



NAUTICUS HULL

RELEASE DOCUMENT

NAUTICUS HULL
NAUTICUS 3D BEAM
CONTAINER SECURING
FPSO PACKAGE
PULS

JUNE 2007

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1 Introduction

1.1 Purpose

The purpose of this document is to inform the users about system requirements, installation process, new programs and enhancements/bug fixes that are implemented in Nauticus Hull since last release.

In this release, several modifications and corrections have been implemented to better support the official IACS Common Structural Rules for Double Hull Oil Tankers (hereafter called “CSR-Tank”). CSR-Tank is applicable for double hull oil tankers with length $L \geq 150$ m. Nauticus Hull is updated according to the final revision of CSR-Tank, January 2006, and for most of the programs IACS Corrigenda 1, “Rule Editorials and Clarifications, April 2006” is also incorporated.

This release also contains support for selected parts of the official IACS Common Structural Rules for Bulk Carriers (hereafter called “CSR-Bulk”). CSR-Bulk is applicable for bulk carriers with length $L \geq 90$ m.

The new 3D modelling and strength assessment environment by use of GeniE as part of Nauticus Hull Finite Element Analysis is included on the current Nauticus Hull Installation CD. The version of GeniE to be used is V3.4-28.

For latest updates on new features, known errors and limitations in the programs, please see the online user manuals and status list.

For information on how to install the program, please read the **Nauticus Hull Installation Guide.pdf**, which can be found on the root of the installation CD.

2 Programs and versions

		Nauticus Hull Rule Check, Pck I	Nauticus Hull Rule Check, Pck I Extended	Nauticus High Speed Light Craft (Nauticus HSLC)	Nauticus HSLC Extended	Nauticus Container Securing	Nauticus Container Securing Extended	PULS	Nauticus Hull Basic, Pck II	Nauticus Hull FEA, Pck III	Nauticus Hull Wave Load Analysis, Pck IV	Nauticus Hull Sea Keeping Analysis
<u>Nauticus Hull Modules</u>												
Nauticus Workflow Manager	10.25	X	X	X	X	X	X		X	X	X	X
Section Scantlings	10.25	X	X	X	X				X	X	X	X
Fatigue	10.25	X	X						X	X	X	X
Rudder	10.25	X	X						X	X	X	X
Cross Sections	10.25	X	X	X	X				X	X	X	X
Rule Check XL	10.25	X	X						X	X	X	X
PULS	10.25	X	X						X	X	X	X
3D Beam	10.25		X		X		X		X	X	X	X
HSLC XL	10.25			X	X							
Container Securing	10.25					X	X					
PULS AV	10.25							X				
PULS XL	10.25							X				
Modeller	10.25								X	X	X	X
2D Modeller	10.25								X	X	X	X
Idealiser	10.25									X		X
GeniE										X		X
<u>SESAM Modules</u>												
Manager										X	X	X
Patran-Pre										X	X	
Presel										X	X	
Sestra										X	X	
Cutres										X	X	
Submod										X	X	
Xtract - Stru										X	X	
Waveship											X	X
Wasim											X	X
Wasim_setup											X	
Wasim_solve											X	
Wasim_fourier											X	
Wasim_stru											X	
Wasim_mass											X	
Postresp											X	X
Postresp Fatigue ext.											X	
Xtract - Animation											X	X
Misc. SESAM Utility Programs										X	X	X

Go to <http://www.dnv.com/software/support/index.asp> >> SESAM Status List, for latest versions of SESAM modules.

3 System Information

3.1 Minimum software requirements

Microsoft Office 2000, Excel + Word, Internet Explorer 5.01, or later versions.

3.2 Minimum hardware requirements

Package	Processor CPU/Mhz	Memory MB	Storage GB	Display and Graphics card
Hull Rule Check FPSO Rule Check 3D Beam HSLC Container Securing	200	128	2	SVGA 256 colours 1024x768 resolution
Basic Ship Modeller Finite Element Analysis Wave Load Analysis Sea Keeping Analysis FPSO Initial Design PULS Advanced Viewer	400	512	10	SVGA 16.5 million colours 1024x768 resolution OpenGL hardware accelerator recommended
GeniE	1500	1024		OpenGL

3.3 Operating system requirement

Windows 2000 with Service Pack 4 or Windows XP. File system should be NTFS.

