LOW DENSITY EPS INSTALL GUIDE rev 2

GUIDE FOR THE INSTALLING THE GEARBOX 2 FIN SYSTEM INTO LOW DENSITY EPS

gearbox surf

AUSTRALIA "Slippr'y Creek", Bellangry Road, Bellangry, NSW 2446
+61 417 243 592
info@gearbox.surf

Hawai'i/USA PO Box 424, Hanalei, HI 96714
+1 808 639 5303
www.gearbox.surf

SETUP INFO

ROUTER BIT SETUP

To adjust the router bit to the correct depth, place the router upside down on a table. Place the base router jig on the bottom of the router base, with the rubber pad on top. Take a box and place it on the rubber pad alongside the router bit. Adjust the router bit until it is slightly above the top of the upper surface of the load beam flange. This is the recommended method of setting up the router bit.

Alternatively, adjust the router bit so that 15.5mm (39/64") of the cutter is protruding above the rubber non-slip pad on the bottom of the jig.

It is a good idea to do a test run in a scrap of foam to ensure that everything is correct before proceeding.

Once the router bit has been setup it will not need to be adjusted again for the installation procedure as the routing system automatically adjust the depth for the different cavities.

NOTE: when routing a box into a board with deep concaves it might be necessary to set the router bit a little deeper than normal. The cavity should be deep enough that when the box is placed in the cavity the flange is just slightly below the lip of the cavity at its lowest point!

ROUTING SYSTEM

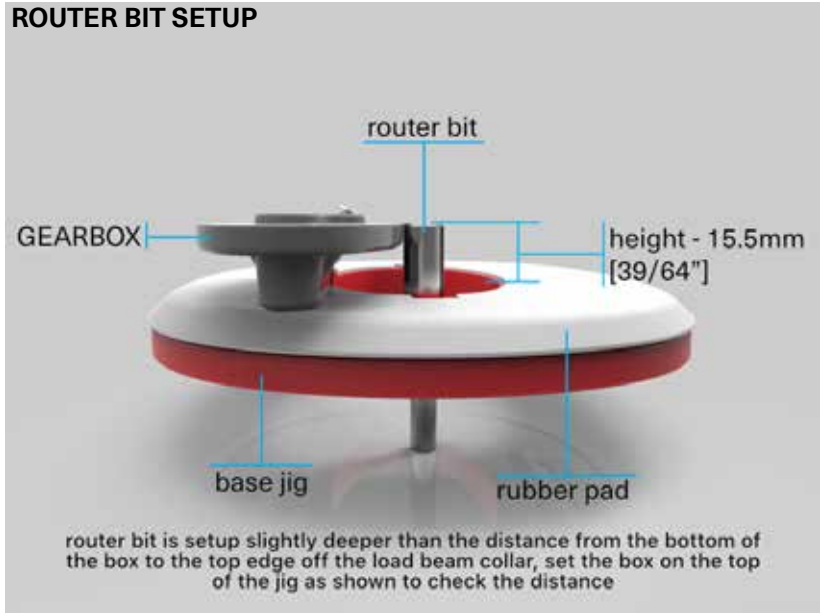
The GEARBOX routing system is made up of five pieces - three routing jigs, router bit, and a hex key.

