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Aqwa Graphical Supervisor User's Guide



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Chapter 1: Aqwa Graphical Supervisor Introduction

The Aqwa Graphical Supervisor (AGS) is a Graphical User Interface which is both a pre- and post-processor to the Aqwa suite of programs. This help document describes the many features of the AGS.

After installation the Aqwa programs appear on the Start Menu under Ansys 2024 R1. AqwaGS starts the Aqwa Graphical Supervisor. The program can be run from here or you can create an icon on the desktop.

To exit the AGS choose **File → Exit** from the main toolbar, or click the cross in the top right corner.

Information for Workbench Users

This help document refers to the original Aqwa solver modules, which are described in detail through the Aqwa Reference Manual. These modules correspond to the Analysis Systems and Analysis Types available through the Workbench interface as follows:

- Aqwa-Line is the frequency domain radiation/diffraction solver used in a Hydrodynamic Diffraction Analysis
- Aqwa-Librium is the frequency domain solver used to calculate equilibrium positions and static/dynamic stability modes in a Hydrodynamic Response Stability Analysis
- Aqwa-Fer is the frequency domain solver used for linearized calculations in a Hydrodynamic Response Frequency Statistical Analysis
- Aqwa-Drift is the time domain solver performing transient calculations including slow drift effects in a Hydrodynamic Response Time Domain Analysis with Analysis Type of 'Irregular Wave Response with Slow Drift' or 'Slow Drift Only'
- Aqwa-Naut is the time domain solver performing transient calculations including nonlinear estimations of incident and hydrostatic pressures in a Hydrodynamic Response Time Domain Analysis with Analysis Type of 'Irregular Wave Response' or 'Regular Wave Response'

Chapter 2: Learning To Use The AGS

2.1. Practice Makes Perfect

When most people get a new program the first thing they want to do is load and go. Go for it! Most experienced users follow an established pattern when test-driving a new application. The following sequence is recommended:

- If you are not already familiar with it, browse the other Aqwa manuals to get a feel for what Aqwa can do.
- Start the AGS and launch each of the different **modes** (graphs, plots). Then open some of the example files that came with the program, which you can find in the Ansys installation directory; for example in C:\Program Files\ANSYS Inc\v241\aqwa\demo. Use the **File → Open** menu command to access the example files.
- Select **Help** from the menu bar and click on **What's this?** Now move the mouse around so that it lands on top of various program features (don't click yet). A yellow **bubble help (p. 144)** box will appear after a few seconds with a description of the feature.

2.2. Screen Layout

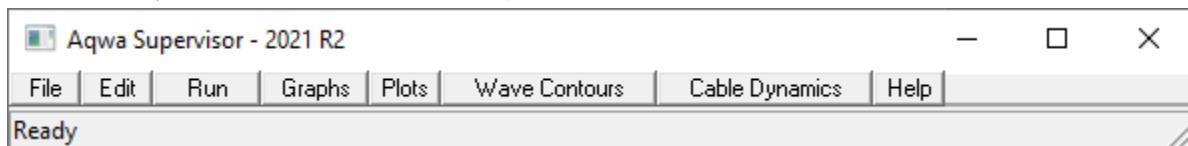
The Aqwa Graphical Supervisor has six principal modes of use:

- **Edit (p. 7)** - a selection of tools to generate and edit Aqwa models, and examine the Aqwa database.
- **Run (p. 125)** - options to run an Aqwa analysis.
- **Graphs (p. 125)** - create and manipulate graphical results from an Aqwa analysis.
- **Plots (p. 53)** - the **Model Visualisation Window** is where structures and connection systems are displayed, and animations are presented. The AGS can also be used to generate a mesh from a lines plan in this mode.
- **Wave Contours (p. 119)** - plot and output the disturbed wave surface from an Aqwa radiation/diffraction calculation.
- **Cable Dynamics (p. 123)** - definition and analysis of problems involving cable dynamics.

Each feature is accessed through the **Aqwa Graphical Supervisor toolbar (p. 5)**.

Chapter 3: The AGS Toolbar

The Aqwa Graphical Supervisor toolbar gives you access to all of the available features of Aqwa. From the toolbar you can access the following components:



- [File Menu \(p. 5\)](#) - Open, close, and save Aqwa models.
- [Edit \(p. 7\)](#) - Create and edit Aqwa models.
- [Run \(p. 31\)](#) - Perform an Aqwa analysis on the currently loaded model.
- [Graphs \(p. 35\)](#) - Display and manipulate Aqwa results graphically.
- [Plots \(p. 53\)](#) - Display and edit Aqwa models visually.
- [Wave Contours \(p. 119\)](#) - Display the disturbed wave surface from an Aqwa radiation/diffraction calculation.
- [Cable Dynamics \(p. 123\)](#) - Define and analyze problems involving cable dynamics.
- [Help \(p. 45\)](#) - Access to the online help system.

The AGS is also closed from this toolbar either by clicking on the cross at the top right hand corner of the toolbar, or selecting Exit from the toolbar File menu.

The toolbar also displays which version of Aqwa you are running.

3.1. The File Menu

From this the toolbar **File** menu you can:

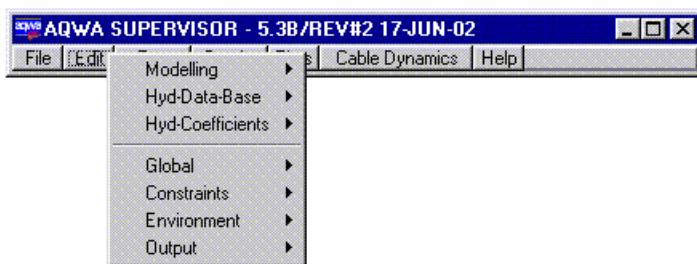
- **Open** - opens an Aqwa [RES \(p. 127\)](#) file.
- **Save** - saves the currently loaded Aqwa model as a [RES \(p. 127\)](#) file.
- **Save As** - saves the presently loaded Aqwa model as a [RES \(p. 127\)](#) file, prompting you for a file name in the process.
- **Exit** - Exits from the AGS.

The **File** menu can also be found in other areas of the AGS, with options appropriate to the context. For example, from the Graphs component, **File** → **Open** allows you to open a specific .PLT plotting file, while **File** → **Exit** will close the Graphs window.

Chapter 4: The AGS Edit Menu

4.1. Editing Introduction

The Edit menu can be accessed through the Aqwa Graphical Supervisor menu bar.



This menu facilitates the creation and editing of Aqwa model files by presenting a series of forms prompting you for model information. A model can be created for any restart stage in any of the Aqwa program modules.

The forms available on this menu are as follows:

Modelling

- [Coordinates \(p. 8\)](#) - generate / edit model coordinates
- [Material Properties \(p. 10\)](#) - generate / edit material properties
- [Geometric Properties \(p. 12\)](#) - generate / edit geometric properties
- [Element Topology \(p. 14\)](#) - generate / edit element properties
- [Show Summary \(p. 17\)](#) - display summary of loaded model

Hyd-Data-Base

- [Frequencies and Directions \(p. 18\)](#) - generate / edit frequencies and directions
- [Natural Frequencies/Periods \(p. 19\)](#) - tabulate natural frequencies and periods
- [Small Angle Stability \(p. 20\)](#)

Global

- [Global Environment \(p. 20\)](#) - edit global environment

Constraints

- [Mooring Lines \(p. 21\)](#) - generate / edit mooring lines
- [Freedoms/Articulations \(p. 21\)](#) - define / edit freedoms and articulations
- [Thrusters \(p. 22\)](#) - generate / edit thruster forces

Environment

- [Regular Wave \(p. 23\)](#) - generate / edit regular waves
- [Wave Spectra \(p. 24\)](#) - generate / edit wave spectra

4.2. Modeling

4.2.1. Coordinates

The coordinates data form is a generation and editing tool for Aqwa model coordinates. All coordinates within a loaded model can be viewed and edited from within this form. You may also create a new coordinate data set (no pre-loaded model required). Each structure must have its own coordinate data set.

Number	Node	Node Name	X-Position	Y-Position	Z-Position
1	1		45.000	-45.000	0.000
2	2		22.500	-45.000	0.000
3	3		0.000	-45.000	0.000
4	11		45.000	-45.000	-20.000
5	12		22.500	-45.000	-20.000
6	13		0.000	-45.000	-20.000
7	21		45.000	-45.000	-40.000
8	22		22.500	-45.000	-40.000
9	23		0.000	-45.000	-40.000
10	31		45.000	-22.500	-40.000

The form allows the user to edit nodal data for multiple structures using the node generation panel and/or by directly editing the node data within the nodal coordinates panel.

Three panels appear on the form:

- [Coordinate Summary and Structure Selection \(p. 8\)](#) - structure number, etc
- [Nodal Coordinates \(p. 9\)](#) - direct editing of nodal data
- [Node Generation \(p. 9\)](#) - generation of single or multiple nodes

4.2.1.1. Coordinate Summary and Structure Selection

This panel allows a structure to be selected and shows the total number of nodes for the selected structure and the total number of nodes in the system.

Structure No.: 1 2 3 4 5 6 7 8 9 0 # Nodes: 34 Total # Nodes: 34

The nodal details for the selected structure in this panel will be displayed in the [Nodal Coordinates panel \(p. 9\)](#).

4.2.1.2. Nodal Coordinates

The coordinate details for the structure selected in the [Structure Selection panel \(p. 8\)](#) will be displayed here. Information in this panel may be altered directly by clicking in a defined text field and editing the data. To add a new node(s) use the [Node Generation panel \(p. 9\)](#).

Nodal Coordinates:

Number	Node	Node Name	X-Position	Y-Position	Z-Position
1	1		45.000	-45.000	0.000
2	2		22.500	-45.000	0.000
9	23		0.000	-45.000	-40.000
10	31		45.000	-22.500	-40.000

You may edit the data fields: X-position, Y-position and Z-position of each node. X, Y, & Z-position refer to the coordinate details in the Fixed Reference Axis (FRA).

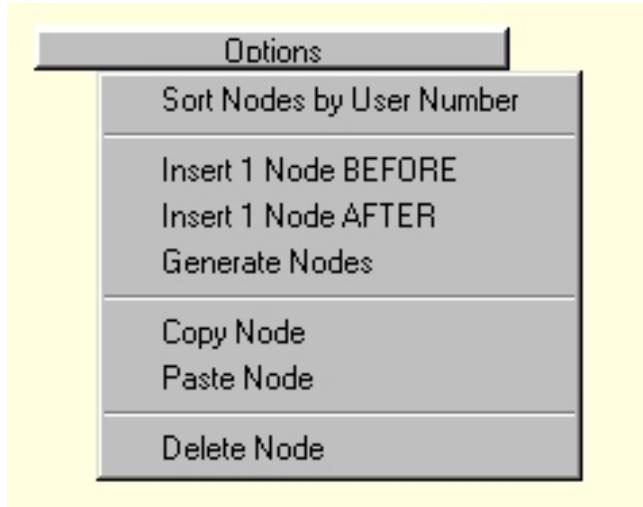
4.2.1.3. Node Generation

This panel can be used for generating new nodes, duplicating nodes, deleting nodes and sorting nodes.

Node Generation:

Start node:	1
# of nodes to generate:	1
Node Increment:	1
X-Increment:	0.000
Y-Increment:	0.000
Z-Increment:	0.000
Name:	<input type="text"/>
Options	

All actions for this panel are contained within the Options button, and will be reflected in the [Nodal Coordinates panel \(p. 9\)](#). Each node generation will be performed on the currently [selected structure \(p. 8\)](#).



The following options are available:

- Sort Nodes by User Number
- Insert 1 Node BEFORE - will create a node before the selected node
- Insert 1 Node AFTER - will create a node after the selected node
- Generate Nodes - will create a set of nodes, using the details defined in the node generation panel
- Copy Node - will copy the selected node
- Paste Node - will paste a node from the copy buffer
- Delete Node - will delete the selected node

4.2.2. Material Properties

The material property data form is a generation and editing tool for Aqwa material properties. All materials within a loaded model can be viewed and edited from within this form. You may also create a new material property data set (no pre-loaded model required).

Note:

Each structure must have its own material property data set.

The form allows the user to edit material property data for multiple structures using either the material generation button and/or by directly editing the material data within the material group table.

Note:

It is not possible to define or modify the material Type from this form.

Three panels appear on the form:

- Material Summary and Structure Selection (p. 11) - structure number, etc.
 - Material Group Table (p. 11) - direct editing of material property data
 - Material Generation (p. 12) - generation of materials

4.2.2.1. Material Summary & Structure Selection

This panel displays the selected structure, the total number of material properties for the selected structure and the total number of material properties in the system.

Structure No. 1 2 3 4 5 6 7 8 9 0 # Material Groups: 1 Total # Materials: 1

The material property details for the selected structure in this panel will be displayed in the [Material Group Table](#) (p. 11).

4.2.2.2. Material Group Table

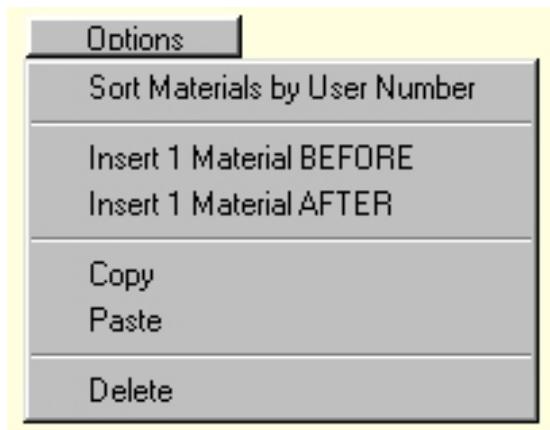
The material property details for the structure selected in the [Structure Selection panel](#) (p. 11) will be displayed here. Information in this panel may be altered directly by clicking in a defined text field and editing the data. To add new materials click the **Material Generation** button (p. 12).

Material Group Tables

Number	Group	Type	Material Name	Parameter 1	Parameter 2	Parameter 3
1	1	PMAS		3.32100E+08	0.000	0.000

4.2.2.3. Material Generation

All actions for this panel are contained within the **Options** button, which can be used for generating new material data groups, duplicating material groups, deleting material groups, and sorting material groups.



Actions will be reflected in the [Material Group Table \(p. 11\)](#). Each material group generation will be performed on the currently selected structure (p. 11).

The following options are available:

- Sort Materials by User Number
- Insert 1 Material BEFORE - will create a material group before the selected material
- Insert 1 Material AFTER - will create a material group after the selected material
- Copy - will copy the selected material
- Paste - will paste a material from the copy buffer
- Delete - will delete the selected material

4.2.3. Geometric Properties

The geometric property data form is a generation and editing tool for Aqwa geometry properties. All geometry within a loaded model can be viewed and edited from within this form. You may also create a new geometry property data set (no pre-loaded model required).

Note:

Each structure must have its own geometry property data sets.

The form allows you to edit geometry property data for multiple structures using either the geometry generation button and/or by directly editing the geometry data within the geometry group table.

Three panels appear on the form:

- [Geometry Summary and Structure Selection \(p. 13\)](#) - structure number, etc.
 - [Geometry Group Table \(p. 13\)](#) - direct editing of geometry property data
 - [Geometry Generation \(p. 13\)](#) - generation of geometric properties

4.2.3.1. Geometry Summary and Structure Selection

This panel displays the selected structure, the total number of geometric properties for the selected structure and the total number of geometry properties in the system.

Structure: 1 2 3 4 5 6 7 8 9 0 Number of Geometric Groups: 1 Total No.: 1

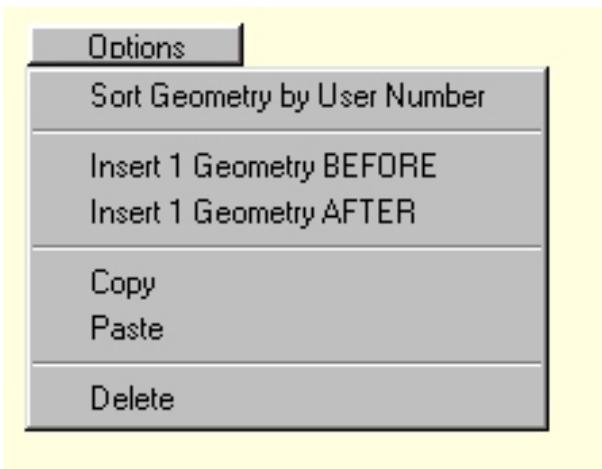
The geometry property details for the selected structure in this panel will be displayed in the [Geometry Group Table](#) (p. 13).

4.2.3.2. Geometry Group Table

The geometry property details for the structure selected in the [Structure Selection panel](#) (p. 13) will be displayed here. Information in this panel may be altered directly by clicking in a defined text field and editing the data. To add a new geometry groups use the [Options button](#) (p. 13).

4.2.3.3. Geometry Generation

Users can use the Options button for generating new geometry data groups, duplicating geometry groups, deleting geometry groups and sorting geometry groups.



All actions for this button will be reflected in the [Geometry Group Table \(p. 13\)](#). Each geometry group generation will be performed on the currently [Selected Structure \(p. 13\)](#).

The following options are available:

- Sort Geometry Groups by User Number
- Insert 1 Geometry BEFORE - will create a geometry group before the selected geometry.
- Insert 1 Geometry AFTER - will create a geometry group after the selected geometry
- Copy - will copy the selected geometry group
- Paste - will paste a geometry group from the copy buffer
- Delete - will delete the selected geometry group

4.2.4. Element Topology

The element topology property data form is a generation and editing tool for Aqwa elements. All elements within a loaded model can be viewed and edited from within this form. You may also create a new element data set (no pre-loaded model required).

Note:

Each structure must have its own element topology data set.

Modelling - Element Topology

Structure:	1 2 3 4 5 6 7 8 9 0	Element generation:	Symmetry:						
# of elements:	16	Total #: 16	<input type="checkbox"/> in X <input checked="" type="checkbox"/> in Y						
Number	Group	Type	Element Name	Node 1	Node 2	Node 3	Node 4	Material	Geometry
7	0	QPPL		22	23	33	32		
8	0	QPPL		32	33	43	42		
9	0	QPPL		1	11	14	4		
10	0	QPPL		11	21	24	14		
11	0	QPPL		4	14	15	5		
12	0	QPPL		14	24	25	15		
13	0	QPPL-ND		1	101	103	3		
14	0	QPPL-ND		1	5	105	101		
15	0	QPPL-ND		101	105	104	103		
16	0	PMAS		999				1	1

The form allows you to edit element topology property data for multiple structures using either the element generation button and/or by directly editing the element data within the element group table.

Four panels appear on the form:

- [Element Summary and Structure Selection \(p. 15\)](#) - structure number, etc.
- [Element Topology Table \(p. 16\)](#) - direct editing of element property data
- [Element Generation \(p. 16\)](#) - generation of element topology properties
- [Symmetry \(p. 17\)](#) - select X/Y symmetry

Note:

Refer to the Aqwa Reference Manual for limits on the maximum permissible numbers of diffracting and total elements.

4.2.4.1. Element Summary and Structure Selection

This panel displays the selected structure, the total number of elements for the selected structure and the total number of elements in the system.

Structure:	1 2 3 4 5 6 7 8 9 0
# of elements:	16 Total #: 16

The element details for the selected structure in this panel will be displayed in the [Element Table \(p. 16\)](#).

4.2.4.2. Element Group Table

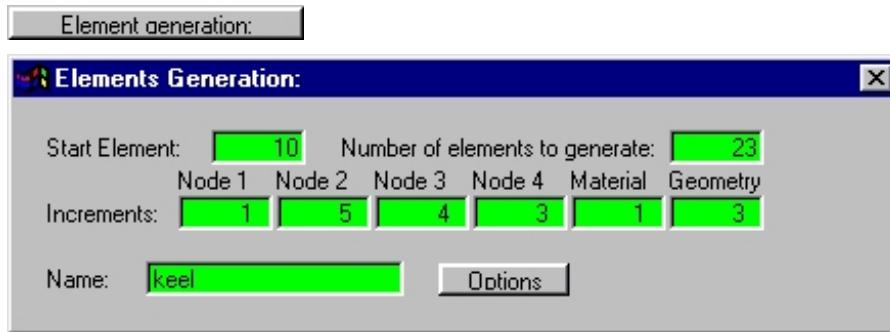
The element details for the structure selected in the [Structure Selection panel \(p. 15\)](#) will be displayed here. Information in this panel may be altered directly by clicking in a defined text field and editing the data. To add new element use the [Element Generation button \(p. 16\)](#).

0	0	PMAS		0	0	0	0	0	0
Number	Group	Type	Element Name	Node 1	Node 2	Node 3	Node 4	Material	Geometry
7	0	QPPL		22	23	33	32		
8	0	QPPL		32	33	43	42		
9	0	QPPL		1	11	14	4		
10	0	QPPL		11	21	24	14		
11	0	QPPL		4	14	15	5		
12	0	QPPL		14	24	25	15		
13	0	QPPL-ND		1	101	103	3		
14	0	QPPL-ND		1	5	105	101		
15	0	QPPL-ND		101	105	104	103		
16	0	PMAS	999					1	1

4.2.4.3. Element Generation

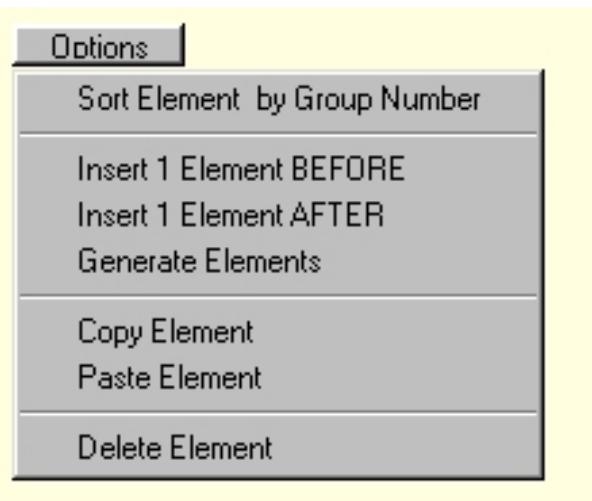
You can use the **Element Generation** button to generate new elements, duplicate elements, delete elements and sort elements.

Clicking the **Element Generation** button on the element topology data form will display the Element Generation dialog box.



All actions for this panel will be reflected in the [elements group table \(p. 16\)](#). Each generation of elements will be performed on the currently [selected structure \(p. 15\)](#).

Generation of elements is controlled by selecting the desired action from the **Options** button.

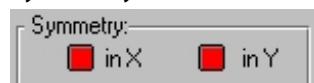


The following options are available:

- Sort Element by Group Number
- Insert 1 Elements BEFORE - will create an elements before the selected element.
- Insert 1 Elements AFTER - will create an element after the selected element.
- Generate Elements - will create a set of elements as defined in the dialog box.
- Copy Element - will copy the selected element
- Paste Element - will paste an element from the copy buffer
- Delete Element - will delete the selected element

4.2.4.4. Symmetry

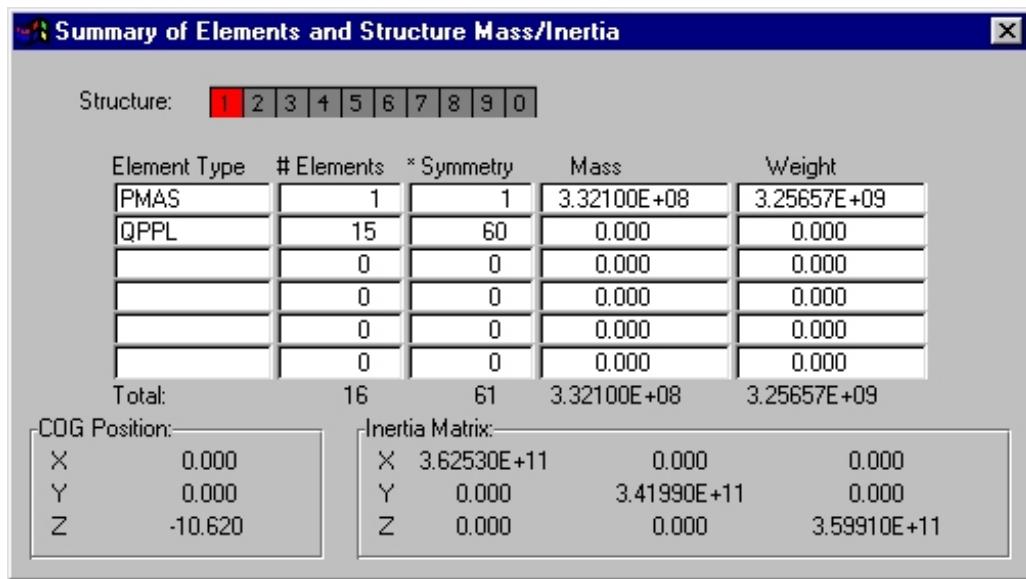
Symmetry in X and Y is selected from this panel.



Symmetry in X and Y will mirror a structure along $Y=0$ and $X=0$ respectively in the Fixed Reference AXES (FRA).

4.2.5. Show Summary

The Summary dialog box summarizes the model definition. A summary for each structure can be viewed within this dialog box.



4.3. Hyd-Data-Base

4.3.1. Frequencies & Directions

The Frequencies and Directions dialog box presents a summary of the information associated with the structure selected in the Structure Selection panel at the top of the window, which has been read from the currently loaded Aqwa restart file. The dialog box includes the following options:

- Frequencies/Directions: displays the wave frequencies and directions which have been included in the Aqwa-Line calculation (read-only).
- Hydrostatic Stiffness: displays the buoyancy force, vertical centre of gravity position and hydrostatic stiffness matrix.
- Added Mass: displays the frequency-dependent added mass matrix at the selected Encounter Frequency.
- Damping: displays the frequency-dependent radiation damping matrix at the selected Encounter Frequency.
- Diffraction Forces: displays the force/moment components and phase angles for diffraction forces acting on the structure in each wave direction, at the selected Wave Frequency.
- Froude Krylov Forces: displays force/moment components and phase angles for Froude-Krylov (incident wave) forces acting on the structure in each wave direction, at the selected Wave Frequency.
- Total Forces: displays force/moment components and phase angles for total forces acting on the structure in each wave direction, at the selected Wave Frequency.
- R.A.O.s: displays the position/rotation coefficients and phase angles; in other words, the response amplitude operators in each wave direction, at the selected Wave Frequency.
- Drift Coefficients: displays the force/moment components for the second-order mean drift forces acting on the structure in each wave direction, at the selected Wave Frequency.

Hydrodynamic Data Base - Frequencies and Directions									
Structure: 1 2 3 4 5 6 7 8 9 10 File: ALP002A.RES									
Frequencies/Directions					Hydrostatic Stiffness				Added Mass
Damping					Froude Krylov Forces				Diffraction Forces
Total Forces					R.A.O.s				Drift Coefficients
Wave Frequency/Periods					Wave Directions				
Number	Radians/se	Period	Calculated		Number	Degrees			
1	0.349	18.000	yes		1	0.000			
2	0.419	15.000	yes		2	45.000			
3	0.524	12.000	"undef"		3	90.000			
4	"undef"	"undef"	"undef"		4	"undef"			
5	"undef"	"undef"	"undef"		5	"undef"			
6	"undef"	"undef"	"undef"		6	"undef"			
7	"undef"	"undef"	"undef"		7	"undef"			
8	"undef"	"undef"	"undef"		8	"undef"			
9	"undef"	"undef"	"undef"		9	"undef"			
10	"undef"	"undef"	"undef"		10	"undef"			

4.3.2. Natural Frequencies/Periods

The Natural Frequencies/Periods dialog box displays the natural frequencies or periods, and the associated percentage critical damping, found for each of the wave frequencies included in the Aqwa-Line calculation.

By default, the values displayed in the tables are the natural frequencies of the structure selected in the Structure Selection panel at the top of the dialog box. Clicking Table By Period switches the view to show natural periods. Clicking Table Critical Damping switches the view to show percentage critical damping for each natural mode.

Natural Frequencies/Periods in Aqwa-Line Analysis Position									
File Help		Structure: 1 2 3 4 5 6 7 8 9 0 1 2							
		Table By Period Table Critical Damping							
A	B	C	D	E	F	G	H	I	J
1	Frequency	Period	Surge(X)	Sway(Y)	Heave(Z)	Roll(Rx)	Pitch(Ry)	Yaw(Rz)	
2	1	0.1000	62.8338	0.0031	0.0031	0.9482	0.4824	0.8497	0.0000
3	2	0.2386	26.3380	0.0000	0.0000	0.9369	0.4824	0.8483	0.0000
4	3	0.3771	16.6611	0.0000	0.0000	0.9496	0.4823	0.8451	0.0000
5	4	0.5157	12.1844	0.0000	0.0000	0.9847	0.4823	0.8404	0.0000
6	5	0.6542	9.6039	0.0000	0.0000	1.0338	0.4823	0.8373	0.0000
7	6	0.7928	7.9254	0.0000	0.0031	1.0884	0.4823	0.8398	0.0031
8	7	0.9313	6.7463	0.0000	0.0000	1.1430	0.4823	0.8479	0.0000
9	8	1.0699	5.8727	0.0000	0.0031	1.1894	0.4823	0.8590	0.0031
10	9	1.2085	5.1993	0.0031	0.0031	1.2146	0.4824	0.8714	0.0031
11	10	1.3470	4.6645	0.0031	0.0031	1.2200	0.4824	0.8829	0.0031
12	11	1.4856	4.2295	0.0031	0.0031	1.2161	0.4824	0.8874	0.0031
13	12	1.6241	3.8686	0.0031	0.0000	1.2089	0.4823	0.8871	0.0031
14	13	1.7627	3.5645	0.0031	0.0000	1.2009	0.4822	0.8859	0.0031

4.3.3. Small Angle Stability

The Small Angle Stability dialog box displays a selection of hydrostatics and small angle stability parameters calculated in Aqwa-Line for the structure selected in the Structure Selection panel at the top of the window.

Hydrostatic Small Angle Stability at ANALYSIS Position					
Structure:	1 2 3 4 5 6 7 8 9 0 1 2	<input type="checkbox"/> OMIT GM-Specified Additional Stiffness			
	Parameter	.	X	Y	Z
1	1.HYDROSTATIC STIFFNESS		X	Y	Z
2	COG Position		-0.000	0.000	0.000
3		Heave(Z)	4.021E+06	0.441	-2.933
4		Roll(RX)	0.441	1.541E+07	-2.607
5		Pitch(Ry)	-2.933	-2.607	5.180E+08
6	2.HYDROSTATIC DISPLACEMENT PROPERTIES		X	Y	Z
7	Actual Volumetric Displacement		1200.000244		
8	Equivalent Volume of structure		1200.000244		
9	Centre of Buoyancy		-0.000	0.000	-1.500
10	Out of balance Forces/Weight		0.000	0.000	0.000
11	Out of balance Moments/Weight		-0.000	-0.000	0.000
12	3.CUT WATER PLANE PROPERTIES		X	Y	Z
13	Cut Water Plane Area	400.000			
14	Centre of Floatation		0.000	0.000	
15	Principal 2nd Moments of Area		3333.332	53333.344	
16	Angle Principal Axis Makes with X(FRA)	-0.000			
17	4.SMALL ANGLE STABILITY PARAMETERS		X	Y	Z
18	C.O.G. to C.O.B.(BG)				1.500
19	Metacentric Heights(GMX/GMY)		1.278	42.944	
20	COB to Metacentre(BMX/BMY)		2.778	44.444	
21	Restoring Moments/Degree Rotations(MX/MY)		2.690E+05	9.041E+06	
22	Specified GMXX/GMYY		None	None	

4.4. Global Environment

This form is used for entering water depth, water density and acceleration due to gravity.

Global Environment	
Water Depth	250.000
Water Density	0.0
Acceleration due to Gravity	0.0

4.5. Constraints

The following constraints are available in the AGS:

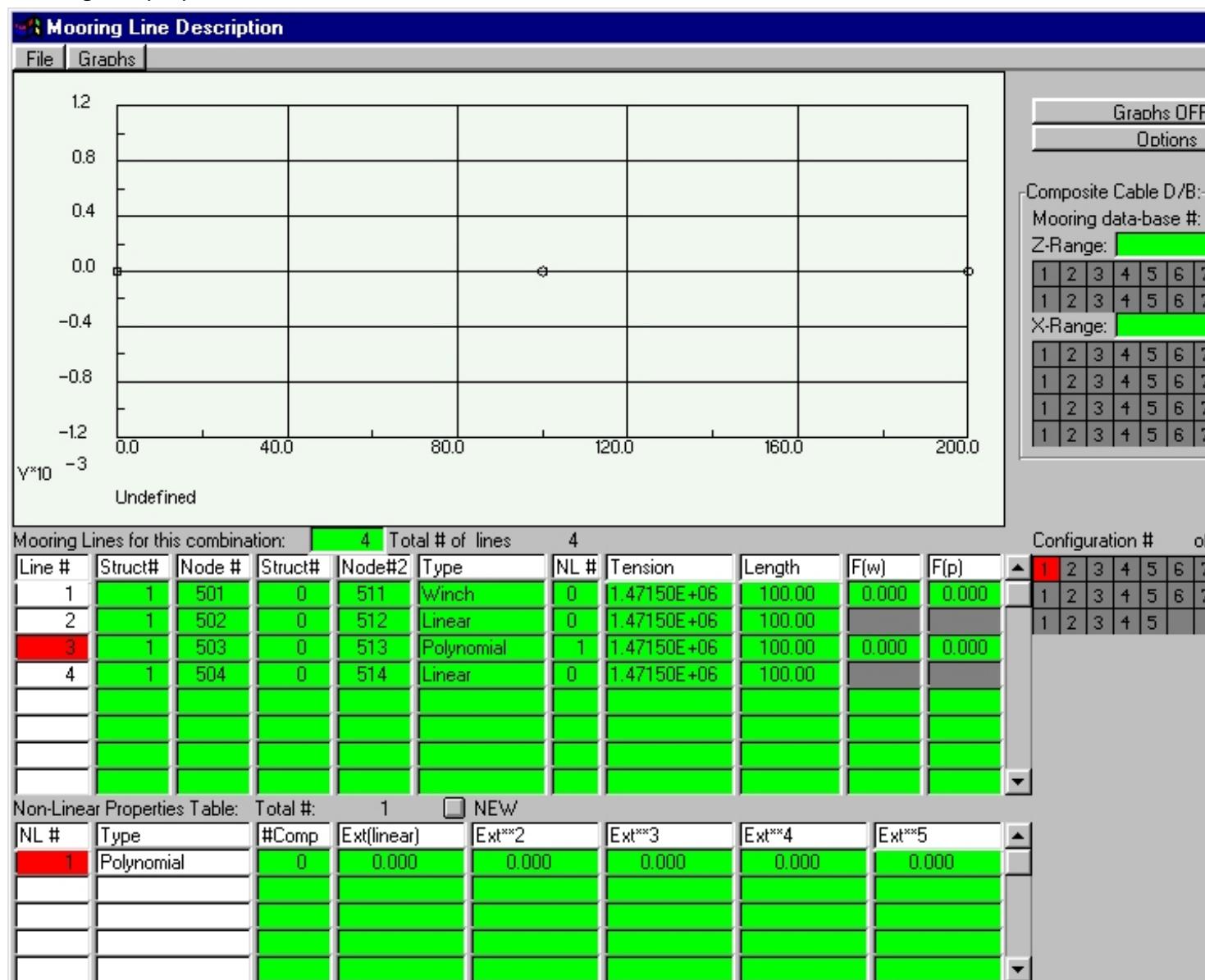
4.5.1. Mooring Lines

4.5.2. Freedoms / Articulations

4.5.3. Thrusters

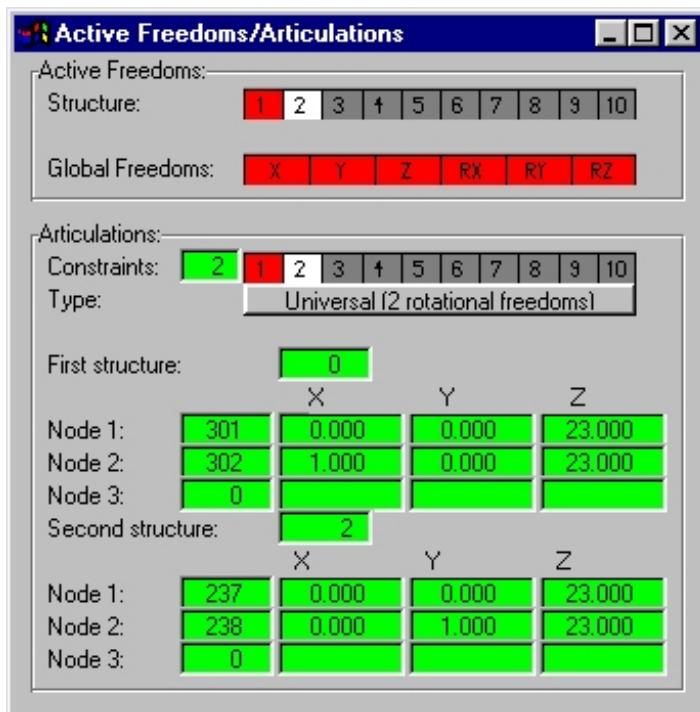
4.5.1. Mooring Lines

Mooring line properties can be reviewed and edited from within this form.



4.5.2. Freedoms / Articulations

Freedoms and articulations can be reviewed and edited from within this form.



4.5.3. Thrusters

Thruster forces can be reviewed and edited within this form.

Thruster forces are defined by assigning an initial force component in the XYZ Fixed Reference Axes (FRA) at a structure node.

During an Aqwa analysis the thruster force components move with the rotation of the structure, and therefore, remain fixed with respect to the structure; for example, the force from a propeller.

Thruster Force Definition									
Structure: 1 2 3 4 5 6 7 8 9 10									
Grdbox									
Number	Node	X	Y	Z	X-Force	Y-Force	Z-Force	Total Force	
1	202	0.000	0.000	-22.500	9867	0.000	4567	10872.681	
2	0				0.000	0.000	0.000	0.000	
3	0				0.000	0.000	0.000	0.000	
4	0				0.000	0.000	0.000	0.000	
5	0				0.000	0.000	0.000	0.000	
6	0				0.000	0.000	0.000	0.000	
7	0				0.000	0.000	0.000	0.000	
8	0				0.000	0.000	0.000	0.000	
9	0				0.000	0.000	0.000	0.000	
10	0				0.000	0.000	0.000	0.000	

4.6. Environment

The following sea environments can be set up.

4.6.1. Regular Wave

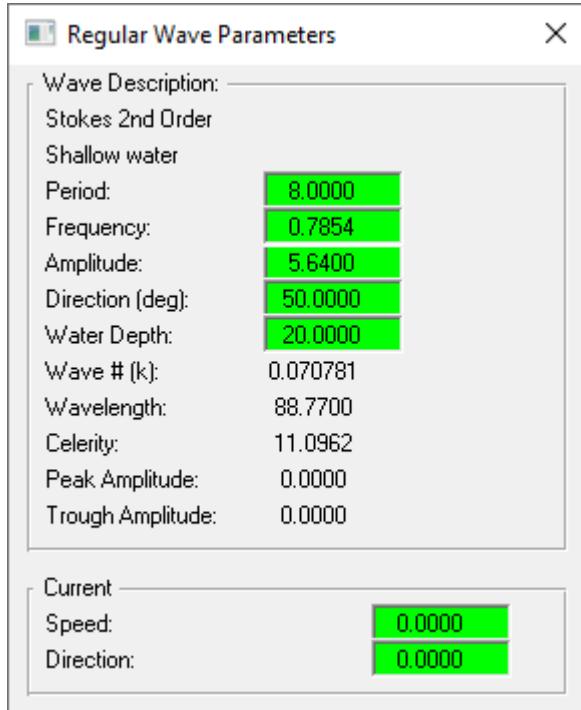
4.6.2. Wave and Wind Spectra

4.6.1. Regular Wave

In an Aqwa-Naut time domain analysis, it is possible to define a regular wave by which structure motions are excited. The following topic describes the input format used in the regular wave dialog box and the options available.

Refer [Regular Wave \(Aqwa-Naut\) - WAVE \(Data Category 13N\)](#) in the *Aqwa Reference Manual* for more details on regular wave definition.

The **Regular Wave Parameters** dialog box appears as follows:



The components of the Regular Wave dialog box are:

- [Wave Description \(p. 24\)](#) - displays the properties of the presently defined regular wave
- [Current \(p. 24\)](#) - define wave current

4.6.1.1. Wave Description

Wave Description:	Stokes 2nd Order
Shallow water	
Period:	8.0000
Frequency:	0.7854
Amplitude:	5.6400
Direction (deg):	50.0000
Water Depth:	20.0000
Wave # (k):	0.070781
Wavelength:	88.7700
Celerity:	11.0962
Peak Amplitude:	0.0000
Trough Amplitude:	0.0000

The **Wave Description** panel allows you to view and define the properties of the regular wave. The wave type (Airy or Stokes) is defined in the Aqwa input file, and cannot be changed here. Period and Frequency values are inter-dependent and will be adjusted as each is modified. Wavenumber, Wavelength and Celerity are automatically updated with the wave properties.

Note:

Peak and trough amplitude are not implemented, and will always display zero values.

