Shaping Surfboards

Chapter 5

The Complete Surfing Guide for Coaches - Bruce "Snake" Gabrielson

Board Building

The subject of board building is near and dear to this author's heart. In the late 1960s, I started designing boards and surfing for a shop in Huntington Beach called Soul Surfboards. At that time, Dale Velzy was their shaper, and I got to spend many hours in the shaping stall with Dale going over board designing, watching and eventually learning how to shape.

When Dale retired from shaping around 1971 and went to Roger's Foam to sell blanks, he gave me his shaping stand, templates, planer, lights, and other equipment so I could shape on my own. I subsequently was one of the shapers at my shop, Wave Trek Surfboards for several years, and still have and sometimes use this equipment today.

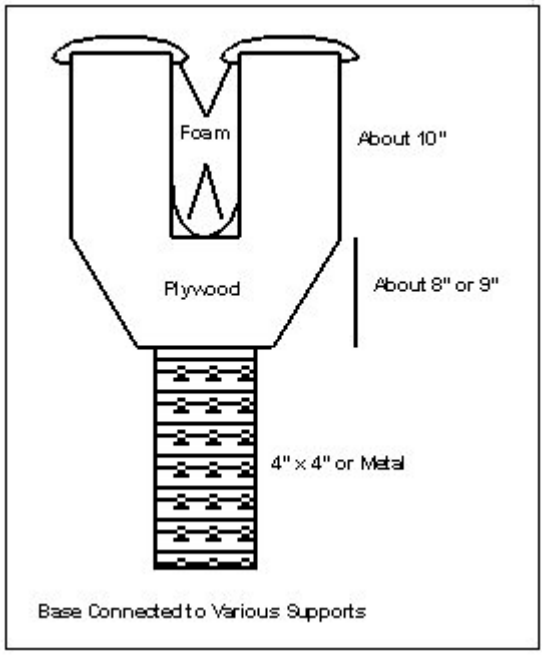
Among the items Dale gave me are the two historical templates shown in the picture (Figure 5-1) said to have been used by him on the first foam surfboard he shaped. Although I haven't confirmed this with Dale in over twenty five years, I believe the two shown were used on the first foam surfboard ever built. I have included this picture for posterity. Additional information on template building is included in Appendix C of this book.

A shaper needs to know what materials work best and how to use good equipment to insure a quality product. For equipment, an electric planner, jigsaw, shureform, tape measure, various size and shaped sand paper blocks (both balsa and foam rubber), small hand plane, straight edge, right triangle, and various sandpaper grades are all needed. In addition, he needs to know how to handle his art, and how to keep it protected so a glasser can do his job efficiently. This section discusses techniques necessary in shaping and building surfboards.

Shaping Racks

Shaping racks are variously designed, but their function is always the same. They must hold the blank level with the floor in both horizontal and edgewise positions, and at the correct height for the shaper. When the blank is on its edge, it must not wobble when pressure is applied to the blank's deck or edge. This means the racks must be solid on the floor, heavily braced, and

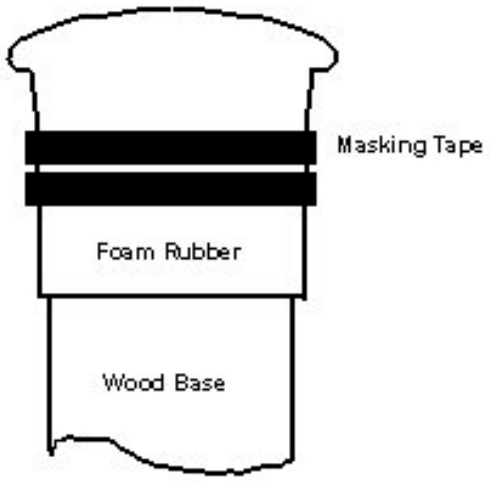
absolutely level between uprights. The top design for a common shaping/sanding/repair rack favored by this author is shown in Figure 5.2. It is waist high, simple and easy to construct, and is commonly used to both shape or sand boards.



