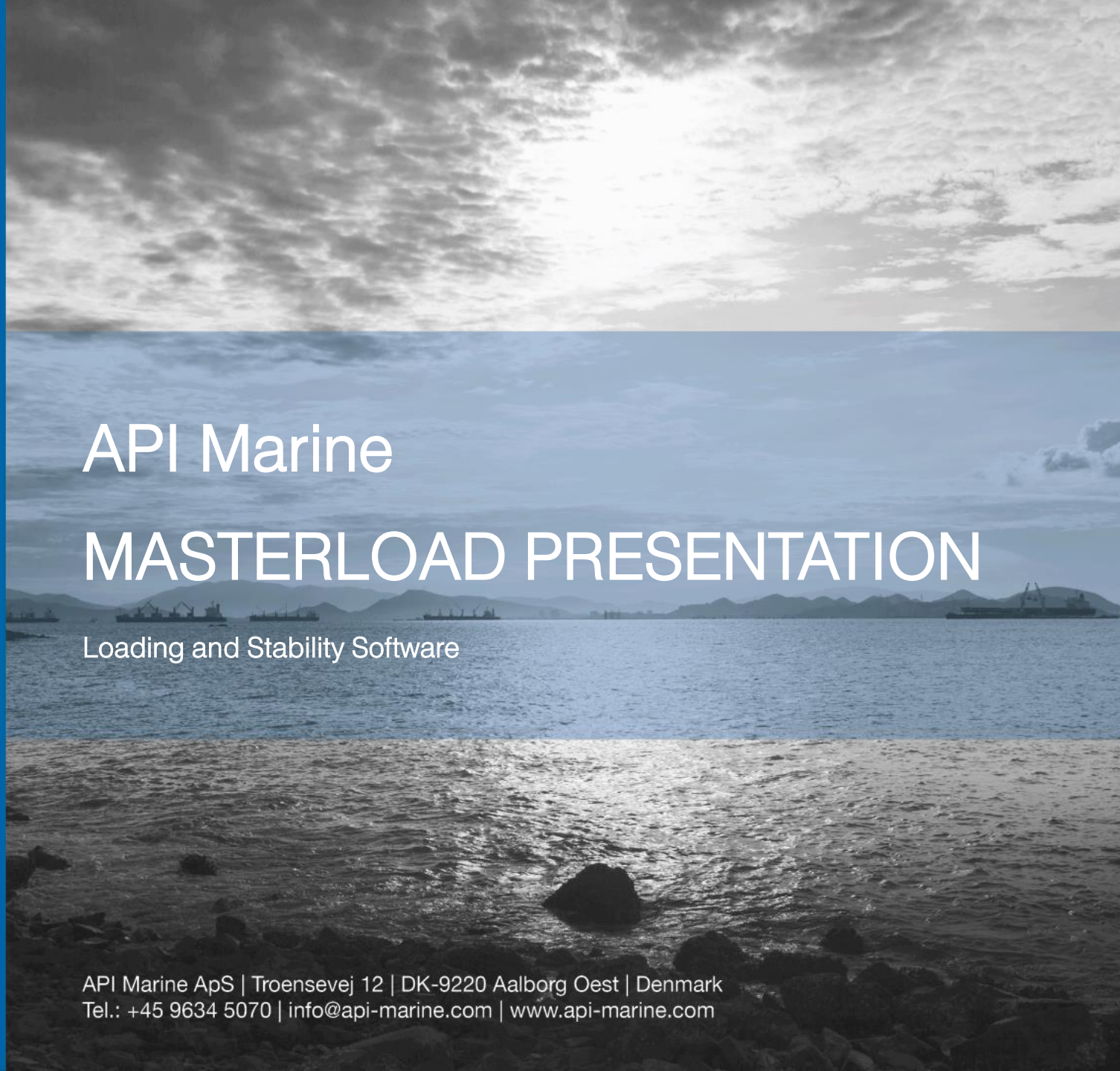


API Marine

MASTERLOAD PRESENTATION

Loading and Stability Software

API Marine ApS | Troensevej 12 | DK-9220 Aalborg Oest | Denmark
Tel.: +45 9634 5070 | info@api-marine.com | www.api-marine.com

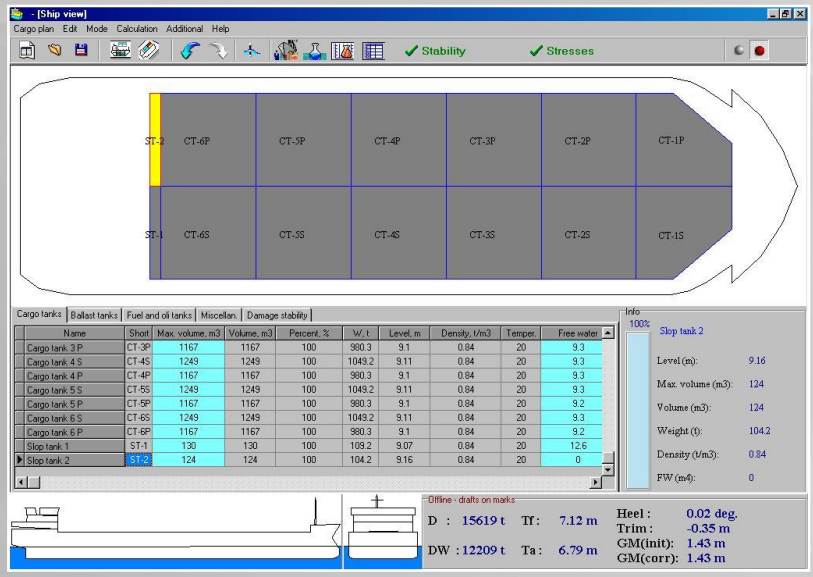
Masterload™

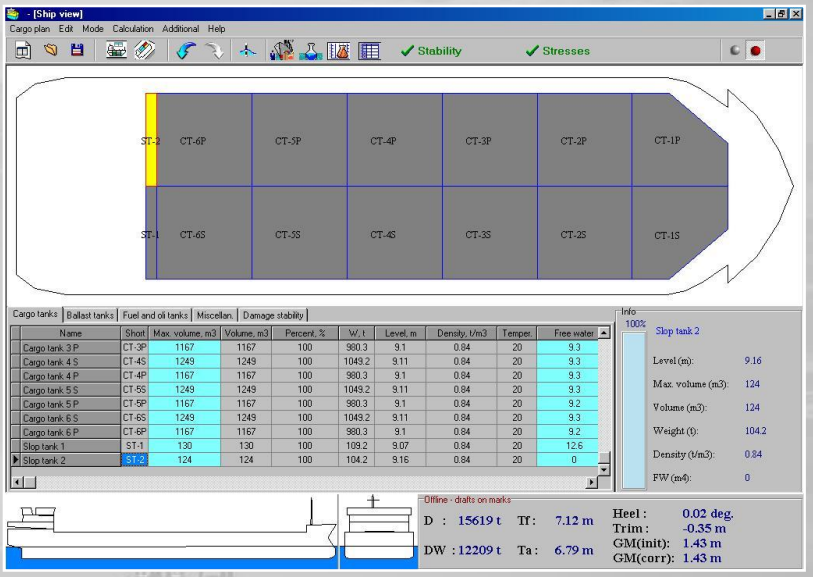
The Loading Computer SW - MasterLoad™ - is designed for cargo planning, keeping carried cargoes, updating the state of carried cargoes during the voyage, calculating the weight, drafts, parameters stability, and strength.

MasterLoad™ can be used with or without level sensors in cargo, ballast and other tanks for “off-line” and/or “on-line” calculations.

Tanker

The first window includes the main menu, sections, the location of the real waterline and brief information about the heel, drafts, displacement and some stability criteria.

