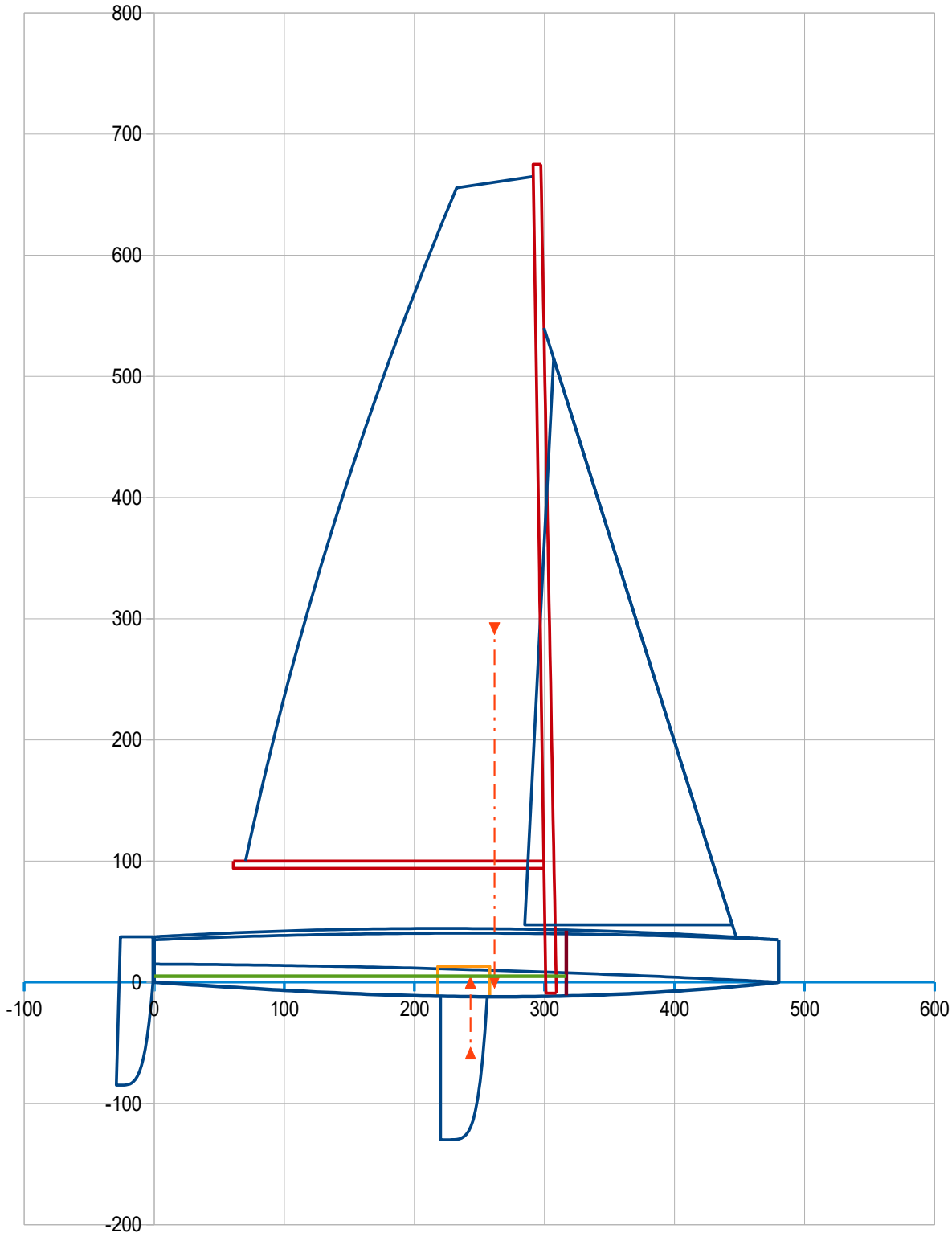
TS19 Dinghy – V5 L 4,80 m x B 1,68 m

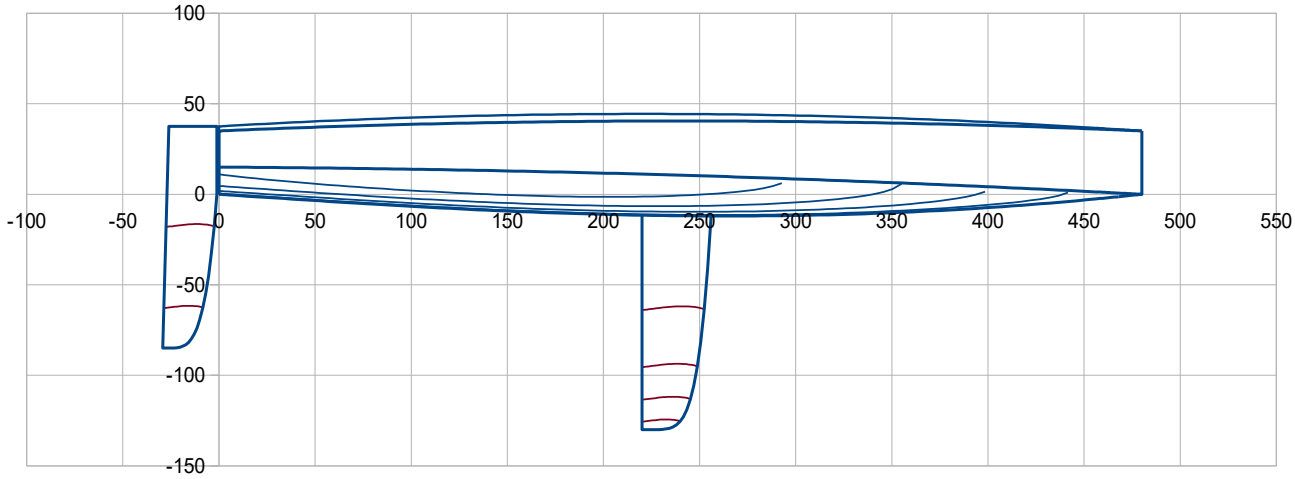
V5 : L is reduced to 4,80 m, width chine is still 1,60 m + slightly flared topsides leads to a width at deck level of 1,68 m. Dinghy weight (inc. all equipment, rig and sails) is assumed at 125 kg , to be confirmed through an initial study of the structure, the materials and the scantlings.

Loa 4,80 m **Boa 1,68 m** Bwl 1,107 m Hull body draft Tc 0,120 m (at 55 % Lwl from transom)
Draft 1,30 m Design displacement 285 kg (**Dinghy ~ 125 kg** + Crew 160 kg)
Free board : at transom 0,35 m **at midship 0,40 m** at bow 0,35 m
SA 12,6 m2 (mainsail 8,7 m2 + jib 3,9 m2) >>

