SARC
MARITIME SOFTWARE AND SERVICES

Newsletter on PIAS and LOCOPIAS functionality extensions

As released between January 2019 and January 2020

Introduction

This newsletter summarizes some major enhancements of (LOCO)PIAS since the previous overview from January 2019. Individual release notes are also published on the website and in LinkedIn group SARC BV around the moment of release, however, an additional comprehensive collection from time to time is considered to be appropriate for archiving purposes. Another source of PIAS news is the SARC users' days, of which we hope to organize one again later this year.

In the previous newsletter it was announced that the PIAS' renewal process, which started in 2012, was about to be finalized. With the release of the August 20 version this chapter has been closed.

In this year will our development team will again work on numerous smaller and larger tasks. Significant enhancements will be an alternative method for damage stability computation (including the effect of flooding through the pipes which can be defined now in Layout), and a redesign of the data structure and parts of the user interface of Loading.

Support

Since August last year, we have been using the e-mail address support@sarc.nl for all your questions regarding PIAS and LOCOPIAS. All of our team have backgrounds in design, engineering and naval architecture so we understand exactly what you want to achieve with the software and the challenges you face. Giving customers the confidence and assurance that their support issues will be dealt with in a prompt and efficient manner.

With the help of our new system we hope to answer even faster and you will have a number to refer to in further correspondence. We have also expanded the support page on our website (https://www.sarc.nl/support/) a little bit, because at the bottom you can find an input form for your question so we have as much information as possible to answer your question.

You can also visit our context-sensitive help reader by pressing F1 in (LOCO)PIAS. In addition, we will be posting more and more short videos on YouTube in the near future to help you with our software.

Training

Being experts in the field of many aspects covered by our software, SARC shares its knowledge by means of courses or training. These can either be given at SARC's office in Bussum, or on-site at the client's premises. Course subjects have been in the past: Probabilistic damage stability explained, The fundamentals of damage stability, Loading optimization in practice, Hands-on training in hull form design, Intact and damage stability for Inland Waterway vessels and many more. Our naval experts provide trainings in English, Dutch and German. Feel free to send us an email at sarc@sarc.nl or call us at +31 85 040 9040 for more information.

Feb 15, 2019

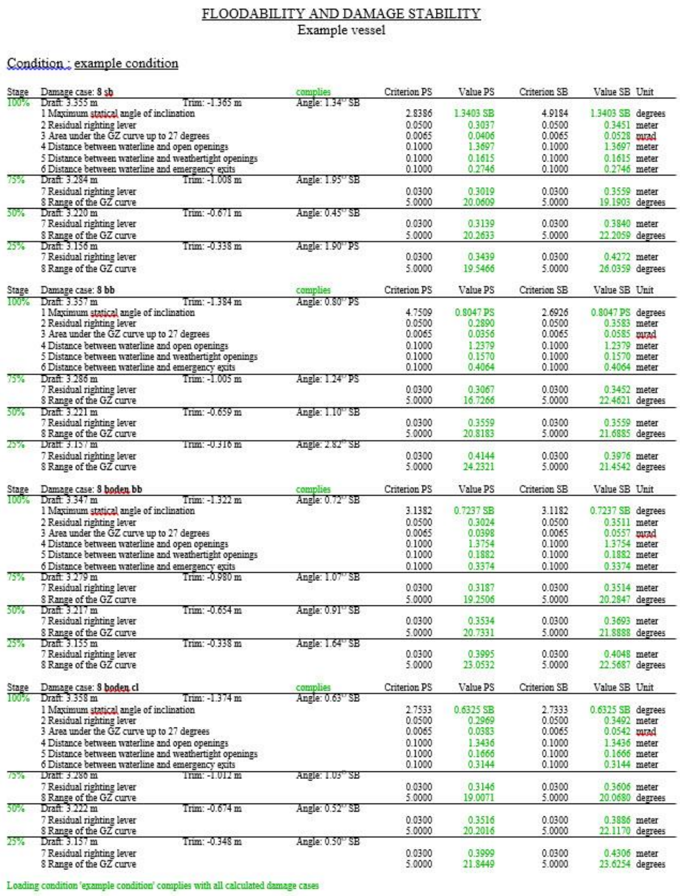
Enhanced conversion from Fairway to PIAS

Multiple solids and/or wireframes combined into one main hull. Benefit: design or combine separate aft and bow into one PIAS hull.

