T/HIS 19.0

T/HIS 19.0 – Contents

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Improved Window Positioning

Window "Common Border" Dragging

Window "Common Border" dragging: introduction

When there are multiple windows on a page, it is now possible to change their position and size in a coordinated way. Windows that share a common border now "know about" their neighbours and it is possible to resize all windows sharing that border.
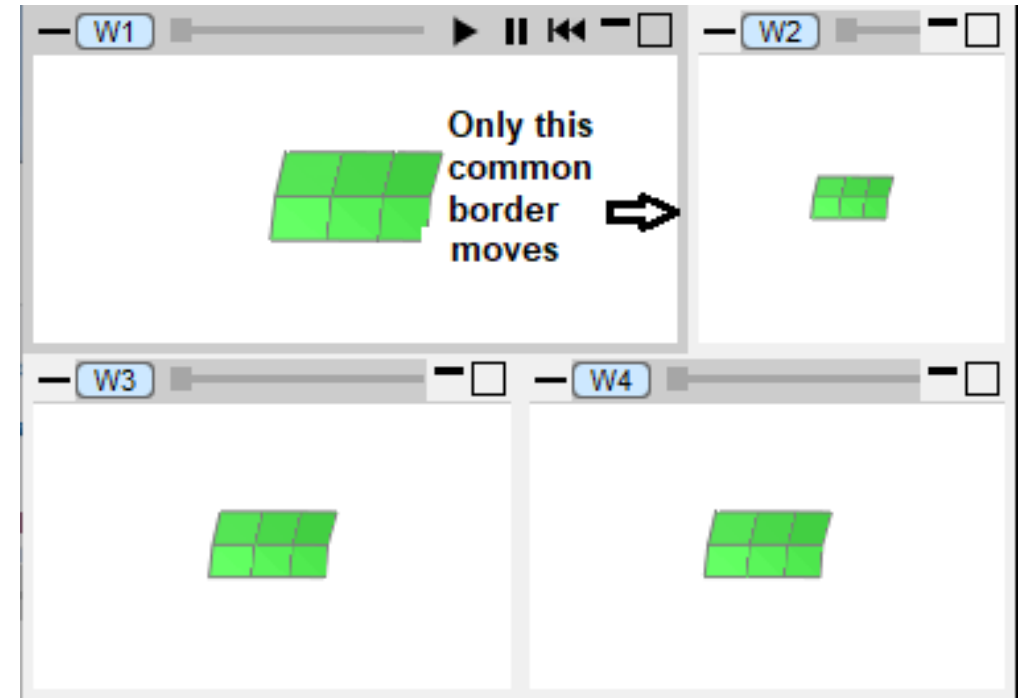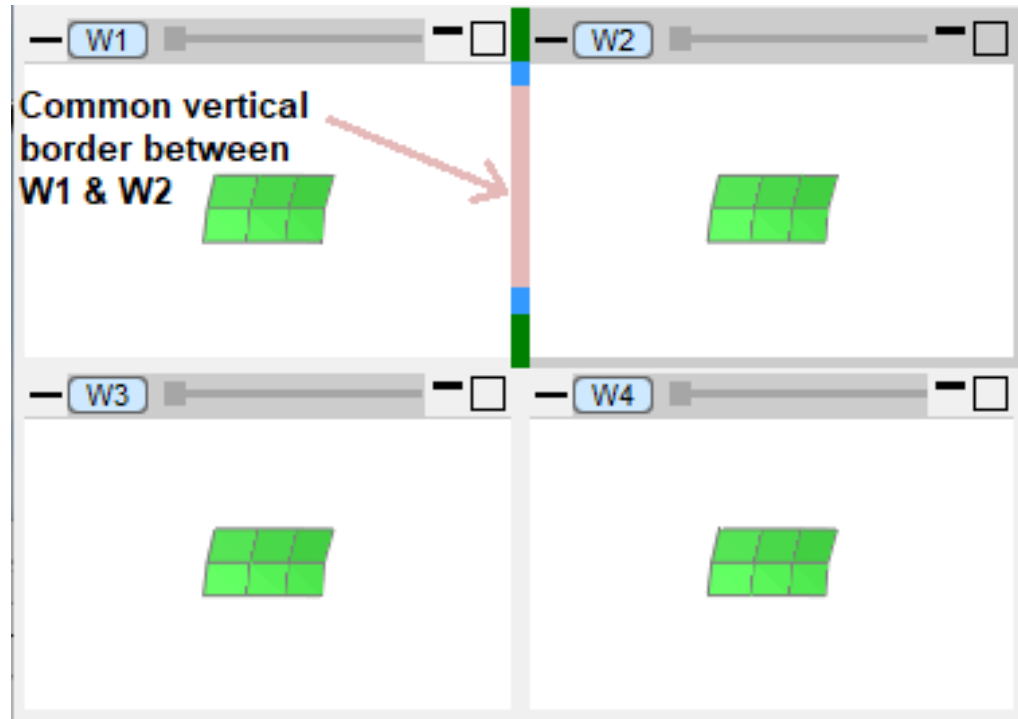
For example:
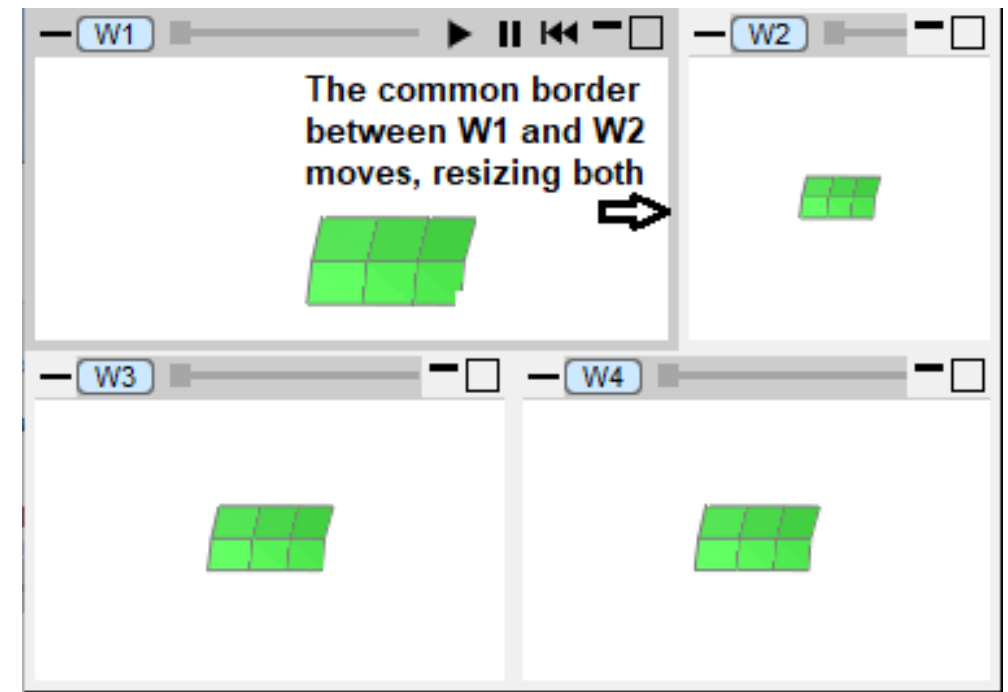
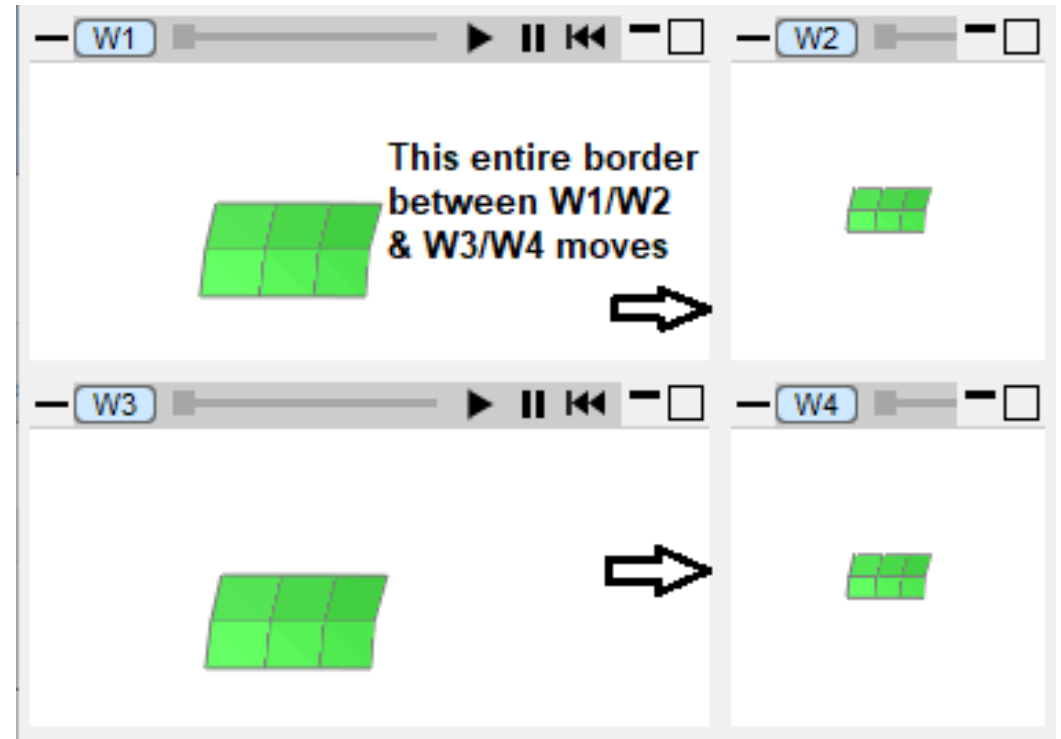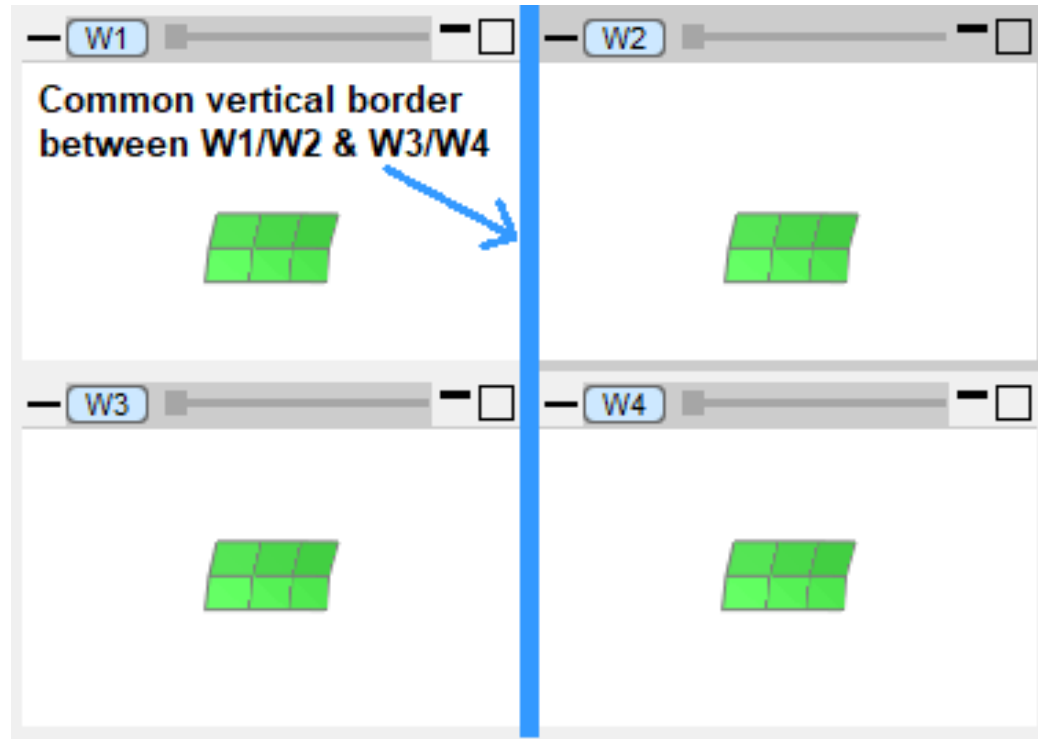# Window "Common Border" dragging: two windows case

To give flexibility about what is dragged, different regions of borders perform different functions and are colour-coded to distinguish them.

