1 Guideline to assembly the sail with Q-Bond Tape

1.1 Gluing of sail

1.1.1 The Chewing gum test

Before a glued sail is designed, the cloth intended should be tested. These tests are to be carried out on every new type of cloth, at every tape delivery, and at every angle adjustment on the sonotrode of both the stationary and mobile activation machine. These tests should be carried out in the same way as activation of the joints when a sail is produced. The tests are carried out to make sure that the right settings have been made at the stationary unit, and to obtain the right speed when activating with the mobile unit, and to establish the width of the joints needed for the sail.

Procedure:

1. Pick 2 pieces of the cloth used for the sail, each at least 60 cm long.

2. Apply 3 pieces of tape, app. 3 cm apart from each other, not too close to the edges.

3. Start activating one of the joints, and make sure that the joint feels warm.
   Try to obtain a surface temperature of 60 degrees Celsius.

   Note! Write down the settings used and the activation temperature for each joint. Also, write down when the activation took place and by whom it was done.

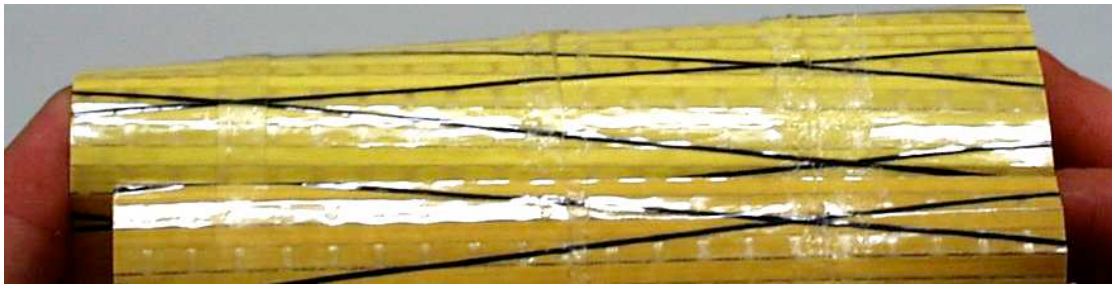
4. Change one of the parameters and repeat the procedure as in No. 3.
   Now try to obtain a surface temperature of 70 degrees Celsius
   Note! Don't forget to take note of what changes in setting that has been made.

5. Activate the third joint as in No. 3.
   Now try to obtain a surface temperature of 50 degrees Celsius
   Note! Don't forget to take note of what changes in setting that has been made.

6. Pull the two pieces of cloth apart. This can be made since the glue is still soft from the gluing. Study the gluing result. The correct result is shown when there is no trace of the original tapes form, and that the glue has the characteristics of chewed chewing gum sticking at both test stripes surfaces.

7. Choose the settings that will be used when producing the sail.

8. Take note of the width of the glue at the chosen setting and add app. 3mm when designing the sail.

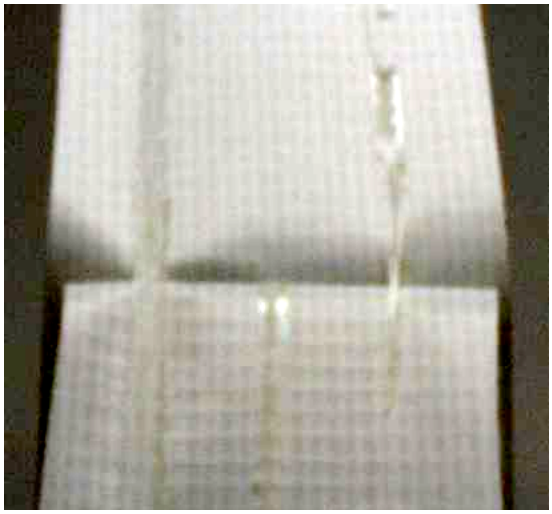


Picture No.12: The chewing gum test. Lines of activated tape from the left:
1. Q-Bond® tape that is not fully activated. The tape has got some of its original structure left.
2. Q-Bond® tape that is not fully activated, but that is affixed to both materials.
3. Properly activated Q-Bond® tape that has flown out and griped the textures of both of the surfaces. This is the result to aim at.

