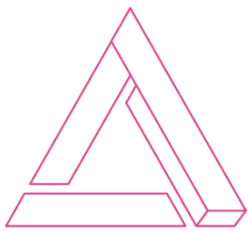


A high-action photograph of a male surfer in a black wetsuit riding a barrel wave. The surfer is positioned in the center of the wave's tunnel, leaning forward with his left hand touching the inner wall of the barrel. The water is a vibrant turquoise color, and the wave's face is curling over him, creating a dramatic, enclosed space. The background is a bright, overcast sky.

# SURF SCIENCE

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O A B E

## INTRO

Good surfing is all about learning skilled movement patterns. These motor skills need to be fluent, coordinated and perfectly timed with the wave. They require constant repetition until they become encoded in the neuronal networks of the brain as learned automatic muscular-skeletal responses of a calmly-focused mind. Surfing, like any other sport, is as much a mind game as it is a physical skill. Combining the two - skilled physical movement patterns and a calm well-tuned mental approach - is the key to surfing success.

Mastering surfing is difficult because the ocean is constantly changing. However, with practice and patience, you can develop the correct control over your body's muscular-skeletal system to train it to fire off controlled and coordinated movements in response to the demands of the wave.

This program aims to share a deeper understanding of the most important aspects in surfing that can be improved with a little effort. The program consists of four critical elements:

- 1 your mental approach,
- 2 your use of the power zones,
- 3 how you move your body, and
- 4 your understanding of your equipment.

These four aspects combine to determine your surfing trajectory. With a bit of mental preparation and some smart training anyone can see massive improvements in their surfing performance.



# MENTAL APPROACH



# PREPARATION

## Relax before your surf

It is easy to get excited about a surf. However, it becomes a problem if you get over-amped when entering the water. This over-amped state can lead to poor wave judgement and blowing many opportunities on a wave. For example, an over-amped surfer may push too hard on their turns for the size of the wave and can often cause the surfer to blow the manoeuvres and lose speed. This in turn can make you under confident for the remainder of the session. Cool it! Try to calm down and feel the wave.

It's often better to slide into the first bottom turn gently and get in sync with the speed of the wave. Gently lean into the bottom turn and try to nail the set up for your first top turn. This approach should enable you to mentally slow the whole wave and anticipate the following section. This allows you to maximise your potential on the wave and focus on fine-tuning the motor skills needed for each turn ahead.

## Clear the mind

Often surfers may feel a little self-conscious or even stupid, especially when learning a new move (motor skill). Learning takes time, repeated practice, perseverance, and a focused mind. If your mind is cluttered with the 'stuff of life' (eg. deadlines, kids, job, marriage, salary, health and so forth) why would you expect to enjoy yourself surfing? Let alone learn a new move?

As you consciously clear your mind of the distracting thoughts and focus on the job at hand, surfing at your peak, the quicker you will process new information into correct muscle memory patterns to have you surfing at your best!

## Focus the mind

The fact is a cluttered mind doesn't leave much 'head space' there isn't space left to focus on the job at hand. Everyone's life is complex. The point is when you decide you want to excel at something you need to be able to cut through the distractions and focus on the one thing you want to be good at.



Your brain has provided you with a 'friend' to help you focus your mind. It's called 'neuroplasticity', your brain's amazing ability to change its neuronal structure and function through experience. Every time you *focus your attention* on learning a new skill you are exciting your brain at the molecular level to build on the neuroplasticity principle of 'neurons that fire together, wire together.' With repeated practice of such attentional focus you are strengthening your neural connections with the desired activity. This is the 'mental game' great achievers in any walk of life have harnessed to their advantage.

## Pre-Surf Routine

It might seem a cliché, or kooky idea, to adopt even a 2 minute pre-surf yoga routine. However, yoga, or for that matter any mind-body relaxation technique, can help centre your mind and unlock the joints in your body. The physical application of a stretching routine will relax the body and the mental process of rhythmic breathing will act as a pre-surf cleanse from all of the distractions in your life.

The principle here is 'free your mind to focus it 'on the surfing and how to approach the session. This way you – *relax to surf so you can surf to relax!*

## Insights

- Remember if you relax to surf, you will get a lot more out of your surfing!
- Have a pre-surf routine like a 3 minute yoga circuit that sets your mind and activates your body for the session ahead.
- Gently feel the wave on your first bottom turn to get in rhythm and mentally slow the wave down.
- Do not get over-amped and push too hard on all your turns. Use an appropriate counter force for the size and power of the wave. This will increase your speed, power and flow in small or large waves!

# PHASES OF PROGRESSION

## Learning is a developmental process

Knowledge acquired through new learning experiences changes as the proficiency of the performer increases. When learning a new skill in surfing a beginner must practice an initial motor program to establish the correct procedure for the manoeuvre. Along with such 'skills drills', basic knowledge on when the skill can be used during a wave is the next step.

As surfing proficiency increases, the surfer experiments with manipulating the muscle memory in various ways in order to make the manoeuvre in a variety of circumstances. Surfing expertise comes from continually adapting your skills to create subtle differences in performance that are highly successful in a variety of situations. It is through this process of experimentation and repetition that a skill undergoes constant improvement. A surfer continues to progress their learning by utilising the phases of - perceiving, deciding and acting - in different ways to construct new and varied motor skills.

### **The feedback link**

In surfing we rely on feedback from experience to correct mistakes in perceiving, deciding and acting from one performance to the next. Mistakes made on the wave, that is, in the execution of a motor program – for example, failing to compress the legs at the right time during a take-off – are often termed overt mistakes.

By staying in our comfort zone we stop ourselves from having new experiences to draw from and slow our learning curve.

It is vital to explore new parts of the wave and with this program's assistance learn the correct motor skills to apply. Mistakes are observable to an onlooker and are, therefore, easy to identify for a coach or through video analysis. As the mistake is observable, feedback can be specific and unambiguous and improvements in technique are measurable. The use of video analysis can be vital in highlighting overt mistakes made in performing a manoeuvre.

## **Phase 1: Perceiving (Learning)**

If you don't make mistakes, you cannot learn. Surfers need to read the information from the surrounding environment (wave) as well as

recall relevant information from the past that can assist their performance. By surfing safe and staying in a 'comfort zone' or the mid-face of the wave, no new experiences can be called upon. Abilities and knowledge are enhanced through feedback; which means you have to make mistakes to learn how not to repeat them.

## **Phase 2: Deciding (Committing)**

Be confident. The more you put yourself out of your comfort zone the more relaxed you will become with the wave over time. Focus on what you can control and block out any information that is irrelevant to the performance. Use your senses to heighten your performance i.e. look, feel, touch etc. This will allow your body to orientate itself and be able to concentrate on balance and contribute to body positioning. Know that your actions will get you the right result!

## **Phase 3: Acting (Focusing)**

Look where you want to go. This will provide information for your brain and help the necessary motor skills to fire. Looking down your line and keeping your chin up will help the organs in your inner ear to provide information on balance. Use the information from your body to determine how it is feeling so you can position yourself for speed and acceleration. Be aware of your breathing pattern. Keep it steady and rhythmic. The more relaxed you are the more receptive you will be to all sensory data your brain is inputting to your mind from your body.

## **Insights**

- If you are not making mistakes you are not acquiring new experiences
- Use the information from new experiences in surfing outside your comfort zone to learn and correct your motor programs.
- Relax before you surf so you can free space in your mind to allow you to focus on the job of surfing.
- Commit to your decisions in surfing, breathe and use your senses (eyes, arms, hands, feet) and past experiences to react in response to the wave.
- Be aware of your breathing pattern. Keep it steady and rhythmic.

A photograph of a surfer riding a wave. The surfer is positioned in the middle of the wave, leaning forward. The wave is breaking, creating white foam. The water is a deep blue color. The sky is a light blue color.

## + POSITIVITY

### **Surfing in critical parts of the wave**

There are characteristically two types of surfers in this situation. Those who are so engrossed in the thrill of the moment that they want to savour every second. So when a wipe-out occurs if they are hurt or harmed, they are genuinely surprised by the outcome.

Then there are those surfers who on entering this situation will immediately expect to be harmed. They take a protective stand, hold their breath, tense up and wait for the wave to smash them. However, if you stay positive and believe you're about to make the best barrel ride of your life then optimism will flow through your veins. This positive attitude will make your body more relaxed, open and receptive to the experience. Also, hopefully, if the wipe-out does happen you're far less likely to be badly hurt or harmed with a relaxed body.

Remember, staying positive is the light at the end of the tunnel. Relax, breathe and enjoy!

### **Confidence in the best outcome**

Surfing has a mental component with regards to achieving predetermined results. Because of the solo nature of the sport without video analysis the only person who can truly know if the performance was skilful is the surfer. Believe and back yourself. Use positive reinforcement after each wave. Otherwise, you may start to doubt yourself and find your confidence wanes. Negative emotions can leave you feeling like your powerless and effect your ability to learn positively from your mistakes and grow as a surfer.

### **Insights**

- Prime yourself with positive reinforcement when you surf, it can be the difference between making it and bailing out early
- Savour your successes and mentally 'burn the image' into your mind for inspiration and confidence
- Focus your attention on the thrill of the moment and believe you will make it
- Relax, breath and enjoy!

## 1. Feeling

### It

During the performance of a move, internal feedback must be provided to the brain with information about the immediate positioning of the body, the effort from the muscles and pressure on the surfboard. This information allows the brain to monitor the move and make adjustments to the motor program.

