

## Tools and Materials

### Material

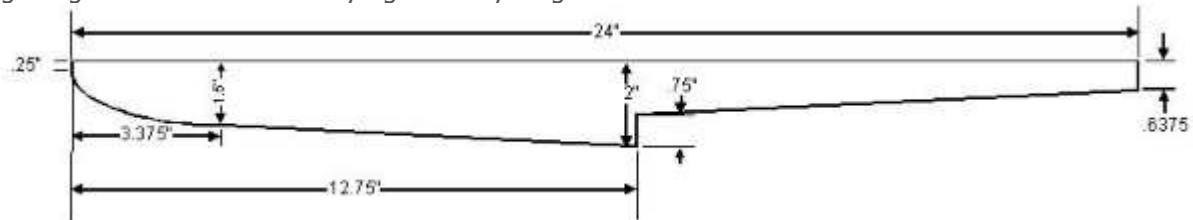
I make my floats out of the inexpensive white sheet insulation (EPS -expanded polystyrene insulation) that you will find at virtually all material supply places and lumber companies. I buy mine at Chase Pitkins a chain in the NE similar to Lowes and Home Depot. A 2' x 8' x 2" sheet which is big enough to make about 10pairs of floats cost less than \$5. Some places only have it in the 1.5" thickness but that will also work just as well. Occasionally your supplier will have a broken sheet that will be adequate for your needs that they will sell for a few dollars. The rest of the material you need you should be able to find at your LHS or craft supply store.

### Cutting The Foam– You don't need fancy hot wire cutting equipment to make floats!

I use a Scroll Saw(we use to call them jig saws) to cut the foam. A small band saw also would work very well. You could even do a reasonable job using a hand held coping saw. Of course you could also cut the foam using a hot wire.

### Float Pattern

The float pattern I use is based on a RCM article written by Chuck Cunningham. You can find a copy of that article [here](#) The dimensions are based on the length of the float which is in turn is determined by the length of the model. Generally the floats should be about 75 – 80% of the fuselage length. For the Slow Stick this worked out to be 25" so that's how long I made my first set of floats. Later I changed it to 24" because it was easier to simply cut out the starting blanks across the 2' width of the sheets. My pattern for these floats is shown below. For other size planes you can proportionally change the dimensions based on the float length. In any event don't worry about getting the dimensions exactly right as anything close should work.



### Float Width

For lighter planes Cunningham suggested a 2" width but for the Slow Stick I found a slightly wider width worked better. Perhaps the lighter and slower parkflyer types benefit from a slightly wider and shorter float. With the method I am using you can make wide floats even though you're starting with foam that is only 1.5" or 2" thick.

### Float Shape

The floats I will be making have a pentagon shaped cross-section. They have a shallow "V" for the bottom, sloped sides and a flat top. It's referred to as the Carl Goldberg shape in this [article](#) from which I got my inspiration for this design.

### Making the Floats

The first step in making the floats is to cut out starting blanks that are about 2.5" wide by 24" long. Since these are rough cut blanks you can cut them out with most anything.(utility knife, hand saw, hot wire, scroll or band saw) You will need 4 blanks for each set of floats.