4.6.1.2. Current

Current	
Speed:	0.0000
Direction:	0.0000

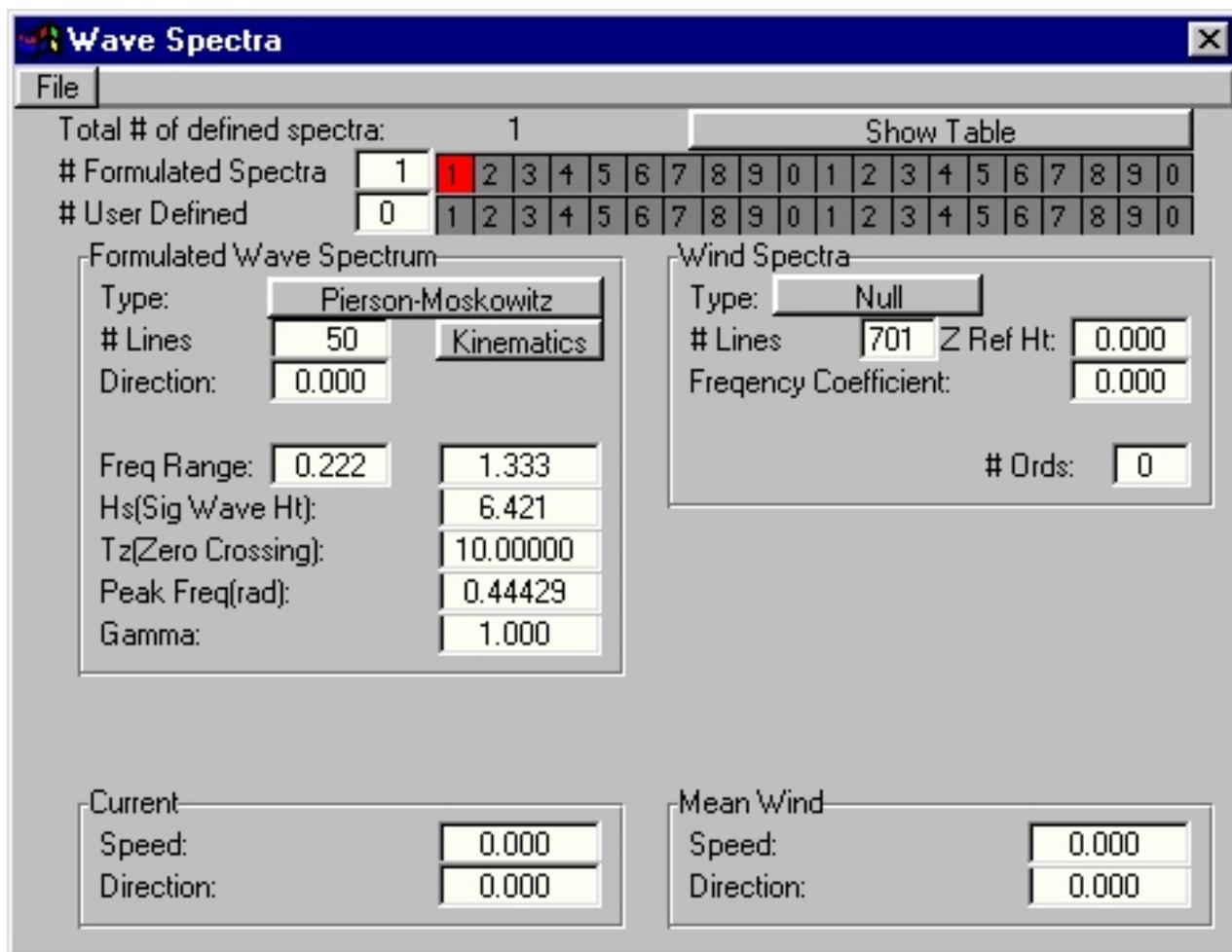
The current associated with the defined regular wave (entered in the [Wave Description](#) (p. 24) dialog box) is entered in this panel. You can define current **Speed** and **Direction**.

4.6.2. Wave and Wind Spectra

Various components of the Aqwa Graphical Supervisor require a wave/wind spectrum to be defined. The following topics describe the input format used in the wave/wind spectra dialog box and the options available.

Refer to the Aqwa Reference Manual for more details on wind and wave spectrum definition.

The Wave Spectra dialog box appears as follows:



The components of the Wave Spectra dialog box are:

- Total # defined spectra (p. 25) - displays the number of presently defined spectra
- # Formulated Spectra (p. 26) - edit/display formulated spectra
- # User Defined (p. 26) - edit/display user defined spectra
- Show table (p. 26) - displays summary of defined spectra
- Formulated wave spectrum (p. 27) - input panel for wave spectra
- Current (p. 28) - define wave current
- Wind Spectra (p. 28) - input panel for wind spectra
- Mean Wind (p. 29) - define wind speed direction

4.6.2.1. Total Number of Defined Spectra

Total # of defined spectra: 1

This panel displays the total number of defined wave spectra, which is the sum of Number of Formulated spectra (p. 26) + User defined spectra (p. 26).

4.6.2.2. # Formulated Spectra

Formulated Spectra 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0

The formulated spectra panel displays the number of defined formulated spectra. In the image above, there is one formulated spectrum (displayed in the text box), and it is highlighted for editing (red box containing the number 1).

To add a new formulated spectra increment the number in the text box by one (you may enter a maximum of 20 formulated spectra). Each defined formulated spectrum will be highlighted in white in the numbered panel beside the text box. To select a spectrum for editing simply click on the number you wish to edit. The selected spectrum will be highlighted in red. For example, the following diagram shows 15 defined formulated spectra with number 12 selected.

Formulated Spectra 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0

You may edit the selected spectrum by altering the values displayed in the [formulated wave spectrum panel \(p. 27\)](#).

To add and edit User Defined spectra use the [# User Defined Spectra \(p. 26\)](#) panel. The maximum permissible total number of spectra (formulated and user defined) is 20.

4.6.2.3. # User Defined Spectra

User Defined 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0

The user-defined spectra panel displays the number of user defined spectra. The image above shows that there are no user defined spectra in the current example.

To add a new user defined spectrum, increment the number in the text box by one (you may enter a maximum of 20 total spectra). Each user defined spectrum will be highlighted in white in the numbered panel beside the text box. To select a user defined spectrum for editing, simply click on the number you wish to edit. The selected user defined spectrum will be highlighted in red. For example, the following image shows 15 user defined spectra with number 12 selected.

User Defined 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0

You may edit the selected user defined spectrum by altering the values displayed in the [user defined wave spectrum panel \(p. 28\)](#).

To add and edit formulated spectra use the [# Formulated Spectra \(p. 26\)](#) panel.

4.6.2.4. Show Table

Show Table

Selecting the **Show Table** button will display a summary table of all the defined wave spectra as in the following image:

Wave Spectrum Table									
Defined Wind/Wave Spectra									
	Wave Spect	Hs	Tz	Directio	Current	Directio	Wind	Directio	Wind Spectru
1	Pierson-Moskowitz	6.421	10.000	0.0	0.000	0.0	0.00	0.0	Null
2	Null	0.000	0.000	0.0	0.000	0.0	0.00	0.0	Null
3	Null	0.000	0.000	0.0	0.000	0.0	0.00	0.0	Null
4	Null	0.000	0.000	0.0	0.000	0.0	0.00	0.0	Null
5	Null	0.000	0.000	0.0	0.000	0.0	0.00	0.0	Null
6	Null	0.000	0.000	0.0	0.000	0.0	0.00	0.0	Null
7	Null	0.000	0.000	0.0	0.000	0.0	0.00	0.0	Null
8	Null	0.000	0.000	0.0	0.000	0.0	0.00	0.0	Null

4.6.2.5. Formulated Wave Spectrum

Formulated Wave Spectrum

Type:	Pierson-Moskowitz	
# Lines	50	Kinematics
Direction:	0.000	
Freq Range:	0.222	1.333
Hs(Sig Wave Ht):	6.421	
Tz[Zero Crossing]:	10.00000	
Peak Freq(rad):	0.44429	
Gamma:	1.000	

The formulated wave spectra may be edited from this panel.

The following wave spectrum formulations are available through AqwaGS:

- Pierson - Moskowitz
- JONSWAP

4.6.2.6. User Defined Wave Spectrum

-User-Defined Spectrum-

# Lines	<input type="text" value="0"/>	
Direction:	<input type="text" value="0.000"/>	
#Ords:	<input type="text" value="0"/>	
Frequency(rad/s)	Ordinate	
1	<input type="text" value="*undef*"/>	<input type="text" value="*undef*"/>
2	<input type="text" value="*undef*"/>	<input type="text" value="*undef*"/>
3	<input type="text" value="*undef*"/>	<input type="text" value="*undef*"/>
4	<input type="text" value="*undef*"/>	<input type="text" value="*undef*"/>
5	<input type="text" value="*undef*"/>	<input type="text" value="*undef*"/>

The user defined wave spectra may be edited from this panel.

4.6.2.7. Current

Current

Speed:	<input type="text" value="0.000"/>
Direction:	<input type="text" value="0.000"/>

The current for each defined wave spectrum (entered in the [Wave Spectra dialog box \(p. 24\)](#)) is entered in this panel. You may define current speed and direction.

4.6.2.8. Wind Spectra

Wind Spectra

Type:	<input type="text" value="Null"/>		
# Lines	<input type="text" value="701"/>	Z Ref Ht:	<input type="text" value="0.000"/>
Frequency Coefficient:		<input type="text" value="0.000"/>	
# Ords:		<input type="text" value="0"/>	

The wind spectra may be edited from this panel. To select a wind spectrum for editing, select the required number from the relevant wave spectrum in the [Wave Spectra dialog box \(p. 24\)](#).

The following wind spectrum formulations are available through AqwaGS:

- Ochi & Shin
- A.P.I.
- User defined.
- NPD

If the wind spectrum is user defined, then an additional edit panel will appear.

	Non-Dim Freq	Ordinate
1	"undef"	"undef"
2	"undef"	"undef"
3	"undef"	"undef"
4	"undef"	"undef"
5	"undef"	"undef"

4.6.2.9. Mean Wind

-Mean Wind

Speed:	0.000
Direction:	0.000

The mean wind for each defined wave spectrum (entered in the Wave Spectra dialog box (p. 24)) is entered in this panel. You may define wind speed and direction.

Chapter 5: The AGS Run Menu

The AGS Run menu can be found on the [AGS toolbar \(p. 5\)](#).



From this menu you can run the following Aqwa programs interactively or in batch mode.

[Aqwa-Line \(p. 32\)](#)

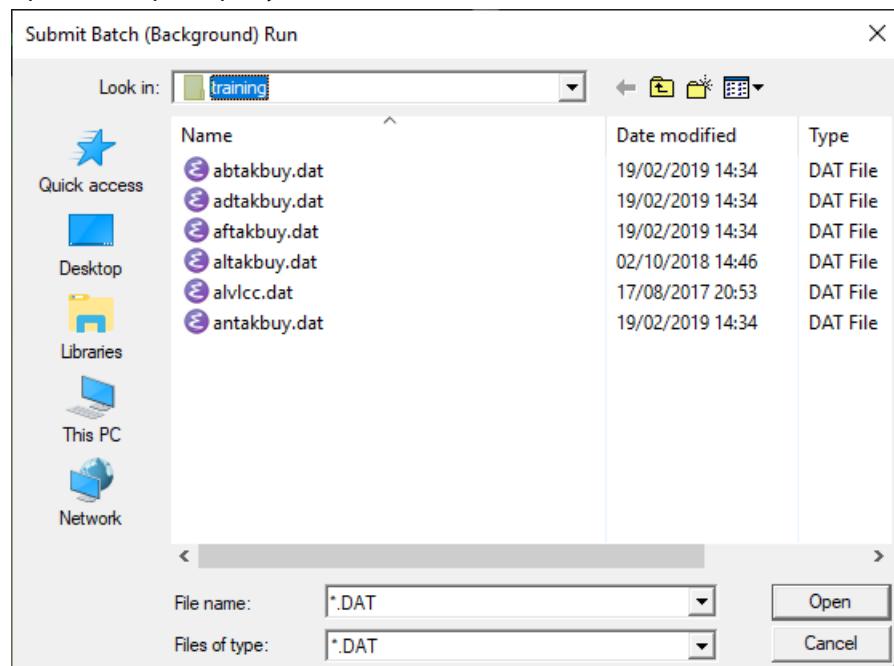
[Aqwa-Fer \(p. 32\)](#)

[Aqwa-Librium \(p. 34\)](#)

The analysis will be performed on the currently loaded Aqwa model.

Note:

Aqwa-Drift and Aqwa-Naut cannot be run interactively. However, you can run them using the BATCH option from the menu, using a standard [.DAT \(p. 127\)](#) file. A popup windows opens and prompts you to browse to a file. One file can be loaded at a time.

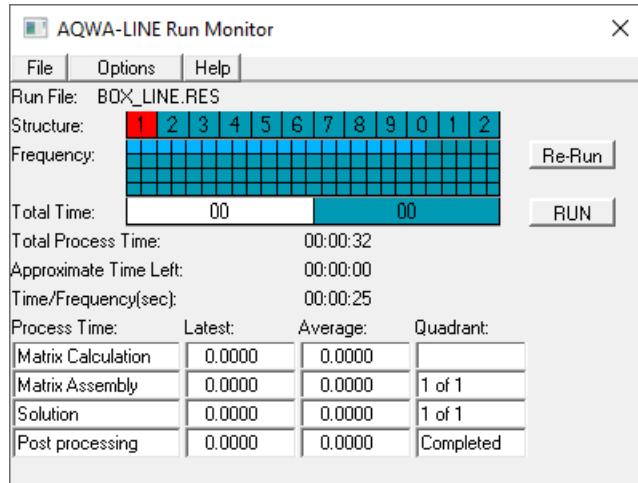


DESIGN mode is for development only.

5.1. Aqwa-Line

Aqwa-Line can be run from within the AGS by selecting **Run → AQWA-LINE**, which opens the Run Monitor. An Aqwa-Line analysis will be performed on the loaded model if the license is available.

The Aqwa-Line Run Monitor controls the analysis.



5.2. Aqwa-Fer

Aqwa-Fer can be run interactively from the AGS toolbar (p. 5). To access this option select **Run → AQWA-FER** from the menu bar.

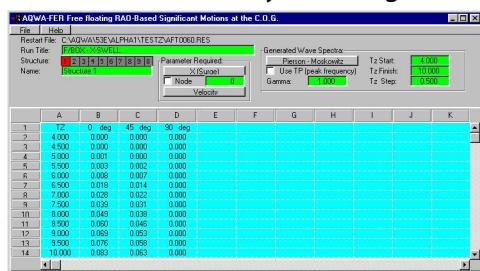


The various options are:

- Free Floating RAO Based (p. 32)
- Aqwa-Fer Run Monitor (p. 33)
- Aqwa-Fer .RSS Results Browser (p. 33)
- Aqwa-Fer .HTM File Dump Utility (p. 33)

5.2.1. Aqwa-Fer Free Floating RAO Based

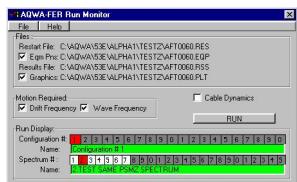
Access this feature by selecting **Run → AQWA-FER → Free Floating RAO Based** from the AGS toolbar.



This window enables RAO based significant responses to be obtained for a range of different spectra.

5.2.2. Aqwa-Fer Run Monitor

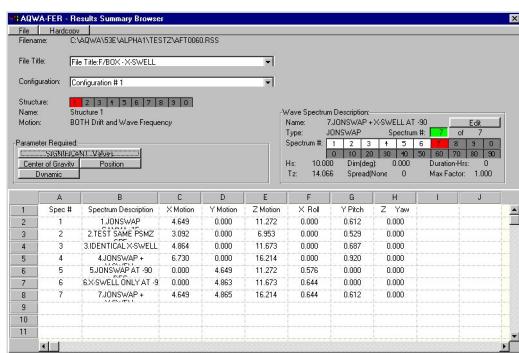
Access this feature by selecting **Run** → **AQWA-FER** → **Run Monitor** from the AGS toolbar.



This window enables Aqwa-Fer to be run interactively from within the AGS. It is necessary to have an existing **.RES** (p. 127) file, spectrum, and mooring configuration.

5.2.3. Aqwa-Fer .RSS Results Browser

Access this feature by selecting **Run** → **AQWA-FER** → **AQWA-FER .RSS Results Browser** from the AGS toolbar.

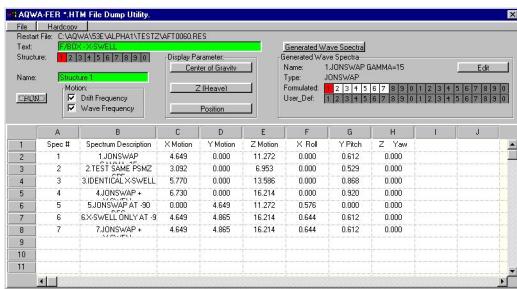


This window gives a summary of the results of an Aqwa-Fer analysis. The following results are available:

- Significant or maximum values
- Results at CG or selected node, reactions or mooring tension
- Position, velocity or acceleration
- Dynamic, static or dynamic +/- static results

5.2.4. Aqwa-Fer .HTM File Dump Utility

Access this feature by selecting **Run** → **AQWA-FER** → **AQWA-FER .HTM File Dump Utility** from the AGS toolbar.



This window enables an html format text file to be created and written out. Clicking the **Hardcopy** button brings up a further window in which the dump options can be specified.



5.3. Aqwa-Librium

Access this feature by selecting **Run → AQWA-LIBRIUM** from the AGS toolbar.



This window allows you to select the structure(s), mooring configuration(s) and spectra to be used for a Librium analysis. You can also select whether to save a .EQP file for use by the other post-processors. When all the required parameters have been set, click the **RUN** button.



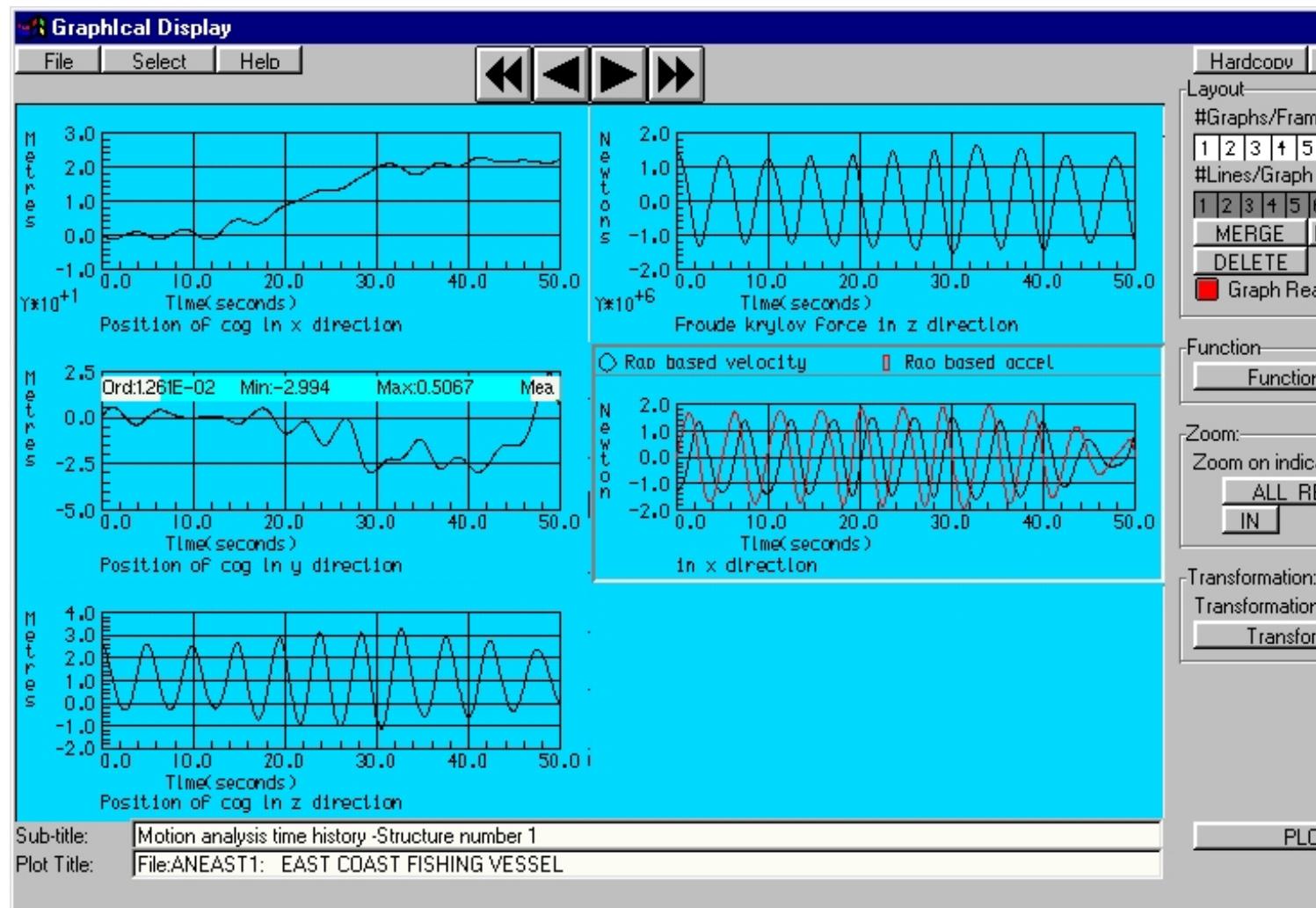
The AQWA Graphical Supervisor also has a Mini-Librium (p. 117) facility accessible from the AGS Model Visualization Window (p. 53).

Chapter 6: The AGS Graph Window

6.1. The Graphical Display Window

The Aqwa Graphical Supervisor has a graphical display facility that allows you to view the results of an Aqwa analysis. The utility has many functions enabling you to view, compare and manipulate any set of results produced from within the Aqwa suite of programs. For example, results from two different analysis may be viewed on the same graph by using the AGS graph merging function.

Selecting Graphs from the Aqwa Graphical Supervisor toolbar starts the Graphical display utility in the Aqwa Graphical Supervisor.

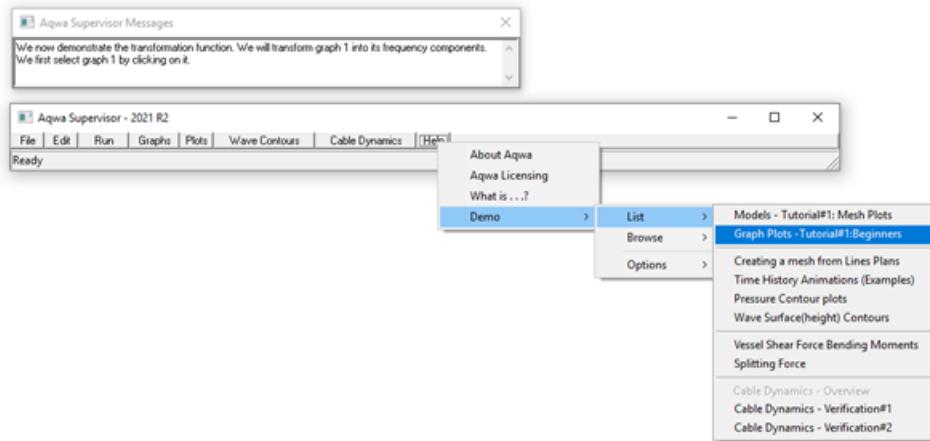


Note:

Up to 20 graphs/plots can be displayed.

Graphs/plots can be superimposed.

View the demo “Graph plot: Tutorial #1 Beginner” from the main AGS menu to see the graph facilities in action.



The features of this window are:

- 6.1.1. Menu
- 6.1.2. Graph Display
- 6.1.3. Graph Scroll Buttons
- 6.1.4. Layout Panel
- 6.1.5. Function/Processing
- 6.1.6. Zoom
- 6.1.7. Transformation
- 6.1.8. Plot Button
- 6.1.9. Sub-Title
- 6.1.10. Plot Title
- 6.1.11. Help
- 6.1.12. Hardcopy Menu
- 6.1.13. Options

6.1.1. Menu



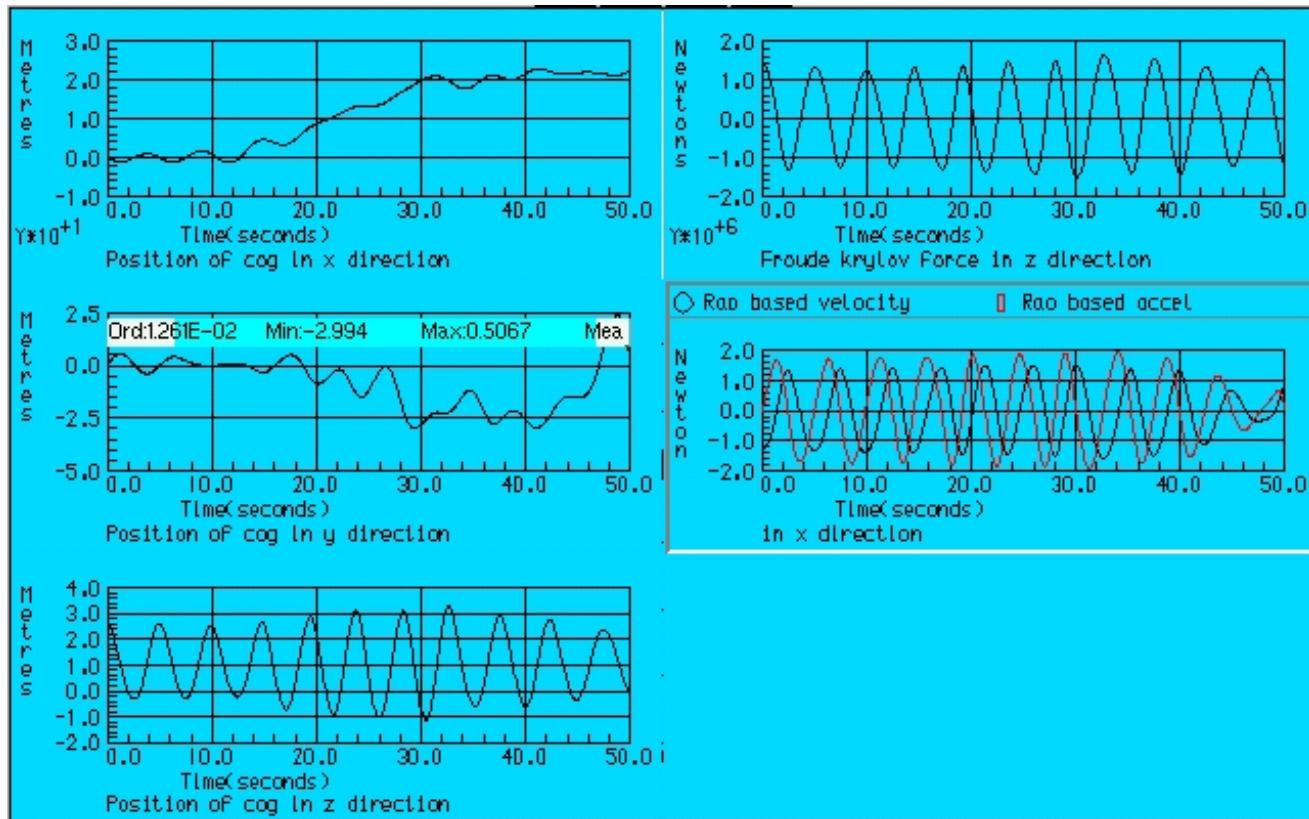
The menu bar has the following options:

- File - The file menu allows you to open .PLT (p. 127) files which contain Aqwa results and all information necessary for graph processing.
- Select (p. 46) - Activates the Graph selection dialog box allowing you to results for plotting. A .PLT file must be open before results selection can be made. You can open a .PLT file from the Graphical Display window menu or from the window associated with this button.
- Help (p. 45)

- [Hardcopy \(p. 45\)](#) - Output of [.HGL \(p. 128\)](#), [.PSC \(p. 132\)](#), [.CSV \(p. 128\)](#), [.PTA \(p. 132\)](#) (graphics) file formats.
- [Options \(p. 46\)](#)

6.1.2. Graph Display

The graph display area displays Aqwa results selected using the **Select** button (p. 46). You can manipulate the graphs by using the panels on the right hand side of the window: [Layout \(p. 39\)](#), [Function \(p. 39\)](#), [Zoom \(p. 44\)](#), and [Transformation \(p. 44\)](#). To scroll through graphs (if there are more defined than displayed) use the graph scroll buttons (p. 38).



6.1.3. Graph Scroll Buttons



You can scroll through the defined graphs by using the navigation buttons. The two outside buttons display the first and last graphs, respectively. The middle two buttons will step through the graphs one by one. To select more graphs use the [Graph Selection window \(p. 46\)](#).

You can display a number of graphs on the screen at one time by using the Layout panel (p. 39) in the top left hand corner of the Graphical Display window.

Note:

The maximum number of graphs that can be displayed is 20.

6.1.4. Layout Panel



This panel has the following features:

- **#Graphs/Frame** - The number of graphs to be displayed on screen. (Option R displays all graphs)
- **Points** - The number of data points to be displayed on the selected graph, either:
 - None - No points
 - Auto - As Min unless the number of points is greater than fifty in which case none plotted
 - Min - The minimum number of points necessary to describe the shape of the graph
 - Max - The maximum number of points without overlap
 - All - All points
- **MERGE** - Combines two or more selected graphs
- **DEMERGE** - Splits a merged graph
- **DELETE** - Removes the selected graph
- **COMPRESS** - Removes empty graph slots
- **Read** - When checked, data values will be reported for the range selected by dragging the cursor across the graph
- **Max. Sig. Figs.** - When checked, the values displayed using the Read option will be to the maximum number of significant figures

6.1.5. Function/Processing



This feature allows creation of new graphs of various functions. The following options are available:



- [Wave Spectrum \(p. 39\)](#)
- [Mathematical \(p. 41\)](#)
- [Data Processing \(p. 42\)](#)

6.1.5.1. Wave Spectrum

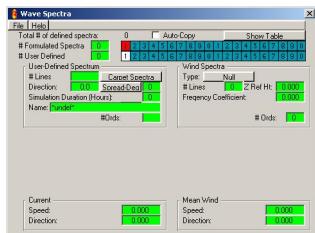
This is a component of the Function/Processing feature of the graphical display utility



The following options are available:

- **Select spectrum** (p. 40)
- Spectral density - Plots a graph of the selected spectrum
- X-Swell Spectral Density - Plots the X-Swell spectrum
- Spectral wavelets - Plots spectral wavelets for the selected spectrum
- Surface time history - Plots the time history of surface elevation with respect to the still water line for the selected spectrum
- Surface elevation - Plots the surface elevation with respect to the still water line in the wave direction at a point in time
- Surface pressure - Plots the pressure head at the still water line
- **Wave time/position** (p. 41)
- **Kinematics Profile** (p. 41)

6.1.5.1.1. Select Spectrum



The components of the **Wave Spectra** dialog box are:

- Menu - The **File** menu allows you to exit the dialog
- **Total # defined spectra** (p. 25) - displays the number of presently defined spectra
- **# Formulated Spectra** (p. 26) - Edit/display formulated spectra
- **# User Defined** (p. 26) - Edit/display user defined spectra
- **Show table** (p. 26) - displays summary of defined spectra
- **Formulated wave spectrum** (p. 27) - input panel for wave spectrum
- **Current** (p. 28) - define wave current
- **Wind Spectra** (p. 28) - input panel for wind spectra

- Mean Wind (p. 29) - define wind speed direction

6.1.5.1.2. Wave Time/Position



The following parameters can be set:

- Simulation time - The time history length
- Time step - The size of the time step, ie the number of points comprising the time history
- Wave time - The time at which an elevation is plotted
- Wave distance - The distance in the direction of the wave at which a time history is plotted.
- Wave X / Y /Z position - The position at which wave kinematics are plotted

6.1.5.1.3. Kinematics Profile



Time history profile - if this option is not set, variables will be plotted against depth.

The following parameters can be set:

- Simulation Time - The time history length
- Wave Time - The time at which an elevation is plotted
- Wave X / Z Pn - The position at which wave kinematics are plotted

The following options are available:



6.1.5.2. Mathematical

The following options are available:



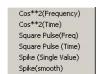
- **Sin/Cos Fns** - Sine and Cosine Functions
- **Ramp Fns** - Ramp Functions
- **Polynomial** - Polynomial Functions

- **White Noise Time/H** - White Noise Time History

Sine and Cosine Functions



Ramp Functions



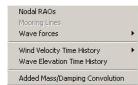
Polynomial Functions



White Noise

Produces a time history based on a combination of all frequencies

6.1.5.3. Data Processing



The following options are available:

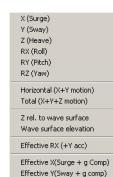
- 6.1.5.3.1. Nodal RAOs
- 6.1.5.3.2. Wave Forces
- 6.1.5.3.3. Wind Velocity Time History
- 6.1.5.3.4. Wave Elevation Time History
- 6.1.5.3.5. Added Mass/Damping Convolution

6.1.5.3.1. Nodal RAOs

This panel allows the RAOs for a range of variables to be plotted for the specified node.



The available variables are:



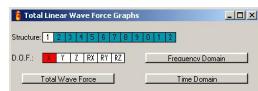
6.1.5.3.2. Wave Forces

Drift Wave Frequency Forces
Wave Drift Damping
Fully-Coupled QTFs

This panel has the following options:

- 6.1.5.3.2.1. Drift Wave Frequency Forces
- 6.1.5.3.2.2. Wave Drift Damping
- 6.1.5.3.2.3. Fully Coupled QTFs

6.1.5.3.2.1. Drift Wave Frequency Forces



Diffraction and/or Froude Krylov Forces may be plotted in the frequency and time domains.

6.1.5.3.2.2. Wave Drift Damping



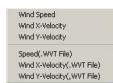
Graphs of the following variables can be plotted for surge, sway or yaw:

- $B_1^*/B_2^*/B_6^*$ - Drift damping in surge, sway and heave
- K - Hydrostatic Stiffness
- C_g -
- QTF - Quadratic Transfer Functions
- M/QTF -
- $mX\text{-arm}$ -
- $mY\text{-arm}$ -
- C_g/C_p -

6.1.5.3.2.3. Fully Coupled QTFs



6.1.5.3.3. Wind Velocity Time History



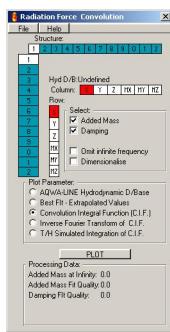
Wind speed and its X and Y velocity components can be plotted for time domain simulations where the data was read in from a [.WVT \(p. 127\)](#) file during the analysis.

6.1.5.3.4. Wave Elevation Time History

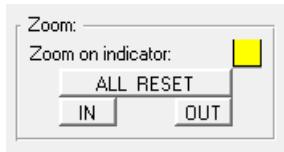


Wind elevation can be plotted for time domain simulations where the data was read in from a [.WHT \(p. 127\)](#) file during the analysis.

6.1.5.3.5. Added Mass/Damping Convolution



6.1.6. Zoom

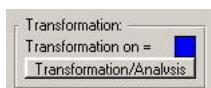


The zoom transformation can apply to a given graph when selected or to all the graphs when no selection is has been made.

The **All Reset** button resets the view for all graphs.

The free-form zoom is always active and can apply to more than one graph of the same panel by maintaining the selection across the graphs. A yellow square will appear on the side of the graphs indicating this view is from a selection area.

6.1.7. Transformation



The AGS offers various predefined transforms that either apply specifically to time or frequency series, or to any other results plot. The transforms allow algebraic calculations between displayed properties, drawing statistics out of a given property, or running interpolations.

6.1.8. Plot Button

The **Plot** button updates the display area containing the graphical output.



6.1.9. Sub-Title

The **Sub-title** text box describes the displayed graph(s) and is printed out when a [hardcopy \(p. 45\)](#) is made. You may alter the text if necessary.



6.1.10. Plot Title

The **Plot Title** text box describes the file and analysis title associated with the displayed graph(s) and is printed out when a [hardcopy \(p. 45\)](#) is made. You may alter the text if necessary.



6.1.11. Help

The Help menu (displayed on all menu bars) allows you access to the Aqwa online help system from anywhere within the AGS.

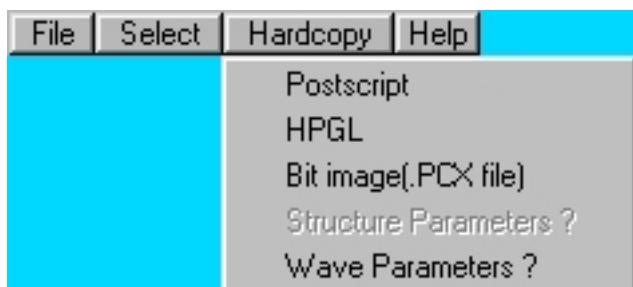
Most of the Help menu entries are not operational. The two entries that are functional are:

What is... - displays bubble help for the feature presently covered by the mouse (click to dismiss).

Demo - gives access to the demos available for the Aqwa Graphical Supervisor.

6.1.12. Hardcopy Menu

The hardcopy menu entry allows you access to various forms of visual output of your model and results. When one of the options is selected, a file will be created in your working directory containing the screen information at time of selection.



The various formats are:

- Postscript - Vector format supported by some printers.
- [HPGL \(p. 128\)](#) - Vector format supported by some printers. This format may also be embedded in most Word Processors.
- Bit Image ([.PCX \(p. 127\)](#) file) - Bitmap format containing color information of the screen.

6.1.13. Options

The **Options** button on the menu bar of the Graphs window has the following choices:

- **Change Abscissa**
- **Define FT Filter**

To change the properties of a particular graph, you will need to select it first.

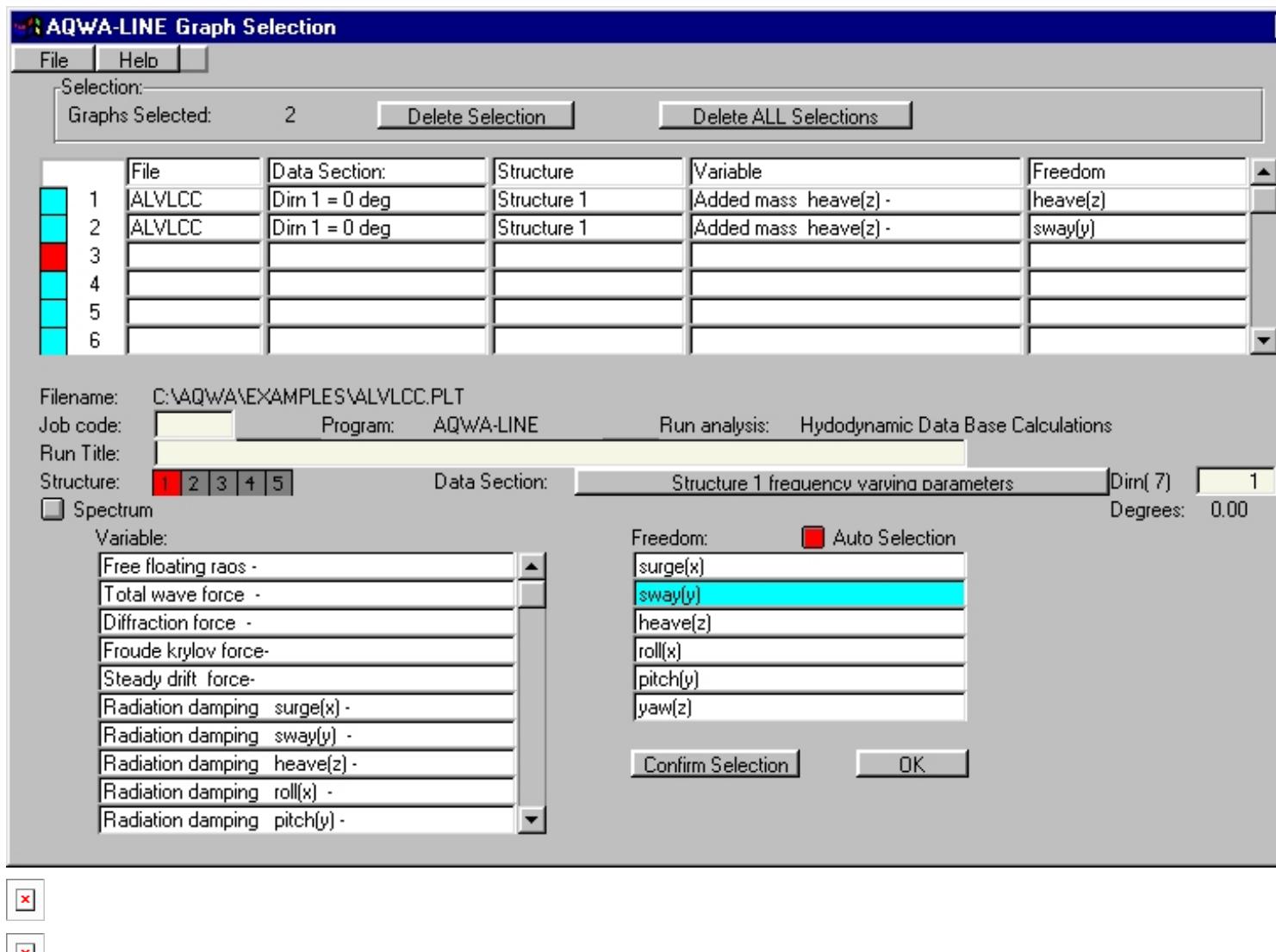
Note:

For some graphs, the option **Define FT Filter** is not available.