The inside shape allows the blank to be wedged on edge, and the flat top covered with carpet (or sometimes foam) prevents the blank from sliding when laying flat. Use wood or metal about five inches wide in the two V supports. Brace these supports well so constant pressure and vibration will not cause any separation. If metal legs (most common) are used, bolt the V frame with 2 bolts on each leg.

A 3 inch or 4 inch diameter pipe about waist high works well for the legs. A wide, heavy base, often built with fiberglass and resend to the floor, will keep the rack from moving. Some shapers cut a hole in their floor and anchor the racks in concrete. Another good method is to securely mount the posts about five feet apart, down the middle of a four foot by eight foot sheet of 3/4" plywood. The plywood is then covered with an old carpet, as is each rack.

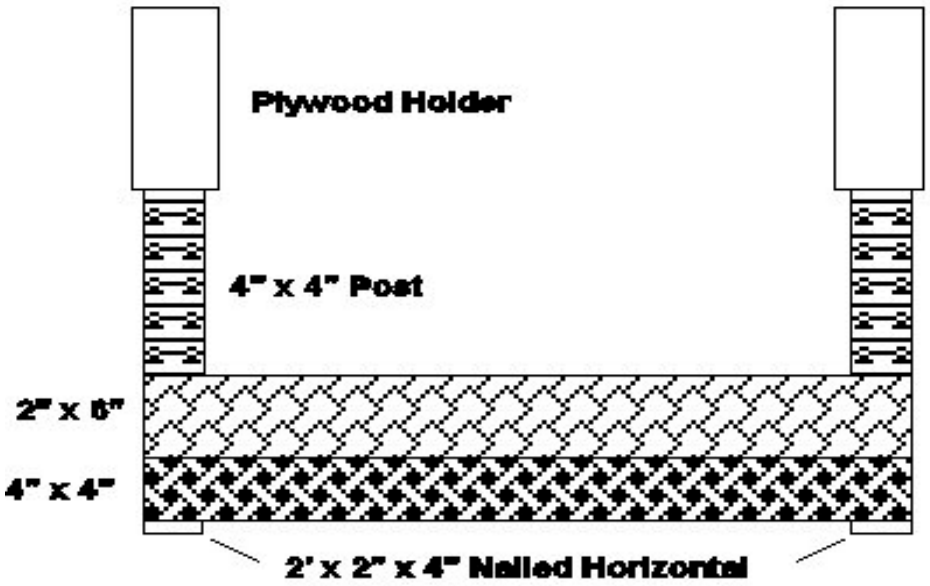
Gluing the carpet down prevents running a risk of having a nail work loose and causing a nick or scratch in the blank. Over the carpeting on the rack, a layer of 3/4" foam rubber is attached. Use glue or masking tape to hold the rubber down as shown in Figure 5.3.



If only shaping an occasional board, a freestanding rack with 4" by 4" posts can be built. The posts are braced together by two 4" by 4" supports on each side with a 2" by 6" cross brace on the floor with a second cross brace between the racks. This configuration is shown in Figure 5.4, and can is easy to used for board sanding and repair work. Again, the cross braces must be solid on the floor to prevent it from moving when pressure is applied to the board. Pouring resin over the cross braces will help. Serious shapers often don't like the cross brace design as it can get in the way of your feet when shaping a board quickly. However, most manufactures have a cross brace support around for use by those making repairs. An actual rack is pictured in Figure 5.5.

Shaping Stall

Racks should be placed in a properly lighted and ventilated stall. Some stalls look similar to horse stalls, but a simple stall can be made in a garage by hanging a drop cloth from the ceiling on each side. The problem will be to build a fixture to hold the lighting in place along each side of the stall.



Common Freestanding Shape/Sand/Repair Rack

Correct lighting helps the shaper easily identify any dips or uneven lines on his blanks. Side lights should be florescent type, a minimum of six feet long, positioned even with the top of the shaping racks along each side wall. Light sets for longboard shaping should be around ten feet long. Two sets of lights on each side and exactly parallel with the floor are necessary to prevent improper shadow areas appearing on the blank.

