

# Altair Safety Report Manager

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## Altair Safety Report Manager Intro

The Altair Safety Report Manager (aka ASRM) is a fully customizable automatic report generation utility for crash & safety regulations. It allows users to create a First Sight Report PPT for the selected impact type & regulation. The PPT report which consists of plots & animations that are generated based on various inputs entered by the user.

A standard report is delivered for each mode with the following info and contents.

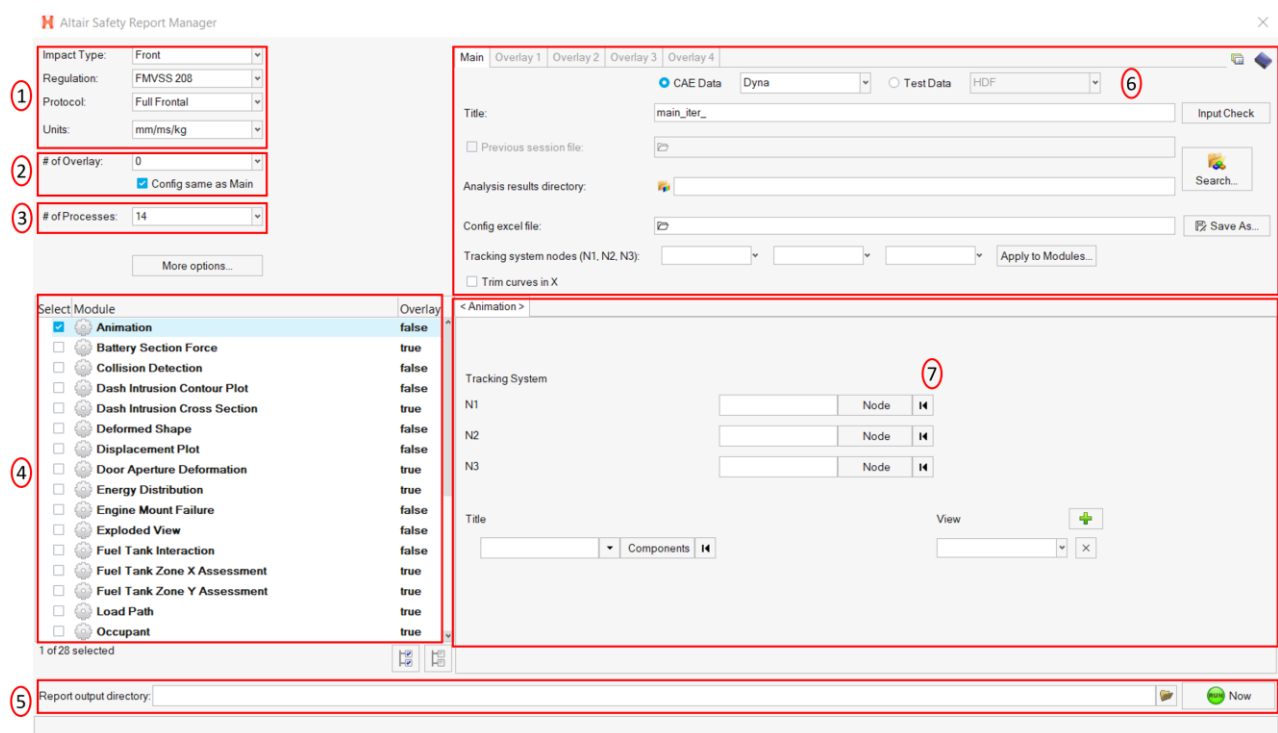
- Model information
- Run quality statistics
- Occupant requirements
- Structure requirements
- Structure overview
- User defined plots

In addition, HyperView template & session files are created at the end of report generation which contains all plots/animations for closer analysis. It has the capability to overlay plots from different iterations. It is also possible to overlay plots with test data in HyperView.

The ASRM utility can also be run on HPC after job completion.

## ASRM GUI Overview

Below is a snapshot of the ASRM GUI. To understand the ASRM workflow better, the GUI is divided into various sections as highlighted & numbered in the below picture. The main functionality of all the sections is briefly described below.



## Impact Type & Units selection Section

In this section, user will be able to select the Impact Type, Regulation, and the Protocol for which he / she wants to generate the PPT report along with the source units used for running the simulation. Based on this selection the modules list (section #4) gets updated.

Impact Type:	Front
Regulation:	FMVSS 208
Protocol:	Full Frontal
Units:	mm/ms/kg

## Overlay selection section

In this section user will be able to select the overlay option. Following scenarios are supported.

- When you want to generate report for a single run then you would set overlay option to 0. Therefore, overlay tabs (in section #6) is disabled.



- When you want to run in overlay mode, then you must pick appropriate number of overlay runs. The overlay tabs get enabled based on the number selected. User can select up to 4 iterations for overlay.

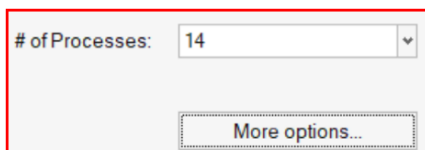


Please note that only those modules which run in HyperGraph (that create curves / graphs) are supported for overlay mode. There is a specific overlay status column next to modules list that indicates the overlay support for each module.

## No. of Processes selection & save session file section

This section allows user to enter the no. of processes to be used when executing the utility. ASRM has the capability to run the report generation in parallel based on the no. of processes selected.

It also saves TPL files and session files at the end of the report generation. Users can also choose to export curves (curves created from the respective plotting modules) into **Excel** format. Click on the **More options...** button to select these options.



## Modules list

This section allows users to select the modules to be run for report generation. User must make sure to select the module that he / she wants to include in the report generation.

## Output directory selection

In this section user will select the output directory path. This is where all the output files such as the session files, images, animations, PPT & log files from the ASRM run will be created.

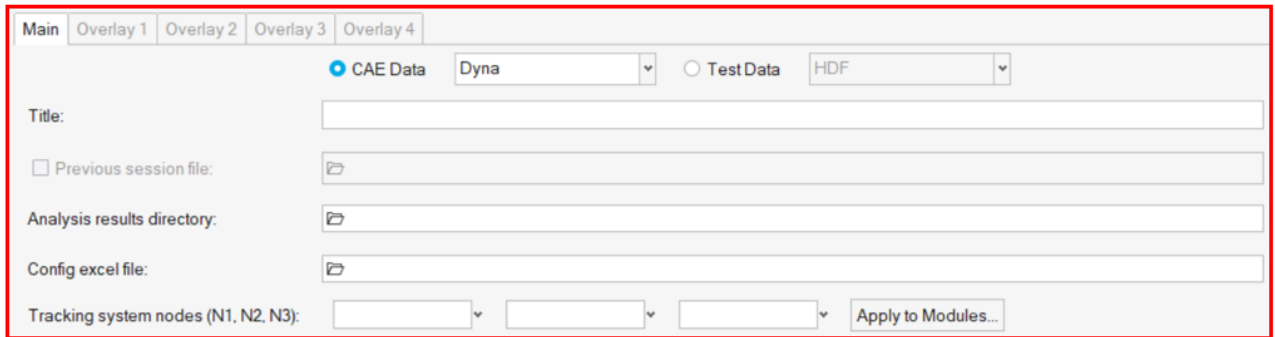
## Main section

### Input directory & configuration section

In this section, user should select the following.