Mar 27, 2019

Output of damage stability (summary)

The output of damage stability (summary) has been given a makeover and has become much shorter than before. This output can also be imported into Microsoft Word or Excel to edit it yourself. For each damage case it is now possible to see briefly and clearly whether this case is complies or not. The complete output has remained unchanged and everything can be found there down to the last detail.



FLOODABILITY AND DAMAGE STABILITY
Example vessel

Condition : example condition

Stage	Damage case: 8 sb		complies	Criterion PS	Value PS	Criterion SB	Value SB	Unit
100%	Draft: 3.355 m	Trim: -1.365 m	Angle: 1.34° SB					
	1 Maximum statical angle of inclination			2.8386	1.3403 SB	4.9184	1.3403 SB	degrees
	2 Residual righting lever			0.0500	0.3037	0.0500	0.3451	meter
	3 Area under the GZ curve up to 27 degrees			0.0065	0.0406	0.0065	0.0528	mrad
	4 Distance between waterline and open openings			0.1000	1.3697	0.1000	1.3697	meter
	5 Distance between waterline and weathertight openings			0.1000	0.1615	0.1000	0.1615	meter
	6 Distance between waterline and emergency exits			0.1000	0.2746	0.1000	0.2746	meter
75%	Draft: 3.284 m	Trim: -1.008 m	Angle: 1.95° SB					
	7 Residual righting lever			0.0300	0.3019	0.0300	0.3559	meter
	8 Range of the GZ curve			5.0000	20.0609	5.0000	19.1903	degrees
50%	Draft: 3.220 m	Trim: -0.671 m	Angle: 0.45° SB					
	7 Residual righting lever			0.0300	0.3139	0.0300	0.3840	meter
	8 Range of the GZ curve			5.0000	20.2633	5.0000	22.2059	degrees
25%	Draft: 3.156 m	Trim: -0.338 m	Angle: 1.90° PS					
	7 Residual righting lever			0.0300	0.3439	0.0300	0.4272	meter
	8 Range of the GZ curve			5.0000	19.5466	5.0000	26.0359	degrees
Stage	Damage case: 8 bb		complies	Criterion PS	Value PS	Criterion SB	Value SB	Unit
100%	Draft: 3.357 m	Trim: -1.384 m	Angle: 0.80° PS					
	1 Maximum statical angle of inclination			4.7509	0.8047 PS	2.6926	0.8047 PS	degrees
	2 Residual righting lever			0.0500	0.2890	0.0500	0.3583	meter
	3 Area under the GZ curve up to 27 degrees			0.0065	0.0356	0.0065	0.0585	mrad
	4 Distance between waterline and open openings			0.1000	1.2379	0.1000	1.2379	meter
	5 Distance between waterline and weathertight openings			0.1000	0.1570	0.1000	0.1570	meter
	6 Distance between waterline and emergency exits			0.1000	0.4064	0.1000	0.4064	meter
75%	Draft: 3.286 m	Trim: -1.005 m	Angle: 1.24° PS					
	7 Residual righting lever			0.0300	0.3067	0.0300	0.3452	meter
	8 Range of the GZ curve			5.0000	16.7266	5.0000	22.4621	degrees
50%	Draft: 3.221 m	Trim: -0.659 m	Angle: 1.10° SB					
	7 Residual righting lever			0.0300	0.3559	0.0300	0.3559	meter
	8 Range of the GZ curve			5.0000	20.8183	5.0000	21.6885	degrees
25%	Draft: 3.157 m	Trim: -0.316 m	Angle: 2.82° SB					
	7 Residual righting lever			0.0300	0.4144	0.0300	0.3976	meter
	8 Range of the GZ curve			5.0000	24.2321	5.0000	21.4542	degrees
Stage	Damage case: 8 boden bb		complies	Criterion PS	Value PS	Criterion SB	Value SB	Unit
100%	Draft: 3.347 m	Trim: -1.322 m	Angle: 0.72° SB					
	1 Maximum statical angle of inclination			3.1382	0.7237 SB	3.1182	0.7237 SB	degrees
	2 Residual righting lever			0.0500	0.3024	0.0500	0.3511	meter
	3 Area under the GZ curve up to 27 degrees			0.0065	0.0398	0.0065	0.0557	mrad
	4 Distance between waterline and open openings			0.1000	1.3754	0.1000	1.3754	meter
	5 Distance between waterline and weathertight openings			0.1000	0.1882	0.1000	0.1882	meter
	6 Distance between waterline and emergency exits			0.1000	0.3374	0.1000	0.3374	meter
75%	Draft: 3.279 m	Trim: -0.980 m	Angle: 1.07° SB					
	7 Residual righting lever			0.0300	0.3187	0.0300	0.3514	meter
	8 Range of the GZ curve			5.0000	19.2506	5.0000	20.2847	degrees
50%	Draft: 3.217 m	Trim: -0.654 m	Angle: 0.91° SB					
	7 Residual righting lever			0.0300	0.3534	0.0300	0.3693	meter
	8 Range of the GZ curve			5.0000	20.7331	5.0000	21.8888	degrees
25%	Draft: 3.155 m	Trim: -0.338 m	Angle: 1.64° SB					
	7 Residual righting lever			0.0300	0.3995	0.0300	0.4048	meter
	8 Range of the GZ curve			5.0000	23.0532	5.0000	22.5687	degrees
Stage	Damage case: 8 boden cl		complies	Criterion PS	Value PS	Criterion SB	Value SB	Unit
100%	Draft: 3.358 m	Trim: -1.374 m	Angle: 0.63° SB					
	1 Maximum statical angle of inclination			2.7533	0.6325 SB	2.7333	0.6325 SB	degrees
	2 Residual righting lever			0.0500	0.2969	0.0500	0.3492	meter
	3 Area under the GZ curve up to 27 degrees			0.0065	0.0383	0.0065	0.0542	mrad
	4 Distance between waterline and open openings			0.1000	1.3436	0.1000	1.3436	meter
	5 Distance between waterline and weathertight openings			0.1000	0.1666	0.1000	0.1666	meter
	6 Distance between waterline and emergency exits			0.1000	0.3144	0.1000	0.3144	meter
75%	Draft: 3.286 m	Trim: -1.012 m	Angle: 1.03° SB					
	7 Residual righting lever			0.0300	0.3146	0.0300	0.3606	meter
	8 Range of the GZ curve			5.0000	19.0071	5.0000	20.0680	degrees
50%	Draft: 3.222 m	Trim: -0.674 m	Angle: 0.52° SB					
	7 Residual righting lever			0.0300	0.3516	0.0300	0.3886	meter
	8 Range of the GZ curve			5.0000	20.2016	5.0000	22.1170	degrees
25%	Draft: 3.157 m	Trim: -0.348 m	Angle: 0.50° SB					
	7 Residual righting lever			0.0300	0.3999	0.0300	0.4306	meter
	8 Range of the GZ curve			5.0000	21.8449	5.0000	23.6254	degrees