To prevent glare, an eight inch wide shelf must be attached to the top of each light assembly. These are normally made of cardboard. One set (there are two lights in a holder) of ceiling lights the same length as side lights, is hung down the center of the stall, about 7 to 8 feet high. Attaching an 8 inch wide piece of cardboard the length of

each side concentrates the lighting directly on the blank and helps contours to appear clearly.

Shaping stalls vary in size depending on the individual shaper. Fifteen feet by eight feet is a good size for shaping guns and shorter boards. Eight feet wide gives plenty of room to walk along the board without bumping it, plus allows room for a small tool shelf.

Proper ventilation is necessary for health reasons. Direct drafts must be avoided however, as any air movement will cause dust to blow into eyes and can also give the shaper a chill. Shaping is strenuous work which caused the shaper to sweat. Sweating is also helped along because of the face-mask the shaper must wear.

Sanding Blocks

Sanding blocks are a seldom emphasized but extremely important part of every shaper's equipment set. These blocks are slightly different than those used by carpenters, and are normally hand made. The basic set for shaping consists of three blocks.

For your long block, take a piece of 3/4" pine or other soft wood about five inches wide and two feet long. To this, completely glue and staple an equally large piece of 50 or 60 grit sandpaper. The paper should be folded from the bottom to the top of the board where the staples or small nails are inserted. Nothing other than the sandpaper itself should touch the bottom of this board as glue bumps or other unevenness will cause depressions while sanding. This block is used primarily for bottom sanding.

The second block should be made from a piece of 1/2" balsa wood about 4" by 10" long. Cut a piece of carpeting slightly larger than the block and tape wood and carpet together with a few wraps of masking tape at each end. Sheets of different grade sandpaper can easily wrap around this block and held by hand while sanding. This block is used for most rail and top sanding.

The final block is not really a block at all, but simply a soft semi-circular sponge with a flat surface about 6" by 8". This is used with fine sandpaper screens for applying the final smooth surface to a finished blank. Only a screen is used by itself for the final rail sanding.

Blanks

Choosing the right surfboard blank is an important part of your design. They are made by pouring a stirred resin mixture into a concrete form. As the mixture cures, it expands to fill the form. Stringers are placed in the foam after the blank has cured by cutting the blank down the middle and gluing.

Blanks are available in various grades, sizes, and weights. First blanks used by most manufacturers are usually perfect as far as consistence of foam is concerned, and contain no air holes. Seconds may contain small shotgun pellet size holed or may have a thick spot in the foam. Rejects usually have large air bubbles or many small holes.

Rejects are considerably cheaper than first or second grade blanks, and the finished board probably won't look as nice, but functionally it will perform the same. Since many people can't

tell the difference between blank grades, lesser grade blanks are sometimes sold as a first to the unwary.

Holes are found by holding the blank in front of a strong light. Move the blank back and fourth and note if small shadows or dark spots can be seen. Holes appear as dark spots. The background light method is used by manufacturers in initial grading. If you find a hole during shaping, you can still shape around it, but will need to fill it (if it's large) with foam dust during your initial glassing.

Classic, ultralite, superlite, etc. refers to the weight of the blank. Heavier blanks are slightly more expensive since more foam is used, but they are also the hardest and most difficult to ding. They are the easiest to shape. Big wave gun boards use heavier blanks since the extra weight is needed for stability and momentum when paddling into waves, especially on off-shore days.

Blanks are rated as follows.

- Superlite - lightest and weakest
- Ultralite - very light
- Blue - light
- Super green - light but strong
- Classic - heaviest and strongest

The blank's rocker (usually referred to as nose kick or tail rocker) is also important in wave catching and turning. Generally, the flatter bottom blanks are used for faster boards while natural rocker boards are used more for small wave contest and general recreation surfing. Rocker is placed in a blank when the stringer is glued. This is also true of nose kick. Natural rocker with a slightly flattened tail is the best bet for inexperienced surfers or shapers who are not certain of what they want to design.

Stringers add weight and strength to a board. Center stringers are normally 1/8 inch redwood for regular boards or 3/16 inch for guns. Balsa wood stringers are the lightest, but generally more expensive. Pressed paper or glue lines are also common for stringers, and are inexpensive. Stringerless boards are very light and also easily broken. They are not recommended for use in large surf.