3.4 Decimal Separator

Decimal separator (symbol)

It is required to use . (dot) as decimal separator for the Nauticus Hull programs.

Open Control Panel → *Regional Settings* to inspect and modify the separator symbols.

If changing Decimals Symbol sign given in regional setting from what is default for selected country, change Decimal Symbol both for numeric and *currency* values. Otherwise, the RCXL spreadsheets may produce wrong result.

List separator

List separator sign must be different from the decimal separator used. Use comma , or semicolon ;

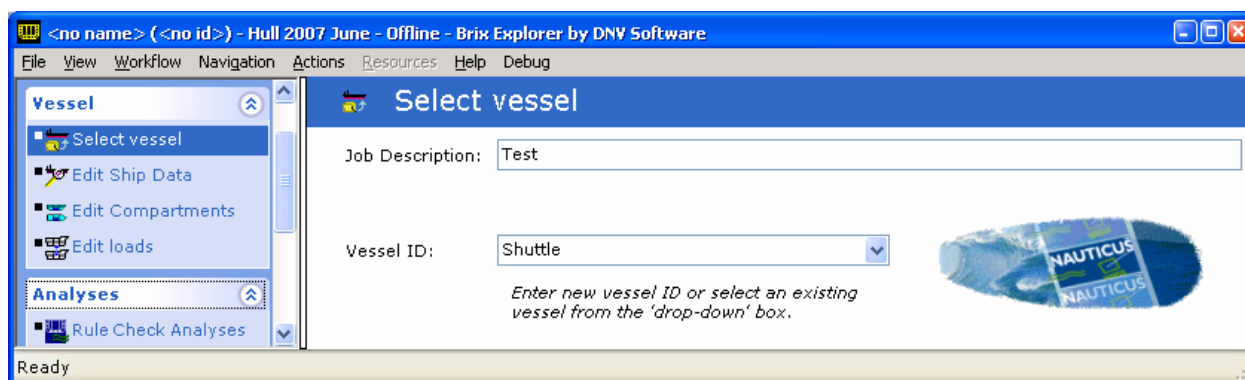
4 Program Updates

4.1 General

This section describes the most relevant program updates since the September 2006 Patch 4 release.

4.2 Brix Explorer

In the previous version all jobs were stored in a local database. Current version will by default not use any database, but save the jobs as xml files on disk. Once the vessel ID is defined the job will be saved under the vessel folder with name “*HullJob.<Job Description>.xml*”. Following job will for example be saved as “*Shuttle\HullJob.Test.xml*” under the user defined hull job directory.



A separate program called “*ExtractDBJobs.exe*” is provided to convert jobs from the old database to file. See appendix A for more information about this program.

Other changes:

- The job list is redesigned for Nauticus Hull.
- Added option to specify name and filename for new analysis.
- It's now possible to open several analyses and access parent Workflow job at the same time.
- ‘Save’ and ‘Refresh’ button is added to ‘Edit Compartment, and ‘Edit Loads’ tools. (Issue #651)
- For CSR Bulk the unused notation ‘*Bulk Carrier BC.B**’ is removed. (Remaining of issue # 402)
- Add dialogue to change filename when analysis is duplicated.
- The default GM in ballast condition was wrong, and is now corrected.

4.2.1 Compartment Tool

A new generic tool has been implemented in Nauticus Hull for defining compartment plan along the whole length of the vessel. By selecting cross sections from pre-defined templates and giving main structural dimensions, compartments will automatically be generated. It is also possible to manually edit or define compartment data.

4.2.2 Loads

All loads information with regards to bending moments and shear forces, compartment loads, loading conditions etc. is now defined in a new tool for managing loads.

This is a significant time saving feature which will prevent the user from entering the same data in multiple places.

4.3 Section Scantlings

4.3.1 Rule Edition - CSR-Tank Rules

If the CSR-Tank Rules are applied, two Rule editions are available, viz, April 2006 and April 2007. Here is how the specified Rule edition (April 2006 or April 2007) is used in Section Scantlings:

April 2006:

The following Rules are included:

- The book "Common Structural Rules for Double Hull Oil Tankers with length 150 meters and above".
- Corrigenda 1 Rule Editorials and Clarifications. January 2006 (Came into force April 1, 2006)
- Corrigenda 2 Rule Editorials and Clarifications. January 2006 (Came into force April 1, 2006)

April 2007:

As for April 2006, plus the following Rules:

- Rule Change Notice No 1, September 2006. (Came into force April 1, 2007)

This Change Notice is to be applied to ships contracted on or after April 1, 2007. However, application to ships contracted for construction prior to April 1, 2007 is acceptable where agreed by builder and prospective owner.