To drag just the single border between two windows, use the central pink zone:

Window "Common Border" dragging: single axis case

To drag the entire single border axis in a given direction between all windows which share that border, use the blue zone (intermediate between centre and corners):

Window "Common Border" dragging: both axes case

To drag both horizontal and vertical borders between all windows which share those borders, use the green zone (at the corners):
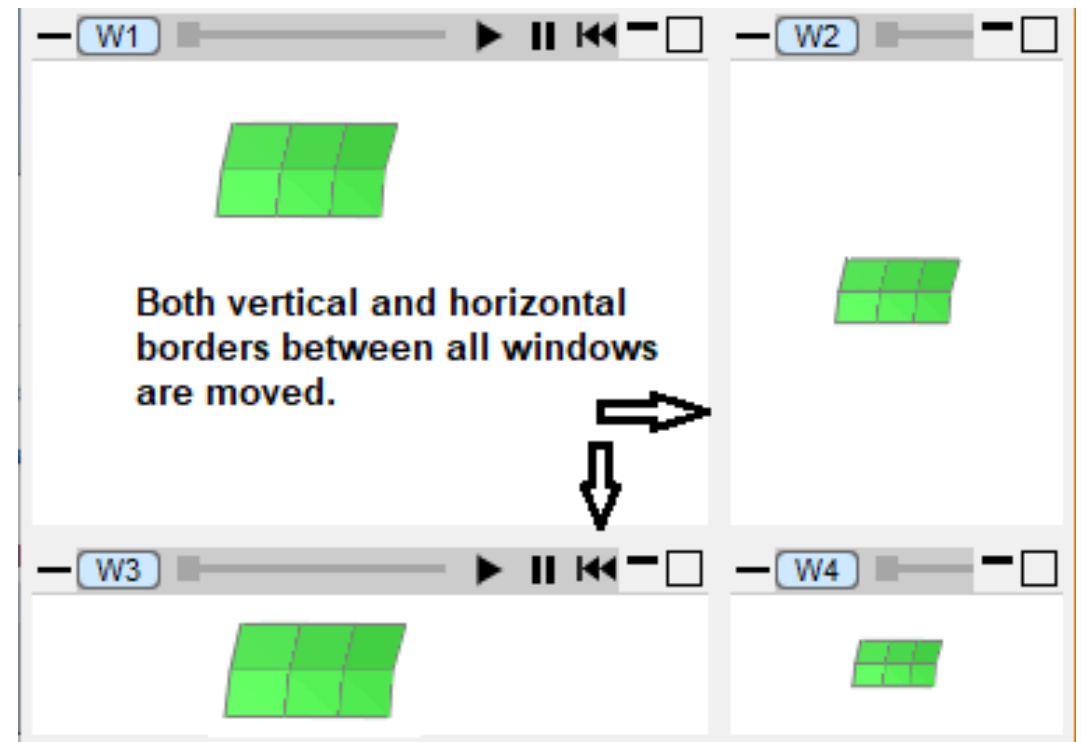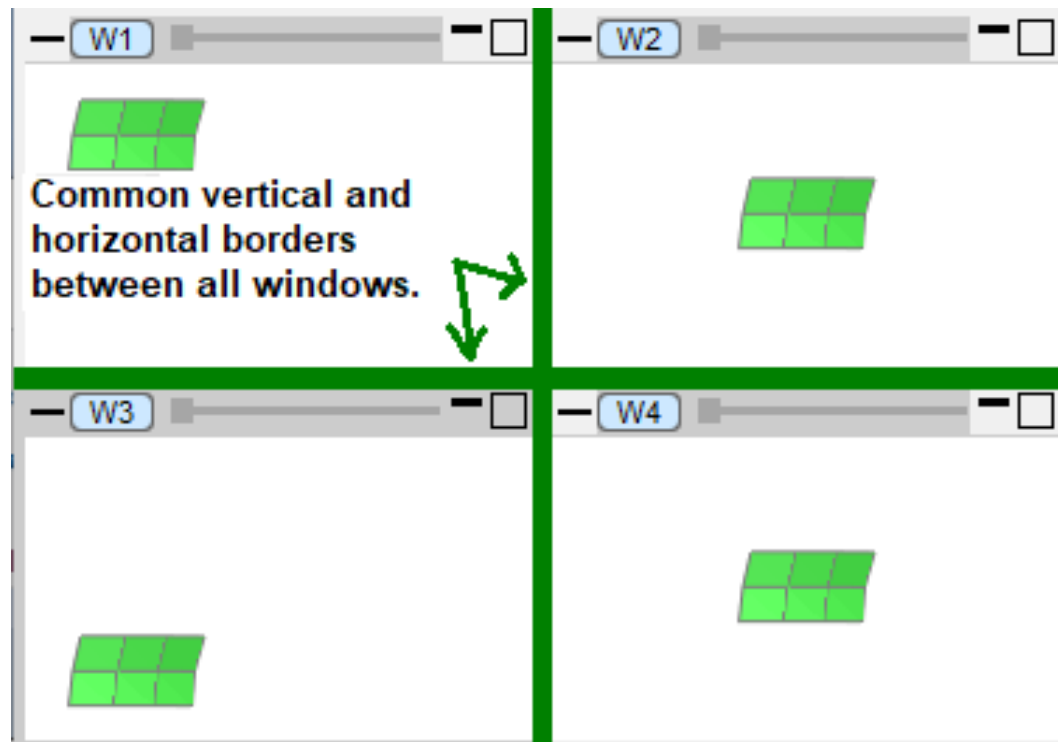
Window "Snap to grid"

Repositioning a window by dragging it used to move just that window and left it "floating" in its new position. When there are multiple windows on a page, these now occupy a grid of locations and it is possible to move a window from one cell to another, shifting the existing windows up and down as required.

1. In the top image W4 in the bottom right corner being dragged up and to the left.

2. When the cursor enters W1 its borders light up in blue to show it is the destination window.

3. On mouse release W4 "snaps" to W1's position and windows W1 to W3 shuffle down to make space.
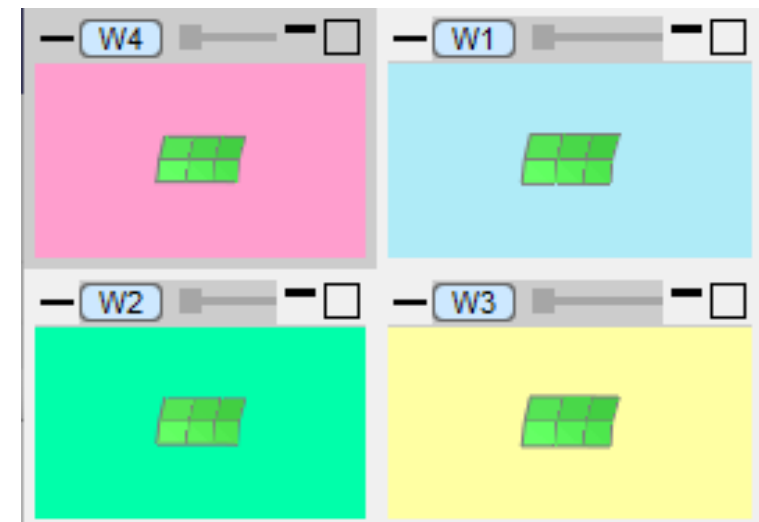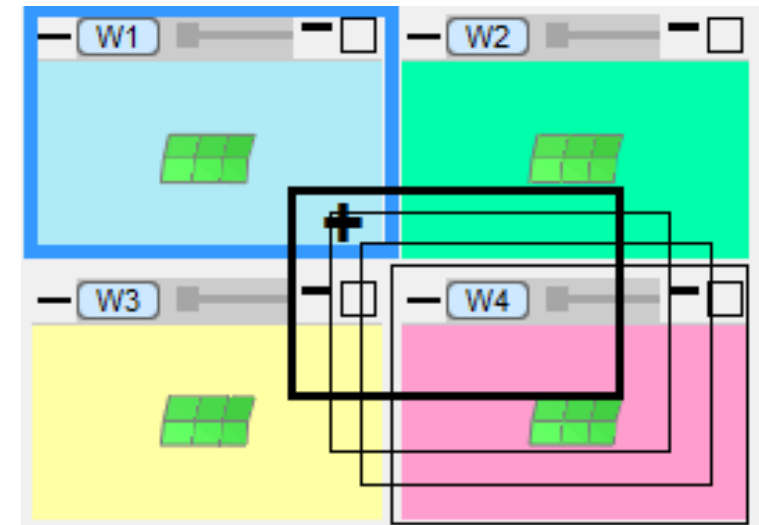
Improved Window Positioning

Changes to Graph Layout
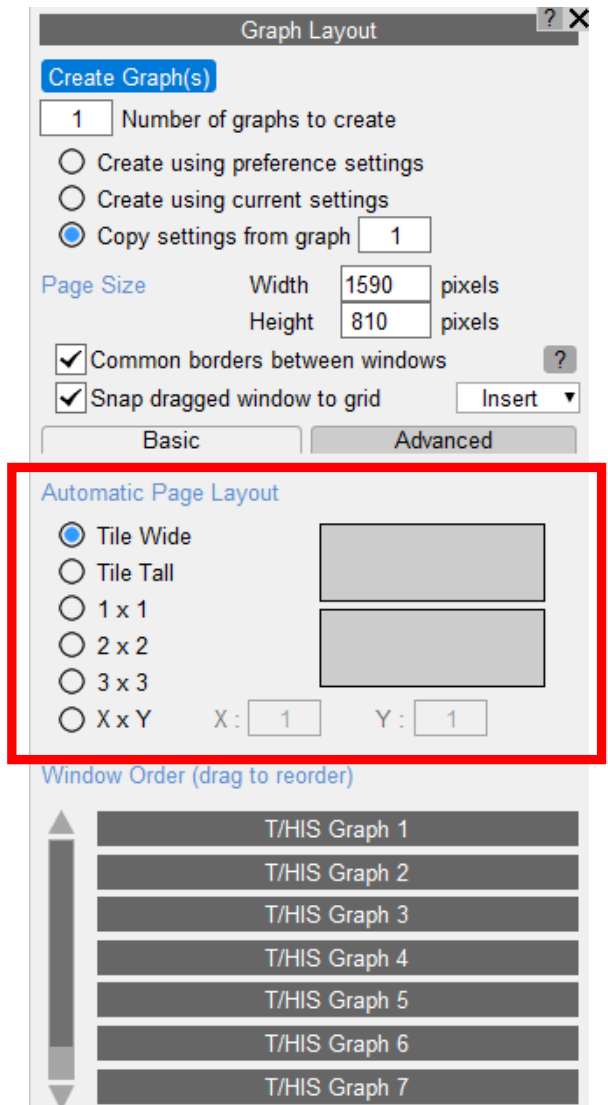
Changes to Graph Layout Menu – Basic Mode

In D3PLOT and T/HIS 19.0, the Graph Layout menu has changed and has been split into separate **Basic** and **Advanced** modes.

In Basic mode, the menu can be used to select a page layout that is automatically applied to all of the pages.

