

**Document Title** hiCRANE2 Simulation Quick Start Guide  
**Project Title** Crane and stacking machinery simulators  
**Document Number** 131014-OPM-029      **Revision** 004  
**Project No.** 131014      **Document type** OPM  
**Client** Internal      **Total Pages** 40

## OPERATION MANUAL

Revision	Prepared by	Issue date/time	Document status	Reviewer
002	William Smith	21.02.2023	approved	Eivind Sele
<b>Revision Comment</b>	<ul style="list-style-type: none"><li>● 001: Initial</li><li>● 002: Added editing of objects</li><li>● 003: Updates for version 5.5.11</li><li>● 004: Combined quick start guide and quick select toolbar manual</li></ul>			
<b>Document location</b>	DCC\Projects\131014 hiCRANE General\OPM\131014-OPM-029 Simulation Quick Start Guide.docx			

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# Introduction

This document seeks to provide a quick start guide to operating the hiCRANE2 simulator, taking the reader through the most essential steps to get started. A more comprehensive description of all the features and functionalities of the simulator can be found in the documents listed in the reference documentation.

## Notation

Term	Description

## Reference documentation

Related documentation:

- 131014-OPM-007 Instructor Application
- 131014-OPM-008 Operator Control Application
- 131014-OPM-010 Logging System

## Starting the Instructor Application



To start the Instructor app, double click on the desktop short cut.

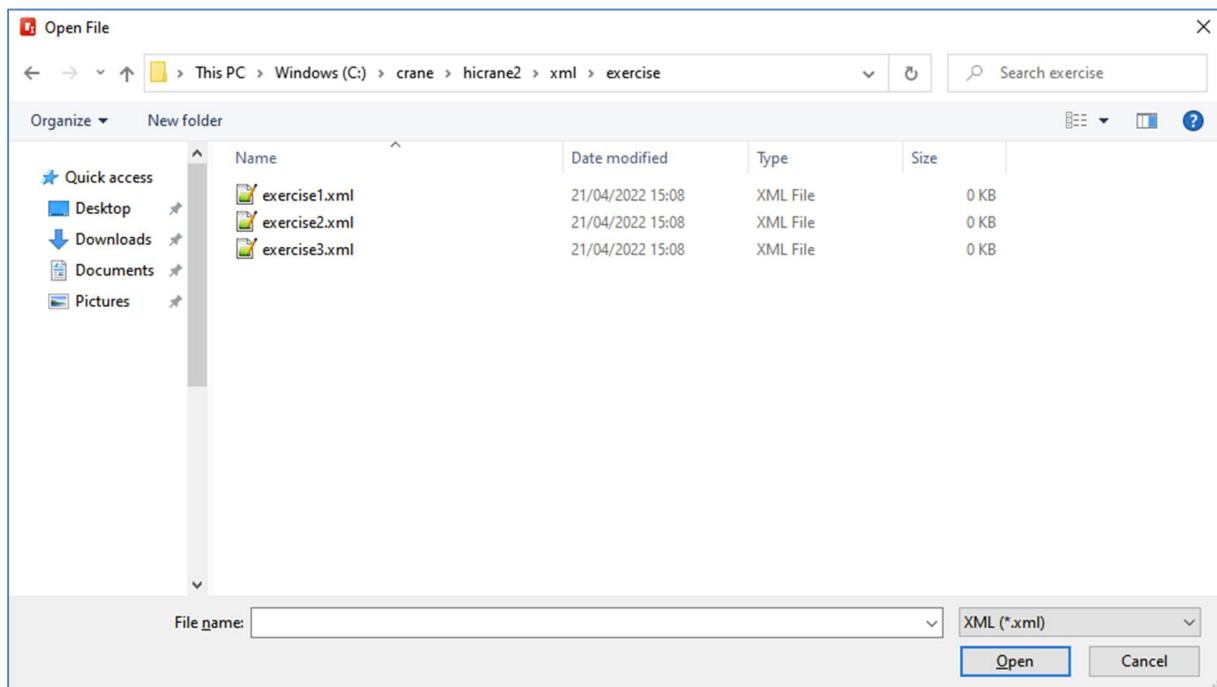
On start up, the instructor app will appear as shown:



## Using an existing exercise

An existing exercise may be loading via the File menu or the Open Folder icon.

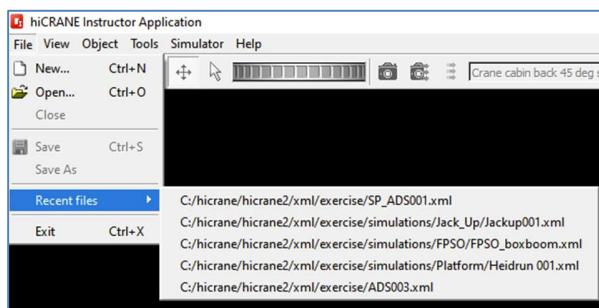
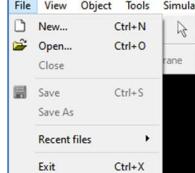
- When opened using the open folder exercise, you will be presented with a file selection dialog.



Select the desired exercise and press Open.

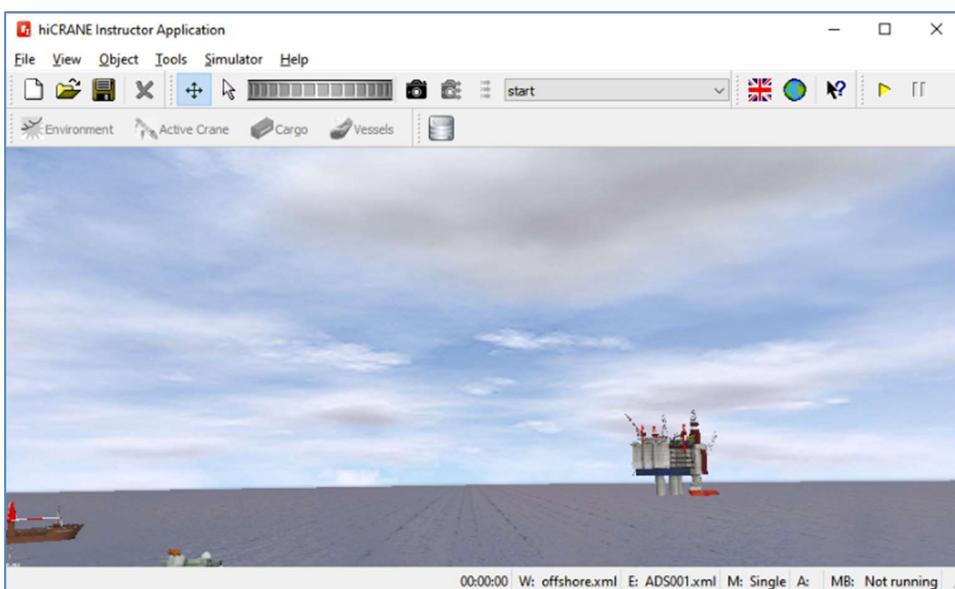
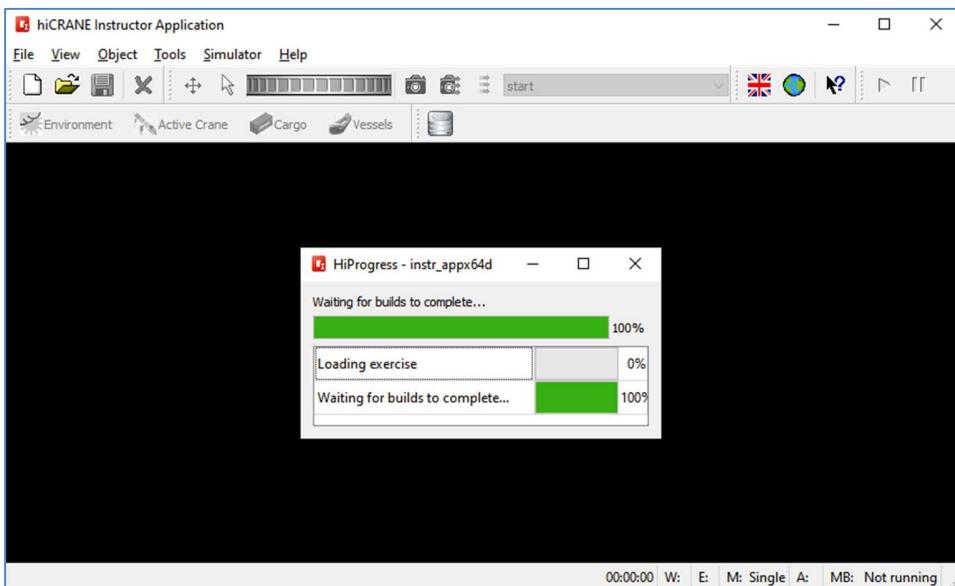
From the File menu

Selecting Open will present the file selection dialog box as discussed above.



Selecting Recent files will present a list of recently opened exercises. Double click on an exercise in the list to open it.

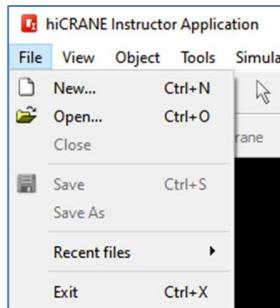
The selected exercise will load.



# Creating a new exercise

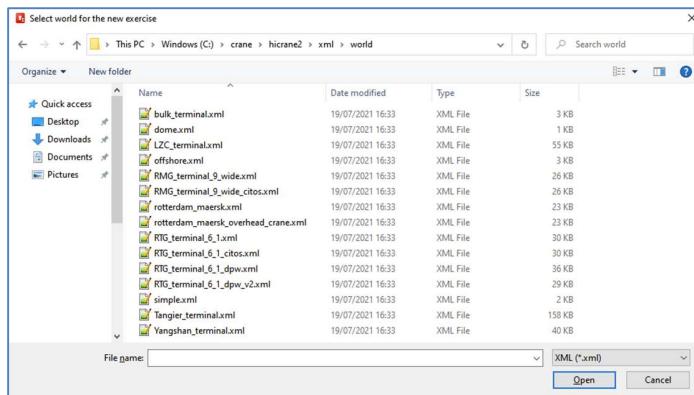
## Creating the 'world' for the exercise

- A new exercise may be created via the *File* menu or the New icon.



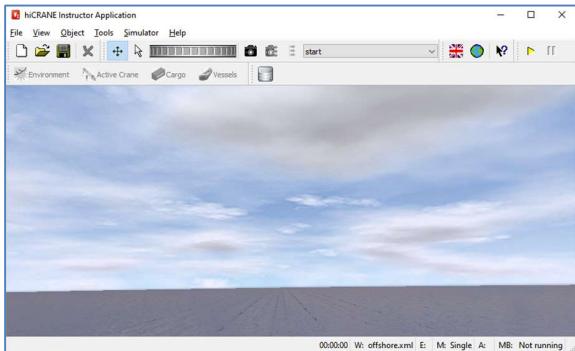
or select the *New...* option to create a new exercise.

For both of these, a select file dialog is displayed. This lists 'worlds' that the simulation exercise will run in. For example, a container terminal world or an offshore world.

