1 - Preparation

Surfboard preparation

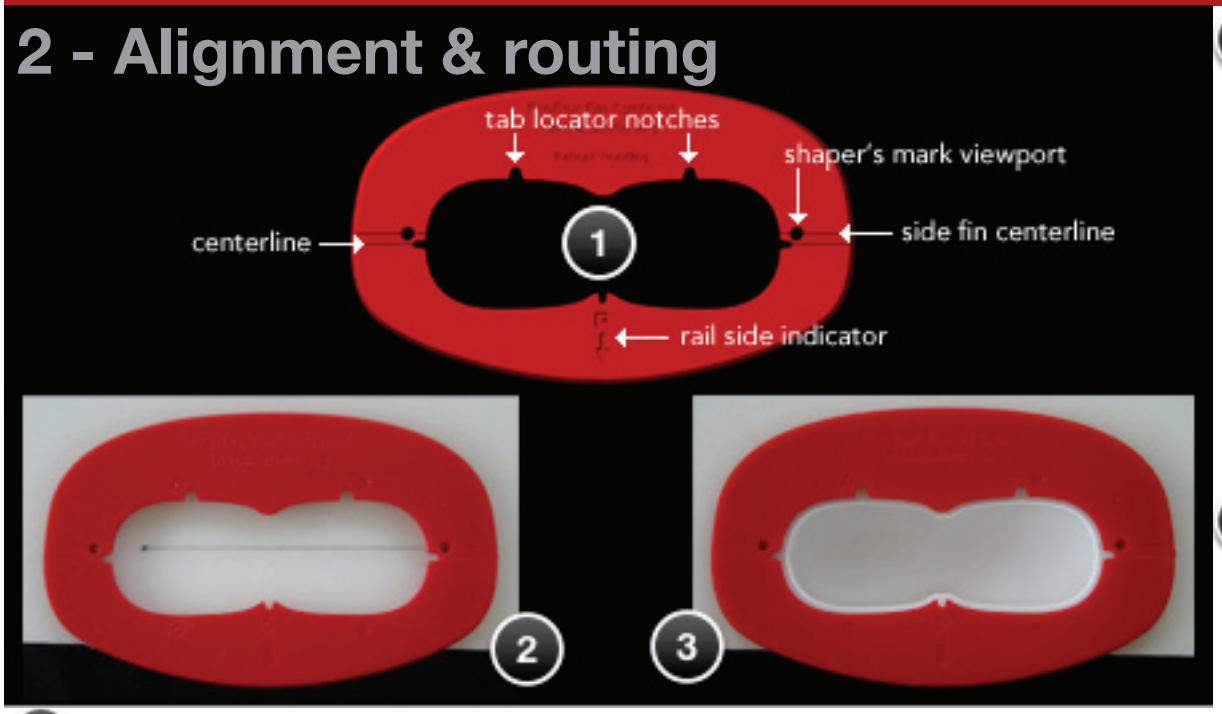
During the laminating process of the board, it is wise to plan for the reinforcement of the tail area of the board where the boxes will be installed. The simplest approach is to put an additional layer across the whole tail area of the board. If this is not desirable then 6-oz patches can be placed where the boxes will be installed. These can be placed either under the glass or on top depending on whether the board is colored or not! If patches are being used we strongly recommend placing them on top of the glass, the reason for this is that way there is less risk of sanding through the primary layer during the sanding process.

The key to a smooth sailing installation is to be well prepared so that there are no surprises in the middle of the process. ProBox boxes are very easy to install but it is still smart to be well prepared. Before proceeding to the Alignment step of the installation process prepare the bottom of the board for the attachment of the installation jigs. The installation should take place after the board has been hot coated. Start by sanding the bottom in the area of the installation so that the surface is smooth, there should be no bumps or unevenness that might cause the jig to not lay flat, or that might result in the jig being tilted in anyway. The goal is to ensure that the jig is flat relative to the bottom contour of the board!

