to:

- width of cloth between the seams: 10,2mm. (3/8")
- space between two seams: 0.6mm. (0. 024")

HOW TO PULL THE THREADS

First of all, before commencing the operation of pulling the threads, you should extract two threads from the material, the one which will be situated at the selvedge of the two dyed portions & the other about 20mm. (13/16") from the base line of the future sail. The extraction of these weft threads (threads that are at rt.angles to the selvedge) will permit you, as follows, to establish the squaring of the material for tracing the sails.

At 30mm.(1 3/16") from the edge of the material, on the "squared" horizontal line, make a mark with a milliners pencil. On your work table, place a large sheet of white paper. Place on the sheet of paper your stemmed glass. Arrange a bright work light over the paper, taking care to keep it higher than the glass. Take the material & hold it tight above the glass. Observe the material with the loupe. You will be surprised at the resulting enlargement & sharpness of the threads, created by back lighting.

Go to the point marked by milliner's pencil. With the sharp point of the tool you have made, isolate the thread by pushing aside, the neighbouring threads, left & right. Using the hook end of the tool, pull up the thread. With the fingers, pull the thread thus puckering the material.. Keep pulling until the dark thread comes into the lighter area of the future sail.

As we have seen, at a scale of 1/50, the second thread should be pulled 0.6mm.(0.024") from the first. The diameter of the threads in pongee silk is 0.2mm.(0.008"). It will suffice therefore to leave three light threads between two dark ones. Using the same method as before, isolate the fourth thread & pull down. You have formed a "simulated line of double oversewing, joining two cloths"!

The width between stitching of the coths was about 510mm., being 10.2mm. (0.39") at a scale of 1/50. Adjust your compasses to this dimension. Place the point on the preceding pulled thread & with the pencil end, make a mark. Isolate the thread & renew the operation. Very soon you will obtain a mastery of the technique & you will be able to pull several threads at a time, thus gaining speed & saving time.

TRACING THE SAILS.

Silk is a soft material & the fabric that you use to make sails, will have a tendency to deform if you do not take certain precautions.

Tracing of the sails should be made on the fabric, perfectly square. In other words, the warp threads should be at 90deg.to the weft threads & this means the *outline* of the traced sail is also oriented correctly to these datum threads. The quality of the tracing & therefore the future form of the sail will depend on it.

Before pulling the threads, you will have pulled two weft threads from the clear part , one above, & one below the future sail, for the squaring of the fabric.

Tape a piece of white paper to a plywood panel, or equal substrate such as MDF. Draw two parallel lines on this paper roughly equal to the distance between the pulled weft threads of the sail. At the left side of the paper, draw another line perfectly square to the two horizontal lines. Place the fabric flat on the sheet of paper, juxtaposing the parallel lines with those of the two weft threads. At the same time, the vertical line on the paper should be situated beneath one of the dark threads. Smooth down the fabric with the flat of the hand, making sure there is no deformation, then hold in place with milliner's pins.

For tracing of the sail you have two choices:

-you can carry forward from the ship plans, on the fabric with a pencil, all of the details such as sides, angles, curves, taking care to keep the width of the sail cloths balanced each side of the center line of the sail

-you can photocopy the sail from the plans, & after cutting out, can place them squarely on the paper, after which you can pin down the fabric & begin tracing.

