AquaEdit
AquaCross
AquaView
» AquaTool
Other

User manual

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1 Introduction

AquaSim is an analysis tool developed by Aquastructures AS. It uses the Finite Element Method (FEM) for calculation and simulation of structural response. The software is well suited for slender, lightweight- and large volume structures, flexible configurations and coupled systems exposed to environmental loads such as:

- waves
- currents
- wind
- impulse loads
- operational conditions
- resonance

This manual describes the functionality of the post processing tool AquaTool. AquaTool processes .AVS-files and may be used to retrieve results for nodes and elements.

Similar properties of the numerical model as found in AquaView can be found in AquaTool, however the presentation of the data is different. While AquaView visualize results in colours on top of a model, AquaTool presents results as numerical values. The values are presented either as a single value from a specific time step, or as a plot from several time steps.

2 Interface

2.1 Main View

When loading AquaTool, the main view will look as presented in Figure 1.
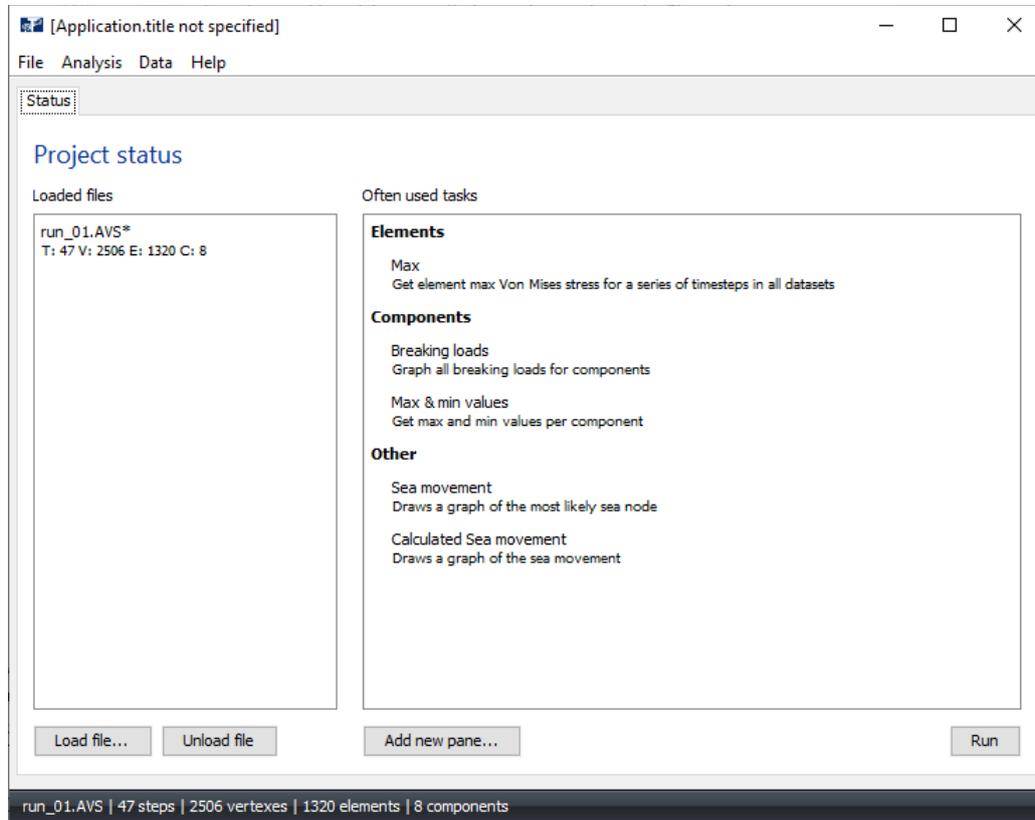

Figure 1 The main view in AquaTool

Project Status provides information about which files has been loaded and often used tasks in AquaTool. More detailed description about the properties are presented in Table 1.

Table 1 Main properties in AquaTool

Property	Definition
File	Provides access to load .AVS-files and exit the program.
Analysis	Allows for information about dataset (e.i. information of the different components in the model) and open the .AVS-file in AquaView.
Data	Provides access to view results for nodes, elements, meshes and components.
Loaded files	Presents overview of which .AVS-files is loaded into AquaTool.
Often used tasks	Shortcut for accessing often used functions and tasks.
Run	Click to run the chosen task from Often used tasks.
Load file	Shortcut for loading .AVS-file into AquaTool.
Unload	Shortcut for omitting selected .AVS-files.
Add new pane	Adds a new pane, to ease presentation of datasets.

