



Release document

NAUTICUS™ Hull

Proven ship design solutions, made for the future

Version: 20.32, September 2024 cycle update 1

This is a cycle update to v.20.31 released in July 2024

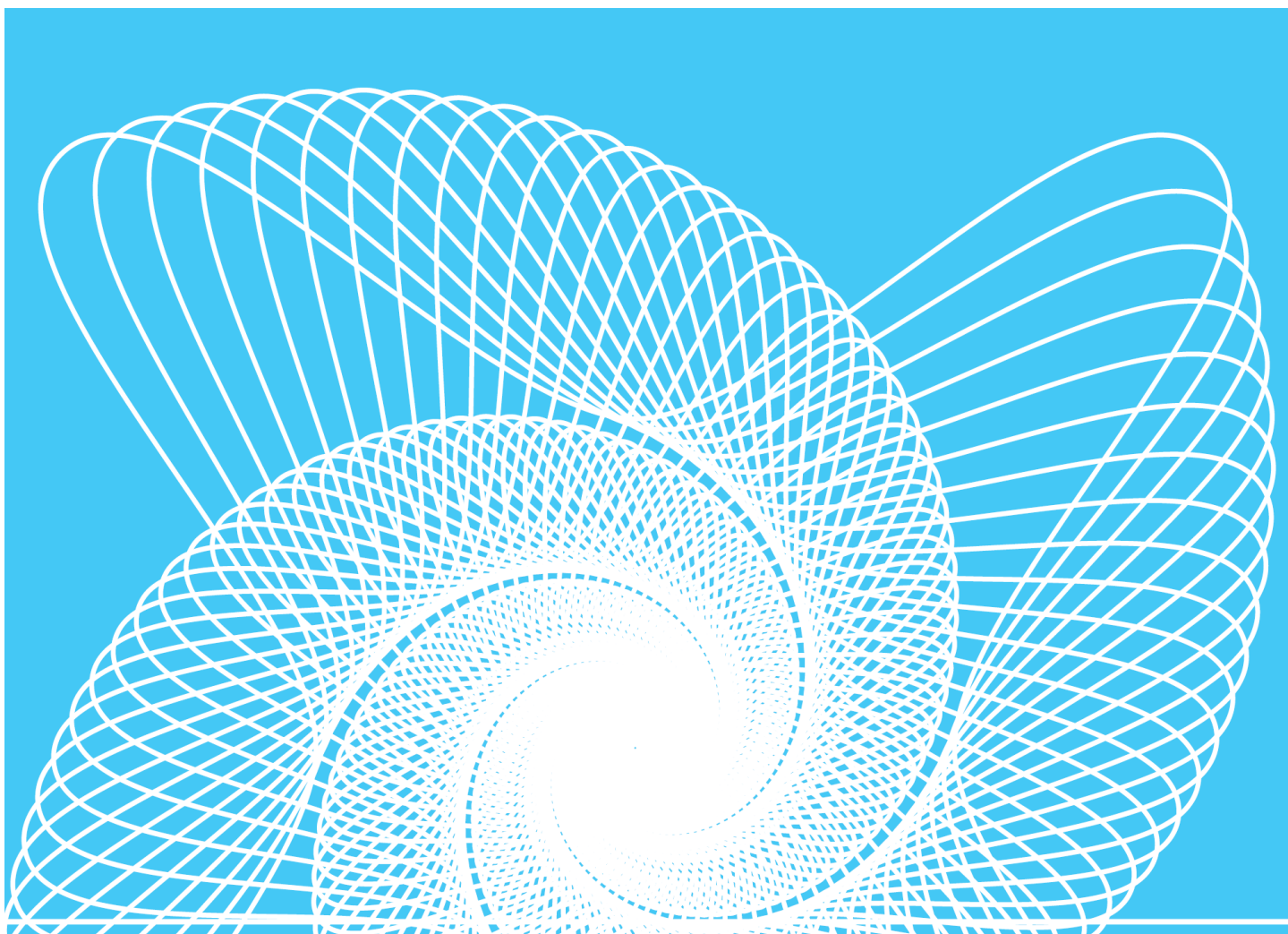


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1 VERSION 20.32 – AN INTERMEDIATE UPDATE OF VERSION 20.31

1.1 Rule set available in 20.32

The following rule set is added to the cycle update:

DNV Rules for classification: Naval vessels (RU-NAV)

Applicable rules

- ☐ DNV rules
- ☐ DNV offshore rules
- ☐ DNV HSLC rules
- ☒ DNV RU-NAV rules
- ☐ DNV RU-YACHT rules (only usable in Analyses->Rules)
- ☐ IACS CSR for bulk carriers and oil tankers

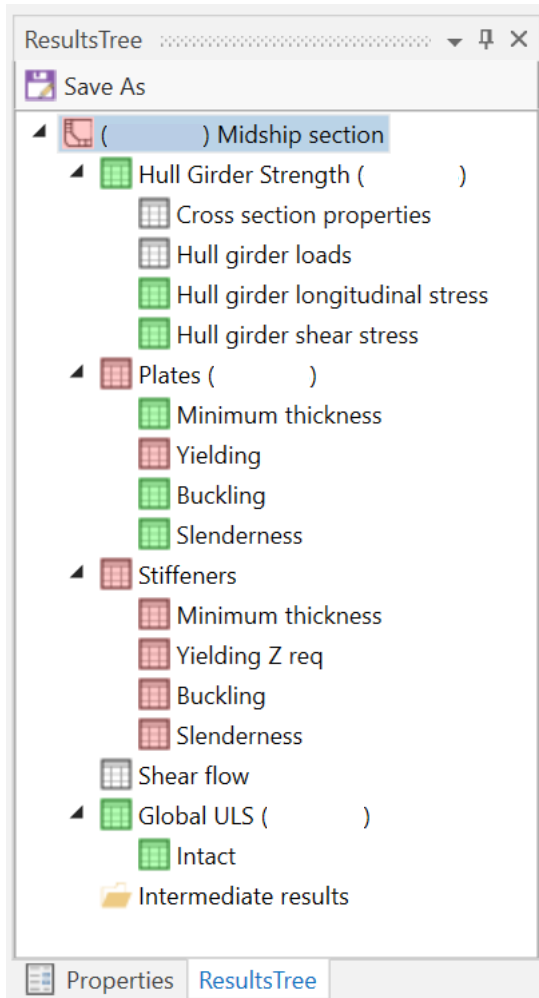
Rule version:

July 2024

Service area restrictions

R0

The following prescriptive RU-NAV requirements are covered in Section Scantlings:



Hull Girder Strength

- Hull girder longitudinal stress
- Hull girder shear stress

Plates

- Minimum thickness
- Yielding
- Buckling
- Slenderness

Longitudinal stiffeners

- Minimum thickness
- Yielding Z req
- Buckling
- Slenderness

Global ULS

- Intact

Note that local prescriptive rule checks of transverse stiffeners are not covered by this cycle update.

1.2 Error corrections and other changes available in 20.32

Area	Case #	Description	ID
Corrections			
FE		For CSR BC&OT, when exporting loads from Nauticus Hull to GeniE, line loads on hatch coaming was not correctly exported. Corrected.	599985
FE	00215189	For anti-flotation supports of independent prismatic tanks, the Local Model Load Applier (LMLA) tool in GeniE, used to distribute loads from a global result file to a local FE model, provided contact pressures in wrong direction. Corrected.	600259
FE	00215206	For anti-pitch and anti-roll supports of independent prismatic tanks, the Local Model Load Applier (LMLA) tool in GeniE, used to distribute loads from a global result file to a local FE model, friction forces were missing for some load cases. Corrected.	600266
Other		For DNV Rules and CSR BC&OT, stiffener buckling results in GeniE for sniped stiffeners in tension was on the conservative side. Corrected.	583802
Other	00211066	Local Model Load Applier (LMLA) tool in GeniE, used to distribute loads from a global result file to a local FE model, had performance issues when distributing nodal loads. Corrected.	592643
Enhancements			
FE		For strength analysis of independent prismatic tanks in GeniE, the Tank Support Coupling Forces (TSCF) tool is enhanced to also include horizontal inertia loads when computing friction force couples in way of vertical tank supports.	584508
FE		For vertical supports of independent prismatic tanks, the Local Model Load Applier (LMLA) tool in GeniE, used to distribute loads from a global result file to a local FE model, is enhanced to also consider horizontal inertia loads when distributing loads.	592739
Analysis Tools		Rule Calculator - DNV Rules - Slenderness calculation for end-and tripping brackets was supported for July 2023 and newer, extended to July 2021 edition and newer.	596566

Content below is identical to content in version 20.31 release document.

2 INTRODUCTION

2.1 Purpose of this document

The purpose of this document is to inform users about system requirements, new programs and functionalities, enhancements and bug fixes that have been implemented in Nauticus Hull since the previous release.

Details about the implementations in all programs are not fully covered in this document, and for more information, the user should consult the program documentations being a part of the installation.

It is recommended that the user contact DNV support or the local approval engineers for details about rule implementations in the program and for information about how to use the program for specific ship types.

For information on how to install the program, please see the *Nauticus Hull Installation Guide*, which can be found on our Customer Portal at www.dnv.com/cp.

2.2 Rule sets covered

DNV Rules for classification: Ships (RU-SHIP)

All editions up to and including July 2023.

DNV-CG-0128, Buckling, December 2023 edition is included in DNV Rule edition July 2023.

DNV Rules for classification: High speed and light craft (RU-HSLC)

July 2019 Edition.

DNV Rules for classification: Naval vessels (RU-NAV)

July 2023 Edition.

DNV Rules for classification: Offshore Units

Support for prescriptive and FE calculations according to DNVGL-OS-C102 Structural design of offshore ship-shaped and cylindrical units up to and including July 2021, entering into force 1st January 2022.

IACS CSR BC & OT – January 2024 and earlier editions

Enter into force on 1st July 2024

The following rule sets are not covered

DNV rules - July 2015 and older

CSR Tank - July 2012 and older

CSR Bulk - July 2012 and older

These rules are supported by Nauticus Hull “Classic” January 2018 (separate installation).

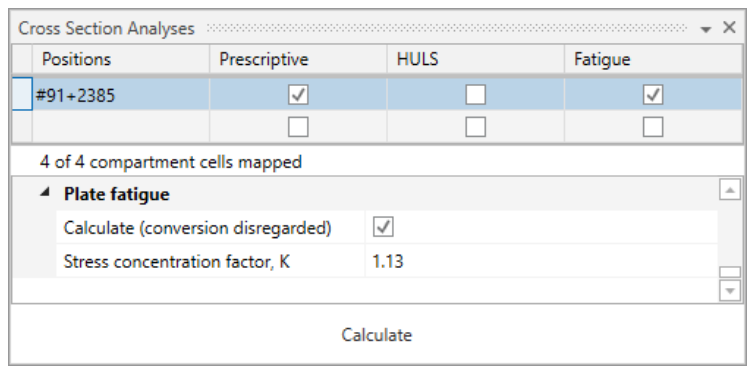


Note: The Nauticus Hull Classic package (January 2018 V18.5) containing the General Cross Section and PULS tools are no longer distributed with this distribution of Nauticus Hull. Users have to download the package from the customer portal.

