# REPAIR MATERIALS

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>DESCRIPTION</th>
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<tbody>
<tr>
<td><strong>Balsa</strong></td>
<td>Raw material for FST (Future Shape Technology series) rails or “parabolic stringers”. It is what gives our unique product its excellent performance characteristics. Quality repair of this feature is paramount to the continued high performance level of Firewire Surfboards: +/-120 kg/m3.</td>
</tr>
<tr>
<td><strong>Bamboo</strong></td>
<td>Deck skin for RapidFire series: Natural veneer: 0.6mm thick@ 600kg/m3.</td>
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<tr>
<td><strong>Cab-o-sil</strong></td>
<td>Typical resin thickening agent. Standard used for many years in surfboard repair. Good for mixing thick slurries. May be used in resin alone or in conjunction with Microballoons (Q-Cell).</td>
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<tr>
<td><strong>Core foam</strong></td>
<td>Expanded Polystyrene (EPS) foam, used as the interior foam of all FW models. While EPS is available, we can provide you with our factory spec EPS. This quality core has better hydrophobic qualities than what you will find locally: 1-2lb/ft3.</td>
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<tr>
<td><strong>Epoxy</strong></td>
<td>This is the structural resin used in the construction and repair of Firewire Surfboards. Its use provides for a quality repair in all facets. While being different to use than traditional polyester repair resins, its structural superiority provides qualities unavailable in other resin systems.</td>
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<tr>
<td><strong>FCS Fusions</strong></td>
<td>One of the standard fin systems used.</td>
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<tr>
<td><strong>Fiberglass</strong></td>
<td>This is a typical product. Most experienced repair shops are familiar with its use: 2.5oz, 4oz, and 6oz/yd2.</td>
</tr>
<tr>
<td><strong>Formula Finish</strong></td>
<td>Acrylic Polymer polish, our factory finish compound.</td>
</tr>
<tr>
<td><strong>Futures</strong></td>
<td>One of the standard fin systems used.</td>
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<tr>
<td><strong>Laminate foam</strong></td>
<td>The laminate foam is the foam just under the outside fiberglass in the FST series. This is a high density foam product. Using this material, it is possible to replace portions of a damaged area of the laminate core creating a ‘perfect’ repair using nothing more than sandpaper, squeegee, and sandbag.</td>
</tr>
<tr>
<td><strong>Microballoons (Q-Cell)</strong></td>
<td>Typical Lightweight thickening agent. Standard used for many years in surfboard repair. Good for mixing thick slurries, so is good for vertical fixes. Because of its light weight, microballoons are good for filling larger gaps without creating dense repairs that can cause more damage. They may be used in resin alone or in conjunction with Cab-o-sil (resin slurry).</td>
</tr>
<tr>
<td><strong>Paint</strong></td>
<td>Any type of water-based acrylic paint, but we discourage customers from using too much dark colored paint which may induce delamination.</td>
</tr>
<tr>
<td><strong>PVC Free Foam</strong></td>
<td>Alternative skin for the RapidFire technology series: 1mm @ 600kg/m3.</td>
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</table>

*Caution: Polyester resins may not be used whenever a repair involves resin contact with the EPS foam core. Polyester resins are solvent based and will melt EPS on contact. |

*It must be noted that mixing of epoxy resins and hardeners are different to using polyester resins. Extra hardener cannot be added to try and speed up cure times. It is extremely important that the correct mix ratios are followed. Not doing so will result in an inhibited cure where the finished product does not have structural properties that would be achieved with correct ratios being used. Please consult your resin supplier for correct ratios and mixing procedure. |

*Before beginning a repair, make sure the entire damaged area is dry and free of any foreign matter (i.e. sand, dirt, wax).
**TOOLS**

**Brushes:** Generally for epoxy resins, disposable ‘chip’ brushes are used.

**Compressor:** Can be used for both vacuum-bagging (intake valve) or spraying paint (output valve).
   The recommended vacuum pressure is 20-25PSI where paint sprays may vary from compressor and/or gun/airbrush used: 30-80PSI.

**Spray gun/airbrush:** Can either be used to cover repaired sections before lamination, or after the finish sand and coated with a UV protective clear coat.

**Router:** Removal of damaged sections, sometimes a better alternative to sanding.

**Sandbag:** Holding down parts of replaced sections if there is no access to vacuum bags or pump.

**Sander:** Orbital: Used for shaping the surface of deck skins and high density foams.
   Rotary: Used for lamination and finish sanding: 2000-5000RPM.

