

Sailboat project examples with « Gene-Hull Sailboat 3.3 »

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« Gene-Hull Sailboat » spreadsheet application, in its new proposed version 3.3, is in line and upgraded from the previous version 3.2.

Gene-Hull sailboat 3.3 is here below illustrated by the generation of some reference boats proposed as a starting point for a project + also various hulls inspired by existing or historical boats.

The corresponding hulls input data are stored in the « Hulls storage » sheet of the application, inc. the input data for the keel, the rudder, the sailplan, the mass spreadsheet and the loading. So you can reproduce them by copy/paste the corresponding data from the « Hulls storage » sheet to the « Gene-Hull » one.

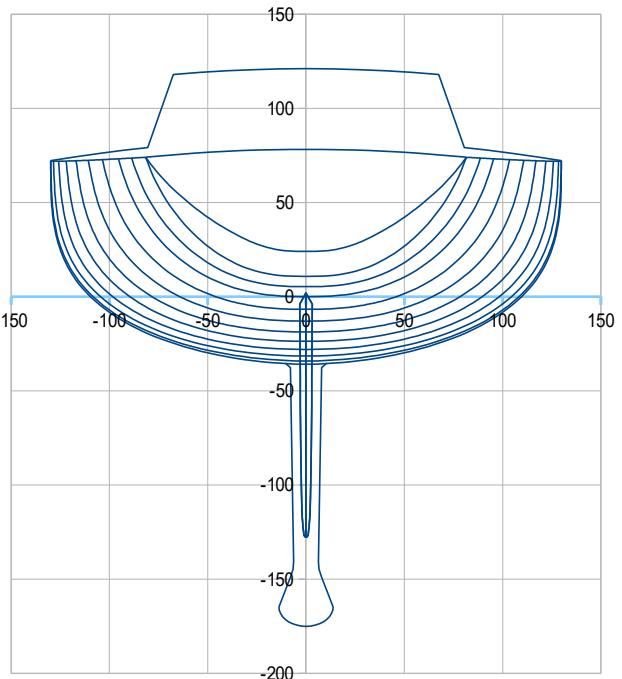
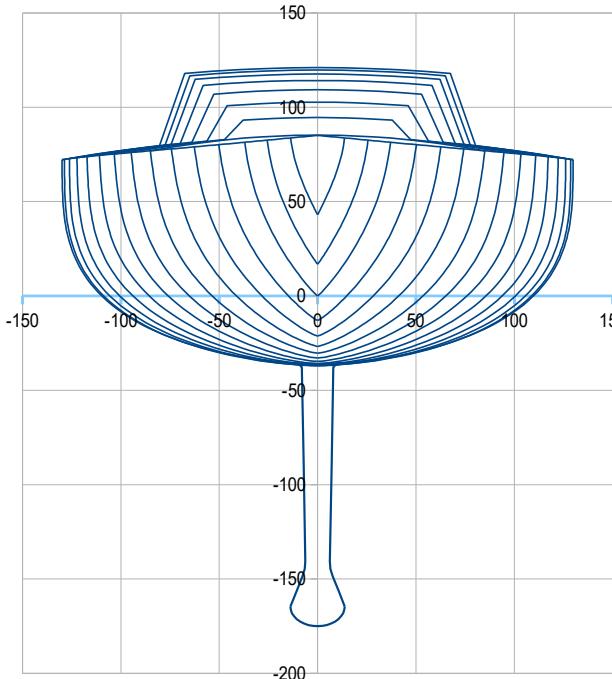
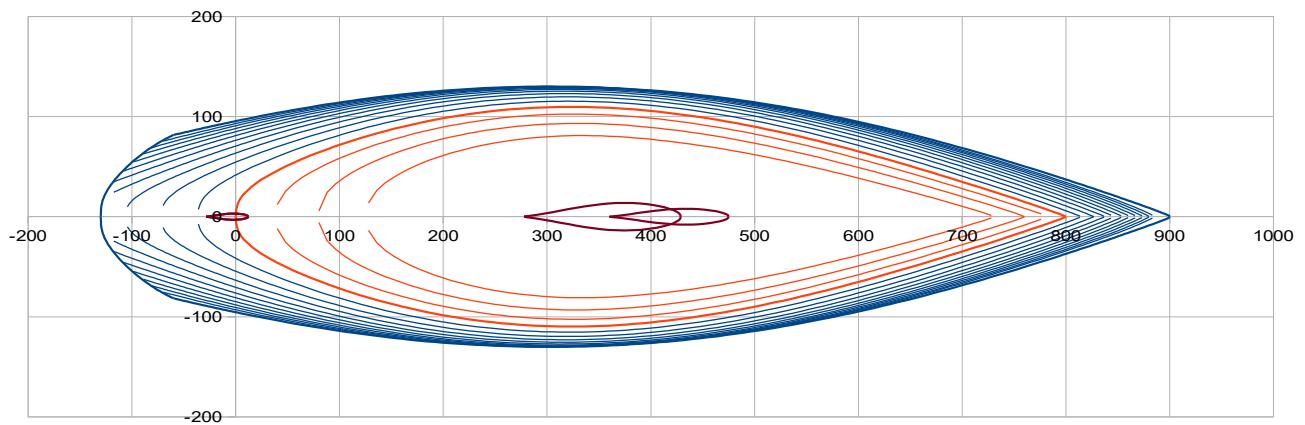
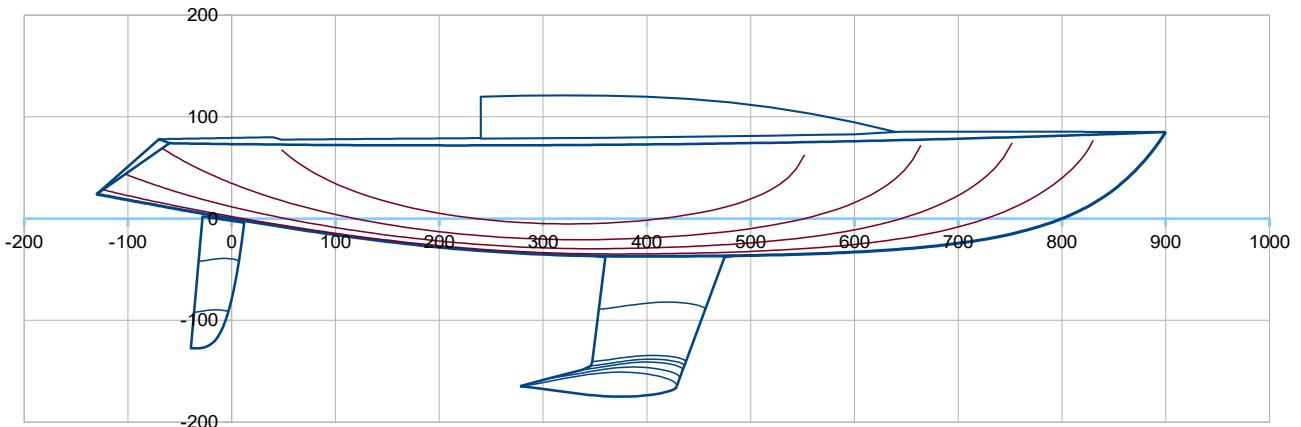
Examples shown with Gene-Hull Sailboat 3,3 :

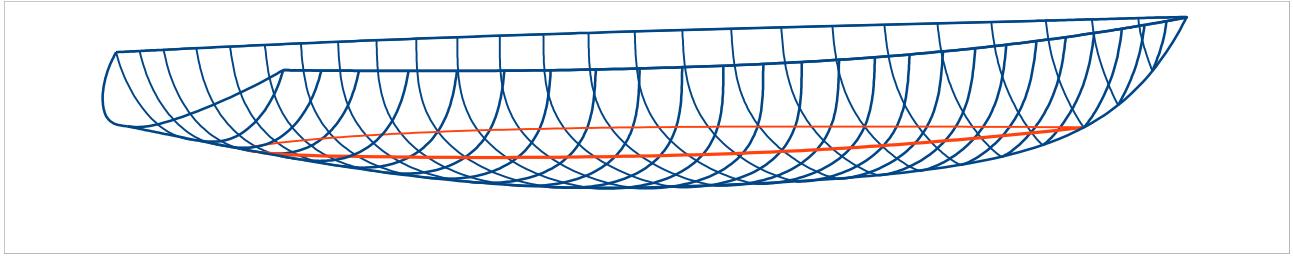
- **V1 reference modern classic sailboat** : all functions are detailed for this example (Hull and Appendages, Hydrostatics data, Sailplan, Mass spreadsheet, Stability and righting moment with a loading)
- **V1,1 variant** – with a modified bow line
- **V1,2 variant** – with V sections only
- **V1,3 variant** – with some tumblehome in the sections
- **U1 reference modern sailboat**
- **U1,1 variant** – with a mid-scow bow
- **B52**, inspired by « Bojar » flush deck cutter 1937 / Johan Anker
- **Classic 6m JI**, inspired by this metric class with a classic approach
- **S30**, inspired by S30 / Knud Reimers
- **T37**, inspired by Tina / Dick Carter
- **M32**, inspired by Melges 32 / Reichel Pugh
- **Blue Water 39**, inspired by Corbin 39 / Robert Dufour - Marius Corbin
- **T10**, inspired by Tofinou 10 / Joubert-Nivelt
- **Dolfi 22,7** , inspired by 15m2 SNS swiss class
- **Dolfi 32S**, inspired by Beneteau Figaro III / VPLP
- **Syd 38**, inspired by Sydney 38 / Murray Burns Dovell
- **Mini 650**, with a classic bow
- **Mini 650 variant**, with a mid-scow bow,
- **MO24**, inspired by the Moore 24,
- **ULDB 50**, inspired by the Swede 55 / Knud Reimers
- **DH17**, inspired by the Drak Harbor 17,5 / B.B. Crowninshield
- **AL29**, inspired by Aloa 29 / J.M. Finot

Boat V1 modern classic daysailer

Boat V1 - Step 1 : Hull and appendages

Loa 10,30 m ; Lwl 8,00 m ; B 2,60 m ; Draft 1,75 m ; Displacement : 2674 kg ; Keel-bulb 1090 kg
>> LCB hull 47,08 %Lwl ; Cp hull : 0,546 ; Sw : 17,40 m² ; DLR : 146 ; Ballast ratio : 40,8 %





Hydrostatics data (at design displacement 2674 kg, i.e. light weight boat without load)

2. Data sum-up and results of hydrostatic and surfaces calculations

2.1 Hull

Loa (m)	10,30	Lwl (m)	8,00	> Hull speed (Knots)	6,9	at Froude 0,4	
>> ft	33,79		26,25				
Boa (m)	2,60	at X (% Lwl)	38,0	Bsheer (m)	2,60	at X (% Lwl)	
>> ft	8,53					38,0	
Bwl (m)	2,19	at X (% Lwl)	40,0	> Bwl / Boa	0,844		
>> ft	7,20						
Tc (m)	0,370	at X (% Lwl)	50	Freeboards (m) >	Aft	Midship	Fore
>> ft	1,21				0,74	0,72	0,85
Displacement at H0 (m3)	2,44467	at LCB (m)	3,766	LCB (%Lwl)	47,08	ZCB (m)	-0,130
>> lbs	5524	w. seawater	1025	kg/m3		>> ft	-0,43

Cp	0,546						
Sf (m2)	11,87	at LCF (m)	3,589	LCF (%Lwl)	44,87	>>> LCB – LCF (%Lwl)	2,21
>> ft2	127,82	>> ft	11,78				

Angle Freeboard/Half beam	29,1	(°), at section C4 (40% Lwl)		Half entry angle (°)	19,1	at 95% Lwl
Sw (m2)	12,83	>Sw/D^(2/3)	7,07			

Shull (m2)	29,52	at X (m)	3,635	Z (m)	0,092	
>> ft2	317,76	>> ft	11,92	>> ft	0,30	
Sdeck (m2)	20,08	at X (m)	3,511	Z (m)	0,79	
>> ft2	216,18	>> ft	11,52	>> ft	2,59	

2.2 Keel

Vol. keel(m3)	0,14938	at X (m)	4,019	X (%Lwl)	50,23	Z (m)	-1,098
		>> ft	13,18			>> ft	-3,60
Ballast (kg)	1090,5	at X (m)	4,019	X (%Lwl)	50,23	Z (m)	-1,098
>> lbs	2404	>> ft	13,18			>> ft	-3,60
Draft oa (m)	1,75		Sw (m2)	3,66		Sxz (m2)	1,36
>> ft	5,74		>> ft2	39,45		>> ft2	14,61
CLR (m)	4,34	CLR (%Lwl)	54,23	CLR = Center of Lateral Resistance			
>> ft	14,23			method: keel profile extended to the waterline, CLR at Z 45% draft and		25,00	% chord

2.3 Rudder(s)

Number	1						
Volume (m3)	0,01486	at X (m)	-0,12	X (%Lwl)	-1,47	Z (m)	-0,54
Sw (m2)	0,91	>> ft	-0,39			Sxz (m2)	0,44
>> ft2	9,80					>> ft2	4,71

2.4 Hull + Keel + Rudder(s)

Displacement at H0 (m3)	2,60891	at LCB (m)	3,759	LCB (%Lwl)	46,98	at ZCB (m)	-0,188
(kg)	2674	>> ft	12,33			>> ft	-0,62
>> lbs	5895						
, of which Ballast (kg)	1090	at Xg (m)	4,019	Xg (%Lwl)	50,23	at Zg (m)	-1,098
>> lbs	2404	>> ft	13,18			>> ft	-3,60
>> % Ballast	40,8						
Sw (m2)	17,40	>Sw/D^(2/3)	9,18	Lwl/D^(1/3)	5,81		
>> ft2	187,32			DLR	146	M(lbs/2240)/(Lwl(ft)/100)^3	

2.5 Data from the mass spreadsheet

Light boat:	M (kg)	2674	at Xg (m)	3,782	Xg (%Lwl)	47,27	at Zg (m)	-0,078
	>> % Ballast	40,8						

Some more information on the hydrostatics data :

In 2.1 Hull :

Hull speed V at Froude 0,4 : is based on the following formula : $0,4 = V / (g Lwl)^{0,5}$

>>> it is the speed that usually can be reached in displacement mode, e.g. usually when beam reaching or downwind sailing providing there is sufficient wind and sail area. For the boat V1, it is 6,9 Knots.

Boa (overall) and Bsheer (at sheer line) : can be different in case of tumblehome sections. Then Boa can be slightly greater than Bsheer

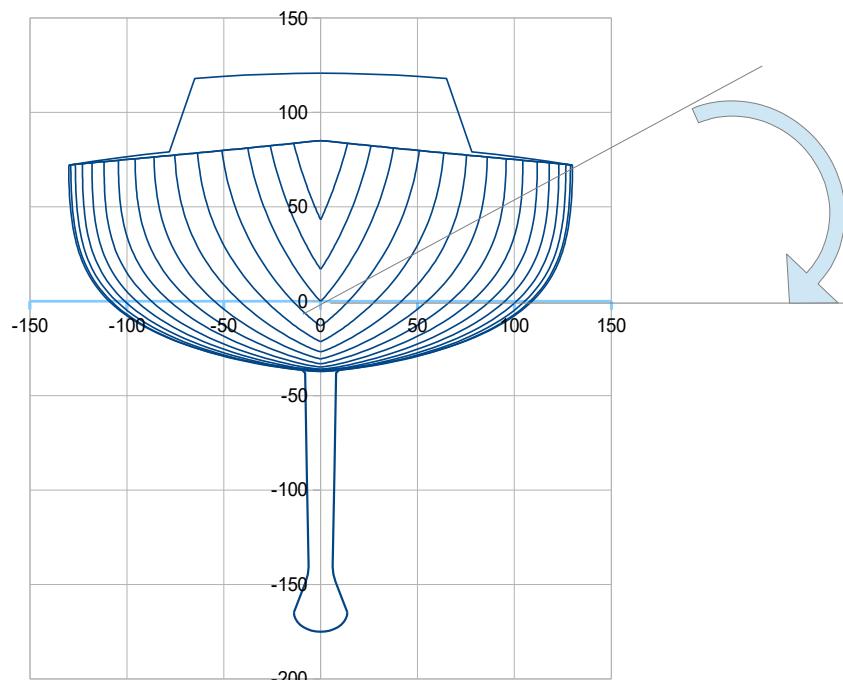
Tc (m) : hull body maximum draft (it is an input data)

Hull body / LCB (Longitudinal Center of Buoyancy) and Cp (Prismatic coefficient) : optimal values are proposed by L. Larsson and Rolf E Eliasson in « Principles of yacht Design », based on Delft series of parent models :

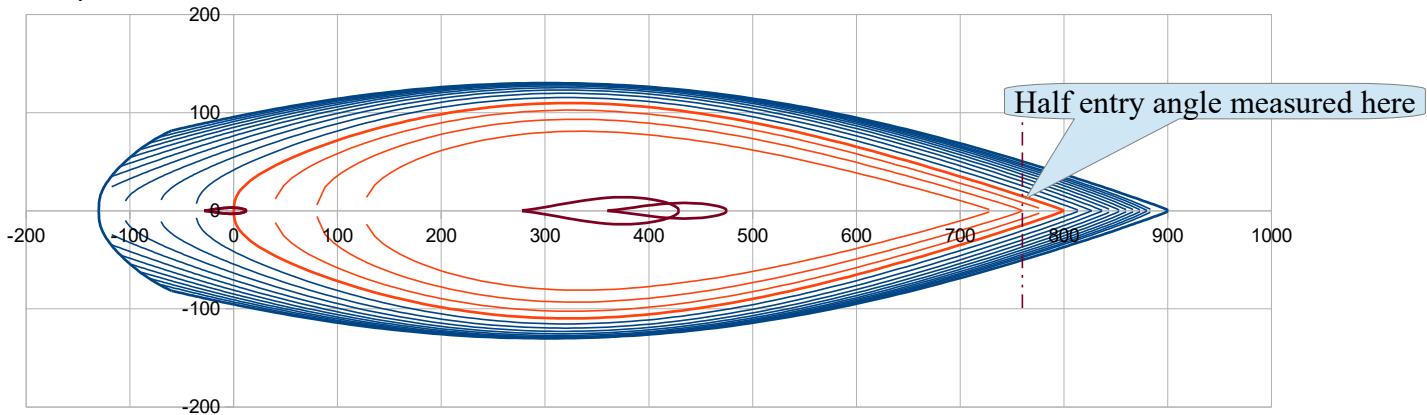
- Optimal LCB can be chosen preferably in the 46% - 47% zone to minimize the residuary drag for the Froude range 0,3 to 0,4
- Optimal Cp choice depends of the Froude main objective for the design : e.g. can be around 0,56 for Froude 0,35 ; from 0,56 to 0,52 for less Froude objective ; from 0,56 to 0,60 for more Froude objective.

Sf and its longitudinal position LCF : Sf is the floatation waterplane area. LCF is usually behind LCB and LCB-LCF (%Lwl) is also given as an indication. In the stability output data (here after), LCB-LCF with heel is given, and the two centers LCB and LCF are showed in the floatation area.

Angle Free-board / half beam : this geometrical data is given at that preliminary stage (before the stability with load following study) to help appreciate the heel angle which could put the sheer line in the water. Usually, due to the exact computation of the heeled hull, if an heel angle > 30° is your objective for such occurrence, a geometrical angle of around 26° to 29° leads to this objective.



Half entry angle : this data is proposed computed at 95 % Lwl, i.e. not exactly at the fore end waterplane fore end in order to mitigate any hollow or roundness influence. For the Boat V1 example, it is 19,1° :



Sw is the wetted surface of the hull body

Shull is the total surface of the hull body and X,Z its geometrical center, **Sdeck** is the total surface of the deck assumed flush (the roof is not taken into account) and X,Z its geometrical geometry. These data are used in the mass spreadsheet preliminary estimation.

In 2,2 Keel :

Ballast (kg) = it is the mass of the keel taking into account the two input densities for the wing and for the bulb, in this case of « keel with bulb » type. In the example above, the two densities are 7,3 i.e. cast iron material . If we change the Bulb density to 11,35 / Lead material, this changes not only the ballast weight but also its X, Z position :

Density Wing	7,30
Density Bulb	7,30

>>>

Ballast (kg)	1090,5	at X (m)	4,019	X (%Lwl)	50,23	Z (m)	-1,098
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Density Wing	7,30
Density Bulb	11,35

>>>

Ballast (kg)	1300,7	at X (m)	3,979	X (%Lwl)	49,74	Z (m)	-1,180
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For the « keel without bulb » type, we consider only one material density.

Sxz : it is the projected area of the keel profile in the vertical plan of symmetry. This data is used in the sailplan sheet for the design ratio « **Skeel / St (%)** » where Skeel is this Sxz and St the area of the two sail triangles main and fore, in order to appreciate if there is enough keel area to provide the lateral resistance. An average of 3,5% ± 0,75 % is proposed for this ratio by L. Larsson and Rolf E Eliasson in « Principles of Yacht Design ».

CLR : it is the Center of Lateral Resistance, estimated by the method of the keel profile extended to the waterline, as proposed by L. Larsson and Rolf E Eliasson in « Principles of Yacht Design ». This data is used in the Sailplan sheet, to estimate the Lead = CE – CLR (%Lwl), more details are given here after for the Sailplan issue. The CLR is estimated à Z 45% and Chord 25% to 35% depending of the keel wing shape in order to cover the fin keel to long keel cases.

In 2,3 Rudder :

Sxz : it is the projected area of the rudder profile in the vertical plan of symmetry. This data is used in the sailplan sheet for the design ratio « **Rudder / St (%)** » where Rudder is this Szx and St the area of the two sail triangles main and fore, in order to appreciate if there is enough rudder area to provide the lateral resistance. An average of 1,4% (inc. the skeg area if any) is proposed for this ratio by L. Larsson and Rolf E Eliasson in « Principles of Yacht Design », with 1% the lower limit and 2% the upper limit. In case of twin rudders, the area of one rudder is taken into account for this criteria.

In 2,4 Hull + Keel + Rudder(s) :

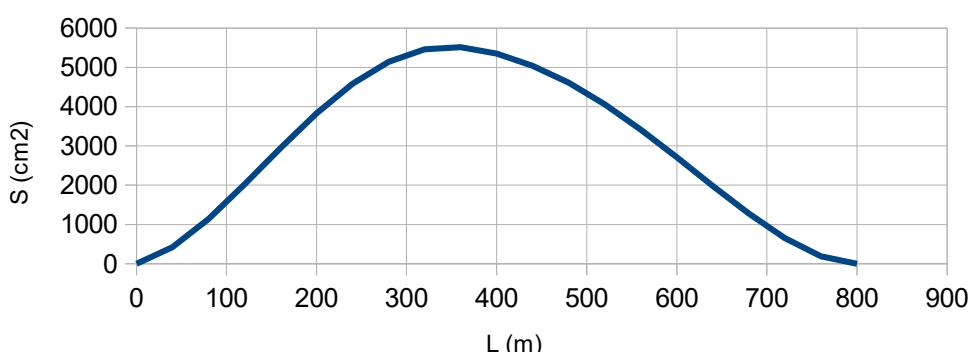
DLR : the Displacement/Length ratio is of first importance, its value should be an objective for the naval architect in relation with the type of yachts he wants to design. The classification, as proposed by various authors, can be as follows :

Boat Type	DLR
Ultra-light ocean racer	60 - 100
Very light ocean racer	100 - 150
Light ocean racer	150 - 200
Light ocean cruiser	200 - 250
Average ocean cruiser	250 - 300
Moderately heavy ocean cruiser	300 - 350
Heavy ocean cruiser	350 - 400+

To note that the ability of planning is considered beginning around DLR < 125 . For the Displacement, one can use either the light ship weight or the loaded weight to see the evolution of the DLR with the weight, especially for small boats where the crew weight is important in %.

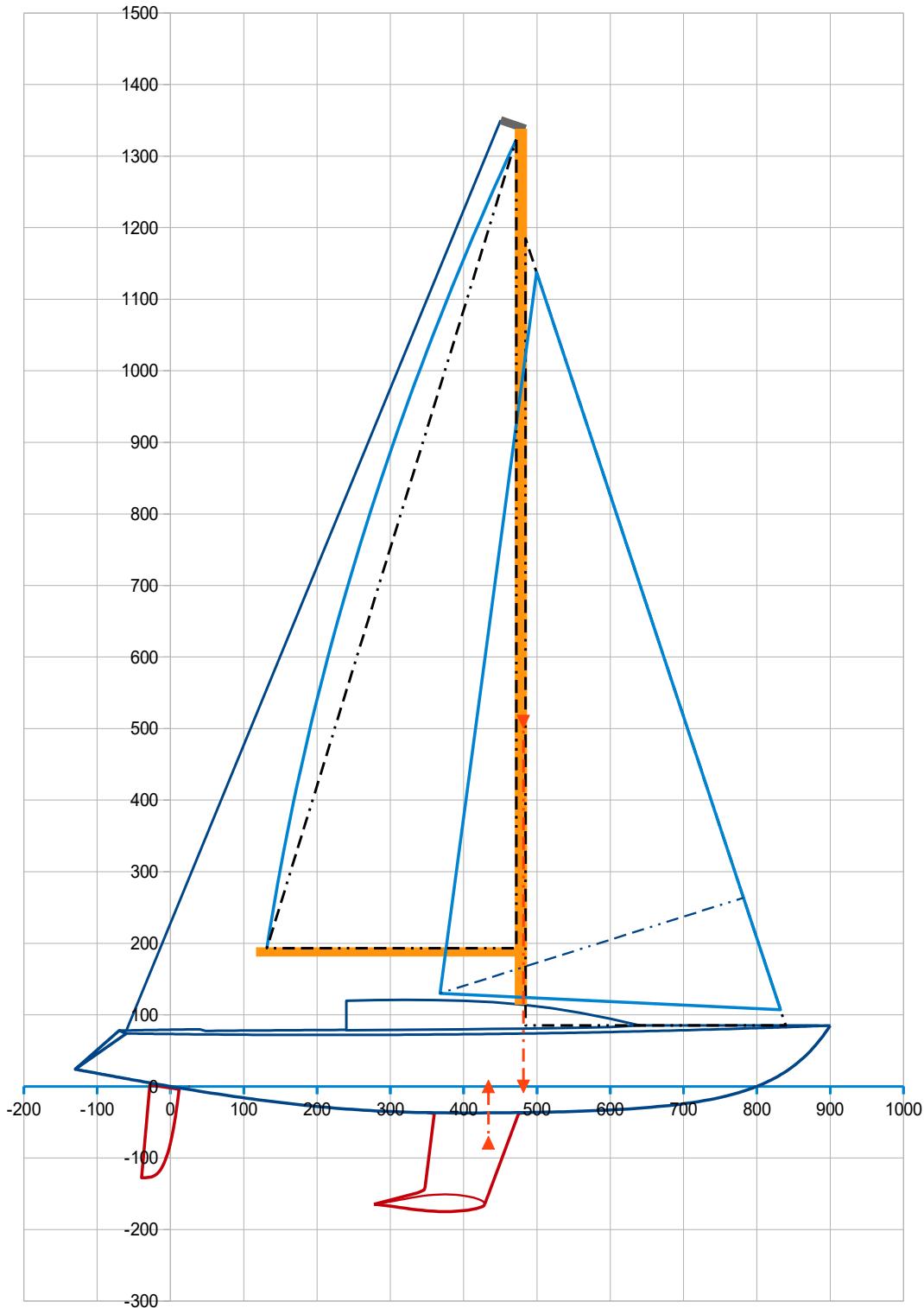
A DLR objective means a more or less heavy scantlings for the hull structure, a more or less heavy accommodations inside the cabin, etc ... Once a DLR objective is given to guide the design process, the mass spreadsheet and the construction technology should be in tune and reflect the reality of this figure. Practically, a preliminary inquiry of existing equivalent boats and their DLR can give clue of the relevance of your choice.

Areas of immersed sections (at design waterline)



Boat V1 - Step 2 sailplan : Input data (yellow cases) for a 2D Sailplan early stage definition, and output data including the « Lead » (CE-CLR) and usual ratios : Skeel/St, Srudder/St, St(or SA)/Sw, St (or SA)/D^(2/3).

Data to enter :		>> in feet						Results considering St = fore + main triangles and its geometrical center CE for the Lead estimation					
Xmast (m)	4,78	15,68	Surface triangles St (m ²)	38,7	416,94	sqft	Main (%)	49,6					
Zboom(m)	1,88	6,17	XCE (m)	4,81	ZCE (m)	5,10	Fore (%)	50,4					
I (m)	11,00	36,09	Lead (CE - CLR) (% Lwl)	6,0	CE geometrical center of the 2 triangles, CLR see Gene-Hull sheet								
J (m)	3,55	11,65	Skeel / St (%)	3,50	ratio keel surface / triangles surface						St/Sw	2,23	
P (m)	11,30	37,07	Srudder / St (%)	1,13	ratio rudder surface / triangles surface						St/D^(2/3)	20,44	
E (m)	3,40	11,15											
Jib HLP (m)	4,35	14,27	Results considering SA = jib + mainsail for an upwind sailing										
Main Roach	2,00	Coeff ≥1	SA (m ²)	47,1	507,03	sqft	Mainsail(m ²)	23,06					
Spi (m ²)	70,00	753,47	Xsa (m)	4,59	Zsa (m)	5,26	Foresail(m ²)	24,04					
			>> SA/Sw	2,71	ratio sails surface / wetted surface								
			>> SA/D^(2/3)	24,86	ratio sails surface / displacement^(2/3)								



Some extra information on the sailplan output data :

Main (%) and Fore (%) : it is the distribution between the two triangles, 50/50 being an average value.

Lead (CE – CLR) (%Lwl) : it is the criteria to consider for a good balance when heeled sailing, to avoid either too much weather helm or lee helm. Practically, that guides the relative position of the mast and the sailplan with regard the keel wing. According to L. Larsson and Rolf E Eliasson in « Principles of yacht Design », for the extended keel method, the recommended range of values is :

Sloop with Masthead rig : 5% - 9%

Sloop with Fractional rig : 3% - 7%

To note that, to take into account the low aspect ratio of heavy fin keel shape typical of some cruising yachts, the CLR is estimated from 25% to 35% of the keel wing chord to better suits with experimental experiences done on models. This value is output in the hydrostatics data.

The Skeel / St (%) and Srudder / St (%) were already mentioned above.

St/Sw (%) or **SA/Sw (%)** ratio, is the Sails area (either **St** triangle areas or **SA** real areas main + jib) versus wetted surface ratio. When considering St, according to L. Larsson and Rolf E Eliasson in « Principles of yacht Design », statistics give a value between 2 and 2,5, with an average at 2,25 (>> ~ 2,5 to 3,0 if you consider the SA).

St/D^(2/3) or **SA/D^(2/3)** ratio, is the Sail area (either **St** triangle areas or **SA** real areas main + jib) versus Displacement ratio. When considering St, according to L. Larsson and Rolf E Eliasson in « Principles of yacht Design », statistics give a value between 15 and 22, with an average at 19 (>> ~ 18,5 to 27,5, average 23,5 if you consider SA).

Boat V1 - Step 3 mass spreadsheet : Hull, keel, rudder(s), sailplan being preliminary defined within a DLR objective, a Displacement and a LCB are provided in the output data. This next step is to adjust the mass units in the mass spreadsheet so that the light boat weight can fit with this displacement and LCB data, i.e. introducing the following input data :

- an overall weight per m² for the Hull structure
- an overall weight per m² for the Deck structure
- an overall % of the displacement dedicated to the Rig and Sails
- an overall % of the displacement for the accommodation and motor
- an overall % of the displacement for the rudder(s) system

That's a preliminary step of course : if your mass units and % on which you can rely due to your proper experience lead to a boat light weight that cannot match the displacement (i.e. your initial DLR objective), then you have to iterate on the hull geometry, and etc ... back and forth iterations up to light weight = displacement and Xg equal or close to LCB.

Mass and Xg, Zg position – early stage estimation	Input data L or S or V m or m2 or m3	Results Mass (kg)	Xg (m)	M Xg	Zg (m)	M Zg
Data to enter : in yellow cells	mass unit or % Disp.					
Hull (skin, structure, keel interface) , with S, Xs and Zs from Gene-Hull sheet	29,52	19,00 (kg/m ²)	560,90	3,63	2038,63	0,02
Deck – roof – cockpit (skin and structure) , with S, Xs and Zs from Gene-Hull sheet	20,08	13,50 (kg/m ²)	271,14	3,51	951,85	0,79
Rig, sails and deck fittings		8,60 (% Disp.)	229,98	4,40	1011,34	3,21
Cabin accomodation and motor		18,00 (% Disp.)	481,34	3,60	1732,84	0,09
Keel			1090,49	4,02	4382,17	-1,10
Rudder		1,50 (% Disp.)	40,11	-0,12	-4,71	-0,54
Results : Light weight boat >>		2674,0	3,782	10112,13	-0,078	-209,17

Here we show the final iteration : with these mass units and % (the input data in the yellow cells), that leads to a weight of 2674 kg which match with the displacement, and a Xg 3,78 m very close to the LCB 3,76 m. The Zg value is also a useful output data, will be of first importance in the next step to assess the stability and the available righting moments with heel. These light weight results are automatically reported at the end of the hydrostatics data :

2.5 Data from the mass spreadsheet						
Light boat:	M (kg)	2674	at Xg (m)	3,782	Xg (%Lwl)	47,27

... and in the sub-section 5,1 for the next step here after with a loading :

Data to enter : yellow cells	Mass (kg)	Xg (m)	Zg (m)	Yg (m)	(in the coordinates of the 2D from the mass spreadsheet
Boat light weight (kg)	2673,96	3,782	-0,078	0	

Boat V1 - Step 4 stability and righting moment with a loading :

In the section 5.1 a design loading can be introduced and in the section 5.2 the resulting sinkage, trim, stability (GZ) and righting moment (RM) can be computed for every heel angle.

At first, to input the loading data in the sub-section 5,1 « Mass spreadsheet with input of a load ». Example here below : 300 kg at Xg 2,00 m, Yg = 0 m & Zg 0,85 m (Crew at center) or Yg = 1,0 m & Zg 0,85 m (Crew sit windward).

5.1 Mass spreadsheet with input of a load					
Data to enter : yellow cells	Mass (kg)	Xg (m)	Zg (m)	Yg (m)	(in the coordinates of the 2D from the mass spreadsheet
Boat light weight (kg)	2673,96	3,782	-0,078	0	
Load (kg)	300,00	2,00	0,85	0,00	Crew at center
			0,85	1,00	Crew sit windward
Total >> Mass (kg)	2973,96	3,602	0,015	0,000	Crew at center
Disp. (m3)	2,90142		0,015	0,101	Crew sit windward

The resulting data (in dark red) are used in the computation of the hydrostatic equilibrium in the sub-section 5,2 : for a given heel angle (inc. when heel = 0) , the user iterates on height and trim up to reach both weight = displacement and Xc (LCB) = Xg.

This sub-routine can be used for various investigations (to remind that negative value of height is a sinkage and that negative value of trim is a bow down attitude).

The case Heel = 0° inform on the draft and trim for the given loading :

5.2 Computation, by input of an Heel angle, and iteration on Height and Trim up to Displacement equality and Xc (LCB) = Xg							
Data to enter : yellow cells				Results			
Heel (°)	0	Disp. (m3)	2,90142	/ Disp. (m3)	2,90142	Relevant only when heel = 0°	DLR
Height (cm)	-2,1725	Xc heel (m)	3,602	/ Xg (m)	3,602	Lwl (m)	8,26
Trim (°)	0,523	Yc heel (m)	0,000	Yg heel (m)	0,101	Z fore (cm)	1,7
		Zc heel (m)	-0,190	> GZ (m)	0,101	Z aft (cm)	-5,6
		Sw heel(m2)	18,27	RM (kN.m)	2,943	Tc (m)	0,39
		Bwl heel (m)	2,24	FB mini (cm)	67,5	Cp Hull	0,538
		LCB - LCF (%Lwl)	2,06	Obliquity (°)	0,0	Relevant only when heel = 1°	LCB Hull (%)
						Yg heel (m)	0,000
						with crew at center	47,35

The relevant results are the ones in black + in blue (when heel = 0°) >>> under this loading :

** Lwl = 8,26 m ; Bwl 2,24 m ; Trim = 0,52° (> 0 = nose up) leading to an elevation at fore perpendicular Z fore = 1,7 cm and a sinkage at aft perpendicular Z aft = -5,6 cm (Z<0 = sinkage).

** Sw = 18,27 m² ; Free-Booard minimum = 67,5 cm ; DLR = 147 in charge.

The case Heel = 1° give the metacentric center GM1° representative of the initial stability when the loading is Y-centered (the pink results are with Yg = 0) :

5.2 Computation, by input of an Heel angle, and iteration on Height and Trim up to Displacement equality and Xc (LCB) = Xg							
Data to enter : yellow cells				Results			
Heel (°)	1	Disp. (m3)	2,90142	/ Disp. (m3)	2,90142	Relevant only when heel = 0°	DLR
Height (cm)	-2,1575	Xc heel (m)	3,602	/ Xg (m)	3,602	Lwl (m)	8,26
Trim (°)	0,523	Yc heel (m)	-0,018	Yg heel (m)	0,101	Z fore (cm)	1,7
		Zc heel (m)	-0,190	> GZ (m)	0,119	Z aft (cm)	-5,6
		Sw heel(m2)	18,30	RM (kN.m)	3,474	Tc (m)	0,39
		Bwl heel (m)	2,24	FB mini (cm)	65,6	Cp Hull	0,538
		LCB - LCF (%Lwl)	2,06	Obliquity (°)	0,1	Relevant only when heel = 1°	LCB Hull (%)
						Yg heel (m)	0,000
						Gz (m)	0,018
						> GM1° (m)	1,04

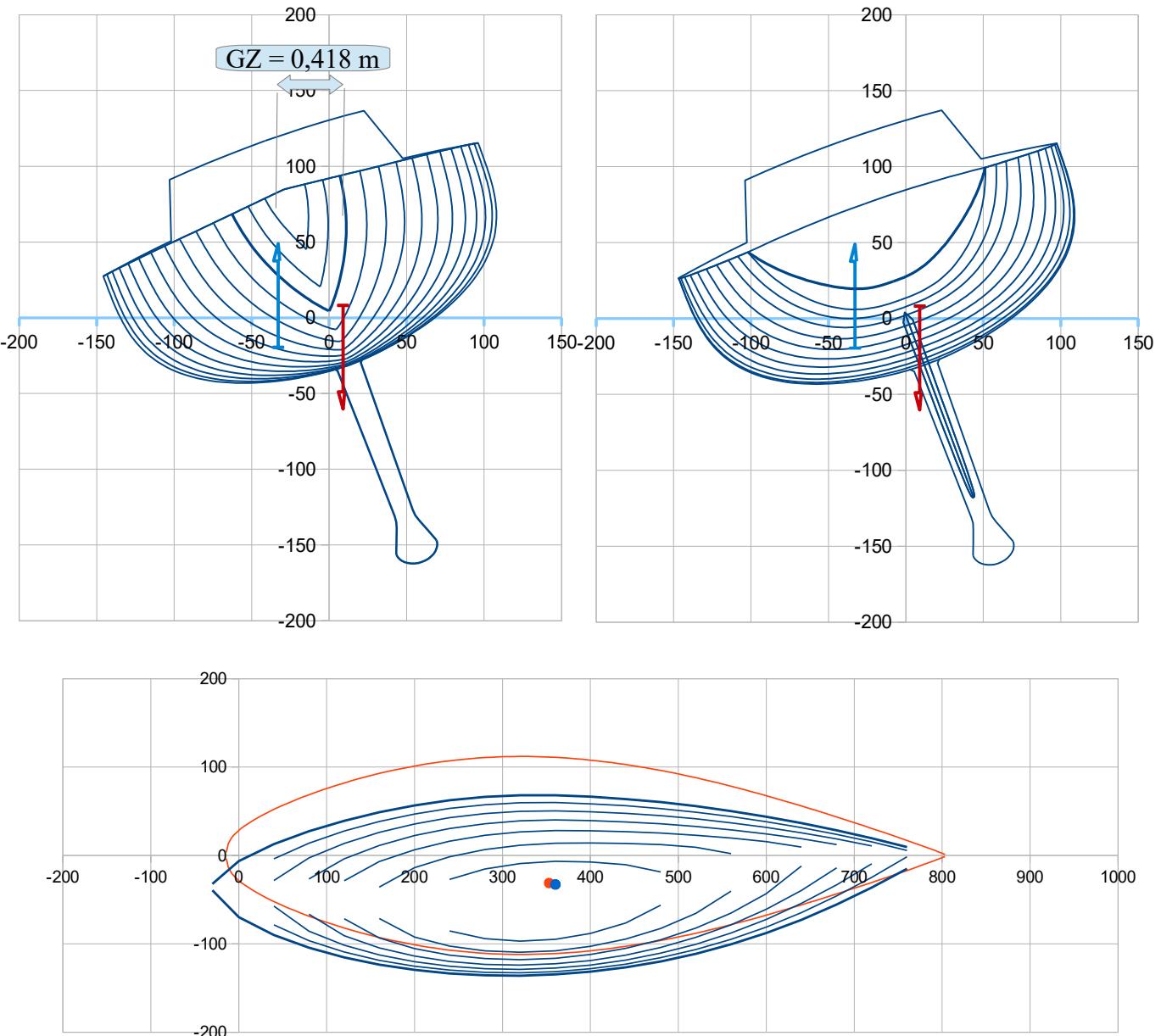
>>> Here, the relevant result is in pink : GM1° = 1,04 m

The case Heel = 20° can give the boat attitude and the RM for an usual sailing :

Data to enter : yellow cells				Results			
Heel (°)	20	Disp. (m3)	2,90142	/ Disp. (m3)	2,90142		
Height (cm)	3,3016	Xc heel (m)	3,602	/ Xg (m)	3,602		
Trim (°)	0,170	Yc heel (m)	-0,328	Yg heel (m)	0,090		
		Zc heel (m)	-0,195	> GZ (m)	0,418		
		Sw heel(m2)	17,56	RM (kN.m)	12,189		
		Bwl heel (m)	2,04	FB mini (cm)	26,3		
		LCB - LCF (%Lwl)	0,89	Obliquity (°)	2,7		

>>> GZ = 0,418 m ; RM = 12,19 kN.m ; Sw = 17,56 m² ; Free-board minimum : 26,3 cm

>>> Trim = + 0,17°



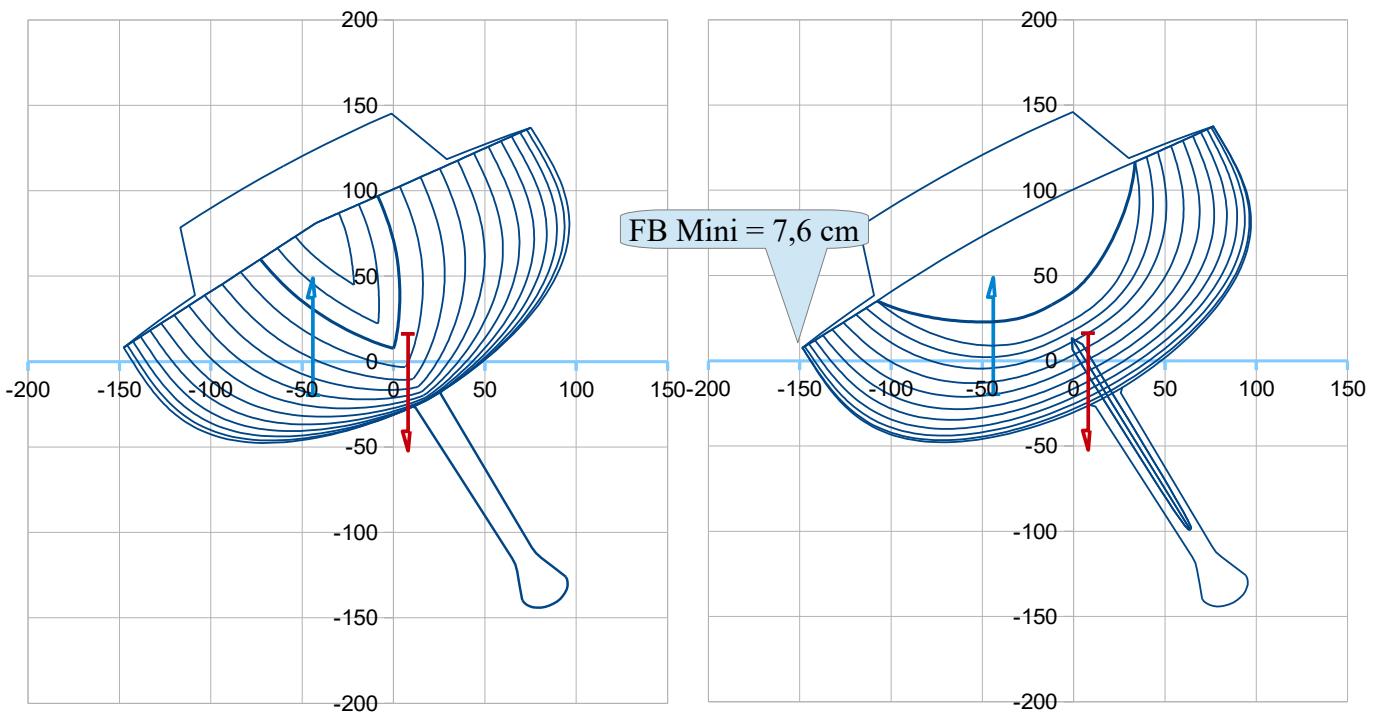
The red line is the floatation waterline when upright with the loading.

The blue lines are the waterlines of the heeled hull, the blue point is the center of buoyancy, the red point is the center of floatation.

The case Heel = 30° give the design RM30° useful to dimension the rig, and the minimum free-board versus the sheer line :

Data to enter : yellow cells		Results	
Heel (°)	30	Disp. (m3)	2,90142
Height (cm)	9,7455	Xc heel (m)	3,602
Trim (°)	-0,260	Yc heel (m)	-0,441
		Zc heel (m)	-0,197
		Sw heel(m2)	17,12
		Bwl heel (m)	1,92
		LCB – LCF (%Lwl)	0,06
		/ Disp. (m3)	2,90142
		/ Xg (m)	3,602
		Yg heel (m)	0,080
		> GZ (m)	0,520
		RM (kN.m)	15,176
		FB mini (cm)	7,6
		Obliquity (°)	3,8

>>> **RM30° = 15,2 kN.m** ; **Sw = 17,12 m²** ; Free-board minimum : 7,6 cm



The Sw and RM results for heel = 0°, 20° and 30° are used to complete the table of input data for the « Gene-VPP » application, by recopy / special paste the Sw and RM results from sub-section 5,2 for each heel angle (0°, 20°, 30°) into the table located in sub-section 5,3 :

Righting Moment RM (kN.m)		
RM0°	RM20°	RM30°
2,943	12,189	15,176

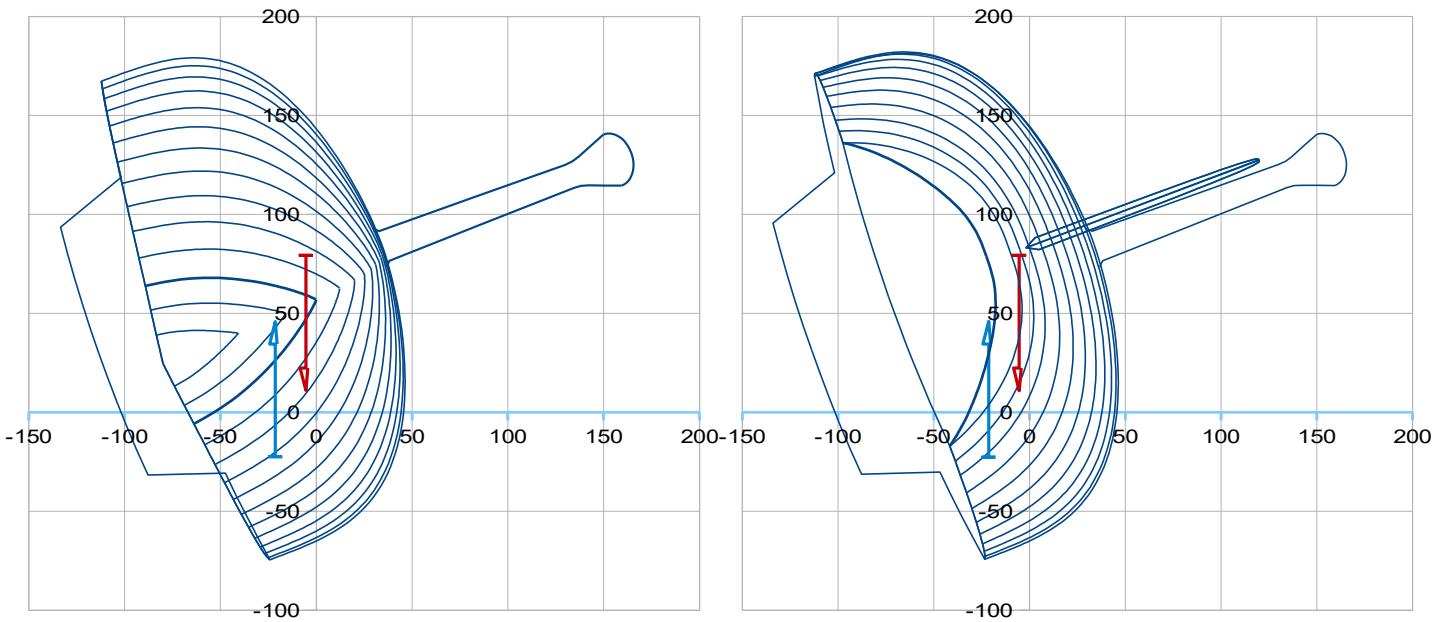
Wetted surface Sw (m2)		
Sw0°	Sw20°	Sw30°
18,27	17,56	17,12

(More information on Gene-VPP in its specific User guide and Examples)

The computation can also be done for heel > 30°, up to 180°, although due to the need of manual iterations for each equilibrium, it is time consuming for the building of the Gz Curve. For this task, we recommend to use **Gene-Stab** post-application allowing an automation of the iterations based on a direct use of the data provided by Gene-Hull. (More information on Gene-VPP in its specific User guide and Examples).