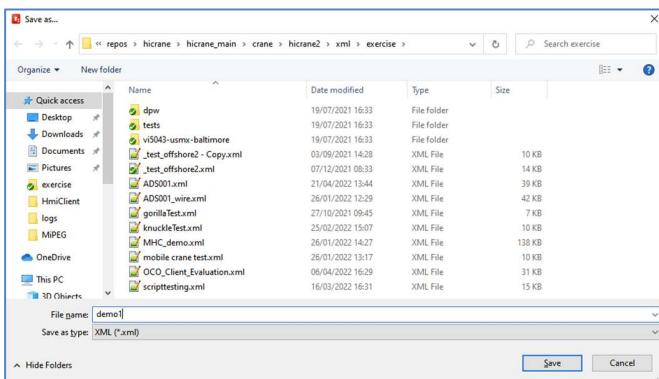


Select a world from the list a press *Open*.

This will create an empty scene into which objects may be placed. This is an example of an offshore world:



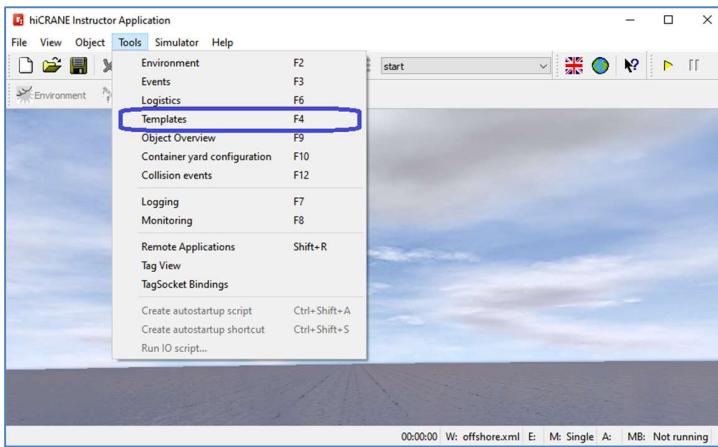
Press the Save button (or use the *File/Save* menu option) to name and save the exercise.



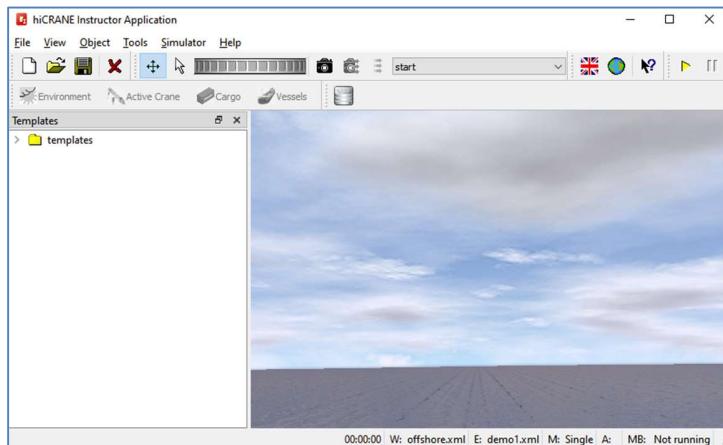
Enter a File name for the exercise and press the Save button.

## Adding objects to the scene

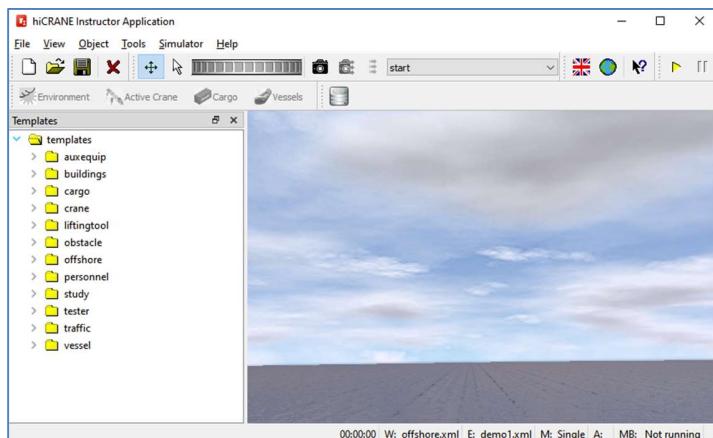
Objects can now be added to the scene. To access the template of objects that may be added, select the Tools/Templates menu item (or press F4).



This will display a templates window.

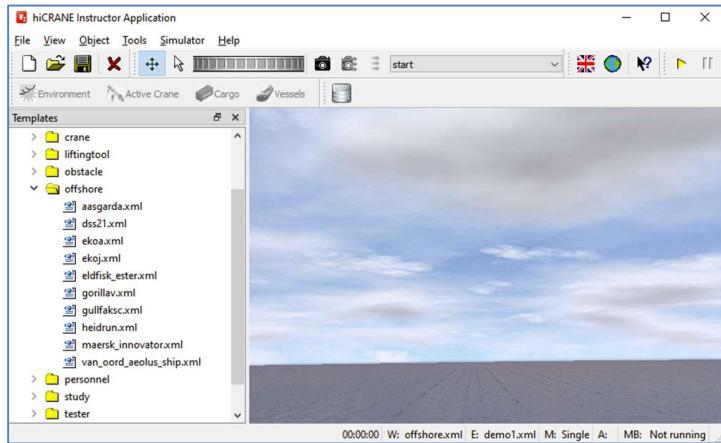


Expand the Templates list by clicking on the > symbol.



Expand the appropriate object type list by, again, clicking on the > symbol next to the object type.

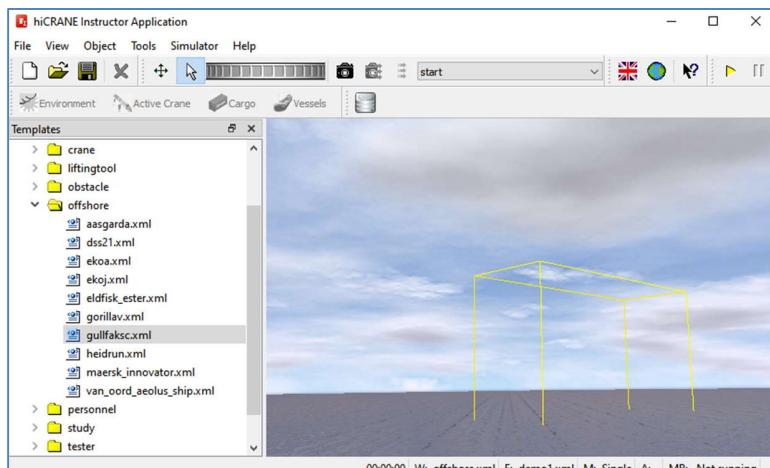
For an offshore scene, the offshore template list should be expanded first to give a list of offshore installations (platforms, rigs, jack up etc).



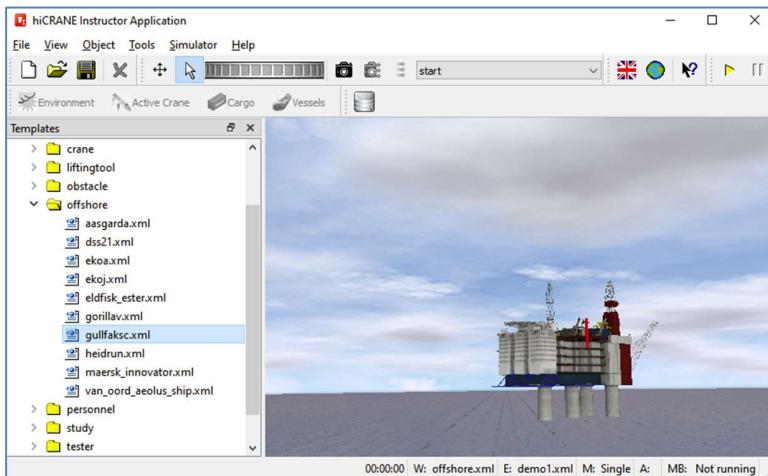
Be aware that available templates may differ depending on the installation, e.g., the availability of the offshore templates depends on whether the offshore module is installed.

All objects are added in the same way: click on an object in the template list with the left hand mouse button and, keeping the left mouse button pressed, drag the object into the scene.

A border will be shown round the object to help with its placement.



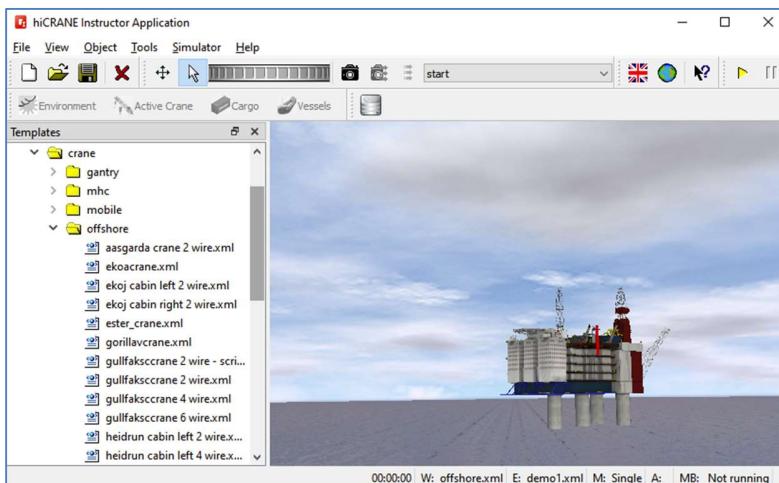
When the object has been positioned correctly, release the left mouse key to add the object to the scene.



**F** It's advisable to save the exercise periodically while you are adding objects to the scene.

Having added the platform, rig etc., you can now start adding objects to it such as cranes and cargo.

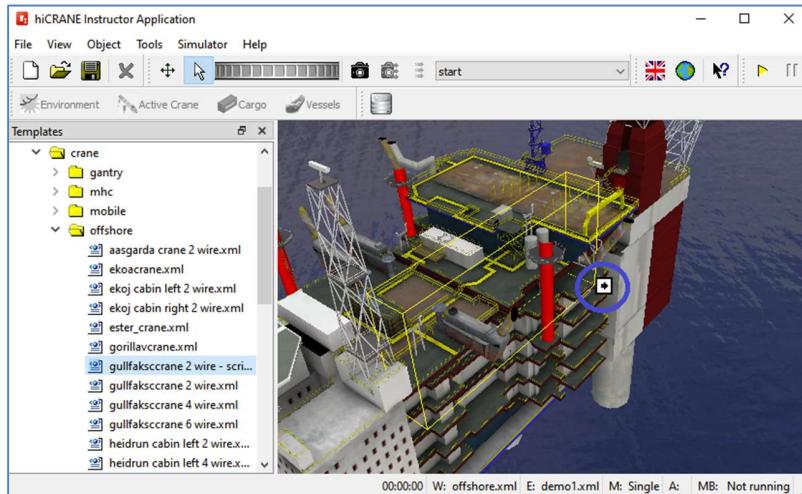
A scene must contain at least one crane. To add one or more cranes, expand the cranes and, since this is an offshore scene, the offshore templates under cranes.



Again, objects are added in the same way: click on an object in the list with the left hand mouse button and, keeping the left mouse button pressed, drag the object into the scene.

