

Repairs

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Composite canoes can be repaired quite easily.

Composite canoes

Our composite canoes are painstakingly made using superior materials and methods. They are tough hulls that aren't easily damaged. Should the unexpected happen, however, a big advantage of a composite canoe over any other type is that it can be repaired quite easily, by ordinary people, using basic techniques.

We'll give a brief description of some types of repairs here, but we have also produced a special videotape on this topic that you may want to see before starting any significant repair.

How to repair a gel-coat finish :

Gel-coat is thickened, colored polyester resin that is sprayed into the mold before a composite canoe is made in it. The gel-coat is not a structural part of the hull; its only purpose is to impart the canoe's color and smooth finish.

A gel-coat finish can acquire scratches, cracks, or blisters. Scratches come, of course, from scraping sharp objects. Surface cracks can happen if the hull is bent or twisted. Blisters are caused by moisture or dirt trapped under the gel-coat during manufacturing. Blisters, however, normally won't appear until after a

canoe is used. So if they are present, we aren't aware of it when a new canoe leaves our shop.

None of these problems are structural. They can be left alone, but if you wish to repair them, the materials are available from us.

The shelf-life of our Gel-coat Repair Kits is limited, so order one only when needed, and specify the precise color of your canoe, since we have offered differing shades at times.

The repair procedure is as follows:

- 1) Remove loose gel and deepen scratches with a utility knife. Sand the area using #600 wet-and-dry sandpaper until the shine is removed. Clean the area with acetone or lacquer thinner. (Acetone is highly flammable and must be used with care.)
- 2) Place a little more than enough gel to fill the area on a piece of cardboard. Add hardener at four to five drops per teaspoon of gel. Mix thoroughly for about a minute using a paddle. (The hardener is a toxic irritant – avoid all contact with your eyes, and excess contact with your skin.)
- 3) Using the paddle, apply the gel mixture immediately and spread it into the repair. Remove any excess with a knife or with acetone. Dry the repair for two to four hours to allow full shrinkage. (To impart a smoother finish, cover the area with wax paper or cellophane while drying.)
- 4) Using a sanding block, and while applying water liberally, sand with #320 or #400 wet-and-dry sandpaper until the repair is almost level with the surrounding area. Finish wet-sanding with #600 sandpaper.
- 5) Polish the repair with a mild automotive finish restoring product such as "polishing compound" or "buffing compound." Use a powered polishing machine if desired. Finally, apply automotive cleaner/wax.

Surface scratches, cracks, or blisters can be left alone.

A crack can be left alone if it doesn't leak.

- 6) With colors other than white, a few weeks of aging are needed for the repair to reach its proper color. If your canoe has faded, some difference may remain between the color of the repair and the canoe, but you may be able to match the colors more closely by polishing the entire canoe.
- 7) If you need to recolor a large area, gel-coat can be sprayed from an automotive gun. Explaining how to make such a large repair is beyond the scope of this book, so contact your dealer, or contact us directly.

How to repair structural damage :

A composite canoe is usually damaged in one of two ways. Compression cracks can occur if the canoe is high-centered on a log or rock, or if something heavy lands on it while upturned in storage or transit. Holes are uncommon and are usually caused by serious mishaps.

Holes must be repaired, of course, but a crack may not if it doesn't leak. Use judgement, but it's wise to be safe and to repair a crack.

For a composite canoe with structural damage, it's usually better to strengthen the hull on the inside rather than the outside. Very rarely will a structural repair be needed on both sides. Typically you can patch the inside, and touch up the gel-coat only if you prefer.

All the needed materials including cloth, roving, resin, catalyst, gel-coat, interior color, gunwales, and ribs are available from us.

The repair procedure is as follows:

- 1) Remove the gunwale(s) if needed.
To remove aluminum gunwales, drill out the rivets using a $3/16$ " bit. To reinstall them, use a rivet gun. If new gunwales are being used, drill new holes in the hull for them. Place the gunwale on the hull, and drill through the flange and the hull

together. Space the holes about 9" apart.

Wood gunwales are a trickier problem. On standard-weight canoes, the gunwales are only screwed on. Removing them isn't difficult, but replacing them is. On ultra-light canoes, wood gunwales are screwed and glued in place. You must chisel them off, which will destroy them. With either type of wood gunwales, the most practical approach is to remove the wood gunwales and rivet on new aluminum ones.