Loading condition 'example condition' complies with all calculated damage cases

Fig.1 Summary output of damage stability

April 9, 2019

Direct computation of tank volume during definition of tank geometry

When designing or defining a ship for some tanks or compartments target capacities apply. In those cases it will be convenient to have permanent feedback on the actual volume of a compartment. This feature is now available in PIAS' Layout module.

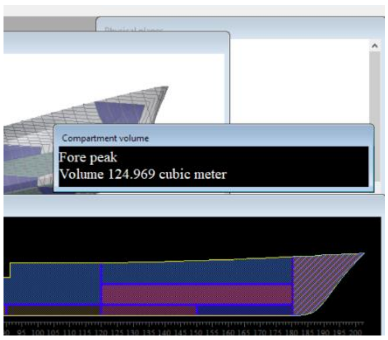


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Fig.2 Compartment volume in Layout.

May 31, 2019

PIAS' Probdam module updated with SOLAS 2020 requirements

On June 15, 2018 IMO adopted resolution MSC.421(98), titled "Amendments to the International Convention for the Safety of Life at Sea". With respect to probabilistic damage stability, this encompasses:

- A change of the required subdivision index for passenger vessels.
- Changes in the formula for the probability of survival, applicable to damage cases that involve a ro-ro space.

PIAS module Probdam has been extended with these changes and is currently being tested. From July 1, 2019 this functionality is available for all users of Probdam.