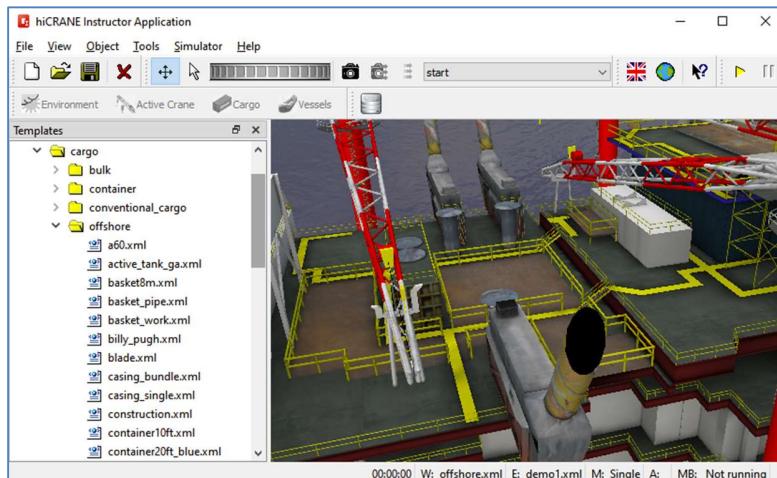
Note that you will first have to move the view so that you are in a position to see where the object is to be placed.

**+ To move the view, select Navigation mode. You can then move the view with either the mouse or the joystick (if connected). To quickly move to an area, double click the mouse on the area you wish to view. The view will zoom in and centre around the point clicked. The view may then be rotated by clicking in the view at the point you wish to rotate round and keeping the left hand mouse button pressed, move the mouse to rotate the view.**



When placing objects such as offshore cranes, there are specific points at which a crane may be placed. When the crane has been placed over an appropriate point an arrow symbol (highlighted in the image above) will be shown. To place the object at this point, release the left hand mouse.

Having added a crane or cranes, cargo should then be added to the scene. Cargo appropriate to an offshore scene can be found in the templates list under cargo\offshore, while cargo appropriate to e.g., cranes using a spreader can be found in the templates list under cargo/container.

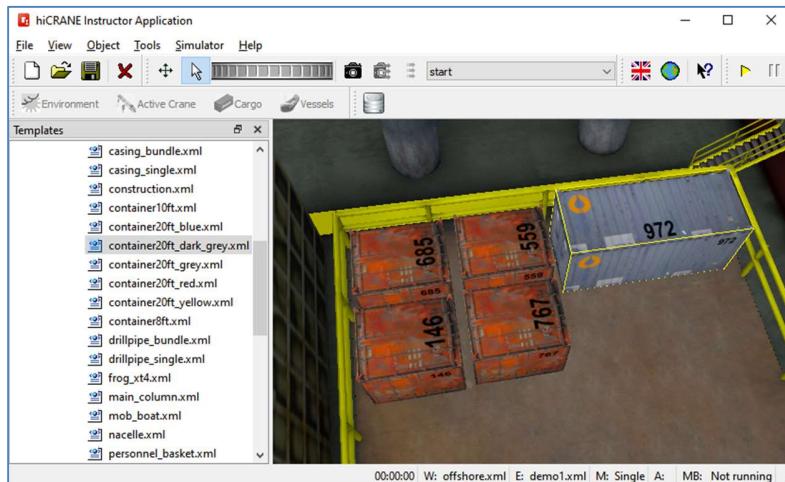


Remember to periodically save the exercise while you are adding objects to the scene.

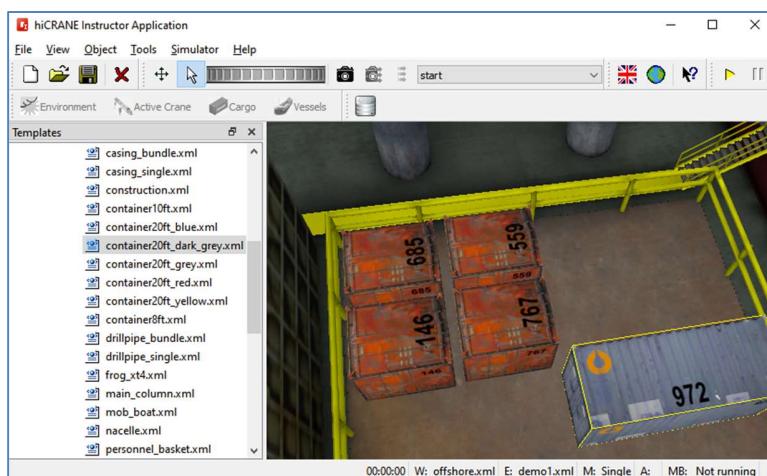
## Moving an object

- An object may be selected and moved when in select mode. Press the button shown to enter this mode.

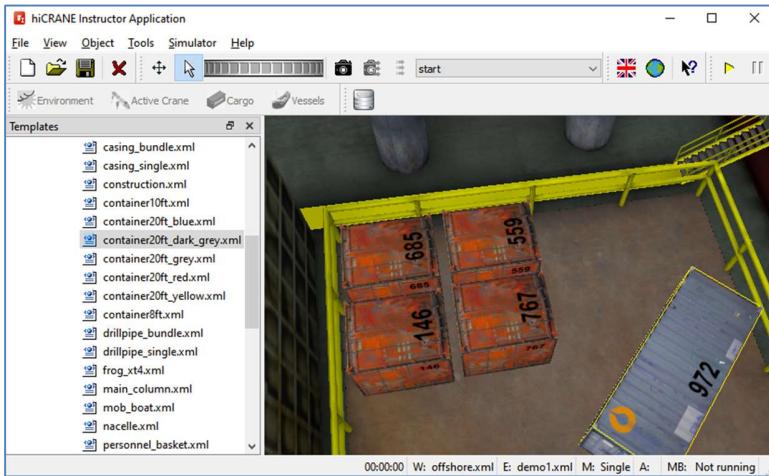
An object may then be selected by clicking on it. When selected, it will have a yellow box shown around it.



The object may be moved by click on the object with the left hand mouse button and, while holding the left mouse button down, move the mouse to drag it to a new position.

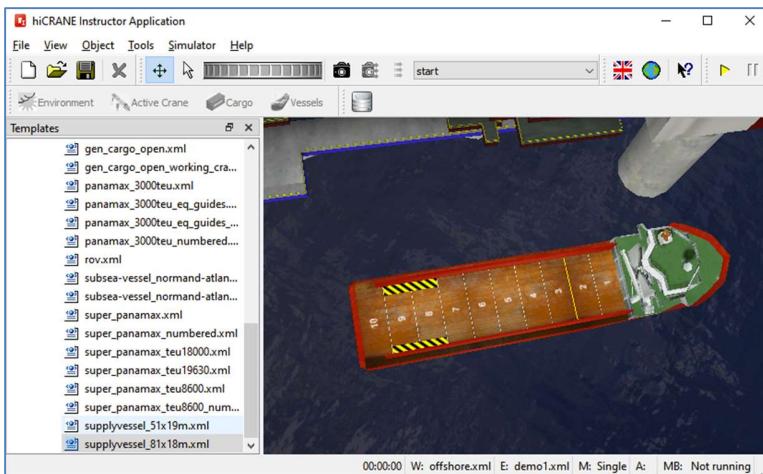


When the object is selected it may also be rotated, in steps, by pressing *alt + R* on the keyboard.



To complete an offshore scene a supply vessel can be added. These are available under vessels in the template list.

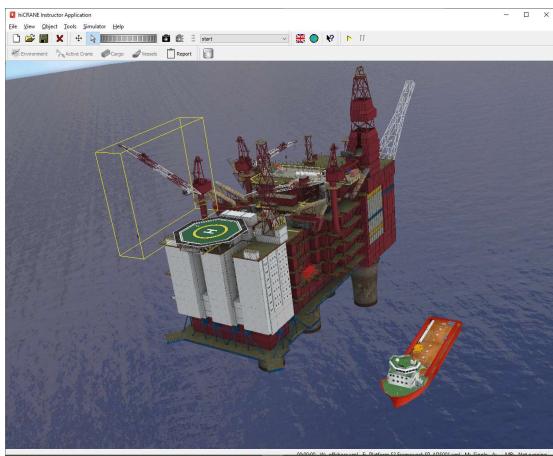
`supplyvessel_51x19m` and `supplyvessel_81x18m` are appropriate for an offshore scene.



## Updating the details for an object.

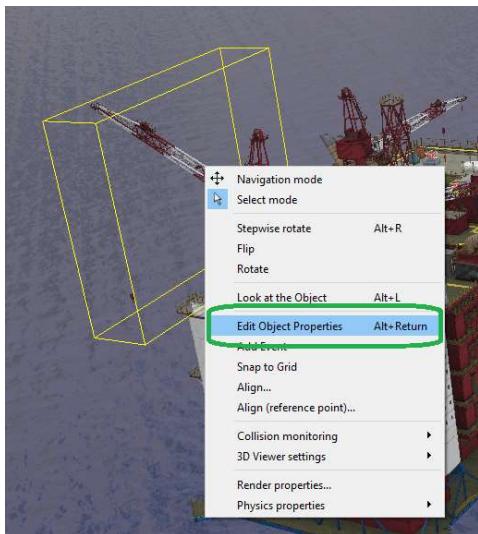
Details for an object may be changed using the object's configuration dialog.

The object whose details are to be modified is selected as described above.

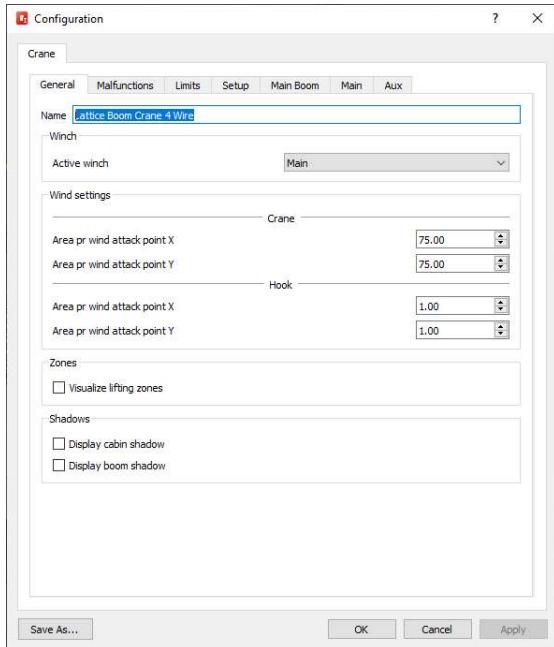


The selected object will have a yellow box around it.

Clicking the right hand mouse button will display a menu. From this menu, select *Edit Object Properties*. Alternatively, press *alt + return* when the object is selected.



The configuration dialog box for the object will be displayed:



In this example, for a crane, the name of the crane may be changed from its default value to a more descriptive name.

**Caution** Caution should be exercised with some of the available settings as they may affect the performance or operation of the object during the simulation.

## Save and start a simulation

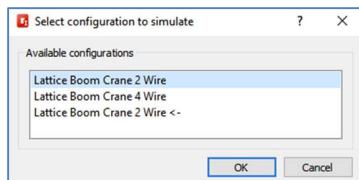
Having completed the building of the scene, a simulation may then be started.