SA/D^(2/3)	29,58
SA/Sw	2,45



The hull :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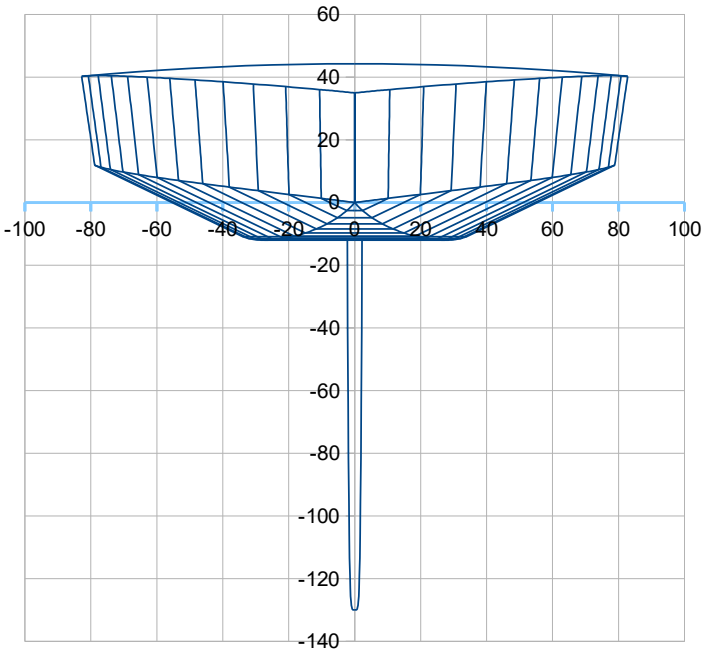
-100 -50 0 50 100 150 200 250 300 350 400 450 500 550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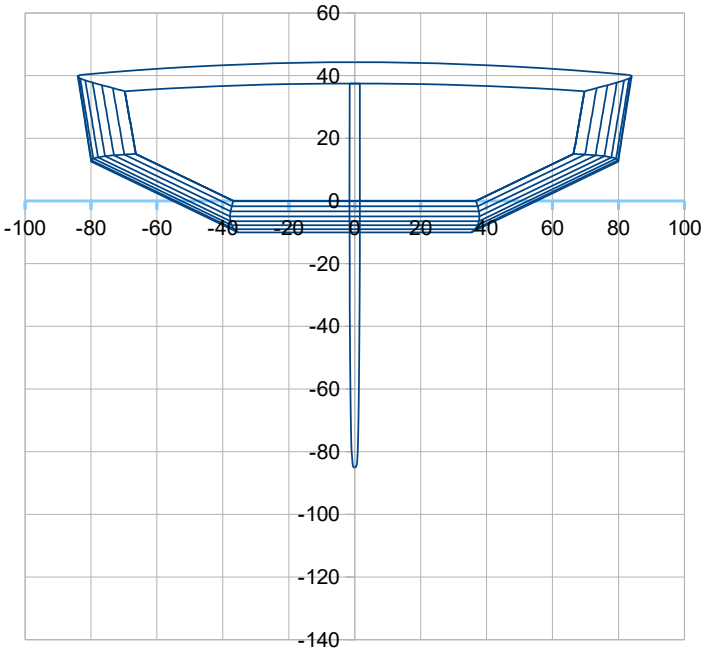
20
0
-20
-40