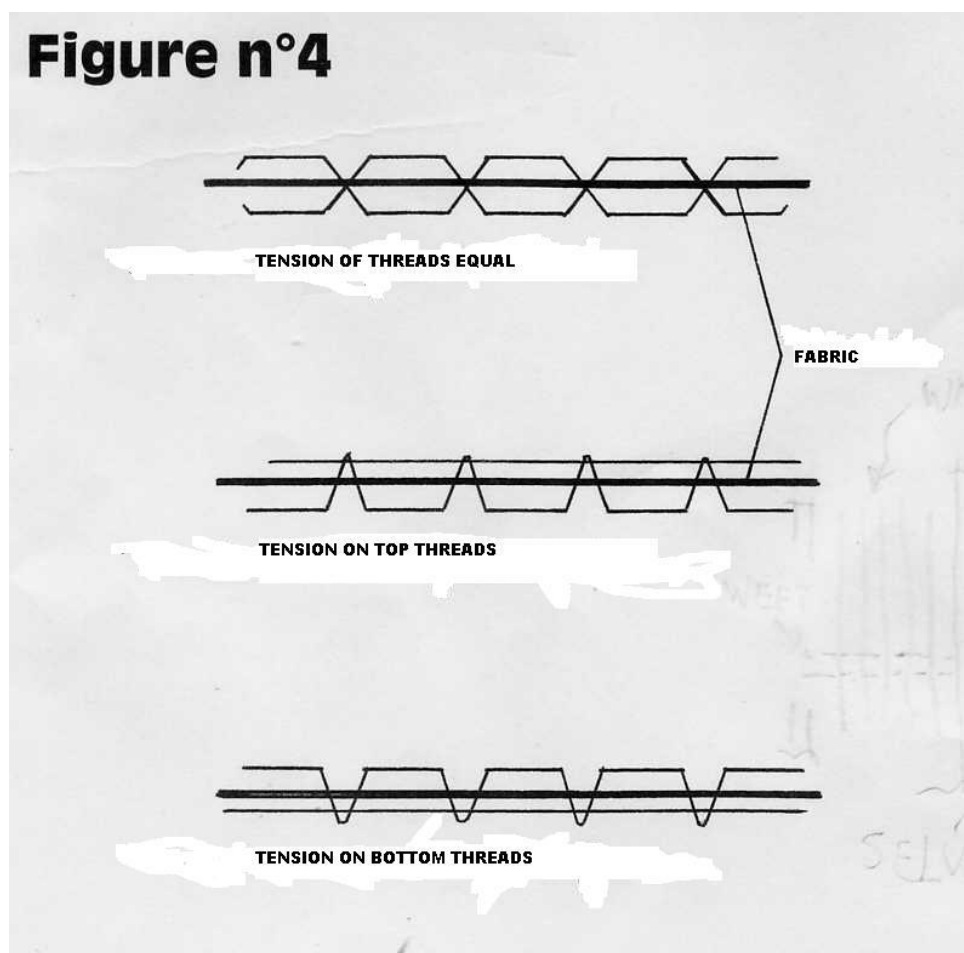
Attention: Do not press too hard with the pencil, or deformation of the sail material will take place.

INSTALLING THE BOLT ROPES

The bolt ropes can be sewn on the machine. This method can achieve remarkable results for scales between 1/50 & 1/100. Before describing this technique, let's talk about preparing the work.

Here again, let's pay attention to deformation of the fabric. To lessen this risk, let's work like a dressmaker who surfilages??? the fabric on an indeformable support. For this, use the sheet of paper which you used to square & trace the sail, sew the fabric on the paper with a curved needle, keeping an eye on the squaring. This technique is called surfilage???

The sewing of the bolt ropes may surprise you, but the technique is remarkable. A dressmaker at the sewing machine uses two threads. One below the fabric in the bobbin, & the other above, threaded through the needle. The tension of the threads is the same & they cross symmetrically through the fabric. If the tension of one is looser than the other, the threads will cross either above or below the material. (see fig. 4)



-wind the bolt rope thread onto a bobbin. Use DMC ecru #3 0.76mm. dia. (0.029") or #5 0.62mm. dia. (0.024") at 1:48 scale. Bolt ropes were left hand twist & purists may want to make their own as commercial thread is right handed . Again, bolt ropes at head, leech & foot of sail were different diameters & a good modeler may want to reflect this, but I think on these two points, at medium & small scales we can ignore it.;