**Remember** Remember to save the exercise file before you start the simulation.

**Caution** An exercise can only have objects added when a simulation is not running, so, ensure that the exercise contains all the objects (cargo etc.) that you will need during a simulation run.

## Starting the simulator

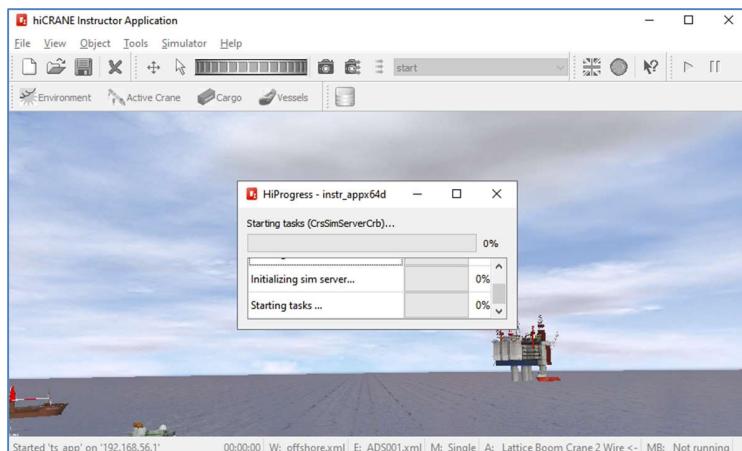
- To start the simulation, select the yellow 'Start Simulator' button.



A list of simulation objects will be presented, for example cranes that may be controlled during a simulation run.

Select the object that is to be controlled during the simulation run and press OK.

When an object is selected the simulation will start to load. Progress of the startup of the simulation will be displayed.



A number of applications which support the simulation will also be started, these can be seen in the windows task bar. The application with the 'I' in its icon is the Instructor app and this icon can be clicked to bring the instructor app back to the foreground if required. The other applications do not require any user input and should just be ignored.

- When the simulation has fully started, the Pause Simulator button will be enabled and you will have access to all the quick select toolbar functions.



Use of the quick select toolbar is covered in a separate user guide.

- You can move around the simulation world using the joystick control (if fitted) or by selecting Navigation Mode and using the mouse to control the view.

For instance, double clicking on an object in the view will cause the view to zoom in on that object.

The view may be rotated by clicking on a point in the view whilst holding down the left hand mouse while moving the mouse.

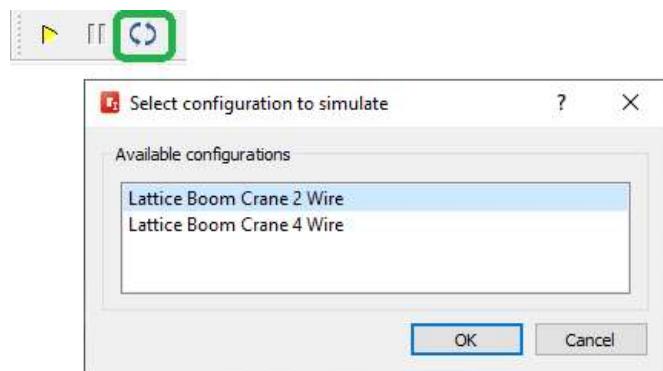
The view may be moved left or right or up and down by holding the shift key, clicking on the screen with the left hand mouse button pressed and then moving the mouse. The view will

follow the mouse movement.

## Switching cranes during a simulation run

In an exercise with multiple cranes, the crane being operated may be changed during a simulation run.

If there are 2 or more cranes in an exercise, a 'switch cranes' toolbar button while be enabled when the simulation is paused. Pressing this button presents a dialog which allows an alternative crane to the one currently being operated to be selected. This will cause the simulated views to be updated to the views from the newly selected crane, and the various displays and controls to be updated to operate and display information for that crane. Malfunction counts etc maintained by the reporting tools are not reset when a crane is switched.



 It is not possible to switch cranes if a load is currently connected to the active crane.

## Quick Select Toolbar

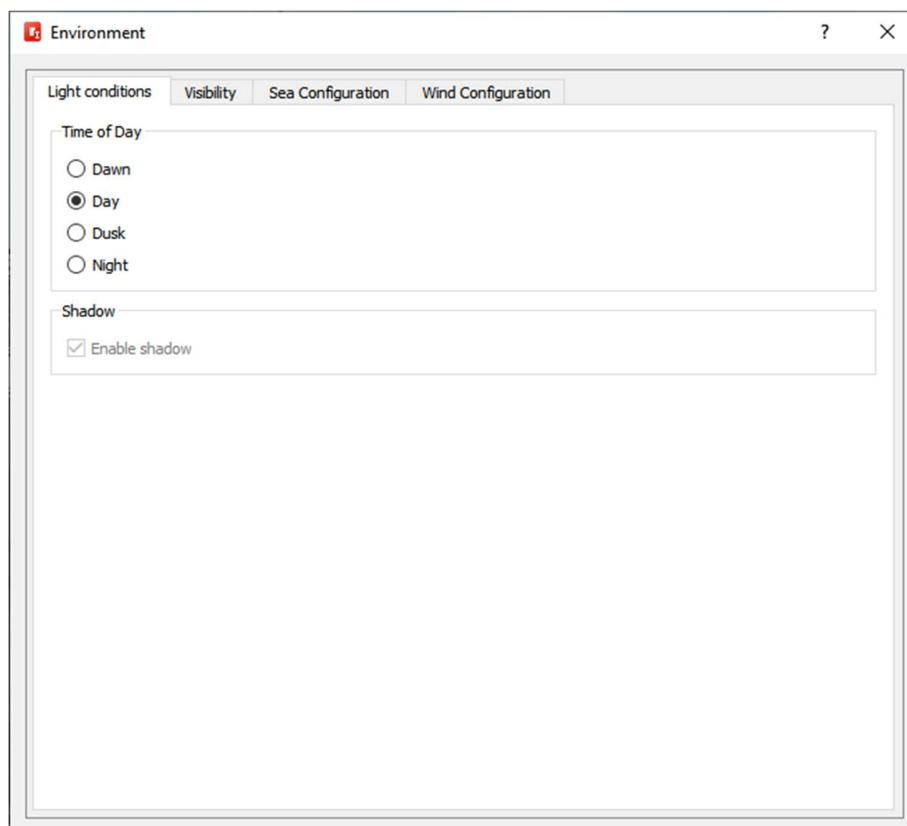
The quick select toolbar provides easy access to actions commonly performed by an Instructor during a simulation run.



The displayed dialog boxes may be kept open and moved to another location on the current monitor, or to another monitor if one is available.

### Environment

 Pressing the Environment tool button displays a dialog which allows the environmental conditions for the simulation to be set and altered during a simulation run.

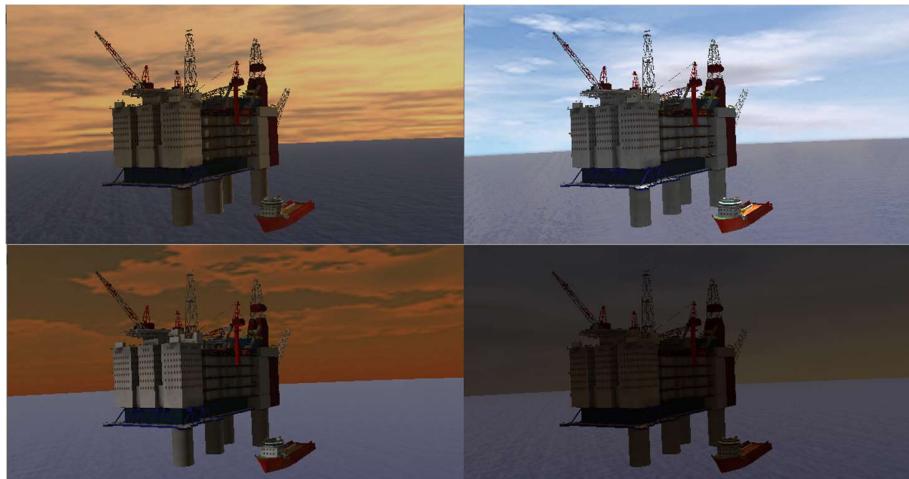


Light conditions, Visibility, Sea Configuration and Wind Configuration Values may be set.

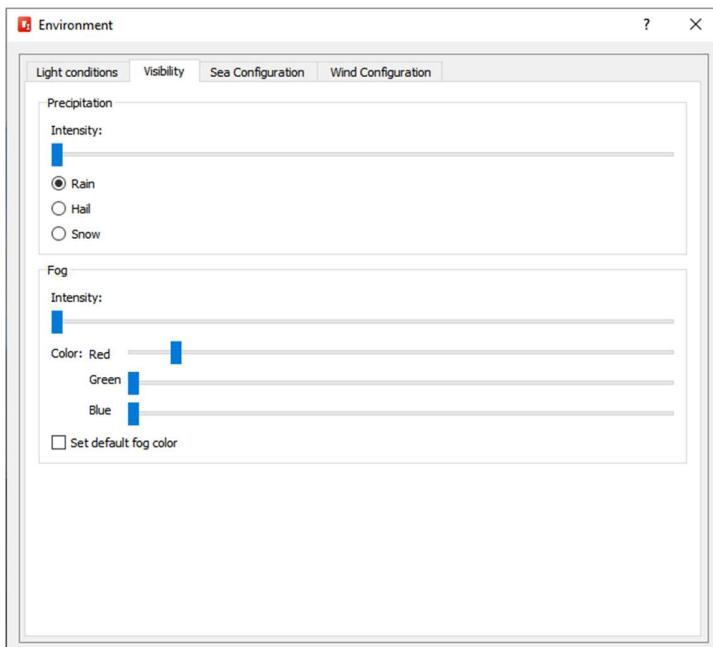
## Light conditions

- Dawn
- Day
- Dusk
- Night

The light level may be set as either Dawn, Day, Dusk or Night by selecting the appropriate setting in Time of Day radio buttons. The default setting is Day.



## Visibility



Visibility relates to the intensity of Precipitation or Fog.

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## Precipitation

- Rain
- Hail
- Snow

Precipitation may take the form of Rain, Hail or Sleet depending on the selection made in the Precipitation radio buttons

For the precipitation to be seen, an intensity must be set using the Intensity slider control.



Precipitation sounds will also be heard, with the sound level increasing as intensity increases

## Fog

The intensity of the fog can be set using the intensity slider. The colour of the fog may also be adjusted using the Red, Green and Blue sliders.