## 2. The Feedback Monitor

Internal feedback is also combined with the external information received from the senses during the move in order to judge how successfully the performance is progressing. For example, based on the speed of a cutback a surfer moves into position to perform a twist. However as they move into position, external information tells them that the surfboard is losing speed. This information indicates the speed for the cutback will be limited should they proceed with the normal technique and trajectory. The resulting move may be unsuccessful. The surfer is now able to adjust their technique and twist more, swinging through slightly earlier and with slightly less force in order to perform a clean cutback.

## 3. Applying the Feeling

Skilled surfers use this information to sense when a performance is going astray and can adjust

accordingly whilst performing the turn in an attempt to still have a successful outcome.

This constant assessing and reassessing of the wave and the success of the skill being used enables a performer to constantly adjust the force, speed and effort flow during the surf to maximise the success of the turns.

## 4. Seeing Yourself Surf

When you first start video training you are in for a nasty shock as things you thought looked cool actually look kooky.

Video analysis however, helps eliminate the bad while building on the good. The trick with video training is to try and feel with your body how it looks. This allows you to gauge how you are surfing.

The more you do it the more you get to narrow the gap between what feels good and what actually looks good. This builds confidence and gets you into a positive spiral.

# FEELING IT, TO UNDERSTAND IT







# CONFIDENCE IN THE WATER

## Exploring new lines

When attempting a new skill, all surfers must begin in the 'thinking phase'. Here the surfer must organise their thoughts about how to physically enact a move. This process involves constructing subroutines to develop a new motor program. Initially, attempts at performance of the skill may take time as thoughts are organised and trial and error is involved to establish basic timing and coordination.

Initial attempts at new skills are often seen as 'jerky' and uncoordinated. However as learning progresses, the pauses become progressively shorter and eventually fuse to form the desired new motor program. This is when a surfer is learning to control the speed and effort for the manoeuvre. This phase can last anywhere from a few surfs to several hours of practice, depending on the difficulty of the move to be developed, the type of waves in which the move is being performed and the previous experience of the surfer.

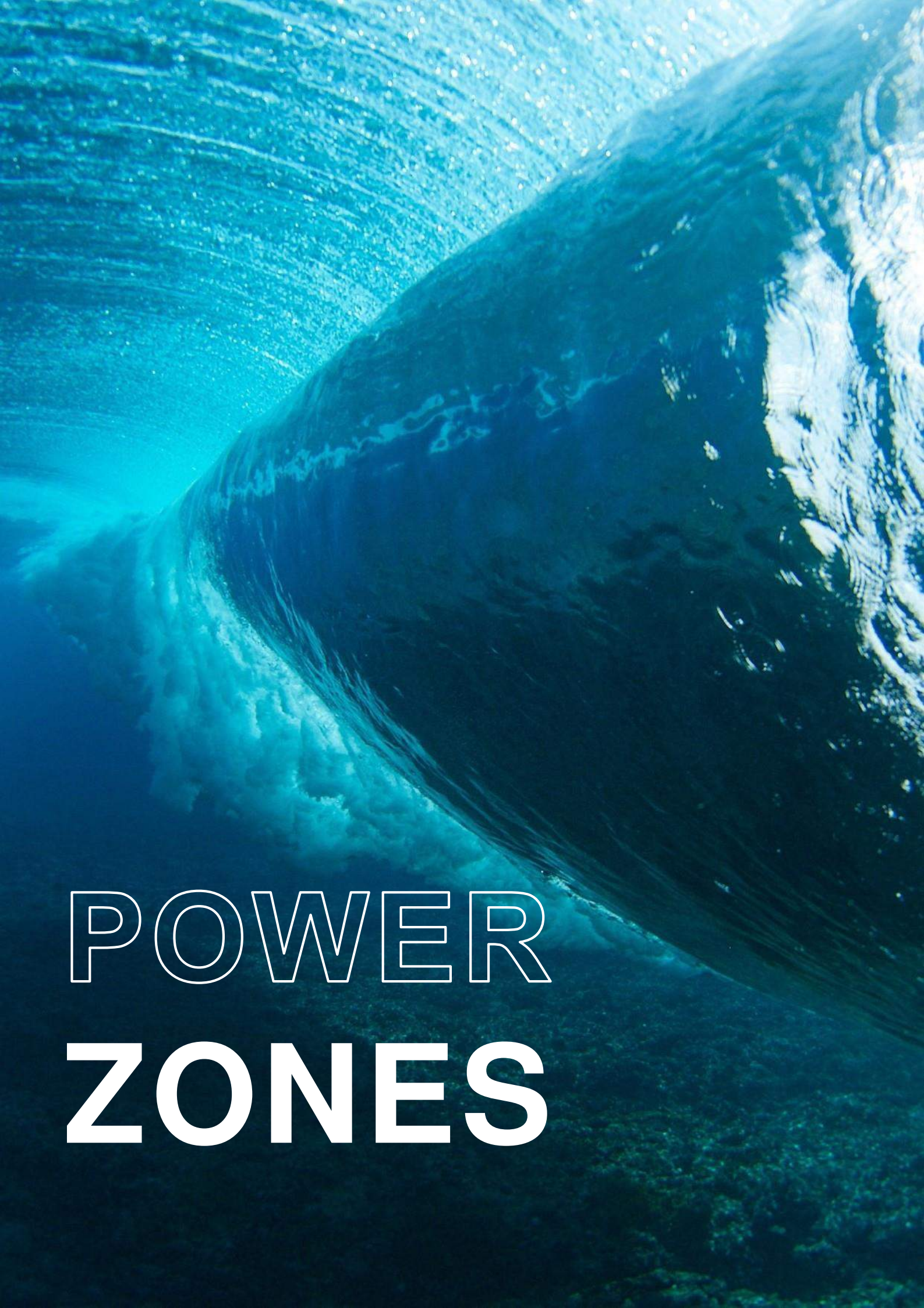
## Getting results, faster

Experiences that will assist your development can include watching surf movies and the performance of the best surfers at your local break. This helps give the surfer a mental picture of what they should be aiming for physically.

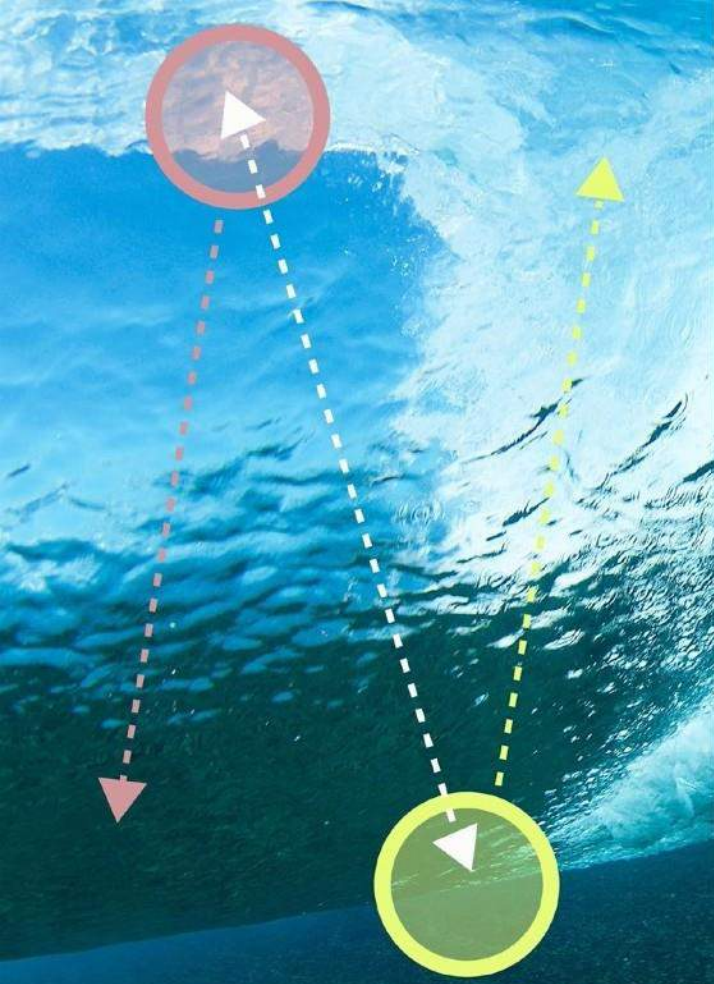
Functional movement based training programs and sports with cross over skills that share similar muscle memory such as skateboarding and snowboarding will help transfer similar muscle movements into your surfing. Skill transference allows a surfer to quickly integrate previously learned tricks and moves into new motor programs to establish a more fluent performance in the water.

## Insights

- Analyse surf videos and try at key sections to emulate the surfers body movements., can be done on a bosu ball or just standing
- Emulate common surfing movements on a bosu ball; pop up, top turns, stance, compressions etc Use a carver board or similar to practice your bottom turn leans and top turn twists



POWER  
**ZONES**



# POWER ZONES

## TOP POWER ZONE

Gravity forces the water down.  
Fall=Speed

## JOIN THE DOTS

The closer you can join the dots between these two power zones the more speed you can generate

## BOTTOM POWER ZONE

Water is pulled up the face.  
Lift = Power

### **The biggest secret in surfing is the power zones**

The most visible power zone on a wave comes from generating speed off the top of a wave, or as gravity pulls you down the face. From Snapper to J-bay you can watch surfers throwing their weight off the top and tapping into the energy of the pitching lip, but how often do you see surfers tapping into the sucking trough around where the lip is landing.

The best example is of Kelly Slater at J-bay. His amazing redirects off the bottom shows how on the worlds fastest right hander he thinks beyond

the obvious top power zone and adds a dimension to his surfing that we struggle to comprehend until we look closely. On casual observation he just looks like the worlds best surfer at work on the worlds best right hand point break.