3 HIGHLIGHTS OF NEW RELEASE

The following main features have been introduced in this version:

DNV Offshore - plate fatigue



Cross Section Analyses

Positions	Prescriptive	HULS	Fatigue
#91+2385	☒	☐	☒

4 of 4 compartment cells mapped

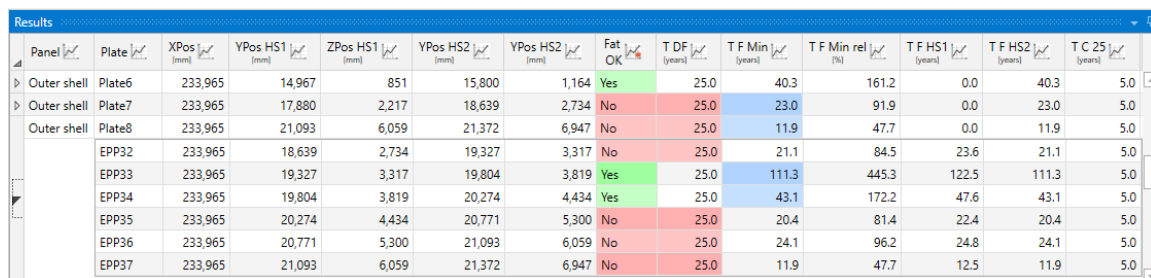
Plate fatigue

Calculate (conversion disregarded) ☒

Stress concentration factor, K 1.13

Calculate

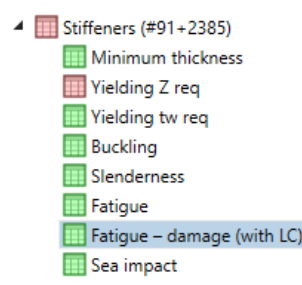
- ☒ Plates (#91+2385)
- ☒ Minimum thickness
- ☒ Yielding
- ☒ Buckling
- ☒ Slenderness
- ☒ Fatigue
- ☒ Sea impact



Results

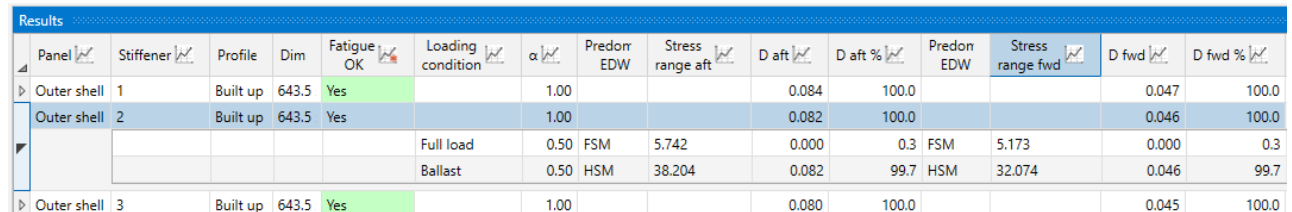
Panel	Plate	XPos	YPos HS1	ZPos HS1	YPos HS2	Fat OK	T DF	T F Min	T F Min rel	T F HS1	T F HS2	T C 25
Outer shell	Plate6	233,965	14,967	851	15,800	1,164 Yes	25.0	40.3	161.2	0.0	40.3	5.0
Outer shell	Plate7	233,965	17,880	2,217	18,639	2,734 No	25.0	23.0	91.9	0.0	23.0	5.0
Outer shell	Plate8	233,965	21,093	6,059	21,372	6,947 No	25.0	11.9	47.7	0.0	11.9	5.0
	EPP32	233,965	18,639	2,734	19,327	3,317 No	25.0	21.1	84.5	23.6	21.1	5.0
	EPP33	233,965	19,327	3,317	19,804	3,819 Yes	25.0	111.3	445.3	122.5	111.3	5.0
	EPP34	233,965	19,804	3,819	20,274	4,434 Yes	25.0	43.1	172.2	47.6	43.1	5.0
	EPP35	233,965	20,274	4,434	20,771	5,300 No	25.0	20.4	81.4	22.4	20.4	5.0
	EPP36	233,965	20,771	5,300	21,093	6,059 No	25.0	24.1	96.2	24.8	24.1	5.0
	EPP37	233,965	21,093	6,059	21,372	6,947 No	25.0	11.9	47.7	12.5	11.9	5.0

DNV and CSR Rules - fatigue – report damage per LC and predominant load case



Stiffeners (#91+2385)

- ☒ Minimum thickness
- ☒ Yielding Z req
- ☒ Yielding tw req
- ☒ Buckling
- ☒ Slenderness
- ☒ Fatigue
- ☒ Fatigue – damage (with LC)
- ☒ Sea impact



Results

Panel	Stiffener	Profile	Dim	Fatigue OK	Loading condition	α	Predom EDW	Stress range aft	D aft	D aft %	Predom EDW	Stress range fwd	D fwd	D fwd %
Outer shell	1	Built up	643.5	Yes		1.00			0.084	100.0			0.047	100.0
Outer shell	2	Built up	643.5	Yes		1.00			0.082	100.0			0.046	100.0
					Full load	0.50	FSM	5.742	0.000	0.3	FSM	5.173	0.000	0.3
					Ballast	0.50	HSM	38.204	0.082	99.7	HSM	32.074	0.046	99.7
Outer shell	3	Built up	643.5	Yes		1.00			0.080	100.0			0.045	100.0

Check of mapped compartments and presence of any loading conditions prior to analysis

Status of mapped compartments for the current cross-section or transverse bulkhead is shown in the Run dialog, reducing the need for manually confirming the mapping prior to analysis. A check whether any loading conditions are defined in Compartments and Loads is also done. Note that there is no check of whether compartments are assigned to the loading conditions, this shall be ensured by user.

The status reflects the situation at the time the dialog is opened.

Cross Section Analyses

Positions	Prescriptive	HULS	Fatigue
#75+100	☒	☐	☒
	☐	☐	☐

1 of 6 compartment cells not mapped
No fatigue loading conditions defined

Prescriptive

Vertical wave bending moments M_{wv} scaling factors

Sagging
1

Hogging
1

Calculate

Rule Calculator – Slenderness check of end brackets and tripping brackets (DNV Rules)

Calculations are available from rule edition July 2023.