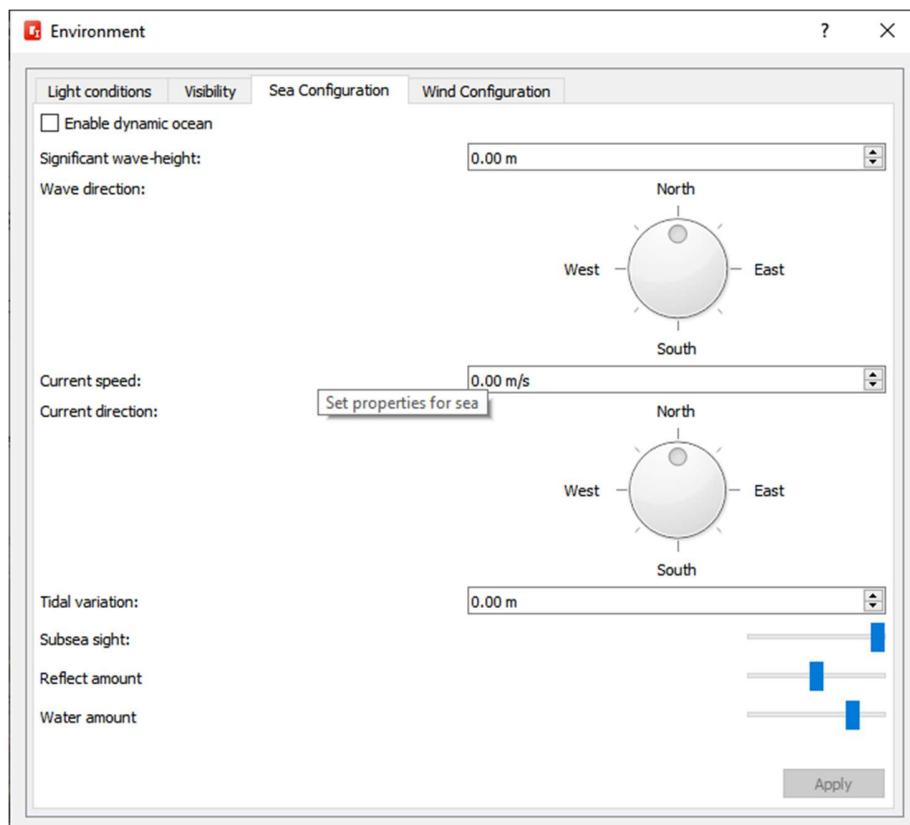


- Set default fog color    Checking (ticking) the Set default fog color check box will reset the fog colour back to its default value.

Precipitation and Fog cannot be selected together. To be able to select one, make sure the intensity of the other is set to 0 (Intensity slider fully left).

## Sea configuration

Sea state parameters such as wave height and direction, and current speed and direction can be set.



**Enable dynamic ocean** The enable dynamic ocean check box must be checked for the simulator to use the sea configuration settings.

**Apply**

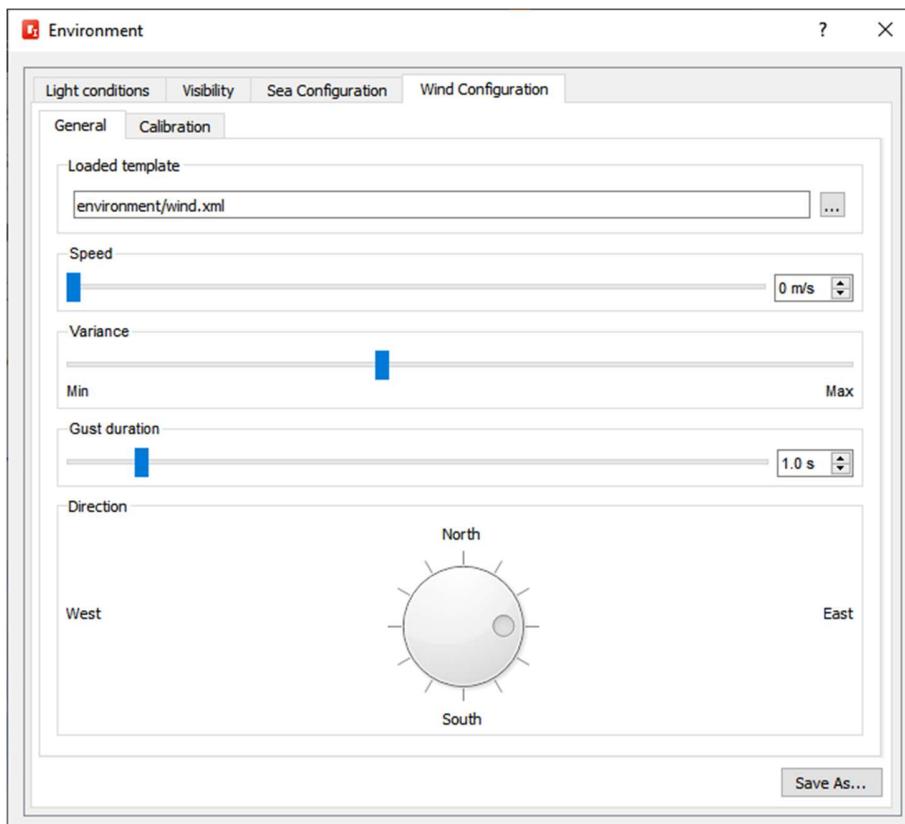
Additionally, the Apply button must be pressed in order for the selected changes to be applied to the current simulation session.



The maximum values for wave height, current speed and tidal variation are set in a system configuration file.

## Wind configuration

Wind speed, direction and variance can be set as well as gust duration.



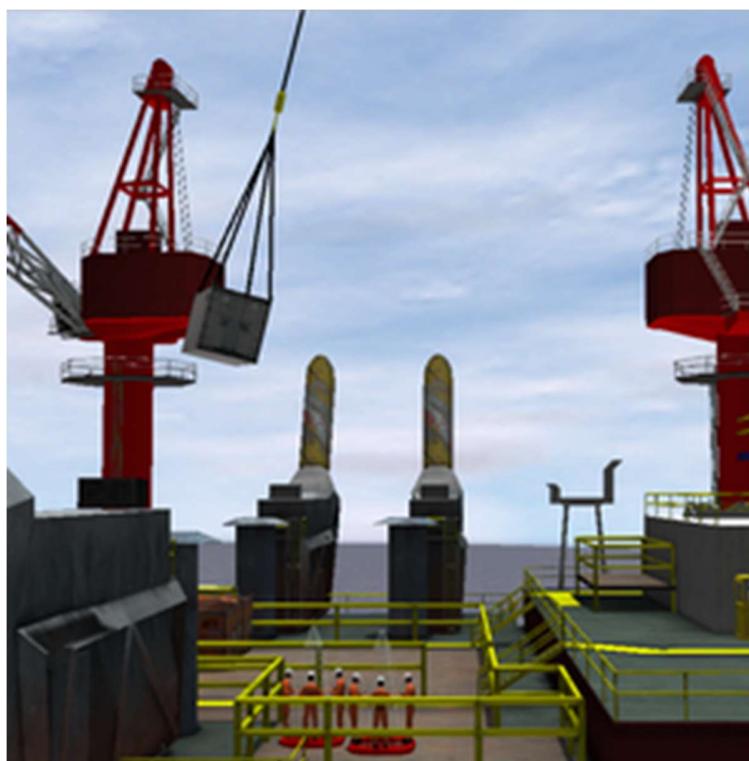
Wind speed may be adjusted from 0 up to a pre-set maximum value.

Wind speed variance is the amount by which the speed changes around the set wind speed and, in effect, sets the intensity of wind gusts.

Gust duration sets the amount of time that the winds gusts are maintained before dropping back.

Direction is the direction that the wind is coming from.

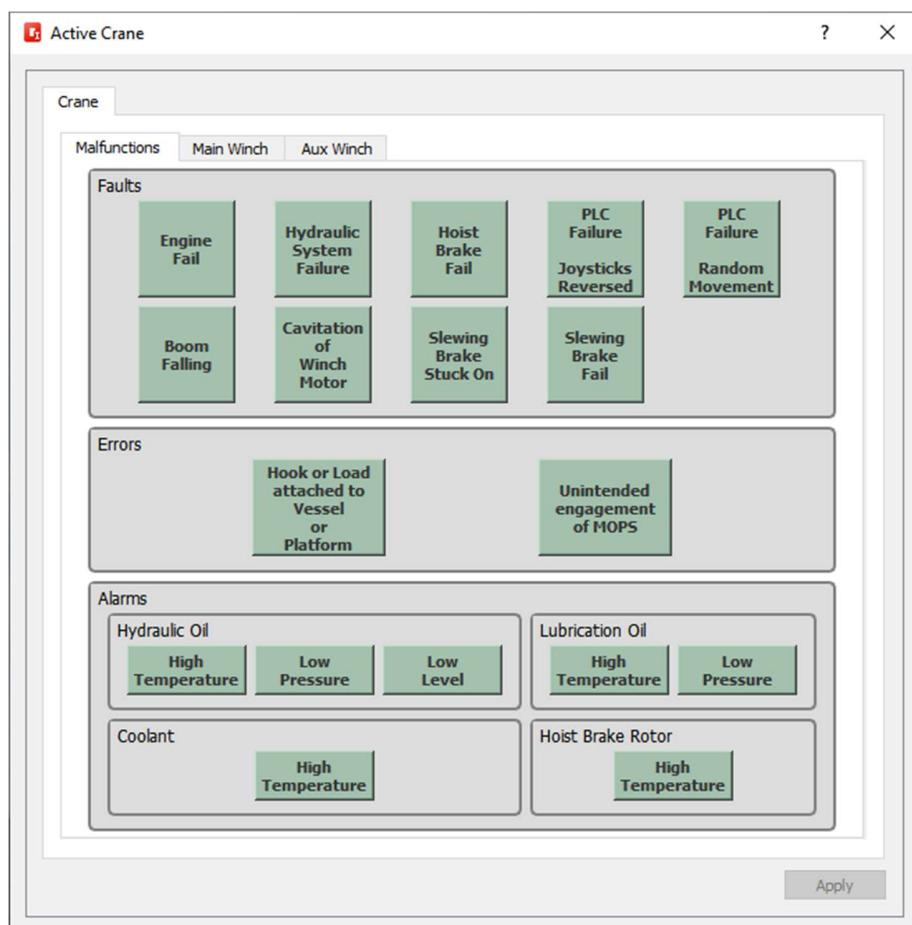
The set values of wind speed will affect objects in the simulation such as the hook and line and the cargo being lifted, with higher speeds affecting them to a higher extent.



## Active crane

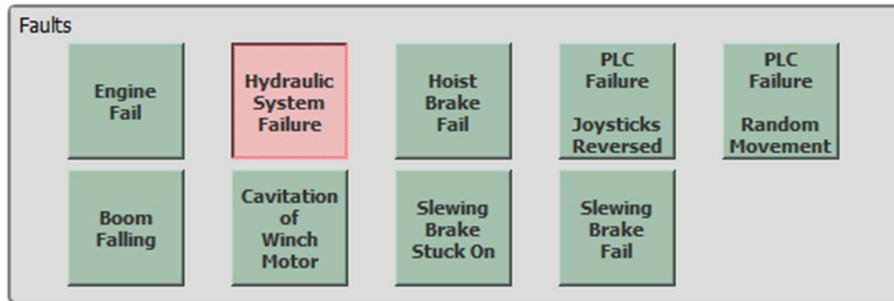


Pressing the Active Crane button displays the active crane dialog. This dialog allows access to selectable crane malfunctions and also to winch related functionality such as adding a pennant and connecting or disconnecting cargo.



## Malfunctions

During a simulation run, malfunctions may be forced on a crane. Malfunctions are crane type specific but taking the offshore crane as an example, malfunctions are split into 3 categories within the Malfunctions tab on the Active crane dialog: Faults, Errors and Alarms. To activate a malfunction, press the appropriate button on the Malfunctions tab. When a malfunction has been selected and is active it's button will display a red background.