6.2. The Graph Selection Window

To display the Graph Selection window choose **Select** from the Graphical Display window's toolbar.

From this window you can select Aqwa results that you wish to plot. The results are produced from one of the Aqwa analysis applications and stored in a [.PLT \(p. 127\)](#) backing file.



The components of the window are:

- **Menu (p. 47)** - Access to file and help system
- **Selection (p. 48)** - Displays selected graphs which will be plotted
- **Job information (p. 48)** - Displays analysis/job information
- **Structure & data section (p. 48)** - Selection of structure, data section of .PLT file and direction
- **Variable (p. 48)** - Display of available results
- **Freedom (p. 51)** - Display of available degrees of freedom

6.2.1. Graph Selection Menu



This menu bar allows you to access the file system to open a ..PLT (p. 127) results file.

6.2.2. Selected Graphs

The graphs selected from the [Variable \(p. 48\)](#) panel and the [Freedom \(p. 51\)](#) panel are displayed in this area. You can scroll through the selected graphs, delete individual graphs, or delete the whole selection.

Selection:				
	Graphs Selected:	2	Delete Selection	Delete ALL Selections
1	File ALVLCC	Data Section: Dim 1 = 0 deg	Structure Structure 1	Variable Added mass heave(z) - Freedom heave(z)
2	File ALVLCC	Data Section: Dim 1 = 0 deg	Structure Structure 1	Variable Added mass heave(z) - Freedom sway(y)
3				
4				
5				
6				

6.2.3. Display of Analysis/Job in Graphs Mode

Filename:	C:\AQWA\EXAMPLES\ALVLCC.PLT
Job code:	<input type="text"/>
Program:	AQWA-LINE
Run analysis:	Hydodynamic Data Base Calculations
Run Title:	<input type="text"/>

The panels here display analysis/job information which you can be alter.

6.2.4. Structure & Data Section

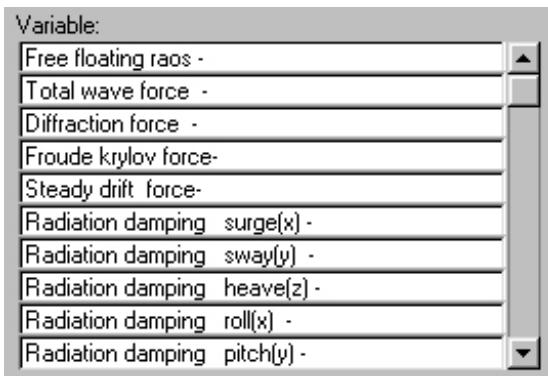
Structure:	<input checked="" type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5	Data Section:	Structure 1 frequency varying parameters	Dirn(7)	1
<input type="checkbox"/> Spectrum				Degrees:	0.00

6.2.5. Plotting Results using the Variable Panel

The Aqwa Graphical Supervisor will plot a graph of any set of results contained within the [.PLT \(p. 127\)](#) file created during an Aqwa suite analysis. Each different analysis package of the Aqwa suite will automatically store default results (depending on the Aqwa package) in the ..PLT file during analysis. The user may request additional results to be stored in the .PLT file by using the relevant print card within the job. The user should also refer to the Aqwa reference manual for details on printing options.

When you are preparing to display results graphically the available analysis results from a .PLT file will be listed in the variable panel of the [Graph Selection window \(p. 46\)](#). The Graph Selection window can be displayed by clicking the **Select** button of the Graphical Display window's [menu \(p. 37\)](#) bar.

The variable panel looks as follows (note that the listed results are dependent on analysis type):



You can select a graph for plotting by selecting the relevant parameter from this panel and then selecting a freedom from the [Freedom Panel \(p. 51\)](#). Press **Confirm Selection** to add the current selection to the [Selection \(p. 48\)](#) pane.

The available results that will be listed in the .PLT file (and therefore the variable panel) are listed in the following tables.

Table Key

Y - Result stored in the .PLT file by default for respective program.

N - Result not stored in .PLT file. Additional data record required if results are needed.

PRRI - Prints RAOs at integration points for an Aqwa-Fer run

PRRS - Prints response spectrum for Aqwa-Fer run

PRNT - Use the PRNT data record if the result is not stored by default

PTEN - Use the PTEN data record if tensions in cables, catenaries and hawsers are required

Aqwa-Line

Parameter	Aqwa-Line
Free floating RAOs	Y
Total wave force	Y
Diffraction force	Y
Froude Krylov force	Y
Radiation damping	Y
Added mass	Y

Aqwa-Fer

Parameter	Aqwa-Fer	Data Record
RAOs @ integration points	N	PRRI

Parameter	Aqwa-Fer	Data Record
Response spectrum	N	PRRS

Aqwa-Librium, Aqwa-Naut, Aqwa-Drift

No.	Parameter	Aqwa-Librium	Aqwa-Naut	Aqwa-Drift (drift motion only)	Aqwa-Drift (+ wave frequency motion)	Data Record (if required)
1	POSITION	Y	Y	Y	Y	PRNT
2	VELOCITY	N	Y	Y	Y	PRNT
3	ACCELERATION	N	Y	Y	Y	PRNT
4	RAO BASED POSITION	N	Y	N	Y	PRNT
5	RAO BASED VELOCITY	N	Y	N	Y	PRNT
6	RAO BASED ACCEL	N	Y	N	Y	PRNT
7	WAVE FREQ POSITION	N	N	N	Y	PRNT
8	WAVE FREQ VELOCITY	N	N	N	Y	PRNT
9	WAVE FREQ ACCEL	N	N	N	Y	PRNT
10	SLOW POSITION	N	N	N	Y	PRNT
11	SLOW VELOCITY	N	N	N	Y	PRNT
12	SLOW ACCEL	N	N	N	Y	PRNT
13	SLOW YAW	N	N	N	N	PRNT
14	MOORING	Y	Y	Y	Y	PRNT
15	GYROSCOPIC	N	N	N	N	PRNT
16	DIFFRACTION	N	Y	N	Y	PRNT
17	LINEAR DAMPING	N	Y	Y	Y	PRNT
18	MORISON DRAG	N	Y	N	N	PRNT
19	DRIFT	Y	N	Y	Y	PRNT
20	FROUDE KRYLOV	N	Y	N	N	PRNT
21	GRAVITY	Y	Y	Y	Y	PRNT
22	CURRENT DRAG	Y	Y	Y	Y	PRNT

No.	Parameter	Aqwa-Librium	Aqwa-Naut	Aqwa-Drift (drift motion only)	Aqwa-Drift (+ wave frequency motion)	Data Record (if required)
23	HYDRODYNAMIC	N	N	N	N	PRNT
24	HYDROSTATIC	Y	Y	Y	Y	PRNT
25	WIND	Y	Y	Y	Y	PRNT
26	SLAM	N	Y	Y	Y	PRNT
27	THRUSTER	Y	N	Y	Y	PRNT
28	YAW DRAG	N	N	Y	Y	PRNT
29	WAVE FREQ FORCE	N	N	N	Y	PRNT
30	ERROR PER Timestep	N	Y	Y	Y	PRNT
31	TOTAL REACTION FORCE	N	Y	Y	Y	PRNT
38	REACTION AT ARTIC 1	N	N	N	N	PRNT
39	REACTION AT ARTIC 2	N	N	N	N	PRNT
40	REACTION AT ARTIC 3	N	N	N	N	PRNT
41	REACTION AT ARTIC 4	N	N	N	N	PRNT
42	REACTION AT ARTIC 5	N	N	N	N	PRNT
43	REACTION AT ARTIC 6	N	N	N	N	PRNT
44	REACTION AT ARTIC 7	N	N	N	N	PRNT
45	REACTION AT ARTIC 8	N	N	N	N	PRNT
46	REACTION AT ARTIC 9	N	N	N	N	PRNT
47	REACTION AT ARTIC 10	N	N	N	N	PRNT
50	TOTAL FORCE	Y	Y	Y	Y	PRNT
N/A	TENSION	N	N	N	N	PTEN

6.2.6. Set Result Freedom

The **Freedom** panel allows you to choose the freedom for which you require to view results.

To select a graph, click on the desired result from the [Variable panel \(p. 48\)](#), choose the freedom and click on confirm selection. Alternatively you can select **Auto Selection** from this panel and every time you choose a freedom the graph will automatically become selected (and displayed in the [Selected graph panel \(p. 48\)](#)).



Chapter 7: The AGS Plot Window

The following functions of the AGS Plot window are described in this chapter:

- 7.1. The Model Visualization Window
- 7.2. Plot Options
- 7.3. Animations
- 7.4. Creating a Mesh
- 7.5. Bending Moment and Shear Forces
- 7.6. Splitting Forces
- 7.7. Pressure Contours
- 7.8. Mesh Scaling
- 7.9. Mini-Librium

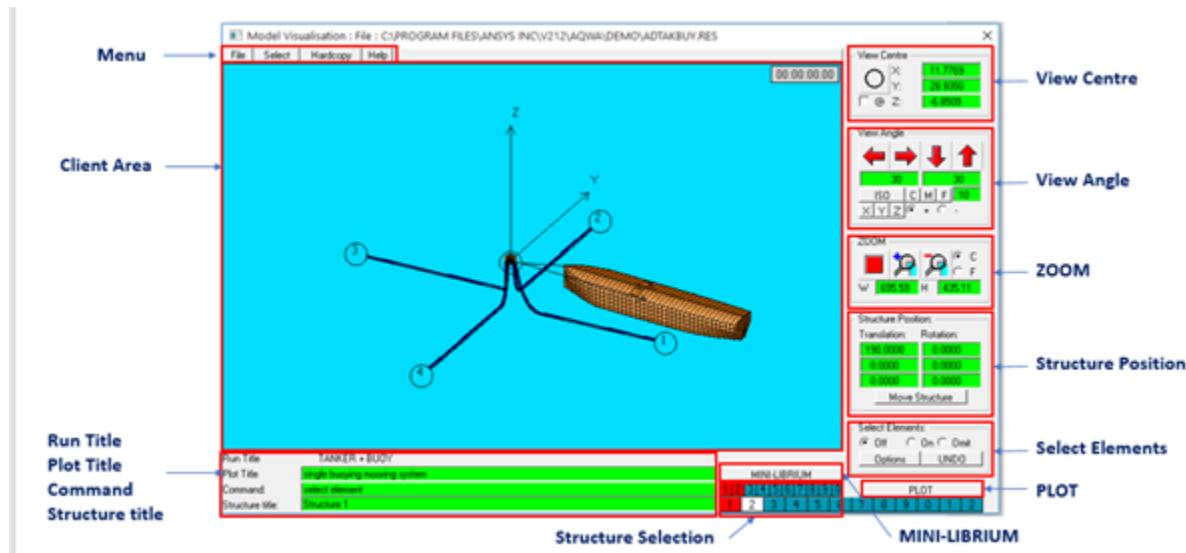
7.1. The Model Visualization Window

The model visualization window is where Aqwa models (and systems of models) are visualized. To access this window select 'Plots' from the AGS toolbar.

From this window you are able to:

- Generate and edit meshes for mono-hull vessels
- View Aqwa models created models for pre- and post-processing.
- Generate and view animation files constructed from Aqwa-Naut and Aqwa-Drift runs.
- View the equilibrium position of a model (or system of models) generated from both the Aqwa-Librium analysis program and the LIBRIUM function built into the AGS.

Most of the functions available within the Model Visualisation window are accessed through the menu system at the top of the Window. The basic window looks as follows:



The key characteristics of the basic Model Visualisation Window are:

- Menu (p. 54)
- Client Area (p. 55)
- View Centre (p. 55)
- View Angle (p. 55)
- Zoom (p. 56)
- Move Structure (p. 57)
- Structure Selection (p. 58)
- Plot (p. 59)
- Run Title, Plot Title, Command, Structure Title (p. 59)

7.1.1. Menu

The menu system within the Model Visualisation window is like any other menu system you will see in most other Windows applications. The various items on the menu bar will give you access to a whole host of user options to be used within the Model Visualisation window.



- File (p. 59)
- Select (p. 60)
- Hardcopy (p. 60)
- Help (p. 45)

7.1.2. Client Area

The client area in the Model Visualisation window allows you to view model information graphically. Systems of models can be viewed from within this area with or without the following options: waves, mooring lines, axis system.

Clicking on any part of the client area will make this point the center of the screen. This allows you to move the model around the client area very easily. This becomes particularly useful when the model is larger than the screen and you wish to move to another part of the model without zooming in/out to find the correct area. This may also be achieved by manually entering the co-ordinate you wish to be the center of the screen in the [View Centre \(p. 55\)](#) panel.

Note:

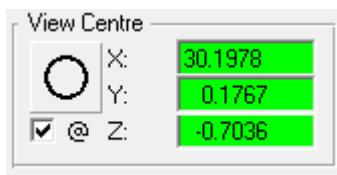
While the background color cannot be changed, the model colors can be manipulated through the Options dialog box.

7.1.3. View Centre

This utility is a component of the [Model Visualisation \(p. 53\)](#) window.

The View Centre panel allows you to set the centre of the client area to the origin of the Fixed Reference Axes origin (0,0,0) by selecting the view centre button.

You may also set the centre of the screen to be any co-ordinate within the Fixed Reference Axes (FRA) system. To do this input the co-ordinates you require (pressing return after each), and then select PLOT at the bottom of the screen.



You may also achieve this simply by clicking the left mouse button anywhere with the [client area \(p. 55\)](#). This will select this co-ordinate to be the center of the screen.

The default position of the center of the screen is the center of the model while in ISO view.

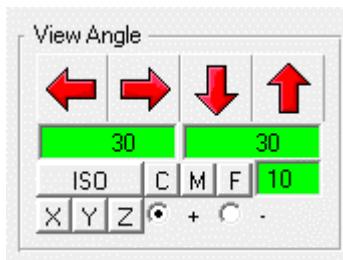
You may also view your model from different angles by using the [View Angle \(p. 55\)](#) panel or zoom in/out of the model by using the [Zoom \(p. 56\)](#) panel.

Note that to alter the position of the model within the Fixed Reference Axis (FRA) you must use the [Move Structure \(p. 57\)](#) panel.

7.1.4. View Angle

This utility is a component of the [Model Visualisation \(p. 53\)](#) window.

The view angle panel allows you to rotate the model(s) about its centre.



The arrow buttons are used to rotate left/right/up/down by the amount of degrees shown in the increment text box. To change the increment select one of the following:

- C - Coarse - 30°
- M - Medium - 10°
- F - Fine - 1°

You may also wish to enter your own value of increment in the increment text box.

The X, Y, Z, & ISO buttons allow you to quickly view your model from these directions. I.e. selecting X will allow you to view the model as if you were looking down the X-axis. The +/- toggle buttons change the direction of this view so that when '+' is selected the view will be from positive to negative, and likewise for '-'.

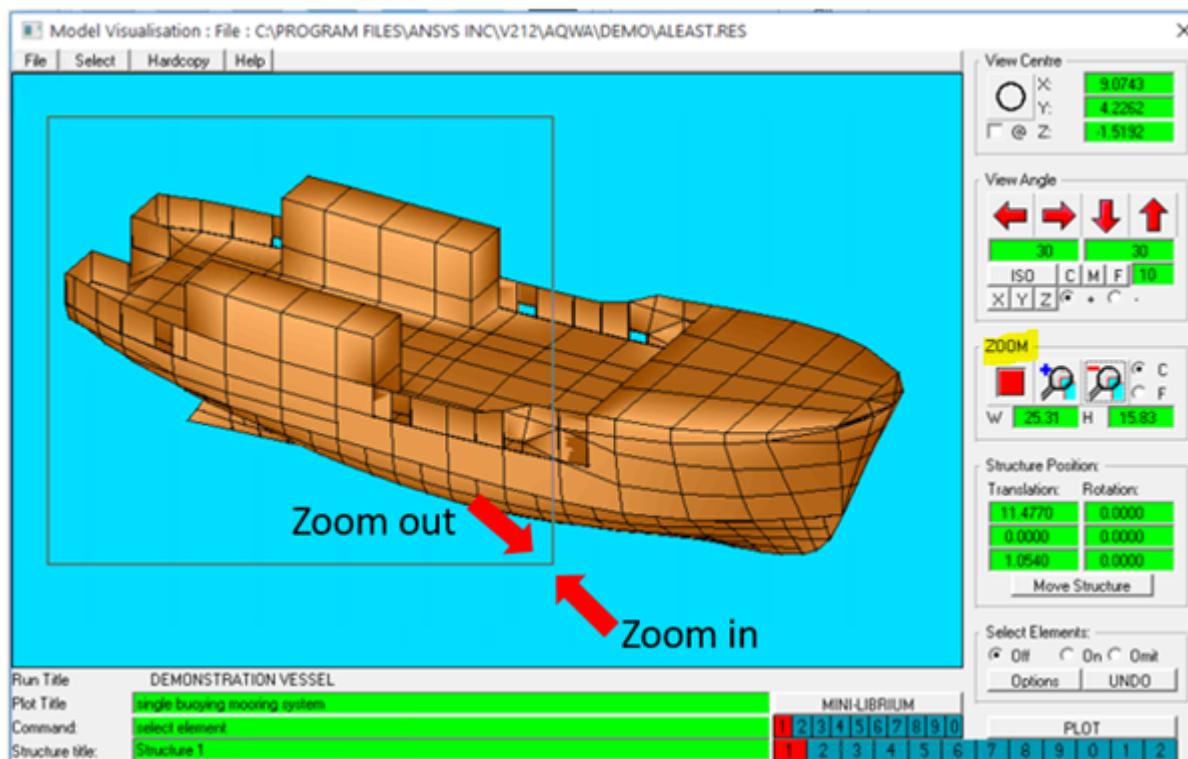
You may also view your model from different positions by using the [View Centre \(p. 55\)](#) panel or zoom in/out of the model by using the [Zoom \(p. 56\)](#) panel.

Note that to alter the position of the model within the Fixed Reference Axis (FRA) you must use the [Move Structure \(p. 57\)](#) panel.

7.1.5. Zoom

This utility is a component of the [Model Visualisation \(p. 53\)](#) window.

The ZOOM control panel allows you to zoom in and out on your model. The first button on the panel zooms to the extents of the model, and positions the model in the default position. (Zoom extents only accounts for model elements and not mooring lines). The zoom in (+) and the zoom out (-) buttons allow you to zoom in and out of your model by 100% or 5% depending on which of the two toggle buttons, Coarse & Fine, is selected.



You may also zoom in and out of the model by dragging the mouse button (left mouse button depressed) over the area of the model. Depending on which direction the mouse is dragged the zoom will be -ve if the mouse is dragged from bottom right to top left, and +ve if dragged from top left to bottom right.

The model co-ordinate extents will be shown in the two remaining text boxes (W & H) in the zoom control panel. These extents are given as dimensions of the Fixed Reference Axes (FRA) used for the model.

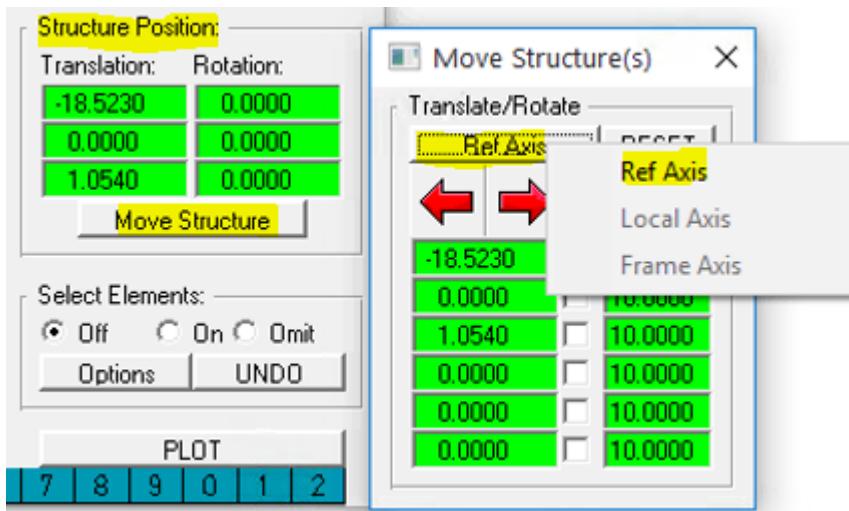
You may also view your model from different angles by using the [View Angle \(p. 55\)](#) panel or move the model about the screen by using the [View Centre \(p. 55\)](#) panel.

Note that to alter the position of the model within the Fixed Reference Axis (FRA) you must use the [Move Structure \(p. 57\)](#) panel.

7.1.6. Move Structure

This utility is a component of the [Model Visualisation \(p. 53\)](#) window.

The Move Structure (Translate/Rotate) panel allows you to manipulate the model's Local System Axes (LSA) within the Fixed Reference Axes (FRA). Press the Move Structure button under Structure Position to open the panel.



The Ref Axis button indicates that the Fixed Reference Axes (FRA) are used as the current axis system. This cannot be changed at this time.

The RESET button will reset the model to its default position.

Models may be manipulated either by using the direction buttons, or by inserting the position of the model in the 6 freedom text entries on the left-hand side of the panel.

To move the model with the buttons select the freedom toggle in which you wish the model to move, enter the increment by which you wish the model to move, and press one of the four move buttons. Note that for a translation you must use the red arrow buttons, and for rotation use one of the circular arrow buttons.

You may also view your model from different angles within the Fixed Reference Axis (FRA) by using the [View Angle \(p. 55\)](#) panel or move the model about the screen by using the [View Centre \(p. 55\)](#) panel.

Zoom options are available under the [Zoom \(p. 56\)](#) panel.

7.1.7. Structure Selection

This utility is a component of the [Model Visualisation \(p. 53\)](#) window.

The structure selection panel allows you to choose which structure(s) are displayed on the screen. The number of structures available in the system is highlighted as white within the structure selection panel. You may select more than one structure to be displayed at any given time. A selected structure will appear red in the selection panel. (A greyed out box implies no structure exists for that number).

1	2	3	4	5	6	7	8	9	0	PLOT	
1	2	3	4	5	6	7	8	9	0	1	2

If you wish to manipulate a structure within the Fixed Reference Axis (FRA) without affecting the position of another structure deselect the structure(s) that do not wish to move. Then move the structure around using the [Translate / Rotate \(p. 57\)](#) panel. In this way you can view the structures positioned in the Local System Axes (LSA) of the system.

7.1.8. Plot

This utility is a component of the [Model Visualisation \(p. 53\)](#) window.

The **PLOT** button updates the image displayed on the screen.

Some operations automatically update the screen, while others require this button to be used.

7.1.9. Run Title, Plot Title, Command and Structure Title

This utility is a component of the [Model Visualisation \(p. 53\)](#) window.

As the name suggests the Run Title displays the name of the analysis as given under TITLE in the .DAT file.

Run Title	DEMONSTRATION VESSEL
Plot Title	single buoying mooring system
Command:	select element
Structure title:	Structure 1

The **Plot Title** is an optional user defined title which will appear in any hardcopy files.

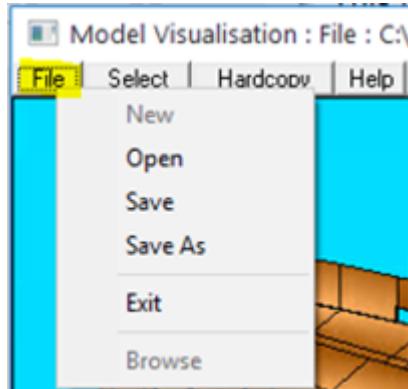
The **Command** line is used for inputting old [Aqwa-Plane commands \(p. 135\)](#). Many of the Aqwa-Plane commands have now been embedded into the AGS and are under the guise of buttons and text boxes. However there still remains a few which are only available through the command panel. These commands can be very useful in manipulating a model definition.

The **Structure Title** displays the name of the currently selected structure in the [Structure Selection \(p. 58\)](#). The run file is displayed in the AGS title bar.

7.1.10. File

This utility is a component of the [Model Visualisation \(p. 53\)](#) window.

The file menu gives the following options:



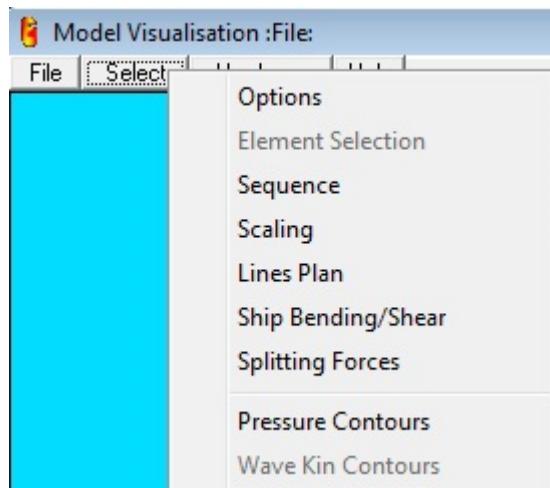
- **Open** - Opens the 'open restart file dialog box'.
- **Browse** - Opens up the Browse window allowing you to view text files.
- **Save** – Saves the .RES (p. 127) file

- **Save As** – Saves the .RES (p. 127) file as the user defined name
- **Exit** - Exits from the Plots window.

7.1.11. Select

This utility is a component of the [Model Visualisation \(p. 53\)](#) window.

The Select menu brings functionality to the Model Visualisation Window.

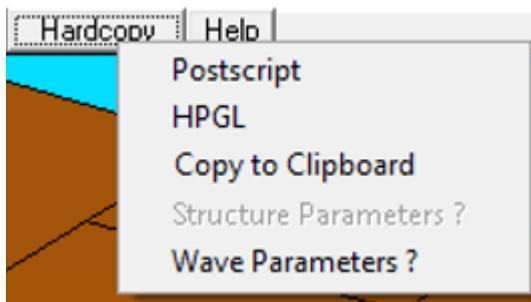


The Select menu gives you access to the following dialogs.

- [Options \(p. 61\)](#)
- [Sequence \(p. 84\)](#)
- [Scaling \(p. 112\)](#)
- [Lines Plan \(p. 88\)](#)
- [Ship Bending/Shear \(p. 95\)](#)
- [Splitting Forces \(p. 106\)](#)
- [Pressure Contours \(p. 107\)](#)

7.1.12. Hardcopy

The Hardcopy menu entry allows you access to various forms of visual output of your model and results. When one of the options is selected a file will be created in your working directory containing the screen information at time of selection.

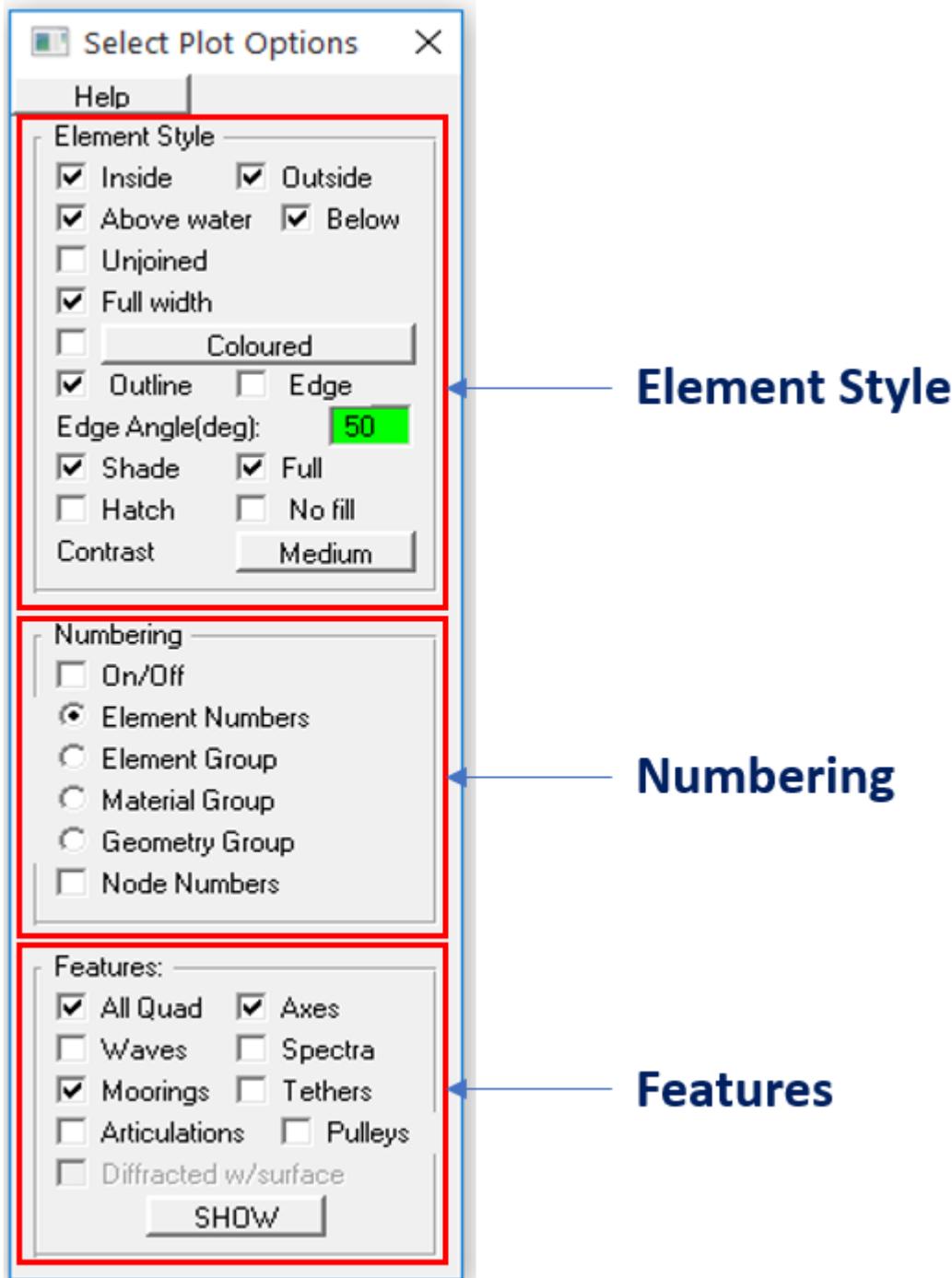


The various formats are:

- Postscript - Vector format supported by some printers.
- HPGL- Vector format supported by some printers. This format may also be embedded in most Word Processors.
- Copy to Clipboard.

7.2. Plot Options

The Option dialog box gives you a range of powerful utilities that allow you to view your structure(s) however you like. To activate the Options dialog box select options from the [Select menu \(p. 60\)](#) on the [Model Visualisation toolbar \(p. 54\)](#).



The dialog box is split into three sections:

7.2.1. Element Style

7.2.2. Numbering

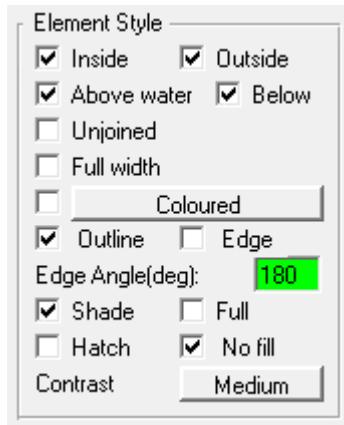
7.2.3. Features Panel

7.2.1. Element Style

The element style panel is a component of the [Options dialog box \(p. 61\)](#) in the [Model Visualisation window \(p. 53\)](#).

To activate the Options dialog box select options from the [Select menu \(p. 60\)](#) on the [Model Visualisation toolbar \(p. 54\)](#).

The Element Style panel offers you control over the way your model's elements are displayed on the screen. This not only allows you to create presentation quality images of your model, but also provides you with a powerful set of tools for checking the integrity of your model.



The element style panel offers the following utilities:

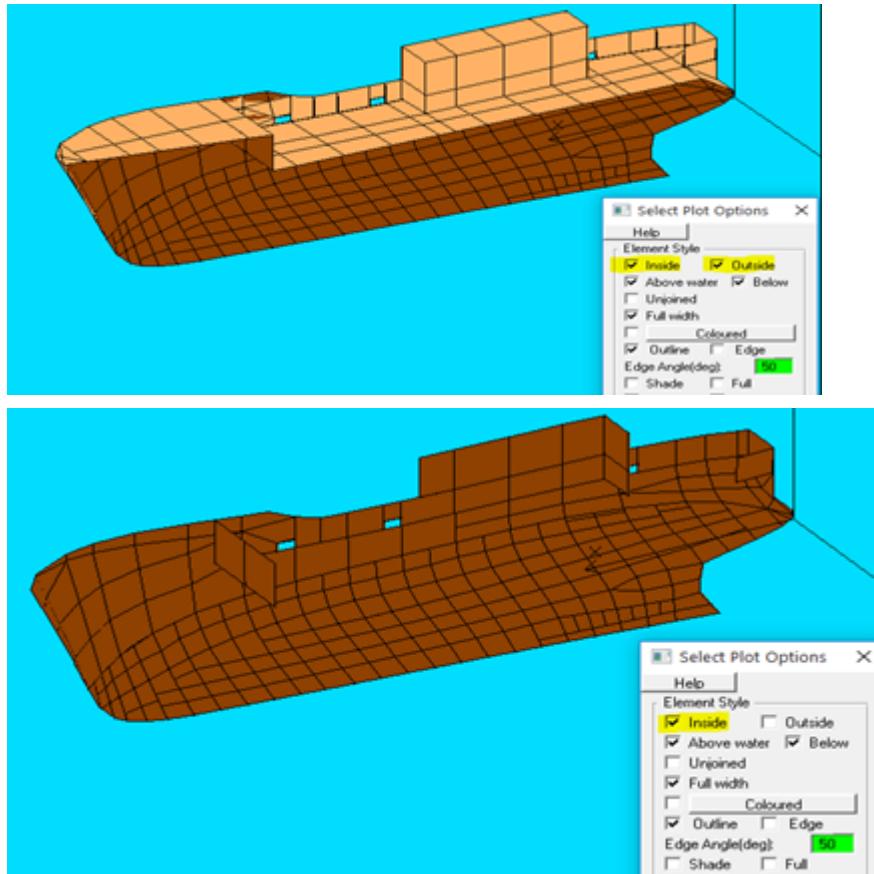
- [Inside / Outside \(p. 63\)](#) - View the inside or outside surfaces of your model
- [Above / Below water \(p. 64\)](#) - View above or below the water-line.
- [Unjoined \(p. 65\)](#) - Display an 'exploded' view of your model to ensure there are no gaps within your model.
- [Full Width \(p. 66\)](#) - Displays Tube elements either as sticks or as tubes.
- [Coloured \(p. 67\)](#) - Allows you to change the color of different parts of the model.
- [Outline \(p. 68\)](#) - Outline view (switches the outline of the individual elements on/off).
- [Edge \(p. 69\)](#) - Traces an edge around the model
- [Shade, Full, Hatch \(p. 70\)](#) - Control the light shading of the model.
- [No Fill \(p. 72\)](#) - Switch rendering on/off
- [Contrast \(p. 73\)](#) - Low to High contrast options

7.2.1.1. Inside / Outside View

This utility is a component of the [element style panel \(p. 63\)](#), which in turn is a component of the [Options dialog box \(p. 61\)](#) in the [Model Visualisation window \(p. 53\)](#). To activate the Options dialog box select options from the [Select menu \(p. 60\)](#) on the [Model Visualisation toolbar \(p. 54\)](#).

The **Inside / Outside** radio buttons allow you to view the inside and outside surfaces of your model. This is a good utility for establishing that the element normals are pointing in the correct direction, which is essential for meaningful results. For example, the positive Y quadrant element nodes must be input in an anti-clock order when looking from the outside of the model (i.e. at the wetted surface elements).

The below images show a half model of a fishing vessel with (a) all elements and (b) inside only activated options.

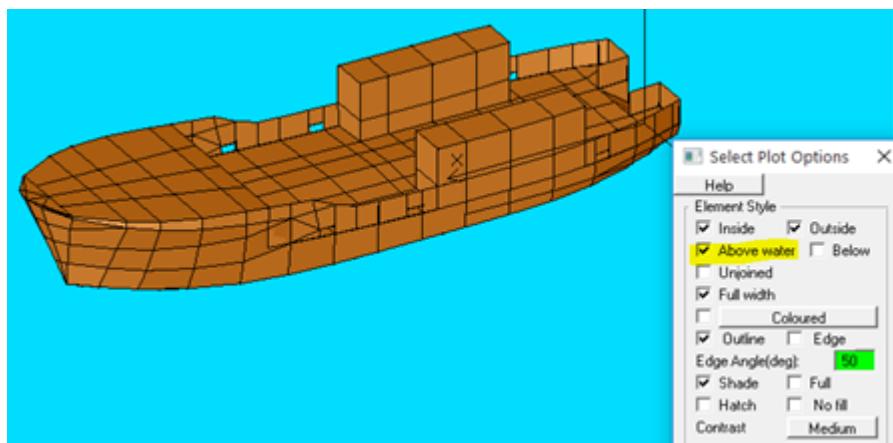


7.2.1.2. Above / Below Water

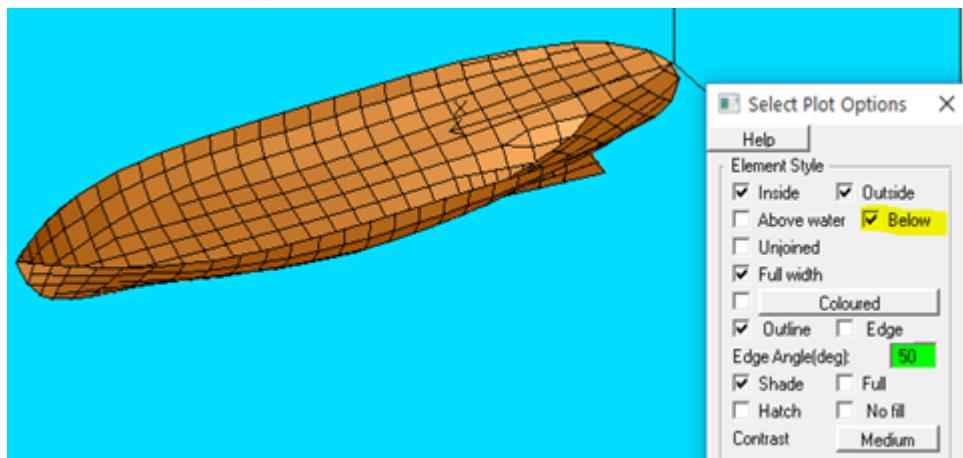
This utility is a component of the [element style panel \(p. 63\)](#), which in turn is a component of the [Options dialog box \(p. 61\)](#) in the [Model Visualisation window \(p. 53\)](#). To activate the Options dialog box select options from the [Select menu \(p. 60\)](#) on the [Model Visualisation toolbar \(p. 54\)](#).

The **Above Water / Below** radio buttons allow you to view the model above and below the water line when displayed in the analysis position. If you have defined your model keel definition position to be above Z=0 (in the Fixed Reference Axis (FRA)) then you must lower the model into the definition position before you may use this utility. You may position your model anywhere within the Fixed Reference Axis (FRA) (including its analysis position) by using the [Move Structure \(p. 57\)](#) panel in the Model Visualisation window.

To view your model above the waterline select the above waterline toggle button and deselect the below waterline toggle button.



To view your model below the waterline select the below waterline toggle button and deselect the above waterline toggle button.

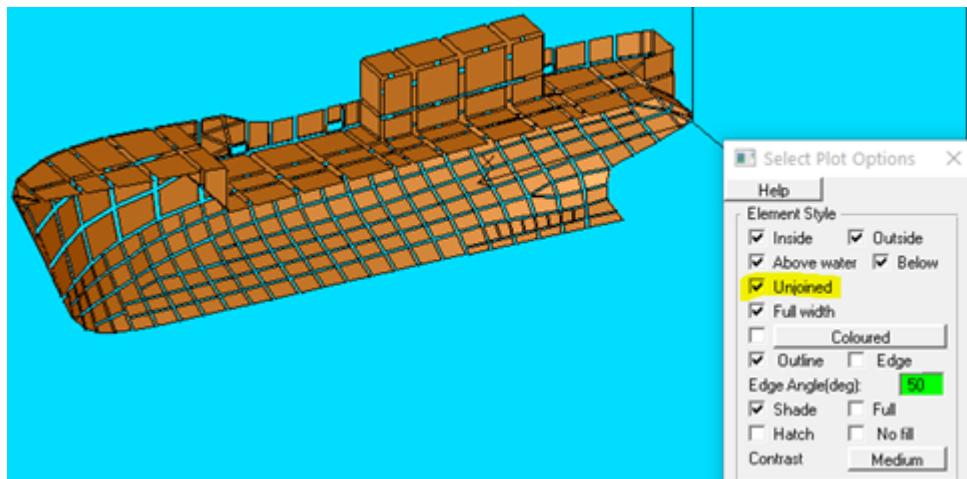


7.2.1.3. Unjoined

This utility is a component of the [element style panel \(p. 63\)](#), which in turn is a component of the [Options dialog box \(p. 61\)](#) in the [Model Visualisation window \(p. 53\)](#). To activate the Options dialog box select options from the [Select menu \(p. 60\)](#) on the [Model Visualisation toolbar \(p. 54\)](#).