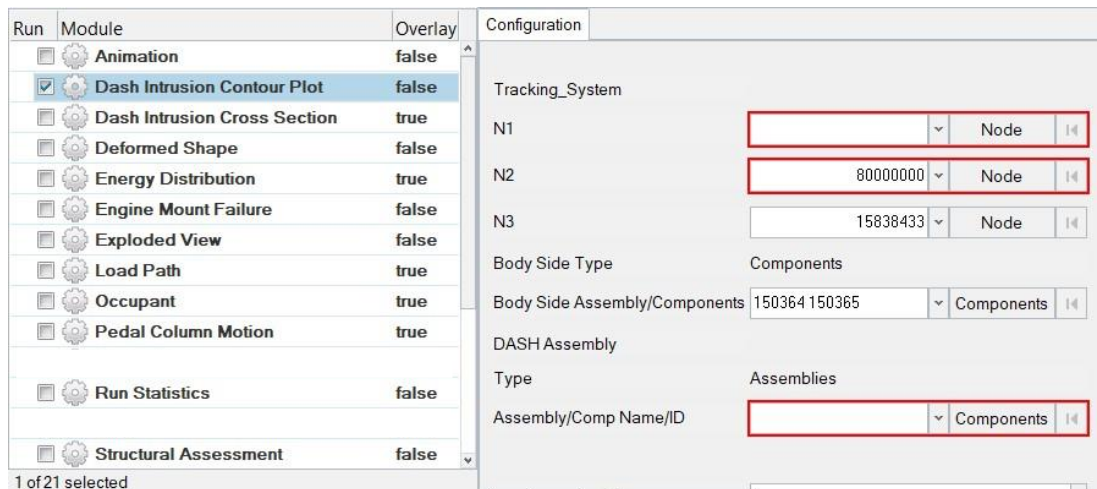
- Type of data being used for generating the report. It could be CAE simulation data or physical test data.
- Title for the report which will be used for creating results directory as well as prefix for curve names & summary tables

- Results directory path where the solver input file, results files such as animation & time history files or test data are located.
- Config file path (if it exists already)
- Define global tracking system using 3 nodes (requests from Time history file). This is an optional input. Once the global tracking system is defined, it can be easily applied to other modules where tracking system is an input. Click on **Apply to Modules...** button, a selection dialog pops up, select the modules to apply the 3 nodes, and click **Apply&Close** button.



### Input Validation check

Input Check button would run a quick validation check to verify if the inputs defined for various modules selected is valid. The verification is done on the results files available in the input directory specified. Any invalid inputs and missing input found from validation check will be highlighted in RED in the ASRM GUI as shown below.



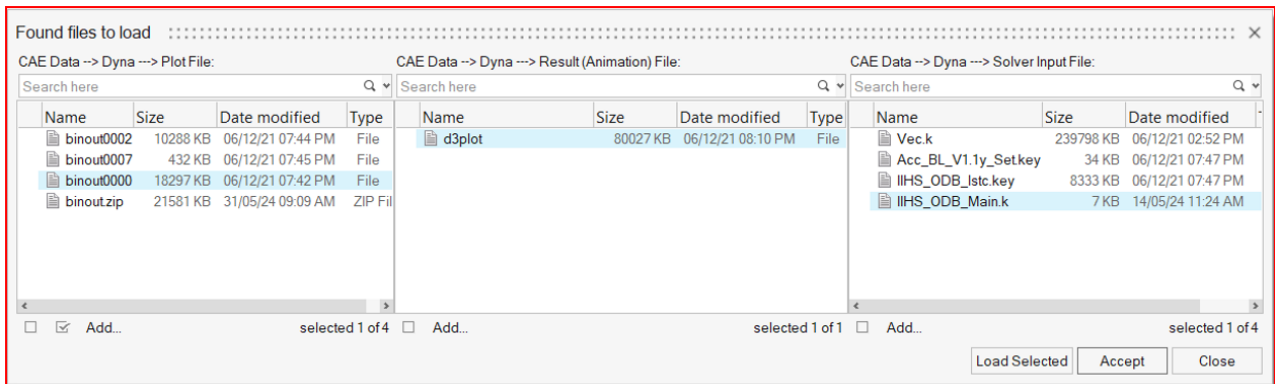
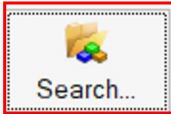
Run	Module	Overlay
<input type="checkbox"/>	Animation	false
<input checked="" type="checkbox"/>	Dash Intrusion Contour Plot	false
<input type="checkbox"/>	Dash Intrusion Cross Section	true
<input type="checkbox"/>	Deformed Shape	false
<input type="checkbox"/>	Energy Distribution	true
<input type="checkbox"/>	Engine Mount Failure	false
<input type="checkbox"/>	Exploded View	false
<input type="checkbox"/>	Load Path	true
<input type="checkbox"/>	Occupant	true
<input type="checkbox"/>	Pedal Column Motion	true
<input type="checkbox"/>	Run Statistics	false
<input type="checkbox"/>	Structural Assessment	false

1 of 21 selected

Configuration	
Tracking_System	
N1	<input type="text"/> Node
N2	<input type="text"/> 80000000 Node
N3	<input type="text"/> 15838433 Node
Body Side Type Components	
Body Side Assembly/Components	<input type="text"/> 150364 150365 Components
DASH Assembly	
Type Assemblies	
Assembly/Comp Name/ID	<input type="text"/> Components


### Search function

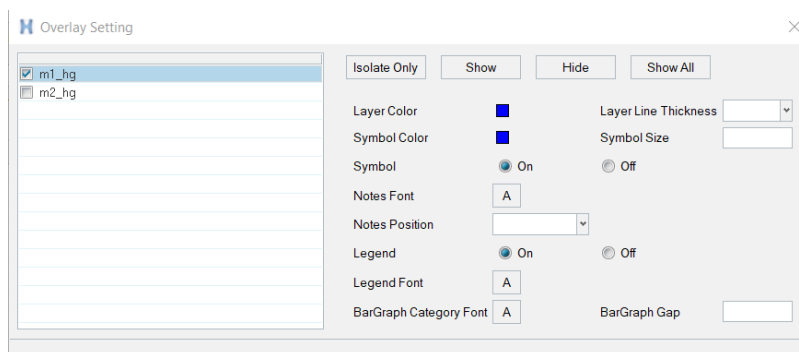
Search button will let users to select and import the 2D time history file (CAE (T01 / binout) or physical test data (HDF / ISO MME)) as well as main solver input file into the current session. This is required for defining the inputs for all the modules. An additional dialog called **files to load** will be displayed to select the files as shown below.




## Change curve attributes & publish session

This section is mainly used for the overlay scenario.

The change curve attributes option  brings up an overlay setting dialog as shown below. This will allow to change various curve & note related attributes for the overlay session per layer basis.



After changing the curve & note related attributes using the overlay setting dialog, user can click on Publish session icon  which would publish a report for the overlay session.

## Configuration section

This is the section wherein the inputs required for all the modules will be entered & displayed. For defining the inputs, firstly make sure to load both the 3D (solver input file) file as well as Time History file using the Load button. Then start defining the inputs for the modules.

FE entities such as nodes, components or assemblies can be selected from graphics screen from the loaded solver input file.

Tracking System

N1

N2

N3

Title

View

Inputs from the Time History files (subcases, requests & components) can be selected from the drop-down context dialog as shown below.