To deactivate the malfunction, press the malfunction again.

Some malfunctions will be automatically reset when an emergency stop is activated.

## Faults

Faults, when activated, prevent a crane function from operating correctly. As an example, the faults that may be applied for an offshore crane are:

Fault raised	Effect	Alarms	Fault cleared
<b>Engine fail</b>	The main engine for the crane will be switched off. This will cause all crane movements to stop. Any connected load will remain in its current position.	An alarm will be displayed and heard which must be acknowledged by the crane operator.	The operator must restart the crane.
<b>Hydraulic system failure</b>	Crane operations such as movement of the boom and the winch will not be possible. Any connected load will remain in its current position.	An alarm will be displayed and heard which must be acknowledged by the crane operator.	The crane will return to its normal operation.
<b>Hoist brake fail</b>	Any connected load will drop. The crane operator is expected to stop the load falling by hitting the emergency stop button on the crane panniers.	A hoist brake alarm will be displayed and heard and an alarm will be generated when the emergency stop is activated.	The crane operator must disengage the emergency stop and restart the crane.
<b>PLC failure - joysticks reversed</b>	Joystick movement is the reverse of normal. For example, moving the joystick to the left will cause the crane to slew right, attempting to lower the load by moving the joystick forward will cause it to fall or moving the joystick back to raise the boom will cause the boom to drop.	No alarm is raised.	The crane will return to its normal operation.

<b>PLC failure - random movement</b>	The crane boom will move erratically. The crane operator is expected to stop the erratic movement by activating the emergency stop.	No alarm is raised but an alarm will be generated when the emergency stop is activated.	The crane operator must disengage the emergency stop and restart the crane.
<b>Boom falling</b>	The boom will start falling. The crane operator is expected to stop the boom falling further by activating the emergency stop.	No alarm is raised but an alarm will be generated when the emergency stop is activated.	The crane operator must disengage the emergency stop and restart the crane.
<b>Cavitation of winch motor</b>	A hissing sound will be heard when the crane operator attempts to raise or lower the winch. It will be possible to lower a load but not to lift it.	No alarm is raised.	The crane will return to its normal operation.
<b>Slewing brake stuck on</b>	It will not be possible to slew the crane	No alarm is raised	The crane will return to its normal operation.
<b>Slewing brake fail</b>	It will not be possible to slow or stop a slewing boom. The crane operator is expected to stop the boom slewing by activating the emergency stop.	No alarm is raised but an alarm will be generated when the emergency stop is activated.	The crane operator must disengage the emergency stop and restart the crane.

## Errors

Error raised	Effect	Alarms	Error cleared
<b>Hook or load attached to vessel or platform</b>	The hook or load will attach itself to either the vessel or platform when it next makes contacts with the vessel or platform.	If the crane operator attempts to winch in the line, an overweight alarm will be raised as the winch takes up the load.	The crane will return to its normal operation.
<b>Unintended engagement of MOPS</b>	<p>The load will begin to fall. The crane operator is expected to stop the load falling by activating the emergency stop.</p> <p>This malfunction will only operate when the load is in the boat zone</p>	An alarm will be displayed and heard and an additional alarm will be generated when the emergency stop is activated.	The crane operator must disengage the emergency stop and restart the crane.

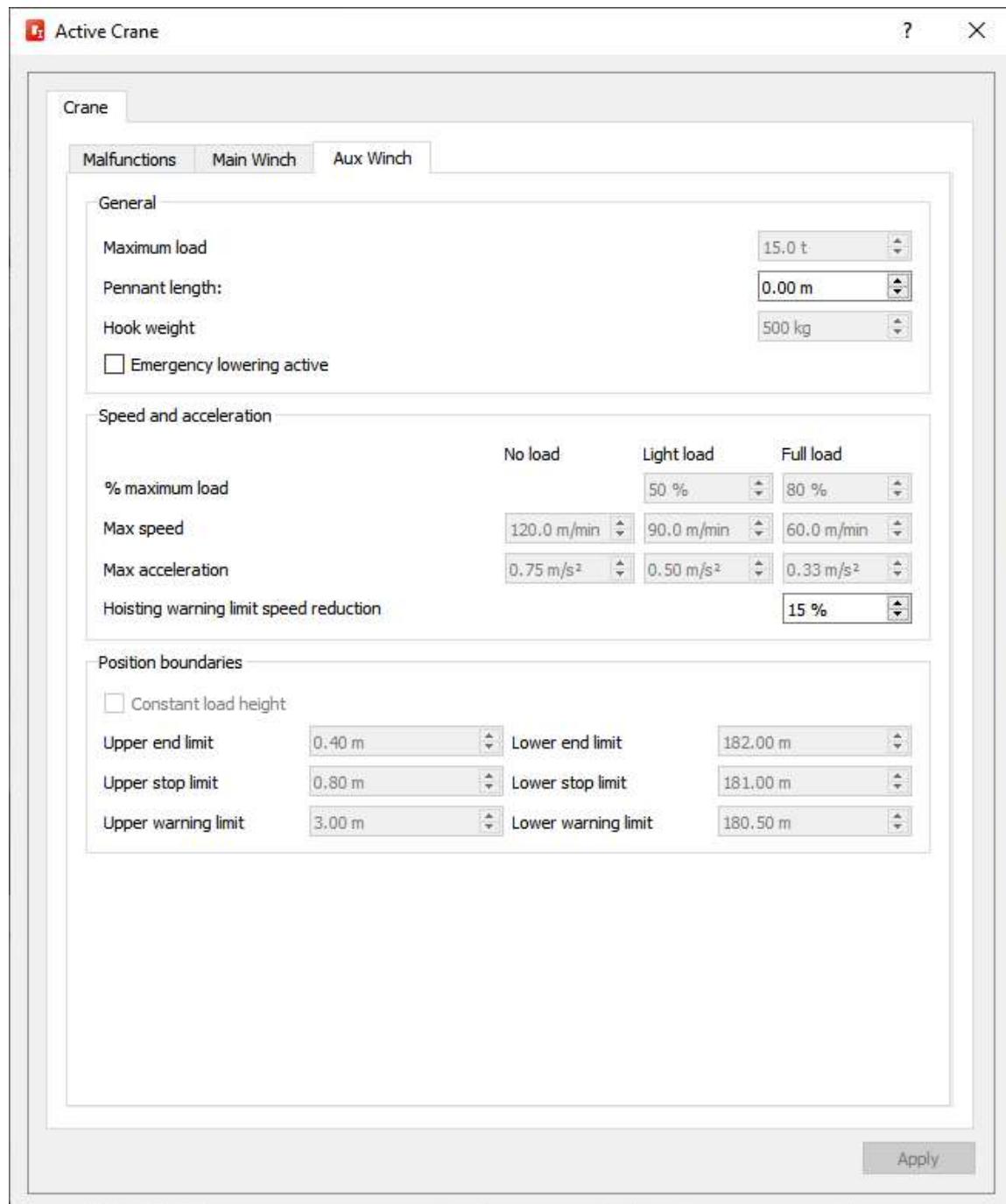
## Alarms

Fluid alarms are grouped by the fluid that they relate to: Hydraulic Oil, Lubrication Oil and Coolant. Additionally there is an alarm for high hoist brake temperature.

Each of these alarm malfunctions operate in a similar way in that an alarm will be displayed and heard and, where appropriate, any gauge values will reflect the alarm condition.

After the malfunction has been cleared, the crane will return to its normal operation.

## Winch functions / operations

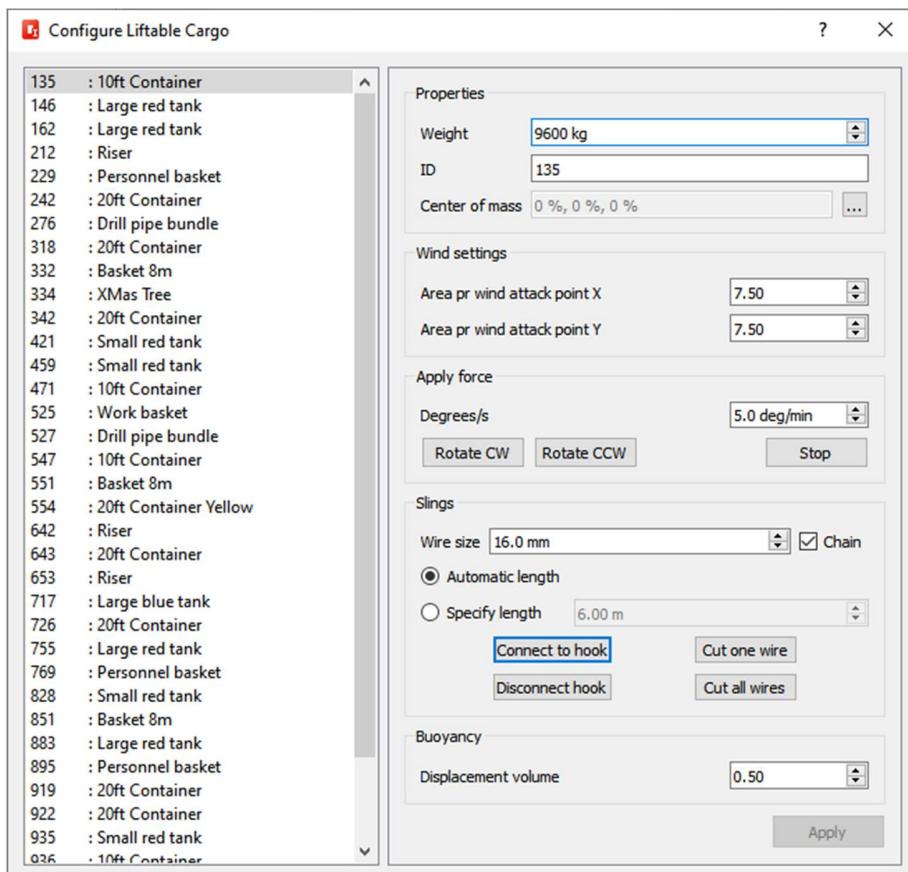


There are separate tabs for each of the crane winches. On this, a pennant can be added to the hook by selecting a Pennant length of 1.00 m or more and then pressing the Apply button.

## Cargo



Pressing the Cargo toolbar button will display a dialog box which displays information for all liftable cargo in the current simulation exercise.

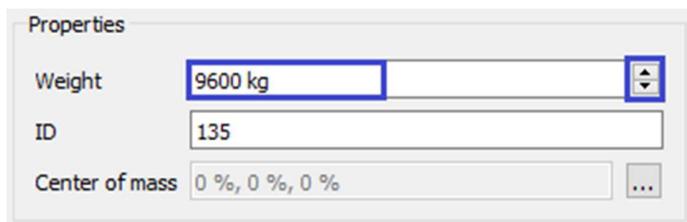


The dialog has a selectable list on the left and an information area on the right. The left hand list contains all the liftable cargo in the simulation exercise. On selecting an item of cargo in the left hand list, the information for that item of cargo will be shown in the right hand area.