Automatic Page Layout

If the layout is set to "Tile Wide" or "Tile Tall" then all Graphs are automatically added to page 1.
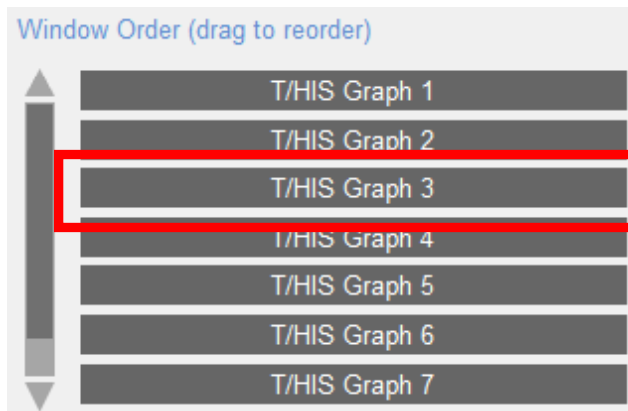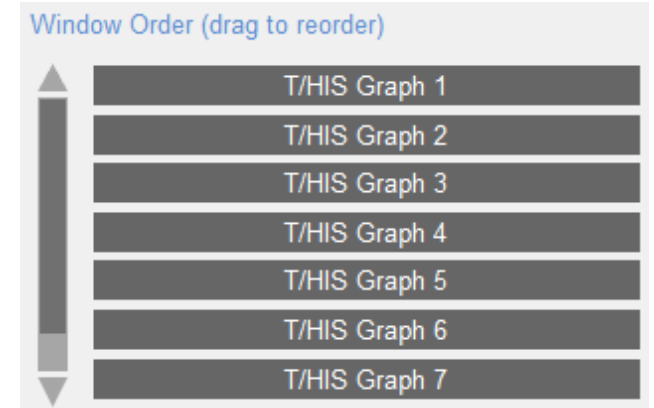
In all other layouts Graphs are automatically added to pages and as many pages as needed are created to hold all the Graphs.
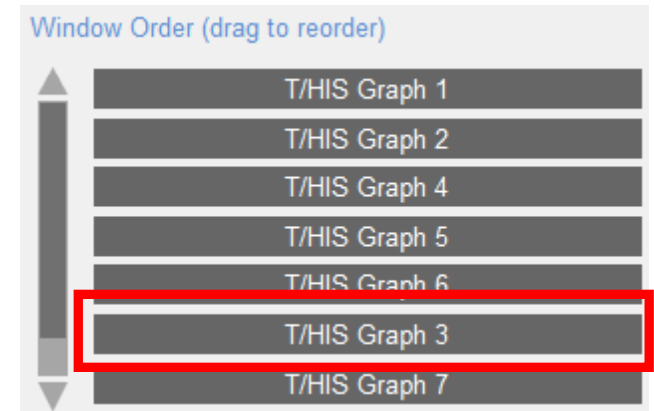
Changes to Window Layout Menu – Basic Mode

Window Order (drag to reorder)

By default, Graphs are added to pages in the order they are created.

The order of Graphs can be changed by clicking on a row and dragging it up or down the list to a new position.
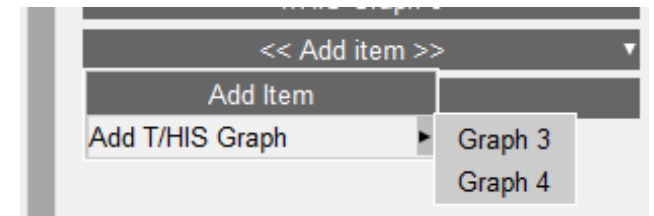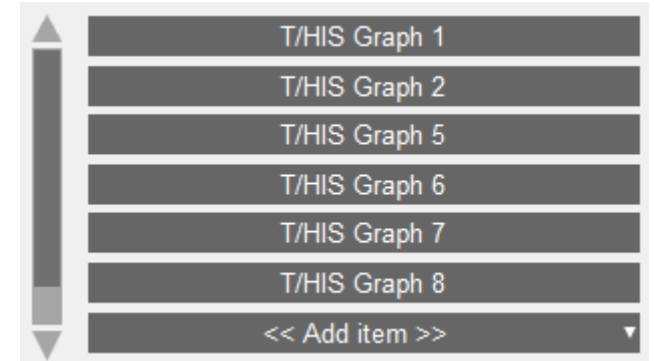
Changes to Window Layout Menu – Basic Mode

Any graphs that have been dragged out onto the desktop are removed from the list (Graphs 3 and 4 in this example).

If graphs are on the desktop, the menu will display additional rows that can be used to add the graphs back into the list so that they are displayed on a page again.

Right-clicking on an **<< Add item >>** row will display a popup menu that can be used to select any graphs currently on the desktop.

In a Linked D3PLOT → T/HIS session, this menu will also display any T/HIS graphs that are currently docked inside D3PLOT windows so that they can be added back onto a page.

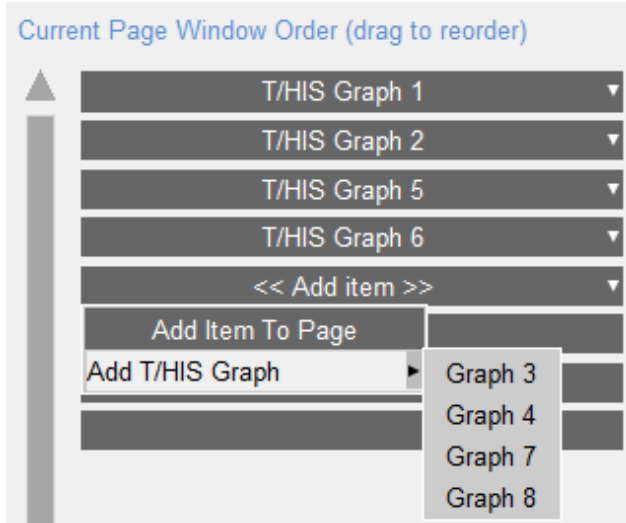# Changes to Window Layout Menu – Advanced Mode

Advanced mode works in a similar way to Basic mode except that it controls the settings for the current page only.

In Advanced mode, the layout and content of each page can be set for that page and the order of the items displayed on each page can also be controlled by clicking on an item and dragging it up or down to a new position.
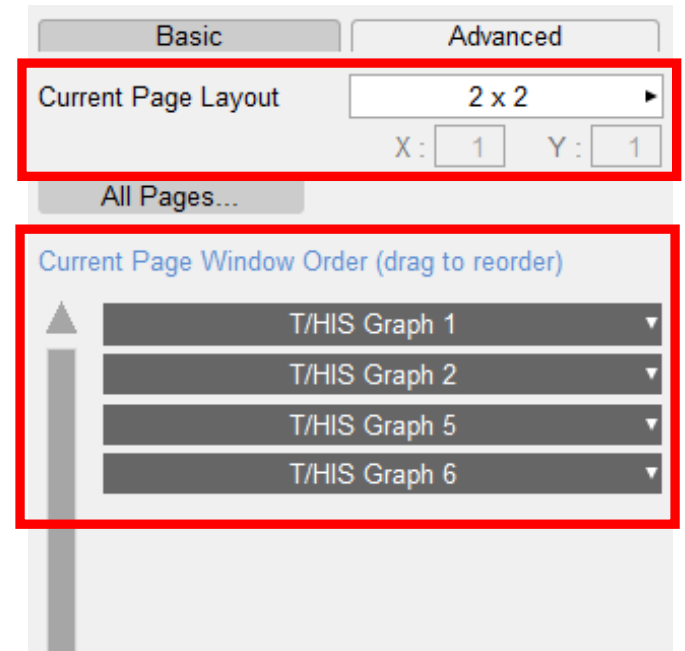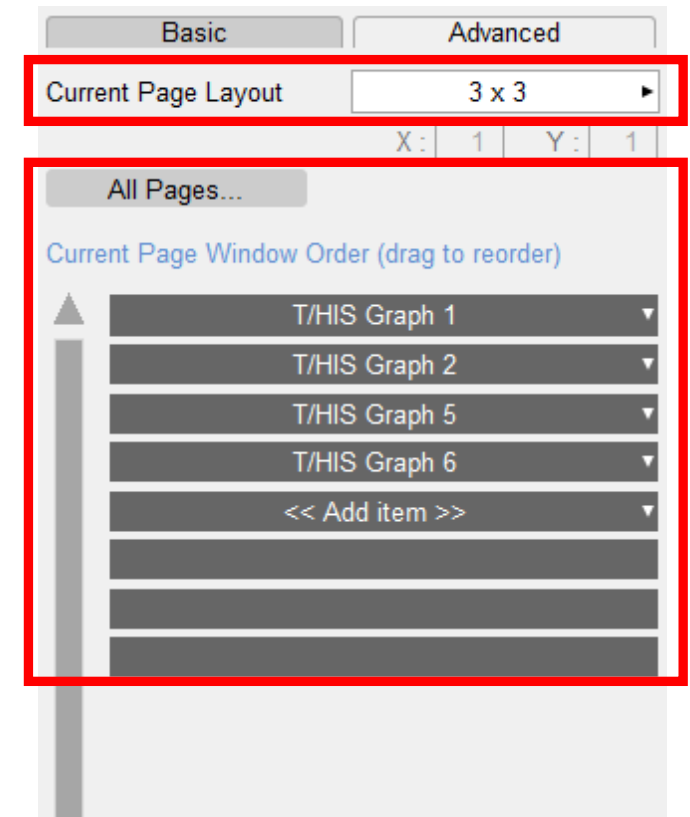
Changes to Window Layout Menu – Advanced Mode

If a page has room for additional Graphs to be added to it then the menu will display additional rows with the first empty row showing **<< Add item >>**.

Right-clicking on **<< Add item >>** will display a popup menu that can be used to select any Graph that is not currently on the page.
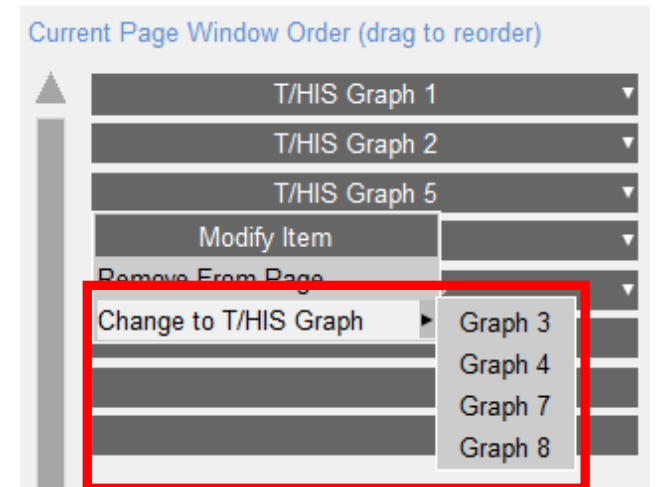
Changes to Window Layout Menu – Advanced Mode

