Just The Facts...

A Guide to Asymmetrical Spinnakers

QUANTUM™
SAIL DESIGN GROUP

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What makes an Asymmetrical Spinnaker Different from a Standard Spinnaker?

First, geometry. The Asymmetrical has a distinct luff and leech. The tack is always the tack, and both sheets are tied onto the same corner (the clew), just like a genoa. Second, the cross-sectional shaping is usually not uniform and semi-circular, as it would be with a spinnaker, but asymmetric. The position of maximum camber (draft), is likely to be forward of 50%. The sails typically have a rounder entry (luff) and flatter exit (leech).

How are they different from the cruising spinnaker we have all known and loved? (Flasher's, Thrashers, MPS, Gennakers, etc.)?

The geometry is basically the same. The difference is in the shaping. Modern asymmetricals use cross-sectional shapes which are asymmetric to varying degrees, in order to enhance performance at specific wind speeds and angles. Also, as shapes have been refined, the distribution of extra area outside the straight line luff and leech has changed. This allows the sails to be larger, and project more useful area at broad reaching angles.

How big are they?

Asymmetricals can be made in a wide variety of sizes, depending on the wind angles and speeds the sail is intended to perform best in. Standard spinnaker sizing parameters of maximum girth = 1.8 x JC (where JC is the length of the spinnaker pole), and SL (spinnaker luff) is roughly equal to the "I" dimension, are not really applicable. Asymmetricals are often much larger if the boat is equipped with a bowsprit, and the sail is optimized for broad reaching and running. The best way to calculate the area of an asymmetrical spinnaker is to use a formula like the Whitbread Area Formula. One way for PHRF to address the question would be to have the sailmaker calculate the sail's area using the Whitbread formula and stamp it on the sail. The sail would receive no penalty as long as the area was not larger than that of a conventional symmetrical spinnaker.

Area of conventional symmetrical spinnakers = SL (Luff Length) x (JC x 1.8)

Whitbread Area Formula

$$SAS \text{ (Sail Area of Spinnaker)} = TRIA + \frac{\{ACOR \times (SMG - SF/2) \times (SLU + SLE)\}}{3} + MHVC$$

$$S = .5 \times (SLU + SLE + SF)$$

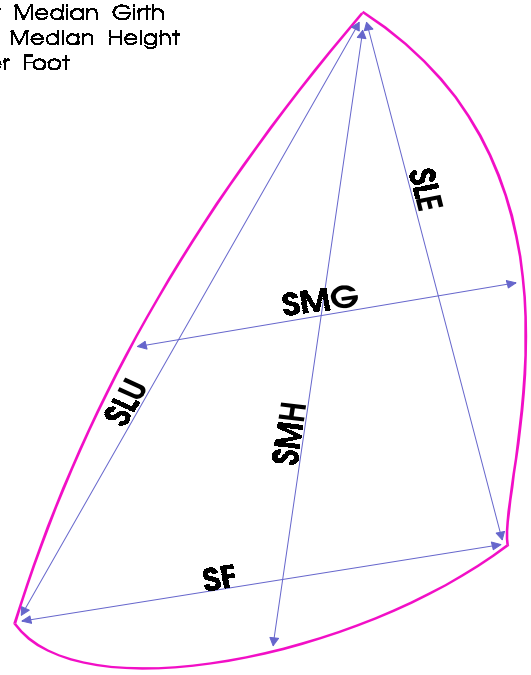
$$TRIA \text{ (Triangular Area)} = \sqrt{\{S \times (S - SLU) \times (S - SLE) \times (S - SF)}$$