Tail Blocks

A quick note on tail blocks for longboards. Tail blocks were used in the early days on longboards primarily to prevent the constant problem of dings on square tails which needed to be repaired. A longboard has more weight that a shortboard, so any points seem to get hammered much easier than those on a shorter board.

The key to a good tail block is to use hardwood such as oak, teak, or mahogany. Any hardwood that doesn't absorb water is fine, just remember that hard woods are also hard to shape. I prefer teak since it is very colorful when resined.

If you only need an 8" wide tail block, shape the end of the 8" wide by at least 1" thick board. Cut the outline with a hand saw then, using first an electric sander then a sanding block slowly whittle the edges to the desired shape using finer sandpaper. Finally, using a small tooth hand saw, cut the board straight across about 1 1/2 inches back from the formed area. After your board is shaped, cut the tail off at the proper thickness using calipers, glue on the block, and then glass over the completed board.

Making a Balsa Board

Balsa boards are much more difficult and take longer to make than traditional foam boards. This is because there are some additional shapes involved, and also because they take longer to plane and sand. Glassing, discussed in the next chapter, is just about the same with a foam board except that you can use lighter cloth.

With balsa or redwood, you start with a plank rather then a blank. Foam blanks are really "blown planks." You buy wood in a plank then make a larger plank to shape the board from. Below are the steps involved and what you need to do. Since working with the balsa plank is the main concern, I'm only going to outline the steps at this point with more in-depth coverage later on in this chapter.

1. Find the blank

You need to find a balsa plank. Usually you need at least several 4" by 4" by 10' + planks, or at least four 6" by 6" planks to make up one larger plank. Some planks are available in 12' lengths, but a 10' plank can usually be found. These aren't readily available and usually must be custom ordered from some remote dealer. Make sure the plank is both long enough to allow for at least ½" to be cut from each end, and also thick enough to allow for both the thickness of your board and also any rocker you ad. Many balsa boards didn't have rocker because the original plank wasn't thick enough to allow for it.

2. Glue the wood

In the early days we didn't hollow boards much so the initial glue was the final glue. A good waterproof wood glue such as Elmer's wood glue will work. Use a squeege to evenly spread the glue on each side before connecting together. Use at least three large clamps to hold the wood tight while the glue sets.

3. Rough shape the blank

Rough shaping is what you can do with an electric planer and rough sandpaper. Unlike a foam shaped board, you make vary shallow cuts with only slight angled cuts on a balsa plank. This means you need to constantly check the level of the deck and bottom with a straight edge to ensure uniformity. You also must slowly cut the rails to the shape you want as a small dip will become immediately visible.

4. Saw the board apart at the glue joints

This step is tough and must be done very carefully. Nowadays, you rout out the inside of the board to make it lighter. This means that the board is shaped first and then hollowed out later. Since you have already glued the board, and since you want to minimize the effect re-gluing has on the board's finish, you need to make the new cuts along the glue lines with a fine tooth hand saw. Cut real slow with the saw near horizontal to keep your cut line straight. If you were lucky and used 6" by 6" planks, only a few cuts are necessary.

5. Hollow out the planks

I suggest you use a hand held router with no base plate to do this. Solidly fix the balsa board with the side to be hollowed up using clamps. Use a small diameter cutting blade on the router unless you really know what you are doing. If you have 4" planks, set the depth of the cut to about 1 ½ inches. The plank is 4 inches thick so this will allow about a full 1" strip for strength running down the plank's middle. If you have 6" planks, you can only cut to 2" before you need to worry about keeping your router blade cutting straight down. This means you will have a 2" inner strip. If you haven't shaped a hollow blank before, don't cut closer than ¾" to the outer edge of the plank or you will have a problem with deck pressure dings. You shouldn't hollow out the outer rail planks or too close to the plank ends.

6. Re-glue the planks

Again, this is a slow process and must be done with care. Some shapers like to add thin redwood stringers at the previous glue joints, but this also changes the surface color. It's also harder to keep the edges well aligned when a stringer is added. I glue the cut lines the same way as initially but put them back together by aligning their bottom edge on the flat surface of a table.