The parts needed for the installation are shown in the figure and listed on the right!

1. **Trim router**
   We recommend the Ryobi TR45K trim router for ProBox installation, these routers are inexpensive and easy to handle and can be found at any Home Depot, or online.
2. **Set of boxes**
   A set of either side bite, thruster, or quad boxes in WHITE or BLACK, make sure the grub screws are turned down below the top of the boxes before covering them.
3. **Router bit**
   ProBox 1/2" x 3/4" router bit with a 5/8" roller bearing.
4. **Installation jigs**
   Depending on the number of boxes being installed either 2, 3, or 4 installation jigs will be needed for an installation.
5. **Spray adhesive**
   Spray adhesive is recommend for attaching the installation jigs to the board, 3M Super 77 is the recommended adhesive.
6. **Die-cut covers**
   A set of die-cut adhesive backed covers are provided for capping the box during the installation process, also a piece of clay is provided for plugging the screw holes. A separate set of covers are provided for the glossing phase, if needed.
7. **Router bit setup**
   The router bit should be setup in the trim router with a measurement of 15/16" from the bottom of the router base to the tip of the router bit. With the bit setup at this distance the bearing will be slightly above the top of the jig when the hole is being routed, this is the correct setup!
8. **Allen key**

2 - Alignment & routing



1 Installation jig details

The installation jig has a two different lines along it's center that are used to correctly position the jig depending on whether its a center or side box. Additionally, there is a small circular cutout in the jig called the viewport, this is used to align the jig with the shaper's mark. The viewport is offset slightly to the side of the centerline of the jig so that it can be aligned with the inner face of a side fin. For a center fin installation the shaper's mark must be extended at 90 degrees to the center line so that it will be visible in the viewport. This drawing of the installation jig shows all of these details.