4.3.2 New Features

Transverse bulkhead in bulk carriers: Flooded condition (CSR-Bulk Rules)

The requirements concerning vertically corrugated transverse bulkheads in the flooded condition acc. to the CSR-Bulk Rules have been included.

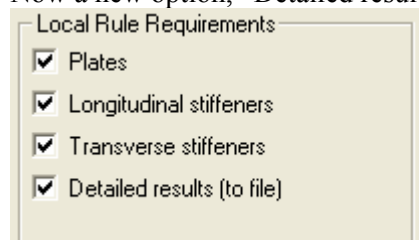
Both DNV Rules and the CSR-Bulk Rules are thus available in the program for checking the flooded condition for transverse bulkheads in bulk carriers.

4.3.3 Miscellaneous Changes

Long calculation time (IM 519)

If the Nauticus Hull database is held on a file server instead of the local hard disc, the calculation would typically take several minutes. The reason is that detailed tables holding the local Rule requirements concerning plates and stiffeners were always stored to files during the calculation process. On the local hard disc, this file operation took only a few seconds. On an external file server, however, the storage of the detailed table was rather time expensive.

Now a new option, "Detailed results (to file)" has been included in the "Report options" dialog:



The "Detailed results" option is off by default. Hence the calculation will take just a few seconds if that option is left unchecked.

Dump of detailed results to file

If the "Detailed results" option explained above is switched on, detailed tables holding the local Rule requirements concerning plates and stiffeners will be stored to files.

The data in the files is plain text, and the file can be opened in e.g. Notepad and MS Excel. The files will be stored in the “Report” subdirectory under the ship project directory. The file names are composed of codes that describe the longitudinal position, whether the table is related to a cross section or a transverse bulkhead, and more. Here is an example showing the files holding the detailed results tables:

Name ▲	Size	Type
X115000_Details_CS_Pl.txt	2 873 KB	Text Document
X115000_Details_CS_St.txt	2 336 KB	Text Document
X115000_Details_TvBhd_Pl.txt	377 KB	Text Document
X115000_Details_TvBhd_PIVCorr.txt	108 KB	Text Document
X115000_Details_TvBhd_St.txt	1 KB	Text Document

Here is a description of the codes in the file names:

X115000 = The longitudinal position is 115000 mm from A.P.

If the frame No had been given as input, the code would be typically be “F85” instead. That means frame No 85.

Details Indicates that this file holds the detailed results.

CS = The detailed results are related to a cross section

TvBhd = The detailed results are related to a transverse bulkhead

Pl = Detailed results for plates

St = Detailed results for stiffeners

PIVCorr = Detailed results for a vertically corrugated bulkhead

Compartment names

Compartment names were not always corresponding in Section Scantlings and in Workflow Manager. This is now corrected. (Not registered in IM)

Ultimate strength of the hull girder (CSR-Bulk)

The ultimate strength check of the hull girder for bulk carriers in the flooded condition has been included. Refer to the CSR-Bulk Rules Ch 5, Sec 2, [2.3].

4.3.4 Error Corrections

Section modulus of stiffeners not perpendicular to the plate (IM 383)

NOTE: This correction is relevant for CSR-Tank and CSR-Bulk Rules only

In the “Local Rule requirements” table for stiffeners, the actual section modulus incl. plate was based on the assumption that the web was perpendicular to the plate.

The section modulus requirement in the table was presented as $Z_r = Z_{r_p} \times \cos(\alpha)$, where α = the angle between the web and the plate flange, Z_{r_p} = section modulus when the web is perpendicular to the plate.

For “inclined” stiffeners, those results were incorrect, and the results have been changed as follows:

Actual section modulus: The section modulus Z_{net} is based on the true angle between the web and plate.

Section modulus requirement: The requirement Z_{r_net} is independent on the angle between the web and the plate.