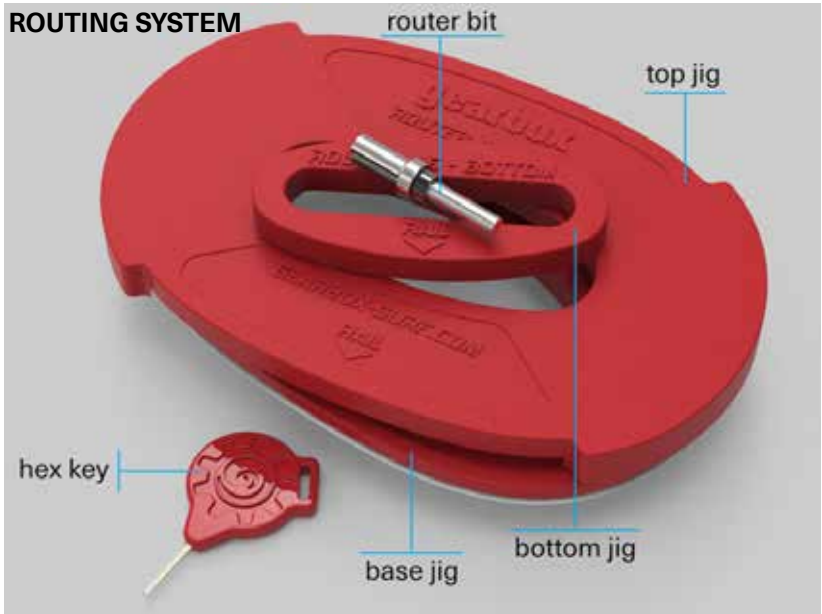
The *base router jig* is the primary positioning jig and serves as the host for the two working jigs (*it is also utilized on some of the other installation options, see the EPS Install Guide*). It has a rubber pad on the bottom to prevent slippage and to protect the bottom of the board. The *bottom router jig* is used to rout the cavity for the bottom of the box. Finally, the *top router jig* is used to rout the shelf onto which the box rests during installation. All jigs have markings on them to help with orientation and placement.

The *router bit* features a bearing that is larger than the 3/8" diameter cutter, so there is a small offset from the edge of the jig during the routing operation.

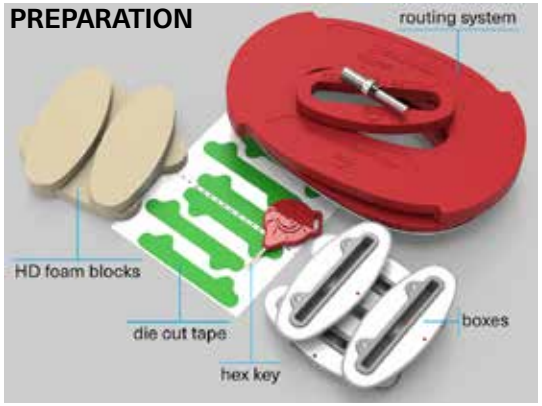
ROUTER

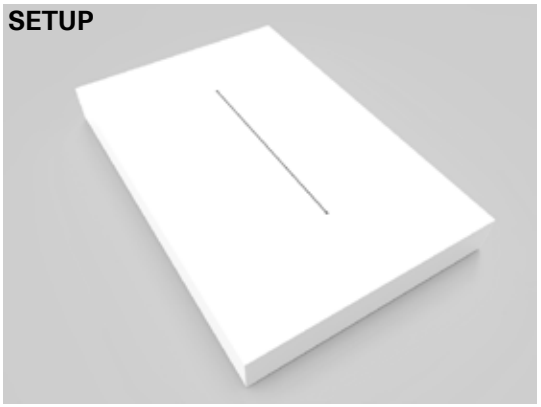
Trim routers are recommended because they are small and easy to handle. Plus they are relatively inexpensive. Our two favorites are the Ridgid R2401 **or the** Makita RT0701C **trim routers, both of which have amply powerful motors and round bases. Larger routers can be dangerous as their bases larger fit well on the jigs.**





INSTALLATION





PREPARATION

A GEARBOX 2 install is very simple and only requires our *routing system*, *hex key*, *die cut tape*, *HD foam blocks*, boxes, and a router that you provide.

A trim router is strongly recommended as these are easier to handle and fit better on the jigs, but any router will work! See info sections for *router bit setup*, details about the routing system, glossary, box details, and more.

Routing will most commonly be performed on the shaped surfboard blank. But an installation can be performed after the bottom has been laminated, but the boxes will still need to be capped with glass.