You also need to be careful the blank's rails aren't depressed when you clamp. I suggest you use some thin boards against the clamp and foam against the blank itself to prevent depressions.

7. Complete the shaping

This is done mostly with a hand plane and sandpaper. Make sure you always take long passes.

8. Glass the board the same as any other board.

Described in the next chapter.

9. Attach fin

Fins for a balsa boards are usually custom made. Never use a fin box or a solid glass fin if you can help it as these detract from the boards worth. Most fins are made from redwood strips. Glue the strips together and then shape to the desired form. You need a wider base fin since turning the board requires more momentum transfer. Two to three layers of cloth on the outside of the fin with the edges pinched and cut after drying will do fine. Attach the fin in the same way any other fin is attached.

10. Fill coat, sand and gloss

This is done the same as for any other board

Template History

Surfboard designs were, and still are, a combination of shaper skills and surfer inputs. Boards were normally designed and built using a number of different templates, with a new templates taken from a design which proved to work very well. This new templates could then be used to shape other boards with similar characteristics and virtually any size.

Prior to the foam board, templates were built rugged, and often made of heavy 1/4" plywood. Often a separate nose, side, and tail template was used. Shaping a board in the longboard era (and sometimes even now) took long hours, with the template sometimes used over and over to check on uniformity of the shape. Foam boards require a lighter, more flexible template that can fit closer to the blank and also to prevent scratching the blank. Using the lighter and thinner material available since the mid-sixty's for the template's construction also enabled them to be made much easier.

Template Building

Shapers have several nose and tail templates that can be combined in various ways to produce virtually any design they want. Templates are usually made out of fiberboard or plywood. Great care is taken to keep edges smooth and lines free of bumps. When a particular finished board performs in an outstanding manner, a shaper will often make a new template in order to preserve the design he has created.

The easiest way to make a template is to find a board close to the desired shape. Lay the board upside down on top of a 1 to 1 1/2 foot wide sheet of thin plywood setting the center stringer of the surfboard exactly even with the straight edge of the plywood. Carefully trace board's outline making sure the pencil is perpendicular to the plywood at all times. This prevents an imperfect representation on the plywood. The line should be drawn solid so it is easy to see.

Next, take a jigsaw and slowly cut the template out. Have the blade of the saw (use a finer tooth blade) cut just outside the edge of the line and not through it. Take the rough templet and clamp each end to a solid object about waist high. Starting at one end using 60 grit sandpaper and a sanding block, make one continuous sweep to the other end while applying even pressure. Repeat the process back and fourth three or four times until the template has a smooth uniform edge.

This type of template will last for years and can be used many times. If the template is to be used once and discarded, cardboard can be used in place of plywood or fiberboard. In this case, use an Exacto knife to carefully cut directly on the trace line of the cardboard. The cardboard should lay flat on old plywood to allow cutting without damaging the plywood. No further smoothing is required and the template can be used immediately.

Shaping

Shaping is an individual skill and techniques are as varied as there are shapers. This section will describe a typical method of shaping close to that used by this author and several others I have been involved with over the years.

Starting with a new blank, cut the nose and tail off for the desired board length and rocker. Cutting close to the tail end saves more rocker through the board and will result in more lift from the tail. Cutting 6 inches to 8 inches back from the tail will eliminate much of the tail rocker. This is more desirable when shaping bigger wave boards.

Choosing the proper length blank to start with will allow enough room to vary board rocker until you are satisfied. Blanks should be at least 1 foot longer than the desired final length. After cutting the blank off at its tail using a hand saw, measure the desired length to the nose. If the blank's rocker looks good to you, cut off the remaining nose section.

The blank is now ready to be plained. While almost any planer will work, the traditional planer used to shape is a Skill planer cut shorter than it comes from the factory. Place the blank bottom up on the shaping rack and starting at the tail end, make a 1/2 inch deep pass along the outside edge of the blank.

Continue the plane line going back and fourth (end to end) until you work to the middle stringer. Then go to the other side of the board and repeat the process. Take the large sanding block and make three or four passes end to end along each side of the blank until any remaining bottom ripples in the blank have been removed. Using the straight edge, check the bottom to ensure there are no dips or bumps needing removal. Some shapers will also make a light pass on the top of the blank at this time, usually about 1/4 inch deep mostly to strip off the blank's outer shell.