On closer scrutiny we see that his repertoire is based around tapping into BOTH power zones and the result is a dimension to his surfing that only very few posses. You can see an example of this [here](#).

## Tapping into the top power zone

It is the best source of speed in surfing and the easiest one to tap into. Simply dropping down the face as close to vertically as possible with gravity will give you the initial speed too keep up with the wave. It is important to repeat the process so as to maintain flow in surfing. By offering the lip to the underside of the board and then thrusting off the top the wave will always keep pushing you down the face with ample speed.

## Not tapping into the top power zone

The inverse of this scenario is a surfer who rides mid face and uses the top power zone to ride partly down the face and back up again in a squiggly line. The result is they never harness all the speed available to them by taking a more vertical line and dropping into the wave face fully before tapping into the bottom power zone.

## Insight

- Drop into the wave like it's a halfpipe and you are on a skateboard





### The importance of the bottom power zone

If you look at a wave closely, most waves have a top and a bottom power zones.

*The bottom power zone is vital. It is the first part of the wave to connect with the reef or sand bank. It's this interaction where the wave bends and gets its direction and speed from.*

Water draws off the bottom and is pulled up to the top. The faster the draw off the bottom the more hollow the wave. The slower the draw the weaker and fatter the wave will be. It is also a good indicator to see how fast the wave is moving and how to match the wave's speed to be able to surf in the pocket or curl of the wave. By having an awareness of the bottom you will intrinsically understand so much more about the complexities of the wave you are surfing.

### Tapping into the bottom power zone

When you have dropped into the wave face you generally will have a lot of speed and you will lean onto the rounded rail of the surfboard. Your body weight pushing onto the rail is opposed by

the bottom power zone that is forcing water to be drawn back up the wave face. When you are on the rail the board and your weight is also being drawn back up the face by the power in the wave. However if you are flat footed when you perform your bottom turn you miss out on all of this energy and have to use the speed you got from dropping in to try and stay in sync with the wave. The result is often a lot of jerky movements to try and manufacture speed and the surfer is out of sync with the wave. If the issue is never fixed, the surfer stops venturing this far down the wave face and starts to take a more horizontal line across the wave to the shoulder and never learns to harness the speed in a wave.

### Insight

- Lean onto your rail to harness the waves energy drawing back up the face
- Compress into the turn like you are at the starting block of a sprinting race, not like someone performing a deadlift

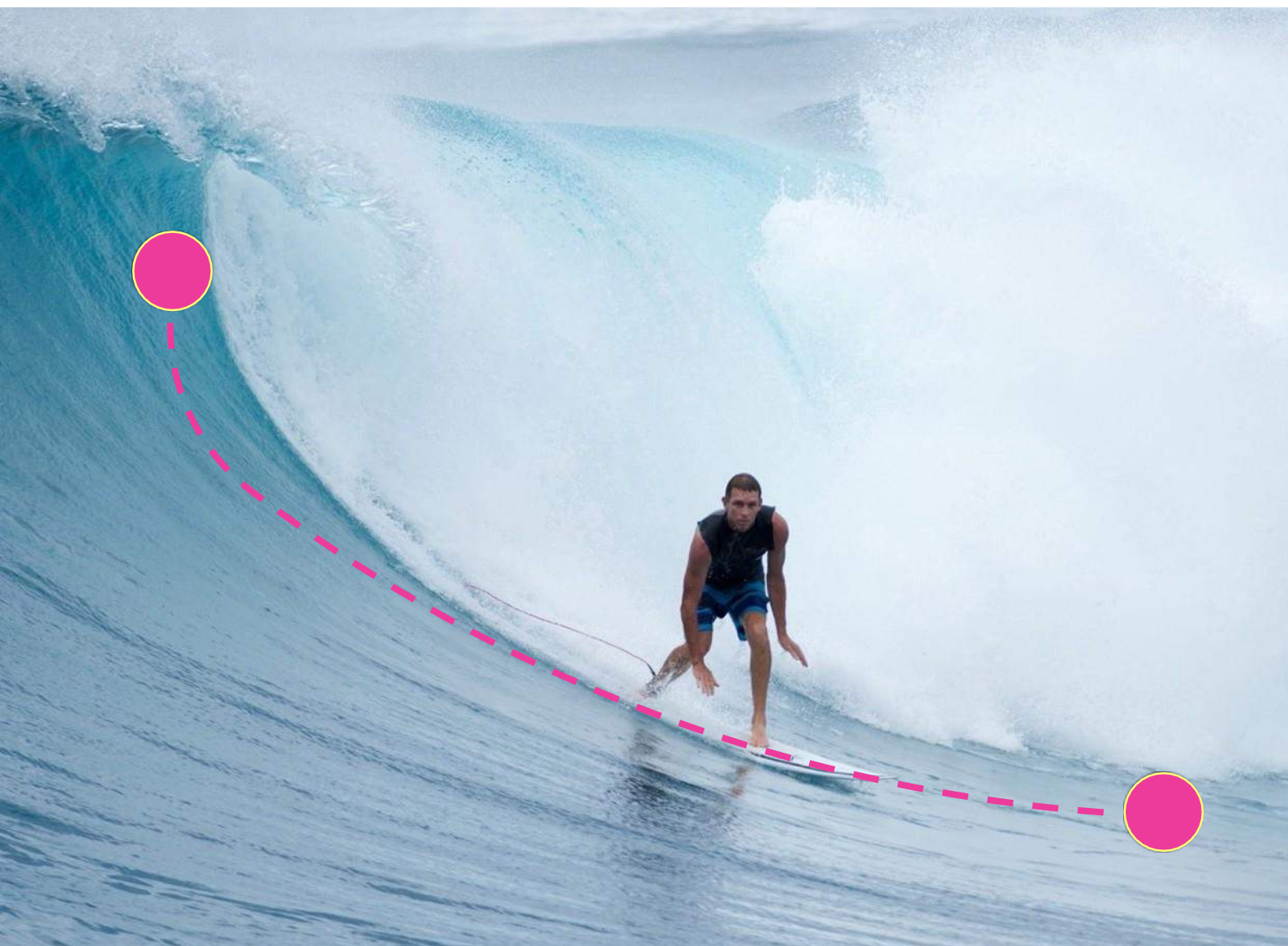
# Joining The Dots

There is a top and bottom source of power that you can tap into when surfing a wave. Doing so will allow your surfing to flow effortlessly. The closer you can join the top and bottom dots (power zones) together through turning, the better, faster and more dynamic your surfing will start to become. Watch a professional surfing video and start to analyse how the pros join the dots between these two power zones in the wave, it can look like they are surfing in a continuing figure 8 shape as they glide between these two zones with so much speed, power and flow.

When you stop focusing on a mid face line, it frees you up to take a more vertical approach to your surfing and the end result is actually more speed and power because you are turning and tapping into the bottom and top power zones.

## Insight

- Bottom power zone pulls you up the face to the top power zone when your rail is activated Top power zone throws you back towards the bottom power zone
- Join the dots between these two zones to increase your speed, power and flow
- Stop surfing the mid face, you cannot do a proper bottom or top turn from this set up!





# 3 FOUNDATIONAL MOVEMENTS

# LEANING

## Turning at high speeds

Riding a bike and surfing have more in common than you think. At speed you have to lean to turn and you need to twist the handle bars to turn the bike when riding slowly. In surfing when you drop into a wave you also have a lot of speed and so the bottom turn like a high speed bike turn, is where the rider leans into it. The difference in surfing however is that this also has another advantage because of the dynamic environment when you lean you also harness the waves energy by tapping into the bottom power zone.

Surfboards rails are designed to be round under the front foot to facilitate the lean. This means it is more of an action done 'off the toes' than a heavy back footed push. When you lean off the bottom the rail will roll and bury itself in the water applying hold. Leaning will also takes the bulk of your weight off the board making it easier to project up the wave face. So by simply leaning your weight in the direction you want to go your board will follow.

## Insight

- Compressing into the lean will also let you harness extra speed when you release your body at the end of the bottom turn
- Lean your surfboard using the toe balls of your feet





# COMPRESSION

Compression is one of the three fundamental movements in surfing. A common error is locked knees which lead to an awkward, fully-upright stance, especially on the drop. Another mistake is to bend the back instead of the knees. This results in a squatting 'poo-man' stance. Either of these movements will render the rider off-balance and hinder their twisting and leaning (the other two fundamental movements). So when we think about compression in surfing it is important we bend our knees and think of it as a lunging motion, like a sprinter at the starting block rather than a squatting motion.

The problem with squatting on a surfboard is that it keeps you centred, strong and in balance, and forces you to 'push hard' with your legs. These are all the elements which make your slow, push water and burn off speed.

Hence, the best technique for speed, drive and acceleration is to lunge like a sprinter at the starting block rather than a squat.

'Forward lunging' will shift your momentum over the front foot allowing forward drive. Pointing your knees in the direction you want to go will direct your momentum. You will face the wave front on like a fighter which allows your body better, faster movement.

Most surfers look at themselves on video or in a photo and don't like what they see. One of the main underlying factors is body positioning. The person looking at the photo can't visualise the progression of the move. This normally happens because you have bent your back as opposed to your knees. If you bend your knees, you can jump, you can pop, you can duck and there are endless possibilities as to what you can do. But if you bend your back you can't see where you are going, you're off balance and the surfing tends to look ugly.

All the best, most photogenic surfers bend that back knee forward to touch the front knee. Think Tom Curren, Kelly Slater, Andy Irons, Craig Anderson. This stance looks like a sprinter poised to project their body forward. In surfing terms, the bent knees catapult the rider onwards and into the next manoeuvre.