SETUP

As part of the setup the blank needs to have the shapers fin *layout lines*, for the desired fin setup. To ease the process there should be a line drawn connecting the two dots that mark the fin location, if these are not already present.

These lines will help with the positioning of the jigs, and are typically placed on the blank by the shaper to their desired fin layout.

STEP 1

Place the *base router jig* on the blank oriented with the rail marker pointing towards the rail. Place the back shapers mark window on the back *shapers mark*, then use either the centerline for a center box, or the side centerline for a side box to align the jig between the marks. Use the shapers mark crosshatch to position the mark within the window.

Typically, the jig does not need to be anchored to the blank as the weight of the jig and the rubber pad on the bottom keep the jig in place.

STEP 2

Once the base jig is in place on the blank, the routing process can proceed. For this type of installation we are first going to rout a single cavity the shape of the box and the full depth using the standard router bit depth setting.

Be very careful when routing a center box as the stringer can cause the router to jump. If there is a lot of vee in the board some tape might be needed to hold the base jig.

Start the routing by plunging the router carefully into the foam away from the jig. Start removing foam from the center of the cavity first. Then finish off by moving the router in a clockwise direction around the perimeter of the jig. This will protect the outer edge of the cavity from debris flying around inside the cavity. Resulting cut is always a 1/16” away from the jig.

When finished wait for the router to stop spinning before removing it from the jig, this prevents accidentally nicking the

jig. Remove the base jig from the board.

STEP 3

Next the *HD foam block* will be installed into the board. Coat the bottom and lower sides of the routed cavity with a very light coat of resin. Push the foam block down into the cavity making sure it is flush with the bottom. Clean any excess resin out of the cavity as there needs to be no resin on the top of the foam block. Allow resin to cure.

Place the base jig back on the board, correctly oriented, then place the *bottom router jig* inside the base jig. Proceed with the routing of the bottom cavity in the HD foam block.

Once the routing is completed remove the base and bottom jigs from the blank.

NOTE: other materials can possibly be used for these support blocks, for example, balsa wood. The key is light weight, rigidity, machinability, and good bonding characteristics.

WARNING: Pay careful attention when routing a stringer, hold the router firmly while slowly plunging into the center of the stringer, then remove small amounts of the stringer at a time to minimize the risk of the router bit catching! Once the stringer has been removed run the router clockwise around the perimeter of the jig to finish the hole. A drill can also be used to remove some of the excess wood to simplify starting the routing process!

STEP 4

Now that all of the cavities have been routed in the board, take a box and lightly push it into a cavity. Ensure that the box is oriented with the screws towards the stringer for side boxes. This will create depressions in the wall of the bottom cavity where the screw posts are located on the box. There are two on each side of the cavity for a total of four.

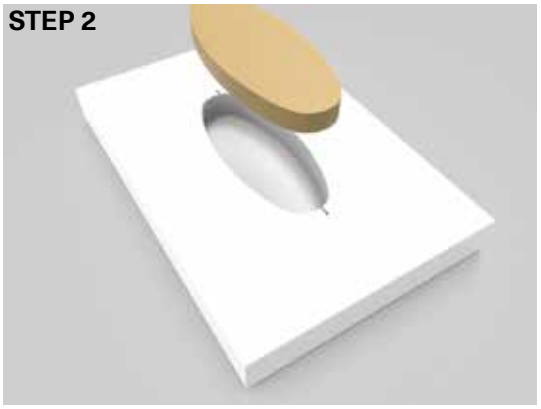
Use a small round file to enlarge the depression to better accommodate the posts. Don't rely on simply pushing the box into the foam to create these depressions. Foam can rebound when compressed, this could cause the box to rise up when installed. Repeat this process for the remaining cavities!