Nevertheless, the current subroutine within the sub-section 5,2 of Gene-Hull can be used to explore some « beyond 30° » case, still with manual iterations on height and trim to reach the equilibrium. Here is an example with heel 110° :

Data to enter : yellow cells	Results
Heel (°) 110	Disp. (m3) 2,90142
Height (cm) 70,6764	Xc heel (m) 3,602
Trim (°) -1,860	/ Disp. (m3) 2,90142 / Xg (m) 3,602
	Yc heel (m) -0,213 Yg heel (m) -0,049
	Zc heel (m) -0,226 > GZ (m) 0,164
	Sw heel(m2) 17,82 RM (kN.m) 4,791
	Bwl heel (m) 1,47 FB mini (cm) -74,5
	LCB – LCF (%Lwl) -1,60 Obliquity (°) -2,0



Boat V1 – with a classic shape for the rear transom :

Within this new version 3.3 of Gene-Hull, it is possible to draw a classic shape for the rear transom, instead of an inverted one. 4 data have to be changed, example with V1 :

Inverted transom

>>>

Classic transom

Rear end of the transom :

X tab ar (m)	-1,30
Z tab ar (m)	0,24

Sheer line, in horizontal projec

X liv ar (m)	-0,60
--------------	-------

Deck / central line rear end

X p ar (m)	-0,70
------------	-------

Rear end of the transom :

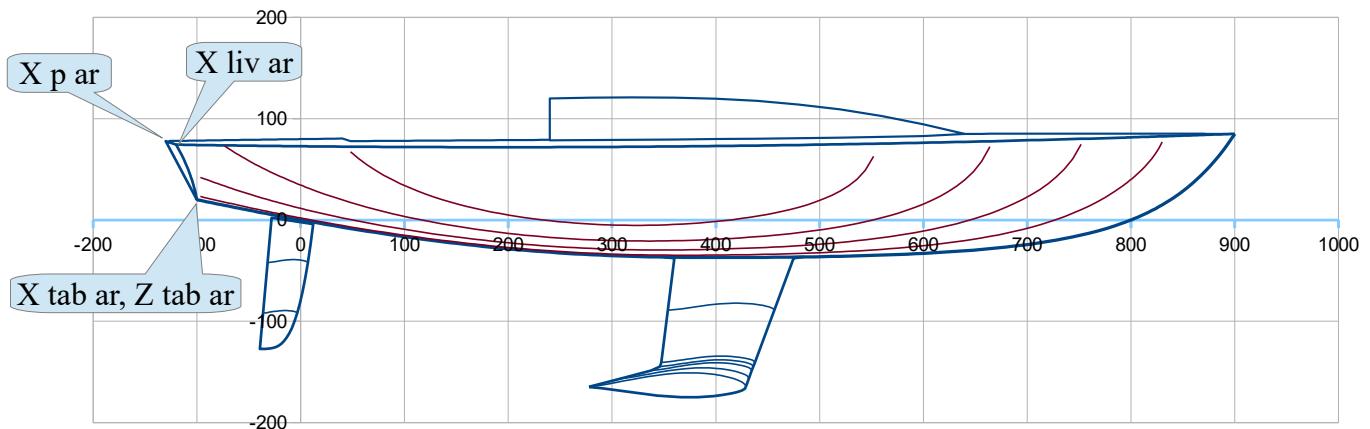
X tab ar (m)	-1,00
Z tab ar (m)	0,20

Sheer line, in horizontal projec

X liv ar (m)	-1,20
--------------	-------

Deck / central line rear end

X p ar (m)	-1,30
------------	-------



Conditions, all the 3 X should be negative and :

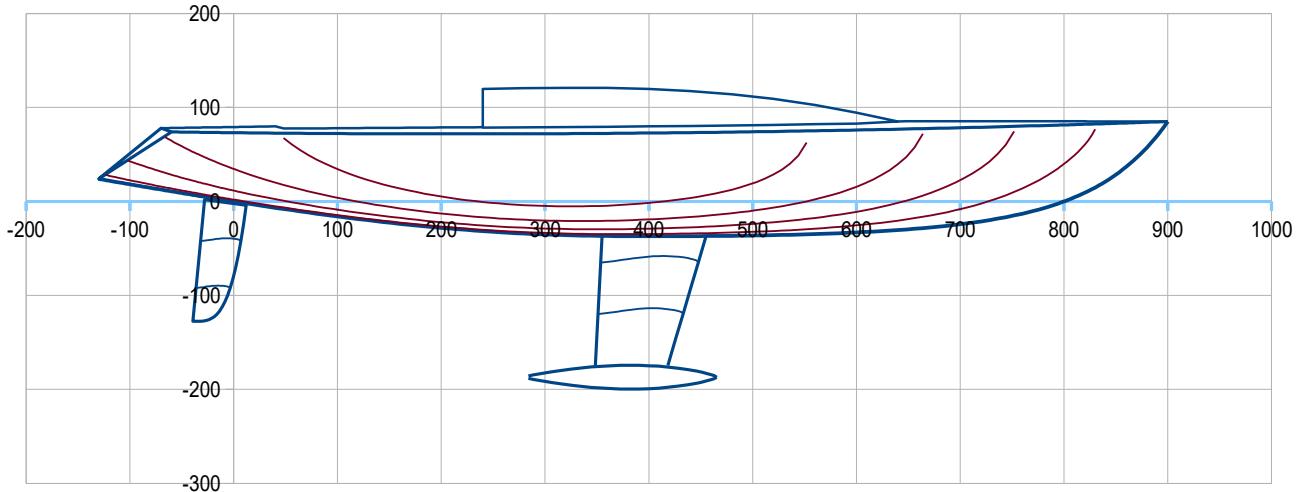
Inverted transom : $X_{tab\ ar} < X_{p\ ar} < X_{liv\ ar} < 0$

Classic transom : $X_{p\ ar} < X_{liv\ ar} < X_{tab\ ar} < 0$

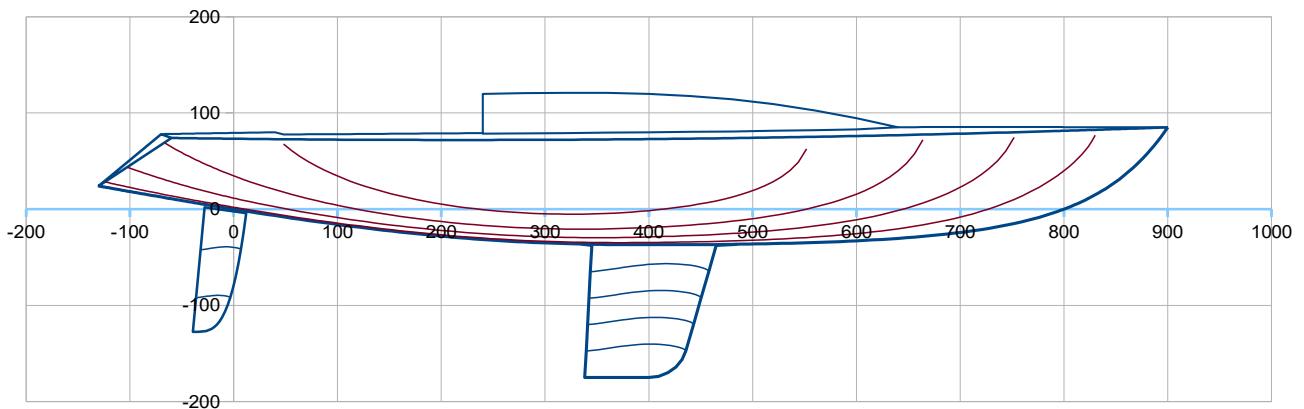
Boat V1 – Other options : « Inverted T keel », « Keel without bulb », « rudder with skeg »

These two options can be introduced by putting Type = 1 for them (and 0 for the previous ones) and input the requested data. Some examples :

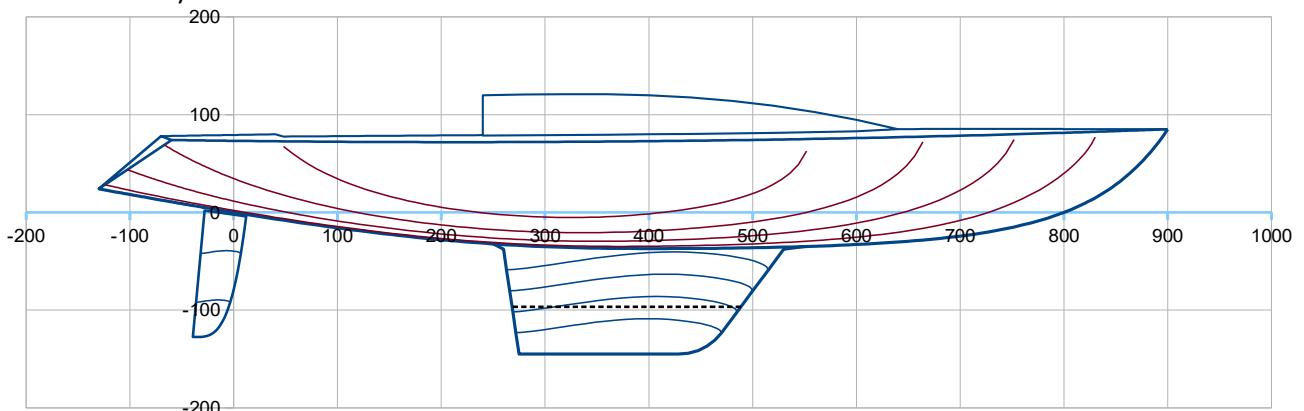
With an inverted T keel :



>>> with a fin keel without bulb :



>>> with a low aspect ratio keel without bulb (the dashed line represents the upper surface of the ballast) :

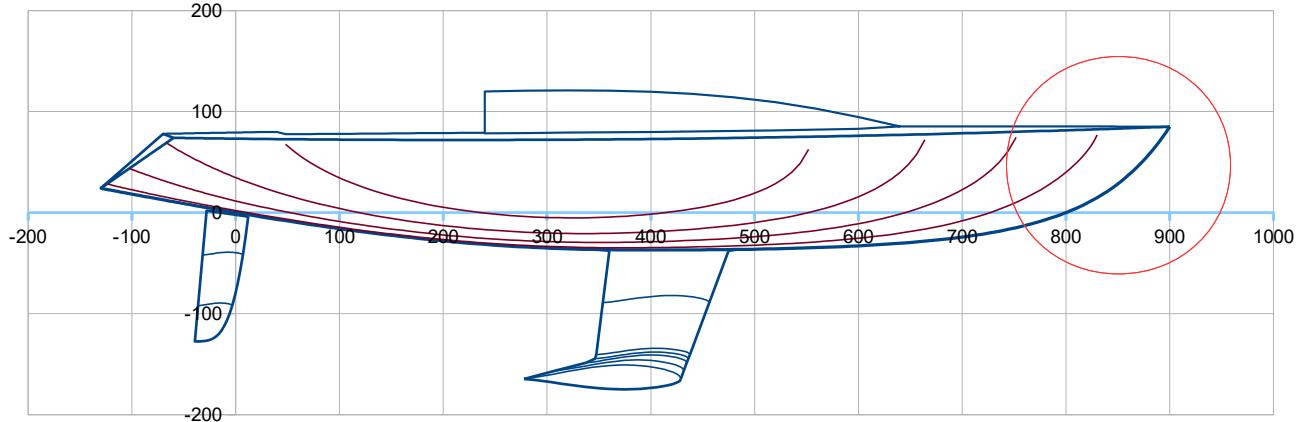


>>> etc..., and then you can do the same steps of design and computation as described above.

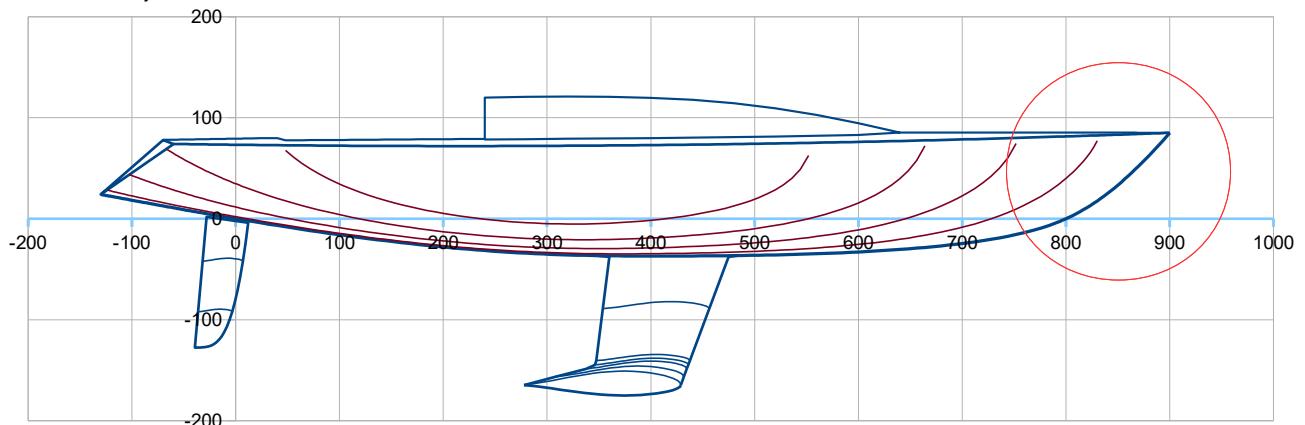
Boat V1 variant >>> V1,1 with a modified bow line

A bow fine shaping can be done by using the parameter **Kbrion**. At first, demonstration by images of its influence :

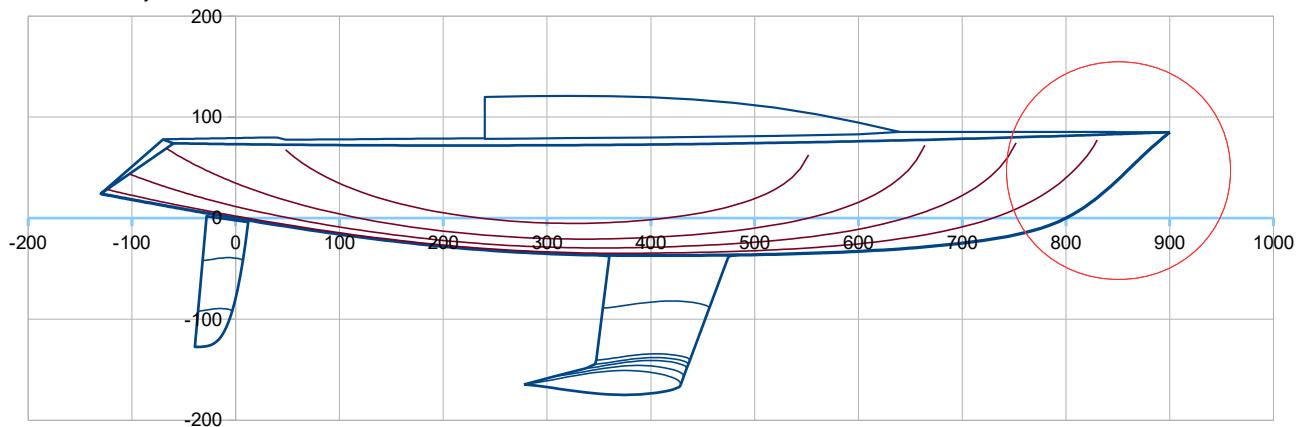
Kbrion = 0 - the initial V1 version



Kbrion = 0,10



Kbrion = 0,20

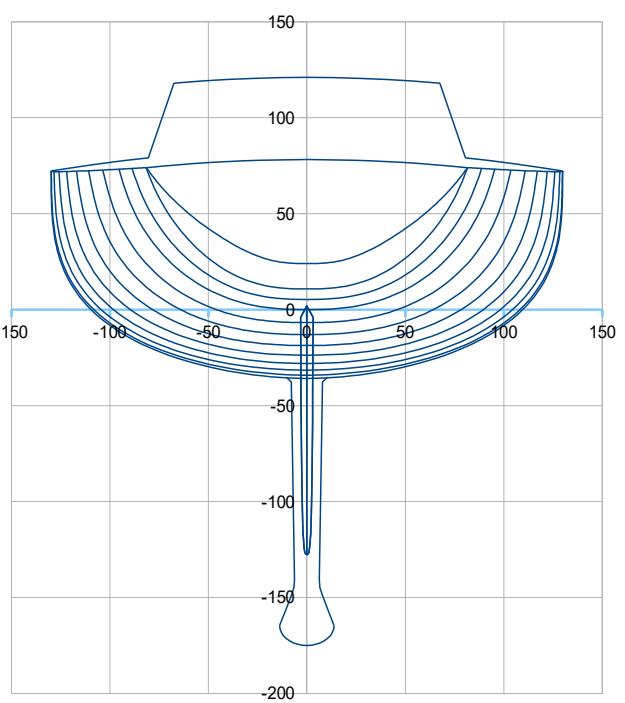
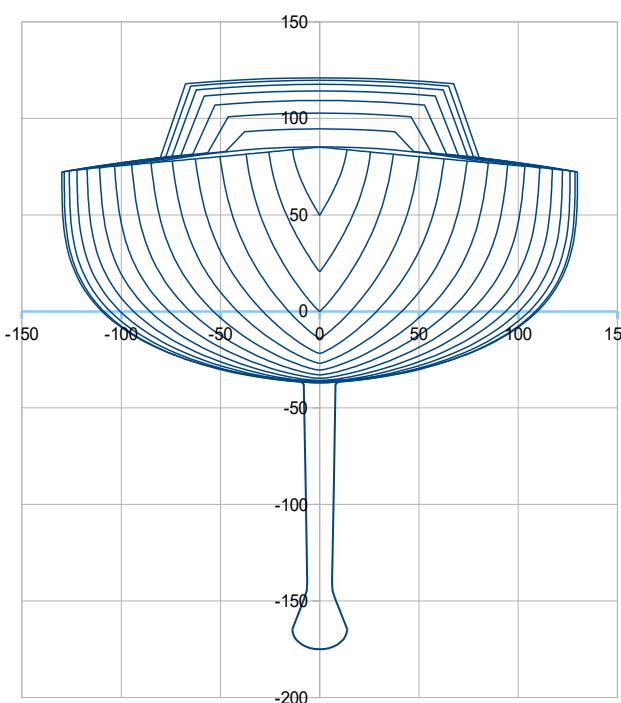
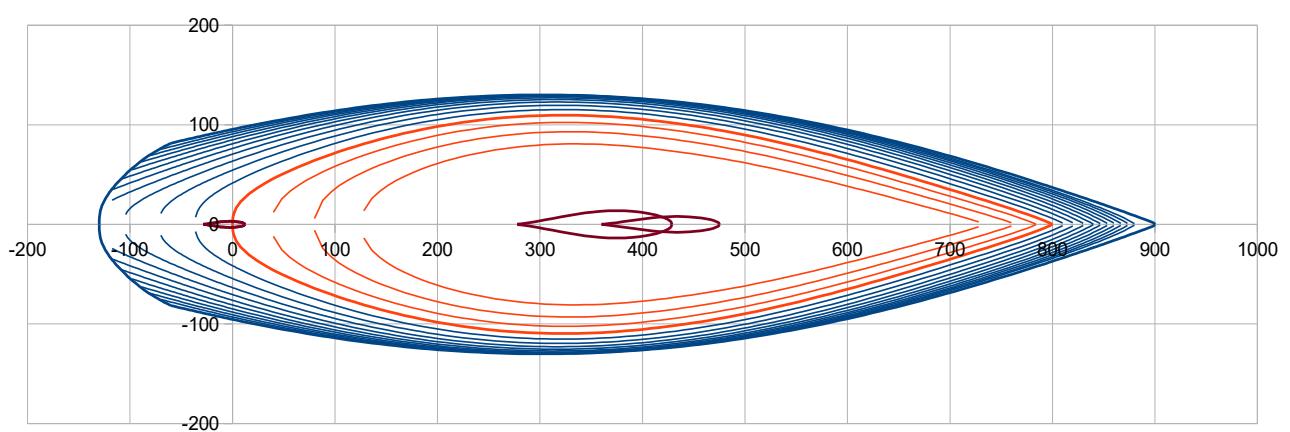
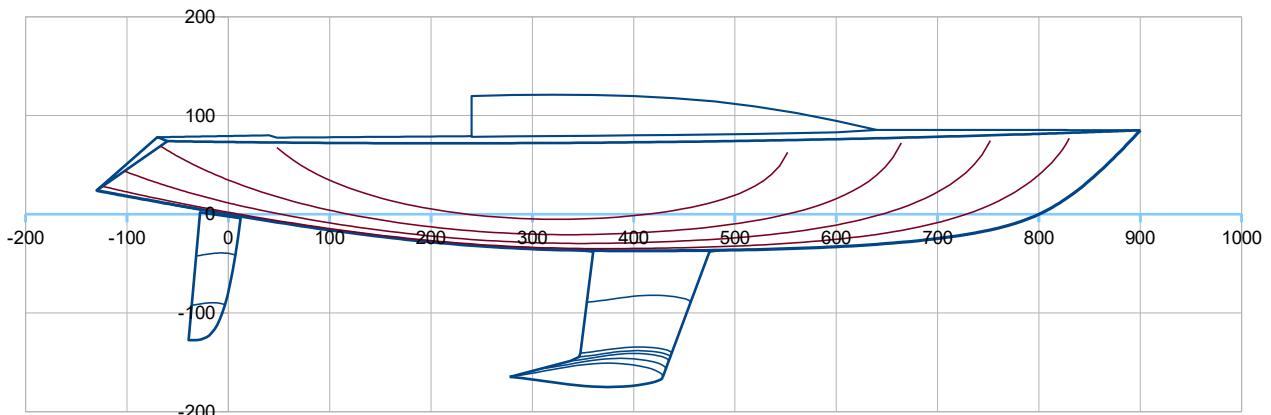


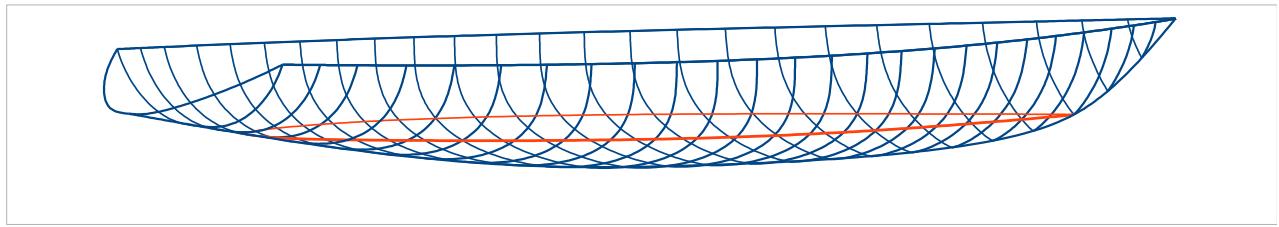
Kbrion > 0 strengthens the bow shape above the water and accentuates the knuckle below, giving a bit more fore volume.

From this screening, one can choose Kbrion = 0,12 for the boat V1,1 version, and some sections parameters are slightly adapted to this new shape and to maintain displacement = weight.

Boat V1 variant >> V1,1 version with Kbrion = 0,12

Loa 10,30 m ; Lwl 8,00 m ; B 2,60 m ; Draft 1,75 m ; Displacement : 2673 kg ; Keel-bulb 1090 kg
>> LCB hull 47,13 %Lwl ; Cp hull : 0,546 ; Sw : 17,41 m² ; DLR : 145 ; Ballast ratio : 40,8 %





Boat V1,1 hydrostatics data :

2. Data sum-up and results of hydrostatic and surfaces calculations

2.1 Hull

Loa (m)	10,30	Lwl (m)	8,00	> Hull speed (Knots)	6,9	at Froude 0,4
>> ft	33,79		26,25			
Boa (m)	2,60	at X (% Lwl)	38,0	Bsheer (m)	2,60	at X (% Lwl)
>> ft	8,53					38,0
Bwl (m)	2,19	at X (% Lwl)	40,0	> Bwl / Boa	0,843	
>> ft	7,19			Freeboards (m) >		
Tc (m)	0,370	at X (% Lwl)	50	Aft	0,74	Midship
>> ft	1,21				2,43	Fore
Displacement at H0 (m3)	2,44353	at LCB (m)	3,770	LCB (%Lwl)	47,13	ZCB (m)
>> lbs	5522	w. seawater	1025	kg/m3		>> ft
Cp	0,546					-0,130
Sf (m2)	11,87	at LCF (m)	3,593	LCF (%Lwl)	44,91	>>> LCB – LCF (%Lwl)
>> ft2	127,78	>> ft	11,79			2,22
Angle Freeboard/Half beam	29,1	(°), at section C4 (40% Lwl)		Half entry angle (°)	18,8	at 95% Lwl
Sw (m2)	12,83	>Sw/D^(2/3)	7,07			
>> ft2	138,10					
Shull (m2)	29,48	at X (m)	3,629	Z (m)	0,092	
>> ft2	317,32	>> ft	11,91	>> ft	0,30	
Sdeck (m2)	20,08	at X (m)	3,511	Z (m)	0,79	
>> ft2	216,18	>> ft	11,52	>> ft	2,59	

2.2 Keel

Vol. keel(m3)	0,14938	at X (m)	4,019	X (%Lwl)	50,23	Z (m)	-1,098
		>> ft	13,18			>> ft	-3,60
Ballast (kg)	1090,5	at X (m)	4,019	X (%Lwl)	50,23	Z (m)	-1,098
>> lbs	2404	>> ft	13,18			>> ft	-3,60
Draft oa (m)	1,75		Sw (m2)	3,66		Sxz (m2)	1,36
>> ft	5,74		>> ft2	39,45		>> ft2	14,60
CLR (m)	4,34	CLR (%Lwl)	54,23	CLR = Center of Lateral Resistance			
>> ft	14,23			method: keel profile extended to the waterline, CLR at Z 45% draft and	25,00	% chord	

2.3 Rudder(s)

Number	1						
Volume (m3)	0,01486	at X (m)	-0,12	X (%Lwl)	-1,47	Z (m)	-0,54
Sw (m2)	0,91	>> ft	-0,39			Sxz (m2)	0,44
>> ft2	9,80					>> ft2	4,71

2.4 Hull + Keel + Rudder(s)

Displacement at H0 (m3)	2,60777	at LCB (m)	3,762	LCB (%Lwl)	47,03	at ZCB (m)	-0,188
(kg)	2673	>> ft	12,34			>> ft	-0,62
>> lbs	5893						
, of which Ballast (kg)	1090	at Xg (m)	4,019	Xg (%Lwl)	50,23	at Zg (m)	-1,098
>> lbs	2404	>> ft	13,18			>> ft	-3,60
>> % Ballast	40,8						
Sw (m2)	17,41	>Sw/D^(2/3)	9,19	Lwl/D^(1/3)	5,81		
>> ft2	187,35			DLR	145	M(lbs/2240)/(Lwl(ft)/100)^3	

2.5 Data from the mass spreadsheet

Light boat:	M (kg)	2673	at Xg (m)	3,781	Xg (%Lwl)	47,26	at Zg (m)	-0,078
-------------	--------	------	-----------	-------	-----------	-------	-----------	--------

Boat V1 variant >>> V1,2 with V sections only

V sections only are obtained by just put 1 for all PE2 parameters. Then , you have to adjust the other sections parameters and the hull draft Tc to maintain the displacement = weight. Here, one solution is :

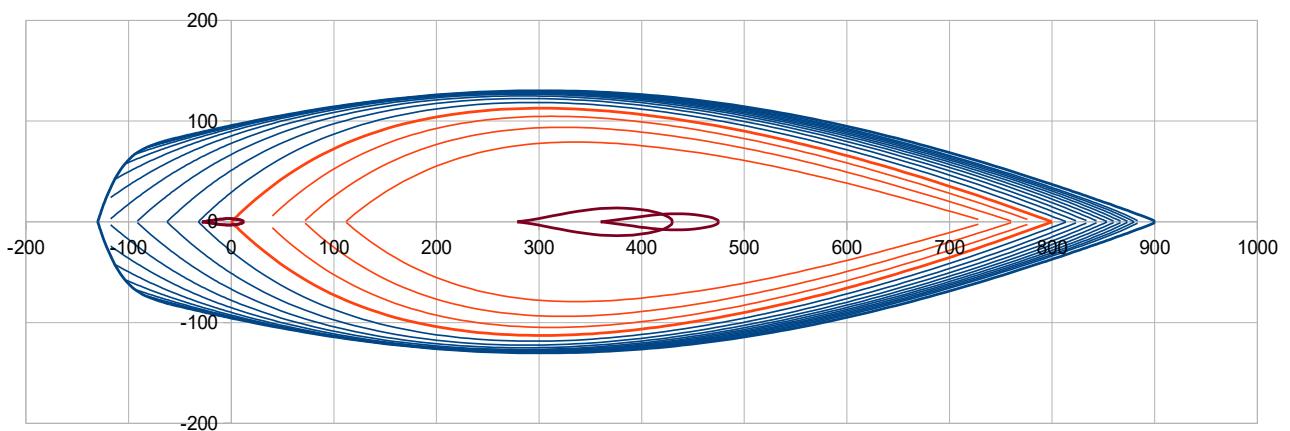
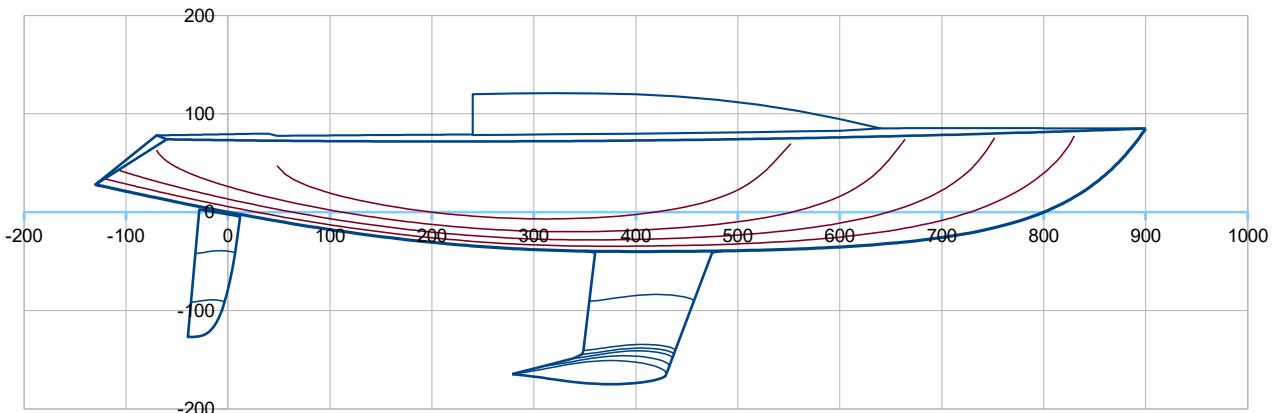
Sections :			
	PE1	C PE1	PE2
Fore	2,000	1,800	1,000
Mid	5,177	1,100	1,000
Aft	3,000	1,100	1,000

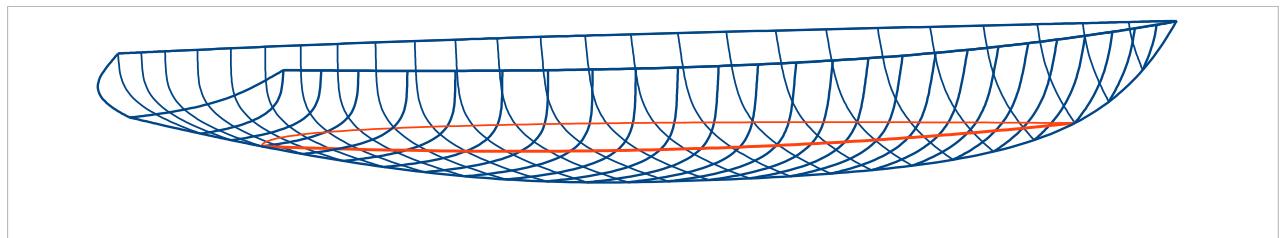
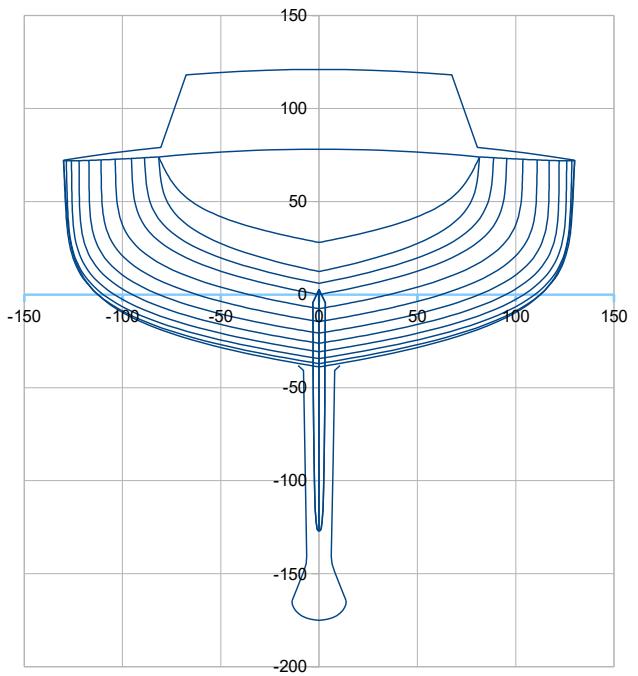
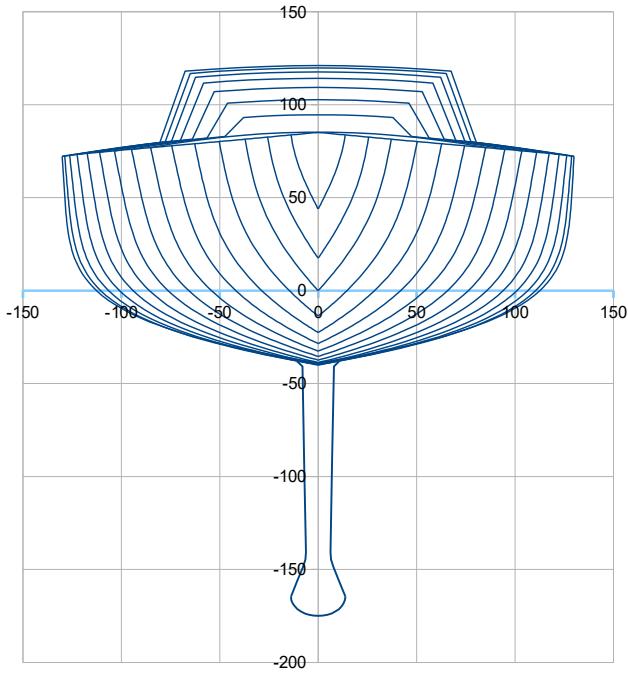
, associated with a hull body draft Tc = 0,4 m :

Tc (m) 0,4000

, leading to an equilibrium at 2654 kg for this variant **V1,2** of V1 :

Loa 10,60 m ; Lwl 8,00 m ; B 2,60 m ; Draft 1,75 m ; Displacement : 2654 kg ; Keel-bulb 1069 kg
 >> LCB hull 47,51 %Lwl ; Cp hull (%): 0,544 ; Sw : 17,50 m² ; DLR : 144 ; Ballast ratio : 40,3 %





Boat V1,2 hydrostatics data :

2. Data sum-up and results of hydrostatic and surfaces calculations

2.1 Hull

Loa (m)	10,30	Lwl (m)	8,00	> Hull speed (Knots)		6,9	at Froude 0,4		
>> ft	33,79		26,25						
Boa (m)	2,60	at X (% Lwl)		38,0	Bsheer (m)	2,60	at X (% Lwl)		38,0
>> ft	8,54								
Bwl (m)	2,26	at X (% Lwl)		38,0	> Bwl / Boa		0,867		
>> ft	7,40								
Tc (m)	0,400	at X (%Lwl)		50	Freeboards (m) >		Aft	Midship	Fore
>> ft	1,31						0,74	0,72	0,85
placement at H0 (m3)	2,42783	at LCB (m)		3,801	LCB (%Lwl)		47,51	ZCB (m)	-0,131
	>> lbs	5486	w. seawater		1025	kg/m3		>> ft	-0,43

Cp
Sf (m2)
>> ft2
Freeboard
Sw (m2)
>> ft2
hull (m2)
>> ft2

>> ft2		120,00	>> ft	11,83	Angle Freeboard/Half beam		29,0	(°), at section C4 (40% Lwl)	Half entry angle (°)	19,8	at 95% Lwl	
Sw (m2)	12,99		>Sw/D^(2/3)				7,19					
>> ft2	139,78											
Shull (m2)	29,87		at X (m)	3,608			Z (m)	0,091				
>> ft2	321,49		>> ft	11,84			>> ft	0,30				
Sdeck (m2)	20,11		at X (m)	3,511			Z (m)	0,79				
>> ft2	216,42		>> ft	11,52			>> ft	2,59				
2.2 Keel												
Vol. keel(m3)	0,14648		at X (m)	4,023			X (%Lwl)	50,29		Z (m)	-1,114	
			>> ft	13,20						>> ft	-3,66	
Ballast (kg)	1069,3		at X (m)	4,023			X (%Lwl)	50,29		Z (m)	-1,114	
>> lbs	2357		>> ft	13,20						>> ft	-3,66	
Draft oa (m)	1,75			Sw (m2)	3,60				Sxz (m2)	1,33		
>> ft	5,74			>> ft2	38,76				>> ft2	14,28		
CLR (m)	4,35		CLR (%Lwl)	54,35			<i>CLR = Center of Lateral Resistance</i>					
>> ft	14,27		method: keel profile extended to the waterline, CLR at Z 45% draft and						25,00	% chord		

2.3 Rudder(s)

Number	1						
Volume (m³)	0,01478	at X (m)	-0,12	X (%Lwl)	-1,47	Z (m)	-0,54
Sw (m²)	0,91	>> ft	-0,39			Sxz (m²)	0,44

>> ft2 9,78

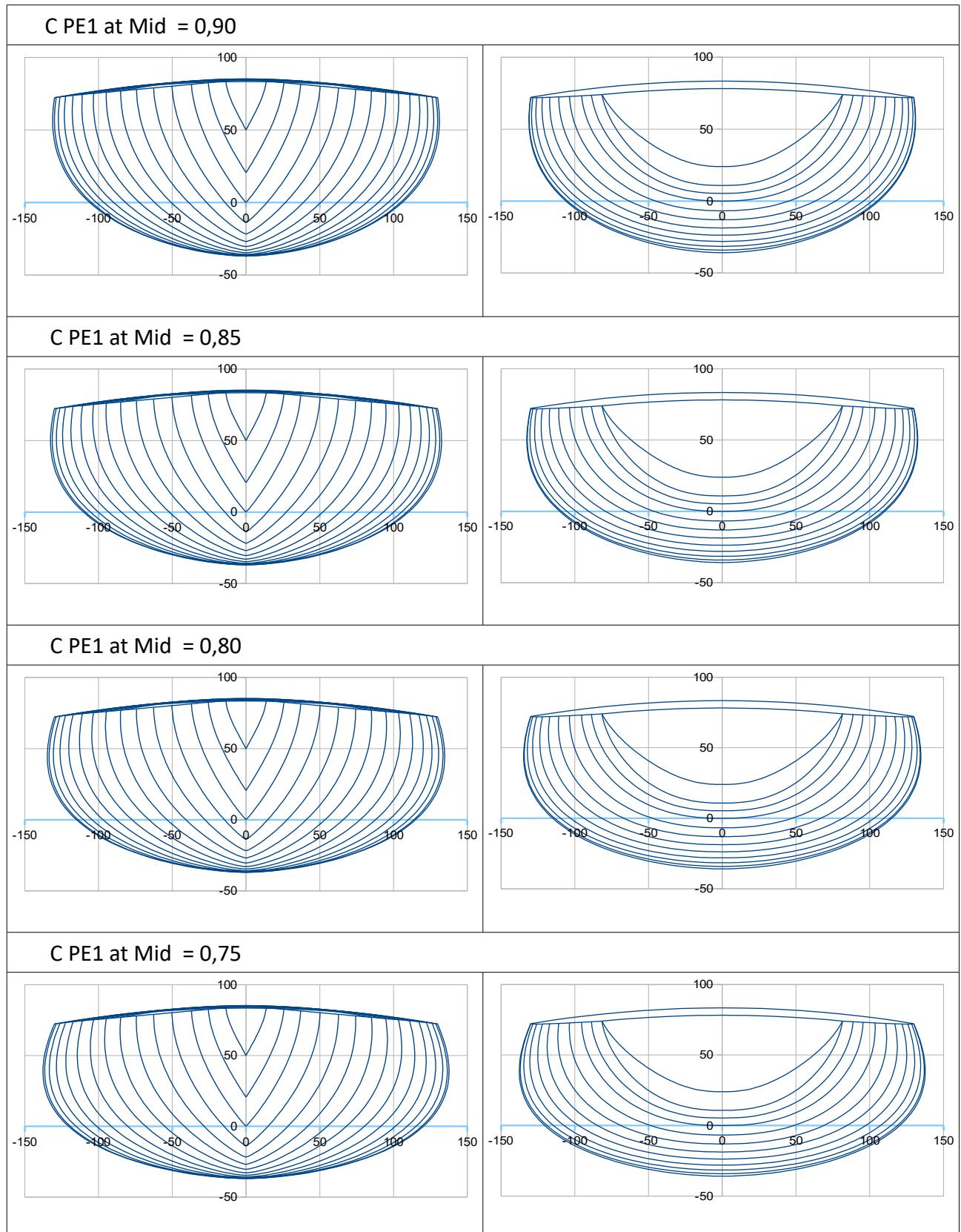
2.4 Hull + Keel + Rudder(s)							
Displacement at H0 (m3) (kg) >> lbs	2,58910 2654 5851	at LCB (m) >> ft	3,791 12,44	LCB (%Lwl)	47,39	at ZCB (m) >> ft	-0,189 -0,62
, of which Ballast (kg) >> lbs	1069 2357	at Xg (m) >> ft	4,023 13,20	Xg (%Lwl)	50,29	at Zg (m) >> ft	-1,114 -3,66
>> % Ballast	40,3						
Sw (m2) >> ft2	17,50 188,32	>Sw/D^(2/3)	9,28	Lwl/D^(1/3)	5,83	DLR	144
						M(lbs/2240)/(Lwl(ft)/100)^3	

2.5 Data from the mass spreadsheet

Light boat: M (kg) 2654 at X_g (m) 3,776 X_g (%Lwl) 47,20 at Z_g (m) -0,080

Boat V1,1 variant >>> V1,3 with some tumblehome in the sections

It is an extension of the sections shape formulation, where adimensional parameters « C PE1 », and especially the C PE1 value set at midship, can be < 1 and that gives a tumblehome effect. At first, demonstration of its influence by the images :



>> V1,3 version

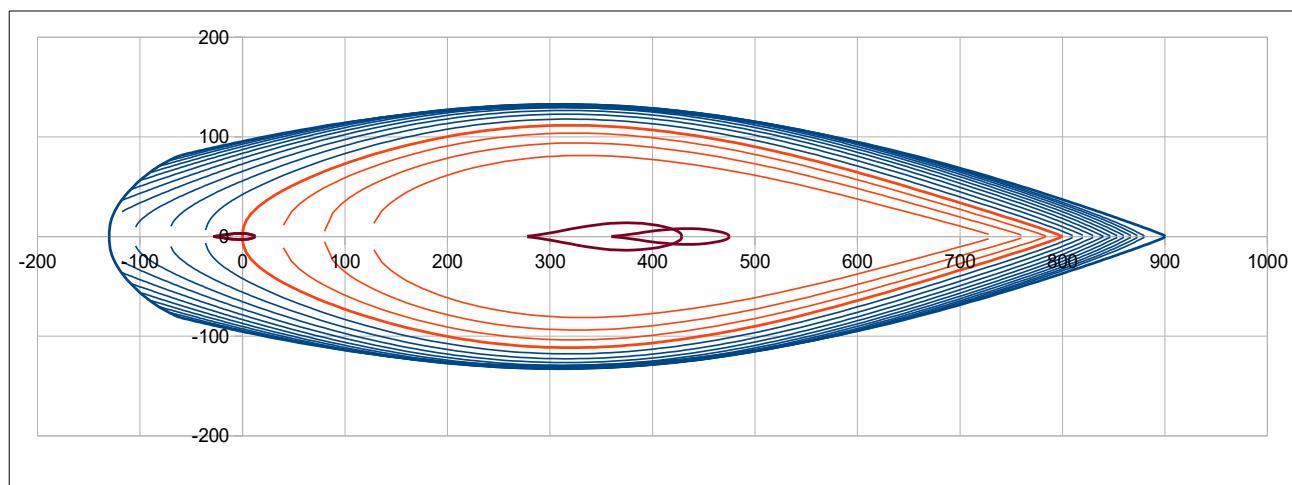
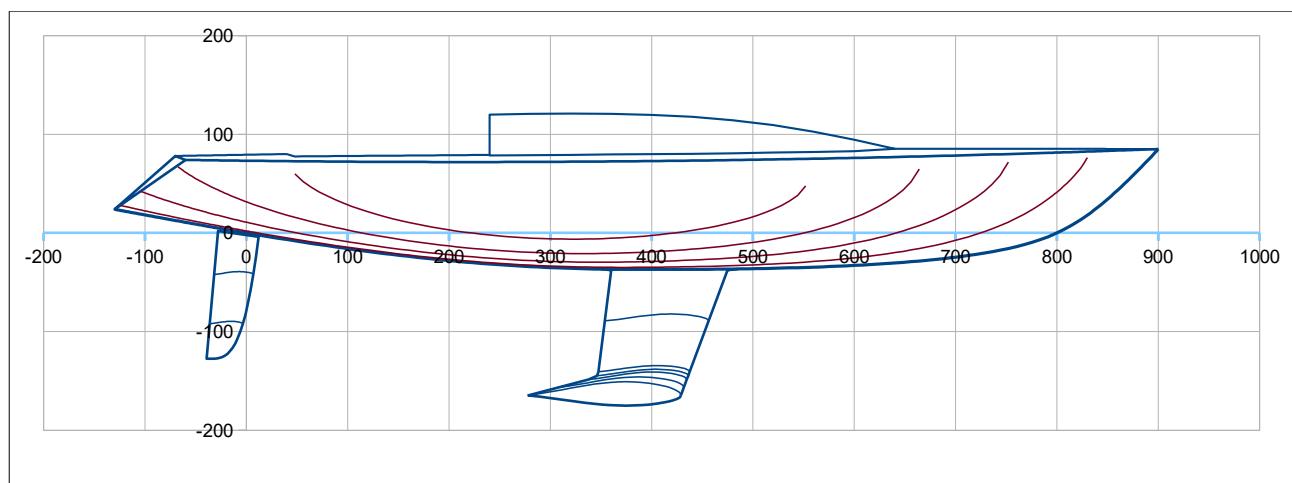
, obtained from the V1,1 version with C PE1 Mid = 0,835 and others parameters (in red) adjusted to maintain displacement = weight :

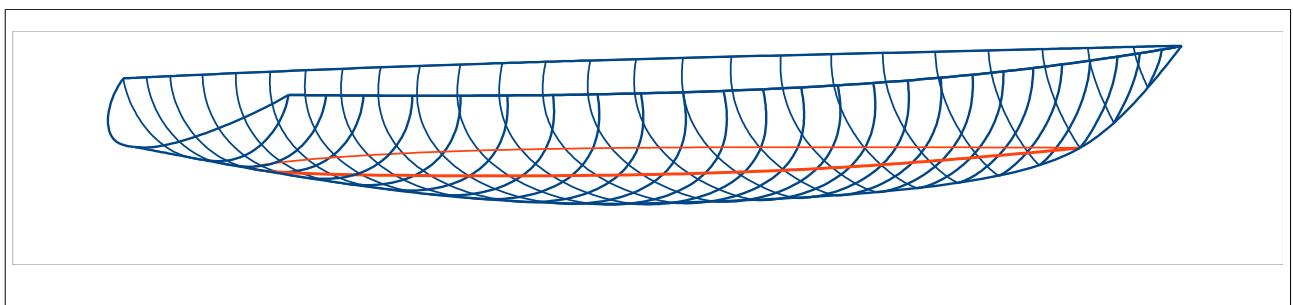
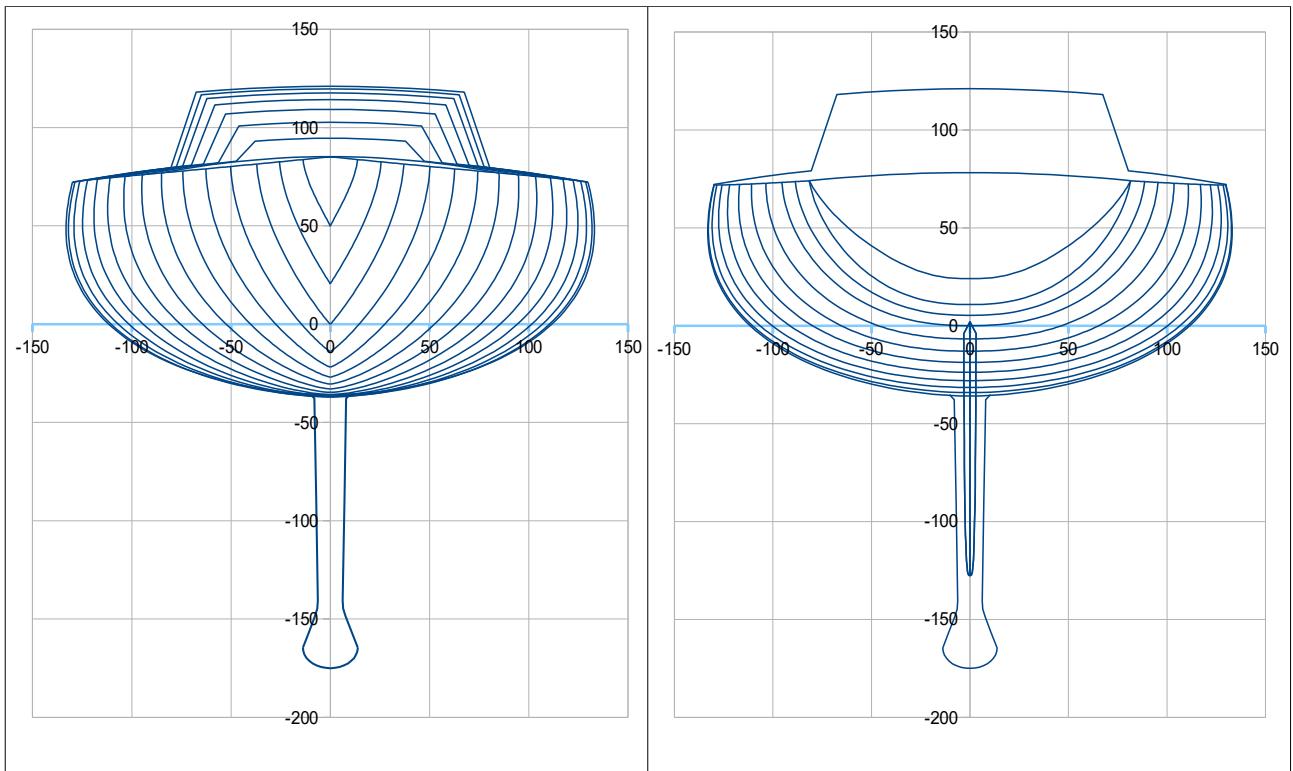
Sections :

	PE1	C PE1	PE2
Fore	1,750	1,350	0,870
Mid	2,250	0,835	1,750
Aft	1,750	1,250	2,500

Loa 10,30 m ; Lwl 8,00 m ; Boa 2,66 m (Bsheer 2,60 m) ; Draft 1,75 m ; Displacement : 2680 kg ; Keel-bulb 1090 kg (Ballast ratio : 40,7 %)

>> LCB hull 46,92 %Lwl ; Cp hull (%): 0,543 ; Sw : 17,50 m² ; DLR : 146





Boat V1,3 hydrostatics data :

2. Data sum-up and results of hydrostatic and surfaces calculations

2.1 Hull

Loa (m)	10,30	Lwl (m)	8,00	> Hull speed (Knots)		6,9	at Froude 0,4	
<i>>> ft</i>	<i>33,79</i>		<i>26,25</i>					
Boa (m)	2,66	at X (% Lwl)		38,0	Bsheer (m)	2,60	at X (% Lwl)	
<i>>> ft</i>	<i>8,73</i>							
Bwl (m)	2,23	at X (% Lwl)		40,0	> Bwl / Boa		0,838	
<i>>> ft</i>	<i>7,32</i>							
Tc (m)	0,370	at X (% Lwl)		50	Freeboards (m) >		Aft	Midship
<i>>> ft</i>	<i>1,21</i>						0,74	0,72
placement at H0 (m3)	2,45010	at LCB (m)		3,753	LCB (%Lwl)	46,92	ZCB (m)	-0,130
	<i>>> lbs</i>	<i>5537</i>	<i>w. seawater</i>		<i>1025</i>	<i>kg/m3</i>	<i>>> ft</i>	<i>-0,43</i>

Cp	0,543						
Sf (m2)	11,97	at LCF (m)	3,569	LCF (%Lwl)	44,61	>> LCB – LCF (%Lwl)	2,30
<i>>> ft2</i>	<i>128,85</i>	<i>>> ft</i>	<i>11,71</i>				
Angle Freeboard/Half beam		29,1	(°), at section C4 (40% Lwl)		Half entry angle (°)	18,4	at 95% Lwl
Sw (m2)	12,92	$>Sw/D^{(2/3)}$	7,11				
<i>>> ft2</i>	<i>139,07</i>						
Shull (m2)	29,77	at X (m)	3,617	Z (m)	0,092		
<i>>> ft2</i>	<i>320,43</i>	<i>>> ft</i>	<i>11,87</i>	<i>>> ft</i>	<i>0,30</i>		
Sdeck (m2)	20,08	at X (m)	3,511	Z (m)	0,79		
<i>>> ft2</i>	<i>216,18</i>	<i>>> ft</i>	<i>11,52</i>	<i>>> ft</i>	<i>2,50</i>		

22 Kool

Vol. keel(m3)	0,14938	at X (m)	4,019	X (%Lwl)	50,23	Z (m)	-1,098
		>> ft	13,18			>> ft	-3,60
Ballast (kg)	1090,5	at X (m)	4,019	X (%Lwl)	50,23	Z (m)	-1,098
>> lbs	2404	>> ft	13,18			>> ft	-3,60
Draft oa (m)	1,75		Sw (m2)	3,66		Sxz (m2)	1,36
>> ft	5,74		>> ft2	39,45		>> ft2	14,60
CLR (m)	4,34	CLR (%Lwl)	54,23	CLR = Center of Lateral Resistance			
>> ft	14,23	method: keel profile extended to the waterline, CLR at Z 45% draft and				25,00	% chord

2.3 Rudder(s)

Number	1						
Volume (m³)	0,01486	at X (m)	-0,12	X (%Lwl)	-1,47	Z (m)	-0,54
Sw (m²)	0,91	>> ft	-0,39			Sxz (m²)	0,44

>> ft2 9,80

2.4 Hull + Keel + Rudder(s)							
Displacement at H0 (m3)	2,61434	at LCB (m)	3,746	LCB (%Lwl)	46,83	at ZCB (m)	-0,188
(kg)	2680	>> ft	12,29			>> ft	-0,62
>> lbs	5908						
, of which Ballast (kg)	1090	at Xg (m)	4,019	Xg (%Lwl)	50,23	at Zg (m)	-1,098
>> lbs	2404	>> ft	13,18			>> ft	-3,60
>> % Ballast	40,7						
Sw (m2)	17,50	>Sw/D^(2/3)	9,22	Lwl/D^(1/3)	5,81	D/R	
>> ft^2	188,32						M(lbs/2240)/(l wl(ft)/100)^3

