

## Sailing upwind in light to medium winds

These are a few notes of guidance along with some pictures to illustrate the points.

Sailing an RS400 upwind fast is a largely about maintaining the correct balance between power, pointing, and maintaining wind flow over the sails, as well as water flow over the foils (centreboard and rudder).

By adjusting your sails to balance these to suit the wind/wave conditions and your tactical position, you will make big gains on the upwind legs.

Fundamentally:

- To get flow over the sail, you open the mainsail leech and jib slot. This means no actual kicker tension and fairly loose mainsheet tension. Watch the mainsail leech closely. The jib can be cracked off maybe as much as 2 inches from tight
- To get more power, you leave some depth in the sail and close the leech. This means loads of mainsheet tension but little or no actual kicker tension. Pulling the main on without the kicker closes the leech without bending the mast. Pulling the boom to exactly the same place using kicker tension bends the mast because it pushes the mast forward at the gooseneck.
- To get more pointing, you flatten the sail to reduce the drag. Use full outhaul tension and increasing amounts of kicker, cunningham and mast ram (forwards, bending the mast).

But these must happen in order.

- You can not harness the power in the sails before you have good flow
- You need to wait until the sails have sufficient power to drive the boat
- Once there is sufficient power, you can then flatten the sails and point high.

In very light winds (helm not on the sidedeck) you must encourage the flow over the sail. If you manage to encourage enough flow then you may harness some power but it is unlikely that you will harness enough power to then be able to flatten off the sail and really point high.

In medium winds (when you are hiking some of the time), getting flow across the sail is no problem, so you must maximise the power in the sail. If you can develop enough power to get good speed, you may then use the speed (speed = good water flow across the foils = good ability to resist leeway) to point high and adjust your sails to reduce drag and increase pointing.

In strong winds (hiking all the time), we have no problem developing enough flow or power so we always flatten off the sail in order to get the maximum pointing.

Where the boundary between each state lies depends on a few things (most significant first):

1. Sea state. The rougher the water, the later each transition occurs
2. How smoothly you sail the boat. If you are a smooth sailor, you disturb the flow of wind over the sails less, and also the flow of water over the foils.
3. How your rig is set up. Your rig can be soft to encourage flow, or rigid to develop power. See Nick Craig's tuning guide on the RS association website for details.
4. Last and least importantly - crew weight. The transition from seeking power to flattening the sail happens sooner if there is less weight in the boat.

A few examples with photos :

### **Borderline between seeking power and converting it to pointing.**

Although the boat is almost flat, the rig is developing too much power (shown by the tiller being pulled towards the helm).

The extra power would be better converted into extra pointing.

To do this, pull on more kicking strap. This is a really tricky transition in a 400. Not too hard to cope with when sailing inland, when you can simply pinch more to reduce the force from the rig. However, on the sea, you much go from having plenty of mainsheet tension with no kicker (max power) to pulling the kicker on and then easing the mainsheet, all within a couple of knots difference in wind strength.

The problem is that if you are at the top end of this power band and ease the mainsheet in a gust, the boom will go up, not out. Opening the leech and making the sail more full. **This is where having the crew playing the kicker really helps.** As the gust comes, the main can go out at the same time as the kicker coming on.

Hiking harder wouldn't hurt either. There is no point depowering the rig until you are giving full effort.



**Borderline between encouraging flow and seeking power.**

In the first picture, the boat is nicely powered up. The leech of the mainsail is open to avoid choking the wind flow.

In the second picture, the wind has dropped slightly but the mainsail has not been trimmed to accommodate the change in wind speed. The mainsheet needs to be eased slightly in order to open the leech and keep the flow going.



**Letting the power escape through the leech**

Here the boat is not making the most of the power available. Given the wind strength, the leech is too open which means that power is escaping from the top of the mainsail.

If the boat had the leech that open in order to encourage more wind flow, the outhaul should be looser.

Note the mismatch between the mainsail leech and the jib slot in the first photo. The shape of the slot should be roughly the same width all the way up to the top of the jib



### **Even slot profile**

Here the leech profile of the jib and mainsail are matching and the slot between them appears even.





### **Easing sails to encourage the flow**

In the first photo, as the wind has dropped, the jib has been eased slightly to encourage the flow to stick to the sail. However, the mainsail leech has not followed suit.

As it is, the slot looks to open. If the mainsheet were eased then the flow would stay attached better and the slot would return to normality.

In the second photo, the boat is coming out of a tack and the sails are deliberately eased in order to help the flow reattach and the boat accelerate.

Once the boat is up to speed (and the flow established properly), both the main and jib sheets will be tightened as the boat changes gear into power mode.



Hope this helps

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