Cal 25 Headstay Tension Experiment & Analysis

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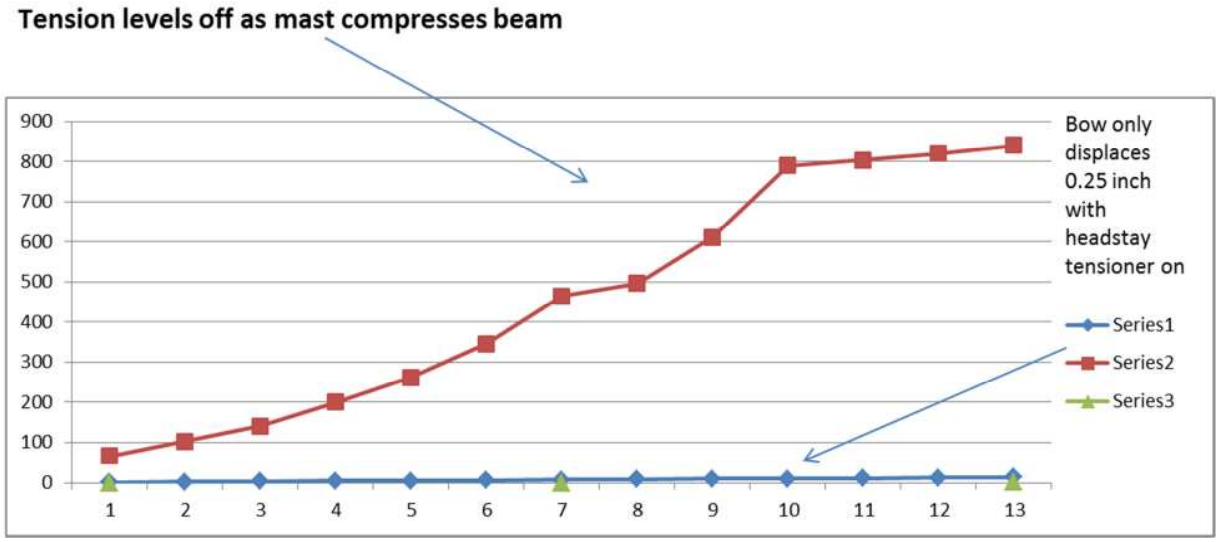
With our boats getting older the assumption is that it becomes progressively harder to generate a reasonable level of headstay tension. A question that is frequently discussed is when the boat is loaded up, does the mast beam give or does the hull actually bend like a banana? Many of us are replacing the mast beam as the old ones soften up but is this likely to solve the problem? My boat has never had the mast beam replaced so I did the experiment in order to learn more about what actually happens when we load up these boats. The attached analysis should shed some light on this subject.

Remember that headstay tension controls the curve of the headstay and therefore the shape/draft location of your genoa. The genoa luff curve can be cut to match up to a very straight headstay or one that has more sag to it, so higher headstay tension and therefore a straighter headstay may not be what is needed in order to get the best performance from your headsail. The wind velocity and sea state should be the factors that are considered in order to decide what setting works best. When the wind is higher and the waves build and the boat begins to pound through the waves, the headstay will alternately load and unload. This will result in the sail shape changing continuously which is detrimental to boat speed and pointing angle. In these conditions, higher headstay tension is an advantage as it will minimize the headstay pumping and maintain your sail shape.

Headstay Tension Test 9-Nov-14				
Tension	**Tesnsioner Position (5 inch Increments)**	**Loo's Gage Reading**	**Headsaty Tension (LSS)**	**Vertical Displacement (Inches)**
Full Off	1	9.0	66.4	0
	2	14.0	103.3	
	3	19.1	141.0	
	4	24.0	200.0	
	5	27.9	262.9	
	6	31.0	346.2	
	7	33.9	464.9	0.125
	8	36.2	496.5	
	9	38.1	611.6	
	10	39.5	790.0	
	11	40.2	804.0	
	12	41.0	820.0	
Full On	13	42.0	840.0	0.25
			Red	Blue



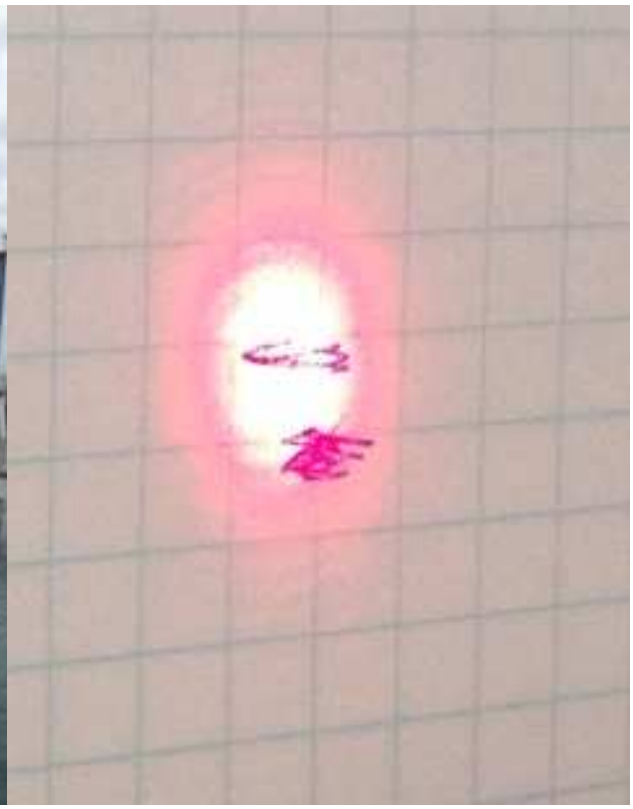
Conclusion: You can see that at about 800 lbs something begins to give and the headstay tension does not increase at the rate that it did in previous adjustments.

Since the bow displacement only changes by 1/4 inch, I assume that it is not the entire hull curving and that it's the mast base pressing into the boat.

DOE

- Laser was mounted on the outboartd and pointed at the the bow of the boat.
- Graph paper was hung from the the inside of the forepeak as far forward as it could be hung. (less than a foot from the bow)
- The back stay tensioner was marked off in 5 inch increments at the tail end.
- 13 readings on the loos gages and on the graph paper were taken with progressive tension added on the backstay tensioner.

Loo's Gage on headstay



Laser on graph paper in bow of boat

http://www.cal25.org/2015/01/06/cal-25-headstay-tension-experiment-analysis

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