Altair HyperGraph 2D 2019 Tutorials

HG-1040: AVD Diagram Using Unit Scaling and Plot Browser

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In this tutorial you will learn how

- Create an **A**cceleration **V**elocity **D**isplacement plot in one window

- Use the unit scaling feature for a plot.

- Use the **Plot Browser** to change the appearance of a plot, such as modifying the axes names, unit type and curve line color.

Tools

The **Build Plots** panel can be accessed one of the following ways:

- Click the **Build Plots** icon,

  OR
- From the menu bar select **Curves > Build Plots**.

This panel allows you to construct multiple curves and plots from a single data file. Curves can be overlaid in a single window or each curve can be assigned to a new window.


The **Plot Browser** resides on a tab in the Tab Area sidebar and allows you to view the HyperGraph 2D plot structure.   The Plot Browser tools allow you to search, display and edit entities and their properties within the current session.   The plot structure is viewed as a flat, listed tree structure within the browser.   However, if the plot has a hierarchy, then the Plot Browser accommodates this hierarchical structure.

From the Plot Browser, you can select entities one at a time or several simultaneously using common selection techniques.   You can also use the browser's context-sensitive menus to select entities.   Using the Plot Browser, you can perform many of the operations available in the HyperGraph 2D panels, thus allowing you to modify your plot and curve properties in one location.

### Step 1: Clear any units association and enable unit scaling.

1. From the **Tools** menu, select *Reset Units Association*.

   The **Reset Units Association** dialog is displayed.
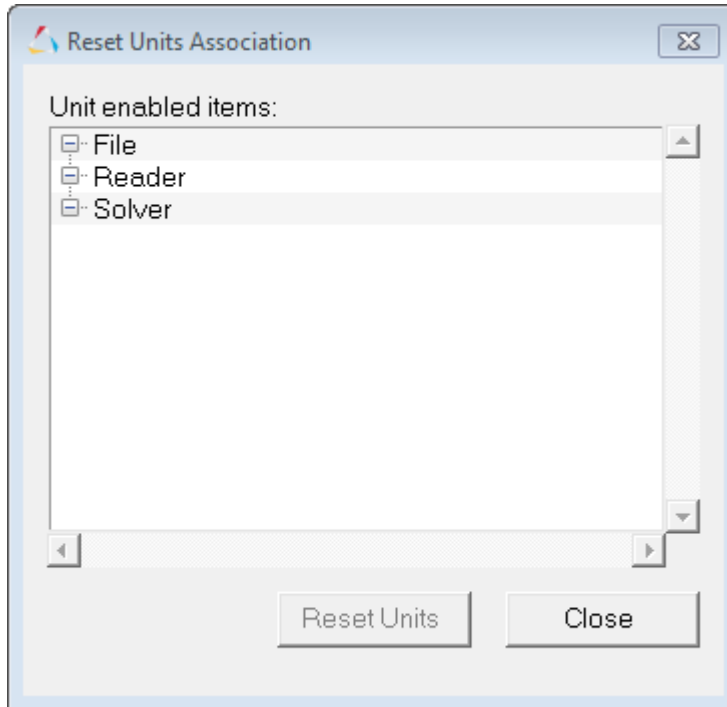
2. If activated, click *Reset Units* to clear any unit associations.   If **Reset Units** is grayed out, you don't need to do anything.

3. Click *Close* to close the dialog.

4. From the toolbar, click the *Options* icon, ⚙.

   The **Options** panel is displayed.
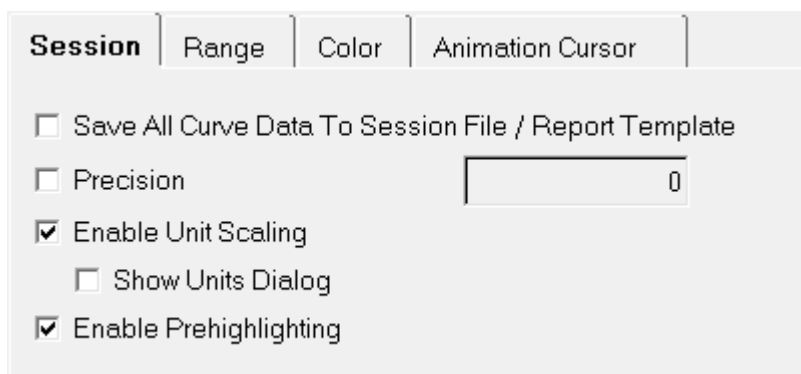
5. From the **Options** dialog, verify that **Enable Unit Scaling** and **Show Units Dialog** are activated.