## Insight

- Compress into your surfboard like a sprinter at the starting block



# TWISTING

When you want to perform a turn, all your power and torque comes from your twist. The longer you hold your twist the greater the power and spray you are going to throw. When you twist it is crucial that you look to where you are going and hold that twist until you reach that destination. If you cut it short you are going to lose speed, but if you hold that coiled position until you connect with the lip or the foam it is going to propel you back out of that twist. A lot of poor technique is done where people are looking down the line and trying to force a move and end up doing a quarter or half a twist, end up mid face and lose speed. A prime example of a surfer with textbook twisting technique is Mick Fanning, who does such a lightning quick twist and looks all the way back at the foam, reconnects with the foam and comes out of that turn with a lot more speed. So in twisting, look down the line and you will cut your turn short. Twist back, commit, look to the pocket and you will find that you come out of the turn with more speed.

## Insight

Rotating your hips will enable you to see more on your way and respond faster. The best technique for the twist is both hands forward with an open palm on your lead hand



Dropping the lead arm will induce a lean and may cause your rail to bury when the section offers little speed



No Twist and can't see



Twist cut short with flat palm

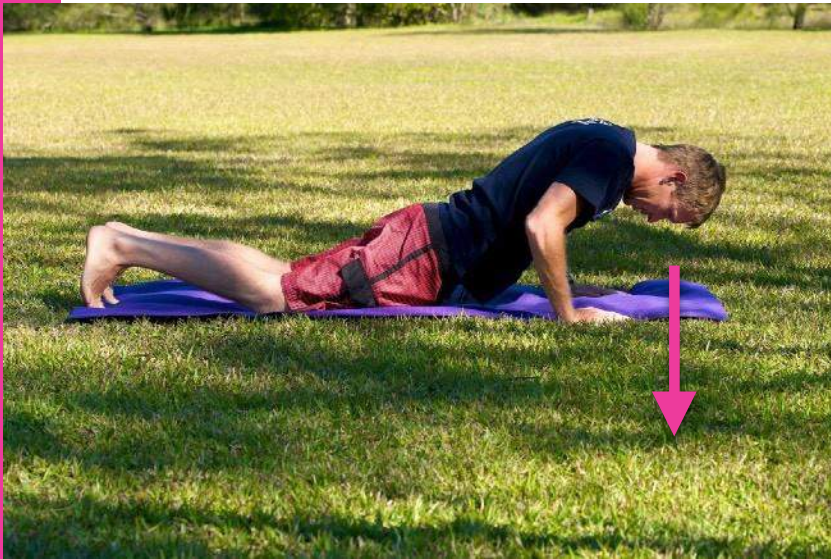


Twist with open shoulder and palm



LEADING  
WITH YOUR BODY

# PADDLING

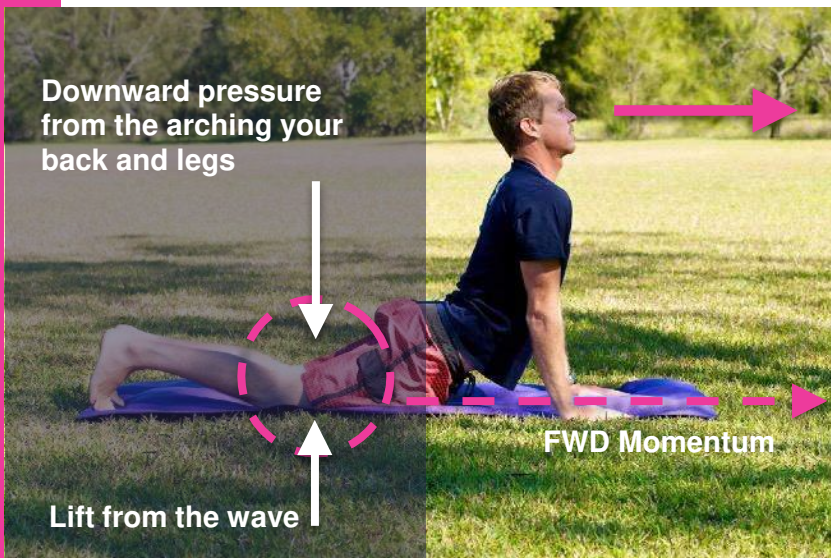


Head down cannot see and respond

It is so important to look where you are going at all times because waves are always changing and you need to be receptive and respond to these changes.

Holding your head up will help you to get better balance by being able to get a reference of where level is. It also creates space for you to pull your front leg through into your standing position.

Arching your back allows for a deeper and stronger paddle stroke. You also get a better view of the wave ahead. More importantly it pushes the tail down against the lift of the wave. This resistance causes energy which is released when the board takes the path of least resistance and is propelled forward.



Back arched and head up

Great view of wave

Creates forward momentum on the surfboard as it is the path of least resistance



Back arched, head up and back knee bent

In picture 3, I bend the back leg and put it on the back of the boarding position to stand. All I have to do next is pull my front leg trough - easy!

## Insight

- Arching your back strengthens your paddle and create forward momentum by pushing the tail down against the lift in the wave

Commit to the wave and point your lead hand down and stomp on your front foot to force the board straight down the wave to initiate speed from the take off.

Stand flat footed in any sport and you will have the coach screaming at you.



For the bottom turn push down on your finger tips. This will trigger a response from your toes to follow suit and the board will roll onto its rail.

Once on rail the board will accelerate through the water as there is less friction on the bottom deck. Transferring your weight over the rail and towards the lip will send a clear message to the board instructing it where to go.

# STANCE

The fighting stance is one of the most fundamental positions that you can ever learn. A proper stance allows for strong, effortless movement and an easy transference of force from body to extremity. There is no disadvantage in having a good stance.

*Having a good stance allows you freedom of movement that directly translates into the individual expression of the surfer's style.*

Whenever you are in a fighting stance you want a small amount of tension kept in your abdominal muscles. Also it is important that your pelvis be positioned directly underneath your shoulders. This will allow for a stronger stance, assist you in twists, and improve balance by keeping your spine in an optimal position. This amount of tension will aid your movements but will not subtract from your ability to move or breathe effectively.

Arm positioning is extremely important as it is the guide to which your legs and surfboard follows. Raising your arms up will create a lightness on your feet. Arms give you leverage for twisting and jumping. Your lead arm needs to be the active arm as it generally guides the nose of the board. The rear arm is the your power which you want to keep closer to the body and level for balance.

*Never stand flat footed on both feet as your movement become sluggish. Fighters need to be well grounded, light on their feet with cat-like reactions. Keep your arms up to lift your centre mass.*

## Insight

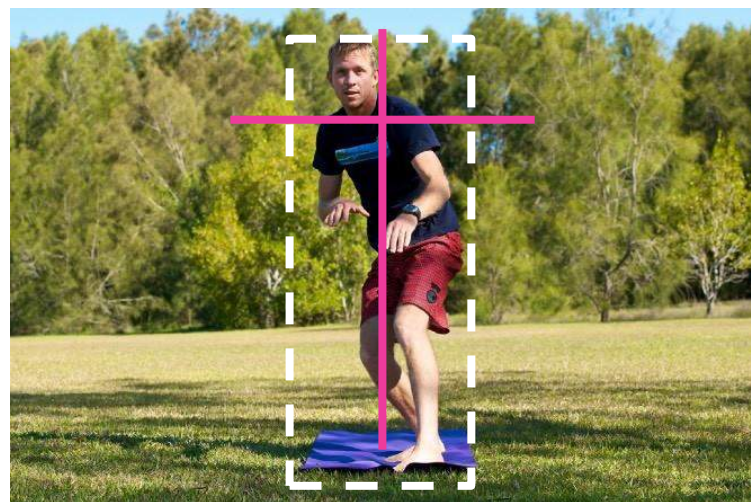
- A fighters stance keep you light on your board and ready to react
- Eyes forward, shoulders level and arms up



**Back bent bad posture. A straighter back allows for better balance and helps your to increase your twisting potential.**



**Eyes forward and shoulders level. Keeping your chin up and eyes forward makes you more aware of what's going on around you and improves response times from your body.**



**Good posture for quick reactions. Your arms always lead your board in jumps and movements so keep the up and ready.**

# PROJECTION

Skateboarders lift their arms above their heads to project up the ramp.

It is a handy trick to apply to your surfing you help lift your body weight towards the lip.



On contact with the lip bend your wrists back to get your board on rail. The purpose of this is to offer up the bottom deck for the wave to smack and push you back down the wave with double the speed.

Twisting off the top will allow the board to pivot off its wide point in the centre and quickly rotate allowing you to drop in again and create even more speed from gravity.

## Insight

- Hands above head to project up
- Bend your wrists to help activate the surfboard rail

# ARMS & WRISTS

## Arm

In surfing where you look and where you point your lead arm, the nose of the board will follow. Your body generates the movement and your board will obediently follow.

*The rear arm is where the power lies.*

Try to push this hand forward in the direction of your momentum to aid in speed and drive.

With your hands on the board if you bend your wrists back you can easily access your inside rail. This will help you to throw more spray on top turns and loosen up the board through twists.

## Wrist & Twist

Visualise for a moment that you are surfing with the surfboard underneath your hands so that when you go for a top turn you bend your wrists back, keep your hands in front of you and then guide your surfboard from the top of the wave, right down to the bottom of the wave.

Doing this exercise you will find your body naturally falls into good posture and technique.

If you went up for the same top turn and you had no coordination from your wrists, your arms, your hands and you are looking down the line instead of where you are trying to go you will find that your turn quickly falls apart.

So you can manipulate your leans and your twists by bending your wrists either forwards or backwards. So if you bend your fingers downwards you will activate your toes and if you bend your fingers upwards you will activate your heels and this will allow your surfboard to surf rail to rail.

