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Competition

How to compare the competition

Performance wise.

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How to compare the competition

Performance wise: Main measures that tell it all: the easy ones

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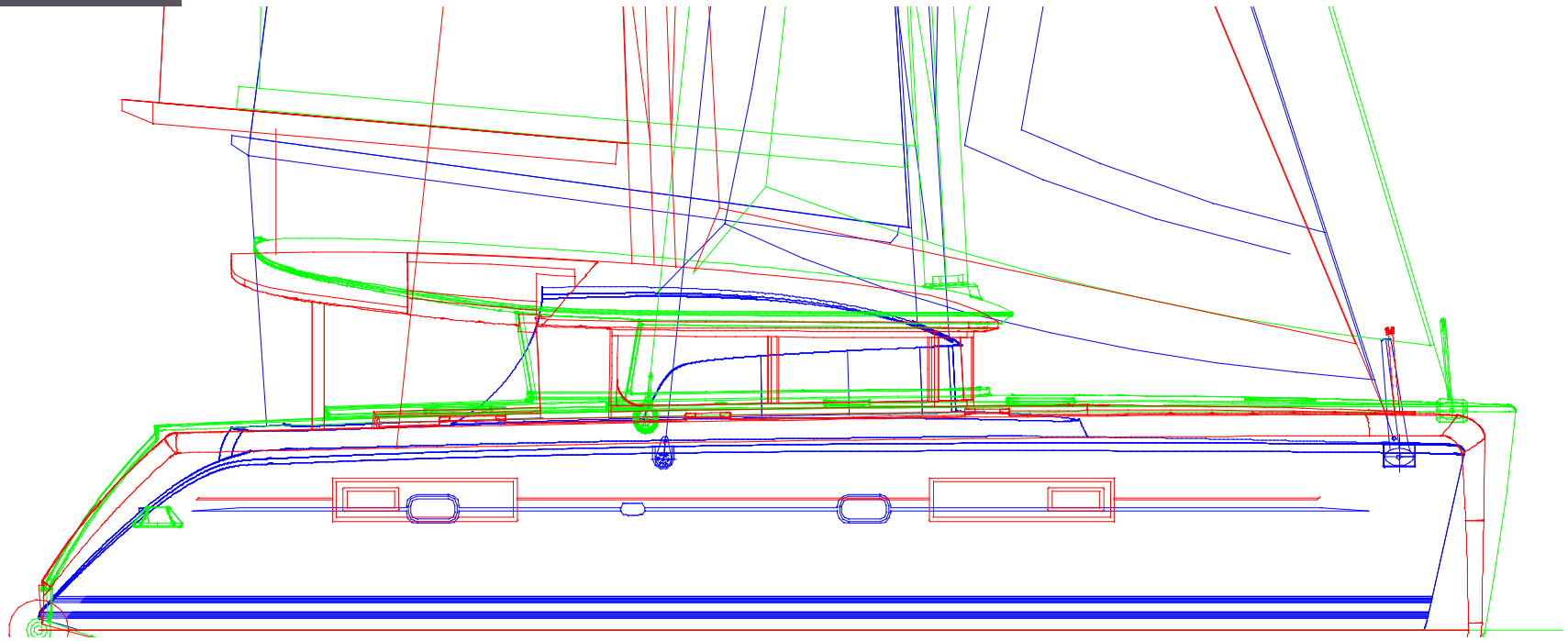
The longer the better



Hull LWL Vs LOA is major: it is best if it equals 1, i.e.: LWL=LOA

LWL is THE naval architecture best speed capacity criteria

On displacement hulls (all cruising cats without foils), Theoretical Max Speed is given by a fomula:

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This is a base

Some parameters will help exceeding these numbers

Some others will bring them down

Hull speed in knots = √((LWL x g) /(2 x pi)) x 3600/1852

LWL	Hull speed	LWL	Hull speed	LWL	Hull speed	LWL	Hull speed
11,00	8,06	14,00	9,09	17,00	10,01	20,00	10,86
11,10	8,09	14,10	9,12	17,10	10,04	20,10	10,89
7,30	6,56	14,20	9,15	17,20	10,07	20,20	10,92
7,40	6,61	14,30	9,18	17,30	10,10	20,30	10,94
7,50	6,65	14,40	9,22	17,40	10,13	20,40	10,97
7,60	6,70	14,50	9,25	17,50	10,16	20,50	11,00
7,70	6,74	14,60	9,28	17,60	10,19	20,60	11,02
7,80	6,78	14,70	9,31	17,70	10,22	20,70	11,05
7,90	6,83	14,80	9,34	17,80	10,25	20,80	11,08
8,00	6,87	14,90	9,38	17,90	10,28	20,90	11,10
8,10	6,91	15,00	9,41	18,00	10,30	21,00	11,13
8,20	6,96	15,10	9,44	18,10	10,33	21,10	11,16
8,30	7,00	15,20	9,47	18,20	10,36	21,20	11,18
8,40	7,04	15,30	9,50	18,30	10,39	21,30	11,21
8,50	7,08	15,40	9,53	18,40	10,42	21,40	11,24
8,60	7,12	15,50	9,56	18,50	10,45	21,50	11,26
8,70	7,16	15,60	9,59	18,60	10,48	21,60	11,29
8,80	7,21	15,70	9,62	18,70	10,50	21,70	11,31
8,90	7,25	15,80	9,65	18,80	10,53	21,80	11,34
9,00	7,29	15,90	9,69	18,90	10,56	21,90	11,37
9,10	7,33	16,00	9,72	19,00	10,59	22,00	11,39
9,20	7,37	16,10	9,75	19,10	10,62	22,10	11,42
9,30	7,41	16,20	9,78	19,20	10,64	22,20	11,44
9,40	7,45	16,30	9,81	19,30	10,67	22,30	11,47
9,50	7,49	16,40	9,84	19,40	10,70	22,40	11,50
9,60	7,53	16,50	9,87	19,50	10,73	22,50	11,52
9,70	7,56	16,60	9,90	19,60	10,75	22,60	11,55
9,80	7,60	16,70	9,93	19,70	10,78	22,70	11,57
9,90	7,64	16,80	9,96	19,80	10,81	22,80	11,60
10,00	7,68	16,90	9,99	19,90	10,84	22,90	11,62
10,10	7,72	17,00	10,01	20,00	10,86	23,00	11,65

LWL in meter
g is gravity = 9,81
pi = 3,1416…

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How to compare the competition

