

## Newsletter on PIAS and LOCOPIAS functionality extensions

As released between January 2020 and July 2021

### Introduction

This newsletter summarizes some major enhancements of (LOCO)PIAS since the previous overview from January 2020. 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 next year.

This year our development team will again work on numerous smaller and larger tasks. Significant enhancements will be:

- A new Loading data structure, giving room to much more information (and, e.g., longer names for weight items).
- An integrated damage cases menu and data structure, to be applied by all modules performing damage stability (i.e. Loading, Hydrotables and Probdam).
- Intermediate stages of flooding generated by flow through the pipes ([as defined in Layout](#)). This will be a completely new subsystem, as an alternative to conventional PIAS' "complex stages of flooding" mechanism.
- A set of menus to define container-specific data — such as casting locations and bay/row/tier positions — which will allow PIAS users to also use the new container module. After all, while the container module was designed for LOCOPIAS, it can still be a valuable tool in the ship design stage as well.
- Container lashing in LOCOPIAS.

### Online training

Being experts in the field of many aspects covered by our software, SARC shares its knowledge by means of courses or training. Due to the global pandemic, the development of online course material has been given a high priority. Initially, we want to help the novice user to get started in PIAS. We want to share the course with anyone who is interested in it in the autumn of this year. Feel free to send us an email at [sarc@sarc.nl](mailto:sarc@sarc.nl) or call us at +31 85 040 9040 for more information.

These can also be given at SARC's office in Bussum, or on-site at the client's premises. Especially the complicated items lend themselves very well to a training where everyone is physically present so that each trainee gets enough attention. 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.

Feb 11, 2020

## New PIAS menu

The PIAS menu has been modified, all modules are now collected into a single window. New additions are buttons to read latest PIAS news, check PIAS' version number and open the manual.

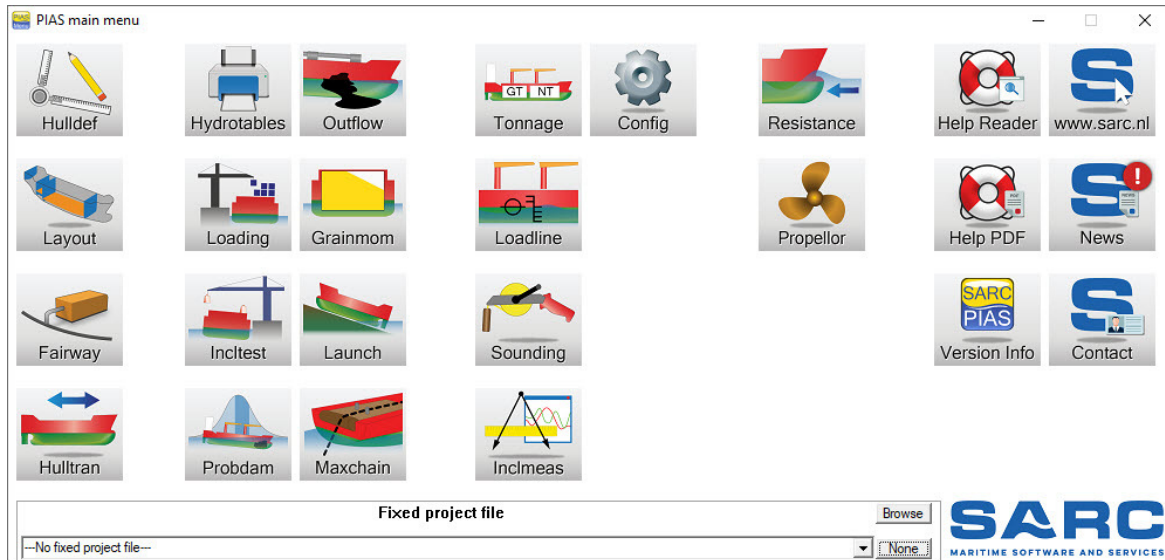


Fig.1 New PIAS menu

Feb 27, 2020

## Two-way 3D data exchange between PIAS and CADMATIC Hull

In the last few years SARC and [CADMATIC](#) have [joined forces](#) to develop a collaborative ship design system together with [Conoship](#). This collaboration has been called the Dutch Collaborative Platform for the Design and Engineering of Ships (CPDES) research project.

In the early design stage, most small and medium-sized shipyards and design offices have difficulty controlling consistency when exchanging the ship's arrangement and hull data between the 2D General Arrangement (G.A.) plan and stability analysis tools. The exchange of design data is often done manually and it can take days to implement design changes like repositioning decks or bulkheads in the G.A. plan and analyzing the effects on the various design calculation applications. Performing damage stability calculations very late in the basic design process, for example, often involves a lot of rework and increased building costs if the design does not fulfil the requirements.

Time-consuming design data exchanges and managing the consistency of design data are designers' main challenges. Therefore, uniform, modern data exchange interfaces between early design software tools and steel design software tools are very beneficial.

With a focus on bulkheads & decks and compartments, we created a V1.0 implementation, which covers intensively used data and actions, as well as a comprehensive manual and other instruction materials.

