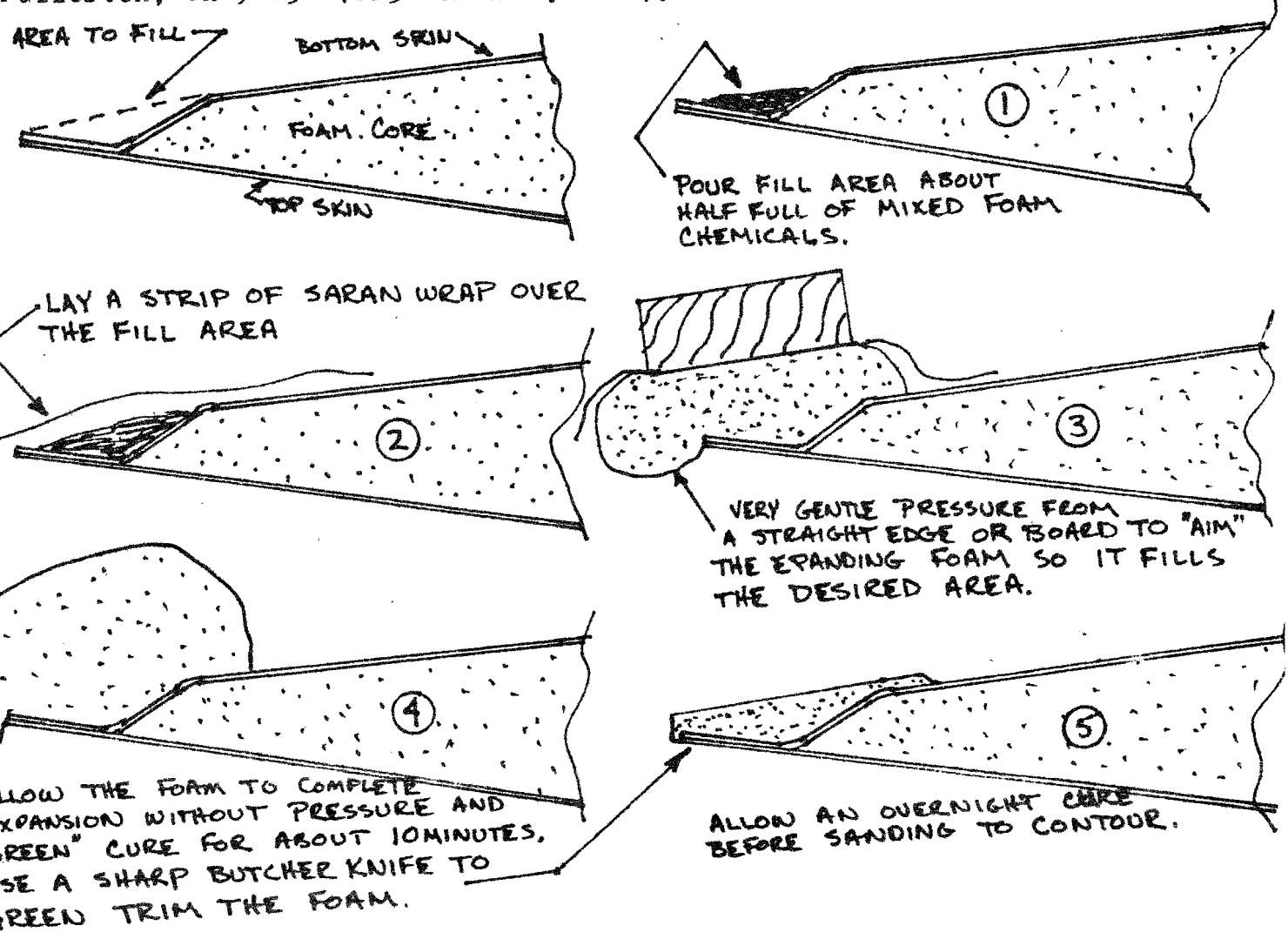
ADVENTURE NEWSLETTER #9
January 1981
Published By
Mead Engineering Company
P.O. Box 354
Colwich, Kansas 67030

Mostly for Builders In the two months that have flashed past since newsletter number eight was published, we have been heavily involved in the construction of a glass and foam prototype of a production oriented design. This project has produced a number of spinnoff's for Adventure builders and this newsletter is almost entirely devoted to passing along the most usefull of these new techniques.