The blank's bottom is now flat and ready for the board's outline to be drawn with a soft pencil. Four measurements are required for the outline. The tail width is marked on both sides with a right triangle or L directly perpendicular to the stringer and approximately 1 foot from the bottom. The nose width is marked approximately 1 foot from the top and perpendicular from the stringer.

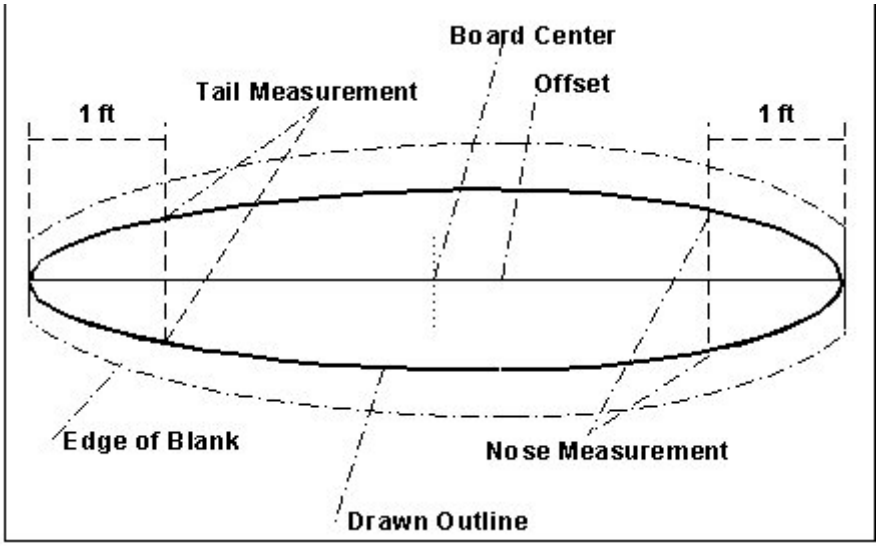
The next mark (the offset) relates to the board's maximum width. Place a small mark on the stringer at the exact middle of the blank. The widest part of the board is normally marked some inches above this point. Unless you are an experienced board designer, look at a board you like and take the measurement from it. You will probably need a large metal L or right triangle to ensure the marks are the same on both sides and perpendicular to the stringer.

Using the selected template for the nose you want, position it from the blank nose through the nose width mark and then down along the blank until you are as close to you can to the middle mark. Once set, put a small mark on the template's outer edge at the blank's nose mark so you will be able to repeat the position exactly on the other side of the blank.

Draw a line on the blank extending through the nose mark and middle mark. Flip the template

over, move to the other side of the blank, and repeat the process. Hold the blank up by the front and rear and eyeball the lines to make sure they are identical.

Using the selected tail template, repeat the process at the bottom of the board, going through the tail mark to the midpoint mark on each side of the blank. If the midpoints where the nose and tail lines cross are not uniform, lay a template's midpoint between each line and find a position to draw where the lines will smooth out. Use this same location on both sides. The final lines and marks are shown in Figure 5.6. A professional shaper will have various size and shape templates, and can mix and match until obtaining the outline desired on virtually any size board.



Blank With Outline Measurements

Cutting and Shaping the Outline

After the desired outline is finished, use a jigsaw with a larger tooth blade, and while lightly pressing down, cut the blank just outside the drawn line. Make sure the blade does not bend in or out while cutting as you need an edge perpendicular to the blank bottom. Once cut, use your middle sanding block with the blank placed on edge and rough grit sandpaper to carefully sand both edges down to the outline itself.

The board is now ready for shaping. It is difficult to describe how to create art in words. Therefore, only some general information will be provided leaving an actual design to the shaper. You need to know how thick the board will be and the deck contour so you can plane to the approximate shape. You also need to know if there will be a fin box as this determines how thick the tail section can be.