SARC and CADMATIC achieved the following for bulkheads and decks:

- A two-way 3D data exchange between PIAS and CADMATIC Hull
- A 3D data synchronization mechanism between PIAS and CADMATIC Hull
- Communicate design changes with synchronized Logbook entries
- User-friendly settings and features to facilitate communication between the systems

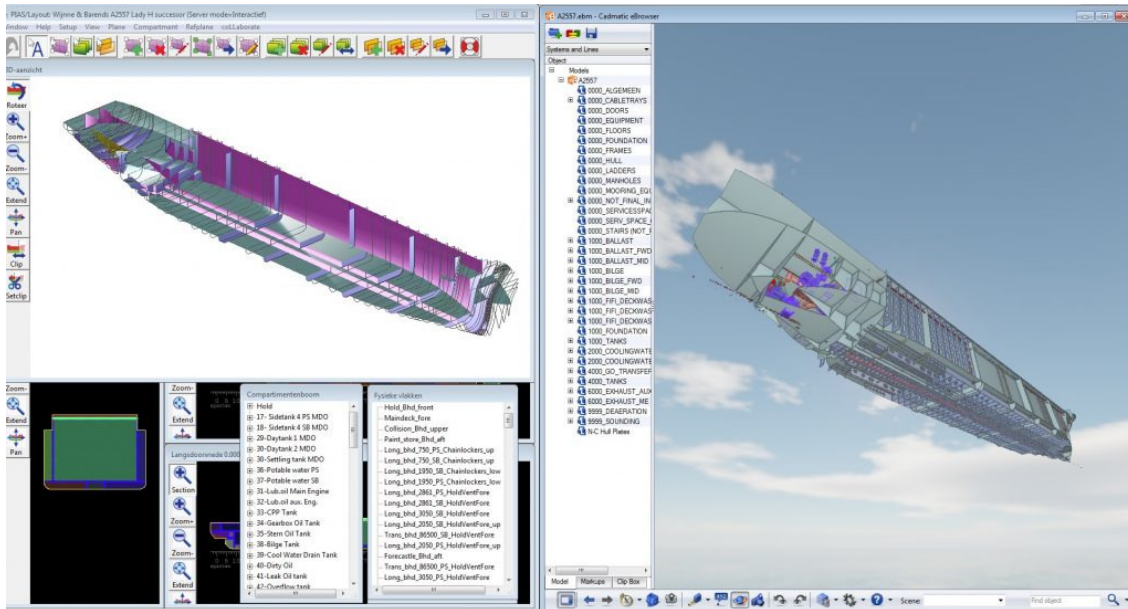


Fig.2 Screenshot of two-way 3D data exchange

This function is now available in PIAS and CADMATIC Hull, please contact us by phone or e-mail for more information.

May 14, 2020

## Adjustable page heading in PIAS

Now it is possible for the user to modify the PIAS page heading for all generated output. With this setting you can add and remove page headings and give it an identifiable name.

**SUMMARY STABILITY CALCULATIONS**  
MW456

14 May 2020  
r21047M

**New possibilities for general page heading**

Fig.3 Example of page heading

More detailed information can be found [in the manual](#).

June 25, 2020

## SARC presents: 'Recent and future developments of PIAS' webinars

During this global pandemic we are trying to stay in touch with PIAS users and our other followers and keep them updated about our software. Just before the CoVid-19 pandemic we have visited some companies to inform them personally of our recent, current and future developments within SARC and on PIAS, Fairway and LOCOPIAS.

Because of the changed circumstances, we now want to demonstrate such online and we invite you to join in on our webinars about "Recent, current and future developments in PIAS". [The entire playlist can be viewed on YouTube.](#)

Subjects of all webinars:

Recent and current developments: <https://www.youtube.com/watch?v=LoPje3tdcYg>

- SARC BV, current status
- Piping systems integrated in PIAS
- Stability over the 'weakest axis'
- Simultaneous operation of multiple PIAS modules.
- Multithreading
- Other bits and pieces

Future developments: <https://www.youtube.com/watch?v=XDB10hPEotA>

- Integrated module for all types of cargo
- Second generation intact stability criteria
- Voyage concept in LOCOPIAS
- Ship motions module
- Load optimization

Fairway developments: <https://www.youtube.com/watch?v=vLbhSnclE9Q>

- Graphical User Interface has been rationalized
- Modelling in Fairway
- Export IGES LEANURBS

Layout developments: <https://www.youtube.com/watch?v=DhkNsBp2fW0>

- Weight of planes
- Volume of tank in GUI
- Interface bulkheads with CADMATIC
- Implementation piping

Loading / LOCOPIAS developments: <https://www.youtube.com/watch?v=u-zX-glcr5w>

- Hopper stability in Loading
- Flooded tanks
- IMDG module

Miscellaneous developments: <https://www.youtube.com/watch?v=l8r1BqZ-JWM>

- Services like probabilistic damage stability calculation on a viginti core computer and many more.
- Academy
- And more