Corrugated Bulkhead
Profiles
Slenderness - End brackets
Slenderness - Tripping brackets

Calculate all
Calculate selected
Pt.3 Ch.8 Sec.2 [5.2] Slenderness - End brackets

Input

Id text

Gross bracket thickness, t_b [mm]
12
12
12
12

Total corrosion addition, t_c [mm]
0.5
0.5
2
1

Length of bracket, l_b [mm]
1200
1200
600
650

Depth of bracket, d_b [mm]
600
600
400
650

Material, bracket
VL-NS
VL-NS
VL-NS
VL-NS

Edge reinforcement

Edge stiffener profile
FlatBar 100 x 8
FlatBar 100 x 8

Edge material
VL-NS
VL-NS
VL-32
VL-32

Bracket proportions

Information

Slenderness coefficient C for t_b
70.0
26.0
70.0
0.0

Net required, $h_{w,net}$ [mm]
8.6
23.1
5.7
∞

Gross required, $h_{w,gp}$ [mm]
9.0
23.5
7.0
∞

Proportions OK?
OK
NOT OK
OK
db/tb NOT OK

Edge stiffener, h_w

Slenderness coefficient C for h_w
75
75

Net required, $h_{w,net}$ [mm]
90.0
52.1

Gross required, $h_{w,gp}$ [mm]
89.5
50.5

Actual h_w [mm]
100.0
100.0

h_w OK?
OK
OK

Edge stiffener, slenderness

Gross web slend thk, $t_{w,slend,gp}$ [mm]
5.0
6.5

Gross flange slend thk, $t_{f,slend,gp}$ [mm]
0.0
0.0

Gross flange breadth, b_f [mm]
0.0
0.0

Slenderness ok?
OK
OK

Applied corrosion additions

Applied corrosion addition for bracket, t_c [mm]
0.5
0.5
2.0
1.0

Total corrosion addition for web, t_c [mm]
0.5
0.0
1.6
0.0

Total corrosion addition for flange, t_c [mm]
0.5
0.0
1.6
0.0

Corrugated Bulkhead
Profiles
Accelerations
Plate and Stiffeners

Calculate all
Calculate selected
Pt.3 Ch.8 Sec.2 [5.1] Slenderness - Tripping brackets

Input

Id text

PSM location
Bulkhead and side
Deck or bottom
Deck or bottom
Deck or bottom

Unsupported length of PSM flange [m]
5
5
2
6

PSM flange breadth, gross, b_f [mm]
200
250
344
100

Unsymmetrical flange?
☐
☒
☒
☐

Gross bracket thickness, t_b [mm]
12
12
9
7

Total corrosion addition, t_c [mm]
2.5
3
2
2

Length of bracket, l_b [mm]
1200
1200
800
1200

Edge stiffener profile
FlatBar 100 x 10
FlatBar 100 x 10

Edge material
VL-NS
VL-NS
VL-NS
VL-NS

Distance between tripping lbrts

Information

Slenderness coefficient C
0.015
0.025
0.025
0.020

Slb [m]
3,000
6,000
6,000
3,000

Unsupported PSM flange length OK?
NOT OK
OK
OK
NOT OK

Tripping bracket edge stiffening

Edge stiffening required?
Yes, specified
Yes, specified
Yes, not specified
Yes, not specified

Edge stiffener, h_w

Slenderness coefficient C for h_w
50
50

Net required, $h_{w,net}$ [mm]
60.0
60.0

Gross required, $h_{w,gp}$ [mm]
58.0
58.0

Actual h_w [mm]
100.0
100.0

h_w OK?
OK
OK

Edge stiffener, slenderness

Gross web slend thk, $t_{w,slend,gp}$ [mm]
5.5
5.5

Gross flange slend thk, $t_{f,slend,gp}$ [mm]
0.0
0.0

Gross flange breadth, b_f [mm]
0.0
0.0

Slenderness ok?
OK
OK

Applied corrosion additions

Applied corrosion addition for bracket, t_c [mm]
2.4
2.4
1.8
1.4

Total corrosion addition for web, t_c [mm]
2.0
2.0
0.0
0.0

Total corrosion addition for flange, t_c [mm]
2.0
2.0
0.0
0.0

Bottom strengthened for NAABSA operation – Implemented in Section Scantlings

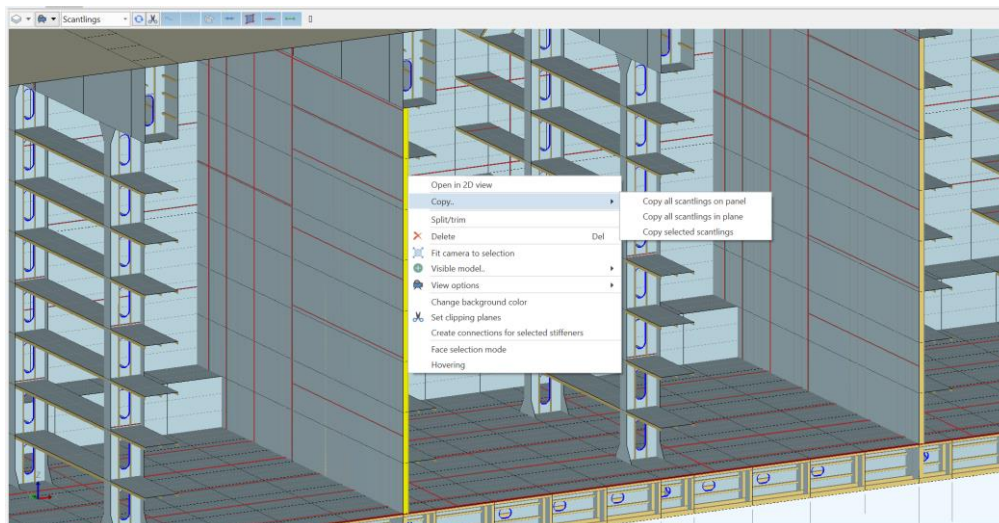
The hull scantling requirements, as required in Pt.6 Ch.1 Sec.13 [3.3] for the NAABSA notation, are now implemented in Section Scantlings.

