

SOFTWARE FOR NAVAL ARCHITECTS

h



SAPURA RUBI

SapuraKencand

8

Seadrill

.

Professional ship design software with modules for modelling of ships, intact stability and damage stability and much, much more. Naval architects around the world use PIAS on a daily basis to create, calculate and analyze ship designs. PIAS assists in all stages of naval architecture: from the first preliminary sketch up to the final design.



WHAT IS **PIAS?**

What characterizes PIAS?

- PIAS is a toolbox for naval architects.
- PIAS is a product of SARC, created by a team of experienced naval architects with hands-on experience.
- PIAS is used by the vast majority of Dutch design offices and yards and many others worldwide.
- PIAS calculations are accepted by all major classification societies.
- PIAS calculations are presented in comprehensive reports.
- PIAS is fully menu-operated, thus reducing the learning curve and errors associated with software using script programming.
- Continuous developments of new methods, modules and options ensure state-of-the-art software.
- PIAS is modular: only purchase the modules as required; additional modules can be provided overnight.
- Frequent updates.
- Unsurpassed support by trained and experienced naval architects.

- PIAS can deal with:
- single, composed and asymmetric hull forms, catamarans, trimarans, semi-submersibles, and odd shapes.
- actual CoG of fluids in tanks (for heel and trim),
- loss of cargo for open hopper vessels, - loss of tank contents in damage stability
- calculations,
- ducted and controllable pitch propellers,
- (damage) stability in waves,
- user-defined and pre-defined stability criteria,
- etc.



WHAT **CHARACTERIZES** PIAS?

jeest

Sanskip

Samskip

KUNE

- AND





WHICH FUNCTIONS ARE AVAILABLE?

DAMEN



Hull shape modelling

- Input of ordinates, either numerically or by digitizing.
- Import of tables of offsets in various formats.
- Hull surface design by SARC's unique Fairway hull design module.
- Import of geometry from CAD files via Fairway.

Longitudinal strength

- Shear forces, bending and torsional moments.
- Deflection and deviation.

Tanks, compartments and layout

- Integrated tank, compartment, bulkhead, deck and piping modelling.
- Configurable tank sounding /pressure/ullage/ correction tables.

Intact stability

- Integrated management of loading conditions.
- GUI-based definition of tank filling, containers and other types of cargo.
- Actual and allowable grain heeling moments.
- Inclining experiment report with inclinometer option.
- Checks of GZ curves against stability criteria.
- Tables and diagrams of maximum allowable VCG' / minimum required G'M.
- Stability calculations in "frozen waves".



Damage stability

- Easy definition of damage cases.
- Progressive flooding via 'critical points'.
- Intermediate stages of flooding.
- Checks of GZ curves against stability criteria.
- Tables of allowable VCG'.
- Floodable lengths.
- Probabilistic damage stability SOLAS/SPS/ DR67&68.
- RoRo stab 90+50 (Stockholm agreement).

Stability criteria

- Input of criteria using a wide range of variables.
- Predefined sets of standard criteria, and the flexibility to use any combination of non-standard criteria.
- Distinct sets of criteria for intact stability and final or intermediate stages of flooding.
- Maximum allowable anchor chain forces for AHTS's.

Speed and power predictions

- Resistance predictions according to Holtrop & Mennen, Savitsky, van Oortmersen, Hollenbach and others.
- Propeller calculation and optimization for B-series, ducted (Ka and Kd series) and controllable pitch propellers.

Report generation

- Direct, formatted output on Windows devices.
- Integral output (of formatted text and graphs) to Word and Excel.
- Graphs exportable to EPS or DXF.

MODULES

PIAS' FAIRWAY MODULE For ship hull design

What does Fairway do?

- Fairway is software for design, fairing, manipulation of ship hull forms and conversions of models from other design software.
- Using Fairway is much like drafting a lines plan on paper, only better.



How does Fairway work?

- The hull surface is shaped through lines that lie on the surface.
- 3D surface geometry is automatically created on basis of these lines.
- User has full control over line geometry, via coordinates of points, defined tangents, line types, etc.
- Contains versatile fairing options, recreating the use of spline and battens, with user-defined accuracy and stiffness of the spline.
- Changes in line geometry are automatically included in connected lines.
- New lines, following the surface, can be added by the push of a button.

Why is Fairway better than NURBS surface modellers?

- Fairway offers direct control over hull coordinates, as opposed to indirect control via 'network control points', 'vertices', 'nodes', 'master lines' and other artificial phenomenae associated with NURBS surfaces.
- Ship hulls generally require an irregular network of lines to describe them: It will take multiple NURBS surfaces to model even the simplest of ships. Thus, the designer is burdened with manipulation, selection and modification of multiple separate surfaces. In Fairway, the network is just a result of the design process, not the governing principle.

What is Fairway used for?

