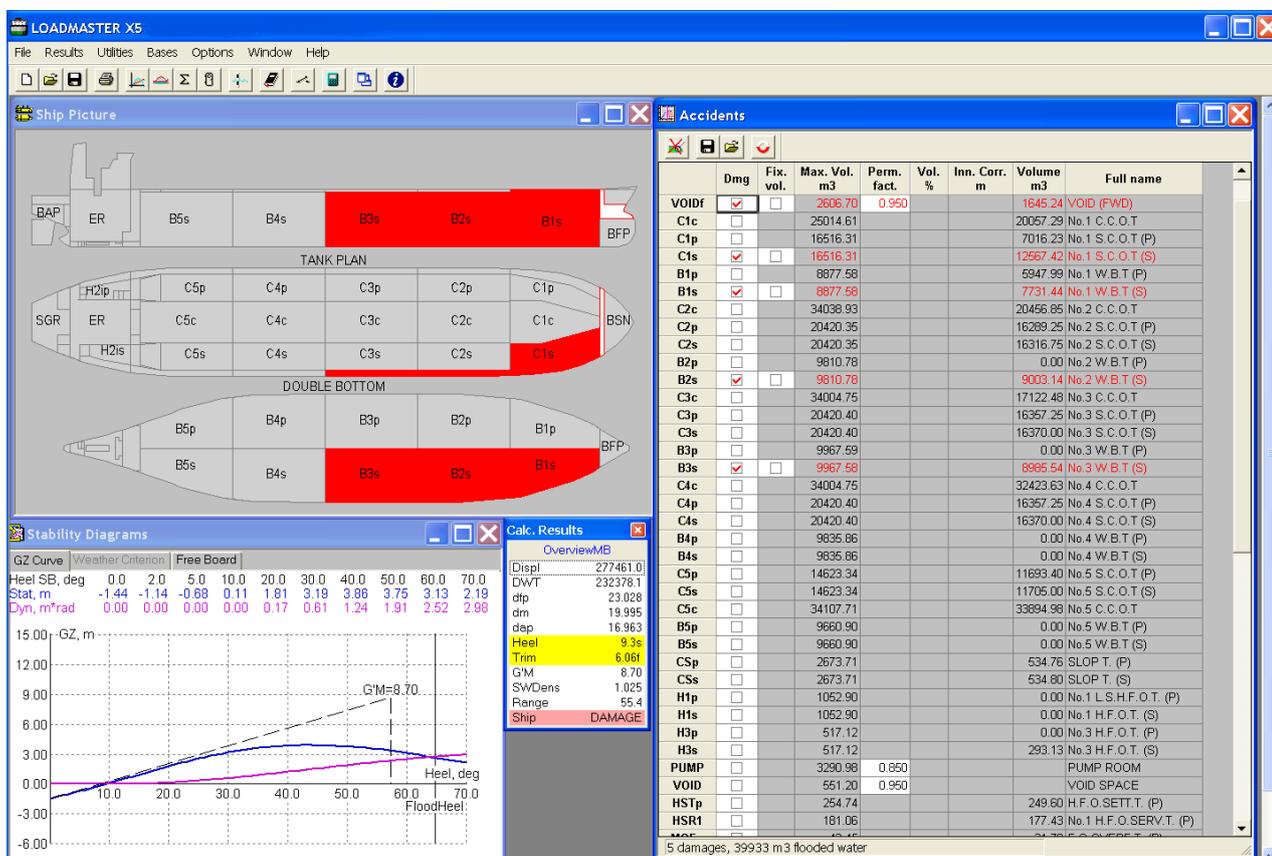


# LOADMASTER® X5

## Damage stability calculation



### General Information

LOADMASTER calculates damage stability using the Lost Buoyancy Method. A 3-D description of the hull as well as the compartments is used in order to find equilibrium. The calculation is in accordance with Classification Societies, IACS UR L5 (Type 3), IMO and MODU.