August 20, 2019

Computations without the Compart detour

Those who followed the newsletters of the past years will have noticed that PIAS has seriously been revised and modernized.
An important topic in this process has been the replacement of Compart with the Layout module. However, PIAS modules using compartment data were still based on the Compart data format, so Layout stored the compartment data both in native Layout format, as well as in Compart format. For the user this was invisible, so as such it was no real objection, but this duality obstructs further software developments. For this reason, all modules of PIAS have been adapted to native Layout format. This new software has been in use within SARC for some time, and has been intensively tested, so we consider it now to be the time for a general release. Actually, you will not see any change in operation of PIAS, although compart-related computations (such as damage stability) might occasionally give marginally different results with the new software. Please be assured that, thanks to the enhanced compartment definition method of Layout, differences — if they occur at all — will be in the direction of increased accuracy.
Compart has been removed from the set of PIAS modules. An act that we will perform with some melancholy because this piece of software has since 1985 served thousands of PIAS users with modelling and computations of an estimated million tanks, holds and spaces.

August 21, 2019

Implementation of Intact Stability Code 2020 allowable anchor handling forces

IMO Intact Stability Code is in its 2020 version extended to include a section 2.7, "Ships engaged in anchor handling operations". These have now been added to the rule set of PIAS' Maxchain module, as well as in the polar plots of LOCOPIAS.

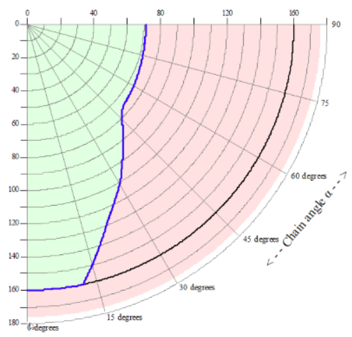


Fig 3. Polar plot of maximum allowable anchor chain force, according to intact Stability Code 2020

September 17, 2019

New feature in Layout: weight and Centers of Gravity of planes

It will be well known that for the definition of spaces and compartments in PIAS, the 'physical planes' provide a very efficient modelling tool. Obviously, these planes will in practice be used to model bulkheads and decks.
Recently, the data storage of the physical planes has been enhanced to include a specific weight (which is the average weight of the plane in ton/m^2). This is used in a new feature, labelled 'Area table', which includes for each plane its area, CoG and weight. At the end of the table total weight and CoG is listed. Although this table provides only a rough approximation of the internal steel hull weight, it is still a useful tool in the early design stage, because it is so tightly integrated with the design model of the internal geometry. At present, the shell weight is not included in this list, although the weight and CoG of the shell plates can be computed with the shell plate expansion function of Fairway.

Example table:

AREAS AND CENTRES OF GRAVITY OF PHYSICAL PLANES

Physical plane	**Area**	**LCG**	**TCG**	**VCG**	**Weight/m²**	**Weight**
	m^2	m	m	m	ton/m²	ton
Transverse bulkhead 5.000	32.62	5.000	-0.000	4.345	0.0750	2.45
Transverse bulkhead 20.000	46.19	20.000	-0.000	3.827	0.0750	3.46
Forepeak bulkhead	25.69	90.000	-0.000	6.296	0.0750	1.93
Deck 1.750	512.16	49.534	-0.000	1.750	0.0624	31.96
Transverse bulkhead 60.000	31.42	60.000	-0.000	3.427	0.0750	2.36
Deck 5.000	208.88	72.109	-0.000	5.000	0.0780	16.29
Transverse bulkhead 75.000	5.68	75.000	-0.000	1.091	0.0750	0.43
Transverse bulkhead 60.000	10.10	60.000	-0.000	1.045	0.0750	0.76
Transverse bulkhead 45.000	11.48	45.000	-0.000	1.077	0.1030	1.18
Longitudinal bulkhead 0.000	36.18	34.025	0.000	0.990	0.0750	2.71
Deck 3.000	139.40	12.707	-0.000	3.000	0.0750	10.45
Longitudinal bulkhead 0.000	17.43	2.418	0.000	4.360	0.0750	1.31
Transverse bulkhead 3.000	15.58	3.000	2.351	4.405	0.0750	1.17
Total	**1092.80**	**45.996**	**0.036**	**2.994**		**76.45**

The total centre of gravity is the weight centre of gravity.

October 17, 2019

New tool bar buttons in Fairway

A select set of frequently used functions in Fairway are now just one click away, directly accessible from the new tool bars. Tool bars in Fairway can be rearranged by dragging them to a different location around the drawing area, or floating anywhere on top of the drawing area. Individual tool bars can be hidden and shown by right-clicking on the tool bar area or from the [Window -> Tool Bars] menu. Users that prefer to activate functions using <Alt> key combinations instead may be interested to switch all tool bars off, which will give them a bigger drawing area.