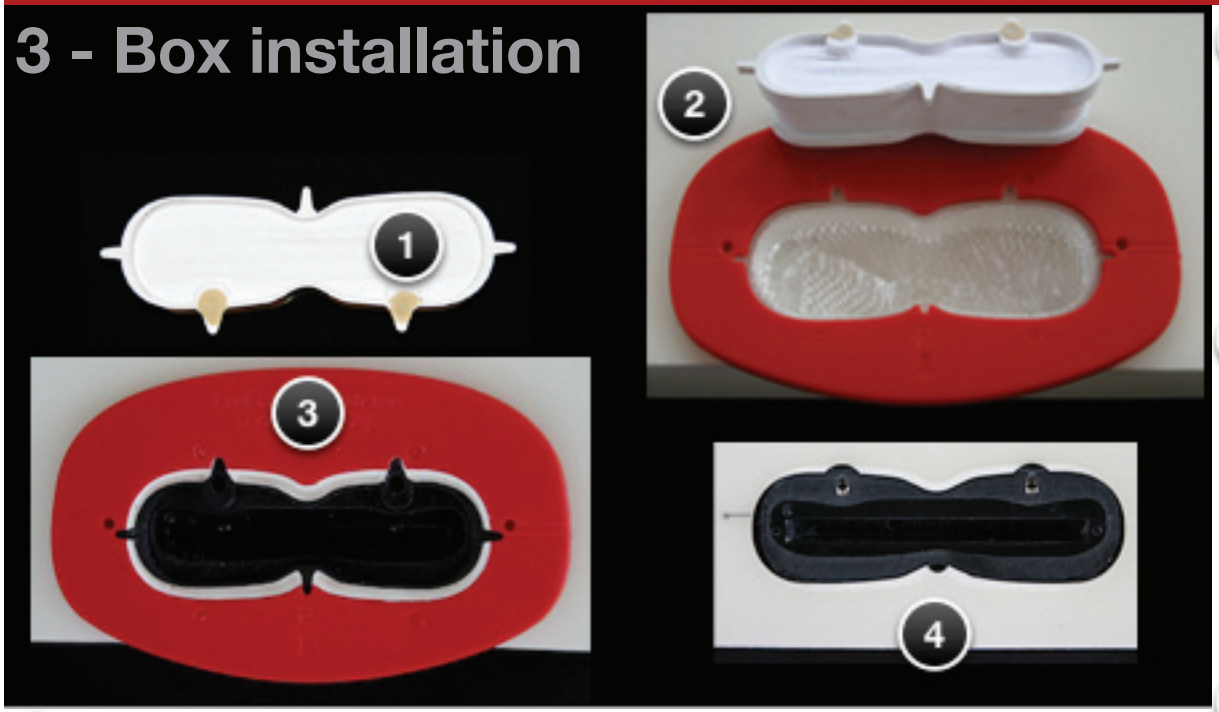
2 Alignment

Prepare the installation jigs and board by spraying a small amount of adhesive on the underside of the jigs and on the bottom of the board. A cutout masking template can be made from a piece of cardboard or door skin, using the jig as a template. This template can then be used to spray the adhesive on the board to minimize over spray.
Allow the adhesive to tack up and then start attaching the jigs to the board. For side boxes the jig must be positioned with the arrow and "R" pointing to the rail. The offset centerline is used for the side boxes, the viewport is centered on this line.
Place the back viewport over the back shaper's mark aligning the jig on the mark by looking through the viewport. At the front end of the jig simply align the offset centerline on the extended line. Ensure that the jig is pressed down flat on the board. The procedure is the same for a center box except the center line is used.

3 Routing

The cleanliness of the installation is determined by how cleanly the hole is routed. So preparation is the key to success for this part of the process. Before starting out make sure that the router bit is sharp and that the router bearing is rotating freely. If the bearing does not rotate freely it will spin against the side of the jig generating heat that will melt the jig! The router bit should already be set to the correct depth before doing the routing, see page 1. We recommend using trim routers as they are small and easy to handle. The key to doing a successful route is to not force the tool, let it cut at its own speed and make sure you are cutting in the correct direction. You want to be cutting against the rotational direction of the cutter.
Start out by removing the inner part of the hole before finishing by going around the inner edge of the jig. Ensure that the bearing is against the edge of the jig, a lot of force is not needed against the jig. Once the hole has been routed there should be a lip around the inner edge of the jig, so the hole is inset from the edge of the jig. This lip makes it easier to pour resin around the box and also helps during the sanding process. The photo shows a routed hole with the lip visible.

3 - Box installation



1 Prepare box

The outside of the box should be cleaned and sanded to improve the bond between the box and the resin. Use provided die-cut covers to cover the top of the box, clay is also provided for plugging the screw holes, this protects the box from resin intrusion. The photo shows a box that has been prepared with a die-cut cover and clay in the screw holes.

2 Prepare routed hole

Line the inside of the routed hole with a strip of 4 or 6-oz cloth. This cloth can either cover the entire interior of the hole or can be spread around the vertical surfaces. The cloth can be applied dry before pouring any resin into the hole, this makes it very simple to add this step to the process. This cloth helps the strength of the installation by helping to spread the loads to the surrounding foam and binding the resin.

3 Potting box into board

The boxes are glued into the board using a mixture of resin, pigment, and catalyst. Roughly 1-oz of resin is required per box. Add catalyst to the resin mixture and pour it into the hole until it is roughly 1/3 full of resin, now snap the box into the jig. Push down on the box to ensure that all of the tabs are flush with the bottom of the board. It is critical that all of the tabs are touching the bottom of the board, this will ensure correct alignment. Fill the remainder of the hole with resin so that it is slightly below the top of the dam on the box, the jig will serve as a dam for the resin. This topping off can be accomplished with either a syringe or a squeeze bottle, ensure that there is enough resin as it will settle.