4.3.5 Error corrections – CSR-Tank

Loading conditions

Local Rule requirements: The loading condition data given in “Edit Loads – Loading conditions” is now used in the fatigue strength check only. In the local requirements calculations, the draughts given in “Edit ship data” and the default values for GM and kr are now used.

This change has made it possible to use different loading conditions for the local requirements and fatigue requirements. (Not registered in IM)

Fatigue zone

If the forward transition zone was specified in the fatigue zone dialog, the program would use the aft transition zone anyway. Hence the forward transition zone was never used in the program. This error has been corrected. (Not registered in IM)

Fatigue – stress factors

The interpolation of the stress factors in the aft and forward transition zones was incorrect. The error has been corrected. (Not registered in IM)

Fatigue – log file

In the smallest fatigue log file, GM and kr were the standard values acc. to the Rules. Now the values given as input are used instead. (Not registered in IM)

4.3.6 Error corrections – CSR-Bulk

Setting pressure of the pressure valve

In the calculations, the pressure valve setting pressure for water ballast was incorrect. The error has been corrected. (Not registered in IM)

Pressure from bulk cargo

A few corrections have been made concerning the calculation of the pressure from bulk cargo and heavy bulk cargo. This applies to both the prescriptive and the fatigue requirements. (Not registered in IM)

Additional thickness

The additional thickness for frame webs in the foremost hold (Ch 6, Sec 2, [2.2.2]) was incorrect. The error has been corrected. (Not registered in IM)

Fatigue lifetime plot

The stiffener lifetime/damage colour plot is now working. (IM 518)

Flooding sagging moment

An error in the calculation of the sagging moment in the flooded condition has been corrected. The k-factor for the hogging curve was used instead of the value for the sagging curve. (Not registered in IM)

Bending moment and shear force curves

The interpolation in the bending moment and shear force curves was incorrect. The error was a problem when the user added points with small distances to the curve. (Not registered in IM)

Filling height for water ballast, bulk and heavy bulk loads

When generating compartments in previous versions of Nauticus Hull, the filling height for water ballast was taken as the maximum z-value of the compartment bounding box. The resulting filling height could only be changed manually by editing the file CompAndLoads.xml. The filling height is now taken as the largest of the height to compartment top and the top of the hatch. When the bounding box is changed by the user, the filling height value will be updated. Now the correct filling height for the bulk and heavy bulk loads are displayed in the results Report. (IM 791)

4.3.7 Error corrections – DNV Rules

Setting pressure for the pressure valve

The setting pressure used in the calculations was incorrect. The error has been corrected. (Not registered in IM)

Fatigue – log file

CN 30.7 fatigue: In the short fatigue log file, GM and kr were the standard values acc. to the Rules. Now the values given as input are used instead. (Not registered in IM)

Fatigue – void spaces

CN 30.7 fatigue: The fatigue strength was not calculated if no load was given as input for one or more compartments. This problem was related to void spaces. Now compartments such as void spaces may well be empty in the fatigue strength calculations. (IM 765)

Fatigue – stiffeners on stringers

CN 30.7 fatigue: The stiffeners on stringers and girders were considered as part of the outer hull. The error has been corrected. (Not registered in IM)

4.3.8 Limitations – CSR-Bulk

- Steel coils are not implemented.
- Limited support for vessels with length less than 150 meters.
- For non-cylindrical holds, the mean breadth of the cargo hold is taken as the extreme breadth of the cargo hold at the considered cross section.
- The alternate load condition data are used in the fatigue calculations only.

4.4 Rule Check XL

4.4.1 New Tools

1) CSR Tank

Buckling of pillars
Effective flange

2) CSR Bulk

Cargo mass curves.
Allowable Hold Loading according to URS20
Hot Spot Stress Analysis for Fatigue Strength Assessment, according to Ch7 Sec4

4.4.2 Changes and corrections

1) DNV RuleCheck

Some spreadsheets were incorrectly protected against user input.

2) HSLC

The following spreadsheets have been replaced with the corresponding sheets included in the DNV RuleCheck package: Beam with four Supports, Single Beam with Brackets and Profile properties

3) Offshore RuleCheck

Excluded StiffenedPlate.xls according to the C.N. 30.1 July 1995. This Classification Note is no longer valid.

4) **CSR Tank and CSR Bulk**

Various corrections.