$$ACOR \text{ (Asymmetry correction)} = \sqrt{\frac{SF}{SF^2 - (SLU - SLE)^2}}$$

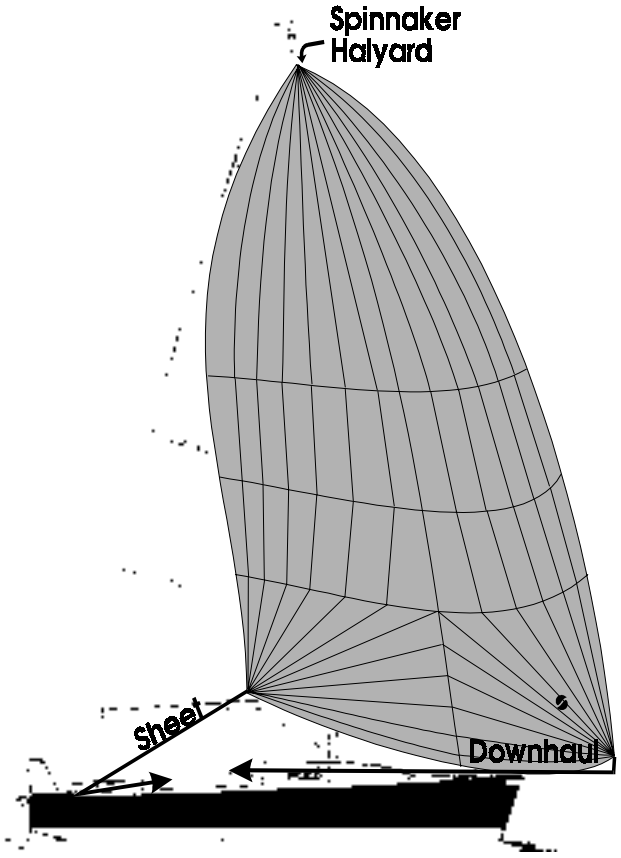
$$MHC \text{ (Mid-Height Correction)} = 2 \times SF/3 \times \sqrt{\{ SMH - (SLU^2 + SLE^2 - SF^2/2) \}}$$

The Asymmetrical Defined

SF * Spinnaker Foot
SLU * Spinnaker Luff Length
SLE * Spinnaker Leech Length
SMG * Spinnaker Median Girth
SMH * Spinnaker Median Height
SF * Spinnaker Foot



Basic Set-Up



How are they rigged?

An ASPINN is set on a spinnaker halyard, with sheets attached to the clew and led aft to blocks on the leeward quarter of the boat. The sheets are led in front of the headstay, and outside all running and standing rigging. For boats with a bowsprit, sheets can be lead either inside or outside the tack downhaul, depending on the preferred method of jibing. The tack is typically controlled by a short (3-6') pennant, or via an adjustable downhaul. The downhaul is usually led through a block at the base of the headstay or outboard end of the bowsprit, and then aft. Use of an adjustable downhaul, as opposed to a fixed pennant, allows for better control of the sail's shape.

Are two sheets necessary?

If you want to jibe easily, yes. When asymmetricals are marketed as "cruising spinnakers," they are often touted as needing only one sheet. This necessitates running the single sheet around the boat during a jibe; not a particularly elegant way to approach the problem. Sheets need to be twice the length of the boat.

Is a bowsprit necessary? What does it do?

A bowsprit will significantly enhance the performance characteristics of an asymmetrical spinnaker. It allows the sail to get further away from the blanketing effect of the mainsail. It also allows the sail designer to dramatically increase the girth of the sail, making a much larger spinnaker possible. Finally, a bowsprit makes handling, particularly jibing, easier. During a jibe the sail is less likely to run afoul of the headstay. If the bowsprit is long enough, the sail can be jibed inside the tack downhaul, between the downhaul and the headstay.

Can a normal spinnaker pole be used?

Yes. In fact many high performance mono-hulls like VOLVO 60's and BOC boats set their asymmetricals in a conventional fashion. An afterguy, running through the outboard end of the spinnaker pole takes the place of the tack downhaul. The use of a conventional pole allows the tack to be pulled to weather as the breeze moves aft relative to the boat, getting the sail out from behind the blanket of the mainsail. It makes an asymmetrical much more effective when broad reaching and running. Not all rule makers allow an asymmetrical to be used in this fashion; insisting that the tack be fixed on the centerline.