The chewing gum test should be carried out to make sure that the right settings are being used. Activate the tape with the settings that make the glue stick equally on both sides. If this is achieved, a very good result on the sails joints will be obtained.

Never underestimate the value of the chewing gum test. This is the only way that properly activated joints can be ensured.

Please consider this when changing the settings:
- Never change more than one thing at a time.
- Study the result of the activation through the chewing gum test to make sure that the change has given the results wanted.



Picture No.13: The chewing gum test, lines of activated glue from the left:
1. Properly activated Q-Bond® tape that has flown out and griped the textures of both of the surfaces. This is the result to aim at.
2. Not fully activated Q-Bond® tape with its original structure left.
3. Q-Bond® tape that is not fully activated, but that is affixed to both materials.

Several machine settings varied at the same time makes it very hard to understand the results from the activation.

1.1.2 Quality control of Q-Bond® tape

Before a new roll of tape can be used, you will have to make sure that it is not too old or has been stored in a wrong way.

The tape is cured through a chemical reaction, and since chemical reactions runs faster at higher temperatures, the tape should be stored in a cool place, at a temperature between 8-22°C.

When opening a new roll of tape make sure that:
1. The glue is clear (transparent) and not cloudy.
2. The glue feels sticky when touching it.

If there is any tape left when the complete sail is assembled, this tape can be used within twelve hours opening the bag. Put the tape roll into its original bag, and seal it well using ordinary tape. Keep the bag cool to slow down the curing process. When opening the tape again, carry out the same quality test as if the tape was new.

1.1.3 Applying Q-Bond® Tape

When putting two panels together using Q-Bond technology, the first step is to apply tape on one of the panels. This is done in the same way as ordinary double-sided tape is applied before sewing.

Picture No. 14: tape applying procedure:

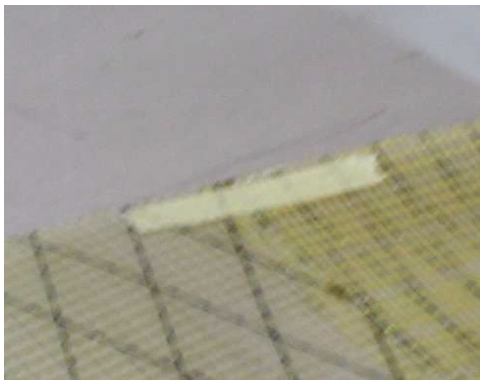
1. Apply the line of glue along the joint. Make sure that the glue is placed in the middle of the seam allowance so that if can flow out equally on both sides.
2. Cut he tape at the end of the joint and leave the plastic release liner film.

1.1.4 Putting two panels together

This is also done in the same way as in ordinary sewing

Picture No.15: Step 1: Place the second panel over the taped panel, and let them intersect over the seam allowance area.

Picture No. 16: Step 2: Remove the plastic film as you are putting the panels together



Picture No.17: Step 3: put a piece of ordinary tape at the end of the joint to prevent it from getting torn apart.

Picture No.18: Step 4: Use a roller over the taped joint to prevent air pockets and to affix the tape to the surfaces.

Picture No.19: Step 5: Several panels can be put together before the joint is activated. Step 6: Activate the tape within 30 minutes after applying it.

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1.1.5 Protective tape

We recommend you to apply a protective tape over the joints to protect the sonotrode, the press wheel and resonance plate from flowing glue. If transparent Mylar tape is being used, the tape can stay on, as it will not be seen in the sail. If ordinary tape is being used it must be removed immediately after activation.

Picture No. 20: A protective tape is applied over the joint to protect the sontrode, the press wheel, the floor and resonance plate from glue. Glue on the sonotrode and plate makes working more difficult, and can leave spots in the sail .

1.1.6 Activating the glue

When all panels are put together, the sail is rolled along the joints as shown in picture No.22.

Picture No.22: The sail is rolled along the joints for easier activation

Picture No. 23: Picture of sail during activation in the stationary unit Mk 3.

Try to keep the joint centered underneath the sonotrode and feeding wheel, doing this will result in the most even joints. If the joint is not centered, this will prevent the glue from flowing out equally on both sides.