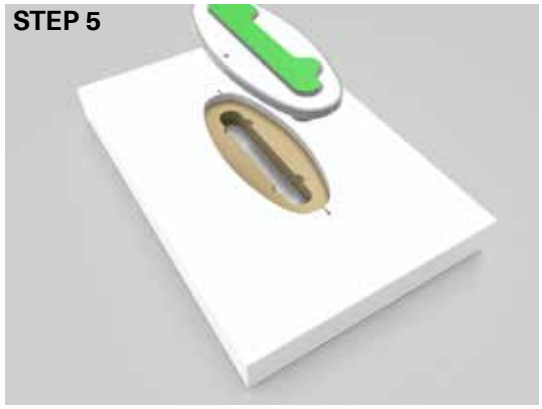
This is especially critical with these HD foam blocks as they are extremely hard and therefore will not allow the box to be pushed fully into the cavity. For blocks made from other high density material such as DCELL the marks will be hard to spot so pay careful attention to the location of these relief recesses.

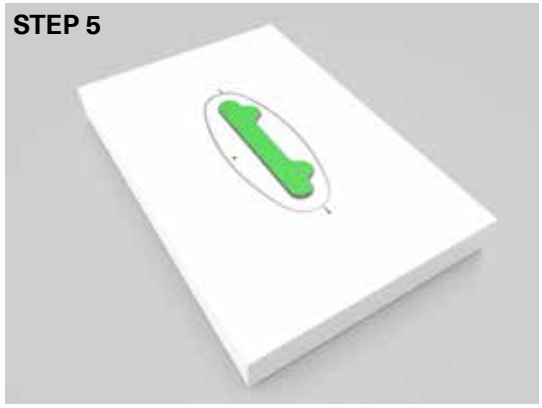
STEP 5

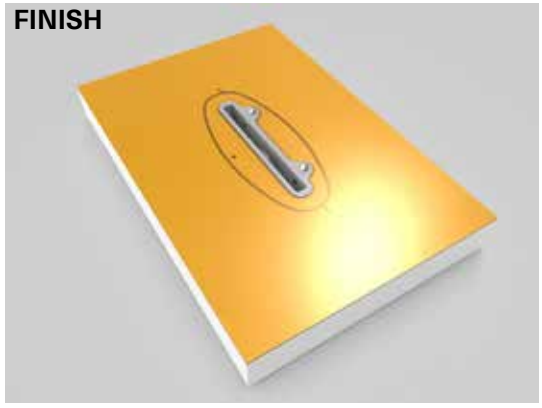
Before starting the installation, the boxes need to be prepared. Use the provided hex key to make sure the *grub screws* are well down into the box so that they cannot be touched when sanding the board. Cover the dams on the boxes with the *die cut tape* we provide, or masking tape cut to fit the dam. Make sure the tape is pressed down tight to prevent resin from leaking into the slot.

To install a box, pour some resin into the routed cavity. Make sure all of the inner surfaces of the cavity are covered with









resin, commonly leaving enough resin to fill the bottom cavity and it will be guaranteed that there will be enough resin. Press the box down onto the cavity, resin should squeeze up around the edges of the box and cover. Make sure the box is fully pressed into the cavity, the upper surface of the load beam collar flange should be slightly below the lip of the cavity. If the load beam cover is loose insert it now by pushing it into the load beam collar. We recommend that if using custom covers they should still be glued into the box before installation. Excess resin will be squeegeed up during the laminating process. Use some of the excess resin to thoroughly cover the top surface of the cover and the dam, before covering with cloth. Now proceed with the lamination process.

After lamination, before the resin gels, check for air around the boxes and rub in extra resin, if needed, to remove any air. Air bubbles can be removed by popping them with a pin or scratch awl.

NOTE: there should always be at least two layers of fiberglass over the boxes. The additional layer should always be placed on top of the bottom lamination. Ideally, the second layer should be added after the bottom has cured, but it can be applied with the bottom laminate.

FINISH

During the lamination process the box is capped with layers of glass, some of which is designed to be removed during the sanding process.

Once the board has been hot coated and has cured it is time to sand the board and boxes. The shape of the dam on the box creates a raised area that needs to be sanded down flush with the bottom surface of the board.