**Sanding block:** Hard and soft block for shaping and sanding flat areas, rails and edges.

**Sandpaper:**
   - 40-80 grit for shaping deck skins, High Density foams, and fin/leash plugs.
   - 150-400 grit for fiberglass and finish sanding.
   - 400-600 wet sandpaper for removing scratches or sanding a painted/UV-protective clear-coated surface.

**Squeegee:** Removal of excess resin from fiberglass.

**Syringe:** For filling delaminations, holes, and small areas that fingers and squeegees cannot reach.

**Vacuum bag/plastic sheet:** Ideal for repairing replaced sections or delaminated areas because it removes all air between foam and fiberglass. 25 PSI max.

**Vacuum Breathe Fabric:** Open fabric intended to let air travel from board/repair to vacuum hose.
   We recommend Scotch-Brite.

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**SAFETY**

*Epoxy resins and hardeners are industrial chemicals. These chemicals are to be respected. Not doing so can result in skin rashes (dermatitis). Likewise, contact with sanding dust and fiberglass fabric should be kept to a minimum. Do not wash epoxy resin from skin with organic solvents. Organic solvents provide a vehicle for resin toxins through the skin and into your system. Contact with sanding and fiberglass dust should be kept to a minimum.*

Follow the suggestions below to minimize risks:

1. Always wear eye protection.
2. Work in a well ventilated area. Do not breath epoxy or hardener vapors. If working without adequate ventilation, always wear a respirator.
3. Always wear a dust mask when sanding - Do not breath sanding dust. Safety goggles and protective wear are recommended.
4. When working with wet resin, always wear gloves. Gloves should either be disposable nitrile, vinyl or reusable latex. If they are reusable latex gloves, they should be replaced regularly. DO NOT wash wet resin from skin with organic solvents. Instead wipe off excess with a paper towel and wash remainder off using a waterless hand cleaner. We suggest Resinoff or Orange Scrub.
5. Always shower after sanding, including washing the hair.
6. Always maintain good housekeeping practices in the work area.
SIMPLE TECHNIQUES

**Shaping:**
* Foam shaping for repair is usually done using sanding blocks although at times a sander is employed. Usually 80-180 grit are used for rough shape and 240-320 grit for finishing/smoothing.
* Vacuum bagging is the best approach to replace foam but enough pressure from a sandbag or clamp may suffice.

Replacing EPS foam:
1. Remove all damaged material.
2. Replace EPS and resin into place with resin slurry.
3. Sand EPS down to correct shape.
4. Seal with a thick resin slurry mix.
5. Laminate (see laminate and finish).

Replacing HD foam:
1. Remove all damaged material by either: cutting, sanding, or routing.
2. Replace HD foam with resin and fiberglass underneath.
4. Seal the surface with a thick resin slurry mix and paint.
5. Laminate (see laminate and finish).
Laminating:
*To reduce gassing, laminate in a cool environment.
*Do not use excess amount of resin; the strength of lamination comes from the fiberglass, not resin.
*Altering orientation of fiberglass 45 degrees can improve strength significantly in multiple layers.

1. Cut the fiberglass to the correct size.
2. Apply a thin layer of resin to the area.
3. Place first piece of fiberglass and apply resin to saturate the cloth.
4. Place the next piece of fiberglass and saturate all layers thoroughly with resin.
5. Use a squeegee to remove all excess resin.
### SIMPLE TECHNIQUES (Cont.)

**Sanding:**
Standard methods are employed here. Sanding is done with 150 up to 400 grit at machine speeds under 4500 RPM.

1. Begin with 150-180 grit and hard block to sand surface flat.
2. Use 150-180 grit with rotary sander (medium or hard pad) to sand large areas of decks.
3. Use 240 and 320 grit with rotary sander (soft pad) to remove scratches and smooth surface.
4. 400 grit sandpaper and 1500 grit scotch-brite are recommended for a very fine finish.
5. Factory finish is done with an acrylic polymer polish and scotch-brite pad.
REPAIRS

Broken boards:
If done correctly, this repair can bring the board’s liveliness back 100%.
1. Pierce splints into the EPS to aid in guiding and holding the two halves in place.
2. Apply a generous amount of “resin slurry” to both halves.
3. Place together (vacuum bag or tape) and align the rails/rocker. Let cure.
4. Fill any gaps or voids with another slurry mix. Let cure.
5. Sand the surface flat.
6. Laminate one side (multiple layers, increasing the size of every piece). Let cure.
7. Sand the overlaps flat and laminate the other side. Let cure.
8. Sand all the fiberglass flat and coat with clear resin and a brush.
REPAIRS (Cont.)

