



# **NATURAL CURVES**

2008 Surfboard Designs & Composite Options

# Natural Curves Surfboards

## Surfboard Designs

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### Short Boards —

Custom shapes for maximum performance in any conditions. The primary design focus of the short board is to blend a combination of variables (rocker, bottom contours, foil or profile, rails, and outline) to generate speed, power, and control. These boards evolve continually, sometimes in incremental steps other times in quantum leaps. The variables can be arranged to accommodate a wide range of surfer / rider skill and fitness levels.

In 2007 we've relaxed the nose and entry rocker, maintained a well defined "speed box" – under the front foot when surfing – under the chest when paddling – and moderately accelerated the tail rocker. This achieves good paddling and lift at take off, excellent acceleration turning off the front foot, back foot, or balanced off both feet, and "butter like" transitions from rail to rail in tight sections.

The bottom contours begin with shallow vee from nose through entry, about 25% the length of the board, transitioning immediately to a shallow single concave that reaches 1/8" at the widepoint continuing to it's deepest point – 1/4" – just in front of the rail fins, then blends away through the fins to the tail. Some boards have a subtle double concave inside the single concave from the trailing edge of the rail fins through the rear fin and off the tail. The single concave tails offer a bit more variation and room for adjustment at any point in a turn. The double concave tails offer a bit more well defined track through a turn. This bottom design promotes early and smooth entry and take off and great acceleration out of turns – the vee in front is very forgiving, eases the board from rail to rail, and helps initiate turns. The deep concave aft provides great lift in the tail and powerful acceleration into the face of the wave.

The foil is crisp and thin in the nose and entry, gains thickness as it approaches the widepoint, carries it's thickness through the widepoint, has a very subtle foil to a crisp moderate thin profile approaching the fins, and carries the moderately thin foil at the fins through the tail. The thinner entry allows the board to transition with ease onto rail when properly displaced by the surfer. The moderate thickness at the widepoint supports the surfer on rail. The moderately thin profile near the fins provides control and facilitates acceleration. Carrying thickness of the profile at the fins through the fins maintains and carries the speed developed from turns. Generally, profiles will be 1/8" to 1/4" thinner 12 inches from the nose than 12" from the tail – 1/16" to 1/8" thinner 24 inches from the nose than 24" from the tail.

Rails are round and neutral in the nose, entry, and widepoint. The rail foil or profile mimics the foil or profile of the body of the board. The bottom of the rail develops a firmer and firmer corner with the "tuck" decreasing as it transitions from the widepoint to the fins. The rails have a very hard – crisp

edge from the leading edge of the rail fins through the tail. Thinner boards have a fuller profile on the deck side and thinner boards a moderately lower profile. The volume of the rail is thin enough to provide control and full enough to support the surfer on rail.

Outlines include squash, thumb, swallow, and round pin tails. The squash, thumb, and swallow tails have the most surface area in the tail and tend to hold energy and speed once created by the surfer. The squash and swallows have the easiest access to a “punchy” turn with their strong corners. The swallows are a bit looser than the squash due to the reduction in surface area from the “cutout.” Thumbtails are a nice combination of the elements of a squash and a round pin. The softer – rounded corner and the reduction in surface area make a looser tail that maintains most of the punchy characteristics of a squash. Round pins are very loose and transition from rail to rail with the least effort of all the tails on offer. Despite being very loose they have great holding power – a result from their reduced surface area. Overall surface area is evenly distributed with a emphasis on maximizing surface area under the frame of the surfer when paddling and /or under the stance of the surfer when riding. Tail selection is very helpful in tuning a shortboard design for a surfer and the common conditions they surf.

Adding length, width, and thickness brings the same performance potential to larger and older surfers. These boards are referred to as **Extended Shortboards**.

### **Step Up Short Boards —**

Step Up boards are designed to perform as a shortboard would in larger, thicker, more powerful waves. At the point where paddling, entry, and projection are marginal due to these conditions we add 2” to 4” of length and up to 1/8” of thickness to produce a slightly higher volume surfboard. The extra volume provides the extra paddling, entry, and projection required for successful performance in these demanding conditions.

