

Downwind Sail Trim

Spinnaker Trim



Introduction

There are two primary parts to downwind sailing with spinnakers:

1. SAIL

- What the sail is?
- What we want to achieve with this sail?
- Where the chosen sail fits in the boat's inventory
- Is it suited to the boat?

2. TRIM

- How do we set, trim, adjust and configure the sails to extract maximum performance.

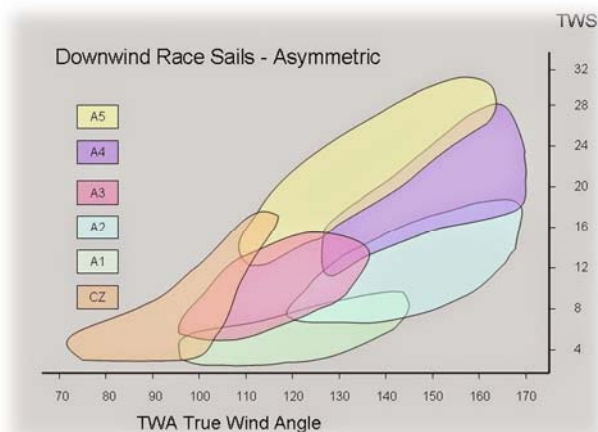
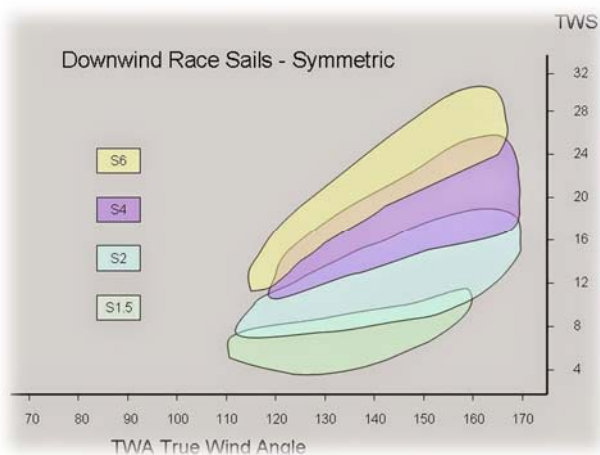
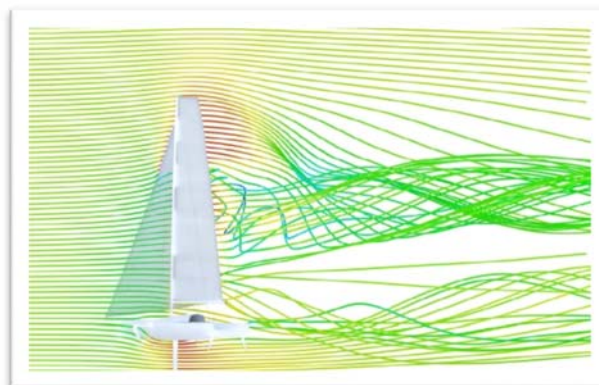
In the old days downwind sails were typically defined by weight...i.e. 0.5, 0.75, 1.5 etc.

In the computer age (80's onwards) Science overtook art and 'Codes' were given to sails based on their mold or 'flying shapes' which were optimised for different TWA and TWS.

This is still evolving as we entered the supercomputer age of CFD and FSI analysis.

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Symmetrical Sails

	S1	S2	S3	S4
TWS	0 - 12	12 - 20	8 - 22	20 - 35
TWA	130 - 150	150 - 175	130 - 160	145 - 170
Luff length	Short luffs to help the sail 'fly' in light winds	Long for maximum projection	Medium for adjustability to different TWA	Short for easy control
Profile	Flat for lower TWA and quick 'flow'	Fuller for stability when flying	Medium	Narrow girth for easy control and reduce area
Weight	Light weight material and constrictor (0.5oz)	Medium weight material and constrictor (0.75oz)	Medium weight material and constrictor (0.9oz)	Heavy weight material and constrictor (1.5oz)