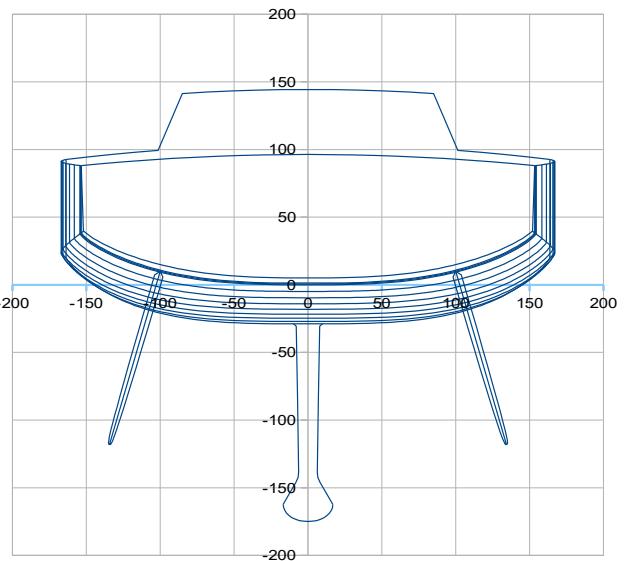
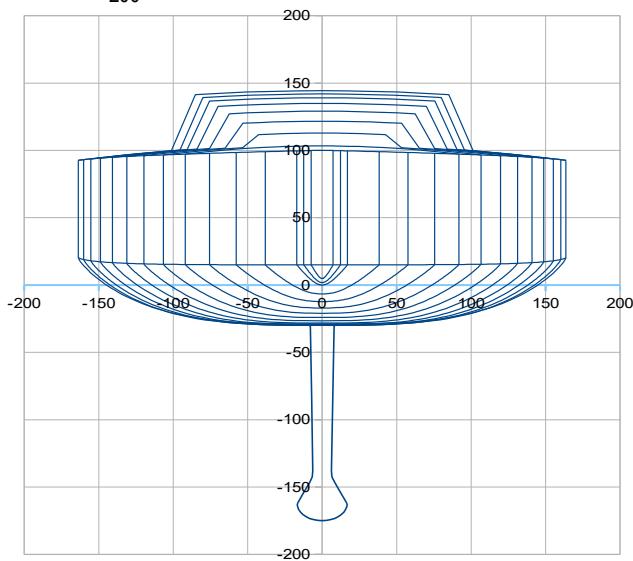
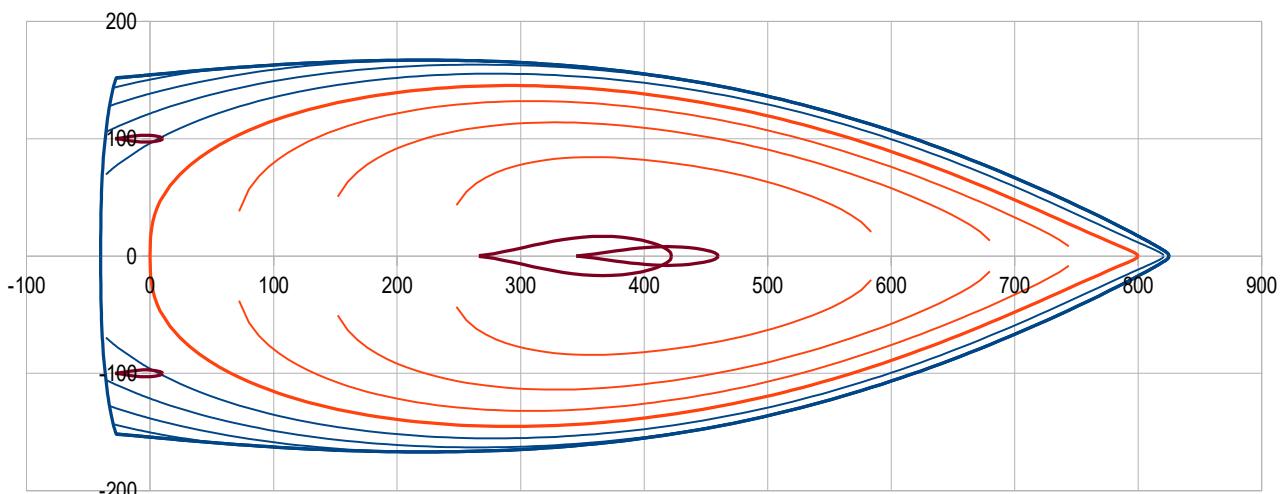
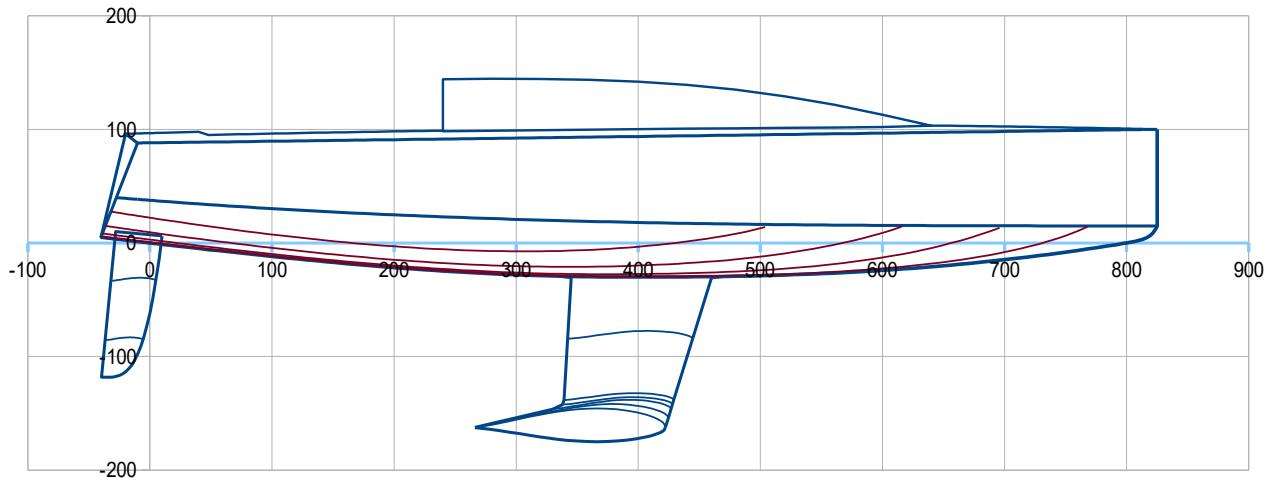
2.5 Data from the mass spreadsheet

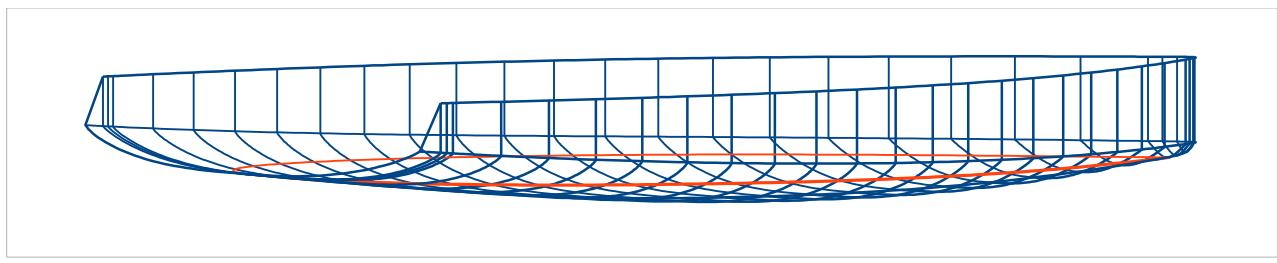
Light boat: M (kg) 2680 at Xq (m) 3.778 Xq (%Lwl) 47.22 at Zq (m) -0.078

Boat U1 : modern style sailboat

Loa 8,65 m ; Lwl 8,00 m ; Boa 3,34 m ; Draft 1,75 m ; Displacement : 3165 kg ; Keel-bulb 1233 kg
 (Ballast ratio : 39,0 %)

>> LCB hull 46,60 %Lwl ; Cp hull (%): 0,550 ; Sw : 22,77 m² ; DLR : 172





Boat U1 hydrostatics data :

2. Data sum-up and results of hydrostatic and surfaces calculations

2.1 Hull

Loa (m)	8,65	Lwl (m)	8,00	> Hull speed (Knots)		6,9	at Froude 0,4
>> ft	28,38		26,25				
Boa (m)	3,34	at X (% Lwl)	28,0	Bsheer (m)	3,34	at X (% Lwl)	28,0
>> ft	10,96						
Bwl (m)	2,90	at X (% Lwl)	37,0	> Bwl / Boa	0,870		
>> ft	9,53			Freeboards (m) >		Aft	
Tc (m)	0,300	at X (% Lwl)	50			0,88	Midship
>> ft	0,98					2,89	Fore
Displacement at H0 (m3)	2,89118	at LCB (m)	3,728	LCB (%Lwl)	46,60	ZCB (m)	-0,110
>> lbs	6533	w. seawater	1025	kg/m3		>> ft	-0,36
Cp	0,550						
Sf (m2)	16,59	at LCF (m)	3,483	LCF (%Lwl)	43,53	>>> LCB – LCF (%Lwl)	
>> ft2	178,58	>> ft	11,43				3,07
Angle Freeboard/Half beam		29,5	(°), at section C4 (40% Lwl)		Half entry angle (°)	25,1	at 95% Lwl
Sw (m2)	17,01	>Sw/D^(2/3)	8,38				
>> ft2	183,04						
Shull (m2)	35,92	at X (m)	3,621	Z (m)	0,126		
>> ft2	386,64	>> ft	11,88	>> ft	0,41		
Sdeck (m2)	23,13	at X (m)	3,344	Z (m)	0,97		
>> ft2	248,93	>> ft	10,97	>> ft	3,17		

2.2 Keel

Vol. keel(m3)	0,16891	at X (m)	3,890	X (%Lwl)	48,63	Z (m)	-1,102
		>> ft	12,76			>> ft	-3,61
Ballast (kg)	1233,1	at X (m)	3,890	X (%Lwl)	48,63	Z (m)	-1,102
>> lbs	2718	>> ft	12,76			>> ft	-3,61
Draft oa (m)	1,75		Sw (m2)	3,97		Sxz (m2)	1,41
>> ft	5,74		>> ft2	42,72		>> ft2	15,20
CLR (m)	4,20	CLR (%Lwl)	52,53	CLR = Center of Lateral Resistance			
>> ft	13,79	method: keel profile extended to the waterline, CLR at Z 45% draft and				25,00	% chord

2.3 Rudder(s)

Number	2						
Volume (m3)	0,02815	at X (m)	-0,13	X (%Lwl)	-1,60	Z (m)	-0,46
Sw (m2)	1,79	>> ft	-0,42			Sxz (m2)	0,43
>> ft2	19,29					>> ft2	4,64

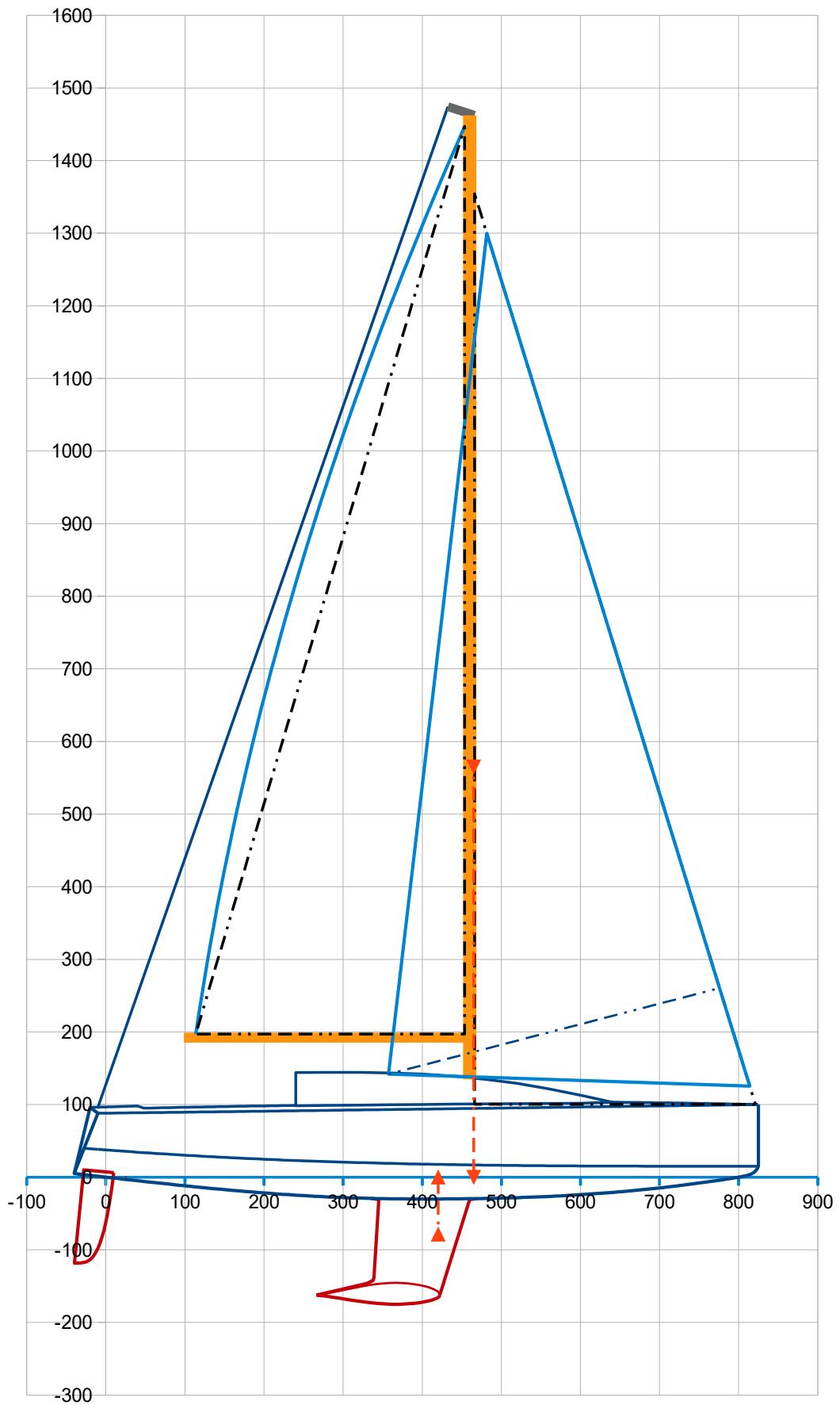
2.4 Hull + Keel + Rudder(s)

Displacement at H0 (m3)	3,08824	at LCB (m)	3,702	LCB (%Lwl)	46,28	at ZCB (m)	-0,168
(kg)	3165	>> ft	12,15			>> ft	-0,55
>> lbs	6979						
, of which Ballast (kg)	1233	at Xg (m)	3,890	Xg (%Lwl)	48,63	at Zg (m)	-1,102
>> lbs	2718	>> ft	12,76			>> ft	-3,61
>> % Ballast	39,0						
Sw (m2)	22,77	>Sw/D^(2/3)	10,74	Lwl/D^(1/3)	5,49		
>> ft2	245,05			DLR	172	M(lbs/2240)/(Lwl(ft)/100)^3	

2.5 Data from the mass spreadsheet

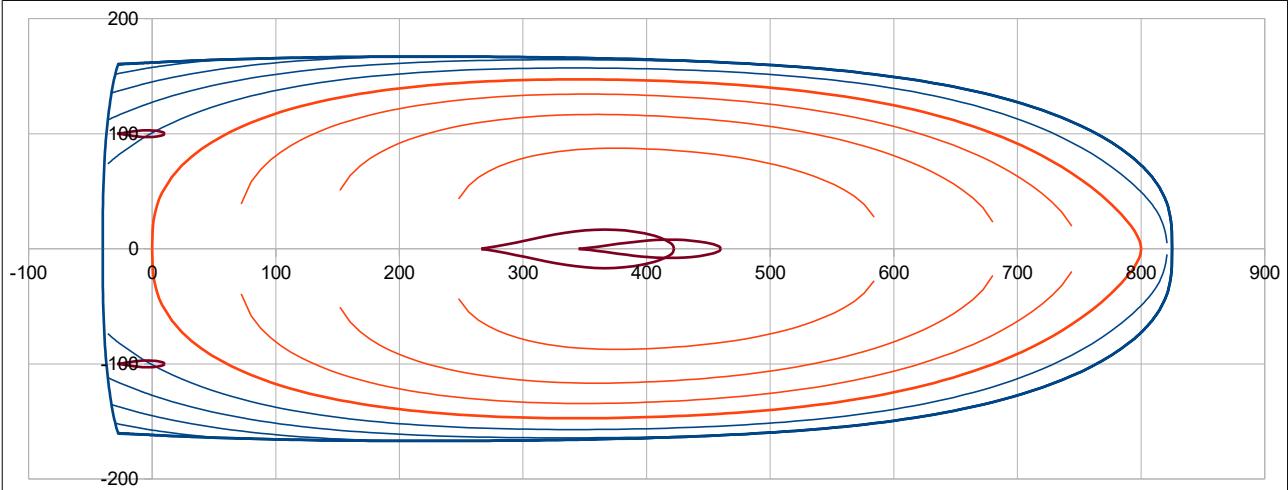
Light boat:	M (kg)	3165	at Xg (m)	3,635	Xg (%Lwl)	45,44	at Zg (m)	-0,006
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SA 52,6 m² (Main 25,5 m² + Jib 27,1 m²) >> SA/Sw = 2,31 SA/D^(2/3) = 24,8

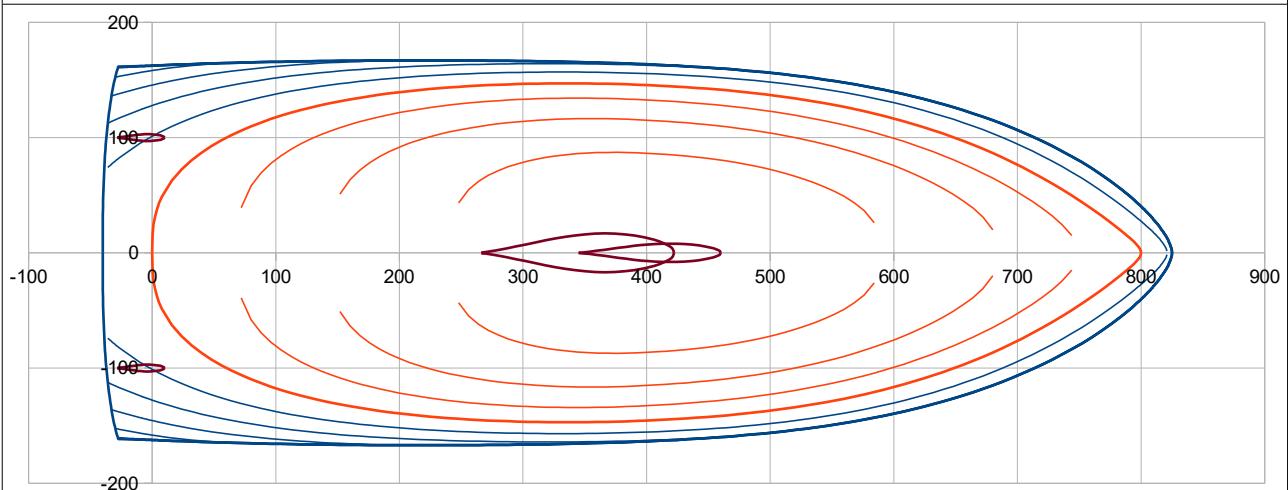


Boat U1 variant >> **U1,1** is an U1 evolution with a scow bow by using 2 parameters : Scow and Pui Scow. Scow gives the global proportion of the effect (Scow = 1 means the maximum rectangular proportion) and Pui Scow influences the water entry at bow. At first, a demonstration with Scow = 1 and various Pui Scow :

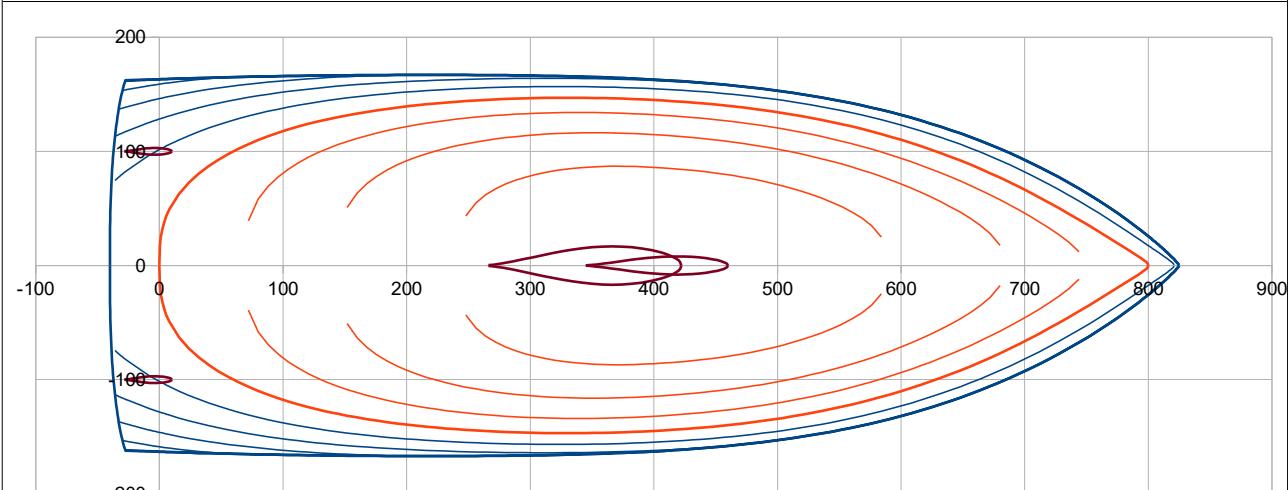
Scow = 1,0 and Pui Scow = 0,30



Scow = 1,0 and Pui Scow = 0,55



Scow = 1,00 and Pui Scow = 0,80



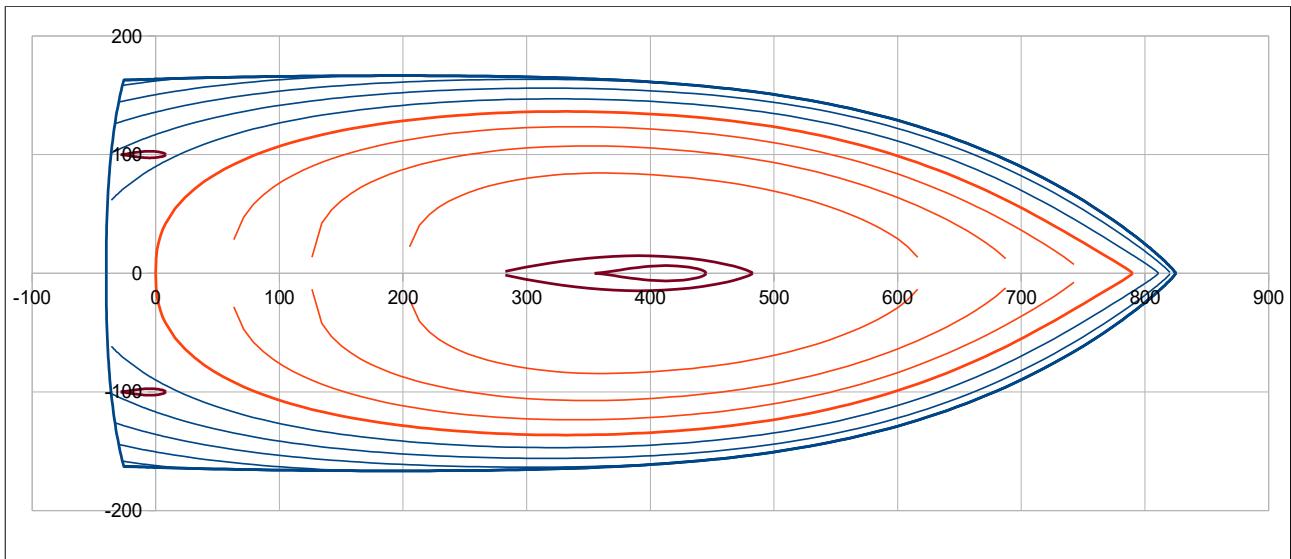
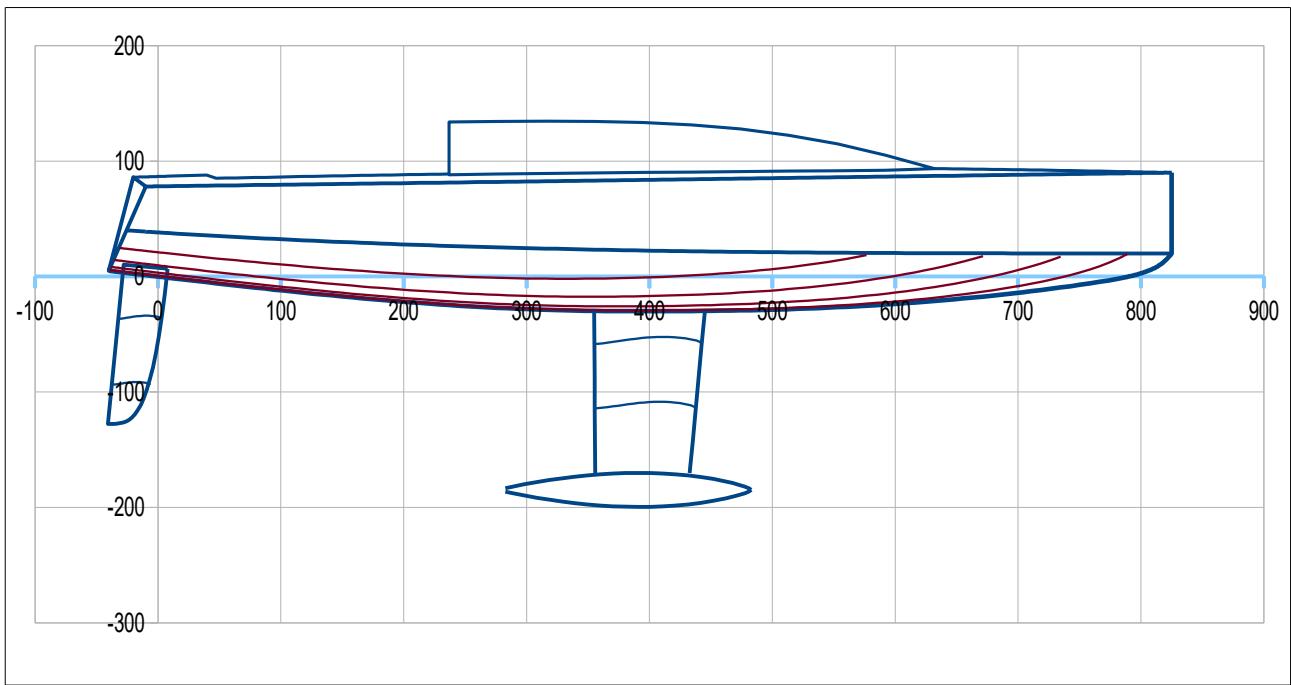
>>> Boat U1,1 day-boat with a mid-scow bow

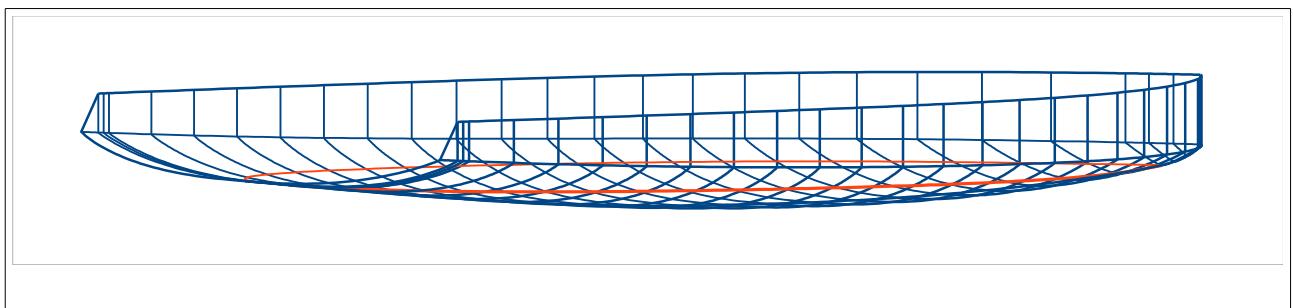
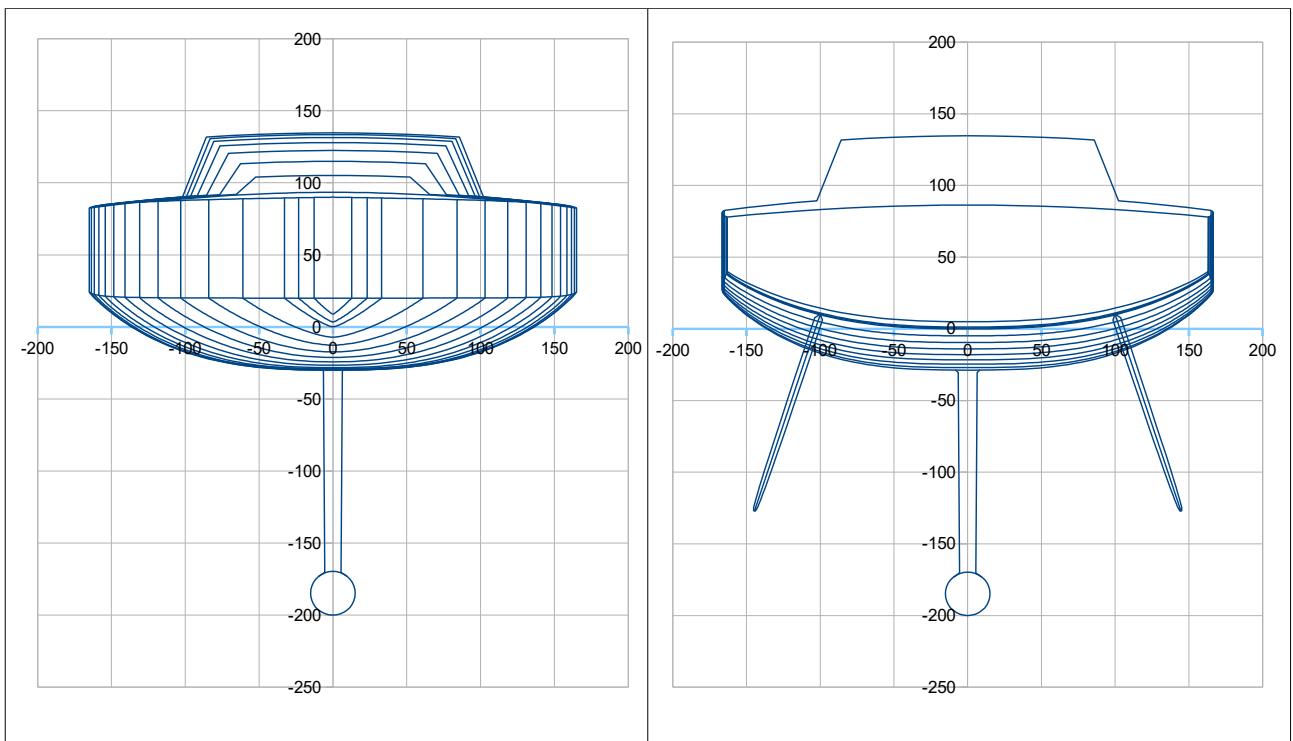
, with using Scow = 1,0 and Pui scow = 0,8 :

Scow	1,00
Pui Scow	0,80

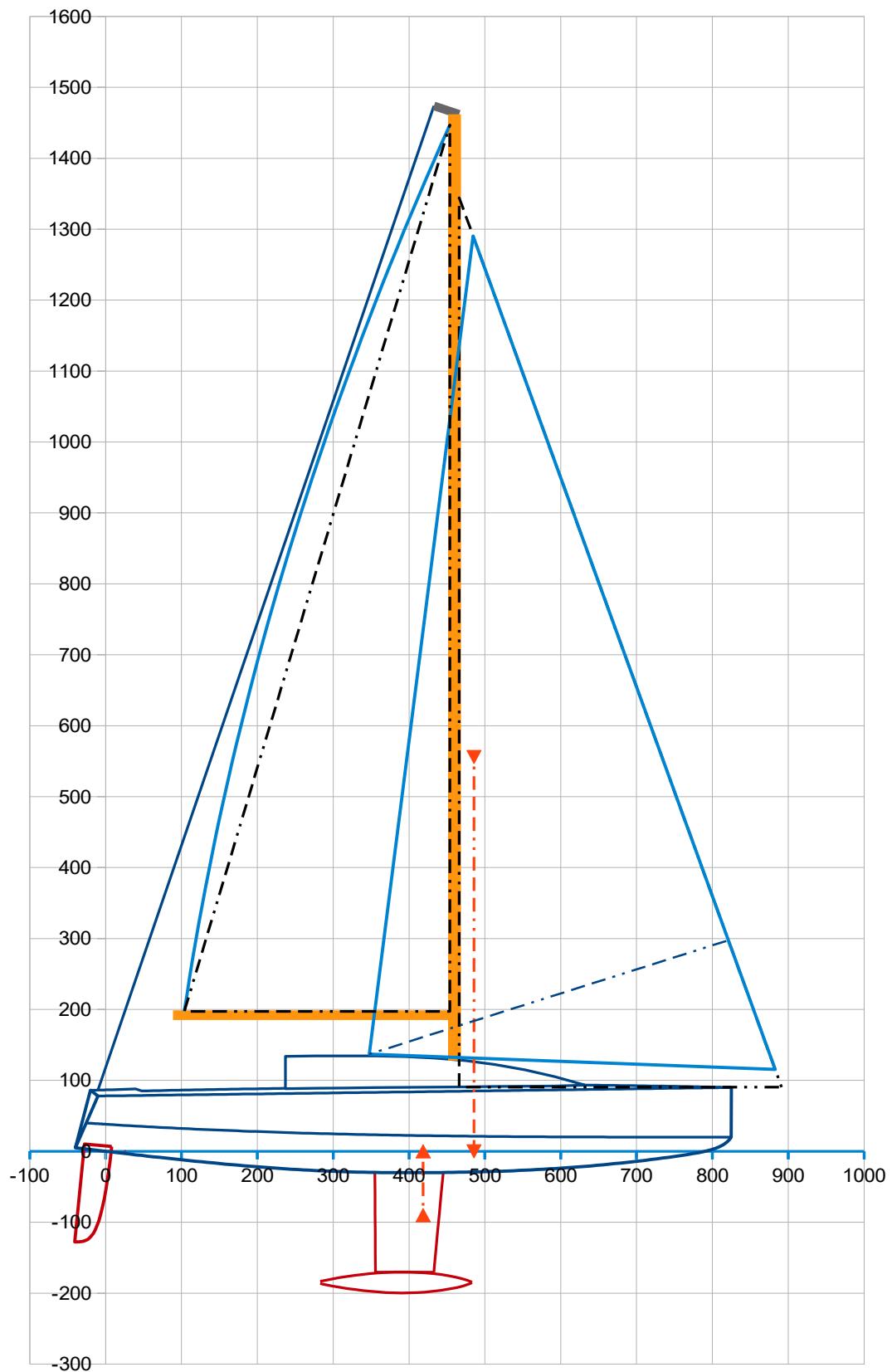
, an inverted T keel and twin suspended rudders :

Loa 8,65 m ; Lwl 7,90 m ; B 3,33 m ; Draft 2,0 m ; Displacement : 2976 kg ; Keel-bulb 1229 kg
>> Cp hull : 0,571 ; Sw : 22,13 m² ; DLR : 168
(Ballast ratio : 41,3 %)





Boat U1,1 : SA 57,9 m² (Main 26,3 m² + Genoa 31,6 m²) >> SA/Sw 2,62 SA/D^(2/3) 28,45



Boat U1,1 hydrostatics data :

2. Data sum-up and results of hydrostatic and surfaces calculations

2.1 Hull

Loa (m)	8,65	Lwl (m)	7,90	> Hull speed (Knots)		6,8	at Froude 0,4
>> ft	28,38		25,92				
Boa (m)	3,33	at X (% Lwl)	25,0	Bsheer (m)	3,33	at X (% Lwl)	25,0
>> ft	10,93						
Bwl (m)	2,73	at X (% Lwl)	42,0	> Bwl / Boa	0,819		
>> ft	8,95			Freeboards (m) >		Aft	Midship
Tc (m)	0,300	at X (% Lwl)	50			0,78	0,82
>> ft	0,98					2,56	2,69
Displacement at H0 (m3)	2,70650	at LCB (m)	3,797	LCB (%Lwl)	48,07	ZCB (m)	-0,107
>> lbs	6116	w. seawater	1025	kg/m3		>> ft	-0,35
Cp	0,571						
Sf (m2)	16,28	at LCF (m)	3,601	LCF (%Lwl)	45,59	>>> LCB – LCF (%Lwl)	
>> ft2	175,24	>> ft	11,82				2,48
Angle Freeboard/Half beam		26,6	(°), at section C4 (40% Lwl)	Half entry angle (°)		31,6	at 95% Lwl
Sw (m2)	16,63	>Sw/D^(2/3)	8,56				
>> ft2	178,95						
Shull (m2)	35,07	at X (m)	3,663	Z (m)	0,097		
>> ft2	377,54	>> ft	12,02	>> ft	0,32		
Sdeck (m2)	24,78	at X (m)	3,486	Z (m)	0,87		
>> ft2	266,76	>> ft	11,44	>> ft	2,85		

2.2 Keel

Vol. keel(m3)	0,16837	at X (m)	3,964	X (%Lwl)	50,17	Z (m)	-1,369
		>> ft	13,00			>> ft	-4,49
Ballast (kg)	1229,1	at X (m)	3,964	X (%Lwl)	50,17	Z (m)	-1,369
>> lbs	2710	>> ft	13,00			>> ft	-4,49
Draft oa (m)	2,00		Sw (m2)	3,63	Sxz (m2)	1,59	
>> ft	6,56		>> ft2	39,05	>> ft2	17,09	
CLR (m)	4,19	CLR (%Lwl)	53,00	CLR = Center of Lateral Resistance			
>> ft	13,74	method: keel profile extended to the waterline, CLR at Z 45% draft and				25,00	% chord

2.3 Rudder(s)

Number	2						
Volume (m3)	0,02839	at X (m)	-0,14	X (%Lwl)	-1,79	Z (m)	-0,52
Sw (m2)	1,88	>> ft	-0,46			Sxz (m2)	0,45
>> ft2	20,24					>> ft2	4,87

2.4 Hull + Keel + Rudder(s)

Displacement at H0 (m3)	2,90326	at LCB (m)	3,768	LCB (%Lwl)	47,70	at ZCB (m)	-0,184
(kg)	2976	>> ft	12,36			>> ft	-0,60
>> lbs	6561						
, of wich Ballast (kg)	1229	at Xg (m)	3,964	Xg (%Lwl)	50,17	at Zg (m)	-1,369
>> lbs	2710	>> ft	13,00			>> ft	-4,49
>> % Ballast	41,3						
Sw (m2)	22,13	>Sw/D^(2/3)	10,88	Lwl/D^(1/3)	5,54		
>> ft2	238,25			DLR	168	M(lbs/2240)/(Lwl(ft)/100)^3	

2.5 Data from the mass spreadsheet

Light boat:	M (kg)	2976	at Xg (m)	3,686	Xg (%Lwl)	46,66	at Zg (m)	-0,173
-------------	---------------	-------------	-----------	--------------	-----------	--------------	-----------	--------

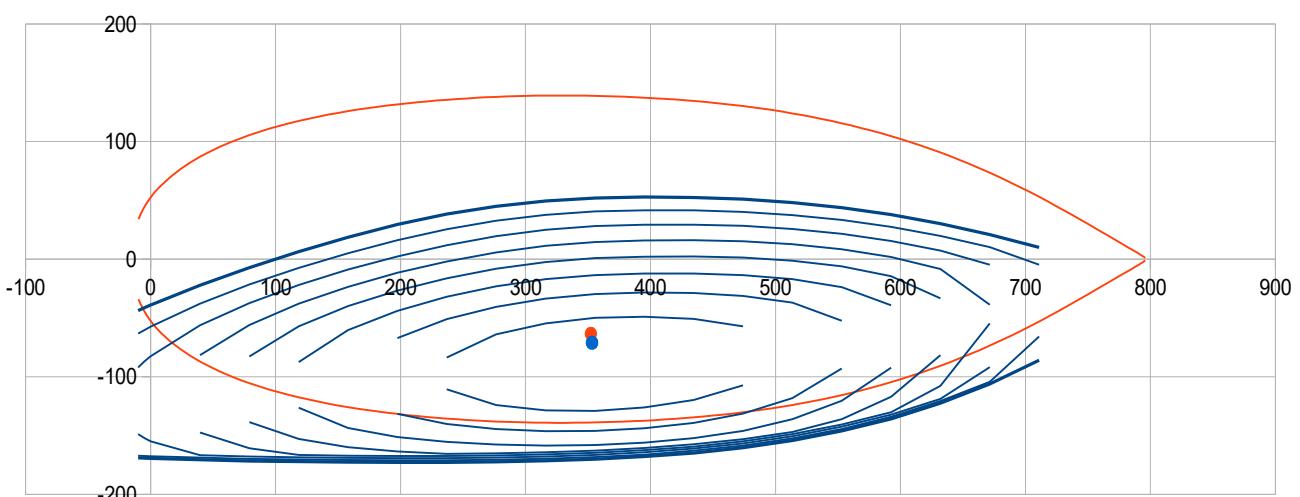
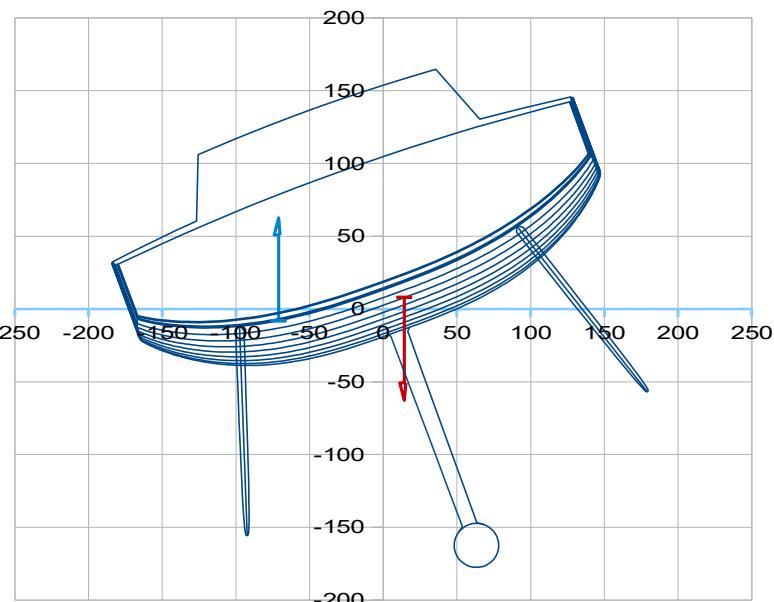
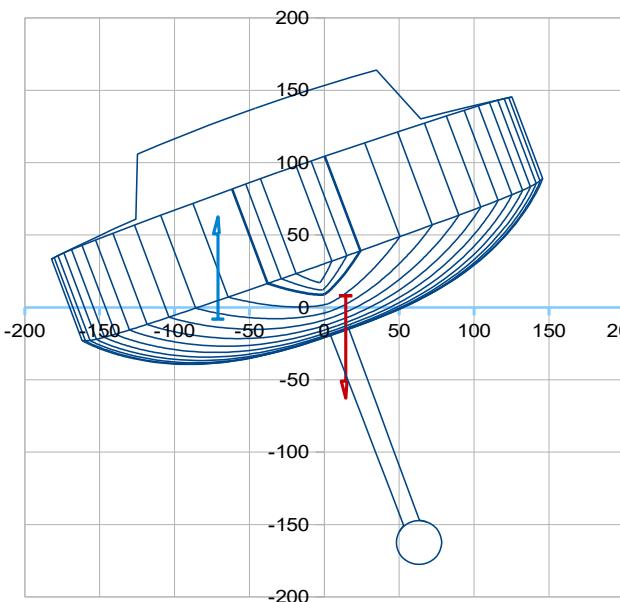
Boat U1,1 at 20° heel , in charge with crew 300 kg sit windward (at Y 1,35 m) :

5.1 Mass spreadsheet with input of a load

					(in the coordinates of the 2D
Data to enter : yellow cells	Mass (kg)	Xg (m)	Zg (m)	Yg (m)	
Boat light weight (kg)	2976,21	3,686	-0,173	0	from the mass spreadsheet
Load (kg)	300,00	2,00	0,85	0,00	Crew at center
			0,85	1,35	Crew sit windward
Total >>> Mass (kg)	3276,21	3,532	-0,079	0,000	Crew at center
Disp. (m3)	3,19631		-0,079	0,124	Crew sit windward

>>> at 20° heel : RM20° = 27,44 kN.m ; Bwl 2,22 m ; Sw20° 19,10 m2

Data to enter : yellow cells		Results		
Heel (°)	20	Disp. (m3)	3,19631	/ Disp. (m3) 3,19631
Height (cm)	11,1831	Xc heel (m)	3,532	/ Xg (m) 3,532
Trim (°)	-0,300	Yc heel (m)	-0,710	Yg heel (m) 0,143
		Zc heel (m)	-0,081	> GZ (m) 0,854
		Sw heel(m2)	19,10	RM (kN.m) 27,439
		Bwl heel (m)	2,22	FB mini (cm) 30,5
		LCB – LCF (%Lwl)	0,11	Obliquity (°) 4,6



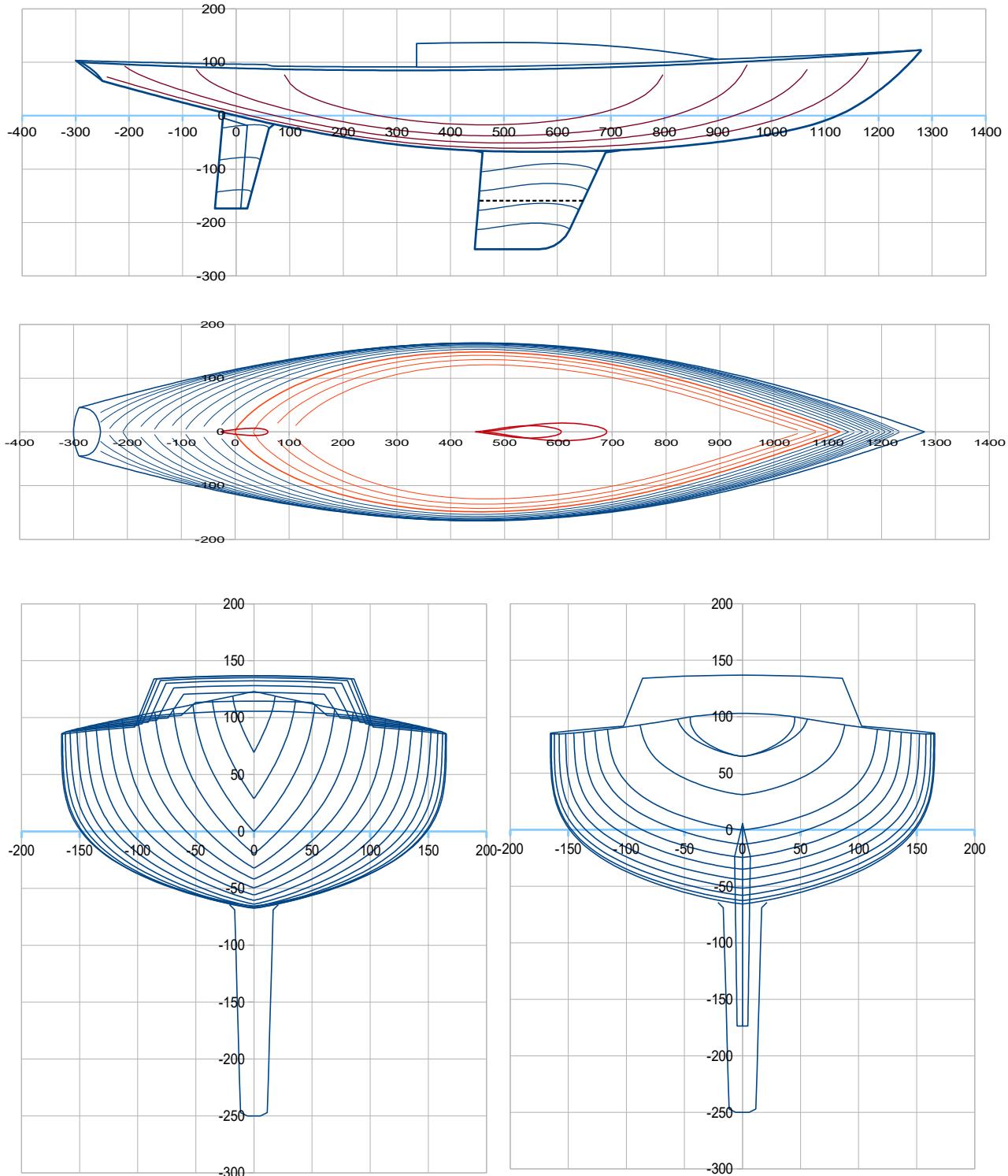
Boat U1,1 Mass spreadsheet early stage estimation

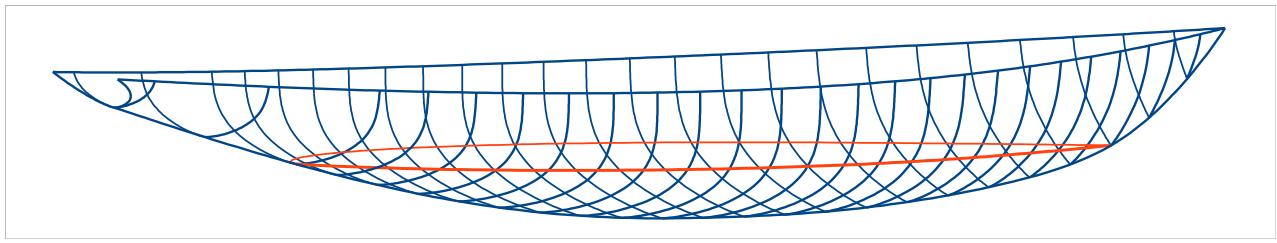
Mass and Xg, Zg position – early stage estimation	Input data L or S or V m or m2 or m3	mass unit or % Disp.	Results Mass (kg)	Xg (m)	M Xg	Zg (m)	M Zg
Data to enter : in yellow cells							
Hull (skin, structure, keel interface) , with S, Xs and Zs from Gene-Hull sheet	35,07	18,00 (kg/m ²)	631,35	3,66	2312,50	0,04	23,59
Deck – roof – cockpit (skin and structure) , with S, Xs and Zs from Gene-Hull sheet	24,78	12,00 (kg/m ²)	297,39	3,49	1036,82	0,87	257,99
Rig, sails and deck fittings		8,50 (% Disp.)	252,95	4,23	1070,47	3,50	885,82
Cabin accomodation and motor		16,00 (% Disp.)	476,14	3,56	1692,66	0,10	46,13
Keel			1229,12	3,96	4871,67	-1,37	-1682,85
Rudder		1,50 (% Disp.)	89,28	-0,14	-12,60	-0,52	-46,03
Results : Light weight boat >>>			2976,2	3,686	10971,51	-0,173	-515,35

Other examples inspired by historical or recent designs

B52, inspired by « Bojar » flush deck cutter 1937 / Johan Anker

Loa 15,80 m ; Lwl 11,23 m ; B 3,31 m ; Draft 2,50 m ; Displacement : 8905 kg ; Ballast : 3045 kg
 >> LCB hull 47,12 %Lwl ; Cp hull : 0,541 ; Sw : 35,58 m² ; DLR : 175 ; Ballast ratio : 34,2 %





Boat B52 hydrostatics data :

2. Data sum-up and results of hydrostatic and surfaces calculations

2.1 Hull

Loa (m)	15,80	Lwl (m)	11,23	> Hull speed (Knots)		8,2	at Froude 0,4
>> ft	51,84		36,84				
Boa (m)	3,31	at X (% Lwl)	40,0	Bsheer (m)	3,31	at X (% Lwl)	40,0
>> ft	10,86						
Bwl (m)	2,97	at X (% Lwl)	40,0	> Bwl / Boa	0,899		
>> ft	9,76			Freeboards (m) >		Aft	
Tc (m)	0,675	at X (% Lwl)	50			0,98	Midship
>> ft	2,21					3,22	Fore
Displacement at H0 (m3)	7,93552	at LCB (m)	5,292	LCB (%Lwl)	47,12	ZCB (m)	-0,224
>> lbs	17932	w. seawater	1025	kg/m3		>> ft	-0,73
Cp	0,541						
Sf (m2)	22,79	at LCF (m)	5,098	LCF (%Lwl)	45,40	>>> LCB – LCF (%Lwl)	
>> ft2	245,26	>> ft	16,73				1,73
Angle Freeboard/Half beam		27,3	(°), at section C4 (40% Lwl)		Half entry angle (°)	19,1	at 95% Lwl
Sw (m2)	25,55	>Sw/D^(2/3)	6,42				
>> ft2	275,04						
Shull (m2)	56,68	at X (m)	4,923	Z (m)	0,071		
>> ft2	610,15	>> ft	16,15	>> ft	0,23		
Sdeck (m2)	37,97	at X (m)	4,611	Z (m)	1,01		
>> ft2	408,69	>> ft	15,13	>> ft	3,31		