4.5 Nauticus Hull FEA, Pck III

4.5.1 Cargo Hold Analysis, CSR-Bulk

1) New Boundary Conditions tool

A new tool used to specify boundary conditions for the cargo hold model is added to the Cargo Hold Analysis template.

2) Copy of data to GeniE

In addition to loading conditions, the following can now automatically be transferred to the Genie model:

- Corrosion additions
- Sets
- Boundary conditions
- Slicer used for calculation correction loads to achieve target hull girder loads
- Wet surface properties used to identify the surfaces for application of external sea pressures

3) Corrected internal tank pressure

The internal tank pressure in ballast tanks which utilise ballast water exchange by the flow-through method was not calculated correctly. This is now corrected.

4.5.2 Cargo Hold Analysis, CSR-Tank

1) Change to stiffener idealisation

According to the rules the beam elements in the FE model representing stiffeners on watertight structures should have out of plane bending properties representing the inertia of the combined plating and stiffener. This is now implemented in the Idealiser. In Patran Pre (and MSC.Patran) the stiffeners on watertight structures are now represented using *General Section* beams. All the section properties for the general section, except from *Inertia about yy (IY)* and *Section Modulus (WYMIN)*, are similar to the properties for the standard beam section. IY and WYMIN are calculated for the combined plating and stiffener.

4.6 3D Beam

4.6.1 Updates and corrections

- "Copy and transform":

- Incremental rotation of the copied selection is implemented.
- An error is corrected which made it possible to copy selected beams without the corresponding end nodes.

- Combined stresses according to von Mises:

- Corrected error in stresses for L-profiles (NB! Shear due to torsion is still incorrect!)
- Corrected the reported hot spot position for Box profiles

- Analysis output:

- The Load case Names are now reported in the Output window for the analysis.

5 Known Issues

5.1 Section Scantlings

5.1.1 General

Interaction with Workflow Manager

Both Workflow Manager and Section Scantlings may now be open and editable at the same time, but changes in Workflow Manager will not be updated in Section Scantlings until the latter is closed and re-opened. When editing ship data for old jobs in the previous BRIX Manager, the whole job must be closed and re-opened for updating the ship data. It is not enough to close and re-start Section Scantlings.

5.1.2 DNV Rules

Section modulus for “tilted” stiffeners when fatigue calculations are included

If the stiffener web is not perpendicular to the plate, the section modulus used in the fatigue calculations will be incorrect. The section modulus requirement should be compared with the actual section modulus, assuming that the web is perpendicular to the plate. However, if the fatigue strength calculations are included, the section modulus of the stiffener will be based on the true angle between the web and the plate. (IM 823)

“Hogging ships”

For “hogging” ships, the allowable still water bending moment is in the area between the maximum and the minimum hogging moment curve. Before the Workflow Manager was introduced in Nauticus Hull, the “minimum hogging” curve could be specified by entering negative values as input for the sagging moment curve.

However, in Workflow Manager, sagging moments are to be given as negative values, hogging moments as positive values.

In Section Scantlings, the moments given in Workflow manager will always be positive values. Hence it is no longer possible to specify the “minimum” hogging moment curve by entering negative values for the sagging moment curve.

Remedial action in Section Scantlings, for “hogging ships”:

In the “Design bending moments and shear forces” dialog, enter a negative value for the sagging moment. The negative sagging moment will then be considered as the “minimum hogging” moment in the calculations.

5.1.3 CSR-Bulk

Bulk loads

If the bulk load is not included (“Has homogenous bulk load” is not marked), the additional $0.1 M_H$ is not added to the heavy bulk load.

Regarding BC-B notation: When calculating pressures for heavy bulk, density=3.0, the input for M_{HD} shall be used. To get correct mass in calculations the input weight shall be $0.9 M_H$. The heavy bulk load is not included in fatigue calculations for BC-B.

5.2 Rule Check XL

5.3 Finite Element Analysis

Following spreadsheet analyses requires Office 2003 or later in order for 'Browse' button to work:

- CSR-TankShip-FEABucklingPostProcTemplate-WithPuls.xls
- CSR-BulkShip-FEABucklingPostProcTemplate.xls
- CSR-Bulk_Ch7_Sc4_Fatigue.xls

Workaround is to write full file path manually.

5.4 Brix Explorer

#585 "Import job from file" do not include files not located at sub directory 'WFDepot'. Workaround is to extract the file manually after import by renaming the file extension from 'bxHullJob' to 'zip'.