The rocker, bottom contours, and foil in Step Up boards is the same as those variables in shortboards. Attention to rail volume is **essential for control**. Generally, the rail volume of a step up board should be the same as the rail volume of a shortboard. The preferred outline for Step Up boards are round-pins and swallow tails. They offer the most control in demanding shortboard conditions.

Maintaining the basic elements of design of a shortboard offers shortboard performance in larger, thicker, and more powerful waves.

## Fish [The Whole School] —

Colonies of surfers have been riding Fish since they were first introduced in the late 60s. The extreme low volume shortboards of the 90s were difficult to ride for most surfers in marginal conditions. Those who choose not to ride a longboard, funboard, or hybrid when waves lacked the necessary power to successfully ride a low volume shortboard took notice of how well Fish performed in these conditions. Elite surfers such as Tom Curren and Dave Rostovich showed how functional Classic Fish and other variations of the Fish could be in good conditions. Accordingly, Classic Fish and a whole “school” of Fishy designs have become an essential part of the boards on offer in the 21st century.

### Classic Fish –

Low rocker throughout, tri plane or shallow vee entry with shallow panel vee from widepoint to tail, foil emphasizing a fuller forward profile tapering gradually thinner through the tail with a flatter deck forward and a slightly crowned deck aft, low moderately chiseled rails throughout – softer at the widepoint and harder in the tail, and a full outline with the widepoint well in front of center and a relatively straight line from the widepoint to the tail. The swallow tail is cut deep into the tail (usually half the distance of the width of the tail.) Keel fins for a true Classic Fish with Quad fins as an option for a looser more performance oriented board.

### Quad Fish –

Same low rocker as the Classic Fish with a little more lift in nose and tail, tri plane or shallow vee entry transitioning to shallow single concave at fins and double concave from fins through tail. Same type of foil as Classic Fish emphasizing fuller forward profile tapering gradually thinner through the tail. Slightly thinner nose and tail foil corresponding to the slight adjustments in rocker from the Classic Fish. Slightly more crowned deck throughout compared to the Classic Fish. The outline has more curve throughout than the Classic Fish while maintaining the surface area. The Quad fin set up is noticeably looser than the Keel fins of the Classic Fish. This board is quicker and livelier than the Classic Fish. The extra rocker, concave bottom, foiled profile, crowned deck, and Quad fins offer greater acceleration and tighter turns extending the range of the Quad Fish from marginal – mushy conditions into better waves.

### 3 X Physh –

Similar rocker, bottom contours, foil and profile – nose to tail and rail to rail – to the Quad Fish. The double concave is a little deeper in the tail than in the Quad Fish. The outline is tighter in the nose and tail with a sharp wing 8” to 9” from the tail. The reduction in surface area in the tail accommodates the thruster fin set up. Similar performance to the Quad Fish – very quick and lively. Extends the performance range into a little bigger surf than the Classic Fish and the Quad Fish. A comfortable fit for surfers who prefer a thruster fin set up to a quad fin set up in marginal to good waves.

## **Semi Guns —**

Designed for speed, quickness, performance, and control in larger and thicker waves. Paddling and entry are a premium in these shapes which range from 6' 8" to 8' 10". Increasingly, surfers are raising the performance level in larger and thicker waves. Consequently, semi guns must offer surfers the ability to perform critical turns and maneuvers as well as paddling and entry. Control is an essential element of semi guns.

Rocker is smooth and continuous throughout without overlooking a well defined yet subtle area from entry through the widepoint and on towards the fins where the curve is a little flatter before accelerating off the tail.

Bottom contours are shallow vee in entry which transitions to single concave from the widepoint through the tail – optional double concave through the fins on larger semi guns for a well defined track projecting out of turns. Maximum depth of the concave array is just in front of the fins.