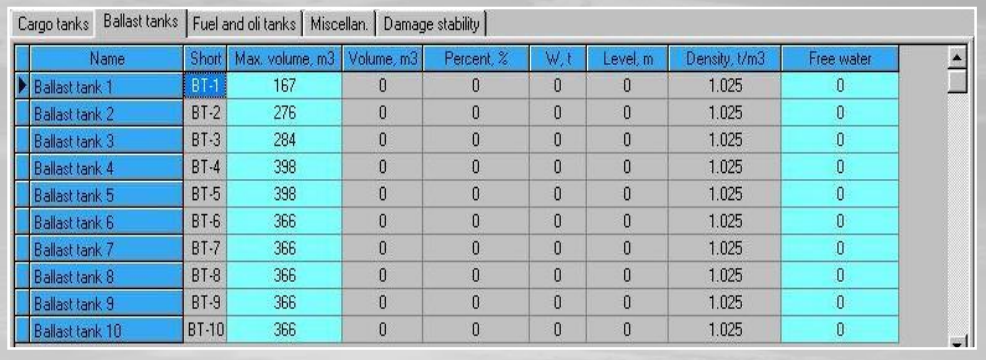




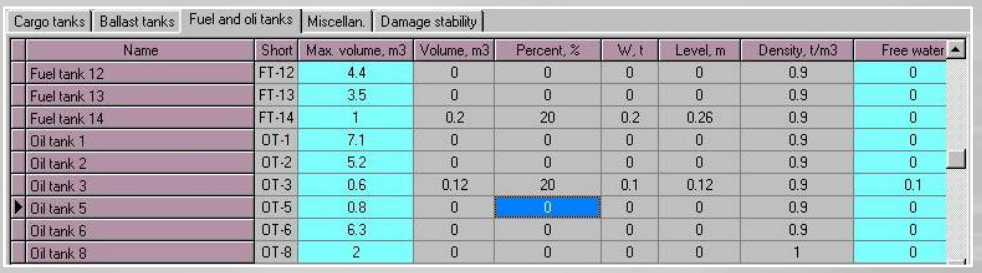
Tanker

The main menu is used for program administration.

If you choose “Tanks”, you can design tank tables, fill in or make dry ballast, cargo, fuel and store tanks in the interactive mode.



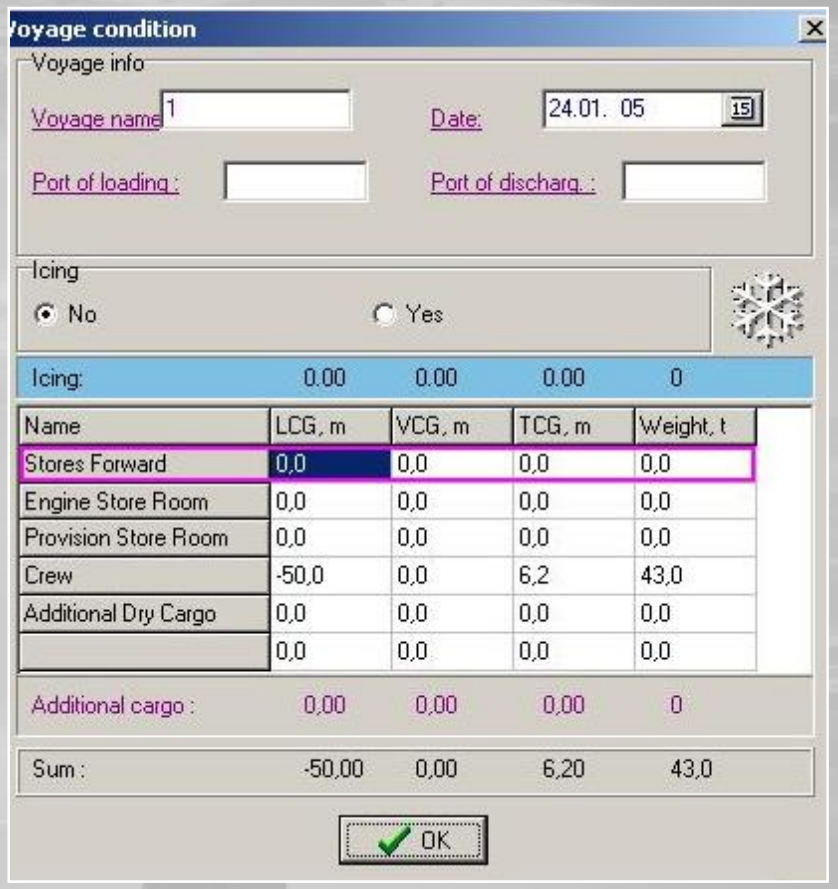
Name	Short	Max. volume, m3	Volume, m3	Percent, %	W, t	Level, m	Density, t/m3	Free water
Ballast tank 1	BT-1	167	0	0	0	0	1.025	0
Ballast tank 2	BT-2	276	0	0	0	0	1.025	0
Ballast tank 3	BT-3	284	0	0	0	0	1.025	0
Ballast tank 4	BT-4	398	0	0	0	0	1.025	0
Ballast tank 5	BT-5	398	0	0	0	0	1.025	0
Ballast tank 6	BT-6	366	0	0	0	0	1.025	0
Ballast tank 7	BT-7	366	0	0	0	0	1.025	0
Ballast tank 8	BT-8	366	0	0	0	0	1.025	0
Ballast tank 9	BT-9	366	0	0	0	0	1.025	0
Ballast tank 10	BT-10	366	0	0	0	0	1.025	0



Name	Short	Max. volume, m3	Volume, m3	Percent, %	W, t	Level, m	Density, t/m3	Free water
Fuel tank 12	FT-12	4.4	0	0	0	0	0.9	0
Fuel tank 13	FT-13	3.5	0	0	0	0	0.9	0
Fuel tank 14	FT-14	1	0.2	20	0.2	0.26	0.9	0
Oil tank 1	OT-1	7.1	0	0	0	0	0.9	0
Oil tank 2	OT-2	5.2	0	0	0	0	0.9	0
Oil tank 3	OT-3	0.6	0.12	20	0.1	0.12	0.9	0.1
Oil tank 5	OT-5	0.8	0	0	0	0	0.9	0
Oil tank 6	OT-6	6.3	0	0	0	0	0.9	0
Oil tank 8	OT-8	2	0	0	0	0	1	0

Tanker

"Voyage condition" is used for input information of specific voyage conditions (water density, icing, dry stores, crew) and additional deck cargo.



Tanker

Information about cargo distribution, stores, ballast, etc. can be shown in drawing or text mode.

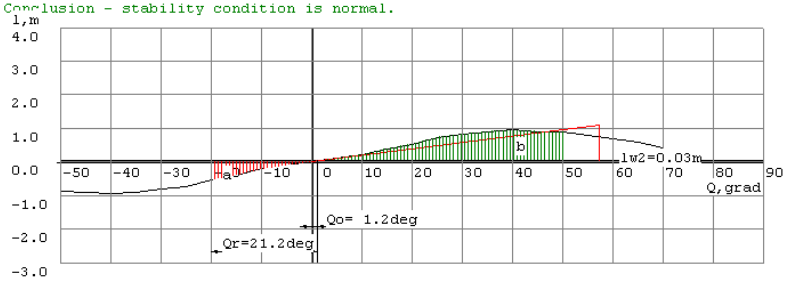
Stability criteria are in line with IMO criteria.

STABILITY CONDITION

Parameter		Value		Limit
1.Displacement	[t]	15292		
2.Deadweight	[t]	11890		
3.Draft at FP	[m]	6.88		
4.Mean draft	[m]	6.81.		
5.Draft at AP	[m]	6.74.		
6.Heel	[deg]	0.09		
7.GM(init.)	[m]	1.58		
8.GM(actual)	[m]	1.09	>	0.15 m
9.Angle of max. GZ	[deg]	40.0	>	25 deg
10.Lever at 30 deg	[m]	0.82	>	0.2 m
11.GZ area 0-30 deg	[m*rad]	0.21	>	0.055 m*rad
12.GZ area 30-40 deg	[m*rad]	0.16	>	0.030 m*rad
13.GZ area 0-40 deg	[m*rad]	0.36	>	0.090 m*rad
14.Angle of downflood.(Qf)	[deg]	56.9		
15.Angle of roll(Qr)	[deg]	21.2		
16.Weather ctiterion	[-]	5.08	>	1.0

Notes:
- water density 1.025 t/m^3
- stability criteria according to IMO

Conclusion - stability condition is normal.



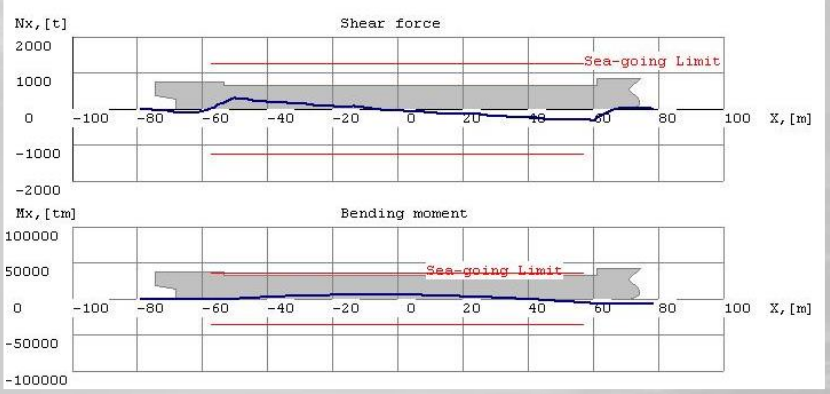
Tanker

If it is necessary to calculate the complicated floating object strength it is possible to use the elements method and additionally to calculate the roll.

