

# Applying Glass and Resin

Photo #1



Photo #2



## Preparation

One of the most important steps in fiberglassing is preparation. The hull should be faired, sanded and all cracks filled. Once you apply the resin, there is no turning back. We advise that you wet down the hull several times to raise the grain and check very carefully for any flaws that might show up under the resin. Sand up to 220 and then back to 120 for the final sanding. You do not need a furniture smooth finish for fiberglassing.

Epoxy is likely to drip onto the floor, so put down some large pieces of cardboard or scrap plywood – something to catch the drips. Plastic is not recommended as it can become slippery.

## Materials

Gather all your materials ahead of time. You will need latex gloves (or plastic if allergic), a good respirator rated for fumes, mixing containers, stir sticks, (Popsicle sticks), plastic spreaders, foam rollers, roller handle, and a 3 in. dry brush. **(Photo #1). You should buy the epoxy pumps for your brand, since they will dispense the proper amounts of mixture.**

## Handling the cloth

Always wear latex gloves when handling fibreglass cloth. Any grease or dirt from your hands may contaminate the cloth. This may result in a blemish on the boat surface.

## Fiberglass Cloth

For most kayaks, 6 oz cloth is recommended, but you could use another weight. Heavier than 6 is probably overkill; 4 ounce may be a bit light for the exterior of your hull but many do use it. 4 ounce is heavy enough for insides and decks. It is entirely up to you.

38 inch wide cloth is the standard width, but you can be more efficient if you buy something in the 60 in. wide range. You can lay the cloth diagonally over the boat and save some length.

Roll out your cloth onto the boat right from the roll. A friend comes in handy. The cloth will lay the nicest on the boat if you lay it over the hull at an angle. By this we mean to run the cloth from corner to corner diagonally. This is referred to being applied on the “bias”. Once you have a long enough piece, cut the cloth with a sharp pair

Photo #3



Photo #4



Photo #5



of scissors. If you used wider cloth, lay it diagonally and cut right from the roll and down the sides, leaving a long tapered piece still on the roll. **(Photo #2)** This extra length can be used to glass the deck later and save some length from your roll.

Use a large, soft paintbrush to smooth out all the wrinkles. Try not to use your hand as it will often catch the cloth and pull threads. Press hard and do this several times. We like to lay the cloth over the boat a day or so before applying resin. This way the cloth relaxes and you can go over it again with the soft brush to stretch the cloth a little and smooth any excess. **(Photos #3 & #4)**

### **Folding Cloth over Ends**

The fiberglass cloth should lie smoothly over most boats at the bow end if you lay in on the bias, but probably not over the stern end, therefore you may need to cut the cloth at that end. Do not attempt to wrap the cloth over the ends, as this is difficult to accomplish for first timers. To determine the cut, lift the cloth up on both sides **(Photo #5)** and then cut along the stem line **(Photo #6 & #7)** and trim back so there is no overhang at the ends.

To protect the outside stems, you should add at least one strip of cloth cut on the bias about four inches wide over the full outside stem where you cut. Some apply several layers to both ends. This will add extra strength against impact. Put this piece aside – it will be added later in the process. Once you are satisfied, it is time to apply the resin.

### **Applying Resin 1<sup>st</sup> Coat**

This is the part of boat building that most people fear. You only have one chance to get it right so take your time and read the manual that came with your resin. Applying epoxy is best done as a two-man job. A second person can continue to mix up fresh epoxy as you go and also use the roller to smooth out the epoxy while you move ahead on the project.

Remember to follow all safety precautions. Wear latex gloves, mask and long sleeve shirt and trousers. Do not let resin get on your skin. Follow proper clean up procedures if you do. **Consult your epoxy manual.** You will need to give your full attention to this process for several hours depending on the epoxy brand that you use. **DO NOT** answer the phone, engage in conversation with friends or take a break.

If you are working in your garage or another closed space, you should consider heating it up to room temperature the day before to get everything warm. This

Photo #6



Photo #7



Photo #8



Photo #9

will ensure average working times of the resin coincides with the times given. Resins will harden slower in cooler temperatures and faster in warmer temperatures. You want to have a temperature in which you have at least one hour to apply all the resin. Resins will also harden faster in larger quantities, so don't mix up too much resin at one time – it will start to get hot.