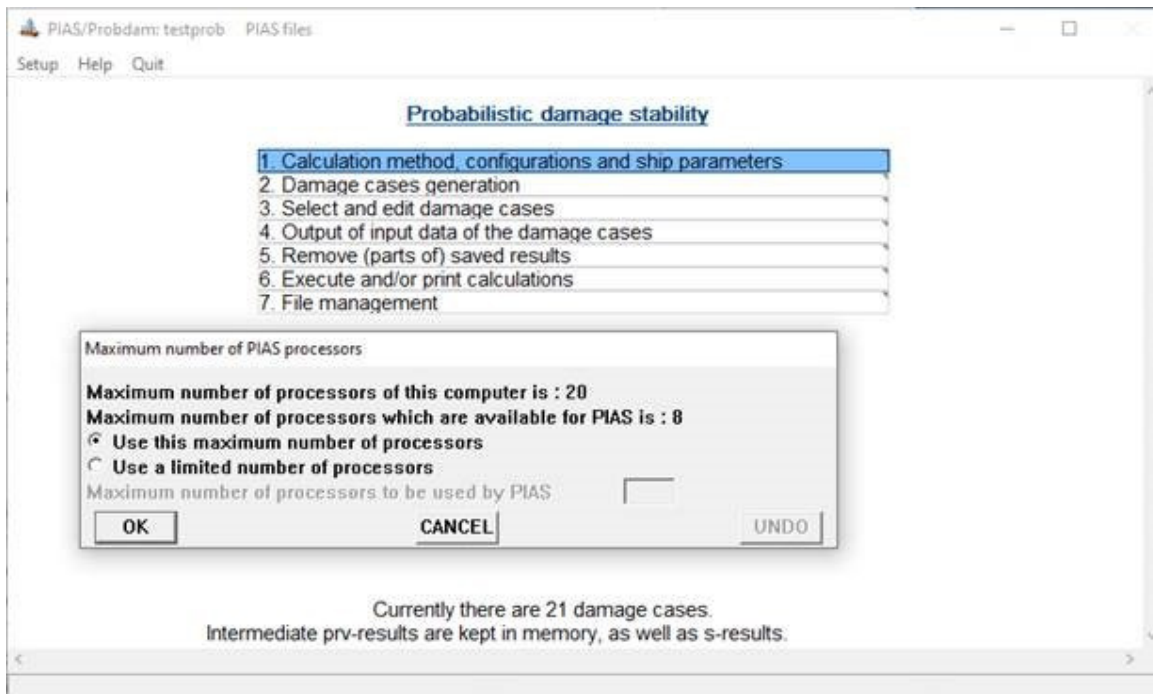
June 30, 2020

## PIAS ES 3: Vigintithreading

PIAS was adapted around 2015 so that more than two calculation cores can be used in parallel. In view of the overhead time involved in starting up a separate calculation task, [a maximum of 8 simultaneous calculation tasks was chosen at the time.](#)

Meanwhile, multithreading has been implemented in even more places within the PIAS for lengthy and computation-intensive tasks such as:

- probabilistic damage stability: the optimization of the damage boundaries.
- probabilistic damage stability: the generation of damage cases.



*Fig.4 Setting window for number of processors*

The last few years multi-core computers have become widely available and there are now PC's available for the common user which have ten or even more cores, where hyperthreading allows twenty or more threads to run simultaneously. Especially with time consuming calculation tasks, such as the ones mentioned above, the overhead time hardly plays a role and one can gain a considerable amount of time by calculating with more than 8 threads.

Therefore, the maximum number of parallel processes within PIAS has been increased from eight (octothreading) to twenty (vintithreading).

To give the user a clear insight in the use of multiple threads, especially in time consuming calculations and in combination with vintithreading, PIAS has been extended with a [thread monitoring interface](#). This interface is visible during the calculations and shows relevant and real time information per thread, such as: information about the status, i.e. a description of the current task of the thread, start time and elapsed time. This thread monitoring interface is also available for single-, dual- and octothreading.

July 10, 2020

## **Direct calculations of tank data**

Conventionally, the tank data from the weight list of a loading condition were interpolated on a pre-calculated tank table. This required tank tables to be calculated in the Layout module. In this implementation, the accuracy of the interpolated data was dependent on the step size of the computation of the table.

Recently, in PIAS a setting has been added which commands the tank data to be computed directly, exactly for the given weight or filling percentage. In this mode, the computational results are for actual level, trim, heel and tank geometry, and may hence deviate from (previously) interpolated results, which could be subject to interpolation inaccuracies.

[With this setting](#), the tank table is calculated on demand, so tables are no longer stored with the compartments in Layout. After defining a tank, it can be used in Loading immediately.

<u>Settings for compartments and tank sounding tables</u>		
1. Tables with everywhere the maximum free surface moment	"	No
2. Identification of the compartment in the tank sketches	"	automatic tank number
3. Difference internal/external geometry including external hullforms	"	No
4. Direct calculations of tank data	"	Yes

*Fig.5 Setting for direct calculation of tank data*

July 23, 2020

## Change in handling of intermediate computation results

Computations of PIAS often involve many steps, however, (paper) space and human attention span are too limited to present each and every intermediate computation sub result. So, only the most prominent results are printed — or listed, or exported, for that matter — and the experience over the past decades has shown that the standard PIAS output collection is adequate for the daily practice. So far, so good.

Yet, from time to time more detailed underlying sub-results are required, either for the insight of the program user / ship designer, or to show the computation's foundation to others. For this purpose PIAS is equipped with a facility called "the intermediate results", which simply collects a vast amount of computational sub results into plain text files. This feature is for some decades already available for stability (criteria) assessment, and for probabilistic damage stability.

However, times and habits are changing, and gradually some backside of the conventional implementation became apparent:

- As mentioned, intermediate results were collected in text files, while the user was expected to find this file and open it with a text editor. Although this procedure induces no fundamental problem, the experience has shown that over the course of the years computer users have become less and less confident in browsing the Windows folder structure, in finding this file, and opening it with a text reading tool.
- Probabilistic damage stability computations may require quite some time. In particular with a detailed ship model, containing hundreds of compartments and thousands of damage cases. Although substantial computation cycles meet no fundamental limitation, their consequence is that mentioned files collection the intermediate results stay open for quite some time. Such as hours or a few day. Still, until so far there is no problem, but unfortunately some computer networks or Windows installation are not able to cope with files open for more than a day. And brutally abort the whole process. Quite annoying, but evaporating from Windows' dungeons and as such unsolvable. Yet avoidable.
- PIAS simply writes its intermediate results to files, inherently in the order of its computations, For sequential computations the output order will be the same as the computation order, so, in single-processing the order of the final results and the order of the intermediate results are intrinsically synchronized. However, when computations are spread over multiple processes the order of computations is arbitrary. And, hence, is the order of reporting of intermediate results. To put it bluntly: if 20 cores are busy simultaneously processing bits and pieces of computations, all their intermediate results will be mixed up.

For reasons 2 and 3, the computational core of PIAS has been reorganized a bit, so intermediate results are stored internally, without sending it directly to an output file. Only after all computations have finished, the collected results are redirected to some output medium, nicely in the intended order. For reason #1, the file nature and the file location is now irrelevant for the user, while PIAS contains a new function to invoke the Windows editor with all relevant intermediate data, without hassling with files, file types and directories.



