

DN Const <mailto:edatkeson@earthlink.net>
Sender : Ed Atkeson, edatkeson@earthlink.net
Dated : December 22, 1999 at 09:56:07
Subject: Re: About this bendy-ness thing...

A. Brown:

>>> I do not own a DN, but I've considered buying one before. What I am wondering is what is the purpose behind having the runner plank and the mast so bendy? How does that make for a faster ice yacht? My gut reaction would be that all the flex would absorb potential forward energy instead of utilizing it. This must be wrong since everyone has flex in their rigs, but I don't get why.

Dear A.

Hmmm, I'm on thin ice here, I'm not the expert, but some thoughts:

I think the main advantage of flexibility in the DN design is not having to change your underwear as often.

There's two things, 1.) The DN is so small and lightweight, you need the flexibility for control and some small measure of comfort. 2.) A flexible mast makes you go fast because of the improved sail shape it gives you.

It's good that the plank is springy, you get a slightly less terrifying ride. These things go 60 over bumpy ice without upsetting. If the plank was rigid, the whole boat would jump whenever the runner hit a bump, the runners would be off the ice half the time, you'd have a lot less control of the boat. If ice was perfect, the DN would probably have a stiffer plank.

If the plank was stiff the boat would blow over quicker in a puff. Some of the energy of a puff is absorbed by the springy plank, letting the boat tilt a bit to windward, dumping some wind, letting you stay on course instead of dealing with a sudden hike.

From what I've heard, boats with bendy masts seem to want stiffer planks, the energy is absorbed by the mast. And this is where I think you're right: if everything is flexing too much you won't go as fast.

The masts used to be stiff. The bending happened by accident. Someone noticed that you go like hell just before your wooden mast turns to splinters.

What mast bending does is it flattens the sail. The DN goes fast because of high speed apparent wind going over the sail. There's an airfoil effect -- picture an airplane wing turned on its end. Normally, it's not humanly possible to pull the sail tight enough to get rid of the belly and twist in the sail enough to get the optimum airfoil shape. When the mast bends, you get a curved leading edge, but a better airfoil cross section of the sail, which I guess, really puts you back in the leather.

There's another comfort factor here, you don't have to pull so hard on the sheet to get a good sail shape.

When you're already going fast, and get hammered by a puff, the mast bends sideways below the hound, lowering the center of power of the sail, making you go forward rather than hiking you up.

Have I got this right?

Ed A

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Dated : December 22, 1999 at 15:23:04
Subject: Re: About this bendy-ness thing...

I can't profess any true knowledge about the what really is happening in an iceboat, but having said that, I think we can frame out the arguments and let others fill in what they know about this bendy-ness thing.

1. Mast bend: there are two functions that seem to be served by a bendy mast: A. when the middle of the spar sags off to leeward it takes a good deal of twist out of the sail, causing a noticeable improvement in speed and pointing. (very significant) In many conditions, the first person to get the spar out of column is way out in front. B: Gust Onslaught: Nobody has the reaction time to ease a sheet on the ice, The rig must self adjust (largely) in order to absorb the loading from a gust.

2: Plank bend: Again, part is for absorbing gust energy, part is from tradition, and part is it just feels right. There are more and more sailors competing with stiffer and stiffer planks, but plenty of fast sailors with limber planks. There may be an argument that a looser hull & plank may attenuate the modulation in the sail, caused by ice imperfections, increasing lift and perhaps a decrease in drag.

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DN Const <mailto:braden@brown.edu>
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Dated : December 22, 1999 at 22:26:34
Subject: Re: About this bendy-ness thing...

A Brown wrote:

What I am wondering is what is the purpose behind having the runner plank and the mast so bendy?

If an iceboat with a bendy plank goes over a bump, the runners go up and down, the hull stays level. With a rigid plank, the hull would be forced to move up and down as well, wasting even more energy.

The mast bend can be controlled -- more bend, flatter sail, less power but less drag for high wind; less bend, fuller sail, more power and more drag. See Think Ice for details of factors influencing mast bend.