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SURFBOARD CONSTRUCTION

FOAM SURFBOARD BLANKS
Modern surfboard blanks are made from two types of foam, polyurethane and polystyrene. Most boards are made out of polyurethane foam blanks using polyester resin. When repairing your board it is important to use the proper resin since failing to do so can increase damage. IE, don't repair epoxy boards with polyester resin.

LAMINATING
After a foam blank is shaped it is laminated. The laminating process combines both resin and fiberglass cloth to seal the foam and create strength. Most modern surfboards are laminated with 4 and 6 ounce fiberglass cloth using LAMINATING RESIN (polyester resin without sanding solution added) or EPOXY RESIN.

First, the cloth is cut to size and laid over the foam. Then, resin is applied with a squeegee to evenly distribute and saturate the resin in the cloth. The process should be repeated on the bottom carefully wrapping the rails to blend over each other. This is standard procedure for both POLYESTER & EPOXY resin using fiberglass cloth.

FINISHING
Once the board is laminated and the fin plug are put in, it's time for finishing. Finishing refers to how the surface of the board looks. There are two basic finishes, Sanded or Gloss; both begin with a final coat of resin for finish sanding. Polyester boards require SANDING RESIN which contains a liquid wax additive that coats the surface for easy sanding (note: laminating resin should never be used for finishing - the surface will remain tacky). Epoxy resin is used for both laminating and finishing.

The final coat of resin needs to be sanded - usually with a foam backed sanding wheel and a medium grit sandpaper. This step evens the surface of the board. A sanded gloss coat is the base for either a sanded or polish finish. Sanded finishes are then wet sanded with a fine grit and sprayed with lacquer. Gloss finishes require additional wet sanding and polishing.
There are two types of resin used to repair surfboards, POLYESTER and EPOXY. The type of surfboard you have will determine which resin you should use for repair.

POLYESTER is the most common type of resin used, and is applied on polyurethane foam. POLYESTER resin comes in two forms, laminating and sanding. Laminating resin will always dry tacky and is used only for laminating cloth. Sanding resin contains a liquid wax solution which allows it to completely harden and sand easily. Therefore, most dings are repaired with POLYESTER SANDING RESIN. POLYESTER resin is temperate and works best when mixed at 77(F) 25(C). The following chart should be helpful for mixing at different temperatures:

<table>
<thead>
<tr>
<th>RESIN CONTENT</th>
<th>HARDENER DROPS</th>
<th>TEMPERATURE (F) or (C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1oz (30ml)</td>
<td>20</td>
<td>45-60 7-15</td>
</tr>
<tr>
<td>1oz (30ml)</td>
<td>10</td>
<td>61-71 16-25</td>
</tr>
<tr>
<td>1oz (30ml)</td>
<td>10</td>
<td>78-89 26-31</td>
</tr>
<tr>
<td>1oz (30ml)</td>
<td>5</td>
<td>90-up 32-up</td>
</tr>
</tbody>
</table>

Polyester resin is also available in a new SUN CURE™ formula which instantly cures when exposed to sunlight. No mixing or measuring, use straight from the can to your repair. SUN CURE™ is available in laminating or sanding formulas and can be used in any temperature.

Epoxy resin can be used to repair both POLYESTER and EPOXY surfboards. Known as the "cure-all" of resins, epoxy resin can be used in both the laminating and sanding process. EPOXY also come in a putty form (DING ALL® QUIK STIK™) from repairing small dings and replacing broken fins.
**FIBERGLASS CLOTH**

FIBERGLASS CLOTH and FIN ROPE are used to provide support and add strength to resin. FIBERGLASS CLOTH comes in many weights. The most popular weight for ding repair is 4 ounce.

**FIN ROPE**

FIN ROPE, not used very much anymore due to removable fin systems, consists of fiberglass strands and is used with resin to form the base for permanent glass-on fins. FIN ROPE can also be used to make leash attachments as a replacement for leash cups.

**Q-CELL FILLER**

Q-CELL filler is a powder material used to thicken and expand polyester or epoxy resin. Q-CELL is great for filling large voids or fractures, it dries white after mixing, and is easily sanded.

**FIBERGLASS FILLER**

FIBERGLASS filler is made by chopping cloth into small pieces and adding it to resin. Fiberglass filler works best when Q-CELL is not available.
Both polyester and epoxy resin are hardened by adding hardener. Since both types of resin require different portions of hardener to work correctly, make sure to have a clean container on hand that easily shows a correct liquid measurement.

**SANDING**

Almost all surfboard repairs require sanding using several different grits of sandpaper, a sanding block, and/or an electric sander. The three basic grits include: medium (100 to 120), fine (180-220), and wet sand (320-400). Use in order from the lowest grit up. The best method of sanding is an electric sanding wheel or orbital sander. If one is not available, cut a 1" x 2" board 4" long and make a sanding block.