Begin by mixing up about five pumps of resin with clear hardener at a time. The best containers are old plastic butter and dairy tubs, or clear plastic cups. Stir the hardener in slowly but well and then let it settle a little to let air bubbles rise to the top. Beginning at about two feet from the stern end, pour the resin on top. Spread the resin over the hull from centreline to bottom edge with the plastic putty spreader, working towards the nearest end of the boat. Do not go too fast or work the resin too long, **(Photo #8)** as this may result in a cloudy finish, which you may not see now, but might appear later when it is too late. Take your time! Let the resin soak fully into the cloth and wood. You cannot force it in. The weave of the cloth should disappear as it soaks up resin. A little more resin is better than not enough.

As you reach the end of the boat, you may find it easier to fold the cloth back and apply resin directly to the boat and then fold the cloth back over. This area can a little tricky to get everything to sit nice and flat against the boat without any air bubbles forming. After you have applied resin to the whole boat, you will come back to these areas and make sure everything is tidy.

Once you are happy with the one end, go back to where you began and work your way to the bow end of the boat. Remember to mix up just enough resin and hardener to keep you going. Try to keep a wet edge of resin on the boat. You should not use the same container for the whole boat. On an average 17 foot kayak, you should go through 5 or 6 mixing containers so that you always have fresh epoxy.

**Note: If at any time you feel the resin in the container you are holding getting a little warm, DO NOT POUR IT ON THE BOAT. It will harden very quickly once it starts to warm up. Put it down on a scrap piece of cardboard or wood and mix up another batch in a different container. Be careful of fumes.**

As you spread the resin over the entire hull, try to keep an even layer. Pull the resin from areas that have more resin to areas that have less. Remember; do not force the resin into the cloth. Let it soak up what is needed to make the cloth disappear completely. You should not see any white patches of cloth. This is referred to as “starving the cloth”. Add more epoxy to these areas.



Photo #10

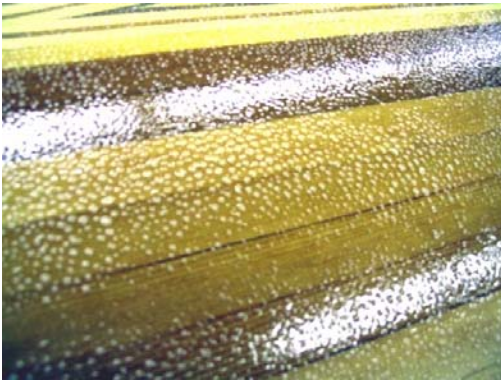


Photo #11



Photo #12



Once resin is covering about one third of the boat, proceed to take the foam roller and carefully and slowly roll out the applied area to smooth out the resin in an even layer. **(Photo #9)** Don't be alarmed by any very small bubbles that form on the surface. **(Photo #10)** If you have a second person helping you (recommended), have them use the roller as you proceed down the boat. Continue to the next third of your boat and repeat procedure for the two remaining thirds. Stay with the project for at least 30 minutes (depending on resin brand and hardener) to make sure resin does not run down the side of the boat.

### Smoothing out Resin

Depending on your resin and working times, before the resin begins to set and stop running down the sides, take the three inch dry brush and drag it very slowly over the boat beginning with the area you started with since this area will be setting up sooner. This is referred to as "tipping off". **(Photo #11)** You can also make your final smoothing application with the plastic putty scraper. Begin at the end of the boat that you first started with. Place the scraper at the centreline of the hull. With the scraper at about a 45-degree angle to the hull, slowly pull the scraper down towards the sheer edge so that you have an even coat left on the boat. **(Photo #12)** Do not press too hard as you pull. Any excess resin that is pulled down is disposed of into a spare container by scraping it off the putty scraper. Do not remove so much resin that the cloth is now exposed and do not put this residue back on the boat. Continue to move along the hull to the other end and then to the other side. You may choose to "tip off" the hardening epoxy with the brush even after using the putty scraper. This will even out the coats. This is done when the epoxy is hard enough that it will not stick to the brush.