February 2, 2021

## Restyled Loading menus

### Introduction

The seasoned PIAS user will have experienced that from time to time a module is subject to a radical rewrite or even a complete redesign. We have seen that the past years with the Fairway GUI, and with Compart being replaced by Layout. You will not have noticed yet, but some month ago we started the overhaul of Loading. For a variety of reasons, from which the most noticeable for the PIAS users will be:

- New file and data structure, with ample space for additional data of loading conditions, weight items etc.
- An additional umbrella data structure to manage the interrelationship between loading conditions.
- Tighter integration between specific loading modules (such as for container, RoRo and general cargo).
- A redesigned container module (with enhanced supported for odd-size containers).

A first step in this process was the systematization of the alphanumerical menus of loading conditions and weight items. This was in-house released at SARC a few months ago, and has been thoroughly tested ever since, so now is the right moment for a general release. Not all changes will be commented here, many will be clear and obvious. However, some imply a change in operation, and will be elaborated further below.

### Filling all tanks of the same weight group

PIAS offered a special menu for the filling all tanks of the same weight group with the same percentage or density. This menu has been removed, because changing these parameters can now directly be done in the corresponding cells of the sub totals of weight groups.

Weight group	%	Density	Weight group	%	Density
Lub oil	50	0.9000	Lub oil	50.00	0.9000
Lub oil	98.00	0.9000	Lub oil	50.00	0.9000
Lub oil	98.00	0.9000	Lub oil	50.00	0.9000
Lub oil	98.00	0.9000	Lub oil	50.00	0.9000
Lub oil	98.00	0.9000	Lub oil	50.00	0.9000
Lub oil	98.00	0.9000	Lub oil	50.00	0.9000

Fig.6 Example of changing weight group to same percentage

### Total weight and COG of a loading condition

Was once listed in an additional row at the end of the list of weight items. This has been replaced by an additional *floating window* with totalized weights and COGs. This window can be kept open besides other *floats*, such as for intact stability or longitudinal strength.

FSM type	Weight group	%	Density	Volume	Ullage	Aft	Fore
	Lub oil	50.00	0.9000	22.320			
from tank geometry	Lub oil	50.00	0.9000	6.365		13.200	19.800
from tank geometry	Lub oil	50.00	0.9000	9.635		7.800	10.800
from tank geometry	Lub oil	50.00	0.9000	2.107		4.200	5.400
from tank geometry	Lub oil	50.00	0.9000	2.107		5.400	6.600
from							4.200
from	Name	Weight	VCG	LCG	TCG	FSM	
from	Light ship (excl Cranes/HC)	4377.288	7.999	58.593	0.191	0.000	9.000
from	Water ballast	3340.024	3.408	77.958	-0.588	1808.017	9.000
from	Gas oil	233.307	4.395	59.860	4.833	35.661	17.400
from	Heavy fuel oil	406.200	2.594	64.104	-2.013	1638.278	19.200
from	Lub oil	20.088	6.128	10.201	-2.083	5.272	19.800
from	Fresh water	65.475	6.160	6.826	0.408	101.033	12.600
from	Various	34.550	2.085	8.472	-0.565	16.935	18.000
from	Sewage / Sludge	3.045	4.662	13.334	0.526	7.753	19.800
from	Miscellaneous	27.000	12.222	98.633	0.926	0.000	15.600
from	Grain / bulk cargo	0.000	1.300	85.390	0.000	0.000	9.000
from	General cargo	28.000	10.347	54.623	0.000	0.000	
from	Tweendeck panels/hatch covers	789.026	10.571	70.295	0.000	0.000	12.000
from	Crane rotating part	120.092	25.418	75.519	7.492	0.000	16.800
from	Total	9444.096	6.470	66.346	0.008	3612.949	
	Miscellaneous					0.000	6.000
	Miscellaneous					121.950	140.000

Fig.7 Floating window with total weight and COG

## Missing tanks in Loading

The option to define an individual row to contain a certain tank (as defined in Layout) has been discarded. Instead, the upper menu bar now contains an option labelled “Add missing tanks”, which will add missing tanks that still have been assigned (in Layout) to be used in Loading. With this option all new tanks can be added to the loading condition with a single command.

## Advice function

This function computes the weight and COG which are required to achieve a desired draft / trim combination. It has been restyled, and is now able to add a new row containing this weight.

Advice

Specify draft and trim  
Enter the mean draft relative to the baseline.  
With the given draft and trim the displacement will be calculated.  
The difference with the displacement of the loading condition will be displayed.

Draft mean	4.738 m
Trim	-1.338 m
G'M	2.009 m

Displacements

Displacement draft and trim	: 9443.251 ton
Displacement loading condition	: 9444.096 ton
Displacement difference	: -0.845 ton

Total advice weight

Weight	: -0.845 ton
UCG	: 6.820 m
LCG	: 63.872 m
TCG	: 87.054 m

OK CANCEL UNDO

Fig.8 Advice window

## Corresponding changes in Layout

In order to facility some present and future functionality in Loading, the property set of a compartment has been extended a bit. For this moment, the most relevant addition is:

- *Automatic inclusion in weight item list*, which indicates that this compartment is a real tank — as opposed to ‘misused’ compartments, e.g. partial grain holds, an unbounded compartment that spans the entire ship and ‘experimental’ compartments as design variation — which is to be included in the weight item list when the *missing tanks* function, as discussed above, is invoked.

With this modification in Layout we also used the opportunity to include **all** compartments’ parameters in the compartment overview list. This has been a request of multiple PIAS users.

## Redraw menu list of weight items

Due to developments in the software, it is possible that the weight list menu is temporarily redrawn somewhat more frequently. This will disappear again in the near future.

February 10, 2021

## PIAS installer extended

At the request of several customers, the PIAS installer has now been extended to accept command line parameters for silent installation, custom installation folder and auto run.