2.2   Loading .AVS-files

Loading .AVS-files is easy, and can be done in several ways:

- o **File** > **Open** > Navigate to folder for .AVS-file.
- o Use the shortcut **Load file…** and navigate to folder for .AVS-file.
- o Drag-and-drop .AVS-file into section for **Loaded files**, as illustrated in Figure 2.
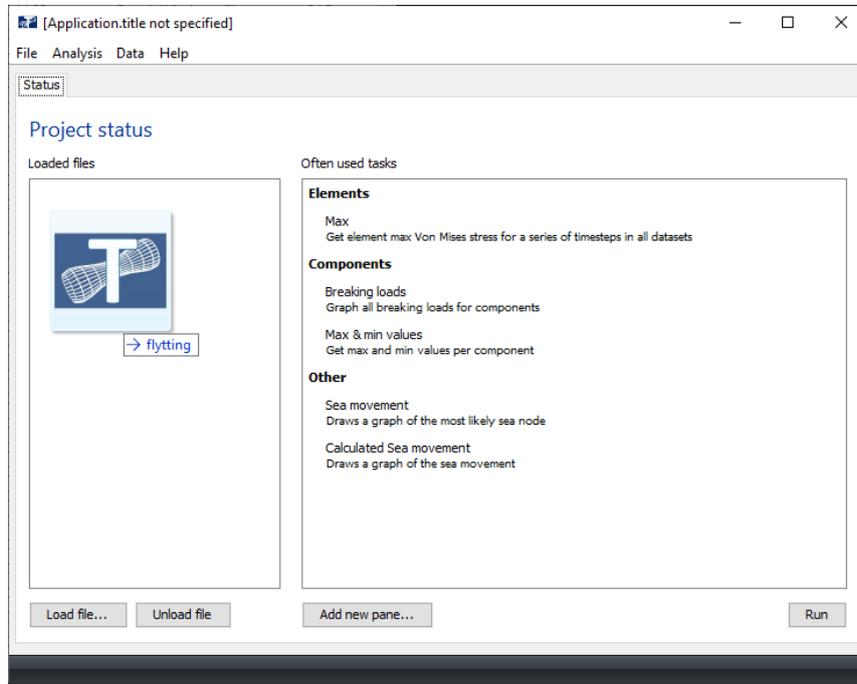

Figure 2 Loading .AVS-file through drag-and-drop

Having loaded file, status of number of timesteps in the simulation, vertexes, elements and components are shown in the lower left corner, Figure 3.
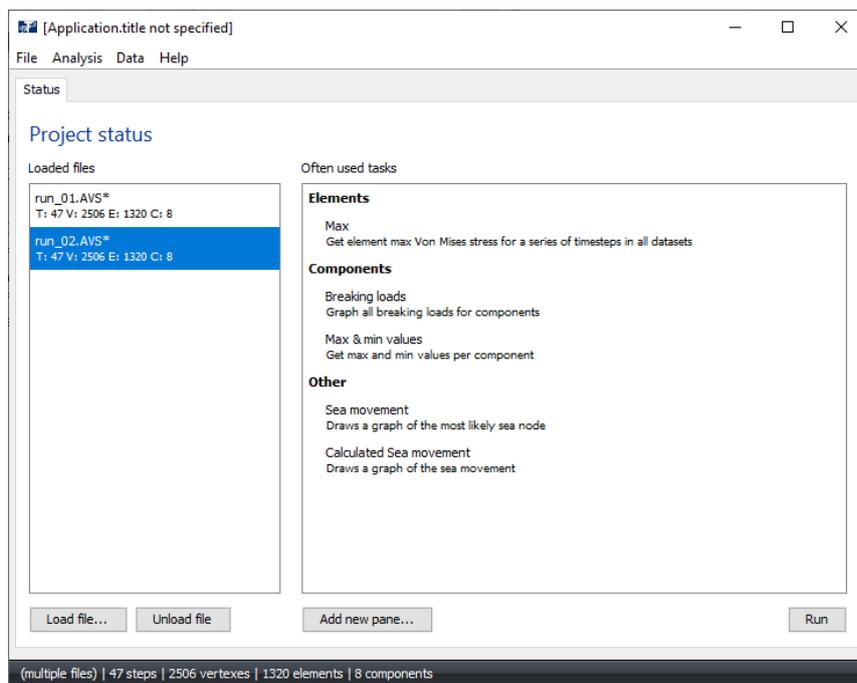