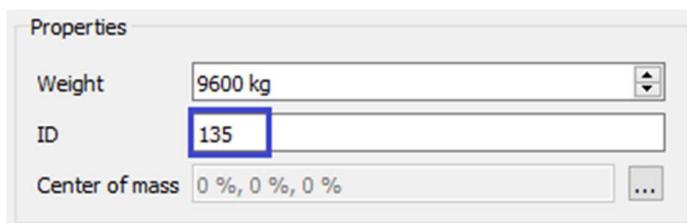
### Cargo parameters

Various parameters for the selected cargo can be altered. Typically this will be the cargo weight or its centre of mass.

The cargo weight can be adjusted either by typing a new value in the text box or by raising or lowering its weight in fixed increment (typically 0.1tonne / 100kg ) using the up and down arrows.

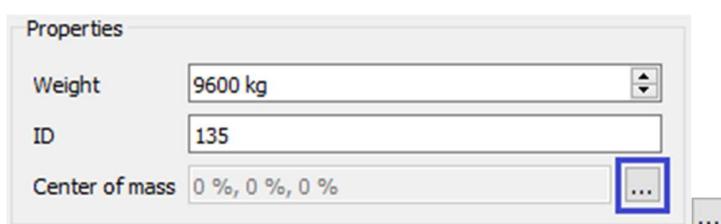


Similarly the Cargo Id may be changed by typing the new value in the ID text box.

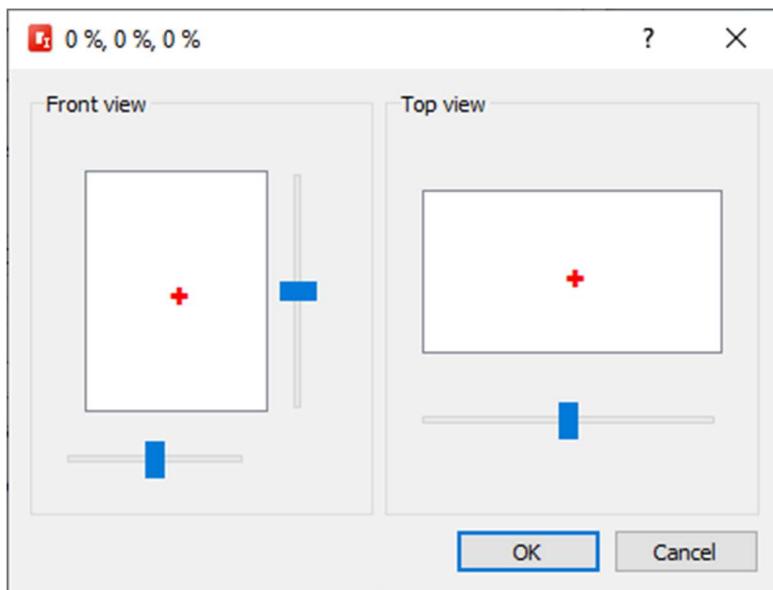


The cargo id entered must be unique to this exercise. If not, a warning will be displayed.

Adjustment of the centre of mass will cause the balance of the cargo to shift.



When the Centre of mass button is pressed a further dialog box is displayed. To adjust the balance of the cargo, adjust the blue sliders as appropriate.

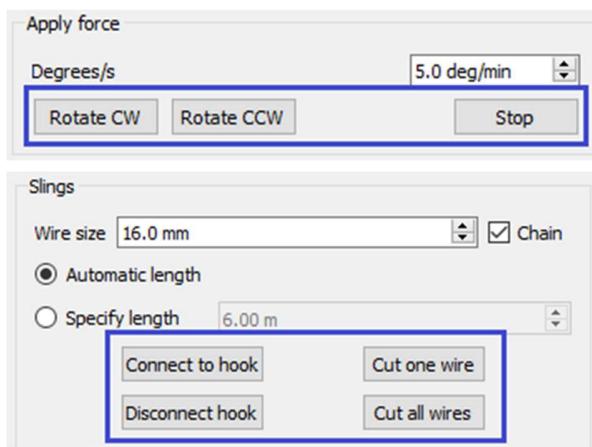


**Apply**

Any changes made to cargo parameters will only have an effect in the simulation session when the Apply button, bottom right of the dialog, is pressed.

## Cargo actions

Actions on the cargo may also be performed. These include the ability to rotate the cargo, connect or disconnect the load to or from the hook and to cut one or more wires connecting the cargo to the hook.

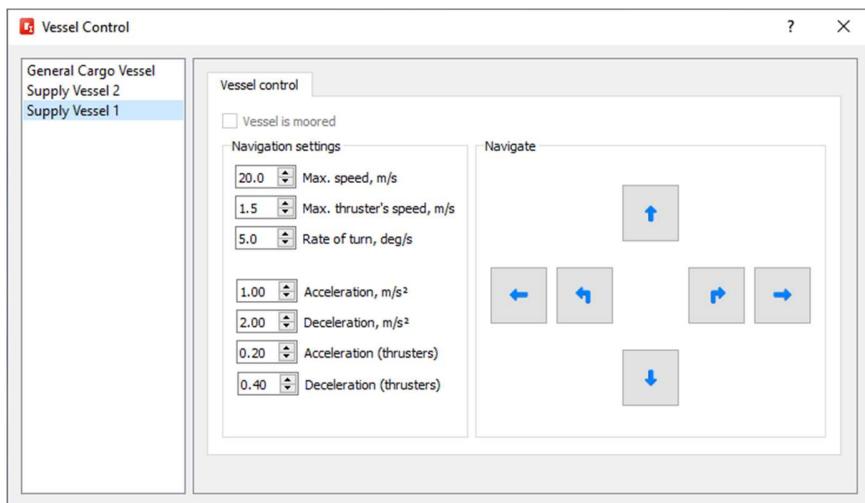


The hook can only be connected to the cargo when it is in close proximity to the cargo.

## Vessels



Pressing the Vessels toolbar button displays the Vessels dialog box. This dialog includes a list of vessels on the left and vessel movement controls on the right.



The vessel selected in the left hand list can moved forwards, backwards, sideways and rotated using the appropriate arrowed buttons in the right hand of the vessels dialog.

## Report



The Report Dialog maintains counts of key measures during a simulation run. It also allows the addition of text notes such as comments on the student's performance or what actions have taken place. It is accessible via the Report button on the quick select toolbar.

This information may be saved to a pdf format file.

Unlike other quick select toolbar buttons, the Report button is enabled as soon as an exercise has been loaded. This is to allow information to be entered by the instructor prior to a simulation starting.

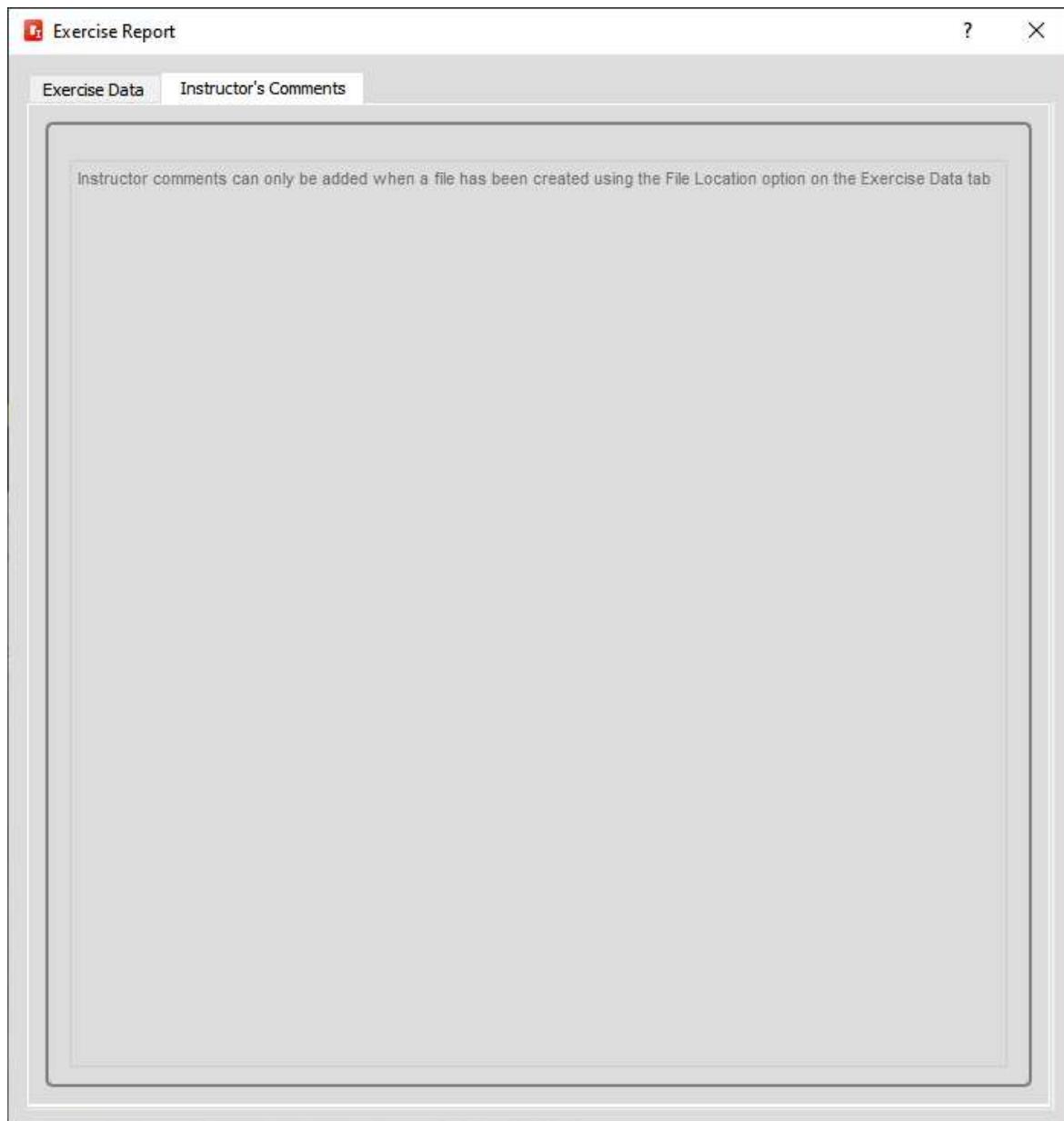
**Exercise Report**

Exercise Data    Instructor's Comments

<b>Instructor's Name</b> <input type="text" value="Enter instructor's name"/>	<b>Student's Name</b> <input type="text" value="Enter student's name"/>
<b>File Location</b> <input type="text" value="Select a location and name for the exercise report file"/> ...	
<b>Session Type</b> <input type="checkbox"/> Familiarisation <input type="checkbox"/> Assessment	<b>Exercise</b> Duration 00:00:00
<b>Weather Conditions</b> Average Wave Height 0 m    Average Wind Speed 0 m/s Average Wind Direction 0 deg (from N)	
<b>Loads</b> Picked Up 0    Set Down 0 Total Mass Moved 0 t	
<b>Warning Conditions</b> GOPS Activations 0    SWL Exceeded 0	
<b>Alarms and Malfunctions</b> Malfunctions Raised 0    Alarms Raised 0    Warnings Raised 0	
<b>Collisions</b> Heavy 0    Light 0	<b>Damage</b> Injured Bunksmen 0    Unseaworthy Loads in Sea 0

The dialog contains 2 tabs - the first, 'Exercise Data', primarily shows summary information for the simulation exercise and also allows the Instructor's name and the Student's name to be entered. The information boxes in the lower part of this tab are only activated when a simulation run is in progress.