For further details we refer to the manual:

[https://www.sarc.nl/images/manuals/pias/htmlEN/general.html#installation\\_command\\_line\\_parameters](https://www.sarc.nl/images/manuals/pias/htmlEN/general.html#installation_command_line_parameters)



March 16, 2021

## Cargo Weight module renewed

The [cargo weight module](#) is designed to do a draft survey. Before and after loading the drafts are measured. These values give a difference in displacement. When taking into account the difference in consumables, the (un)loaded cargo weight is determined.

The module could also be used to check if a loading condition in LOCOPIAS matches the observed drafts. If necessary, a correction could be made to the loading condition. This helps to be sure the stability calculations are made with the correct weights.

With the renewal of this module, it has become clearer that the module can be used in two ways. Both ways of using have their own output buttons in the top right corner:

- Verify displacement for selected loading condition with observed draft marks.
- Compare condition to print the cargo weight determination report.

Also more data is made available directly on screen.

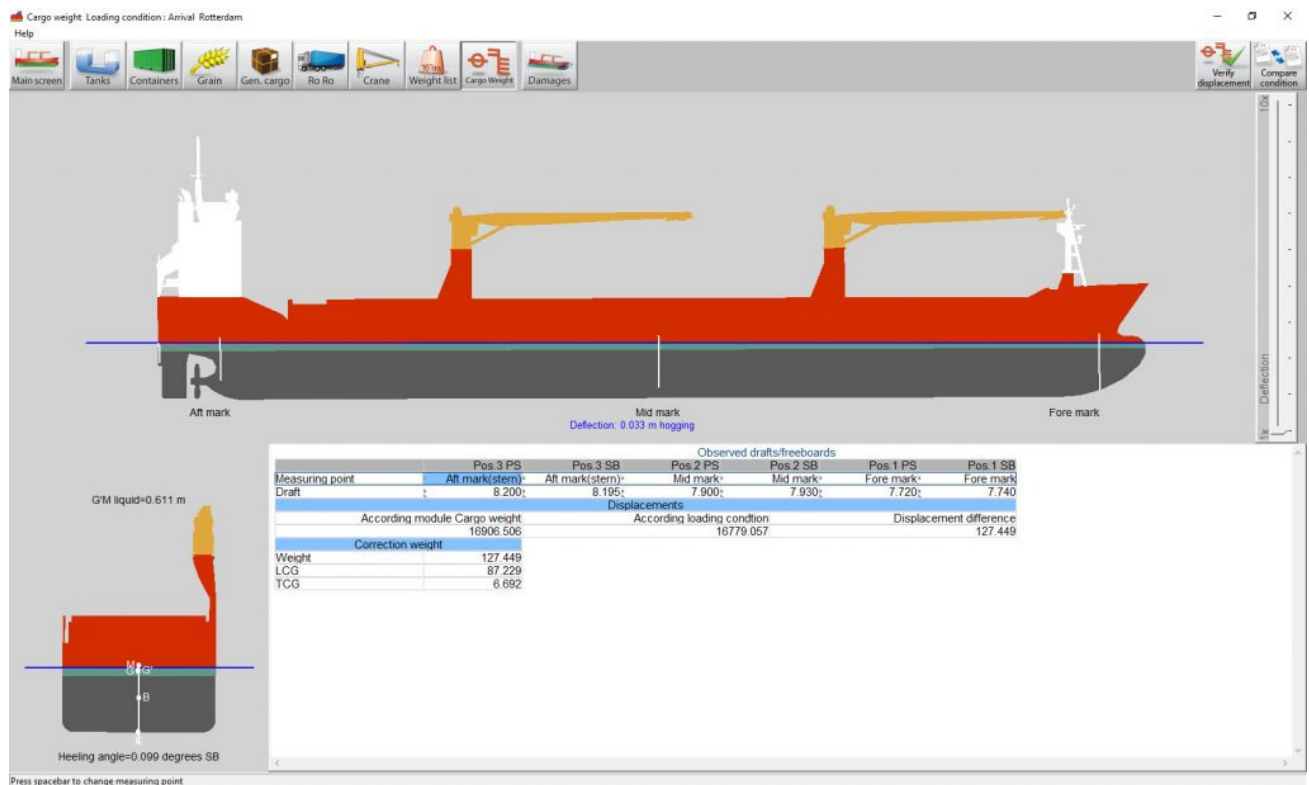


Fig.9 Draft survey GUI

From now on this module is not only offered for LOCOPIAS, but also available for PIAS.

March 29, 2021

## IMDG amendment 40-20 update in LOCOPIAS

The IMDG Code, 2020 Edition (inc. [Amendment 40-20](#)) comes into force on 1 June 2022 and may be applied voluntarily as from 1 January 2021.

The IMDG Code, 2018 Edition (inc. Amendment 39-18) came into force on 1 January 2020 for two years and may be applied voluntarily as from 1 January 2019. Validity of this edition has been extended until 31 May 2022. The overview of changes has been published by