Figure 3 Loaded .AVS-files in AquaTool

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2.3   Unload .AVS-files

A useful feature in AquaTool, is that several .AVS-files may be loaded. This allows the user to plot results from different runs and compare values. If the user wishes to remove one file from AquaTool, click on the relevant file in the **Loaded files**-section and choose **Unload File**.
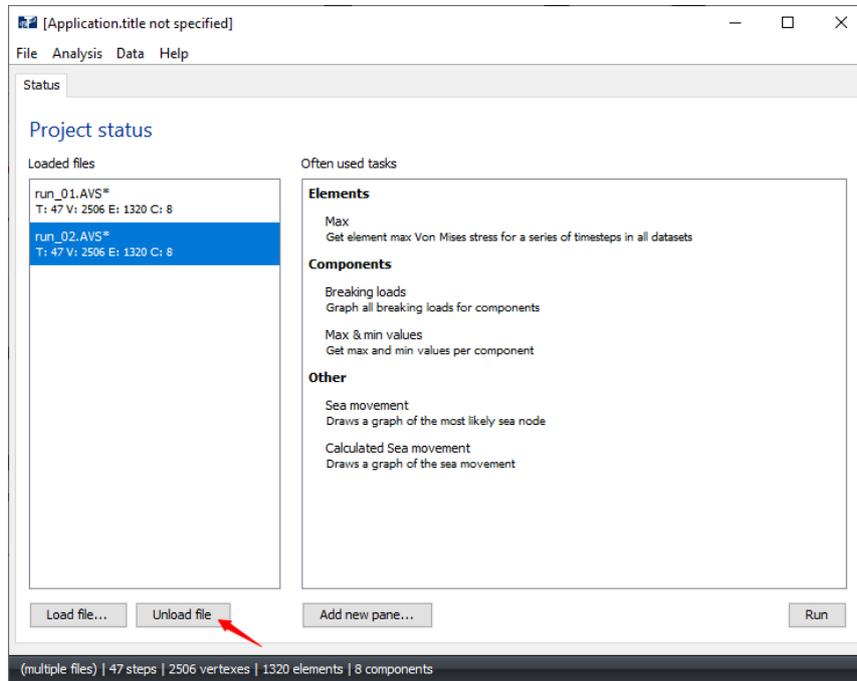

Figure 4 Unload .AVS-file

2.4   Data Menu bar

AquaTool allows for plotting results in tabular form and graphing as function of the simulated time-steps. Having loaded .AVS-files the user may extract results from the Data Menu bar.

An AquaSim-model is built up by elements, connected through nodes. The elements may be expressed as a beam, membrane, truss or Node2Node spring. The collective term of the different ways of expressing elements, is Components or Component group. For more detailed information, reference is made to the AquaEdit User Manual. Upon exporting the AquaSim-model in AquaEdit, unique ID-numbers are generated for each node and element. These ID-numbers enables extracting results in AquaTool.