Sail Area

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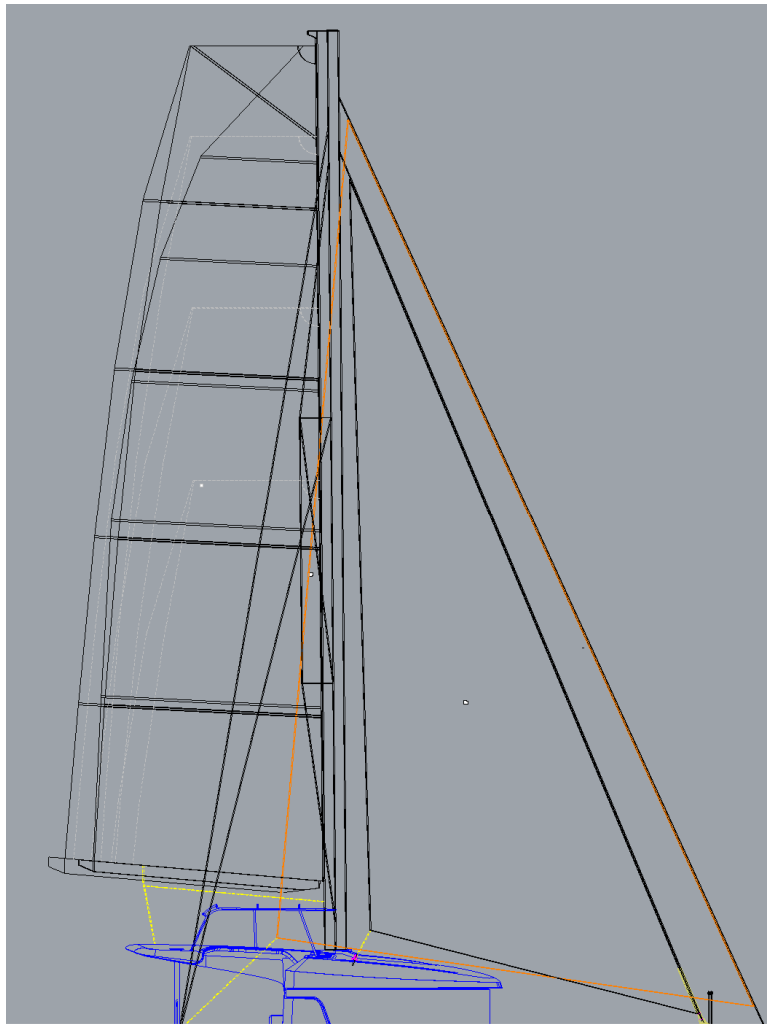
The most, the best

But

The best thought-out
The most performance



Sail area is obviously a major criteria

It shall be considered through various points of view:

- Overall upwind sail area (standard & option)
- Downwind sails options (what sails and which area)
- Balance between Main & jib
- Aspect ratio (Main & Genoa/jib)
- Main sail roach
- Ease of use (trim, reduce, manoeuver)

The combination of these parameters must result in a fair compromise: a cathedral of sails so complicated to use that it is most of the time poorly trimmed is not a sign of performance

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How to compare the competition

Displacement

EEC Displacement

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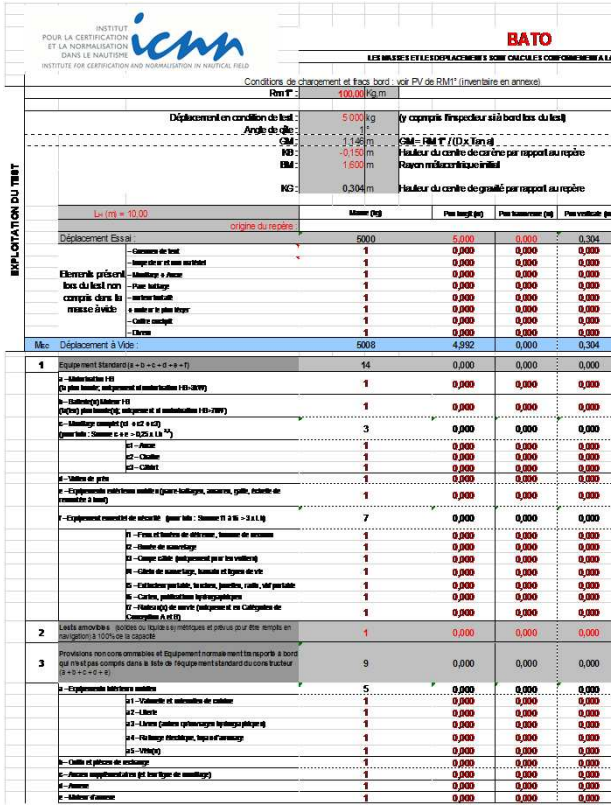
Make up your mind!

Check what is counted

Compare with available ratios

Look at sailing real performance



Lagoon will not cheat

- 3 EEC measures:
  - Empty DSPL: M_{EC}: mobile parts are removed, but to what point?
  - Light DSPL: M_{LC}: Minimum displacement ready to sail: the measure Lagoon is providing
  - Loaded DSPL: M_{LDC}: All the options + max crew capacity: unrealistic number that provides the **PAYLOAD**: how much a boat can be loaded above Light DSPL
- We will provide a M_{EC} for Dealers to compare with competition
- Some competitors cheat with the GRP/Wood weight
- When comparing competition check HL/PL and B/L: if the first one is lower and the second higher than the compared Lagoon, there is very little possibility that the competitor is lighter, unless they use carbon and/or epoxy

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How to compare the competition

Displacement

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EEC Displacement

Lagoon will help you compare but will remain within M_{EC} limits

Displacement		380		400		42		450S		450F		
Empty	M_{EC}	7 304		11 136		11 437		14 089		14 324		235
Light	M_{LC}	8 057	9%	11 940	7%	12 228	6%	15 001	6%	15 195	6%	194
Loaded	M_{LDC}	11 016	27%	16 590	28%	16 946	28%	20 833	28%	20 946	27%	113
Payload		2 959		4 650		4 718		5 832		5 751		

Remember

Some competitors

Do provide

Wrong GRP/Wood weight…

PERFORMANCES³

How to compare the competition

SA/DSPL

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Compare apples & apples

Be suspicious

Use the following presentation to fine tune YOUR SA/DSPL

THE number everyone loves…
..to bullshit about!