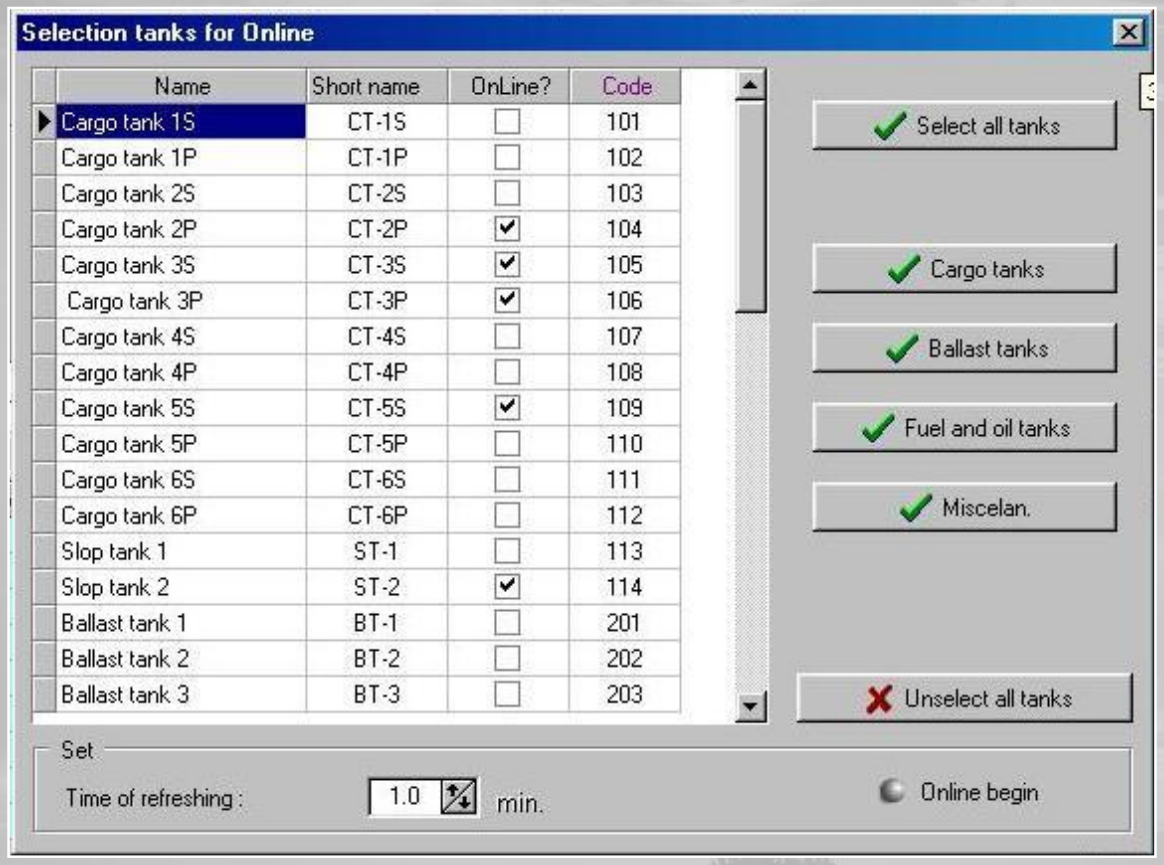
STRESSES CONDITION

Frame	X,m	Nx,t	Nx,t(limit)	Nx,%	Mx,tm	Mx,tm(limit)	Mx,%
22	-57.3	28	1240	2.3	-1396	36320	3.8
51	-35.8	175	1240	14.1	3055	36320	8.4
70	-21.5	69	1240	5.6	4803	36320	13.2
89	-7.2	-11	1240	0.9	5498	36320	15.1
101	0.0	-38	1240	3.1	5223	36320	14.4
109	7.2	-69	1240	5.5	4782	36320	13.2
128	21.5	-143	1240	11.5	2838	36320	7.8
147	35.8	-227	1240	18.3	135	36320	0.4
177	57.3	-299	1240	24.1	-5810	36320	16.0

Notes:
- limit for seagoing service
- Conclusion - strength condition is normal.

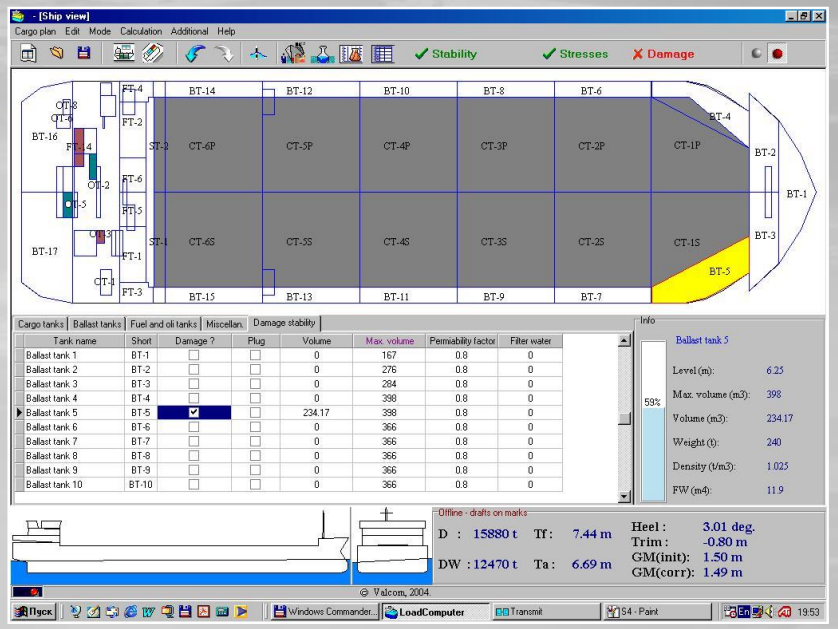


Online Mode


Selection tanks for Online
Name
Short name
OnLine?
Code
Cargo tank 1S CT-1S 101
Cargo tank 1P CT-1P 102
Cargo tank 2S CT-2S 103
Cargo tank 2P CT-2P 104
Cargo tank 3S CT-3S 105
Cargo tank 3P CT-3P 106
Cargo tank 4S CT-4S 107
Cargo tank 4P CT-4P 108
Cargo tank 5S CT-5S 109
Cargo tank 5P CT-5P 110
Cargo tank 6S CT-6S 111
Cargo tank 6P CT-6P 112
Slop tank 1 ST-1 113
Slop tank 2 ST-2 114
Ballast tank 1 BT-1 201
Ballast tank 2 BT-2 202
Ballast tank 3 BT-3 203
Select all tanks
Cargo tanks
Ballast tanks
Fuel and oil tanks
Miscelan.
Unselect all tanks
Set
Time of refreshing :
1.0
min.
Online begin

Damage Stability

The vessel is analytically damaged by opening various combinations of watertight compartments to the sea. The number of compartments and their location are dictated by IMO regulations, SOLAS conventions, or other applicable rules.

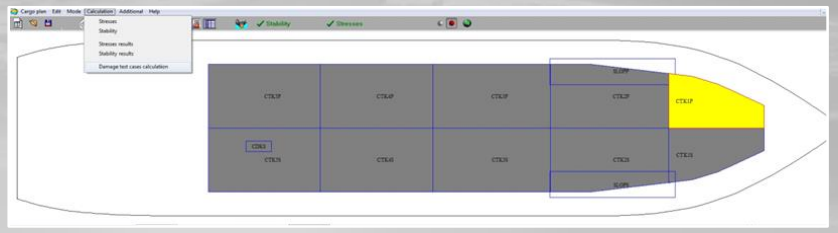


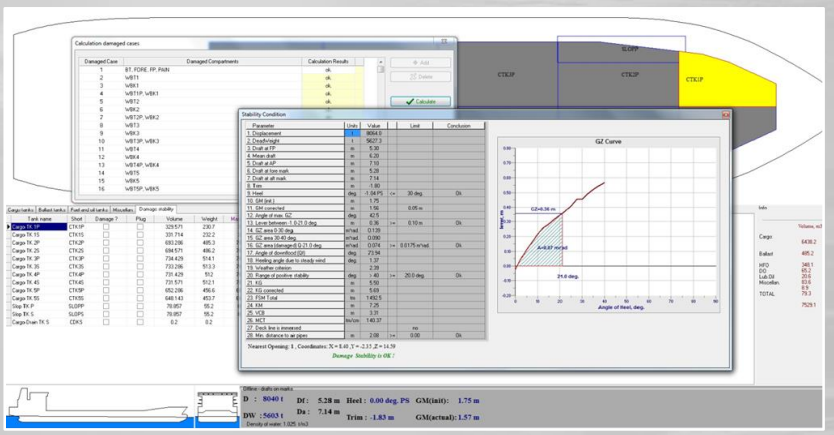
Typically these conditions are identified by the compartment(s) damaged ex: "Water Ballast Tank 5 Stb"

Damage Stability

Damage Stability calculation is provided according MARPOL 73/78, resolution MEPC 248(66).