<Occupant>

Driver / Passenger

Dummy Model: 50th

Driver Restraint Type

Driver ID

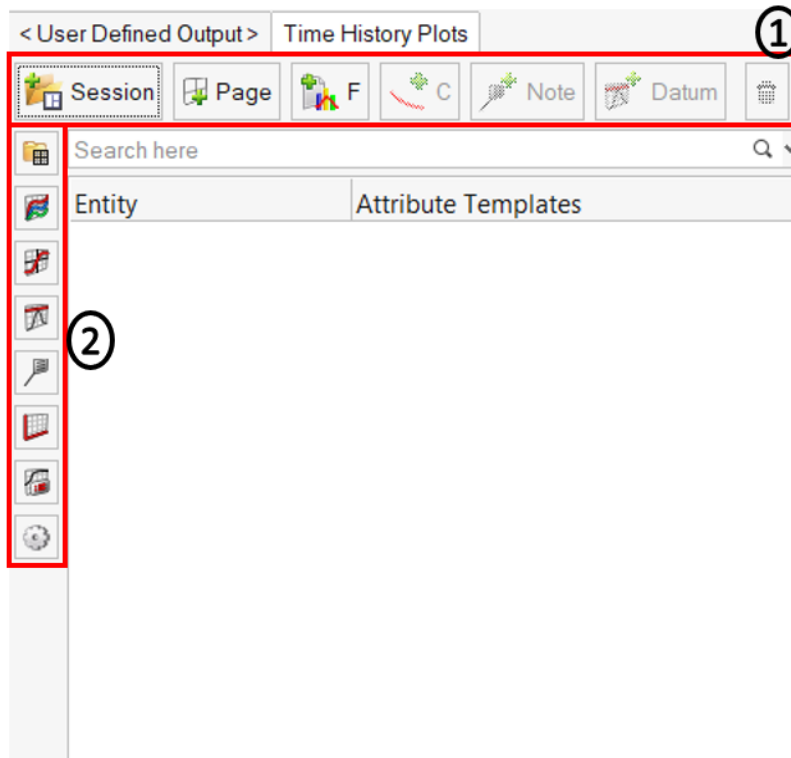
Driver Injury Criteria

Subcase	Datatype	Request	Component	Filter
HEAD_ACC_X	abstat		H3-50TH_DUMMY-1_HEAD_ACCELEROMETER_X_2000001	
HEAD_ACC_Y	abstat_cpm		H3-50TH_DUMMY-1_HEAD_ACCELEROMETER_Y_2000002	
HEAD_ACC_Z	deforc		H3-50TH_DUMMY-1_HEAD_ACCELEROMETER_Z_2000003	
HEAD_ACC_RES	elout		H3-50TH_DUMMY-1_CHEST_ACCELEROMETER_X_2000004	
NECK_UPPER_MOMENT_Y	glstat		H3-50TH_DUMMY-1_CHEST_ACCELEROMETER_Y_2000005	
NECK_UPPER_FORCE_X	prfinc		H3-50TH_DUMMY-1_CHEST_ACCELEROMETER_Z_2000006	
NECK_UPPER_FORCE_Z	matium		H3-50TH_DUMMY-1_PELVIS_ACCELEROMETER_X_2000007	
CHEST_DEFLECTION	ccfusa		H3-50TH_DUMMY-1_PELVIS_ACCELEROMETER_Y_2000008	
CHEST_ACC_X				
CHEST_ACC_Y				
CHEST_ACC_Z				



## Altair Time-History Plotter (ATP) Module

The ATP module is a fully customizable plotting module. It has the capability to create plots from time history data as well as create plots using math operations and templex functions. It allows users to customize the plot layout along with various attributes of plot entities such as curves, windows, pages including annotations (notes) and axes within a simple, intuitive user interface. The GUI is as shown below.

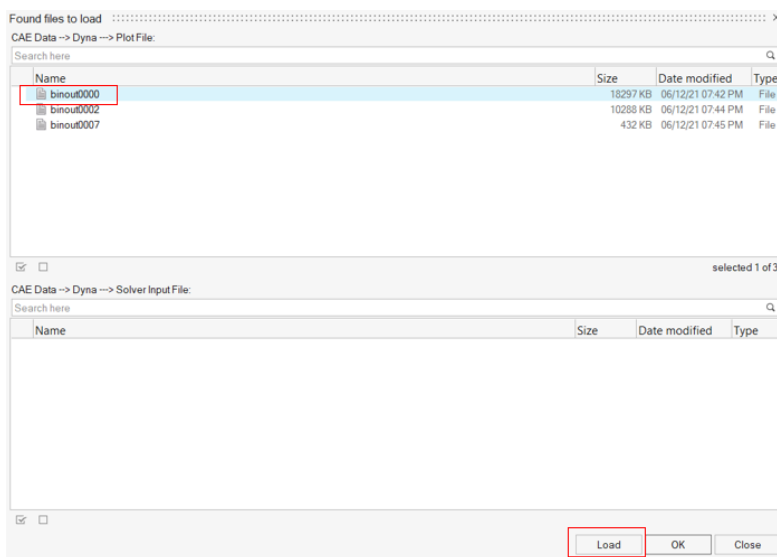


1. At the top there is a **Plotting toolbar** that allows users to define the page layout and then choose ways to create plots and add annotations & datum lines.
  - a. **Session** button is for loading an existing session file (TPL file) and capturing the complete session info by creating an ATP configuration file out of it
  - b. **Add Page** button is for setting the page layout
  - c. **Add File** button is for selecting TRC from time history data file
  - d. **Add crossplot** button is for defining source of your curve using math operations & templex functions
  - e. **Add Note** button allow users to define annotations using math & templex functions
  - f. **Add Datum** button allows to define datum lines for the required pages & windows
  - g. **Delete** button is for deleting the user selected pages, curves, datum lines & notes from the entity tree

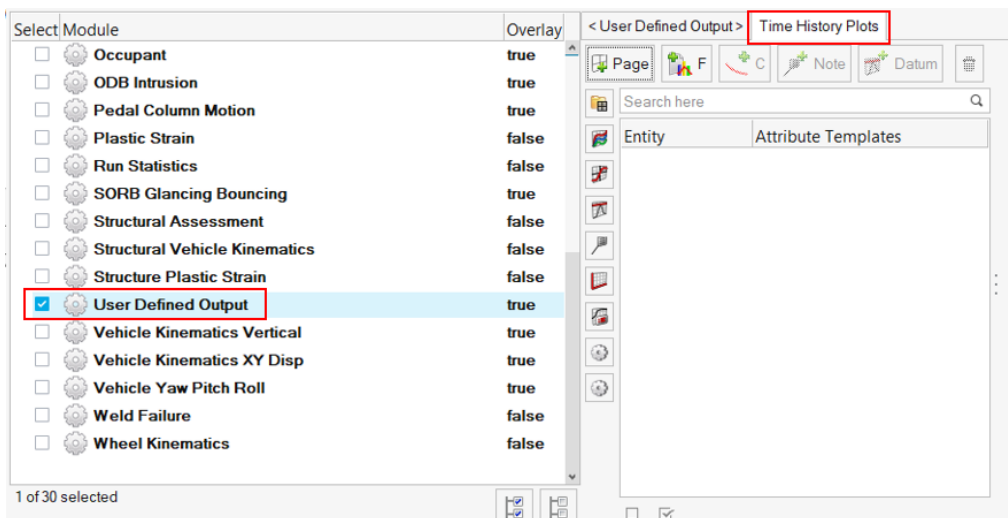
2. At the side there is another toolbar called **Template toolbar** that is used to load previously saved templates (with user defined settings) for various plotting entities such as window, curve, datum, note, axis and legend.