-60
-80
-100
-120
-140
-100 -80 -60 -40 -20 0 20 40 60 80 100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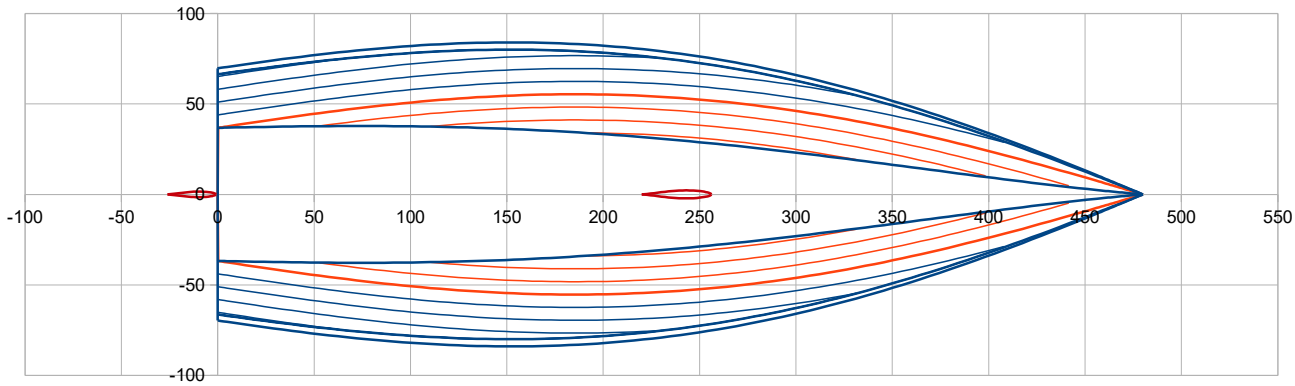
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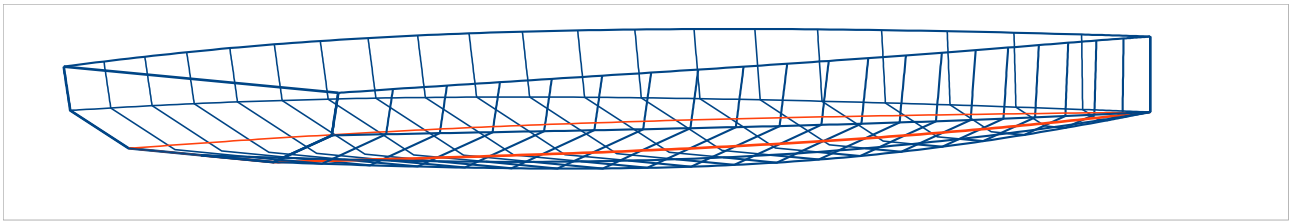
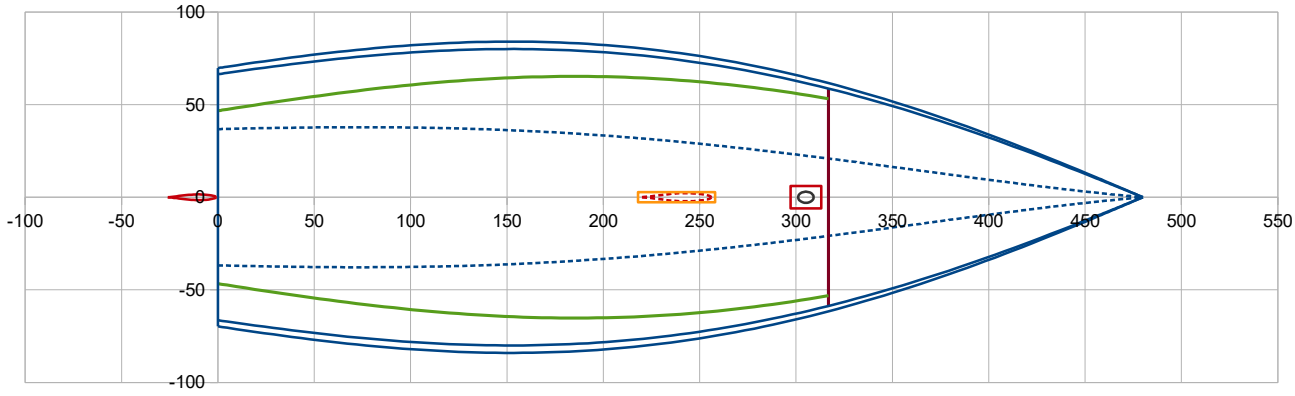