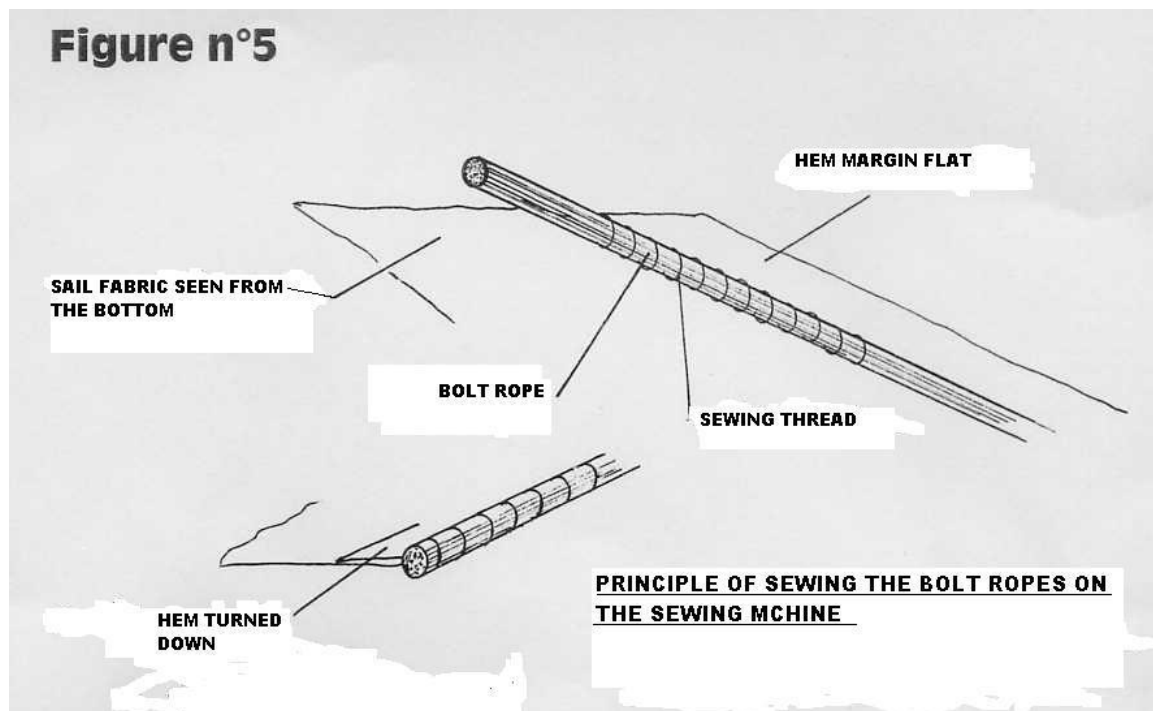
-place the bobbin filled with DMC in the machine table & adjust the tension screw in order that the thread unwinds easily without excessive tension;

-for the sewing thread, use the finest glossy thread available, colour ecru, following machine instructions for tensioning.

The above is very much an adjustment process by trial & error, before achieving perfect results as follows:

-the bolt rope thread should unfold in a perfect line without creasing or excessive tension, on the *reverse side of the sail*. The adjustment for tension will be made with the bobbin screw, or as machine instructions denote.

-the sewing thread should envelop the bolt rope thread without excessive tension. The adjustment is made using the tension screw on the machine. Too much tension crushes the bolt rope creating a succession of bumps. Not enough tension, & the rope will be too loose. See fig.5.



-the length of stitch should neither be too tight nor too wide (using a zig zag). It's a question of pleasing the eye. In reality the sewing thread should lodge between the plies of the rope. This could be accomplished by adjustment of the *length & width* of stitch.

After trials on a swatch & you have found the best adjustment, commence with a simple sail in order to get a feel for the work. Place the fabric under the presser foot, fabric

above, paper below. (**Translator's note:- use a strong tissue paper available from fabric stores**) Start at the sail's sheet point of the foot rope, holding the assembly(sail & paper) firmly, & starting the machine. Keep the movement of the material going with an even tension & follow the tracing of the sail in the presser foot. (it's here that you will discover the advantage of a sheet of paper in surfilage????). Advance the sewing without interruption just to the start of the leech rope. Stop the machine with the needle lowered. Lift the presser foot slowly & pivot the sail around the needle, until you are on the axis of the leech rope.

At this position you have two ways to proceed;

- if your sails have metal eyelets at sheet points & head rope, which is the case for ships at the end of the 19th. century & after, then continue the sewing to the next point of intersection.

-your sails do not have metal eyelets but rope eyelets. This is the case for *ancient marine*. In this case, raise the needle & the presser foot, pull the fabric towards you 3 to 4mm. (1/8" to 5/32"), reverse to the preceding point & re-engage the needle & presser foot.. Continue the sewing just to the other point of intersection, & proceed in the same fashion for each side of the sail. This operation ensures leaving rope for the eyelets at the sheets & head rope.