So this is a quick easy tool to get your surfboard on rail before you even twist allowing you to surf more vertically from top to bottom of the wave.

## Insight

- Look and point where you want you go Power for turns is in your rear arm
- Bending your wrists backwards or forward will help activate your rail



No hands no control



Front hand leads the nose



Rear hand adds power to push



# COORDINATION

**Movement requires co-ordination from the body to be fluid, smooth and successful.**

Once environmental information is perceived and a course of action is determined, the next phase is to engage muscles with the relevant timing, coordination and force to enact a response.

The understanding is that a skilled movement is performed by engaging a motor program. A motor program is built from slices of information about movement, known as subroutines. When specific subroutines are used in the right order and with the correct timing, the resulting movement can be recognised as a specific skill, such as a cutback, aerial or basic bottom turn.

On each implementation of a motor program the subroutines are varied by setting the force, speed and effort parameters to allow the motor program to be adapted to the specific requirements of the situation. The brain enacts these subroutines by sending neural impulses to engage the required muscles. The resulting movement is, hopefully, a skilled move in reaction to the wave and determined by the abilities of the surfer at the time.



1

**1. A forward jump done using the arms for lift as well as balance and direction.**



2

**2. A side on forward jump with similar technique and result.**



3

**3. A side on jump with the arms splitting the momentum in two different directions.**

This poor execution of the jump diminishes forward momentum. It also results in a rather unflattering “poo-man” stance.



MOVEMENT &  
MANOEUVRES



# UNDERSTANDING YOUR RAILS

Surfing requires us to have a good rail game, but has anyone ever told you what that actually is? Whenever your board is flat the bottom rocker will push water and friction will slow you down. If your weight is on top of the board then this will further slow you down. By surfing on rail your board can cut through the water without being held back by friction or being weighed down.

Boards are mostly symmetrical in shape but when on rail we need it to have 2 totally different responses:

- 1 It has to hold off the bottom; and
- 2 It has to release off the top.

These are polar opposites and should be impossible to do.

However if you lean off the bottom the rail will roll and bury itself in the water applying hold. Leaning will also take the bulk of your weight off the board making it easier to project up the wave face.

Twisting of the top will help the board will pivot off the wide point and the tail will release when the hard bottom edge of the tail slices the water apart.

# EXECUTION

## Flow Through Execution

In the first picture Mick's looking down towards the next power zone. His arms, knees and head are all in sync and pointing in the intended direction. This pic looks very photogenic as the viewer can easily predict the outcome.

## Errors in Execution

- Errors in a move occur when:
- Essential subroutines are missing and the resulting movement is not an effective technique
- Extra subroutines (Unnecessary movements) are added that are detrimental to a successful technique
- Subroutine organisation is not effective and poor skill execution results – poor coordination
- The entire skill or some subroutines are not engaged at the correct moment – poor timing
- The strength or speed of the movement does not match the effort required
- Movements are attempted that are beyond the muscular-skeletal capabilities or current positioning of the performer.

## Errors in Mick's move occur when:

- Mick's back arm is lagging which in turn is hindering his twist.
- Without the twist Mick's board is flat and cannot release the tail and speed is lost
- The rear arm prevents Mick from looking back down to the bottom of the wave and regaining his speed and flow
- The ensuing spray is smaller without the twist and the turn lacks power



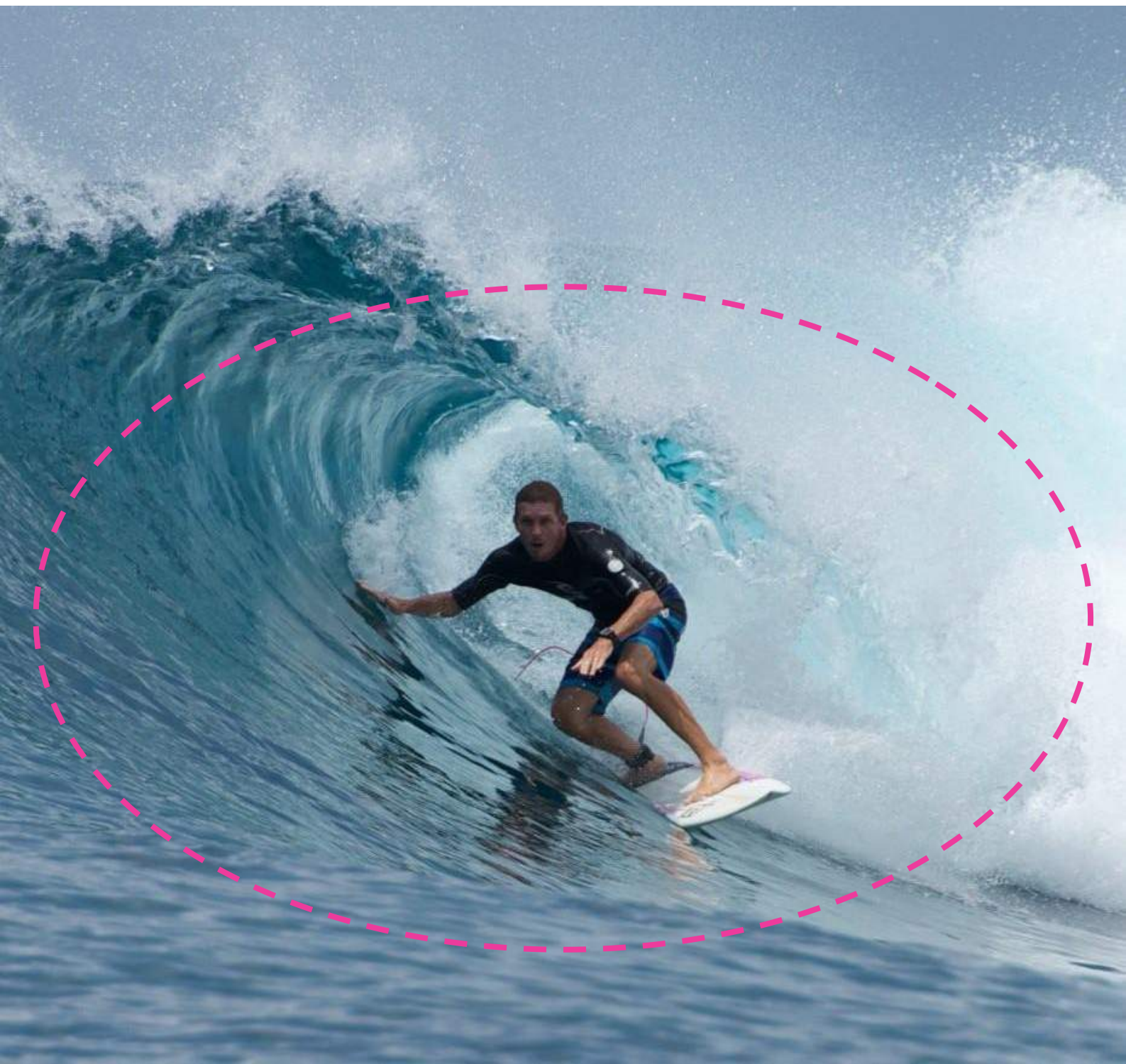
# PERIPHERAL VISION

Surfers who look at the nose of their board, or follow their tail or focus on the lip being smashed apart by their last top turn, cannot anticipate what is happening around them or react to what the wave is doing.

Use your peripheral vision in order to see the top of the wave and bottom of the wave.

It is important you keep your chin up, look in the direction you are going and let your peripheral vision take in the lip and the bottom of the wave.

Now you can anticipate what your body needs to do; on the bottom turn a gentle lean and on the top turn a twist.



# SURFING ON RAIL

A lot of surfers fall into the category of surfing too flat, standing up straight and not engaging the rail.

This means that friction between the bottom of the board and the water is holding you back.

The fix is an easy one. Simply by using your hand as a touch point ahead, lean over the rail and allow it to roll. This will lower your centre of gravity to assist the lean and activate your core. The touch will entice a compression out of you giving you more power and co-ordinate the turn for a cleaner line.

The board's rail is round over the front foot to allow for the leaning aspect of surfing but not many surfers use it. Use your bodyweight and arm positioning to enhance your projection into the top turns



# RECOVERY

**The job:** to remain composed and execute the clean finishing of a move

**The trap:** Loss of balance , flailing arms and blowing a potentially great turn

**Trigger word:** Coffee cup

**Insight:** No matter how half a sleep you are in the morning you always seem to never spill the hot coffee. Its be cause you are preprogrammed not to or else it burns.

So simple technique for completing turns is to hold the imaginary coffee cup. Keep your back straight, chin up and lunge on the compression.

Level shoulders will maintain your balance throughout the recovery. Relax you got this!



# STYLE

**The job:** Surfing with speed and flow that appears to be effortless and well co-ordinated.

**The trap:** Surfing with hands down and slow reactions.

**Trigger word:** Coffee cup and level shoulders

**Insight:** Style is to look photogenic at each point of the wave. To do this the onlooker should be able to see your body language and be able to envisage the next move playing out.

To achieve this you need to be light on your feet, knees slightly bent and lunging forward for speed and a faster reaction time.

Hold your chin up keep your head level for balance to better see and anticipate the next section. A straighter back allows for better twists and more power. Relax and breathe for more effective decision making.





# SURFBOARD

## DESIGN & PURPOSE



# DESIGN PURPOSE

In surfing we need to be able to match the speed of the wave.