4 Finishing

Once the resin is fully cured remove the jig by gently peeling it away from the bottom of the board. The jig is flexible enough to make it easy to peel it up.
Screw the set screws in, using the Allen key, until they are below the level of the top of the box. Now grind the box down flush with the bottom of the board, this will remove the resin dam and tabs from the box. This process might result in a very slight sanding of the insert that is installed in the box. Do not over sand the bottom of the board as that could weaken the reinforcing glass around the box!
The picture shows a box that has been sanded down flush with the bottom of the board. At this point in time the installation is completed and the sanding process can be performed on the rest of the board. All the boxes can be installed simultaneously as ProBox provides enough installation jigs to perform a complete installation.
If the board is going to have a gloss coat and be polished, the box and screws should be covered with our die-cut gloss cover, or masking tape, to prevent resin intrusion around the insert and the screws holes.
This completes the basic installation process for the ProBox Fin System!

1 Epoxy installation

The process for installing with epoxy is identical to the polyester process, but there are some things that have to be taken into consideration. Epoxy can generate a lot of heat when it starts to kick-off, this heat can potentially melt EPS foam. This is especially critical with 1# density EPS. It is therefore advisable to take some extra precautions when installing with epoxy into EPS foam. The first suggestion is to use a slow hardener if possible. If this is not possible then consider pouring the resin in two or more stages, half fill the box, let the resin kick and cool off before topping it off with a fresh batch of resin.

2 Resin reinforcement - roving

This technique involves wrapping a strand of fiberglass roving twice around the box. The best source for the strand of roving is from a piece of 24-oz woven roving cloth. The reason this works better is because the glass strands in the woven roving are sized with a material that binds the fibers together making them easier to manage. A single strand 18" long is all that is needed, per box. Before installing the box wrap the roving around the box while still dry and then place the box into the routed hole and pour resin to top off the hole following the standard installation process. Because of the shape of the box, tabs and nubs make it is easy to position the roving around the box and have it stay in position.

3 Installation jigs

The ProBox installation jigs are reusable and when cared for can do a large number of installations. The material can be easily cleaned with acetone. Should resin harden on the jig it can be easily chipped or broken off. Because the jig is flexible it can bent to remove the hardened resin. We do not recommend storing the jigs in acetone as they could soften over time deforming the shape. Plus this would mean re-applying the spray adhesive every time the jig is used. It is worth the effort to keep the inner face of the jig clean as the router bearing needs to be able to run on this surface. If it is caked with debris the bearing will ride over the debris causing the routed hole to have an uneven edge.

4 Routing

When starting to route a box hole with the Ryobi trim router, to avoid the router grabbing or kicking and to prevent cutting the jig, use the router like a plunge router. Place the woodworkers base on the router and then set the half-circle of the base down on the jig/board, then with both hands on the handles, slowly allow the bit to rotate down into the board. This technique gives you a lot more control over the router, when compared to trying to drop the router down free hand. An inexpensive small plunge router called a Trend T4 Plunge Router can also be purchased that will eliminate the issues associated with a fixed router by allowing the router bit to be plunged.

5 Adhesive cleanup

Clean the adhesive off the boards before sanding, as this saves sand paper and minimizes the chances of over sanding around the boxes as the tendency is to chase the adhesive gum around the board. A very light coat of WD40 can be used, but any adhesive remover will work as well. Use just enough to release the adhesive, then use a razor blade and cloth to remove the adhesive.

6 Resin top-off

Make sure enough resin is added to completely fill the area between the resin dam and the jig as the resin will soak into the foam a little and settle down. To little resin and it can settle down below the level of the glass, leaving a dip around the box.

7 Center box routing

When routing the center box on a board with a large stringer, it is wise to make shallower passes during the routing process to prevent the router from catching. One trick if you don't want to be adjusting the depth of the router bit for these cuts, stack two additional jigs on top of the base jig, holding them down with masking tape. Then do the routing of the stringer, then remove one jig and repeat the process until the routing is completed. If you are using the Trend plunge router just make shallower cuts by not plunging all of the way down. Or plunge down through the stringer like a drill, then cleanup horizontally with the router.

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