Now that we have an accurate SA and a trustable DSPL…

- Neutralize the units:
  - If Sail area is 100m² and DSPL 15 tonnes SA/DSPL is not just 6,67 m²/tonnes: the real formula is:

    → $\sqrt{SA} / \sqrt[3]{DSPL}$

    Where:
    - SA = Sail Area in m²
    - DSPL= weight of the boat in kg / sea water density in kg/m³
    - Sea water density is 1024kg/m³

    So the 6,67m²/tonne become 4,08
  - If you keep the units, a cheat of 10% in the weight of the boat results in a 10% change in the SA/DSPL m²/tonnes while neutralizing the unit show a change of only 3,3%
- Do not compare boats more than 2’ apart: it is not linear
- Do not take for granted odd numbers
- Never forget: it is one of many parameters

PERFORMANCES³

How to compare the competition

Beam Max

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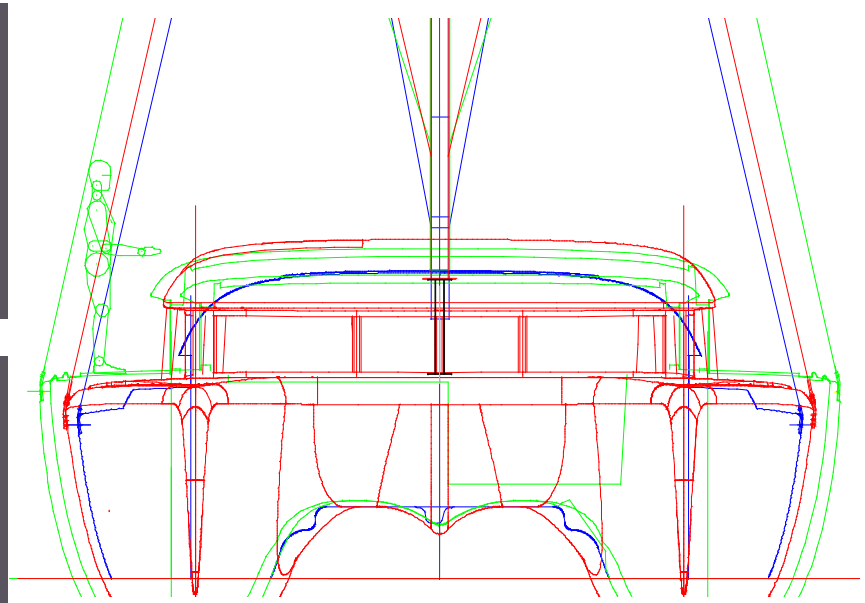

Beam is the wisdom of compromise!

- Beam is comfort and weight
- Beam is stiffness and stress
- Beam is large gangways and marina expenses

Beam also means distance inside the two hulls:
→ According to VPLP avoiding collision between the two wakes of each hull is a major performance point

Be wise: be wide!

Watch out!

Beam and weight are close friends

Lagoon catamarans are the beamiest of their size Vs competition

But

VPLP uses moderation to avoid too much weight and stress.

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How to compare the competition

Hull sections below LWL

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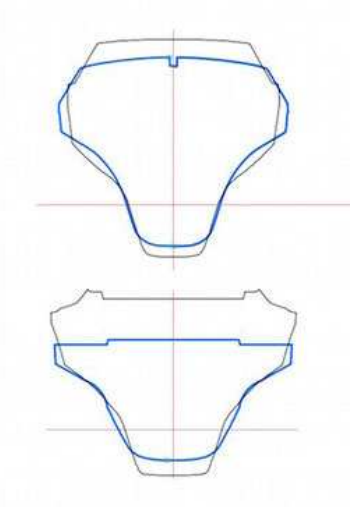

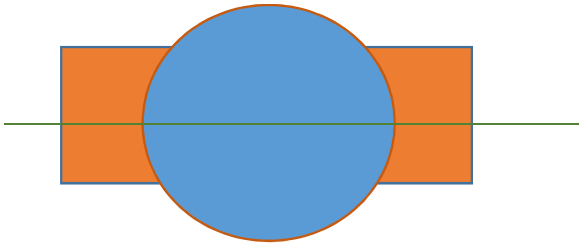

For a given Displacement

- A circular section will provide the minimum wetted surface area …and the smallest accommodation
- A rectangular section will provide the maximum wetted surface area…and the largest accommodation

→ The good designer is the one who finds the best compromise

- There are other parameters related to this:
  - → Max hull depth
  - → Max BWL
  - → Best ratio Keel volume Vs Hull volume
  - → Etc.

It is not an option to choose between King size bed and performance:
we want both!

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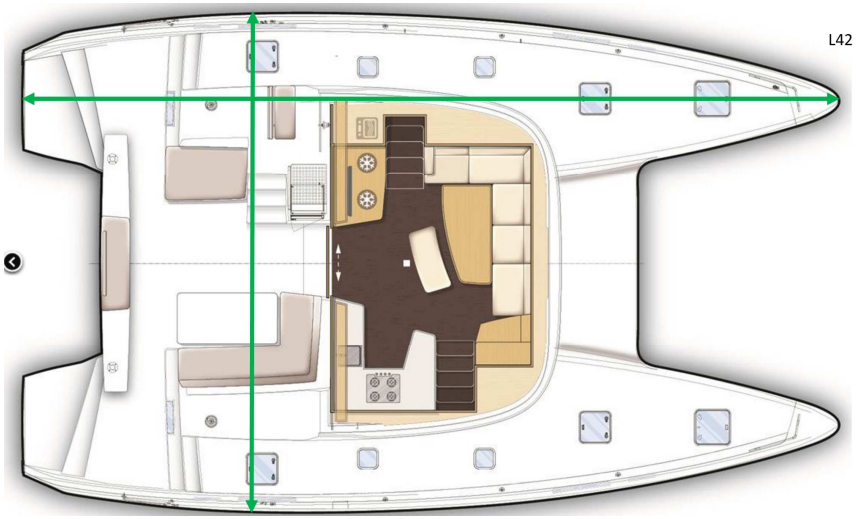
How to compare the competition

B/L

How large is the Tennis court?

- Very simple measure that should be taken on similar Hull length
- It shows
  - Lateral stiffness
  - General accommodation capacity (to be considered together with HL/PL & BxP)
- High numbers mean more GRP
- VPLP advices to keep a large number not only for stiffness but also to have floats as apart as possible (interacting wake reduction)



To compare with similar hull length

Remember:

Large B/L = weight
Large B/L = good hydro
Large B/L = VPLP choice

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How to compare the competition

Hull Length Vs Plateform Length: HL/PL

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The higher the better!