Sand down the protruding dam on the boxes until the boxes are completely flush with the bottom of the board. This will expose the slot of the box and the grub screw holes. It is important to pay attention when sanding, with under the glass fin systems, over sanding can be very detrimental to the integrity of the installation.

If the board is going to be glossed and polished another die cut tape, or masking tape, will need to be applied to the top of the box to cover the exposed slot and screw holes. Now the glossing process can be completed. Once the gloss coat has cured the board can be polished as with any other fin system. Remove the tape at the end of the process to keep the box slot clean.

POST LAMINATION INSTALLATION

PREPARATION

In addition to the two installation options described in this guide and the standard guide, there is another option that is very useful in certain situations.

It is a post lamination installation where the boxes are installed after the board has been laminated, before the hot coats are applied.

The advantages of this approach are an increase in strength. More time to complete the installation, without the pressure of laminating the entire bottom of the board. Improvement in the strength of the bottom lamination as it is not interrupted by the box installation so the fiberglass can be laid down more symmetrically.

The process is identical to the standard installation technique with the exception that the board is first laminated before performing the installation.

STEP 1

Laminate the board, as normal

STEP 2

Proceed with the installation, by following one of the install guides already described previously. The only difference in the process is that the routing will be also going through the bottom lamination.

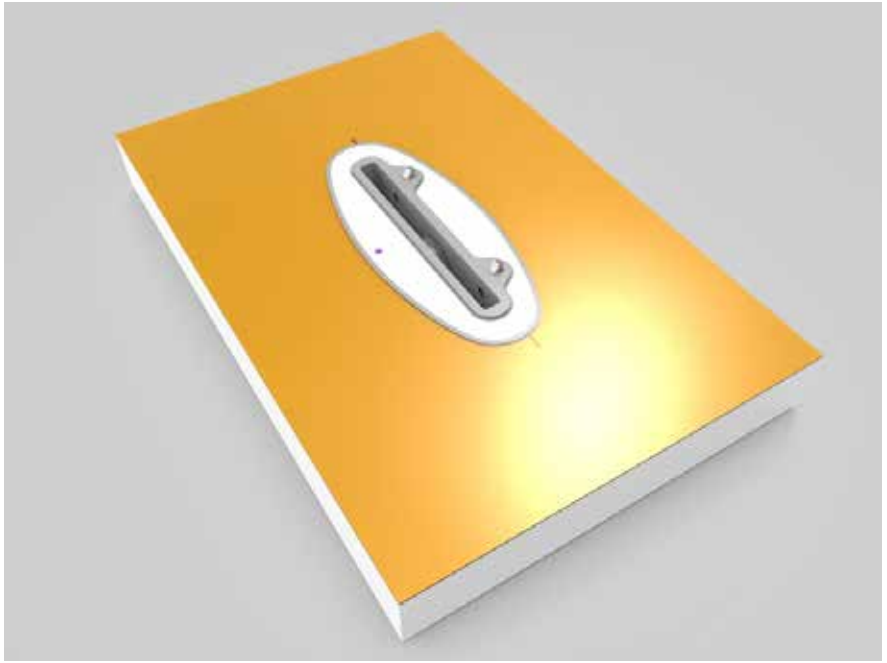
Boxes will still need to be capped with two layers of glass, as with the standard approach.

STEP 3

On completion of the installation, apply the hot coats as per any normal lamination.

NOTE: due to the lamination on the bottom of the board, the base jig may be more inclined to want to move on the board. This can be countered in one of three ways.

1. ***order a base jig with no bottom pad and then use double sided carpet tape to anchor the jig to the board***
2. ***apply a few pieces of adhesive backed sanding paper to the bottom of the board and then place the base jig with its pad on the sand paper, this will help prevent the jig from sliding***
3. ***apply double-sided carpet tape to the board on either side of the box location, then place the base jig on the tape to lock it in place, peel off the tape when done***



The appearance of the installation will change if this approach is used on a board with a colored bottom. In this case there will be no color over the cover, so it will show as WHITE in the install, unless there is a custom or color cover, which case the color or material will be visible!