The Unjoined button allows you to display an exploded view of the elements within your model. This utility makes it possible to see if there are any gaps within the elements of your model.

To view an exploded view select Unjoined.

**TIP:**

When using this utility it is useful to use the other view options to obtain a clearer image of particular areas of your model in order for model checking to be performed. For example it may be useful to [Zoom](#) (p. 56) in on a particular area of your model with [Element Number](#) (p. 75) and [Node Numbers](#) (p. 77) switched on.

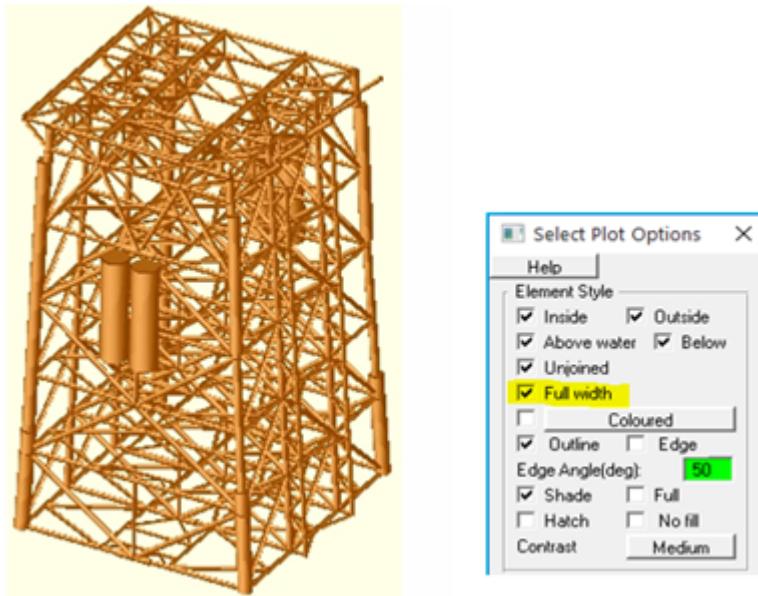


7.2.1.4. Full Width

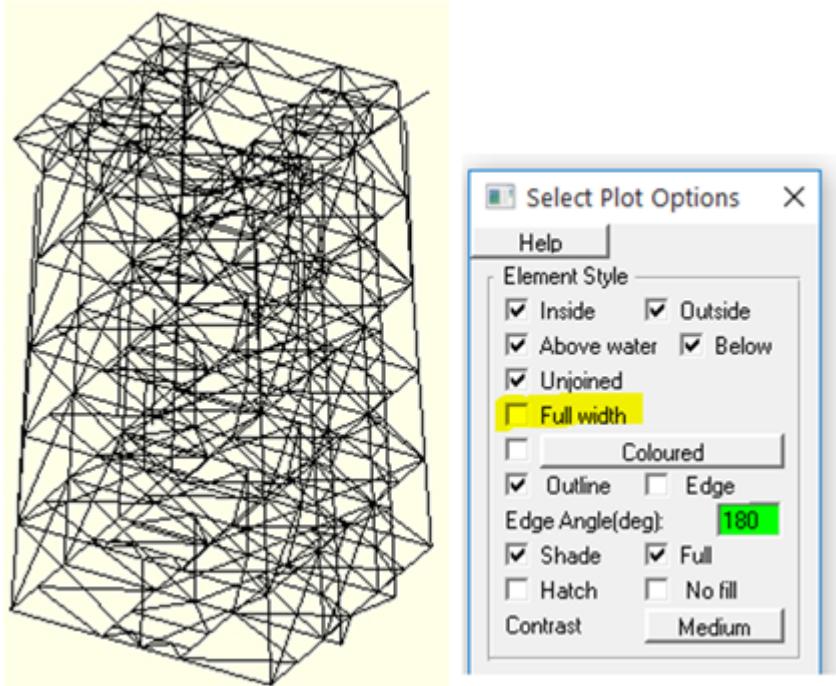
This utility is a component of the [element style panel](#) (p. 63), which in turn is a component of the [Options dialog box](#) (p. 61) in the [Model Visualisation window](#) (p. 53). To activate the Options dialog box select options from the [Select menu](#) (p. 60) on the [Model Visualisation toolbar](#) (p. 54).

The full width button switches the display of tube elements between 'stick' model and fully drawn. This may have speed benefits on slower machine, however this facility may usually be switched on.

The below model is displayed with the **Full** button selected.



To switch full drawing of tubes to off, deselect this button.



7.2.1.5. Colored

This utility is a component of the [element style panel \(p. 63\)](#), which in turn is a component of the [Options dialog box \(p. 61\)](#) in the [Model Visualisation window \(p. 53\)](#). To activate the Options dialog box select options from the [Select menu \(p. 60\)](#) on the [Model Visualisation toolbar \(p. 54\)](#).

You may create a more aesthetically pleasing model by defining different colors for each element group with this utility.

The default-shaded color may be changed to a number of other colors for different parts of your model depending on the [Element Group Number \(p. 75\)](#) associated with each element. (Elements with the same element group number may not have different coloring).

To change the coloring of each element group the **Coloured** toggle button must be selected, and the default colors must be manually changed.

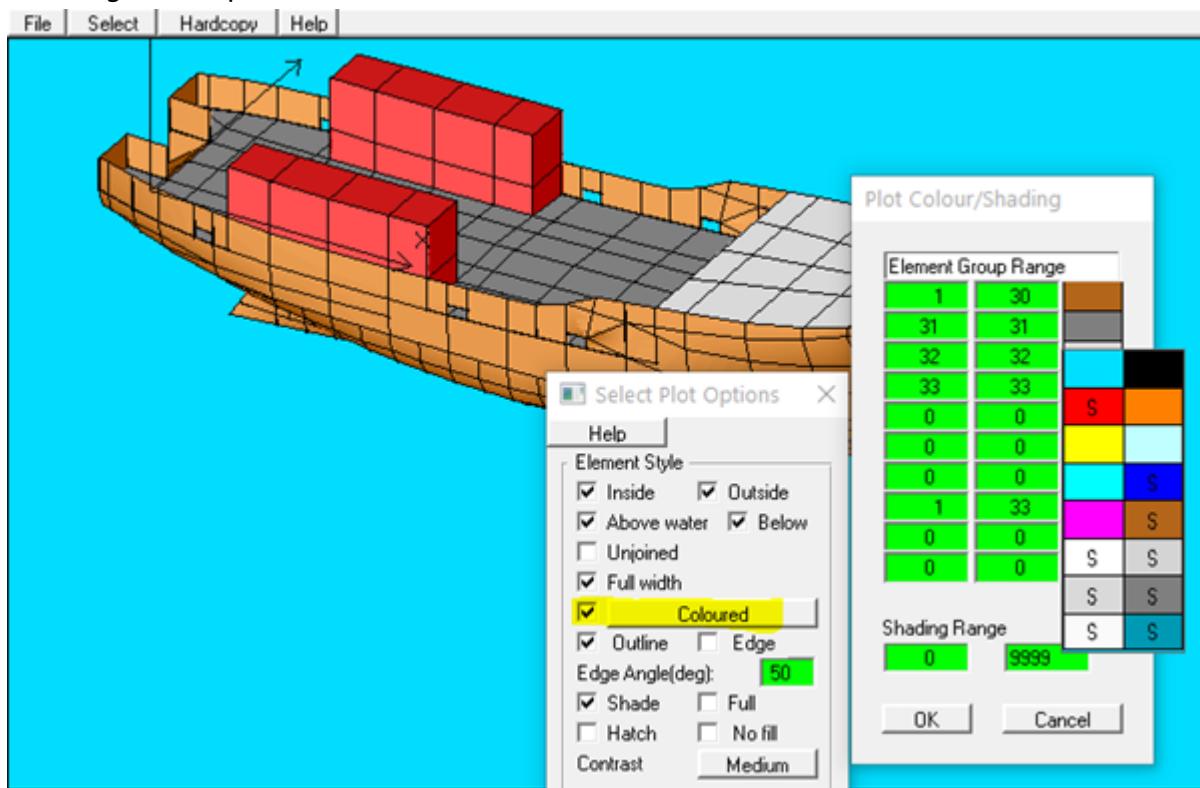
If you select the toggle box to the left of the button labeled **Coloured**, pressing the **Coloured** button will then display the Plot Colour/Shading dialog box.

To change the color of a particular element group enter the group number or range in the available text boxes and select the required color from the color panel. Clicking on the color box adjacent to the group text box accesses the color panel).

Note that only colors with an 'S' label will produce a shaded surface.

The shading density may exist within the range 0 - 9999.

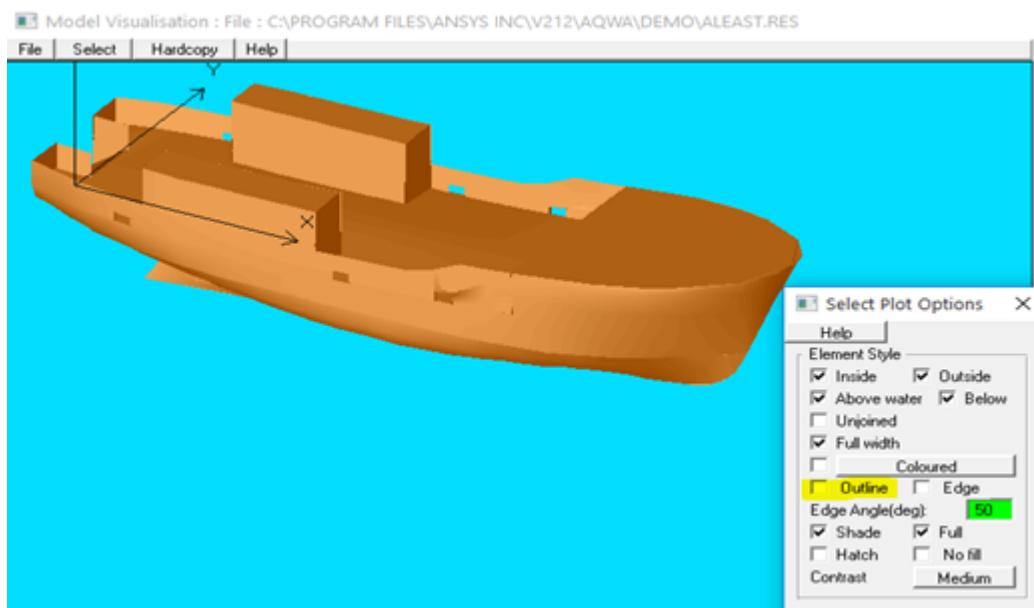
Selecting OK will produce the desired effect.



7.2.1.6. Outline

This utility is a component of the [element style panel \(p. 63\)](#), which in turn is a component of the [Options dialog box \(p. 61\)](#) in the [Model Visualisation window \(p. 53\)](#). To activate the Options dialog box select options from the [Select menu \(p. 60\)](#) on the [Model Visualisation toolbar \(p. 54\)](#).

The Outline utility allows you to switch the element mesh off while maintaining the element surface shading. The default option is to have the Outline switched on (Outline selected).



This utility has been further enhanced in the [Edge \(p. 69\)](#) select option.

Note:

Outline on and Edge on may not be used together.

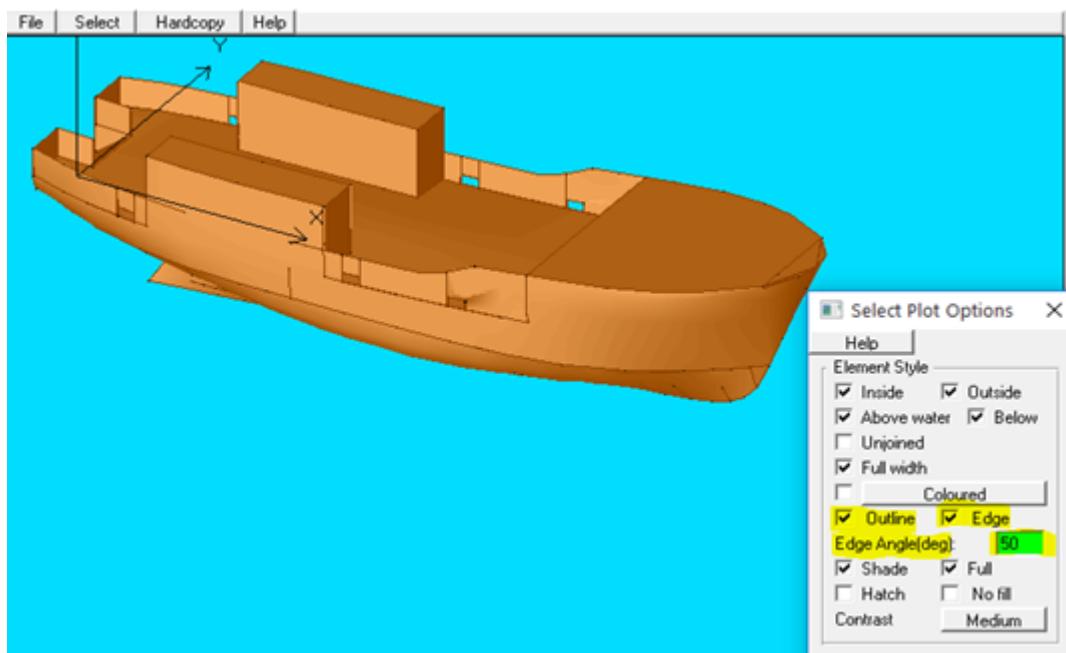
7.2.1.7. Edge

This utility is a component of the [element style panel \(p. 63\)](#), which in turn is a component of the [Options dialog box \(p. 61\)](#) in the [Model Visualisation window \(p. 53\)](#). To activate the Options dialog box select options from the [Select menu \(p. 60\)](#) on the [Model Visualisation toolbar \(p. 54\)](#).

The **Edge** toggle button is an enhancement of the [Outline](#) utility.

This utility will display your model with meshing switched off and with any element edges at a defined angle highlighted in a dark colour. The defined angle which is used to draw the element to element edge is defined by the text box to the right of the Edge toggle button.

The default position for this toggle button is de-selected.



This utility may be used in conjunction with the other surface shading options: [Shade \(p. 70\)](#) and [No Fill \(p. 72\)](#).

Tip:

The Edge utility will display all coincident element edges or any holes within your model. This utility is therefore very useful in detecting any hidden errors within your model.

Note:

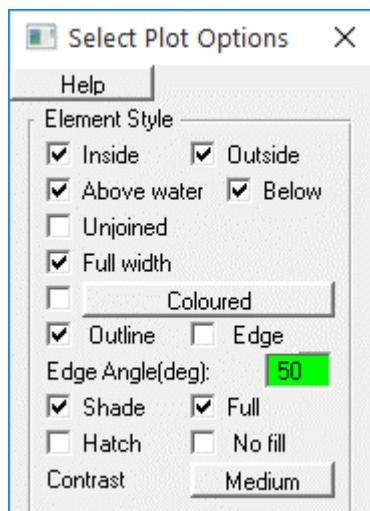
Coincident elements will produce incorrect results.

7.2.1.8. Shade, Full, Hatch

This utility is a component of the [element style panel \(p. 63\)](#), which in turn is a component of the [Options dialog box \(p. 61\)](#) in the [Model Visualisation window \(p. 53\)](#). To activate the Options dialog box select options from the [Select menu \(p. 60\)](#) on the [Model Visualisation toolbar \(p. 54\)](#).

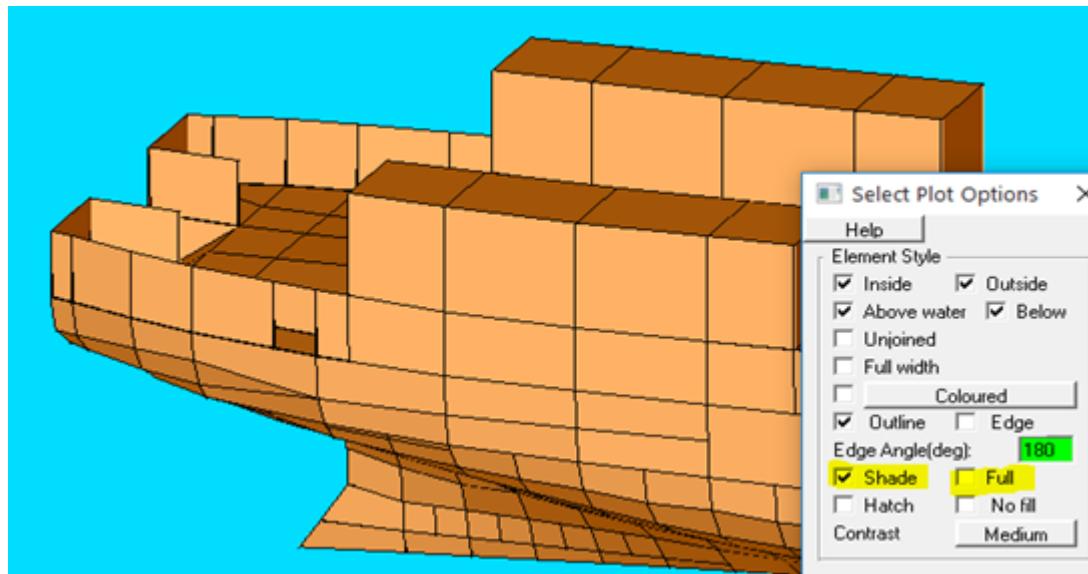
The shading options within the AGS facilitate not only presenting an aesthetically pleasing display of your model, but also in checking the integrity of your model.

The default shading is set to full shading with no hatching.



Providing that the defined [Element Colours \(p. 67\)](#) support shading, the displayed image should be smoothly defined on the display.

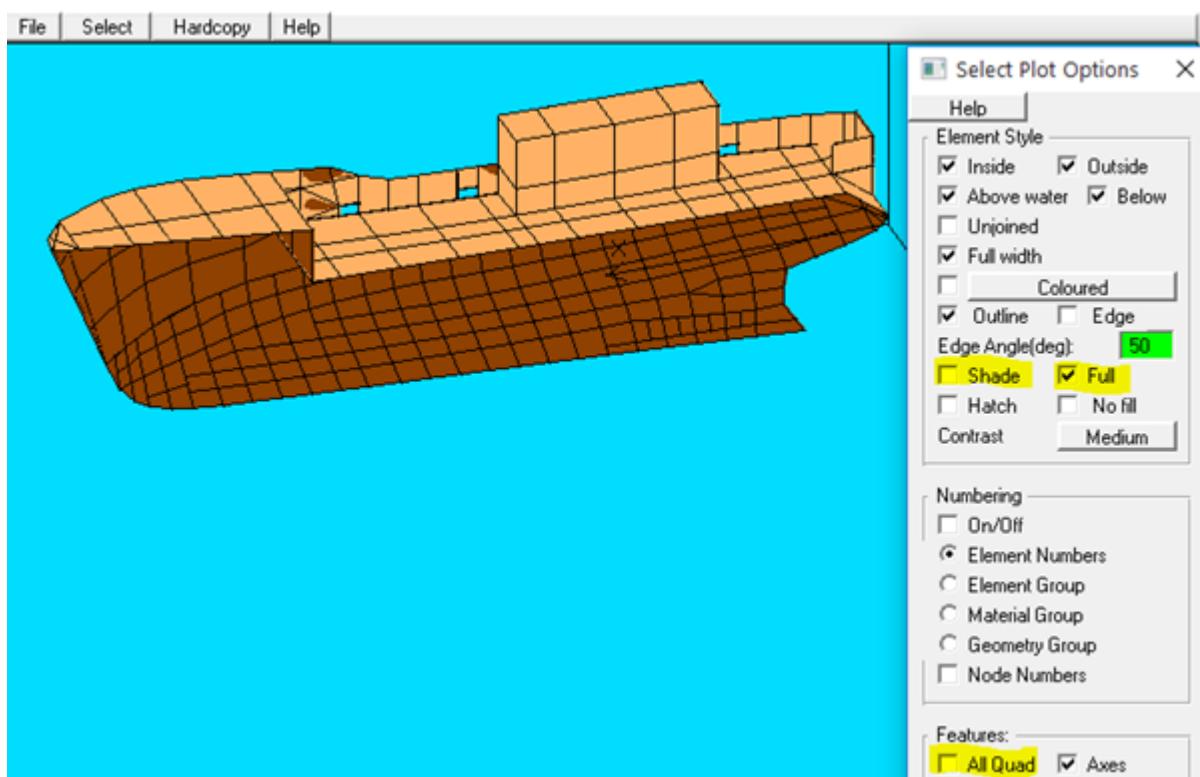
Switching the Full toggle button off will allow the user to see the shade of each element individually (each element has only one color, rather than smooth shading). This can be useful for model checking.



Switching the Hatch toggle button on will create an even smoother image.

However, this will only be apparent when the model elements are viewed at close range. [Zoom \(p. 56\)](#) into your model to view this smoother image.

Switching the shading off will produce an unshaded view of your model. The displayed image will show the inside surface of the element in dark brown and the outside surface in light brown.



Tip:

Viewing your model with Shade switched off allows you to view the directions of the element normal and allows you to check the integrity of the model. (I.e. if an outside surface is shown as dark brown then the element must be redefined to face the correct way). To view both the inside and outside of the model it may be necessary to switch half the model off using the All Quad option.

Note:

Incorrect element normal directions will produce incorrect results.

7.2.1.9. No Fill

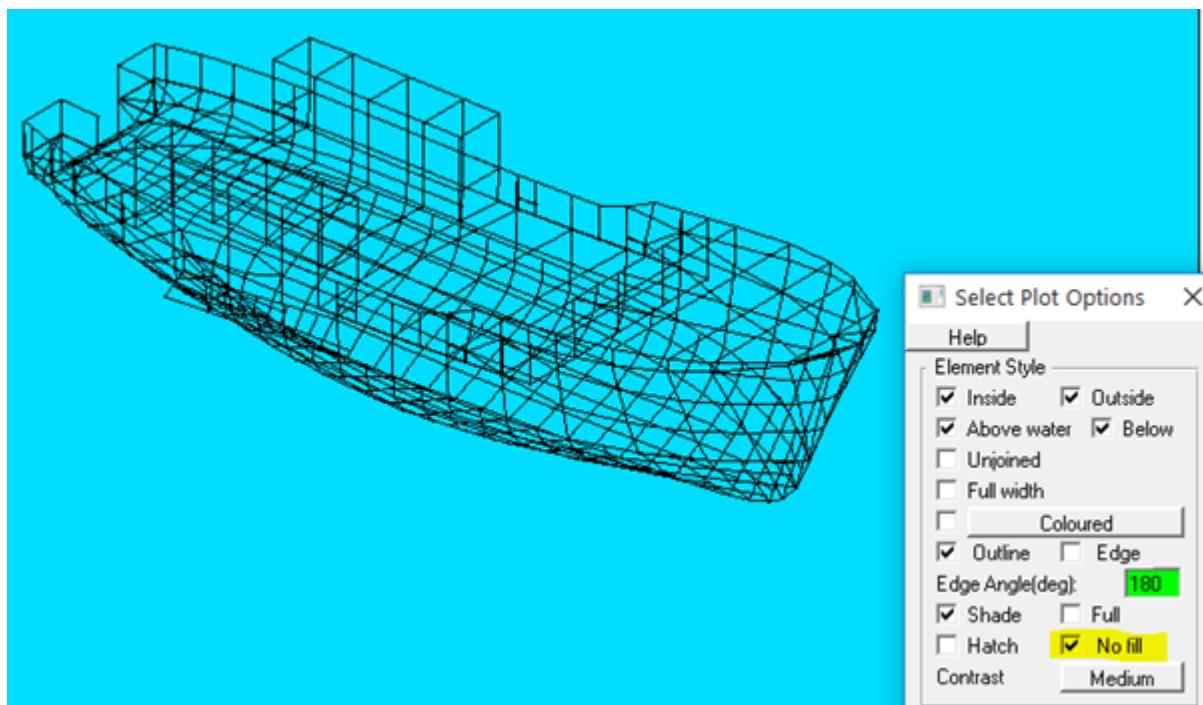
No Fill - Element Style

This utility is a component of the [element style panel \(p. 63\)](#), which in turn is a component of the [Options dialog box \(p. 61\)](#) in the [Model Visualisation window \(p. 53\)](#). To activate the Options dialog box select options from the [Select menu \(p. 60\)](#) on the [Model Visualisation toolbar \(p. 54\)](#).

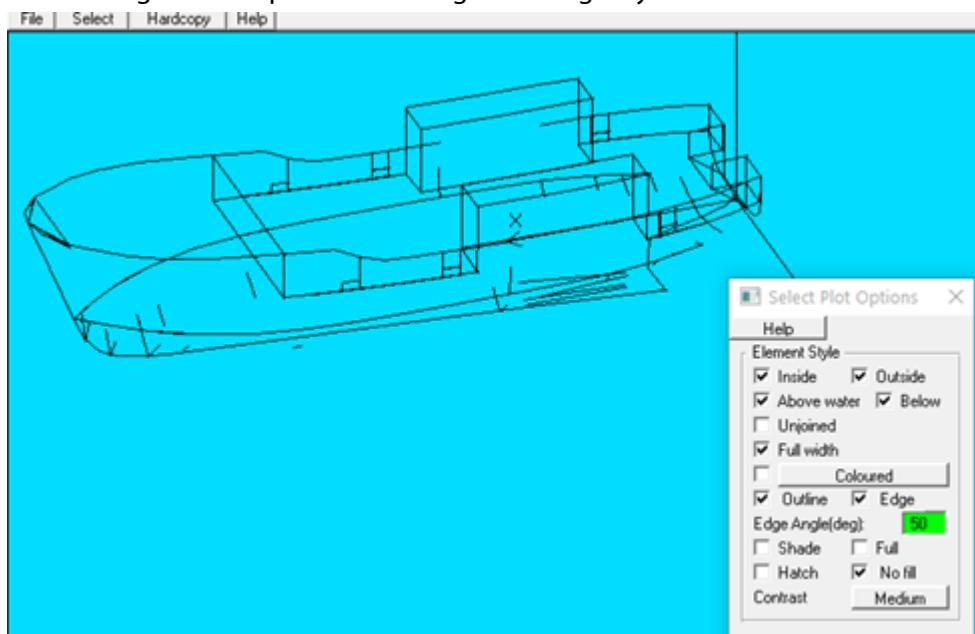
The No Fill toggle button will switch the shaded fill on or off.

The default position for No Fill is off.

To switch the fill off select the No Fill toggle button.

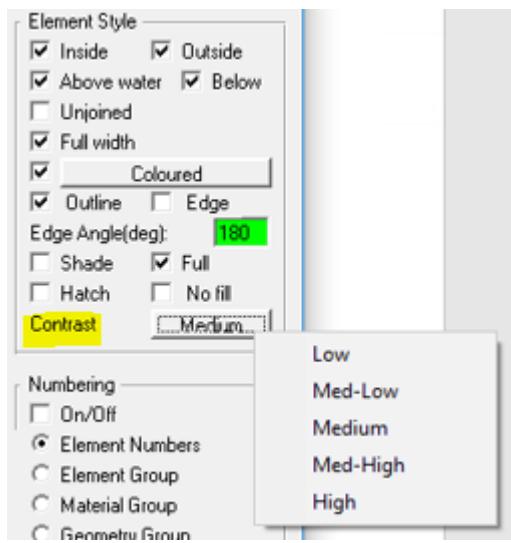


This utility may also be used with [Shade](#) (p. 70) and [Edge](#) (p. 69). For example switching No Fill on and Edge on will produce an edge drawing of your model without mesh or shading shown.



7.2.1.10. Contrast

This utility is a component of the [element style panel](#) (p. 63), which in turn is a component of the [Options dialog box](#) (p. 61) in the [Model Visualisation window](#) (p. 53). To activate the Options dialog box select options from the [Select menu](#) (p. 60) on the [Model Visualisation toolbar](#) (p. 54).



The contrast button allows you to change the lighting contrast of the displayed model to:

- Low
- Med-Low
- Medium
- Med-High
- High

Selecting Low will display an image with low lighting.

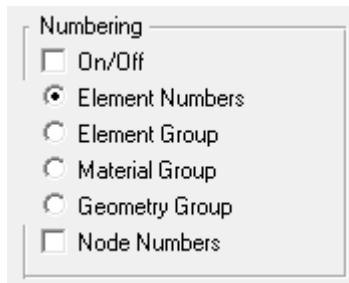
Selecting High will display an image with high intensity lighting.

The intermediate options will produce intermediate lighting between low and high.

7.2.2. Numbering

This panel is a component of the [Options dialog box \(p. 61\)](#) in the Model Visualisation window (p. 53). To activate the Options dialog box select options from the [Select menu \(p. 60\)](#) on the [Model Visualisation toolbar \(p. 54\)](#).

The Numbering panel allows you to switch various element numbering systems on and off. This is useful in checking the integrity of your model.



The available options are:

7.2.2.1. On/Off

- 7.2.2.2. Element Numbers
- 7.2.2.3. Element Group
- 7.2.2.4. Material Group
- 7.2.2.5. Geometry Group
- 7.2.2.6. Node Numbers

7.2.2.1. On/Off

This utility is a component of the [element style panel](#), which in turn is a component of the [Options dialog box \(p. 61\)](#) in the [Model Visualisation window \(p. 53\)](#). To activate the Options dialog box select options from the [Select menu \(p. 60\)](#) on the [Model Visualisation toolbar \(p. 54\)](#).

To view any of the numbering systems, this toggle button must be selected.

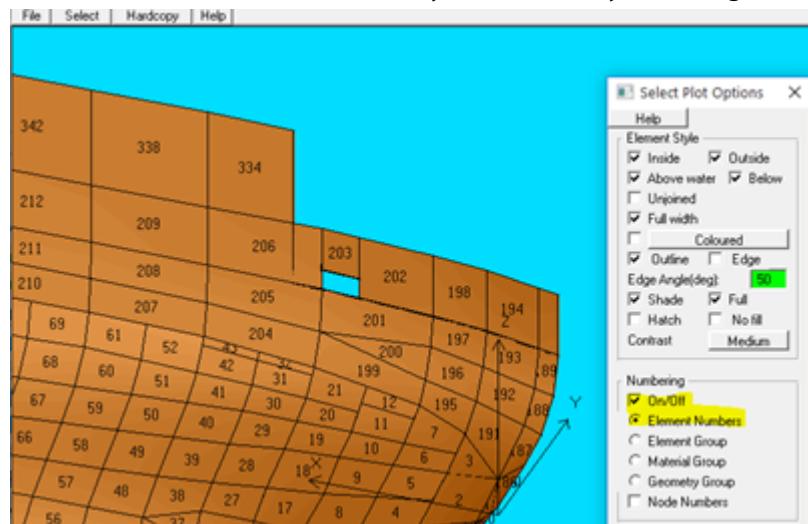
Note:

Only one set of numbers can be selected at any one time apart from NodeNumbers, which can be viewed along side any other numbering system.

7.2.2.2. Element Numbers

This utility is a component of the [element style panel](#), which in turn is a component of the [Options dialog box \(p. 61\)](#) in the [Model Visualisation window \(p. 53\)](#). To activate the Options dialog box select options from the [Select menu \(p. 60\)](#) on the [Model Visualisation toolbar \(p. 54\)](#).

The element numbers (labels) may be viewed by selecting this radio button.



Tip:

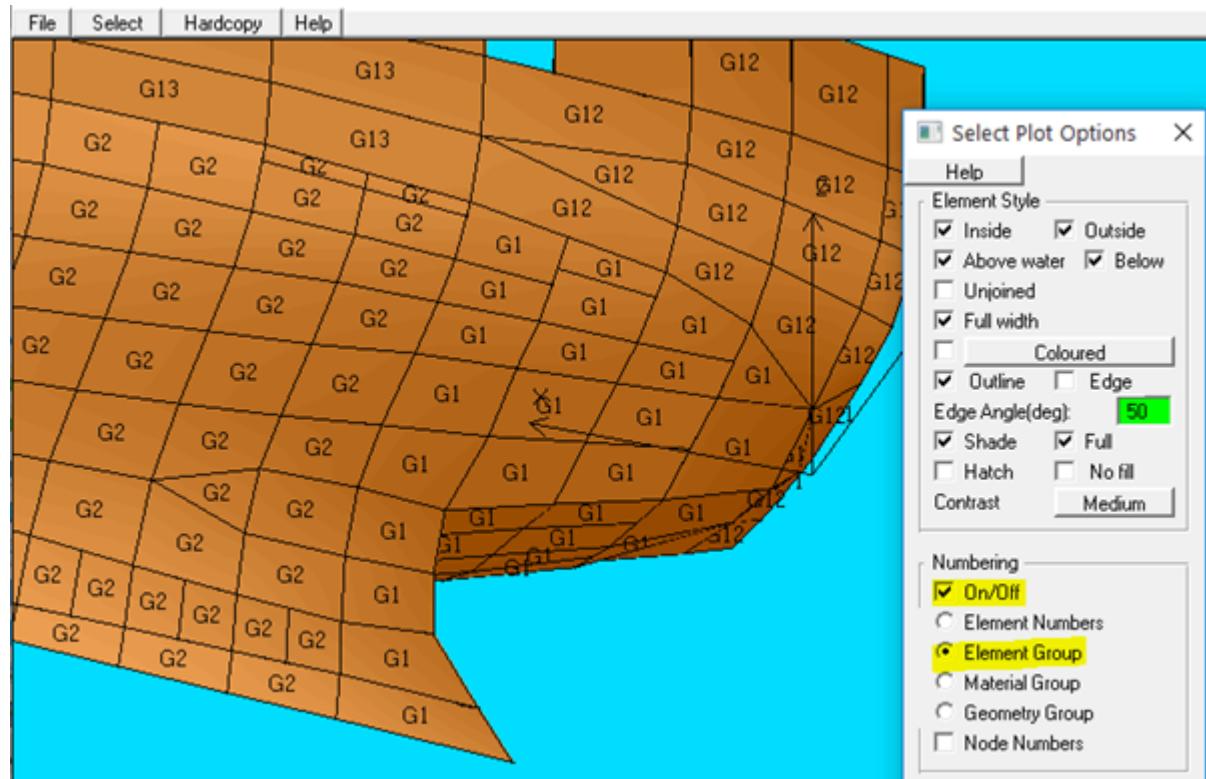
You may view selected parts of your structure(s) by using one of the [Aqwa-Plane commands \(p. 135\)](#).

When selecting a numbering system ensure that [On/Off \(p. 75\)](#) is switched on, and the screen is updated using the **PLOT** button.

7.2.2.3. Element Group

This utility is a component of the [element style panel](#), which in turn is a component of the Options dialog box (p. 61) in the Model Visualisation window (p. 53). To activate the Options dialog box select options from the Select menu (p. 60) on the Model Visualisation toolbar (p. 54).

If the model elements have been assigned geometry group numbers then group numbers may be viewed by selecting this radio button.



Tip:

You may view selected parts of your structure(s) by using one of the [Aqwa-Plane commands](#) (p. 135).

When selecting a numbering system, ensure that [On/Off](#) (p. 75) is switched on, and the screen is updated using the **PLOT** button.

7.2.2.4. Material Group

This utility is a component of the [element style panel](#), which in turn is a component of the Options dialog box (p. 61) in the Model Visualisation window (p. 53). To activate the Options dialog box select options from the Select menu (p. 60) on the Model Visualisation toolbar (p. 54).

The material group numbers may be viewed by selecting this radio button.

Tip:

You may view selected parts of your structure(s) by using one of the [Aqwa-Plane commands](#) (p. 135).

When selecting a numbering system ensure that [On/Off](#) (p. 75) is switched on, and the screen is updated using the **PLOT** button.

7.2.2.5. Geometry Group

This utility is a component of the [element style panel](#), which in turn is a component of the Options dialog box (p. 61) in the [Model Visualisation window](#) (p. 53). To activate the Options dialog box select options from the [Select menu](#) (p. 60) on the [Model Visualisation toolbar](#) (p. 54).

The geometry group numbers may be viewed by selecting this radio button.

Tip:

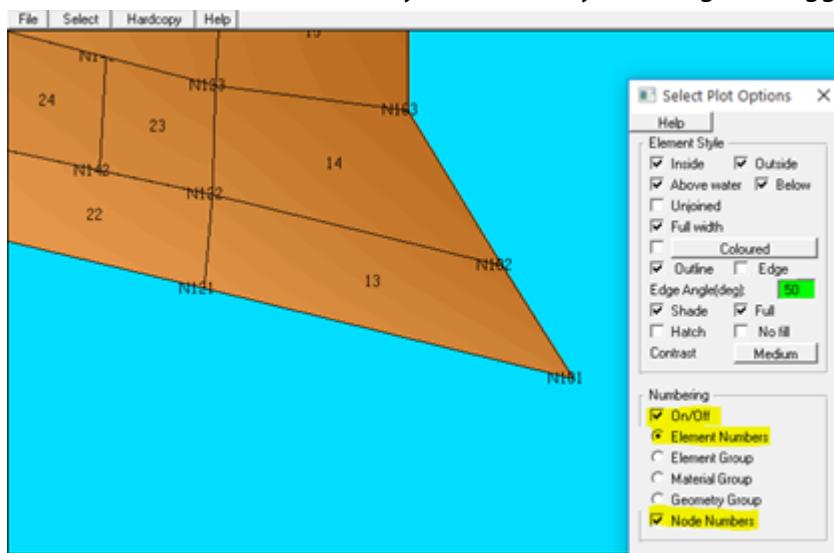
You may view selected parts of your structure(s) by using one of the [Aqwa-Plane commands](#) (p. 135).

When selecting a numbering system ensure that [On/Off](#) (p. 75) is switched on, and the screen is updated using the **PLOT** button.

7.2.2.6. Node Numbers

This utility is a component of the [element style panel](#), which in turn is a component of the Options dialog box (p. 61) in the [Model Visualisation window](#) (p. 53). To activate the Options dialog box select options from the [Select menu](#) (p. 60) on the [Model Visualisation toolbar](#) (p. 54).

The element node numbers may be viewed by selecting this toggle button.



Tip:

A clearer display of the node numbers will be achieved with the [Unjoined](#) (p. 65) view switched on.

You may view selected parts of your structure(s) by using one of the [Aqwa-Plane commands](#) (p. 135).

When selecting a numbering system ensure that [On/Off](#) (p. 75) is switched on, and the screen is updated using the **PLOT** button.

7.2.3. Features Panel

This panel is a component of the [Options dialog box \(p. 61\)](#) in the [Model Visualisation window \(p. 53\)](#). To activate the Options dialog box select options from the [Select menu \(p. 60\)](#) on the [Model Visualisation toolbar \(p. 54\)](#).



This utility allows you to view different components of your structure(s) simultaneously or individually.

The available options are:

- **All Quad** - Display model with symmetry switched on/off
- **Axes** - Display system axes
- **Waves** - Display regular wave surface (Aqwa-Naut only)
- **Spectra** - Display irregular wave surface (Aqwa-Drift only)
- **Moorings** - Display Mooring lines
- **Tethers** - Display Tether elements
- **Articulations** - Display Articulations (Joints)
- **Pulleys** - Display Pulleys
- Diffracted w/surface – (Not available)
- **SHOW** – Display model information such as COG, seabed etc.

Tip:

You may also view selected parts of your structure(s) by using one of the [Aqwa-Plane commands \(p. 135\)](#).

When selecting parts of a structure ensure that the screen is updated using the **PLOT** button.

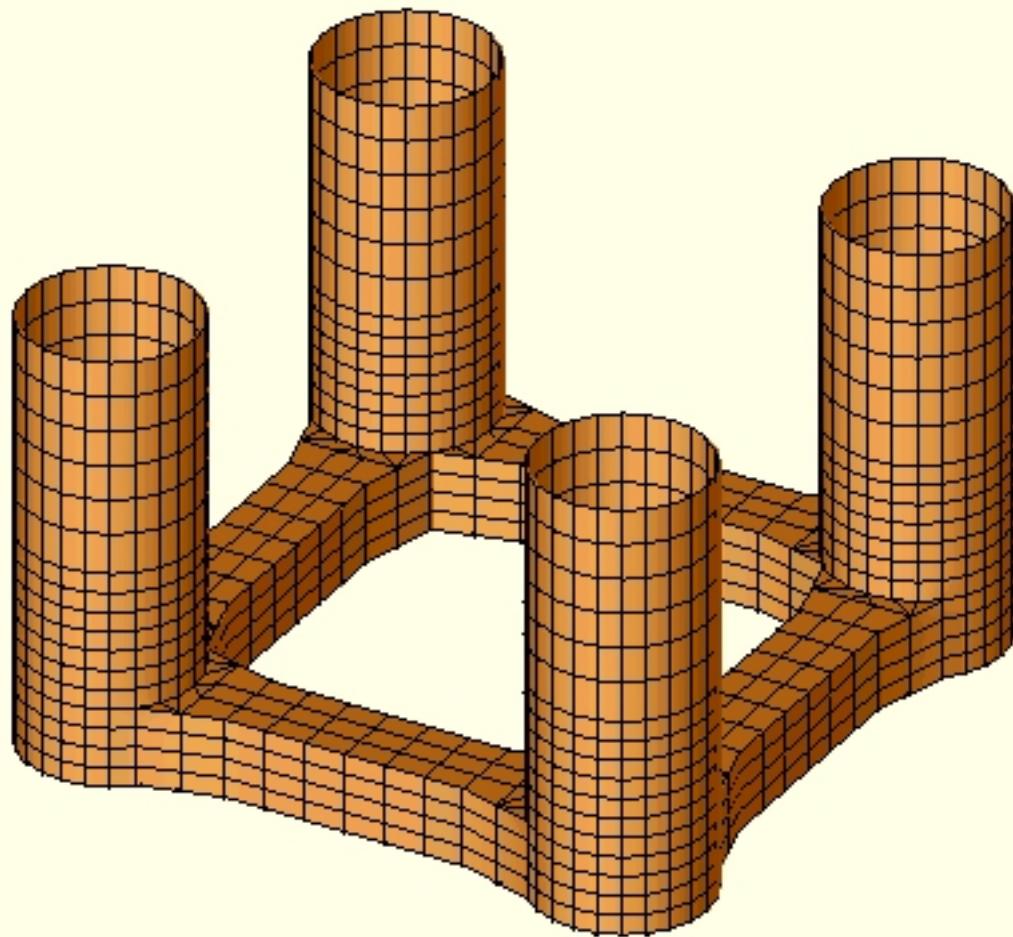
7.2.3.1. All Quad

This utility is a component of the [Features style panel \(p. 78\)](#), which in turn is a component of the [Options dialog box \(p. 61\)](#) in the [Model Visualisation window \(p. 53\)](#). To activate the Options dialog box select options from the [Select menu \(p. 60\)](#) on the [Model Visualisation toolbar \(p. 54\)](#).