Easy to get ratio

straightforward

True teller

Small HL/PL means
GRP weight
Wood & accommodation weight
More pitching
More slamming
…more accommodation

→ Anything below 1,40 is performance killer
→ Bali with values around 1,15 are obviously too heavy for good performance

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How to compare the competition

Hull Length Vs Plateform Length: HL/PL

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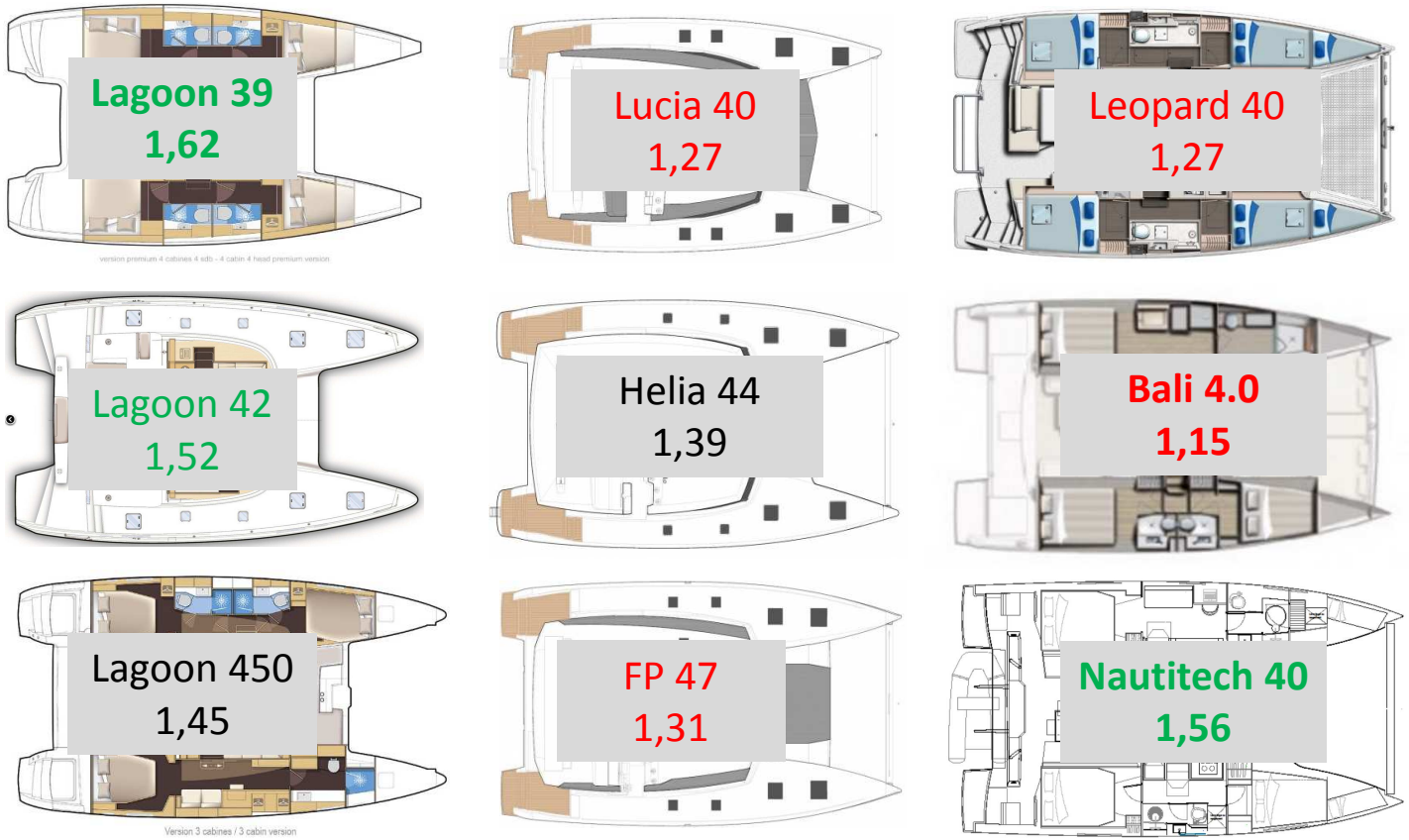

Fountaine Pajot HL/PL very Low – last ones worse

R&C below 1,3

Bali close to a risky 1!

Nautitech is good

Outremer 45 best: 2 !

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How to compare the competition

B x P

Comfort Level Indicator

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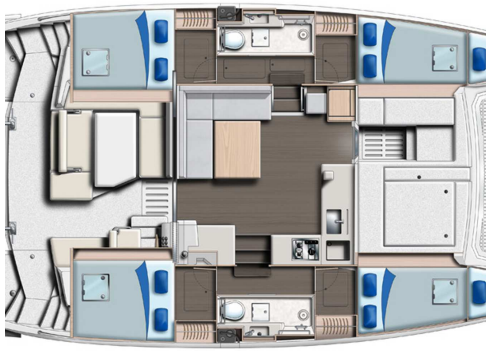
- Easy to measure on a brochure
- Clearly tells you about how roomy the boat is
- Big numbers mean heavy boats



Accommodation teller

Displacement teller

Where Naval Architects and Interior Designers will never agree!

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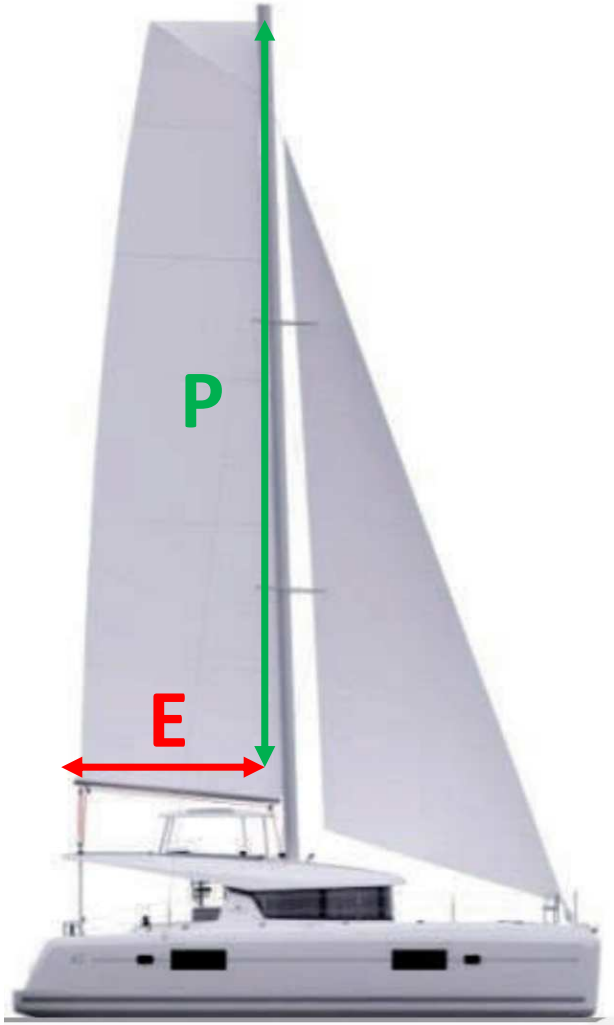
The higher the better!