**COVER SHEET**

For most repairs, the use of a COVER SHEET can minimize the amount of sanding required. A COVER SHEET is usually made of clear plastic or wax paper and is placed over the repair during the drying process to form a smooth, glossy finish. A COVER SHEET is used for flat repairs and can be taped to cover rail dings. Once the repair is completely dry, slowly remove the cover sheet and sand the surface if needed.

**EPOXY PUTTY**

"THE QUIK STIK"
For quick, on the spot repairs, **QUIK STIK™** epoxy putty repairs both polyester and epoxy surfboards. **QUIK STIK™** can be applied to wet and dry dings and will even dry while surfing. The **QUIK STIK™** contains a blue dye that turns white after about 1 minute of mixing. **QUIK STIK™** works best when rubbed smooth with wet fingers. Therefore, the repair will need little if any sanding.

### SUN CURE® FIBERFILL RESIN

For instant ding repair choose **SUN-CURE® FIBERFILL** resin. A clear, fiberfill, polyester resin that cures in "minutes" when exposed to the sun. **SUN-CURE®** requires no mixing or adding cloth and cures in any temperature. **SUN-CURE®** produces a tack free surface that can be sanded in minutes.

### MISCELLANEOUS TOOLS

- **TAPE** - Most ding repair requires the use of paper masking tape. Buy a good brand - cheap tape will soak up resin and leave a mess.
- **ACETONE** - Acetone cleans up both epoxy and polyester resin off of tools and brushes.
- **PAINTBRUSH** - A paintbrush is important for large repairs and laminations. Buy a good one that doesn't shed bristles.

### BASIC REPAIR "HOW-TO"

### USING SUN CURE FIBERFILL RESIN
1. Remove all moisture, loose particles and dirt from the repair area.
2. Rough sand the surrounding area to allow resin a secure bond.
3. IN THE SHADE, apply the needed amount of SUN CURE\textsuperscript{tm} to the repair with an application stick. Make sure to work out any air bubbles and form the resin to the repair.
4. For flat surface or rail dings apply the clear plastic cover sheet over the resin to mold the surface and create a no-sand finish. (Note: Make sure to take each side of the cover sheet to hold in place.)
5. EXPOSE THE REPAIR TO SUNLIGHT (If you can see a shadow, SUN CURE\textsuperscript{tm} will work).
   - Bright Sun: Gel 15 seconds - Full cure 4 to 6 minutes
   - Partial Sun: Gel 25 seconds - Full cure 6 to 8 minutes
   - Light Overcast: Gel 45 seconds - Full cure 12 to 20 minutes
   (NOTE: when using SUN CURE\textsuperscript{tm} in intense summer sun, thick repairs may need to be taken in and out of the sun every minute to avoid excessive heat build-up to avoid cracking)
6. Make sure resin has completely hardened before removing the plastic coversheet or sanding. SUN CURE\textsuperscript{tm} has a tack-free surface that will allow an easy sand finish.

**USING Q-CELL FILLER**

When added to polyester or epoxy resin, Q-CELL filler thickens the resin to make it more workable and expands it to fill in large areas. This expansion reduces the amount of resin required therefore reducing weight. (Note: Q-CELL is only a filler and should be sealed with a coat of resin before use). The following lists instructions for using Q-CELL filler:

1. Estimate needed resin and mix in hardener.
2. Add Q-CELL to resin in small amounts until desired consistency is reached. (For best results, a medium paste is recommended, avoid adding too much Q-CELL to the resin mixture or it will be too thick to apply).
3. Stir resin until Q-CELL is completely saturated.
4. Apply mixture to the repair.

**MINOR DINGS**
There are two basic types of minor dings, punctures and fractures. These dings may occur on your board's nose, tail, rail, or flat surfaces. Small punctures can easily be repaired with SUN CURE™ fiberfill resin (see sec. on using SUN-CURE® FIBERFILL RESIN) or DING ALL® QUIK STIK™ epoxy putty (see sec. on EPOXY PUTTY) or with regular polyester resin by following these easy steps:

**Materials:** Resin and hardener, fiberglass, masking tape, sandpaper, cover sheet, mixing cups, mixing sticks, and plastic gloves.

**Tools:** Scissors, sander

1. Dry and clean fracture, light sand the area about 1/4" around the fracture. Cut or grind away any broken fibers to create a void to be filled. For larger fractures requiring cloth laminations, size and cut cloth before mixing resin.