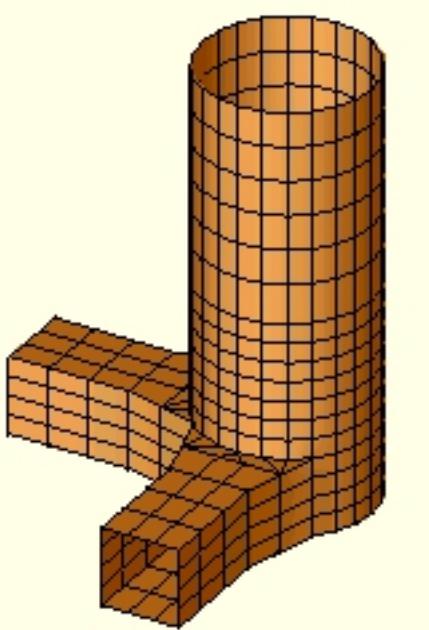
When selected (default) this toggle button will display all the quadrants of the model. When de-selected the structure(s) will be displayed without the symmetry (X and/or Y) defined in Data Cat-

egory 2 of the data file. If the model was created without the SYMX or SYMY data record, then this utility will have no effect.

When All Quad is switched on the full model is displayed:



When All Quad is switched off the following effect is achieved:



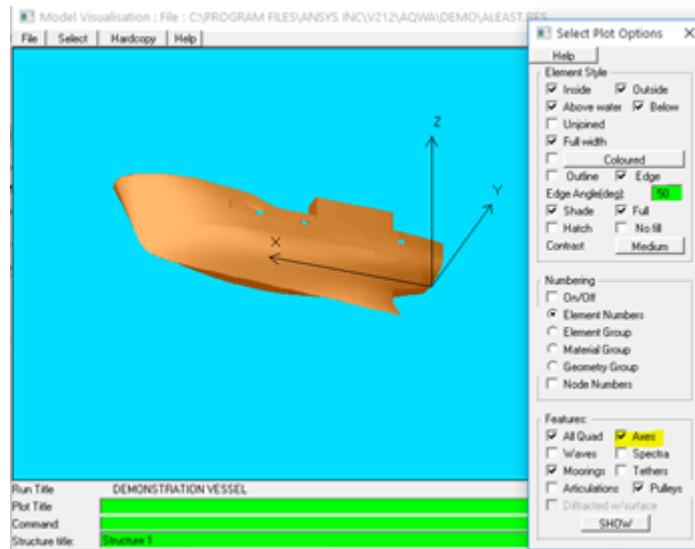
Tip:

You may also view selected parts of your structure(s) by using one of the Aqwa-Plane commands (p. 135).

When selecting parts of a structure ensure that the screen is updated using the **PLOT** button.

7.2.3.2. Axes

This utility is a component of the **Features** style panel (p. 78), which in turn is a component of the **Options dialog box** (p. 61) in the **Model Visualisation window** (p. 53). To activate the Options dialog box select options from the **Select** menu (p. 60) on the **Model Visualisation toolbar** (p. 54).



This feature will switch the system axes display on (default) and off.

Tip:

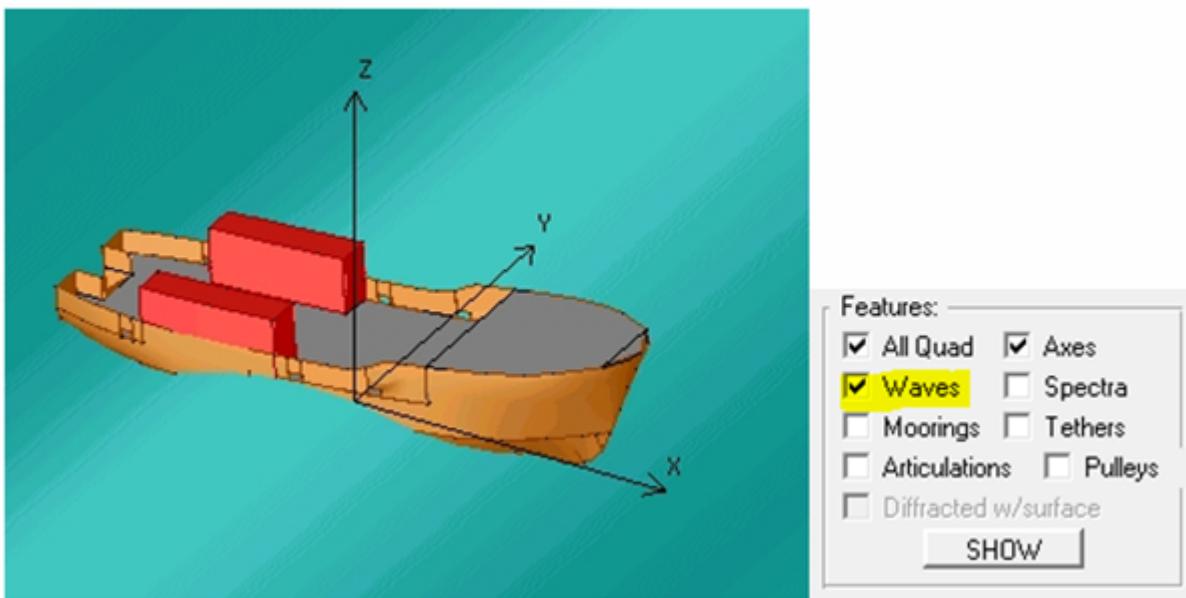
You may also view selected parts of your structure(s) by using one of the Aqwa-Plane commands (p. 135).

When selecting parts of a structure, ensure that the screen is updated using the **PLOT** button.

7.2.3.3. Waves

This utility is a component of the **Features** style panel (p. 78), which in turn is a component of the **Options dialog box** (p. 61) in the **Model Visualisation window** (p. 53). To activate the Options dialog box select options from the **Select** menu (p. 60) on the **Model Visualisation toolbar** (p. 54).

The regular waves defined in Aqwa-Naut may be visualised within the AGS using this facility. By default, the waves are switched off. Selecting the Waves toggle button will display the regular wave surface:

**Tip:**

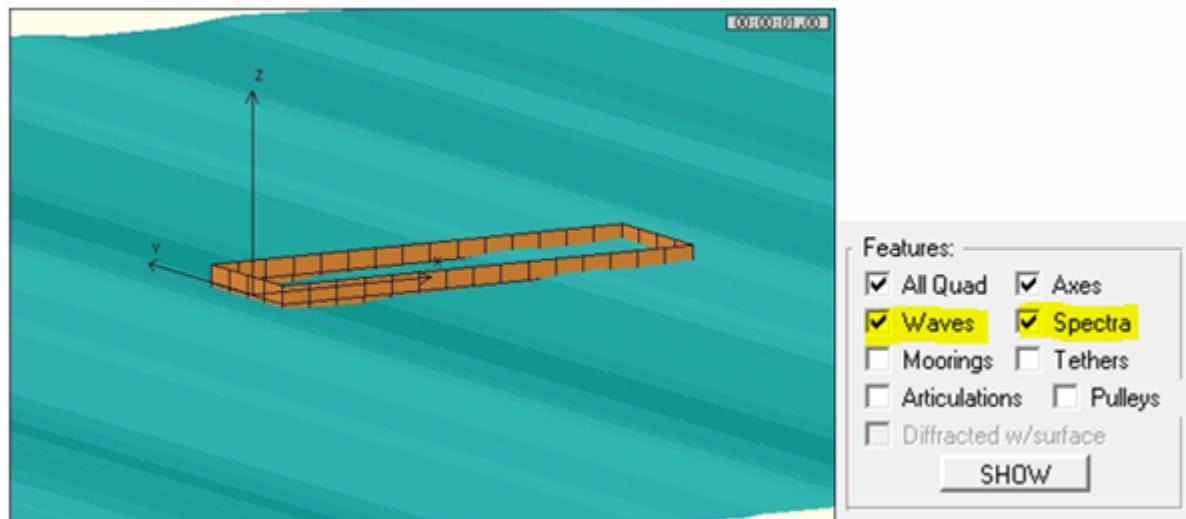
You may also view selected parts of your structure(s) by using one of the Aqwa-Plane commands (p. 135).

When selecting parts of a structure ensure that the screen is updated using the **PLOT** button.

7.2.3.4. Spectra

This utility is a component of the **Features** style panel (p. 78), which in turn is a component of the **Options dialog box** (p. 61) in the **Model Visualisation window** (p. 53). To activate the Options dialog box select options from the **Select** menu (p. 60) on the **Model Visualisation toolbar** (p. 54).

The irregular waves defined in Aqwa-Drift may be visualised within the AGS using this facility. By default, the spectra waves are switched off. Selecting the Spectra toggle button & the **waves** (p. 80) toggle button will display the irregular wave surface:



Tip:

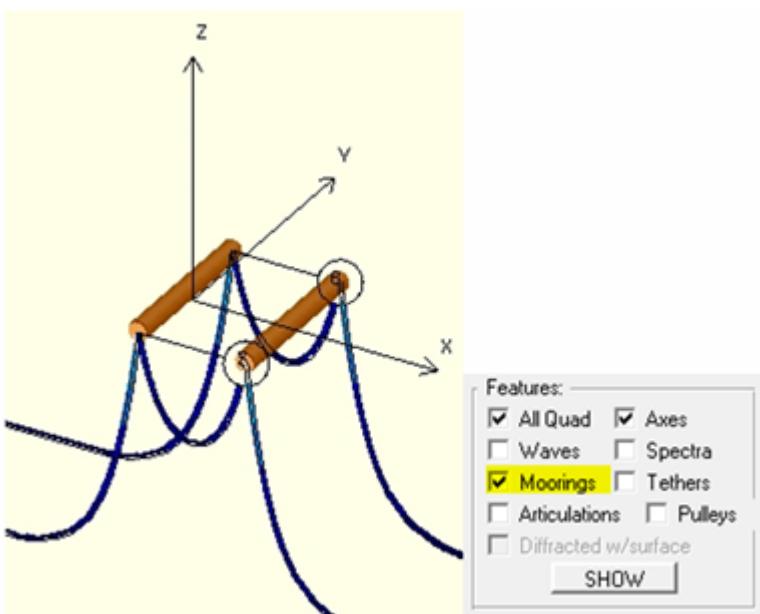
You may also view selected parts of your structure(s) by using one of the Aqwa-Plane commands (p. 135).

When selecting parts of a structure ensure that the screen is updated using the **PLOT** button.

7.2.3.5. Moorings

This utility is a component of the **Features** style panel (p. 78), which in turn is a component of the **Options dialog box** (p. 61) in the **Model Visualisation window** (p. 53). To activate the Options dialog box select options from the **Select** menu (p. 60) on the **Model Visualisation toolbar** (p. 54).

If there are any mooring lines defined within your system you may toggle them on and off using the **Moorings** toggle button. By default, the mooring lines will be switched on:



Deselecting the mooring toggle button will remove any mooring lines from the display.

Tip:

You may also view selected parts of your structure(s) (including selected mooring lines) by using one of the Aqwa-Plane commands (p. 135).

When selecting parts of a structure ensure that the screen is updated using the **PLOT** button.

7.2.3.6. Tethers

This utility is a component of the **Features** style panel (p. 78), which in turn is a component of the **Options dialog box** (p. 61) in the **Model Visualisation window** (p. 53). To activate the Options dialog box select options from the **Select** menu (p. 60) on the **Model Visualisation toolbar** (p. 54).

Tether elements can be viewed by selecting this toggle button. Only a straight line joining the anchor and attachment points is drawn.

Tip:

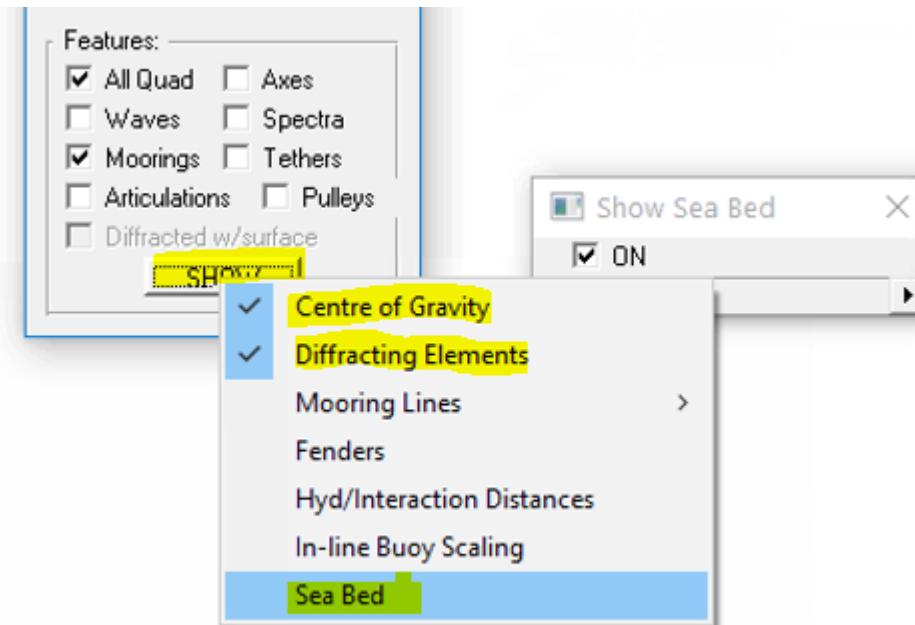
You may also view selected parts of your structure(s) by using one of the Aqwa-Plane commands (p. 135).

When selecting parts of a structure ensure that the screen is updated using the **PLOT** button.

7.2.3.7. SHOW

This utility is a component of the **Features** style panel (p. 78), which in turn is a component of the **Options dialog box** (p. 61) in the **Model Visualisation window** (p. 53). To activate the Options dialog box select options from the **Select** menu (p. 60) on the **Model Visualisation toolbar** (p. 54).

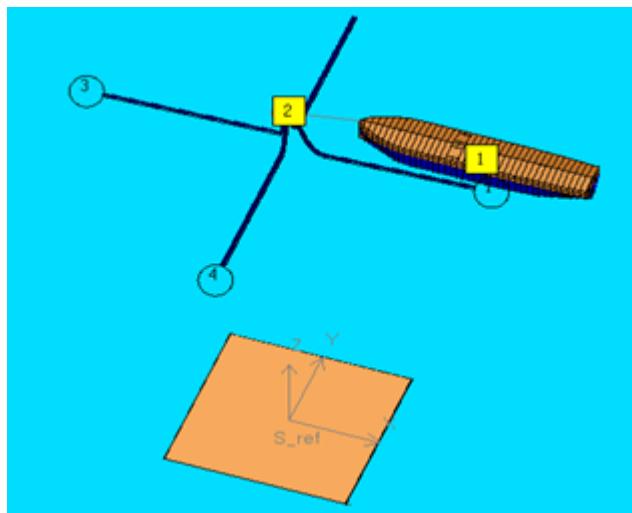
This utility allows you to view some additional information of your structure(s).



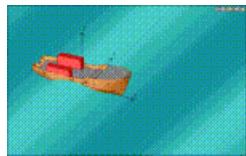
The available options are:

- Centre of Gravity - Display Structure number at COG
- Diffracting Elements - Display diffraction elements in blue colour
- Mooring Lines – Display full composite and line number (default)
- Fenders -Display detailed fender configurations (default)
- Hyd/Interaction Distance - Indicators of the hydrodynamic interaction structure distances
- In-line Buoying Scaling – Scaling of the in-line buoying of composite moorings in mooring line visualization.
- Seabed – Display seabed

An example below shows the model with the options selections of Centre of Gravity, Diffraction Elements and Seabed

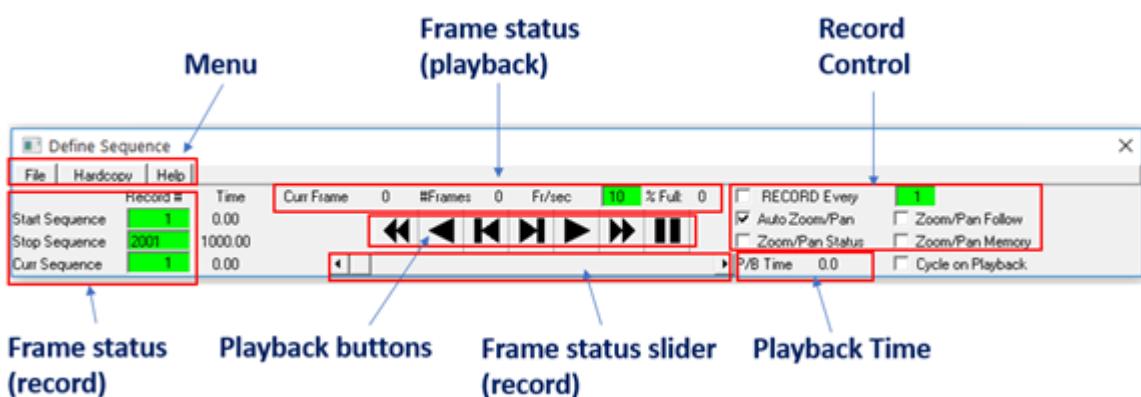


7.3. Animations



The Aqwa Graphical Supervisor has the ability to create animations (or sequences) of displayed images. Animations may be created from static objects moved around the client area or from a sequence of events created from a time domain analysis such as an Aqwa-Naut or an Aqwa-Drift analysis.

The animation control (record & playback) is directed from the Sequence dialog box, which can be activated from the [Select menu \(p. 60\)](#) of the [Model Visualisation window \(p. 53\)](#) (select Sequence on the menu).



The components of the Sequence dialog box are:

[Menu \(p. 85\)](#) - File, Hardcopy, and Help menus

[Frame status \(record\) \(p. 85\)](#) - Displays number of available frames/recorded frames

Frame status (playback) (p. 86) - Displays frame numbers during playback. Also controls frames per second during playback.

Playback buttons (p. 86) - Standard playback buttons

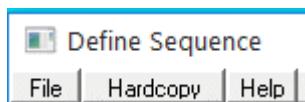
Frame status slider (record) (p. 86) - Displays frame number during recording (graphical display)

Record control (p. 87) - Record and zoom/pan status buttons

Playback time (p. 88) - Displays playback time.

7.3.1. Menu

This is a component of the [Sequence Dialog box \(p. 84\)](#), which can be activated from the [Select menu \(p. 60\)](#) of the [Model Visualisation window \(p. 53\)](#) (select Sequence on the menu).



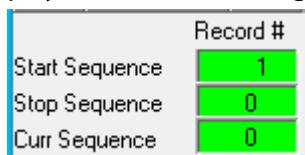
The animation menu bar gives you access to the File system, [Hardcopy \(p. 88\)](#), and [Help \(p. 45\)](#) system.

The File system allows you to open previously recorded and saved [.SEQ \(p. 132\)](#) sequence files.

7.3.2. Frame Status (Record)

This is a component of the [Sequence Dialog box \(p. 84\)](#), which can be activated from the [Select menu \(p. 60\)](#) of the [Model Visualisation window \(p. 53\)](#) (select Sequence on the menu).

The frame status panel displays the status of the sequence frames during recording (*not* during playback). The following items are on the panel:



- **Start Sequence** - displays the starting value of the sequence before recording. During recording this value will increment to display the most recently recorded frame. You may change this value to record from any part of the [.POS \(p. 127\)](#) file (when recording in the time domain). Note that frames cannot be deleted from the [.SEQ \(p. 132\)](#) once recorded.
- **Stop Sequence** - This value represents the final frame you wish to be recorded in the animation. This value will be set to the maximum number of available frames when recording animations from time domain results. You can change this value to a number less than the maximum available frames.
- **Curr Sequence** - displays the currently viewed frame. You can view any available frame within a [.POS](#) file by changing this value. This value is also reflected in the [frame status slider \(p. 86\)](#).

The position in time of each value is displayed alongside each textbox.

7.3.3. Frame Status (Playback)

This is a component of the [Sequence Dialog box \(p. 84\)](#), which can be activated from the [Select menu \(p. 60\)](#) of the [Model Visualisation window \(p. 53\)](#) (select Sequence on the menu).

During playback of an animation this panel will display the currently viewed frame, the total number of frames and the number of frames per second (FR/sec) during playback. To alter the speed of the animation change the value of FR/sec. The maximum speed of any given animation is machine dependent.

This panel will display values for recently recorded animations (i.e. one that still exists in the animation buffer) and previously saved animations (.SEQ).

When recording the number of frames/second controls the rate at which the Zoom/Pan changes from the current view to the new view. It is assumed that the zoom occurs in 4 seconds. For example, if the number of frames/second is 10 then the change will occur in 40 frames ($4*10$). If the frames/sec is set to 5 then Zoom/Pan will change in 20 frames ($4*5$).

7.3.4. Playback Buttons

This is a component of the [Sequence Dialog box \(p. 84\)](#), which can be activated from the [Select menu \(p. 60\)](#) of the [Model Visualisation window \(p. 53\)](#) (select Sequence on the menu).



The playback buttons facilitate the playback of a recorded sequence. The sequence may be pre-recorded (.SEQ) or recently recorded and residing in the buffer.

The buttons in order of appearance are:

- Fast Rewind
- Play backwards at prescribed speed (FR/sec)
- Step one frame back
- Step one frame forward
- Play forward at prescribed speed (Fr/sec)
- Fast Forward
- Pause/Stop playback

7.3.5. Frame Status Slider (Record)

This is a component of the [Sequence Dialog box \(p. 84\)](#), which can be activated from the [Select menu \(p. 60\)](#) of the [Model Visualisation window \(p. 53\)](#) (select Sequence on the menu).

The frame status slider visually displays the currently viewed frame of a .POS file. The frame number is shown in the Curr Sequence text box of the [frame status \(record\) \(p. 85\)](#) panel.

7.3.6. Record Control

This is a component of the Sequence Dialog box (p. 84), which can be activated from the **Select** menu (p. 60) of the Model Visualisation window (p. 53) (select Sequence on the menu).



Recording is controlled from this panel. The available buttons are:

- **RECORD Every** - Selecting the record button will record frames between the Start Sequence and Stop Sequence values specified in the [frame status \(record\)](#) (p. 85) panel, with a frame generated at every N-th time step (where N is the number in the text box on the right). To stop recording before the Stop Sequence value is reached deselect RECORD. When the system is not recording you may alter the frame range (any range) and Zoom/Pan status of the display. You can stop and start recording at any time, altering the frame range or zoom/pan status at each stop. Additional recording will be appended to the end of the presently buffered recording.

- **Auto Zoom/Pan** - The AGS has the ability to automatically Zoom/Pan during animations. To create this effect follow the below procedure:

Ensure that the system is not recording. If you are in the middle of a recording you can stop by deselecting **RECORD**. You may then continue this procedure.

Reposition your structure within the [Model Visualisation](#) (p. 53) window using the various [zoom](#) (p. 56) and [pan](#) (p. 55) components on the right hand side.

Select record. The AGS will then continue recording from the last recorded frame, and in a short period of time will move the structure from its initial position (if exists) to the newly defined position (interpolating accordingly in the process).

Note:

De-selecting the Zoom/Pan button will cause the AGS to jump from the last recorded frame (if exists) to the new position without displaying any intermediate steps.

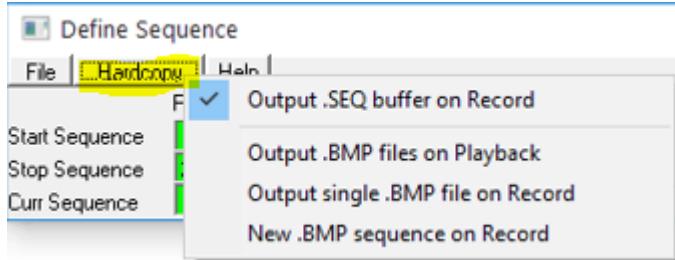
- **Zoom/Pan Status** - This button indicates that a Zoom/Pan position has been defined.
- **Zoom/Pan Follow** – When this button is on, it indicates that the most recent point clicked on is part of the CURRENT structure and will follow.
- **Zoom/Pan Memory** – When off, ignore the view point/angle and scale when executing a Zoom/Pan; when on, use the new zoom point/width, remember the first setting.

Note:

To change the rate at which the Zoom/Pan goes from the current view to the new view, see the note in the [Frame Status \(playback\)](#) (p. 86) topic.

7.3.7. Hardcopy

Hardcopy in Menu is used to create the animation files in either .SEQ or .BMP format.



The available options are:

- Output .SEQ buffer On Record – Switching on this option enables [Playback buttons \(p. 88\)](#)
- Output .BMP files on Playback - writes out the .BMP files (note that user should switch Output .SEQ buffer On Record as well)
- Output single .BMP file on Record – not available
- New .BMP sequence on Record - not available

7.3.8. Playback time - Animations

This is a component of the [Sequence Dialog box \(p. 84\)](#), which can be activated from the [Select menu \(p. 60\)](#) of the [Model Visualisation window \(p. 53\)](#) (select Sequence on the menu).

P/B Time 0.000

The playback time counter displays the length of time the most recently played animation took to play back.

7.4. Creating a Mesh

The Aqwa suite of programs requires a data (.DAT) file to perform analysis. The first two decks of the data file define the structure's mesh within the Fixed Reference Axis (FRA). The AGS has a mesh generation utility, but it is only available for ship/boat models. However, Workbench can be used to create all types of Aqwa models.

Note:

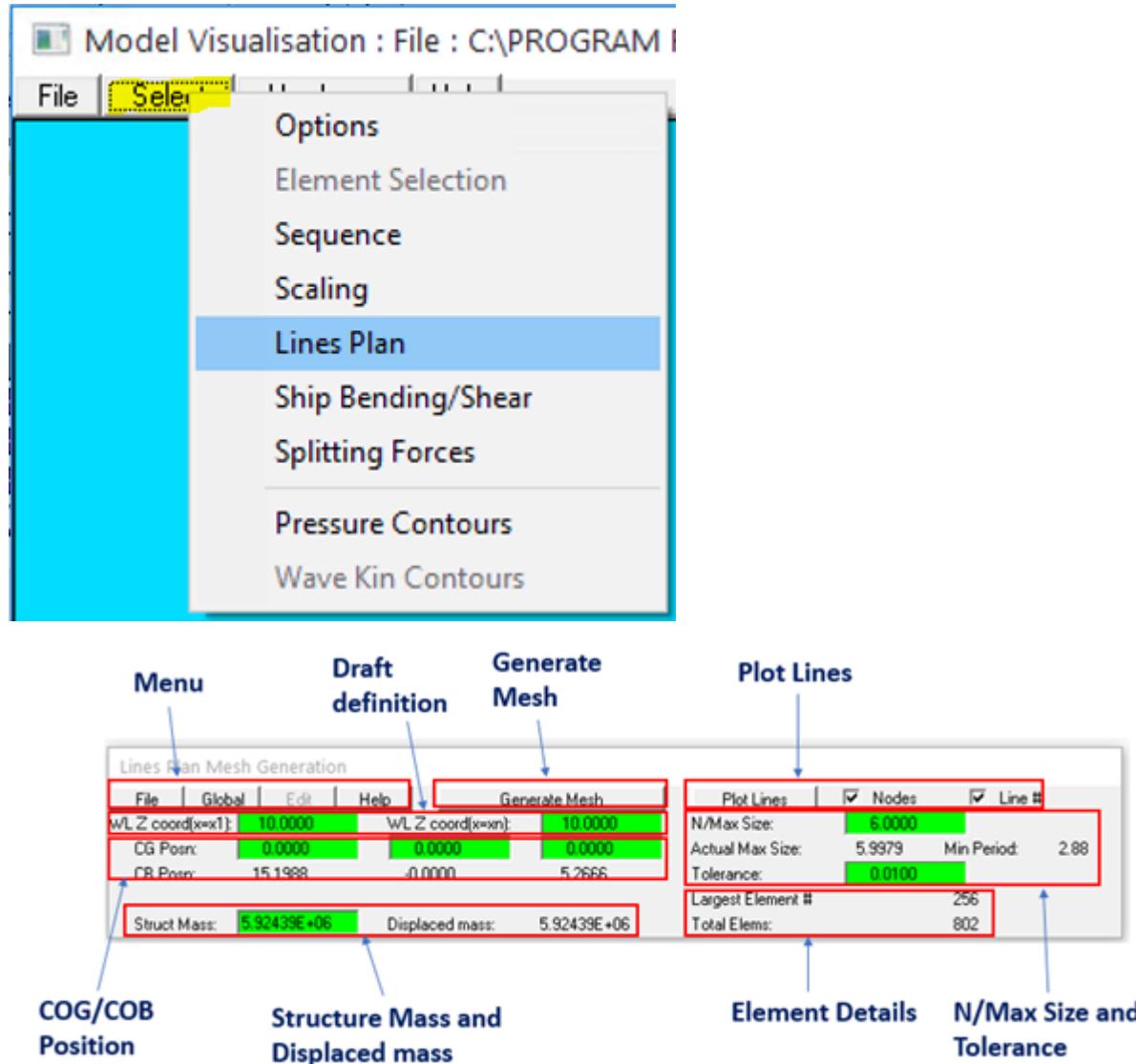
You should *not* rely on models created from a mesh. **Always** check an automatically generated model for errors before proceeding with analysis.

The mesh generation facility allows you to generate an Aqwa ship/boat model automatically from a user specified lines plan ([.LIN \(p. 129\)](#)) file. The mesh is then saved to a Aqwa data file (.DAT) as a single structure which can then be enhanced by the user for Aqwa analysis. This data file contains information for the structure definition and centre of gravity position only.

The mesh generation facility also allows you to convert an existing Aqwa restart file (.RES) to an Aqwa data (.DAT). Note that only structure information will be saved.

To activate Mesh Generation mode select Lines Plan from the [Select menu \(p. 60\)](#) on the Model Visualisation menu bar (p. 54).

The Lines Plan Mesh Generation dialog box will then appear.



This dialog box has the following components.

- [Menu Bar \(p. 90\)](#) - File, Global, Help, and Edit
- [Draft Definition \(p. 91\)](#) - Input of draft at vessel extremities
- [CG/CB Position \(p. 92\)](#) - Input of Centre of Gravity position
- [N/Max Size / Tolerance \(p. 92\)](#) - Control the size of the elements
- [Plot Lines \(Nodes / Line#\) \(p. 93\)](#) - Plot the lines plan sections

- Structural Mass (p. 95) - Displays displaced mass & structural mass
- Generate Mesh (p. 94) - Create mesh from lines plan
- Element details (p. 95) - Description of max size, largest element and total number of elements

Tip:

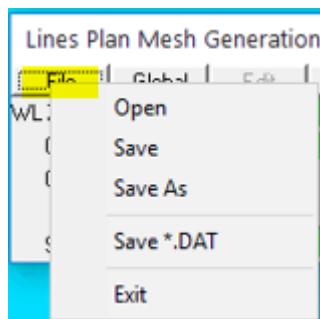
The lines plan sections and the mesh's screen orientation may be manipulated within the [client area \(p. 55\)](#) by using the various utilities within the [Model Visualisation window \(p. 53\)](#). These utilities are: [View Centre \(p. 55\)](#), [View Angle \(p. 55\)](#), [Zoom \(p. 56\)](#), [Move Structure \(p. 57\)](#), [Command \(p. 59\)](#), [Element Style \(p. 63\)](#), [Numbering \(p. 74\)](#), [Features \(p. 78\)](#).

7.4.1. Menu Bar

This is a component of the [Mesh Generation utility \(p. 88\)](#). To activate Mesh Generation mode select Lines Plan from the [Select menu \(p. 60\)](#) on the [Model Visualisation menu bar \(p. 54\)](#).

The Mesh Generation dialog box Menu bar allows you to open and save files and access the help system.

- **File**



The file menu has the following options:

- **Open:** You may open an Aqwa lines plan ([..RES \(p. 127\) \(p. 129\)](#)) by clicking on the open menu entry. More information on the format of the [.LIN \(p. 129\)](#) file can be found in the topic [file formats](#).
- **Save and Save As:** This will allow you to save any changes you have made to the lines plan ([..RES \(p. 127\) \(p. 129\)](#)) within the Aqwa Graphical Supervisor. (Note that editing facilities are under development and are not yet released).
- **Save *.DAT:** Once your lines plan has been [meshed \(p. 94\)](#) you may save the data by selecting this entry.
- **Exit:** Will remove the Mesh Generation dialog box from your desktop.
- **Global (p. 20)** - Definition of Global parameters
- **Edit** - This feature is not available.
- **Help (p. 45)** - accesses the AGS help system.

Tip:

The lines plan sections and the mesh's screen orientation may be manipulated within the [Client area](#) (p. 55) by using the various utilities within the [Model Visualisation window](#) (p. 53). These utilities are: View Centre (p. 55), View Angle (p. 55), Zoom (p. 56), Move Structure (p. 57), Command (p. 59), Element Style (p. 63), Numbering (p. 74), Features (p. 78).

7.4.2. Draft Definition

This is a component of the [Mesh Generation utility](#) (p. 88). To activate Mesh Generation mode select Lines Plan from the [Select menu](#) (p. 60) on the [Model Visualisation menu bar](#) (p. 54).

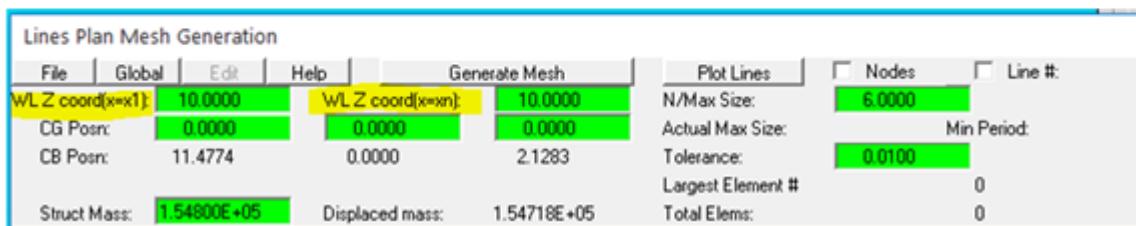
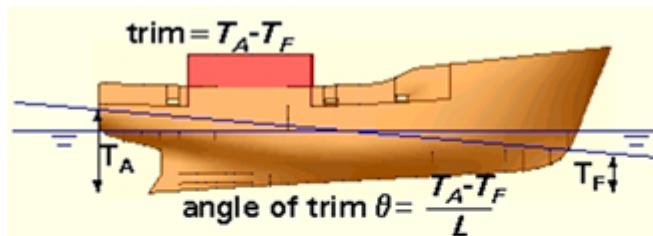
To generate a meshed model of your structure the required draft must be entered in these text boxes. The correct draft must be known in order for the correct element definition to be assigned to your model (elements above the waterline will be assigned non-diffracting elements while those below will be assigned diffracting elements QPPL & TPPL).

The draft definition text boxes allow you to enter the draft of the vessels extremities.

Draft(x=0)	10.000	Draft(x=xn):	10.000
------------	--------	--------------	--------

Entering the draft at X=0 will set the draft for the whole vessel (even keel) at this value.

Trimming the vessel: By changing the draft value at X=Xn trim may be applied to the vessel. For example If you wish to trim your vessel as follows set X=0 to T_A , and X=Xn to T_F .



A reasonable value for the draft must be input before attempting to [mesh](#) (p. 94) the model. An incorrect draft value may create an erroneous model.

Tip:

The lines plan sections and the mesh's screen orientation may be manipulated within the [Client area](#) (p. 55) by using the various utilities within the [Model Visualisation window](#) (p. 53). These utilities are: View Centre (p. 55), View Angle (p. 55), Zoom (p. 56), Move Structure (p. 57), Command (p. 59), Element Style (p. 63), Numbering (p. 74), Features (p. 78).

7.4.3. CG/CB Position

This is a component of the [Mesh Generation utility](#) (p. 88). To activate Mesh Generation mode select Lines Plan from the [Select menu](#) (p. 60) on the [Model Visualisation menu bar](#) (p. 54).

The position of the centre of gravity of your model can be entered in these text boxes. To help you input a reasonable CG position the AGS will display the CB position of a meshed model below the input text boxes for the CG position.

If no value of CG is entered then the default values of (0.0,0.0,0.0) will be assumed.

Tip:

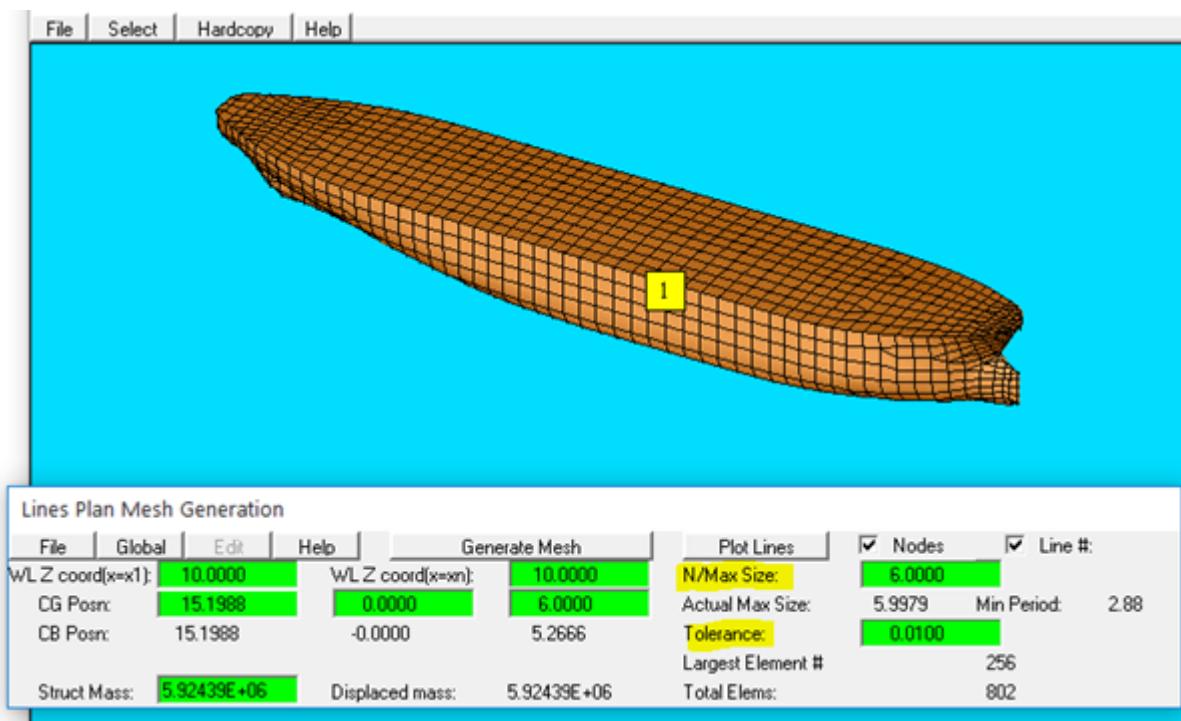
The lines plan sections and the mesh's screen orientation may be manipulated within the [Client area](#) (p. 55) by using the various utilities within the [Model Visualisation window](#) (p. 53). These utilities are: View Centre (p. 55), View Angle (p. 55), Zoom (p. 56), Move Structure (p. 57), Command (p. 59), Element Style (p. 63), Numbering (p. 74), Features (p. 78).

7.4.4. N/Max Size / Tolerance

This is a component of the [Mesh Generation utility](#) (p. 88). To activate Mesh Generation mode select Lines Plan from the [Select menu](#) (p. 60) on the [Model Visualisation menu bar](#) (p. 54).

The size of the meshed elements can be controlled by inputting maximum values in these text boxes.

The default value for element N/Max size is 6m.



Setting a larger element N/MAX value, for example 20.0m, will produce a coarser model.

Note:

While finer models may produce better results, analysis time will increase. The maximum number of elements is 40,000, of which 30,000 may be diffracting. In addition, there cannot be more than 60,000 nodes around a half section.

The actual maximum mesh size of the model is displayed. The Min Period value indicates the minimum period at which the model can be analyzed without violating the diffraction/radiation modeling rules when the ship has been [meshed](#) (p. 94).