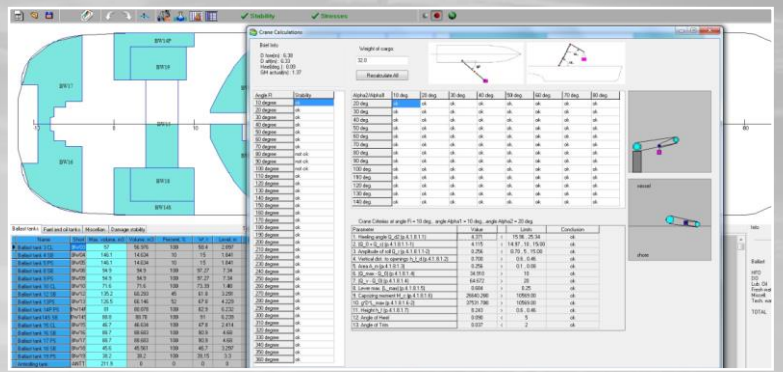
All loading could be checked for all damage test cases described in a Damage Stability booklet

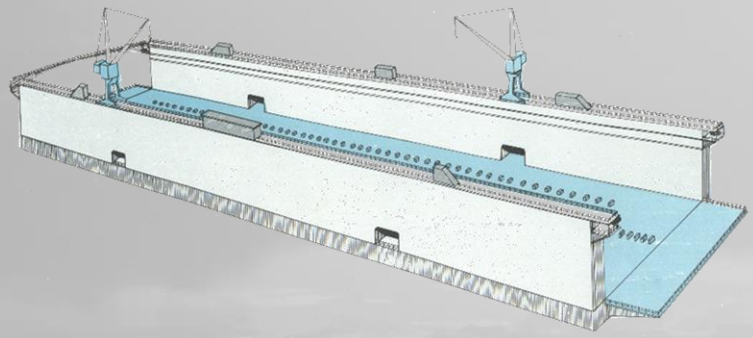


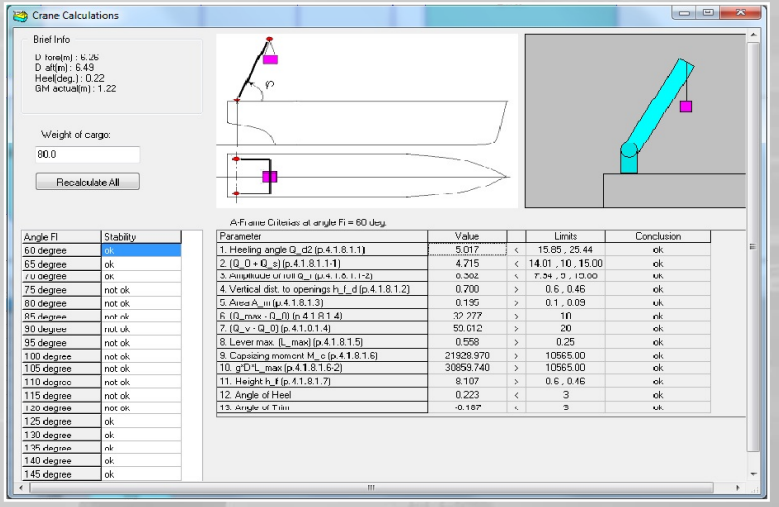


Damage Stability

There are some special functions to calculate a possibilities for the crane and A-frame operation

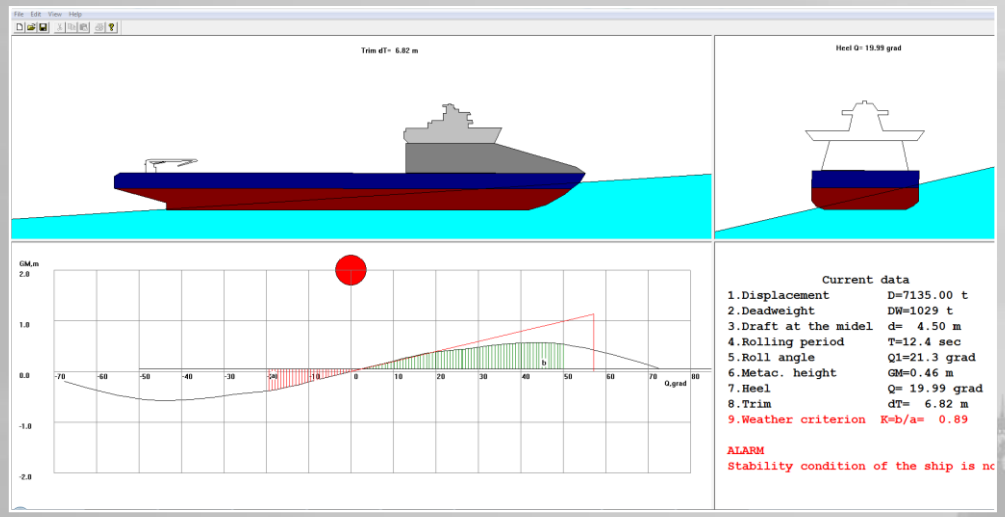


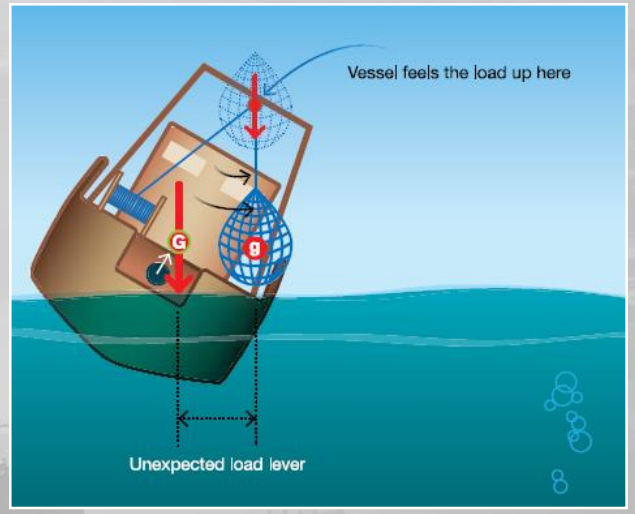




Additional Possibilities

The dynamic stability calculation shows how much the loads reduce the stability safety while working (the area under the curve). Every lift is only as safe as the load lifted, the condition of the vessel at that time and the sea-state size and direction





New Requirements

New Requirements for Tankers as per January 2016 for Stability Calculation

MARPOL ANNEX I Regulations 28/6

and

MARPOL 73/78, resolution Marine Environment Protection Committee

MEPC.248(66)

Information Needed

Intact and damage stability calculation

- Hull drawing
- General arrangement
- Capacity plan
- Tanks and compartments tables
- Additional cargoes