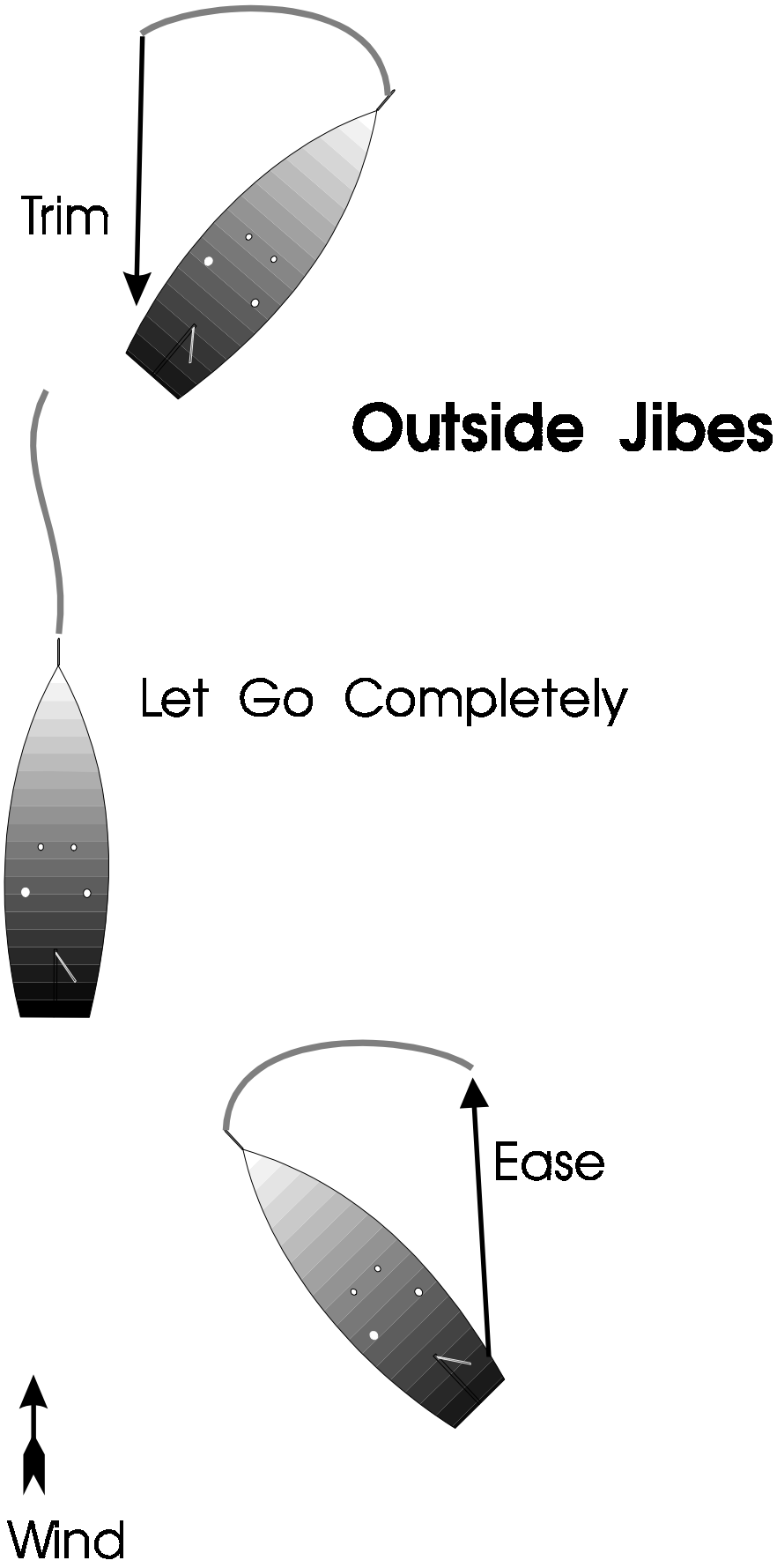
What is the best procedure for setting an asymmetrical?