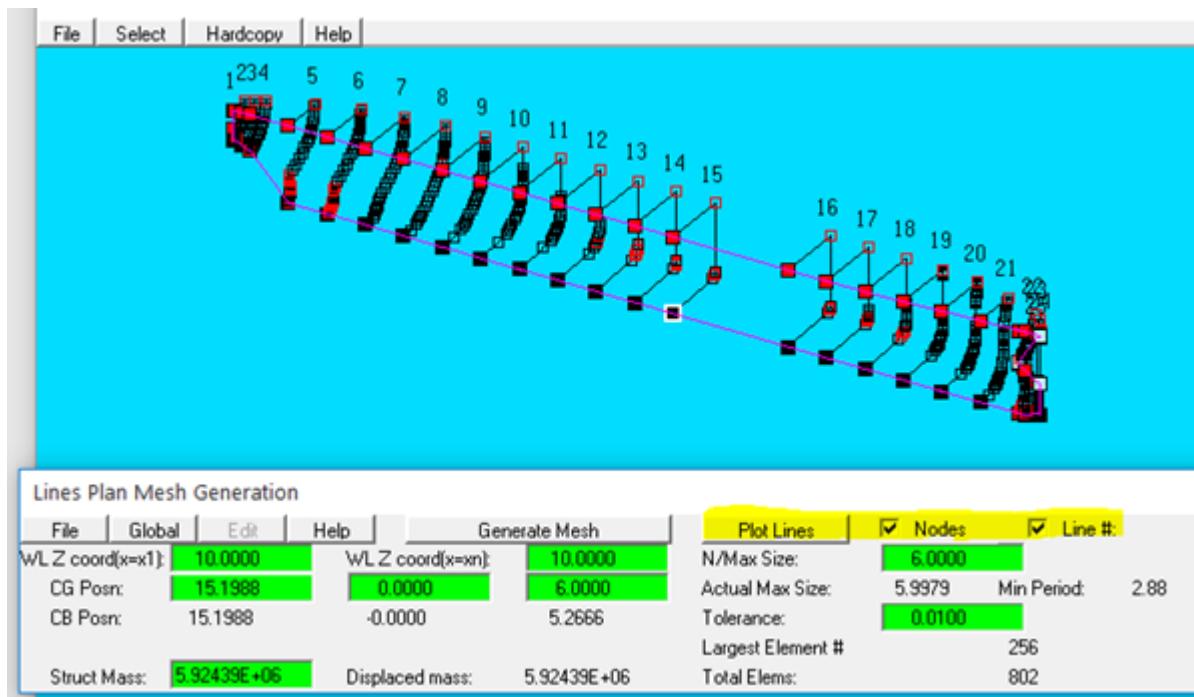
Tip:

The lines plan sections and the mesh's screen orientation may be manipulated within the [client area](#) (p. 55) by using the various utilities within the [Model Visualisation window](#) (p. 53). These utilities are: [View Centre](#) (p. 55), [View Angle](#) (p. 55), [Zoom](#) (p. 56), [Move Structure](#) (p. 57), [Command](#) (p. 59), [Element Style](#) (p. 63), [Numbering](#) (p. 74), [Features](#) (p. 78).

7.4.5. Plot Lines (Nodes /Line#)

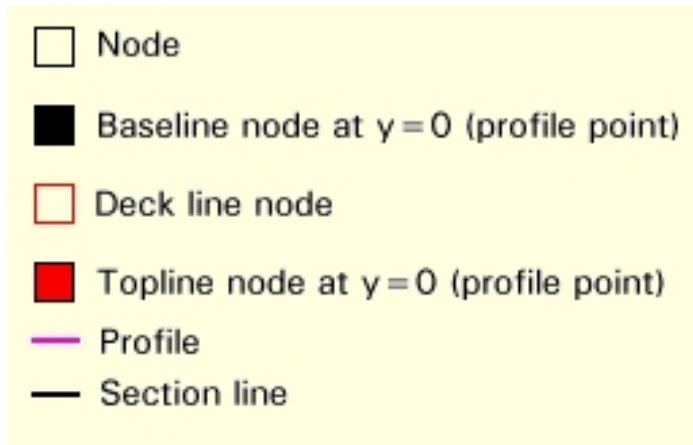
This is a component of the [Mesh Generation utility](#) (p. 88). To activate Mesh Generation mode select Lines Plan from the [Select menu](#) (p. 60) on the [Model Visualisation menu bar](#) (p. 54).

The lines plan ([.LIN \(p. 129\)](#)) is viewed as a set of sections as defined in your [.LIN \(p. 129\)](#) file. This button will refresh that view.



When the [.LIN \(p. 129\)](#) file is read by the AGS the information will be scanned and a profile created from the nodes which touch $y=0$. If the AGS cannot determine the profile, then an error will be reported and you will be expected to refine the [.LIN \(p. 129\)](#) plan until it works correctly. A successful scan will

produce a profile displayed with a magenta color. The following colors will be used to differentiate the various node types.



If the [.LIN \(p. 129\)](#) plan does not have a defined centerline (CL) deck node then the Aqwa Graphical Supervisor will automatically add CL deck nodes with the same y value as that given by the deck at the side node. The nodes and section numbers are displayed by default..

Tip:

The lines plan sections and the mesh's screen orientation may be manipulated within the [client area \(p. 55\)](#) by using the various utilities within the [Model Visualisation window \(p. 53\)](#). These utilities are: [View Centre \(p. 55\)](#), [View Angle \(p. 55\)](#), [Zoom \(p. 56\)](#), [Move Structure \(p. 57\)](#), [Command \(p. 59\)](#), [Element Style \(p. 63\)](#), [Numbering \(p. 74\)](#), [Features \(p. 78\)](#).

7.4.6. Generate Mesh

This is a component of the [Mesh Generation utility \(p. 88\)](#). To activate Mesh Generation mode select Lines Plan from the [Select menu \(p. 60\)](#) on the [Model Visualisation menu bar \(p. 54\)](#).

Pressing the Generate Mesh button will create a mesh from a loaded lines plan ([.LIN \(p. 129\)](#)) ([p. 129](#)). If the mesh is undesirable alter the various components of the [Mesh Generation dialog box \(p. 88\)](#).

A successfully generated mesh will be displayed. Errors during the generation will be reported via a Windows message box.

Note:

Erroneous elements will be highlighted in red and should be considered as void elements.
(Do not rely on a model if warned of errors).

Tip:

The lines plan sections and the mesh's screen orientation may be manipulated within the [client area \(p. 55\)](#) by using the various utilities within the [Model Visualisation window \(p. 53\)](#). These utilities are: [View Centre \(p. 55\)](#), [View Angle \(p. 55\)](#), [Zoom \(p. 56\)](#), [Move Structure \(p. 57\)](#), [Command \(p. 59\)](#), [Element Style \(p. 63\)](#), [Numbering \(p. 74\)](#), [Features \(p. 78\)](#).

7.4.7. Structural Mass and Displaced Mass

This is a component of the [Mesh Generation utility](#) (p. 88). To activate Mesh Generation mode select Lines Plan from the [Select menu](#) (p. 60) on the [Model Visualisation menu bar](#) (p. 54).

The AGS will calculate the displaced mass when the model is meshed. The structural mass will be set to the displaced mass, however you may change this value for structures not in equilibrium.

Tip:

The lines plan sections and the mesh's screen orientation may be manipulated within the [client area](#) (p. 55) by using the various utilities within the [Model Visualisation window](#) (p. 53). These utilities are: View Centre (p. 55), View Angle (p. 55), Zoom (p. 56), Move Structure (p. 57), Command (p. 59), Element Style (p. 63), Numbering (p. 74), Features (p. 78).

7.4.8. Element Details

This is a component of the [Mesh Generation utility](#) (p. 88). To activate Mesh Generation mode select Lines Plan from the [Select menu](#) (p. 60) on the [Model Visualisation menu bar](#) (p. 54).

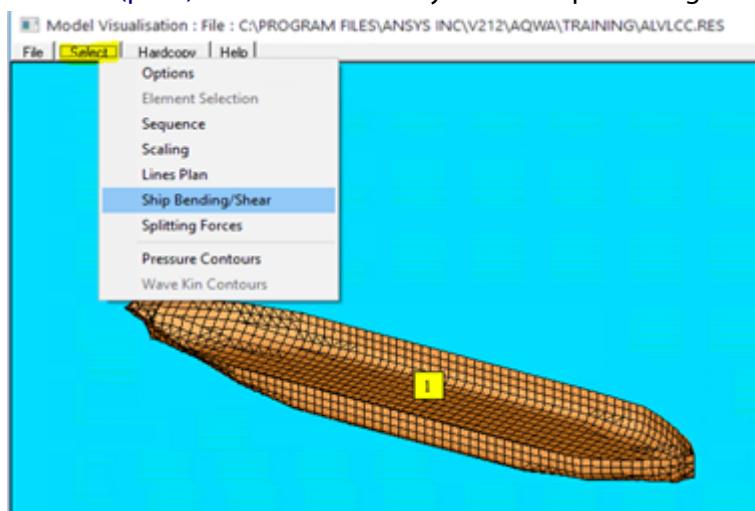
This panel displays the largest element sequence number and the total number of elements.

Tip:

The lines plan sections and the mesh's screen orientation may be manipulated within the [client area](#) (p. 55) by using the various utilities within the [Model Visualisation window](#) (p. 53). These utilities are: View Centre (p. 55), View Angle (p. 55), Zoom (p. 56), Move Structure (p. 57), Command (p. 59), Element Style (p. 63), Numbering (p. 74), Features (p. 78).

7.5. Bending Moment and Shear Forces

The Bending Moment (BM) /Shear Force (SF) calculation utility is activated from the [Model Visualisation Window](#) (p. 53). To start this facility select Ship Bending/Shear from the [Select menu](#) (p. 60).

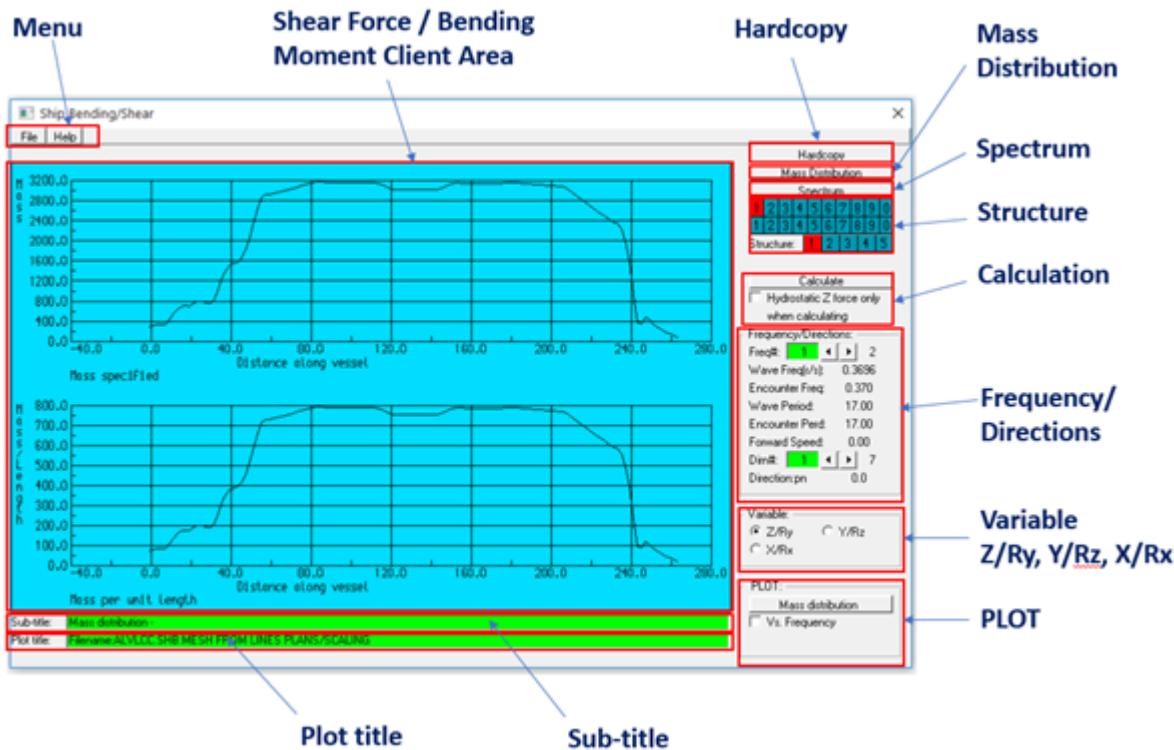


This facility allows you to calculate the Bending Moment and Shear forces about/along the X, Y, or Z axis of your model.

The utility will calculate these forces either under static (still water) conditions or with a given sea state defined by the user.

In order for the AGS to calculate the necessary forces you must follow these steps:

- Run your model in Aqwa-Line which will create the file, *.POT (p. 127), containing potential for each wetted element. The .POT file is needed for the SF & BM calculation.
- Define the Mass Distribution along the vessel. This is input into the Aqwa Graphical Supervisor in the form of an .MSD file. Note that the total mass and the resolved LCG of this mass must equal that calculated by Aqwa-Line. Failure to do this will cause the AGS to attempt to resolve the residual forces. However this method may result in non-zero residual forces causing erroneous results in the SF and BM. Note that the .POT, .RES, and the .MSD (p. 130) files must reside in the same directory.
- Open the .RES file within the AGS and select Ship Bending/Shear from the Select menu (p. 60) of the Model Visualisation Window (p. 53).



Ship Bending/Shear window consists of following components:

- Shear Force / Bending Moment Client Area (p. 97)
- Menu (p. 98)
- Hardcopy (p. 60)
- Mass Distribution (p. 98)
- Spectrum - Choose the wave spectrum you wish to use.

- Structure - Only one structure may be used for the BM/SF calculation.
- Calculate (p. 99)
- Frequency/Directions (p. 99)
- Variable Z/Ry, Y/Rz, X/Rx (p. 100)
- PLOT (p. 101)
 - Mass Distribution (p. 102)
 - Static Shear Force & Bending Moment (p. 102)
 - Shear Force & Bending Moment RAO (p. 103)
 - Shear Force & Bending Moment RAO @ t=0 (p. 104)
 - Shear Force & Bending Moment RAO @ t=T/4 (p. 104)
 - Shear Force & Bending Moment RAO Envelope (p. 105)
 - Significant Amplitude (p. 105)
- Sub-title -The subtitle text box gives a description of the displayed plot. You may enter your own description.
- Plot title - The Plot title text box gives a description of the analysis file name. You may enter your own description.

7.5.1. Shear Force / Bending Moment Client Area

This is a component of the Bending Moment/Shear Force calculation utility activated from the [Model Visualisation Window \(p. 53\)](#). To start this facility select [Ship Bending/Shear \(p. 95\)](#) from the [Select](#) menu (p. 60).

The client area of the Ship Bending / Shear window displays a plot of one of the following shear force / bending moment calculations:

- Mass Distribution (p. 102)
- Static Shear Force & Bending Moment (p. 102)
- Shear Force & Bending Moment RAO (p. 103)
- Shear Force & Bending Moment RAO @ t=0 (p. 104)
- Shear Force & Bending Moment RAO @ t=T/4 (p. 104)
- Shear Force & Bending Moment RAO Envelope (p. 105)
- Significant Amplitude (p. 105)

You may output a copy of the displayed image by using the [hardcopy \(p. 60\)](#) menu.

7.5.2. Shear Force / Bending Moment Menu Bar

This is a component of the Bending Moment/Shear Force calculation utility activated from the Model Visualisation Window (p. 53). To start this facility select [Ship Bending/Shear \(p. 95\)](#) from the Select menu (p. 60).

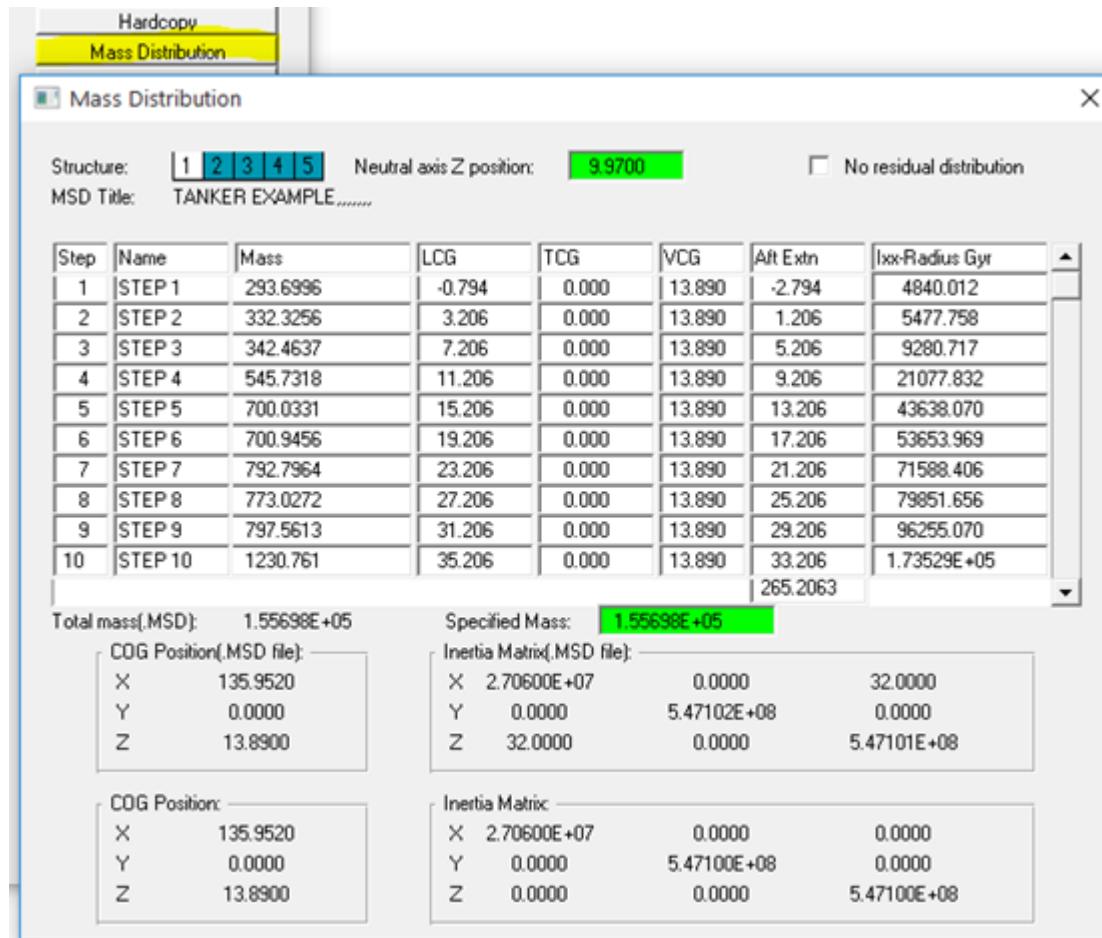
The menu bar allows you to open a .RES file, exit from Shear Force Bending Moment calculation mode, or access the help system.

7.5.3. Mass Distribution - SF / BM Calculation

This is a component of the Bending Moment/Shear Force calculation utility activated from the Model Visualisation Window (p. 53). To start this facility select [Ship Bending/Shear \(p. 95\)](#) from the Select menu (p. 60).

The Mass Distribution button will activate the mass distribution viewer (as defined by the [.MSD \(p. 130\)](#) file). Note that if the .MSD file generates residual forces (i.e. the total mass and resolved LCG do not match that calculated by Aqwa-Line) then the AGS will attempt to redistribute the mass to resolve the problem. The mass distribution viewer will reflect this calculation - However selecting 'No residual distribution' in the Mass Distribution window will turn off this function.

The Mass Distribution window is as follows:



7.5.4. Calculate - SF / BM Calculation

This is a component of the Bending Moment/Shear Force calculation utility activated from the Model Visualisation Window (p. 53). To start this facility select [Ship Bending/Shear \(p. 95\)](#) from the Select menu (p. 60).

The Calculate button will cause the AGS to recalculate the Bending Moment and Shear forces along the chosen axis. All the following options will be calculated (for all frequencies and directions) and stored in a plain text .SHB (p. 127) output file:

- [Mass Distribution \(p. 102\)](#)
- [Static Shear Force & Bending Moment \(p. 102\)](#)
- [Shear Force & Bending Moment RAO \(p. 103\)](#)
- [Shear Force & Bending Moment RAO @ t=0 \(p. 104\)](#)
- [Shear Force & Bending Moment RAO @ t=T/4 \(p. 104\)](#)
- [Shear Force & Bending Moment RAO Envelope \(p. 105\)](#)
- [Significant Amplitude \(p. 105\)](#)

Note:

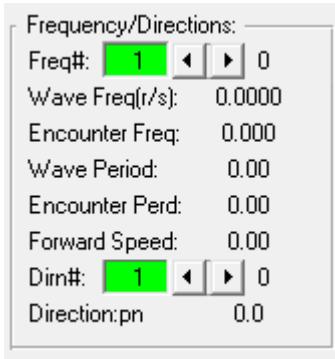
The results are stored in an internal .SHB (p. 127) file which, if removed or deleted from your disk, will have to be recalculated.

Use the **Hydrostatic Z force only when calculating** check box to exclude any horizontal component of hydrostatic force on non-vertical structure panels from the Bending Moment and Shear force calculation.

7.5.5. Frequency/Direction - SF / BM Calculation

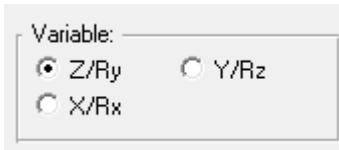
This is a component of the Bending Moment/Shear Force calculation utility activated from the Model Visualisation Window (p. 53). To start this facility select [Ship Bending/Shear \(p. 95\)](#) from the Select menu (p. 60).

This panel reflects the wave frequency and direction defined in the Aqwa-Line run corresponding to the displayed Bending Moment (BM) and Shear Force (SF). You may change the frequency and direction (if exists) to view the different results.



7.5.6. Variable Z/Ry, Y/Rz, X/Rx - SF / BM Calculation

This is a component of the Bending Moment/Shear Force calculation utility activated from the [Model Visualisation Window \(p. 53\)](#). To start this facility select [Ship Bending/Shear \(p. 95\)](#) from the [Select](#) menu (p. 60).

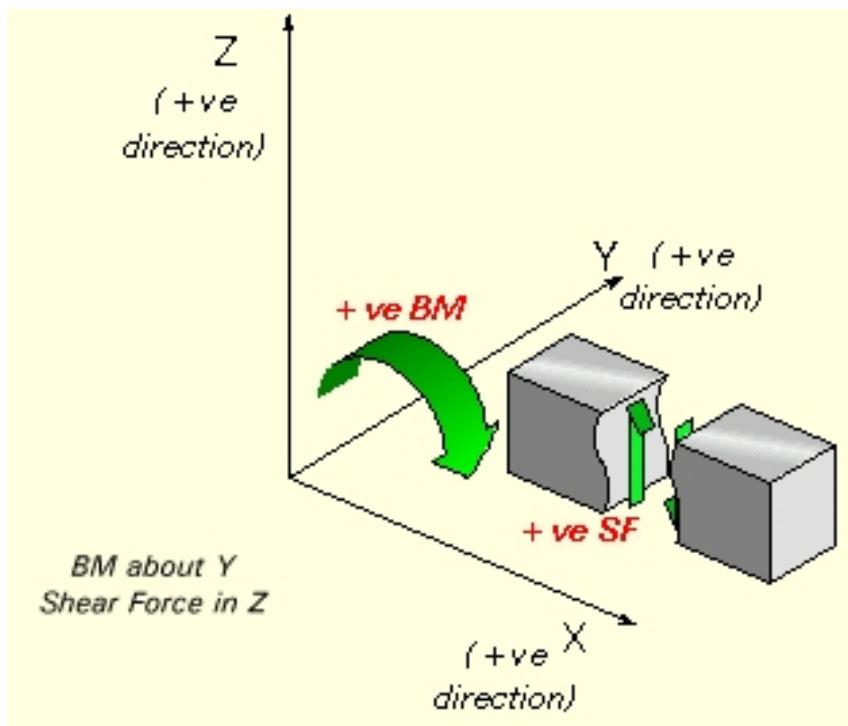


This panel defines along which axis the Bending Moment (BM) and Shear Force (SF) is to be calculated.

The default selection is Z/Ry - Shear force in Z, Bending Moment about Y.

The Aqwa Fixed Reference Axis (FRA) system applies to the BM & SF calculation (in other words, the hogging/sagging convention does not apply).

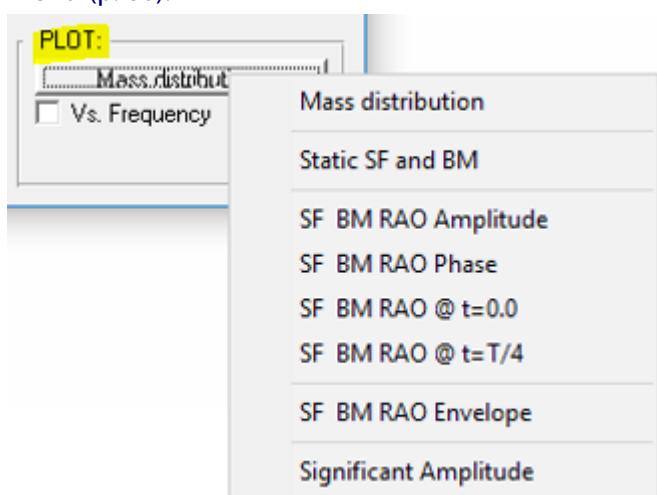
For example, the default Z/Ry would use the following system:

**Note:**

If the BM and SF are required in Y/Rz or X/Rx then the value of Ixx or radius of gyration must be input in the [.MSD \(p. 130\)](#) file.

7.5.7. PLOT - Shear Force & Bending Moment

This is a component of the Bending Moment/Shear Force calculation utility activated from the Model Visualisation Window (p. 53). To start this facility select [Ship Bending/Shear \(p. 95\)](#) from the [Select](#) menu (p. 60).



The PLOT button (on the BM & SF page) allows you to plot the following options:

[Mass Distribution \(p. 102\)](#)

[Static Shear Force & Bending Moment \(p. 102\)](#)

[Shear Force & Bending Moment RAO \(p. 103\)](#)

[Shear Force & Bending Moment RAO @ t=0 \(p. 104\)](#)

[Shear Force & Bending Moment RAO @ t=T/4 \(p. 104\)](#)

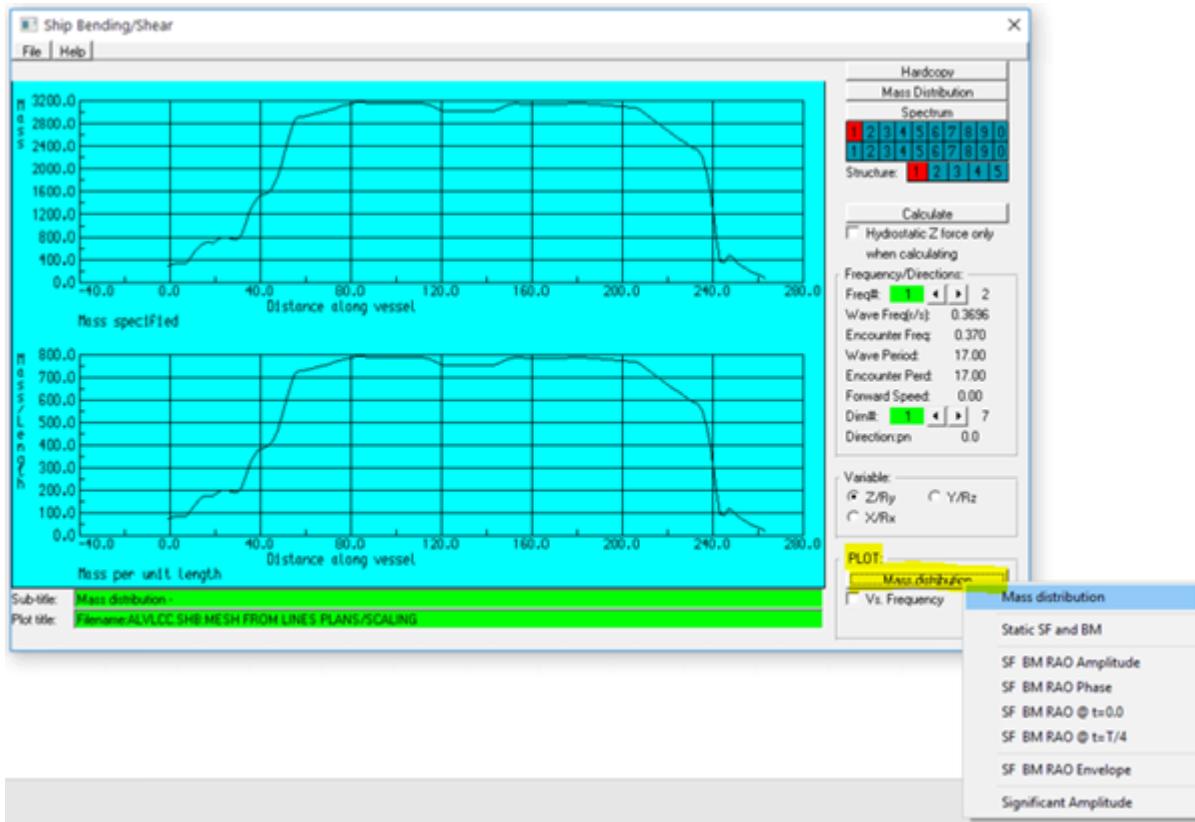
[Shear Force & Bending Moment RAO Envelope \(p. 105\)](#)

[Significant Amplitude \(p. 105\)](#)

7.5.7.1. Mass Distribution - SF / BM Calculation

This is a component of the Bending Moment/Shear Force calculation utility activated from the [Model Visualisation Window \(p. 53\)](#). To start this facility select [Ship Bending/Shear \(p. 95\)](#) from the Select menu (p. 60).

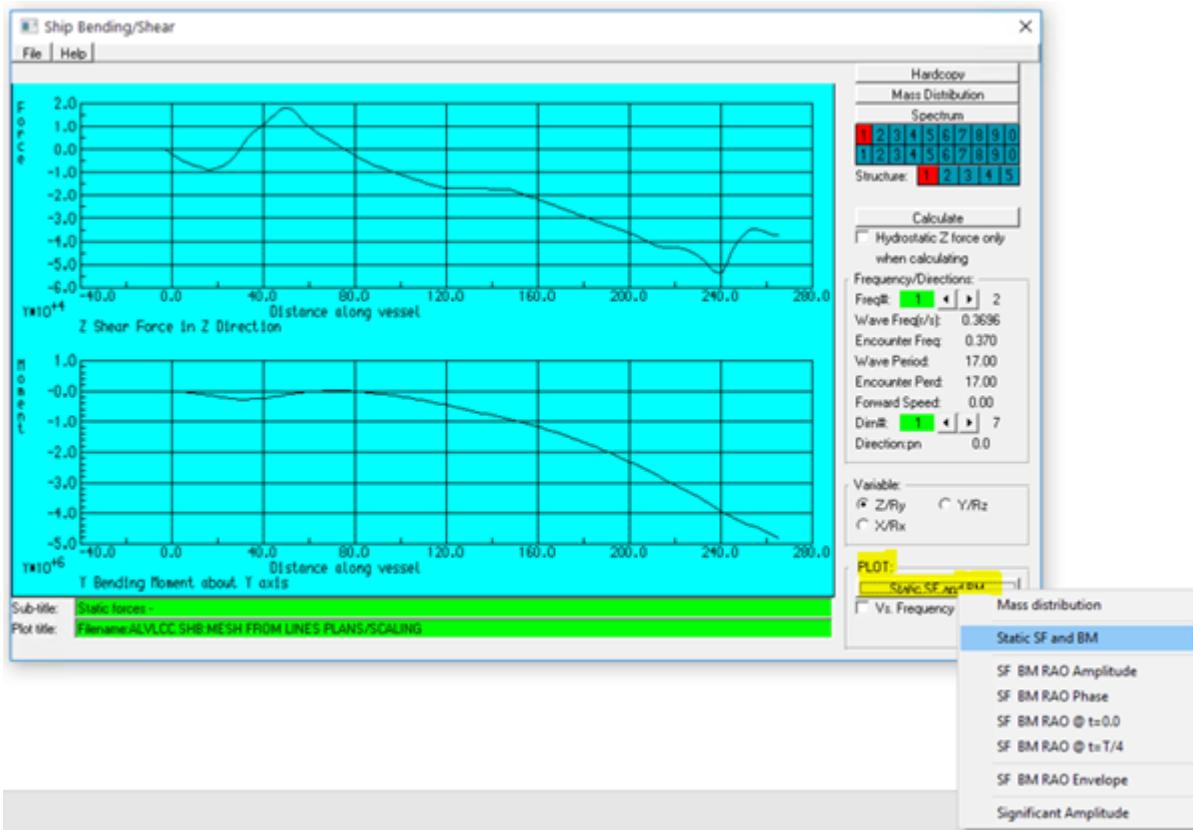
To plot the mass distribution - as defined in the [.MSD \(p. 130\)](#) file - select Mass Distribution from the [PLOT \(p. 101\)](#) button.



7.5.7.2. Static Shear Force & Bending Moment

This is a component of the Bending Moment/Shear Force calculation utility activated from the [Model Visualisation Window \(p. 53\)](#). To start this facility select [Ship Bending/Shear \(p. 95\)](#) from the Select menu (p. 60).

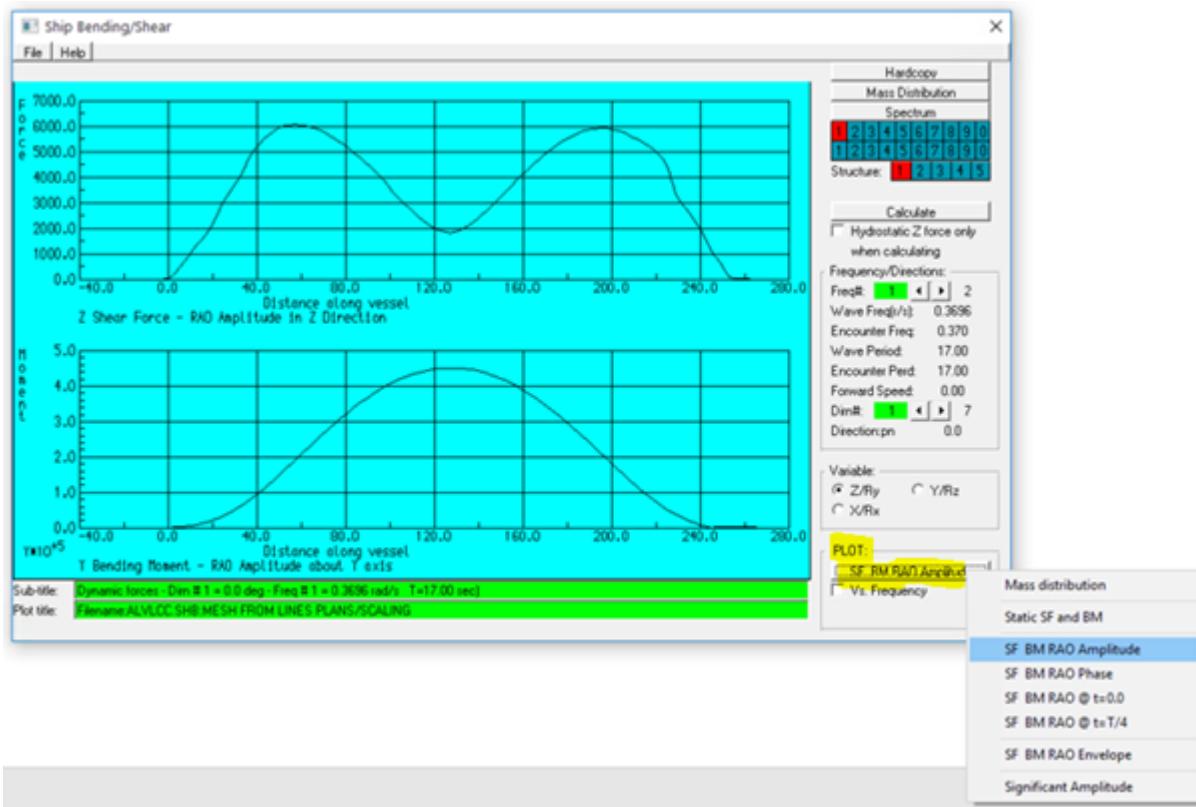
To plot the static shear force and bending moment select Static Shear Force & Bending Moment from the [PLOT \(p. 101\)](#) button.



7.5.7.3. Static Shear Force & Bending Moment RAO

This is a component of the Bending Moment/Shear Force calculation utility activated from the [Model Visualisation Window \(p. 53\)](#). To start this facility select [Ship Bending/Shear \(p. 95\)](#) from the [Select menu \(p. 60\)](#).

To plot the Shear Force & Bending Moment RAO Amplitude select SF BM RAO Amplitude from the [PLOT \(p. 101\)](#) button.



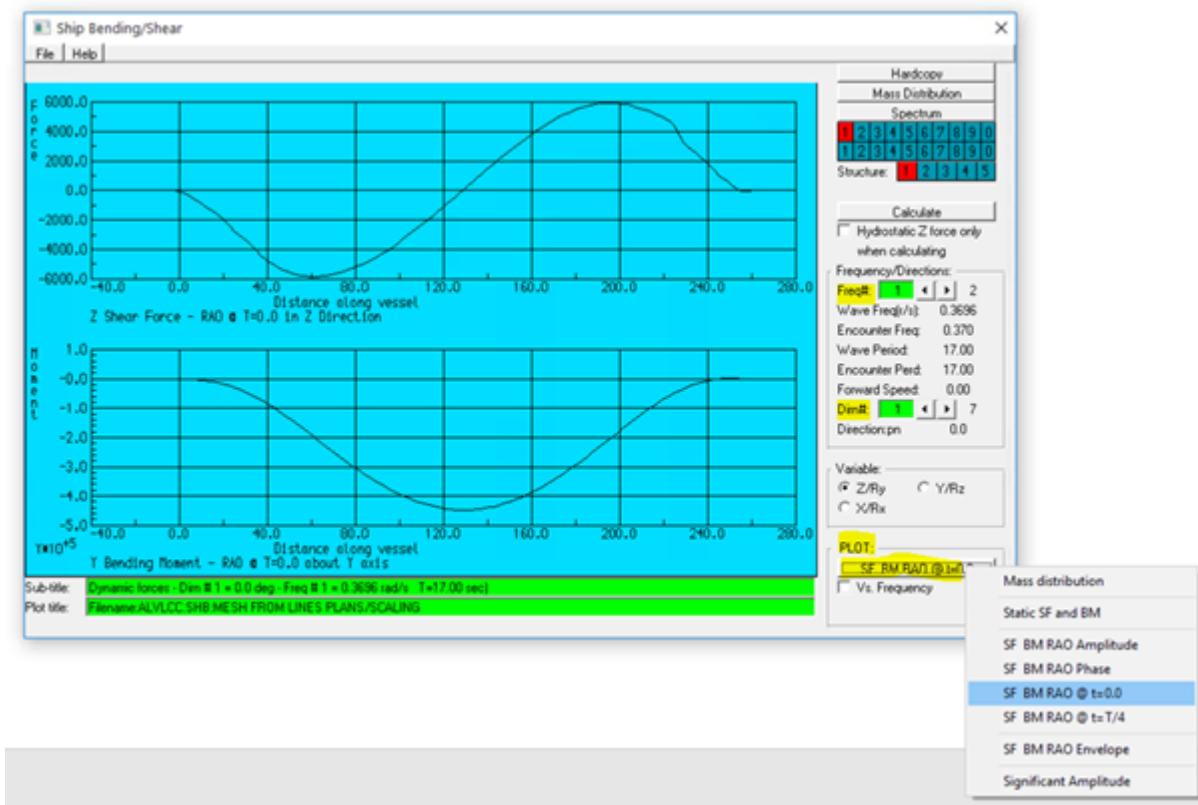
To plot the Shear Force & Bending Moment RAO Phase, select SF BM RAO Phase from the PLOT (p. 101) button.

7.5.7.4. Shear Force & Bending Moment RAO @ t=0 or @t=T/4

This is a component of the Bending Moment/Shear Force calculation utility activated from the Model Visualisation Window (p. 53). To start this facility select [Ship Bending/Shear \(p. 95\)](#) from the Select menu (p. 60).

To plot the Shear Force & Bending Moment RAO at t=0.0 select SF BM RAO @t=0.0 from the PLOT (p. 101) button.

For example: The shear force and bending moment at t=0.0 for the specified wave Frequency#1 (0.3696 rad/s) and Direction#1 (0.0 degrees) are shown below.



The shear force and bending moment at $t=T/4$ (T is the wave period) for the specified wave frequency and direction can also be calculated and plotted by selecting the SF BM RAO @ $t=T/4$.

7.5.7.5. Shear Force & Bending Moment RAO Envelope

This is a component of the Bending Moment/Shear Force calculation utility activated from the Model Visualisation Window (p. 53). To start this facility select [Ship Bending/Shear \(p. 95\)](#) from the Select menu (p. 60).

To plot the Shear Force & Bending Moment RAO Envelope, select SF BM RAO Envelope from the PLOT (p. 101) button.