#840 When several users work on a common 'hull job directory'. A warning message is given if two users open the same file. If however the two users have different date/time format given in control panel - regional settings, the second user get error message "*String was not recognized as a valid DateTime*". The job or analysis will not be opened. Workaround can be one of following:

- Wait until first user is finished,
- Delete the file named "<filename>.inuse".
- Contact Nauticus Hull Support for information about how to turn off the 'file-in-use' option.
- Preferably should all users use the same date/time format.

5.4.1 Load tools

Load test height for CSR-Bulk loads

The load test height for liquid compartment loads is not shown in the CSR-Bulk compartment loads dialog, and it is not possible to edit the value. The load test height is however calculated according to the rules when the internal tank pressures are applied in Section Scantlings.

Not all CSR-Bulk compartment loads are generated automatically

According to the rules side tanks that are void spaces should be calculated as water ballast tanks. Compartment loads for side tanks specified as void spaces are not generated automatically and must be added manually.

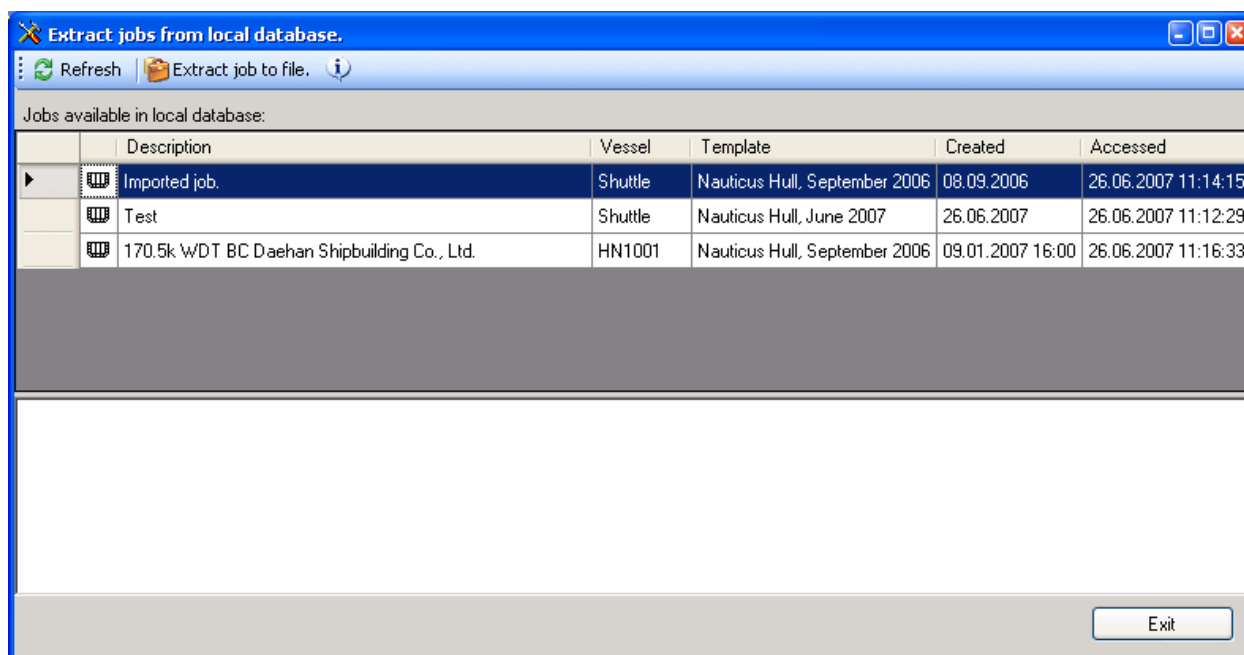
Unspecified attributes for compartment loads, DNV Rules

If not all the attributes for a compartment load are specified in the DNV Rules compartment loads grid, Section Scantlings may crash during the calculations. Workaround is to specify a value for all the attributes, i.e. replace the text "(null)" with a valid value in the grid.

Appendix A, How to extract jobs from old database.