The additional strength for this install technique comes from the fact that the side of the box is bearing onto the edge of the lamination once installed. This helps dissipate loads into the laminate making it stronger.

This installation technique is also easier for anyone wanting to check the cant angle of the box. The box can first be glued into the board with a fin in the slot. This allows the fin cant angle to be checked before applying the caps of glass over the boxes.

GENERAL INFO

Custom Covers

One of the unique design features of the GEARBOX system is the cover that fits inside the load beam collar. This covers primary role is to provide an enhanced bonding surface between the box and the bottom lamination on the board. The materials are always selected to help achieve this improved bond.

But the cover also provides a unique customization opportunity as well, it allows a wide variety of different materials to be applied to its upper surface. These can be anything from carbon fiber to wood veneers. This section will perform a simple walk through of the process of making a wood veneer cover.

START - we always start with the standard ABS plastic cover, that comes with every box.

STEP 1 - the cover is sanded down by the thickness of the veneer so that once applied the cover is still flush with the top edge of the flange. We will be providing covers that have been sanded down to this thickness for those who do not want to deal with the sanding.

STEP 2 - take a piece of wood veneer and place it on a some tempered glass, with the good side down. Apply glue to the upper surface of the cover and flip it over onto the back of the veneer. Place a piece of wood on top of the cover and apply a couple of clamps, clamping the whole assembly to the glass.

STEP 3 - once the glue has set remove the clamps and trim off the excess veneer around the perimeter with a pair of scissors. Now using a sanding block true up the veneer to the cover. For the inner shape, use a utility knife to cut out the excess veneer. Then use a Dremel tool with a 3/8" sanding drum to sand the veneer flush to the inner shape of the cover. Us a piece of 220 grit sandpaper to clean up any burring on the edges of the veneer. ***NOTE: the cover has an 8º slope to the outer and inner edges, be sure to sand at this angle to get the best possible fit of the cover in the box.***

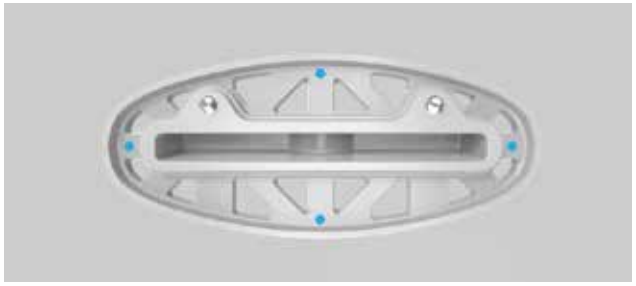
FINISH - once the cover is finished it should be glued into the box with SuperGlue, this eliminates any problems that might arise if the cover is not laying flat in the collar. It only takes a small amount to glue a cover into the box, four little drops of glue. A small spring clamp on each end and each side will hold it in place. Once installed the resin will lock the cover permanently in place.

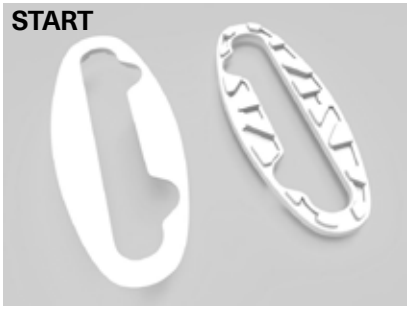
TIPS

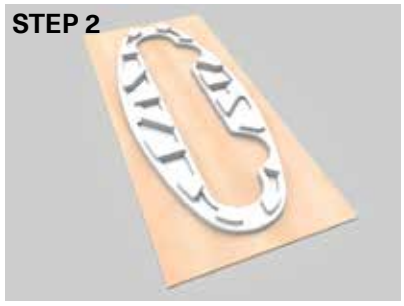
Wood veneer has a tendency to want to splinter at the edges when being sanded. To make it easier to manage apply some catalyzed sanding resin to the glass prior to placing the veneer on it. This will give the veneer a smooth finish when completed and will prevent the splintering. Sand the upper surface before installing to remove the wax from the resin to improve the bond.