It is easiest to set on a broad reach, where the sail will be blanketed by the mainsail. Secure bag just forward of the shrouds. Attach halyard, sheets, and downhaul, led as diagrammed. (Make sure halyard is outside and in front of the headstay). Pre-pull the downhaul so that the tack will be 3-4' off
the deck. Leave the sheet well eased, with wraps around the winch. Hoist rapidly. When the sail is fully hoisted, trim the sheet. You can use a spinnaker sock to keep the sail from filling while you hoist.

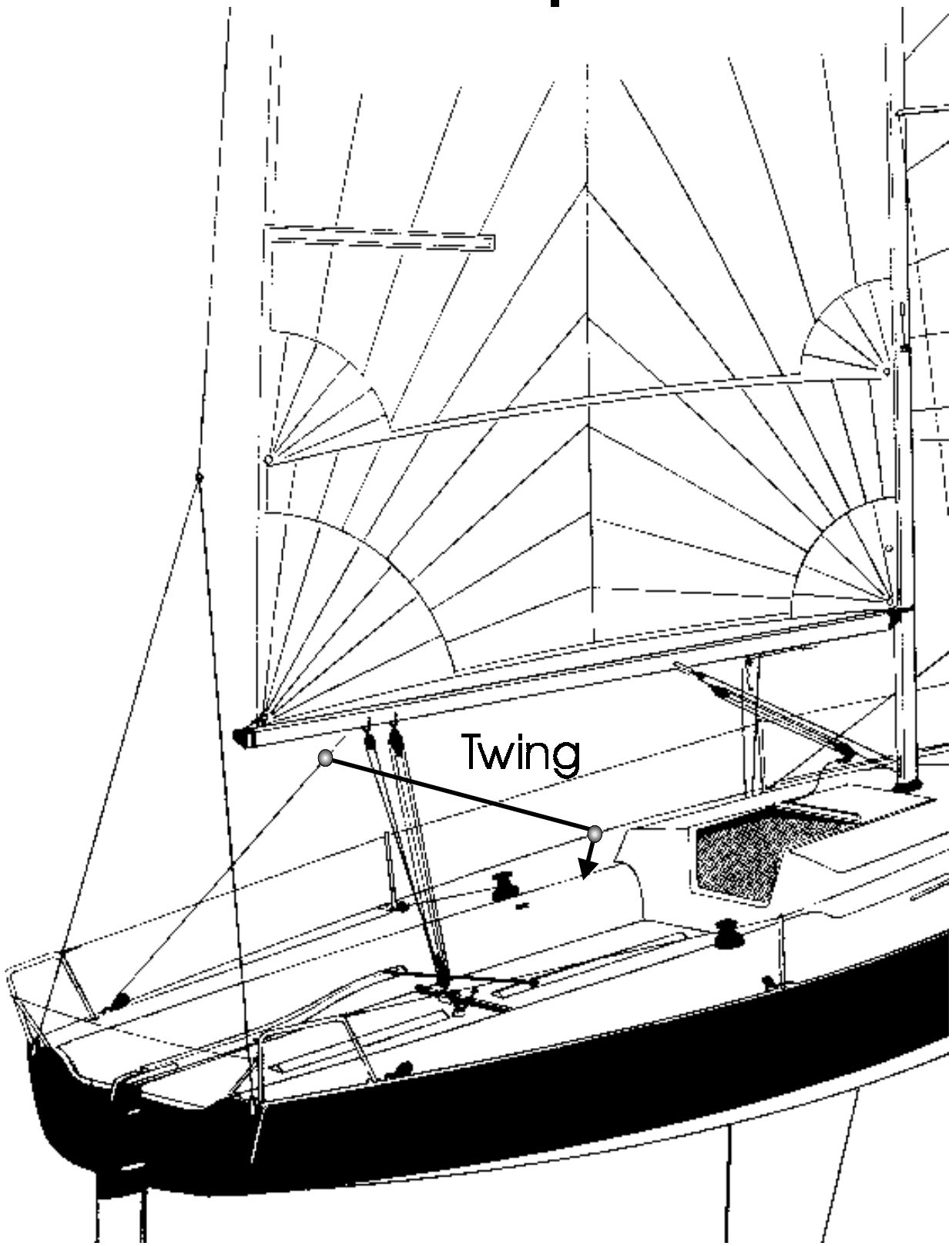
How is the sail trimmed?