2.2 Keel

Vol. keel(m3)	0,65336	at X (m)	5,696	X (%Lwl)	50,72	Z (m)	-1,470
		>> ft	18,69			>> ft	-4,82
Ballast (kg)	3044,7	at X (m)	5,547	X (%Lwl)	49,40	Z (m)	-1,956
>> lbs	6712	>> ft	18,20			>> ft	-6,42
Draft oa (m)	2,50		Sw (m2)	7,45		Sxz (m2)	3,64
>> ft	8,20		>> ft2	80,22		>> ft2	39,16
CLR (m)	6,16	CLR (%Lwl)	54,89	<i>CLR = Center of Lateral Resistance</i>			
>> ft	20,22	method: keel profile extended to the waterline, CLR at Z 45% draft and				25,00	% chord

2.3 Rudder(s)

Number	1						
Volume (m3)	0,09932	at X (m)	0,11	X (%Lwl)	0,94	Z (m)	-0,82
Sw (m2)	2,58	>> ft	0,35			Sxz (m2)	1,24
>> ft2	27,74					>> ft2	13,33

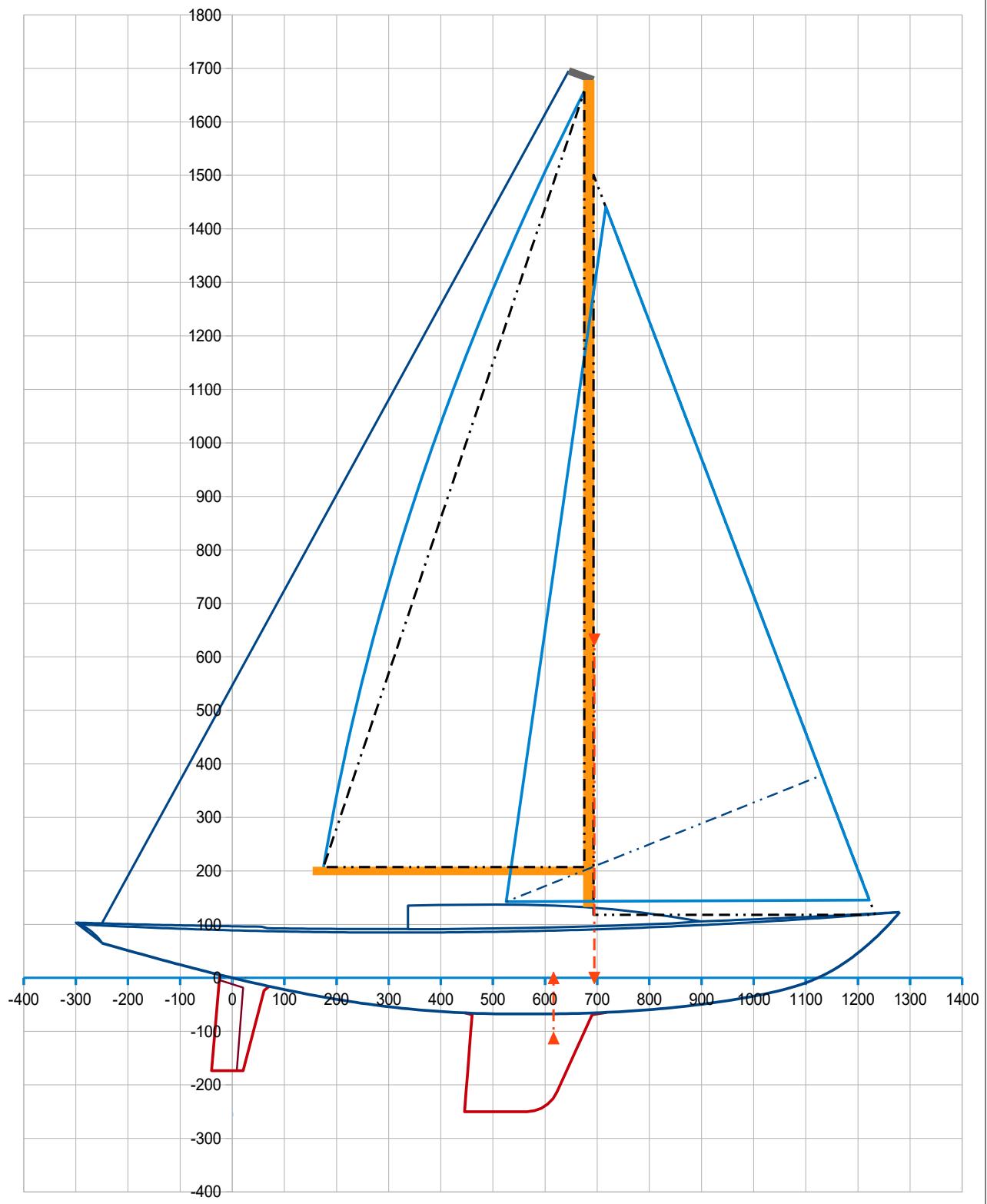
2.4 Hull + Keel + Rudder(s)

Displacement at H0 (m3)	8,68821	at LCB (m)	5,263	LCB (%Lwl)	46,86	at ZCB (m)	-0,324
(kg)	8905	>> ft	17,27			>> ft	-1,06
>> lbs	19633						
, of which Ballast (kg)	3045	at Xg (m)	5,547	Xg (%Lwl)	49,40	at Zg (m)	-1,956
>> lbs	6712	>> ft	18,20			>> ft	-6,42
>> % Ballast	34,2						
Sw (m2)	35,58	>Sw/D^(2/3)	8,42	Lwl/D^(1/3)	5,46		
>> ft2	382,99			DLR	175	<i>M(lbs/2240)/(Lwl(ft)/100)^3</i>	

2.5 Data from the mass spreadsheet

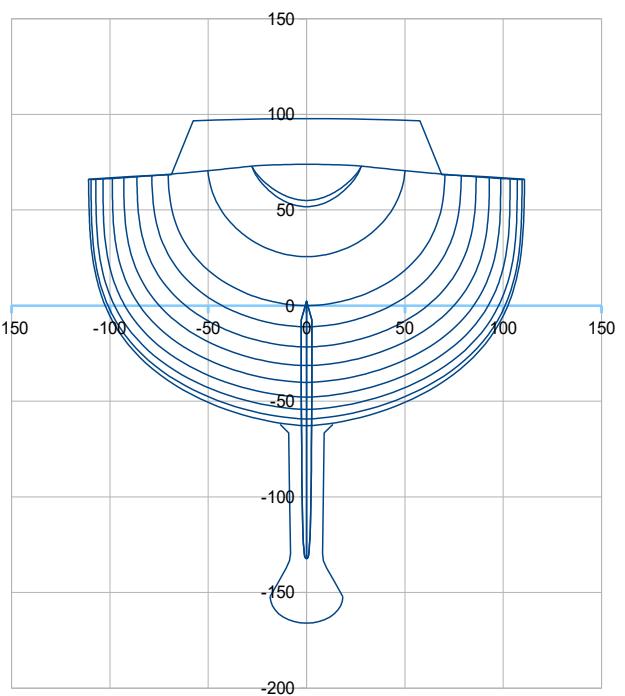
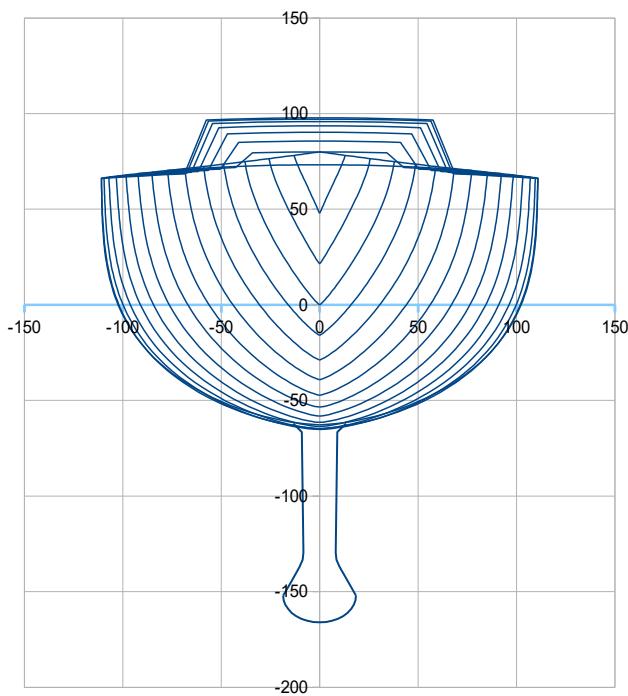
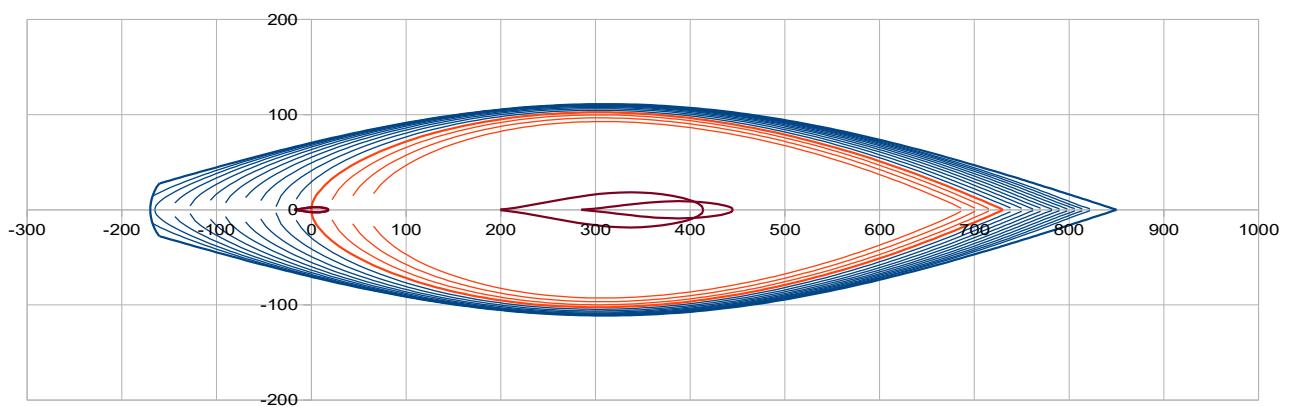
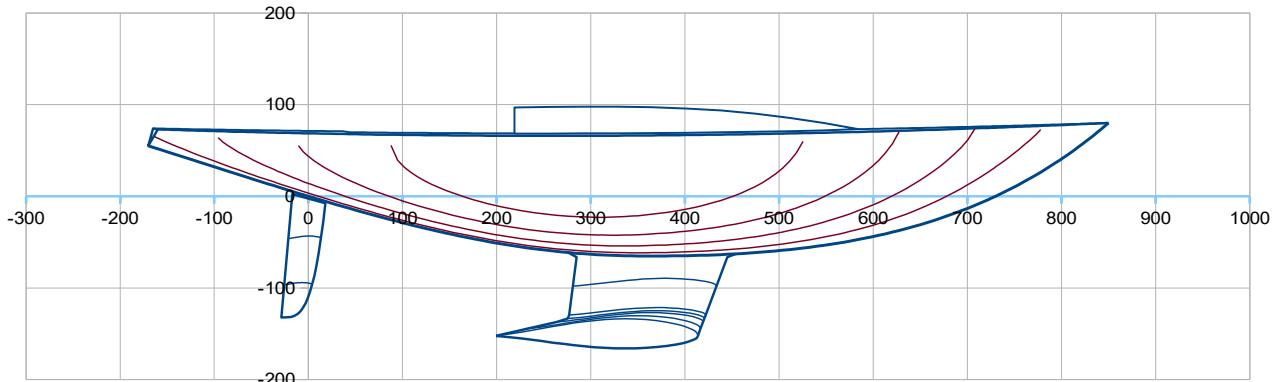
Light boat:	M (kg)	8905	at Xg (m)	5,193	Xg (%Lwl)	46,24	at Zg (m)	-0,126
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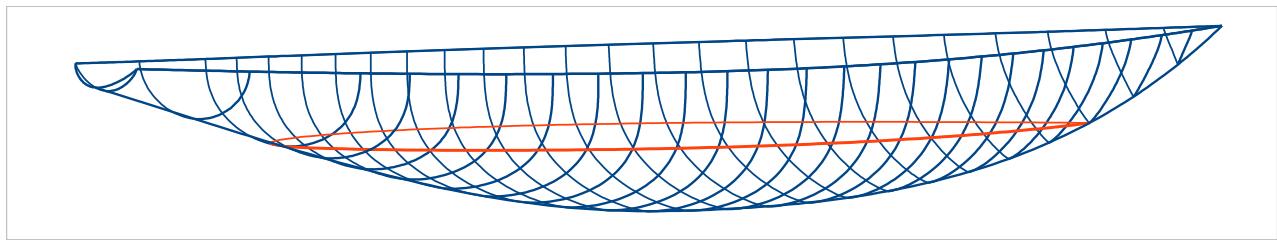
Boat B52 SA 89,6 m² (Main 43,5 m² + Jib 46,1 m²) >>> SA/Sw 2,52 SA/D^(2/3) 46,1 m²



Classic 6m JI, inspired by this metric class with a classic approach

Loa 10,20 m ; Lwl 7,30 m ; B 2,22 m ; Draft 1,66 m ; Displacement : 4015 kg ; Ballast : 2018 kg
=> LCB hull 47,50 %Lwl ; Cp hull : 0,539 ; Sw : 18,11 m² ; DLR : 288 ; Ballast ratio : 50,2 %





Boat Classic 6m JI hydrostatics data :

2. Data sum-up and results of hydrostatic and surfaces calculations

2.1 Hull

Loa (m)	10,20	Lwl (m)	7,30	> Hull speed (Knots)		6,6	at Froude 0,4
>> ft	33,46		23,95				
Boa (m)	2,22	at X (% Lwl)	43,0	Bsheer (m)	2,22	at X (% Lwl)	43,0
>> ft	7,28						
Bwl (m)	2,05	at X (% Lwl)	41,0	> Bwl / Boa	0,923		
>> ft	6,72			Freeboards (m) >		Aft	
Tc (m)	0,652	at X (% Lwl)	50			0,73	Midship
>> ft	2,14					2,40	Fore
Displacement at H0 (m3)	3,68913	at LCB (m)	3,467	LCB (%Lwl)	47,50	ZCB (m)	-0,224
>> lbs	8336	w. seawater	1025	kg/m3		>> ft	-0,74
Cp	0,539						
Sf (m2)	10,44	at LCF (m)	3,335	LCF (%Lwl)	45,68	>>> LCB – LCF (%Lwl)	
>> ft2	112,42	>> ft	10,94				1,82
Angle Freeboard/Half beam			30,8	(°), at section C4 (40% Lwl)		Half entry angle (°)	22,4
Sw (m2)	12,79	>Sw/D^(2/3)	5,36				at 95% Lwl
>> ft2	137,63						
Shull (m2)	26,80	at X (m)	3,310	Z (m)	0,008		
>> ft2	288,53	>> ft	10,86	>> ft	0,02		
Sdeck (m2)	16,25	at X (m)	3,126	Z (m)	0,72		
>> ft2	174,86	>> ft	10,26	>> ft	2,37		

2.2 Keel

Vol. keel(m3)	0,21599	at X (m)	3,535	X (%Lwl)	48,43	Z (m)	-1,231
		>> ft	11,60			>> ft	-4,04
Ballast (kg)	2017,5	at X (m)	3,500	X (%Lwl)	47,94	Z (m)	-1,288
>> lbs	4448	>> ft	11,48			>> ft	-4,23
Draft oa (m)	1,66		Sw (m2)	4,49		Sxz (m2)	1,43
>> ft	5,45		>> ft2	48,33		>> ft2	15,42
CLR (m)	4,03	CLR (%Lwl)	55,14	CLR = Center of Lateral Resistance			
>> ft	13,21	method: keel profile extended to the waterline, CLR at Z 45% draft and				25,00	% chord

2.3 Rudder(s)

Number	1						
Volume (m3)	0,01200	at X (m)	-0,03	X (%Lwl)	-0,47	Z (m)	-0,59
Sw (m2)	0,84	>> ft	-0,11			Sxz (m2)	0,40
>> ft2	9,00					>> ft2	4,33

per rudder

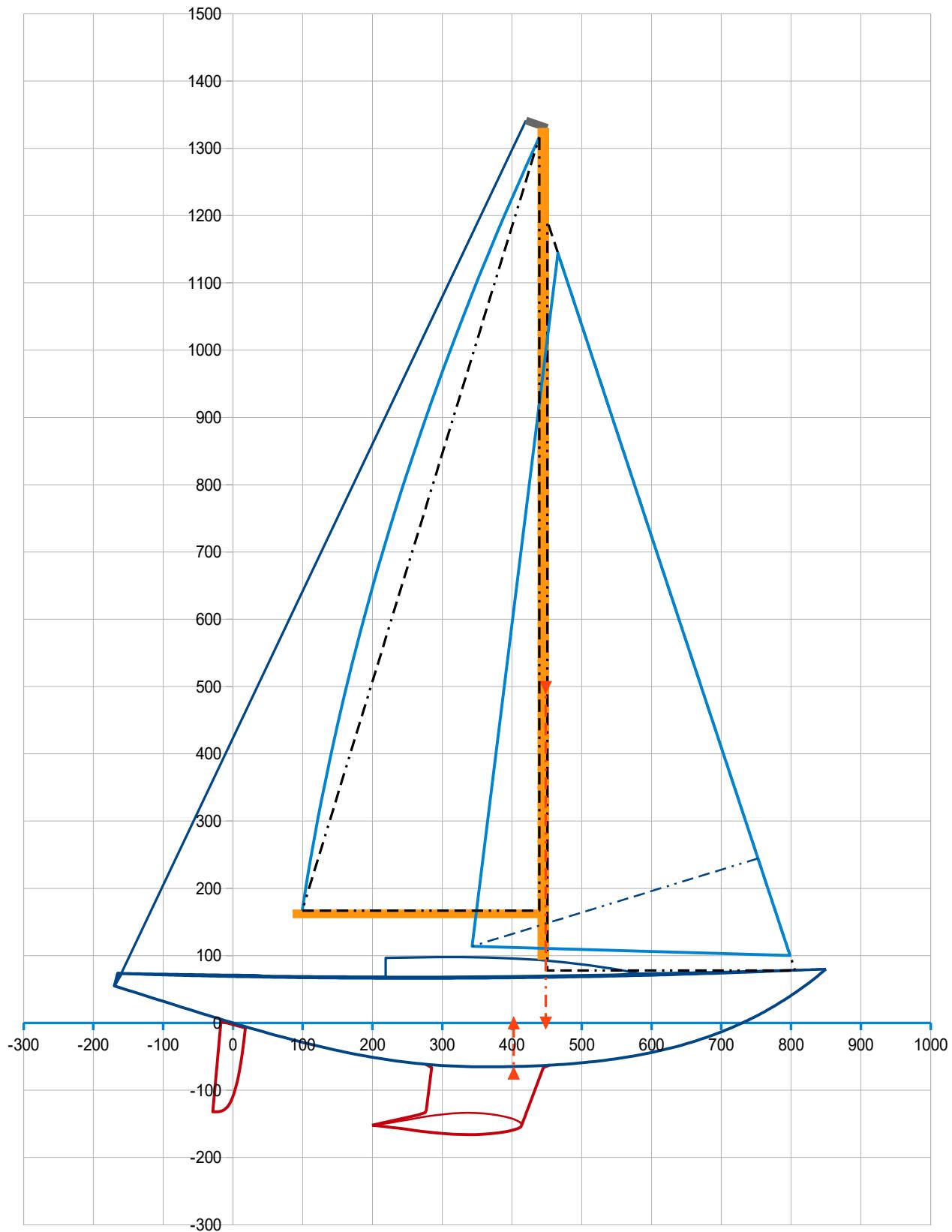
2.4 Hull + Keel + Rudder(s)

Displacement at H0 (m3)	3,91713	at LCB (m)	3,460	LCB (%Lwl)	47,40	at ZCB (m)	-0,281
(kg)	4015	>> ft	11,35			>> ft	-0,92
>> lbs	8852						
, of which Ballast (kg)	2018	at Xg (m)	3,500	Xg (%Lwl)	47,94	at Zg (m)	-1,288
>> lbs	4448	>> ft	11,48			>> ft	-4,23
>> % Ballast	50,2						
Sw (m2)	18,11	>Sw/D^(2/3)	7,29	Lwl/D^(1/3)	4,63		
>> ft2	194,97			DLR	288	M(lbs/2240)/(Lwl(ft)/100)^3	

2.5 Data from the mass spreadsheet

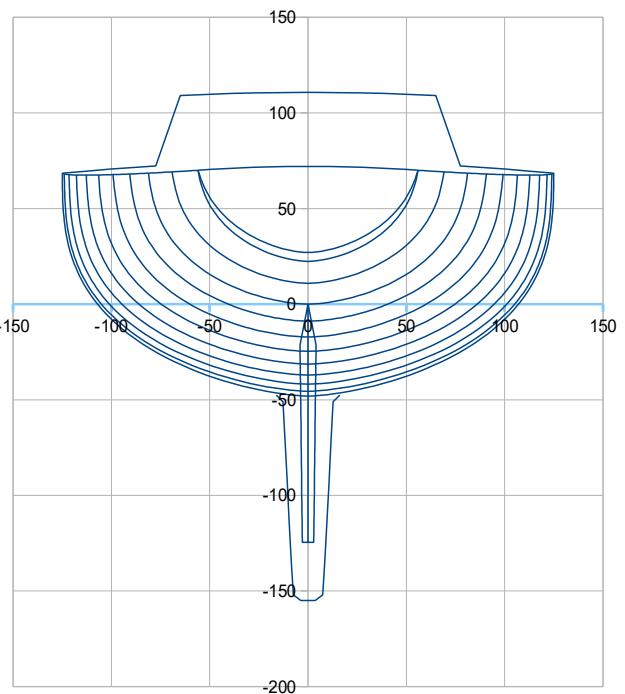
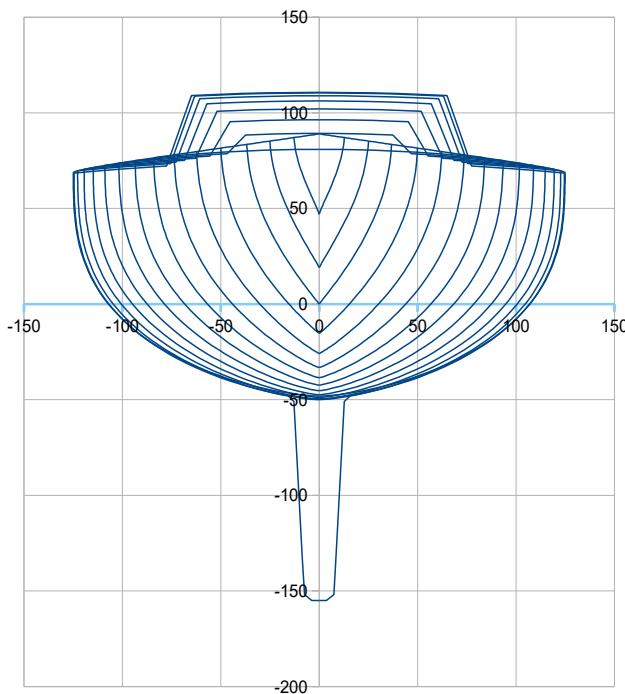
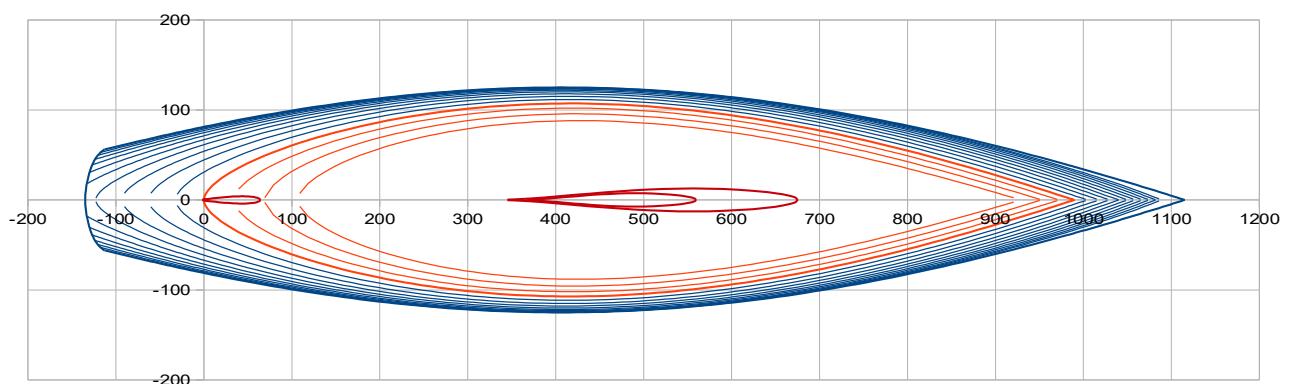
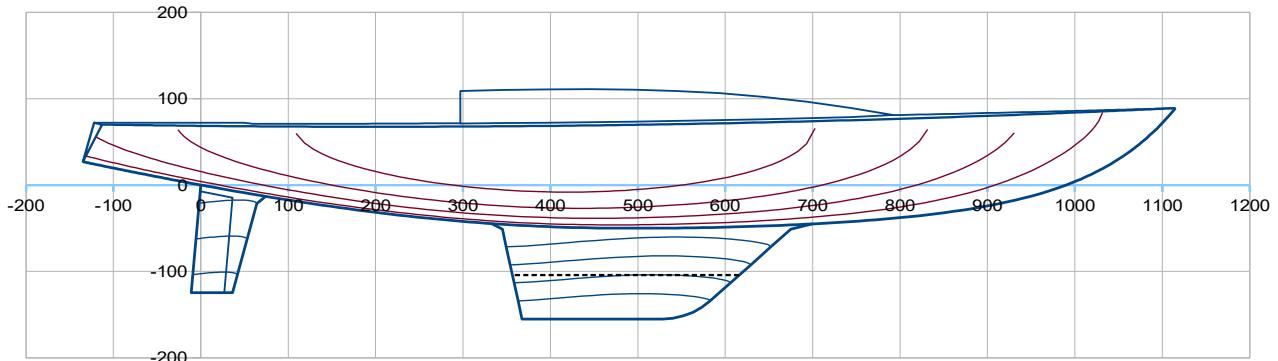
Light boat:	M (kg)	4015	at Xg (m)	3,468	Xg (%Lwl)	47,50	at Zg (m)	-0,147
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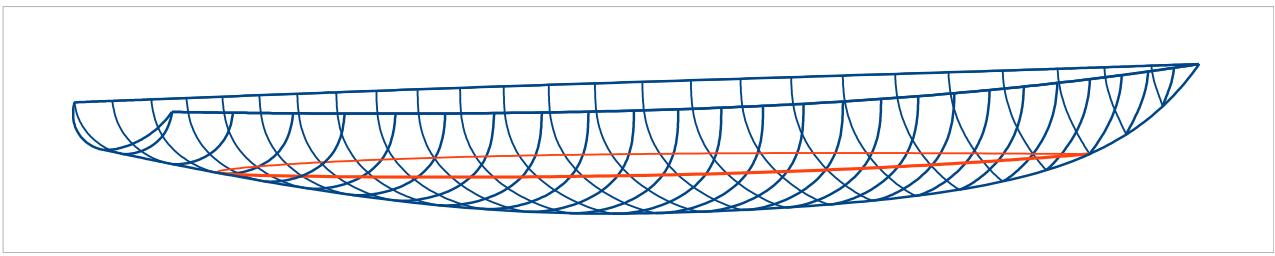
Boat Classic 6m JI SA 47,5 m² (Main 23,5 m² + Jib 24,0 m²) >> SA/Sw 2,62 SA/D^(2/3) 19,12



S30, inspired by the S30 / Knud Reimers

Loa 12,50 m ; Lwl 9,9 m ; Boa 2,50 m ; Draft 1,55 m ; Displacement : 4339 kg ; Ballast : 1501 kg
>> LCB hull 47,76 %Lwl ; Cp hull : 0,541 ; Sw : 23,42 m² ; DLR : 125 ; Ballast ratio : 34,6 %





Boat S30 hydrostatics data :

2. Data sum-up and results of hydrostatic and surfaces calculations

2.1 Hull

Loa (m)	12,50	Lwl (m)	9,90	> Hull speed (Knots)	7,7	at Froude 0,4
>> ft	41,01		32,48			
Boa (m)	2,50	at X (% Lwl)	41,0	Bsheer (m)	2,50	at X (% Lwl)
>> ft	8,20					41,0
Bwl (m)	2,14	at X (% Lwl)	42,0	> Bwl / Boa	0,858	
>> ft	7,04			Freeboards (m) >		
Tc (m)	0,500	at X (% Lwl)	50	Aft	0,70	Midship
>> ft	1,64			Freeboards (m) >	2,30	Fore
Displacement at H0 (m3)	3,83190	at LCB (m)	4,728	LCB (%Lwl)	47,76	ZCB (m)
>> lbs	8659	w. seawater	1025	kg/m3		>> ft
Cp	0,541					-0,170
Sf (m2)	14,50	at LCF (m)	4,537	LCF (%Lwl)	45,83	>>> LCB – LCF (%Lwl)
>> ft2	156,09	>> ft	14,88			1,93
Angle Freeboard/Half beam	28,7	(°), at section C4 (40% Lwl)		Half entry angle (°)	17,2	at 95% Lwl
Sw (m2)	16,41	>Sw/D^(2/3)	6,70			
>> ft2	176,62					
Shull (m2)	35,84	at X (m)	4,637	Z (m)	0,059	
>> ft2	385,74	>> ft	15,21	>> ft	0,19	
Sdeck (m2)	23,94	at X (m)	4,352	Z (m)	0,76	
>> ft2	257,68	>> ft	14,28	>> ft	2,48	

2.2 Keel

Vol. keel(m3)	0,36903	at X (m)	5,133	X (%Lwl)	51,84	Z (m)	-0,927
		>> ft	16,84			>> ft	-3,04
Ballast (kg)	1501,3	at X (m)	4,969	X (%Lwl)	50,19	Z (m)	-1,221
>> lbs	3310	>> ft	16,30			>> ft	-4,01
Draft oa (m)	1,55		Sw (m2)	5,65		Sxz (m2)	2,93
>> ft	5,09		>> ft2	60,83		>> ft2	31,49
CLR (m)	5,47	CLR (%Lwl)	55,29	CLR = Center of Lateral Resistance			
>> ft	17,96			method: keel profile extended to the waterline, CLR at Z 45% draft and		35,00	% chord

2.3 Rudder(s)

Number	1						
Volume (m3)	0,03269	at X (m)	0,27	X (%Lwl)	2,69	Z (m)	-0,60
Sw (m2)	1,36	>> ft	0,87			Sxz (m2)	0,65
>> ft2	14,64					>> ft2	7,04

per rudder

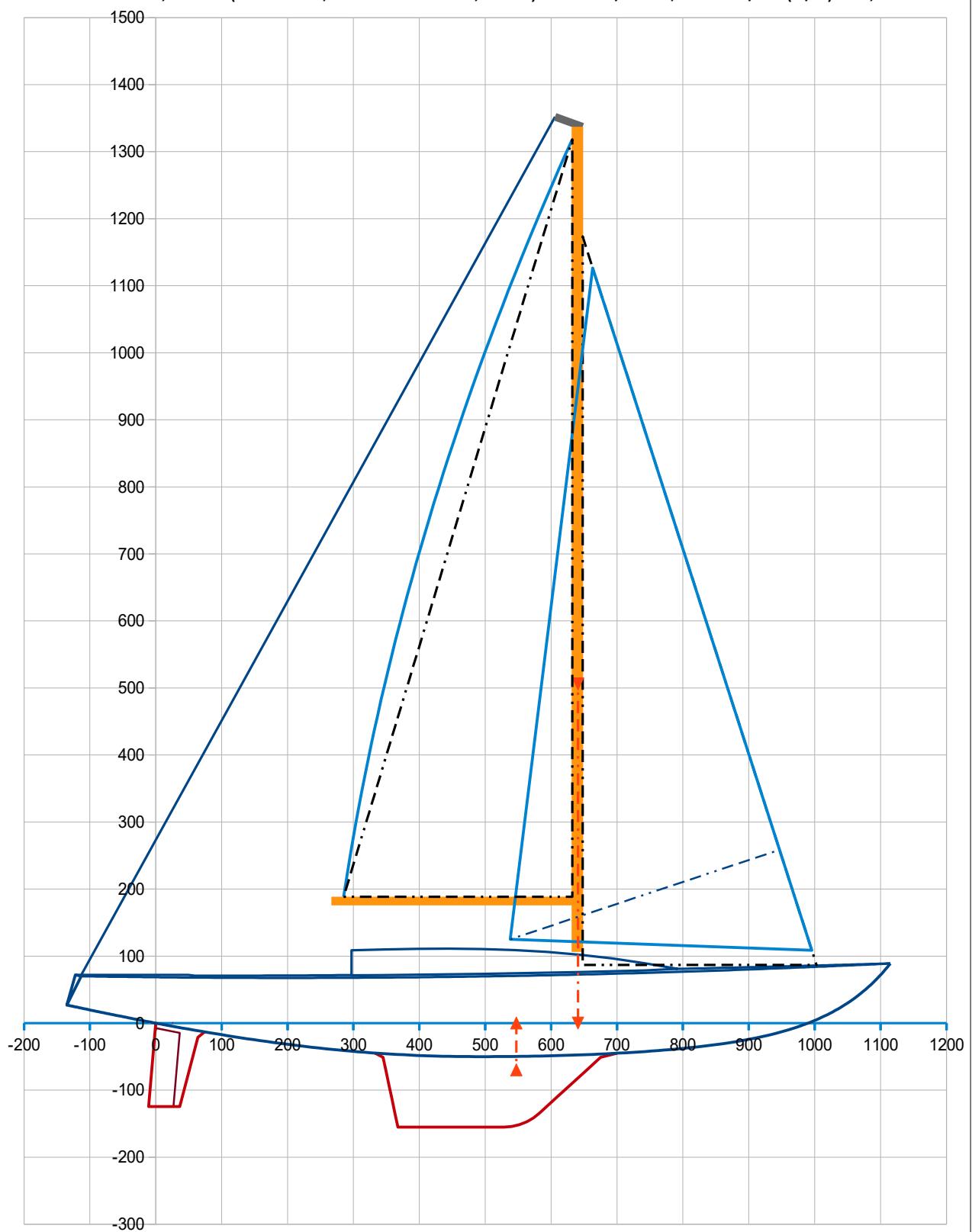
2.4 Hull + Keel + Rudder(s)

Displacement at H0 (m3)	4,23361	at LCB (m)	4,729	LCB (%Lwl)	47,76	at ZCB (m)	-0,239
(kg)	4339	>> ft	15,51			>> ft	-0,78
>> lbs	9567						
, of which Ballast (kg)	1501	at Xg (m)	4,969	Xg (%Lwl)	50,19	at Zg (m)	-1,221
>> lbs	3310	>> ft	16,30			>> ft	-4,01
>> % Ballast	34,6						
Sw (m2)	23,42	>Sw/D^(2/3)	8,95	Lwl/D^(1/3)	6,12		
>> ft2	252,09			DLR	125	M(lbs/2240)/(Lwl(ft)/100)^3	

2.5 Data from the mass spreadsheet

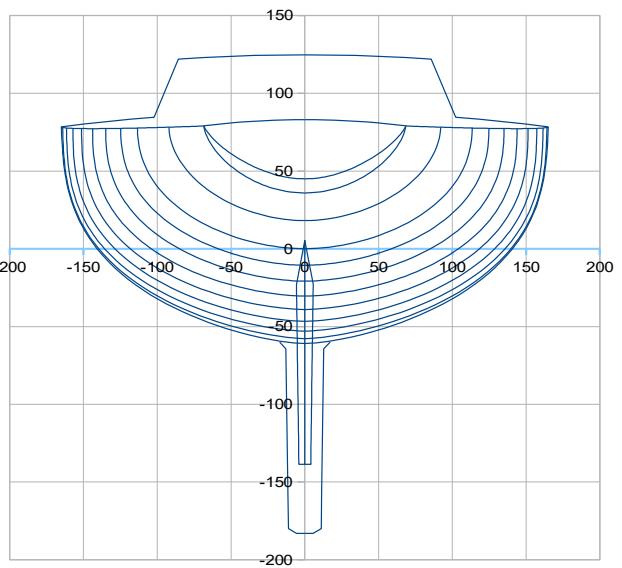
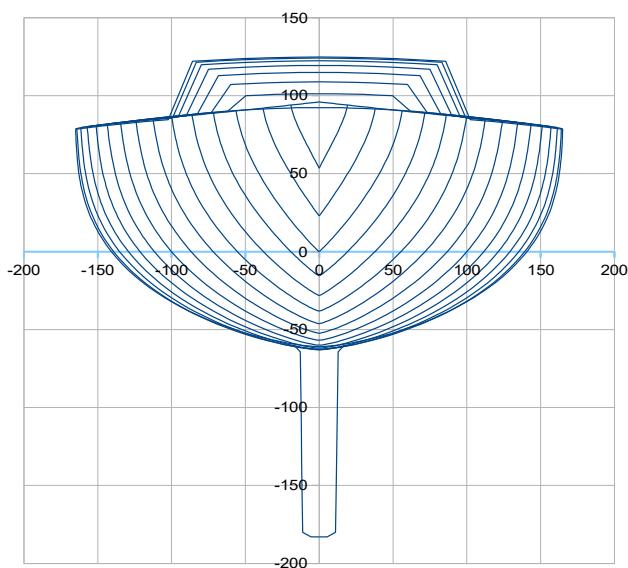
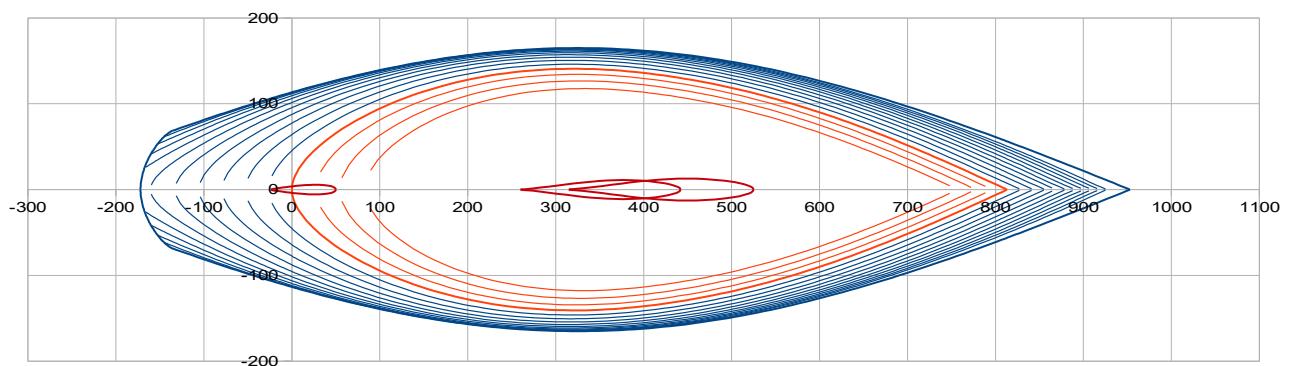
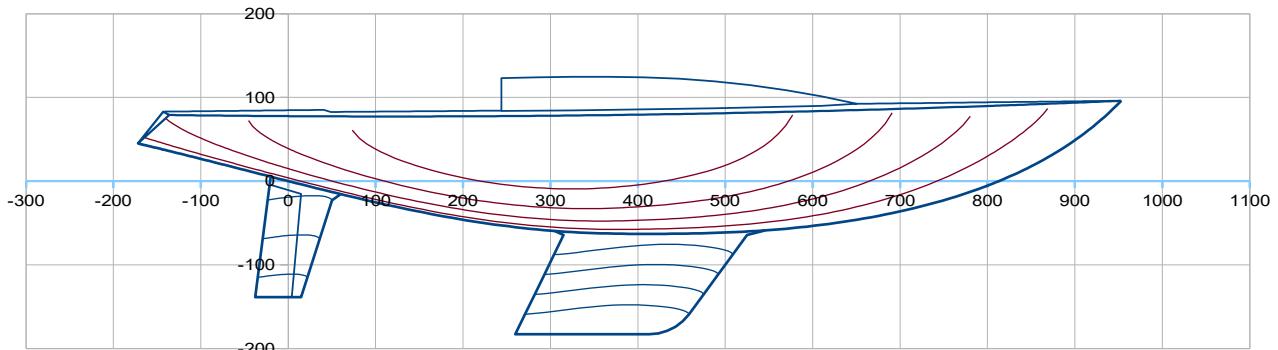
Light boat:	M (kg)	4339	at Xg (m)	4,723	Xg (%Lwl)	47,71	at Zg (m)	-0,077
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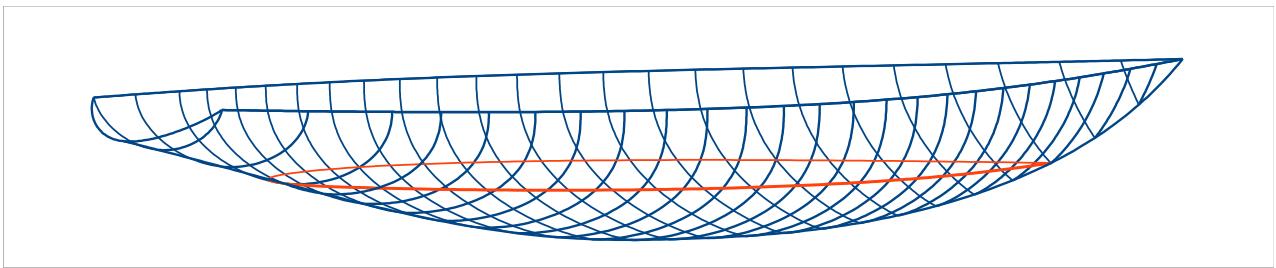
Boat S30 SA 47,0 m² (Main 23,5 m² + Jib 23,5 m²) >> SA/Sw 2,01 SA/D^(2/3) 17,97



T37, inspired by Tina / Dick Carter

Loa 11,25 m ; Lwl 8,13 m ; B 3,30 m ; Draft 1,83 m ; Displacement : 5672 kg ; Ballast : 2664 kg
>> LCB hull 46,95 %Lwl ; Cp hull : 0,540 ; Sw : 24,22 m² ; DLR : 294 ; Ballast ratio : 47,0 %





Boat T37 hydrostatics data :

2. Data sum-up and results of hydrostatic and surfaces calculations

2.1 Hull

Loa (m)	11,25	Lwl (m)	8,13	> Hull speed (Knots)		6,9	at Froude 0,4
>> ft	36,91		26,67				
Boa (m)	3,30	at X (% Lwl)	40,0	Bsheer (m)	3,30	at X (% Lwl)	40,0
>> ft	10,83						
Bwl (m)	2,82	at X (% Lwl)	40,0	> Bwl / Boa	0,853		
>> ft	9,24			Freeboards (m) >		Aft	Midship
Tc (m)	0,630	at X (% Lwl)	50			0,79	0,78
>> ft	2,07					2,59	2,56
Displacement at H0 (m3)	5,11268	at LCB (m)	3,817	LCB (%Lwl)	46,95	ZCB (m)	-0,212
>> lbs	11553	w. seawater	1025	kg/m3		>> ft	-0,69
Cp	0,540						
Sf (m2)	15,70	at LCF (m)	3,658	LCF (%Lwl)	44,99	>>> LCB – LCF (%Lwl)	
>> ft2	168,99	>> ft	12,00				1,95
Angle Freeboard/Half beam	25,4	(°), at section C4 (40% Lwl)		Half entry angle (°)		24,8	at 95% Lwl
Sw (m2)	17,51	>Sw/D^(2/3)	5,90				
>> ft2	188,43						
Shull (m2)	37,80	at X (m)	3,639	Z (m)	0,041		
>> ft2	406,88	>> ft	11,94	>> ft	0,13		
Sdeck (m2)	26,68	at X (m)	3,479	Z (m)	0,86		
>> ft2	287,15	>> ft	11,41	>> ft	2,81		

2.2 Keel

Vol. keel(m3)	0,36490	at X (m)	4,033	X (%Lwl)	49,61	Z (m)	-1,199
		>> ft	13,23			>> ft	-3,93
Ballast (kg)	2663,8	at X (m)	4,033	X (%Lwl)	49,61	Z (m)	-1,199
>> lbs	5873	>> ft	13,23			>> ft	-3,93
Draft oa (m)	1,83			Sw (m2)	4,99	Sxz (m2)	2,45
>> ft	6,00			>> ft2	53,71	>> ft2	26,35
CLR (m)	4,51	CLR (%Lwl)	55,43	CLR = Center of Lateral Resistance			
>> ft	14,78			method: keel profile extended to the waterline, CLR at Z 45% draft and		30,00	% chord

2.3 Rudder(s)

Number	1						
Volume (m3)	0,05642	at X (m)	0,07	X (%Lwl)	0,82	Z (m)	-0,67
Sw (m2)	1,73	>> ft	0,22			Sxz (m2)	0,83
>> ft2	18,61					>> ft2	8,95

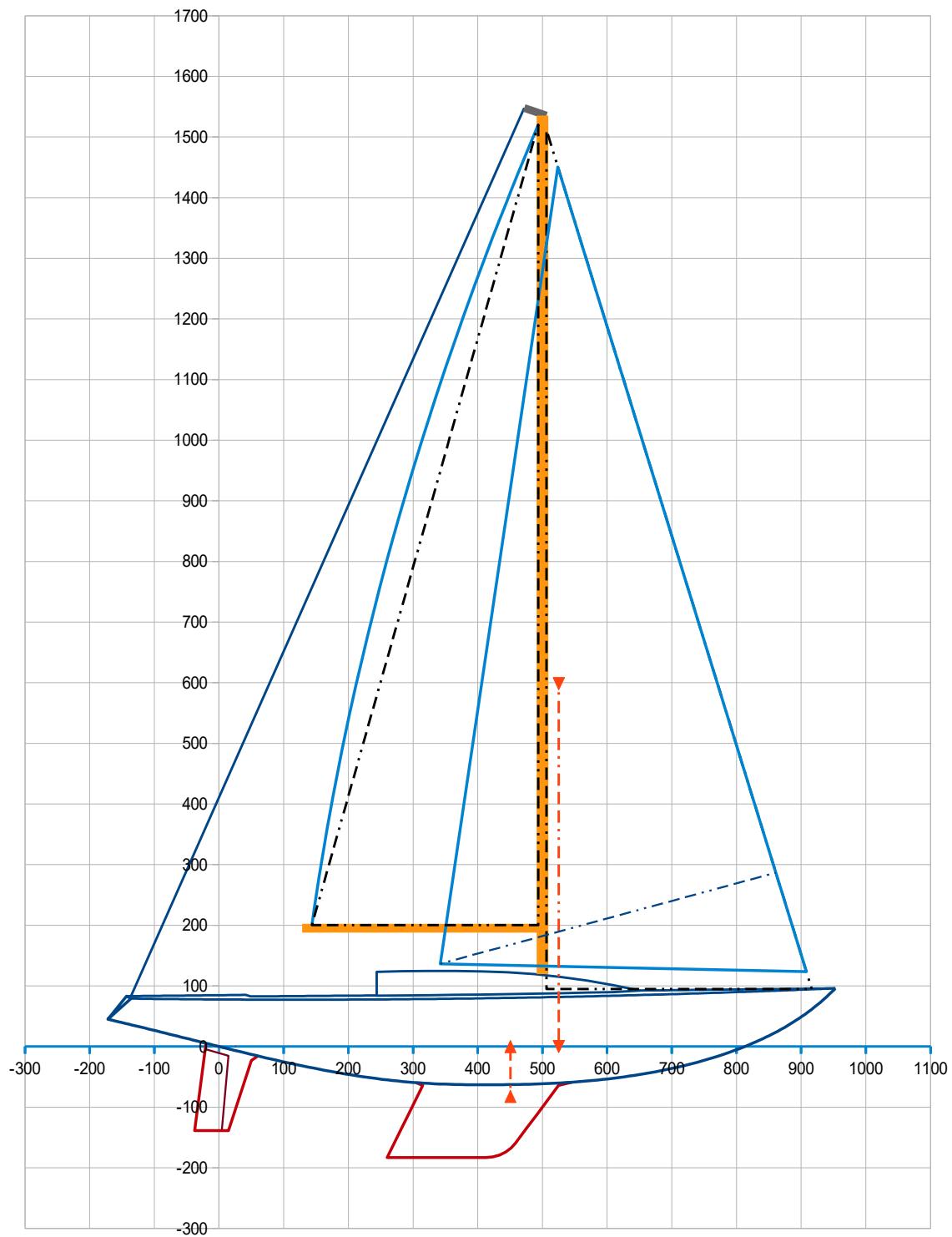
2.4 Hull + Keel + Rudder(s)

Displacement at H0 (m3)	5,53400	at LCB (m)	3,793	LCB (%Lwl)	46,65	at ZCB (m)	-0,281
(kg)	5672	>> ft	12,44			>> ft	-0,92
>> lbs	12505						
, of which Ballast (kg)	2664	at Xg (m)	4,033	Xg (%Lwl)	49,61	at Zg (m)	-1,199
>> lbs	5873	>> ft	13,23			>> ft	-3,93
>> % Ballast	47,0						
Sw (m2)	24,22	>Sw/D^(2/3)	7,74	Lwl/D^(1/3)	4,60		
>> ft2	260,75			DLR	294	M(lbs/2240)/(Lwl(ft)/100)^3	