Buckles:
1. Remove any damaged fiberglass and replace any EPS as needed.
2. Fill the remaining voids and gaps with a “resin slurry” mix. Let cure.
3. Sand the area flat.
4. Laminate (multiple layers, increasing the size of every piece). Let cure.
5. Sand the fiberglass flat and coat with clear resin and a brush. Let cure.
Separation between foam layers: Drilling holes
1. Drill evenly spaced holes into entire affected area.
2. Lightly sand the area with 150-240 grit.
3. Inject resin with a syringe. (We recommend using vacuum suction from an adjacent hole to pull resin completely into void.)
4. Place in vacuum bag and or underneath sandbag. Let cure.
5. Fill any remaining voids or gaps. Let cure.
7. Laminate. Let cure.
8. Sand the fiberglass flat.
9. Coat with clear resin and a brush. Let cure.
10. Sand and finish.
Separation between foam layers: Replacing High Density foam

1. Circle the affected area with pencil.
2. Sand away HD foam to EPS with medium pad and 80 grit sandpaper.
3. Lightly sand surrounding area with 150-240 grit.
4. Replace HD foam with multiple layers (fiberglass between EPS and HD foam).
5. Place in vacuum bag and or underneath sandbag. Let cure.
7. Fill any remaining voids or gaps. Let cure.
8. Seal the HD foam with a thick “resin slurry” mix. Let cure.
9. Sand roughly with heavy grit (option to paint here before laminating).
11. Sand the fiberglass flat.
12. Coat with clear resin and a brush. Let cure.
Replacing Damaged Bamboo:
1. Sand the surface with 150-180 grit sandpaper.
2. Cut away damaged bamboo.
3. Trace the old piece onto new bamboo and cut.
4. Wet EPS foam, fiberglass, and bottom of bamboo with resin; lay fiberglass and place bamboo under pressure (vacuum or sandbag). Let cure.
5. Fill any voids or gaps with “resin slurry” mix. Let cure.
6. Sand level with surrounding surface.
7. Laminate with multiple layers. Let cure.
8. Sand fiberglass.
9. Coat with clear resin and brush.
10. Sand and finish.
**Delamination:**
2. Laminate with multiple layers. Let cure.
4. Coat with clear resin and brush.
5. Sand and finish.

**Dings:**
Most dings are simply fill and finish. This can be done a number of ways by generally filling the ding with a resin and Cab-o-sil mix. This can be done with epoxy resin.
1. Sand or cut away damaged area.
2. Replace with new material and/or “resin slurry” mix.
3. Shape new material. Seal with “resin slurry” mix if needed. Let cure.
4. Sand roughly if needed.
5. Laminate with multiple layers. Let cure.
6. Sand fiberglass level with surrounding area.
7. Coat with clear resin and brush.
8. Sand and finish.
Replacing Balsa rail:
1. Sand away damaged area with 80 grit sandpaper.
2. Shape new piece of balsa.
3. Place new balsa in rail with “resin slurry” mix (use tape or clamp to hold in place). Let cure.
4. Shape new balsa.
5. Laminate with multiple layers. Let cure.
7. Coat with clear resin. Let cure.
8. Sand and finish.
Replacing Fin Plugs:
1. Remove any severe damage by sanding roughly around the fin plug.
2. Measure the placement and tape the routing jig securely into position.
3. Remove small amounts at a time, adjusting the router depth with every pass.
4. Sand the edges lightly.
5. Let all the remaining water inside the EPS foam dry completely.
6. Replace any missing EPS foam with “resin slurry” mix if needed and shape or re-route the correct depth.
7. “Dry-test” fin depth and angle before applying resin.
8. Use “resin slurry” mix and set new fin box in place.
9. Fill any remaining voids or gaps around fin box. Let cure.
10. Lightly sand around edges of box and surrounding surface.
12. Grind plug down and sand fiberglass flat.
Cover spray:
1. Prepare the area by sanding lightly with 240 grit sandpaper and wipe with a clean cloth.
2. Tape off the rails and decals.
3. Spray multiple coats of paint to completely cover area. Let dry.
4. Pull tape off.
5. Spray the area with a UV-protective clear coat. Let dry.
6. Wet sand the area with plenty of water.
7. Use scotch-brite by hand to remove any remaining shine.