The foil is shifted forward compared to the foil in shortboards and particularly more pronounced from the widepoint to the tail. This offers greater control and projection through the critical turns required in larger and thicker waves. Surfers have the option of going slightly, moderately, or substantially thicker with the semi gun's profile depending on their style, skill, and fitness.

Rails are round and neutral in the nose, entry, and widepoint and develop a firm corner as they transition from the widepoint to the tail. The hard edge in the tail is watered down a little compared to the edge in the tail of a shortboard for greater control in thick water at high speed. Rail profiles are generally lower than those of the shortboard for control in thick water at high speeds. The greater thickness a surfer chooses – the lower the rail profile. Conversely, the less thickness a surfer chooses – the fuller the rail profile. This offers control in the higher volume boards and conversely stability in lower volume boards.

Outlines are generally round pins and swallow tails. These are the two outline with the least surface area in the tail offering the most control.

## Guns —

A fundamental, functional, and efficient design. Big wave surfing places brutally clear cut demands on a surfboard and surfer. First and foremost is catching waves with fluid entry followed closely by control getting to and off the bottom of the wave.

Big wave gun rocker is a continuous curve rocker, a rocker with no flat spots that still flows fromboard. These smooth and continuous curves allows the big wave gun to glide effortlessly through water in critical conditions, control and carry speed, and project well out of turns.

Big wave guns require a convex bottom configuration. These boards are designed to be functional and efficient in extreme conditions. Vee in the entry transitions to nearly flat or tri plane in the mid section to panel vee in the tail section of the surfboard. The vee in entry can cut through the chop and turbulence of wind blown or riptide surfaces or slice into a glassy surface at the speeds developed dropping into a big wave. The flatter mid section keeps the hull at speed and accelerates the board into the shallow panel vee in the tail. The panel vee in the tail steers the board from rail to rail and holds the board in a line much like the keel of a sailboat transfers the force of the wind into forward motion.

The foil or profile of the big wave gun has a singular function. Like its little brother, the Semi Gun, the profile has the thickness shifted forward. A full yet well foiled nose gains thickness through the wide point, then tapers with a smooth reduction of volume through the tail. Most of the volume is concentrated at the wide point corresponding to the concentration of surface area in the outline. The forward mass has a pendulum effect pulling the board down the face in take off and down the line out of the turns.

The rails of a big wave gun are round, neutral, and forgiving in the entry. They transition from this neutral entry rail into a steep, crowned, angular profile in the wide point that tucks softly into the bottom of the board. The rail profile remains the same from the wide point through the tail, but the volume and thickness of the rail reduces with the flow of the profile of the board. The rail must support the forces of the surfer and the wave to control and maintain speed while the board is on rail. From the wide point to the tail the bottom of the rail profile transitions from the soft tucked profile to a hard edge with no radius. At the fin the rail has no tuck and an extremely hard edge.

The outline is distinguished by its wide point and concentration of surface area forward of center. The outline from nose to wide point is a relatively straight curve designed to eliminate drag paddling into and dropping down the face of huge waves where entry is often challenged by strong winds or rips. The outline from wide point to tail is a long continuous curve. There is minimum surface area in the back half of the board. This anchors the board into the face of the powerful waves for which it's designed. The features of the big wave gun's outline are about control and projection.

Glassed on single fins and tri fins are both employed in big wave guns.

## Hybrids —

Hybrid design varies with the surfer, the approach they take to surfing, and the waves they intend to ride. Borrowing components from modern shortboards and integrating them into a longer surfboard—with significant surface area, hybrids combine the thrill of carve and glide. Variations in volume (from length, width, thickness, and rail) offer a variety of performance options for surfers of diverse skill and fitness.

Hybrids rocker is continuous curve rocker. This is a bottom curve with no flat spots that still flows from greater curves in the nose and entry of the surfboard to lesser curves in the mid and tail sections of the board. These smooth and continuous curves allow these boards to turn with relative ease, yet develop speed, and project well out of turns.

Hybrids have very simple clean bottom contours. They flow from slight vee or roll entry to shallow tri plane wide point to panel vee with soft transition on the center of the vee.