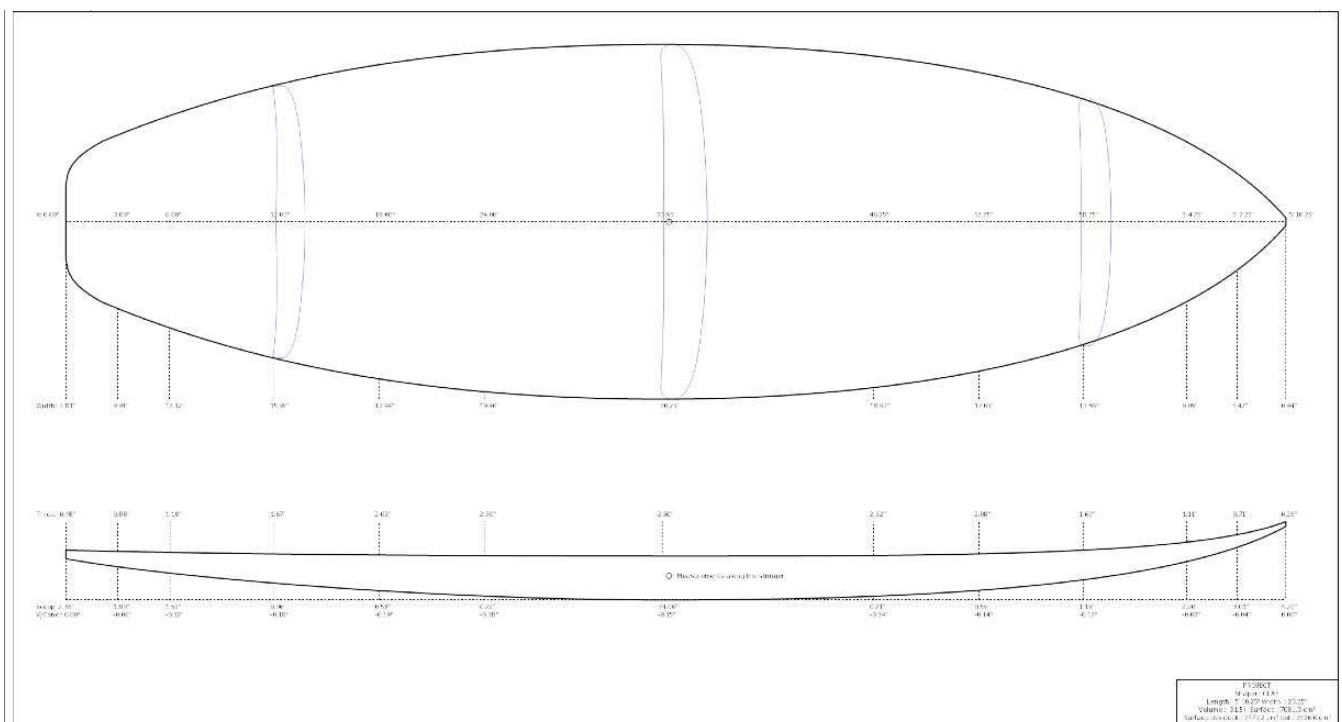
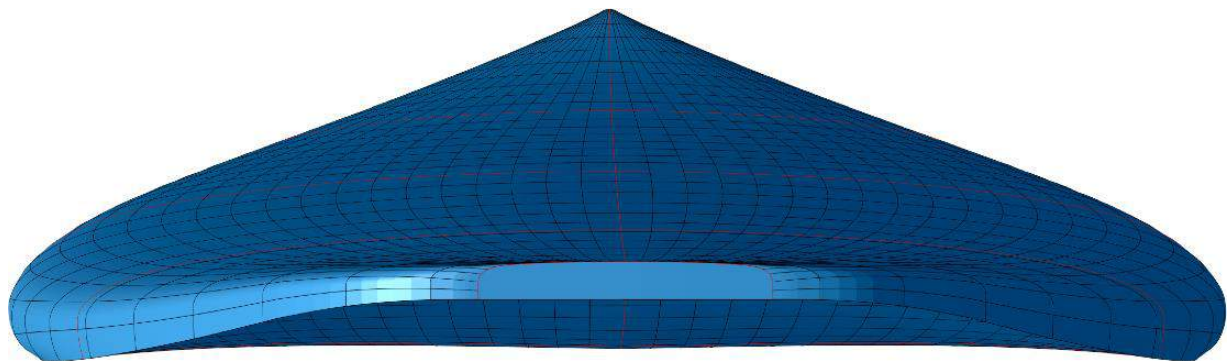
Surfing at the same speed at which the wave is traveling allows us to tap into the waves top and bottom power zones making surfing seem effortless and flowing.

- It is important that we don't surf too slow and get left behind.
- It is equally important that we don't surf too fast ahead of the wave on the shoulder.

Therefore the most important design feature in surfboards is the ability to turn. Turning allows for full control over the board and allows us to do top to bottom manoeuvres that tap into the power zones of the wave so we can always match speed for speed.

## About Surfboards

When talking about surfboards there is copious amounts of technical information online about all the different specifications and aspects about surfboard design. What is most important however is to understand what surfboards are engineered to do and then have a grasp on the most important elements of your equipment design and how that would affect your board choice for different conditions and performance. Thus in this section we will just cover off the main points of relevance and reference a few good places to find more information.





# OUTLINE CURVES

Water follows the outline curve of the board. As it moves past the widest point of the outline it starts to curve in allowing Kelly a tighter turning circle. The more parallel the outline of the board is the faster and driver it would be however the offset would be the board feeling stiff and hard to turn.

# ROCKER

## Rocker is the curve of your surfboard from nose to tail

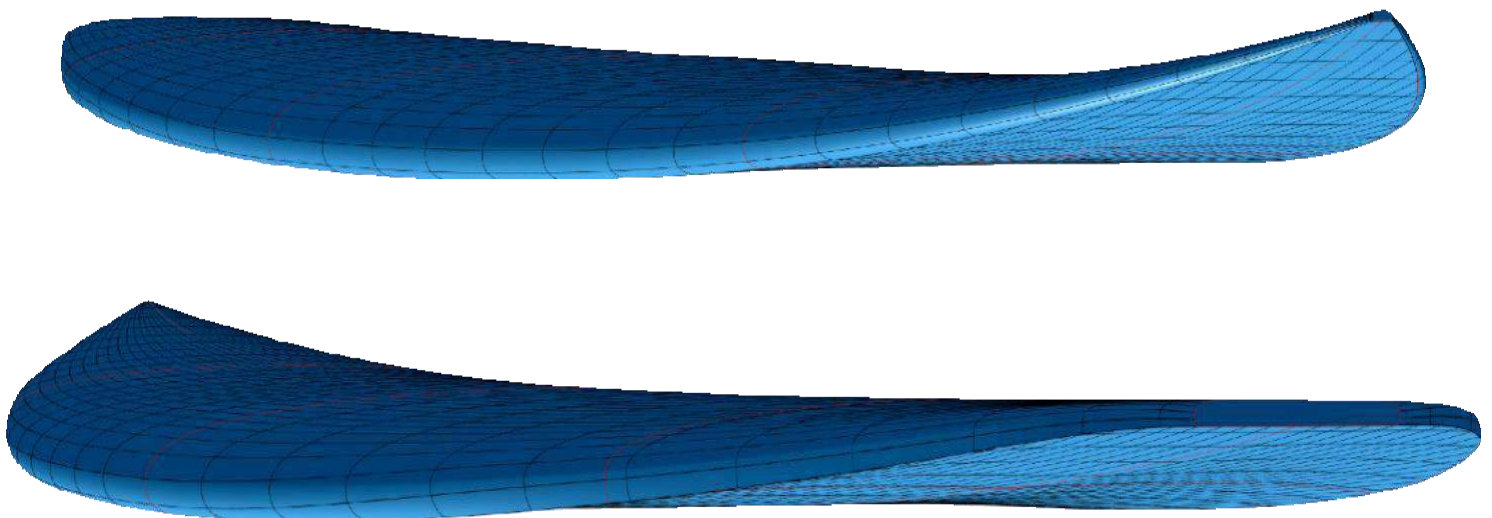
It can be broken down into different sections such as nose rocker, tail rocker, and the centre. Curve through the board will slow the board down but it is necessary in order for the board to fit into the curve of the wave. If the tail rocker is too flat you can expect heaps of drive and acceleration but limited control and when trying to turn the board it may feel like it puts the breaks on and stops. If the board is too flat it may be prone to nose diving and flipping over inside the barrel. This type of board works well in weaker waves with flatter faces or with novice surfers who surf out on the shoulder.

Curve allows us to surf deeper in the pocket and better access the waves raw energy. Accessing this power makes our surfing flow. It helps with turning tighter in the pocket and makes the surfing faster and more dynamic. However too much curve and the board will push water and slide out on bottom turns. It also will be hard to maintain any speed through the flat sections of a wave.

**Nose rocker:** Nose rocker is the upward curve of the rocker in the front section of the board. It helps keep the board from pearling and is steeper in larger surfboards. Insufficient nose rocker will cause the board to pearl while excessive nose rocker will push water and slow down the board.

**Tail Rocker:** Tail rocker is the upward curve of the rocker near the back tail section of the surfboards. Increased tail rocker will add maneuverability and lift to the tail at speed and provide tail sensitivity in critical turns

**Foil:** Foil is the distribution of foam from nose to tail on a surfboard. Obviously for the board to flow correctly it must be evenly balanced through the shape. If there is excessive foam left in the nose center or tail or dips and bumps it will create uneven flow and cause the surfboard to be unbalanced. Proper even distribution of this foam will tremendously effect its performance and flow through the water.