The Data Menu bar provides much the same result types as found in AquaView, with some limitations. Results may be extracted from Nodes, Elements, Meshes (membrane), or on a more general level, for Components. Example of the different types of results available for Element, is shown in Figure 5. For more information about the different result types, reference is made to the AquaView User Manual.
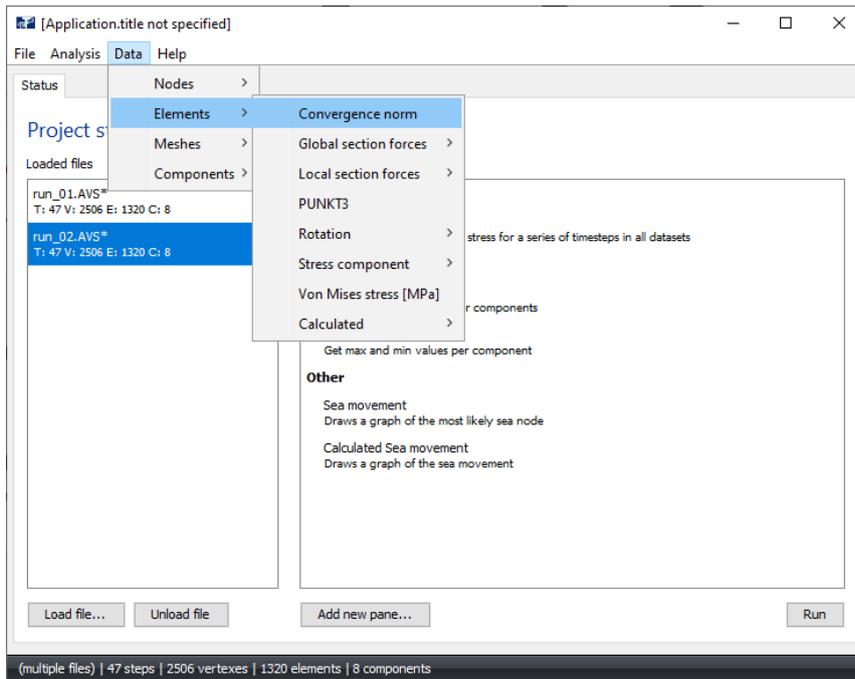
Figure 5 The Data menu bar

2.5 Analysis menu bar

The **Analysis**-menu provides the user access to information about the AquaSim-model, and allows the user to open the .AVS-file in AquaView through AquaTool.

Show dataset information provides basic information about the different components in the AquaSim-model. In the Components section, click on the element to view the element ID-number and other information such as breaking load, line width and cross section coordinates. This is illustrated in Figure 6.
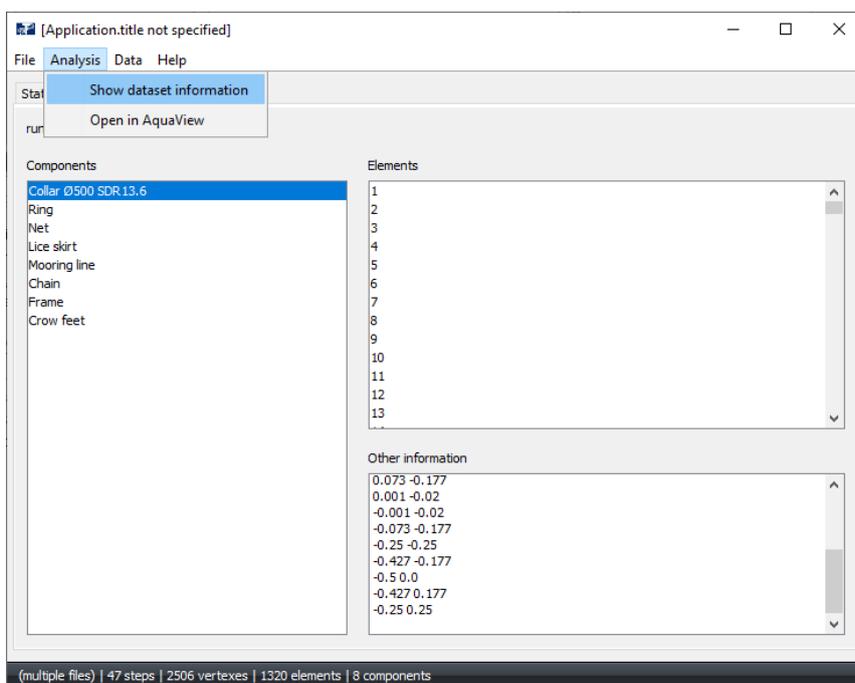

Figure 6 Show dataset information

3 Plotting results

Results may be extracted from the Data Menu bar. AquaTool display different menu options depending if a file contains several timesteps (.AVS) or as a maximum-file (PFAT.AVS).