### Cutting the Pattern

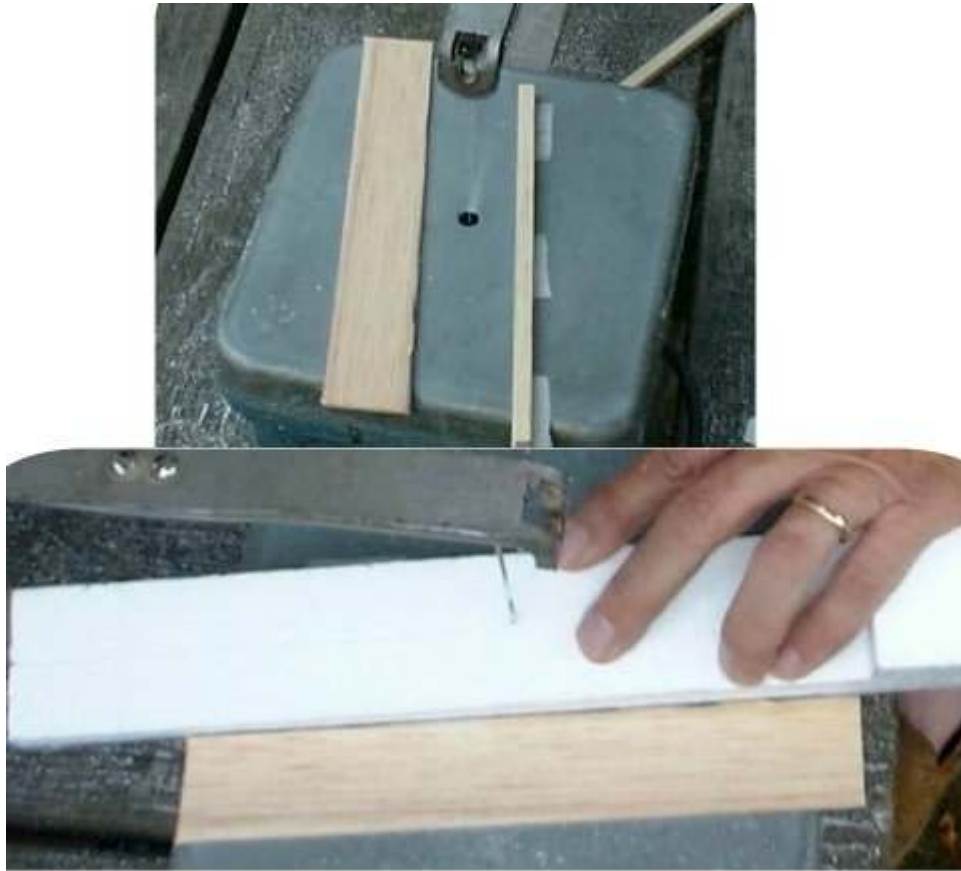
Make a template of the float pattern on a piece of thin cardboard. Pin it to the side of a foam blank and trace around it with a Sharpie type marker. Now using the saw carefully cut out the float. Do this with each of the 4 blanks. Because the foam is very easy to cut you will find you can do a very good job of cutting out these floats.



### **Creating the Pentagon Shape**

In this step you will cut the floats lengthwise so when you reassemble them with the cut faces together you will form the pentagon shape. If you have a saw in which you can tilt the blade or table all you need to is tape down a guide  $7/8$ " from the blade and tilt the blade away from the guide at about a 12 deg angle. With the top of the floats on the saw table cut two of the floats lengthwise starting from the nose end of the float. Cut the remaining two starting from the tail end.

If you can't tilt your saw like by 40 year old jig saw then you will have to use shims. For 2" thick blanks tape a  $1/8$ " thick piece of wood down on the saw table  $7/8$ " away from the blade. (I angled the guide so the float will clear the arm that supports the blade). For the shim take a  $3/8$ " piece of wood and tape it 1.75" away and parallel to the first piece. (If you are using  $1\ 1/2$ " foam then change the shim to  $1/4$ " and put it  $1\ 3/16$ " away from the  $1/8$ " guide) Now with the top down and one side resting against  $1/8$ " guide and the top resting on the shim cut two floats lengthwise starting from the nose end and cut the remaining two floats starting from the tail end. The halves you will be using are those that have the wider bottoms. *Note the distance of the guide from the blade determines the width of the float. If you increase it by  $1/8$ " the floats will end up about  $1/4$ " wider. If you change the distance to the guide still keep the distance between the guide and shim the same.*



### **Squaring the Top**

The next step is to square up the tops of the floats. Tape a  $\frac{3}{4}$ " thick piece of wood  $\frac{3}{16}$ " away from the blade. Take the cut halves from above and with the cut face down and the top against the guide, cut along the length of the float to square up the top. You will notice that you will be cutting two from the nose end and two from the tail end.