2.5 Data from the mass spreadsheet

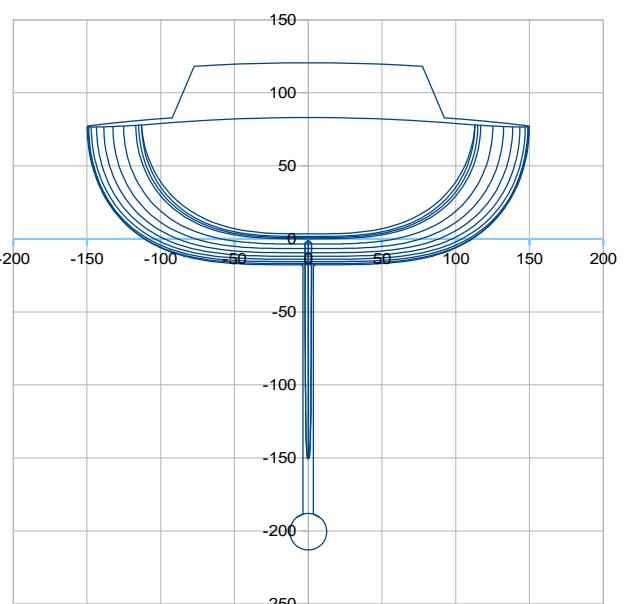
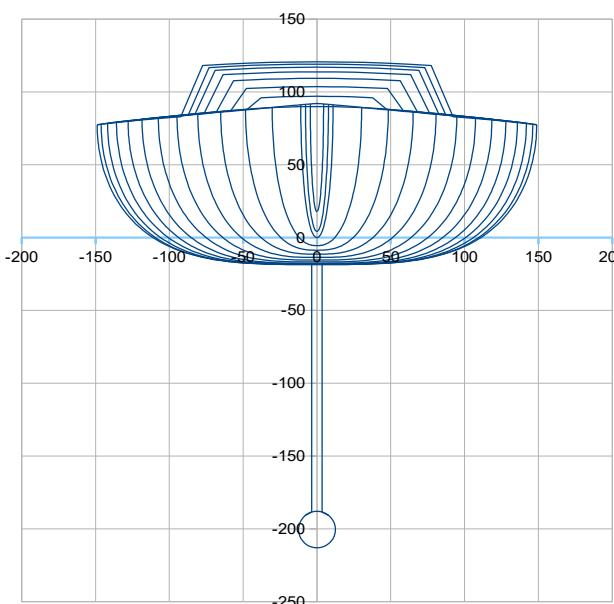
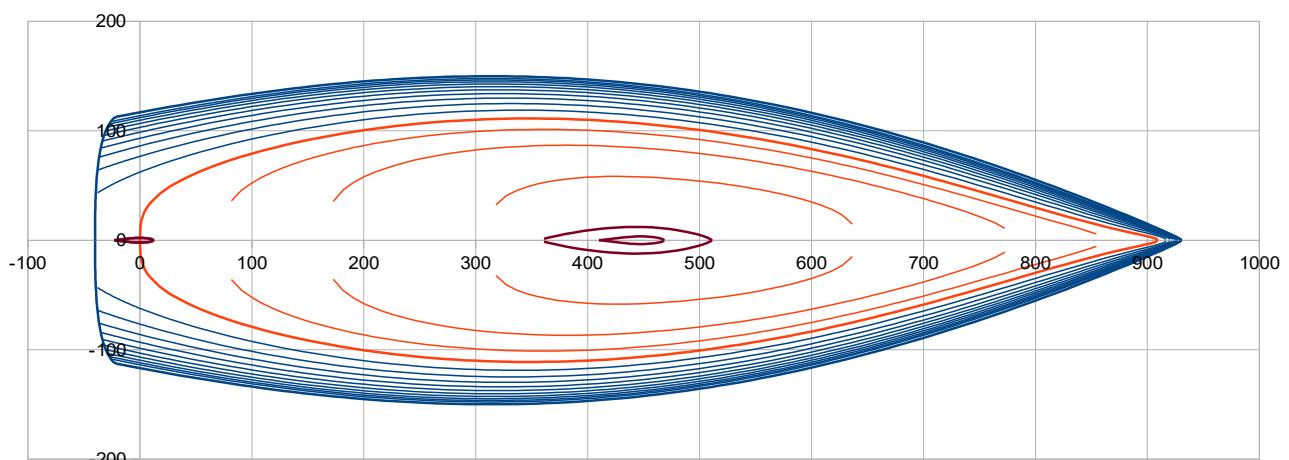
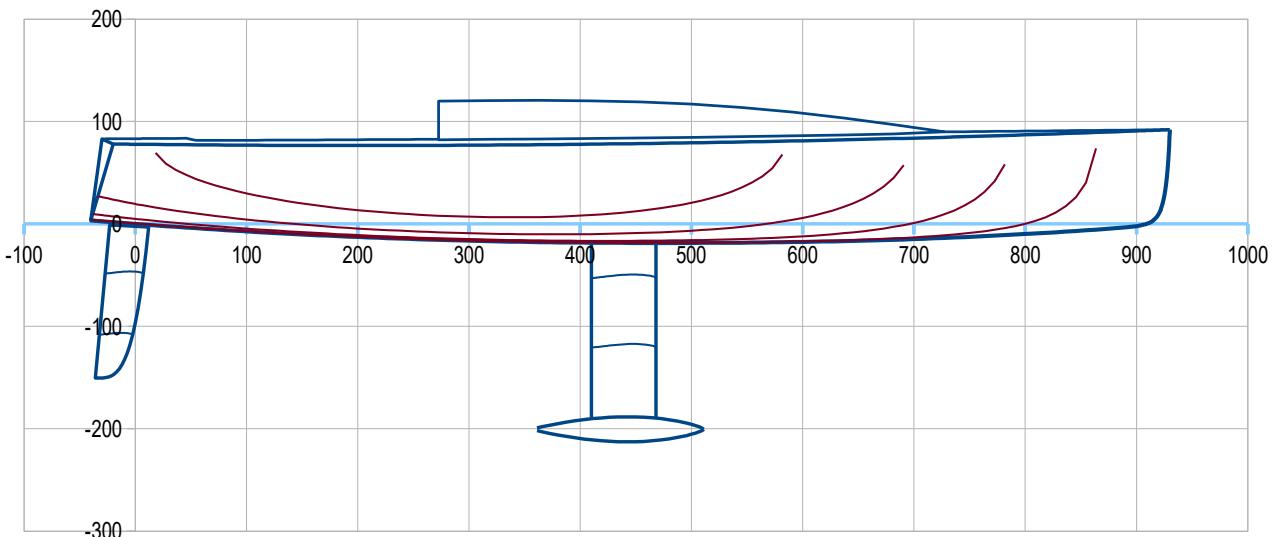
Light boat:	M (kg)	5672	at Xg (m)	3,895	Xg (%Lwl)	47,91	at Zg (m)	0,007
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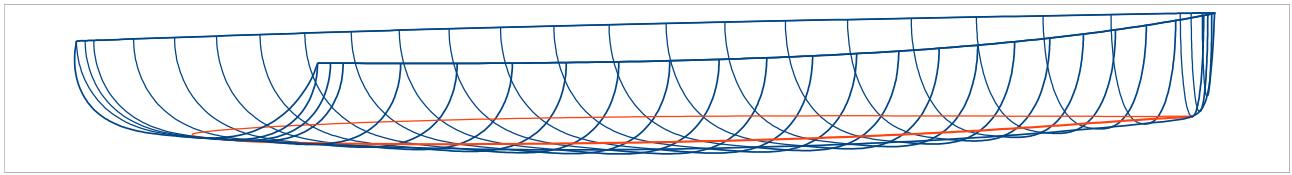
Boat T37 SA 66,1 m² (Main 27,7 m² + Jib 38,3 m²) >> SA/Sw 2,73 SA/D^(2/3) 21,11



M32, inspired by Melges 32 / Reichel Pugh

Loa 9,70 m ; Lwl 9,09 m ; B 3,00 m ; Draft 2,13 m ; Displacement : 1741 kg ; Ballast : 775 kg
>> LCB hull 46,45 %Lwl ; Cp hull : 0,552 ; Sw : 17,95 m² ; DLR : 65 ; Ballast ratio : 44,5 %





Boat M32 hydrostatics data :

2. Data sum-up and results of hydrostatic and surfaces calculations

2.1 Hull

Loa (m)	9,70	Lwl (m)	9,09	> Hull speed (Knots)	7,3	at Froude 0,4
>> ft	31,82		29,82			
Boa (m)	3,00	at X (% Lwl)	34,0	Bsheer (m)	3,00	at X (% Lwl)
>> ft	9,83					34,0
Bwl (m)	2,23	at X (% Lwl)	38,0	> Bwl / Boa	0,742	
>> ft	7,30			Freeboards (m) >		
Tc (m)	0,186	at X (% Lwl)	52	Aft	0,78	Midship
>> ft	0,61				2,56	Fore
Displacement at H0 (m3)	1,60323	at LCB (m)	4,222	LCB (%Lwl)	46,45	ZCB (m)
>> lbs	3623	w. seawater	1025	kg/m3		>> ft
Cp	0,552					-0,070
Sf (m2)	13,94	at LCF (m)	3,933	LCF (%Lwl)	43,26	>>> LCB – LCF (%Lwl)
>> ft2	150,05	>> ft	12,90			3,18

Angle Freeboard/Half beam	27,5	(°), at section C4 (40% Lwl)	Half entry angle (°)	14,2	at 95% Lwl
Sw (m2)	14,22	>Sw/D^(2/3)	10,38		
>> ft2	153,04				
Shull (m2)	32,66	at X (m)	4,130	Z (m)	0,147
>> ft2	351,51	>> ft	13,55	>> ft	0,48
Sdeck (m2)	22,98	at X (m)	3,810	Z (m)	0,84
>> ft2	247,38	>> ft	12,50	>> ft	2,75

2.2 Keel

Vol. keel(m3)	0,08424	at X (m)	4,417	X (%Lwl)	48,59	Z (m)	-1,490
		>> ft	14,49			>> ft	-4,89
Ballast (kg)	775,0	at X (m)	4,412	X (%Lwl)	48,54	Z (m)	-1,597
>> lbs	1709	>> ft	14,47			>> ft	-5,24
Draft oa (m)	2,13	Sw (m2)	2,78			Sxz (m2)	1,24
>> ft	6,99	>> ft2	29,89			>> ft2	13,37
CLR (m)	4,54	CLR (%Lwl)	49,89	CLR = Center of Lateral Resistance			
>> ft	14,88	method: keel profile extended to the waterline, CLR at Z 45% draft and				25,00	% chord

2.3 Rudder(s)

Number	1						
Volume (m3)	0,01133	at X (m)	-0,10	X (%Lwl)	-1,07	Z (m)	-0,64
Sw (m2)	0,96	>> ft	-0,32			Sxz (m2)	0,46
>> ft2	10,28					>> ft2	4,94

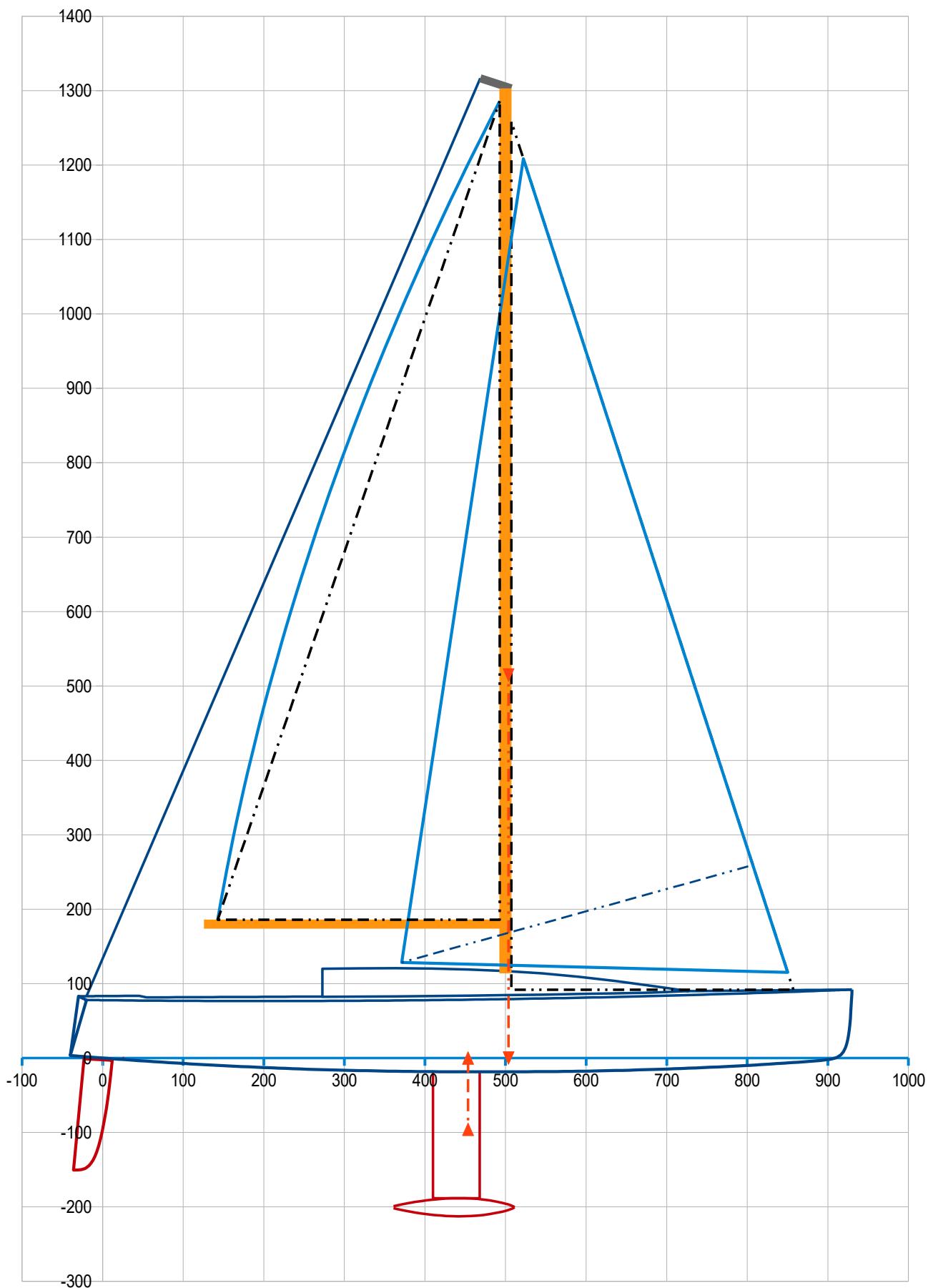
2.4 Hull + Keel + Rudder(s)

Displacement at H0 (m3)	1,69879	at LCB (m)	4,203	LCB (%Lwl)	46,24	at ZCB (m)	-0,145
(kg)	1741	>> ft	13,79			>> ft	-0,47
>> lbs	3839						
, of which Ballast (kg)	775	at Xg (m)	4,412	Xg (%Lwl)	48,54	at Zg (m)	-1,597
>> lbs	1709	>> ft	14,47			>> ft	-5,24
>> % Ballast	44,5						
Sw (m2)	17,95	>Sw/D^(2/3)	12,61	Lwl/D^(1/3)	7,62		
>> ft2	193,21			DLR	65	M(lbs/2240)/(Lwl(ft)/100)^3	

2.5 Data from the mass spreadsheet

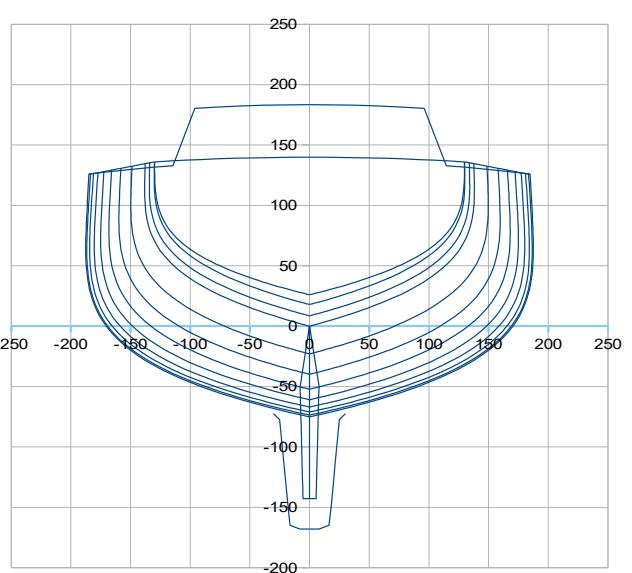
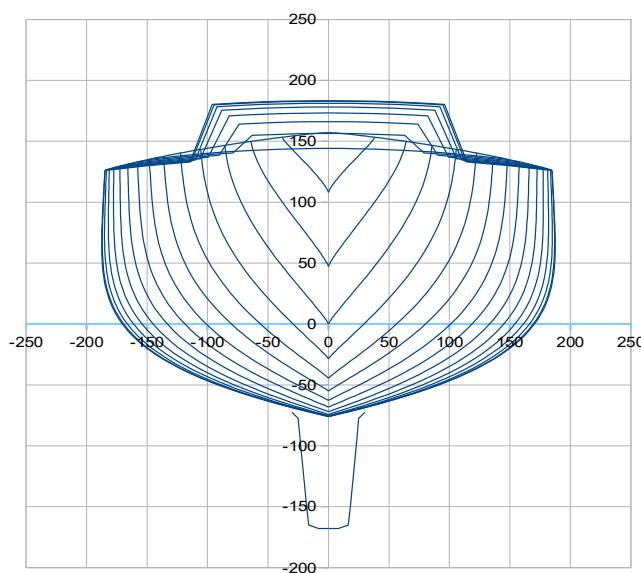
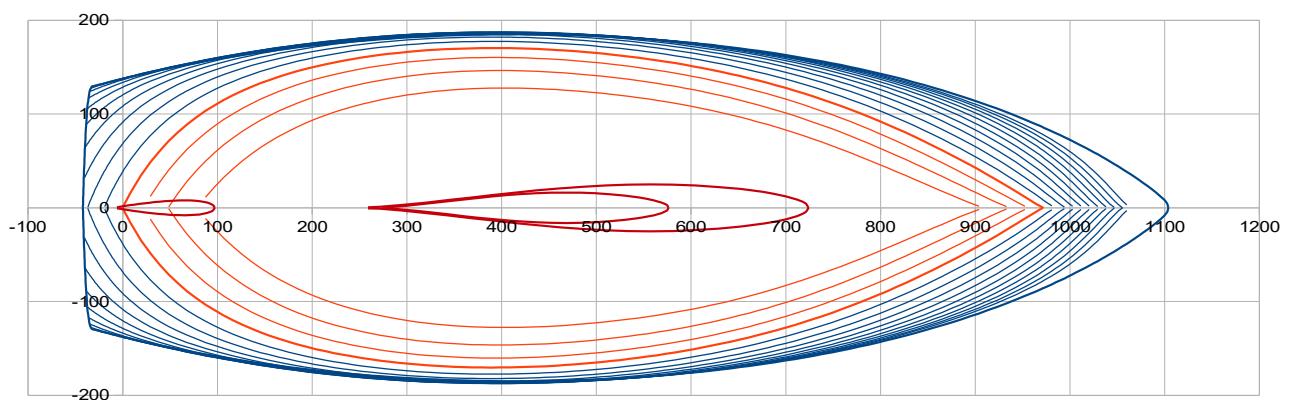
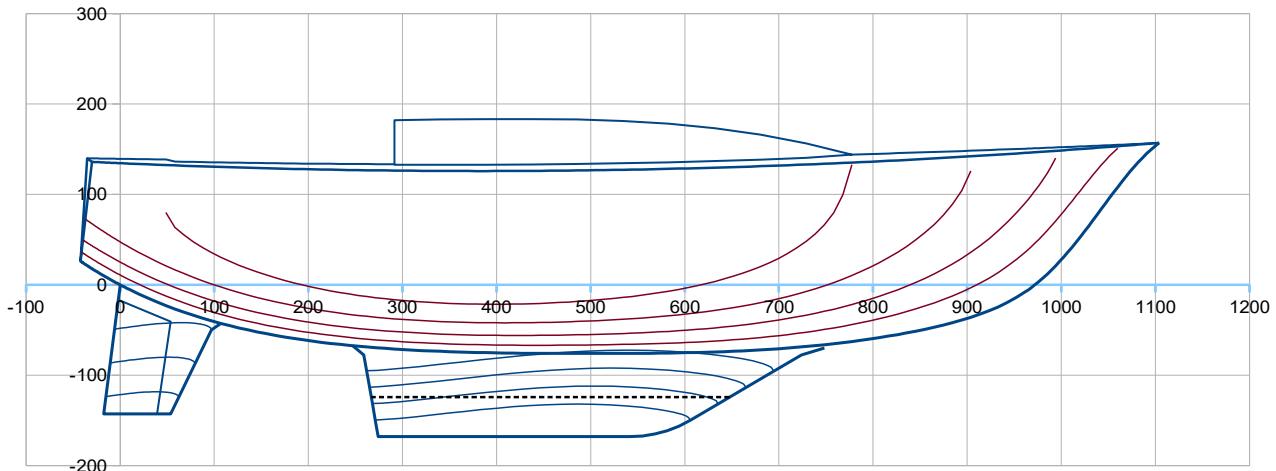
Light boat:	M (kg)	1741	at Xg (m)	4,219	Xg (%Lwl)	46,41	at Zg (m)	-0,193
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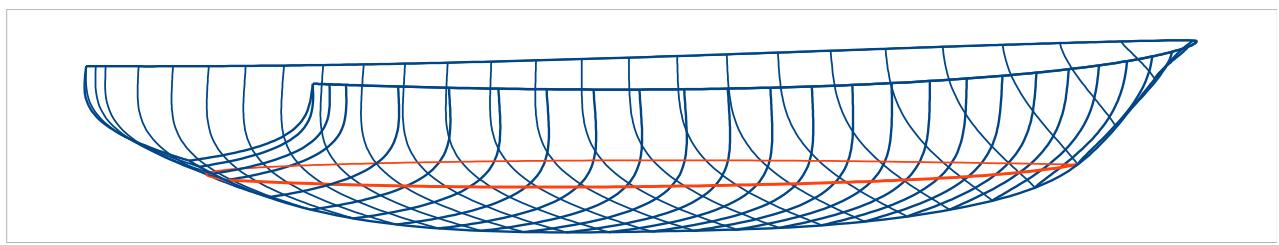
Boat M32 : SA 49,7 m² (Main 23,1 m² + Jib 26,6 m²) >> SA/Sw 2,77 SA/D^(2/3) 34,94



Blue Water 39, inspired by Corbin 39 / Robert Dufour – Marius Corbin

Loa 11,46 m ; Lwl 9,72 m ; B 3,75 m ; Draft 1,68 m ; Displacement : 10940 kg ; Ballast : 4078 kg
>> LCB hull 46,85 %Lwl ; Cp hull (%): 0,603 ; Sw : 36,60 m² ; DLR : 332 ; Ballast ratio : 37,3 %





Blue Water 39 hydrostatics data :

2. Data sum-up and results of hydrostatic and surfaces calculations

2.1 Hull

Loa (m)	11,46	Lwl (m)	9,72	> Hull speed (Knots)		7,6	at Froude 0,4
>> ft	37,60		31,89				
Boa (m)	3,75	at X (% Lwl)	43,0	Bsheer (m)	3,70	at X (% Lwl)	43,0
>> ft	12,30						
Bwl (m)	3,41	at X (% Lwl)	40,0	> Bwl / Boa	0,909		
>> ft	11,18			Freeboards (m) >		Aft	
Tc (m)	0,760	at X (% Lwl)	50			1,36	Midship
>> ft	2,49					4,46	Fore
Displacement at H0 (m3)	9,60320	at LCB (m)	4,554	LCB (%Lwl)	46,85	ZCB (m)	-0,255
>> lbs	21700	w. seawater	1025	kg/m3		>> ft	-0,84
Cp	0,603						
Sf (m2)	23,82	at LCF (m)	4,473	LCF (%Lwl)	46,01	>> LCB – LCF (%Lwl)	
>> ft2	256,43	>> ft	14,67				0,83
Angle Freeboard/Half beam		34,3 (°), at section C4 (40% Lwl)		Half entry angle (°)		30,6	at 95% Lwl
Sw (m2)	26,71	>Sw/D^(2/3)	5,91				
>> ft2	287,50						
Shull (m2)	58,31	at X (m)	4,796	Z (m)	0,158		
>> ft2	627,63	>> ft	15,73	>> ft	0,52		
Sdeck (m2)	35,75	at X (m)	4,703	Z (m)	1,40		
>> ft2	384,82	>> ft	15,43	>> ft	4,58		

2.2 Keel

Vol. keel(m3)	0,96453	at X (m)	4,957	X (%Lwl)	51,00	Z (m)	-1,150
		>> ft	16,26			>> ft	-3,77
Ballast (kg)	4077,6	at X (m)	4,728	X (%Lwl)	48,64	Z (m)	-1,411
>> lbs	8990	>> ft	15,51			>> ft	-4,63
Draft oa (m)	1,68		7,66			Sxz (m2)	3,84
>> ft	5,51	>> ft2	82,47			>> ft2	41,35
CLR (m)	5,63	CLR (%Lwl)	57,94	CLR = Center of Lateral Resistance			
>> ft	18,48	method: keel profile extended to the waterline, CLR at Z 45% draft and				35,00	% chord

2.3 Rudder(s)

Number	1						
Volume (m3)	0,10550	at X (m)	0,38	X (%Lwl)	3,96	Z (m)	-0,75
Sw (m2)	2,22	>> ft	1,26			Sxz (m2)	1,07
>> ft2	23,91					>> ft2	11,50

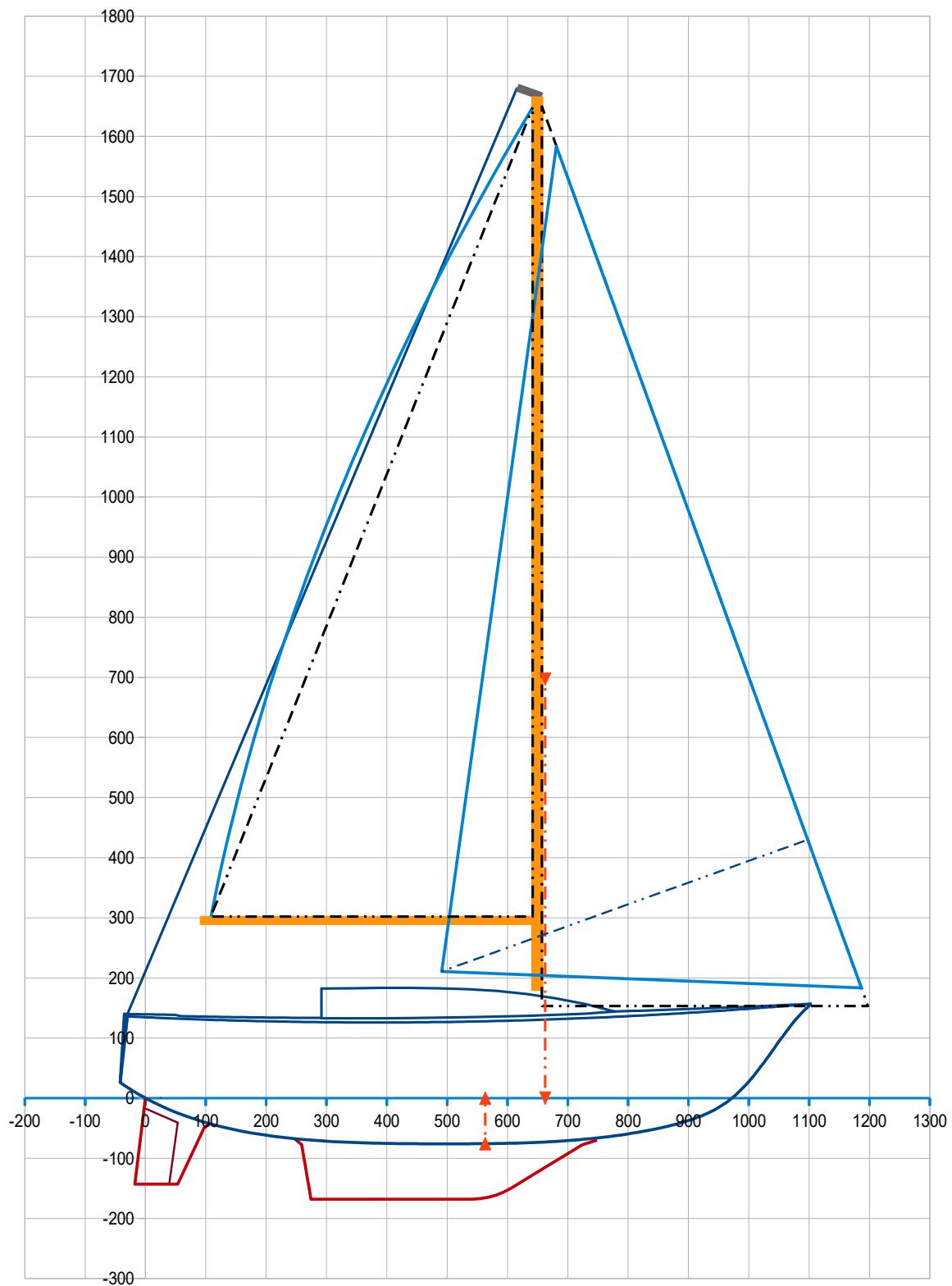
2.4 Hull + Keel + Rudder(s)

Displacement at H0 (m3)	10,67323	at LCB (m)	4,549	LCB (%Lwl)	46,80	at ZCB (m)	-0,340
(kg)	10940	>> ft	14,92			>> ft	-1,12
>> lbs	24118						
, of which Ballast (kg)	4078	at Xg (m)	4,728	Xg (%Lwl)	48,64	at Zg (m)	-1,411
>> lbs	8990	>> ft	15,51			>> ft	-4,63
>> % Ballast	37,3						
Sw (m2)	36,59	>Sw/D^(2/3)	7,55	Lwl/D^(1/3)	4,41		
>> ft2	393,89			DLR	332	$M(\text{lbs}/2240)/(\text{Lwl}(\text{ft})/100)^{\frac{3}{2}}$	

2.5 Data from the mass spreadsheet

Light boat:	M (kg)	10940	at Xg (m)	4,676	Xg (%Lwl)	48,10	at Zg (m)	-0,082
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Blue water 39 SA 92,1 m² (Main 43,1 m² + Genoa 49,0 m²) >> SA/Sw 2,52 SA/D^(2/3) 19,0

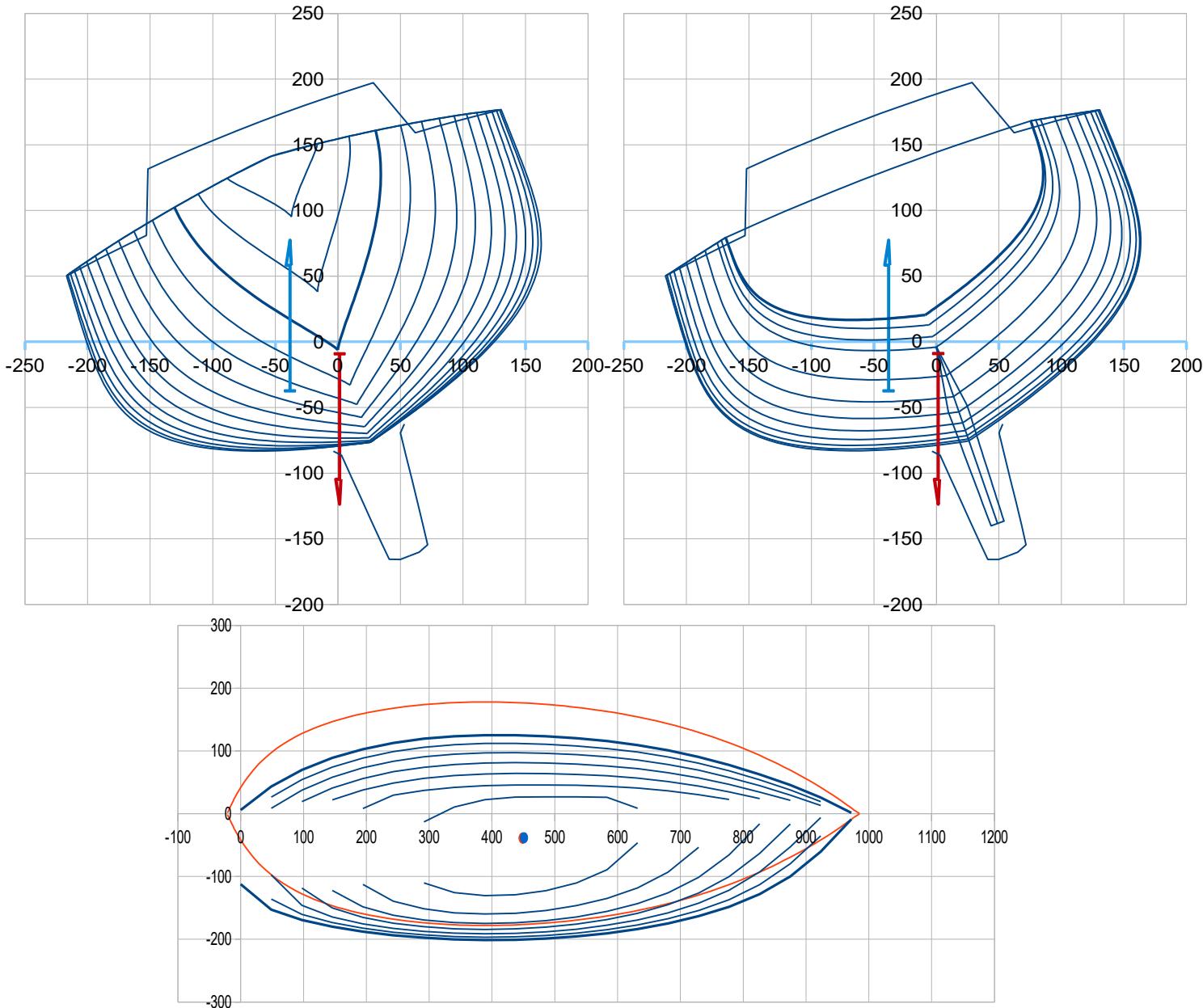


At 20° heel angle with a loading of 3060 kg >>> Displacement 14 000 kg

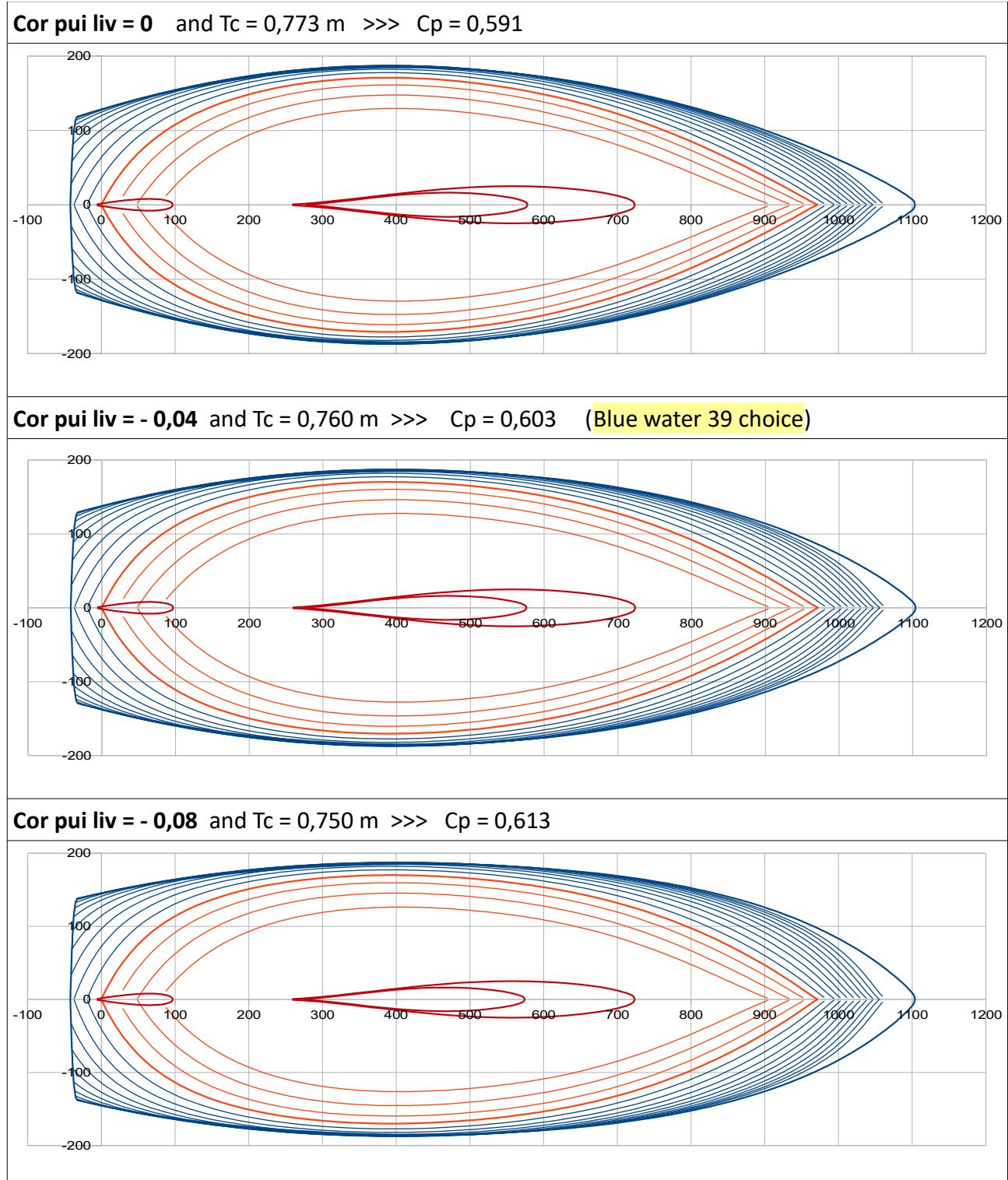
5.1 Mass spreadsheet with input of a load

					(in the coordinates of the 2D
Data to enter : yellow cells	Mass (kg)	Xg (m)	Zg (m)	Yg (m)	
Boat light weight (kg)	10939,72	4,676	-0,082	0	from the mass spreadsheet
Load (kg)	3060,00	3,92	0,10	0,00	Crew at center
			0,10	0,00	Crew sit windward
Total >>> Mass (kg)	13999,72	4,510	-0,042	0,000	Crew at center
Disp. (m3)	13,65826		-0,042	0,000	Crew sit windward

Data to enter : yellow cells		Results		
Heel (°)	20	Disp. (m3)	13,65827	/ Disp. (m3) 13,65826
Height (cm)	-5,076	Xc heel (m)	4,510	/ Xg (m) 4,510
Trim (°)	-0,125	Yc heel (m)	-0,383	Yg heel (m) 0,014
		Zc heel (m)	-0,374	> GZ (m) 0,397
		Sw heel(m2)	39,28	RM (kN.m) 54,529
		Bwl heel (m)	3,27	FB mini (cm) 50,2
		LCB – LCF (%Lwl)	0,22	Obliquity (°) 1,7

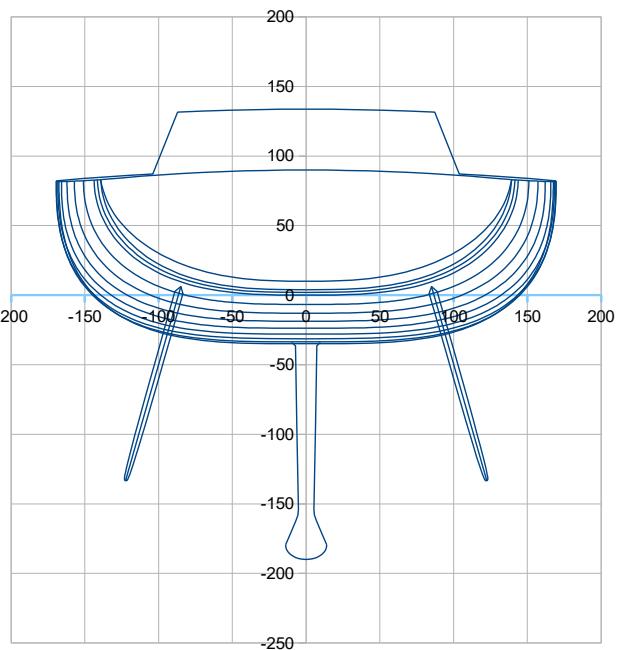
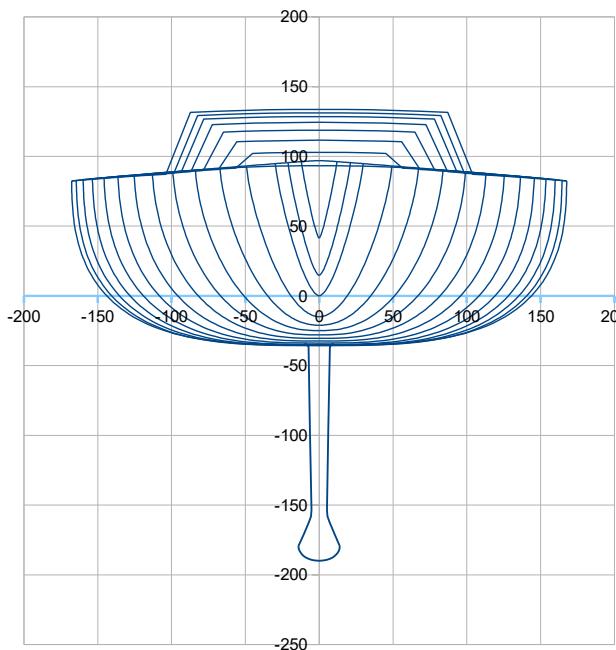
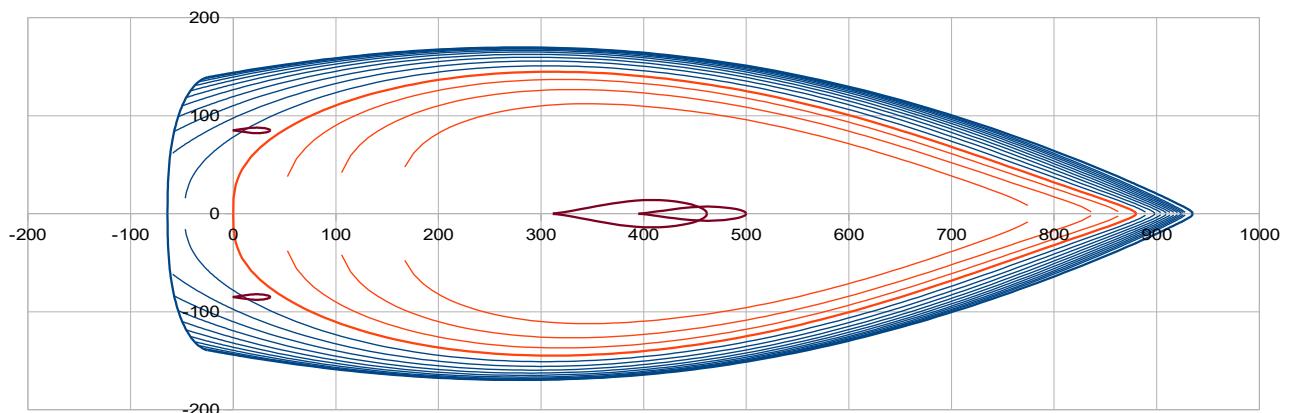
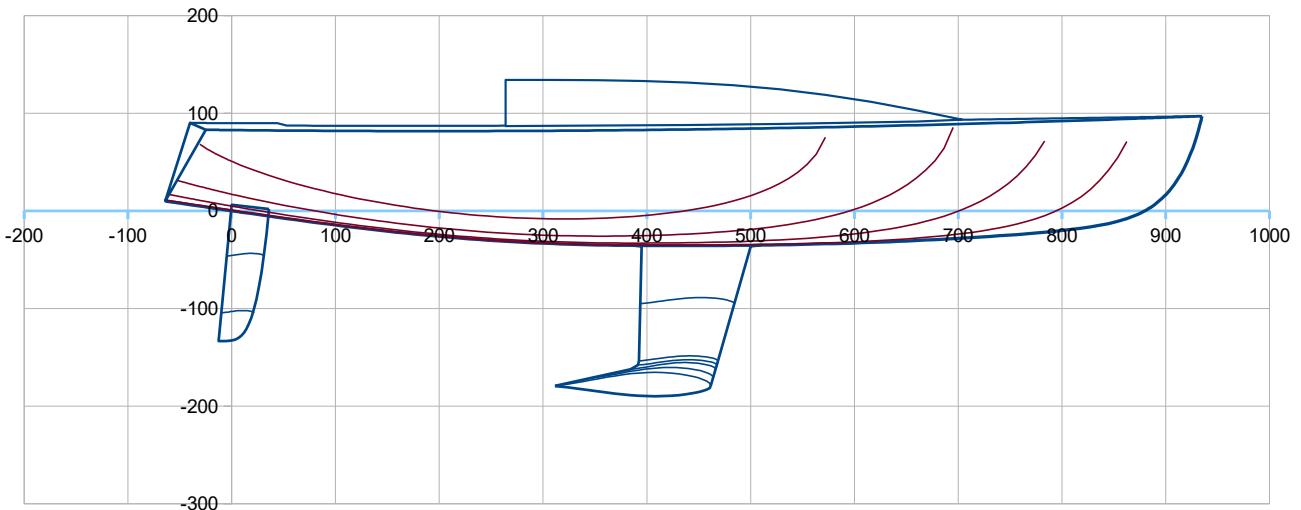


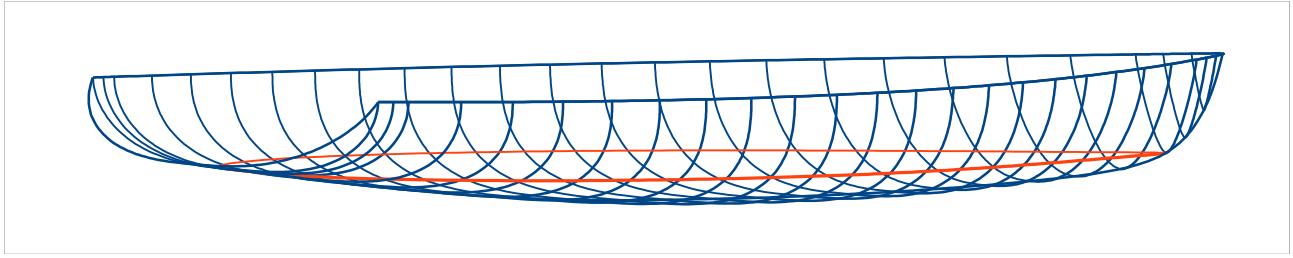
Within Blue Water 39, demonstration by images **the influence of the use of negative values for « Cor Pui liv »** acting on the sheer line roundness towards the ends + slight adjustment of the hull draft **Tc** to keep constant the displacement :



T10, inspired by Tofinou 10 / Joubert – Nivelt

Loa 9,99 m ; Lwl 8,80 m ; B 3,39 m ; Draft 1,90 m ; Displacement : 4216 kg ; Ballast : 1210 kg
>> LCB hull 46,06 %Lwl ; Cp hull (%): 0,559 ; Sw : 24,24 m² ; DLR : 172 ; Ballast ratio : 28,7 %





T10 hydrostatics data :

2. Data sum-up and results of hydrostatic and surfaces calculations

2.1 Hull

Loa (m)	9,99	Lwl (m)	8,80	> Hull speed (Knots)		7,2	at Froude 0,4
>> ft	32,78		28,87				
Boa (m)	3,39	at X (% Lwl)	32,0	Bsheer (m)	3,39	at X (% Lwl)	32,0
>> ft	11,13						
Bwl (m)	2,90	at X (% Lwl)	35,0	> Bwl / Boa	0,854		
>> ft	9,50			Freeboards (m) >		Aft	Midship
Tc (m)	0,356	at X (% Lwl)	50			0,83	0,82
>> ft	1,17					2,72	2,69
Displacement at H0 (m3)	3,94496	at LCB (m)	4,053	LCB (%Lwl)	46,06	ZCB (m)	-0,136
>> lbs	8914	w. seawater	1025	kg/m3		>> ft	-0,45

Cp

Sf (m2)	0,559	at LCF (m)	3,779	LCF (%Lwl)	42,94	>>> LCB – LCF (%Lwl)	3,12
>> ft2	17,74	>> ft	12,40				

Angle Freeboard/Half beam

26,2 (°), at section C4 (40% Lwl) Half entry angle (°) 19,8 at 95% Lwl

Sw (m2)

>> ft2	18,71	at X (m)	3,971	Z (m)	0,080
	201,39	>> ft	13,03	>> ft	0,26

Shull (m2)

>> ft2	37,94	at X (m)	3,971	Z (m)	0,080
	408,33	>> ft	13,03	>> ft	0,26

Sdeck (m2)

>> ft2	26,66	at X (m)	3,745	Z (m)	0,89
	286,93	>> ft	12,29	>> ft	2,92

2.2 Keel

Vol. keel(m3)	0,13768	at X (m)	4,342	X (%Lwl)	49,34	Z (m)	-1,188
		>> ft	14,25			>> ft	-3,90
Ballast (kg)	1210,3	at X (m)	4,303	X (%Lwl)	48,89	Z (m)	-1,284
>> lbs	2668	>> ft	14,12			>> ft	-4,21
Draft oa (m)	1,90		Sw (m2)	3,64		Sxz (m2)	1,36
>> ft	6,23		>> ft2	39,17		>> ft2	14,61
CLR (m)	4,64	CLR (%Lwl)	52,68	CLR = Center of Lateral Resistance			
>> ft	15,21			method: keel profile extended to the waterline, CLR at Z 45% draft and		25,00	% chord

2.3 Rudder(s)

Number	2						
Volume (m3)	0,03007	at X (m)	0,14	X (%Lwl)	1,60	Z (m)	-0,58
Sw (m2)	1,94	>> ft	0,46			Sxz (m2)	0,47
>> ft2	20,89					>> ft2	5,02

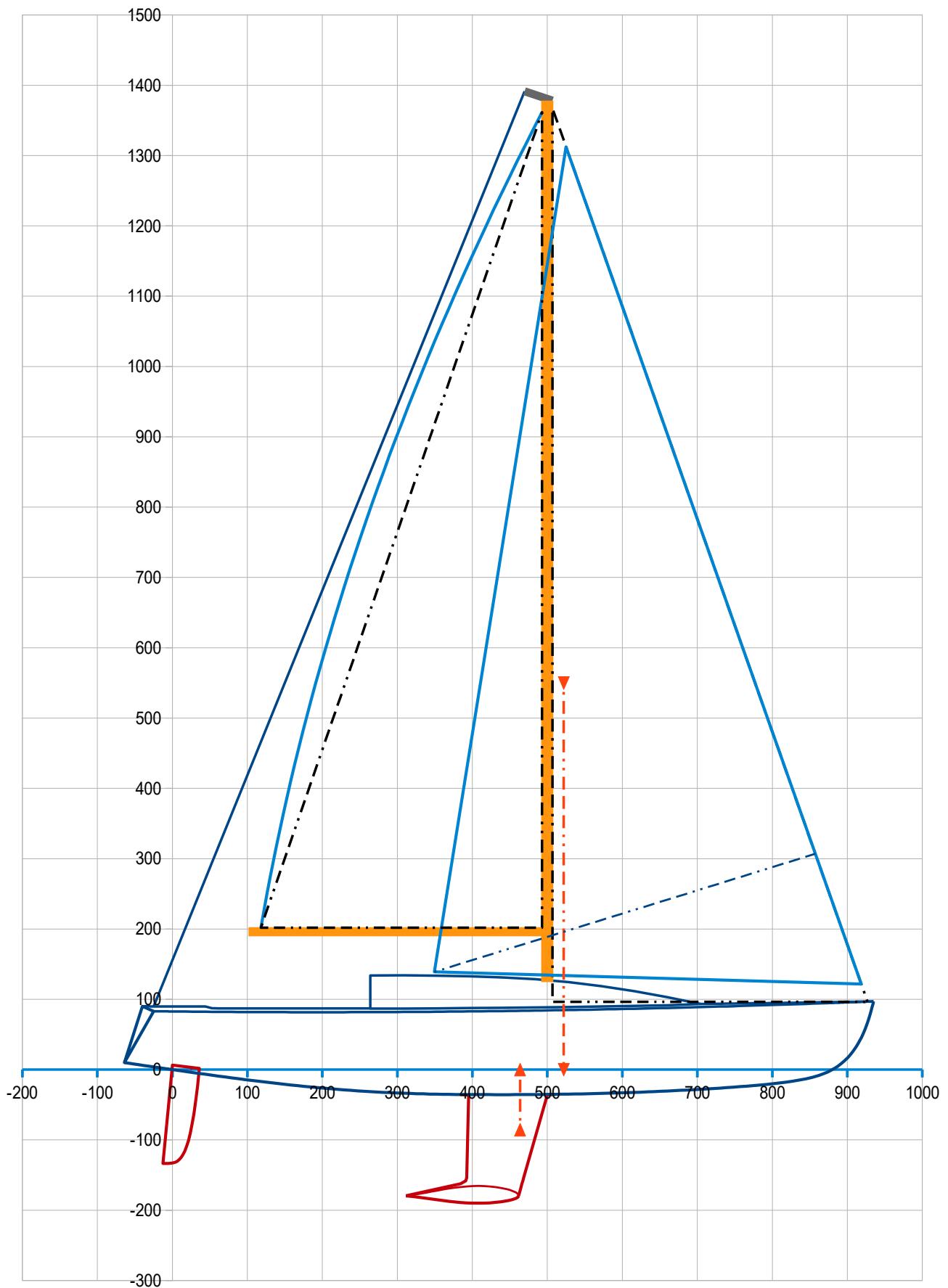
2.4 Hull + Keel + Rudder(s)

Displacement at H0 (m3)	4,11271	at LCB (m)	4,035	LCB (%Lwl)	45,85	at ZCB (m)	-0,174
(kg)	4216	>> ft	13,24			>> ft	-0,57
>> lbs	9294						
, of which Ballast (kg)	1210	at Xg (m)	4,303	Xg (%Lwl)	48,89	at Zg (m)	-1,284
>> lbs	2668	>> ft	14,12			>> ft	-4,21
>> % Ballast	28,7						
Sw (m2)	24,29	>Sw/D^(2/3)	9,46	Lwl/D^(1/3)	5,49		
>> ft2	261,45			DLR	172	M(lbs/2240)/(Lwl(ft)/100)^3	

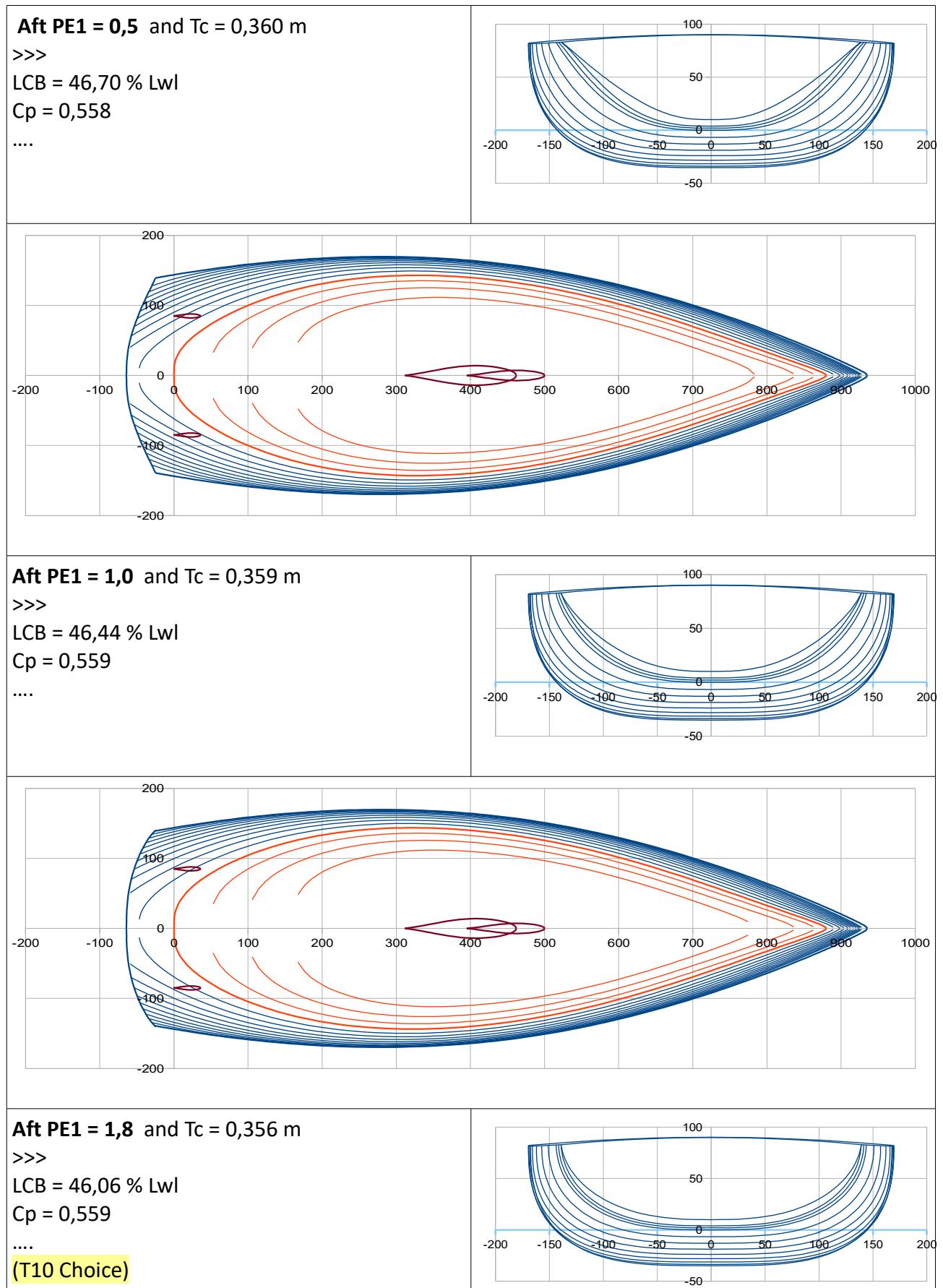
2.5 Data from the mass spreadsheet

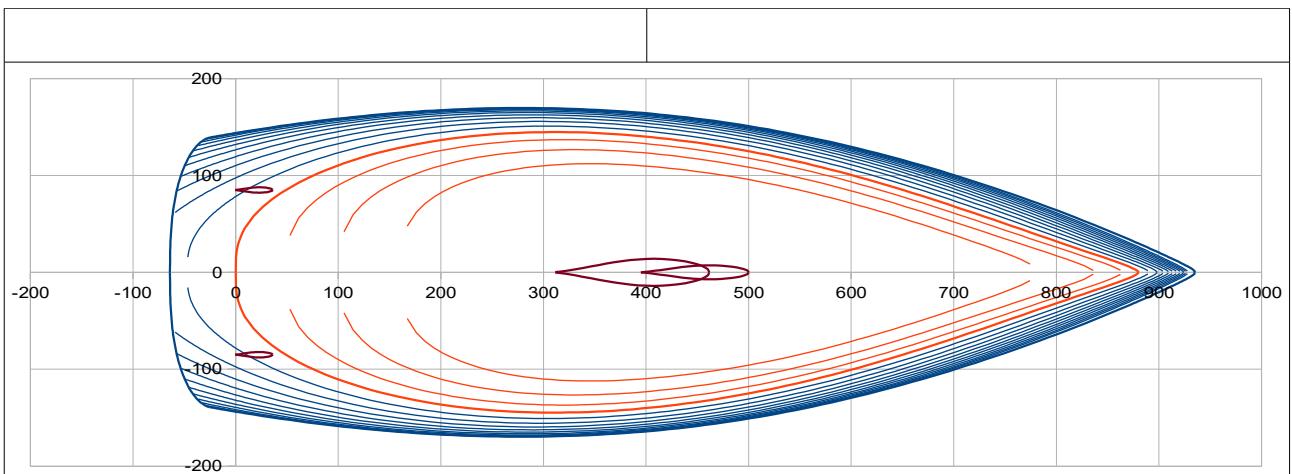
Light boat:	M (kg)	4216	at Xg (m)	4,021	Xg (%Lwl)	45,69	at Zg (m)	0,150
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Boat T10 : SA 60,5 m² (Main 26,1 m² + Jib 34,4 m²) >> SA/Sw 2,49 SA/D^(2/3) 23,56



Within T10, one can demonstrate by images **the influence of aft value of PE1 on the rear transom and waterlines**. Done with hull draft T_c adjustement to keep constant the displacement.





