

Sheeting Techniques

With the construction of a foam wing, the strength is achieved by the shearing action between the sheeting and the foam. The thickness of the wing also plays a role. The density or strength of the sheeting itself is the least-critical factor in the strength of the wing, so the method by which the sheeting is glued will, in large part, be the determining factor in the wing's strength. A spar may help but I have never found them to be necessary when the sheeting is done properly.

I don't claim to have all the answers, and for most of us the ultimate way to accomplish the task at hand may be a combination of methods. Let's take a look at three methods for applying the sheeting to the foam: epoxy or probond with weights for holding the sheeting to the skins, contact cement, and vacuum-bagging.

Erik will be vacuum-bagging his wings. For the purpose of this article, we'll pay a quick visit to each of the methods rather than trying to give in-depth instruction. A close friend of mine, Norm Cassella, a long-time builder with more than 60 completed 1/3-scale Lasers and countless other models, uses spray contact cement for all of his foam sheeting. His models have proven themselves with countless hours baking in the sun. Many of them are still flying weekly and in perfect condition after ten years! In fact, the completed Extra you see in this article was built with the method I'm going to describe.

The trick here is to use an industrial grade of spray glue. Some builders have used 3M #77 and have had less than satisfactory results. We have had great luck with 3M 08074 spray trim adhesive available at your local automotive parts store. It won't melt the foam when applied correctly, it doesn't lift in hot weather, and it continues to hold fast for years without drying out.

Contact cement is probably the quickest way to sheet foam, and although it is far less work than the other methods it may not be the easiest! If the two pieces to be glued touch in the wrong spot you could easily have a ruined wing because they instantly adhere on contact and will not separate without destroying one of the parts.

As with any sheeting method, a good flat table or work surface is essential to attain a straight wing panel. We were lucky to obtain a couple of 5' x 3' slabs of machined marble. It's about as perfect as you can find without the expense of a machinist's table.

With contact glue, trial fitting is the key. You start with the trailing edge and roll the wing on the flat surface to the leading edge. Mark the corners and double-check the marks. Spray the contact cement on both surfaces to be glued and let stand until tacky as per the directions on the can. It usually takes about ten minutes.

Too much build-up will take longer to dry and may melt the foam, so don't over do it. You're after a medium, even coat. Getting the trailing edge flat on the first contact is very important to obtain a straight TE. Tack down the TE, then just roll the panel flat on the table to the LE and you're done!

I always use epoxy to adhere the end caps and edges and make sure they are glued well to any exposed sheeting. This ensures that the sheeting will not lift from an edge.

Newsflash: while I am sitting here writing, Erik weighed the two sheeted wing panels, complete with trailing edges, phenolic sockets installed, servo rails, and dowel plates. They are *exactly* the same weight! (We weighed them in grams to verify.) That's how

accurate you can be when you pay attention to the details. Amazing! Again, he is vacuum bagging with epoxy.

The weighting method is what most modelers use and it works virtually the same with both epoxy and polyurethane. Trim your glued or taped sheets to fit in the shucks as tightly as you want. We leave roughly 1/4-inch overhang all the way around.

Erik likes to seal the wood before applying any epoxy so that it does not soak into the wood too heavily. He prefers to use hairspray because it's lightweight and spray-on convenience but Balsa-Right will seal the wood slightly better. Hairspray is also ready to sand in just a few minutes where Balsa Right must dry for several hours.

Sand the hairsprayed surface with 320 grit paper on a foam block and wipe it clean with a tack cloth or vacuum it. Weigh the epoxy (or at least use a measuring vessel) to get the same amount on each wing panel. Spread it evenly with a plastic spreader or your wife's department store credit cards (I find that the Neiman Marcus and Lord and Taylor cards work the best) until the whole surface has a shine. Don't allow any significant build-up. Push any excess off onto some wax paper.

On your flat building surface, place the assembled wing core and skins into the shucks with the top of the wing down. Align the assembly and place a flat and true piece of 3/4-inch particleboard that spans the entire core on the top to spread the weight that you are about to add. Most people use bricks or heavy blocks to weight the core. It takes at least 200 pounds, or more on a wing this size to get a good, tight bond evenly across the wing surface. Add the weight and let the cores dry over night.

As mentioned, for our airplane Erik wanted to use the vacuum-bagging method. Vacuum-bagging is a process by which the wing is placed in a plastic sleeve and sealed, allowing the air to be pulled out with a vacuum pump, creating completely uniform pressure around the entire wing assembly. At 8 psi the equivalent would be to place about 1800 pounds on the wing panel. The vacuum also tends to pull the glue further into the porosity of both the wood and the foam creating a better bond with less glue. This method requires some special tools and materials. On average, you can get started vacuum-bagging for approximately \$300. See the Equipment List for tools, materials, and suppliers used.



The wing and skins are inside the plastic sleeve while the shucks are lightly weighted on the outside to hold everything in place. In this picture, you can see the vacuum pump, the sleeve, and various hardware to get everything doing its job.

After the sheeting is in place, we will have to install and shape the leading edges, root plates, and tips. We used 1/8-inch light ply for the wing and stab roots and 1/8-inch balsa for the tips with 1/2-inch contest-grade balsa sheet stock for the leading edges. Shape them per plans.