Hydrostatics at design displacement 285 kg

B1 – Hydrostatics data								
B1.1 Hull								
Loa (m)	**4,80**	**Lwl (m)**	**4,80**	> Hull speed (Knots)	5,3	at Froude 0,4		
>> ft	*15,75*		*15,75*					
Boa (m)	**1,680**	**at X (% Lwl)**	**32,0**	Bsheer (m)	1,68	at X (% Lwl)	32,0	
>> ft	*5,51*				*5,51*			
Bwl (m)	**1,107**	**at X (% Lwl)**	**39,0**	> Bwl / Boa	0,659			
>> ft	*3,63*			**Freeboards (m) >**	**Aft**	**Midship**	**Fore**	
Tc (m)	**0,120**	**at X (%Lwl)**	**55,0**		**0,35**	**0,40**	**0,35**	
>> ft	*0,39*				*>> ft*	*1,15*	*1,31*	*1,15*
Displacement at H0 (m3)	**0,26593**	**at LCB (m)**	**2,230**	**LCB (%Lwl)**	**46,46**	**ZCB (m)**	**-0,049**	
>> lbs	*601*	*w. seawater*	*1025*	*kg/m3*		*>> ft*	*-0,16*	
Cp	**0,556**							
Sf (m2)	**3,91**	**at LCF (m)**	**2,037**	**LCF (%Lwl)**	**42,44**	>>> LCB – LCF (%Lwl)	4,02	
>> ft2	*42,13*	*>> ft*	*6,68*					
Half entry angle (°)	**17,5**		**Flat bottom Sf (m2)**	**2,44**	**Sf flat/Sf(%)**	**62**		
Sw (m2)	**4,01**	>Sw/D^(2/3)	9,69	X Sf (m)	1,756	X Sf (%Lwl)	37	
>> ft2	*43,12*					D/Sf (kg/m2)	117	
Shull (m2)	**8,93**	**at X (m)**	**2,165**	**Z (m)**	**0,057**	**Keel line angles :**		
>> ft2	*96,12*	*>> ft*	*7,10*	*>> ft*	*0,19*	**Aattack (°)**	**5,0**	at C9 station
Sdeck (m2)	**6,01**	**at X (m)**	**1,956**	**Z (m)**	**0,39**	**Aexit (°)**	**4,0**	at aft transom
>> ft2	*64,71*	*>> ft*	*6,42*	*>> ft*	*1,27*			
B1.2 Daggerboard								
Vol. keel(m3)	**0,00883**	**at X (m)**	**2,384**	**X (%Lwl)**	**49,67**	**Z (m)**	**-0,602**	
		>> ft	*7,82*			*>> ft*	*-1,98*	
Draft oa (m)	**1,30**		**Sw (m2)**	**0,75**		**Sxz (m2)**	**0,36**	
>> ft	*4,27*		*>> ft2*	*8,04*		*>> ft2*	*3,86*	
CLR (m)	**2,43**	**CLR (%Lwl)**	**50,66**	*CLR = Center of Lateral Resistance*				
>> ft	*7,98*	method: keel profile extended to the waterline, CLR at Z 45% draft and					25,00	% chord
B1.3 Rudder								
Volume (m3)	**0,00325**	**at X (m)**	**-0,15**	**X (%Lwl)**	**-3,02**	**Z (m)**	**-0,35**	
Sw (m2)	**0,39**	*>> ft*	*-0,48*			**Sxz (m2)**	**0,19**	
>> ft2	*4,16*					*>> ft2*	*2,00*	
B1.4 Hull + Keel + Rudder(s)								
Displacement at H0 (m3)	**0,27802**	**at LCB (m)**	**2,207**	**LCB (%Lwl)**	**45,98**	**at ZCB (m)**	**-0,070**	
Displacement in kg	**285,0**	*>> ft*	*7,24*			*>> ft*	*-0,23*	
>> lbs	*628*							
Sw (m2)	**5,14**	>Sw/D^(2/3)	12,06	Lwl/D^(1/3)	7,35			
>> ft2	*55,31*			***DLR***	***71,8***	*M(lbs/2240)/(L(ft)/100)^3*		
B1.5 Data from the mass spreadsheet								
Dinghy with payload M(kg)	**285,0**	**at Xg (m)**	**1,975**	**Xg (%Lwl)**	**41,14**	**at Zg (m)**	**0,423**	
Light boat (kg)	125,0		1,942				0,451	
Bare hull (kg)	102,3							