Short booms are:
More performance
&
More comfort

How to compare the competition

Aspect Ratio



P/E for a mainsail

Higher means more performance

- Higher center of sail area
- Shorter chords
- The highest wind =the cleanest
- Short boom is easier to maneuver
- Short E less frightening when jibing
- Better shape when reefed
- Natural move with square top mains

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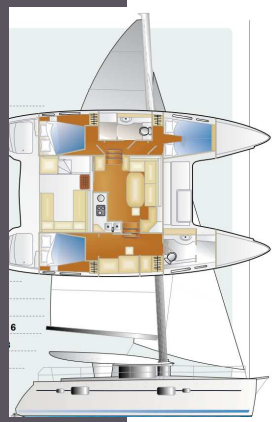
How to compare the competition

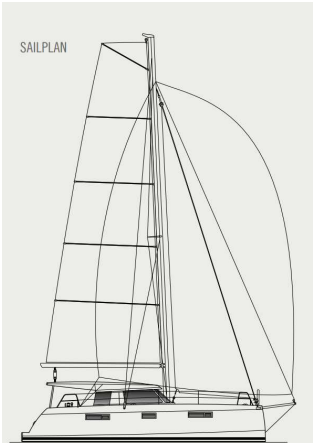
Aspect Ratio

Lagoon 42 is the best

Lucia 40 is very low

Lagoon 39	Lagoon 400	Lagoon 42	Lucia 40	Bali 4.0	Leopard 40	Nautitech 40
3,75	3,04	4,09	2,75	2,84	2,79	2,80





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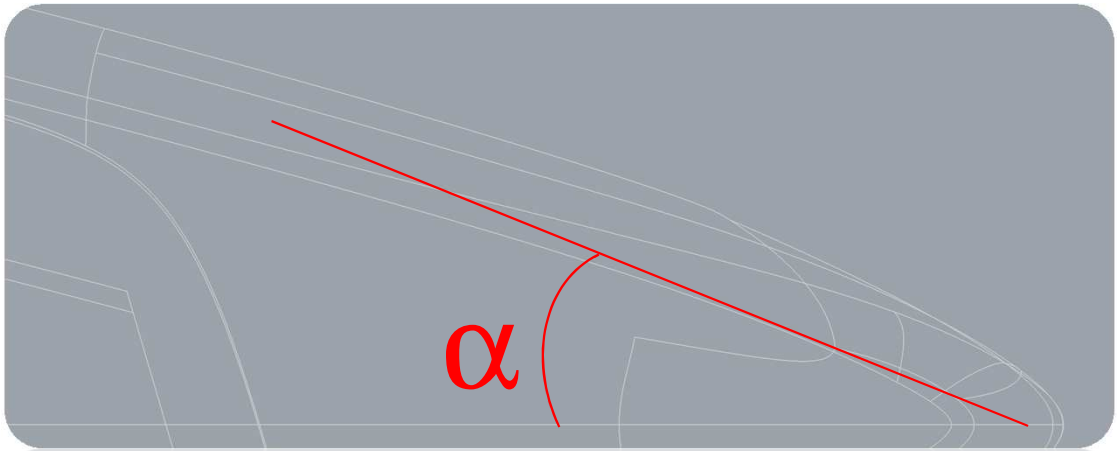
How to compare the competition

Half angle of entrance



A true Naval Architect challenge

Not Black or White

Pushing water?
Or
Sailing flat?

VPLP says: aim 17,5°

Nothing obvious here

- It tells the balance between the capacity of a vessel to go through the fluid with little resistance and its ability to damp the pitching moment
- On displacement hulls, we are coming to very small numbers to rather impressive ones
- It takes a lot of background to determine what is the right compromise: VPLP has been on this for a very long time
- It is rather difficult to measure on the competition but it can be done with a large compass at a dryland boat show (that's how I get them!)

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How to compare the competition