- 2) Remove any loose pieces from the damaged area. Rough the inside of the hull with a disc sander or by hand sanding. It is unnecessary to remove all the interior color coating, but roughing the surface will improve the adhesion of the repair.
- 3) Apply a quality masking tape (such as 3M, cheap tape leaves adhesive residue) to the outside of the hull covering the area of the repair. The tape prevents resin from leaking to the outside. If the hull is misshapen due to the accident, you may be able to reform it by hand, and use tape to hold it in position until the repair dries.
- 4) Cut several pieces of cloth an inch or so larger all around than the damage. (A Kevlar canoe need not be repaired using Kevlar cloth, unless weight is important) The number of pieces needed depends on the type and/or location of the damage.
To repair a crack, three pieces are typically sufficient for adequate strength.
To repair a hole, you need as many pieces of cloth as the number of layers used to build the hull in that area. All our composite canoes are made from varying numbers of layers, totalling up to seven in the areas of highest stress. So to repair such an area, you need that many pieces.
- 5) Mix resin and catalyst in the ratio of $1/2$ pint resin to $1/2$ teaspoon catalyst. The

precise ratio isn't critical to the strength of the repair, but it will change the drying time, perhaps causing the resin to dry before you are done, or causing the repair to dry very slowly, especially in low temperatures. If you are not concerned with slow drying, use slightly less catalyst.

- 6) Using a small (1/2" to 1") paint brush, coat the damaged area entirely with resin. Then apply one layer of cloth, pushing it into the resin to become saturated.
Apply more resin and cloth alternately until you are done. (If you wish to match the appearance of a hull who's inner layer is woven roving, apply roving at the end.)
- 7) Dry the entire lamination simultaneously. This should happen in a few hours at room temperature, but the time can vary greatly at temperatures below 60°F or above 80°F. To be safe, leave the repair at least overnight before disturbing it
- 8) If you have a Cross-rib or Center-rib hull, broken ribs can be repaired or replaced, but it's not often necessary. The rib adds no strength; the cloth laminated around it does. Thus a rib can be repaired simply by patching over the crack. In severe case, the rib could be ground out and replaced. Please contact your dealer or us directly before making this type of repair.
- 9) Outside structural repairs are rarely necessary and are difficult to finish with gel-coat. But should an outside repair be needed, start it after the inside repair is done. Please contact your dealer or us directly before making this type of repair.
- 10) To finish the repair on the inside, sand it smooth, mix inside color coating with catalyst, and brush it over the repair.
- 11) The exterior can be touched up as noted earlier in the section on repairing gel-coat.

Royalex[®] canoes

Royalex canoes are very difficult to damage, and they seldom need substantial repair. This is fortunate because, unlike with a composite canoe, making any large-scale repair to a Royalex canoe is necessarily makeshift.

Dents are fairly uncommon because, being quite flexible, Royalex will usually absorb an impact and spring back. If a dent remains, however, you can often repair it easily by heating and pushing the dent out. (Sometimes a dent will pop back on its own when heated.) You can try a hair dryer if you like, but it probably won't be powerful enough. Ask at a hardware store about renting an industrial-type heat gun. Use it very sparingly.

A few other things do happen to Royalex canoes with some degree of frequency. The most common is damage or wear on the very end of the bow. You can install a Kevlar Skid Plate (page 15) beforehand to protect against this, or you can install one afterward as a repair.

To match its appearance to the canoe, you can paint it using spray cans available from us.

Royalex canoes can also be cut by sharp objects. This rarely happens near the center of the canoe where it is quite flexible, but it may happen near the ends which are quite stiff.

Small cuts or punctures can be repaired by filling with adhesive products meant to repair shoes. The one that we use is called "Shoe Goo," although there probably are other brand names. This can be sanded after drying, but not very well, so try to be neat when you apply it. Use a paint scraper, popsicle stick, or something similar to apply the adhesive and clean the excess away quickly before it has

Dents can usually be popped out with heat and pressure.

Small cuts can be fixed with shoe adhesives.

Repair large cuts or holes just like a composite canoe

had time to dry. If you wish, you can paint over the repair after it has dried overnight.

A large gouge might be patched with shoe adhesive, but if it is substantial enough to weaken the structure, it is best to repair the gouge as if it were cut entirely through.

Large cuts or holes (both of which are very rare) can't be fixed with shoe adhesive, nor with any sort of Royalex-like material. This is the point at which fixing a Royalex canoe becomes makeshift, because you must repair it as you would a composite canoe, by adding layers of composite fabric bonded with resin to the inside and/or the outside of the canoe.

Unfortunately, the composite repair will not adhere to the Royalex canoe as strongly as it would to a composite canoe. Moreover, the differing expansion/contraction rates for the repair compared to the canoe will constantly be taxing the adhesion of the repair.

To achieve success, you must use epoxy resin. Other types won't stick well to a Royalex canoe. Also, you must thoroughly sand the area, because the adhesion will be purely mechanical (not chemical), and it needs all the "grip" it can get. Finally, make the repair no larger than absolutely necessary in order to minimize the variances in expansion/contraction caused by temperature changes.

A gouge can be repaired on one side only, but repair cuts or holes both inside and out using basically the same procedure as described on page 56 to repair a composite canoe. Use epoxy resin and about three layers of fabric (both on the inside and outside for cuts and holes.) Then sand and paint if you wish.

Gunwales can be replaced by drilling out the rivets and pop-riveting new ones on as described for composite canoes on page 56. End caps are also available from us and can be easily replaced by drilling out the rivets.

Gunwales can be drilled out and new ones riveted on.