Hazcheck: <https://imdgsupport.existec.com/imdg-code-40-20-summary-of-changes/>

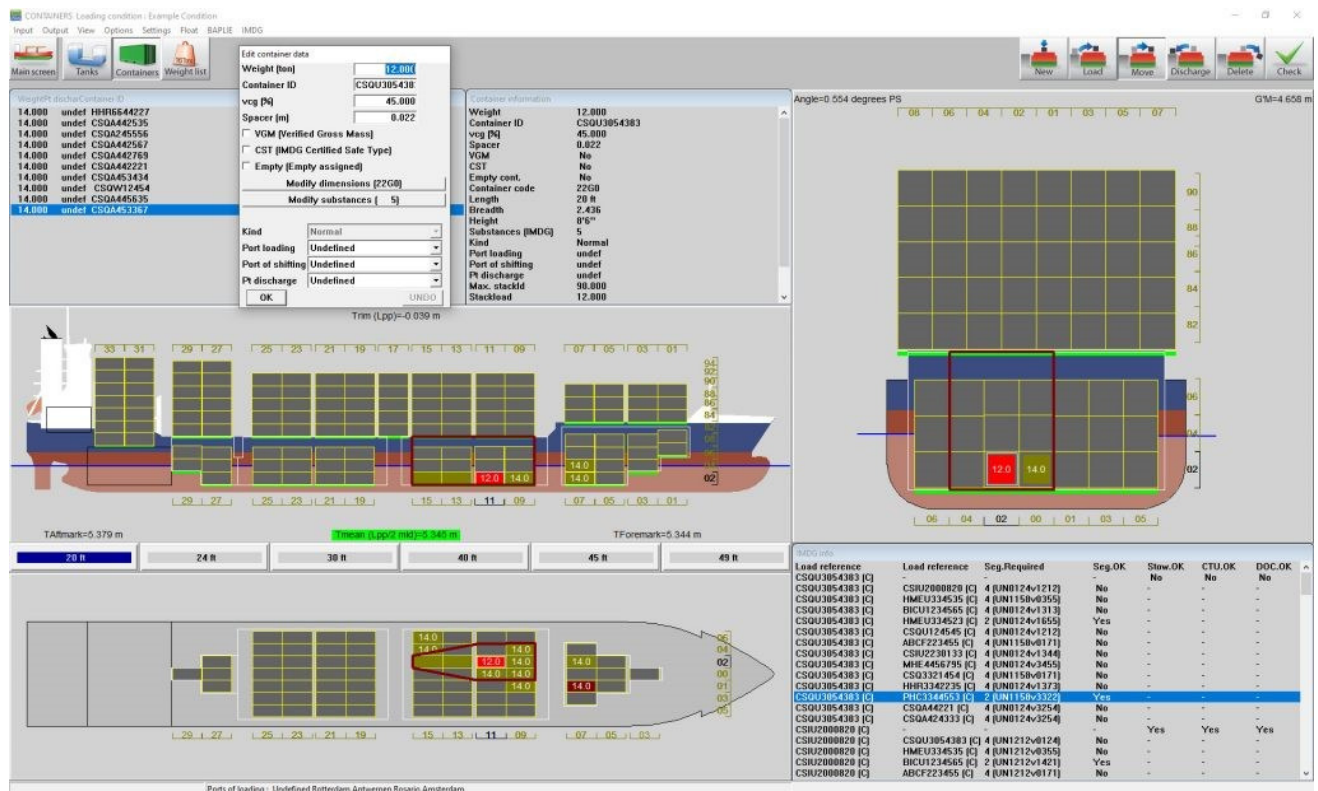


Fig.10 Container IMDG GUI

The [LOCOPIAS IMDG module](#) is available since 2018. Now SARC has integrated the IMDG Amendment 40-20 into the LOCOPIAS IMDG module. The updated module is available and ready to be delivered. If you would like to request the updated LOCOPIAS IMDG module (IMDG Amendment 40-20) now, please send us a message.

April 12, 2021

## Operation of PIAS slightly updated

In order to make it easier for the user, it is now possible to make multiple selections within PIAS. This can be done by holding down the Ctrl button and clicking with the mouse on a cell. More information on the general process and options can be found:

[https://www.sarc.nl/images/manuals/pias/htmlEN/operation.html#operation\\_copy\\_paste](https://www.sarc.nl/images/manuals/pias/htmlEN/operation.html#operation_copy_paste)

Yes	No	General Cargo, Departure 98% Consumables (copy)
Yes	No	RoRo Cargo, Departure 98% Consumables (copy)
Yes	No	Grain 45cuft, Departure 98% Consumables
Yes	No	Homogeneous Cargo 0.642 t/m3, Departure 98% Cons.
Yes	No	Containers, Departure 98% Consumables
Yes	No	General Cargo, Departure 98% Consumables
Yes	No	RoRo Cargo, Departure 98% Consumables

Fig.11 Selecting multiple loading conditions

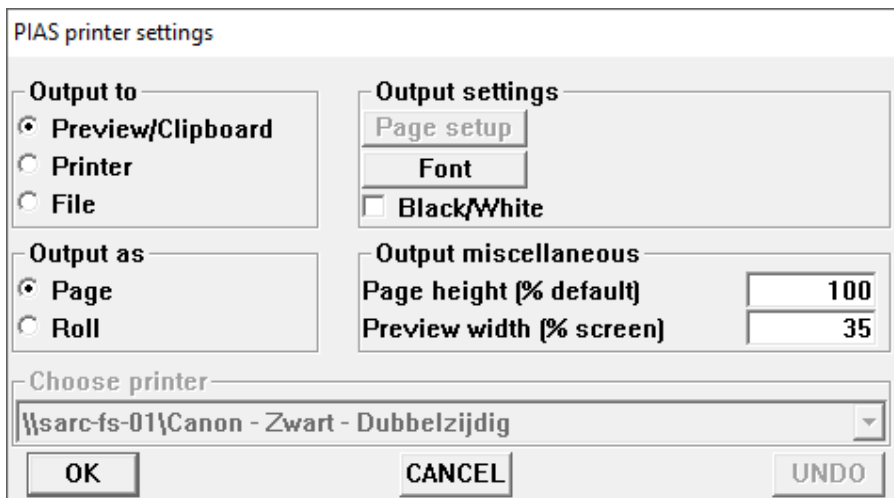
Please note that this also affects other functions. For example, the export of loading conditions has changed, now it is possible to export just selected loading conditions.

Some adjustments have also been made internally in PIAS making [horizontal scrolling](#) a lot faster.