2. For taping flat surface and rail dings, tape around the sanded area to prevent resin from spreading. Nose and tail dings require taping under one side to mate the shape of the missing piece - multiple pieces of tape might be needed. Although the resin mixture will be thick, the tape will hold the resin in place around the broken or fractured part and will act as a mold eliminating extensive sanding and shaping.

3. For mixing, first estimate the amount of resin needed to fill the ding. Use scissors and chop thin pieces of cloth, (about 1/8" pieces) and add to the resin. The cloth will make the resin very workable and will provide needed strength. Using an adequate mixing cup, estimate resin and add hardener (see sec. RESIN). Once mixed, slowly stir the chopped cloth into the resin (don't add too much).

4. To apply resin on flat surfaces and rail dings, use a mixing stick and work out any air bubbles. A plastic or wax paper cover sheet is applied over the surface of the repair to mold a smooth surface. On rail dings, tape down each end of the cover sheet to hold it in place. DO NOT REMOVE the cover sheet until the resin has completely hardened. Check the hardening progress by looking at the leftover resin in your mixing cup. Once dry, slowly peel off the cover sheet. If sanding is needed, start by using a medium grit sandpaper. Keep the sanding surface flat and avoid excessive, uneven sanding. Following initial sanding, use fine (wet/dry) sandpaper. To match a gloss finish, polish the repair after wet sanding (refer to SANDING for more info).

**DELAMINATION**

DELAMINATION is when fiberglass cloth becomes separated from the foam on your board and occurs mainly where your feet apply pressure to the board's surface.

Detected by soft, hollow sections, DELAMINATION will quickly crack and absorb water causing the foam in your board to discolor and rot if left alone. DELAMINATION can easily be repaired by following these steps:

1. **Gather your materials and tools:** resin and hardener, drill with 1/8" bit, wax paper, weight (slightly larger than repair area) and a DING ALL® DELAMINATION REPAIR BOTTLE.

2. **Prepare your board.** Remove all wax and dirt. Drill two holes at opposite ends of the repair. Squeeze all of the moisture out of the repair and lay the board flat.

3. **Mix:** Estimate enough resin to fill less than half of the delamination. Pour the resin into the bottle, add hardener, replace cap and shake (see sec. RESIN for mixing instructions).

4. **Apply** the resin by squeezing into each hole leaving room for compression. Place wax paper over the top
of the repair and add weight to flatten.

5. Once dry, remove the weight and wax paper. If resin leaked out and needs to be sanded, refer to sec. SANDING.

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**FINS, REPLACE & REPAIR**

Replacing or repairing a fin begins with having the proper materials on hand - especially while traveling. Knowledge of repairing fins can salvage a surf trip! If a fin has stress cracks that have not broken through, or is not loose, do not attempt to repair it.

**To repair a fin:**

First, **gather your tools and materials:** resin and hardener, fiberglass cloth, fin rope, masking tape, sandpaper, rubber or plastic gloves, acetone, spare fins - if needed, mixing cups, mixing sticks, scissors, sanding wheel or sander, paint brush, hot glue gun - optional (note: some tools may be substituted by hand tools).

**BROKEN FINS**

1. **Preparation:** broken fins require grinding or removing any broken fibers to the foam to provide a void to be replace by a new layer of fin rope and cloth. Once the particles are removed, clean and sand the surrounding surface. Apply masking tape around the sanded edges of the repair to prevent excess resin buildup. Align the fin by matching it to the opposite fin. Trailing fins are set straight and stand vertical.
2. Once aligned, the fin must be taped in place. Apply a piece of masking tape across the top of the fin and attach to each rail while holding the fin in place. Adjust by pulling on tape.
3. Each Damaged side of a fin must be replace by one piece of fin rope, extending 1" past the front and back, and two oval patches of 4 or 6 ounce cloth covering the base and side of the fin. Cut the second patch larger to overlap the first patch when applied.
4. **To apply,** in one step, mix the estimated amount of resin (sec. RESIN) and saturate the fin rope. Use gloves and squeeze excess resin out. Then, apply along the base of the fin. Place the first fiberglass patch over the fin rope, overlapping the base and the side of the fin and brush on resin. Once saturated, apply the second patch to overlap the first and brush on resin.
5. **Sanding:** once dry refer to sec. SANDING for sanding instructions. The use of a foam backed sanding wheel quickens this step. Monitor the strength of the repair during sanding, weak areas might need to be recovered with more layers of cloth.