Right-clicking on a row containing a Graph will display a popup menu that can be used to remove the Graph from the current page.
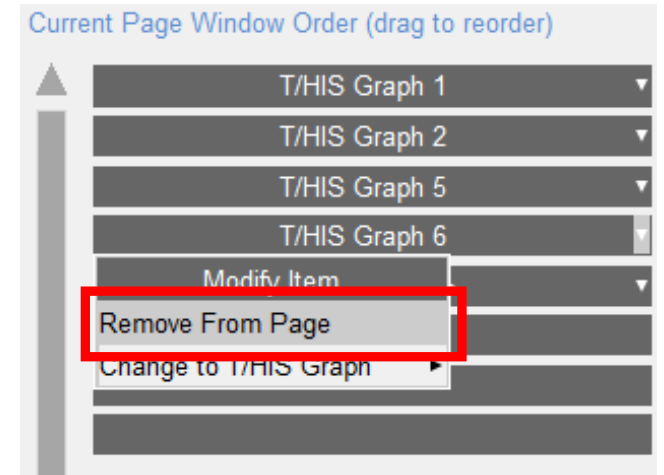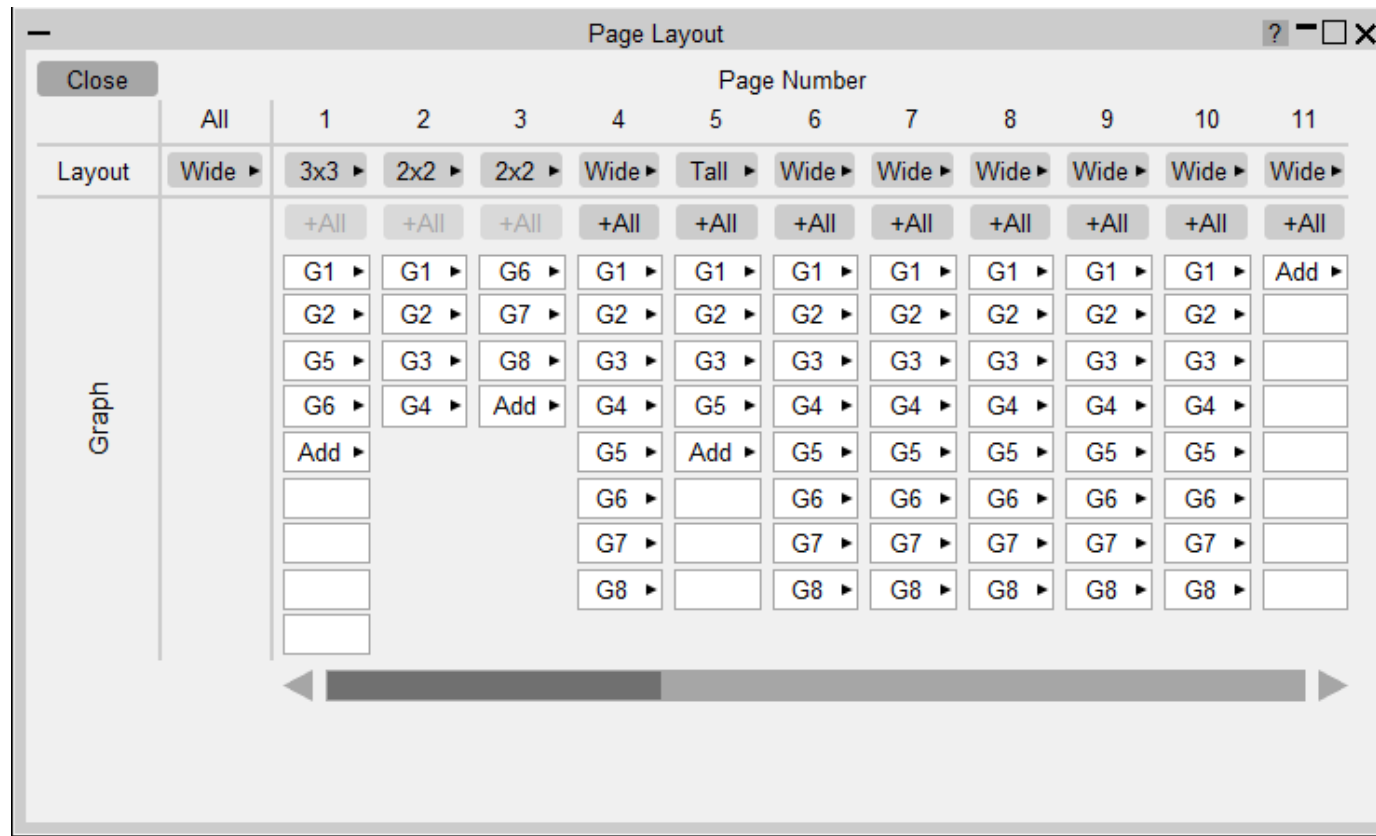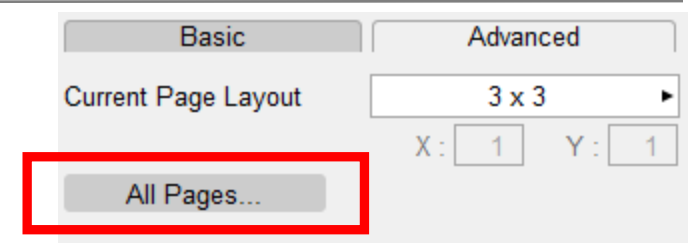

Alternatively, the same popup can also be used to change an item to a different Graph that is not already on the current page.

Changes to Window Layout Menu – Advanced Mode

In Advanced mode, the **All Pages...** button can be used to display a separate menu that shows the layout and contents of all pages:

Changes to Window Layout Menu – Advanced Mode
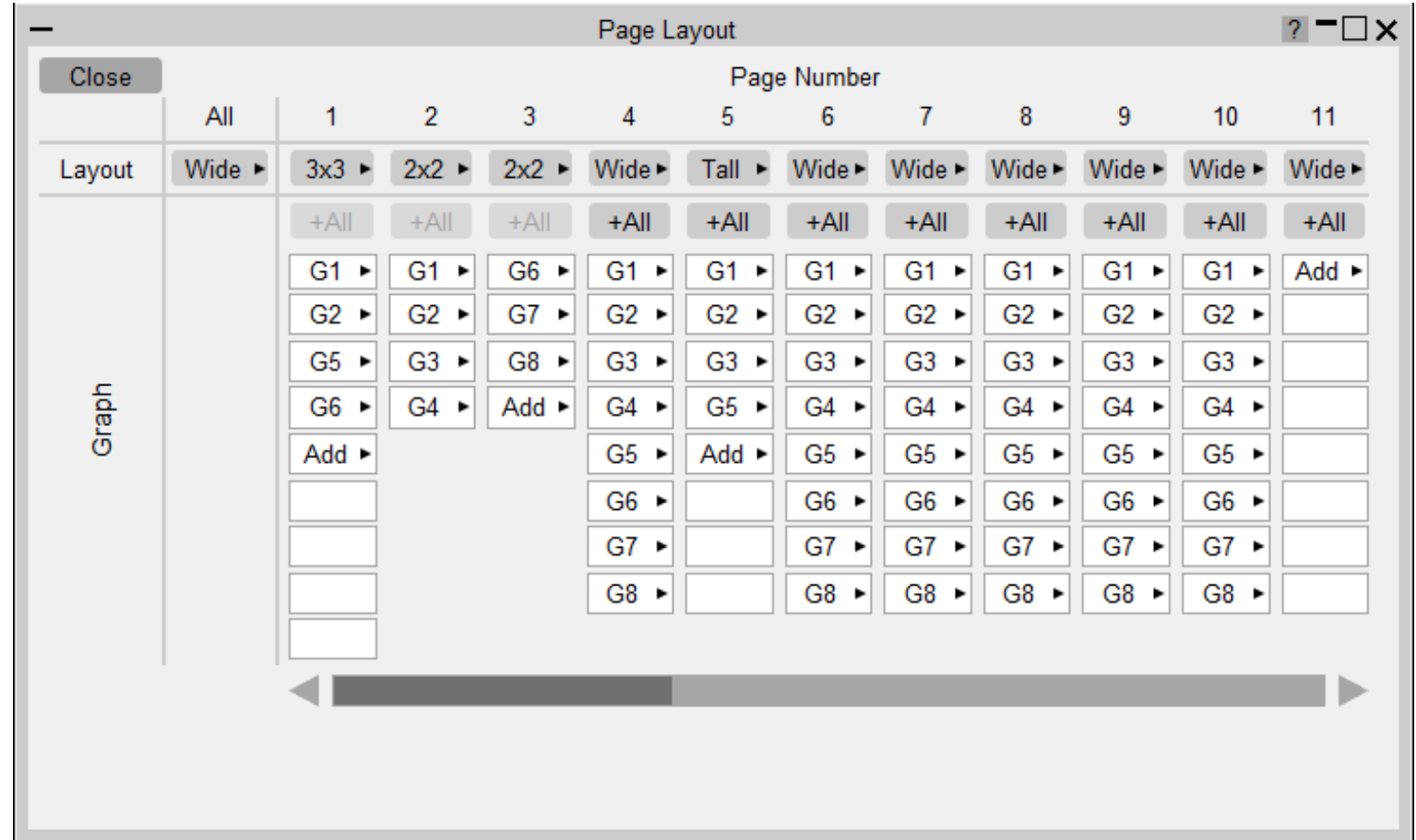
This menu allows the layout and contents of each page to be individually changed.

The options to reorder or change the contents of each page are similar to those in the Window Order section of the Layout menu:

- Drag the buttons in each column up and down to reorder windows and graphs on a page
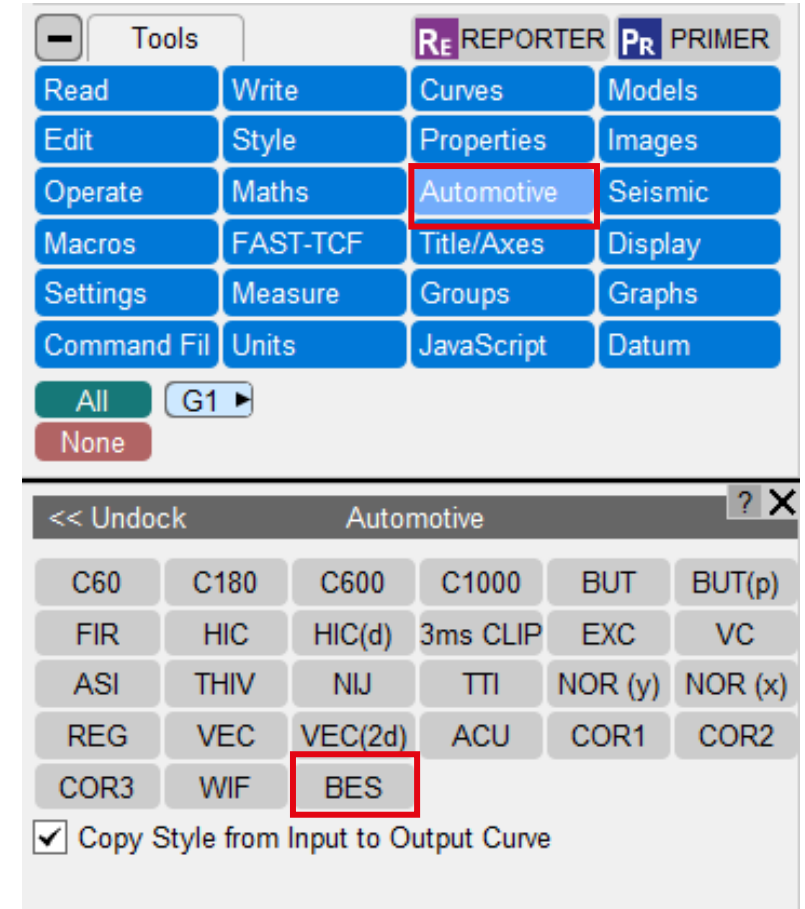- Use the popup menus to edit page contents
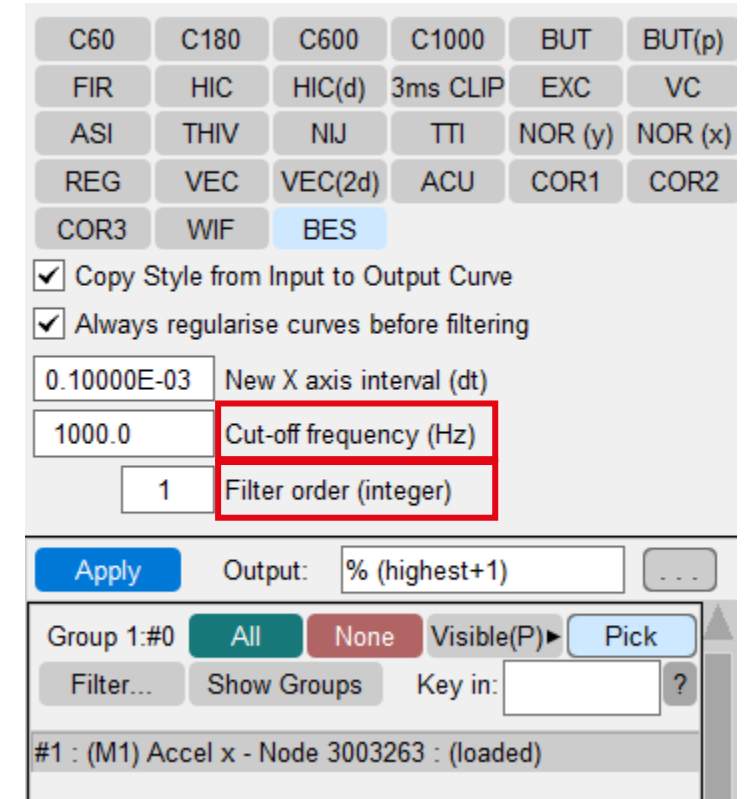
Filtering and Correlation

Bessel Filter

Bessel Filter

- A **Bessel** filter operation has been added to the **Automotive** menu of T/HIS.