- Hull form design, starting with a basic shape or a previously defined hull form.
- Hull design guided by a designed sectional area curve, to meet preset hull parameters.
- Design modification at any design stage.
- Hull form transformation and scaling.
- Completion of partial lines plans.
- Shell plate expansions of developable and double curved plates including templates.
- Manipulations on multiple solids for hull, superstructures, bow thrusters, etc.
- Fairing with user-defined accuracy, up to and beyond production tolerances.
- Export of hull form data to downstream, engineering software, Finite Element, CFD, DXF, IGES, VRML, tables of offsets, etc.

- Generation of lines plans and tactile scale models (Rapid Prototyping, 3D printing).
- Import of DXF and IGES wire frame models, as well as IGES NURBS surface models.

Which tools are available in Fairway?

- Views on frames, waterlines and buttocks at any design stage.
- Rendered graphics.
- Generation of frames, buttocks, waterlines and diagonals on user-defined positions.
- Projection of curved lines onto defined models.
- A library of simple curve elements.
- User-defined geometric relations between lines to define bottom rake, fixed shear strake height, etc.
- Hydrostatic analysis, and a direct link to all PIAS' modules for further more complex analyses.
- Automatic modification of the hull to fit developable plates.
- An expandable library of hull models that may be used as start-off for new projects.
- Scaling, frame shifting, 'point-based deformations'.





PIAS' LOADING MODULE

For intact and damage stability and longitudinal strength

What is Loading designed for?

- For integrated management of loading conditions, tank fillings and cargo loads.
- For fast, intuitive and easy determination and assessment of load cases.
- To be identical to and compatible with SARC's LOCOPIAS on-board loading software, so that the same options and results are guaranteed in both the design and the operational phase of the vessel.



Autore White/ads														-
-	10			- tent	1	•1	-							Y
tians .	Civilia	Tate	West of the other	VCS	LCO LCO	Torres of the local division of the local di	File	FORTIGE	Vields pred	•	sw	VARM	Uber	in the second se
-Vilded allest	1000		LTIC-LTI	1000	1000	10000	7 9 10	a or de la calera	C VINH AND	10.10	100	COLUMN 1		1000
1 FF 105 CL	2	forth .	1.000	140	128.045	0.000	3.008	Burn lanktable	 Waterbalant 	8.00	1 100	8 908		129.1
42 DB 3 099 CL		lark.	145-125	8-500	80.129	0.000	1.008	North Carlidual Ar	 Waterhalant 	9.85.00.	1.025	945-003		85.0
41 LT 3 708 PG	1	1819	204.799	1.947	89.215	-0.244	1.008	Brone Sanstables	 Wateballet 	590.00	1.005	228 994		. 82.9
AF FLY YAR OB	4	5414	204.219	1.947	89,211	6.544	0.009	Anal Paragonal	· vraterbalast	190 W.	1.995	647 794		94.5
12 APR 4 WE PS	4	-	20.0	1.229		44.79	1.000	BALLE INCOME.	Villagender	190.00	1.049.	200.006		. 95
10 04 1 0 8 28	4	-	174,040	1.474	20.000		7.805	BALLE PROPERTY.	viatorialization.	199.00	1000	808.304		- 25
to be think with	4	1018	104.070	8.452	40 135	-1007		and at a	-	-	1.125	100 008		
J CIT WEICL	4	Ser.		4 783	125-301	0.000	1.1		and the second s		1.82	310 578		- 49.9
20 06 5 168 36	÷	-	117.000		49.135	1.479			Server Value		1.95	114.121		
51 NU 1 NU P	4	100	100.041	5.225	49 133	4871	- DOT		Visite Contraction		1.182	514 828		- 19
22 UPT O NUM SIM	6	100	100.041	1.000	40 113	1072		f perpendicular	10541 Marriel		1.185	104 626		- 51
An owner was and	-A	100	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	1.004	21.407		1000	and the sheet which make	4.545 Bellet		1.385	100.000		- 62.4
24 24 4 100 50		1978	101.462	1.414	- 21,299	5.087		144	4 000 LTL MOVE		1.185	108.762		- 81
25 251 6 258 P.S.		500	208.013	8.405	33 382	-0.672	1 1 1 1 1		diffe made		1.100	202,808		- 66
28 OVT & FOR DR.	4		2. 200.013		10.962	0.872		a second	0 191 Augri	au 122	1.122	100.000		
21 10 102 02	4	10.0	1 1000	4.502		0.800			2.506 meter		1.145	0.000		2.4
20 10* 110 20				e		0.000					1.100	0.000		2.4
S DE L'HE GA	- E					0.000		_		_	1.122	200.000		
4 L1 1 WE PD	A	26.8	N			1.0.20	1 000	Sector Sector Sector	101 million and and	440.04	100	111.301		7,78 9
5 LT 1 W0 20		100	- A - A			0.240	1.008	BUTS SPREAM	state of a second second	900.00	100	211 301		700
S LW 2 FPB CA.			- 2 L L	Contract of		0.000	2.008	1010 1010200	ST BEAUTIMENT		1.000	1041142		- 21
1 LI I WEPD	-	- 104	- S - S	C100		-7879	1.009	NUM STOCKER	VIRGINARY	100.00	-190	100 412		
E LI I WE DE	-	208		acted 11.		1.64	1009	9079 52795208	- VIRPORT	100.00	1042	100 -00	-	26.5
20.00.05		100				1.647	21.845	Room humbhaltable	40.1	14 00	0.900	15 724		8.0
11 00 55		and a		-		7.50	21486	Rear Institution		88.00	0.900	81 783		17.0
12 00 04/1 05	-	-	1 1 1 1 1	8 567	1 8 8 5 5	A 175	4.547	Secon Local dial		95.00	0.500	4 474		
10 00 041 2 05	-	-	6.537	8 282	5 500	1850	1.293	Boots target aller	00	81.06	0.900	7.156		5.0
and an and a second second	-	_	799.251	100	-	COLUMN 1	TRACING.	Pict (President	of the local division of	10.00	1000	COLUMN 1	_	_
40 HED MO PS		144	102 711	1 345	79.415	.0.400	2 009	Rom tanétatika	1 40	9.00.00	0.955	812 327		P3.0
41 HEO MID SE		term.	172 741	3 724	79.587	1-642	1,008	Secre tankigide	1 180	980.00	0.950	404 612		P2.0
AT HER CHERE CL		Term	- 1.644	5.670	80.694	0.619	11098	North Tariad at Ar	HED 1	10.00	0.040	3100		79.0
AT DR & HED PE	2	large.	201 064	1.4.00	65.101		1228.849	Warm Livish dido	1 10 1	80.00	0.040	213 791		58.1
44 DB 4 MIC 58	2	lane.	1. 184 798	0.454	45.501	6.875	460.2993	Borts lariet.et.du	+ HO	80.00	0 160	942 188		88.1
45 HPO SETTLIANS PS	2	lank.	40.007	8.407	10,005	-5.908	35.479	Burn laristatile	4 100	88.00	0 350	42.229		12.4
AD HEO DAY PB	2	Sarih .	23 843	8.049	18 400	-0.241	8.788	Burn lankbabler	+ #0	86 (0)	5 #50	24107		12.4
40	-		18 375	8.797	10 212	200	4.794		- <u></u>	98.00	0 900	43.148		
BD LO CINC CL		Serie .	1, 11226	1.394	05.609	0.800	2.301	Non landake	4 60 1	. 95 00.	0.800	12.476		10.2
RT LOME STORE PS	2	5444	16-297	4.001	0.567	-7220	1.545	North Inviduality	1 10 1	98.00	0.909	18 805		7.0
52 LO AL STORE 18	2	Term.	3.7%	8 241	4.300	4.579	0.187	www.tanadacan	+ +0 :	. 98.00,	0 300	8128		4.2