Ease the sheet out until the sail luffs (curls) along the leading edge. Trim in just enough to stop luffing. A periodic curl is good; this indicates the sail is just on the edge of luff. As with all sails, over-trimming is the most common problem. When in doubt, let it out.

For reaching, tighten the downhaul to minimize luff sag. This will pull the camber (draft) forward and open the leech. The tighter the downhaul, the more genoa-like the shape. Though it is a function of breeze velocity and the designed range of the sail, in lighter winds you can use most asymmetricals as close as 50 degrees apparent wind angle. For running and broad reaching, ease the downhaul, allowing the tack to float up 4-6' off the deck. This will allow the sail to lift up, and the luff to rotate out to weather, away from the blanketing effect of the mainsail. It will also create a more spinnaker-like (symmetrical) shape. Another useful technique as you sail at


Trim
Outside Jibes
Let Go Completely
Ease
Wind

Twings Help Control Sail Shape



broader angles, is to "twing," or move the sheet lead forward. (see diagram). This keeps the clew from rising up and dumping off the leech, making the sail more symmetrical and powerful.

How deep (broad) an angle you can sail is largely a function of breeze velocity. The lighter the air, the higher the angle (closer to the wind) you will need to sail to keep the asymmetrical full and pulling. To find the optimum angle for a given breeze velocity, start with sail full and pulling and bear off slowly till the clew begins to droop and the sheet begins to lose pressure, then head back up till the sail is solid and fully pressurized. This magic edge changes with velocity. You will be able to sail lower angles in the puffs, but will have to head up in the lulls. If rules allow, you can sail wing on wing when running. A whisker pole is a big help sailing wing on wing. It will stabilize the sail, help it project area, and allow for a wider steering groove without collapsing the sail.

What about changing tacks?

Asymmetrical spinnakers are generally jibed, not tacked. Start with sail fully loaded. Bear off slowly, easing the sheet as smooth and fast as you can without collapsing the sail. The trick is to use the sheet pressure to get the sail out in front of the boat. If you don't get the sail eased out before the boat gets downwind, it will collapse and fall into the headstay. As the boat passes through dead downwind, release the old sheet completely and take up on the new sheet. The sail is jibed outside and in front of the headstay. If you have a long enough bowsprit, and it is blowing pretty hard, you may want to try jibing inside the tack downhaul. No matter which system you use, turn from a broad reach to a broad reach. Do not stop in the middle of the turn, or you will encourage the sail to get wrapped around the headstay. The lighter the air, the higher the reaching angle you will need to sail, both at the outset, and as you exit the jibe. In very light air, you may have to physically help the sail around the headstay.

How do you take them down?

Bear off to a broad reach, (10-20 degrees up from a dead-run is best). Grab the sheet just in front of the main boom. Release the downhaul completely and gather the sail behind the mainsail. Ease the halyard as fast as the sail can be gathered. Stuff the sail down the companionway hatch as you gather. Putting the sail in the bag later is easier than trying to do it on deck if there is much breeze. The sail can also be doused by releasing the sheet and taking hold of the foot of the sail directly, or the tack downhaul. A spinnaker sock can be pulled down over the sail first to keep the sail from blowing out of control during the gather. Release the sheet, and pull the sock down, then gather as described above.

At what wind angles can an asymmetrical be carried?