3.1 Query properties

Selecting a result type from the **Data**-menu opens the window **Query properties**, as shown in Figure 7. In the field **Range/Tagname** the ID-number of node or element is specified. It can either be a single ID-number, or a range of several numbers. For displaying results for a single node/element, type the ID-number (found e.g. in AquaView by clicking the relevant node/element). For a range, enter two numbers separated by a dash, e.g. 430-440. For several ID-numbers, but not next to each other, separate the values by comma, e.g. 433, 436. More information about the subsequent options are presented in Table 2.
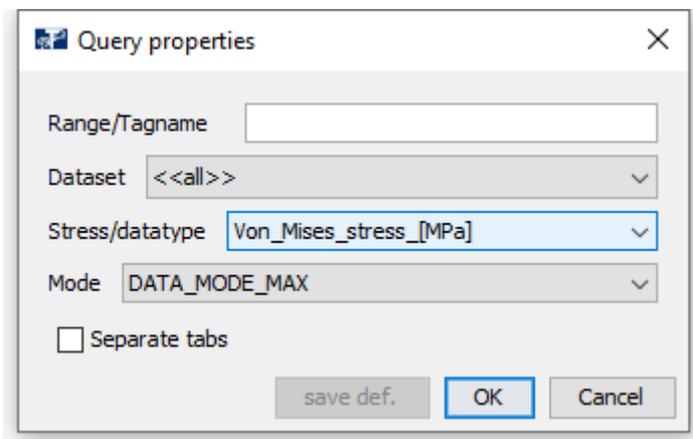

Figure 7 Window for extracting results

Table 2 Options under Query properties

Options	Definition
Range/Tagname	Type the ID-number of node or elements. Several ID-numbers may be specified.
Dataset	Choose witch loaded .AVS-file to extract results.
Stress/datatype	Choose what type of results to be presented. E.g. global section forces, local section forces, Von Mises etc. For more information on the result types, reference is made to AquaView User Manual. This option equals the selection of different menu-options from Data-menu.
Mode	Choose the level or position of results between two nodes (node A and B) that constitutes an element. ○ DATA_MODE_MAX: presents the maximum value of the two nodes. ○ DATA_MODE_AVREAGE: presents the average value between the two nodes. ○ DATA_MODE_MIN: presents the minimum value between the two nodes. ○ DATA_MODE_A: presents the value in node A. ○ DATA_MODE_B: presents the value in node B. ○ DATA_MODE_ABS_MAX: presents the absolute value of the maximum value between the two nodes. ○ DATA_MODE_ABS_MIN: presents the absolute value of the minimum value between the two nodes.

Separate tabs	If a range of ID-numbers are specified, this option enables to present the results in separate tabs.
Save def.	Enables to save custom setting for the Query properties.

3.2 Element(s) tab

Having set the **Query properties** and proceeded by choosing **OK**, new tab(s) is generated in the Main view presenting the specified results. Figure 8 gives an example where two .AVS-files are loaded, and the axial forces in element number 513 is plotted. The values are presented in tabular form at the top, and graphically as a function of the simulated time-steps below.
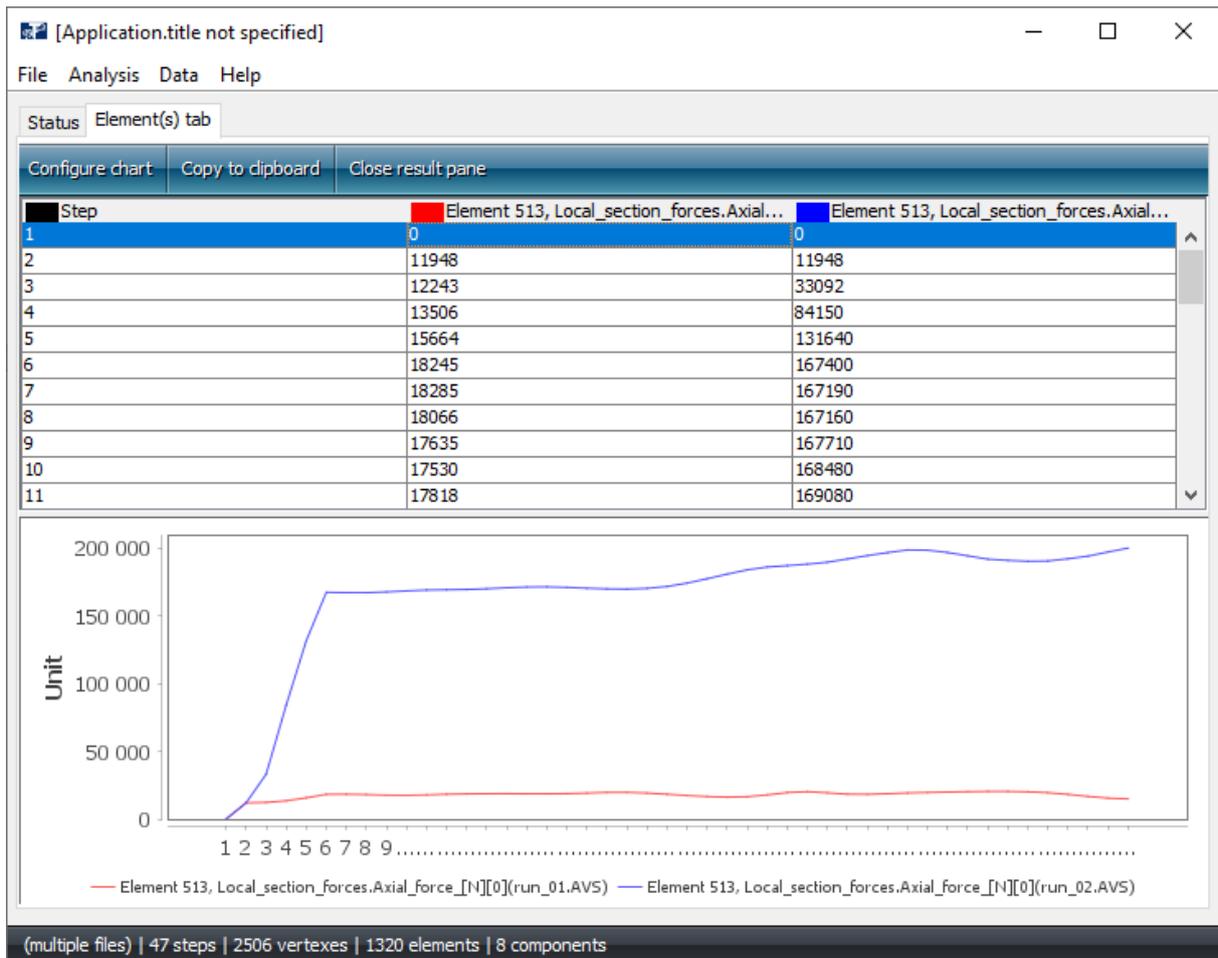