Which tools are present in Loading?

- GUI-based definition of tank filling, containers, grain and other types of cargo.
- Computation of intact stability, and verification against stability requirements.
- Large number of pre-programmed standard stability criteria for intact and damage stability, and configurable requirements for specific criteria.
- Effects of grain moments, and loss of crane load.
- Maximum allowable VCG.
- Computation of shear forces, bending moments and damage stability and verification against criteria.
- The Ballast advice option for automatic determination of optimal quantity and distribution of ballast water.
- Specific GUI's for loading of tanks, containers, grain and crane operations.
- Polar diagram or allowable chain forces for anchor handlers.

PIAS' LAYOUT MODULE

For design of the internal geometry of ships.

What is Layout designed for?

- Design and utilization of internal geometry, that means for bulkheads, decks, tanks and compartments.
- To offer the ship designer a versatile tool which manages spaces (compartments), planes (bulkheads and decks) and addresses the duality between them.



PIAS' PROBDAM MODULE

For computation and optimization of probabilistic damage stability



MODULES

Which tools are present in Layout?

- Tank modelling and visualization.
- Automatic generation of spaces between bulkheads and decks.
- Tank definitions relate to the defined hull, so changes in the hull are automatically reflected in the compartments.
- Modelling of sounding pipes, pressure gauges and overfill sensors.
- Tank sounding or ullage tables, tank pressure tables, trim correction tables, and more.
- Integrated piping system design and modelling.

Which interfacing and collaboration options are supported by Layout?

- Composition of subdivision plan to be used as framework for general arrangement and tank plans - and export to DXF or EPS formats.
- Instantaneous exchange of model data with CADMATIC hull.

What is Probdam designed for?

- To offer the ship designer the shortest way from ship design to probabilistic damage stability results.
- To rely on conventional naval architectural entities, instead of theoretical, artificial constructs.

Which tools are available in Probdam?

- Automated generation of damage cases.
- Four different computation methods, to suit different needs for different purposes.
- Automated determination of damage boundaries.
- Automated calculation of attained index.
- Optimization of VCG' values to meet required subdivision index R exactly.
- Multiple settings and calculation schemes to comply with authorities' preferences.



ADDRESS Landstraat 5 1404 JD Bussum The Netherlands +31 85 040 90 40 sarc@sarc.nl

MARITIME SOFTWARE AND SERVICES

www.sarc.nl

1)

11/1-