### **Gluing**

Now if you cut things correctly when you put the opposite halves together you will have two floats with a nifty looking pentagon cross section. I glued the halves together by spreading a thin layer of Probond polyurethane glue on one half and wetting the other half. I held them together with rubber bands and used pieces of masking tape to keep the rubber bands from digging in to the foam. When gluing make sure the back of the step lines up and that the tops are level. Any mismatches on the bottom are easy to sand off after the glue cures.

### **Sanding**

Sand the float to remove any excess glue and any gross irregularities or mismatches. Don't get carried away with sanding trying to make everything perfect.

Below is a photo of what the floats look at this point. The pair weighs 1.3 ounces.

At this point you are where you would have been if you had bought ready-made foam cores. Over the next few days I'll continue with finishing the floats and attaching them to your model.

### **Covering**

Covering the bottom of the floats is really a must. It makes the bottom smoother, protects the bottom from small dings and most important it adds considerable strength to the float. The simplest covering is to use 2" wide plastic packaging tape. Just as easy, a little lighter and looks better is to use the colored covering tape they use for covering foam wings. Your LHS will probably have some. Other covering options would be a low temperature iron on covering such as Econokote or Solite. One that is very easy to apply and one of the toughest is 3/4oz fiberglass applied with Minwax Polycrylic. The Polycrylic wets the fiberglass cloth and pulls it down on the foam. Because the cloth is so thin it is easy to apply to a curved surface. With any of the covering options I like to overlap about 1/4" on the sides to give the corners of the float some protection. You could cover the whole float but I think this just adds unnecessary weight.

Although not essential you may want to consider gluing a piece of 1/32" ply to the back of the

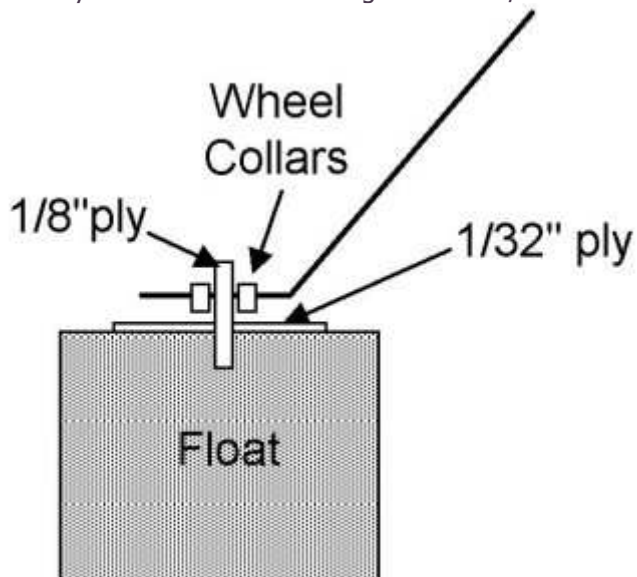
step to give it a little more protection.

I decided to cover mine with the colored tape and the pair now weighs 1.5oz.



### Attachment

The attachment method I use is shown below. For attachment plates I used 1.5" square pieces of 1/32" ply. They have a 1/8" wide by 1/2" long slot in the center of them to take 1/2" x 3/4" x 1/8" ply tabs. Use epoxy glue on the attachment plates. Make some shallow holes in the foam under the attachment plates to give the glue a better hold on the foam. Dig out a little area under the slots so you can later insert and glue in the 1/8" tabs.