Keel profile view

Wisdom of compromise

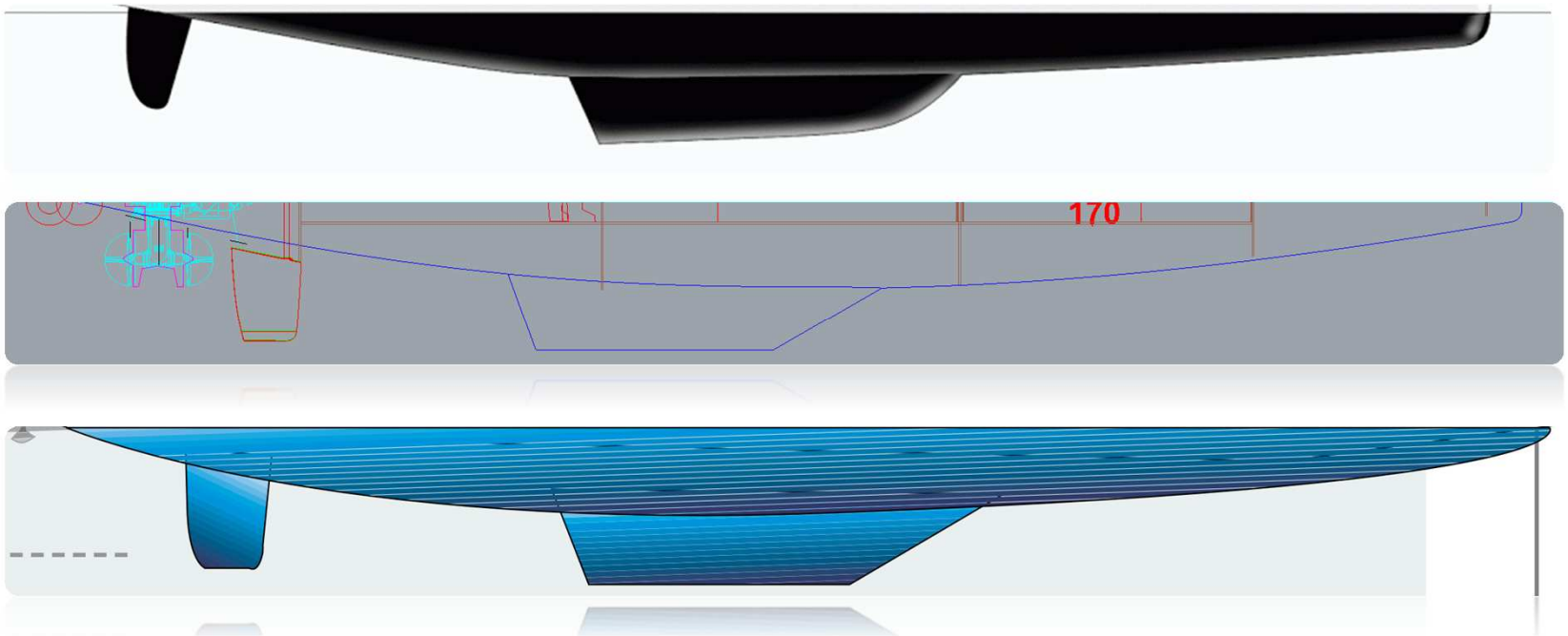
- Deep keels are good for performance, bad for shallow waters
- Round leading edge provides disturbed flow to the sections
- More volume in the keels = better hull lines
- 50mm added draft makes a difference in upwind capacity and hull lines

Simplicity is best

Trapezoidal shape

Flat bottom

VPLP adds 50mm compared to same size competition



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How to compare the competition

Mast longitudinal location

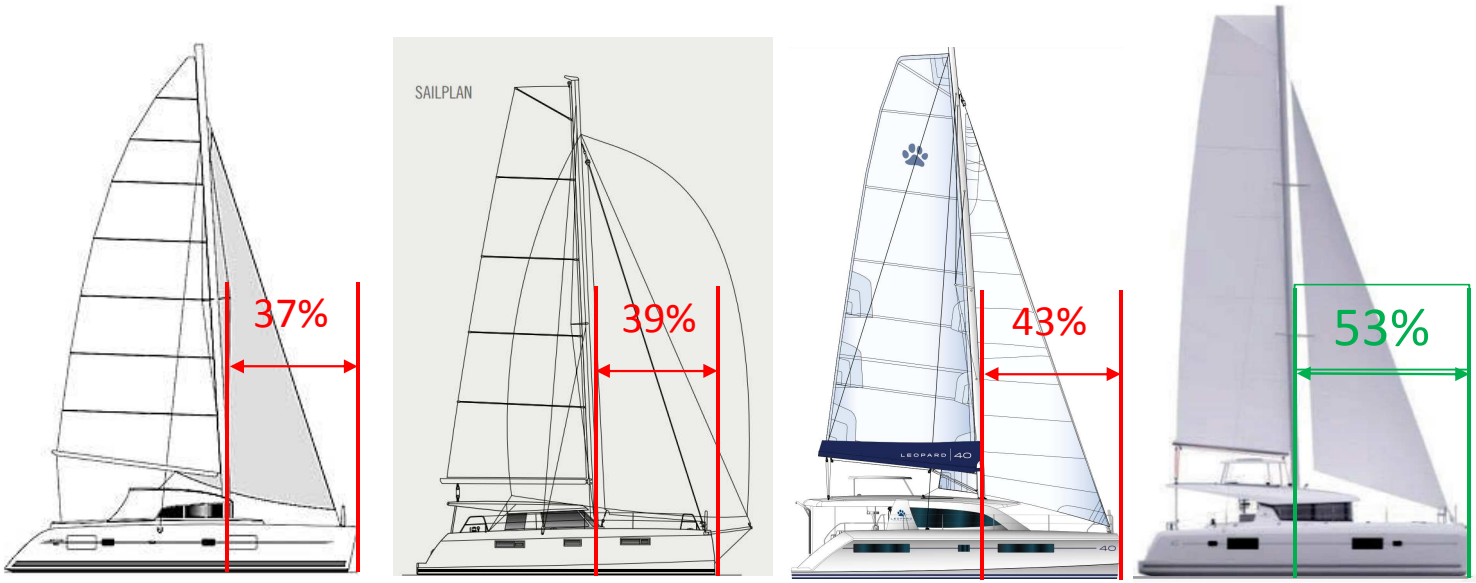
There is a goal!

- Moving the mast aft has all the benefit given when launching the 39/52:
  - More downwind sail area / Performing self tacking jib/ Short boom / High A/R / Less pitching moment
- Square top mains have made this move highly beneficial

Moving aft

Aim for LCG and Mast position same location

50% or more is the way!



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How to compare the competition

Mast location Vs LCG

Longitudinal stability

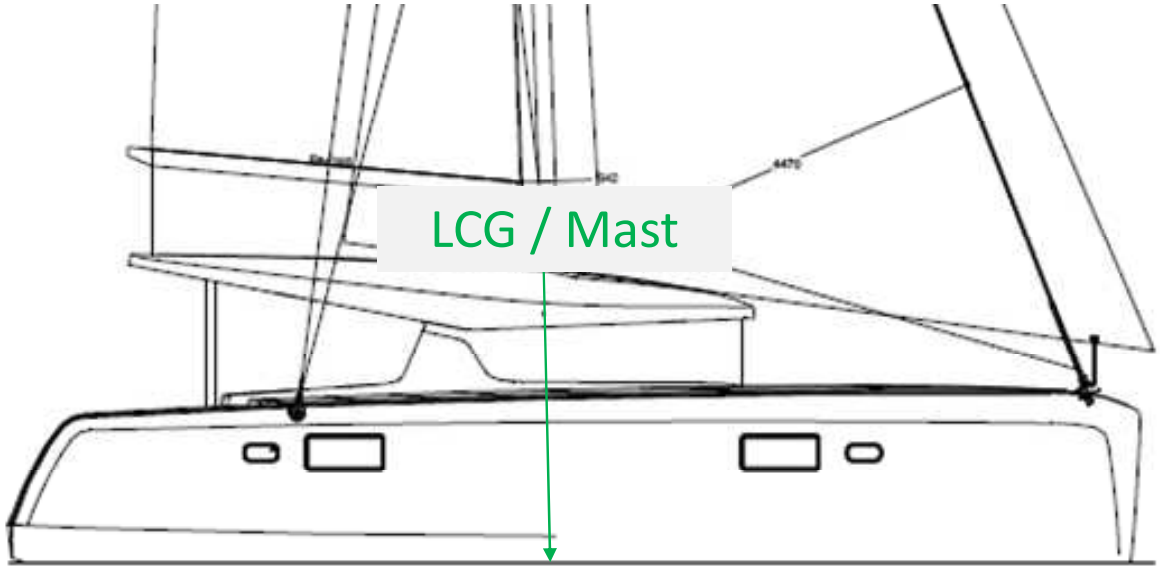
- A mast centered above Longitudinal Center of Gravity (LCG) is generating less pitching moment
- Momentum is affected by inertia: One meter of momentum results in 4 times the effect of the displaced load