Figure 8 Element(s) tab

To view larger part of the tabular results, simply place the cursor at the at the line between the table and the graph, click and drag down. The option **Copy to clipboard** enables to transfer data to e.g. Microsoft Excel. **Close the pane** exits the active Element(s) tab.

3.2.1   Configure chart

Selecting **Configure chart** opens a window, **Edit analysis**, Figure 9. The different options in this window is presented in Table 3.
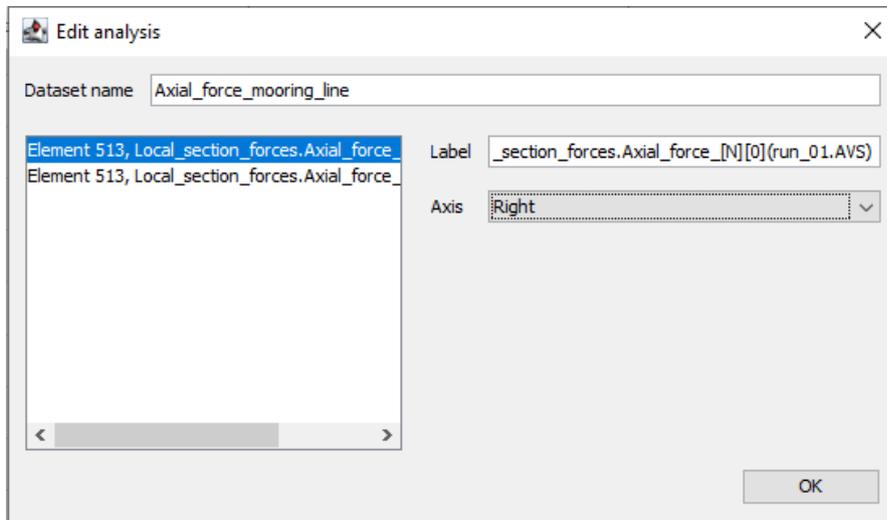

Figure 9 Configure chart window

Table 3 Options under Configure chart

Options	Definition
Dataset name	Customize the name of the dataset.
Label	To generate secondary axis (for two or more datasets), choose the desired dataset from the list to the left. The chosen dataset is automatically shown in Label.
Axis	Choose between Right or Left. This defines if the secondary axis is presented to the left or right in the graphically view.

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