Use case 1: Read Time History File, plot Head Acceleration X,Y,Z curves and then create a Resultant Head Acceleration curve


- 1) Launch Altair Safety Report Manager
- 2) Select the basic inputs such as Impact Type, Regulation, Protocol & Units info from the GUI
- 3) Click on the browse icon next to **Analysis Results directory** and select the folder where time history files are located
- 4) Click on **Search** button, select the master time history file and click on **Load** button. This will load the results data from the selected time history file into the current session.



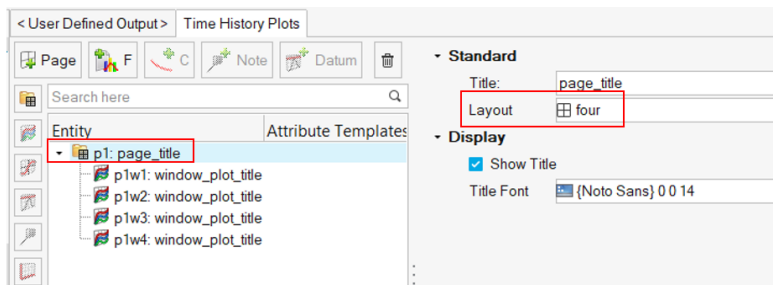
- 5) Click on & highlight the **User Defined Output** from the module list browser.
- 6) Click on the **Time History Plots** tab.




We will now create a page with 4 window layout (2 x 2). Select & plot Head Acceleration request with X, Y & Z component in the first 3 windows. Then create a new curve in the 4<sup>th</sup> window which will be the resultant of the other 3 curves.

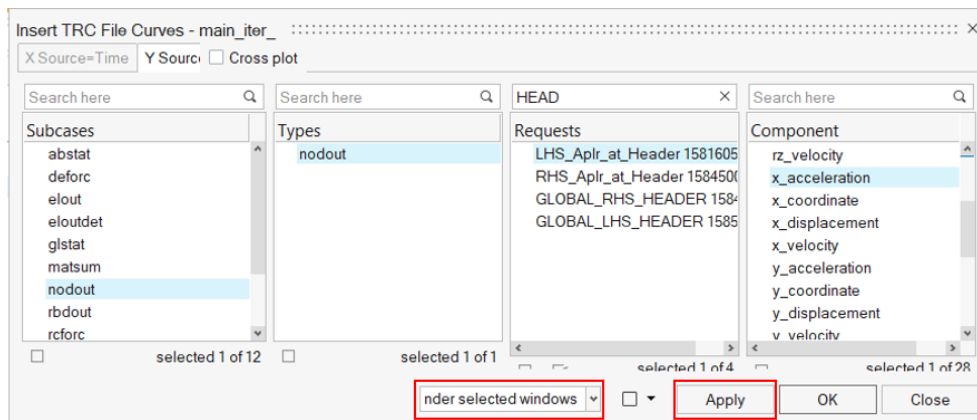
7) Click on Page button to Add a Page (  )

8) Click on **p1: page\_title** item in the Entity browser & select 4 window layout.




9) Highlight **p1w1: window\_plot\_title** item in the Entity browser. Click on **Add File** button (  ). An **Insert TRC File Curves** dialog is displayed.

10) Select the appropriate Subcase, Type, Request & Component as needed. Make sure the drop down at the bottom of the dialog is set to **Under selected windows** option. Click on **Apply** button.



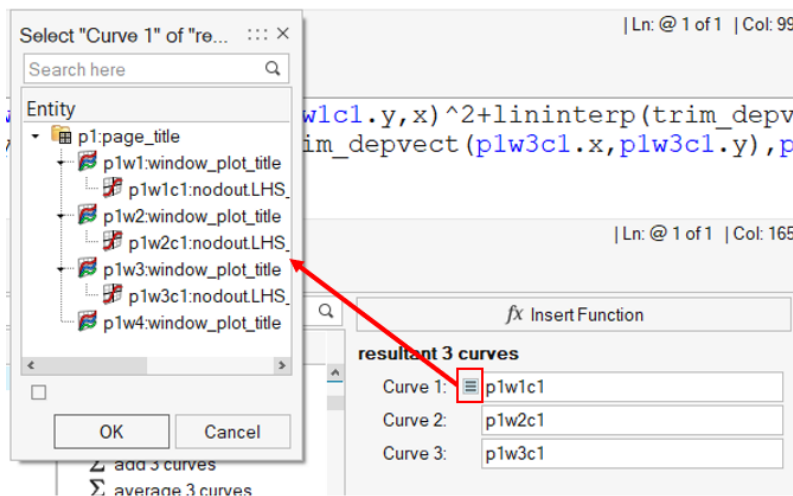
11) Repeat the steps #10 & 11 by selecting **p1w2: & p1w3:** items separately in the Entity browser and selecting appropriate TRC to plot y & z acceleration curves respectively.

Now to create resultant curve, follow the steps below.

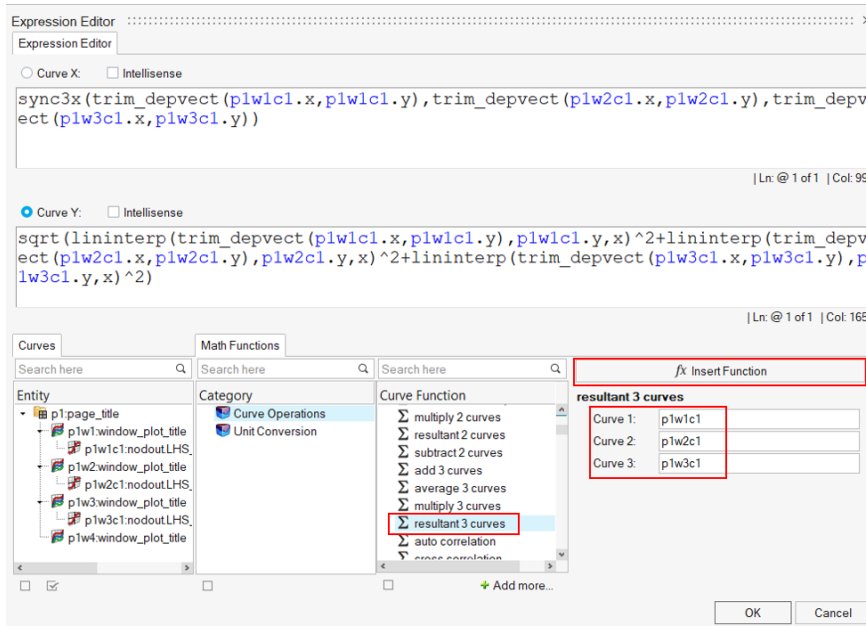
12) Select **p1w4: window\_plot\_title** in the Entity browser. Click on **Add crossplot...** button (  ). An **Expression Editor** dialog is displayed.