The top of the blank is contoured first using slightly curved passes from end to end as shown in

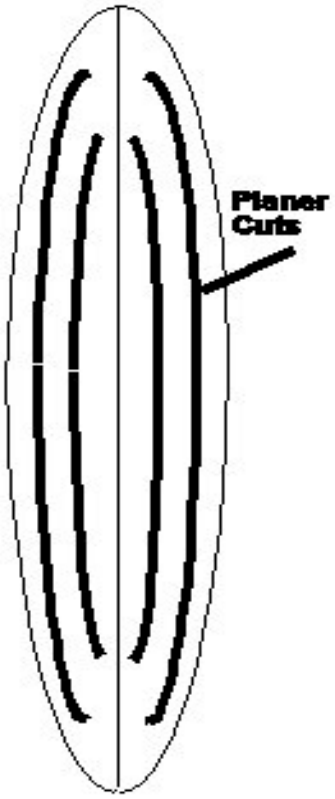


Figure 5.7. Adjust the cutting depth for deeper cuts (or make more passes with light cuts) along the outer edges. This leaves larger buildups in the middle. Don't touch the bottom of the board until the very last as the bottom outline must be maintained until the rails are shaped.

The top taper should support your intended rail design. Use the planer with your hand (closest to the board) on the trigger to make the passes until the approximate deck form emerges. Eyeballing from the nose and tail every few minutes will ensure the deck is uniform on both sides. You might also want to look at the board with the overhead light on and off as the difference in shading will somewhat highlight any unevenness. Also note that any unevenness from the lighting may cause you to put dips into the blanks surface.

When plaining is completed and the board in a rough shape, use the large sanding block with passes from end to end to smooth down the rough planed edges. Next, use the middle sanding block to work each side from middle to outside edge until the deck is smooth. Make sure not to sand too much in one spot as this can cause a dip in the blank.

Rail Design

Before attempting to shape the rails, the shaper must have a good very idea of the final rail design wanted. Ideas vary on which rail shape is the best for different kinds of surf. Every few years another shaper comes along with a "new" design he thinks is best for the area where he surfs most of the time. These "new" designs are really old designs that have been around off and on for years, but may be used with the fashion of the day. This section is intended to be generic, and not favor one particular design over another.

Generally, sharper and lower rail line designs are used for large or steep and hollow conditions. In these waves, the rail is needed to bite more into the wave so the board can remain stable at faster speeds. Sharper rails are also needed if sweeping turns are planned that use more rail than fin.

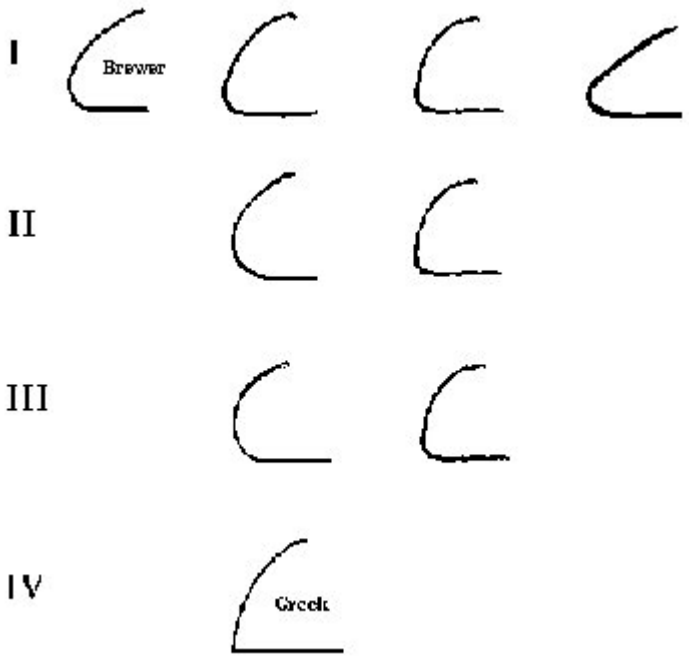
"Brewer" rails were designed so a surfer could experience the freedom of softer rail design while still maintaining a low rail stability. These rails are used in conjunction with Brewer fins for maximizing control on larger waves. Years back, Greek Surfboards promoted a knife edge for maneuverability using a low rail design. Their boards provided maximum rail control while compensating by adding rocker and bottom design for lift and overall maneuverability.