Pitching is a killer

Reducing pitching is
More speed
More comfort

Mast above LCG

Is the way to go!



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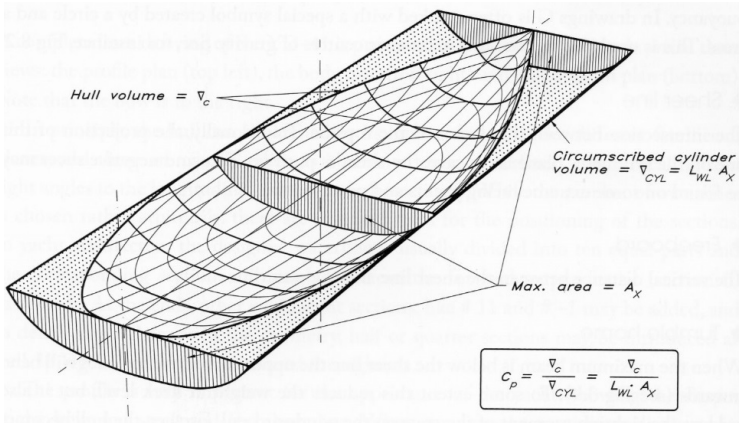
Look smart at the Yacht Club!

Difficult to get

Tells a lot about the modernity of the design

How to compare the competition

Prismatic coefficient



One foot in Naval Architecture

Where is the volume under the sea?

- It compares the largest section under the sea with the volume of vessel under the sea
- It is very difficult to get (but can be done on a dryland boat show!)
- Analysis is very different from monohull to catamarans and from displacement hulls to planning ones.

On a displacement sailing catamaran:

- High prismatic means a lot of volume fore and aft
  - → High angle of entrance
  - → Good pitching reduction
- Low prismatic means thin entrance
  - → Old fashion multihulls very good in light airs and no wave, very bad in all other situations
- VPLP says: the right number is around 0,59

How to compare the competition

Performance wise

Velocity Prediction Program analysis

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How to compare the competition

Velocity Prediction program analysis

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VPP is mean!

Use caution to compare

Yacht Design numbers are pessimistic

Sailors measures are optimistic

How to compare ?

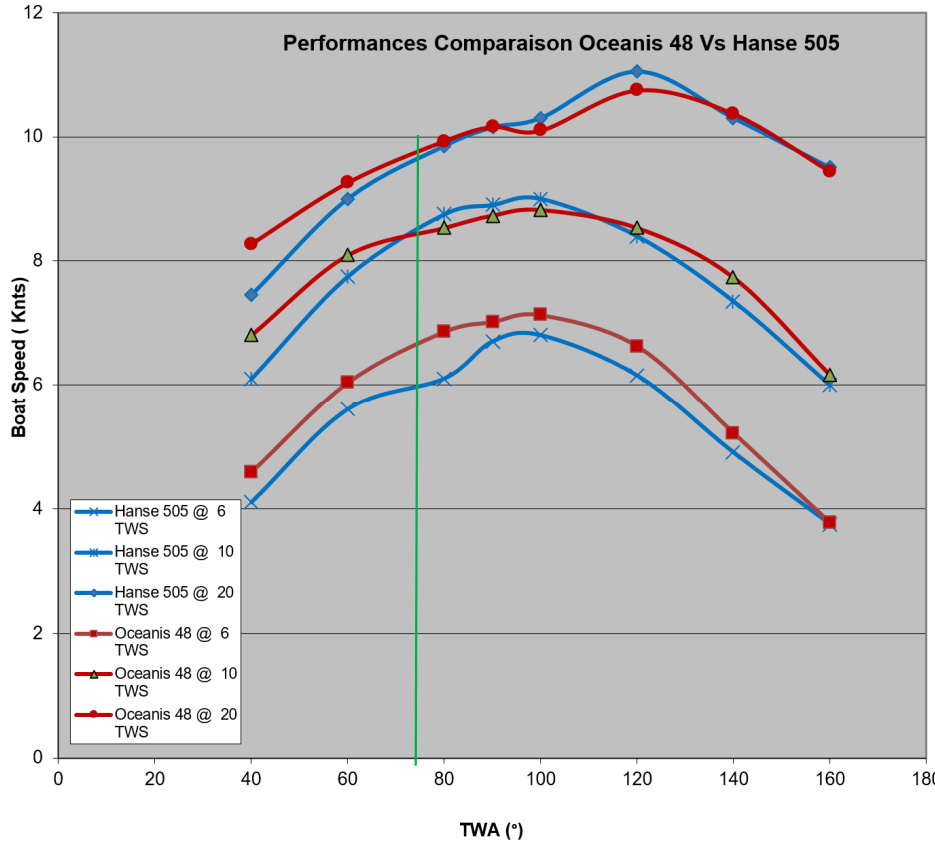
@ 6kts
TWS Oceanis 11,2% faster than Hanse
@ 10kts
TWS Hanse 1,1% faster than Oceanis
@ 20kts
TWS Oceanis 1,5% faster than Hanse

How to compare?

- Only look at %tage difference between 2 boat speeds at same wind angle & same wind speed
  → Boat speed itself is irrelevant

How to cheat?