- A Bessel filter is a type of linear filter with a maximally flat group/phase delay (maximally linear phase response), which preserves the wave shape of filtered signals in the passband.

Bessel Filter

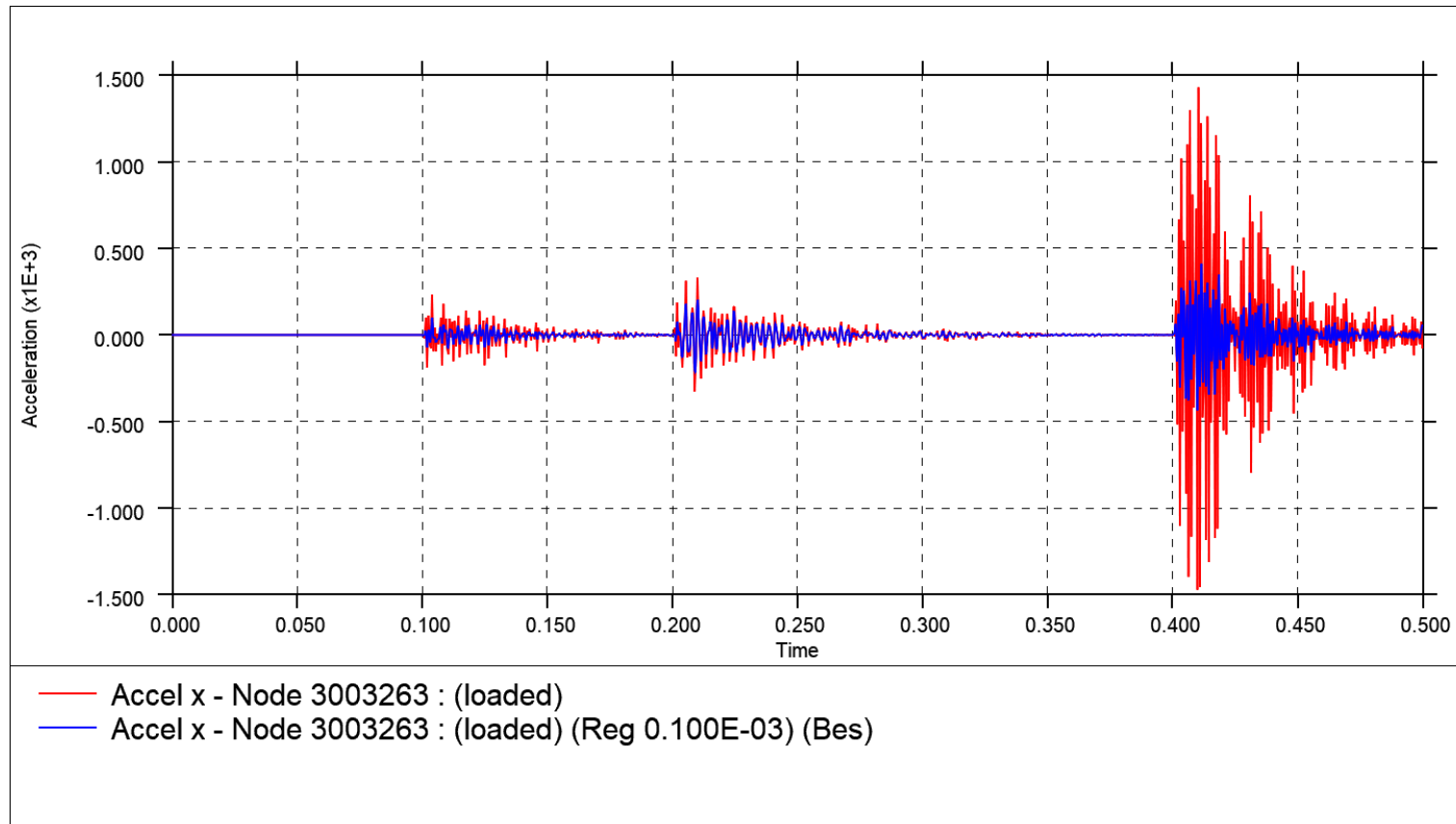- The Bessel filter can be used in the same way as the existing Butterworth filter, with its "Cut-off frequency" and "Filter order" options.

- For T/HIS 19.0, a maximum filter order of 10 is supported.

Bessel Filter

Here is an example of a node acceleration curve before and after a 3rd order Bessel filter with a cut-off frequency of 1000 Hz is applied:

Filtering and Correlation

MADM Correlation Tool

MADM Correlation Tool

Included in T/HIS 19.0 as a JavaScript is the MADM Correlation Tool. The minimum area discrepancy method (MADM) is ideal for correlation between LS-DYNA simulations and physical tests when **force** versus **deflection** is the relationship of interest, and offers benefits over other correlation methods that focus on parameters versus time.

The MADM Correlation Tool was developed in collaboration with the University of Coventry [1][2].
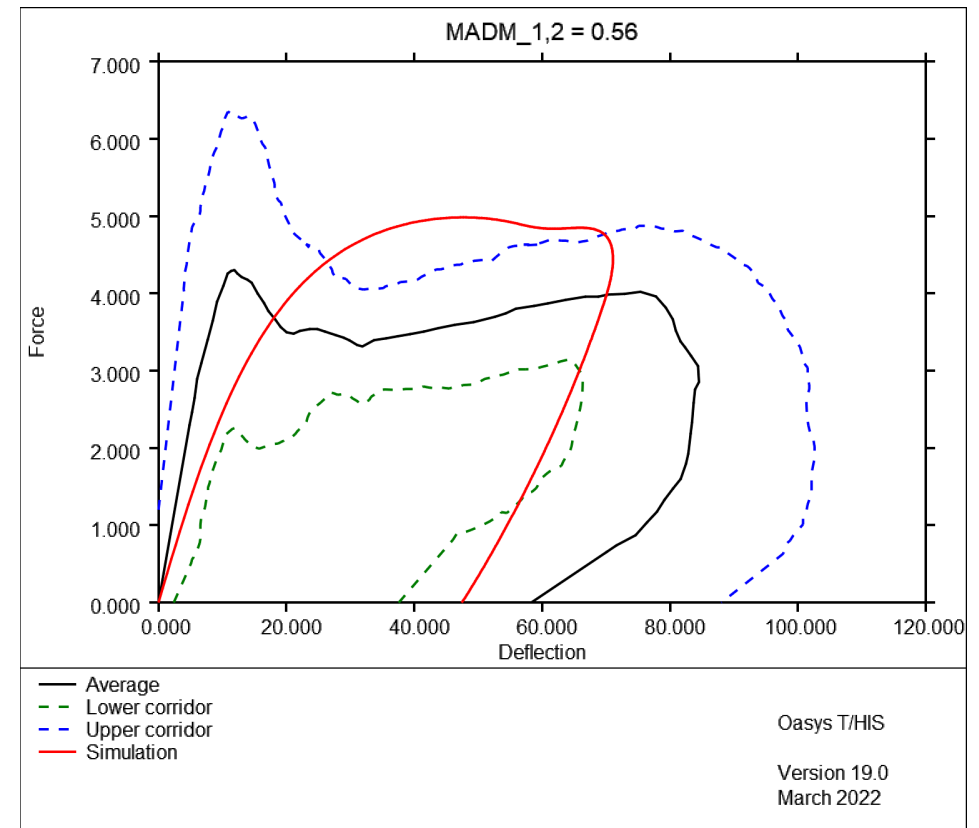
[1] Bastien, C., Diederich, A., Christensen, J., & Ghaleb, S. (2021). Improving Correlation Accuracy of Crashworthiness Applications by Combining the CORA and MADM Methods. Proceedings of the Institution of Mechanical Engineers, Part D: Journal of Automobile Engineering. https://journals.sagepub.com/doi/10.1177/09544070211069666

[2] Peres, J, Bastien, C, Christensen, J & Asgharpour, Z 2019, 'A Minimum Area Discrepancy Method (MADM) for Force Displacement Response Correlation', Computer Methods in Biomechanics and Biomedical Engineering, vol. 22, no. 11, GCMB-2018-045, pp. 981-996. https://doi.org/10.1080/10255842.2019.1610745

MADM Correlation Tool

To access MADM, open the JavaScript panel and select MADM → **MADM Correlation Tool**. Further help and academic references can be found in the MADM window.
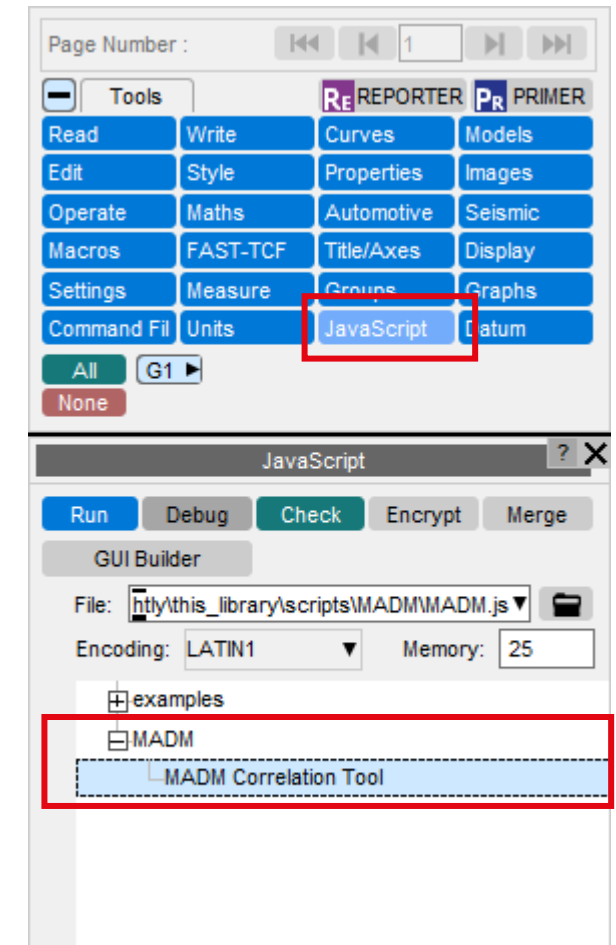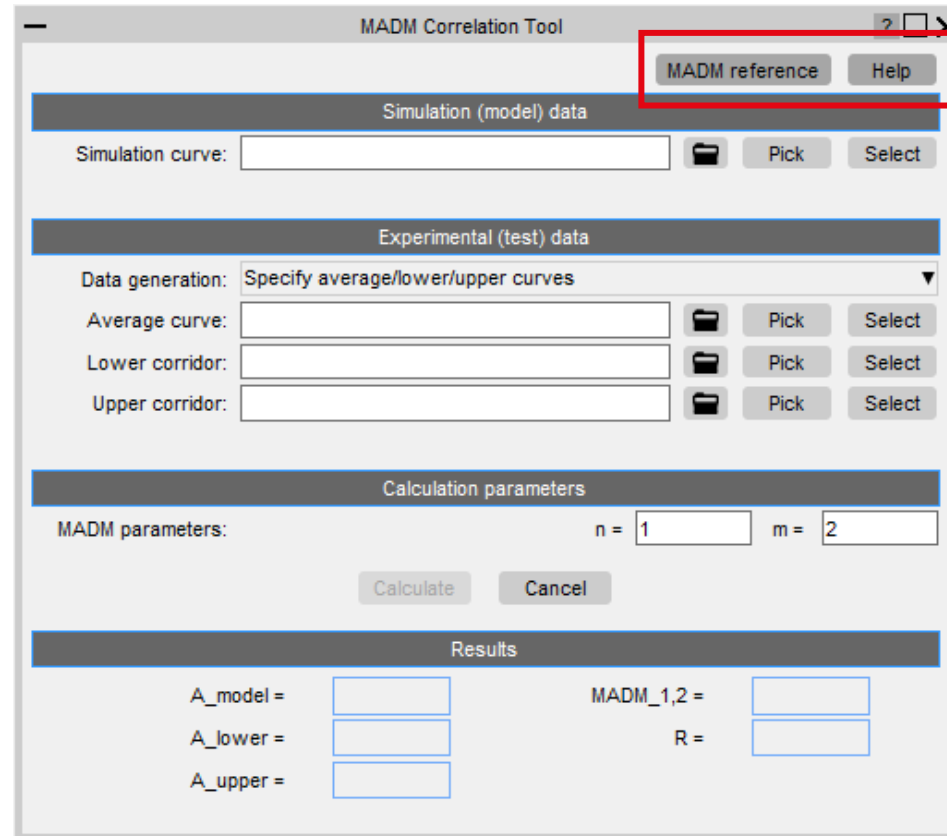
HDF

HDF Read

- T/HIS 19.0 has some new support for reading HDF files. We plan to develop HDF support further.