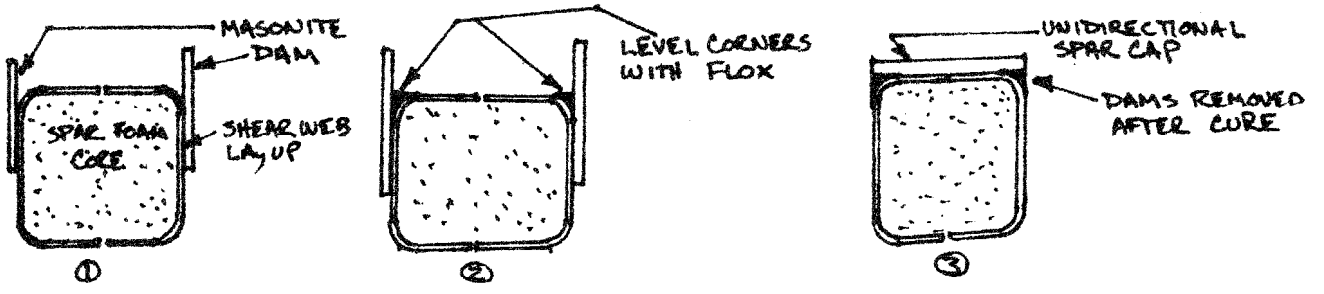
Control Surface Trailing Edges The trailing edges of elevators, Ailerons and the rudder on the Adventure require filling to complete the airfoil contour. The Adventure plans show this fill as a very dry mixture of microballoons and epoxy which has a density of about 0.025 pounds per cubic inch. Since the plans were printed, a new light weight automotive body filler has appeared on the market which has a density of about 0.030 Lb/in$^3$. The light weight Automotive material works beautifully and is cheaper than epoxy/micro mixed at home. A third technique has been developed which is by far the lightest yet which uses a two part "foam-in-place" polyurethane foam to fill the trailing edge. This latest technique results in a significant reduction in the lead mass balance weight required for each surface. The reduction in lead and basic surface weight increases the flutter safety margin of the airplane as well as reducing its empty weight. The process is shown in the following sketches. The material used is "X-40" liquid polyurethane foam available from Aircraft Spruce and Specialty Co. Box 424 Fullerton, CA 92632 ($15 for a 2Qt kit).



Control Surface fill (cont'd)

The cured polyurethane foam is insensitive to primer surfacer, Feather-fill, and paint, so direct application of these materials is acceptible. Beware! This process requires good timing. The foam chemicals must be well mixed for uniform foaming action and yet the whole process from the start of mixing to full expansion only takes about 120 seconds. Get <u>everything</u> ready and within easy reach before starting. Try a practice piece before trying the real thing. The two quart kit of foam is enough for about four sets of Adventure control surfaces.

<u>Wing Spar Laminating Dams</u> When laminating the unidirectional spar caps, the cap material tends to slide off the edges of the spar plug inboard of b.l. 12.5. Adding a temporary "dam" of masonite to the front and rear faces of the spar plug will end the problem and give you a classier looking spar carrythrough. Make two strips of masonite that are 13 to 14 inches long and about 2½ inches wide. Cover one face of each strip with Scotch brand number 218 "Fine Line Paint Tape". Bond the two strips of tape covered masonite to the front and rear faces of the spar plug so that the tape covered masonite sticks up above the edge of the spar plug by about ⅛ inch. Use a few dabs of 5 minute epoxy to bond the strips in place. The paint striping tape has a coating of mold release compound which the epoxy will not bond to so that the strips can be easily removed after the spar cap layup is cured. The 5 minute will stick well enough to keep the strips in position if you don't get too rough with them. Before you start laminating the spar cap, trowel the rounded corners next to the dams level with flox. After the last spar cap ply has been wet out you can use a small square ended stick or squeegee to level the little depression next to each dam caused by razor trimming the crossfibers (after each fold in the spar "flagging" ) over top of the soft flox.