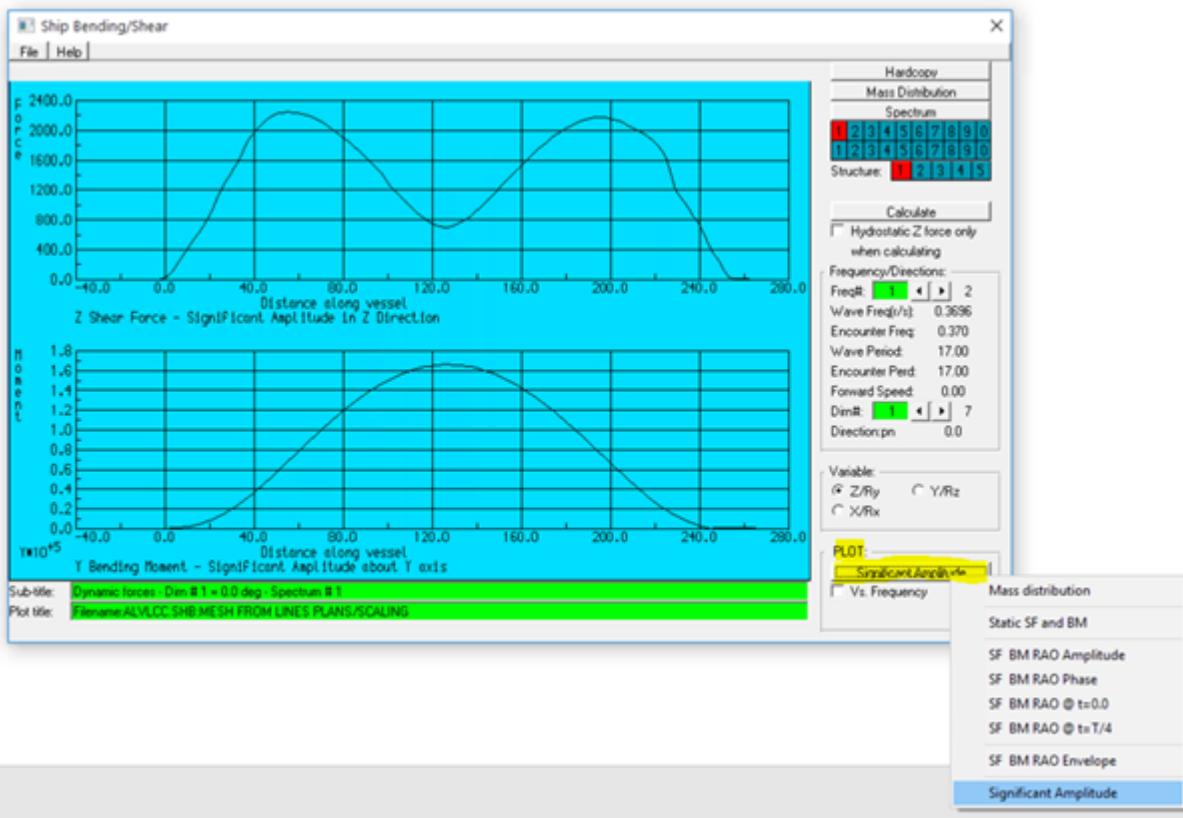
7.5.7.6. Significant Amplitude in SF / BM Calculation

This is a component of the Bending Moment/Shear Force calculation utility activated from the Model Visualisation Window (p. 53). To start this facility select [Ship Bending/Shear \(p. 95\)](#) from the Select menu (p. 60).

If a wave spectrum has been defined in the imported .RES file, or defined in Wave/wind Spectra from the AGS Edit menu – Environment – Spectra, the significant amplitudes of shear force and bending moment along a specified ship direction can be calculated and plotted.

To plot the Significant Amplitude select Significant Amplitude from the PLOT (p. 101) button.

E.g.



7.6. Splitting Forces

The Splitting Force calculation utility is activated from the [Model Visualisation Window](#) (p. 53). To start this facility select Splitting Forces from the [Select menu](#) (p. 60).

This facility allows you to calculate the total forces on any part of your model.

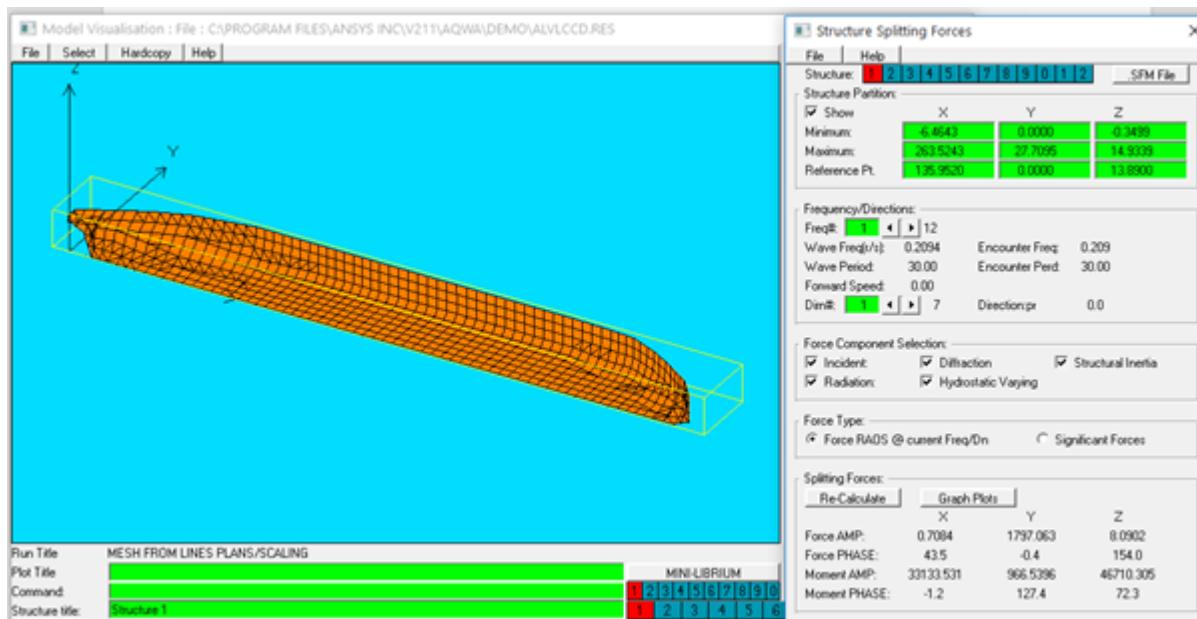
In order for the AGS to calculate the necessary forces you must follow the convention below:

- Run your model in Aqwa-Line to create [*.POT](#) (p. 127) for each wetted element. The .POT file is needed for the calculation of splitting forces.
- Define the Mass Distribution over the vessel. This is input into the AGS in the form of an [.SFM](#) (p. 132) file. Note that the total mass and the resolved LCG of this mass must equal that calculated by Aqwa-Line. Failure to do this will cause the AGS to attempt to resolve the residual forces. However this method may result in non-zero residual forces causing erroneous results in the splitting forces.

Note:

The .POT, .RES, and the [.SFM](#) (p. 132) files must reside in the same directory.

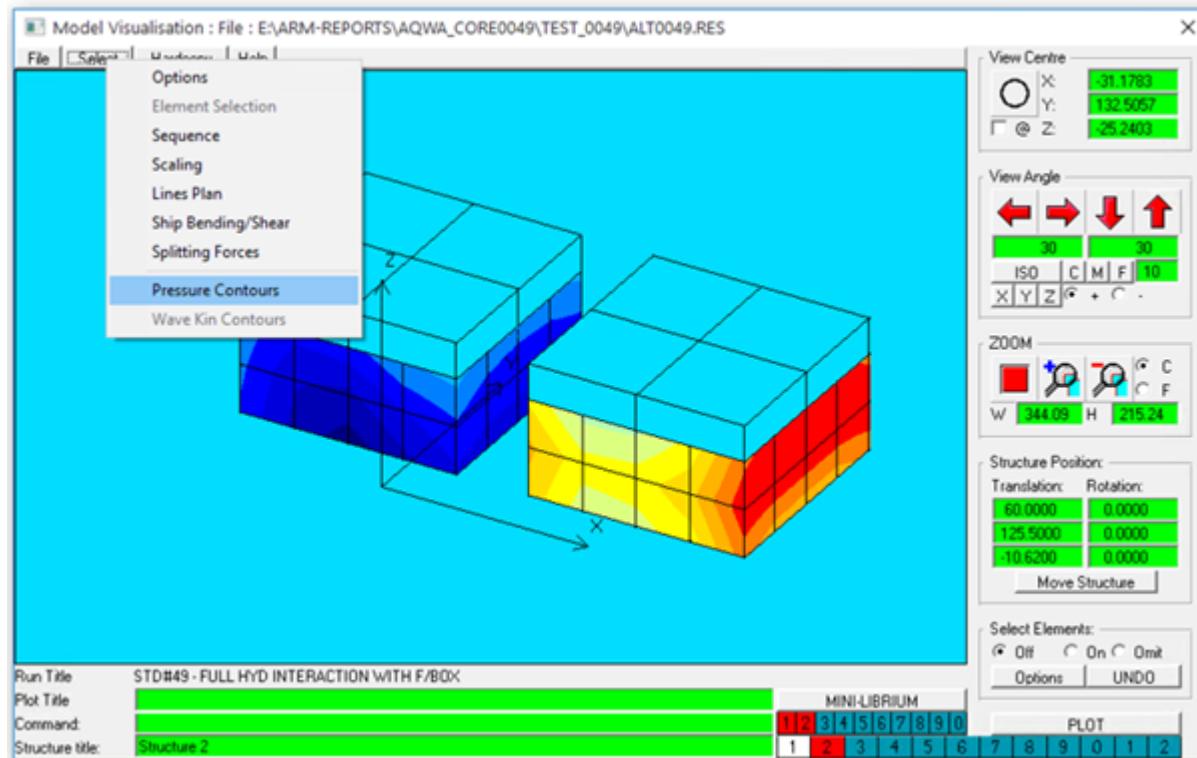
- Open the .RES file within the AGS and select Splitting Forces from the [Select menu](#) (p. 60) of the [Model Visualisation Window](#) (p. 53).



The splitting structure partition, the reference point where the force and moment are calculated with respect to, wave frequency/directions, the force component selection etc can be selected. The splitting forces are showed in the Splitting Forces panel.

7.7. Pressure Contours

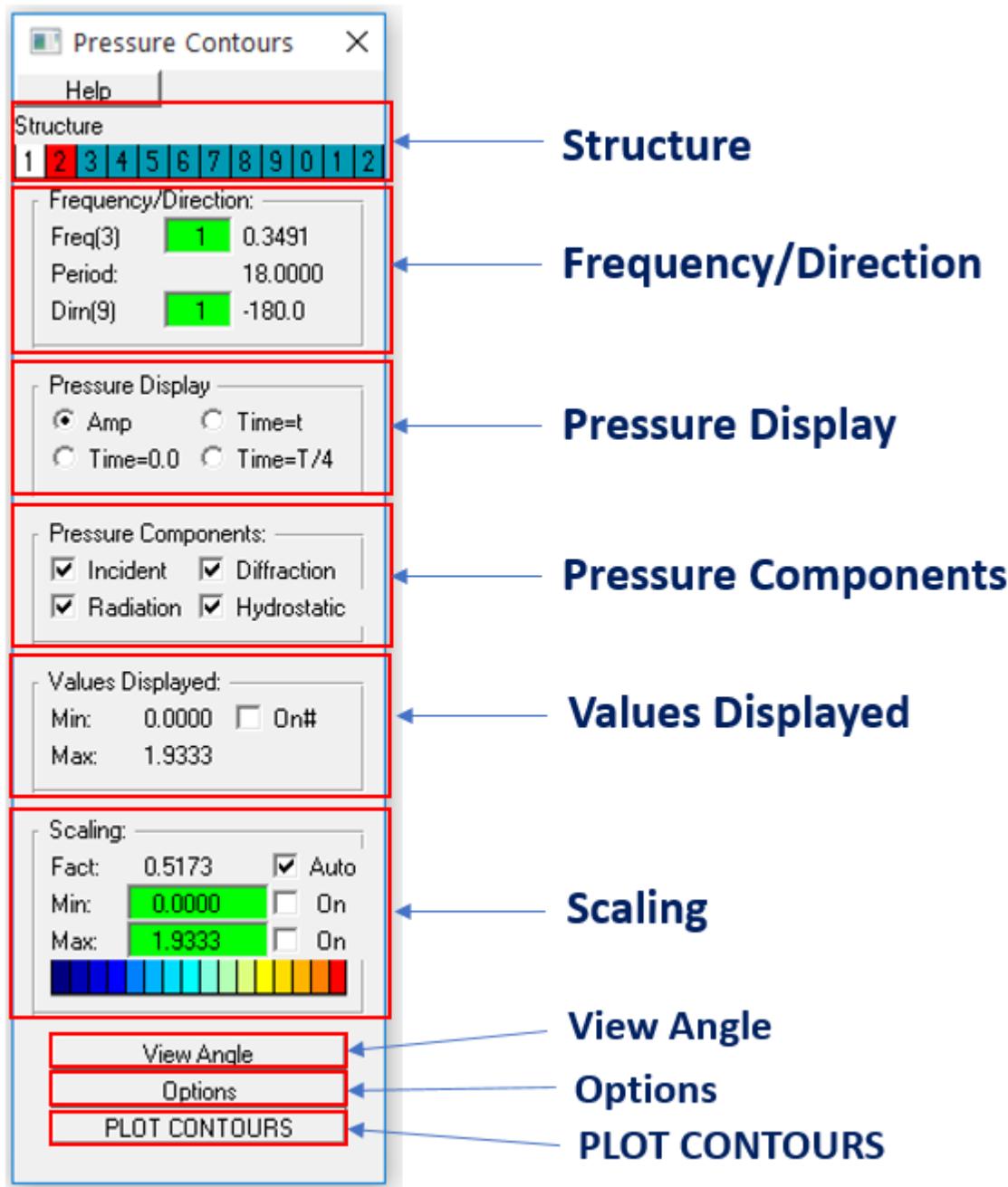
The Pressure Contours dialog box is a component of the Model Visualisation window (p. 53). To activate the Pressure Contours dialog box select pressure contours from the Select menu (p. 60) on the Model Visualisation menu bar (p. 54).



The AGS has the capability of calculating and displaying the components of pressure along your model. To use the facility your model must have been analyzed with Aqwa-Line.

Note:

Pressures can also be output in the .LIS file by including the PRPR option in the options header of the Aqwa-Line run.



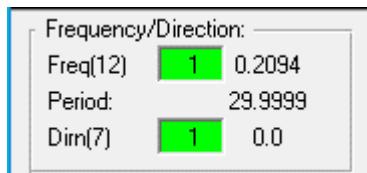
The Pressure Contour dialog box has the following components.

- Structure - Display structures in this model (numbers with white or red backgrounds)

- Frequency/Direction (p. 109) - Define wave frequency / direction
- Pressure Display (p. 109) - Display pressure amp or at input time
- Pressure Components (p. 110) - Display incident, diffraction, radiation and/or hydrostatic pressure components
- Values Displayed (p. 110) - Display of minimum and maximum values
- Scaling (p. 111) - User input of minimum and maximum displayed values
- View Angle (p. 111) - Alter the view position
- Plot Contours (p. 112) - Updates the client area

7.7.1. Frequency / Direction

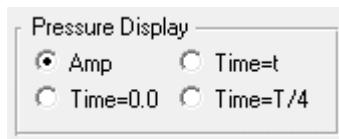
The Frequency/Direction panel is a component of the [Pressure Contours dialog box \(p. 107\)](#) in the [Model Visualisation window \(p. 53\)](#). To activate the Pressure Contours dialog box select pressure contours from the [Select menu \(p. 60\)](#) on the [Model Visualisation menu bar \(p. 54\)](#).



This panel is used for selecting the wave frequency and direction (defined in the Aqwa-Line run) used in the pressure contour plot calculation.

7.7.2. Pressure Display

The Pressure display panel is a component of the [Pressure Contours dialog box \(p. 107\)](#) in the [Model Visualisation window \(p. 53\)](#). To activate the Pressure Contours dialog box select pressure contours from the [Select menu \(p. 60\)](#) on the [Model Visualisation menu bar \(p. 54\)](#).

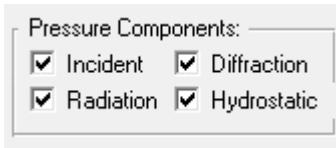


The Pressure display panel has four options:

- **Amp:** This will plot the amplitude of the pressure over the structure.
- **Time=0.0:** This will plot the pressure contours at time=0; in other words, when the crest of the wave is at the CG position of the structure.
- **Time=T/4:** This will plot the pressure contours at T/4, where T is a wave period for the zero forward speed case or an encounter wave period for the forward speed case.
- **Time=t:** This facility will allow you to plot the pressure contours over a period of time. This facility must be used in conjunction with the [Animation \(p. 84\)](#) facility within the AGS. Recording a sequence with this button selected will record the pressure contours in time history.

7.7.3. Pressure Components

The Pressure Components panel is a component of the [Pressure Contours dialog box \(p. 107\)](#) in the [Model Visualisation window \(p. 53\)](#). To activate the Pressure Contours dialog box select pressure contours from the [Select menu \(p. 60\)](#) on the [Model Visualisation menu bar \(p. 54\)](#).



The pressure component panel allows you to choose which components of pressure you wish to be plotted.

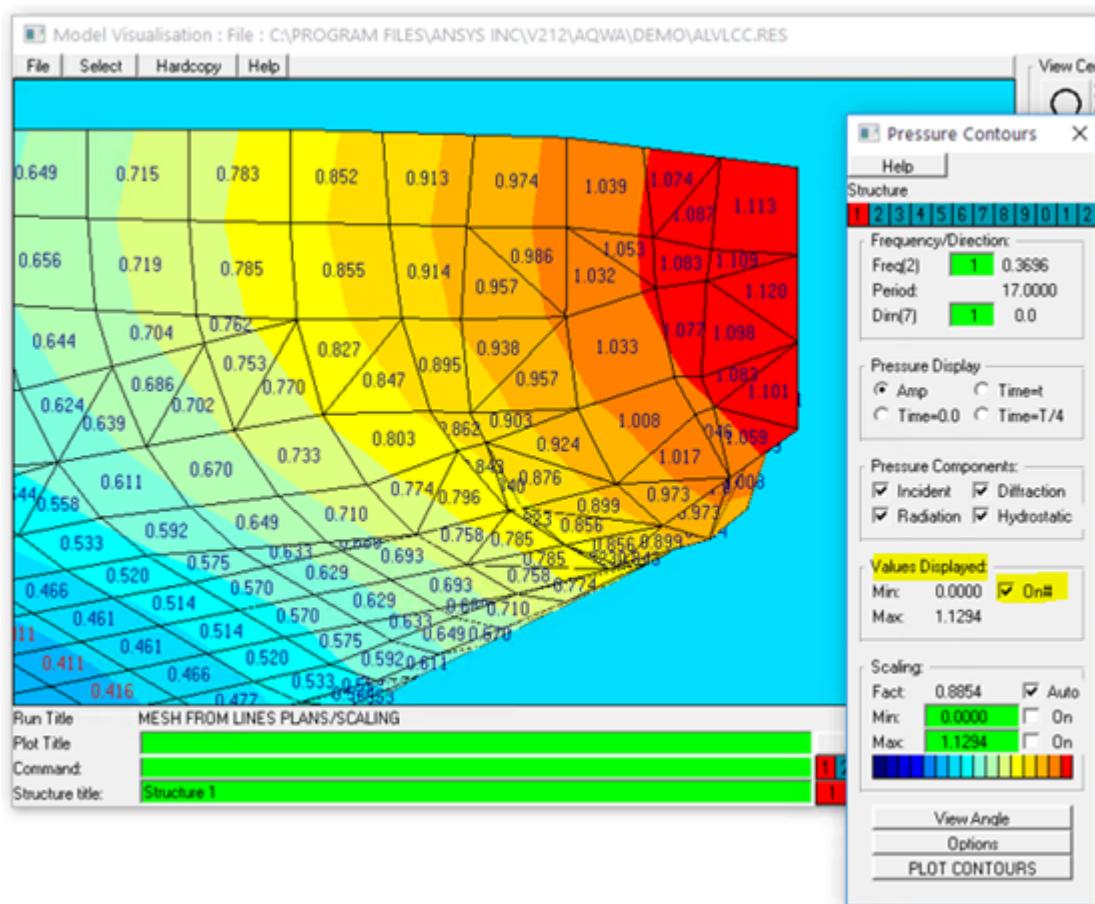
You can plot a combination (or all) of the following components:

- Incident
- Diffraction
- Radiation
- Hydrostatic - Note that this is the value of the hydrostatically varying pressure. i.e. the pressure change due to the varying immersion of the structure.

7.7.4. Values Displayed

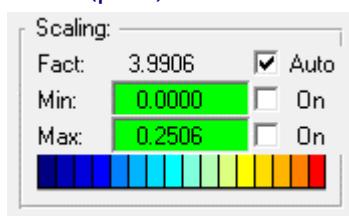
The Values Displayed panel is a component of the [Pressure Contours dialog box \(p. 107\)](#) in the [Model Visualisation window \(p. 53\)](#). To activate the Pressure Contours dialog box select pressure contours from the [Select menu \(p. 60\)](#) on the [Model Visualisation menu bar \(p. 54\)](#).

This panel displays the maximum and minimum pressure component values on the structure surface. To plot the values of pressure at the element centroids select the 'on' button in this panel. The pressure values will be shown on the display.



7.7.5. Scaling

The Scaling panel is a component of the Pressure Contours dialog box (p. 107) in the Model Visualisation window (p. 53). To activate the Pressure Contours dialog box select pressure contours from the Select menu (p. 60) on the Model Visualisation menu bar (p. 54).

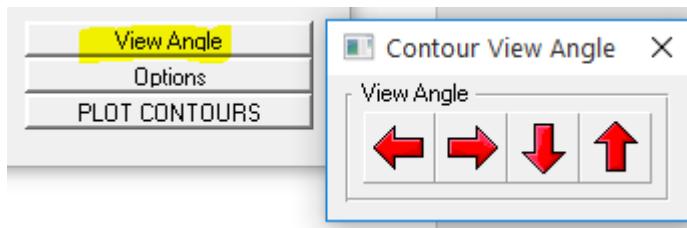


The scaling panel allows you to specify the maximum and minimum pressures to be plotted on the structure. Minimum pressures are displayed as blue increasing to red for maximum pressures.

By default the AGS will automatically set the minimum available value to blue and the maximum available value to red.

7.7.6. View Angle

The View Angle panel is a component of the Pressure Contours dialog box (p. 107) in the Model Visualisation window (p. 53). To activate the Pressure Contours dialog box select pressure contours from the Select menu (p. 60) on the Model Visualisation menu bar (p. 54).



The view angle panel allows you to rotate the model within the [Client Area \(p. 55\)](#). This panel has the same function as the [View Angle \(p. 55\)](#) panel on the Model Visualisation Window (p. 53).

7.7.7. Plot Contours (Pressure)

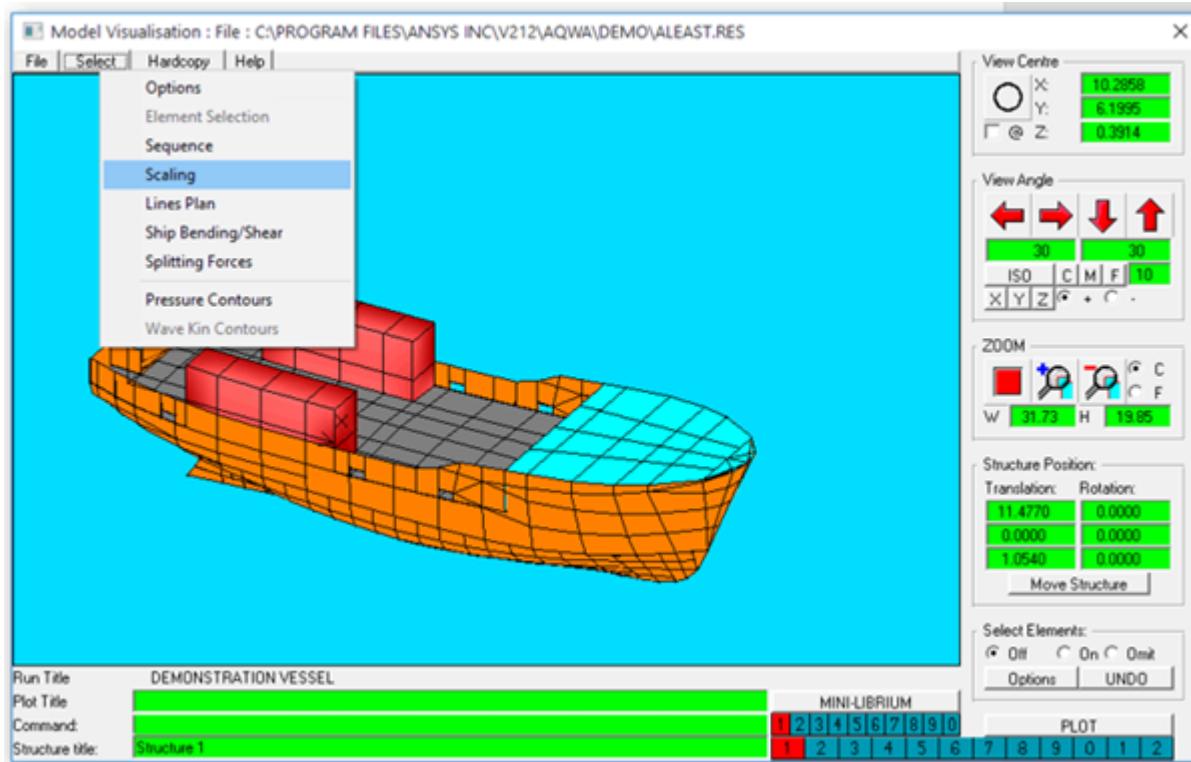
The Plot Contours panel is a component of the [Pressure Contours dialog box \(p. 107\)](#) in the [Model Visualisation window \(p. 53\)](#). To activate the Pressure Contours dialog box select pressure contours from the [Select menu \(p. 60\)](#) on the [Model Visualisation menu bar \(p. 54\)](#).

The **PLOT CONTOURS** button will plot (refresh) the contour plot displayed in the client area of the screen.

To plot contours on your structure you must have run the model in Aqwa-Line. From the [Pressure Contours \(p. 107\)](#) dialog box select the [Pressure Components \(p. 110\)](#) and [Frequency/Direction \(p. 109\)](#) that you wish to plot and then press this button.

7.8. Mesh Scaling

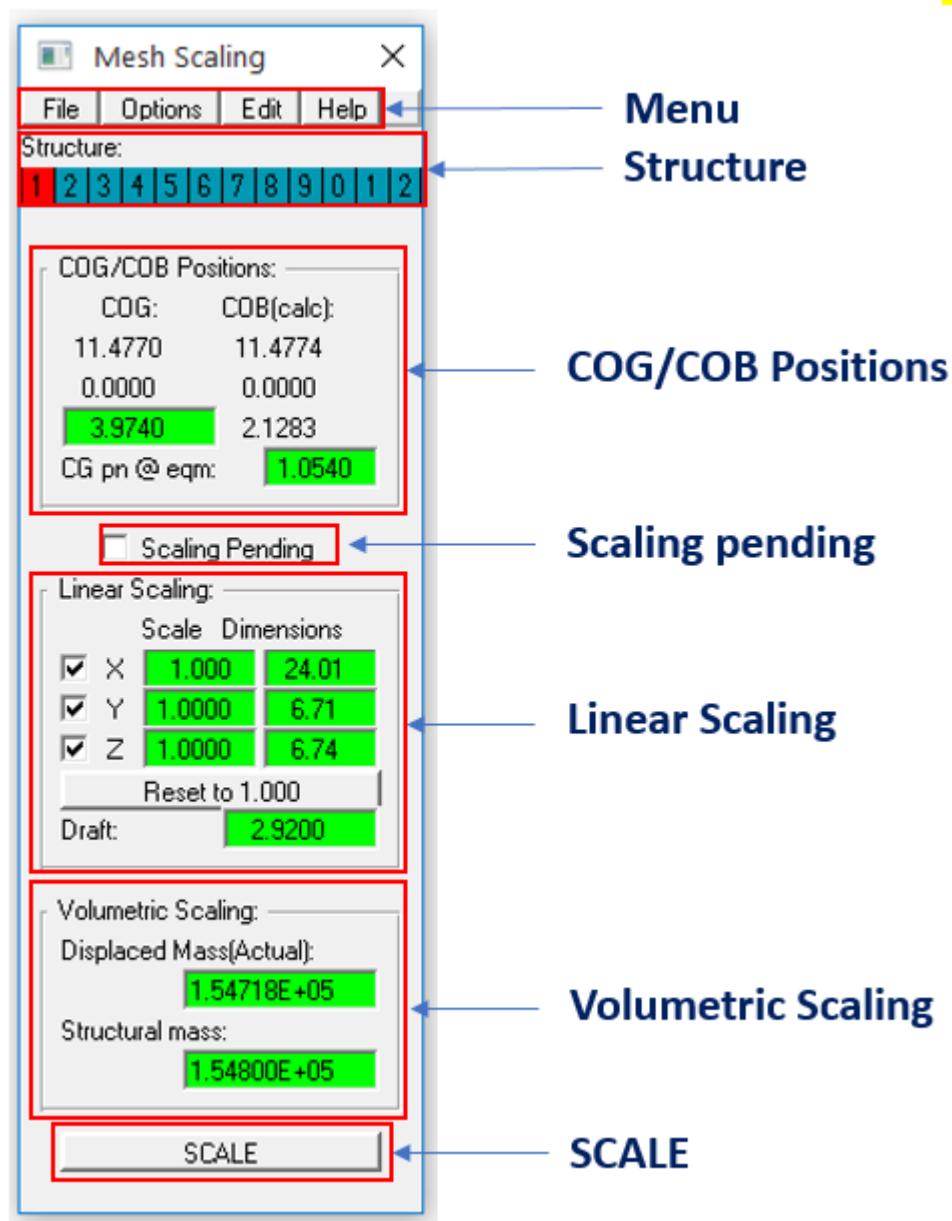
The Mesh Scaling dialog box is a component of the [Model Visualisation window \(p. 53\)](#). To activate the Mesh Scaling dialog box select scaling from the [Select \(p. 60\)](#) menu on the [Model Visualisation menu bar \(p. 54\)](#).



The AGS has the facility to scale an existing model mesh. The facility is used from within the Model Visualisation window and scales structures within an open .RES (p. 127) file. The scaling can be performed as a linear function in X and/or Y and/or Z of the Fixed Reference Axis (FRA). Volumetric scaling can also be performed by altering the displaced or structural mass of the structure.

Once an existing structure has been scaled the new mesh information can be stored in a .DAT (p. 127) file by selecting Save from the menu bar.

The Mesh scaling dialog box is as follows:

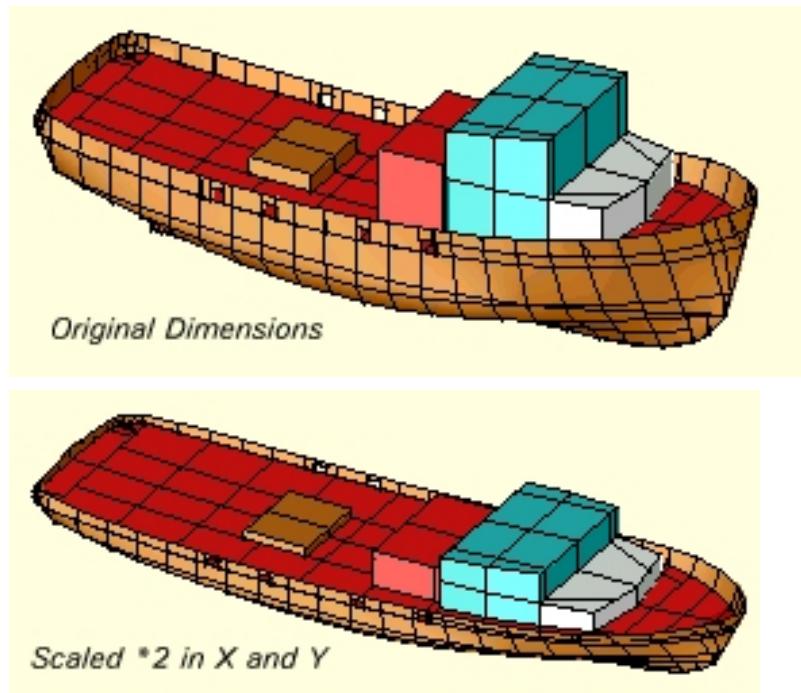


The components of the dialog box are:

- **Menu** (p. 114) - Saves the new model information and accesses the help system
- **Structure** (p. 115)- Choose the structure for scaling

- [COG/COB Positions \(p. 115\)](#)- Displays the new values of COG and COB
- [Scaling Pending \(p. 116\)](#) - Scaling indicator
- [Linear Scaling \(p. 116\)](#) - Scale the structure along the Fixed Reference Axis (FRA)
- [Volumetric Scaling \(p. 116\)](#) - Scale the structure by altering the structural mass or displaced mass
- [SCALE \(p. 117\)](#)

An example of a structure scaled in X and Y is given below.

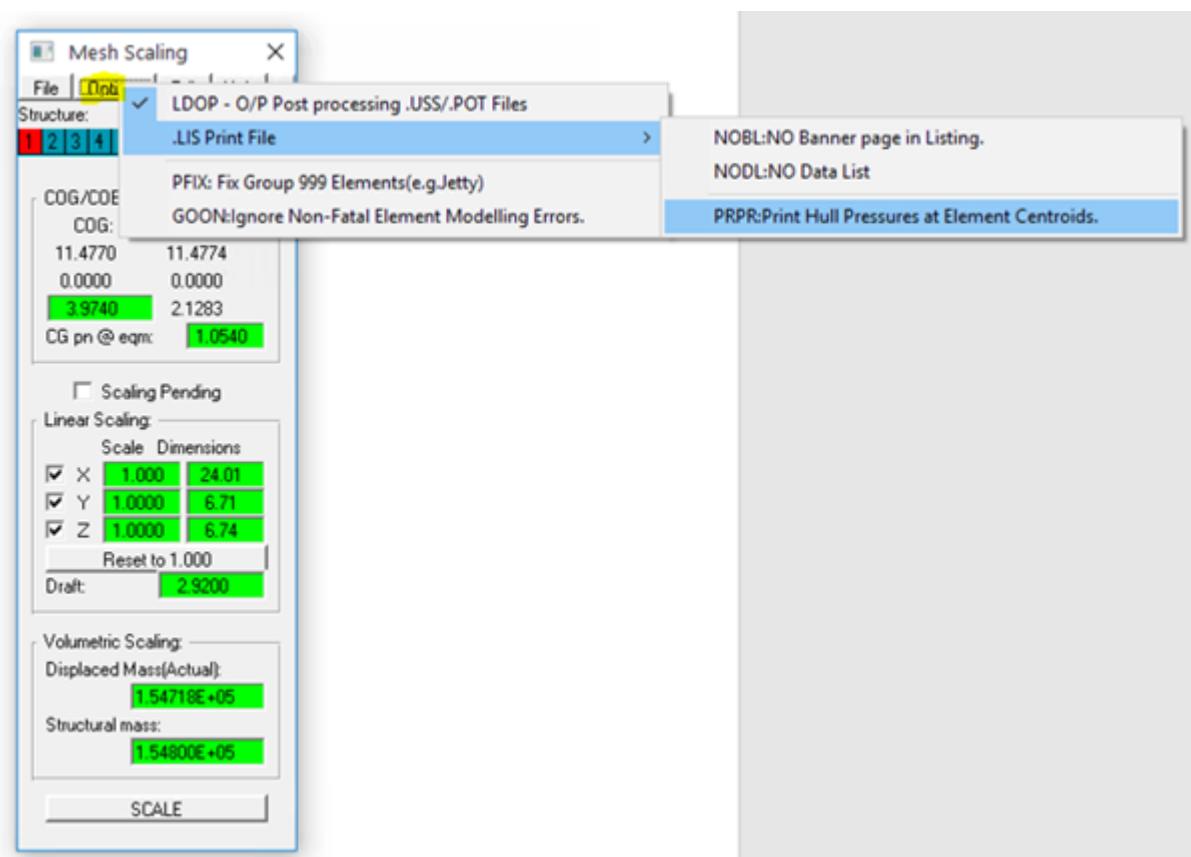


7.8.1. Menu

This is a component of the [Mesh Scaling dialog box \(p. 112\)](#) which in turn is a component of the [Model Visualisation window \(p. 53\)](#). To activate the Mesh Scaling dialog box select scaling from the Select menu ([p. 60](#)) on the [Model Visualisation menu bar \(p. 54\)](#).

The scaling menu allows you to save a scaled model mesh definition as a .DAT file. This is done by selecting Save from the menu. The data will be stored in a default .DAT file.

Selecting Options in this menu panel will add in the specified options in the generated file of the scaled model.



Selecting help will activate the help system.

7.8.2. Structure

This is a component of the [Mesh Scaling dialog box \(p. 112\)](#) which in turn is a component of the [Model Visualisation window \(p. 53\)](#). To activate the Mesh Scaling dialog box select scaling from the [Select menu \(p. 60\)](#) on the [Model Visualisation menu bar \(p. 54\)](#).

The structure panel allows you to select different structures for scaling.

7.8.3. COG / COB Positions

This is a component of the [Mesh Scaling dialog box \(p. 112\)](#) which in turn is a component of the [Model Visualisation window \(p. 53\)](#). To activate the Mesh Scaling dialog box select scaling from the [Select menu \(p. 60\)](#) on the [Model Visualisation menu bar \(p. 54\)](#).

This panel reflects the COG and COB positions.

COG/COB Positions:	
COG:	COB(calc):
135.9520	135.9518
0.0000	0.0000
13.8900	7.6936
CG pn @ eqm:	-0.6800

7.8.4. Scaling Pending

This is a component of the [Mesh Scaling dialog box \(p. 112\)](#) which in turn is a component of the [Model Visualisation window \(p. 53\)](#). To activate the Mesh Scaling dialog box select scaling from the [Select menu \(p. 60\)](#) on the [Model Visualisation menu bar \(p. 54\)](#).

The Scaling Pending button reflects the state of scaling. The button will be checked if the [Linear \(p. 116\)](#) or [Volumetric \(p. 116\)](#) Scaling properties have been modified but the [SCALE \(p. 117\)](#) button has not been pressed.

7.8.5. Linear Scaling

This is a component of the [Mesh Scaling dialog box \(p. 112\)](#) which in turn is a component of the [Model Visualisation window \(p. 53\)](#). To activate the Mesh Scaling dialog box select scaling from the [Select menu \(p. 60\)](#) on the [Model Visualisation menu bar \(p. 54\)](#).

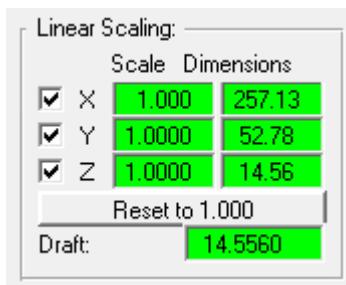
The Linear Scaling panel allows you to alter the structures dimensions in X and/or Y and/or Z. You may enter a scaling factor, or alter a physical dimension value. The XYZ toggle buttons allow you to constrain scaling in the respective directions. For example, if the [volumetric scaling \(p. 116\)](#) is used you may wish to have no scaling in the X direction. Simply deselect the X toggle button to do this.

Clicking the Reset to 1.000 button will reset the structures dimensions to the original dimensions.

The draft text box reflects the new draft position.

Note:

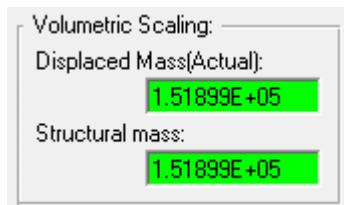
If the scaling values are altered select the [SCALE \(p. 117\)](#) button to perform the scale operation.



7.8.6. Volumetric Scaling

This is a component of the [Mesh Scaling dialog box \(p. 112\)](#) which in turn is a component of the [Model Visualisation window \(p. 53\)](#). To activate the Mesh Scaling dialog box select scaling from the [Select menu \(p. 60\)](#) on the [Model Visualisation menu bar \(p. 54\)](#).

The Volumetric Scaling panel allows you to alter the displaced or structural mass of the structure. This alteration will be reflected in the [Linear scaling \(p. 116\)](#) panel in X, Y and Z. If you wish to constrain the scaling in any direction deselect the X, Y or Z toggle button in the Linear Scaling panel.