April 26, 2021

## PIAS printer settings

In recent months we have made several minor adjustments to PIAS. One of them is the PIAS printer settings. These can still be found in the same location, but now everything is clearly displayed in one screen. [http://www.sarc.nl/images/manuals/pias/htmlEN/general.html#general\\_print\\_options](http://www.sarc.nl/images/manuals/pias/htmlEN/general.html#general_print_options)



The image shows the 'PIAS printer settings' dialog box. It is divided into several sections:

- Output to:** Three radio buttons: 'Preview/Clipboard' (selected), 'Printer', and 'File'.
- Output settings:** A group box containing:
  - 'Page setup' button
  - 'Font' button
  - 'Black/White' checkbox (unchecked)
- Output as:** Two radio buttons: 'Page' (selected) and 'Roll'.
- Output miscellaneous:** Two input fields:
  - 'Page height (% default)' with value '100'
  - 'Preview width (% screen)' with value '35'
- Choose printer:** A dropdown menu showing '\\sarc-fs-01\Canon - Zwart - Dubbelzijdig'.
- At the bottom are three buttons: 'OK', 'CANCEL', and 'UNDO'.

Fig.12 Printer settings window

In combination with the [general page heading](#), it has become easier to quickly get the right output in the right place.

May 11, 2021

## Ship motions computation available in PIAS

PIAS' Motions module predicts the ship motions in the frequency domain. In its present version it uses a semi-analytical method for quick calculations in the concept design phase which can calculate the transfer functions for the heave, roll and pitch motions of the vessel, using only the main parameters of a vessel together with its speed, heading and the wave frequency. The method makes it possible to calculate the vertical motion, velocity and accelerations of any point on vessel on its longitudinal axis.

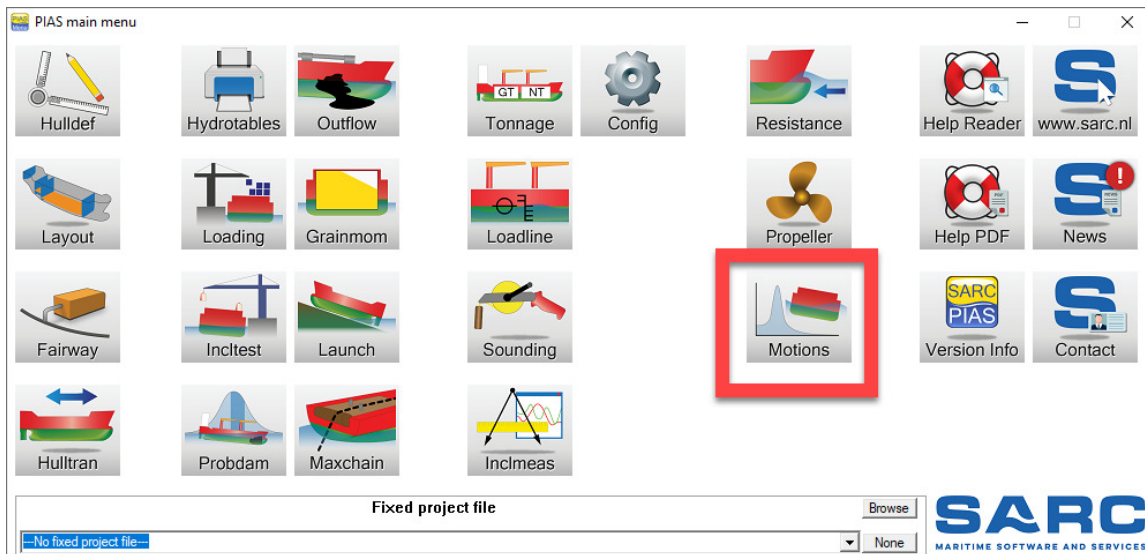


Fig. 13 Motions module within the PIAS menu

Many input parameters can be derived from the hull form as defined in PIAS (if available), which will save the user time. Some parameters also have the possibility to be estimated when the user doesn't have a fixed number yet.

The output is designed to make it as easy as possible to responses for certain locations on the hull. This can be easily imported to text editors or spreadsheets for further processing.

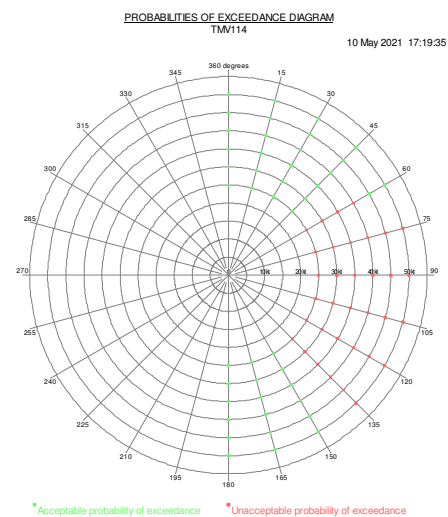


Fig. 14 Example: Probabilities of exceedance

1. Input data for motion analysis				
Parameter	Unit	Value	Source	
Method	-	Jensen et al	-	
Name of the vessel	-	TM/V114	-	
Starting frequency	rad/s	0.050	-	
Frequency interval	rad/s	0.050	-	
End frequency	rad/s	1.750	-	
Length waterline	m	96.000	-	
Breadth	m	13.800	-	
Draft	m	2.500	-	
Block coefficient	-	0.530	-	
Calculate roll RAO	y/n	Yes	-	
Waterline coefficient	-	0.713	-	
Metacentric height	m	4.190	-	
Natural roll period	s	6.300	User-defined	
Length ratio	-	0.600	-	
Critical damping	%	0.000	-	
Wave spectrum	-	One-parameter Pierson-Moskowitz	-	
Significant wave height	m	2.500	-	
Peak frequency	Hz	0.127	-	
Windspeed	m/s	10.826	-	
Number of speeds	-	6	-	
Speed 1	knots	25.000	-	
Speed 2	knots	30.000	-	
Speed 3	knots	35.000	-	
Speed 4	knots	40.000	-	
Speed 5	knots	45.000	-	
Speed 6	knots	50.000	-	
Number of wave headings	-	13	-	
Wave heading 1	degrees	180.000	-	
Wave heading 2	degrees	165.000	-	
Wave heading 3	degrees	150.000	-	
Wave heading 4	degrees	135.000	-	
Wave heading 5	degrees	120.000	-	
Wave heading 6	degrees	105.000	-	
Wave heading 7	degrees	90.000	-	
Wave heading 8	degrees	75.000	-	
Wave heading 9	degrees	60.000	-	
Wave heading 10	degrees	45.000	-	
Wave heading 11	degrees	30.000	-	
Wave heading 12	degrees	15.000	-	
Wave heading 13	degrees	0.000	-	

Fig.15 Input options for Motions

Currently, this module is extended with a strip theory method, which will be released later this year. The strip theory based method is capable of computing the transfer functions for all six ship motions (surge, sway, heave, roll, pitch and yaw), and will be able to calculate the motion, velocity and acceleration of any point on the vessel.