<u>Pre-Impregnating Glass Cloth</u> When laminating in limited access or hard to reach areas you will find pre-impregnation a usefull technique. pre-impregnation simply means wetting out the glass cloth before you position it rather than after. You can use a clean piece of cardboard or polyethylene plastic (sold as painter's drop cloth s or you can cannibalize a trash bag) to protect your work bench while you wet small pieces of glass cloth or tapes. You do the wetting on a flat, easily accessible surface then paint a light coat of epoxy on the joint area and stipple the preimpregnated material into position. This technique will save a lot of awkward laminating while you are taping the bulkheads to the side and bottom panels in your Adventure fuselage. Don't use waxed paper. The wax disolves into the epoxy and jepordizes the bond strength.

Tailwheel Conversion The Adventure prototype is about 75% complete in its conversion to conventional landing gear. Roughly half of the Adventure plans holders have voiced an interest in a tailwheel version of the design and with some time to burn during the Kansas winter we've undertaken the task. Originally we felt that the prototype might be difficult to convert since no provision had been made for the main gear installation forward of the wing spar. As it turns out the conversion only required about one weeks worth of evening effort to complete. (lengthening the bottom access cover was actually more time consuming) The tailwheel is a mixed blessing, the airplane should be a bit faster, about 6 pounds lighter, capable of handling rougher surfaces, and the sitting room in the cockpit is increased with the main gear spring moved forward, but the visibility on landing is much worse and 'S' turning for ground visibility is necessary. The prototype will be using a locking/ free castoring type of tailwheel similar to that gaining popularity amoung Pitts Special operators. We should have some operating experiences to share in newsletter number 10.

More Styrofoam Stuff Since our last great discussion of Styrofoam and all of the different colors and designations, we've had an opportunity to work extensively with the bright orange colored Dow Brand BB ( Bouyancy Billet). This material is manufactured by Dow Chemical Co. for use in floatation for boat docks and other marine floatation. The local availability of the BB material seems to be better than the Brand FB which is used primarily in pipeline insulation. The orange foam works the same, weighs the same and appears to cost about the same as the blue foams. One potential advantage in the orange foam is that it is available in larger blocks than any of the other varieties. Blocks of orange foam as large as 10 X 24 X 109 inches are available and to our knowledge these are the largest blocks of foam suitable for wing core material available.

The orange foam does have a few quirks. The reccommended epoxy for Adventure builders (APCO 2426 resin/ 2177 hardener) appears to bleed into the orange foam extensively. This trait makes for heavy parts and can dry a layup out during the cure cycle by "wicking" the epoxy into the foam and out of the cloth. Bad news. The new 'Safe-T-Poxy' (APCO 2410 resin/2183 hardener) system works very well over the orange foam and does not soak in. We don't know why just yet but if you are working with the orange foam plan on using the Safe-T-Poxy system.

Basic Education I thought that the Adventure plans were explicit on this point but too many folks are still asking the same questions. If you don't already know how to work with the basic materials used in the Adventure (i.e. foam cutting, laminating, mixing epoxy, etc.) the Adventure plans won't teach you. Start out by getting Burt Rutan's book on "Moldless composite sandwich aircraft construction" from Aircraft Spruce and read it carefully. Make the practice layups and learn the basics before starting on the Adventure. You Macho types may find building practice parts beneath your dignity, but you'll end up with a much nicer airplane if you do.