- The version of HDF currently supported is **HDF5**. HDF4 files require external conversion to HDF5 before they can be read into T/HIS. We have provided an **HDF4 to HDF5 Converter Tool** to facilitate this – see the T/HIS manual for details.

- Currently we support Float datatypes within Atomic datasets and Float datatypes within Compound datasets.

- Upon selecting a valid HDF file, a basic menu allows you to browse the file contents.
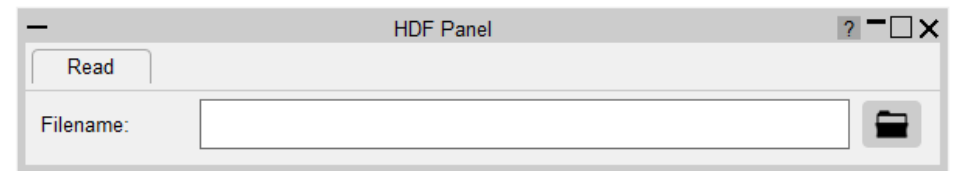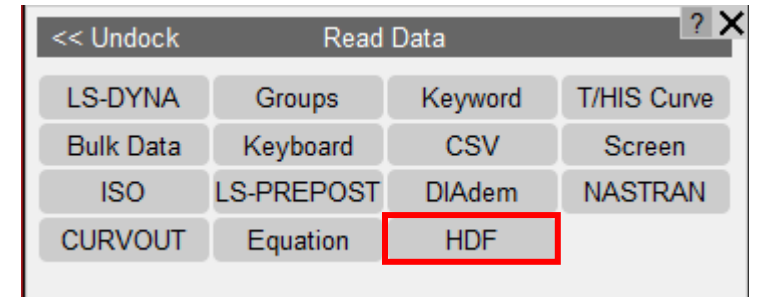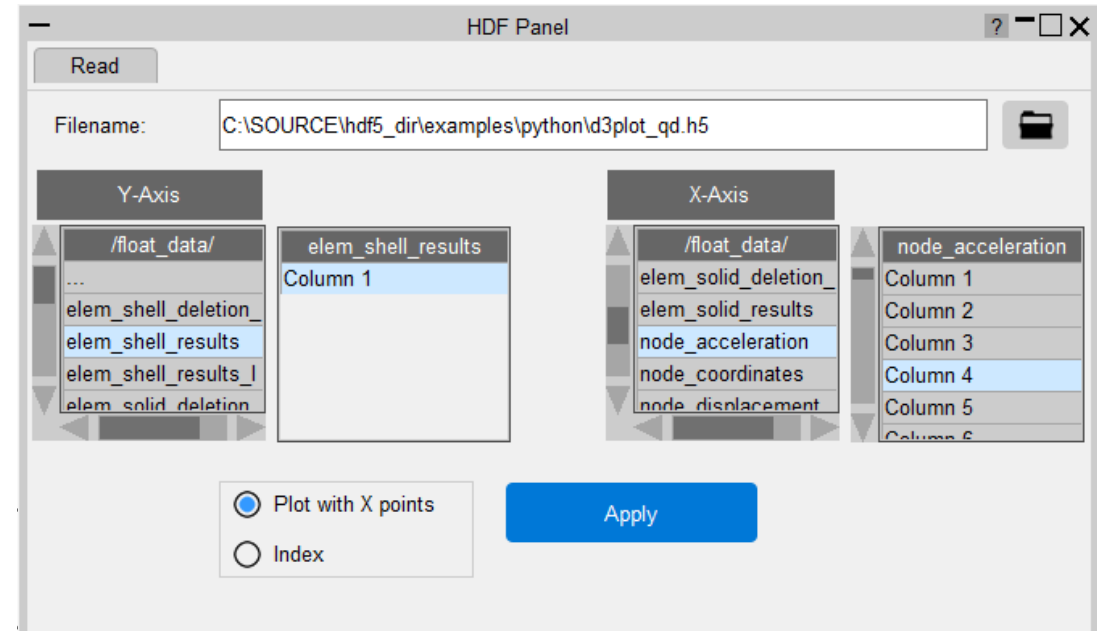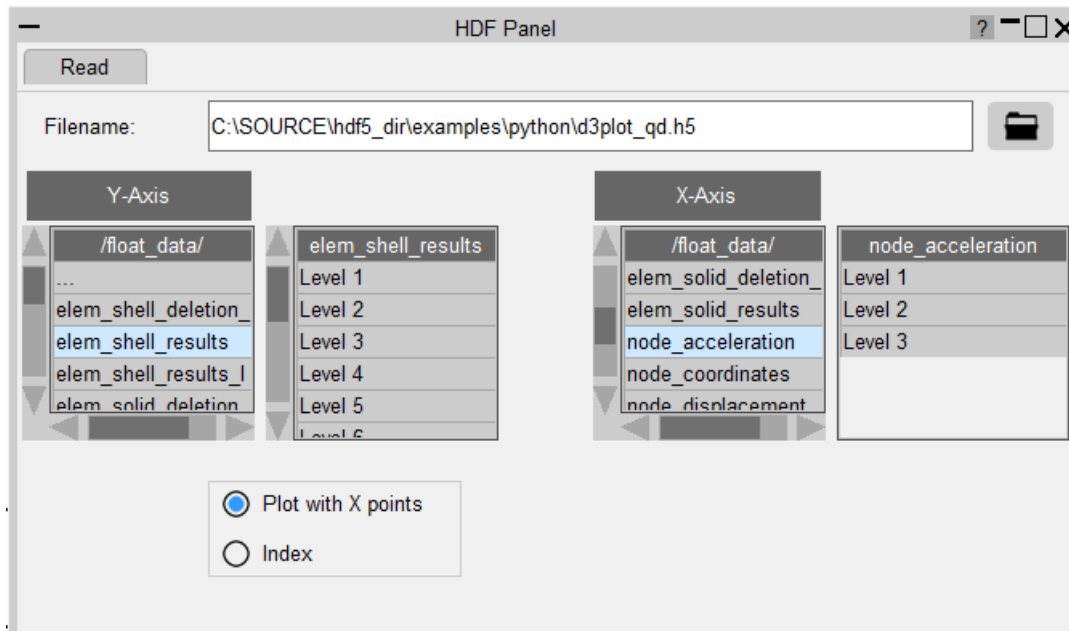
HDF Read

The panel opens with "Plot with X points" mode selected by default.
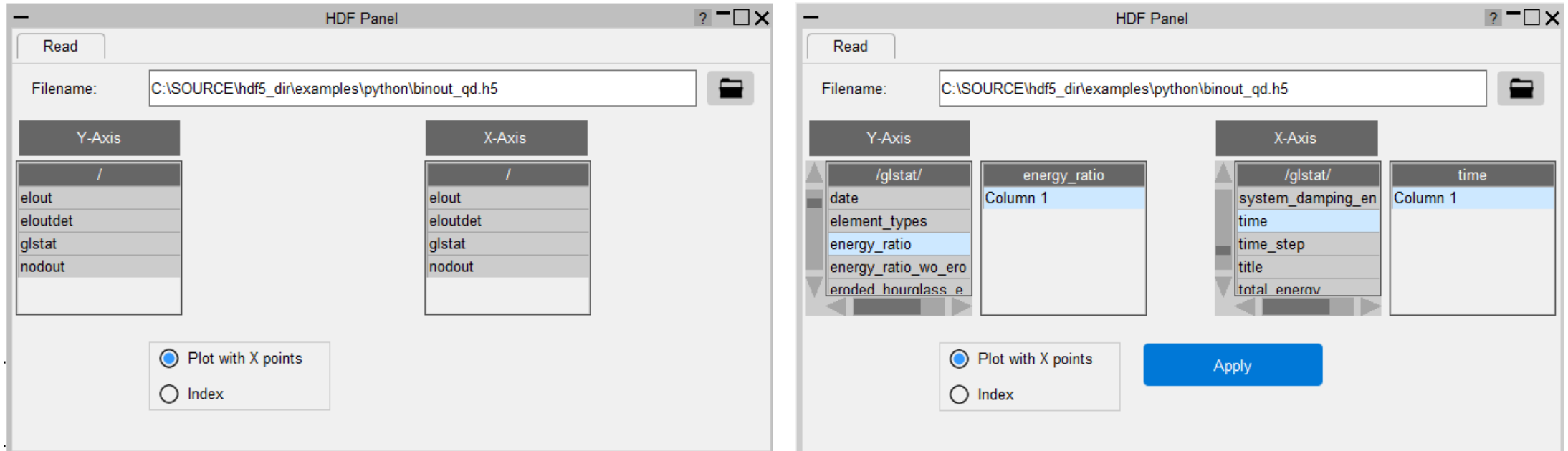
Selecting a dataset will map an adjacent dataset box displaying the contents of the dataset.
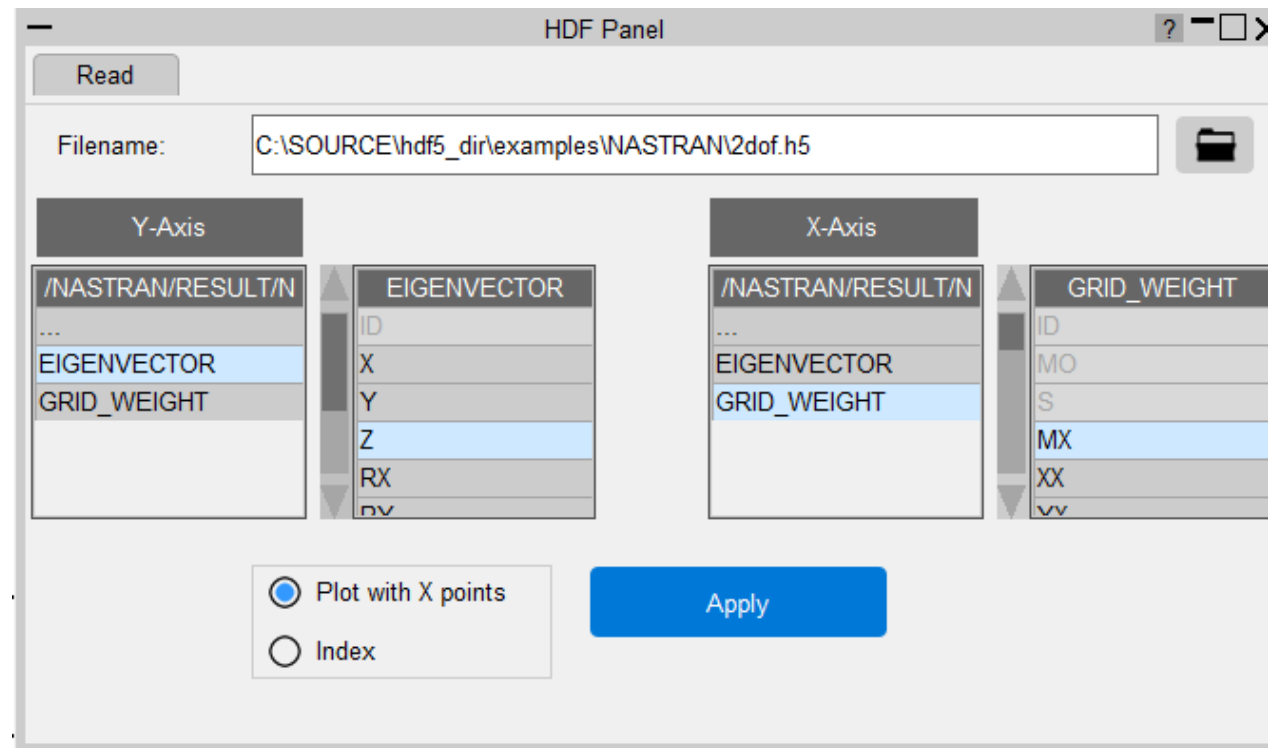
HDF Read

