



The Ultra-Bond System

We have investigated gluing alternatives to sewing for many years. Back in the mid-eighties, we used an epoxy adhesive called "Black Max" to bond seams together and eliminate slippage in highly loaded areas of large laminate sails. Although this glue had excellent shear strength, the seams still needed two rows of stitching at the top and bottom, as it was still possible to peel the seams apart. In addition, this glue was black and really messy! Because it was applied at room temperature, Black Max needed a catalyst to "kick" the curing process, which would otherwise take up to two weeks. The process was difficult to apply as the ultimate seam strength was affected by using just the right amount of catalyst. While we made many very successful sails with this adhesive, we have always been looking for a cleaner, stronger, simpler system.

When *Dimension Polyant Sailcloth* in Putnam, Connecticut first announced their **Ultra-Bond** system, we were very interested, and in August of 1995 we were invited to visit them. Their system, utilizes a specially designed glue gun that heats adhesive to a precise temperature, and compressed air to force the heated adhesive into the seams. To evaluate this process, I brought two sails with me to assemble and glue, with John Gluek's help. They were a Triradial Kevlar Main and a Dacron Jib, both for an Olson 30. First, I pre-assembled the panels using a narrow seamstick along one edge of a seam, followed by the **Ultra-Bond** adhesive that John applied. I was immediately impressed by the smoothness of the seams. As soon as we got the sails back to Rochester, the finishing details were completed and the sails were put out on the water. Both sails were absolutely smooth, no stitching puckers. They really looked and acted like they were one piece, perfectly smooth three dimensional surfaces! We knew this was what we were looking for and ordered the **Ultra-Bond** glue gun.

While dimension had done some prior seam tests, we were anxious to test the shear strength ourselves, particularly after the strips were **IMPACT FLUTTERED**. When we received our glue gun in early September 1995, we assembled an assortment of test strips and proved to ourselves that this process really makes an indestructible, permanent seam. We used our specially designed Air Drive flatbed tester for this project. This tester is driven by compressed air, and, unlike the Instron tester we use for cloth tests, this machine will tension the test strip to whatever load is selected. This load can be slowly increased to the breaking point of the fabric, while we check for, and measure any slippage. Every **Ultra-Bond** seam test, including the ones that were Impact Fluttered, showed absolutely no slippage prior to the failure of the cloth itself!

Since 1996, we have fully integrated the **Ultra-Bond** system into our production process of laminate sails. We have minimized the through process time, and still allowed the required 3-4 days of cure time before the seams can be fully loaded. To date we have built over 500 **Ultra-Bonded** sails in all size ranges from J/24 sails up to 8 Meters. By eliminating any possibility of seam slip, we were able to use a new and extremely light, 4.2 oz "**PBO - Zylon**" for a Heavy #1, and even a main for the 8 Meter '96 World's. "PBO" is a new fiber that has 50% lower stretch and almost twice the breaking strength of Kevlar Edge and K49 (the new high-modulus Kevlars).

There are Many Advantages to Using the Ultra-Bond System:

- 1.** The **Ultra-Bond** seam is actually stronger than the cloth itself.
 - 2.** The seam's are much smoother than a sewn seam as there is no puncturing of the cloth with a needle or puckering from the tension of the thread.
 - 3.** The sails are lighter, partially because the seams do not require the heavy buildup of reinforcing tapes that are necessary for sewn seams.
 - 4.** The elimination of any seam slip potential allows the use of much lighter open scrim Kevlar laminates in the high load areas of large sails, with a potential savings of over 25% in the weight of the finished sail!
 - 5.** The **Ultra-Bond** process has given us the ability to make the lightest, strongest sails possible, and produces, essentially, a one-piece, 3-dimensional sail surface that is smooth and wrinkle free.
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