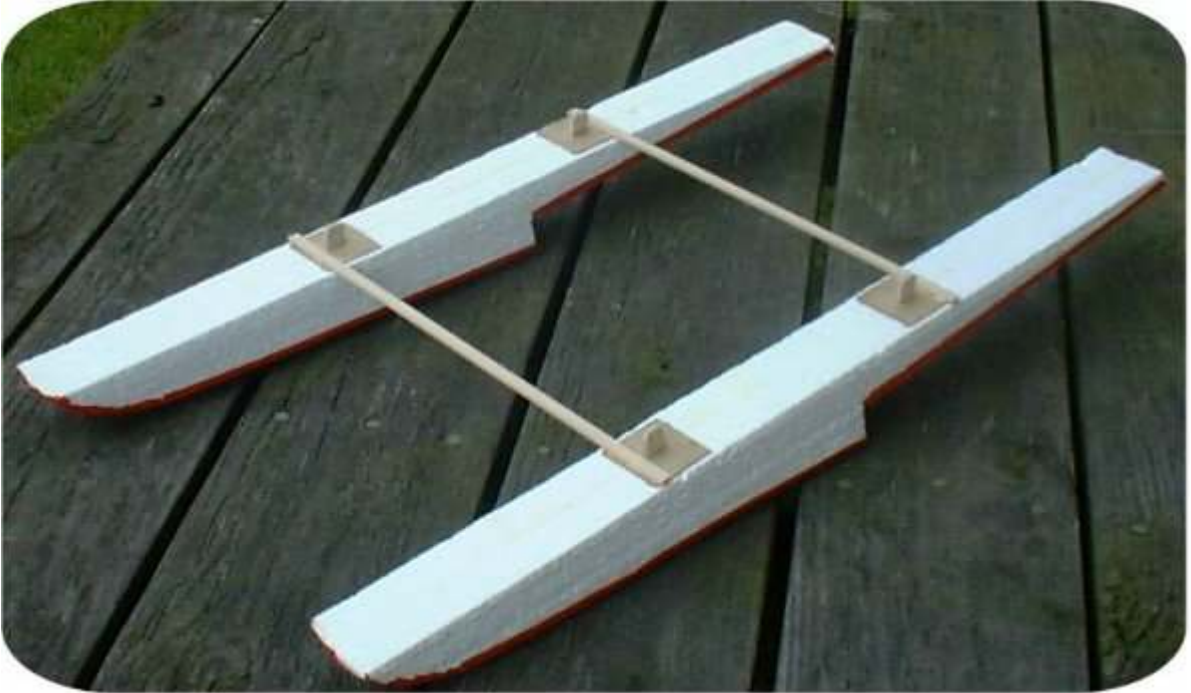
### **Plate Location**

The plate location will depend on your model. You want to locate the front plate so when the landing gear is inserted in the tab the CG will be at or up to about  $\frac{1}{2}$ " in front of the step. For example the Slow Stick landing gear lines up with the leading edge of the wing and the CG is about  $4\frac{1}{8}$  back from the leading edge. I centered the attachment plate  $8\frac{1}{4}$ " back from the tip of the float. The step is  $12\frac{3}{4}$ " from the tip and if you do the math you will see this puts the CG about  $\frac{1}{2}$ " ahead of the step. Obviously things aren't actually this precise. I have flown with a range of CG location relative to the step without any problems. Just give it your best guess and it will probably be fine. The back plate should be about  $\frac{1}{3}$  the length of the float from the front plate but that can be varied to whatever works best for you model.

### **Cross-Brace**

To align the floats, make sure they are level and set the spacing I used  $\frac{1}{4}$ " x  $\frac{3}{32}$ " basswood sticks glued to the attachment plates. Spruce would be stronger but slightly heavier. To make sure things were level, flat and square I laid the floats out on a piece of cardboard marked with guide lines. I taped a piece of wood down to align the tips and taped the cross braces in place before gluing them to the floats using epoxy. Finally glue the  $\frac{1}{8}$ " tabs in place after drilling them with the proper size holes for the axle. You probably should coat the wood with something like polycrylic to give it some water protection. The floats now ready to mount on the airplane weigh 2.0oz.