☒ NAABSA notation P_NA- 100.00 [kN/m²]

Panel	Plate	t loc	t c	t act gr	t loc gr	αp	b	P	Ca	ReH	Load case	Design load set	a	P s	P d	αa	βa	σ_{hg}	C a max
		OK	[mm]	[mm]	[mm]		[mm]	[kN/m ²]	[kN/m ²]	[N/mm ²]			[mm]	[kN/m ²]	[kN/m ²]			[N/mm ²]	
Outer shell	Plate0	Yes	1.5	11.0	8.5	0.996	600	100.0	0.800	235	Static	NAABSA	1.400	100.0	0.0	0.500	0.900	0.0	0.800
	EPP1	Yes	1.5	11.0	8.5	0.996	600	100.0	0.800	235	Static	NAABSA	1.400	100.0	0.0	0.500	0.900	0.0	0.800
	EPP2	Yes	1.5	11.0	8.5	0.996	600	100.0	0.800	235	Static	NAABSA	1.400	100.0	0.0	0.500	0.900	0.0	0.800

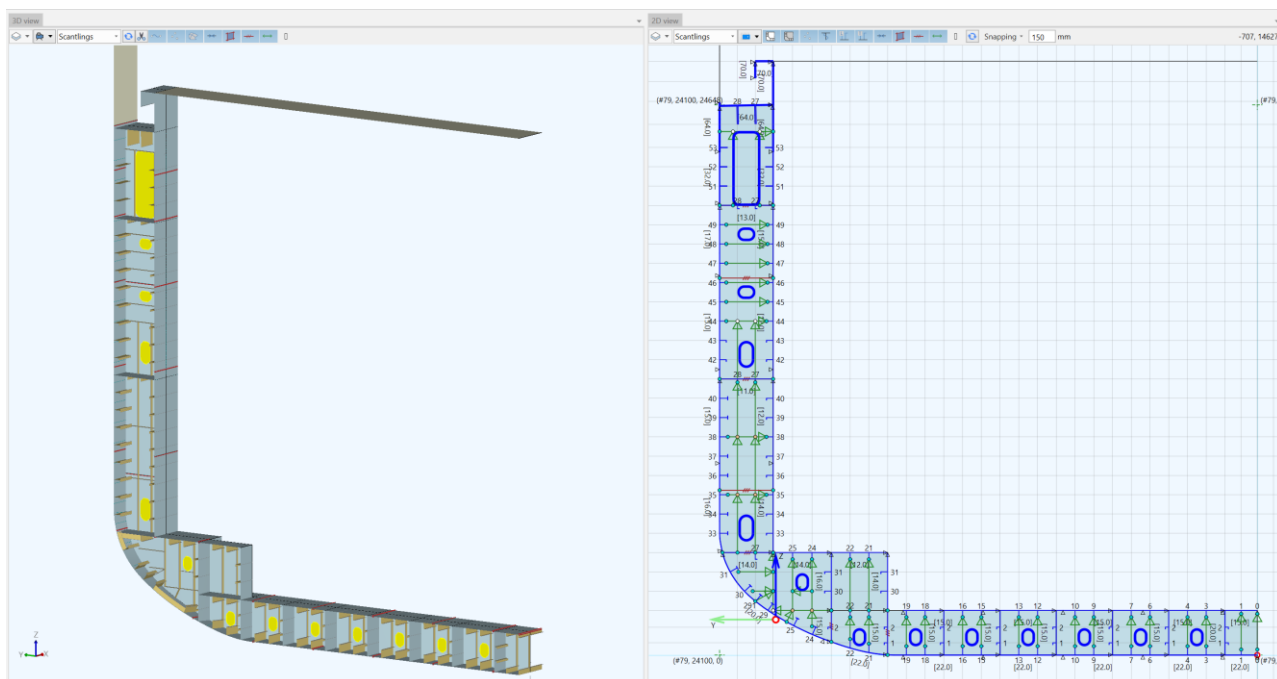
3D model – Improved scantlings modelling

User can now copy scantlings to geometry object(s) with similar structural arrangement, e.g. copy scantlings for typical web frame / typical transverse bulkhead to similar web frames / transverse bulkheads.



3D model – Improved scantlings selection

A new selection filter for openings is now available. Multiple selection of scantlings by double-clicking or rubber band selection is improved.



MPV – Load template for dry cargo ships with a long centre hold

Load template for automatic creation of standard FE design load combinations in accordance with Pt.5 Ch.1 Table 1 now implemented in the FE manager.

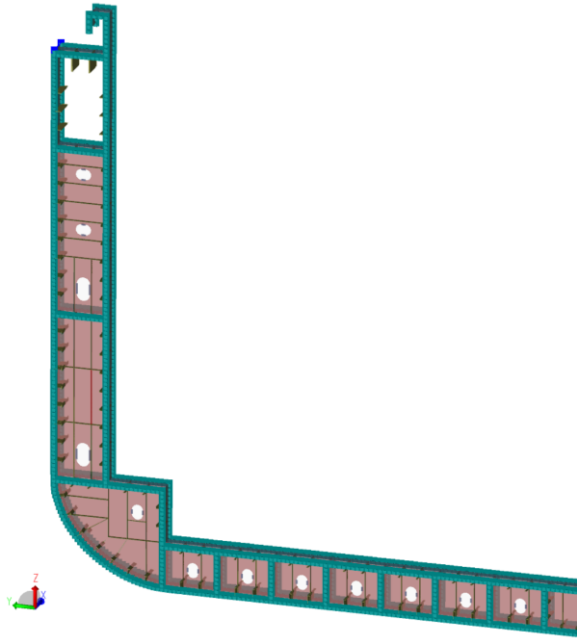


FE manager – Export local model from Nauticus Hull to GeniE

The FE manager now allows for exporting a local model from Nauticus Hull to GeniE. Prescribed boundary conditions at model ends can be automatically assigned.