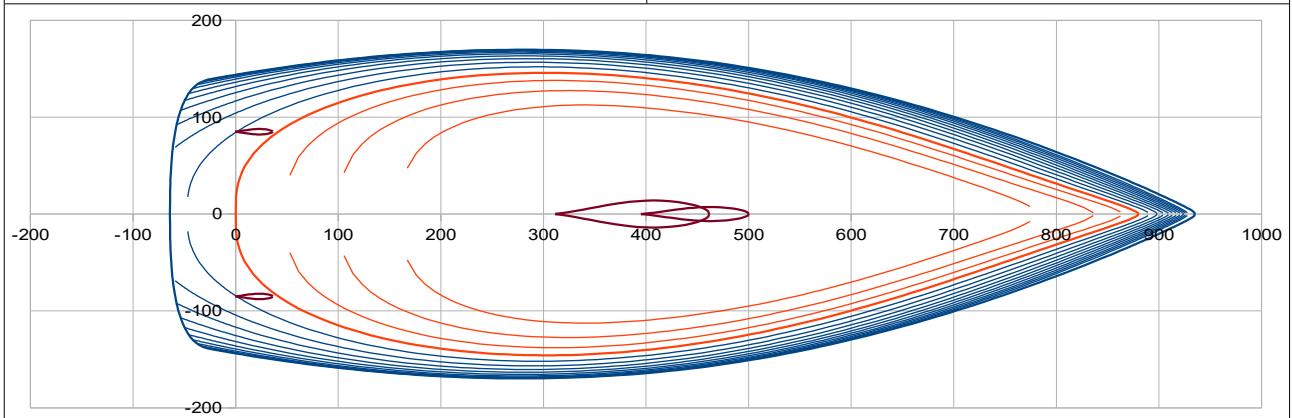
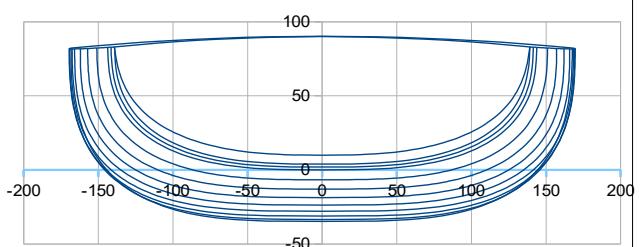
Aft PE1 = 2,5 and Tc = 0,354 m

>>>

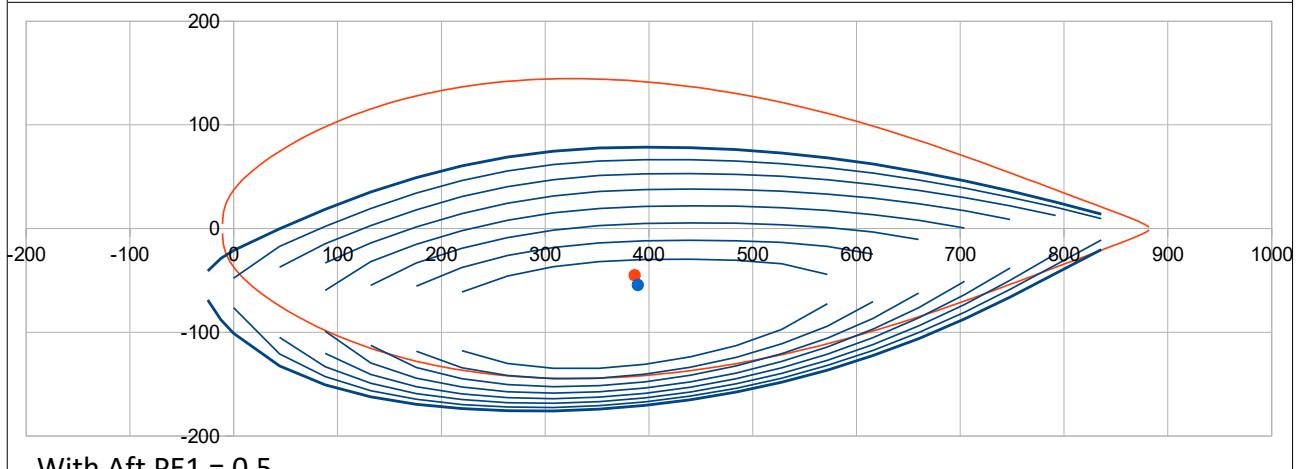
LCB = 45,76 % Lwl

Cp = 0,559

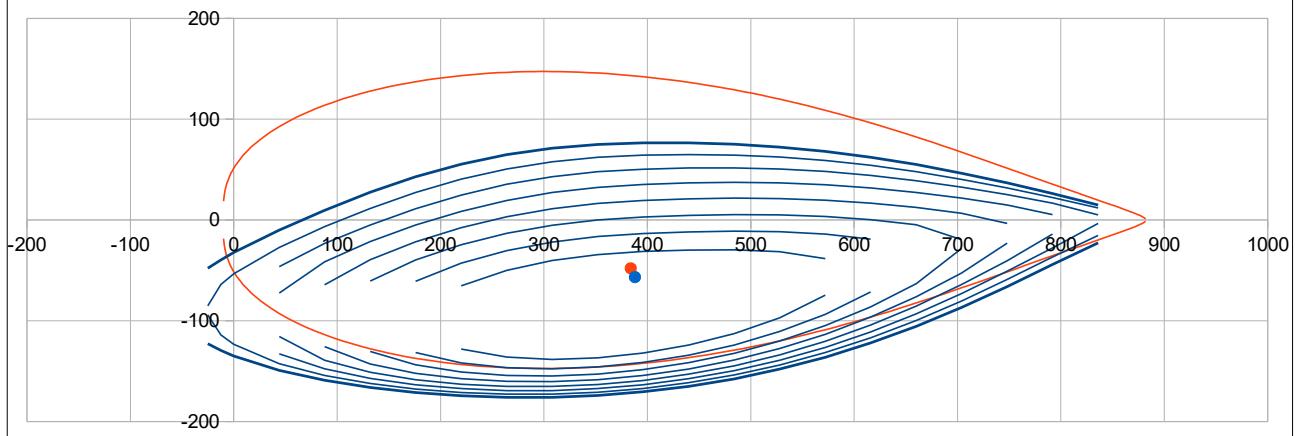
....



Comparison of the 20° heeled hull with the 2 extremes rear transom shape



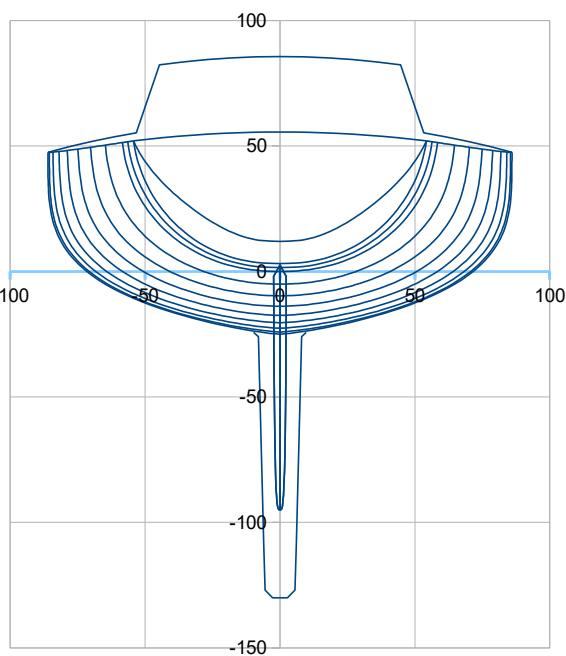
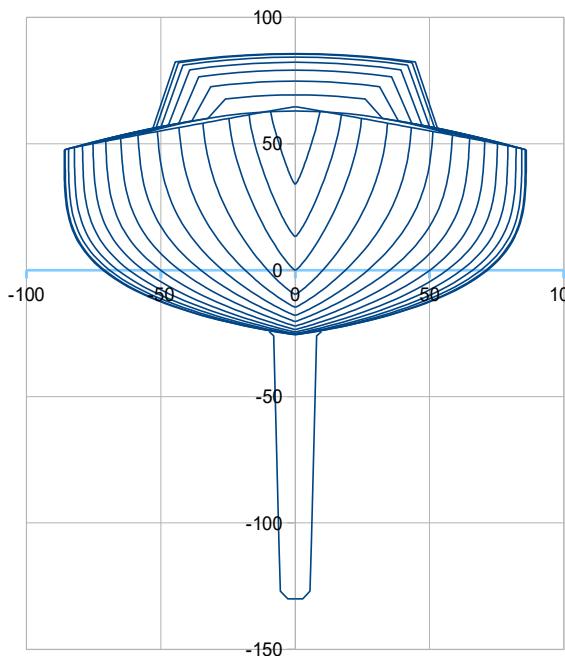
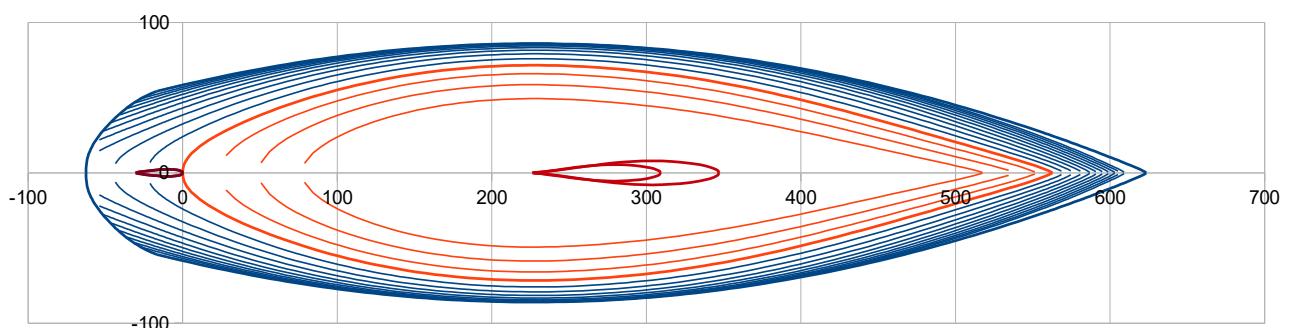
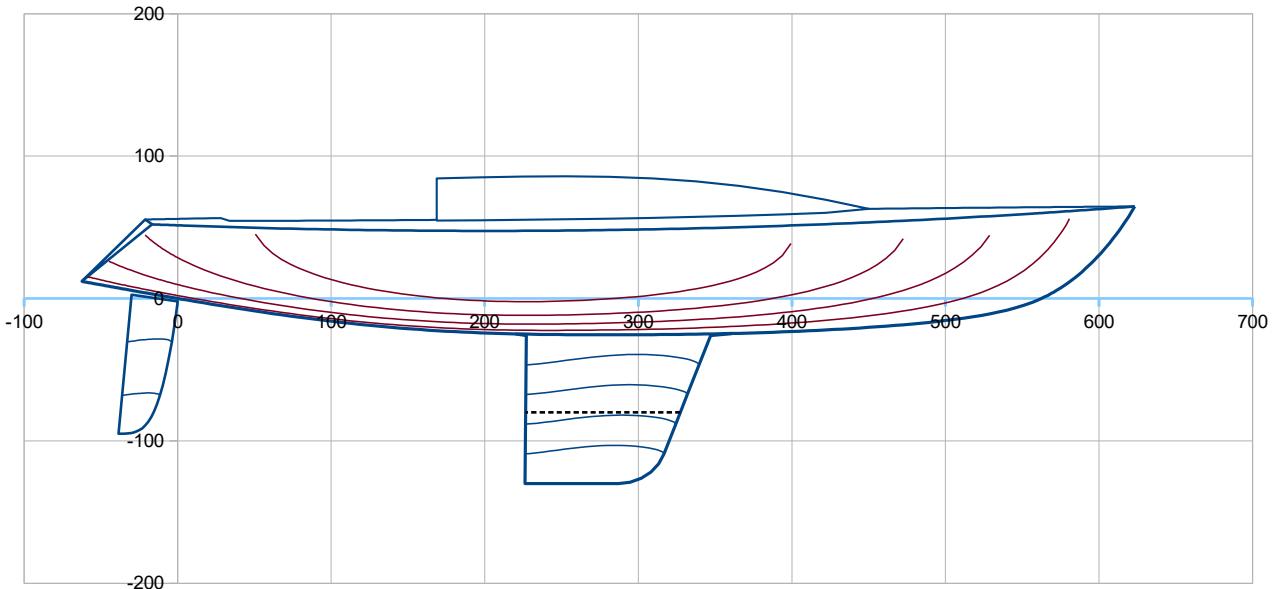
With Aft PE1 = 0,5

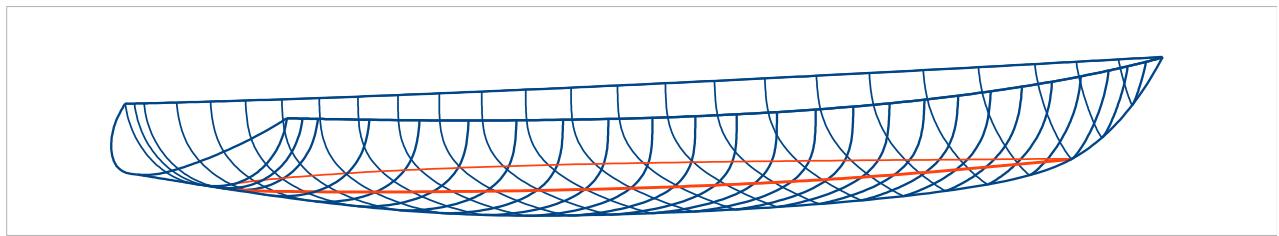


With Aft PE1 = 2,5

Dolfi 22,5, inspired by 15m2 SNS designs

Loa 6,86 m ; Lwl 5,63 m ; B 1,72 m ; Draft 1,30 m ; Displacement : 840 kg ; Ballast : 416 kg
>> LCB hull 46,57 %Lwl ; Cp hull : 0,555 ; Sw : 8,61 m² ; DLR : 132 ; Ballast ratio : 49,6 %





Dolfi 22,5 hydrostatics data :

2. Data sum-up and results of hydrostatic and surfaces calculations

2.1 Hull

Loa (m)	6,86	Lwl (m)	5,63	> Hull speed (Knots)	5,8	at Froude 0,4
>> ft	22,50		18,45			
Boa (m)	1,72	at X (% Lwl)	40,0	Bsheer (m)	1,72	at X (% Lwl)
>> ft	5,64					40,0
Bwl (m)	1,43	at X (% Lwl)	40,0	> Bwl / Boa	0,832	
>> ft	4,70					
Tc (m)	0,255	at X (% Lwl)	51,5	Freeboards (m) >	Aft	Midship
>> ft	0,84				0,52	0,47
Displacement at H0 (m3)	0,71856	at LCB (m)	2,620	LCB (%Lwl)	46,57	Fore
>> lbs	1624	w. seawater	1025	kg/m3		0,646140857
Cp	0,555					
Sf (m2)	5,45	at LCF (m)	2,541	LCF (%Lwl)	45,17	
>> ft2	58,62	>> ft	8,34			>> LCB – LCF (%Lwl)
Angle Freeboard/Half beam		28,9	(°), at section C4 (40% Lwl)		Half entry angle (°)	17,1
Sw (m2)	5,88	>Sw/D^(2/3)	7,33			at 95% Lwl
>> ft2	63,34					
Shull (m2)	13,45	at X (m)	2,671	Z (m)	0,069	
>> ft2	144,79	>> ft	8,76	>> ft	0,23	
Sdeck (m2)	9,16	at X (m)	2,596	Z (m)	0,56	
>> ft2	98,61	>> ft	8,52	>> ft	1,85	

2.2 Keel

Vol. keel(m3)	0,09406	at X (m)	2,869	X (%Lwl)	51,01	Z (m)	-0,709
		>> ft	9,41			>> ft	-2,33
Ballast (kg)	416,4	at X (m)	2,806	X (%Lwl)	49,89	Z (m)	-1,002
>> lbs	918	>> ft	9,21			>> ft	-3,29
Draft oa (m)	1,30		Sw (m2)	2,21	Sxz (m2)	1,07	
>> ft	4,27		>> ft2	23,79	>> ft2	11,55	
CLR (m)	3,08	CLR (%Lwl)	54,77	CLR = Center of Lateral Resistance			
>> ft	10,11			method: keel profile extended to the waterline, CLR at Z 45% draft and		25,00	% chord

2.3 Rudder(s)

Number	1						
Volume (m3)	0,00682	at X (m)	-0,18	X (%Lwl)	-3,22	Z (m)	-0,40
Sw (m2)	0,51	>> ft	-0,59			Sxz (m2)	0,25
>> ft2	5,54					>> ft2	2,67

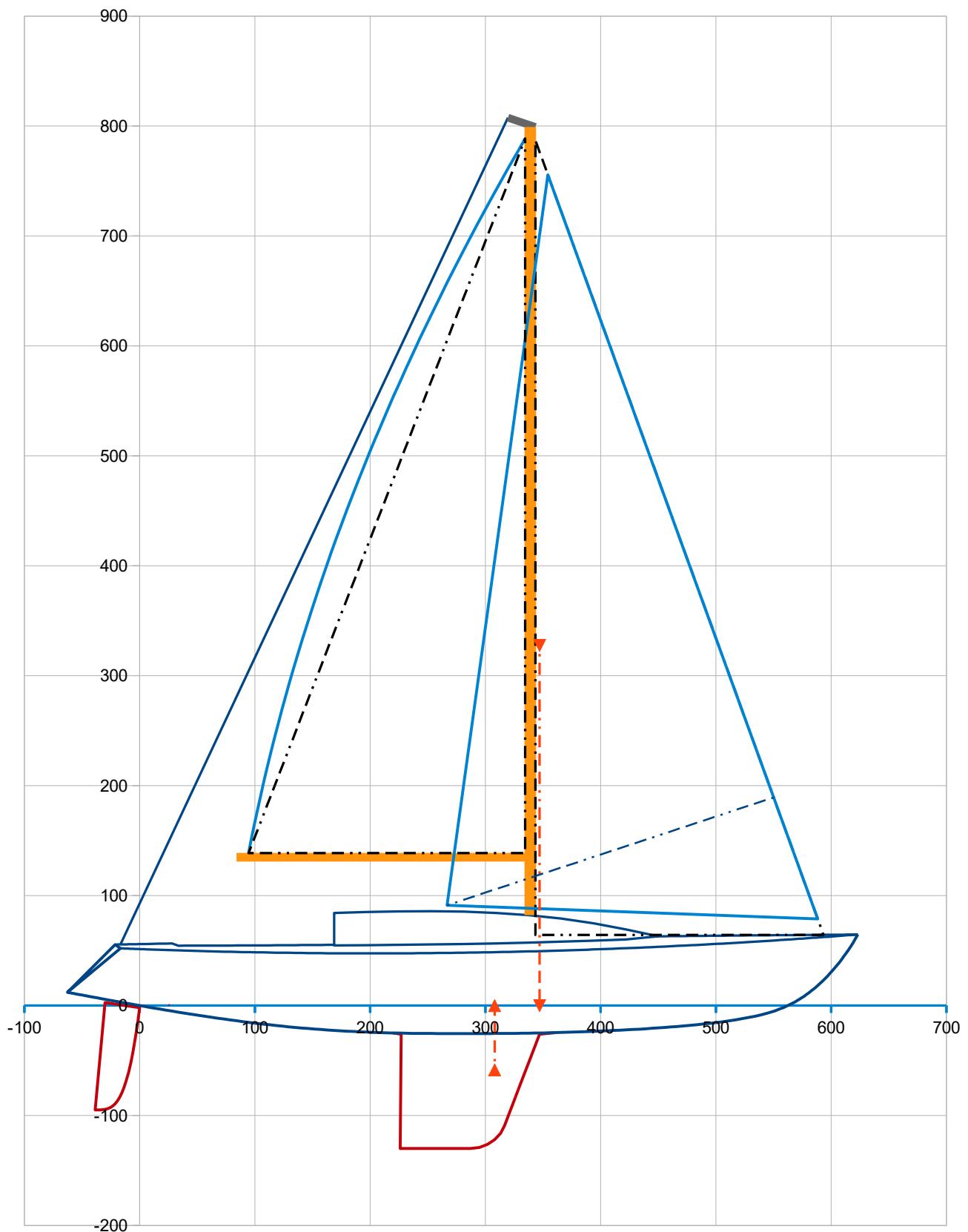
2.4 Hull + Keel + Rudder(s)

Displacement at H0 (m3)	0,81944	at LCB (m)	2,625	LCB (%Lwl)	46,66	at ZCB (m)	-0,159
(kg)	840	>> ft	8,61			>> ft	-0,52
>> lbs	1852						
, of which Ballast (kg)	416	at Xg (m)	2,806	Xg (%Lwl)	49,89	at Zg (m)	-1,002
>> lbs	918	>> ft	9,21			>> ft	-3,29
>> % Ballast	49,6						
Sw (m2)	8,61	>Sw/D^(2/3)	9,83	Lwl/D^(1/3)	6,01		
>> ft2	92,67			DLR	132	M(lbs/2240)/(Lwl(ft)/100)^3	

2.5 Data from the mass spreadsheet

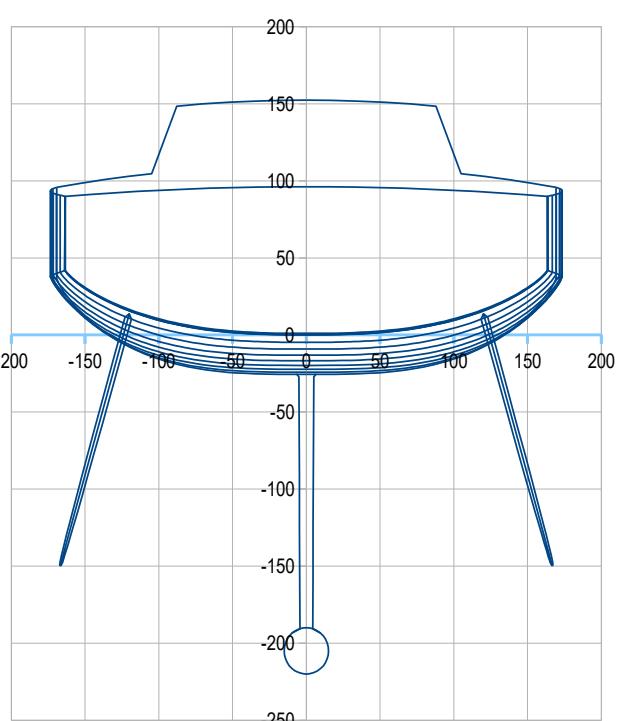
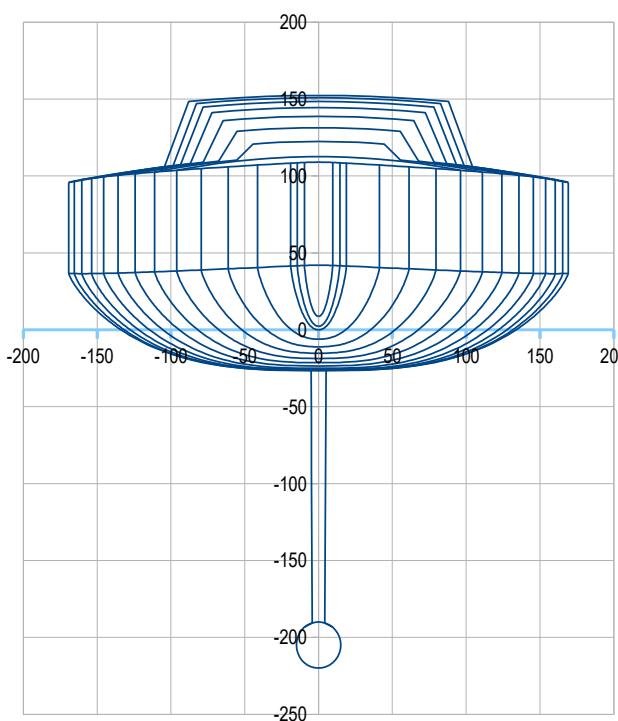
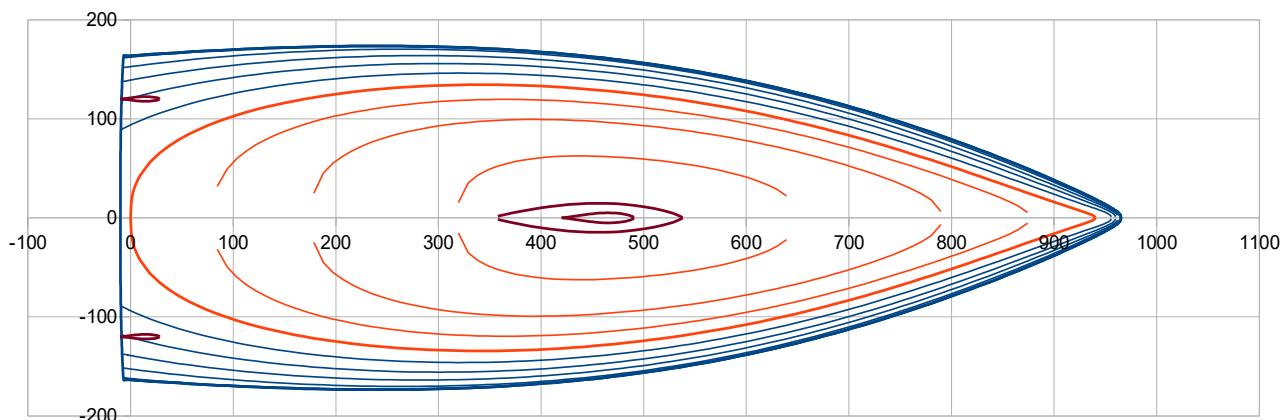
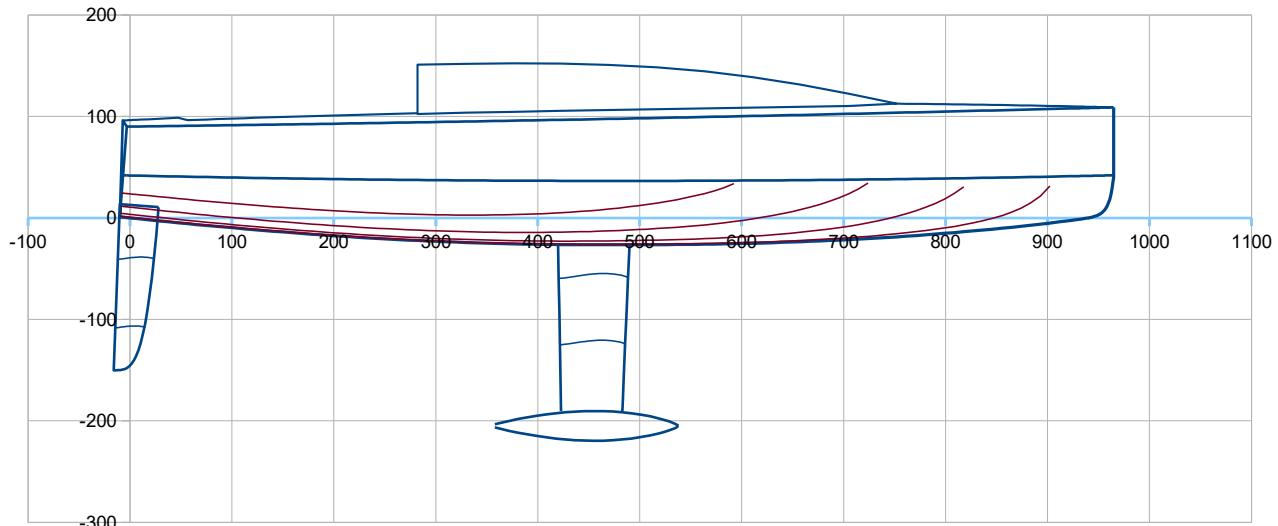
Light boat:	M (kg)	840	at Xg (m)	2,714	Xg (%Lwl)	48,26	at Zg (m)	-0,256
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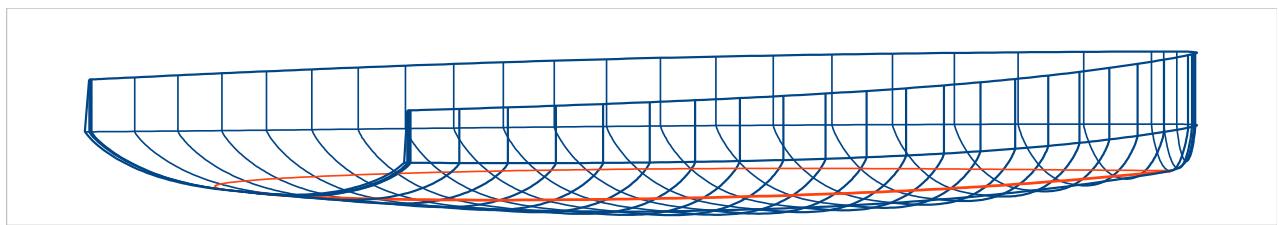
Dolfi 22,5 SA 20,3 m² (Main 9,37 m² + Jib 10,96 m²) >> SA/Sw 2,36 SA/D^(2/3) 23,21



Dolfi 32S, inspired by Beneteau Figaro III / VPLP

Loa 9,75 m ; Lwl 9,40 m ; B 3,47 m ; Draft 2,20 m ; Displacement : 3014 kg ; Ballast : 1248 kg
 >> LCB hull 46,52 %Lwl ; Cp hull : 0,560 ; Sw : 23,93 m² ; DLR : 100 ; Ballast ratio : 41,4 %





Dolfi 32S Hydrostatics data

2. Data sum-up and results of hydrostatic and surfaces calculations

2.1 Hull

Loa (m)	9,75	Lwl (m)	9,40	> Hull speed (Knots)		7,5	at Froude 0,4
>> ft	31,99		30,84				
Boa (m)	3,47	at X (% Lwl)	26,0	Bsheer (m)	3,47	at X (% Lwl)	26,0
>> ft	11,38						
Bwl (m)	2,69	at X (% Lwl)	36,0	> Bwl / Boa	0,774		
>> ft	8,82						
Tc (m)	0,265	at X (% Lwl)	50	Freeboards (m) >		Aft	Midship
>> ft	0,87					0,90	0,95
Displacement at H0 (m3)	2,78046	at LCB (m)	4,373	LCB (%Lwl)	46,52	ZCB (m)	Fore
>> lbs	6283	w. seawater	1025	kg/m3		>> ft	1,09

Cp	0,560	Sf (m2)	18,04	at LCF (m)	4,080	LCF (%Lwl)	43,41	>>> LCB – LCF (%Lwl)	3,11
		>> ft2	194,19	>> ft	13,39				
Angle Freeboard/Half beam				29,5	(°), at section C4 (40% Lwl)		Half entry angle (°)	19,5	at 95% Lwl
Sw (m2)	18,44			>Sw/D^(2/3)	9,32				
>> ft2	198,46								
Shull (m2)	41,46			at X (m)	4,352	Z (m)	0,167		
>> ft2	446,26			>> ft	14,28	>> ft	0,55		
Sdeck (m2)	28,08			at X (m)	3,970	Z (m)	1,02		
>> ft2	302,23			>> ft	13,03	>> ft	3,33		

2.2 Keel

Vol. keel(m3)	0,13298	at X (m)	4,555	X (%Lwl)	48,46	Z (m)	-1,560
		>> ft	14,94			>> ft	-5,12
Ballast (kg)	1248,1	at X (m)	4,547	X (%Lwl)	48,37	Z (m)	-1,669
>> lbs	2752	>> ft	14,92			>> ft	-5,47
Draft oa (m)	2,20		3,30			Sxz (m2)	1,44
>> ft	7,22		>> ft2	35,51		>> ft2	15,46
CLR (m)	4,70	CLR (%Lwl)	50,05	CLR = Center of Lateral Resistance method: keel profile extended to the waterline, CLR at Z 45% draft and			
>> ft	15,43						25,00 % chord

2.3 Rudder(s)

Number	2						
Volume (m3)	0,02658	at X (m)	0,07	X (%Lwl)	0,75	Z (m)	-0,55
Sw (m2)	2,19	>> ft	0,23			Sxz (m2)	0,53
>> ft2	23,59					>> ft2	5,67

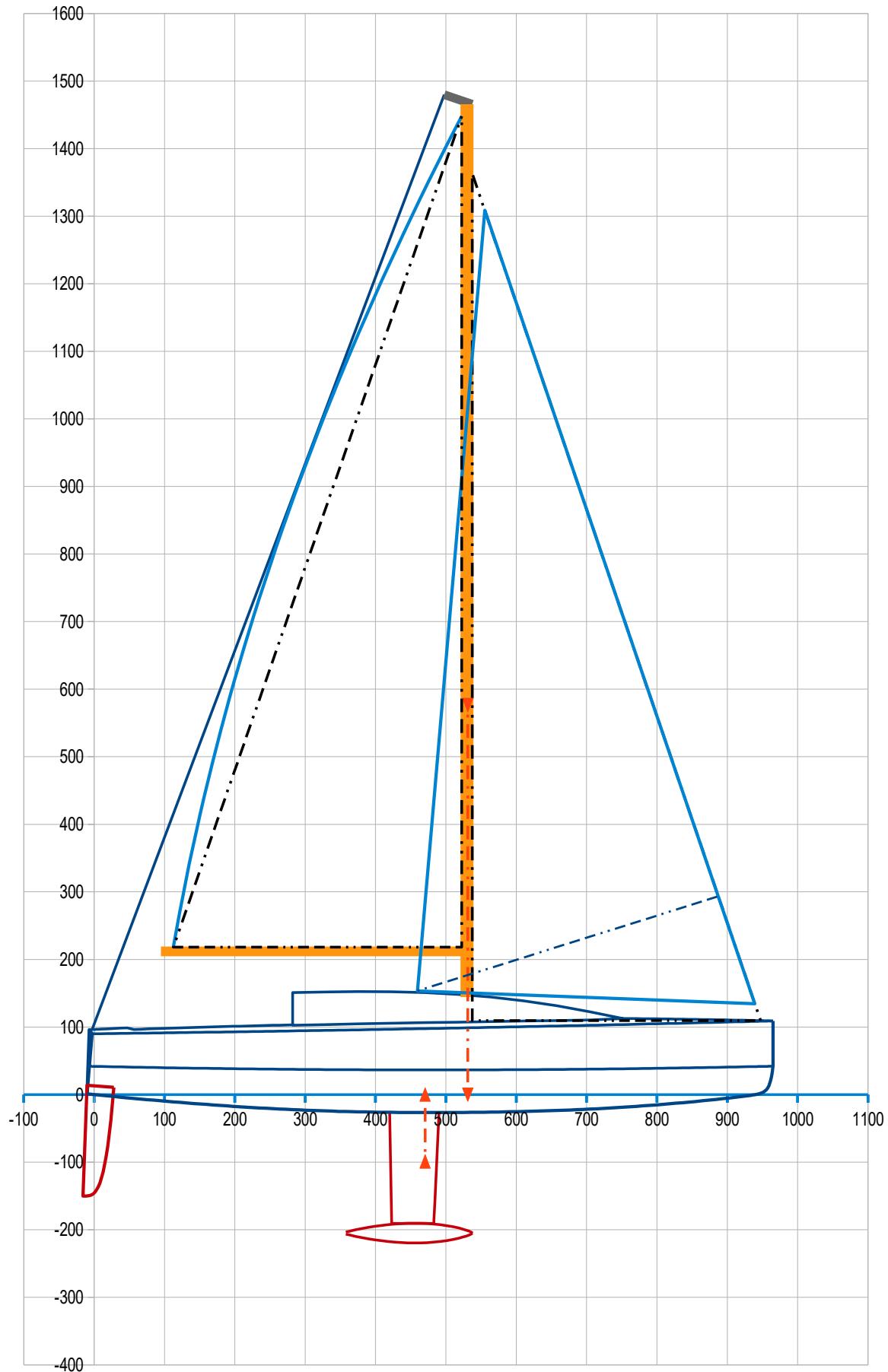
2.4 Hull + Keel + Rudder(s)

Displacement at H0 (m3)	2,94003	at LCB (m)	4,342	LCB (%Lwl)	46,19	at ZCB (m)	-0,167
(kg)	3014	>> ft	14,25			>> ft	-0,55
>> lbs	6644						
, of which Ballast (kg)	1248	at Xg (m)	4,547	Xg (%Lwl)	48,37	at Zg (m)	-1,669
>> lbs	2752	>> ft	14,92			>> ft	-5,47
>> % Ballast	41,4						
Sw (m2)	23,93	>Sw/D^(2/3)	11,66	Lwl/D^(1/3)	6,56		
>> ft2	257,56			DLR	101	M(lbs/2240)/(Lwl(ft)/100)^3	

2.5 Data from the mass spreadsheet

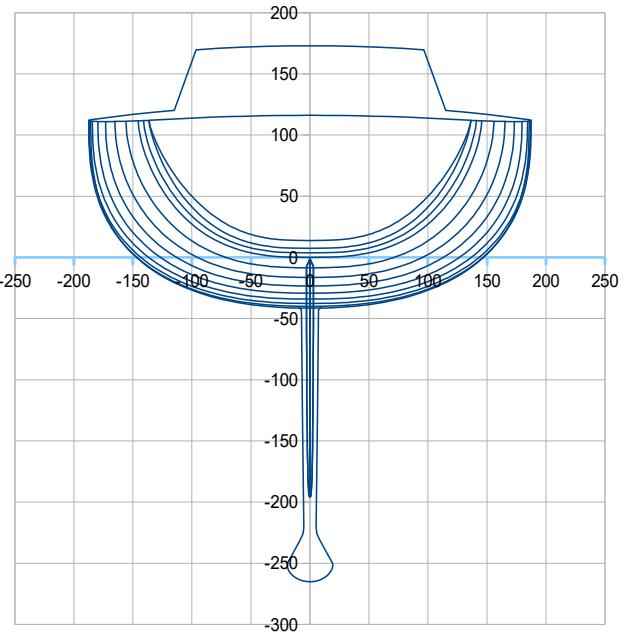
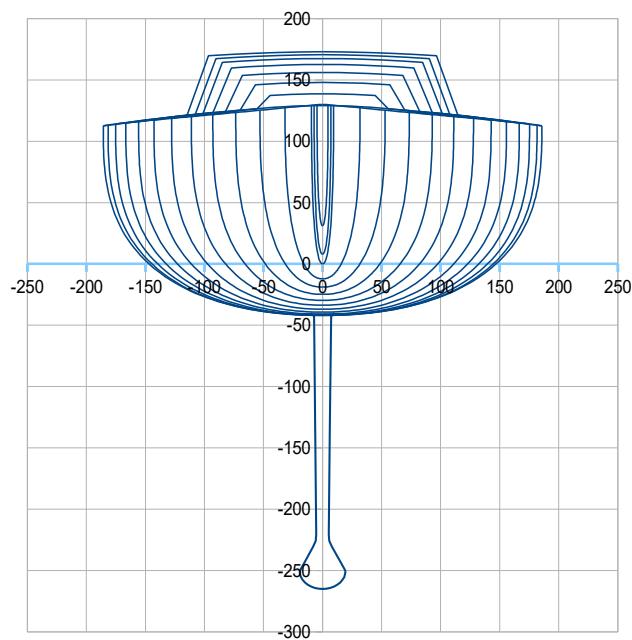
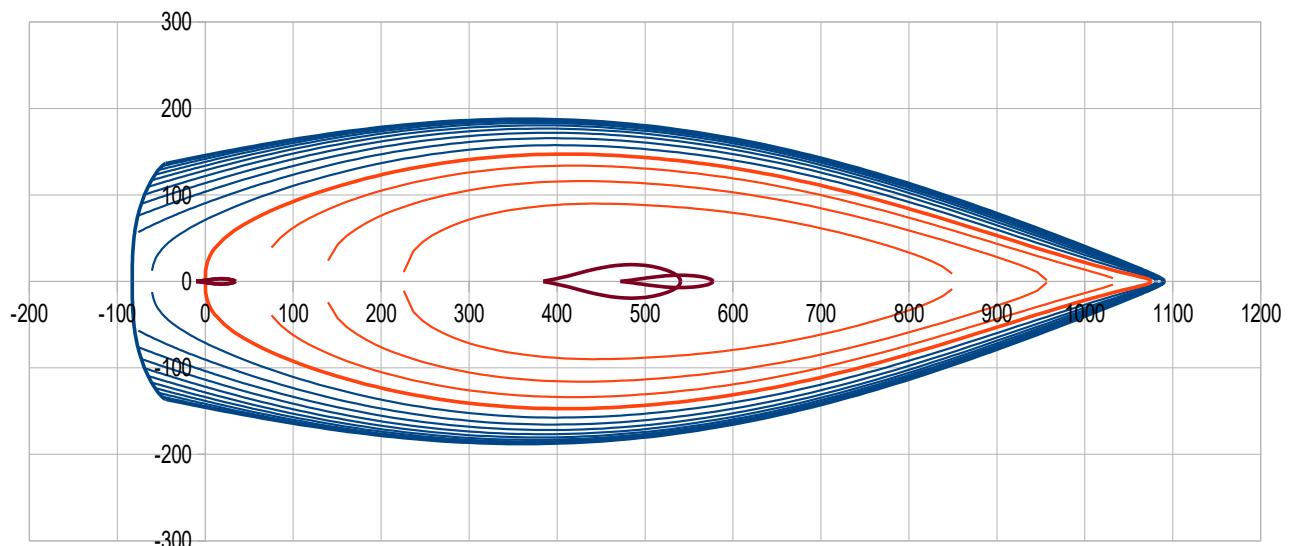
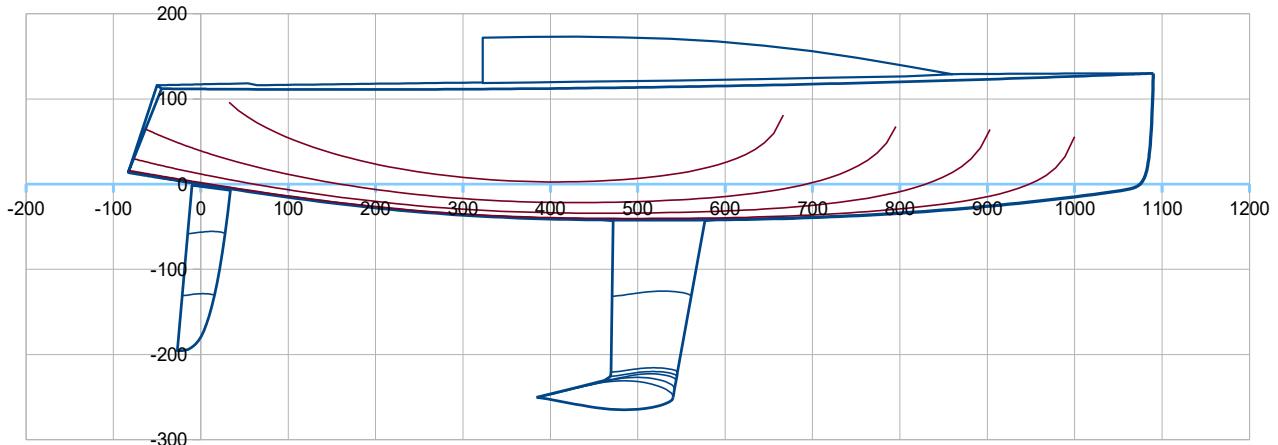
Light boat:	M (kg)	3014	at Xg (m)	4,298	Xg (%Lwl)	45,72	at Zg (m)	-0,180
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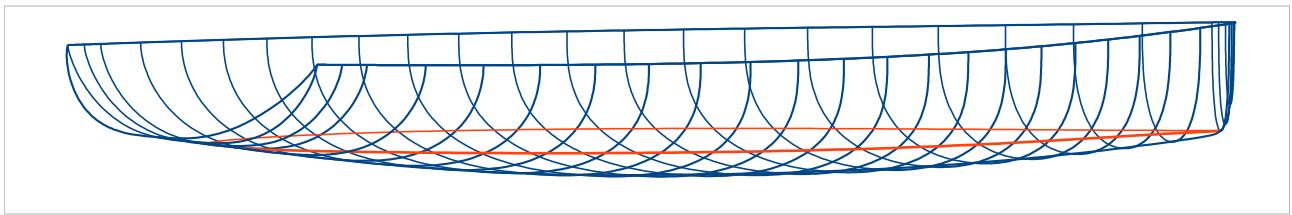
Dolfi 32S SA 58,6 m² (Main 30,3 m² + Jib 28,3 m²) >> SA/Sw 2,45 SA/D^(2/3) 28,57



Syd 38, inspired by Sydney 38 / Murray Burns Dovell

Loa 11,73 m ; Lwl 10,75 m ; B 3,75 m ; Draft 2,65 m ; Displacement : 5642 kg ; Ballast : 1930 kg
>> LCB hull 45,71 %Lwl ; Cp hull : 0,553 ; Sw : 29,40 m² ; DLR : 127 ; Ballast ratio : 34,2 %





Syd 38 hydrostatics data :

2. Data sum-up and results of hydrostatic and surfaces calculations

2.1 Hull

Loa (m)	11,73	Lwl (m)	10,75	> Hull speed (Knots)	8,0	at Froude 0,4
>> ft	38,48		35,27			
Boa (m)	3,75	at X (% Lwl)	34,0	Bsheer (m)	3,75	at X (% Lwl)
>> ft	12,30					34,0
Bwl (m)	2,94	at X (% Lwl)	38,0	> Bwl / Boa	0,785	
>> ft	9,66					
Tc (m)	0,420	at X (% Lwl)	50			
>> ft	1,38					
Displacement at H0 (m3)	5,26416	at LCB (m)	4,914	LCB (%Lwl)	45,71	ZCB (m)
>> lbs	11896	w. seawater	1025	kg/m3		>> ft
Cp	0,553					-0,153
Sf (m2)	21,41	at LCF (m)	4,673	LCF (%Lwl)	43,47	>> LCB – LCF (%Lwl)
>> ft2	230,49	>> ft	15,33			2,24

Angle Freeboard/Half beam 31,2 (°), at section C4 (40% Lwl) Half entry angle (°) 15,3 at 95% Lwl

Sw (m2)	22,72	>Sw/D^(2/3)	7,51
>> ft2	244,55		

Shull (m2)	53,42	at X (m)	4,817	Z (m)	0,190
>> ft2	575,02	>> ft	15,80	>> ft	0,62
Sdeck (m2)	34,29	at X (m)	4,355	Z (m)	1,20
>> ft2	369,11	>> ft	14,29	>> ft	3,94

2.2 Keel

Vol. keel(m3)	0,21707	at X (m)	5,097	X (%Lwl)	47,41	Z (m)	-1,689
		>> ft	16,72			>> ft	-5,54
Ballast (kg)	1930,4	at X (m)	5,055	X (%Lwl)	47,02	Z (m)	-1,830
>> lbs	4256	>> ft	16,58			>> ft	-6,00
Draft oa (m)	2,65		Sw (m2)	5,19		Sxz (m2)	1,96
>> ft	8,69		>> ft2	55,86		>> ft2	21,05
CLR (m)	5,40	CLR (%Lwl)	50,27	CLR = Center of Lateral Resistance			
>> ft	17,73			method: keel profile extended to the waterline, CLR at Z 45% draft and		25,00	% chord

2.3 Rudder(s)

Number	1						
Volume (m3)	0,02319	at X (m)	0,06	X (%Lwl)	0,58	Z (m)	-0,82
Sw (m2)	1,49	>> ft	0,20			Sxz (m2)	0,72
>> ft2	16,09					>> ft2	7,74