For a 1D or 2D dataset the dataset box will give a listing of Columns (see previous slide) but for a 3D dataset you first need to select the Level and then the Column:

HDF Read

For a Compound dataset, the dataset box lists the dataset labels. If a row is greyed out then it does not contain a supported datatype.
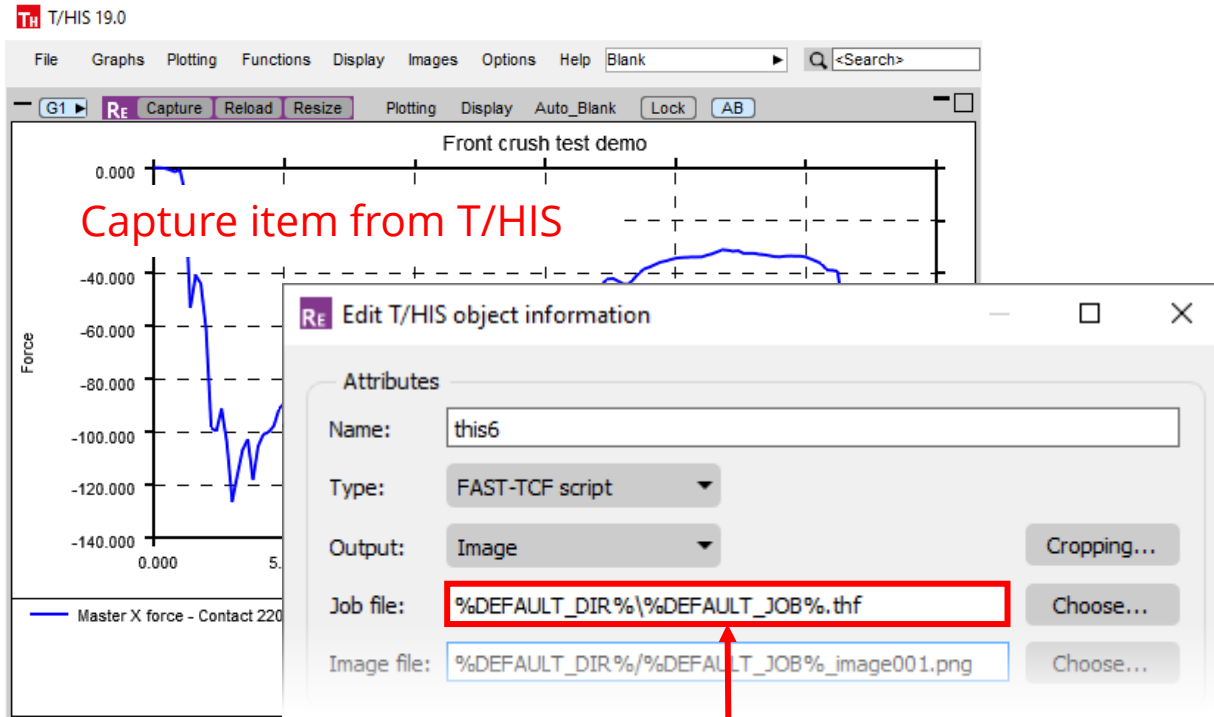
HDF Read

- Rather than plotting against X points, you can select "Index" to plot Y data against the index number of each Y point:
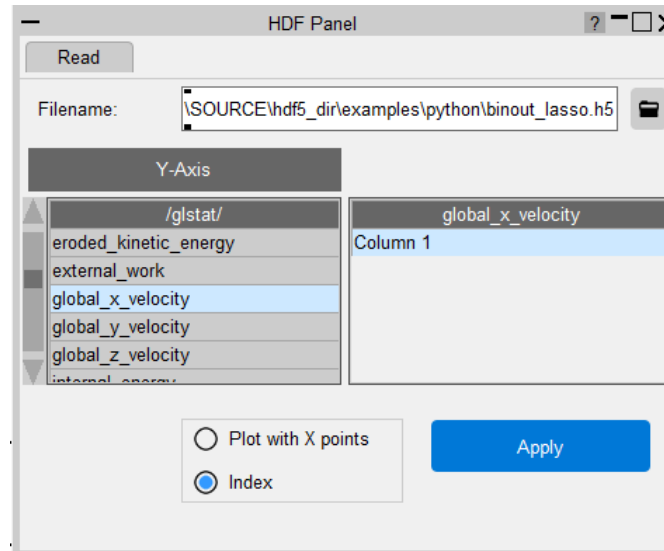
- For now, FAST-TCF is not supported for HDF (any HDF curves will be skipped).

- As we develop it further, please send us any feedback you have on HDF support.

REPORTER Integration

Automatic update of DEFAULT_DIR and DEFAULT_JOB

Capture item from T/HIS

In REPORTER, job uses variables automatically

Model file path and filename from T/HIS automatically

If you open REPORTER from D3PLOT or T/HIS and capture an item, the values of DEFAULT_DIR and DEFAULT_JOB are now automatically updated to match the current model in D3PLOT or T/HIS (previously you would have had to edit the hardwired filenames manually). This makes it easier to set up your template to run for different models.

Improved Support for LS-DYNA Results

*CONTROL_ENERGY

- In the Global menu, support has been added for six new *CONTROL_ENERGY components, for new parameters MATEN, DISEN and DRLEN.

- The MATEN options are also added in the Part menu.

- The internal energy is split into three different energies – plastic, elastic, damage:
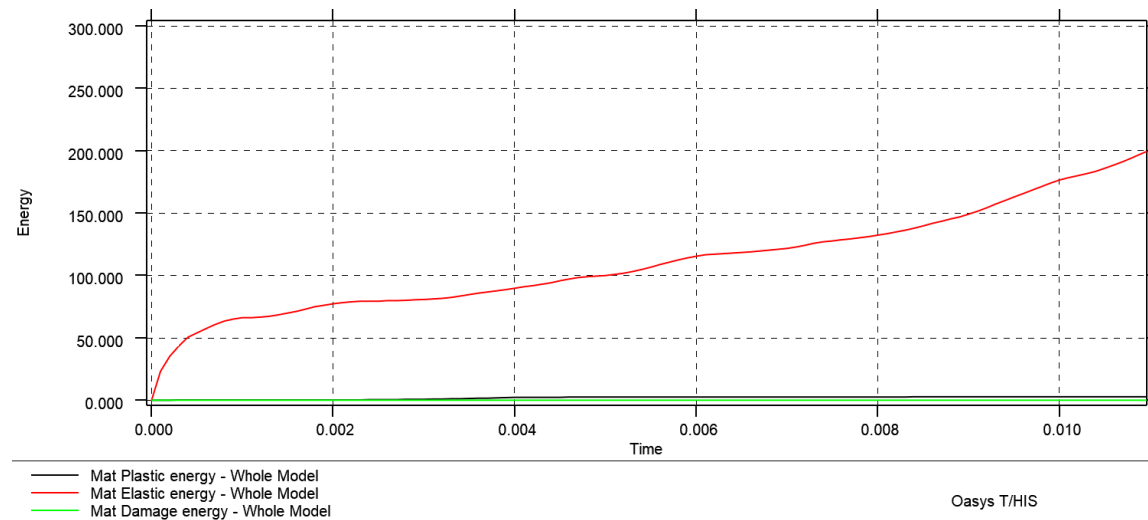
DIE - Dissipated IE
DKE - Dissipated KE
DE - Drilling energy

MPE - Mat Plastic energy
MEE - Mat Elastic energy
MDE - Mat Damage energy

Mat Plastic energy - Whole Model
Mat Elastic energy - Whole Model
Mat Damage energy - Whole Model

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Discrete Beam

- Support has been added to the Discrete Beams menu for 15 new components including forces and moments.

- The component names have been modified to be in a local co-ordinate system (Axial, S, T).

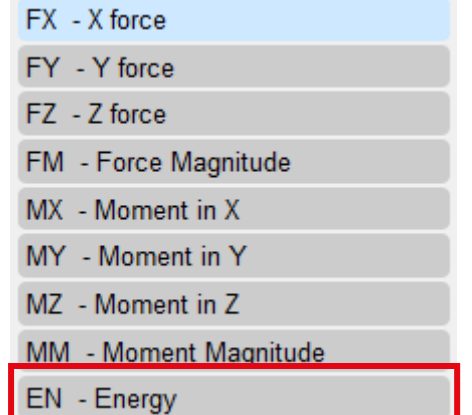|	
AXD - Relative Axial displacem	
SD - Relative S - Displacemen	
TD - Relative T - Displacemen	
AXR - Axial rotation	
SR - Rotation in S	
TR - Rotation in T	
RNAX - Relative Axial force	
RNS - Resultant S - Force	
RNT - Resultant T - Force	
MAX - Axial moment	
MS - Moment in S	
MT - Moment in T	
AXX - Axial Direction X	
AXY - Axial Direction Y	
AXZ - Axial Direction Z	
SX - S - Direction X	
SY - S - Direction Y	
SZ - S - Direction Z	
TX - T - Direction X	
TY - T - Direction Y	
TZ - T - Direction Z	

Joints

- A new Cylindrical sub-type has been added to the Joints menu, with16 new components as shown:
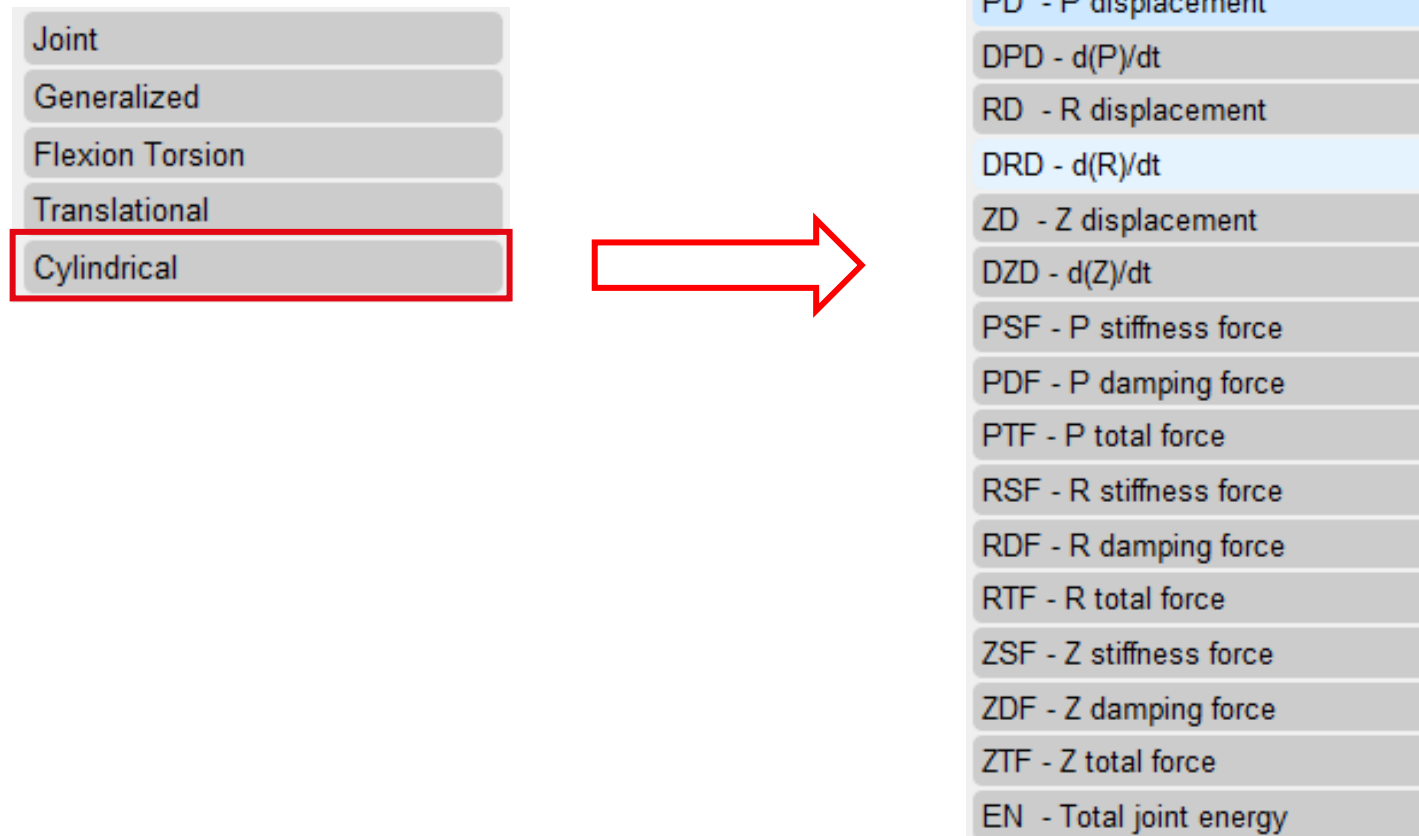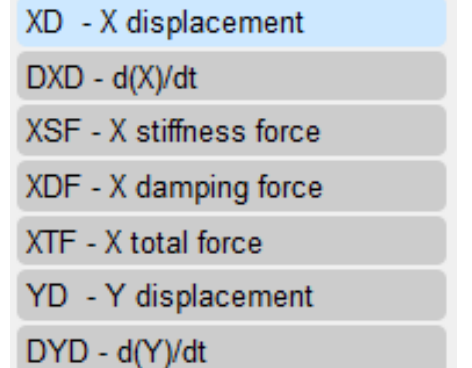
Joints