Nota 1 : Floatation area Sf = 3,91 m2 >>> ~ 40 kg of extra weight gives 1 cm of sinkage

Nota 2 : Center of gravity Xg = 1,975 m of the dinghy with its crew corresponds to the 160 kg crew weight positioned at X ~ 2,0 m / transom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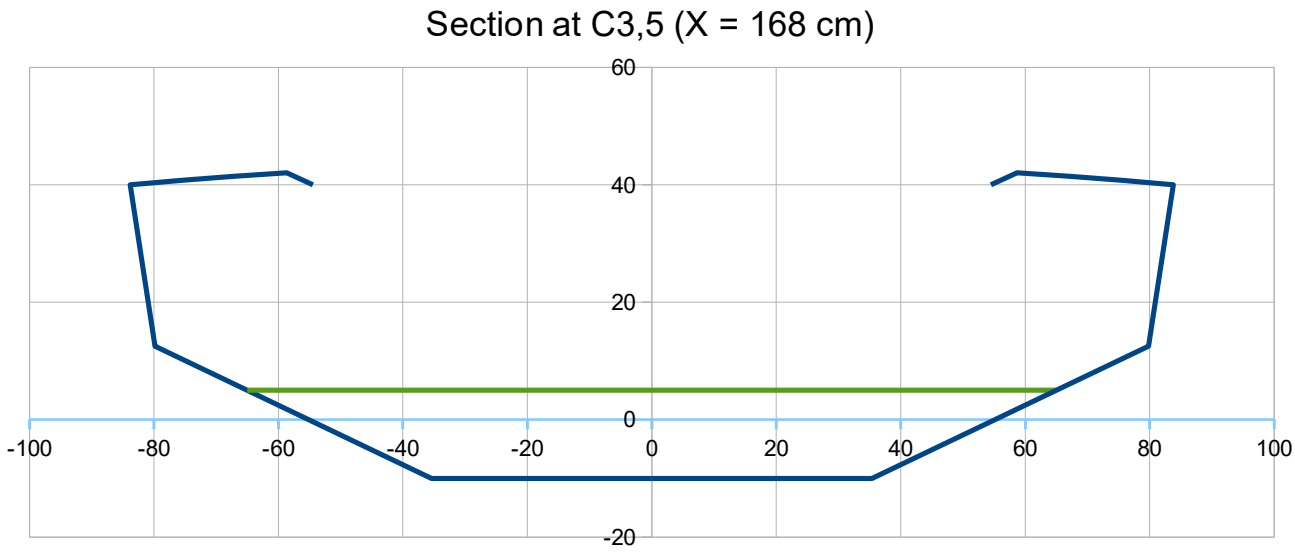
300
350
400
450
500
550