FEA General Settings

General information	
Name:	Local
FE model extent	
Aft end #	Fwd end #
#83-500	#83+500
Min y (mm)	Max y (mm)
unlimited	unlimited
Min z (mm)	Max z (mm)
unlimited	unlimited
Hullform settings	
No. of points on each hull form curve	48
Hull form curve min distance [m]	5
Exporting scope	
☒ 1: Include all scantlings ☐ 2: Skip outer shell scantlings ☐ 3: Include only outer shell scantlings	
Include	
☒ Modelling grids ☒ Boundary conditions ☒ Wet surface properties ☒ Sets ☒ Structure types ☒ Default mesh density 250 [mm]	
GeniE workspace name:	
LocalModel	
Open in GeniE	



4 ENHANCEMENTS, MODIFICATIONS AND CORRECTIONS

4.1 Enhancements and other modifications

Area	Case #	Description	ID
Rules	300973	When switching to another rule set in Applicable rules under Ship data (e.g from DNV Rules to CSR BC&OT), the hull girder loads was not automatically re-calculated when accessing Hull girder loads. This limitation is now removed.	163231
Rules		Welding in way of connection between stiffeners and PSMs. Throat thicknesses now shown in additional result table "Weld sizes".	434174
Rules\DNV		For DNV Rules the design load sets are now independent of each loading condition: In compartments and loads tool, if a compartment load/wheel load/UDL is created in any loading condition, the relevant design load sets are always checked by the analysis.	93071
Rules\DNV		DNV Offshore - Naming of load scenarios updated to comply with DNV Offshore rule terms Transit and Survival.	160531
Rules\DNV		Stiffener fatigue results - report of part damage. Result table showing damage and predominant EDW per loading condition added to the fatigue result tree.	160532
Rules\DNV		For DNV Rules the local scantlings requirements for NAABSA notation is now implemented.	528931
Rules\DNV	00182158	ICE - Polar Class - azimuth or podded propellers - the fore boundary of stern region was not considering minimum 0.04L forward of the section where the parallel ship side at UIWL ends, as described in [4.7.3]. Now implemented.	539684
Rules\CSR		CSR - fatigue results - Ka and Kb stress concentration factors now shown in result table - advanced results.	539832
Section Scantlings	00158829	Performance and memory consumption. Slow performance and increased memory usage over time while repeating analysis runs. Improved, performance and increased memory consumption addressed in several parts of the analysis.	528492
Section Scantlings	00159001	Repeated analysis runs of same cross-section caused increased memory consumption until NH responded slowly or practically not at all. Memory handling significantly improved, now forcing memory cleanup after previous run when a re-run of analysis is requested.	528745

Section Scantlings		In Section Scantlings and TBHD tool, if selecting stiffener span result in the results table, the stiffener's property grid is now also available.	532131
Section Scantlings		Import from POSEIDON - alignment of longitudinals. Inconsistent use of GlobalZ or GlobalY reference for positioning longitudinals could lead to incorrect result in spans and spacings calculated from the hull form. When a stiffener has reference GlobalZ, program assumes stiffener to be positioned at constant Z along vessel and vice versa for GlobalY. Import from POSEIDON improved.	536862
Section Scantlings	00186511	Unmapped compartment cells when running analysis. In certain situations there may be compartment cells in the cross-section or transverse bulkhead model that is not mapped to a compartment. The mapping status is not directly visible unless view case Compartments is selected. Unmapped compartments may lead to false results, which is not always easy to spot. The mapping status will now be checked upon opening the Run dialog and a message stating the mapping status, like "3 of 18 compartment cells not mapped" will be shown.	546806
Section Scantlings		Memory consumption - program did not properly release memory from previous analysis runs of the same model, eventually causing out-of-memory and slow behaviour of the program. Memory now cleared where possible before every run resulting in a significant reduction of consumed memory.	558971
Section Scantlings		For Section Scantlings, additional intermediate pressure results are now provided: split pressures in static pressure plot (one from each side) and dynamic pressure plot (one from each side).	574803
Transverse Bulkhead		When copying in-plane stiffener(s) in TBHD tool / 3D model, that is overlapping existing stiffener(s), a check is now implemented preventing overlapping stiffener(s).	284009
Compartments and Loads	566913	Joined compartment - message "Could not update data for joined compartment. Did not find matching original compartments." The name of the compartment was not included in the message causing some challenges to find the subject compartment to remedy the problem. Name added.	567638
FE	292633	In the FE template for LNG carrier cargo hold models in the midship area, LC12 according to DNV-CG-0133 Sec.4 Table 4 was missing flooding of the void space surrounding the independent tank. Corrected.	143727
FE		In FE manager, a warning is provided if any design parameter affecting the hull girder loads is changed.	160390
FE		For Multi-purpose dry cargo ship with a long centre cargo hold, the standard FE design load combination factors according to Pt.5 Ch.1 Sec.5 Table 1 are now implemented.	287778

FE	362282	For DNV Offshore Rules, if more than 2 prescriptive loading conditions are defined, a warning message will now be given when generating FE load cases in FE manager.	304466
FE		In FE manager, when crating container loads, the container stowage can now use 3D model compartments generated from a prescriptive 3D model in Nauticus Hull.	362886
FE	428968	The Local Model Load Applier (LMLA) tool run in GeniE now supports global model result file with complex loads (from wave load analysis).	403474
FE	00140498	For non-CSR tankers, the FE load templates used the CSR BC&OT templates and manually adjustments were needed in order to comply with DNV Rules. The non-CSR templates are now updated according to DNV Rules.	479504
FE		When exporting Nauticus Hull 3D model with openings to GeniE, openings are now supported in the export and will be represented with the hole concept in GeniE.	488813
FE		When exporting FE model from NH to GeniE, the user can now specify a bounding box extent of NH model to be exported.	530601
FE		When exporting NH model to GeniE that contains overlapping stiffeners, only the greater stiffeners are exported (as GeniE does not allow for overlapping beams).	536893
FE		In FE manager, export of global models is now only available for Container Ships and MPV with long centre cargo hold.	564502
FE		When exporting a Nauticus Hull model to GeniE, the model is automatically saved in GeniE.	565657
FE		Performance when exporting of FE model from Nauticus Hull to GeniE is significantly improved.	569770
FE		In FE manager, the GUI is better aligned between the different model type options (global model cargo, cargo hold/partial ship model, local model).	574418
FE		When exporting a set from Nauticus Hull to GeniE, the set will be configured in GeniE so that when mirroring, the mirrored parts are added to the same set.	577537
3D Model		When copying in-plane plate seam(s) or opening(s) in TBHD tool / 3D model, that is overlapping an existing member, a check is now implemented preventing overlapping plate seam(s) or opening(s).	361131
3D Model		When importing a 3D model to Nauticus Hull via the OCX schema, end connection and shear connection information is imported.	372724
3D Model		In NH V20.30, for continuous stiffeners in TBHD tool, the span information for each span was removed from the stiffener property grid. This is now available (roll-back to V20.24).	537709
3D Model		For a 3D model, selection filter for openings is now implemented, similar to other scantling object types (plate/plate seam/stiffener).	546400