### **Rigging**

The last step is attaching the floats to your airplane. I assume you will be using the landing gear for the front attachment. For the rear support I used 1/16" wire that I shaped similar to the landing gear. To attach the support to the fuselage I bolted and glued it to a piece of 1/16" ply and then attached it to the fuselage using high strength Velcro like material (hook and loop). I got mine at Radio Shack but I have seen it in other places. This stuff holds very well and it is what I use to hold on my camera when doing aerial photography. The adhesive on this material also forms a very high strength bond. This method should work just as well with a conventional fuselage. If you don't like the Velcro like stuff permanently on the fuselage just put it on a plywood plate and bolt this plate to the fuselage when you want to put on the floats.



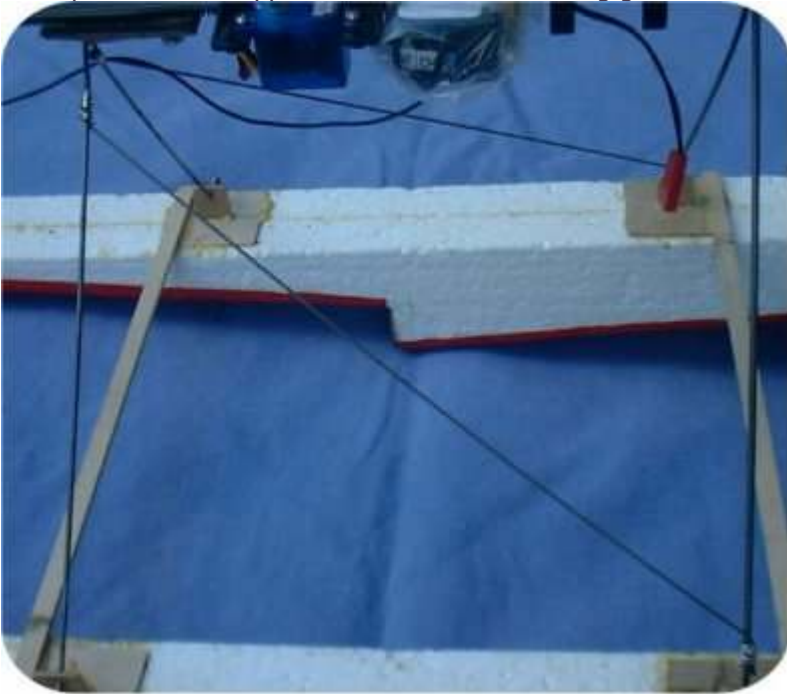
I really like this attachment method as it allows some flexibility in the attachment point. Also in a hard landing it will let loose, reducing the chance for damage. I confirmed this when I inadvertently landed on shore instead of the water. The rear attachment let loose and nothing was damaged.

### **Incidence**

The key thing about making the rear support is that you make so the wing has a positive incidence relative to the top of the floats. This means you want the front of the wing to be higher from the top of the floats than the back of the wing. Because the Slow Stick wing is positive relative to the fuselage all I tried to do was make the floats parallel to the fuselage. In general I think for parkflyer models the front to back difference should be in the  $\frac{1}{4}$ " to  $\frac{1}{2}$ " range. To facilitate adjusting the incidence you can make the rear tabs a little longer than the  $\frac{3}{4}$ " I suggested and drill a vertical series of holes.

### **Diagonal Brace**

You may find that because of the lightweight of the landing gears in parkflyers you will get some vibration when you use them as part of the float rigging. I flew many flights on my Slow Stick without any additional bracing and would occasionally get some vibration in the floats when taking off. Although this never hurt anything I eventually added a diagonal brace(.04" dia) from the top of the rear support to bottom of the landing gear which eliminated the problem.



I still have a few more tips and points to present but you should have enough information now to add floats to your model and start enjoying flying off water