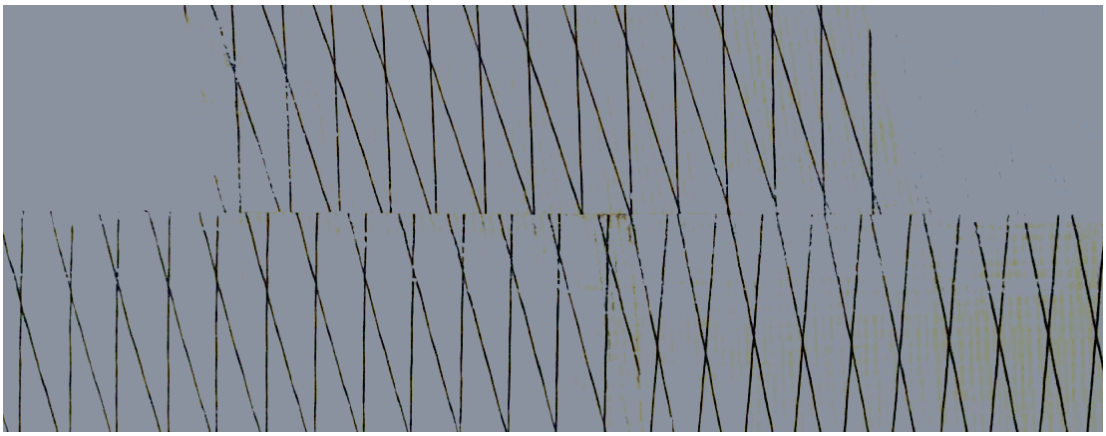
The same joint can be activated several times during the activation process if there is any uncertainty of how well the joint has been activated.

If the shape the joint is not satisfactory, or the final shape of the sail needs an adjustment, this can be done after the activation as the joint can be torn apart, as long as the glue not is cured. Apply new tape and activate the joint again.

If the joint is not warm enough, or if the glue has not flown out as much that it did in the chewing gum test, the joint must be activated again. The joint can be activated as many times as necessary to make the proper result.

It is important the sail does not stop during the activation. If the sonotrode activates the same part of the joint too long, the ultrasonic energy can burn through the fabric.
If you need to stop during the activation turn the ultrasonic energy off by release the foot pedal or the On/Off switch at the mobile units handle.

We recommend a sail design preventing four or more panels from intersecting. Compare with picture 24. Thick intersections will make it hard to work the sail properly since the hammer will get stuck. The intersections will run smoother if the panel intersections are designed in a way that makes the hammer run on the intersection like walking down a staircase.



Picture No. 24: Activation is made a lot easier if the panels are designed in a way avoiding too many intersections in the same spot. The activation has been made from the left to the right.

At some intersections, like at the corners of the sail, it might be necessary for the sonotrode to activate two joints at the same time.

Work consistently during the activating process. Mark the activated joints with a pen to keep track of which joints have been activated.

1.1.7 Curing of the sail

When the sail is completely activated, the glue needs to cure before taking it further into the production process. The curing process described below is not the complete process, only the necessary one to take the sail further into production.

Have in mind during the process of hardening:

1. Curing of the joints should take place at a temperature of between 18-22°C and an atmospheric humidity of between 50-60% for the best possible results. If the humidity is not the right, water can be sprayed in the air above the sails to raise the humidity locally.
2. To protect them from deformation, the activated joints may not be folded within two days after the activation. They must also be placed on a plain surface.
3. To get the best results, make sure that the joints are hardened with plenty of air on both sides. This can be accomplished by letting the sail harden in a net hanging from the roof. Compare with picture No. 25.

Picture No.25: Picture showing a suitable way to store the sail while hardening. Air is coming in from all directions, and the sail is not interfering with the other production.

The sail can be folded and loaded after three days of curing. After five days the hardening is complete, and the sail can be delivered to the customer.

Guideline Sail Assembly

It is very important that that the sail is allowed to harden for five days before delivery. If delivered too early, the way of delivering it can prevent the joints from hardening properly. I.e. low temperature etc.

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