3D Model		For a 3D model, the user can now in 3D view select all plates, all stiffeners, all plate seams or all openings belonging to a panel by double-clicking.	547039
3D Model		For TBHD tool or 3D model, when creating 3D stiffeners or 3D plate seams on plane geometry, they are now represented with start/end nodes, similar to 2D stiffeners and 2D seams.	550850
3D Model		Nauticus Hull now supports import of models via OCX schema V3.0.	553211
3D Model		When creating a Section Scantlings cross sections from a 3D model, containing shear connection info and end connection info, these parameters are exported to Section Scantlings and used in the analysis (connection area requirements, fatigue assessment, effective stiffener spans)	559022
3D Model		For a 3D model, the user can now delete opening(s) in 3D model view (2D view previously implemented).	562849
3D Model		For a 3D model, the user can now in 2D view select all plate seams or all openings belonging to a panel by double-clicking (stiffeners / plates previously implemented).	563637
3D Model		In the 2D view of a 3D model or in the TBHD tool, rubber band selection is now implemented for plate seams, stiffeners, and openings (plates previously implemented).	566788
Analysis Tools		Rule Calculator - calculation of selection of multiple columns in one operation now supported. Select columns, press "Calculate selected".	92724
Analysis Tools		Rule Calculator - rearrange column sequence by moving one or multiple columns right/left is now supported. Available via short-cut keys or context menu. Any calculation results for affected columns will not be preserved, these columns have to be recalculated.	308293
Analysis Tools		Excel spreadsheet for Wheel loading is now updated according to latest DNV Rule edition (July 2023 edition).	421555
Analysis Tools		Excel spreadsheet for Buckling strength of plated structures according to DNV-RP-C201 are now ported to NH V20.	454103
Analysis Tools		Excel spreadsheet for RP-C202 updated, allowing for profile type Bulb reinforced with T.	533372
Resources		When importing 3D geometry, e.g. hull form surface or 3D model via OCX, a diagnostics tool is implemented giving errors and warnings to the user.	576945

4.2 Corrections

Area	Case #	Description	ID
Rules\DNV		Offshore - Production and storage unit - the stern slamming and bow impact pressures were not adjusted based on fwv_uls. Corrected, pressures are now multiplied by the fwv_uls at midship which may result in a reduced or increased impact pressure.	533632
Rules\DNV		DNV Offshore - fatigue. Kr and GM applied as specified for "Others" giving undesired results. Modified, now applied as for tanker > 150m (CSR).	533975
Rules\DNV	00188848	DNV RU-YACHT - it was not possible to set Restricted Service Area - RSA to None (=R0), this could result in wrong wave coefficient being used. Corrected.	552311
Rules\DNV		For DNV Rules buckling requirements according to CG-0128, the average buckling stress shall only be Poisson corrected when both x and y stress are in compression and is now corrected.	567057
Rules\DNV		HSLC - monohull - Bwl instead of B was used in calculation of minimum Msw and Mw. Corrected, B is now used for these calculations.	569632
Rules\CSR	00188080	CSR - connection strength - welding. Erroneous welding factor used for lug/direct connection when stiffener penetration arranged without web stiffening. Factor as for open slots with web stiffening used. Corrected.	550796
Rules\CSR	00189003	Connection strength. Depending on position Aft or Fwd, P1 or P2 was incorrect (too high). Corrected.	552332
Ship Data	237275	Ship data - Ice class parameters, graphics for ice regions. Erroneous input could cause graphics to obscure input fields, making it impossible to correct. Boundaries of graphics now limited to prevent obscuring cells.	92292
Section Scantlings		CSR BC - side frame - web angle to plate removed from side frame property interface as the general "Web angle to plate" serves the same purpose. Angle specified when defining the webframe is transferred to "Web angle to plate"	532119
Section Scantlings		CSR - longitudinal corrugated bulkhead where corrugation extends below inner bottom. Corrugation requirements for part below inner bottom were not applied. Corrected.	533736
Section Scantlings		For DNV Offshore rules, some rule calculation messages from Section Scantlings were missing in the report. Corrected.	534122
Section Scantlings		For CSR BC and OT, in Section Scantlings results table, yielding twReq requirement was missing "Yes/No" if required thickness was equal to corrosion addition. Corrected.	535116