- Displacement used
- VCG used
- Code 0, downwind sails used
- Sails stiffness, sea state



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How to compare the competition

Performance wise: velocity Prediction program analysis

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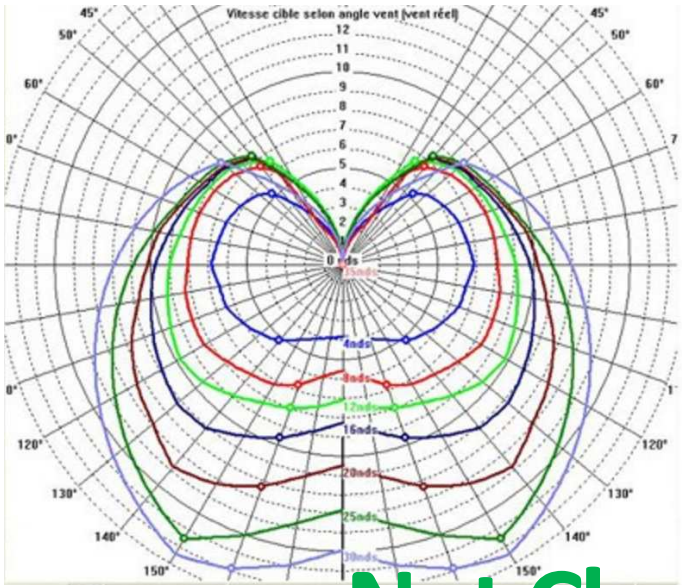
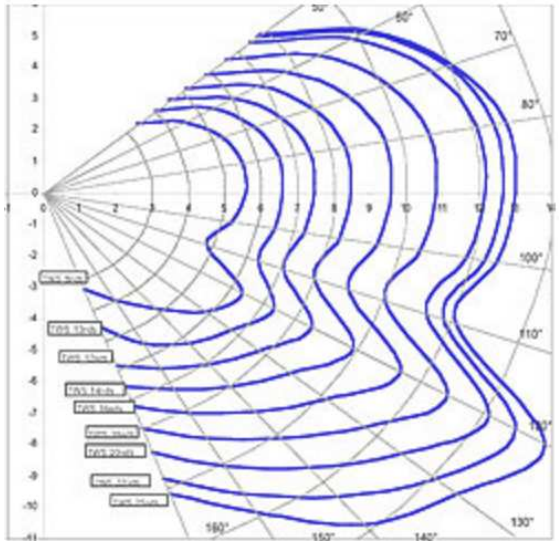
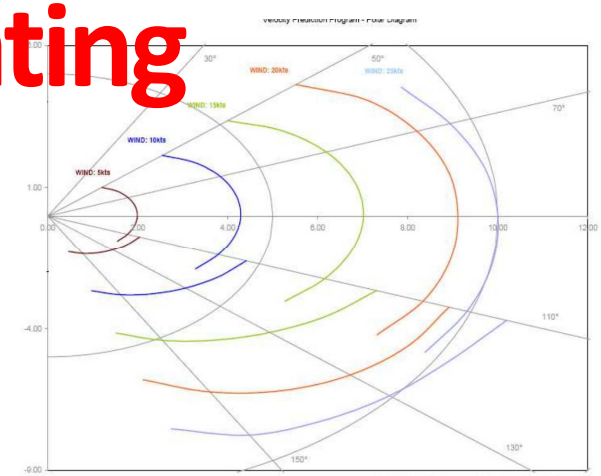
How to cheat ?





Cheating



Not Cheating

Watch out!

We all want to look good

Check the smoothness of the curves

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How to compare the competition

Performance wise: velocity Prediction program analysis

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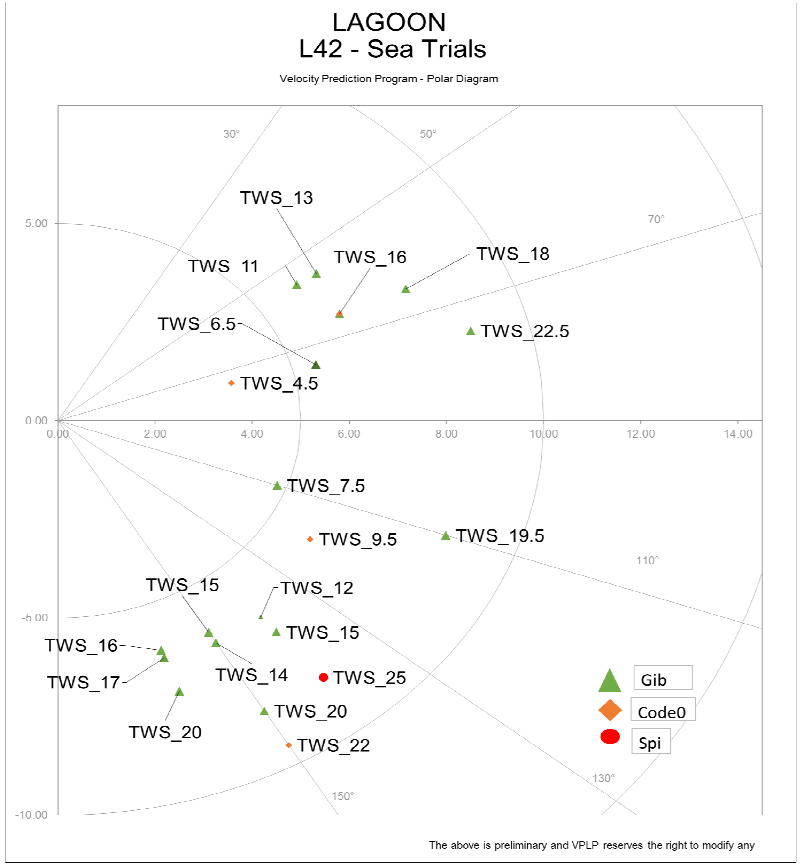
How to know what is going on?

Use magazines & sea trials to get real numbers and compare on the curves

← *Le potentiel du 42' dans la brise est remarquable pour une unité aussi aménagée*



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How to compare the competition

Performance wise: translation on the water

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Average speeds: what a cruising cat is looking for

Good sail trim and proper navigation = better than steering

Love your autopilot

&

Put it at work!

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How to compare the competition

Performance wise: translation on the water

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Sailing conditions: it writes the tempo

Wind steadiness, Sea state,

waves crest span, direction to the wind

Allow one thing to the sea:

It is stronger than you & your boat

Never overload

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How to compare the competition

Performance wise: translation on the water

Ship loading: Payload is critical for durable performance

Why is my average speed increasing through the days of a journey?

The lighter is the boat through a passage the faster she will go

You have drunk all the beverages
&
eaten all the food:

YOU ARE LIGHTER!