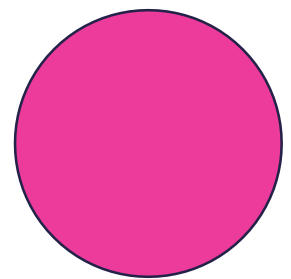
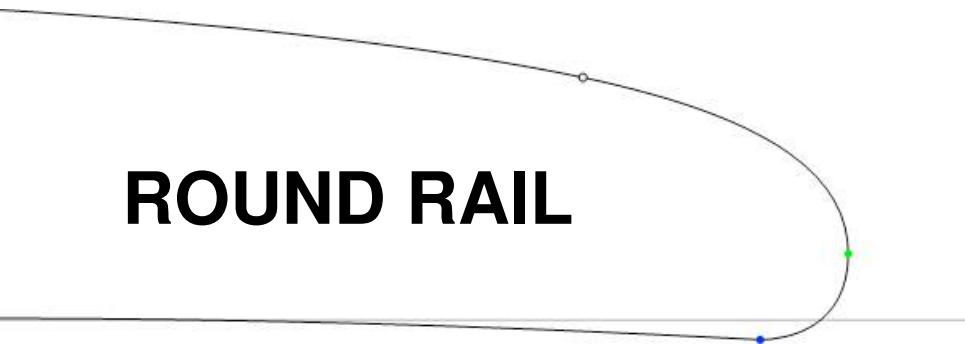


# SURFBOARD RAILS

## Shape and Thickness

Fuller rails carry more foam and help provide floatation when leaned on edge. Thinner tapered rails carry less foam making them easier to sink and lean on edge. Now the harder the rails edge the cleaner the water breaks away from the board which contributes to speed and looseness. Hard rails penetrate the water poorly at high speeds and resist be leaned on edge while softer rails provide a smoother more forgiving response.

## ROUND RAIL

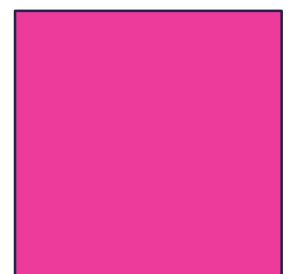
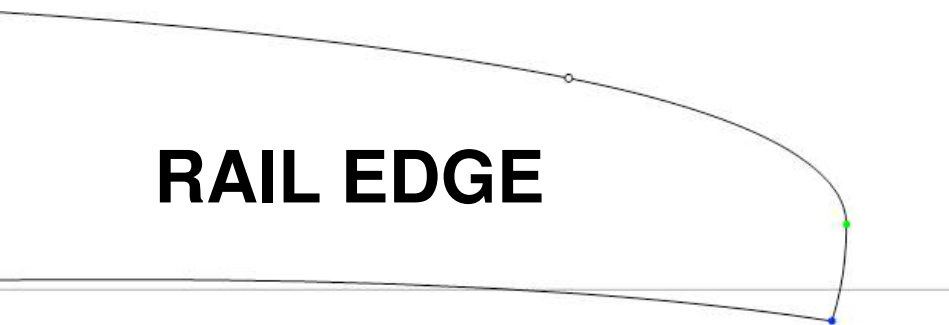


Surfboard rails are round to facilitate turning when you lean over the rail. The fact that the rails are round midway by the front foot suggests that rail turns are done off the front foot.

The round part of a rail is similar in shape to a tyre on a bicycle. Both are designed this way to help facilitate a turn when weight is shifted over and the person leans in a direction they are intending to go.

The roundness of the rail allows water to adhere to it which in turn provides hold during a turn. The rounder the rail the more forgiving the turn will be.

## RAIL EDGE



Squares due to their particular shape don't roll well. The reason rails are square in the tail section is to help disengage turns and help stabilise the board and re-centre your weight over the middle of the board. Pressing hard on the back foot will disengage the board and bring it back to its flat resting position.

The hard edge in the tail acts like a knife and cuts through the water. This is the part of the board that allows the tail to release when pushed through the turn.

Source: [Claytonsurfboards](#)

# VOLUME VS DISTRIBUTION

The word 'Volume' in the surfboard industry over the last 10 years has become the go to metric for equating who should be riding what. It is one of the most widely used and accepted sales tactics for selling more boards. Volume equates to how much foam is used in the board giving you buoyancy and paddle power and is measured by the amount of area (In liters) inside your board. Volume is becoming increasingly popular today with most boards being designed using computer software, shapers are now starting to display the volume of their boards either on their website or their boards.

**Volume is not the most important aspect of a surfboards design** However it is an accurate way to find a range of boards that are suitable for your weight, fitness, ability and age. There are plenty of tools online to figure out your ideal volume, which should give you a volume range to select your preferred board's dimensions within.

**What is most important however is the distribution of this foam.** Foam distribution is what separates your average shaper from a great shaper who can make a board in any volume suit the design purpose of letting a surfer engage rail on their bottom turn and release of their top turn.

Be mindful when buying your next board your choice is not just limited to how well it paddles, it

that foam has been distributed throughout the board which will determine whether it becomes your magic stick.

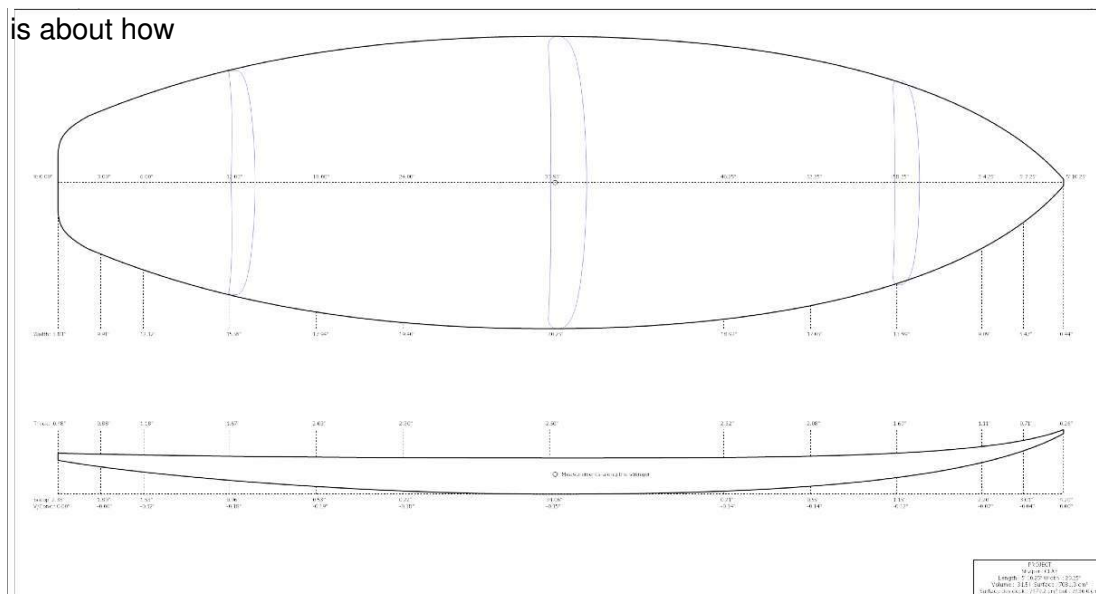
**Lower Volume Boards:** Higher sensitivity to the surfer's movements which allows it more responsive to turning. This requires a more advanced top to bottom or rail to rail surfing style to take advantage of the increased control over the board. If you are surfing mid face or flat footed you will find that a lower volume will sink deeper into the wave face and feel sluggish.

Whilst an advanced surfer may want a highly sensitive rail and more responsiveness over the board, there is a fine line between a low and under volume board which will be sluggish and hard to paddle.

If you need extra volume in your board to paddle but want a more responsive feeling try investigating with your rail designs.

**Higher Volume Boards:** Lower sensitivity to the surfer's movements as the board wants to go straight and will require more effort to turn the board. Higher volume boards will produce more down the line speed naturally and are very stable which will make it harder to surf on rail from the top to bottom of the wave.

Today, most standard hybrid and performance shortboards fall within 25-35 Litres, but if you have to make a choice between a slightly lower or higher than your ideal volume, it would be wise to heed Rob Machado advice 'foam is your friend.'



# Fins

**Fins are foiled to represent a drop of water.**

As a water drop is foiled by air to be the most aerodynamic shape in the world. This foil shape determines the way the water flows under the board. The basic idea is to create lift under the surfboard and help propel it most effectively in different wave conditions. The more pronounced the foil, the more lift it will provide. Unfortunately, this also causes more drag on the board, which slows it down.

## FIN CANT:

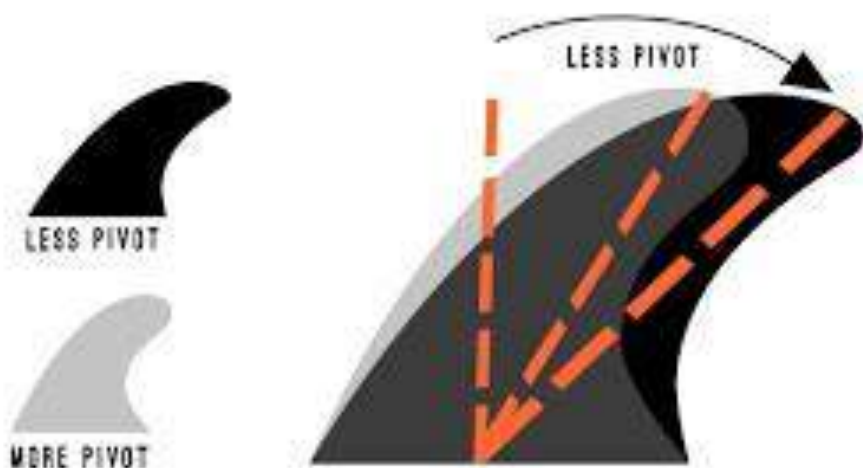
THE OUTWARD ANGLE OF THE FIN IN RELATION TO BOTTOM



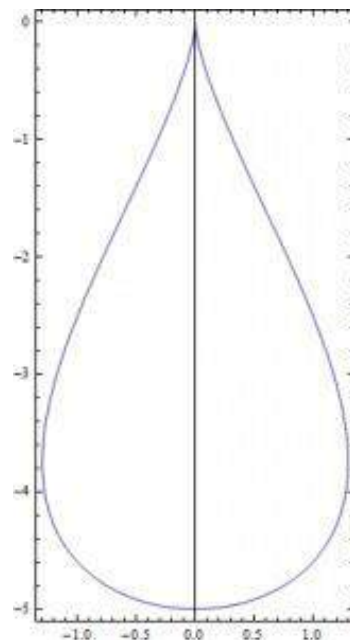
**CAN'T** = The angle of the fin in relation to the surfboard base. If the fin has a large cant, it will be more responsive board through turns, while decreasing the cant (bringing it closer to 90°) makes the board faster, especially when traveling in a straight line.

