

## **SAILORS TIPS**

**Subject:** Mainsail Trim, close hauled.

James asked me to write another article, so I thought I would write about Mainsail Trim this time. I will try to keep it in general terms, but some technical terms will have to be used to describe certain points. Also I will state up front that trimming a mainsail is somewhat personal and relates to the characteristics of the boat; so not every one will agree to what I have to say. So whatever works best on your boat, that's the thing to use!

There are many adjustments to the mainsail that is why it is the hardest sail to trim. Knowing what each adjustment accomplishes is Absolutely Necessary in fine-tuning the sail.

Lets start with raising the mainsail with the mainsail halyard. Tighten the halyard till the wrinkles are pulled out. The Halyard tension along with the Cunningham, and Outhaul determine primary the location of the maximum draft fore & aft (normally about 40-50% back from the luff). The sail maker also has a big input into the amount of draft and twist of the sail when he makes it. Basically you can only work with what he has given you. Draft is the percent of depth in the curve of the sail in reference to the length of its chord. You divide the depth (inches) of maximum draft by the length of its chord (Chord, the length of a line (inches) from the luff to the leach) times 100, which equals the percent of draft. Draft of a mainsail varies based on the wind pressure or wind speed expressed as knots. Normal draft in light air (less than 10 kts) is about 10% to 15% (there are some different theories on this). As wind pressure increases, draft is reduced. The outhaul controls the lower portion of the draft in the mainsail (increased outhaul means less draft) and the mainsail sheet, controls the upper portion of the mainsail draft by controlling the leach tension (increased tension means more draft).

Pull the Headsail inward till it starts to slow the boat or starts to back wind the Mainsail. Set the boom about 6-8 inches leeward of the backstay. Raise or lower the boom by adjusting the boomvang, boomkicker, or mainsheet and traveler. Adjust the boom until the twist in the Mainsail causes the tell-tales attached to the aft end of the top two battens to fly straight aft. This tells you that the Headsail and Mainsail are operating together and the slot between the sails is set about right. The slot or opening between the two sails must be correct to maximize the Venturi effect. Further Mainsail trim will depend on your boats performance and by trial and error.

Why is twist so important? Wind as it flows across the water is slowed by friction near the surface of the water. Wind at the top of your mast is not encumbered by this friction, and thus is moving faster. With the boat speed the same, but with increased wind velocity at the top of the mast verses at the bottom of the mast, the apparent wind angle at the top of the mast shifts aft a few degrees. Thus, with out twist at the top portion of the Mainsail, the sail will stall on the out side of the sail loosing valuable forward drive.

Another reason why twist is so important is a look at the force vectors on the outside of the Mainsail. A force vector is a force represented by a line in a certain direction and its length representing its strength. Draft is the driving parameter of a sail going to windward. When wind hits the sail at the correct apparent wind angle, forces are developed on the inside and by Venturi effect on the outside of the sail. The strength of these force vectors is determined by the draft or curve of the sail. They are not equal along the length of the sail (fore to aft), but have greater strength at the forward third of the sail since they are perpendicular to the curve of the sail and the sail curves forward more & more near the mast. The aft third of the sail if it curves inward too much, can actually retard forward drive by the force vectors pointing slightly aft. You can bring the boom in line to the backstay in some cases, but a decrease in forward driving force may be noticed.

Mainsail trim takes a lot of practice with a trial and error approach to achieve the desired effect. Don't think you can accomplish it in one afternoon of sailing. After about 50 years of sailing, I just improved it again this year. Is that a slow learner?

Happy Sailing

Thanks John & Billie

PS: I changed my jib sheet knots from Bowlines to a Pedigree Cow Hitch. They seem to catch less on the shrouds.