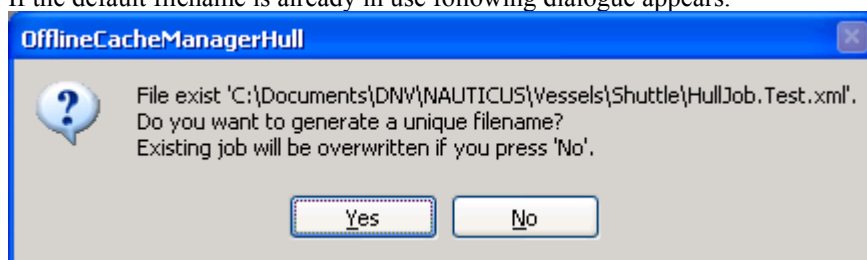
All jobs were stored in a local database in the September 2006 version. Current version will by default not use any database, but save the jobs as xml files on disk. 'ExtractDBJobs' is a separate program to convert jobs from local database to files compatible with stand-alone version of June 2007.

To start the program press 'Start' – 'All Programs' – 'DNV Software' – 'Extract DB Jobs'. Alternatively find the file *ExtractDBJobs.exe* in the Nauticus Hull installation folder and double click on it.

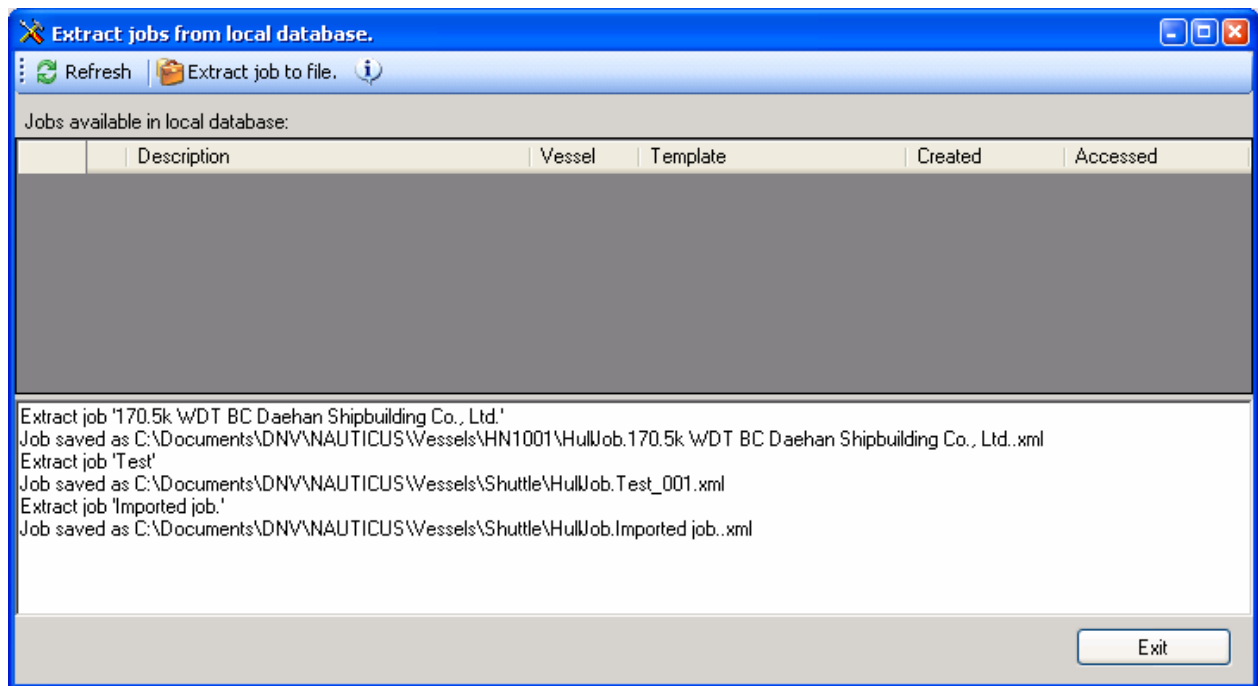


Select the job you want and press the *Extract job to file* button. You may select more than one by click and drag or press and hold the 'Ctrl' key while clicking.

If the default filename is already in use following dialogue appears.



The lower panel gives information about created files. When the job is successfully extracted the job in the database will be terminated and removed from the list.



It is possible to rename the files, but it is essential that job files begin with 'HullJob.' and ends with '.xml'. The text between will be the 'Job Description' visible in Nauticus Hull.

Press the *Exit* button to quit the program.