13) Select **Curve Operations** under Category list, **resultant 3 curves** function under function

list. Select the curve for each of the 3 source curves by clicking on the curve selection icon (

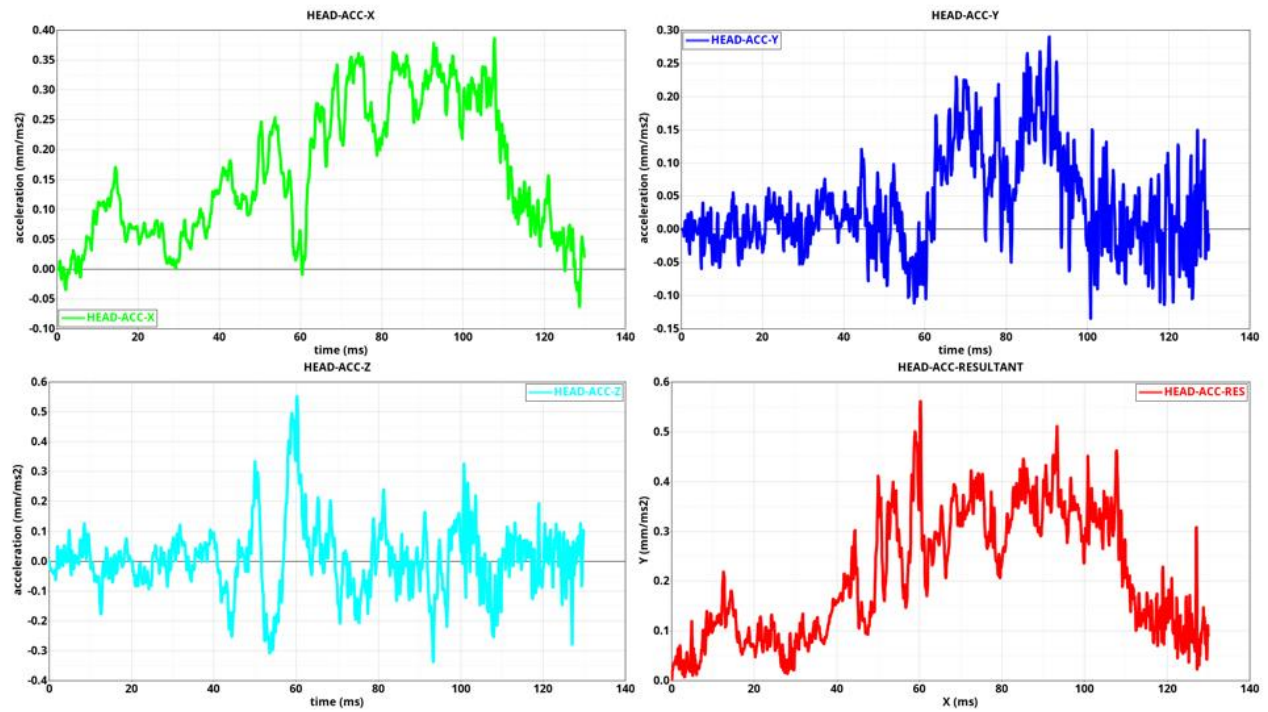


- 14) Once the 3 curves (Head\_Acc\_X, Y & Z) have been selected, click on **fx Insert Function** button. This will apply the templex expression required for creating the resultant curve. Click on **OK** button to close the Expression Editor.



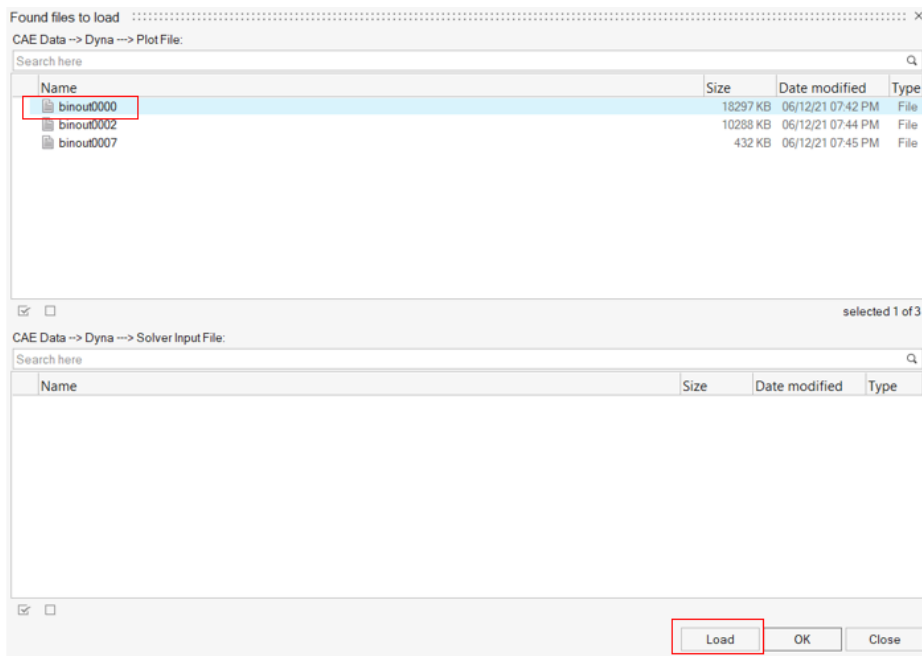
- 15) Click on **Save As...** button next to **Config excel file** entry in the main ASRM GUI to save a configuration file. Click on **RUN** button to generate a PPT report.
- 16) A PPT report will be generated with a slide like the one shown below.

## HEAD-ACCELERATION




Use case 2: Read Time History File, plot Acceleration & Displacement curves and then create a cross plot of Acceleration vs Displacement

- 1) Launch Altair Safety Report Manager
- 2) Select the basic inputs such as Impact Type, Regulation, Protocol & Units info from the GUI
- 3) Click on the browse icon next to **Analysis Results directory** and select the folder where time history files are located.
- 4) Click on **Search** button, select the master time history file and click on **Load** button. This will load the results data from the selected time history file into the current session.

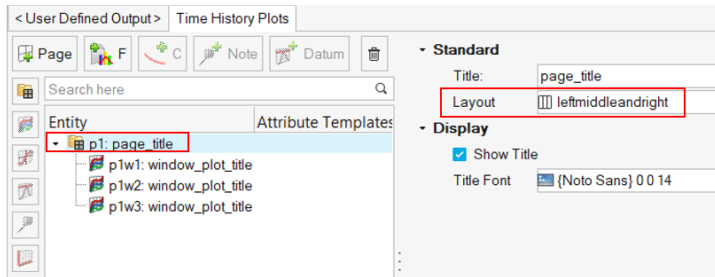



- 5) Click on & highlight the **User Defined Output** from the module list browser.
- 6) Click on the **Time History Plots** tab.

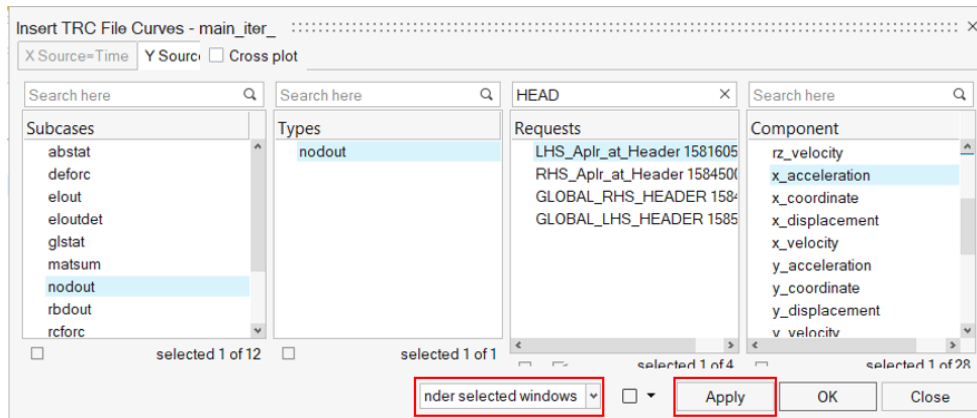
We will now create a page with 3 window layout (1 x 3). Select & plot Bpillar rocker Displacement & Acceleration curves in the first 2 windows. Then create a new curve in the 3rd window which will be the cross plot of the 2 curves.

- 7) Click on Page button to Add a Page (  )

- 8) Click on **p1: page\_title** item in the Entity browser & select 3 window layout.