Asymmetrical Sails

A0/Code Zero/MHO/FRO

	A0 Light air upwind turbo	A0 Reaching sail	A0 Heavy air reaching sail
TWS	0 - 8	10 - 20	20 - 30
TWA	066 – 090	080 - 120	120 - 140
Luff length	Tight luff		
Profile	Flat profile for lower TWA and quick 'flow'		
Weight	Strong Laminate construction for high loads. Usually on a furler for ease of use		

	A1	A2	A3	A4	A5	A6	A7
TWS	0 - 12	12 - 22	12 - 25	20 - 30	20 - 30	30 - 40	40+
TWA	100 - 130	140 - 170	100 - 130	145 - 170	120 - 150	145 - 170	145+
Luff length	Short to help the sail set and 'fly' in light winds	Long to project forwards and to windward	Short for tighter TWA	Short to help sail control	Short to help sail control (fractional if option)	Short to help sail control (fractional if option)	Very short to help sail control. Fractional only
Profile	Flat for lower TWA and quick 'flow'	Full for deeper TWA and maximum power	Flat for quick 'flow'	Flat for quick 'flow' Smaller mid girth for less power. Approx 90% of A2	Smaller mid girth for less power. Less area, approx. 70% of an A3	Smaller mid girth for less power. Less area, approx. 70% of an A4	Smaller mid girth for less power. Less area, approx. 70% of an A5
Weight	Light weight material and constrictor (0.5oz)	Medium weight material and constrictor (.75oz)	Medium weight material and constrictor (.90oz)	Heavy weight material and constrictor (1.5oz)	Heavy weight material and constrictor (1.5oz)	Very heavy weight material and constrictor (2.0oz)	VERY heavy weight material and constrictor (2.5 – 3.0oz)

Choosing which sail

- Choose your sail for your angle and wind strength
- Choose the sail that suits your boats VPP / Polar
- Make sure the team know how to set it up!
- Make sure your defaults are pre-set
- What's your 'Plan B?'

Start with the main

- Set the halyard for downwind
- Use the vang to control twist
- Sheet tension for
 - Optimum boom angle /projected area
 - Battens and spreaders
- Easing outhaul is questionable downwind! Most important is that it is not forgotten when going upwind.

Symmetrical Sail Trim

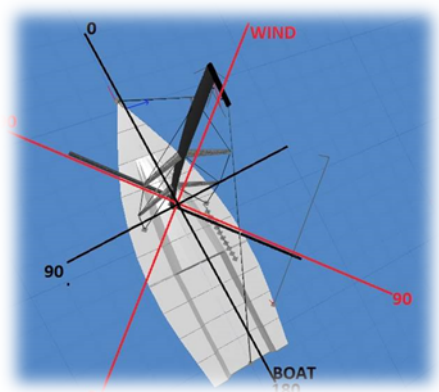
- Start with TWA – what is the TWA for the course you are sailing?
- The luff - pole height, pole angle, tack height will influence your trim.
- For S sails set your pole angle for optimum projection – as close to 90° to the wind as possible.
- Next comes the sheet – ease it or 'float' it until it rolls.
- Observe where the luff 'caves' or curls first.
- Adjust tweaker to control the rolling.
- For S sails re-trim pole angle for optimum projection.

Pole

Pole height...

- Alters luff length, therefore projection – higher pole = the further the sail will fly away from the boat.
- Alters where the sail will roll – generally the higher the pole the higher the luff will 'cave' or curl.
- Alters boat handling – the further away from the boat the sail becomes it effects directional stability.

Pole Angle alters the angle the boat can sail to the wind



TWA and the Pole



Pole angle, height & projection

Tweaker / Downhaul

- Tweaker alters the sheeting angle
- Tweaker alters the twist of the sail
- Tweaker controls the power in the sail
- Lock it down for depth
- Let it up for speed
- For depth – keep the sail symmetrical
- For speed – twist the sail to make it asymmetric!