THE HEMS

With the bolt ropes finished, cut the fabric all around the sail, leaving a margin of 10 to 15mm. (3/8" to 9/16"). Fold the hem evenly without removing the paper. While pinching with the fingers, pull the bolt ropes to the exterior of the sail so that they are placed exactly on their correct axis, according to the plan.

The hems are best fixed with double faced tape. My advise is that this is the best technique. Use "Three M's #465 tape. It comes in different widths, 6,9,12mm. (1/4", 3/8", 1/2"). This tape has hardly any thickness. Pin your sail on a substrate. Fabric below & hem facing you. Cut a length of adhesive equal to a side, or a little more for a curved side. Apply the tape along the sewn line of the bolt rope, in the margin (not within the sail area). Without removing the protective film, press the tape firmly with a flat tool to assure good glueing. Do the same for all sides. To cut the hems to their correct width, use a template consisting of a lath of wood, of the same width as the hem.

Remove the paper from the sail. Place the template butted against the bolt rope & using a well sharpened circular cutter, cut along the lath line. Hem & tape will be cut to the correct width. For the curved edges, keep the template in place with pins or lead weights.

Place the sail again on the substrate, remove the protective film from the tape, & fold down the hem onto the sail, while drawing the bolt rope to the outside of sail. Press the fold with the stick & proceed to do same for the other sides.

REEF BANDS & LININGS

You will use the same technique using double face tape. Use for this wider tape, or glue several bands side by side. Cut these pieces of fabric following the plans, & keeping in

mind the right thread & the squaring of the pieces with respect to the center line of the sail..

If you wish, in the area of the reef bands & linings, you can simulate sewing using the technique of pulling darker threads. With experience, I find that it is not necessary for the simple fact of using double thickness of fabric will sufficiently indicate the presence of reinforcing.

CLEW GARNETS & CRINGLES

The eyelets at the point of the sheets are doubled by a cord which reinforces the bolt rope. This reinforcing rope is lashed to the bolt rope (fig.6). The cringles are for bowlines & reef tackle lines. They can be done as shown in fig.7