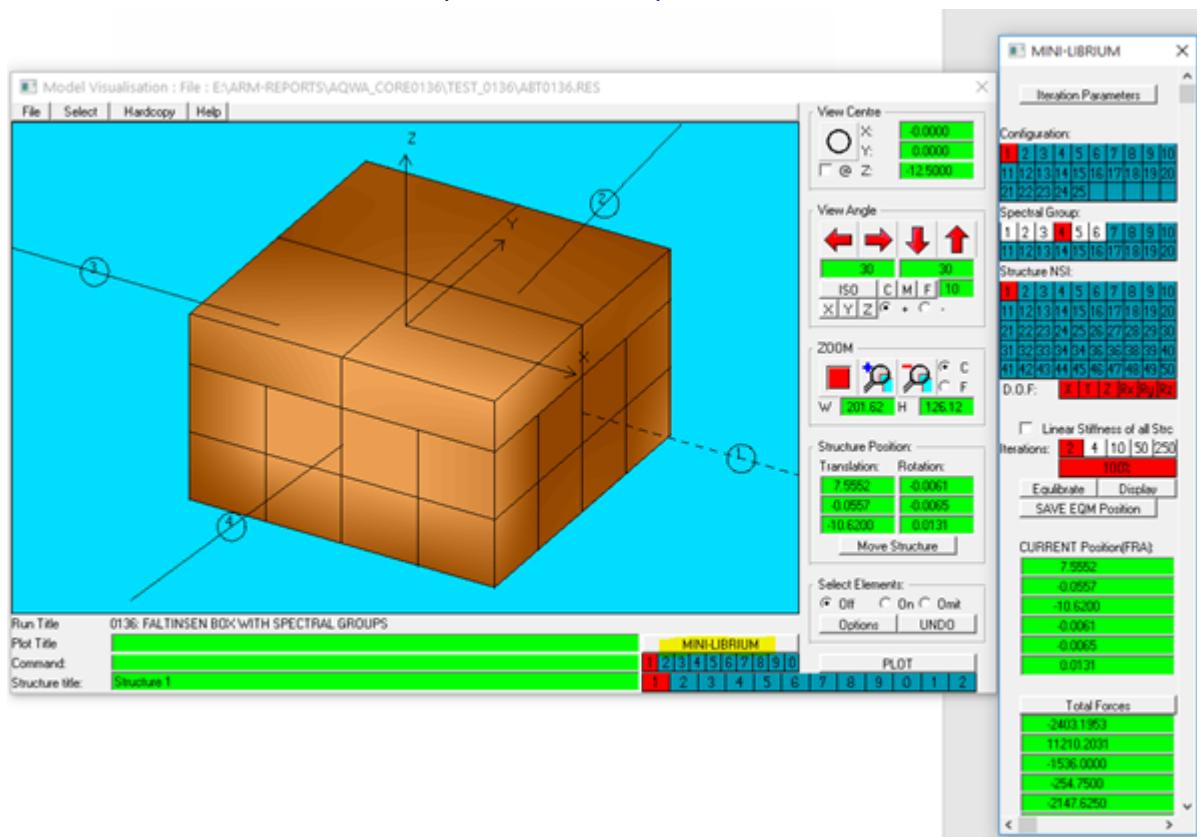
7.8.7. Scale

This is a component of the [Mesh Scaling dialog box \(p. 112\)](#) which in turn is a component of the [Model Visualisation window \(p. 53\)](#). To activate the Mesh Scaling dialog box select scaling from the [Select menu \(p. 60\)](#) on the [Model Visualisation menu bar \(p. 54\)](#).

The SCALE button performs the scaling defined in the [Linear Scaling \(p. 116\)](#) or [Volumetric Scaling \(p. 116\)](#) panels. To reset the structure dimensions to their original value select reset to 1.000 in the [Linear Scaling panel \(p. 116\)](#).

7.9. Mini-Librium

Mini-Librium is a sub-set of the analysis package Aqwa-Librium. This feature is accessible through the [Model Visualisation window \(p. 53\)](#). Licensed users can also use the full version of Librium within the AGS. For more information on this please see [here \(p. 34\)](#).



Chapter 8: The AGS Wave Contour Window

This window shows the incident / diffracted / radiated wave surface contours with second order effects. Air gap can also be shown by including RAO motions. Significant values can be shown for the current spectrum. The following topics are covered in this chapter:

8.1. Wave Contour Menu



This menu has the following options:

- File - The file menu allows you to open .RES (p. 127) files which contain Aqwa results.
- Hardcopy - The current image is copied to the clipboard.
- Graph Options (p. 119) - Displays graph options of currently displayed values.
- Help (p. 45) - The Help menu (displayed on all menu bars) allows you access to the Aqwa online help system from anywhere within the Aqwa Graphical Supervisor.

8.1.1. Graph Options



This menu has the following options:

- **Structure SWL (start @CURSOR pn.)** - Produces a graph of the currently displayed values along the waterline starting nearest the cursor position. Click on Graphs button on main AGS menu to view.
- **X Grid (left to right)** - Produces a graph of the currently displayed values along the X grid (left to right) starting at the nearest Y cursor position. Click on Graphs button on main AGS menu to view.
- **Y Grid (bottom to top)** - Produces a graph of the currently displayed values along the Y Grid (bottom to top) starting at the nearest X cursor position. Click on Graphs button on main AGS menu to view.

8.2. Plot Selection

The Plot Selection Window gives you access to the following plot options:

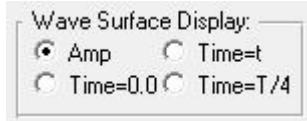
- 8.2.1. Frequency / Direction
- 8.2.2. Wave Surface Display
- 8.2.3. Wave Surface Component
- 8.2.4. Values Displayed
- 8.2.5. Zoom
- 8.2.6. Plot Options
- 8.2.7. Options

8.2.1. Frequency / Direction



Select the structure number, and wave frequency and direction to be contoured.

8.2.2. Wave Surface Display



This panel has the following options:

- **Amp** - When selected the wave amplitude is contoured, for second order calculations the peak amplitude is used.
- **Time=t** - Displays wave contours at the current time (for cycling through wave contours).
- **Time=0.0** - Displays the wave contours at time=0, when the wave crest is above the centre of gravity.
- **Time=T/4** - Displays the wave contours a quarter of the way through the wave cycle.

8.2.3. Wave Surface Component



Incident, Diffraction, and Radiation components can be added or subtracted from the contour plot.

The **RAO Motion** switch enables the wave height with respect to a user-specified "horizontal deck" to be visualized; in this way, the air gap can be assessed.

8.2.4. Values Displayed



Minimum and maximum values of wave elevation.

8.2.5. Zoom



Zooms in by a factor of two when selected.

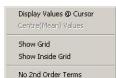
8.2.6. Plot Options



This panel has the following options:

- **Scaling** - Enables user specification of contour scale
- **Options** (p. 121) - Displays wave contour display options.
- **Cycle** - Animates contours through the wave cycle.
- **STOP** - Stops animated contouring.
- **Wave Amplitude** - Specification of the amplitude of the incident wave.
- **Significant Wave Amp** - If a spectrum is defined, the significant wave amplitude can be plotted. The spectrum can be reviewed or modified by clicking on Edit - Environment - Wave Spectra, from the Main AGS menu.
- **PLOT CONTOURS** - Updates contour plot or starts animation.

8.2.7. Options



This menu has the following options:

- **Display Values @ Cursor** - Reports wave elevation and slope to message window.
- **Show Grid** - Overlays numerical grid on plot.
- **Show Inside Grid** - Highlights grid points inside vessel.
- **No 2nd Order Terms** - Second order terms removed from plot.

Chapter 9: The AGS Cable Dynamics Window

This window enables the analysis of cable dynamics in terms of line configuration and forces.

Note:

When using this window it is not necessary to have first modeled cable dynamics in the batch runs as results are recalculated within the AGS. However for analysis of cable motion governed by the time history of the position of the fairlead, results may be wrong if cable dynamics were not considered in the generation of the .pos file.

9.1. Cable Dynamics Window Menu

File | Help |

This menu has the following options:

- File - The file menu allows you to open .RES (p. 127) files which contain Aqwa results.
- Help (p. 45) - Access to the file system.

9.2. Plot Selection

The Cable Dynamics Plot Selection Window contains the following sections:

9.2.1. Structure/Mooring Line Selection

9.2.2. EDIT

9.2.3. Fairlead Motion

9.2.4. Time Integration

9.2.5. Run Analysis

9.2.6. Graph #1 Selection

9.2.7. Graph #2 Selection

9.2.1. Structure/Mooring Line Selection



This panel has the following options:

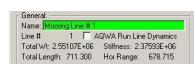
- Structure - Select the structure which the mooring line is attached to.
- Mooring Line - The mooring line to be analyzed.

- **EDIT** (p. 124) - Press to display or edit the current mooring line properties.
 - Verification - Press to display verification information and load associated models.

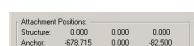
9.2.2. EDIT

This window displays and permits editing of the current mooring line properties'.

Properties of currently selected line:



Attachment positions:



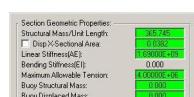
The anchor location can be changed in order to achieve the specified anchor or fairlead pre-tension and heading:



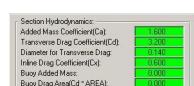
Selection of cable section:



This panel describes the geometry of the currently selected section:



This panel displays the hydrodynamic parameters relating to the cable dynamics analysis:



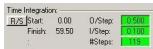
9.2.3 Fairlead Motion



This panel allows fairlead motion to be imposed and has the following options:

- **None** - No imposed fairlead motion.
 - **Linear Response** - Imposes the linear response at the fairlead due to the current spectrum.
 - **SHM/Transient** - To impose Simple Harmonic Motion.
 - **Time/History(.POS)** - Imposes Motion of fairlead read from positions file.

9.2.4. Time Integration



This panel defines the time integration parameters for the full non-linear time history in terms of:

- **O/Step** - The time step.
- **I/Step** - The inner time step for the cable.
- **# Steps** - The number of steps.

These parameters can be set back to the current values for the simulation by clicking the R/S (reset) button.

9.2.5. Run Analysis



Select the type of analysis to be performed:

1. **Static** - An Aqwa-Librium type analysis.
2. **Linearised Frequency Domain** - The drag is linearized
3. **Linearised Modal (Eigenvector)** - The drag is not considered
4. **Linearised Time History** - The drag is linearized
5. **Full Non-Linear Time History** - Include all the nonlinear drag

Hold values of Linearised Drag - having performed drag linearization, the values can be retained for the next analysis.

9.2.6. Graph #1 Selection



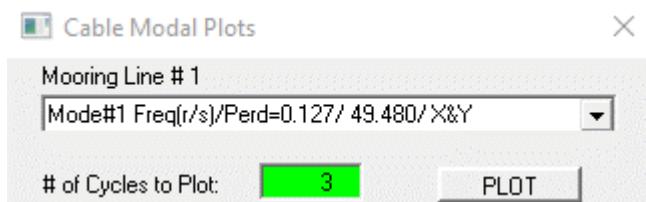
Selects the parameter to be plotted in the upper graph from the following options:

- Configuration
- Relative Normal Motion
- Element Tension
- Strain (Extension/length)
- Energy (Full T/H only)

Quasi-Static Solution - Superimposes the quasi-static solution onto the cable dynamics analysis results.

Auto-SAVE to Selected Graphs - This option allows the upper plot to be viewed in the AGS graphs window.

Mode Plots - Plot selections for cable modals. Run Linearised Modal (Eigenvector) to get inputs.



9.2.7. Graph #2 Selection



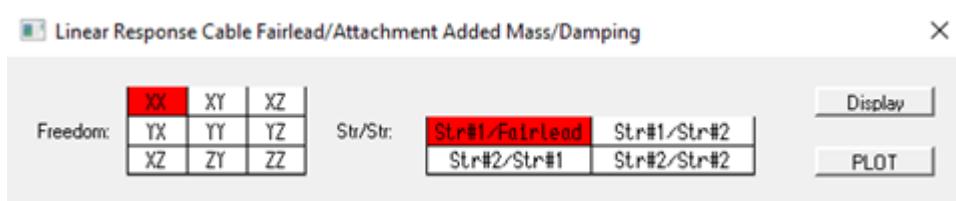
Selects the parameter to be plotted in the lower graph from the following options:

- Top/Str #2 Tension
- Top/Str #2 Reaction (FRA)
- Anchor/Str #1 Reaction (FRA)
- Anchor/Str #1 Tension
- Node Tension
- Node Position
- Node Velocity
- Touchdown Point
- Cable Energy

Quasi-Static Solution - Superimposes the quasi-static solution onto the cable dynamics analysis results.

Auto-SAVE to Selected Graphs - This option allows the lower plot to be viewed in the AGS Graphs window.

Added Mass/Damping – Plot selection for the linear response of cable fairlead and attachment added mass/damping. Display selection for the low frequency fairlead equivalent added mass/damping and cable fairlead stiffness.



Chapter 10: AGS File Formats

The input and output files used throughout the Aqwa suite are described in [Aqwa Files in the Aqwa Reference Manual](#). The following files used by the AGS are described there.

- .DAT - Aqwa data file
- .HYD - Aqwa hydrodynamic database
- .LIS - Aqwa Results File (ASCII plain text)
- .PCX - Zsoft Graphics bitmap format
- .PLT - Aqwa Graph data file
- .POS - Aqwa position file
- .RES - Aqwa Results / Restart file
- .SHB - Aqwa Sheer Force & Bending Moment results file.
- .PAC - Centroid pressures
- .PAG - Grid point pressures
- .POT - Potential at each element
- .USS - Unmodified Source Strengths
- .WHT - Wave height time history
- .WVT - Wind velocity time history

These input and output files are described in more detail in this section.

- [.LIN \(p. 129\)](#) - Aqwa lines plan
- [.MSD \(p. 130\)](#) - Mass distribution of a vessel; used for shear force and bending moment calculation
- [.SEQ \(p. 132\)](#) - Aqwa Sequence (animation) file

The following additional files output by the AGS are described in this section:

- [.BMP \(p. 128\)](#) - Bitmap format
- [.CSV \(p. 128\)](#) - Spreadsheet file
- [.HGL \(p. 128\)](#) - Hewlett Packard Graphics format

- [.PSC \(p. 132\)](#) - Adobe Postscript (text/graphics) format
- [.PTA \(p. 132\)](#) - ASCII table which stores graph data in text form

10.1. Format Requirements

All Aqwa ascii input files will accept the following:

- Comments starting in any column, but the 1st non-blank character must be one of * ! /
- Blank lines
- Upper or lower case

'Free format' files, (in other words, those with values separated by commas or blanks) will also accept TAB characters.

10.2. The .BMP File Format

The Aqwa .BMP is the bitmap image file. It is created in the Aqwa Graphical Supervisor's [animations \(p. 84\)](#) facility.

10.3. The .CSV File Format

The CSV (comma separated variables) are an ASCII (plain text) representation of spreadsheet data. The values are separated by commas, which indicate the separating points for columns. Many spreadsheet programs, notably Microsoft Excel (TM), can read CSV data for the Macintosh or PC.

The CSV format is used in the Aqwa Graphical Supervisor to output [graph \(p. 35\)](#) data in tabular form. This file can then be read.

10.4. The .HGL File Format

An HPG graphics file can be output for any image displayed on the client areas of the system. To output a graphics file select [Hardcopy \(p. 45\)](#) from the menu bar. You may also produce a [Postscript \(p. 127\)](#) graphics file or copy an image to the clipboard.

HPG (Hewlett Packard Graphics Language - HPGL) is vector/text format which can be copied directly to a HPGL compliant printer or embedded in a word processor. Because the format is vector the image can be resized (and stretched) without any undesirable distortion of the image data.

The Internet is a good source of information on the HPGL language. Hewlett Packard also produce a book, *The HP-GL/2 and HP RTL Reference Guide - A Handbook for developers - ISBN: 0-201-63325-6*, which is a generic guide to the language.

10.5. The .LIN File Format

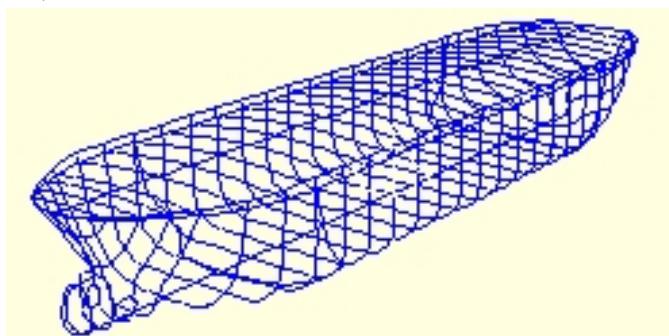
The Aqwa .LIN file is an ASCII (i.e. text) file used in the development of a ship/boat mesh within the AGS [meshing \(p. 94\)](#) facility. The file contains the definition of a ship lines plan's sections as a series of user input offsets.

It is up to the user to prepare the .LIN plan ready for meshing.

The following example demonstrates the convention used in the .LIN file. Each section is defined free-format ([TAB] or space(s) delimited) in X Y and Z with Z increasing from keel to top.

Example

The following set of ship section offsets would be read from the lines plan and input in the following way.



*.LIN as follows (note that this is a cut down version of the file):

The first line contains the X value, the second the Y, and the third Z.

Section 1: (this line is a comment...do not include)

-135.800	0.000	16.000
-135.800	1.440	16.500
-135.800	2.100	17.000
-135.800	4.970	21.000
-135.800	5.350	22.000
-135.800	5.640	23.000
-135.800	5.820	24.000
-135.800	5.940	25.000
-135.800	6.000	26.100
-135.800	0.000	26.130

Section 2: (this line is a comment...do not include)

-133.150	0.000	14.990
-133.150	0.030	15.000
-133.150	6.130	20.000
-133.150	6.610	21.000
-133.150	6.980	22.000
-133.150	7.270	23.000
-133.150	7.460	24.000
-133.150	7.580	25.000
-133.150	7.630	26.090
-133.150	0.000	26.120

Section n....: (this line is a comment...do not include)

136.650	0.000	1.730
136.650	0.210	2.000
136.650	0.410	2.500
136.650	0.460	11.000
136.650	0.370	11.500
136.650	0.230	12.000
136.650	0.000	12.270
136.650	0.000	27.670
136.650	1.840	28.000
136.650	2.860	28.460
136.650	0.000	28.460

Tips:

Condense your stations at high areas of surface change.

Only two stations are needed to define a parallel midbody section of a vessel: one at either end of the parallel section.

Restrictions:

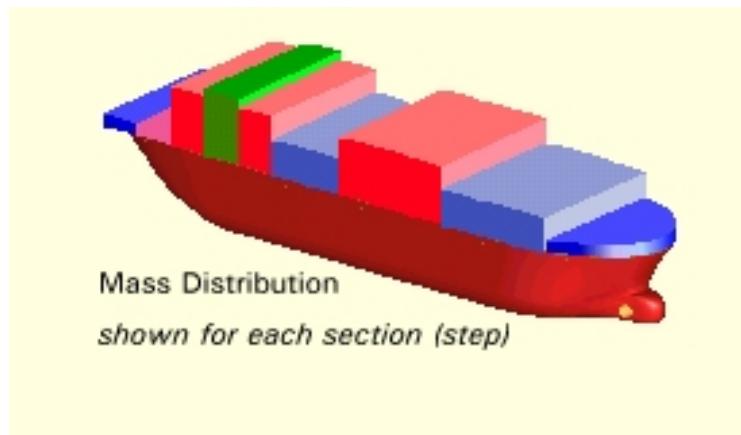
A bulbous bow cannot extend further forward than the forepeak.

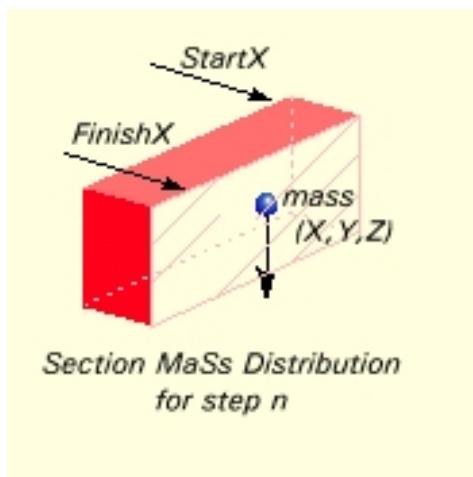
An attempt to represent a vertical step (e.g. in the deck) is likely to be unsuccessful.

10.6. The .MSD File Format

The Aqwa MSD (**MaSs Distribution**) file is used in the bending moment and shear force calculation utility within the AGS. The file should have the same name as the .RES file; for example, ALTEST.MSD, where there exists ALTEST.RES, ALTEST.USS, etc. files.

The file is a user input (ASCII - plain text) of the neutral axis and the mass distribution of the vessel. The bending moment and shear force can be calculated along any of the global axes and the MSD file can be used to define a corresponding mass distribution. Typically a conventional ship will be modelled with its longitudinal axis along the global X axis, but for a spar the variation of shear force and bending moment along a vertical (global Z) axis will probably be required. A ship may be split into 50 segments (steps) from aft to forward, with the mass distribution defined as a lump mass for each segment. The maximum number of steps is 100.





The MSD file defines:-

1. the direction and position of the neutral axis
2. each lumped mass value
3. the position in X, Y, Z of each lumped mass
4. the distribution of each mass in the direction of the neutral axis (start position, finish position)
5. moment of inertia OR radius of gyration about the neutral axis

To specify a neutral axis parallel to the global X direction enter NEUTRAL-X followed by the Y and Z coordinates of the neutral axis. For the global Y direction enter NEUTRAL-Y followed by X and Z coordinates. For the global Z direction enter NEUTRAL-Z followed by X and Y coordinates.

The steps must be placed in a sequential order along the neutral axis.

To specify Ixx enter the option IXX on line 4 of the file, similar for Iyy or Izz. If the option IXX is not specified on this line then radius of gyration will be assumed. If you only require BM & SF calculations in the default direction then the column [IXXVALUE or radius of gyration] may be left blank.

A typical MSD file for a ship would look as follows.

```
TANKER EXAMPLE,,,,,,,
SECTION,MASS,X,Y,Z,STARTX,FINISHX, Ixx (or radius or gyration)
NEUTRAL-X, 0.0, 9.97
IXX
STEP 1, 289.7, -2.000,0.000,13.426, -4.000, 0.000, [IXXVALUE or radius of gyration]
STEP 2, 327.8, 2.000,0.000,13.426, 0.000, 4.000, [IXXVALUE or radius of gyration]
STEP 3, 337.8, 6.000,0.000,13.426, 4.000, 8.000, [IXXVALUE or radius of gyration]
STEP 4, 538.3, 10.000,0.000,13.426, 8.000, 12.000, [IXXVALUE or radius of gyration]
STEP 5, 690.5, 14.000,0.000,13.426, 12.000, 16.000, [IXXVALUE or radius of gyration]
STEP 6, 691.4, 18.000,0.000,13.426, 16.000, 20.000, [IXXVALUE or radius of gyration]
STEP 7, 782.0, 22.000,0.000,13.426, 20.000, 24.000, [IXXVALUE or radius of gyration]
STEP 8, 762.5, 26.000,0.000,13.426, 24.000, 28.000, [IXXVALUE or radius of gyration]
STEP 9, 786.7, 30.000,0.000,13.426, 28.000, 32.000, [IXXVALUE or radius of gyration]
STEP 10, 1214.0, 34.000,0.000,13.426, 32.000, 36.000, [IXXVALUE or radius of gyration]
STEP 11, 1493.0, 38.000,0.000,13.426, 36.000, 40.000, [IXXVALUE or radius of gyration]
STEP 12, 1548.7, 42.000,0.000,13.426, 40.000, 44.000, [IXXVALUE or radius of gyration]
STEP 13, 1779.2, 46.000,0.000,13.426, 44.000, 48.000, [IXXVALUE or radius of gyration]
```

```
STEP n,2302.3, 50.000,0.000,13.426, 48.000, 52.000, [IXXVALUE or radius of gyration]
STEP 50,2825.5, 54.000,0.000,13.426, 52.000, 56.000, [IXXVALUE or radius of gyration]
```

10.7. The .PSC File Format

The Aqwa .PSC graphics file can be output for any image displayed in the client areas of the AGS. To output a graphics file select [Hardcopy \(p. 88\)](#) from the menu bar. You may also produce a postscript graphics file or copy an image to the clipboard.

PSC (Adobe PostScript Language - PS) is vector/text format which can then be copied directly to a PS compliant printer or accessed through a PS compliant application such as GhostScript or ROPS32. Because the format is vector, the image can be resized (and stretched) without any undesirable distortion of the image data.

The Internet is a good source of information on the PS language. Adobe also produce two books, *PostScript Language Reference Manual - ISBN: 0-201-10174-2* and *PostScript Language Tutorials and Cookbook - ISBN: 0-201-10179-3*, which give detailed information on the language.

10.8. The .PTA File Format

The Aqwa .PTA format is an ASCII (plain text) file which stores graph data in text form.

10.9. The .SEQ File Format

The Aqwa .SEQ file is an [animation \(p. 84\)](#) sequence created in the AGS animations facility.

The .SEQ file is in binary format and uses advanced compression algorithms to store a series of bitmaps (frames) in as a compressed file.

The .SEQ file can also be played with the animation facility.

10.10. The .SFM File Format

The Aqwa .SFM (**S**plitting **F**orce **M**ass) file is used in the splitting forces calculation utility within the AGS. The file should have the same name as the .RES file, prefixed by AL; for example, ALTEST.SFM, where there exists ALTEST.RES, ALTEST.USS, etc. files.

The file is a user input (ASCII - plain text) of a number of point masses defining the mass distribution of the vessel.

The format of the ASCII .SFM file is a .CSV (comma separated variables) file with the following format.

```
TITLE Example Data File
STRUCTURE,1
User Code, Mass, X, Y, Z, Ixx, Ixy, Ixz, Iyy, Iyz, Izz
    Repeated as necessary
END
```

where:

User Code: Used for reference to each record for data errors

Mass: Value of the point mass

X, Y, Z: Position of the point mass

I_{xx}, etc.: 6 optional inertias for the point mass

Also see the bubble help in the AGS for more details.

10.11. Using The AGS With Other Applications

Aqwa results (.LIS) can be viewed with any ASCII text editor, while [.CSV \(p. 128\)](#) files may be read by any ASCII editor, or can be imported into a spreadsheet.

[.HGL \(p. 128\)](#) files can be printed directly to a HPGL compatible printer (ask your IT technician for details). HPGL files can also be imported into a Word processor (provided that the word processor has the necessary filter).

Chapter 11: Aqwa-Plane Commands

The Aqwa Graphical Supervisor continues to support a limited number of commands from Aqwa-Plane - historically the results processor for Aqwa.

These commands have been included in the AGS environment because of the powerful functionality that they give to the user. The commands (entered in the [Command \(p. 59\)](#) text box) allow you select part of the structure(s) to be drawn. Using the system in this way allows you to correct any modeling errors. For example, you may wish to view a selected number of elements that share a common node.

The following options are available:

- [View selected elements \(p. 135\)](#)
- [View elements sharing a common node\(s\) \(p. 136\)](#)
- [Viewing QPPL and TPPL elements \(p. 137\)](#)

These commands are considered an extension to the view features found on the [Options dialog box \(p. 61\)](#).

11.1. Selecting Elements

You may select and deselect specific elements by using the following two commands (entered in the [Command \(p. 59\)](#) text box).

Deselecting:

OMIT ELEMENTS enables the user to omit previously selected elements for the STRUCTURES previously selected, by specifying one or more ELEMENT numbers.

- If no integer numbers are present, ALL elements are omitted.
- If none are found, it is ignored.
- If **TO** is present within the list of integers, the numbers preceding and following are interpreted as a range.

For example:

```
OMIT ELEMENTS 2 TO 4 7 TO 9
```

omits elements 2,3,4,7,8, and 9.

Selecting:

SELECT ELEMENTS enables the user to select elements for the STRUCTURES PREVIOUSLY SELECTED by specifying one or more ELEMENT numbers.

- If no integer numbers are present, ALL elements are selected.
- If any element numbers do not exist, they are ignored.
- If **TO** is present within the list of integers, the numbers preceding and following are interpreted as a range.

For example:

```
SELECT ELEMENTS 2 TO 4 7 TO 9
```

selects elements 2,3,4,7,8, and 9.

Tip:

If the number(ing) for the selection you wish to make is unknown, switch on the relevant [numbering system \(p. 74\)](#) under options.

This command is considered an extension to the view features found on the [Options dialog box \(p. 61\)](#).

11.2. Selecting Nodes

You may select and deselect specific elements with the specified nodes by using the following two commands (entered in the [Command \(p. 59\)](#) text box).

Deselecting:

OMIT NODES will enable the user to omit previously selected elements for the STRUCTURES previously selected, by specifying one or more user NODE numbers contained in the element definition.

- If no integer numbers are present, ALL elements are omitted.
- If none are found, it is ignored.
- If **TO** is present within the list of integers, the numbers preceding and following are interpreted as a range.

For example:

```
OMIT NODE 2 4 6 TO 9
```

omits ELEMENTS which have the following nodes 2,4,6,7,8, and 9.

Selecting:

SELECT NODES enables the user to select elements for the STRUCTURES PREVIOUSLY SELECTED by specifying one or more NODE numbers contained in the element definition.

- If no integer numbers are present, ALL elements are selected.
- If any nodes do not exist, they are ignored.

- If **TO** is present within the list of integers, the numbers preceding and following are interpreted as a range.

For example:

```
SELECT NODE 2 4 6 TO 9
```

selects ELEMENTS constructed with the following nodes 2,4,6,7,8, and 9.

Tip:

If the number(ing) for the selection you wish to make is unknown switch on the relevant [numbering system \(p. 74\)](#) under options.

This command is considered an extension to the view features found on the [Options dialog box \(p. 61\)](#).

11.3. Selecting QPPL & TPPL Elements

You may select and deselect specific QPPL & TPPL elements by using the following two commands (entered in the [Command \(p. 59\)](#) text box).

Deselecting:

OMIT QPPL enables the user to omit previously selected QPPL elements for STRUCTURES previously selected, within a range of element numbers, which are optional.

- If no integer numbers are present, all QPPL elements are omitted.
- If none are found, it is ignored.
- If **TO** is present within the list of integers, the numbers preceding and following are interpreted as a range.

For example:

```
OMIT QPPL 2 9 3 TO 5
```

omits elements 2,3,4,5 and 9 if they are QPPL elements

OMIT TPPL enables the user to omit previously selected TPPL elements for STRUCTURES previously selected, within a range of element numbers, which are optional.

- If no integer numbers are present, all TPPL elements are omitted.
- If none are found, it is ignored.
- If **TO** is present within the list of integers, the numbers preceding and following are interpreted as a range.

For example:

```
OMIT TPPL 2 9 3 TO 5
```

omits elements 2,3,4,5 and 9 if they are TPPL elements

Selecting:

SELECT QPPL enables the user to select QPPL elements for STRUCTURES PREVIOUSLY SELECTED within a range of element numbers, which are optional.

- If no integer numbers are present, all QPPL elements are omitted.
- If no QPPL elements are found, the complete command is ignored.
- If TO is present within the list of integers, the numbers preceding and following are interpreted as a range.

For example:

```
SELECT QPPL 2 9 3 TO 5
```

selects elements 2,3,4,5 and 9 if they are QPPL elements

SELECT TPPL enables the user to select TPPL elements for STRUCTURES PREVIOUSLY SELECTED within a range of element numbers, which are optional.

- If no integer numbers are present, all TPPL elements are omitted.
- If no TPPL elements are found, the complete command is ignored.
- If TO is present within the list of integers, the numbers preceding and following are interpreted as a range.

For example:

```
SELECT TPPL 2 9 3 TO 5
```

selects elements 2,3,4,5 and 9 if they are TPPL elements

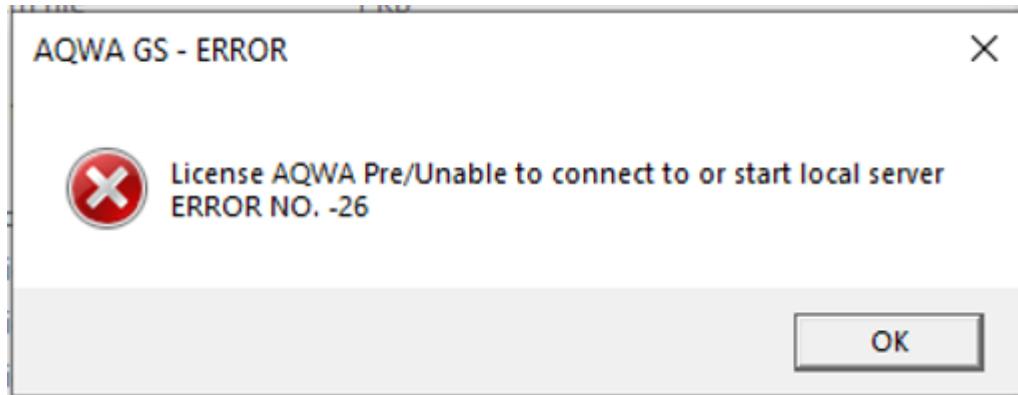
Tip:

If the number(ing) for the selection you wish to make is unknown switch on the relevant [numbering system \(p. 74\)](#) under options.

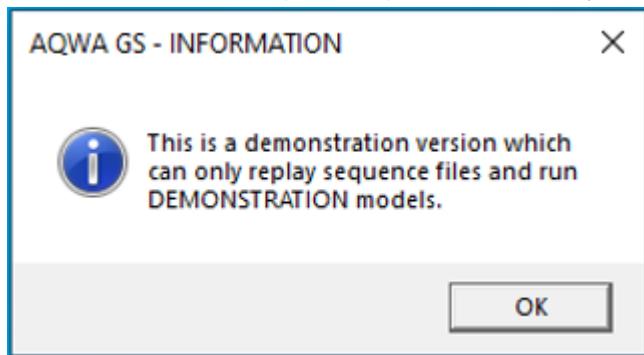
This command is considered an extension to the view features found on the [Options dialog box \(p. 61\)](#).

Chapter 12: Demonstration Mode

The Aqwa Graphical Supervisor will be run in demonstration mode if the Aqwa Pre license is not accessed. If the AGS is running in demonstration mode, the following message will be output to the screen when the program is started.



Click **OK**. The following message will be displayed:



License restrictions may be viewed in more detail in the [Aqwa License dialog box \(p. 141\)](#). When running in demonstration mode the following restrictions apply:

- All Sequence animations may be viewed.
- You may view demonstration data included in the folder \ANSYS\Inc\v241\aqwa\demo.

Note:

Changing file details (e.g. file dates & size) will render demonstration files invalid. No other data may be viewed.

-
- Data may not be saved.
 - Demo files may be played.

Chapter 13: AGS Security

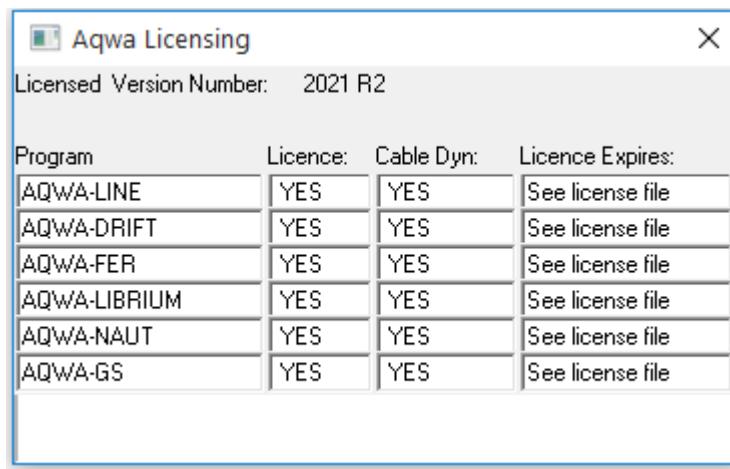
The Aqwa Graphical Supervisor can be run in full mode or in demonstration mode.

- When run in full mode you will have access to all facilities within the AGS.
- [Demonstration mode \(p. 139\)](#) is activated when the security system is deactivated. The security system will be de-activated when there is no Aqwa Pre license accessible.

Full details of your access rights can be found in the [Aqwa License dialog box \(p. 141\)](#).

13.1. The Aqwa Licensing Dialog Box

The AGS can be run in full mode or in demonstration mode. This dialog box details which mode you are running in. The **Aqwa Licensing** dialog box can be opened by selecting **Aqwa Licensing** from the **Help** menu on the AGS toolbar.



If the application is running in demonstration mode, all fields will be blank or report 'n/a'.

Full mode will report license information for all programs.

13.2. Running the Aqwa Graphical Supervisor

When the AGS is executed, it will check the Aqwa Pre license.

If the Aqwa Pre license is available, the AGS will run in full mode. If the Aqwa Pre license is not available, the AGS will run in demonstration mode. If you are running the AGS in demonstration mode please see [here \(p. 139\)](#) for restrictions on the program's use. If you are licensed to use the software, but the program runs in demonstration mode, contact Ansys support.

Chapter 14: AGS Glossary

▽

Displaced water volume

AM

Immersed area of midship section

AP

After Perpendicular - The perpendicular to the design load waterline at its intersection with the after edge of rudder post or center-line of the rudder stock.

Aqwa-Drift

Hydrodynamic response – Time domain analysis with second order wave forces

Aqwa-Fer

Hydrodynamic response - Frequency statistical analysis

Aqwa-Librium

Hydrodynamic response – System equilibrium position and dynamic stability analysis

Aqwa-Line

Hydrodynamic diffraction analysis in frequency domain

Aqwa-Naut

Hydrodynamic response – Time domain analysis with nonlinear incident wave and hydrostatic forces on instantaneous wetted surface

Aqwa

Advanced Quantitative Wave Analysis system

AS

Immersed sectional Area

AW

Amplitude of regular wave

B

Breadth (or Center of Buoyancy in hydrostatics)

BL

Baseline

BM(T)

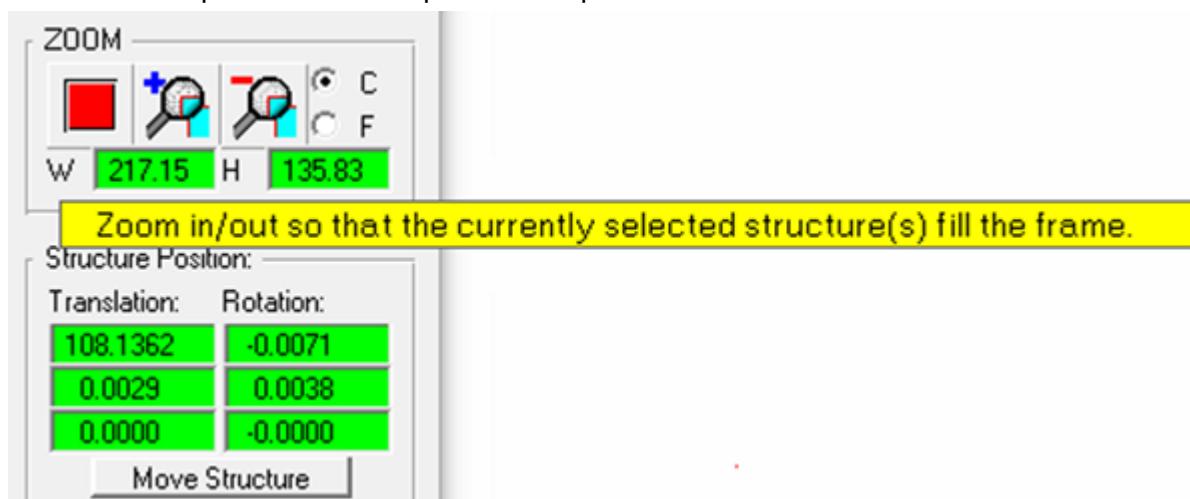
Metacentric radius (transverse)

BML

Longitudinal metacentric radius

bubble help

This is an example of 'bubble help' or a 'hot spot'



CB

Block coefficient

CL

Centerline

CM

Midship section coefficient

COB

Center of buoyancy

COF

Center of Flotation - Centroid of Waterplane area

CP

Prismatic Coefficient (longitudinal)

CPL

Prismatic Coefficient (longitudinal)

CPV

Vertical Prismatic Coefficient

CW

Waterplane Area Coefficient

D

Depth (to uppermost continuous deck at side midships)

DISPLACE

Mass displacement ($\nabla = \rho \nabla$)

FP

Forward Perpendicular - The perpendicular to the designed load waterline at its intersection with the forward side of the stem

FW

Fresh water density (ρ taken as 1.000 tonne/m³)

GM(T)

Metacentric Height (transverse)

GML

Longitudinal metacentric height

GZ

Righting lever

IL

Longitudinal moment of inertia of waterplane about COF

IT

Transverse moment of inertia of waterplane about COF

K

Horizontal Plane through the baseline

KB

Height of COB above baseline

KG

Height of COG above baseline

KM(L)

Height of Longitudinal metacenter

KM(T)

Height of Transverse metacenter above baseline

KN

Righting lever with COG assumed at **K**

LBP

Length between perpendiculars (L in hydrostatic calculations)

LCB

Longitudinal center of buoyancy

LCF

Longitudinal center of flotation

LCG

Longitudinal center of gravity

LOA

Length overall

LPP

Length between perpendiculars (L in hydrostatic calculations)

LWL

Length on design load waterline

M

Metacenter

MCT 1"

Moment to change trim 1inch

MCT 1cm

Moment to change trim 1cm

N

Intersection of vertical through metacenter and horizontal through **K** on centerline

SW

Salt water density (ρ taken as 1.025 tonne/m³)

T

Draught (Draft), Wave Period

TPC

Tonnes per centimeter immersion

TPI

Tonnes per inch Immersion

VCB

Vertical center of buoyancy

VCG

Vertical center of gravity

WL

Waterline

WSA

Wetted Surface Area

Z

Intersection of vertical through metacenter and horizontal through COG