Section at C3,5 (X = 168 cm)
60
40
20
0
-20
-100
-80
-60
-40
-20
0
20
40
60
80
100

Mass spreadsheet, very preliminary … :

D – Mass spreadsheet – Preliminary

Eléments	L m	S m2	V m3	Mass units to enter	Masse (kg)	X (m)	M X	Z (m)	M Z
Hull :									
Hull assuming at unit mass kg/m2		8,93		**6,00**	53,58	2,165	115,987	0,057	3,077
Transom assuming at unit mass kg/m2		0,43		**6,00**	2,56	0,000	0,000	0,187	0,479
Deck - benches – double bottom									
assuming at average unit mass kg/m2		6,01		**6,00**	36,07	1,956	70,542	0,388	14,001
Daggerboard :									
Daggerboard, assuming at kg/m3			0,008832	**550,00**	4,86	2,384	11,583	-0,602	-2,925
Daggerboard trunk, assuming kg				**5,00**	5,00	2,384	11,922	0,160	0,800
Rudder :									
Rudder, assuming kg/m3			0,003251	**550,00**	1,79	-0,145	-0,259	-0,349	-0,624
Rudder-helm system, assuming kg				**3,00**	3,00	-0,073	-0,218	0,233	0,700
Rig and sails :									
Mast >> at kg/m		6,741		**1,00**	7,08	3,001	21,242	3,375	23,889
Boom >> at kg/m		2,388		**0,80**	2,01	1,802	3,614	1,000	2,006
Sails at mass in g/m2		12,60		**0,30**	3,97	2,120	8,414	3,275	12,996
Deck & cockpit equipment :									
Various deck equipment, kg of provision				**5,10**	5,10	0,000	0,000	0,400	2,040
Light weight >>>					**125,0**	**1,94**	242,826	**0,45**	56,438
				Bare hull >>	102,3				

Initial stability (with crew 160 kg at X 2,0 m, Y 0, Z 0,65 m) :

B4.1 Mass and center of gravity with the input of a load

Data to enter : yellow cells	Mass (kg)	Xg (m)	Zg (m)	Yg (m)	(in the coordinates of the 2D plan views abo
Boat light weight (kg)	*125,01*	*1,942*	*0,451*	*0*	*from the mass spreadsheet*
Load (kg)	**160,00**	**2,000**	**0,65**	**0**	Crew at center
			0,40	**1,425**	Crew at windward in hiking posture
Total >>> Mass (kg)	**285,01**	**1,975**	**0,563**	**0,000**	**Crew at center**
Disp. (m3)	**0,27806**		**0,423**	**0,800**	**Crew at windward**

>>>

B4.2 Computation of the heeled hull : by input of an Heel angle and iteration on Height and Trim up to Displacement equality and Xc (LCB

Data to enter : yellow cells		Results				Specific results			
Heel (°)	**1**	**Disp. (m3)**	**0,27806**	**/ Disp. (m3)**	**0,27806**	**Relevant only when heel = 0°**		DLR	92
Height (cm)	**0,6461**	**Xc heel (m)**	**1,975**	**/ Xg (m)**	**1,975**	Lwl (m)	4,42	Z fore (cm)	4,09
Trim (°)	**0,760**	Yc heel (m)	-0,020	Yg heel (m)	0,792	Bwl (m)	1,11	Z aft (cm)	-2,28
	2,272	Zc heel (m)	-0,055	**> GZ (m)**	**0,813**	Tc (m)	0,11	Trim (°)	0,76
	5,14	**Sw heel(m2)**	**5,14**	**RM (kN.m)**	**2,272**	Cp Hull	0,626	LCB Hull (%)	44,95
	31,5	**Bwl heel (m)**	**1,11**	**FB mini (cm)**	**31,5**	**Relevant only when heel = 1°**			
		LCB – LCF (%Lwl)	**1,38**	**Obliquity (°)**	**0,2**	Yg heel (m)	-0,010	with crew at center	
						Gz (m)	0,010		
						> GM1° (m)	**0,59**		

GM1° = 0,59 m Moderate stability (0,30 m < GM1° < 0,60 m)