- 9) Highlight **p1w1: window\_plot\_title** item in the Entity browser. Click on **Add File** button (  ). An **Insert TRC File Curves** dialog is displayed.
- 10) Select the appropriate Subcase, Type, Request & Component as needed and plot a displacement curve. Make sure the drop down at the bottom of the dialog is set to **Under selected windows** option. Click on **Apply** button.



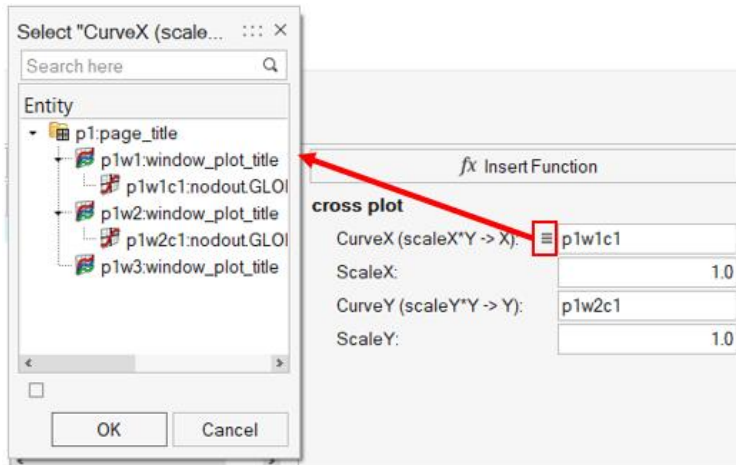
- 11) Repeat the steps #10 & 11 by selecting **p1w2: window\_plot\_title** item in the Entity browser and selecting appropriate TRC to plot acceleration curve.

Now to create cross plot curve, follow the steps below.

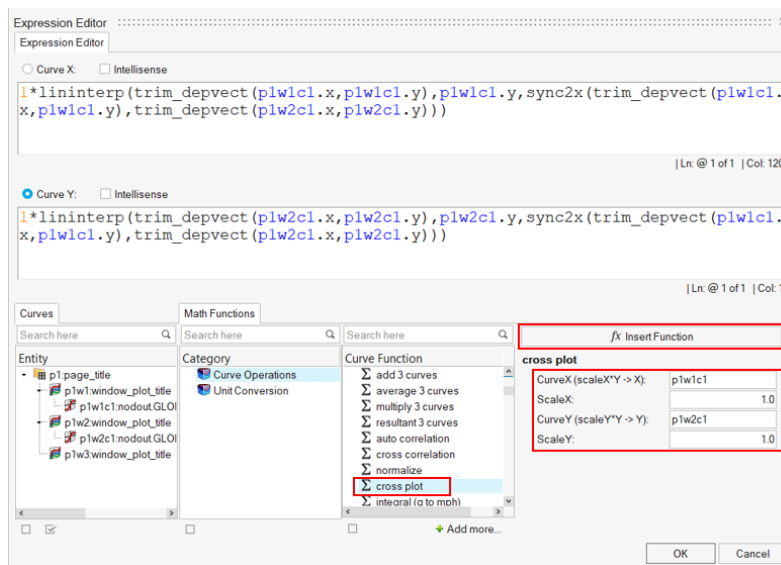
- 12) Select **p1w3: window\_plot\_title** in the Entity browser. Click on **Add crossplot...** button (  ). An **Expression Editor** dialog is displayed.

- 13) Select **Curve Operations** under Category list, **cross plot** function under function list. Select the two curves by clicking on the curve selection icon (  )



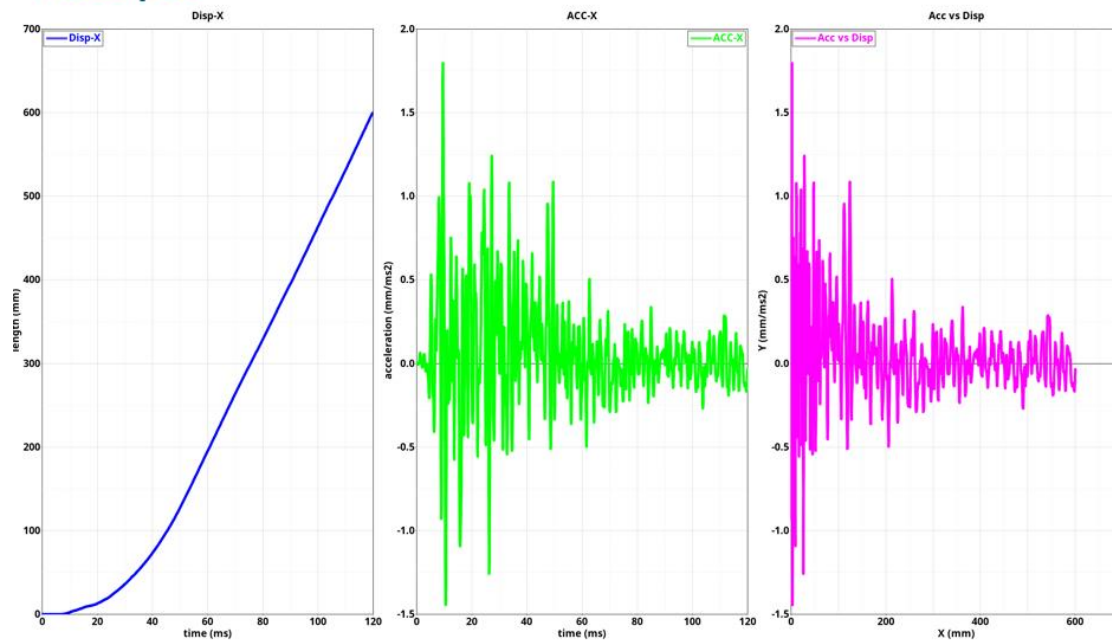


- 14) Once the 2 curves (Displacement & Acceleration) have been selected, click on **fx Insert Function** button. This will apply the templex expression required for creating the cross plot. Click on **OK** button to close the Expression Editor.



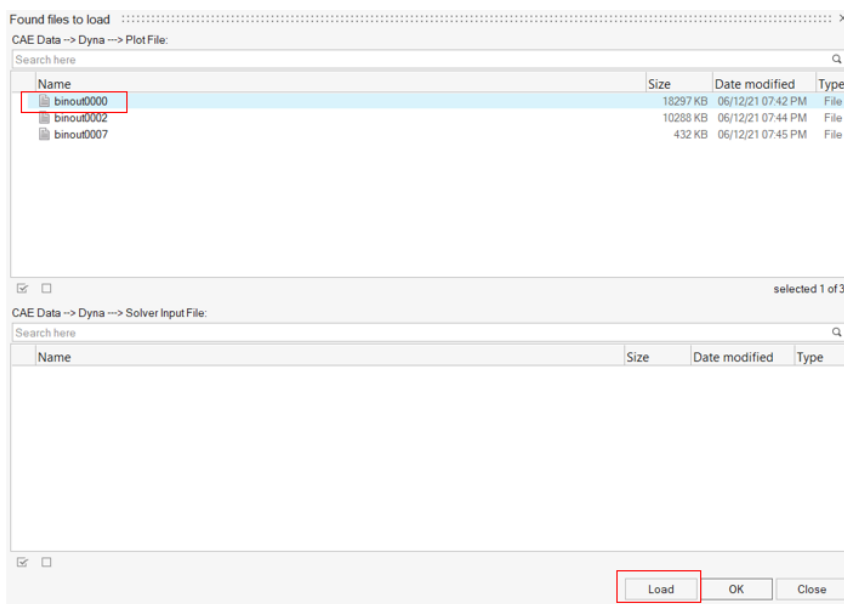
- 15) Click on **Save As...** button next to **Config excel file** entry in the main ASRM GUI to save a configuration file. Click on **RUN** button to generate a PPT report.
- 16) A PPT report will be generated with a slide like the one shown below.