- In the Joint subtype, a new energy component has been added.

- For the Generalized subtype, the coordinate system has been changed to X ,Y ,Z from phi, theta, psi. The corresponding JavaScript tags have been modified accordingly.
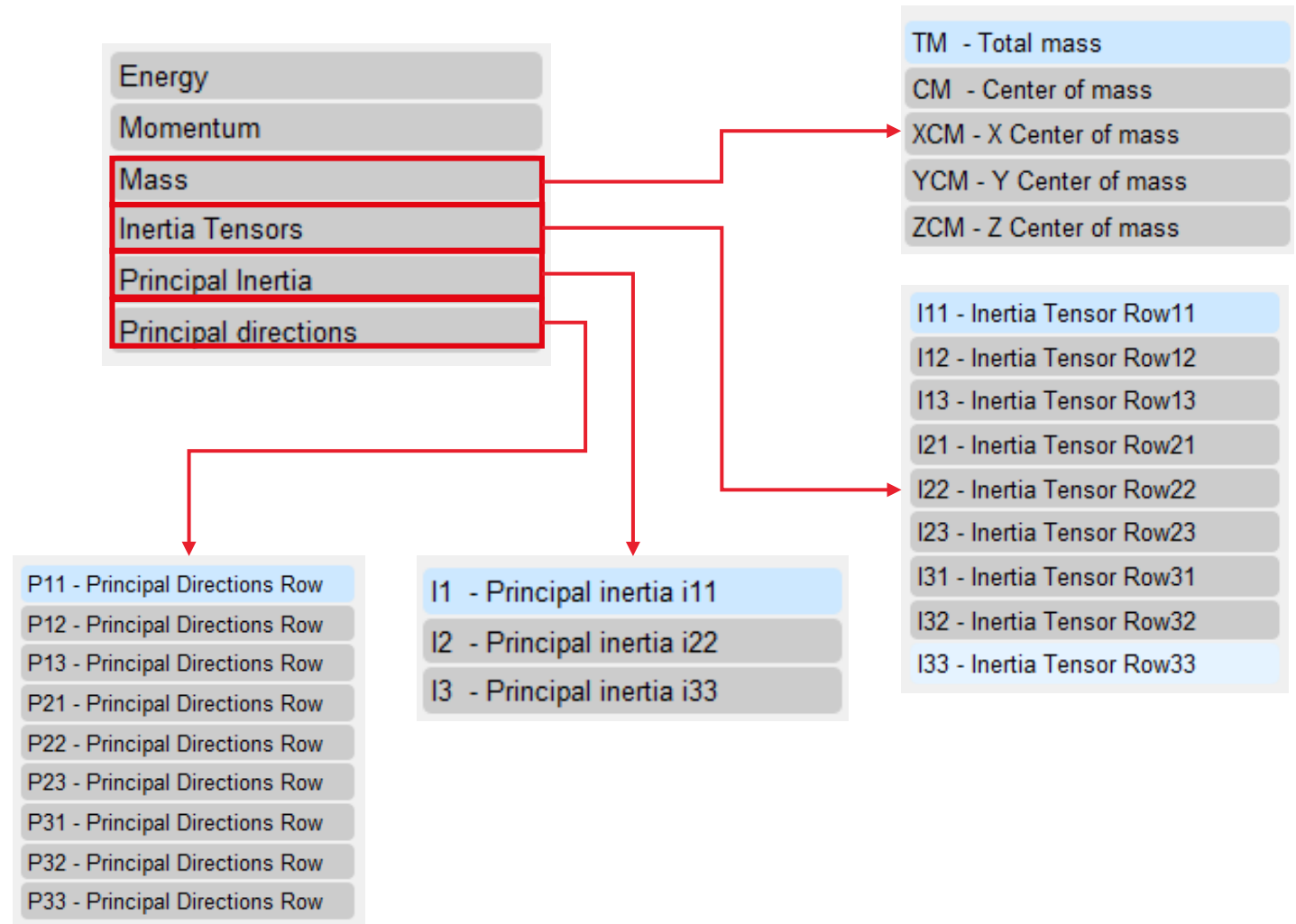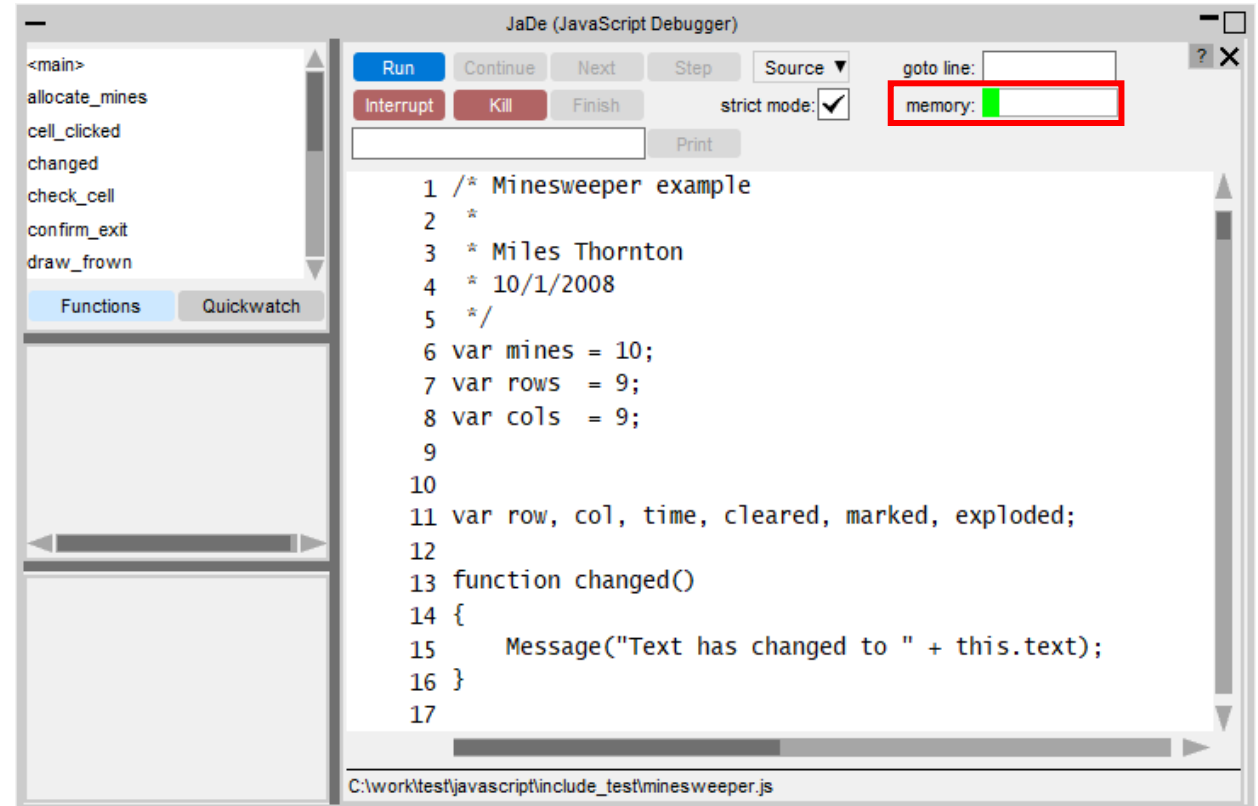
Subsystems

- Support has been added to the Subsystem menu for four new Mass and Inertia sub-types, with 26 new components as shown:

JavaScript

Memory use in JaDe

- The JavaScript debugger now shows how much garbage collection memory is being used by a script.

console API

- The JavaScript engine now implements the console API (as specified in https://console.spec.whatwg.org) so functions such as console.log(), console.warn() etc are now usable.

- Output is sent to the console window on Windows and the terminal window on Linux.

Other JS API changes

- The special encoding comment at the beginning of a script now supports Shift-JIS as an encoding.

- ECMAScript 6 Modules are now supported in T/HIS. Both static and dynamic imports are supported.

- A new function Colour.GetFromName has been added to return a colour value (integer) for a core colour or user colour from its name.
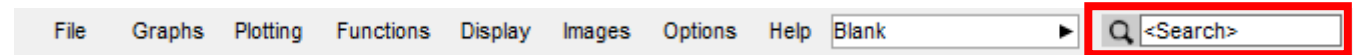
Search Box

Search Box

- Previous versions of T/HIS included a Quick Find button which has now been made more prominent in the form of a search box located on the top bar.

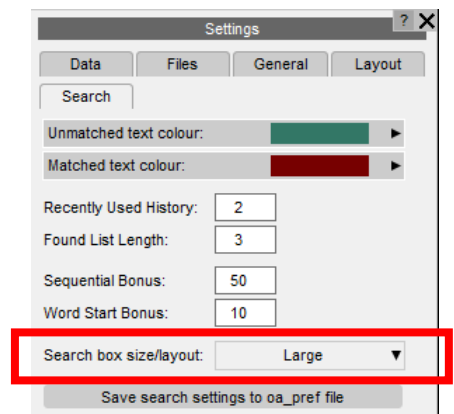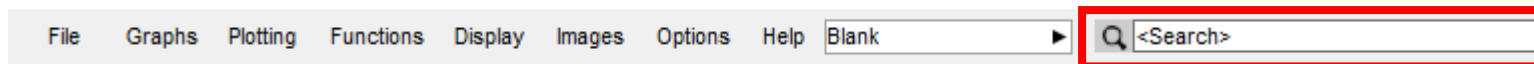- The existing keyboard shortcut (#) can still be used too.
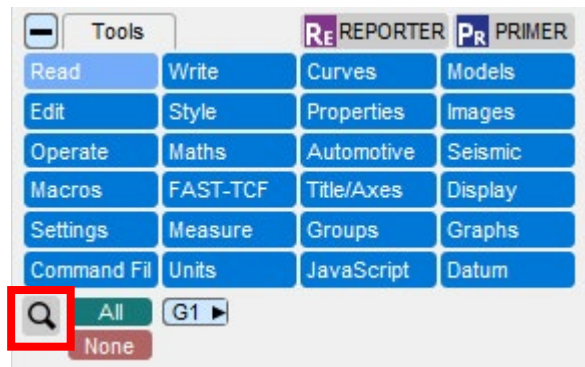
v18

v19

- The size of the search box and other search options can be controlled from Options → Settings → Search

Contact Information

ARUP

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