Step 2:   Open the `nodout` file.

1. From **File** menu, select ***New > Session*** to clear all contents in the HyperGraph session.

2. Verify ***XY Plot*** is selected from the plot type menu, ⌃.

3. Click the ***Build Plots*** icon, 📄 .

4. Click the ***Open File*** icon, 📂, and select the `nodout` file, located in the `plotting` folder.

Step 3: Plot the curves and set the curve units.

1. Return to the **Build Plots** panel, 📄 .

2. For the **X Type:** select ***Time***.

3. From the **Y Type:** column, select ***Node Data***.

   The data available in the file is listed under the **Y Request** column.

4. From the **Y Request:** column, press and hold the CTRL key and select ***Nodal Point 2500001*** and ***Nodal Point 2500002***.

5. From the **Y Component:** column, select ***X Displacement, X Velocity*** and ***X Acceleration***

6. From the **Layout** drop-down menu, select ***Use Current Plot***.

7. Click ***Apply*** to create the curves on page 1.

   The **Units Profile** dialog is displayed.

8. From the **Units Profile** dialog, select the *C* radio button and click *OK*.

   This sets the **Length**, **Time** and **Mass** units for the file to *millimeter*, *milliseconds*, and *kilograms*, respectively.
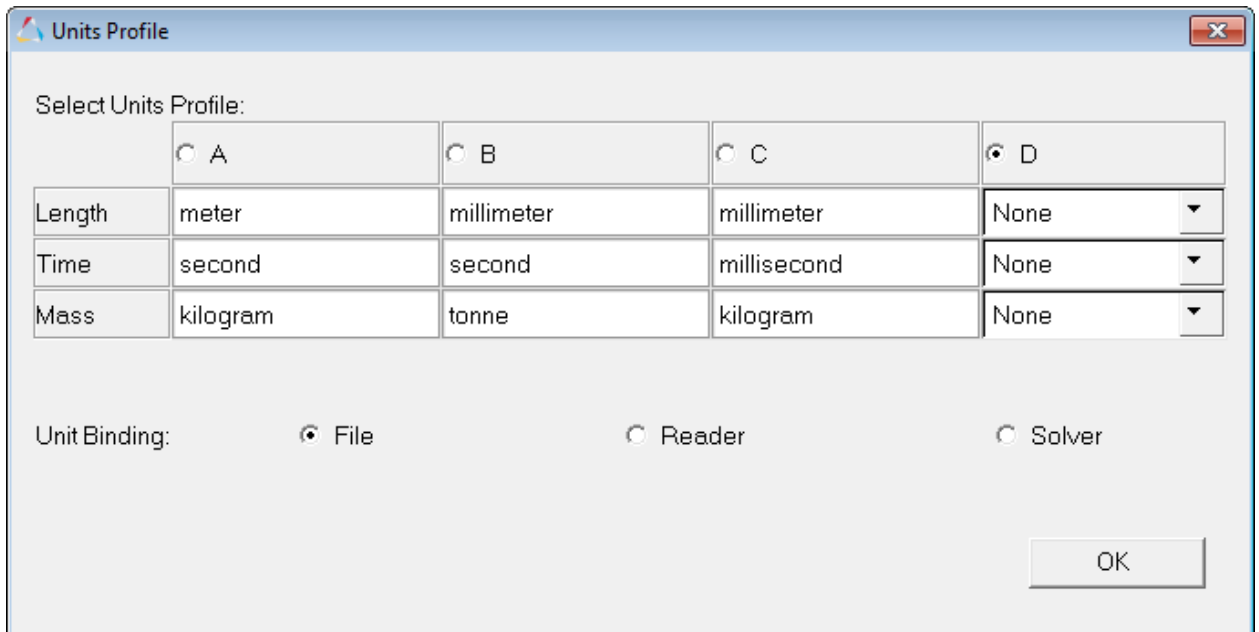

9. Click *OK* to close the **Select Units Profile** dialog.

   The curves are plotted and the units for the vertical and horizontal axis are changed to millimeters and milliseconds, respectively.

10. Click *Apply*.

    The displacement, velocity and acceleration are plotted. Notice that two additional axes have been added to the right of the window to accommodate the velocity and acceleration data (use your plot with your default setting.