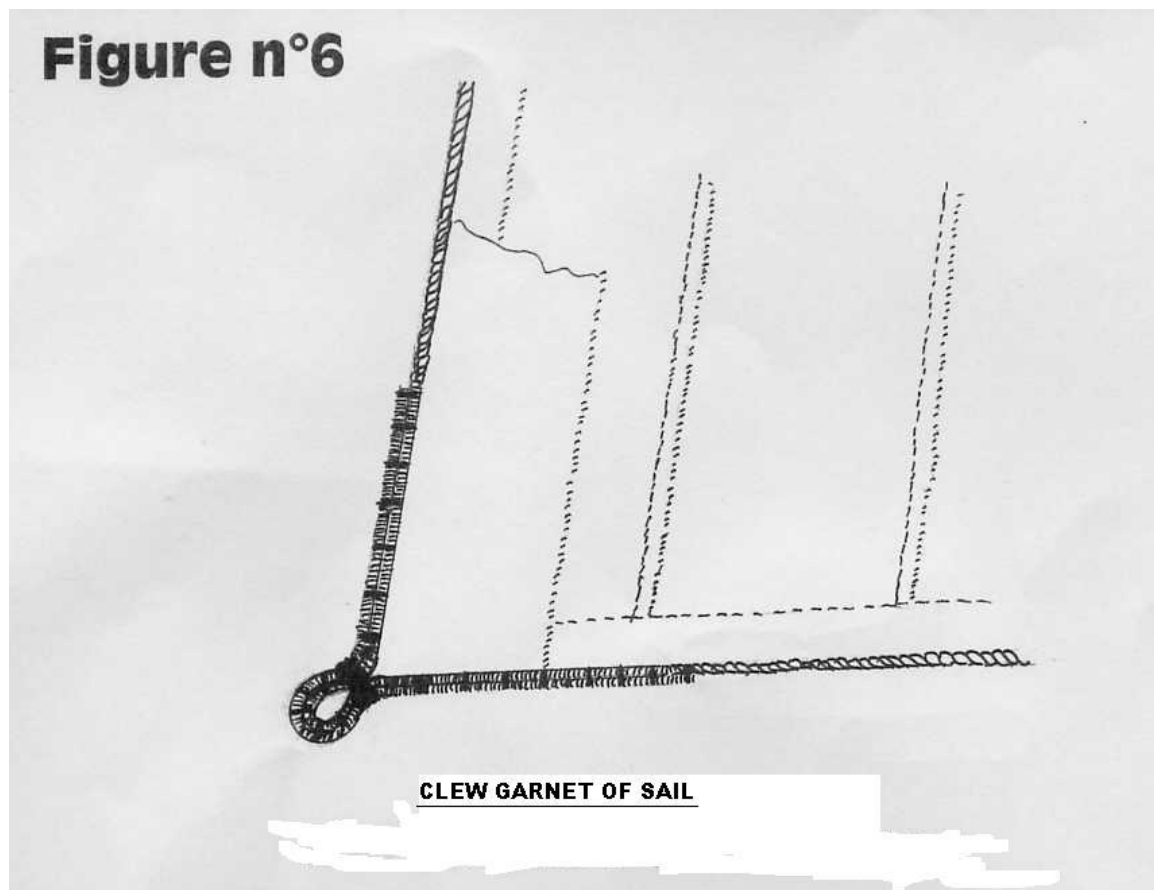
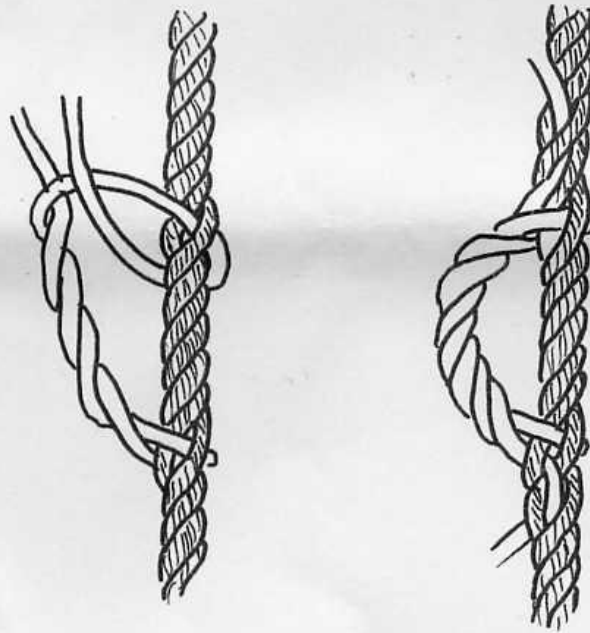


Figure n°7



EAR RING CRINGLE OF SAIL

EYELET HOLES & REEF BANDS

The sail is lashed to the yard with head ropes. The rope passes through the small eyelets of the sail at the middle of the cloths. These eyelets are placed at the hem of the sail head. To make them, place a drop of glue on the cloth each side of the sail & pierce the fabric with a needle. After a while the glue dries & the eyelet is formed.

The reef points serve to reduce the amount of sail in bad weather. They go through the reef bands & hang both sides of the sail. To place them, make a simple knot in the middle of the reef point. With a needle, pierce the band at the middle of each cloth, insert the reef point, pull the point through up to the band & tie a knot on the other side, as close as possible to the fabric.

With the majority of models, the reef points hang in all directions, which gives a bad effect. Here is a tip for holding them in place. After cutting all of them to the correct length, grip the end of the point with tweezers, add a spot of glue on the underside of the point, using a hypodermic syringe, & apply to the surface of the sail.

Attention: the reef points should fall naturally, but in a way that *follows the wind*. In the case of fore & aft sails where the cloths are inclined, don't represent the points as parallel to the sewing. This representation makes your work seem dull!

CONCLUSION

As I have said at the beginning, this way of making sails for scales at 1/50 to 1/100 gives impeccable results. At the last championship of the world in class **C1** at St. Gallen (Switzerland), amongst the models presented by France, two models surpassed, the bisquine??? La Perle & the schooner, La Topaze. Both had sails using this technique. This fashion of making sails is little known & was remarked on by many foreign modelers.

Suppliers of silk pongee (France);- <http://www.shop-text.net/Les%20Soies%20I.htm>
Suppliers of silk pongee (N. America & U.K.) Try local East Indian stores or Internet.

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