### Applying Resin 2<sup>nd</sup> Coat

Subsequent coats of resin are best smoothed out with the foam roller 6-8 hours apart (depending on temperature and epoxy hardener used) before the first coat cures completely. A good rule of thumb is when you cannot dent the epoxy with your fingernail. If you are not able to apply coats in succession, you are best to let the first coat completely cure and then wash the hull with a mild soap and water mixture then lightly sand the hull to ensure a good bonding surface between coats (mechanical bond). If you apply the second coat within the time frame, sanding is not necessary, as the second coat will bond to the first coat while the first coat is still curing (chemical bond). Never sand uncured epoxy.

Photo #13



Photo #14



You will need approximately 1/3 the amount of resin for the subsequent coats. You can quickly spread the epoxy with the plastic spreader and then roll it out for a smooth surface or simply apply with the roller from a shallow paint tray. Remove excess resin as you did for coat #1 and dispose of excess resin. Either way you apply these coats, you will need to “tip off” with the dry brush. You should not be able to see the texture of cloth after the second coat. You can also apply the subsequent coats with a good brush to get a smooth application. Let the 2<sup>nd</sup> coat of resin cure partially and then apply your third coat. It is now that you should add the small piece of cloth over the stem areas.

Allow all the epoxy to fully cure for 24 hours following final fourth coat before moving the structure from your building forms to cradles.

With four thin coats, you should have built up enough epoxy thickness for final sanding in preparation for varnish without sanding into the cloth.

### Glassing the Inside (Hull)

Glassing the insides is basically the same as for the outside of your boat, except that you will have a more difficult time getting the cloth to lay flat in the ends.

Inside your hull, we recommend that you take a small amount of epoxy and thicken with a fairing compound such as micro-balloons. Use this mixture to run a fillet in the sharp keel and stem areas in bow and stern of the hull. **(Photo #13)** By using a fairing compound, you will be able to sand this area for a smooth finish before glassing and will insure that the glass will conform to the sharp curves in the bottom of the boat. No one will see this area in your kayak. With the hull ready for glass, roll out your cloth and smooth out as before with a dry brush. It is imperative that the cloth sits on the bottom of the boat in all areas. In the sharp bow and stern area, you may need to cut the cloth up the centerline with a razor blade and have the two halves lay over top of each other. It is often very tricky to get the cloth to fold into these areas, depending on your hull shape, but you want to get a good dry fit before you start to apply epoxy. Hold the cloth at the sheer line with a few cheap clothes pegs. **(Photo #14)**

Pour the resin into the bottom of the boat near the centerline and pull the resin up the sides to the sheer. Work from one end of the boat to the other. Smooth out with a roller and tip off with the dry brush.

You probably only need two layers of epoxy in the bow and stern of the boat. For a smoother finish in the cockpit area, a third layer might be needed to build up enough

Photo #15



Photo #16



thickness for sanding.

To insure that your hull maintains its original shape while the epoxy cures, you can take a few of the forms and place them back in the boat when the second coat is getting hard. To do this, tape some wax paper to the hull edges of a few of the forms in the bow and stern (forms 3 and 5 for bow and 13 and 15 for stern depending on boat length and design). After you have two coats of epoxy spread into the hull and the epoxy has been allowed to set up for about one hour, place the forms back in the boat closer to the ends by about  $\frac{1}{2}$  an inch than where they originally were and hold in place with a few strips of fiber tape across the sheer line **Photo #15**. By doing this, your hull will be slightly wider than plans call for, but it will a lot easier to push the hull in when you attach the deck than to try and reach inside and push it out.

Leave everything overnight while the epoxy completely hardens. You will be able to remove them the next day and clean up the small marks left by the forms. You can apply another layer of epoxy in this area if you wish. You might consider leaving the forms in until you are ready to attach the deck. Since the hull is much more flexible in the middle, forms are not needed in this area.

### Glassing the Inside (Deck)

On the underside of your deck, it is recommended that you add a few extra small pieces of cloth in stress areas such as behind and around the sides of the cockpit.

**(Photo #16)** This is the area of the deck that you will sit or push with your hands to get out of your boat or lean on during self rescues. If you are cutting hatches, a second small piece of cloth about 50% larger than the actual hatch size is recommended. Roll the full length of cloth over the smaller pieces so there are no fraying edges to contend with.

Follow all the procedures for applying the epoxy and smoothing out. The areas with double layers of glass will require a lot more epoxy and take longer to fully wet out clear.