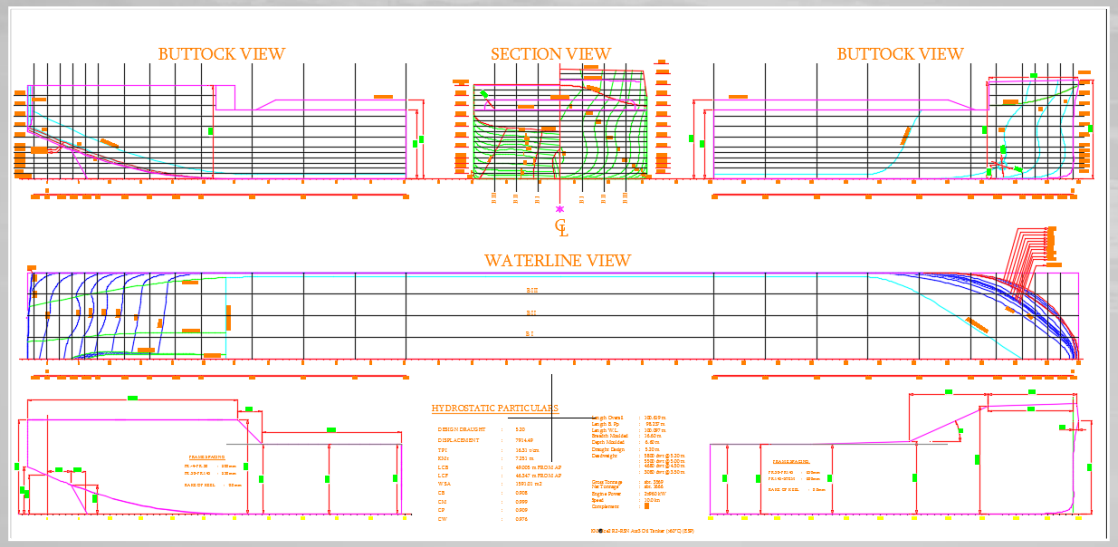
Strength calculation

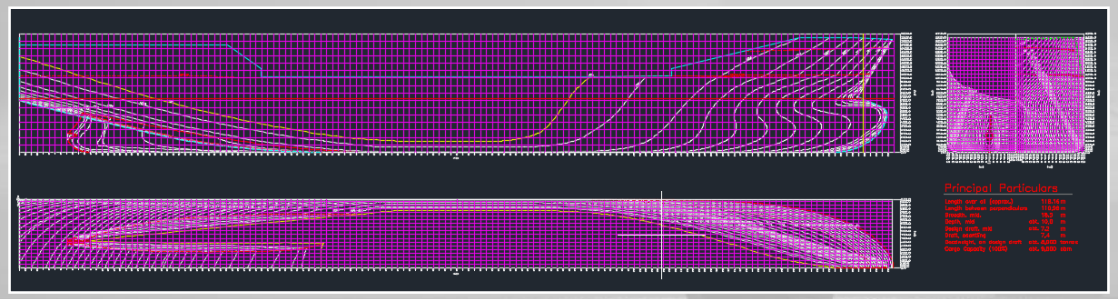
- Light weight distribution
- Bending Moment & Shear Force Limits

Stability Booklet

Hull

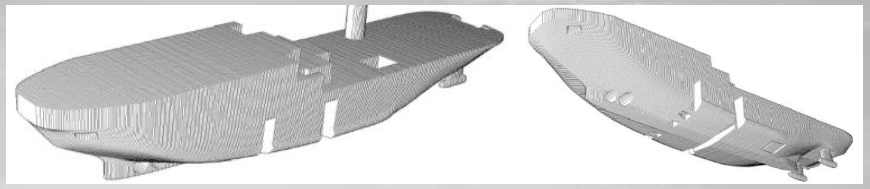
Lines (Body) Drawing (AutoCAD format)

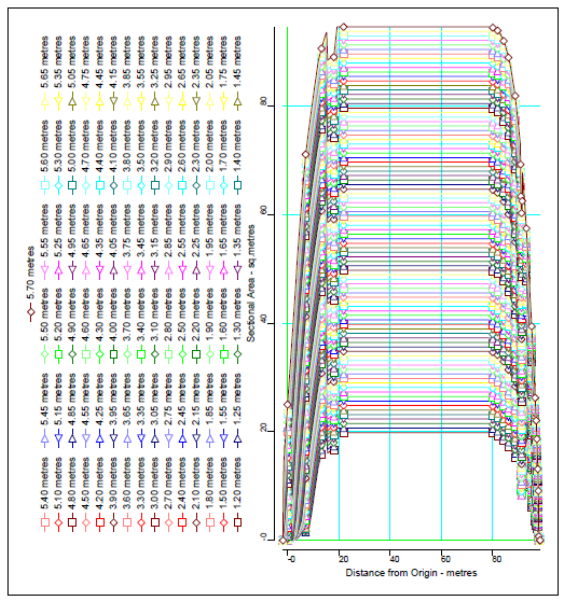


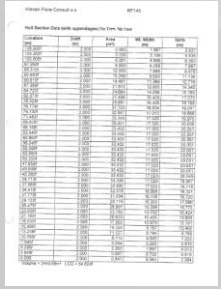


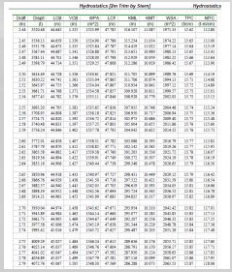
Alternative Information to Create a Hull Drawing

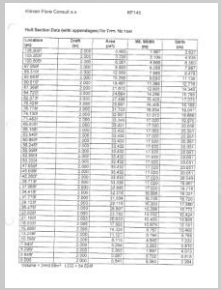
- Bonjan (Section area curvers)
- Hydrostatic curves Or NAPA.db file

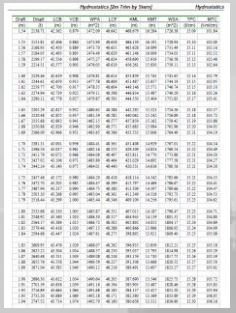


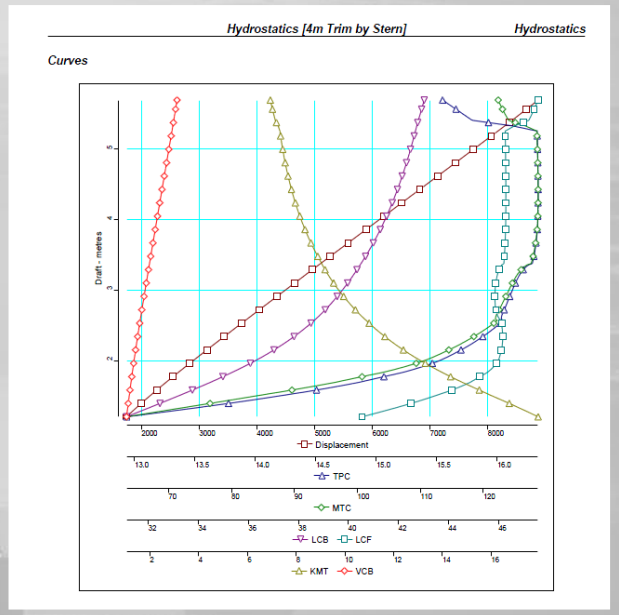




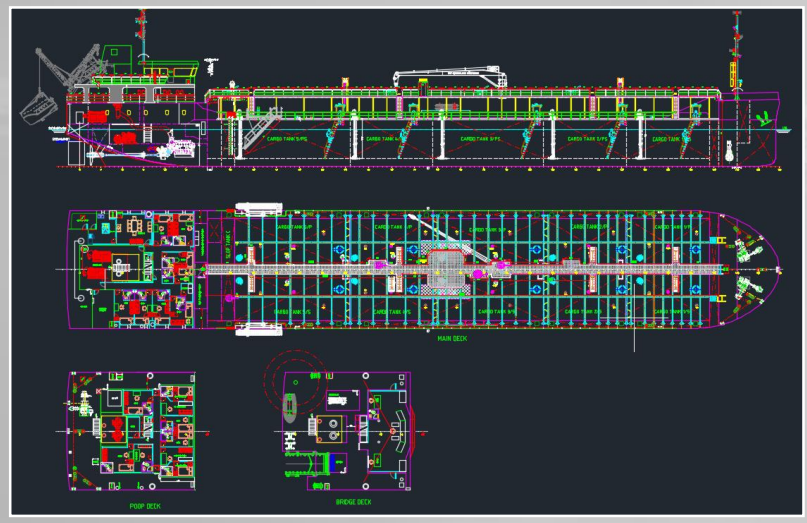


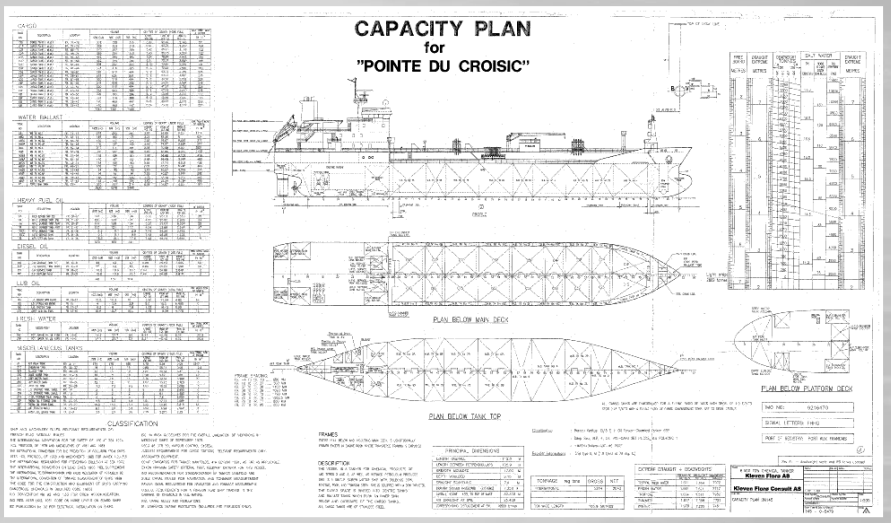




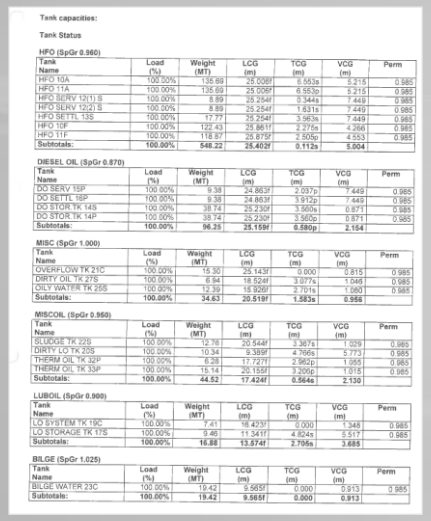


General Arrangement and Capacity Plan Drawings





Tanks and Compartments Tables



Tank capacities:

Tank Status

HFO (SpGr 0.960)

Tank Name	Load (%)	Weight (MT)	LCG (m)	TCG (m)	VCG (m)	Perm
HFO 10A	100.00%	136.69	25.008f	6.553p	5.215	0.985
HFO 11A	100.00%	135.69	25.008f	6.553p	5.215	0.985
HFO SERV 12(1) S	100.00%	8.89	25.254f	9.344s	7.449	0.985
HFO SLHV 12(2) S	100.00%	8.89	25.254f	1.631s	7.449	0.985
HFO SETTL 12S	100.00%	17.77	25.254f	3.963s	7.449	0.985
HFO 10F	100.00%	122.43	25.861f	2.275s	4.266	0.985
HFO 11F	100.00%	118.87	25.875f	2.505p	4.553	0.985
Subtotals:	**100.00%**	**548.22**	**25.402f**	**0.112p**	**5.004**	

DIESEL OIL (SpGr 0.870)

Tank Name	Load (%)	Weight (MT)	LCG (m)	TCG (m)	VCG (m)	Perm
DO SERV 15P	100.00%	9.38	24.863f	2.037p	7.449	0.985
DO SETTL 16P	100.00%	9.38	24.863f	3.912p	7.449	0.985
DO STOR TK 14S	100.00%	38.74	25.230f	3.560s	0.871	0.985
DO STOR TK 14P	100.00%	38.74	25.230f	3.560p	0.871	0.985
Subtotals:	**100.00%**	**96.25**	**25.159f**	**0.580p**	**2.154**	

MISC (SpGr 1.000)

Tank Name	Load (%)	Weight (MT)	LCG (m)	TCG (m)	VCG (m)	Perm
OVERFLOW TK 21C	100.00%	15.30	25.143f	0.000	0.815	0.985
DIRTY OIL TK 27S	100.00%	6.94	18.524f	3.077s	1.046	0.985
OILY WATER TK 29S	100.00%	12.39	15.926f	3.701s	1.060	0.985
Subtotals:	**100.00%**	**34.63**	**20.519f**	**1.583s**	**0.956**	

MISCOIL (SpGr 0.950)

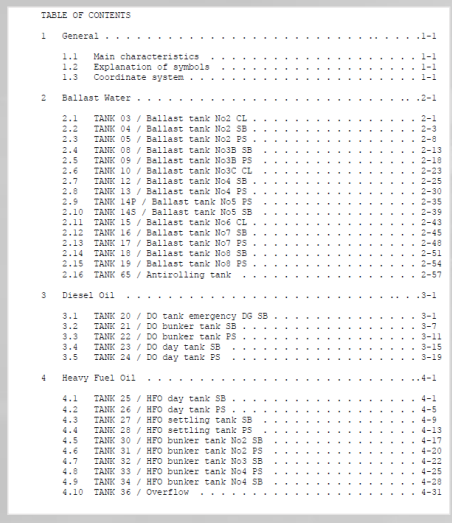
Tank Name	Load (%)	Weight (MT)	LCG (m)	TCG (m)	VCG (m)	Perm
SLUDGE TK 22S	100.00%	12.78	20.544f	3.367s	1.929	0.985
DIRTY LO TK 20S	100.00%	10.34	9.389f	4.766s	5.773	0.985
THERM OIL TK 32P	100.00%	6.28	17.727f	2.962p	1.955	0.985
THERM OIL TK 33P	100.00%	15.14	20.155f	3.209p	1.918	0.985
Subtotals:	**100.00%**	**44.52**	**17.424f**	**0.564s**	**2.139**	

LUBOIL (SpGr 0.900)

Tank Name	Load (%)	Weight (MT)	LCG (m)	TCG (m)	VCG (m)	Perm
LO SYSTEM TK 19C	100.00%	7.41	18.423f	0.000	1.348	0.985
LO STORAGE TK 17S	100.00%	9.46	11.341f	4.824s	5.517	0.985
Subtotals:	**100.00%**	**16.88**	**13.874f**	**2.706s**	**3.685**	

BILGE (SpGr 1.025)

Tank Name	Load (%)	Weight (MT)	LCG (m)	TCG (m)	VCG (m)	Perm
BILGE WATER 23C	100.00%	19.42	9.565f	0.000	0.913	0.985
Subtotals:	**100.00%**	**19.42**	**9.565f**	**0.000**	**0.913**	



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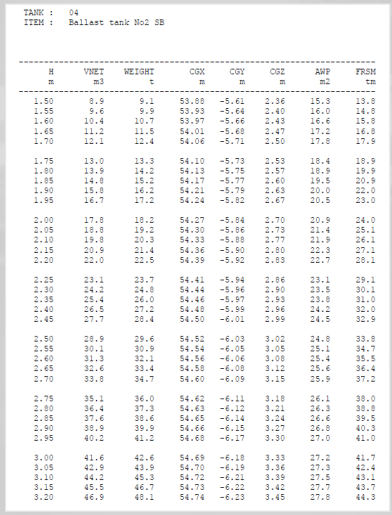
2.12 TANK 16 / Ballast tank No7 SB 2-45
2.13 TANK 17 / Ballast tank No7 PS 2-48
2.14 TANK 18 / Ballast tank No8 SB 2-51
2.15 TANK 19 / Ballast tank No8 PS 2-54
2.16 TANK 65 / Antirolling tank 2-57

3 Diesel Oil 3-1

3.1 TANK 20 / DO tank emergency DG SB 3-1
3.2 TANK 21 / DO bunker tank SB 3-7
3.3 TANK 22 / DO bunker tank PS 3-11
3.4 TANK 23 / DO day tank SB 3-15
3.5 TANK 24 / DO day tank PS 3-19

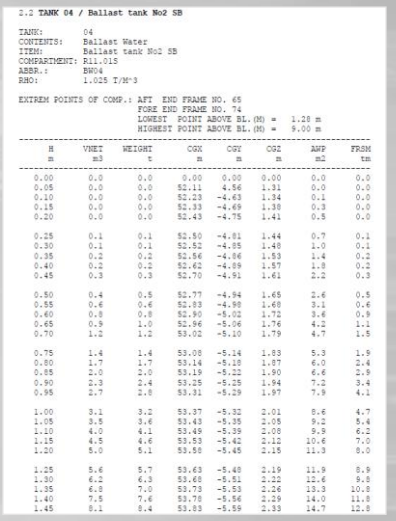
4 Heavy Fuel Oil 4-1

4.1 TANK 25 / HFO day tank SB 4-1
4.2 TANK 26 / HFO day tank PS 4-5
4.3 TANK 27 / HFO settling tank SB 4-9
4.4 TANK 28 / HFO settling tank PS 4-13
4.5 TANK 30 / HFO bunker tank No2 SB 4-17
4.6 TANK 31 / HFO bunker tank No2 PS 4-20
4.7 TANK 32 / HFO bunker tank No3 SB 4-22
4.8 TANK 33 / HFO bunker tank No4 PS 4-25
4.9 TANK 34 / HFO bunker tank No4 SB 4-28
4.10 TANK 36 / Overflow 4-31