This is a function of design, materials, construction; and a function of breeze velocity. The flatter and more genoa-like (asymmetrical in shape) the sail is, the closer to the wind it can be carried. More symmetrical (spinnaker-like) shapes are used in larger, fuller sails, to optimize them for broad reaching and running. The trick is to strike the right balance for the intended usage, or to have several asymmetricals with different purposes. As mentioned in the section on trim, the lighter the air, the closer to the wind you will be able to sail, regardless of the design. Angles as close as 50 degrees apparent are not uncommon in under 9-10 knots of wind. The problem for most asymmetricals, particularly on conventional displacement mono-hulls, comes in 10-14 knots of breeze when trying to sail at broader angles, (more than 135 degrees apparent). At these angles and velocities the sail has trouble being blanketed by the mainsail. This is the range where having a spinnaker pole, and the ability to pull the tack to weather out from behind the mainsail, pays off. In more wind asymmetricals stay full and pressurized at broader and broader angles. On dead runs, an asymmetrical sail can really only be stabilized in a wing on wing configuration with a whisker pole holding the clew out.

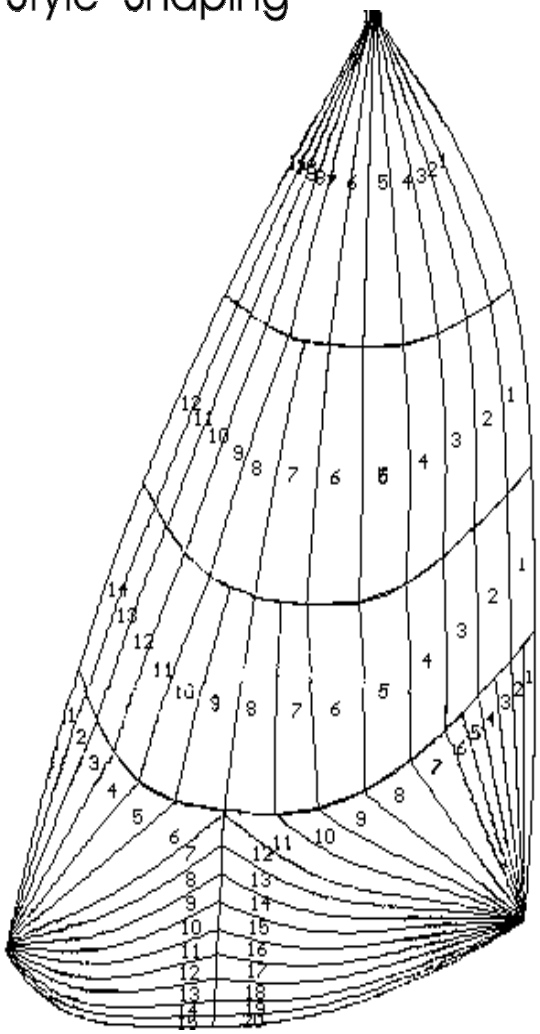
Is an asymmetrical as fast as a conventional spinnaker?

They are better reaching sails, but not as good when broad reaching or running. This means they work best on high performance monohulls or multihulls. These boats go fast enough to pull their apparent wind forward; effectively they are always reaching. On slower displacement boats, once the breeze is blowing between 10 and 14 knots true, they just don't go that much faster. This means that the apparent wind doesn't go very far forward, and that making the best VMG (speed straight downwind), is a matter of sailing at broader angles. Not enough extra speed is produced by sailing higher angles to make up for the extra distance sailed. This region can be seen in a boat's computer modeled speed prediction (or polar plots), and is referred to as the "downwind cliff." The lighter and faster a boat, the more breeze velocity it takes to reach this downwind cliff, the more time spent reaching at high apparent wind angles, the more effective an asymmetrical becomes. A bowsprit also helps, because the sail can be larger, and can be carried further away from the mainsail.

"Symmetrical" Style Shaping

Melges 24

Genoa Style Shaping



"Encore" Custom S&S 73
Code 5 Asymmetrical

SLU 28.96
SLE 26.8
SF 13.7
SMG 10.96
SMH 31.73

Design Range
14-25 apparent wind velocity
Inside 95 degrees apparent wind angle