Six sea spectra have been programmed: JONSWAP, one-parameter Pierson-Moskowitz, two-parameter Pierson-Moskowitz, ISSC, ITTC and Liu. These can be used to analyze the ship's behavior in irregular seas.

July 13, 2021

## Use of function keys in PIAS

Within PIAS function keys can also being employed in the text menus:

- **F1** – Opens the context-sensitive help reader.
- **F2** – In order to edit the text in a cell, the F2 key can be used. The existing text will then become modifiable.
- **F3** – To edit a longitudinal position, F3 enables the conversion from frames to meters
- **F4** – It offers the same frame position conversion options as F3, however, now shown in a popup window.
- **F5** – Modify a value reference, or a referential value when using reference planes (at present only in Layout, however the reference plane system will gradually be used by other PIAS modules as well).

The use of the function keys should allow the user to work faster. Especially the F1 button is very helpful if you want to know more about a module and don't want to search for a long time in the manual.

More info at: [https://www.sarc.nl/images/manuals/pias/htmlEN/operation.html#operation\\_input\\_screen](https://www.sarc.nl/images/manuals/pias/htmlEN/operation.html#operation_input_screen)

*We are currently putting the finishing touches to a new container module. Please find the draft of an article below as issued at major maritime journal:*

## Integration IMDG and loading and stability software

Quite some safety-related aspects are traditionally included in ship loading software, such as stability, damage stability, longitudinal strength and line of sight. In 2004 this set was extended with provisions for the carriage of dangerous goods in packaged form, in the International Maritime Dangerous Goods

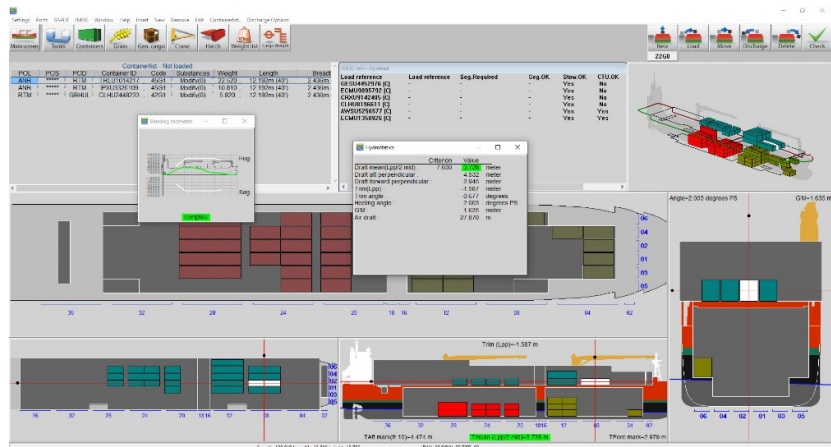


(IMDG) Code. For the verification of a loading condition with containers carrying dangerous substances against this Code, usually separated tools are applied, such as stand-alone software or paper-based procedures. Two manufacturers of dedicated software packages have worked together thus creating an integrated tool which covers all mentioned aspects.

One partner is Exis Technologies, of Darlington UK, the leading global supplier of systems for the management of dangerous goods in sea transport. A key product of Exis is the Hazcheck system, which includes the full IMDG database with all requirements concerning packaging, separation, heat sources, ventilation etcetera. Such an externally supplied database offers the advantage of being filled and scrutinized by professionals, with a strong commitment to keeping the database up to date. This is demonstrated by the fact that the most recent IMDG 40-20 amendment, which becomes mandatory in June 2022, is now already available at Exis. A nice feature of Hazcheck is its ability to act as a background server, which enables seamless integration with on-board loading and stability software.

LOCOPIAS is a state-of-the-art loading computer, manufactured by SARC, Bussum, The Netherlands. Since its conception in the mid 90s it has been installed on more than 1500 ships of various types, such as container, RoRo, naval, dry cargo, tanker, inland waterway, pipe laying and offshore construction and crane vessels. LOCOPIAS has always been equipped with a dedicated container GUI with support for a wide range of standard container types. However, corresponding container slot positions needed to be pre-defined for all container types, which was quite a task to do. Recently, a completely redesigned and rewritten container module was released, equipped with enhanced logic for the positioning of containers of varying sizes. This new module requires only a minimal amount of predefined data, while still supporting all ISO container types, even those not foreseen in the design stage of the ship.

The redesign of this LOCOPIAS module also offered the opportunity to extend the vessel's geometric data set with IMDG-related items, such as the locations of living quarters and ventilation inlets. In collaboration with the Hazcheck database this allows for an automated verification of a container load against the IMDG code, including checks on individual container placement and separations between multiple containers.



LOCOPIAS can be installed as a shipborne software program, where relevant connected to the tank gauging system. In addition, LOCOPIAS copies are allowed to be used in shore offices as well, with the ability to transfer loading conditions, including IMDG particulars, to and from the ship. Data exchange with other computer systems is supported by the BAPLIE importer and exporter.

Fig. 16 New GUI for Container module

Exis and SARC are confident that this fusion of their products will allow them to continue to support their customers with productive and user-friendly software solutions.