Where small thinner beach break and reef break waves are prevalent, softer "egg" like rails are

common. This design is useful in breaks like the South Bay area of Los Angeles and the majority of breaks along the East and Gulf coast. A soft rail allows the surfer to completely exploit his fin's turning radius. Since torque is equal to force times distance, non-biting rails allow turning from near the tail to be fast and effortless in smaller surf. Tricks and many higher scoring contest maneuvers are also easier to perform with soft rails.

The chief problem with soft rails in faster waves is speed. Since more actual rail contact is made with the wave face on large or quick breaking waves, soft rails will create more friction and thus more drag. More knife like edges with turned down rails work in small fast waves, but can catch on larger non-steep waves and create problems.

Shown in Figure 5.8 is a general summary of various rail designs. Each rail type is discussed below in terms of where it is most effectively used. This is a typical overall estimate and not to be construed as accurate for every wave type when other factors of the overall board design are taken into consideration. The reader is also cautioned that the board's bottom and rail design must go hand-in-hand for the rail to be effective.



I

Best in big or heavy waves and also in fast point breaks.

II

Best in slower beach break and reef break waves.

III

Best in small beach break or shore break waves.

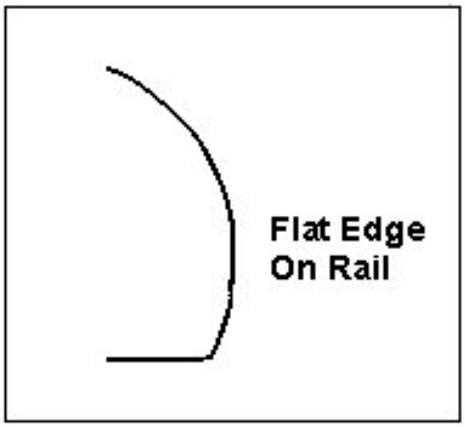
IV

Best in fast or steep beach break or reef break. Most effective in smaller waves but sometimes found on big wave boards.

Rail Shaping

At this point, the final rail, nose, and tail design has been determined and the shaper again places the blank on edge in the shaping rack. Note that as the rail shape progresses, excessive downward force can cause the rail edge against the rack to scrape or deform. Therefore, go very easy with the pressure.

Make only a couple of light passes with the planer first on the upper side of the rail to approximate the shape wanted. Use the second sanding block walking end to end to work down the rail to near the final shape. Lean the board the opposite direction in the rack and make a pass on the bottom edge of the rail to approximate the final shape. For a low rail design, this pass may not be necessary. Again make a couple of passes back and fourth with the second sanding block, this time on the lower edge. The rail edge will now look like Figure 5.9 with only a thin strip of the original outline cut still remaining. Repeat this process on the opposite rail.



The rails, and board, are now ready for final sanding. Hold a piece of sanding screen over the rail an walk the length a few times to finish smoothing. Use a rough screen first, then a fine screen. Repeat on the opposite rail. Lay the board flat and use the sponge sanding block and the fine screen in a slight circular motion to complete the sanding and shaping process. If any contour in the tail, nose, or bottom is desired, such as a concave, it is best to sand these out at the end and then perform the final sanding.

The last step is to smooth the stringer. By this time it is sticking up slightly from the blank on both sides. Use a very small (1 inch) hand plane with only one side of the cutting edge extending below the plane. Put this edge over the stringer and make a slow smooth pass the entire length. Make sure the only pressure down is over the cutting edge as it is very easy to scratch the blank at this point. Run your fingers along the stringer to ensure no bumps remain. If you do feel a bump or scratch the blank you must repeat the entire sanding process. Failure to remove this bump will cause the glass to be sanded through along the stringer after glassing.

When the blank has been shaped, it is vulnerable to both nicks and dirt or finger prints. Carefully place it in a plastic bag and place where it won't get bumped until ready for glassing. I like to use a wall rack as shown in Figure 5.10 for storing. These can be made with a 1" dowell and an eight

foot 2"x4" cut in two.