The second tab, Instructor's Comments, contains a free text entry area where the Instructor may write any notes relevant to the simulation run



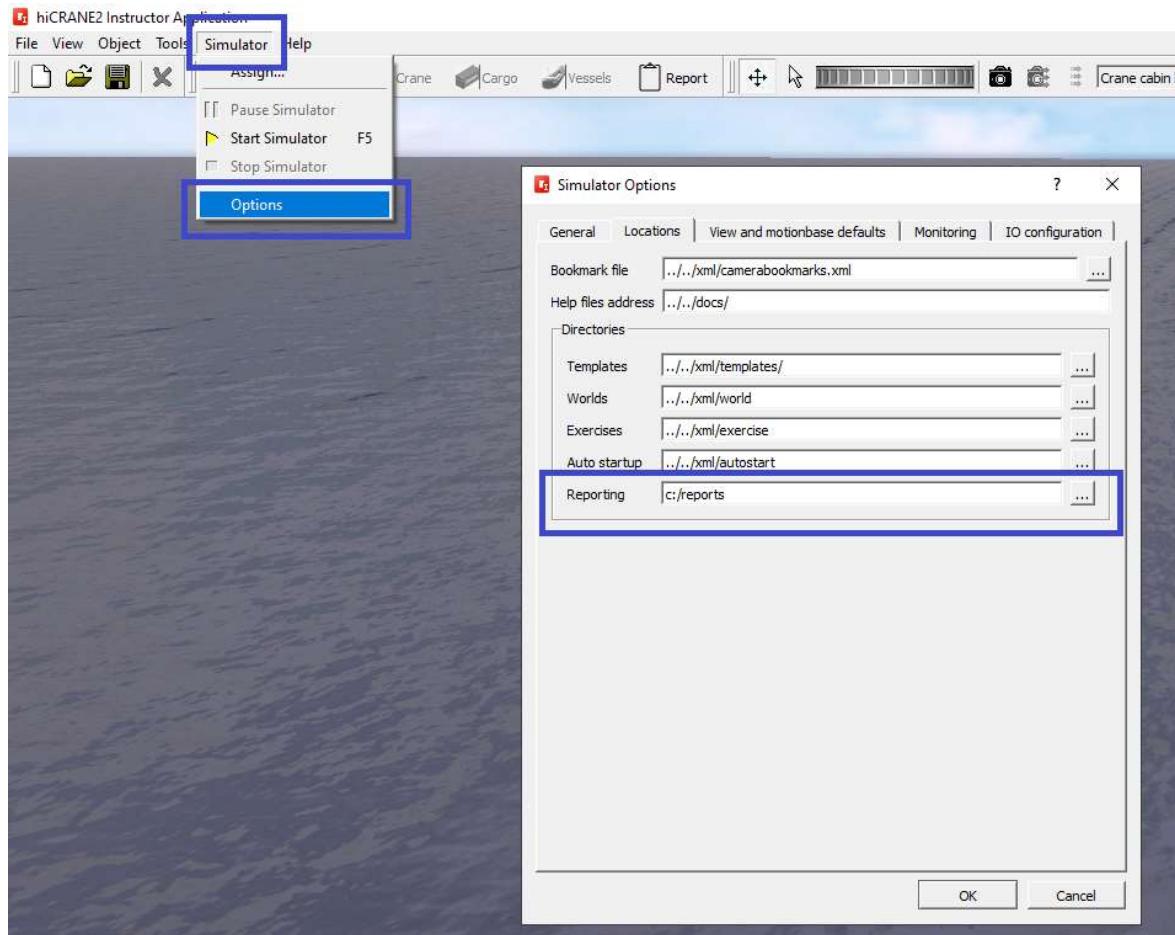
## Saving report to a file

A printable version of the report may be produced. This will be a pdf format file which will, by default, be named according to the Student's name and the session type.

The Instructor's Comments section of the report will only be enabled when a name and location has been selected for the report file.

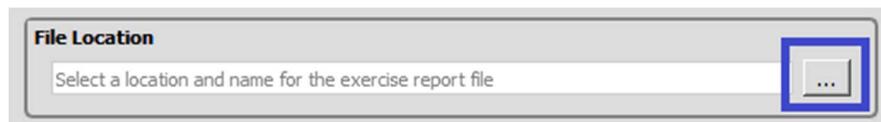
### Default report storage location

The default location for storing reports is set under the Simulator/Options -> Locations tab. If required, reports may be stored in sub-folders under this location.

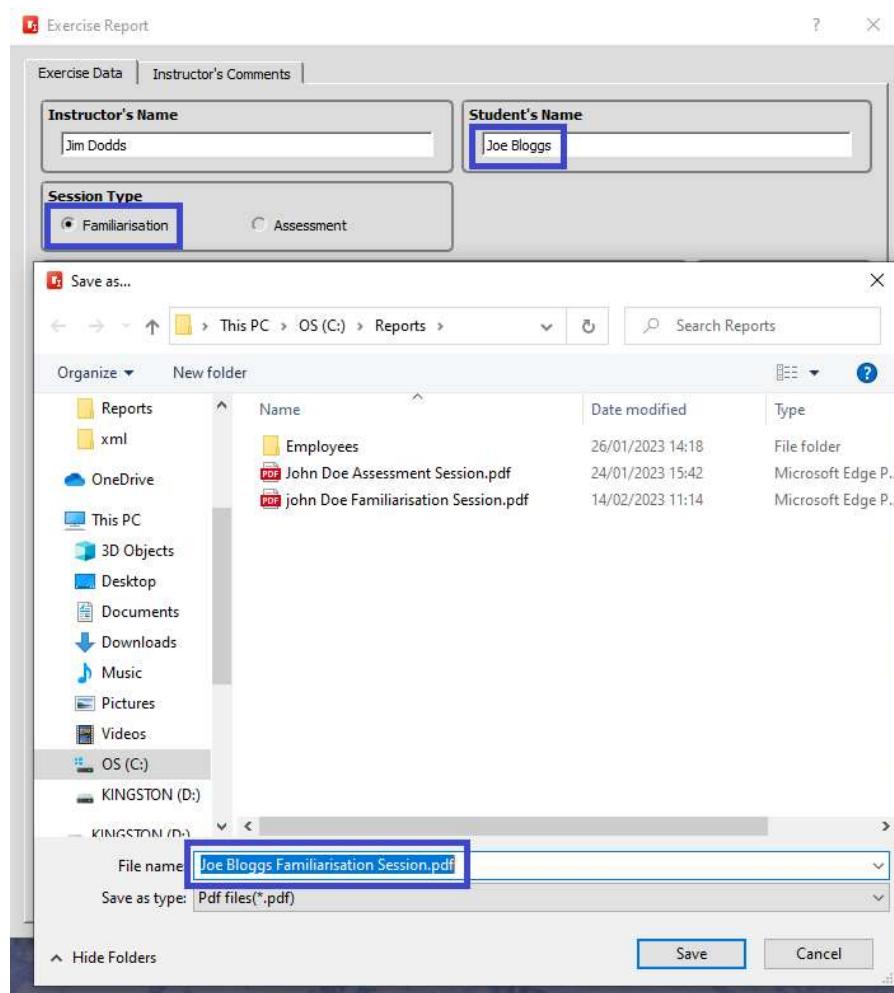


### File name and location

To create a pdf format file to save the report information to select the ... button:



A name for the report file is autogenerated using the student name and the session type.



The file may be saved to a subfolder, such as Employees in the example above. If necessary, the file name can be altered in the File name dialog box. When you are happy with the file name and location, select Save.

When a pdf file name has been entered, the information displayed on both tabs of the dialog box is written to the file periodically (every 5 minutes by default) or when the dialog is closed.

The Report Dialog may be closed and re-opened at any point as the information held by it will be updated in the background, and written to the pdf file periodically.

A typical Report Dialog view may be:

The screenshot shows the 'Exercise Report' dialog box with the following data:

- Exercise Data:**
  - Instructor's Name: John Duncan
  - Student's Name: Duncan Jones
  - File Location: C:/temp/DuncanJones.pdf
  - Session Type: Familiarisation (checked), Assessment (unchecked)
  - Exercise Duration: 00:25:30
- Weather Conditions:**
  - Average Wave Height: 4.0 m
  - Average Wind Speed: 4.9 m/s
  - Average Wind Direction: 22 deg (from N)
- Loads:**
  - Picked Up: 1
  - Total Mass Moved: 9.1 t
  - Set Down: 1
- Warning Conditions:**
  - GOPS Activations: 1
  - SWL Exceeded: 1
- Alarms and Malfunctions:**
  - Malfunctions Raised: 3
  - Alarms Raised: 0
  - Warnings Raised: 0
- Collisions:**
  - Heavy: 1
  - Light: 2
- Damage:**
  - Injured Banksmen: 1
  - Unseaworthy Loads in Sea: 1

And its associated pdf report:

## HiCrane Exercise Record

**RelyOn Nutec**  
Simulation technologies

Instructor's Name: Duncan  
Student's Name: Jones

Exercise Elapsed Time: 00:25:34

**Weather Conditions**

Average Wave Height	4.0 m	Average Wind Speed	4.9 m/s
Average Wind Direction	22 deg (from N)		

**Loads**

Picked Up	1	Set Down	1
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**Total Mass Moved**

9.1t

**Warning Conditions**

GOPS Activations	1	SWL Exceeded	1
------------------	---	--------------	---

**Alarms and Malfunctions**

Malfunctions Raised	3	Alarms Raised	0
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**Warnings Raised**

0

**Collisions**

Heavy	1	Light	2
-------	---	-------	---

**Damage**

Injured Banksmen	1	Unseaworthy Loads In Sea	1
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**Instructor's Comments**

Lorem ipsum dolor sit amet consectetur adipiscing elit, urna consequat felis vehicula class ultricies mollis dictumst, aenean non a in donec nulla. Phasellus ante pellentesque erat cum risus consequat Imperdiet aliquam, Integer placerat et turpis mi eros nec lobortis taciti, vehicula nisi litora tellus ligula porttitor metus.

Vivamus Integer non suscipit taciti mus etiam at primis tempor sagittis sit, euismod libero facilisi aptent elementum fais blandit curus gravida sociis erat ante, eleifend lectus nullam dapibus nebulosus feugiat curae curabitur est ad. Massa cursus fringilla porttitor quam sollicitudin laculis aptent leo ligula euismod dictumst, orci penatibus mauris eros etiam praesent erat volutpat posuere hac. Metus fringilla nec ullamcorper odio aliquam lacinia conubia mauris tempor, etiam ultricies proin quisque lectus sociis id tristique, integer phasellus taciti pretium adipisci tector sagittis ligula.

Instructor's Signature

Student's Signature

Report Produced: 17:26 Tue Feb 15 2022

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A .png format file is used to display the logo in the top right of the report. This file must be placed in the \hicrane2\images folder and must be named reportlogo.png.

The image on the report is forced to a height of 90 pixels, so ideally the report logo should be around this height. If the image is larger or smaller than this the height of the logo is resized to 90 pixels.