## cross plot

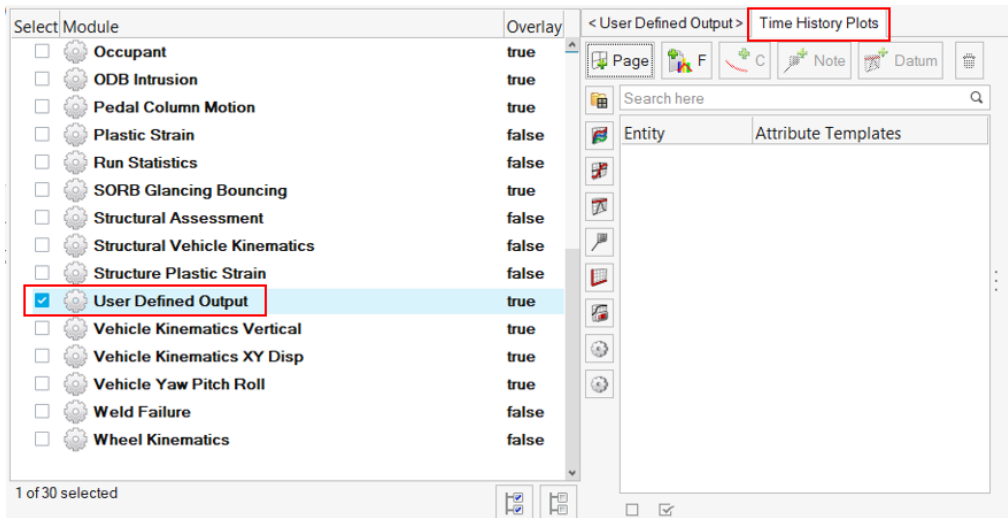


Use case 3: Read Time History File, plot Head Acceleration curve, apply filter and then calculate HIC (Head Injury Criteria) value


- 1) Launch Altair Safety Report Manager
- 2) Select the basic inputs such as Impact Type, Regulation, Protocol & Units info from the GUI
- 3) Click on the browse icon next to **Analysis Results directory** and select the folder where time history files are located
- 4) Click on **Search** button, select the master time history file and click on **Load** button. This will load the results data from the selected time history file into the current session.



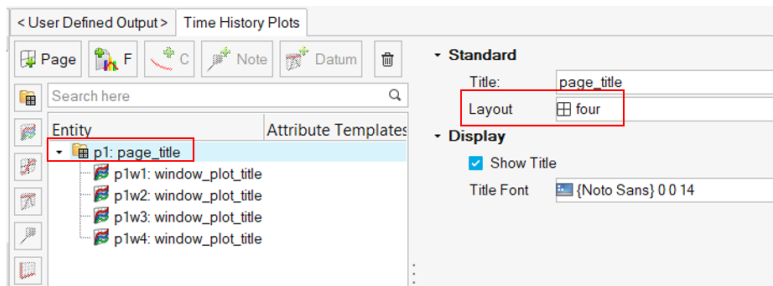
- 5) Click on & highlight the **User Defined Output** from the module list browser.
- 6) Click on the **Time History Plots** tab.




We will now create a page with 4 window layout (2 x 2). Select & plot Head Acceleration request with X, Y & Z component in the first 3 windows. Then create a new curve in the 4<sup>th</sup> window which will be the resultant of the other 3 curves.

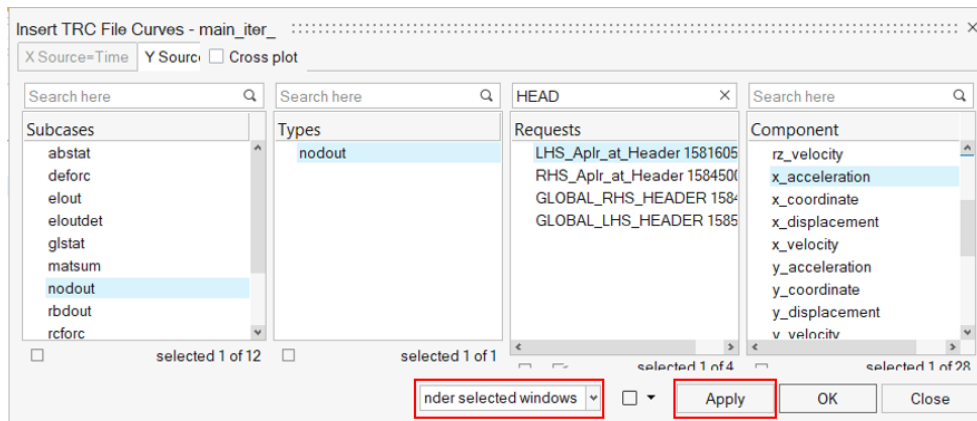
7) Click on Page button to Add a Page (  )

8) Click on **p1: page\_title** item in the Entity browser & select 4 window layout.




9) Highlight **p1w1: window\_plot\_title** item in the Entity browser. Click on **Add File** button (  ). An **Insert TRC File Curves** dialog is displayed.


10) Select the appropriate Subcase, Type, Request & Component as needed. Make sure the drop down at the bottom of the dialog is set to **Under selected windows** option. Click on **Apply** button.

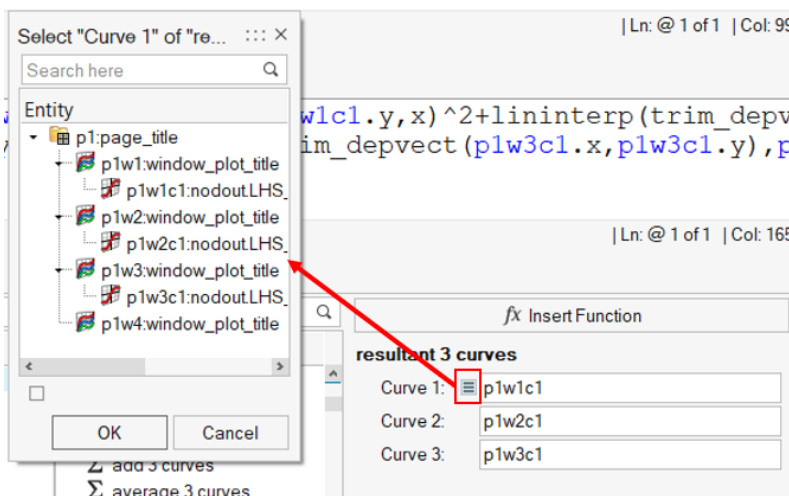


- 11) Repeat the steps #10 & 11 by selecting **p1w2:** & **p1w3:** items separately in the Entity browser and selecting appropriate TRC to plot y & z acceleration curves respectively.