This process can be followed for different types of materials, just let your imagination run with it!

GLUE DROP PLACEMENT







Alternate Cant Angles

While the system provides a large range of cant angles, there might be situations where other angles are required.

This is possible by using an alternative installation process. Instead of putting the box in during the lamination process it can be bonded into the blank before lamination.

This allows a fin to be placed in the box so that the installer can adjust the box to a specific angle.

In order to do this the cavity for the box has to made slightly deeper in order to allow the adjusted box to still sit below the lip of the cavity.

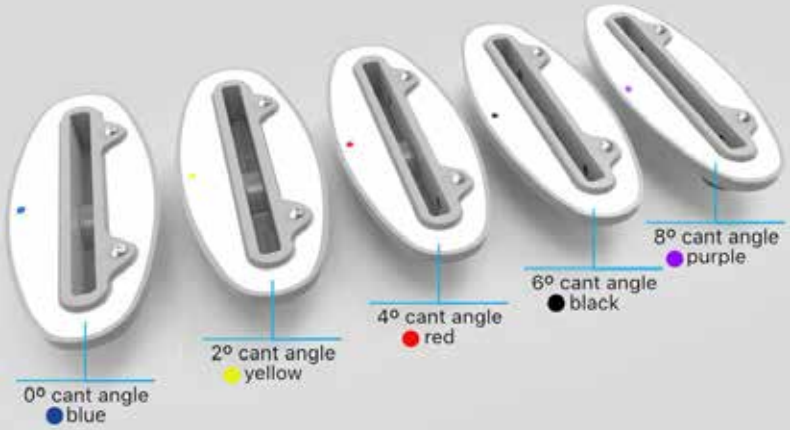
It is critical with this type of installation to ensure that there is sufficient resin in the cavity during the install. This is due to the fact that the box will no longer be seated flat on the shelf created by the cavity. So there needs to be enough resin to fill in the space below the tilted collar of the box.

For the more precise installer it is also possible to adjust the base router jig to the desired angle. This allows the cavity to still function as intended, allowing the collar to be fully seated on the shelf.

It is also possible in certain circumstances to shave down the flange of the collar in order to better accommodate a change in angle, but this should only be done in extreme situations.

When adjusting the cant angle to something other than those provided it is advisable to use some sort of guide to ensure that they are installed precisely.

Box Range



GLOSSARY

routing system - a complete set of router jigs that cover all of the routing needs for the system without the need to adjust the router bit.

hex key - an Allen key that is used to adjust the grub screws used by the system to lock the fin into the slot of the box.

die cut tape - masking tape that has be die cut to match the top shape of either the side or center box.

layout lines - once a shaper completes a board they typical mark the location of the fin setup on the blank, these are critical for the box installation.

router bit - a specific router bit is provided with the system that features a bearing on the top that is used to follow the pattern provided by the jig.

router bit setup - the process of getting the router bit set to the correct depth, see SETUP INFO on page 4.

base router jig - the primary jig used to handle positioning, also used for EPS installs.

bottom router jig - the jig that is used to rout the bottom cavity for the box, nestles within the base jig.

top router jig - the jig that is used to rout the top cavity that supports the collar of the box, locates on top of the base jig.

shapers mark - these are the marks placed on the blank by the shaper, typically take the form of a front and back dot with a connecting line between the two.

high density foam blocks - these are blocks that are used during an installation in low density foam where additional support is needed for the box.

grub screws - the screws used to lock the fin into the box, there are two of them per box.

HD foam block - high density foam block either polyurethane or PVC.

Box Details