Tweaker down

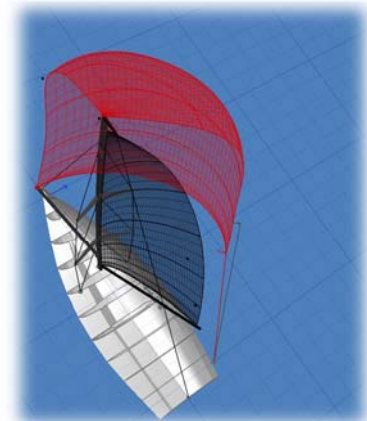


Tweaker up

Roll the boat to windward for increased projection and optimise your downwind TWA. This is a common technique employed by race crews often referred to as 'pressing' or sailing on the 'red line'.

By adjusting the boat's trim with crew weight on the weather side and grouped in the side stay area the windward heel can produce an effect which makes the helm neutral, projects the spinnaker and results in the boat sailing deeper at the same speed.

Results vary with different boats – but is worth experimenting as the results can be dramatic!

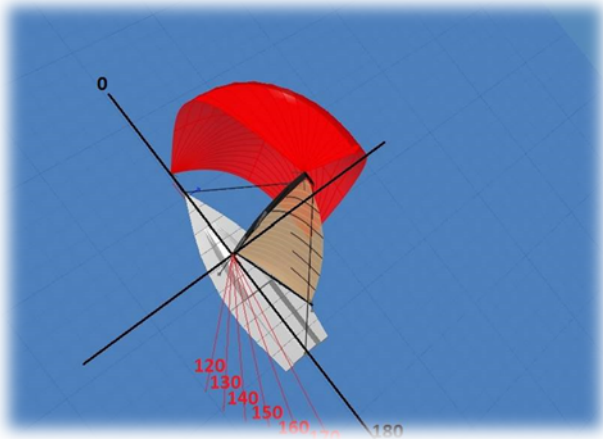


Reaching with an S Sail

If you need to use your symmetric spinnaker for reaching make sure you configure it properly! By using the controls on the boat you can make the sail assume an asymmetric shape.

- Pole Down, Tweaker Up = make it an Asymmetric!
- Note the main twist.
- If you are reaching the mainsail also needs to be twisted – so ease the vang.

Asymmetrical Sail Trim



Angles are everything! Be sure you know the TWA for your course so you can select the most suitable sail!

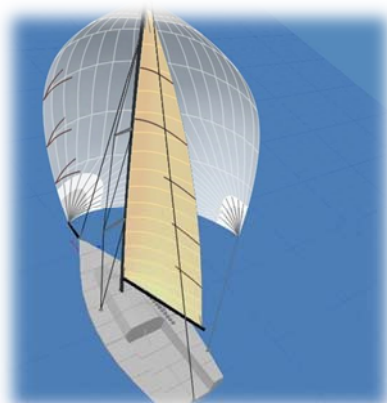
Trimming the Asymmetric

As luff length has a direct effect on how deep you can sail, you can alter this with your Luff tension (halyard, tack line) and your tweaker tension based on how much sheet you have eased out.

As you ease the sheet the leech will 'fly' more, so you may need to pull the tweaker on as the sheet gets eased to control the leech. This will result in you being able to sail deeper. If you ease the tack up, or the halyard down a little, this will allow the luff to project even more, adding to an increased TWA.



As the sail eases the leech twists



Tweaker down for deeper running as the sheet gets eased.



Ease the tack to induce luff projection = deeper angles.

Communication

- As with trimming upwind the same 'trim cycle' must be applied to downwind.
- The discussion is related to the balance of the boat, the desired angle to sail the boat...and this being synchronised between the helm, trimmers and crew.

Conclusion

1. Know the course you want to sail
2. Know the TWA for this course
3. Choose the spinnaker/setup
4. Adapt / change gears using controls
5. Adjust controls to manage power
6. Every boat is different...experiment!