## FIN RAKE / FIN SWEEP:

THE MORE RAKE THE LESS PIVOT A FIN WILL HAVE



**RAKE** = Fins with a small rake/ large offset will propel the board faster and remain fairly stable, but there is a sacrifice in turnability. Fins with a large rake/ small offset give the surfboard a tighter turning radius, but don't offer as much stability.



# TAIL SHAPES

Whilst there are many tail designs in surfboard design there are three major concepts and functions

- 1 More surface area in the tails allows for more lift and drive from the wave as well as stability;
- 2 The more curve the tails on the outline the better it will turn;
- 3 The straighter the outline is in the tail i.e. Swallow tail the more drive the board will have. Narrower tails allow for greater control in rounder powerful surf.

## Common Design Purposes

**Square Tail:** The square tail contains the greatest area of any tail design. The square tail design will carve the sharpest most pivotal turns and be most responsive.

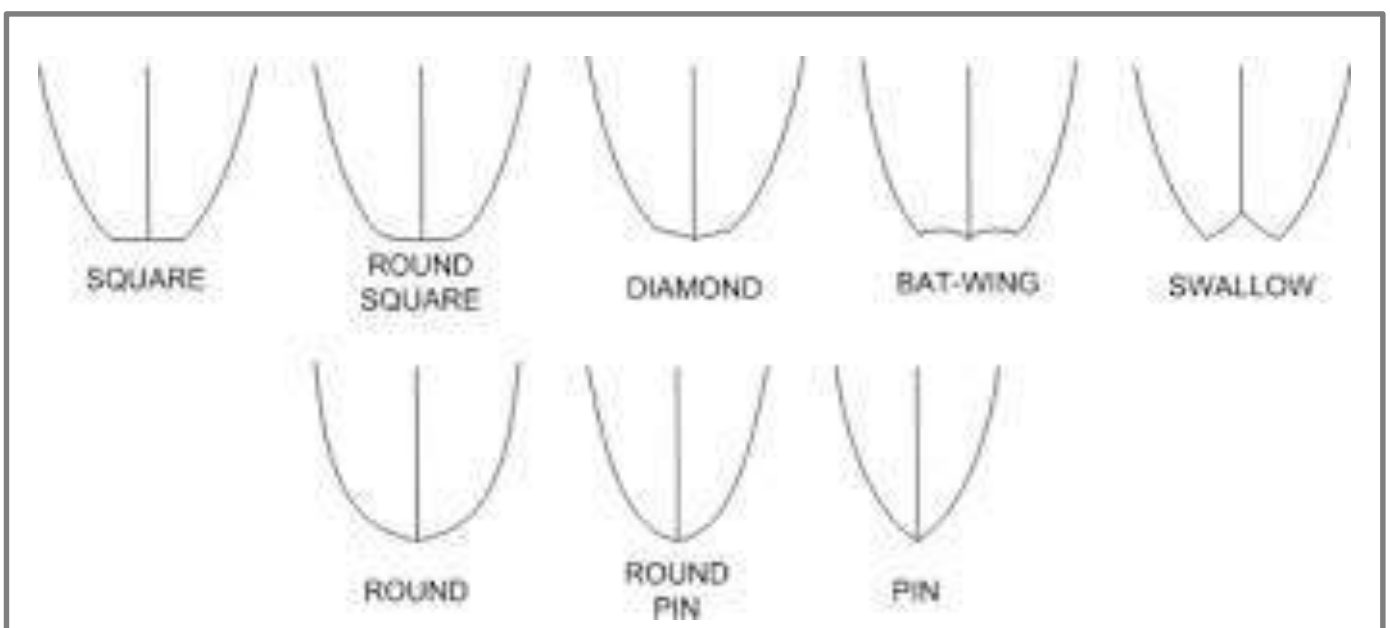
**Squash Tail:** Just a rounded version of the square tail. It is somewhat less responsive and its curves are not quite as sharp and pivotal due to its rounded corners.

**Swallow Tail:** The swallow tail is basically two pin tails side by side. The swallow tail shifter to the other rail there is a hesitation from one side of the tail to the other. The gap allows water to flow freely between the two pins and hold well when banked hard for maximum water flow.

**Round Tail:** A very smooth turning tail that has a bit more area than the rounded pin tail. The extra area makes it more suitable to smaller to mid-range surf.

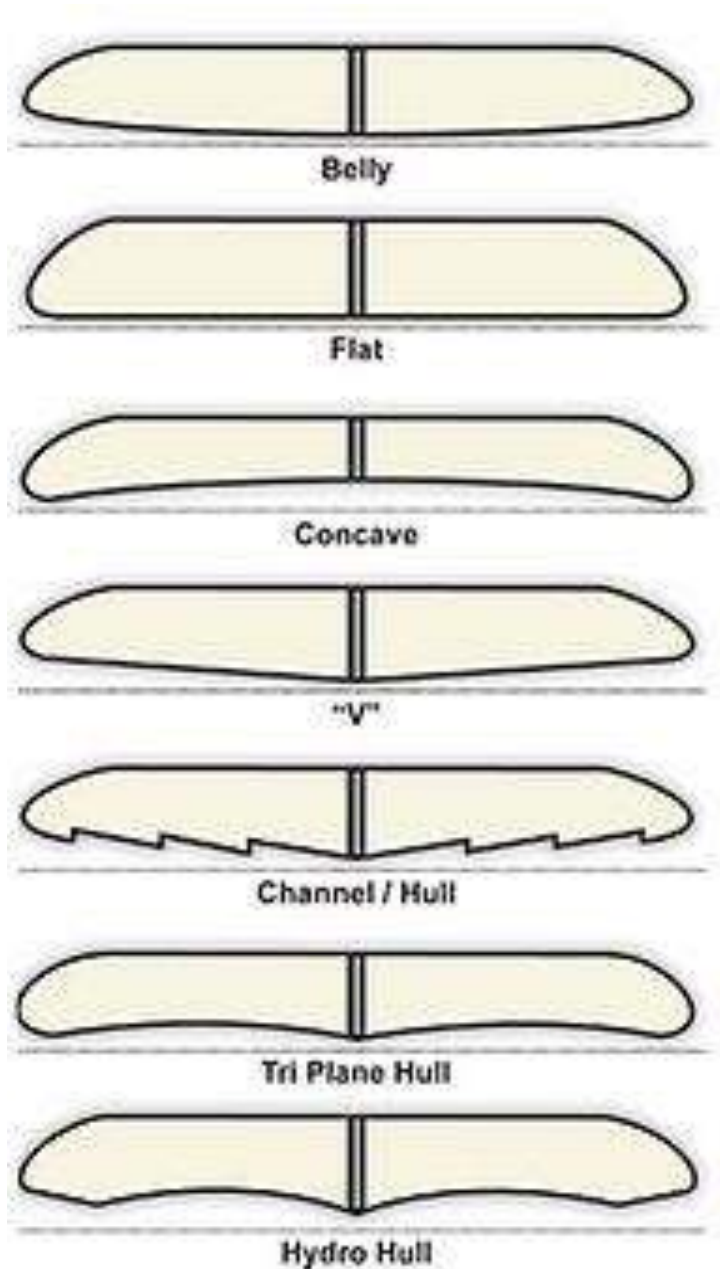
**Rounded Pin Tail:** Very versatile and smooth rail to rail. They hold the surfboard in the after and transition from rail to rail well.

**Pin Tail:** Primarily for larger waves. These tails have the minimum amount of area and hold in well at higher speeds in big surf.





# BOTTOM CONTOURS



**Flat:** This provides a completely flat planning surface on the bottom of your surfboard. They are quick and loose in small and mushy surf but at higher speeds can be difficult to turn and shift to the side when turned hard.

**Concave:** This provides a concave planning surface on the bottom of the surfboard. The main purpose of the concave is to channel the water flow down the length of the surfboard. This channeling of the water through the center and squeezed out the tail adds more lift and responsiveness to the surfboard. Concaves are a very important design feature and can cause a board to track swiftly and improve tail responsiveness for critical turns.

**Channels:** The channel surfboard bottom consists of flat planes that are designed in a concave configuration. They typically number from 4 to 8 channels and direct water flow down the length of the channel. Since the channels sit side by side to each other, the water is not being compressed as it is in a full concave. These concave configurations of each channel propel water down the back underbelly of the surfboard and convert this into forward thrust. Longer and deeper channels give a more pronounced effect.

**Vee:** This is the opposite of concave. Vee is used to loosen up the tail at high speeds and increases the rocker at the rail line, which makes boards turn more easily. Overall, Vee makes a surfboard easier to lean on edge.



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