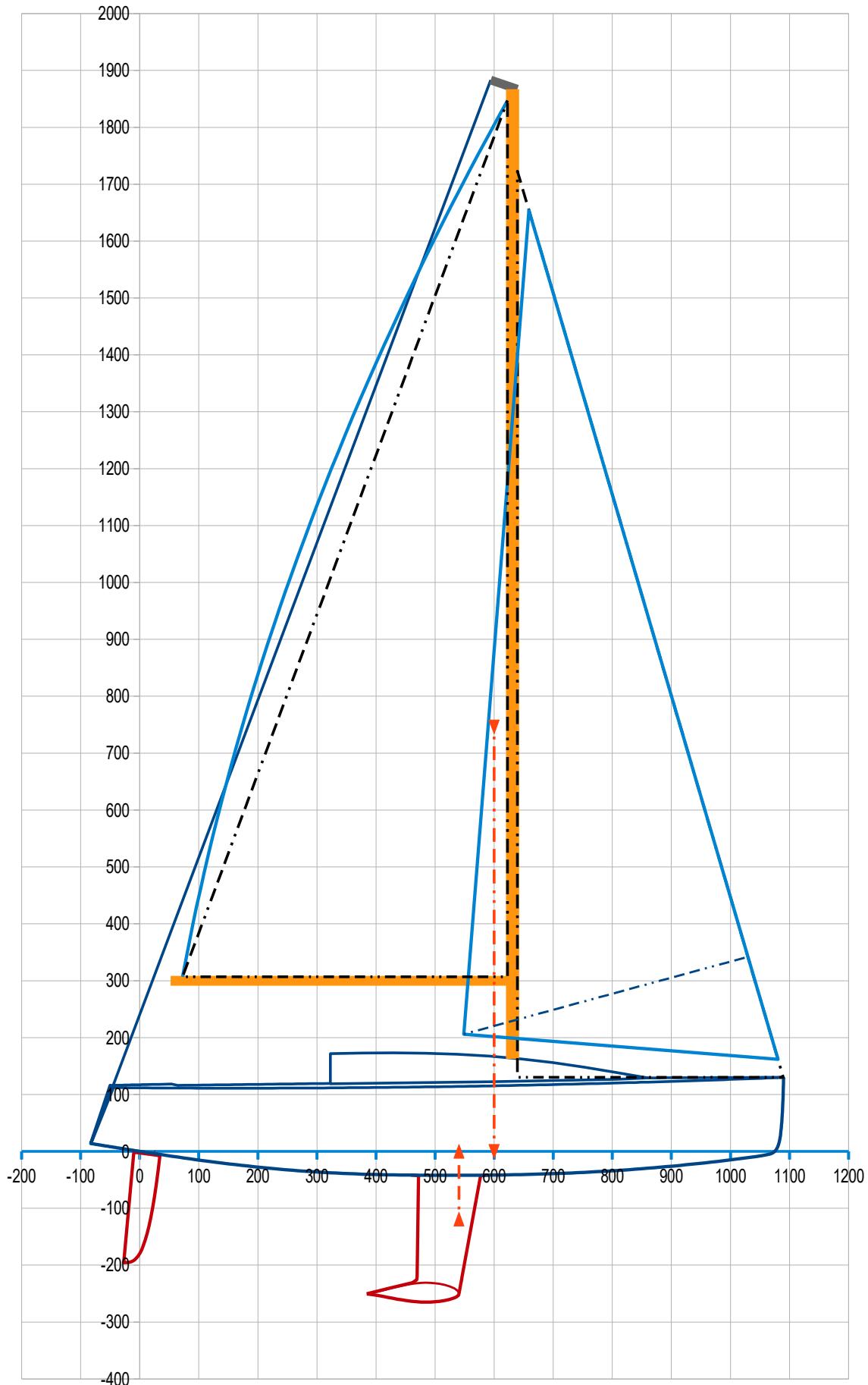
2.4 Hull + Keel + Rudder(s)

Displacement at H0 (m3)	5,50442	at LCB (m)	4,901	LCB (%Lwl)	45,59	at ZCB (m)	-0,216
(kg)	5642	>> ft	16,08			>> ft	-0,71
>> lbs	12438						
, of which Ballast (kg)	1930	at Xg (m)	5,055	Xg (%Lwl)	47,02	at Zg (m)	-1,830
>> lbs	4256	>> ft	16,58			>> ft	-6,00
>> % Ballast	34,2						
Sw (m2)	29,40	>Sw/D^(2/3)	9,43	Lwl/D^(1/3)	6,09		
>> ft2	316,50			DLR	127	M(lbs/2240)/(Lwl(ft)/100)^3	

2.5 Data from the mass spreadsheet

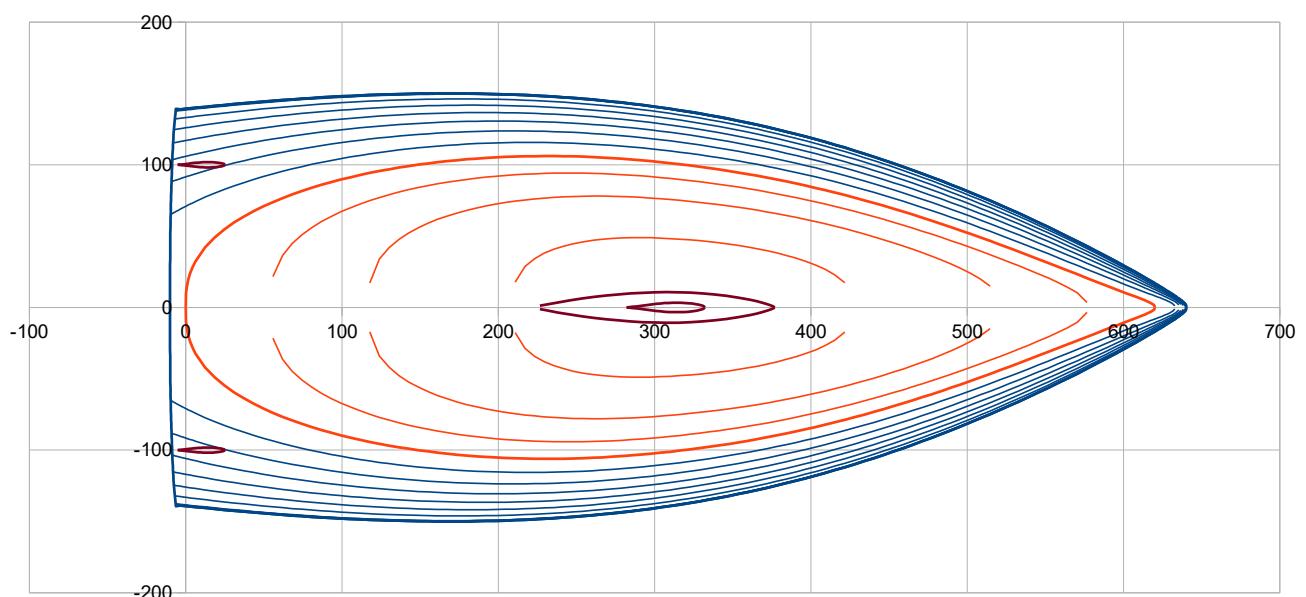
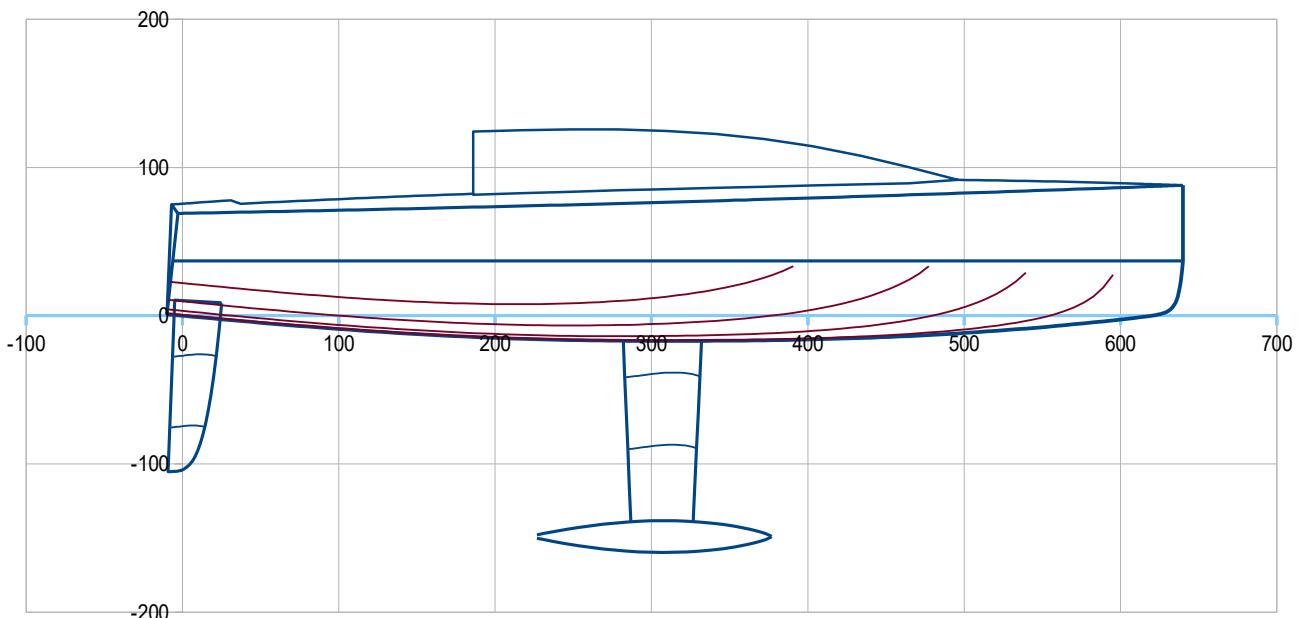
Light boat:	M (kg)	5642	at Xg (m)	4,874	Xg (%Lwl)	45,34	at Zg (m)	-0,011
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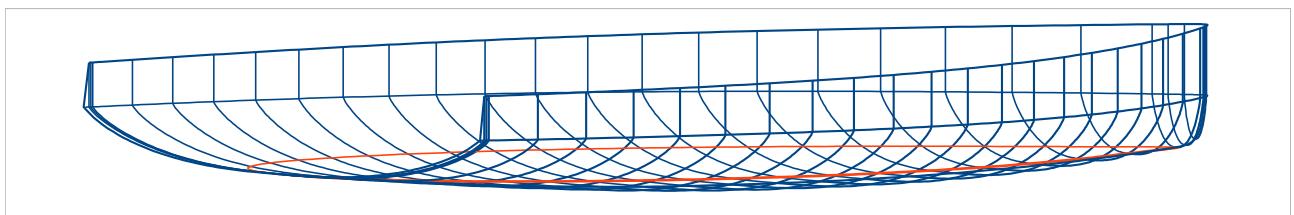
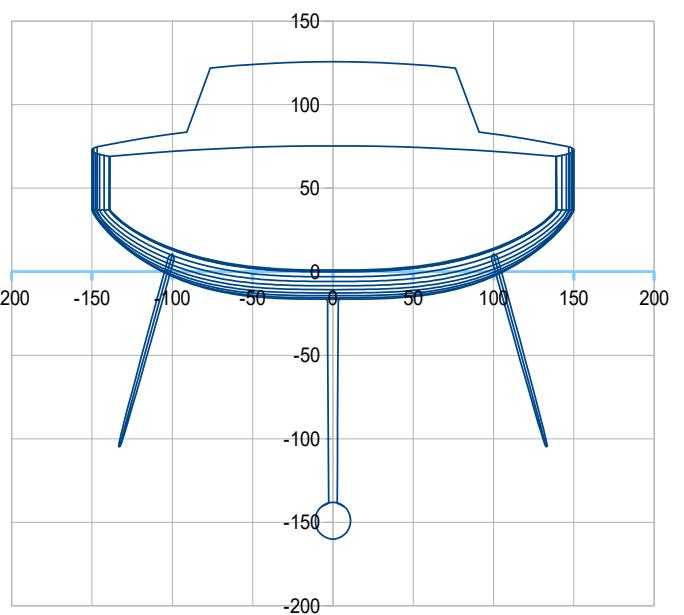
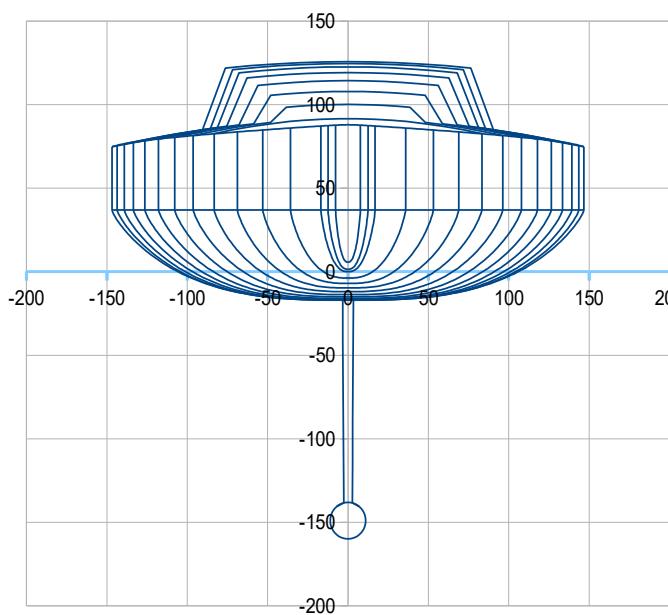
Syd 38 SA 90,4 m² (Main 50,9 m² + Jib 39,5 m²) >> SA/Sw 3,07 SA/D^(2/3) 28,99



Mini 650, with a classic bow

Loa 6,5 m ; Lwl 6,2 m ; B 3,00 m ; Draft 1,60 m ; Displacement : 1014 kg ; Ballast : 503 kg
>> LCB hull 46,80 %Lwl ; Cp hull : 0,559 ; Sw : 12,49 m² ; DLR : 119 ; Ballast ratio : 49,6 %





Mini 650 Hydrostatics data

2. Data sum-up and results of hydrostatic and surfaces calculations

2.1 Hull

Loa (m)	6,50	Lwl (m)	6,20	> Hull speed (Knots)		6,1	at Froude 0,4
>> ft	21,33		20,34				
Boa (m)	3,00	at X (% Lwl)	27,0	Bsheer (m)	3,00	at X (% Lwl)	27,0
>> ft	9,84						
Bwl (m)	2,12	at X (% Lwl)	37,0	> Bwl / Boa	0,707		
>> ft	6,96			Freeboards (m) >		Aft	
Tc (m)	0,170	at X (% Lwl)	50			0,69	Midship 0,74
>> ft	0,56					2,26	Fore 0,88
Displacement at H0 (m3)	0,92584	at LCB (m)	2,901	LCB (%Lwl)	46,80	ZCB (m)	-0,062
>> lbs	2092	w. seawater	1025	kg/m3		>> ft	-0,20
Cp	0,559						
Sf (m2)	9,36	at LCF (m)	2,714	LCF (%Lwl)	43,77	>>> LCB – LCF (%Lwl)	
>> ft2	100,78	>> ft	8,90				3,03
Angle Freeboard/Half beam		27,0	(°), at section C4 (40% Lwl)		Half entry angle (°)	22,9	at 95% Lwl
Sw (m2)	9,47	>Sw/D^(2/3)	9,97				
>> ft2	101,91						
Shull (m2)	22,30	at X (m)	2,864	Z (m)	0,143		
>> ft2	240,02	>> ft	9,40	>> ft	0,47		
Sdeck (m2)	16,08	at X (m)	2,623	Z (m)	0,81		
>> ft2	173,10	>> ft	8,60	>> ft	2,64		

2.2 Keel

Vol. keel(m3)	0,05191	at X (m)	3,073	X (%Lwl)	49,57	Z (m)	-1,178
		>> ft	10,08			>> ft	-3,86
Ballast (kg)	502,9	at X (m)	3,068	X (%Lwl)	49,48	Z (m)	-1,255
>> lbs	1109	>> ft	10,07			>> ft	-4,12
Draft oa (m)	1,60		Sw (m2)	1,80	Sxz (m2)	0,77	
>> ft	5,25		>> ft2	19,43	>> ft2	8,31	
CLR (m)	3,18	CLR (%Lwl)	51,33	CLR = Center of Lateral Resistance			
>> ft	10,44	method: keel profile extended to the waterline, CLR at Z 45% draft and				25,00	% chord

2.3 Rudder(s)

Number	2						
Volume (m3)	0,01159	at X (m)	0,09	X (%Lwl)	1,39	Z (m)	-0,38
Sw (m2)	1,21	>> ft	0,28			Sxz (m2)	0,29
>> ft2	13,08					>> ft2	3,14

per rudder

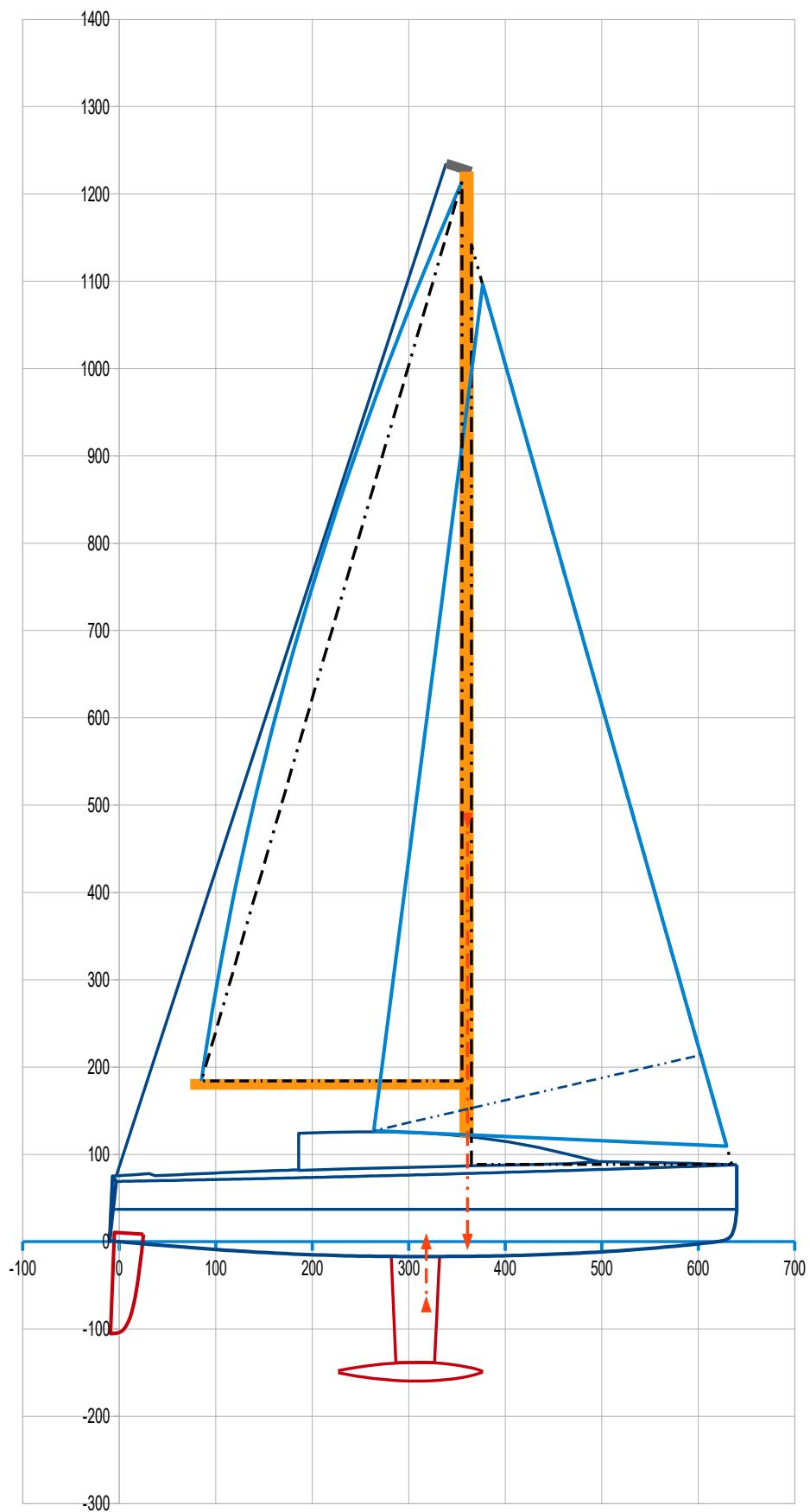
2.4 Hull + Keel + Rudder(s)

Displacement at H0 (m3)	0,98934	at LCB (m)	2,877	LCB (%Lwl)	46,41	at ZCB (m)	-0,125
(kg)	1014	>> ft	9,44			>> ft	-0,41
>> lbs	2236						
, of which Ballast (kg)	503	at Xg (m)	3,068	Xg (%Lwl)	49,48	at Zg (m)	-1,255
>> lbs	1109	>> ft	10,07			>> ft	-4,12
>> % Ballast	49,6						
Sw (m2)	12,49	>Sw/D^(2/3)	12,58	Lwl/D^(1/3)	6,22		
>> ft2	134,41			DLR	119	M(lbs/2240)/(Lwl(ft)/100)^3	

2.5 Data from the mass spreadsheet

Light boat:	M (kg)	1014	at Xg (m)	2,882	Xg (%Lwl)	46,49	at Zg (m)	-0,293
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Mini 650 SA 35,0 m² (Main 16,7 m² + Jib 18,3 m²) >> SA/Sw 2,80 SA/D^(2/3) 35,23

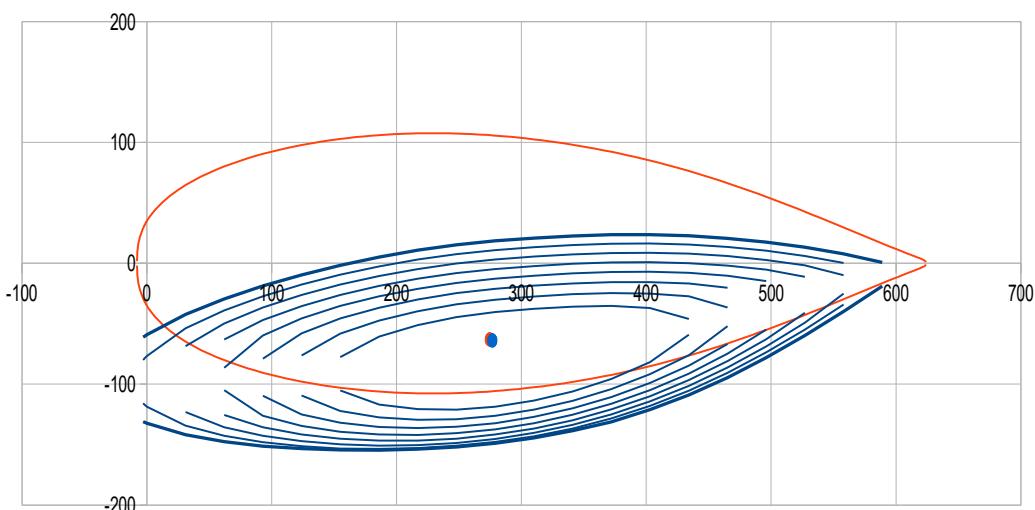
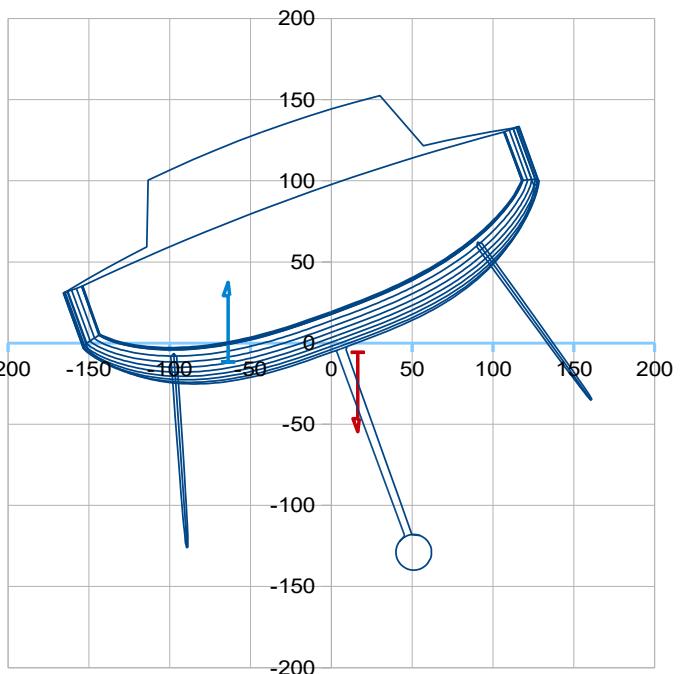
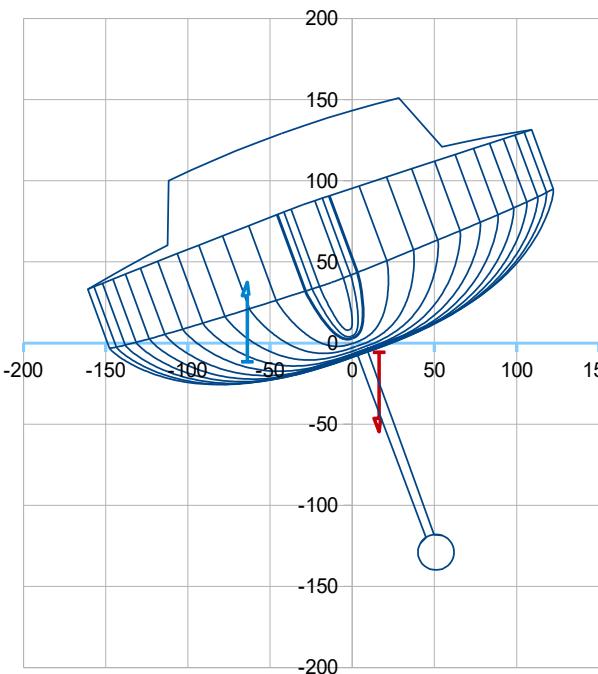


Mini 650 , with a sailor 75 kg sit windward (at Y 1,4 m) :

Data to enter : yellow cells	Mass (kg)	Xg (m)	Zg (m)	Yg (m)	(in the coordinates of the 2D
Boat light weight (kg)	1013,82	2,882	-0,293	0	from the mass spreadsheet
Load (kg)	75,00	1,20	0,85	0,00	Crew at center
			0,85	1,40	Crew sit windward
Total >> Mass (kg)	1088,82	2,767	-0,215	0,000	Crew at center
Disp. (m3)	1,06226		-0,215	0,096	Crew sit windward

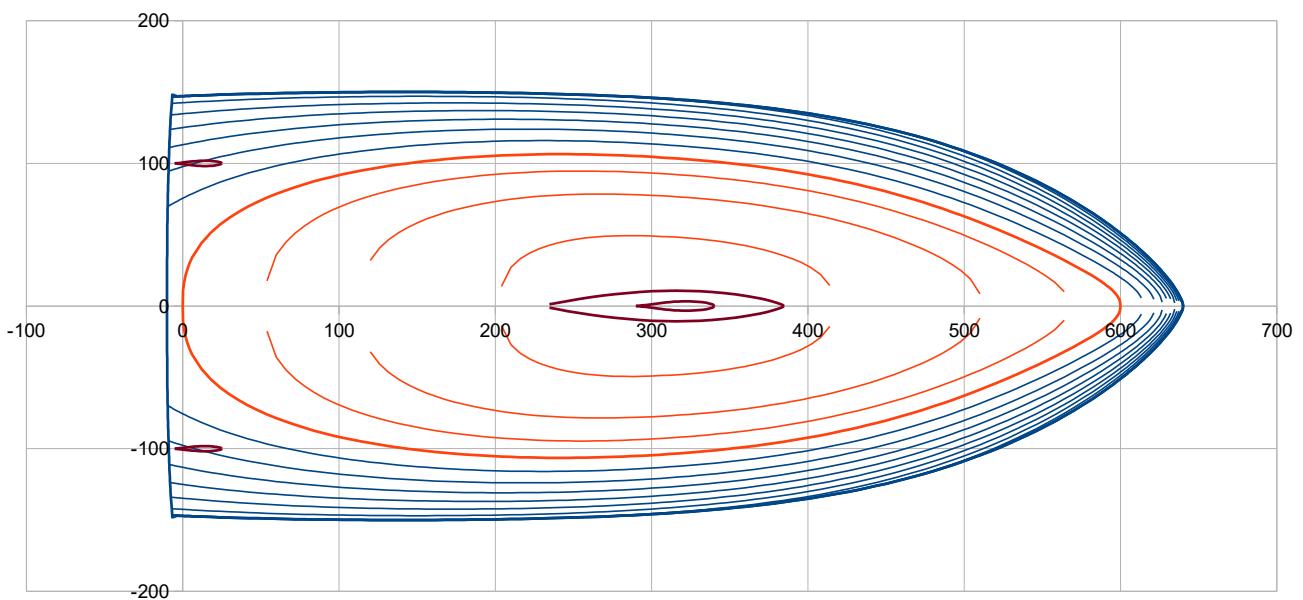
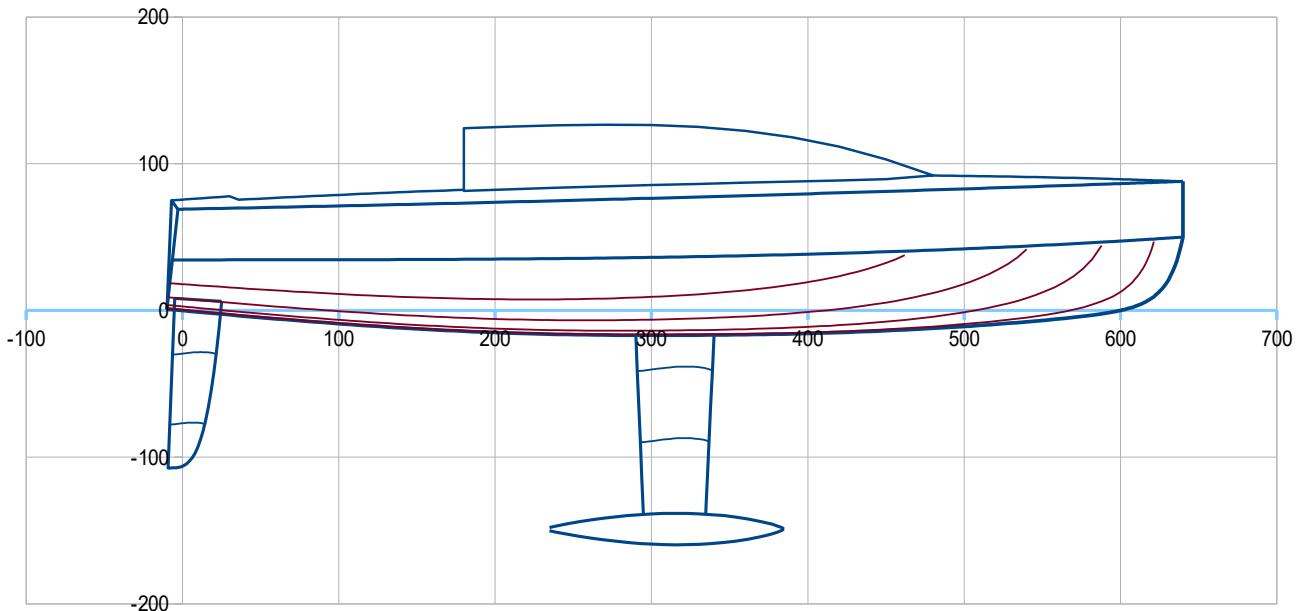
>>> at heel 20 ° : RM20° 8,57 kN.m Sw20° 11,01 m2 Bwl20° 1,68 m

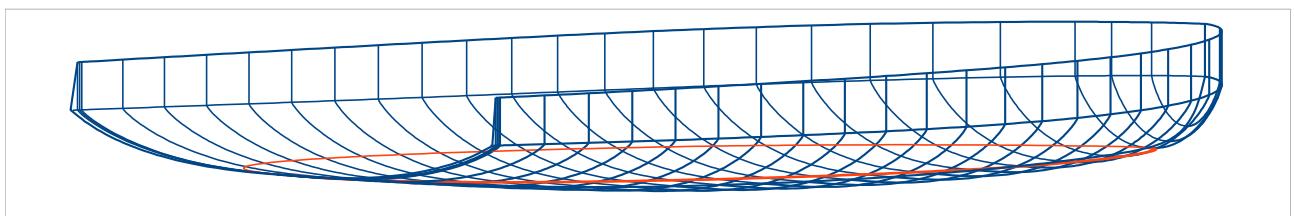
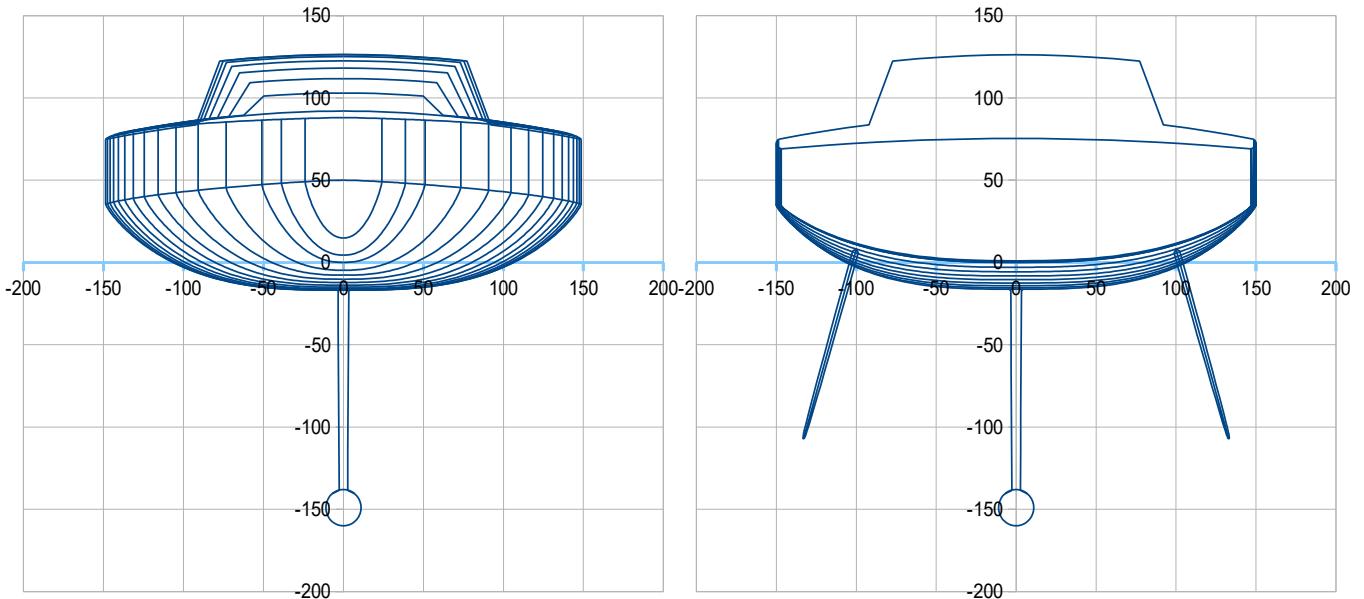
Data to enter : yellow cells	Results
Heel (°)	20
Height (cm)	10,9215
Trim (°)	-1,363
Disp. (m3)	1,06226
Xc heel (m)	2,767
Yc heel (m)	-0,639
Zc heel (m)	-0,116
Sw heel(m2)	11,01
Bwl heel (m)	1,68
LCB – LCF (%Lwl)	0,32
/ Disp. (m3)	1,06226
/ Xg (m)	2,767
Yg heel (m)	0,164
> GZ (m)	0,803
RM (kN.m)	8,572
FB mini (cm)	30,9
Obliquity (°)	8,3



Mini 650, with a mid-scow bow

Loa 6,50 m ; Lwl 6,00 m ; B 3,00 m ; Draft 1,60 m ; Displacement : 1039 kg ; Ballast : 503 kg
=> LCB hull 48,64 %Lwl ; Cp hull : 0,592 ; Sw : 12,92 m² ; DLR : 134 ; Ballast ratio : 48,4 %





Mini 650 with a mid-scow bow - Hydrostatics data

2. Data sum-up and results of hydrostatic and surfaces calculations

2.1 Hull

Loa (m)	6,50	Lwl (m)	6,00	> Hull speed (Knots)		6,0	at Froude 0,4
>> ft	21,33		19,69				
Boa (m)	3,00	at X (% Lwl)	23,0	Bsheer (m)	3,00	at X (% Lwl)	23,0
>> ft	9,84						
Bwl (m)	2,13	at X (% Lwl)	40,0	> Bwl / Boa	0,709		
>> ft	6,98			Freeboards (m) >		Aft	
Tc (m)	0,168	at X (% Lwl)	50			0,69	0,74
>> ft	0,55					2,26	2,43
Displacement at H0 (m3)	0,94969	at LCB (m)	2,919	LCB (%Lwl)	48,64	ZCB (m)	-0,061
>> lbs	2146	w. seawater	1025	kg/m3		>> ft	-0,20
Cp	0,592						
Sf (m2)	9,84	at LCF (m)	2,770	LCF (%Lwl)	46,16	>>> LCB – LCF (%Lwl)	
>> ft2	105,94	>> ft	9,09				2,48
Angle Freeboard/Half beam		26,7	(°), at section C4 (40% Lwl)		Half entry angle (°)	30,4	at 95% Lwl
Sw (m2)	9,90	>Sw/D^(2/3)	10,24				
>> ft2	106,52						
Shull (m2)	23,27	at X (m)	2,904	Z (m)	0,138		
>> ft2	250,45	>> ft	9,53	>> ft	0,45		
Sdeck (m2)	17,51	at X (m)	2,768	Z (m)	0,81		
>> ft2	188,50	>> ft	9,08	>> ft	2,64		

2.2 Keel

Vol. keel(m3)	0,05194	at X (m)	3,153	X (%Lwl)	52,56	Z (m)	-1,177
		>> ft	10,35			>> ft	-3,86
Ballast (kg)	503,1	at X (m)	3,148	X (%Lwl)	52,47	Z (m)	-1,254
>> lbs	1109	>> ft	10,33			>> ft	-4,11
Draft oa (m)	1,60		Sw (m2)	1,81	Sxz (m2)	0,77	
>> ft	5,25		>> ft2	19,45	>> ft2	8,33	
CLR (m)	3,26	CLR (%Lwl)	54,37	CLR = Center of Lateral Resistance			
>> ft	10,70	method: keel profile extended to the waterline, CLR at Z 45% draft and				25,00	% chord

2.3 Rudder(s)

Number	2						
Volume (m3)	0,01159	at X (m)	0,09	X (%Lwl)	1,43	Z (m)	-0,40
Sw (m2)	1,21	>> ft	0,28			Sxz (m2)	0,29
>> ft2	13,08					>> ft2	3,14

2.4 Hull + Keel + Rudder(s)

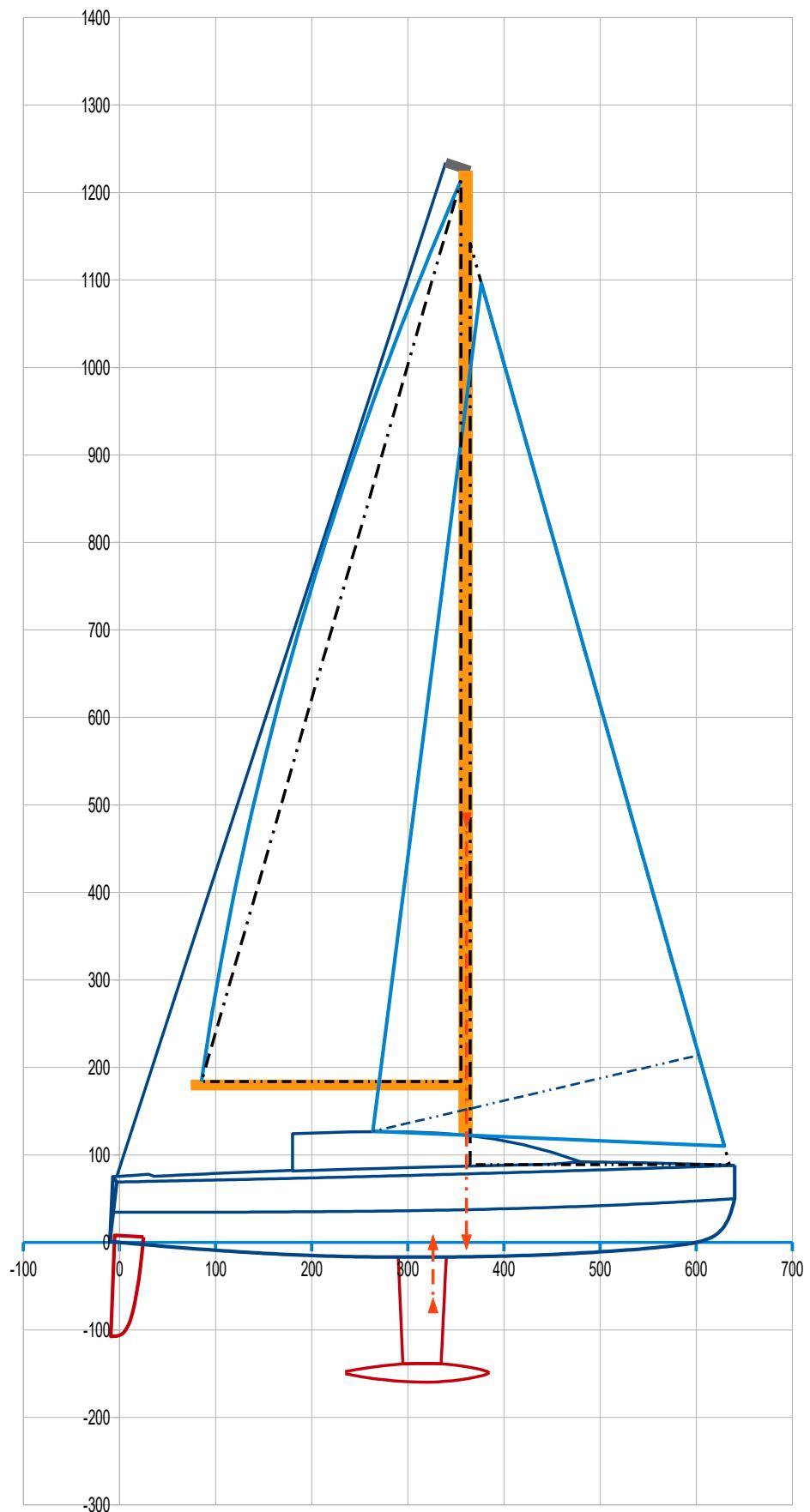
Displacement at H0 (m3)	1,01322	at LCB (m)	2,898	LCB (%Lwl)	48,30	at ZCB (m)	-0,122
(kg)	1039	>> ft	9,51			>> ft	-0,40
>> lbs	2290						
, of which Ballast (kg)	503	at Xg (m)	3,148	Xg (%Lwl)	52,47	at Zg (m)	-1,254
>> lbs	1109	>> ft	10,33			>> ft	-4,11
>> % Ballast	48,4						
Sw (m2)	12,92	>Sw/D^(2/3)	12,81	Lwl/D^(1/3)	5,97		
>> ft2	139,05			DLR	134	M(lbs/2240)/(Lwl(ft)/100)^3	

2.5 Data from the mass spreadsheet

Light boat:	M (kg)	1039	at Xg (m)	2,939	Xg (%Lwl)	48,99	at Zg (m)	-0,274
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Mini 650 with a mid-scow bow

SA 35,0 m² (Main 16,7 m² + Jib 18,3 m²) >> SA/Sw 2,71 SA/D^(2/3) 34,67

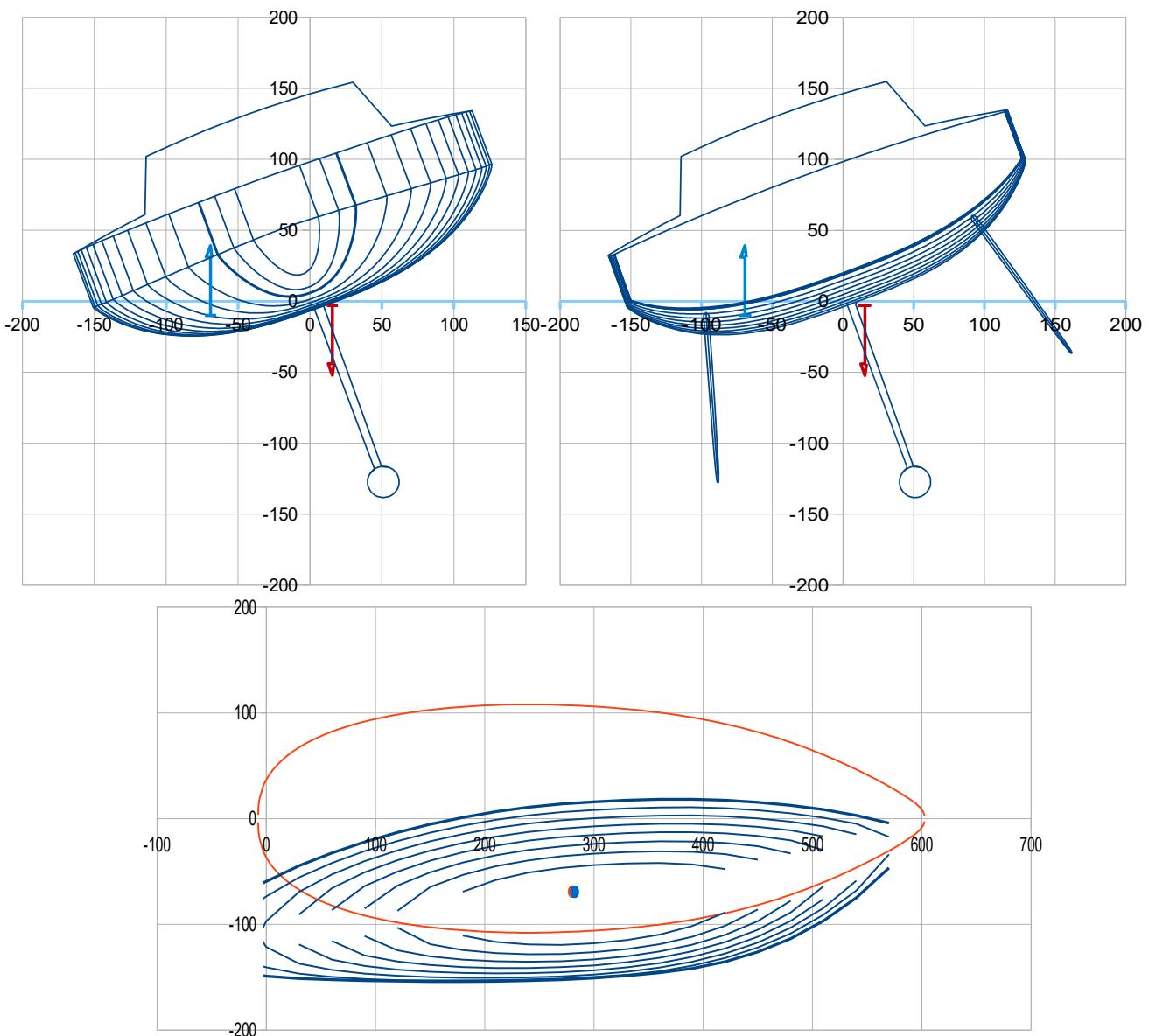


Mini 650 with a mid-scow bow, with a sailor 75 kg sit windward (at Y 1,4 m) :

Data to enter : yellow cells	Mass (kg)	Xg (m)	Zg (m)	Yg (m)	(in the coordinates of the 2D
Boat light weight (kg)	1038,68	2,939	-0,274	0	from the mass spreadsheet
Load (kg)	75,00	1,20	0,85	0,00	Crew at center
			0,85	1,40	Crew sit windward
Total >> Mass (kg)	1113,68	2,822	-0,198	0,000	Crew at center
Disp. (m3)	1,08652		-0,198	0,094	Crew sit windward

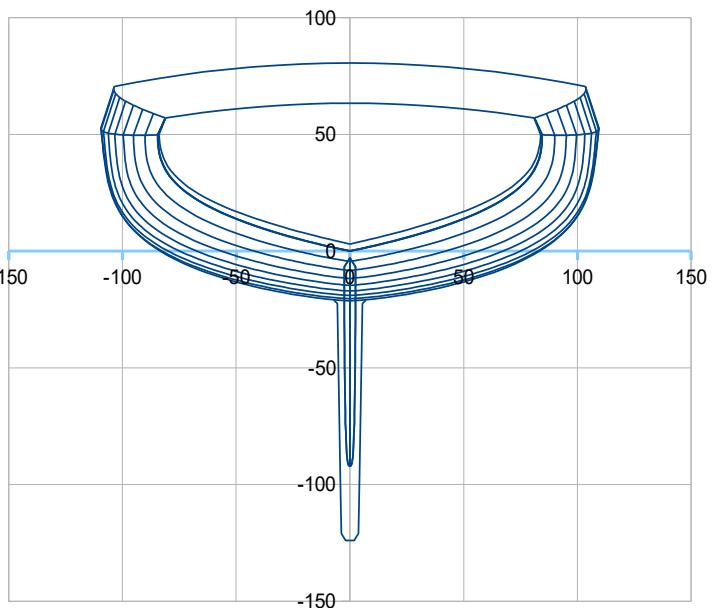
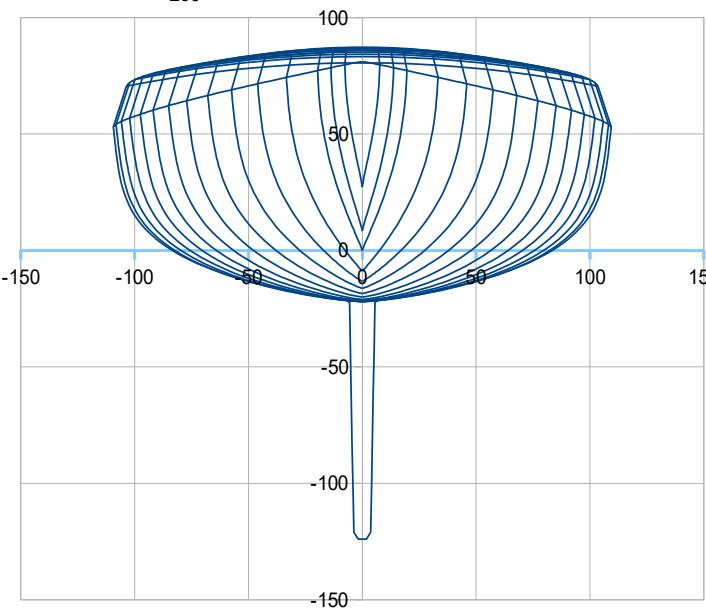
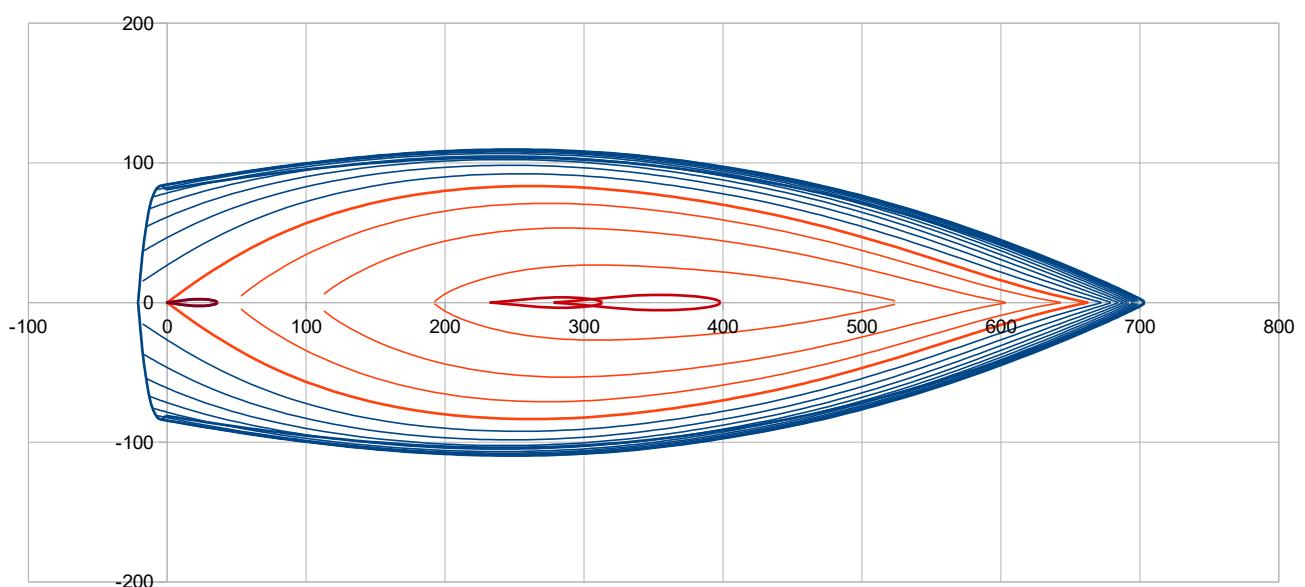
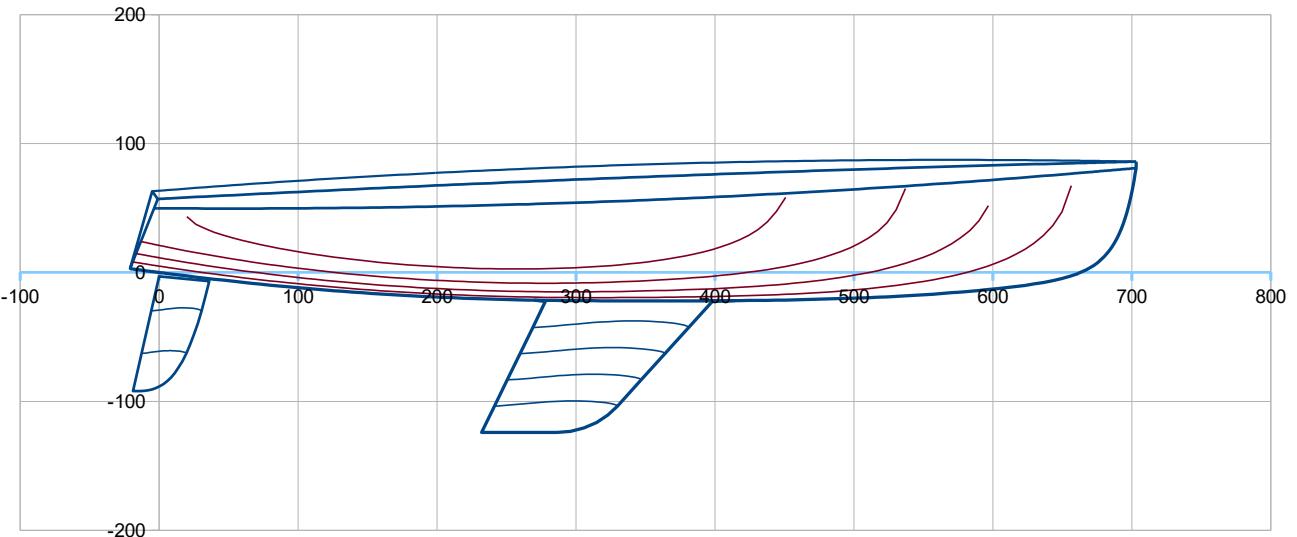
>>> at heel 20° : RM20° 9,27 kN.m (+8,2%) Sw20° 11,26 m2 (+2,3%) Bwl20° 1,67 m

