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Landenberger Tuning Tips – Mast Setup

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Over the past few seasons it has become quite clear that many people who have been experiencing speed or power problems have had little basic knowledge of what they can do with the mast settings. It is clear what to do with the cunningham, simply pull on it to get the pressure out of the sail as you need, but often the mast is left unattended to, as a last priority. In fact it is one of the most important speed controls on the boat. It is important to understand how to use it, and what you want to have in the sail shape for different conditions. It is not so easy to just come up with numbers and angles that will suit every mast and sail so I will try to make some key points to help understand this correctly.

The more pre bend set in the mast the more effect mast rotation has on the sail shape.

The effect of the spreaders means that the more the mast is rotated backwards, the more the lower mast section can bend forward (in the direction of the boat) and the stiffer the top section becomes. Leaving the cunningham tension out of the discussion at the moment, the result would be that the sail becomes flatter in the bottom and fuller in the top.

Rotating the mast more forward allows the spreader to start to work and the lower mast section becomes stiffer in the forward direction and the top becomes softer backwards. The result is the sail will become deeper in the bottom and flatter in the top.

Cunningham pressure flattens the sail and will tend to flatten the top more than the bottom since the top of the mast is unsupported and more free to bend.

Understanding the sail shape that works best in the differing conditions is then very important. For example in Flat water you would like to have a very even profile through the sail from top to bottom with good power in the top and the possibility to pull the mainsheet quite hard without stalling the back of the sail. On flat water you can sheet hard and point higher. By wave conditions you would want good power down low in the sail and have the top more open and twisted. This gives you power and the twisted top allows the boat to accelerate easily letting you steer around more and power the boat through the waves easier. Generally you can't point as high as the boat on flat water but because of the waves you can achieve a much better VMG (velocity made good).

The typical example is that with increasing wind the sailor will pull the Cunningham hard but not adjust the mast rotation to go with it. The effect of the Cunningham is flattening the sail, but more in the top. This allows the leech to open. The boat may feel ok but often the leech is too open and you can't point high enough. This setup can be good in big waves but on flat water the sailor would like to have the leech standing much straighter so they should rotate the mast further back. If you go back to our original points you can see that the mast becomes stiffer in the top and can bend more in the bottom. This is therefore powering up the top and flattening the bottom of the sail. With the Cunningham pressure you can sheet

on hard and point high with good speed.

The other typical mistake which occurs, is that the sailor by strong wind, simply pulls the mast back in line with the boom and pulls full Cunningham pressure. Because the mast rotation is too far back the sail becomes too full in the top and too open in the bottom. The sail will have a lot of twist which some sailors think is good for strong wind, but because of the top of the mast reaching its maximum stiffness in the aft direction of the boat the sail will remain too full in the top. The end result is a sail which is twisted to far and with too much profile for the strong wind. The twist causes you to loose pointing ability and the depth is causing excessive drag, just slowing you down. You are in effect going slower and lower than the correctly trimmed boats.

Spreader rake is also another significant factor in setting up you rig. It also plays a part in how much the rotation angle affects the depth of the sail. That can be a whole subject of its own, so for now I make just a few comments. Try to think of pre-bend as controlling the position the mast takes its bend. The more pre-bend you make in the mast the lower the mast likes to bend. The lower the mast tries to bend the straighter the top section becomes. The flatter the pre-bend the more the top section tries to bend. The normal reaction of sailors is to increase the pre-bend for strong wind to flatten the sail and reduce it in light wind to increase power. Principally that is correct, but it must be incorporated with the rotation to get the right balance in the sail. Like most things, too much or too little can be harmful. It is a great failure made by many sailors to flatten the spreader angle to far reducing the pre-bend in the mast to almost straight. For light wind this is doing more harm than good. The heavier sailors also often request more luff curve because they are looking for power. With more luff curve and flatter spreaders light wind speed can quickly come to an end. The sail will become very full down low with a deep entry angle from the mast and a very closed leech section. When you get the first wind in the sail you may get a feeling of power, but you may also experience the boat just wanting to fly a hull but not wanting to go easily forward. The boat will not point and will not accelerate.

In many cases it is actually better to go the other way. By very light wind you can increase the pre-bend to open the lower part of the sail and reduce the entry angle of the sail behind the mast. With the rotation angle set correctly to get the head standing up just the right amount you can be very fast. Just remember flat is fast and deep is slow. It has a lot more to do with entry and exit angles of the sail to achieve height and power.

Amongst sail makers there are many different ideas, and history has proven that there are many ways to build fast sails. The most important thing is that the sailor can understand how the sail should work and manage it well. Also restrictions on materials and designs in the boats themselves change the way the sail has to work to achieve the best results. We design our A class sails to allow the mast to be rotated well back. The reason being, that the mast itself creates a lot of profile over the rig and therefore it is very important to be able to reduce the wind age over the mast by rotating back as the wind increases. At the same time the sail must flatten rather than get fuller. That is the secret to success.

Good sailing.

Landy