

## Camber, the Johanna way.

A discussion of *Hows* and *Whys* around the barrel-cut cambered panel junk sail



*Malena*

*Johanna*

*Samson*

*Broremann*

Over the years I've received a number of questions (expressing worries) about the cambered panel sails I have designed for boats like *Malena*, *Johanna*, *Samson* and *Broremann*. All of these sails have got their cambered panels from the so-called barrel cut method.



The paper template for *Broremann's* lower panels. Note the rounding along battens; the barrel shape.

### Sail material.

One misunderstanding which almost has grown into a dogma, is that the barrel cut method only will work with very elastic sailcloth. This is not so. The blue cloth used on *Johanna* is quite stretchy diagonally, but not to any abnormal degree. It is definitely not a sort of

navalised Lycra! Some years ago Don Taylor sent me a sample of the Odyssey III cloth and I found it to be just as stretchy as my blue cloth. In fact, when studying both cloths under a magnifying glass, it appeared to me that they were woven in the same way. In both cases I found them impossible to rip with hand force.

The German yacht *Peregrine* has a big JR with barrel cut panels. AFAIK it has been made from ordinary Dacron sail cloth, not very light either. That boat sails very well.



In *Peregrine's* sail there are not many wrinkles along the battens. I think Sebastian has stretched the sail a bit more along the battens than I do. This limits the camber a bit, but also makes the vertical curve more trapeze-like than in my sails with slacker setup. We had a hard time overtaking *Peregrine* in *Johanna*...

### Vertical curve.

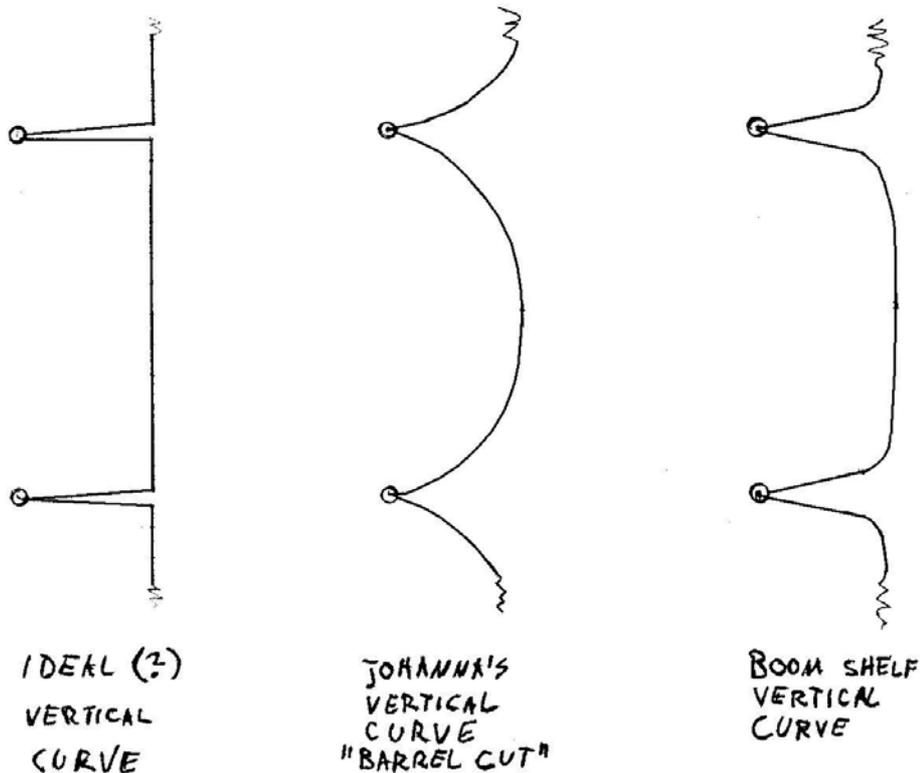
One argument I often hear against the barrel cut method is that one only gets the designed camber on a little spot mid-between the battens.



**Broermann's barrel cut panels**



**Kingfisher 26, boom-shelf cut panels**



The diagram above shows the curves at the vertical cut through the max camber point in 3 different sails.

When I made the first barrel-cut sail for *Malena*, I too was concerned that only a part of the sail area would actually be working. I already had experience with a flat sail and hinged battens sail (same size), so was curious about how this one would compare. I needed not have worried; the cambered panel sail was at least as fast to windward as the hinged batten sail. One may think that the reason for *Malena's* and *Johanna's* success is mainly the high SA/disp ratio. Not so with the schooner *Samson*. Despite having a SA/disp of just 13.3 she has proven to be a good sailer, even in fairly light winds (F3).

I can't prove it yet, but my hunch is that this is what is happening at the barrel-cut panels:

- Close to the luff, the *Johanna*-style batten panels indeed have a trapeze shape with a very narrow groove at the battens. The incoming wind will thus see an almost uniform leading edge. In other words, the angle between the incoming wind and leading edge is almost constant.
- The same happens at the trailing edge: The vertical curve between the battens is nearly straight (trapeze or rectangle). This forces the air to leave the sail with the same angle of departure.
- I'm not sure what happens in the middle (max camber position), but my hunch is that the viscosity of the air ensures that the air passing over the groove more or less takes the same route as the air passing over the hump. By the way; there is no guarantee that the wind will just pass along the batten panels – it may well pass diagonally for what I know.

The key thing in my opinion is how the wind enters and leaves the sail. My telltales at the leech definitely indicate a healthy airflow across the sail (until I stall it by over-sheeting it), but I see now that I should also fit telltales at each batten, not only at the middle of each

panel, as today. If these extra telltales indicate a nice airflow, then I declare that the whole sail is working.

In real life I don't want more total force out of *Johanna's* sail than I have today. With today's setup with 8% camber (or should I say "8" ?) and a SA/disp=23, I can carry almost as much sail upwind as downwind. If I increased the camber, I would have to reef earlier when close-hauled and then I would have to un-reef each time I fell off to a run. With my sort of sailing, in and out among islands, that would be quite awkward. I could however use a more close-winded rig, but am unwilling to pay for it in money or trouble (read: carbon mast or wing sail).

Nothing negative on the boom shelf method: It may well give at least as powerful sails as the barrel cut method and it may also end up looking better. But *amateur-friendly* the boom shelf method is not. Sewing straight edges to curved ones isn't easy.

## Conclusion

Most methods of making camber seem to work somehow. The important thing if one need better progress to windward is to say goodbye to the flat sails.

Stavanger, 20091119

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.. winter is when the Fuji heater is back on board. That happened last week so now I am ready to fry flies on the walls again...