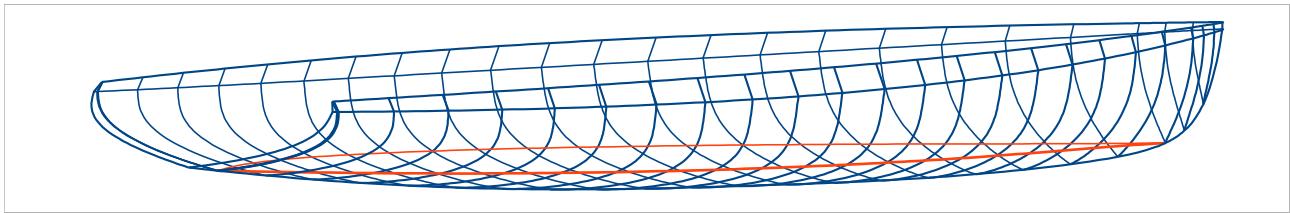
Data to enter : yellow cells	Results
Heel (°)	20
Height (cm)	12,3485
Trim (°)	-1,200
Disp. (m3)	1,08652
Xc heel (m)	2,822
Yc heel (m)	-0,692
Zc heel (m)	-0,101
Sw heel(m2)	11,26
Bwl heel (m)	1,67
LCB – LCF (%Lwl)	0,34
/ Disp. (m3)	1,08652
/ Xg (m)	2,822
Yg heel (m)	0,156
> GZ (m)	0,849
RM (kN.m)	9,273
FB mini (cm)	32,0
Obliquity (°)	6,7



MO24, inspired by the Moore 24

Loa 7,24 m ; Lwl 6,63 m ; B 2,19 m ; Draft 1,24 m ; Displacement : 930 kg ; Ballast : 454 kg
>> LCB hull 47,59 %Lwl ; Cp hull : 0,540 ; Sw : 10,22 m² ; DLR : 89 ; Ballast ratio : 48,9 %





MO24 Hydrostatics data

2. Data sum-up and results of hydrostatic and surfaces calculations

2.1 Hull

Loa (m)	7,24	Lwl (m)	6,63	> Hull speed (Knots)	6,3	at Froude 0,4	
>> ft	23,75		21,75				
Boa (m)	2,19	at X (% Lwl)	37,0	Bsheer (m)	2,08	at X (% Lwl)	
>> ft	7,19					37,0	
Bwl (m)	1,67	at X (% Lwl)	40,0	> Bwl / Boa	0,762		
>> ft	5,47						
Tc (m)	0,220	at X (% Lwl)	52	Freeboards (m) >	Aft	Midship	Fore
>> ft	0,72				0,57	0,69	0,86
Displacement at H0 (m3)	0,83727	at LCB (m)	3,155	LCB (%Lwl)	47,59	ZCB (m)	-0,075
>> lbs	1892	w. seawater	1025	kg/m3		>> ft	-0,25
Cp	0,540						
Sf (m2)	7,15	at LCF (m)	2,991	LCF (%Lwl)	45,11	>>> LCB – LCF (%Lwl)	2,48
>> ft2	76,96	>> ft	9,81				
Angle Freeboard/Half beam	32,8	(°), at section C4 (40% Lwl)		Half entry angle (°)	14,6	at 95% Lwl	
Sw (m2)	7,54	>Sw/D^(2/3)	8,49				
>> ft2	81,20						
Shull (m2)	19,76	at X (m)	3,240	Z (m)	0,157		
>> ft2	212,70	>> ft	10,63	>> ft	0,52		
Sdeck (m2)	11,10	at X (m)	2,933	Z (m)	0,74		
>> ft2	119,50	>> ft	9,62	>> ft	2,41		

2.2 Keel

Vol. keel(m3)	0,06224	at X (m)	3,182	X (%Lwl)	47,99	Z (m)	-0,659
		>> ft	10,44			>> ft	-2,16
Ballast (kg)	454,3	at X (m)	3,182	X (%Lwl)	47,99	Z (m)	-0,659
>> lbs	1002	>> ft	10,44			>> ft	-2,16
Draft oa (m)	1,24	Sw (m2)	2,10			Sxz (m2)	1,03
>> ft	4,07	>> ft2	22,57			>> ft2	11,06
CLR (m)	3,35	CLR (%Lwl)	50,56	CLR = Center of Lateral Resistance			
>> ft	11,00	method: keel profile extended to the waterline, CLR at Z 45% draft and			32,50	% chord	

2.3 Rudder(s)

Number	1						
Volume (m3)	0,00764	at X (m)	0,12	X (%Lwl)	1,74	Z (m)	-0,42
Sw (m2)	0,58	>> ft	0,38			Sxz (m2)	0,28
>> ft2	6,28					>> ft2	3,02

per rudder

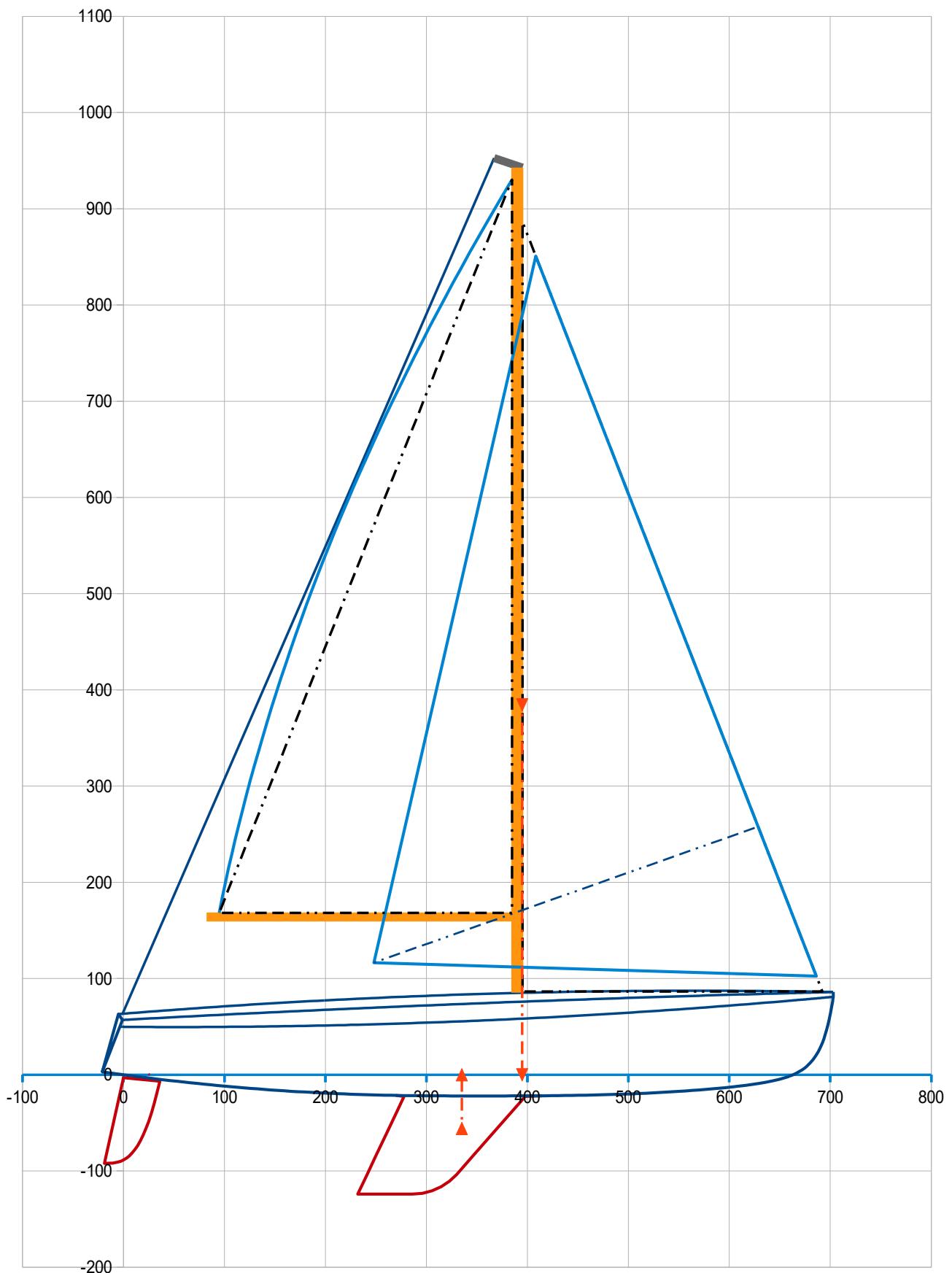
2.4 Hull + Keel + Rudder(s)

Displacement at H0 (m3)	0,90715	at LCB (m)	3,131	LCB (%Lwl)	47,23	at ZCB (m)	-0,118
(kg)	930	>> ft	10,27			>> ft	-0,39
>> lbs	2050						
, of which Ballast (kg)	454	at Xg (m)	3,182	Xg (%Lwl)	47,99	at Zg (m)	-0,659
>> lbs	1002	>> ft	10,44			>> ft	-2,16
>> % Ballast	48,9						
Sw (m2)	10,22	>Sw/D^(2/3)	10,91	Lwl/D^(1/3)	6,85		
>> ft2	110,05			DLR	89	M(lbs/2240)/(Lwl(ft)/100)^3	

2.5 Data from the mass spreadsheet

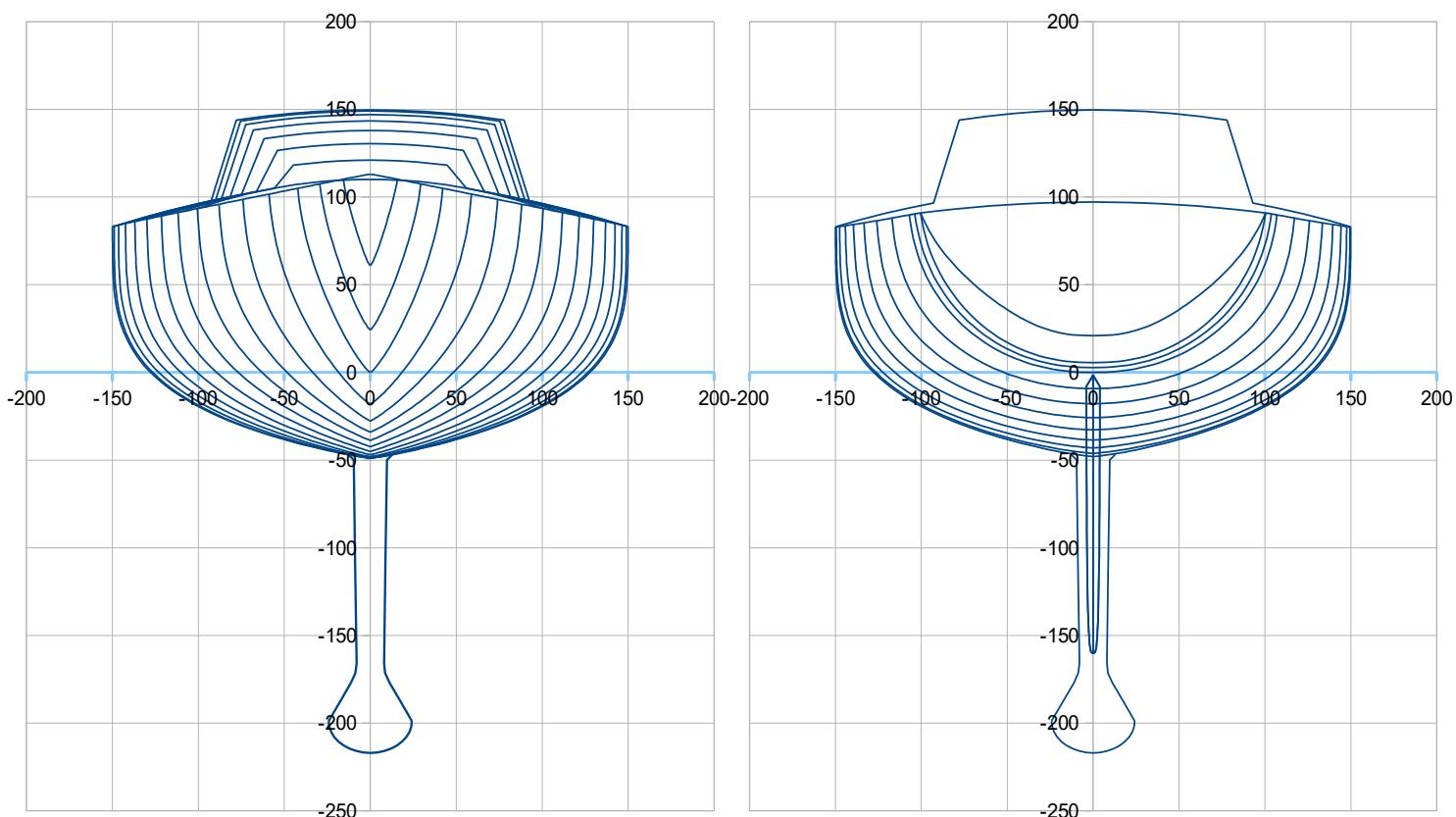
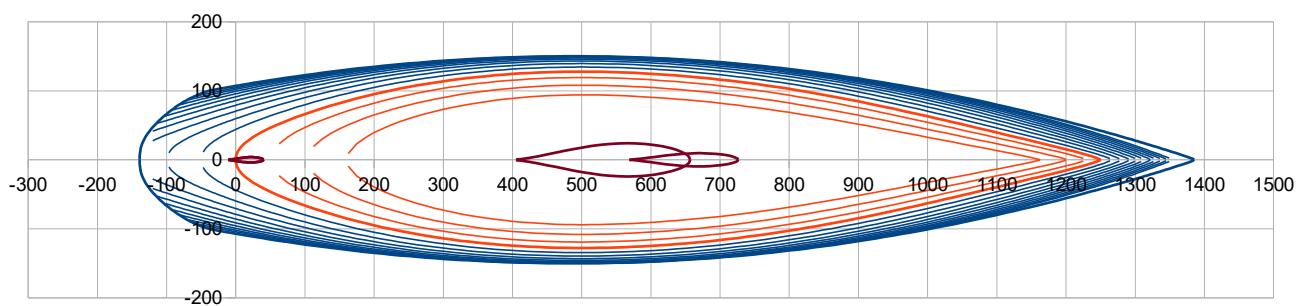
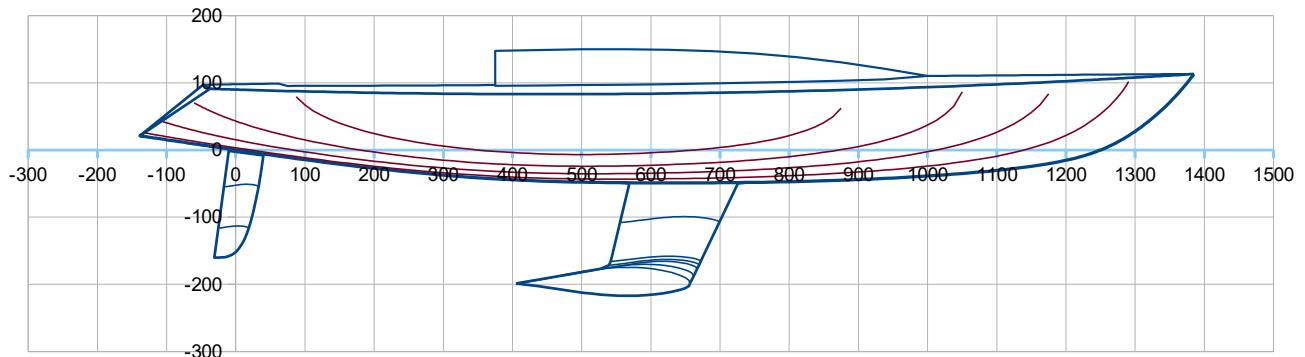
Light boat:	M (kg)	930	at Xg (m)	3,148	Xg (%Lwl)	47,48	at Zg (m)	-0,024
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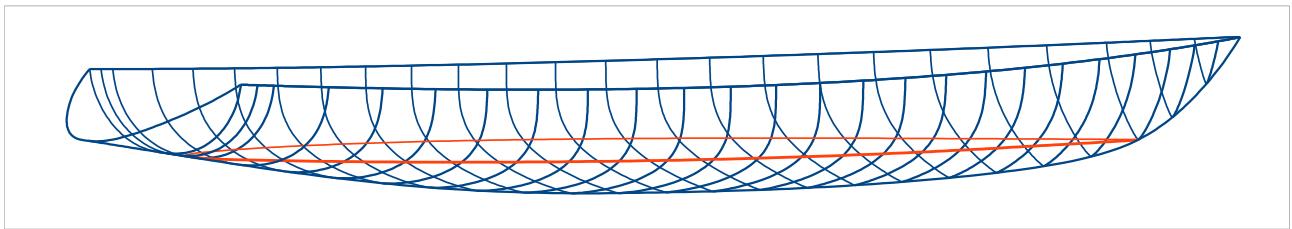
MO24 : SA 30,0 m² (Main 13,3 m² + Jib 16,7 m²) >> SA/Sw 2,93 SA/D^(2/3) 31,97



ULDB 50, inspired by Knud Reimers Swede 55

Loa 15,24 m ; Lwl 12,50 m ; B 3,00 m ; Draft 2,17 m ; Displacement : 6072kg ; Ballast : 1908 kg
>> LCB hull 46,64 %Lwl ; Cp hull : 0,552 ; Sw : 32,24 m² ; DLR : 87 ; Ballast ratio : 47,9 %





ULDB 50 Hydrostatics data

2. Data sum-up and results of hydrostatic and surfaces calculations

2.1 Hull

Loa (m)	15,24	Lwl (m)	12,50	> Hull speed (Knots)	8,6	at Froude 0,4
>> ft	50,00		41,01			
Boa (m)	3,00	at X (% Lwl)	39,0	Bsheer (m)	3,00	at X (% Lwl)
>> ft	9,84					39,0
Bwl (m)	2,56	at X (% Lwl)	40,0	> Bwl / Boa	0,852	
>> ft	8,38			Freeboards (m) >		
Tc (m)	0,490	at X (% Lwl)	51,5	Aft	0,91	Midship
>> ft	1,61			Freeboards (m) >	2,99	Fore
Displacement at H0 (m3)	5,49478	at LCB (m)	5,830	LCB (%Lwl)	46,64	ZCB (m)
>> lbs	12417	w. seawater	1025	kg/m3		>> ft
Cp	0,552					-0,163
Sf (m2)	21,71	at LCF (m)	5,630	LCF (%Lwl)	45,04	>>> LCB – LCF (%Lwl)
>> ft2	233,69	>> ft	18,47			1,61
Angle Freeboard/Half beam	29,0	(°), at section C4 (40% Lwl)		Half entry angle (°)	13,9	at 95% Lwl
Sw (m2)	23,70	>Sw/D^(2/3)	7,61			
>> ft2	255,12					
Shull (m2)	52,88	at X (m)	5,909	Z (m)	0,106	
>> ft2	569,19	>> ft	19,39	>> ft	0,35	
Sdeck (m2)	35,59	at X (m)	5,717	Z (m)	0,99	
>> ft2	383,07	>> ft	18,76	>> ft	3,23	

2.2 Keel

Vol. keel(m3)	0,39834	at X (m)	6,042	X (%Lwl)	48,34	Z (m)	-1,511
		>> ft	19,82			>> ft	-4,96
Ballast (kg)	2907,9	at X (m)	6,042	X (%Lwl)	48,34	Z (m)	-1,511
>> lbs	6411	>> ft	19,82			>> ft	-4,96
Draft oa (m)	2,17		Sw (m2)	7,08		Sxz (m2)	2,29
>> ft	7,12		>> ft2	76,21		>> ft2	24,66
CLR (m)	6,67	CLR (%Lwl)	53,38	CLR = Center of Lateral Resistance			
>> ft	21,89	method: keel profile extended to the waterline, CLR at Z 45% draft and			25,00	% chord	

2.3 Rudder(s)

Number	1						
Volume (m3)	0,03102	at X (m)	0,08	X (%Lwl)	0,65	Z (m)	-0,72
Sw (m2)	1,46	>> ft	0,27			Sxz (m2)	0,70
>> ft2	15,72					>> ft2	7,56

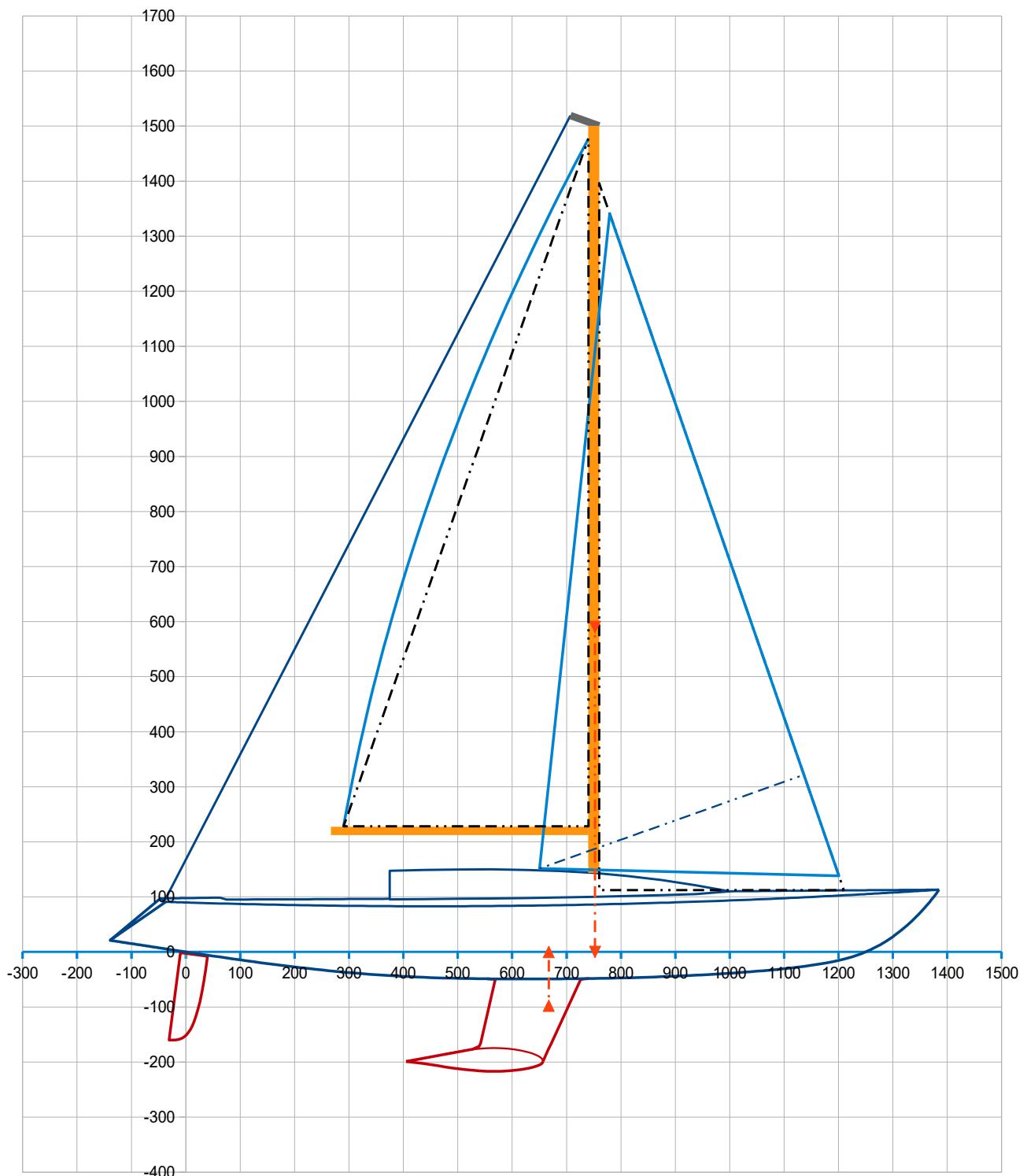
2.4 Hull + Keel + Rudder(s)

Displacement at H0 (m3)	5,92413	at LCB (m)	5,814	LCB (%Lwl)	46,52	at ZCB (m)	-0,256
(kg)	6072	>> ft	19,08			>> ft	-0,84
>> lbs	13387						
, of which Ballast (kg)	2908	at Xg (m)	6,042	Xg (%Lwl)	48,34	at Zg (m)	-1,511
>> lbs	6411	>> ft	19,82			>> ft	-4,96
>> % Ballast	47,9						
Sw (m2)	32,24	>Sw/D^(2/3)	9,85	Lwl/D^(1/3)	6,91		
>> ft2	347,05			DLR	87	M(lbs/2240)/(Lwl(ft)/100)^3	

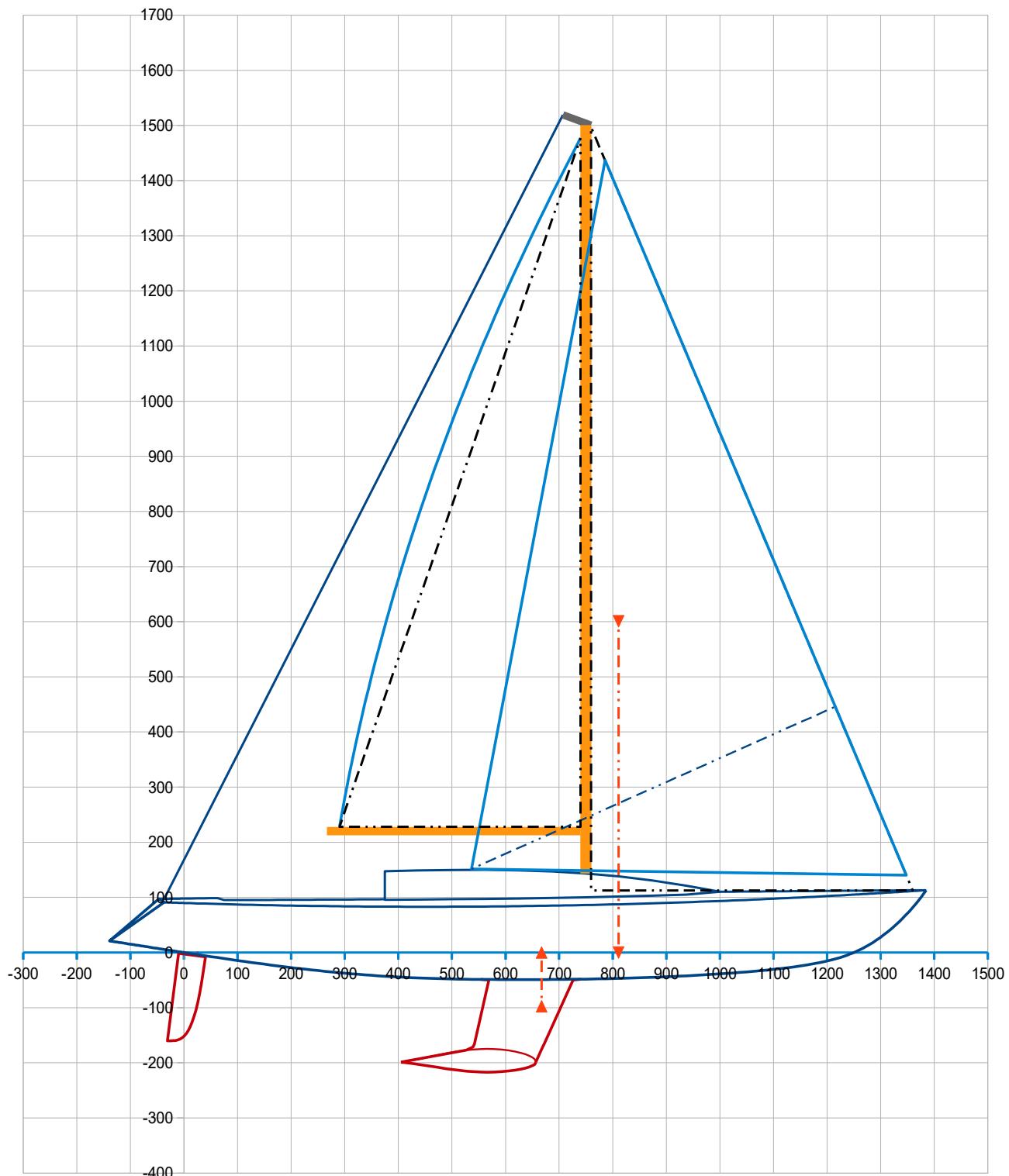
2.5 Data from the mass spreadsheet

Light boat:	M (kg)	6072	at Xg (m)	5,887	Xg (%Lwl)	47,10	at Zg (m)	-0,400
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ULDB 50 SA with Jib 67,2 m² (Main 33,7 m² + Jib 33,5 m²) >> SA/Sw 2,08 SA/D^(2/3) 20,53

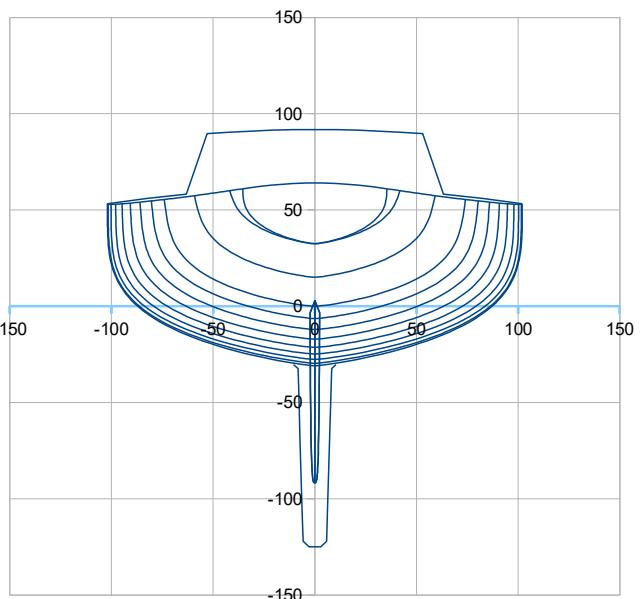
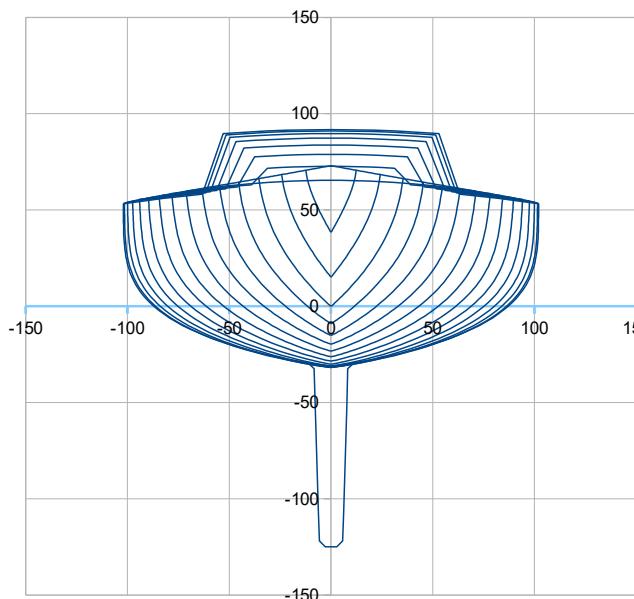
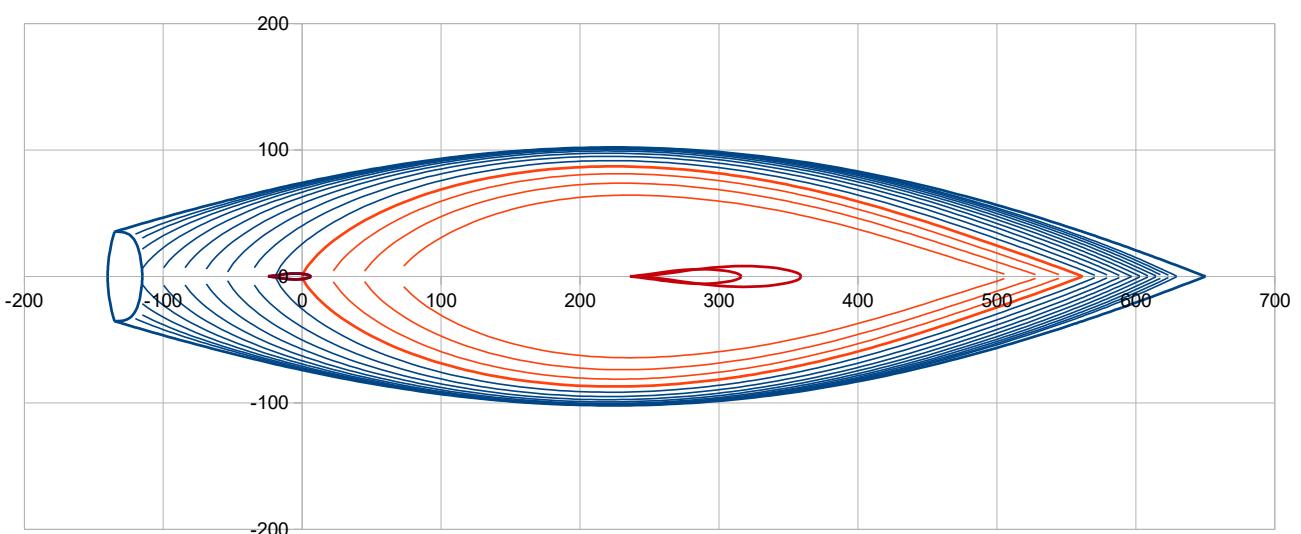
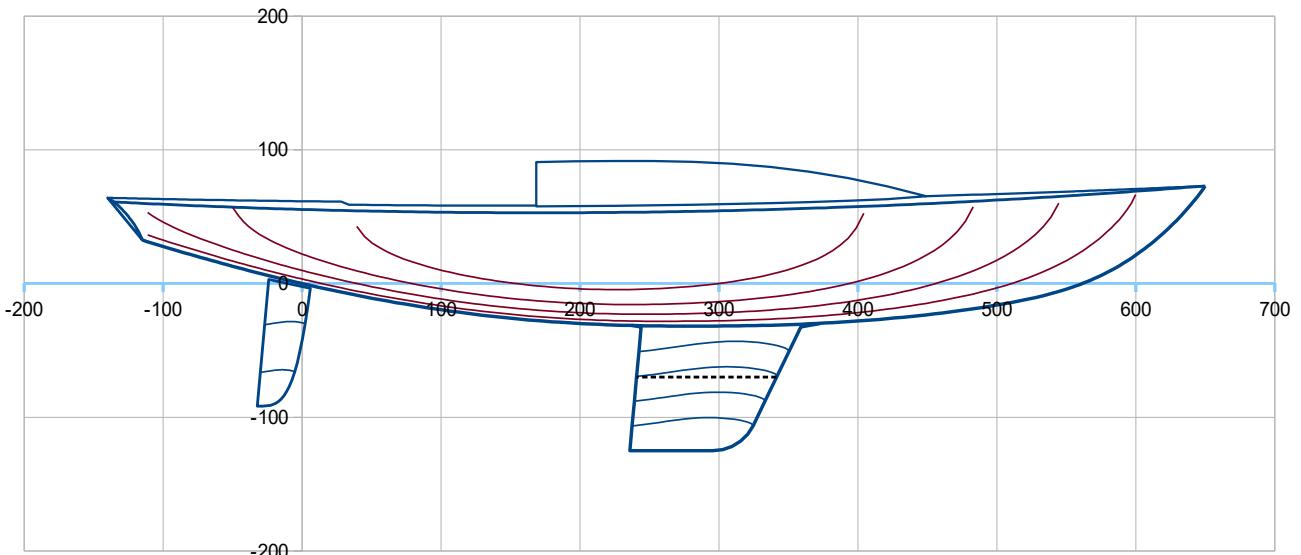


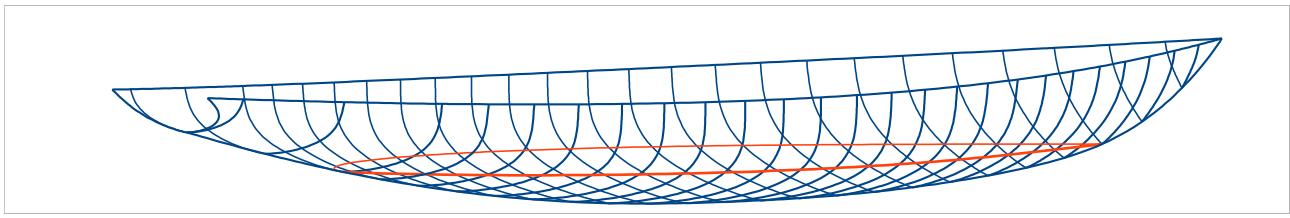
ULDB 50 SA with Code 0 87,1 m² (Main 33,7 m² + Code 0 53,4 m²) >> SA/Sw 2,70 SA/D^(2/3)
26,62



DH17 inspired by Dark Harbour 17,5 / B.B. Crowninshield

Loa 7,90 m ; Lwl 5,62 m ; B 2,04 m ; Draft 1,25 m ; Displacement : 1192kg ; Ballast : 479 kg
>> LCB hull 46,72 %Lwl ; Cp hull : 0,545 ; Sw : 9,55 m² ; DLR : 188 ; Ballast ratio : 40,2 %





DH17 Hydrostatics data

2. Data sum-up and results of hydrostatic and surfaces calculations

2.1 Hull

Loa (m)	7,90	Lwl (m)	5,62	> Hull speed (Knots)	5,8	at Froude 0,4
>> ft	25,92		18,42			
Boa (m)	2,04	at X (% Lwl)	40,0	Bsheer (m)	2,04	at X (% Lwl)
>> ft	6,69					40,0
Bwl (m)	1,74	at X (% Lwl)	40,0	> Bwl / Boa	0,854	
>> ft	5,71			Freeboards (m) >		
Tc (m)	0,318	at X (% Lwl)	50	Aft	0,60	Midship
>> ft	1,04			Freeboards (m) >	1,97	Fore
Displacement at H0 (m3)	1,07332	at LCB (m)	2,623	LCB (%Lwl)	46,72	ZCB (m)
>> lbs	2425	w. seawater	1025	kg/m3	>> ft	-0,105
Cp	0,545					
Sf (m2)	6,62	at LCF (m)	2,535	LCF (%Lwl)	45,15	>>> LCB – LCF (%Lwl)
>> ft2	71,29	>> ft	8,32			1,56
Angle Freeboard/Half beam	27,5	(°), at section C4 (40% Lwl)		Half entry angle (°)	21,4	at 95% Lwl
Sw (m2)	7,15	>Sw/D^(2/3)	6,82			
>> ft2	76,97					
Shull (m2)	17,16	at X (m)	2,449	Z (m)	0,074	
>> ft2	184,66	>> ft	8,03	>> ft	0,24	
Sdeck (m2)	12,12	at X (m)	2,339	Z (m)	0,62	
>> ft2	130,43	>> ft	7,67	>> ft	2,04	

2.2 Keel

Vol. keel(m3)	0,08340	at X (m)	2,984	X (%Lwl)	53,14	Z (m)	-0,724
		>> ft	9,79			>> ft	-2,38
Ballast (kg)	479,1	at X (m)	2,926	X (%Lwl)	52,10	Z (m)	-0,912
>> lbs	1056	>> ft	9,60			>> ft	-2,99
Draft oa (m)	1,25		Sw (m2)	1,90		Sxz (m2)	0,94
>> ft	4,10		>> ft2	20,48		>> ft2	10,07
CLR (m)	3,21	CLR (%Lwl)	57,24	CLR = Center of Lateral Resistance			
>> ft	10,54			method: keel profile extended to the waterline, CLR at Z 45% draft and	25,00	% chord	

2.3 Rudder(s)

Number	1						
Volume (m3)	0,00599	at X (m)	-0,12	X (%Lwl)	-2,10	Z (m)	-0,39
Sw (m2)	0,50	>> ft	-0,39			Sxz (m2)	0,24
>> ft2	5,33					>> ft2	2,56

per rudder

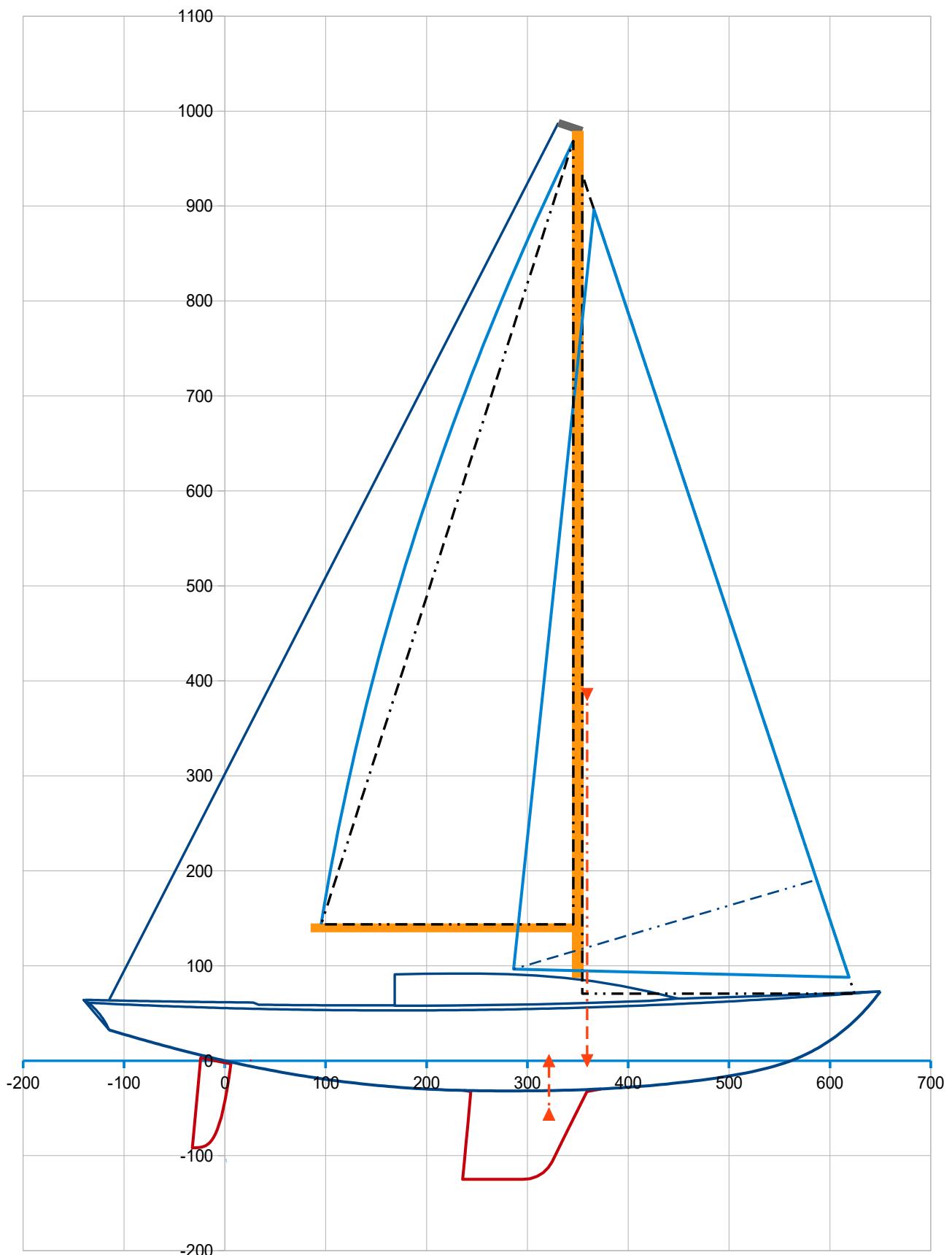
2.4 Hull + Keel + Rudder(s)

Displacement at H0 (m3)	1,16271	at LCB (m)	2,635	LCB (%Lwl)	46,93	at ZCB (m)	-0,151
(kg)	1192	>> ft	8,64			>> ft	-0,49
>> lbs	2627						
, of which Ballast (kg)	479	at Xg (m)	2,926	Xg (%Lwl)	52,10	at Zg (m)	-0,912
>> lbs	1056	>> ft	9,60			>> ft	-2,99
>> % Ballast	40,2						
Sw (m2)	9,55	>Sw/D^(2/3)	8,64	Lwl/D^(1/3)	5,34		
>> ft2	102,78			DLR	188	M(lbs/2240)/(Lwl(ft)/100)^3	

2.5 Data from the mass spreadsheet

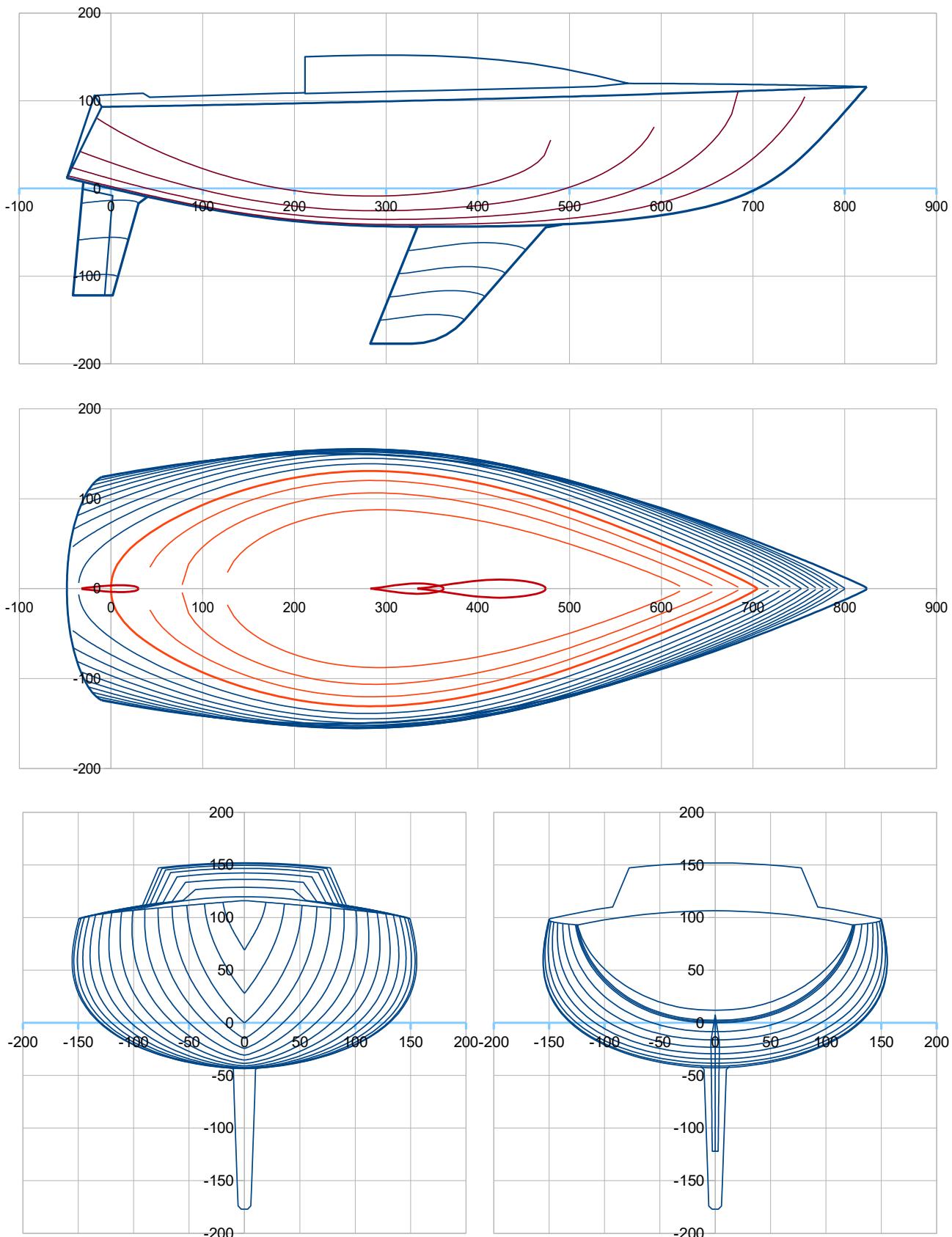
Light boat:	M (kg)	1192	at Xg (m)	2,640	Xg (%Lwl)	47,02	at Zg (m)	-0,120
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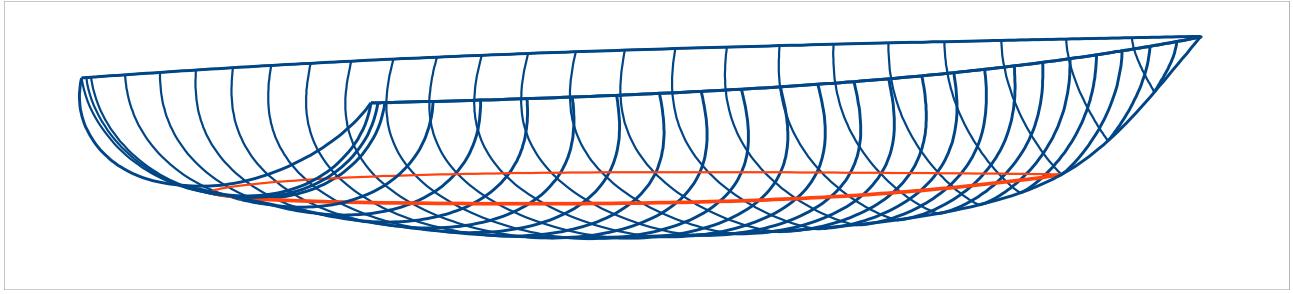
DH17 SA 26,0 m² (Main 12,4 m² + Jib 13,6 m²) >> SA/Sw 2,72 SA/D^(2/3) 23,50



AL29 inspired by Aloa 29 / J.M. Finot

Loa 8,72 m ; Lwl 7,05 m ; B 3,11 m ; Draft 1,77 m ; Displacement : 3339kg ; Ballast : 1124 kg
>> LCB hull 46,87 %Lwl ; Cp hull : 0,556 ; Sw : 17,91 m² ; DLR : 266 ; Ballast ratio : 33,8 %





AL29 Hydrostatics data

2. Data sum-up and results of hydrostatic and surfaces calculations

2.1 Hull

Loa (m)	8,72	Lwl (m)	7,05	> Hull speed (Knots)	6,5	at Froude 0,4
>> ft	28,61		23,13			
Boa (m)	3,11	at X (% Lwl)	34,0	Bsheer (m)	3,01	at X (% Lwl)
>> ft	10,20					34,0
Bwl (m)	2,62	at X (% Lwl)	40,0	> Bwl / Boa	0,841	
>> ft	8,58					
Tc (m)	0,436	at X (% Lwl)	50	Freeboards (m) >	Aft	Midship
>> ft	1,43				0,93	0,98
Displacement at H0 (m3)	3,07501	at LCB (m)	3,304	LCB (%Lwl)	46,87	Fore
>> lbs	6949	w. seawater	1025	kg/m3	ZCB (m)	-0,155
Cp	0,556				>> ft	-0,51
Sf (m2)	12,58	at LCF (m)	3,161	LCF (%Lwl)	44,83	>>> LCB – LCF (%Lwl)
>> ft2	135,45	>> ft	10,37			2,03

Angle Freeboard/Half beam 33,5 (°), at section C4 (40% Lwl) Half entry angle (°) 25,4 at 95% Lwl

Sw (m2) 13,56

>> ft2 145,95

Shull (m2) 32,16

>> ft2 346,19

Sdeck (m2) 20,00

>> ft2 215,28

AL29 SA 46,0 m² (Main 16,7 m² + Genoa 29,3 m²) >> SA/Sw 2,57 SA/D^(2/3) 20,95