TANK : 04
ITEM : Ballast tank No2 SB

H m	VNET m3	WEIGHT t	CGX m	CGY m	CGZ m	AWP m2	FRSM tm
1.50	8.9	9.1	53.88	-5.61	2.36	15.3	13.8
1.55	9.6	9.9	53.93	-5.64	2.40	16.0	14.8
1.60	10.4	10.7	53.97	-5.66	2.43	16.6	15.8
1.65	11.2	11.5	54.01	-5.68	2.47	17.2	16.8
1.70	12.1	12.4	54.06	-5.71	2.50	17.8	17.9
1.75	13.0	13.3	54.10	-5.73	2.53	18.4	18.9
1.80	13.9	14.2	54.13	-5.75	2.57	18.9	19.9
1.85	14.8	15.2	54.17	-5.77	2.60	19.5	20.9
1.90	15.8	16.2	54.21	-5.79	2.63	20.0	22.0
1.95	16.7	17.2	54.24	-5.82	2.67	20.5	23.0
2.00	17.8	18.2	54.27	-5.84	2.70	20.9	24.0
2.05	18.8	19.2	54.30	-5.86	2.73	21.4	25.1
2.10	19.8	20.3	54.33	-5.88	2.77	21.9	26.1
2.15	20.9	21.4	54.36	-5.90	2.80	22.3	27.1
2.20	22.0	22.5	54.39	-5.92	2.83	22.7	28.1
2.25	23.1	23.7	54.41	-5.94	2.86	23.1	29.1
2.30	24.2	24.8	54.44	-5.96	2.90	23.5	30.1
2.35	25.4	26.0	54.46	-5.97	2.93	23.8	31.0
2.40	26.5	27.2	54.48	-5.99	2.96	24.2	32.0
2.45	27.7	28.4	54.50	-6.01	2.99	24.5	32.9
2.50	28.9	29.6	54.52	-6.03	3.02	24.8	33.8
2.55	30.1	30.9	54.54	-6.05	3.05	25.1	34.7
2.60	31.3	32.1	54.56	-6.06	3.08	25.4	35.5
2.65	32.6	33.4	54.58	-6.08	3.12	25.6	36.4
2.70	33.8	34.7	54.60	-6.09	3.15	25.9	37.2
2.75	35.1	36.0	54.62	-6.11	3.18	26.1	38.0
2.80	36.4	37.3	54.63	-6.12	3.21	26.3	38.8
2.85	37.6	38.6	54.65	-6.14	3.24	26.6	39.5
2.90	38.9	39.9	54.66	-6.15	3.27	26.8	40.3
2.95	40.2	41.2	54.68	-6.17	3.30	27.0	41.0
3.00	41.6	42.6	54.69	-6.18	3.33	27.2	41.7
3.05	42.9	43.9	54.70	-6.19	3.36	27.3	42.4
3.10	44.2	45.3	54.72	-6.21	3.39	27.5	43.1
3.15	45.5	46.7	54.73	-6.22	3.42	27.7	43.7
3.20	46.9	48.1	54.74	-6.23	3.45	27.8	44.3



2.2 **TANK 04 / Ballast tank No2 SB**

TANK: 04
CONTENTS: Ballast Water
ITEM: Ballast tank No2 SB
COMPARTMENT: R11.01S
ABBR.: BW04
RHO: 1.025 T/M^3

EXTREM POINTS OF COMP.: AFT END FRAME NO. 65
FORE END FRAME NO. 74
LOWEST POINT ABOVE BL.(M) = 1.28 m
HIGHEST POINT ABOVE BL.(M) = 9.00 m

H m	VNET m3	WEIGHT t	CGX m	CGY m	CGZ m	AWP m2	FRSM tm
0.00	0.0	0.0	0.00	0.00	0.00	0.0	0.0
0.05	0.0	0.0	52.11	4.56	1.31	0.0	0.0
0.10	0.0	0.0	52.23	-4.63	1.34	0.1	0.0
0.15	0.0	0.0	52.33	-4.69	1.38	0.3	0.0
0.20	0.0	0.0	52.43	-4.75	1.41	0.5	0.0
0.25	0.1	0.1	52.50	-4.81	1.44	0.7	0.1
0.30	0.1	0.1	52.52	-4.85	1.48	1.0	0.1
0.35	0.2	0.2	52.56	-4.86	1.53	1.4	0.2
0.40	0.2	0.2	52.62	-4.89	1.57	1.8	0.2
0.45	0.3	0.3	52.70	-4.91	1.61	2.2	0.3
0.50	0.4	0.5	52.77	-4.94	1.65	2.6	0.5
0.55	0.6	0.6	52.83	-4.98	1.68	3.1	0.6
0.60	0.8	0.8	52.90	-5.02	1.72	3.6	0.9
0.65	0.9	1.0	52.96	-5.06	1.76	4.2	1.1
0.70	1.2	1.2	53.02	-5.10	1.79	4.7	1.5
0.75	1.4	1.4	53.08	-5.14	1.83	5.3	1.9
0.80	1.7	1.7	53.14	-5.18	1.87	6.0	2.4
0.85	2.0	2.0	53.19	-5.22	1.90	6.6	2.9
0.90	2.3	2.4	53.25	-5.25	1.94	7.2	3.4
0.95	2.7	2.8	53.31	-5.29	1.97	7.9	4.1
1.00	3.1	3.2	53.37	-5.32	2.01	8.6	4.7
1.05	3.5	3.6	53.43	-5.35	2.05	9.2	5.4
1.10	4.0	4.1	53.49	-5.39	2.08	9.9	6.2
1.15	4.5	4.6	53.53	-5.42	2.12	10.6	7.0
1.20	5.0	5.1	53.58	-5.45	2.15	11.3	8.0
1.25	5.6	5.7	53.63	-5.48	2.19	11.9	8.9
1.30	6.2	6.3	53.68	-5.51	2.22	12.6	9.8
1.35	6.8	7.0	53.73	-5.53	2.26	13.3	10.8
1.40	7.5	7.6	53.78	-5.56	2.29	14.0	11.8
1.45	8.1	8.4	53.83	-5.59	2.33	14.7	12.8

Deadweight Constants and Additional Cargo

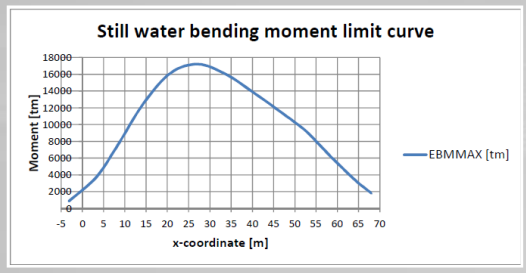
Description	Filling %	Weight (t)	L.C.G. (m)	T.C.G. (m)	V.C.G. (m)	Frs.mom. (tm)
I).CREW&LUGGAGE						
crew&luggage		3.0	14.80	0.00	18.55	0.0
J).Provision						
provision		0.8	10.00	0.00	14.50	0.0
K).Spare						
spare		10.0	8.50	0.00	14.50	0.0
Lightweight		3870.6	44.13	0.02	7.73	
ICE		95.9	53.85	0.00	13.36	0.0

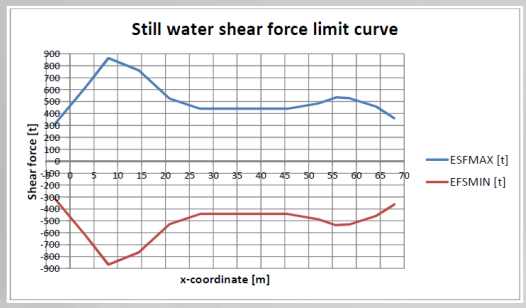
7.3. CALCULATION OF ICING

No.	ITEMS	ICING AREA	Icing weight per square meter	ICING WEIGHT	V.C.G.	V.MT.	L.C.G.	L.MT.
		(m2)	(t/m2)	(t)	(m)	(t-m)	(m)	(t-m)
	HORIZONTAL							
1	Upper deck	1416.9	0.03	42.507	10.3	437.822	60.139	2556.328
2	F'CLE deck	187.41	0.03	5.622	14	78.712	105.023	590.471
3	Passage	420.89	0.03	12.627	13.6	171.723	62.024	783.158
4	Poop	284.54	0.03	8.536	13.6	116.092	10.94	93.386
5	02 Acc. deck	82.78	0.03	2.483	16.3	40.479	9.429	23.416
6	03 Acc. deck	54.26	0.03	1.628	19	30.928	5.549	9.033
7	Bridge deck	36.39	0.03	1.092	21.7	23.690	10.262	11.203
8	Compass deck	127.05	0.03	3.812	24.7	94.144	15.828	60.328
	LATERAL							
9	Side of main h	311.58	0.0075*2	4.674	8.77	40.988	53.518	250.127
10	FCL	50.92	0.0075*2	0.764	12.219	9.333	105.904	80.889
11	Upper structure	241.98	0.0075*2	3.630	16.169	58.689	11.839	42.972
12	crane	17.18	0.0075*2	0.258	18.019	4.643	55.977	14.425
13	Funnel	30.43	0.0075*2	0.456	22.398	10.224	3.722	1.699
14	Fore mast	8.64	0.0075*2	0.130	16.268	2.108	108.136	14.014
15	Aft mast	17.92	0.0075*2	0.269	27.887	7.496	14.038	3.773
16	Bulwark	130.17	0.0075*2	1.953	12.934	25.254	54.654	106.715
17	Store room	35.19	0.0075*2	0.528	14.958	7.896	65.211	34.422
18	Rail	22.8	0.0075*2	0.342	13.55	4.634	50.261	17.189
				91.309		1164.857		4693.550
	5% calculated weight			4.565				
	calculated moment					116.486		469.355
	TOTAL			**95.9**	**13.36**	**1281.342**	**53.85**	**5162.905**