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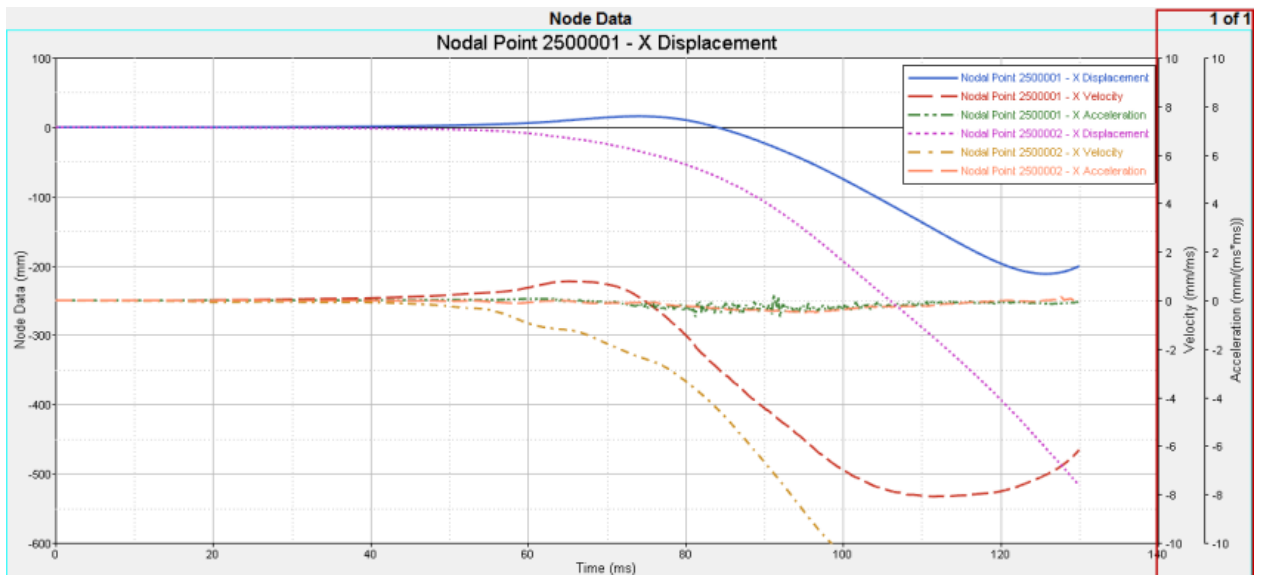
Step 4: Modify the plot's appearance and rename an axis.

In this step, you will use the **Plot Browser** to change the appearance of the plot.

1. From the **Plot Browser**, click the *Axes* icon, ⬛.

2. Expand the folders for page 1 (**p1: Node Data**), and window 1 (**w1:XY Plot**) by clicking the plus button next to each folder.

3. The following axes are listed under w1:XY Plot: **X1, Y1, Y2**, and **Y3**.

4. Select the *X1* axis.

5. From the **Properties Table**, located in the bottom portion of the Plot Browser, click the color palette next to **Color** and select *black*.

| Name	Value
⊟ **Standard**	
Visibility	☑
Name Visibility	☑
Name	X1
Text	Time
Type	Horizontal
⊟ **Display**	
Font Settings	{Microsoft Sans Serif} 12 regular normal
Color	⬛
⊟ **Scale**	
Scale Type	Linear
Min	0.0
Max	140.0
Auto Fit	☑
Fit Range	☐
⊟ **Tics**	
Format	Auto
Tic Method	Tics per axis
Tics per Axis	8
Grids per Tic	2
Precision	5
Tic Font Settings	{Microsoft Sans Serif} 10 regular normal

6. Select the *Y1* axis

7. From the **Properties Table**, click the color palette next to **Color** and select *red*.

8. Change the color for the **Y2** axis to *blue* and change the color for **Y3** to *pink*.

Next, you will rename the axes using the Plot Browser.

9. From the **Plot Browser**, select the **X1** axis.

10. From the **Properties Table**, click the *Name* field and enter the name `Displacement`.

11. Repeat steps 9 and 10 for the **Y1**, **Y2**, and **Y3** axes.   Rename them `Node Data`, `Velocity` and `Acceleration`, respectively.

   The new vertical axes names for X1, Y1, Y2 and Y3 are shown below:
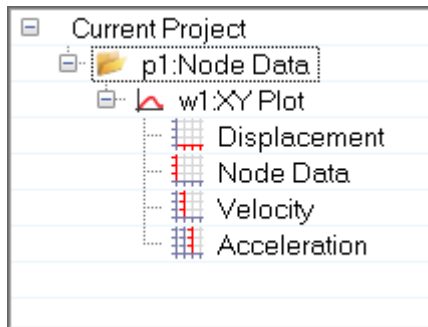
Step 5: Modify the curve line color.