Section Scantlings		Fatigue analysis - advanced results - Ka and Kb was shown as 0 for both aft and fwd connection if "Calculate permissible K-factors" was not checked. Corrected, presentation of Ka and Kb as applied to the end connection does not depend on calculation of permissible K-factors.	546366
Section Scantlings		Compartment mapping lost. A compartment cell that was mapped to a compartment when saving workspace, is not mapped when re-opening workspace. Caused by a stricter mapping process invoked when opening the workspace. This mapping process did not accept mapping to a compartment whose bounding box was not intersecting the midpoint between 1st aft and 1st fwd.	557543
Section Scantlings		Transverse stiffeners - defining a longitudinal stiffener as "Buckling stiffener" caused the succeeding transverse stiffeners not to have access to the span properties. Caused by "Buckling stiffener" property set for the transverse stiffener, which is not supported. Corrected.	565952
Section Scantlings	00196267	Cross-section summary plot - stiffeners without end connection were shown in red color even though the calculation results for the stiffeners was OK. This was misleading and plot is modified.	567611
Section Scantlings		Compartments for a cross-section not shown in compartments view case, only geometry. This happened if Aft compartment view in a transverse bulkhead model was current prior to selecting the cross-section. Corrected.	573821
Transverse Bulkhead		Transverse bulkhead - copy stiffeners. Stiffener copies were not always trimmed at panel boundaries in case the boundary of the panel varied. Corrected.	419211
Transverse Bulkhead		Message "Could not find breadth of vessel at z=" shown during analysis. The process causing this message is not relevant for a transverse bulkhead analysis and is removed.	533394
Transverse Bulkhead		In transverse bulkhead tool, if a plate seam is placed at a surface boundary, plate EPP was not correctly generated. Corrected.	579163
Compartments and Loads		Bulk Carriers CSR and DNV - Steel coil loads with key coil. Key coil index set to a value > 0 before un-checking Key coil checkbox could lead to key coil being considered anyway. Corrected. To consider presence of key coil, checkbox has to be checked and index set > 0. Setting index to 2 or 3 affects Ck value as per rules.	574626
FE		For FE Fatigue tools files created for DNV Rules and switching to CSR BC&OT, the FE fatigue tool was not correctly updated (and vice versa). Corrected.	491264
FE		When exporting a 3D model from NH to GeniE, transverse stiffeners on outer shell were typically not correctly exported. Corrected.	544444
FE		When exporting JavaScript loads or corrosion additions from Nauticus Hull to GeniE, the available NH input allowing for	545193

		offset between GeniE model and NH was wrongly not considered. Corrected.	
FE		In FE Fatigue Tool, it is now stated that result files with 2nd order elements are not supported.	553926
FE	00197107	When exporting a transverse bulkhead model from Nauticus Hull to GeniE, the vertical outer shell was wrongly exported not as a straight line. Corrected.	569772
FE		When exporting corrosion additions from Nauticus Hull to GeniE as JavaScript functions, any spacing in compartment name (defined in compartments and loads) was not allowed. Corrected.	574735
FE		In FE manager, If specify polygon load area for UDL in counter clockwise direction, the export to GeniE failed. Corrected.	580745
3D Model		For a 3D model, when using 3D stiffener wizard, the created stiffeners' ends were not correctly connected to intersecting stiffeners. Fixed.	369935
3D Model		When creating a new plate on a 3D model's outer shell, the preview graphics highlighting the plate's extent is improved.	426612
3D Model		When intersecting 3D model and creating a 2D cross section view, color coding of connection properties was not available. Corrected.	455429
3D Model		When intersecting 3D model and creating a 2D cross section view, changes to 3D model position codes were not correctly updated on the 2D cross section view. Corrected.	465558
3D Model		In NH 3D model, performance is significantly improved when modelling 2D stiffeners terminated on outer shell (e.g. transverse deck stiffeners).	548199
3D Model		If selecting multiple panels of a 3D model, property update was not assigned to all selected panels. Corrected.	579164
Analysis Tools		CSR - deck house spreadsheet. Entered data was not saved if definition of plates and stiffeners stated at a tier higher than tier 1, i.e. line 1 was empty. Corrected.	309880
Analysis Tools	00190823	Spreadsheet, ships with L less than 90m. Rule update for stiffener slenderness not available. Selection of rule edition introduced (this will not affect existing standalone copies of the spreadsheet).	557529
Analysis Tools		For DNV Offshore Rules, in Rule Calculator, the tab for Corrugated Bulkhead was unintentionally available and is now removed.	562715
3D-Beam	00157127	3D-Beam - flooding load calculated by Get Rule Loads different from flooding load calculated in Rule Calculator or cross-section analysis. Corrected, caused by inconsistent use of length units.	523855

5 TECHNICAL NOTES

5.1 Hardware requirements

Minimum Memory	Recommended Memory	Minimum free Storage	Minimum Screen resolution
16 GB	32 GB or more	8 GB	1280 x1024

5.2 Operating system requirement

- Windows 10 or Windows 11

5.3 Software requirements

- Excel and Word from Microsoft Office 2010 with SP2 or newer.
- Microsoft .NET Framework 4.8.
- The Local Model Load Applier console application, accessible from GeniE, requires .NET 8.0.



6 OTHER PRODUCT INFORMATION

6.1 Programs and versions

The following programs are available in this release:

Program Version
Nauticus Hull v20.31
Application version manager
GeniE64
License manager
Sesam converters 64
Sesam manager
Sestra64
Submod

Version number of Sesam component in the FEA package can be found in file *PackageContents.xml* located together with the installation.

6.2 Usage of open source/free distributable libraries

Library	Purpose	Public licence	Source
IxMilia/Iges	Read/Write IGES files	Apache License 2.0	GitHub
HDF5	Read/Write HDF5 files	https://support.hdfgroup.org/ftp/HDF5/releases/COPYING	https://portal.hdfgroup.org
Live Geometry	2D viewer	Microsoft Public License (Ms-PL)	https://archive.codeplex.com/?p=livegeometry
AvalonEdit	Text editor	MIT	https://github.com/icsharpcode/AvalonEdit
AutoFac	IoC container	MIT	https://github.com/autofac/Autofac
Log4Net	Message log	Apache License 2.0	https://logging.apache.org/log4net/

6.3 Software Support

Email: Software.Support@dnv.com

Web: [Technical software support](#)

[Customer Portal](#)

- download of
 - new or old releases
 - release documents
 - installation guides
 - user manuals
- registration and follow-up of support request
- Knowledge base / FAQ's



About DNV

DNV is a global quality assurance and risk management company. Driven by our purpose of safeguarding life, property and the environment, we enable our customers to advance the safety and sustainability of their business. Operating in more than 100 countries, our professionals are dedicated to helping customers in the maritime, oil & gas, power and renewables and other industries to make the world safer, smarter and greener.