**REPLACING FINS**

1. Similar to repair, replacing fins begins with a flat surface. First, remove any broken fibers with a sanding wheel. Clean and sand the repair surface. Use filler (see sec. Q-CELL & FIBERGLASS FILLER) and fill any holes. Let dry and sand flat.
2. Align the fins to be tacked on. Place a mark where the front and back of the fin should be (note: refer to opposite fin or similar board for alignment). Tack the fin in place by using a hot glue gun or **DING ALL® QUIK STIK™**. If tacking with resin apply tape across the top of fin and attach to each rail to hold in place once resin is applied.
3. Once tacked in place, repeat the same preparation and glassing process in the broken fin section above.
**To repair a broken board:**

1. **Gather your tools and materials:** resin and hardener, fiberglass cloth, tape, plastic gloves, squeegee, acetone, mixing cup, mixing sticks, filler, sander (flat or disc), scissors, 4 wood splints 20" long 1"x 2", paint brush, saw horse or equivalent.

2. **Preparation:** both broken ends must be cleaned free of dirt wax and moisture. Place the largest section horizontally and attach the four splints with masking tape - two on the top and two on the bottom. Position each splint half way over the break and space each about 12 to 14 inches apart. The splints will guide and hold the broken pieces while being tacked together (note: the splints might need to be wedged to match the surfboard's rocker).

3. **Apply:** refer to sec. Q-CELL & FIBERGLASS FILLER and mix enough filler to tack the boards together filling any voids. With the splints attached to the largest section, place board vertical, apply filler resin and slide into the broken piece. If possible keep the board vertical while drying.

4. When dry, remove the splints and place the board horizontal. The second application will be filling the open cracks on both sides. Refer to sec. Q-CELL & FIBERGLASS FILLER and mix filler. Fill all cracks even with the surface and apply a cover sheet if possible (see sec. COVER SHEET). If any sections of cloth are torn off, take this time to replace them.

5. After both sides are filled, rough sand surface flat and prepare four pieces of cloth - two bottom layers 6 to 8 inches wide overlapping the rails and two top layers 10 to 12 inches wide overlapping the bottom layer and both rails.

6. Prepare enough laminating resin to coat one side at a time using a paint brush or squeegee. Work out all excess resin and let each side dry before repeating on opposite sides. Upon completion of laminations brush on a coat of sanding resin and refer to sec. FINS, REPLACE & REPAIR for sanding instructions.
The Fin Control System® by Gorilla Grip® is designed with safety in mind, IN MOST CASES a collision between your surfboard and body can result in damage to your surfboard and sometimes injury to yourself.

Using the Fin Control System the chances of this happening are reduced. The fin has tabs that are engineered to break off in most collisions, therefore, causing no damage to the surfboard and reducing the chances of injury.

If this occurs, undo grub screws, turn the surfboard upside down and lightly tap over the broken fin - the tabs will fall out - (a freeing agent can be used), then simply replace the fin and GO SURFING.

If however, there is damage to your Fin Control Plug in the surfboard, follow these steps.

1. **Gather your materials and tools:** 1 1/8"(30mm) holesaw, drill, resin and hardener, fiberglass powder, replacement FCS plug, repair jig (this can be made out of a 2"x4" piece of 1/2" plywood), spare FCS fin, and tape.
2. Make repair jig by drilling 1 1/8" hole through the center of the 1/2" plywood. This will be used to keep the hole saw straight while drilling out the damaged plug.
3. Center and tape fin jig over damaged Fin Control Plug. (Picture #1, Jig is aluminum)
4. Mark hole saw with tape to measure 3/4 inch deep. Drill with hole saw to correct depth, (hole saw should be cutting resin around the Fin Control Plug). (Picture #2)
5. Remove hole saw and drilling jig, then with a screwdriver in the Fin Control Plug slot, wiggle the plug until it cracks away from the resin and then remove. (Picture #3)
6. Install the new Fin Control Plug on the tab of a fin and tighten. (Don't forget to clean the plugs with acetone before installation). Insert into hole and second plug. Make sure the plug stoppers are flush with the bottom of the board.
7. If repair hole is very large, first fill cavity with Q-Cell/resin and sand flat.
   **NOTE:** Do not let Q-Cell/resin set for a long time before refitting the Fin Control Plug. This will ensure that the boring of the hole with Q-Cell/resin is not to difficult.
8. Tape off area around the plug.
9. Mix up enough resin to fill in around the plug. Add some milled or chopped fiberglass to the resin along with hardener. (Do not use Q-Cell filler for this - it's too weak.) Using a squeeze bottle or small pouring cup, add the resin into the area around the plug. (Make sure not to drip any resin into the top of the plug)
10. Let the plug harden and then remove the spare fin jig. Turn the screw so it is below the surface of the plug and begin sanding. Use 60-80 grit to take down the rough part then continue with finer grits.

Repair cracks around Fin Control Plugs in the same manner, but if the crack is very small, scratch up with a sharp instrument and fill with Q-Cell/resin.