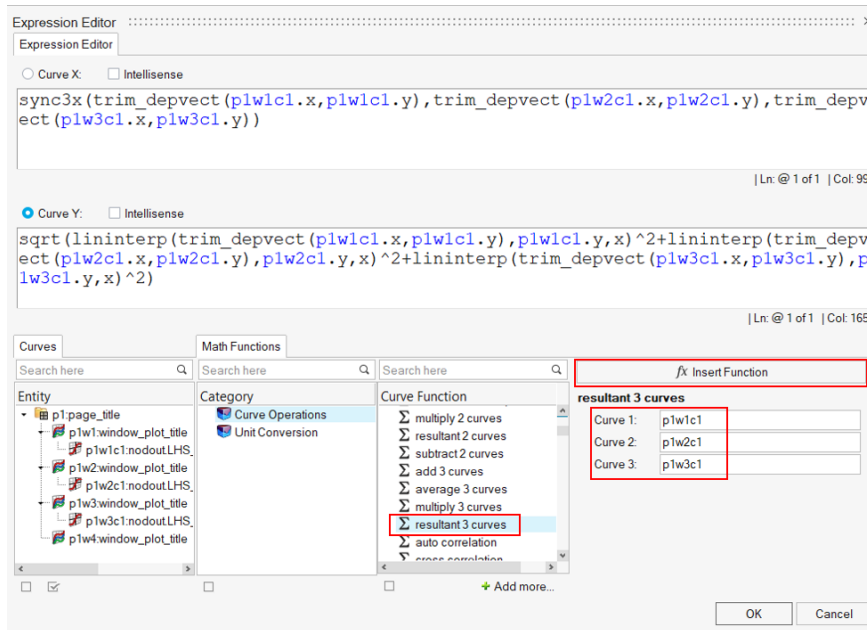
Now to create resultant curve, follow the steps below.



- 12) Select **p1w4: window\_plot\_title** in the Entity browser. Click on **Add crossplot...** button (  ). An **Expression Editor** dialog is displayed.

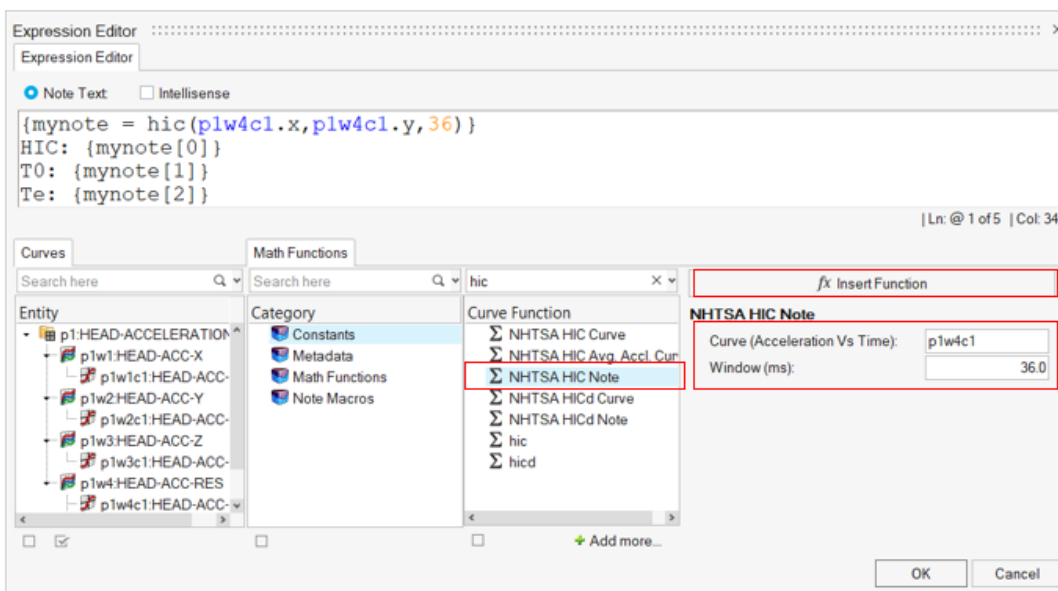
- 13) Select **Curve Operations** under Category list, **resultant 3 curves** function under function list. Select the curve for each of the 3 source curves by clicking on the curve selection icon (  )





- 14) Once the 3 curves (Head\_Acc\_X, Y & Z) have been selected, click on **fx Insert Function** button. This will apply the templex expression required for creating the resultant curve. Click on **OK** button to close the Expression Editor.

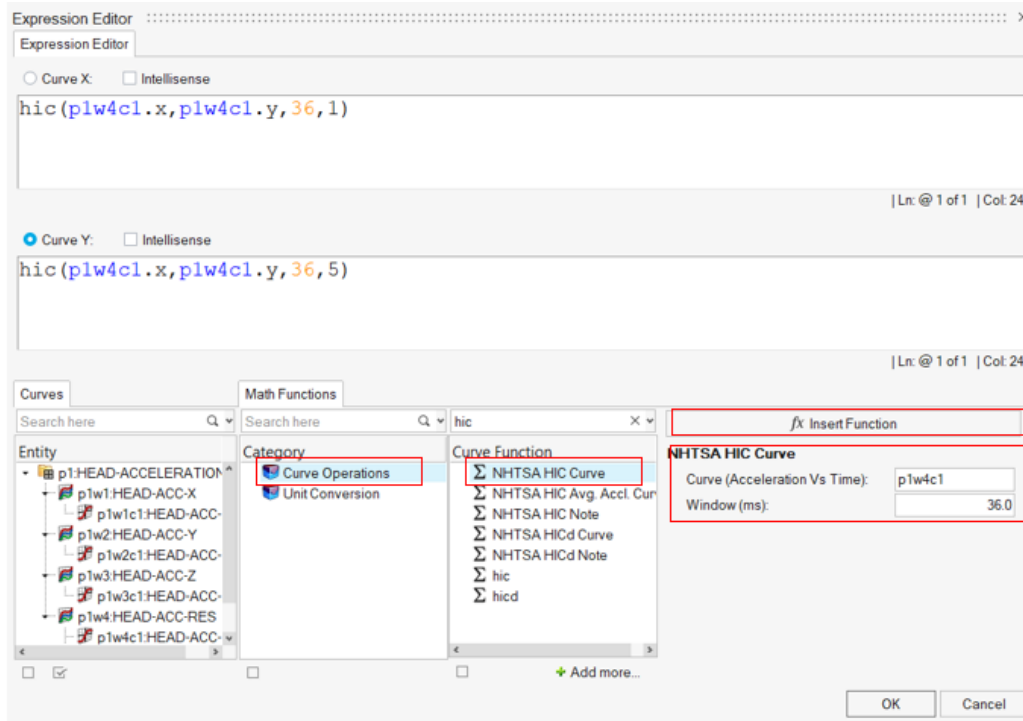


- 15) Select **p1w4c1: window\_plot\_title** in the Entity browser. Click on **Note...** button (  ). An expression editor dialog pops up.
- 16) Select NHTSA HIC Note function under curve function list. Select the curve (p1w4c1) for the Acceleration vs Time curve by clicking on the curve selection icon (  )
- 17) Then click on **fx Insert Function** button. This will apply the templex expression required for creating HIC note. Click on **OK** button to close the Expression Editor.



- 18) Select **p1w4: window\_plot\_title** in the Entity browser. Click on **Add crossplot...** button (  ). An **Expression Editor** dialog is displayed.

- 19) Select **Curve Operations** under Category list, **NHTSA HIC Curve** function under function list. Select the curve (p1w4c1) for the Acceleration vs Time curve by clicking on the curve selection icon (  )
- 20) Then click on **fx Insert Function** button. This will apply the templex expression required for creating HIC curve. Click on **OK** button to close the Expression Editor.



- 21) Click on **Save As...** button next to **Config excel file** entry in the main ASRM GUI to save a configuration file. Click on **RUN** button to generate a PPT report.
- 22) A PPT report will be generated with a slide like the one shown below.

## HEAD-ACCELERATION