LOADMASTER calculates trim and stability parameters, which correspond to the final stage of flooding.

All predefined damage cases, corresponding to the vessels damage stability booklet, are calculated instantly. The results are displayed in a matrix. The operator can in addition to the fixed predefined damage cases create his own cases. Any damage case can be selected for a detailed study.

Advice on how to recover stability for damaged vessel can be derived from the recommendations feature within the program.

### 3-D calculation method

For compartments communicating with outside water the volume of water in the compartments is determined by the position of the water line and alters as the vessel heels.

For compartments that do not communicate with outside water and are partly filled, the volume of water in the compartments remain unchanged when vessel heel changes.

The user has the ability to enter a fixed volume in a damaged compartment if applicable.

### Ship's picture

Drawing of the vessel showing one side view as well as one or more horizontal plans. The window is interactive and shows the user visually the compartments that are damaged.

## Damage survey

Immediate calculation of a series of pre-defined damage case as per ships damage stability booklet. In addition any previously user defined damage case is also combined with the vessel's current or fictive condition. A summary of the calculation results is presented. Any of the predefined cases may be selected for a detailed study. The survey report is made for onscreen presentation as well as hard copy. Making IACS UR L5 (TYPE 3) reporting a matter of a mouse click.

## Recommendations

Recommended actions to improve stability after damage. Damaged compartments can be defined with fixed volume and the program will assist the user in finding a pumping sequence that will restore stability.

Name	dfp	dap	Trim	Heel	G'M	G'Zmax	Range	W/Flooded	FBmin	FBpos	FDoor	AreaGZ	FDoorSt
1.12	19.	17.	1.92f	1.2s	9.05	3.35	66.2	20901	9.53	-127.9	10.88	0.5786	8.71
1.11	18.	18.	0.55f	0.3p	9.69	3.63	68.2	10993	9.59	-127.9	10.72	0.6166	9.37
1.21	18.	18.	0.14a	0.8s	9.25	3.40	66.4	32210	9.23	-127.9	10.42	0.5873	7.54
1.22	18.	18.	0.28f	0.4p	9.37	3.48	67.9	16296	9.47	-127.9	10.62	0.5939	9.39
1.23	17.	18.	1.36a	0.3p	9.55	3.54	67.9	28939	9.13	-127.9	10.23	0.6037	8.26
1.24	19.	17.	1.18f	0.2p	8.49	3.15	67.5	48443	9.73	-127.9	10.87	0.5370	7.46
1.31	21.	18.	2.99f	10.2s	9.47	3.42	52.6	40029	3.95	96.8	6.80	0.6333	6.80
1.32	23.	19.	4.89f	0.4p	9.06	3.25	61.3	70113	7.27	41.3	9.22	0.5387	9.20
2.11	19.	17.	1.97f	3.1s	9.59	3.60	63.7	14657	9.37	-127.9	10.12	0.6132	9.84
2.12	21.	17.	3.91f	5.0s	7.58	2.80	60.6	39781	7.31	96.8	9.11	0.4899	7.39
2.21	20.	17.	3.47f	4.8s	7.35	2.62	59.2	74680	7.59	96.8	9.32	0.4671	5.86
7.29	21.	17.	3.29f	0.4s	9.23	3.27	62.0	64231	9.71	-127.9	10.87	0.6022	9.34

Damaged Compartments				Ballast Pump capacity, m3/h	Diesel Pump capacity, m3/h
	Fix. vol.	Time to fix., min	Pump effc m3/h		
C1s	<input checked="" type="checkbox"/>	30	500	1500	300
C2s	<input type="checkbox"/>				
C3s	<input type="checkbox"/>				

	dfp m	dap m	Heel deg	G'M	G'Zmax m	Stab range deg	Min free board m
Initial	17.30	14.01	14.7s	8.35	3.58	55.3	5.84
Allowed			30.00	0.00	0.10	20.0	
Desired			5	10	0.1	20	0

Damaged Compartments				Ballast Pump capacity, m3/h	Diesel Pump capacity, m3/h
	Fix. vol.	Time to fix., min	Pump effc m3/h		
C1s	YES	30	500	1500	300
C2s	NO				
C3s	NO				

#	Action	Volume, m3	Duration, min	dfp, m	dap, m	Heel, deg	G'M,	G'Zmax, m	Range, deg	FBmin, m
Initial				17.30	14.01	14.7s	8.35	3.58	55.3	5.84
1	B5p pump in	6616.4	264.7	16.32	15.66	11.2s	6.70	3.79	58.8	7.09
2	B5s pump in	6379.2	255.2	16.24	16.72	13.3s	9.02	3.65	56.7	5.21
3	B4p pump in	6339.2	253.6	15.57	17.63	10.2s	9.25	3.80	59.6	5.82
Desired				5.0	10.00	0.10	10.00	0.10	20.0	0.00

Elapsed time	773.4									
1	B4s pump in	6159.9	246.4	16.49	18.08	12.6s	11.1	3.57	55.8	4.33

## Stability

Stability parameters and results window for damage condition with automatic check against rules and regulations.

Parameter	Code	Value	Limit
<input checked="" type="checkbox"/> Displacement	Displ	208121.6	
<input checked="" type="checkbox"/> Deadweight	DWT	163038.7	
<input checked="" type="checkbox"/> Draft at FP	dfp	17.302	
<input checked="" type="checkbox"/> Draft at midship	dm	15.658	
<input checked="" type="checkbox"/> Draft at AP	dap	14.013	
<input checked="" type="checkbox"/> Heel	Heel	14.7s	30.0
<input checked="" type="checkbox"/> Trim	Trim	3.29f	
<input checked="" type="checkbox"/> G'M act.	G'M	8.35	>= 0.00
<input checked="" type="checkbox"/> Water density	SWDens	1.025	
<input type="checkbox"/> Flooding heel	FloodHeel	70.0	
<input type="checkbox"/> Flooded water	W/Flooded		
<input type="checkbox"/> Res. buoyancy	Rbuoy		
<input type="checkbox"/> Min. free board	FBmin		
<input type="checkbox"/> Min doors elevation	FDoor		
<input type="checkbox"/> Max. arm	G'Zmax		
<input type="checkbox"/> Heel max. arm	HGZmax		
<input checked="" type="checkbox"/> Stab. range	Range		
<input type="checkbox"/> Area under GZ	AreaGZ		
<input type="checkbox"/> Max. heel stage	HmaxSt		
<input type="checkbox"/> Unprotected heel	Hump		
<input type="checkbox"/> Any heel	Hany		
<input type="checkbox"/> Min doors elevation stage	FDoorSt		

Calc. Results	
C_15	
Displ	208121.6
DWT	163038.7
dfp	17.302f
dm	15.658f
dap	14.013f
Heel	14.7s
Trim	3.29f
G'M	8.35
SWDens	1.025
Range	55.3
Ship	DAMAGE

## Damage reports

LOADMASTER comes equipped with all the necessary reports for fulfilling reporting requirements. To be viewed on screen or printed as hard copy.

Damage Survey - Condition: C\_15

Report: No.1 Group Loaded (G-C=0.8033) Dep.

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Case of Damage	Compartment	Volume	Duration	dfp	dap	Heel	G'M	G'Zmax	Range	FBmin
1.12	C1s, B1s, BFP, BSN, VOIDf									
1.21	C1s, B1s, BFP									
1.22	B1p, B1s, BFP									
1.23	C1s, C1p, C1s, B1p, B1s, BFP									
1.24	B1p, B1s, B1p, B1s, BFP, BSN, VOIDf									
2.1	C1s, C2s, B1s, B2s									
2.11	B1s, B2s									
2.2	C1s, C2s, B1p, B1s, B2p, B2s									
1.12	C1s, B1s, BFP									
1.21	B1p, B1s, BFP									
1.22	C1s, C1p, C1s, B1p, B1s, BFP									
1.23	B1p, B1s, B1p, B1s, BFP, BSN, VOIDf									
2.1	C1s, C2s, B1s, B2s									
2.11	B1s, B2s									
2.2	C1s, C2s, B1p, B1s, B2p, B2s									
1.12	C1s, B1s, BFP									
1.21	B1p, B1s, BFP									
1.22	C1s, C1p, C1s, B1p, B1s, BFP									
1.23	B1p, B1s, B1p, B1s, BFP, BSN, VOIDf									
2.1	C1s, C2s, B1s, B2s									
2.11	B1s, B2s									
2.2	C1s, C2s, B1p, B1s, B2p, B2s									
1.12	C1s, B1s, BFP									
1.21	B1p, B1s, BFP									
1.22	C1s, C1p, C1s, B1p, B1s, BFP									
1.23	B1p, B1s, B1p, B1s, BFP, BSN, VOIDf									
2.1	C1s, C2s, B1s, B2s									
2.11	B1s, B2s									
2.2	C1s, C2s, B1p, B1s, B2p, B2s									
1.12	C1s, B1s, BFP									
1.21	B1p, B1s, BFP									
1.22	C1s, C1p, C1s, B1p, B1s, BFP									
1.23	B1p, B1s, B1p, B1s, BFP, BSN, VOIDf									
2.1	C1s, C2s, B1s, B2s									
2.11	B1s, B2s									
2.2	C1s, C2s, B1p, B1s, B2p, B2s									
1.12	C1s, B1s, BFP									
1.21	B1p, B1s, BFP									
1.22	C1s, C1p, C1s, B1p, B1s, BFP									
1.23	B1p, B1s, B1p, B1s, BFP, BSN, VOIDf									
2.1	C1s, C2s, B1s, B2s									
2.11	B1s, B2s									
2.2	C1s, C2s, B1p, B1s, B2p, B2s									
1.12	C1s, B1s, BFP									
1.21	B1p, B1s, BFP									
1.22	C1s, C1p, C1s, B1p, B1s, BFP									
1.23	B1p, B1s, B1p, B1s, BFP, BSN, VOIDf									
2.1	C1s, C2s, B1s, B2s									
2.11	B1s, B2s									
2.2	C1s, C2s, B1p, B1s, B2p, B2s									
1.12	C1s, B1s, BFP									
1.21	B1p, B1s, BFP									
1.22	C1s, C1p, C1s, B1p, B1s, BFP									
1.23	B1p, B1s, B1p, B1s, BFP, BSN, VOIDf									
2.1	C1s, C2s, B1s, B2s									
2.11	B1s, B2s									
2.2	C1s, C2s, B1p, B1s, B2p, B2s									
1.12	C1s, B1s, BFP									
1.21	B1p, B1s, BFP									
1.22	C1s, C1p, C1s, B1p, B1s, BFP									
1.23	B1p, B1s, B1p, B1s, BFP, BSN, VOIDf									
2.1	C1s, C2s, B1s, B2s									
2.11	B1s, B2s									
2.2	C1s, C2s, B1p, B1s, B2p, B2s									
1.12	C1s, B1s, BFP									
1.21	B1p, B1s, BFP									
1.22	C1s, C1p, C1s, B1p, B1s, BFP									
1.23	B1p, B1s, B1p, B1s, BFP, BSN, VOIDf									
2.1	C1s, C2s, B1s, B2s									
2.11	B1s, B2s									
2.2	C1s, C2s, B1p, B1s, B2p, B2s									
1.12	C1s, B1s, BFP									
1.21	B1p, B1s, BFP									
1.22	C1s, C1p, C1s, B1p, B1s, BFP									
1.23	B1p, B1s, B1p, B1s, BFP, BSN, VOIDf									
2.1	C1s, C2s, B1s, B2s									
2.11	B1s, B2s									