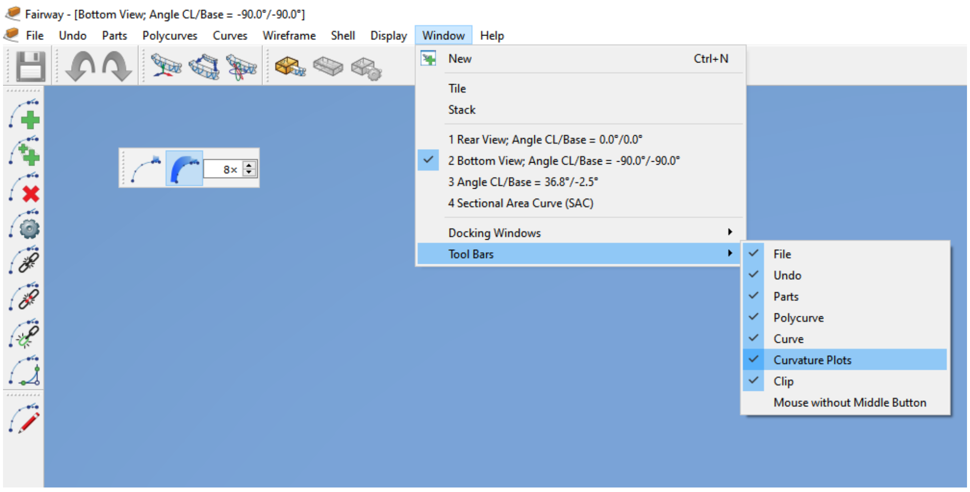
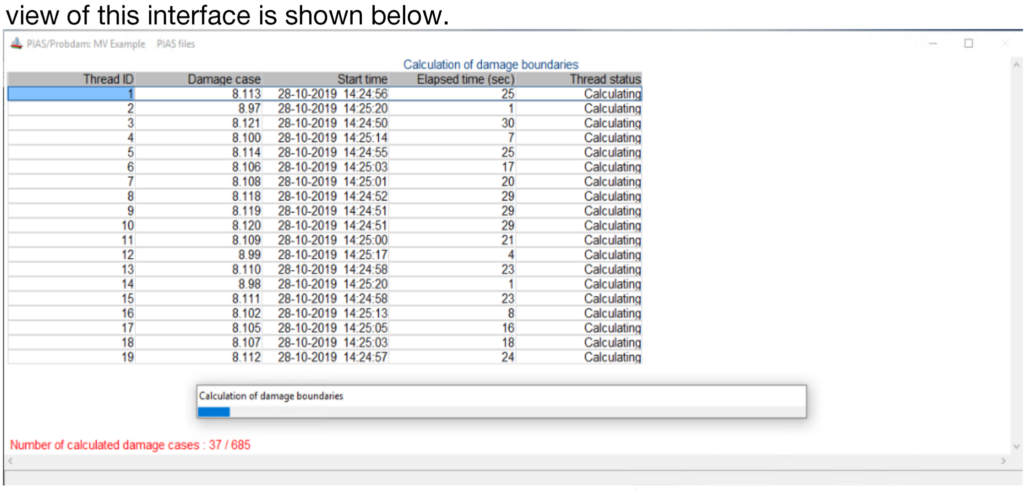


Fig.4 New icons for frequently used functions in Fairway.

October 21, 2019

PIAS thread monitoring interface

To speed up time consuming calculations (more specific, parts of the probabilistic damage stability calculations), PIAS uses parallelization of the calculation process where possible. For example the generation of damage cases and the calculation of damage boundaries is multithreaded.
Multithreading in PIAS is available as dual-threading (up to 2 cores), Octo-threading (up to 8 cores) and will be available soon in Viginty-threading (up to 20 cores).
Up till now, the feedback of the application during the calculation progress was limited. In order to provide some insight on the status of lengthy computations, PIAS has been extended with a thread monitoring interface. This gives detailed information on the status of the available, and working threads. A screen view of this interface is shown below.