The foil of the hybrid has a balanced distribution of thickness from nose to tail. The nose and tail are thinner - the nose more so than the tail. The transition from thinner nose, to thicker wide point, to thinner tail must be very smooth to maximize the performance function of the hybrid.

The rails of a hybrid are borrowed from the modern shortboard. They are thin, round, and neutral through the nose, entry, and widepoint allowing them to penetrate the face of a wave as the board rolls onto the rail. The round, neutral rails in the entry also provide easy transition from rail to rail in critical – tight areas of a wave. From the wide point to the tail the rail profile remains the same on the deck, but begins to shorten the radius and develop an edge on the bottom side of the rail. At the rail fins the rail has no tuck and an extremely hard edge. Through this transition the rail provides leverage and release so the board can accelerate off the rail and out of the turn. The substantial volume of hybrids requires the rail profile to be a bit lower or more crowned for control.

The outline is a clean continuous curve. The wide point is in front of center to carry surface area towards the nose. Surfers are comfortable in trim and turning the board in long arcs from this forward area or turning off the tail. The outline in the tail is borrowed from the shortboard. The turning radius off the tail varies with the intent of the surfer and the demands of the wave from tighter to longer arcs. Tail configuration further varies the turning radius and projection of the design. Tail options include squash, thumb, and roundpin tails.

## Longboards —

Traditional or Classic Longboards capture the designs of the halcyon days of longboards. High density foam and 10 oz volan cloth yield a weighty board that trims and nose rides with ease.

Contemporary Longboards are versatile and performance oriented. They combine classic outlines with contemporary rocker, bottom contours, and rails. Lighter foam density and glassing schedule contribute to a more sensitive feel than their classic predecessor. These boards carve, trim, and ride the nose.

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## Composite Options

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### **Polyurethane Polyester Composite —**

Traditional surfboard composite. A polyurethane foam blank core with a polyester resin and fiberglass skin. Surfblanks Australia® Super Whites of various densities with various multi ply stringers, Silmar® ortho and iso resins, and Hexel® fabrics.

### **Polyurethane Epoxy Composite —**

Composite combining the stability of polyurethane foam blank cores and the superior physical properties of epoxy resin. A polyurethane foam blank core with an epoxy resin and fiberglass skin. Surfblanks Australia® Super Whites of various densities with various multi ply stringers, Resin Research® epoxy resins, and Hexel® fabrics. Post cured to achieve maximum physical properties.

### **EPS Epoxy Composite —**

Composite combining the latest generation of EPS foam blank cores and the superior physical properties of epoxy resin. Marko Foam® and US Foam® EPS foam blank cores of various densities with various multi ply stringers, Resin Research® epoxy resins, and Hexel® fabrics. EPS / Epoxy Composites are built with 2 options: (1) hand laminations - approximately 4:1 resin to fabric ratio and (2) vacuum bagged laminations - nearly 1:1 resin to fabric ratio. The vacuum bagged laminations allow additional fabric in the composite which yields a very strong glass job. Hand laminated and vacuum bagged glass jobs are post cured to achieve maximum physical properties.

### **Parabolic EPS Epoxy Composite —**

EPS foam blank core with "parabolic" stringers in the rails with optional 4" wide x 1/16" thick balsa or spruce "springer" vacuum bagged flat onto the center of the deck. A progressive approach to controlling the flex pattern of high performance surfboards. This composite combines the latest generation of EPS foam blank cores and the superior physical properties of epoxy resin. Marko Foam® EPS foam blank core of various densities with "parabolic" stringers, Resin Research® epoxy resins, and Hexel® fabrics. This composite design is also built with 2 lamination options: (1) hand laminations - approximately 4:1 resin to fabric ratio and (2) vacuum bagged laminations - nearly 1:1 resin to fabric ratio. The vacuum bagged laminations allow additional fabric in the composite which yields a very strong glass job. Hand laminated and vacuum bagged glass jobs are post cured to achieve maximum physical properties.