Lightweight Distribution and Bending Moment and Shear Force Limits

X (fr.)	X (m/AP)	Y (t/m)
-4	-2.4	1.541
-3	-1.8	15.407
-2	-1.2	19.45
-1	-0.6	19.6837
0	0	39.017
1	0.6	38.381
2	1.2	40.726
3	1.8	41.246
4	2.4	38.981
5	3	33.028
6	3.6	34.066
7	4.2	38.636
8	4.8	30.8899
9	5.4	34.3362
10	6	33
11	6.6	34.817
12	7.2	42.376
13	7.8	37.7885
14	8.4	47.089
15	9	38.66
16	9.6	39.0411
17	10.2	39.8465
18	10.8	36.0313
19	11.4	37.0533
20	12	33.496
21	12.6	32.9612
22	13.2	33.1885
23	13.8	35.241
24	14.4	37.4705
25	15	37.6252
26	15.6	38.3411
27	16.2	34.872
28	16.8	23.1575





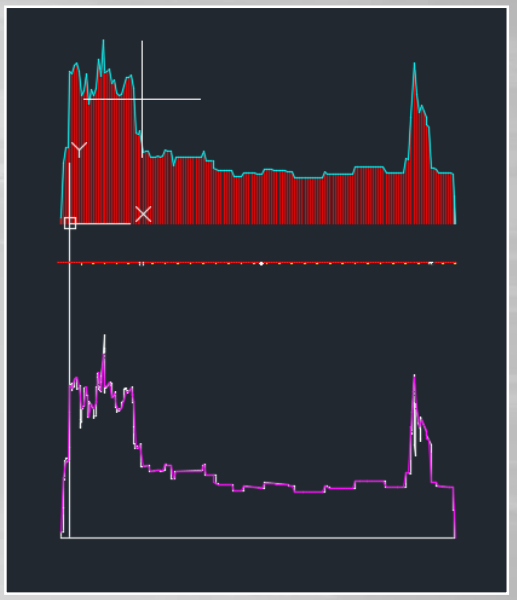
PERMISSIBLE STRENGTH LIMITS

BV No. 01077X

Ship's Name M/V Kleven Flora

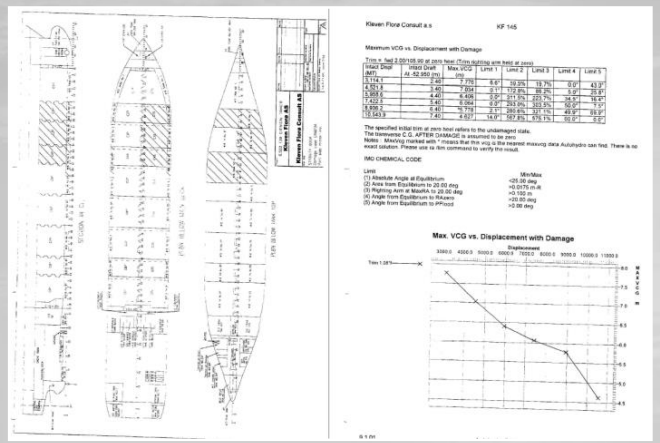
Lpp 105.90 m
B 17.00 m
C 9.15 m

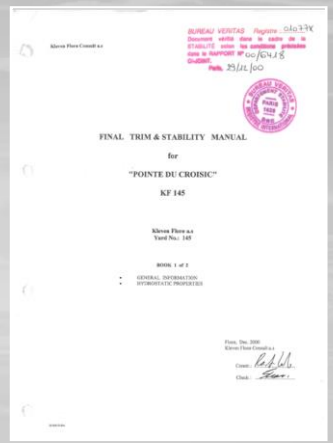
READ OUT FRAME NO.	LONG. POS.	X-Loc. (m)	PERMISSIBLE SHEAR FORCES (kN) Positive Still Water	Positive Harbour	Negative Still Water	Negative Harbour	PERMISSIBLE BENDING MOMENTS (kNm) Hogging Still Water	Hogging Harbour	Sagging Still Water	Sagging Harbour
	A.P.	0.00	18320	18320	-18320	-18320	60000	74079	55000	74079
	0.2 L	21.18	13285	18320	-12607	-18320	300000	370394	275000	370394
37		28.10	24058	29093	-23379	-29093	300000	370394	275000	370394
	0.3 L	31.77	29771	34806	-29093	-34806	300000	370394	275000	370394
43		38.05	30179	34806	-28903	-34806	300000	370394	275000	370394
	0.4 L	42.36	30459	34806	-30459	-34806	300000	370394	275000	370394
46		43.42	30459	34806	-30459	-34806	300000	370394	275000	370394
51		52.37	30459	34806	-30459	-34806	300000	370394	275000	370394
56		61.32	30459	34806	-30459	-34806	300000	370394	275000	370394
	0.6 L	63.54	30459	34806	-30459	-34806	300000	370394	275000	370394
59		66.89	29605	34806	-29131	-34806	300000	370394	275000	370394
	0.7 L	74.13	28586	34806	-25995	-34806	300000	370394	275000	370394
64		75.64	25990	34806	-25995	-34806	300000	370394	275000	370394
68		82.60	28596	34806	-29334	-34806	300000	370394	275000	370394
71		88.17	28596	34806	-29334	-34806	300000	370394	275000	370394
	0.85 L	90.02	28596	34806	-29334	-34806	300000	370394	275000	370394
77		98.29	31831	34806	-32184	-34806	175013	216079	160428	216079
	F.P.	105.90	34806	34806	-34806	-34806	60000	74079	55000	74079

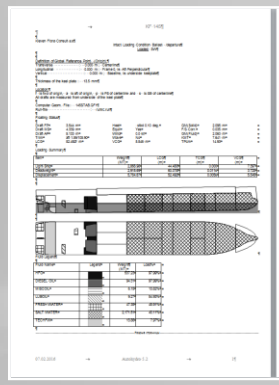


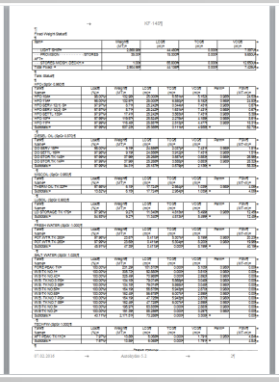
Stability and Damage Stability Booklets

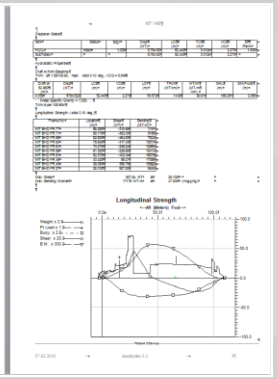
FINAL DAMAGE STABILITY
AND
RESULTING MAXVCG CALCULATIONS
FOR
Kleven Flore
Yard No. 145
BOOK 1 OF 5
EQUILIBRIUM AFTER DAMAGE

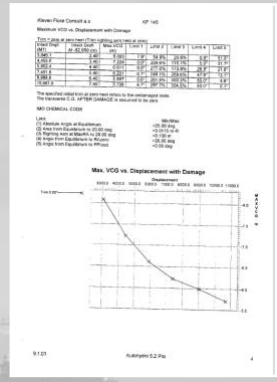

Kleven Flore Consult a.s
KF 145
Maximum VCG vs. Displacement with Damage
Max. VCG vs. Displacement with Damage

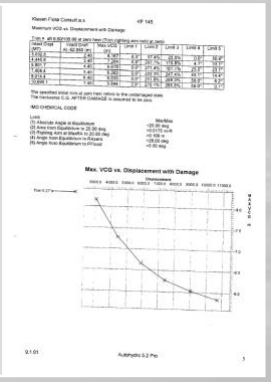

FINAL TRIM & STABILITY MANUAL
for
"POINTE DU CROISIC"
KF 145
Kleven Flore a.s
Yard No.: 145
BOOK 1 of 5
- GENERAL INFORMATION
- HYDROSTATIC PROPERTIES






Longitudinal Strength


Max. VCG vs. Displacement with Damage


Max. VCG vs. Displacement with Damage

Masterload™

Quality

Reliability

Safety

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