Thread ID	Damage case	Start time	Elapsed time (sec)	Thread status
1	8.113	28-10-2019 14:24:56	25	Calculating
2	8.97	28-10-2019 14:25:20	1	Calculating
3	8.121	28-10-2019 14:24:50	30	Calculating
4	8.100	28-10-2019 14:25:14	7	Calculating
5	8.114	28-10-2019 14:24:55	25	Calculating
6	8.106	28-10-2019 14:25:03	17	Calculating
7	8.108	28-10-2019 14:25:01	20	Calculating
8	8.118	28-10-2019 14:24:52	29	Calculating
9	8.119	28-10-2019 14:24:51	29	Calculating
10	8.120	28-10-2019 14:24:51	29	Calculating
11	8.109	28-10-2019 14:25:00	21	Calculating
12	8.99	28-10-2019 14:25:17	4	Calculating
13	8.110	28-10-2019 14:24:58	23	Calculating
14	8.98	28-10-2019 14:25:20	1	Calculating
15	8.111	28-10-2019 14:24:58	23	Calculating
16	8.102	28-10-2019 14:25:13	8	Calculating
17	8.105	28-10-2019 14:25:05	16	Calculating
18	8.107	28-10-2019 14:25:03	18	Calculating
19	8.112	28-10-2019 14:24:57	24	Calculating

Calculation of damage boundaries

Number of calculated damage cases : 37 / 685

Fig.5 Thread monitoring interface.

December 16, 2019

Resist shallow-water correction

The PIAS module Resist, which can predict resistances of different ship types with nine published empirical methods, has been expanded with a shallow-water correction. The implemented method is based on *H.C. Raven, "A new correction procedure for shallow-water effects in ship speed trials", Proceedings of PRADS2016 (2016), Copenhagen, Denmark*. In 2017 the ITTC has accepted this method, and now it can be used in Resist to predict the increase in resistance when sailing in shallow waters.

V knots	V m/s	Froude	FnD	Rvisc KN	Rv,add KN	Rres KN	Rapp KN	Rmodel KN	Rs,add KN	Rtotal KN	EHP KW
6.00	3.09	0.107	0.387	16.65	2.38	0.57	0.00	3.64	0.29	23.57	72.7
6.50	3.34	0.116	0.419	19.33	2.76	1.28	0.00	4.28	0.42	28.11	94.0
7.00	3.60	0.125	0.451	22.19	3.17	2.56	0.00	4.96	0.59	33.54	120.7
7.50	3.86	0.134	0.483	25.24	3.60	4.69	0.00	5.69	0.84	40.15	154.8
8.00	4.12	0.143	0.515	28.47	4.07	7.99	0.00	6.48	1.18	48.29	198.7
8.50	4.37	0.152	0.548	31.88	4.55	12.83	0.00	7.31	1.65	58.38	255.2
9.00	4.63	0.161	0.580	35.47	5.07	19.60	0.00	8.20	2.33	70.84	327.9
9.50	4.89	0.170	0.612	39.23	5.60	28.68	0.00	9.13	3.27	86.16	421.0
10.00	5.14	0.179	0.644	43.18	6.17	40.48	0.00	10.12	4.59	104.83	539.2

Fig.6: Output table of Resist with the shallow-water correction enabled. Marked in red are the newly calculated resistance components, the additional viscous resistance due to shallow water Rv,add and the additional resistance due to sinkage in shallow-water conditions Rs,add.

January 6, 2020

Automated processing of appendages

Since its childhood, PIAS had the feature of an easy definition of upper appendages, such as deckhouses or camber, where manual commands were used to explicitly add or remove the appendages to or from the hullform. With the latest PIAS version this user command is not required anymore; once appendages have been defined, they will automatically be incorporated in the hullform, in accordance with their most recent definition.

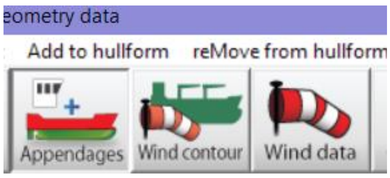


Fig.7 Appendages options in Hulldef.

Please be aware that in order to accommodate this new *modus operandi*, the file format containing the frame shapes has been updated. As usual with PIAS, conversion from old to new format is done automatically, without user intervention. However, it will be evident that elder PIAS version cannot read the new format, so in order to be prepared for the new format it is recommended to download and install the most recent PIAS version.

January 23, 2020

Former "Rhine" calculations now integrated Hulldef/Hydrotables

Container ships navigating the major European inland waterways should comply with the ES-TRIN 2017/1 standard. Since the 1980s PIAS contains a dedicated module, named Rhine, for this regulation (and its predecessors). This module has now been discarded, for all its functions have been relocated to other PIAS modules.
All input can now be done with Hulldef, the applicable stability criteria can be set in the regular fashion, while Hydrotables will produce the required table of maximum allowable VCG.
As alternative to the approximation formulae from ES-TRIN, it is now also possible to compute the maximum VCG with direct calculations on basis of the foundational stability criteria.