1. From the **Plot Browser**, click the **Curve** filter icon, ⎯⎱.

2. Expand the folders for page 1 (**p1: Node Data**) and window 1 (**w1:XY Plot**) by clicking the plus button next to each folder.

3. Select the two **Displacement** curves from the list for nodal points **2500001** and **2500002**

4. From the **Properties Table**, next to **Line Color**, click the color palette and select **black**.

    This changes the color of those two curves to black.

5. From the same expanded **w1:XY Plot** folder, select the **X Velocity** curves.
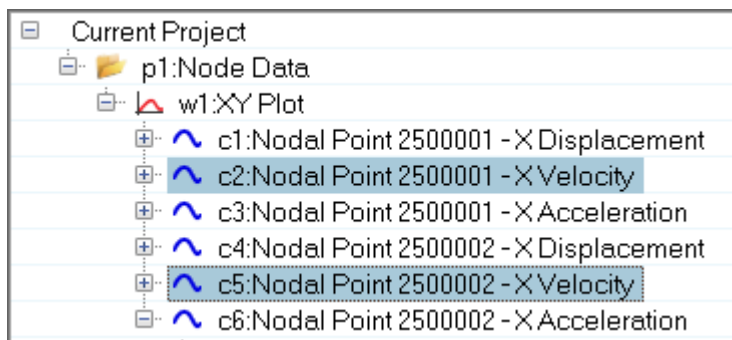
6. From the **Properties Table**, change their line color to **red**.

7. Select the **X Acceleration** curves and change their line color to **blue**.

8. From the Plot window, right-click on the horizontal axis to display the following context menu:
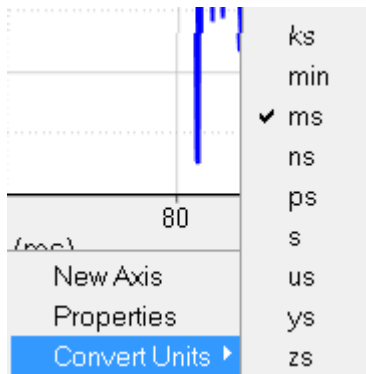
9. Select ***Convert Units*** and change the unit type from milliseconds to `seconds (s)`.

10. From the Plot window, right-click in the vertical axis and select ***Convert Units***. Change the distance from millimeters to `meters`.

11. Repeat step 8, but for the right-side **Velocity** axis. Change the speed from millimeters/milliseconds to `mph`.

12. You can also change the unit type for a curve by right-clicking on the curve and selecting ***Enable/Change Curve Unit***.

    The **Enable/Change Curve Unit** dialog is displayed.
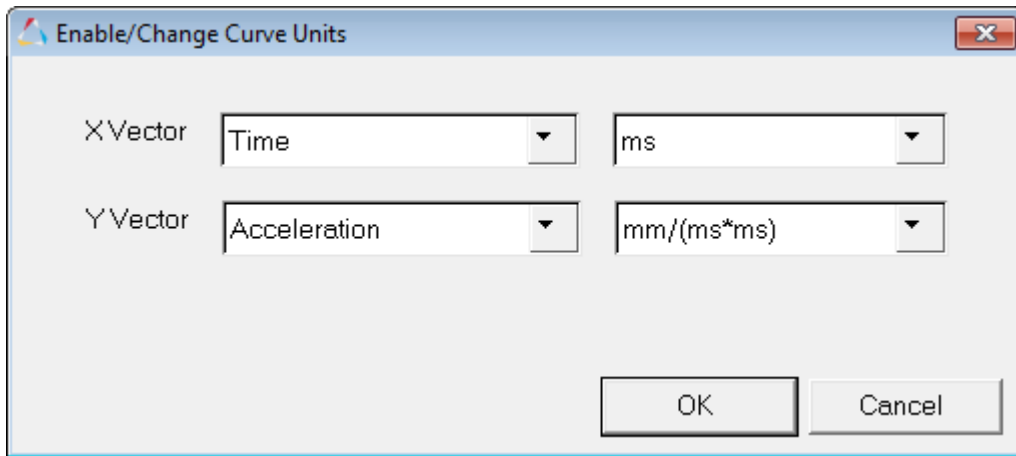
13. From the **YVector**, select the right-most drop-down menu and change the unit from millimeter/millisecond to `kph`.

14. Click ***OK***.

    The final plot window is shown below: