Altair Safety Report Manager

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Altair Safety Report Manager

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.

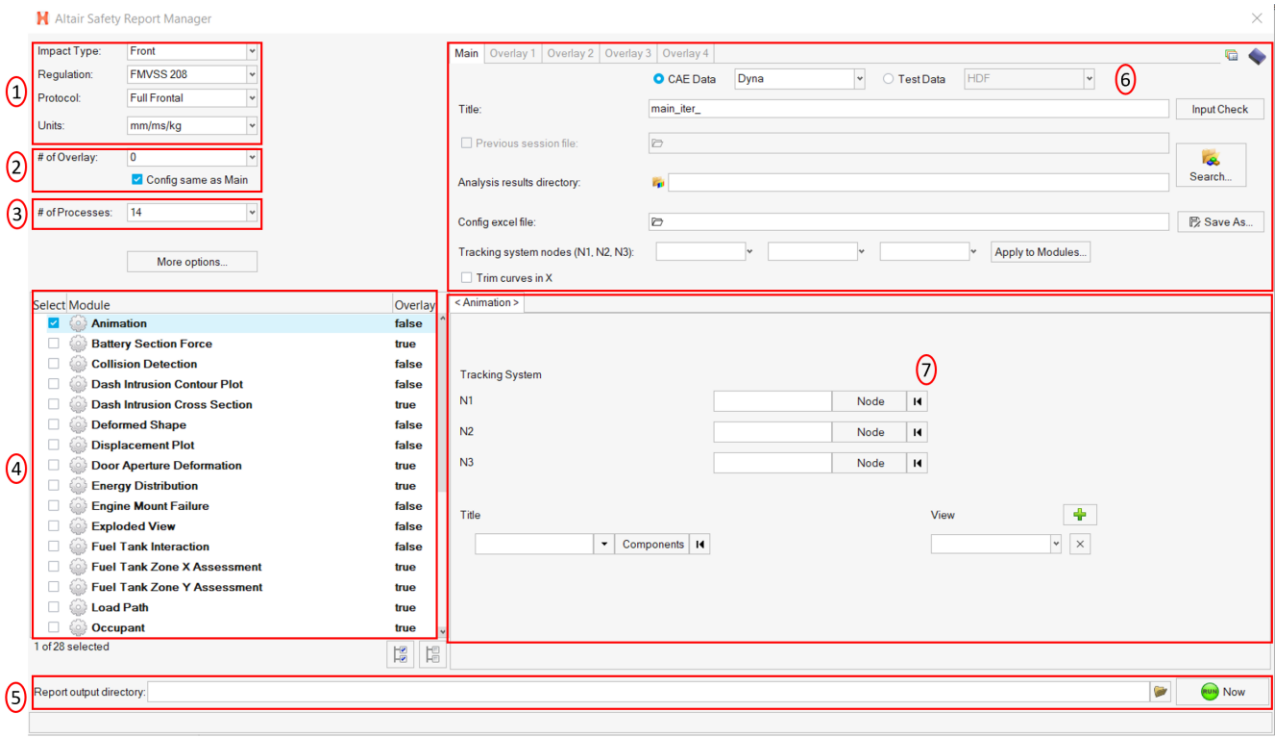
- Model information
- Run quality statistics
- Occupant requirements
- Structure requirements
- Structure overview
- User defined plots

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.

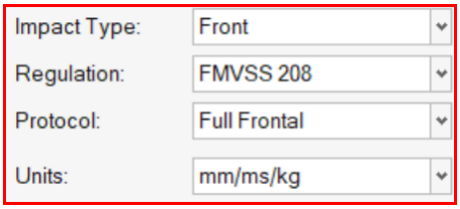
ASRM GUI Overview

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.



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 report & log files from the ASRM run will be created.

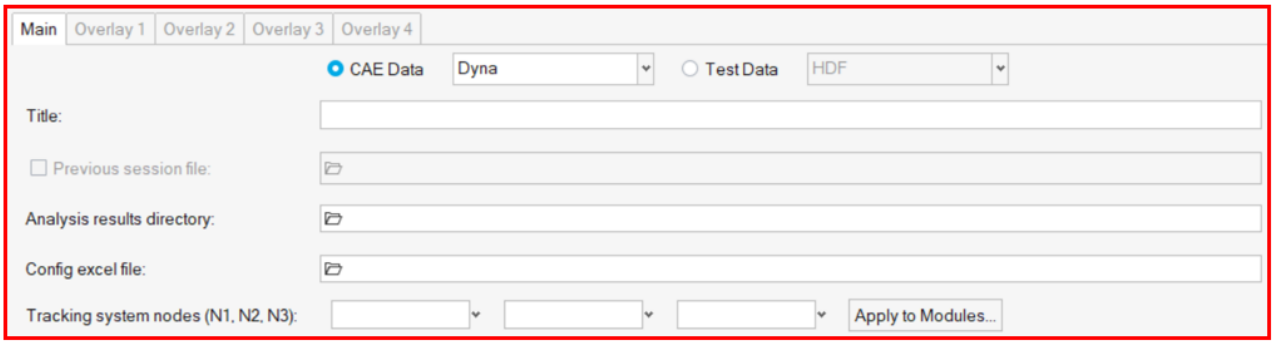
Main section

Input directory, data type & configuration section

In this section, user should select the following.

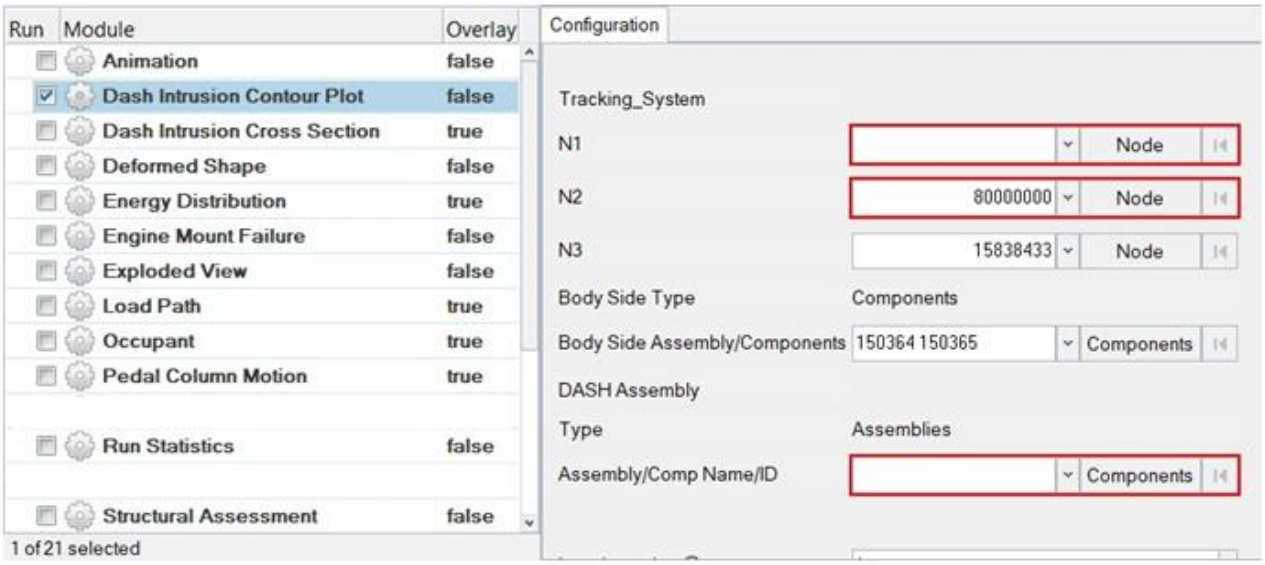
- Type of data being used for generating the report. It could be CAE simulation data or physical test data.
- Title for the report which will be used for creating results directory as well as prefix for curve names & summary tables
- Results directory path where the solver input file, results files such 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.



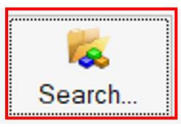
Input Validation check

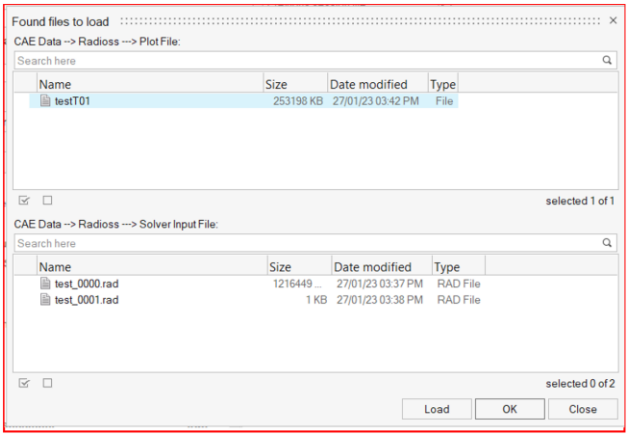
Input Check button would run a quick validation check to verify if the inputs defined for selected modules is valid. The verification is done on the results files available in the input directory specified. Any invalid inputs and missing input found from validation check will be highlighted in RED in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



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.

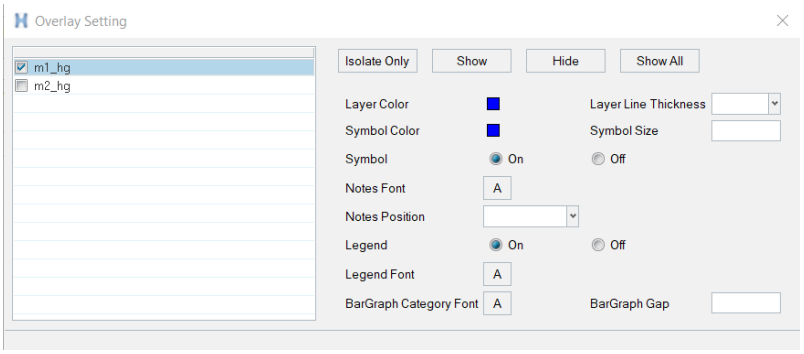




Change curve attributes & publish session

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.

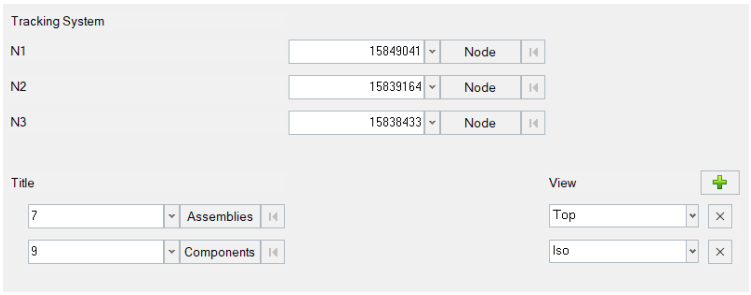


After changing the curve & note related attributes using the overlay setting dialog, user can click on Publish session icon  which would publish a report for the overlay session.

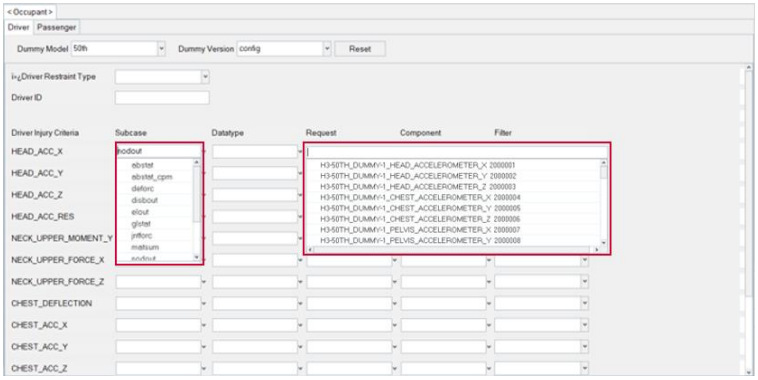
Configuration section

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 **Search** 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.



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



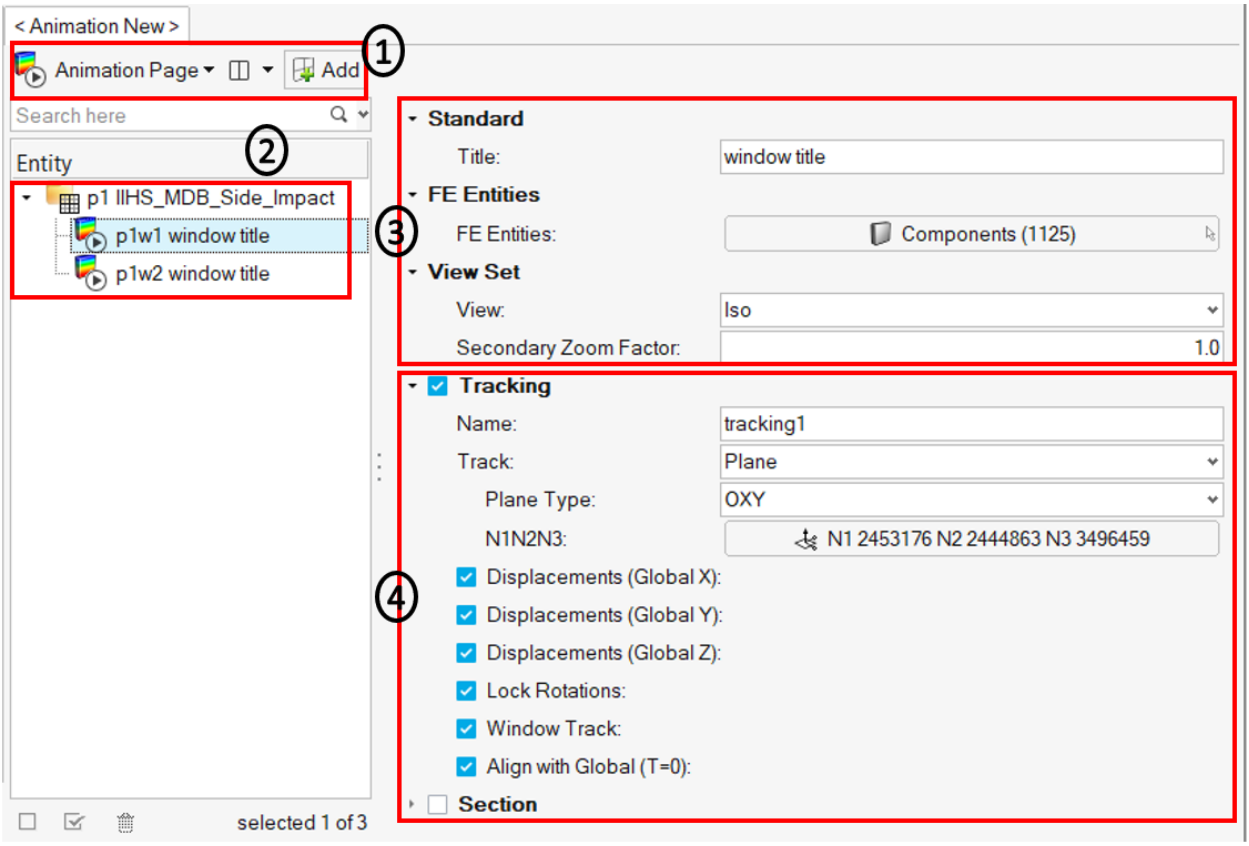
Modules

Following is the list of modules supported by ASRM utility for front impact type.

- Animation New
- Belt Forces
- BOM
- Collision Detection
- Contour Plot
- Deformed Shape
- Energy Dissipation
- Energy Distribution
- Floor Bolt Force
- Front Impact Description
- Front Seat Angle Assessment
- Front Seat Dynamic Assessment
- Load Path
- Loadcase Description
- Measure Plot
- Rear Impact Angular Change
- Rear Impact Description
- Recliner Moment
- Run Statistics
- Static Headrest Displacement
- Static Headrest Summary
- User Defined Output
- Weld Failure
- Whiplash Summary

Animation New

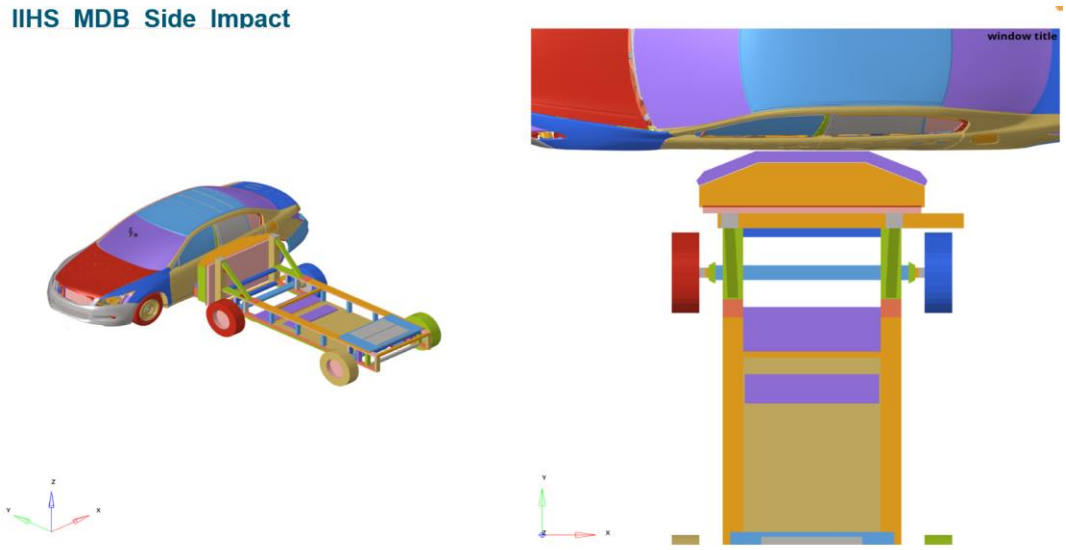
This module lets you capture animation of the selected parts (or assemblies) and offers flexibility in terms of page layout, view orientation, tracking and section cut. The GUI and the various inputs that are required to be defined are mentioned below.



Inputs:

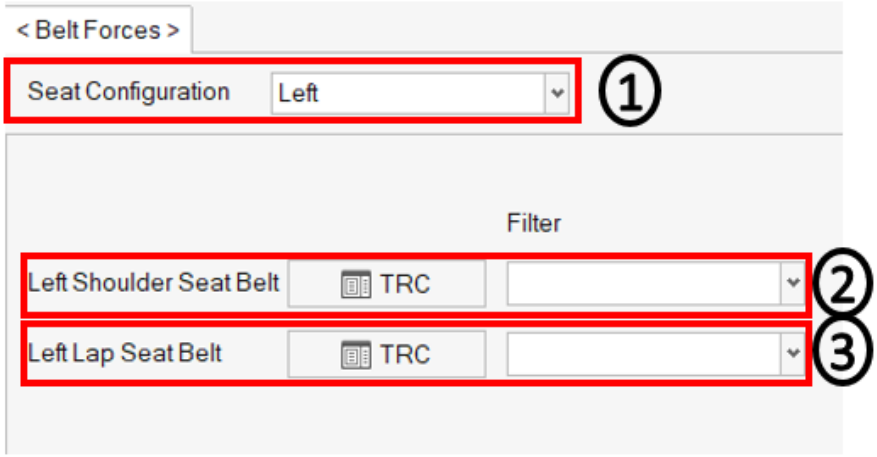
1) Use this input to select the page & window layout that will be captured and included in the report. 2 layouts are supported i.e. 1 x 1 and 1 x 2. Select the layout and click on **Add** button to add the page layout into the entity list browser.
2) The **Entity** list browser is used to list and manage the pages included by the user and their respective layouts.
3) Enter the **Title** used for the slide title in the report, select the **Components** to be used for the current page and the **View Set** to be used to orient the components.

4) Define **Tracking system** & **Section cut** details along with its attributes to be applied while generating the report.



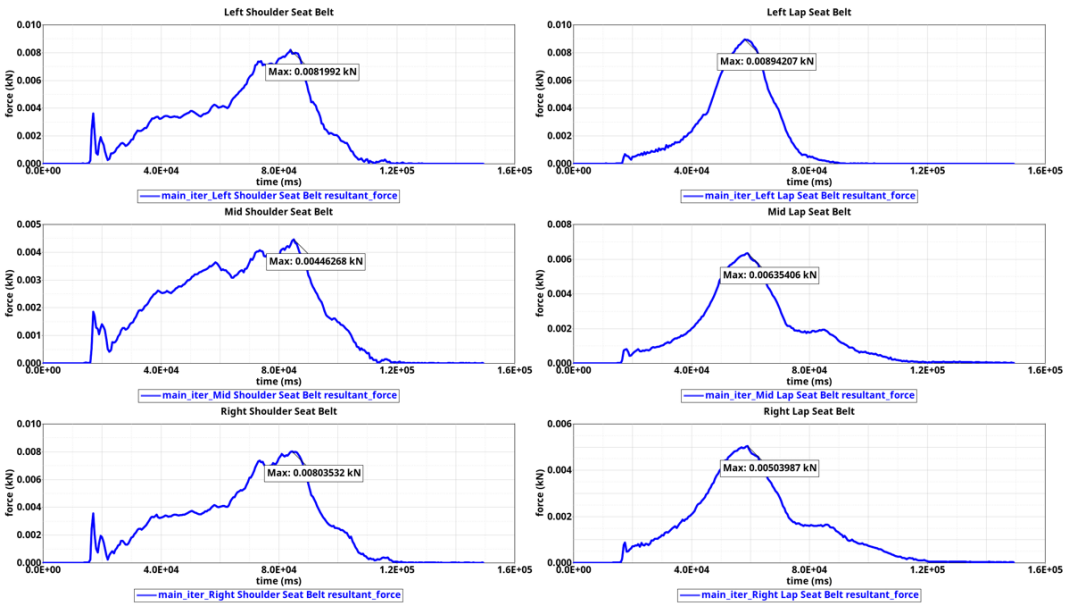
Belt Forces

This module is used to create shoulder and lap seat belt force plots for following seat configurations viz. Left, Right, Mid, 2 seats & 3 seats.



Inputs:

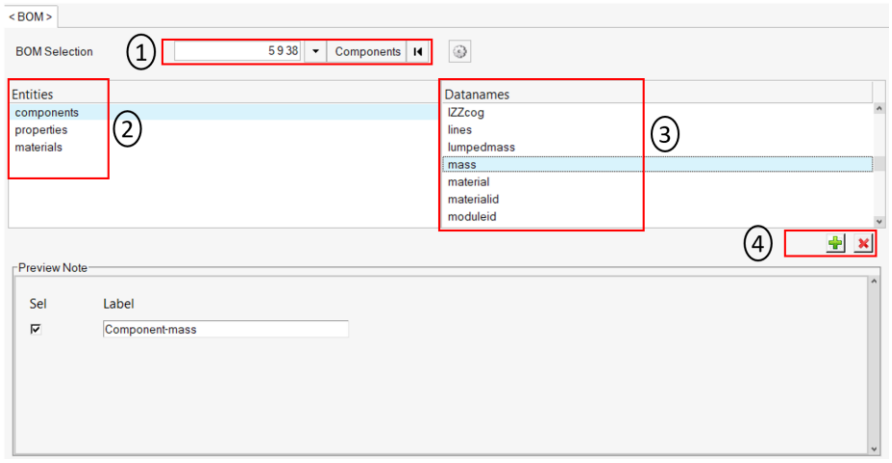
1) Select the seat configuration that you are interested in
2) Select the respective channel (type, request & component) for the shoulder force
3) Select the respective channel (type, request & component) for the lap force



Seat Belt Forces

BOM

BOM module is an advanced exploded view module. It has the capability to include data name attributes as annotations in the report. Users can pick from several data names (around 100) related to components, property, and material entity attributes. The selected BOM info can be easily attached as annotations to the components in the exploded view.

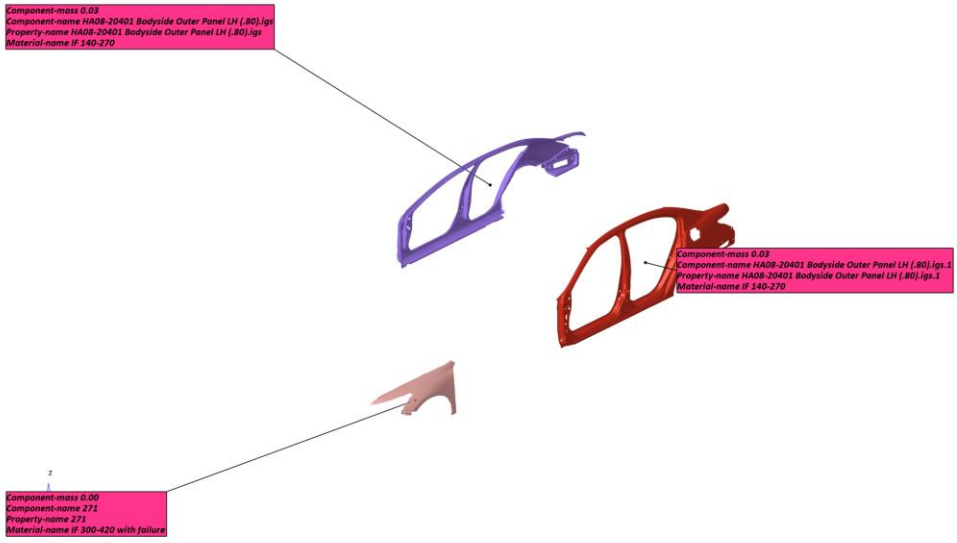


Inputs:

1) Select the assembly IDs or components IDs that should be included in the BOM report

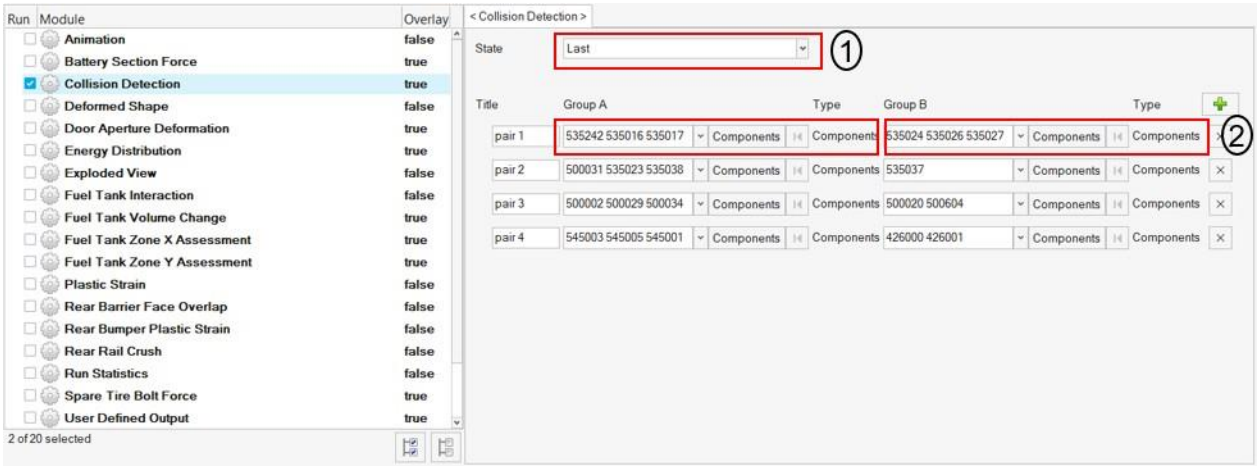
2) Select the entity type for which the data name attribute should be searched
3) Select the appropriate data names from the list
4) Click on + icon to add the selected attribute

Output report:



Collision Detection

Collision detection module is used to perform collision interference checking. This module letsusers to define a collision set by selecting a pair or groups of components (parts) and then detect penetration between the two pairs. Users can define multiple collision sets. This capability allows users to quickly perform design reviews.



Inputs:

1) Select the time step state at which the collision detection is performed

2) Select the components (parts) for each of the two Groups A & B. This forms one collisionset. Likewise, users can define multiple collision sets

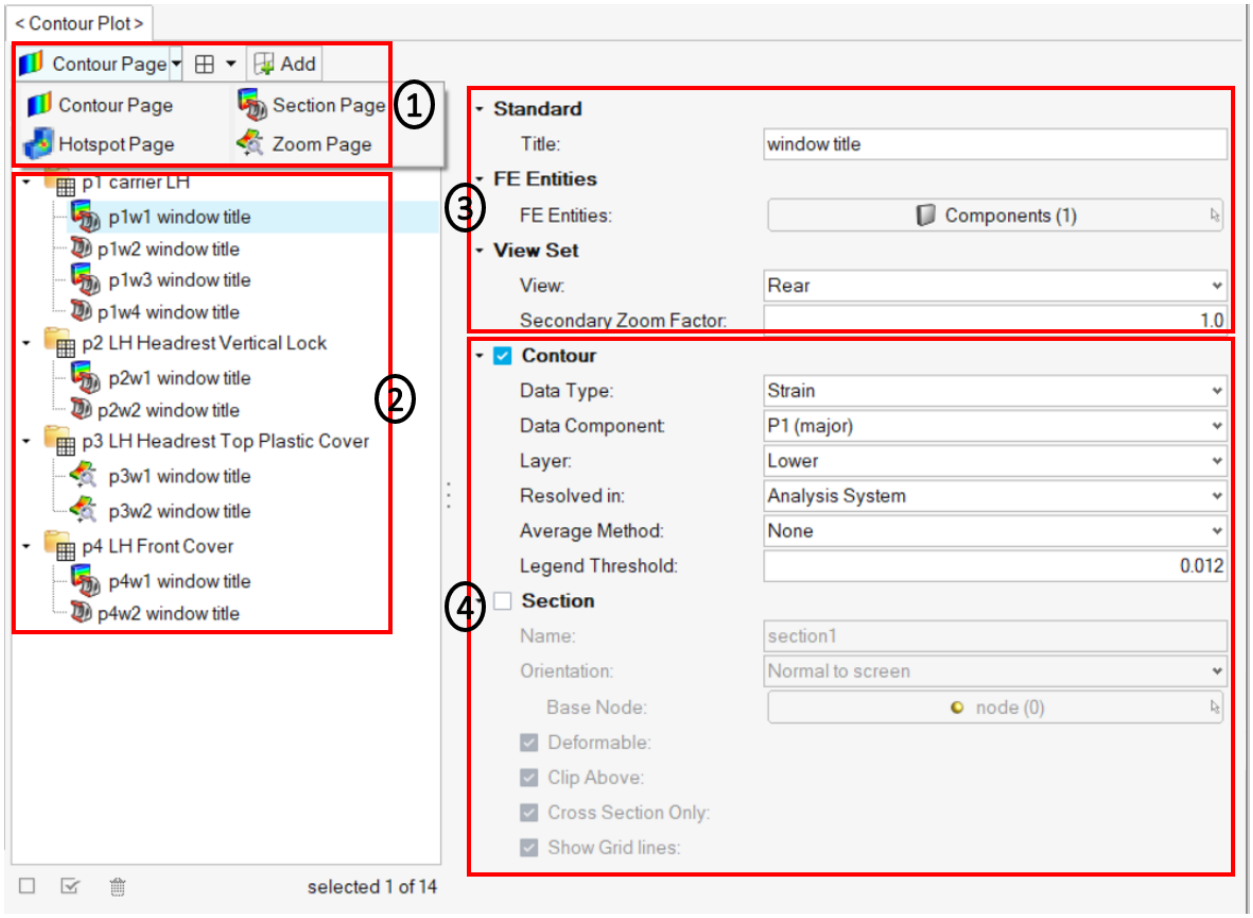
Output report:

Contour Plot

This is a generic module that allows users to define 4 different types of pages and layouts (namely **Contour** page, **Section** page, **Hotspot** Page & **Zoom** page) and include them in the report. It has the following capability.

- Ability to generate reports with any scalar result datatype contour.
- Ability to find Hotspots & report them.
- Ability to draw section cuts.
- Ability to capture images with user specified zoom factor.

The GUI and the various inputs that are required to be defined are mentioned below.



Inputs:

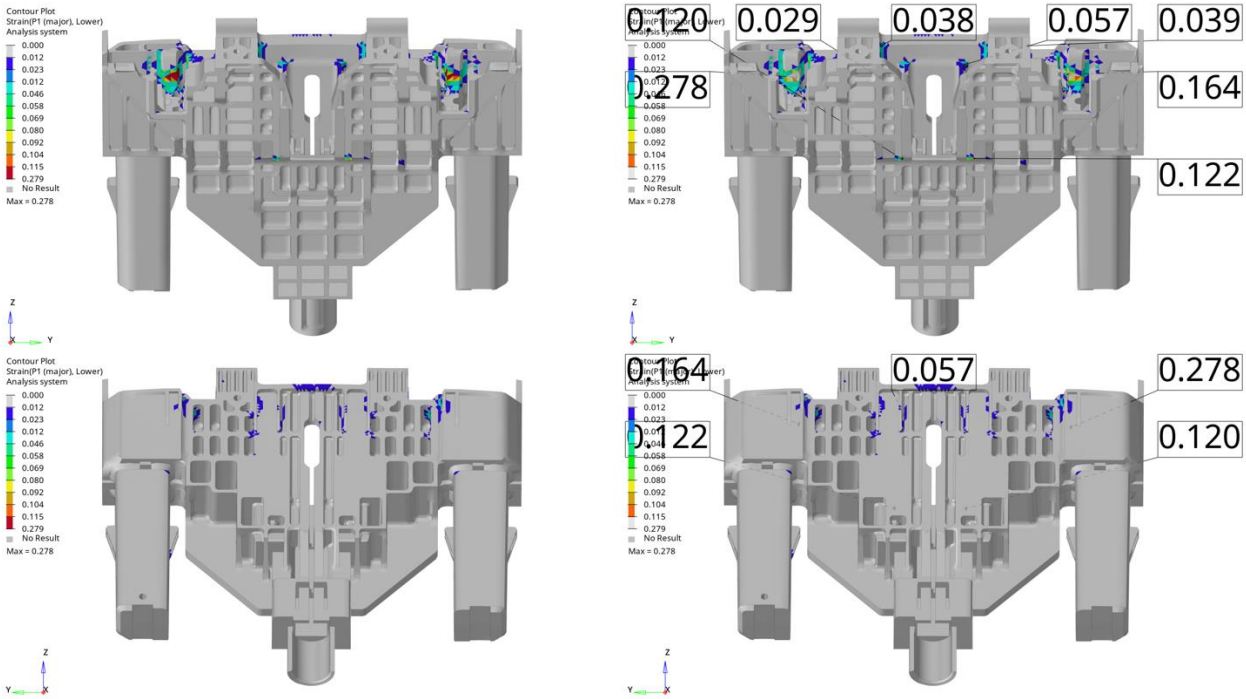
1) Use this input to select the page & window layout that will be captured and included in the report. The layouts supported are different for different page types as mentioned below.
    a. Contour page – 1 x 1, 1 x 2 & 2 x 2
    b. Section page – 1 x 2 & 2 x 2
    c. Hotspot page – 1 x 1
    d. Zoom page - 1 x 2 & 2 x 2.

    Select the required layout and click on **Add** button to add the page layout into the entity list browser.

2) The **Entity** list browser is used to list and manage the pages included by the user and their respective layouts.
3) Enter the **Title** used for the slide title in the report, select the **Components** to be used for the current page type selected and the **View Set** to be used to orient the components.

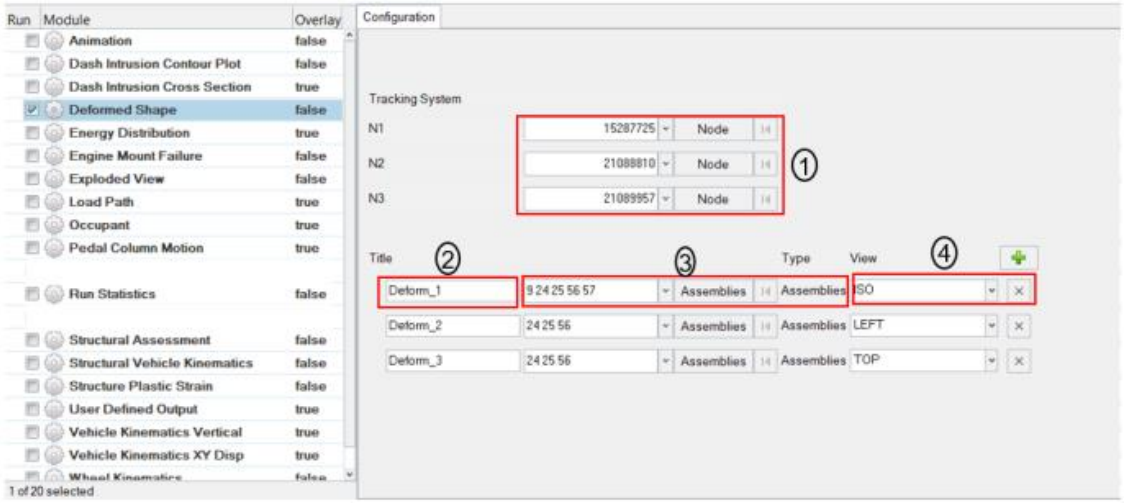
4) Define the **Contour** & **Section** details (& all its attributes) to be applied while generating the report for the Contour module.

Output: Section page with 2 x 2 layout



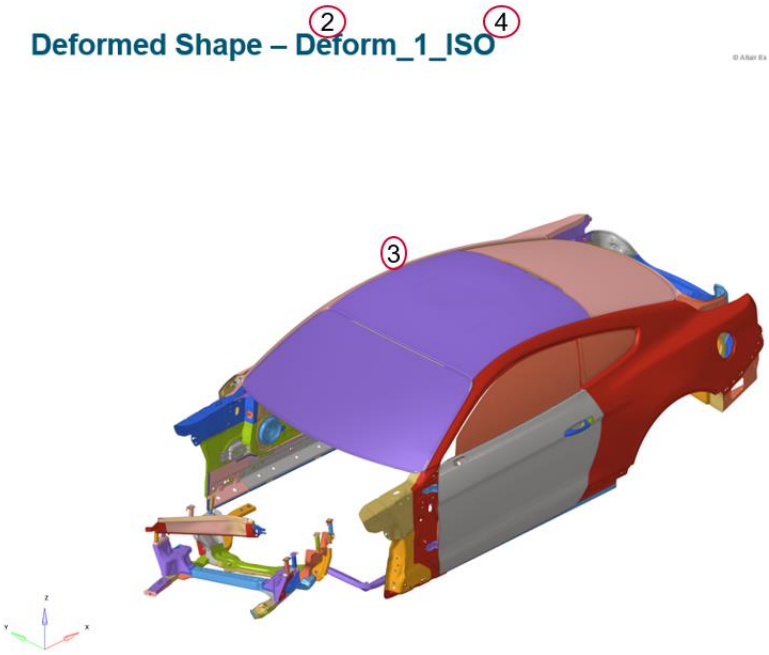
Deformed Shape

This module is used to create deformed shape of the user selected part sets (components or assemblies) in standard views (Left, Right, Top, Bottom, Front, Rear & Isometric views)



Inputs:

1) Node ID 1, 2 & 3 for defining tracking system
2) Label to be used for the slide title
3) Assembly IDs that will be considered for deformed shape
4) The view to be used for deformed shape image capture

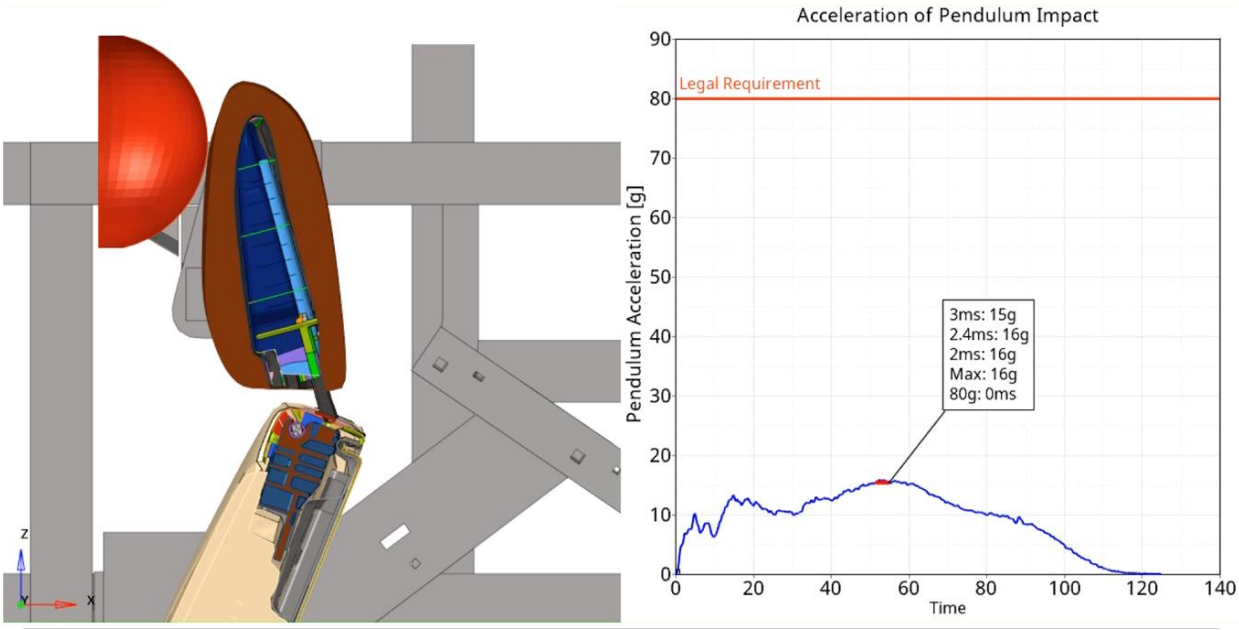


Energy Dissipation

This module is used to create Energy Dissipation report for Seat as per ECE-R17 regulation. It contains an animation of pendulum impact on the Headrest and a plot of pendulum acceleration. The GUI and the inputs are as below.

Inputs:

1) Selection of Seat components (Components/Assemblies/Elements supported)
2) View set selection. The selected seat components (in step 1 above) will be oriented in the view set selected before capturing the animation.
3) Section definition (optional). If defined, a section cut will be applied based on the inputs and then the animation will be captured.
4) Subcase, Datatype, Request, Data Component, and filter selection from time history data. This info will be used to created the pendulum acceleration plot
5) FPS or Frames Per Second parameter is required for capturing the animation (avi file)

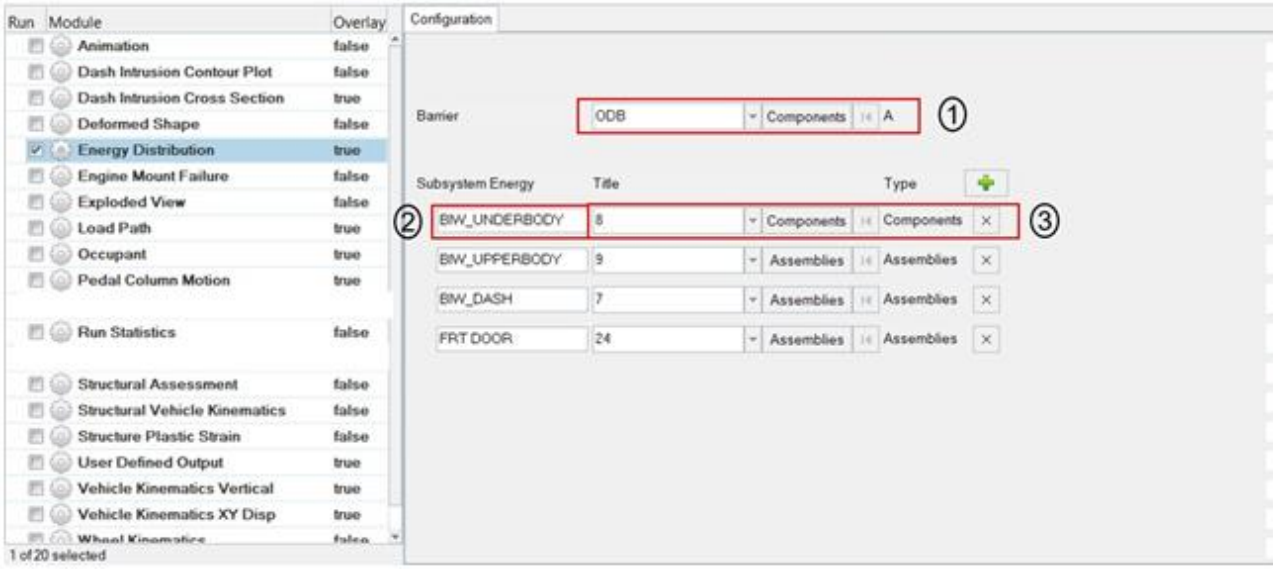


Energy Distribution

The Energy Distribution module is used to create energy distribution plots (bar graphs) for the barrier (system level) as well as for user selected sub systems such as BIW-upperbody, BIW-underbody etc.

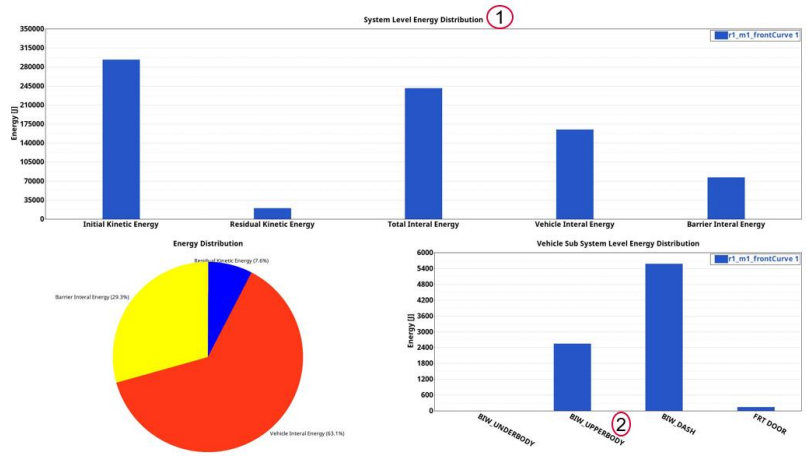
For the barrier, energy plots are created for Initial kinetic energy, residual kinetic energy, total internal energy, vehicle internal energy and barrier internal energy.

A pie chart is also created showing energy distribution for residual kinetic energy along with vehicle & barrier internal energy.



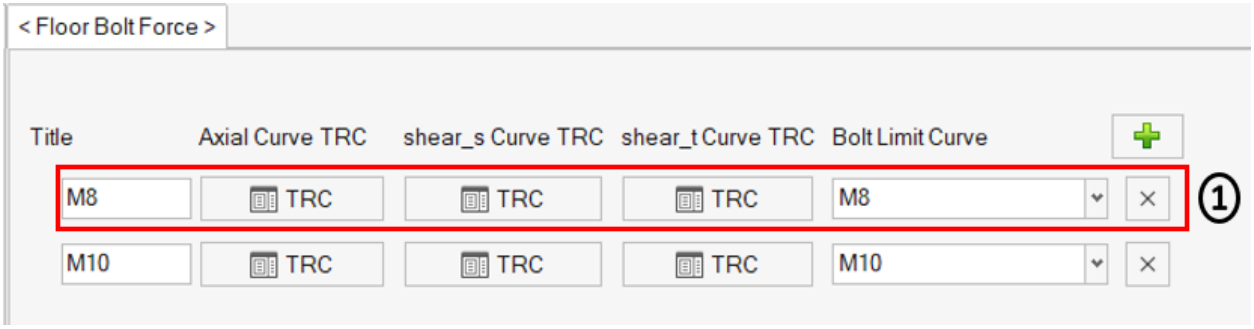
Inputs:

6) Barrier assembly or component ID
7) Subsystem name
8) Subsystem assembly or component ID



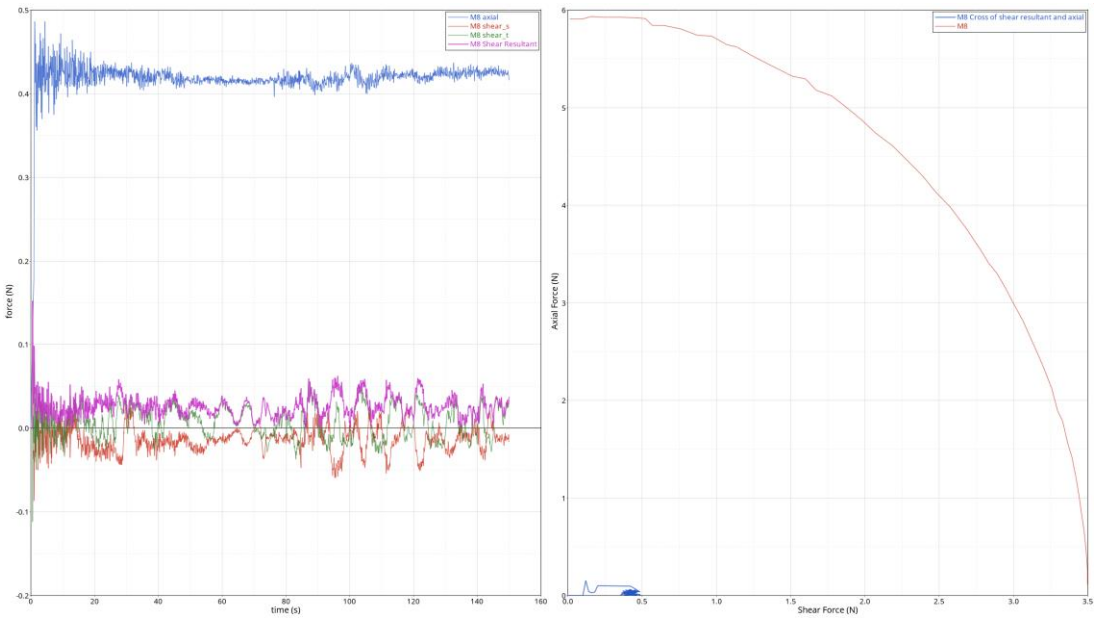
Floor Bolt Force

This module is used to create plots for bolt forces at each of the seat bolt locations. It contains axial, shear_s & shear_t plots along with resultant of shear_s & shear_t plot and a cross plot of axial force vs resultant shear force as shown below.



Inputs:

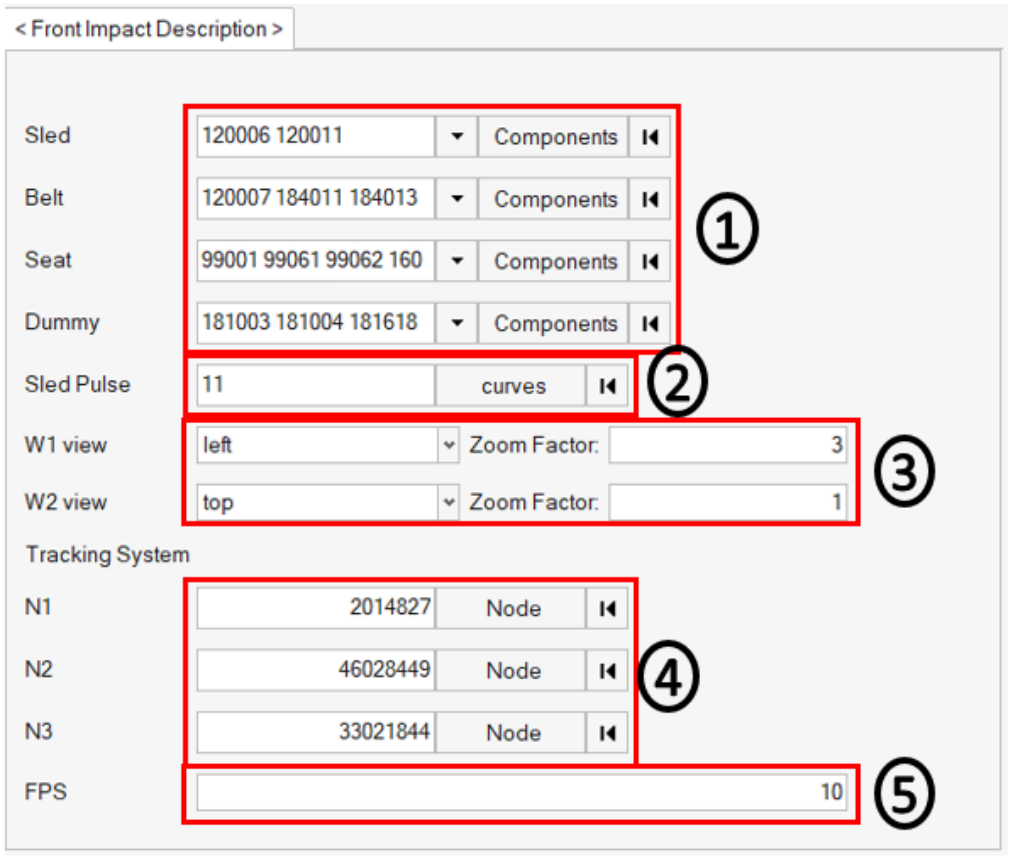
1) For each of the seat bolt location, enter a title to be used as slide title
2) Select the type, request & component (TRC) for axial curve, shear_s & shear_t curves
3) Select the bolt limit curve from the drop down.



Front Impact Description

This module is used to create a summary report for Font Impact load case. The report consists of the following slides.

- Analysis summary slide capturing the load case, seat position, dummy type, test pulse, seat belt system
- A plot containing the Front Crash Pulse
- Front impact simulation animation in user selected views capturing the Sled, Belt, Seat & Dummy parts.



Inputs:

1) Select the parts representing the Sled, Belt, Seat & Dummy sub-systems
2) Select the Sled Pulse load curve
3) Select the two views for model orientations to be captured in the report
4) Select the 3 nodes defining the tracking system
5) Enter the Frames Per Second value used when capturing the animation

Outputs:

Analysis / Summary:

Variant:

Loadcase:
Front Impact

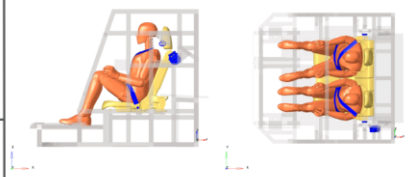
Seat position: Design
Dummies: 2x50 HII

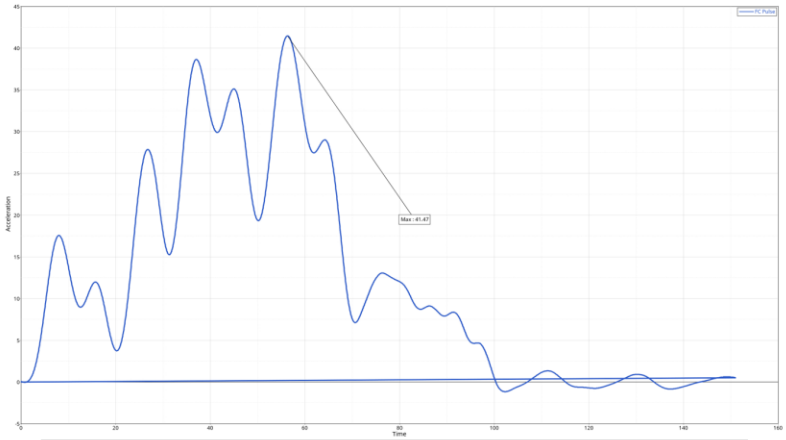
Test Pulse:
Front impact puls – max. 41 g

Seat belt system:
Time to fire the pretensioner: 11 ms

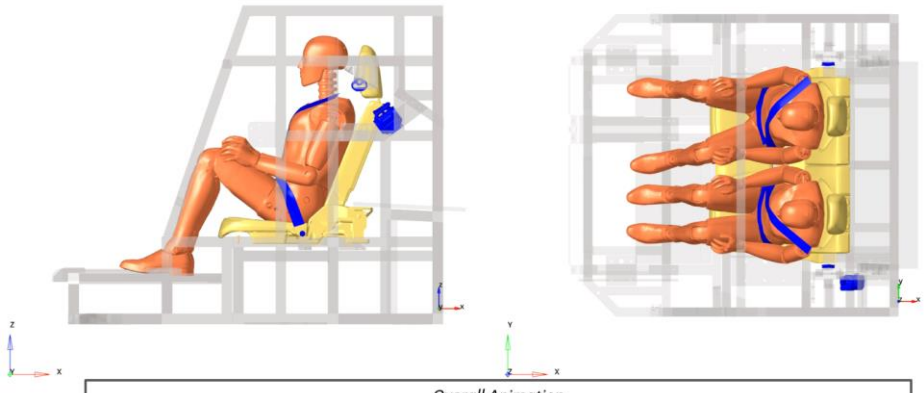
Criteria:
1. No crack: No breakage
2. No detached parts.

Conclusion:





Front Crash Pulse



Overall Animation

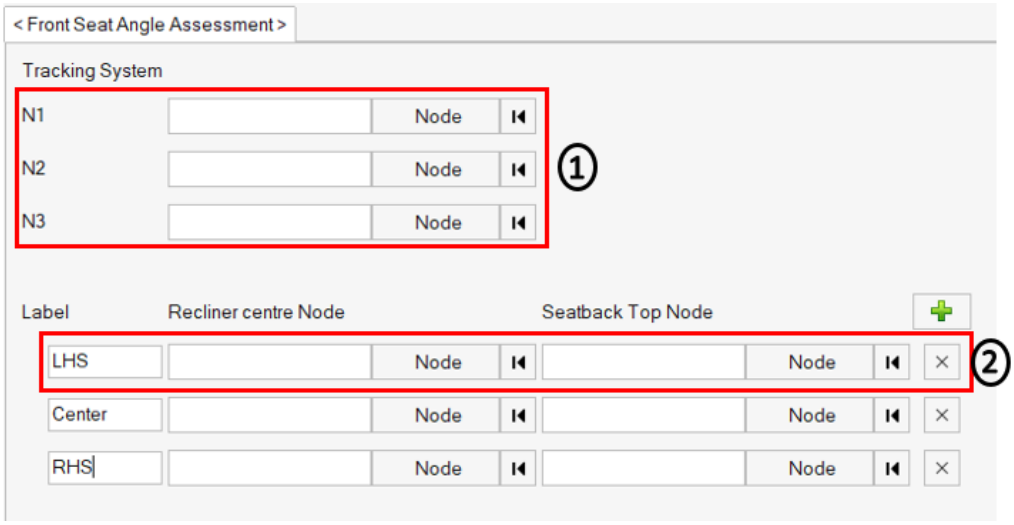
Front Seat Angle Assessment

This module evaluates seatback deflection (in deg) as part of the Front Seat Whiplash Dynamic assessment for High Severity Pulse. The seatback deflection is assessed where a three point penalty will be applied to the overall score when seats have a rotation of 32 deg or greater. The report generated (PPT & HTML) consists of the following.

1) A summary table with angle calculated between recliner center node and seatback top node at user specified locations. The table also has average angle and comparing it with the capping limit.

2) Image of the dummy and the seat along with the measured angle at each of the specified locations

The GUI is as shown below.



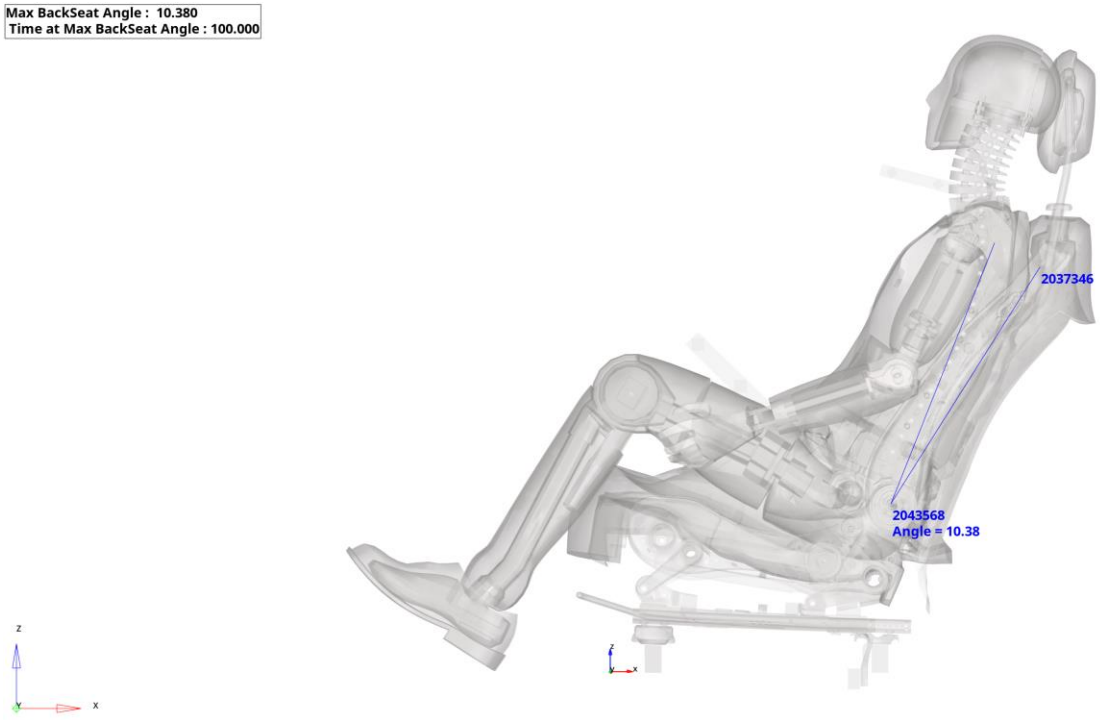
Inputs:

1) **Tracking system** definition. Select 3 nodes on the ground panel that defines a tracking system.

2) **Recliner center node & Seatback Top node** selection. Select one node each for defining the recliner center node & seatback top node. These 2 nodes will be used for angle calculation. Users can select the node pairs at multiple locations. The average angle will be calculated if more than one location (node pair) is specified.

EuroNCAP Whiplash Front Seat Angle Assessment Summary

Title	Values (deg)
LHS1	10.38
LHS2	8.45
Center	7.60
RHS1	9.60
RHS2	8.22
Capping Limit	32.00
Average Backseat Deflection	8.85
Max Backseat Deflection	10.38



Front Seat Dynamic Assessment

This module generates dynamic assessment report for the Front Seat Whiplash load case. This module is supported across multiple regulations such as EURONCAP, CNCAP, JNCAP etc. The injury criteria summary table and point scoring varies from one regulation to the other. The time history data input is from a simulation that is run to dynamically test a motor vehicle seat and head restraint assembly to assess the extent to which they reflect best practice in preventing soft tissue neck injuries. A BioRID UN rear crash dummy is used and is seated in a standardized position restrained by a three-point belt. The report generated (PPT & HTML) consists of the following.

1) Dynamic assessment detailed summary table with points scoring. The values reported in the table for all the injury criteria are based on the Head-to-Head Restraint contact force end time (T-HRC end time)

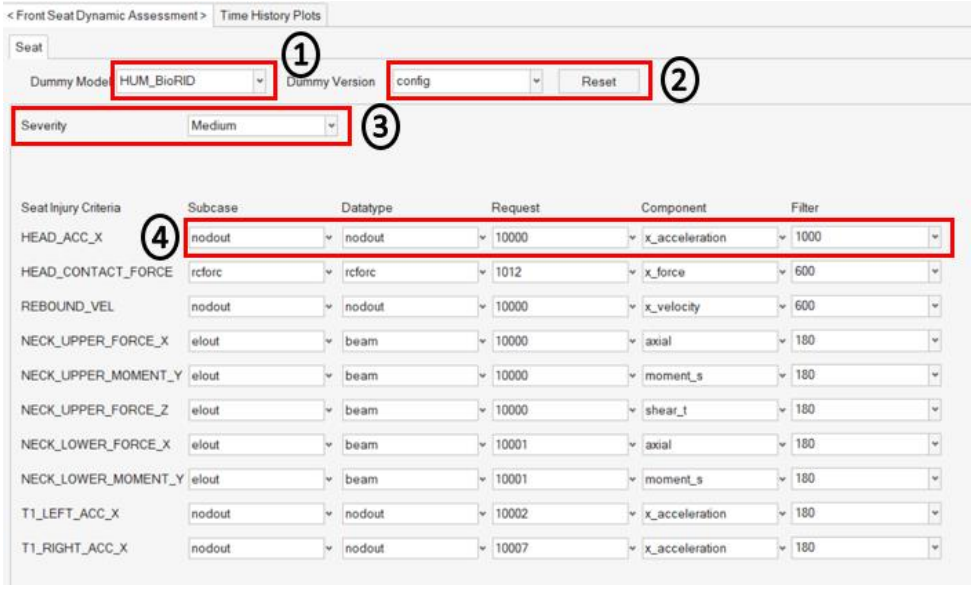
2) Performance plots (with limit datum lines) for each of the injury criteria

3) Head Restraint Contact Time (T-HRC start & T-HRC end). It is defined as the time of first contact between the rear of the ATD head and the head restraint, where the subsequent continuous contact duration exceeds 40ms.

4) Nkm Calculation. The Nkm criterion is based on a combination of moment and shear forces, using critical intercept values for the load and moment.

5) NIC Calculation. The NIC is based on the relative horizontal acceleration and velocity of the occipital joint relative to T1.

The GUI is designed in such a way that it offers flexibility to support various types and versions of dummies as per the supported impact and regulation types. A snapshot of the GUI is as shown below.



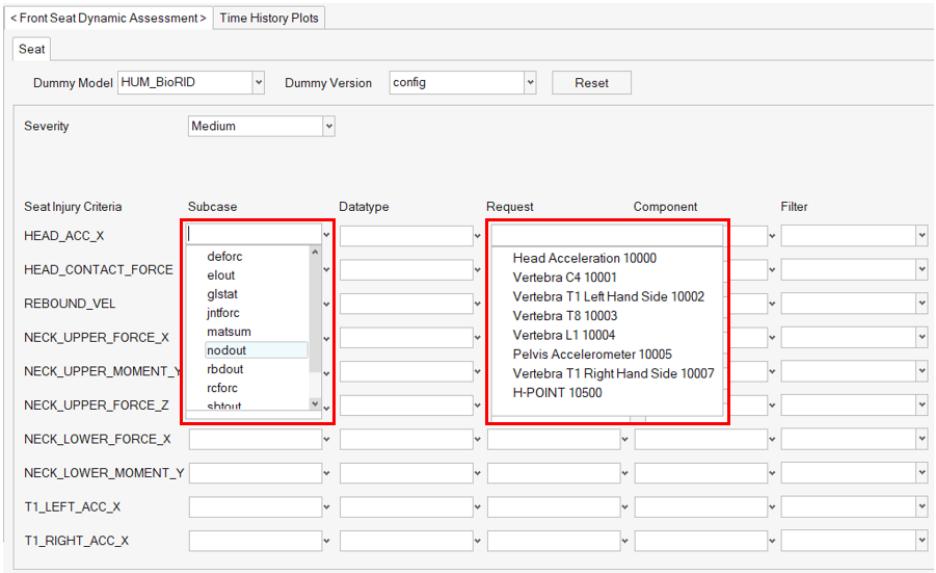
Inputs:

1) **Dummy model** selection option. Currently for the Front Seat Dynamic Assessment, we support BioRID dummy type.

2) **Dummy version** selection. Users can either select a particular version number from the drop down or set it to config option. When selecting a version number, all the subcase, datatype, request & component types along with filters are predefined based on defaults config file. When user selects the config option then it is user's responsibility to define all the inputs. This is especially needed when using a newer dummy version.

3) **Pulse severity selection**. There are 3 pulse severity options available namely **Low**, **Medium,** and **High**.

4) **Dummy Injury Criteria selection**. This option is enabled only when the dummy version is set to config. Users should first make sure to load the Time History file (T01 / binout / HDF / MME) by clicking the **Search** button. After loading the file, user can start defining the appropriate subcase, datatype, request & component types for each of the injury criteria.



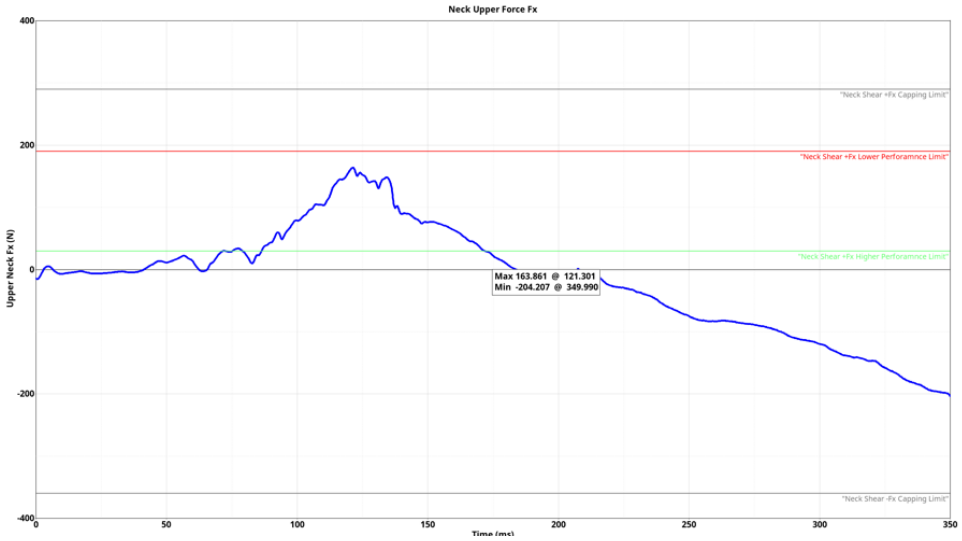
EuroNcap Whiplash Front Seat Dynamic Assessment Summary

Total points (Out of 3)	2.25

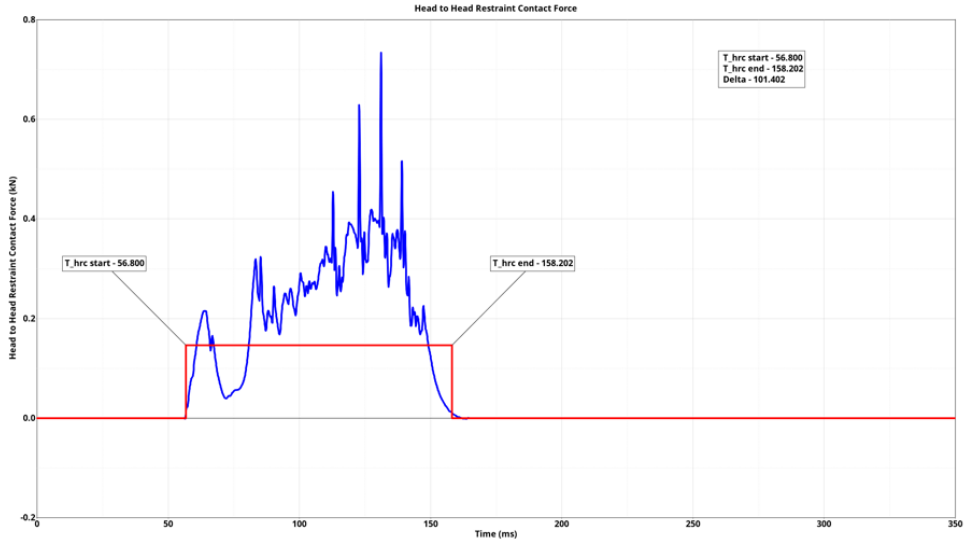
Detailed Summary

High Severity Pulse	Higher Limit	Lower Limit	Capping Limit	main_iter_	Points
NIC (m2/s2)	13	23	25.5	20.50	0.250
NKM	-	-	0.78	0.21	
Upper Neck Shear +Fx (N)	30	210	364	20.32	1.000
Upper Neck Shear -Fx (N)	-	-	360	80.79	
Upper Neck Tension +Fz (N)	470	770	1024	208.83	1.000
Upper Neck My Extension (N*m)	-	-	30	16.99	
Upper Neck My Flexion (N*m)	-	-	30	2.75	
Lower Neck Shear Fx (ABS) (N)	-	-	360	188.09	
Lower Neck My Extension (N*m)	-	-	30	1.89	
Lower Neck My Flexion (N*m)	-	-	30	6.20	
T1 Acceleration (g)	-	-	17.8	13.78	
T_hrc start (ms)	-	-	92	81.90	
T_hrc end (ms)	-	-	-	150.00	
Rebound Velocity (m/s)	-	-	6	5.59	

Neck Upper Force Fx



Head to Head Restraint Contact Force



For CNCAP, the point scoring & the STAR rating is based on the following specification. There is a separate point scoring calculation for Front seat & Rear seat as shown in the table below. The values reported in the table for all the injury criteria are based on the Head to Head Restraint contact force end time (T-HRC end time)

Injury	Front Seat Point	Rear Seat Point	Higher Limit	Lower Limit	Front Max Score	Rear Max Score
NIC	2 to 0	0.8 to 0	< 8 m^2/s^2	> 30 m^2/s^2	2	0.8
Upper Neck Fx+	1.5 to 0	0.6 to 0	< 340 N	> 730 N	1.5	0.6
Upper Neck Fz+	1.5 to 0	0.6 to 0	< 475 N	> 1130 N		
Upper Neck My	1.5 to 0	0.6 to 0	< 12 Nm	> 40 Nm		
Lower Neck Fx+	1.5 to 0	0.6 to 0	< 340 N	> 730 N	1.5	0.6
Lower Neck Fz+	1.5 to 0	0.6 to 0	< 257 N	> 1480 N		
Lower Neck My	1.5 to 0	0.6 to 0	< 12 Nm	> 40 Nm		
Max Seatback Deflection	0 to -2	0 to -0.8	< 25 deg	>= 25 deg	0	0
Dynamic Seat Displacement	0 to -5	0 to -2	< 20 mm	>= 20 mm	0	0
HRMD	0 to -2	0 to -0.8	Yes	No	0	0

CNCAP Whiplash Dynamic Assessment Summary

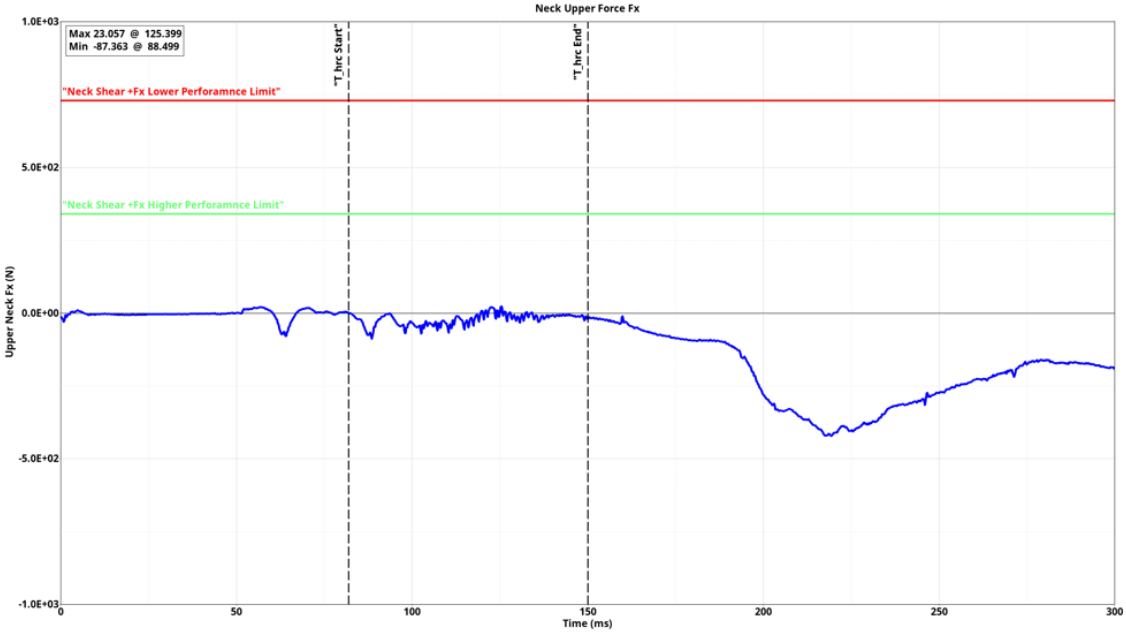
★★★★★	85 %
★★★★	75 %
★★★	65 %
★★	60 %
★	< 60 %

Seat Location	Front
Points	3.6
Modifier	0
Total Points (out of 5)	3.6
Score %	72
Star Rating	3

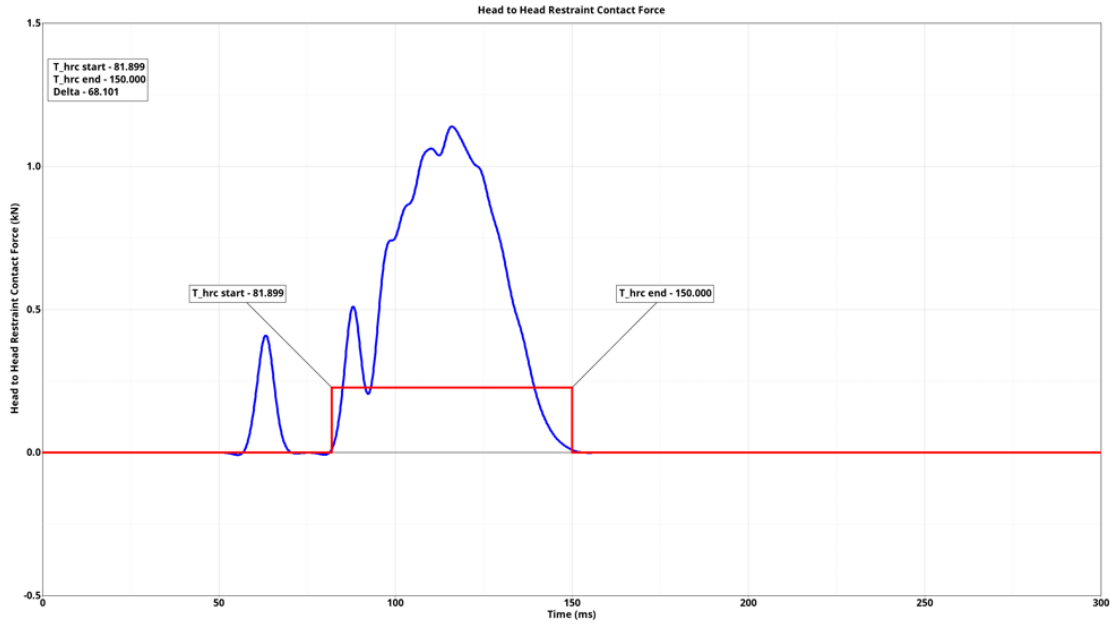
Detailed Summary

Title	Higher Limit	Lower Limit	main_iter_	Points
NIC (m2/s2)	8	30	20.50	0.863
Upper Neck Shear +Fx (N)	340	730	23.06	1.500
Upper Neck Tension +Fz (N)	475	1130	220.80	1.500
Upper Neck My (N*m)	12	40	16.91	1.237
Lower Neck Shear +Fx (N)	340	730	190.75	1.500
Lower Neck Tension +Fz (N)	257	1480	220.80	1.500
Lower Neck My (N*m)	12	40	1.87	1.500
Dynamic Seat Displacement (mm)	20	20	0.01	0.000
Max Seatback Deflection greater than 25 deg	No	Yes	No	0
Seat headrest interferes with the headform of HRMD	No	Yes	No	0
T_hrc start (ms)	-	-	81.90	
T_hrc end (ms)	-	-	150.00	

Neck Upper Force Fx



Head to Head Restraint Contact Force



For JNCAP, the point scoring & the LEVEL rating is based on the following specification.

Injury	Weightage	Point	Higher Limit	Lower Limit	Max Score
NIC	1	4 to 0	< 8 m²/s²	> 30 m²/s²	4
Upper Neck Fx+	2	4 to 0	< 340 N	> 730 N	8
Upper Neck Fz+		4 to 0	< 475 N	> 1130 N	
Upper Neck My Flexion		4 to 0	< 12 Nm	> 40 Nm	
Upper Neck My Extension		4 to 0	< 12 Nm	> 40 Nm	
Lower Neck Fx+		4 to 0	< 340 N	> 730 N	
Lower Neck Fz+		4 to 0	< 257 N	> 1480 N	
Lower Neck My Flexion		4 to 0	< 12 Nm	> 40 Nm	
Lower Neck My Extension		4 to 0	< 12 Nm	> 40 Nm	

Rating Scheme Frontal & Side Impact, Whiplash:

Level	Points
5	≥ 10.5
4	≥ 9
3	≥ 7.5
2	≥ 6
1	< 6

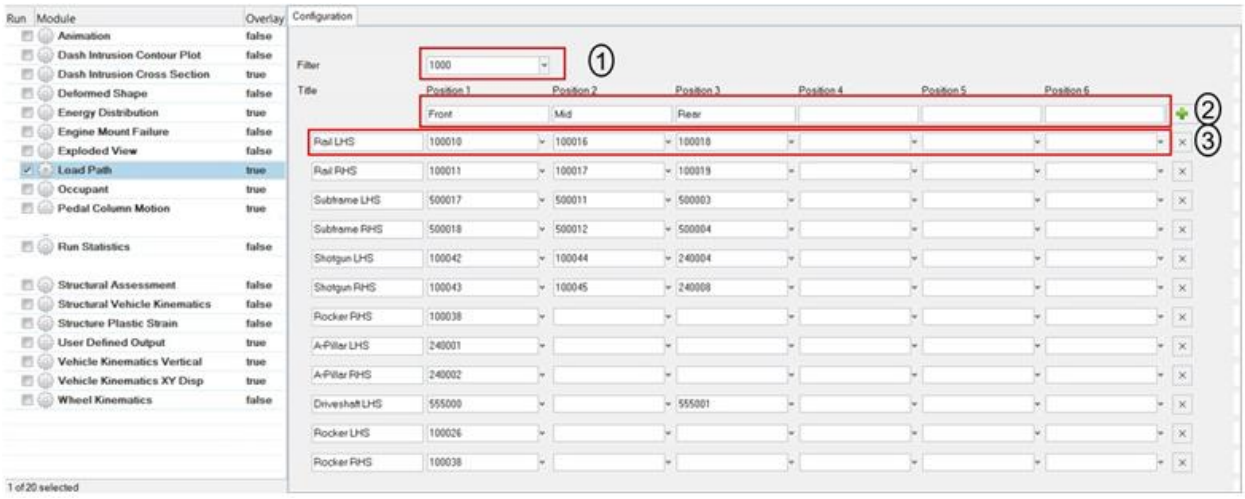
Load Path

The Load Path module lets you create following report summary.

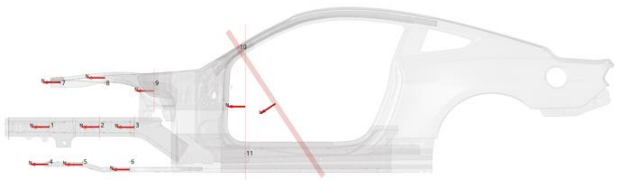
1) It creates an image of the vehicle and identifies the location of each cross section that is defined by the user in the config file

2) It creates a Load Path Section Forces and Properties summary table

3) It also creates Load Path section forces plots for all the cross sections



Cross Section Locations

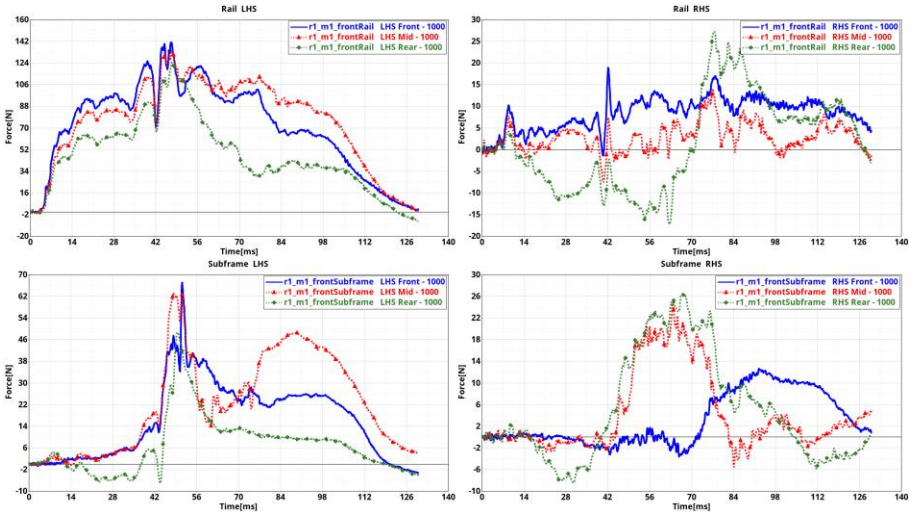


1	Rail Front
2	Rail Mid
3	Rail Rear
4	Subframe Front
5	Subframe Mid
6	Subframe Rear
7	Shotgun Front
8	Shotgun Mid
9	Shotgun Rear
10	A-Pillar Front
11	Rocker Front

Load Path Summary

#	Title	Peak Load [LHS] (KN)	Area(mm2)	Ix (mm4)	Iy (mm4)	J (mm4)	Sx (mm3)	Sy (mm3)	Peak Load [RHS] (KN)	Area (mm2)	Ix (mm4)	Iy (mm4)	J (mm4)	Sx (mm3)	Sy (mm3)
		r1_m1_front													
1	Rail Front	141.00	38.37	178846.17	51224.93	-43216.83	847.13	693.77	18.93	38.37	165168.37	51224.92	-45234.58	847.13	693.77
2	Rail Mid	135.32	36.67	104454.26	65096.91	40738.48	792.97	679.60	14.11	36.63	63340.71	79026.63	17641.33	791.38	681.85
3	Rail Rear	125.37	39.52	124027.32	71430.19	-43017.08	880.11	776.17	27.44	39.52	184206.11	55540.15	-48580.74	880.11	776.17
4	Subframe Front	67.17	17.45	3589.02	8405.00	0.00	214.27	280.17	12.62	17.45	3589.02	8405.00	0.00	214.27	280.17
5	Subframe Mid	63.52	17.81	4033.52	8729.89	-0.58	228.13	290.98	24.74	17.81	4033.10	8729.89	0.54	228.20	290.98
6	Subframe Rear	49.07	17.45	3589.01	8405.06	0.00	214.27	280.17	26.45	17.45	3589.01	8405.06	0.00	214.27	280.17
7	Shotgun Front	23.95	64.34	74444.15	272987.83	-22519.68	699.06	1554.85	4.45	64.34	59385.91	278937.03	-34549.85	699.07	1554.85
8	Shotgun Mid	21.84	38.94	34520.59	143438.48	7054.20	791.54	961.01	20.31	38.94	47275.78	121756.20	39462.78	791.55	961.32
9	Shotgun Rear	31.99	131.04	2977343.36	4236128.96	3173750.07	4893.40	2722.56	35.47	136.25	2157098.05	1226453.29	-446369.53	3312.09	4441.09
10	Rocker Front	115.19	120.65	8934548.12	336710.24	-176468.24	12426.70	3454.34	17.31	120.65	9795451.07	904324.39	999808.24	12426.70	3454.34

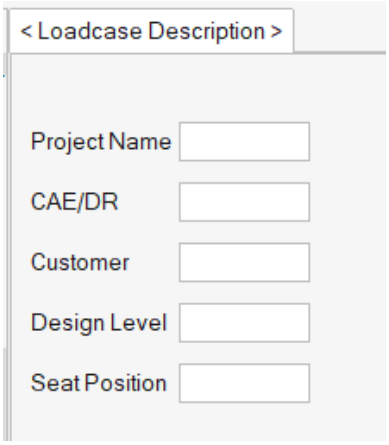
Cross Section Force Plot



Loadcase Description

This module generates a title slide (as per customer requirement). It can be included as a title slide for any of the Seat specific load cases such as Pendulum impact, Whiplash etc. It takes following info as user inputs

1) Project Name
2) CAE/DR
3) Customer Name
4) Design Level
5) Seat Position



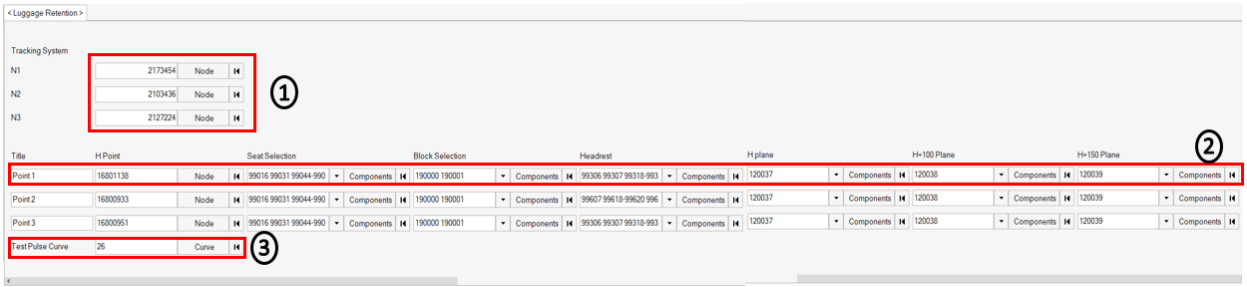
The above information will be included in a title slide as per the master PPT template.

Luggage Retention

This module is used to validate the design of the rear seat backs as per ECE R17 (Economic Commission for Europe of the United Nations (UN/ECE)) regulation. The ECE R17 establishes uniform standards for approving vehicles based on their seats, anchorages and head restraints.

The module creates the following summary report from the selected simulation results data.

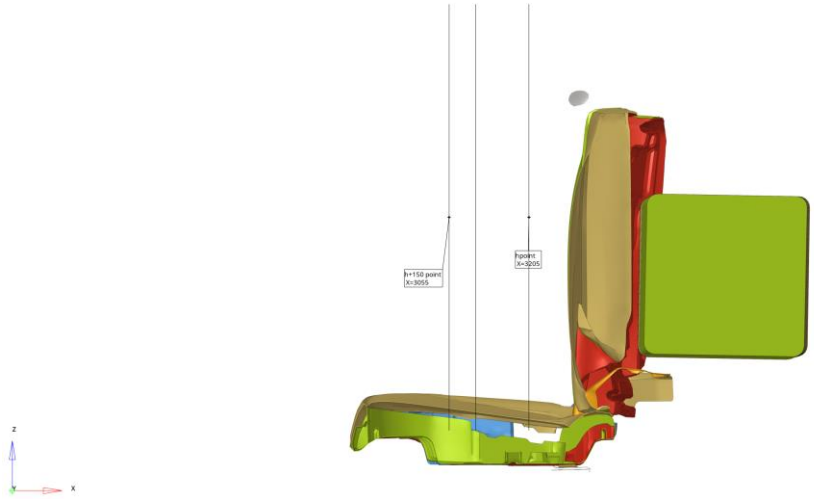
- Forward deflection of Head Restraint & the structure
- Plotting of Test pulse
- Capturing the ECE-R 17 with 80% of the permissible dynamic forward displacement

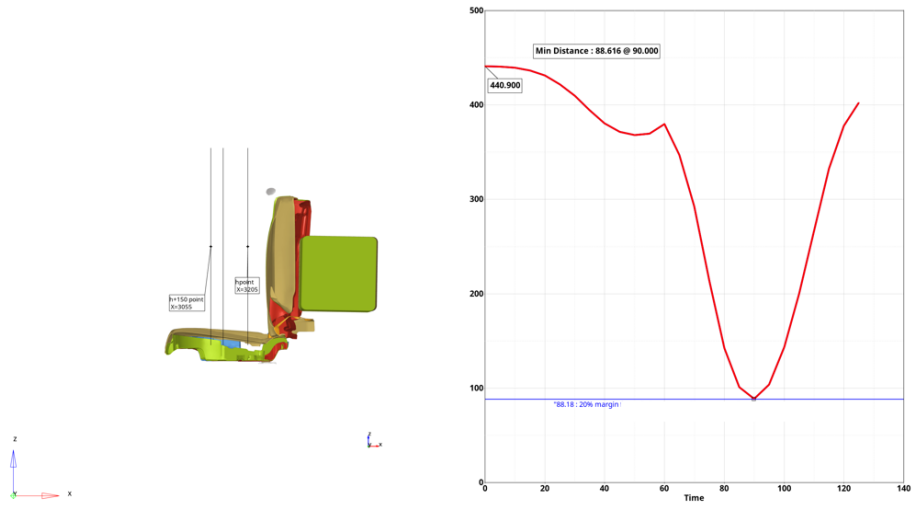


Inputs:

1) 3 nodes that define the tracking system
2) H point location, Seat, Block & Headrest parts along with the parts defining the H plane, H+100 plane & H+150 plane at 3 different locations
3) Test pulse curve ID from the solver input deck

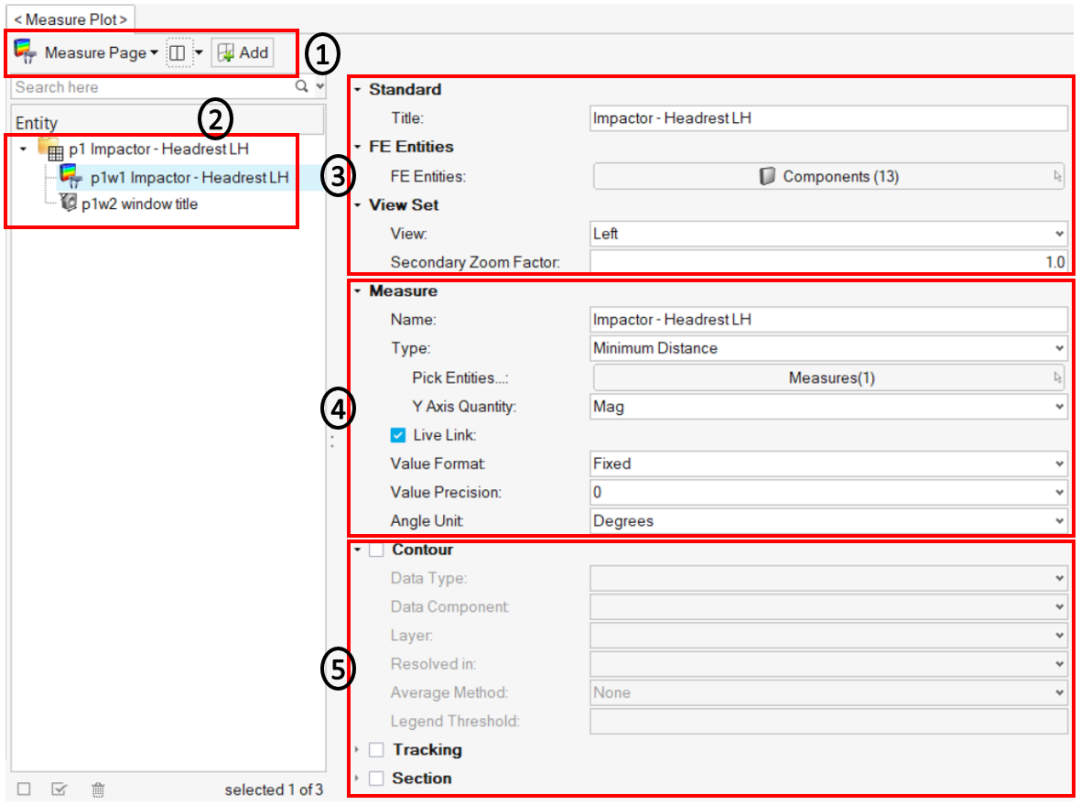
Outputs:


h+150 point
X=3055
hpoint
X=3205
z
x


h+150 point
X=3055
hpoint
X=3205
z
x
Min Distance : 88.616 @ 90.000
440.900
*88.18 : 20% margin
500
400
300
200
100
0
0
20
40
60
80
100
120
140
Time

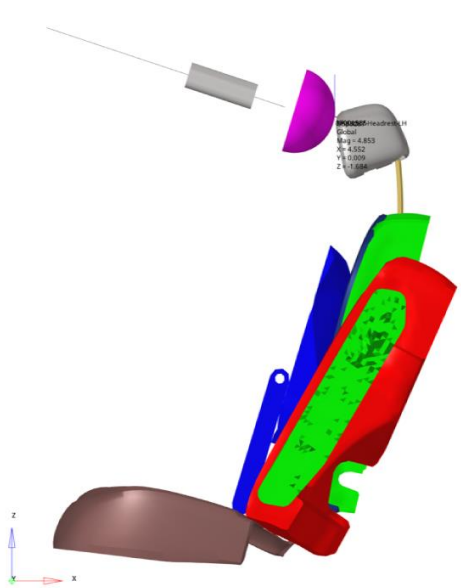
Measure Plot

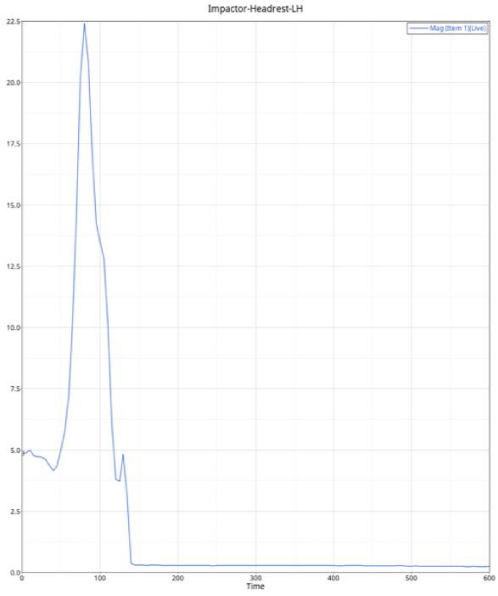
This is a generic module that allows users to apply various types of measures on the 3D animation results data, generate animations and measure plots and include them in the report. The GUI and the various inputs that are required to be defined are mentioned below.



Inputs:

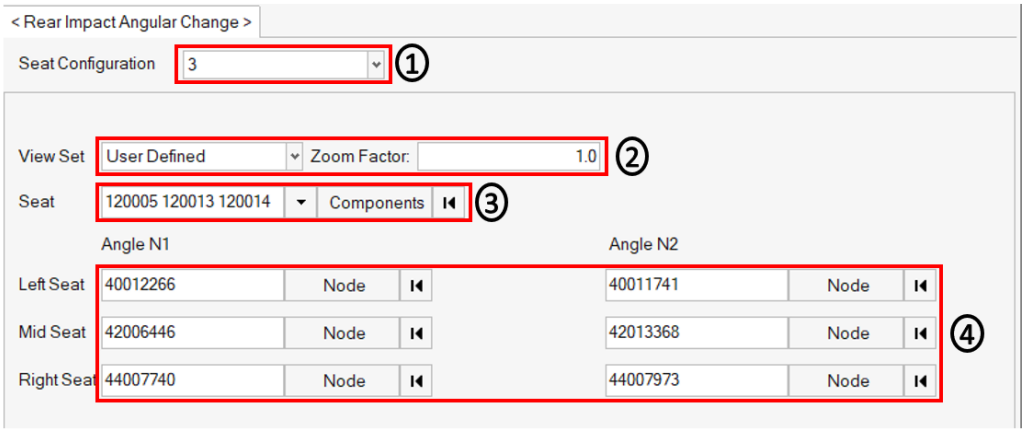
1) Use this input to select the page & window layout that will be captured and included in the report. 2 layouts are supported i.e. 1 x 2 and 2 x 2. Select the layout and click on **Add** button to add the page layout into the entity list browser.
2) The **Entity** list browser is used to list and manage the pages included by the user and their respective layouts.
3) Enter the **Title** used for the slide title in the report, select the **Components** to be used for the current measure and the **View Set** to be used to orient the components.
4) Define the **Measure** and all of its attributes to be applied such as measure type, measure entities, format & precision for the measure etc.
5) Optionally user can also enter the **Contour**, **Tracking** & **Section** details to be applied while generating the report for the Measure module.




Impactor-Headrest-LH
Mag (Item 1)(Live)
22.5
20.0
17.5
15.0
12.5
10.0
7.5
5.0
2.5
0.0
0
100
200
300
400
500
600
Time

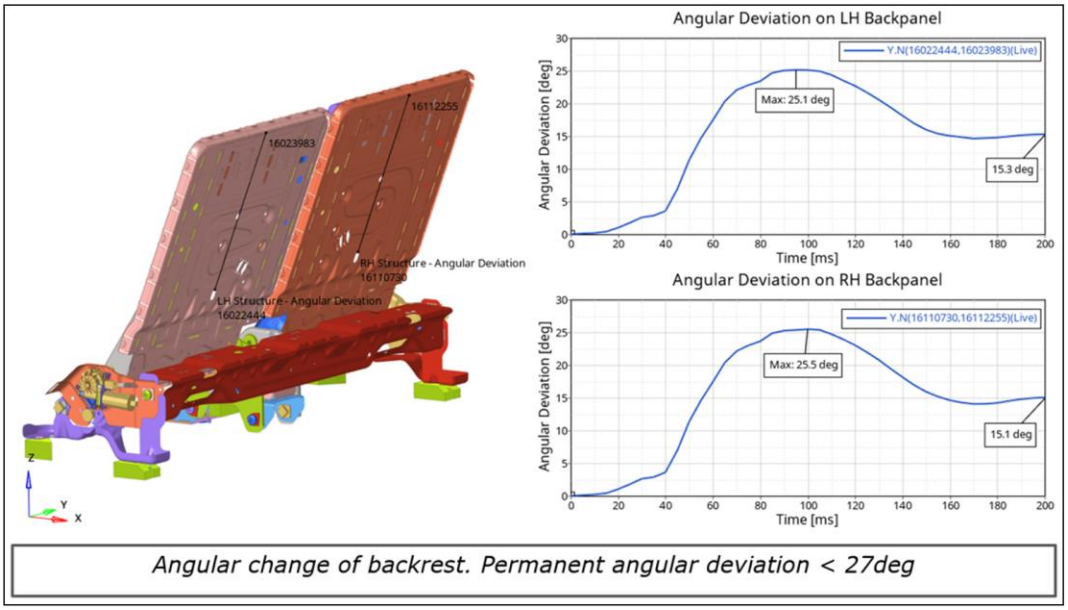
Rear Impact Angular Change

This module is used to find the angular change of backrest for the following seat configurations during rear impact simulation. The configurations supported are Left, Right, Mid, 2 seat & 3 seat. A summary slide is generated highlighting the angular change of backrest for the selected seat configuration and creating an angular deviation plot across the simulation steps.



Inputs:

1) Select the required seat configuration
2) Select the view and the zoom factor to be used for orienting the seat
3) Select the seat parts
4) Select the two nodes (on top & bottom of the seat backrest) for calculating the angular deviation

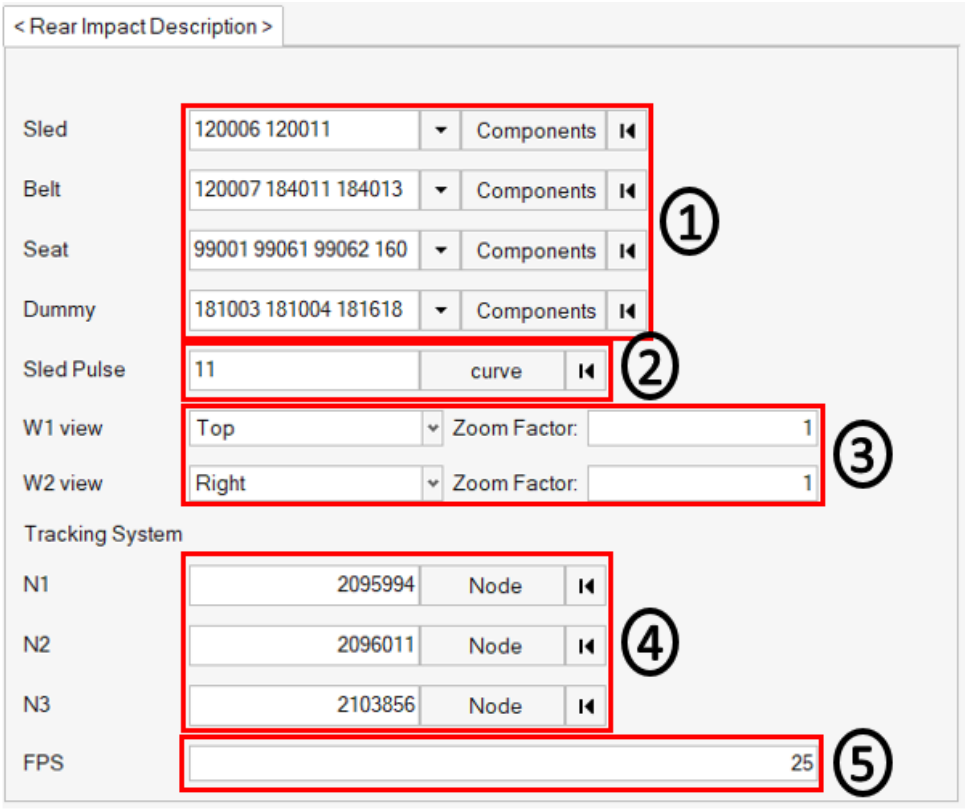


Angular change of backrest. Permanent angular deviation < 27deg

Rear Impact Description

This module is used to create a summary report for Rear Impact load case. The report consists of the following slides.

- Analysis summary slide capturing the load case, seat position, dummy type, test pulse, seat belt system
- A plot containing the Rear Crash Pulse
- Rear impact simulation animation in user selected views capturing the Sled, Belt, Seat & Dummy parts.



Inputs:

5) Select the parts representing the Sled, Belt, Seat & Dummy sub-systems
6) Select the Sled Pulse load curve
7) Select the two views for model orientations to be captured in the report
8) Select the 3 nodes defining the tracking system
9) Enter the Frames Per Second value used when capturing the animation

Outputs:

Analysis / Summary:

Variant:

Loadcase:
Rear Impact

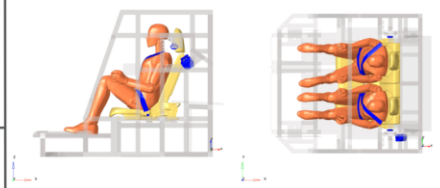
Seat position: Design
Dummies: 2x50 HII

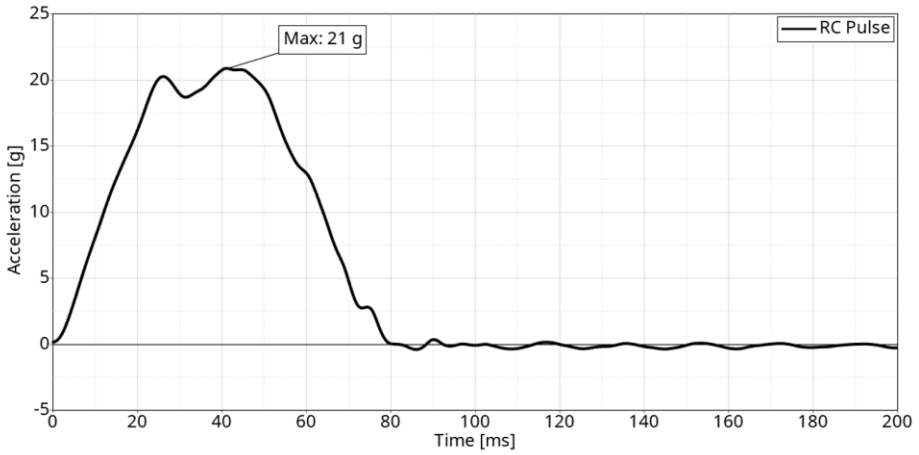
Test Pulse:
Rear impact puls – max. 21 g

Seat belt system:
Time to fire the pretensioner: 60 ms

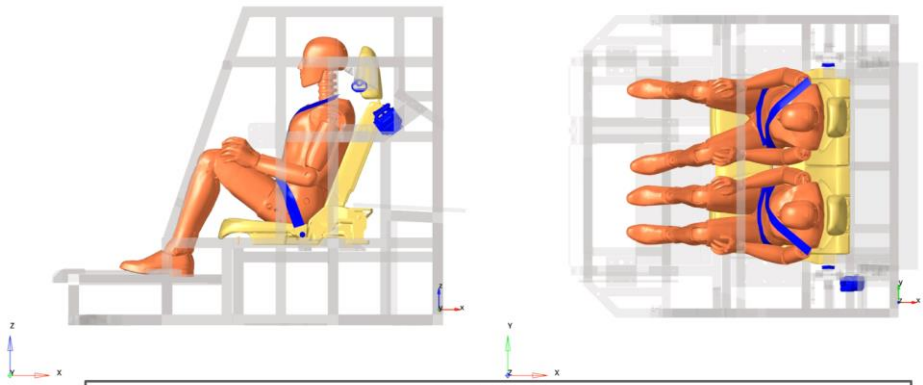
Criteria:
1. No crack; No breakage
2. Permanent static backrest deflection must stay below 27°
3. No detached parts.

Conclusion:





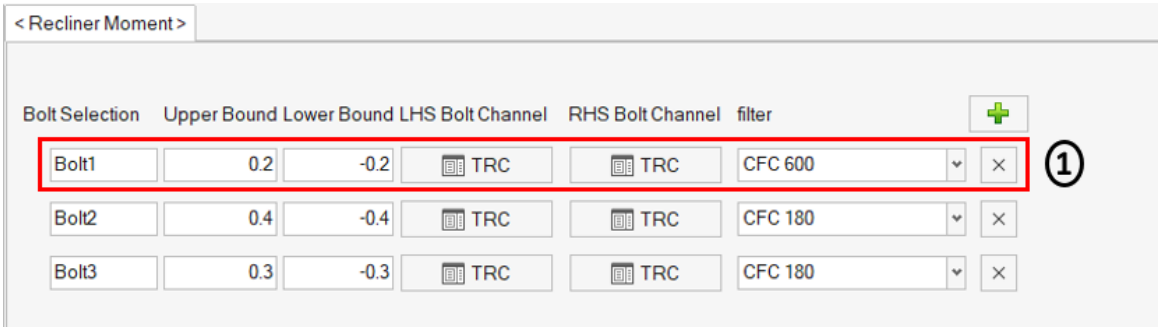
Rear Crash Pulse



Overall Animation

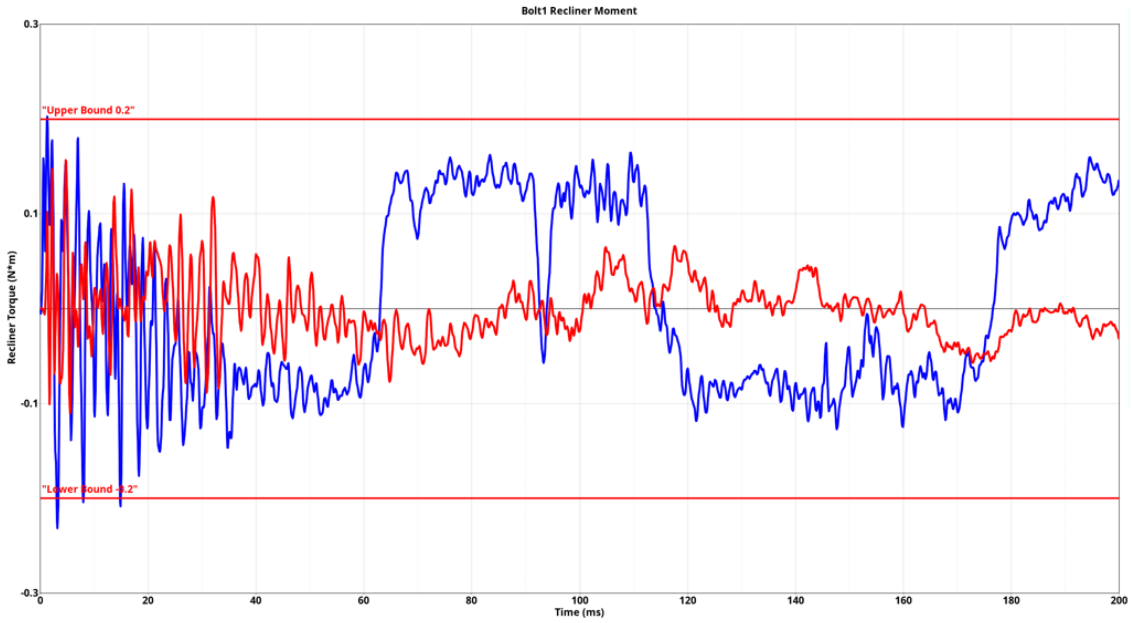
Recliner Moment

This module is used to create recliner moment plots at user selected seat bolt locations. At each selected location, recliner torque left and right channels are plotted as shown below.



Inputs:

1) For each of the seat bolt location, enter a title to be used as slide title
2) Enter the upper & lower bound limits for the recliner torque
3) Select the type, request & component (TRC) for left & right hand bolt channels along with the filter class to be applied



Run Statistics

This module creates following summary info.

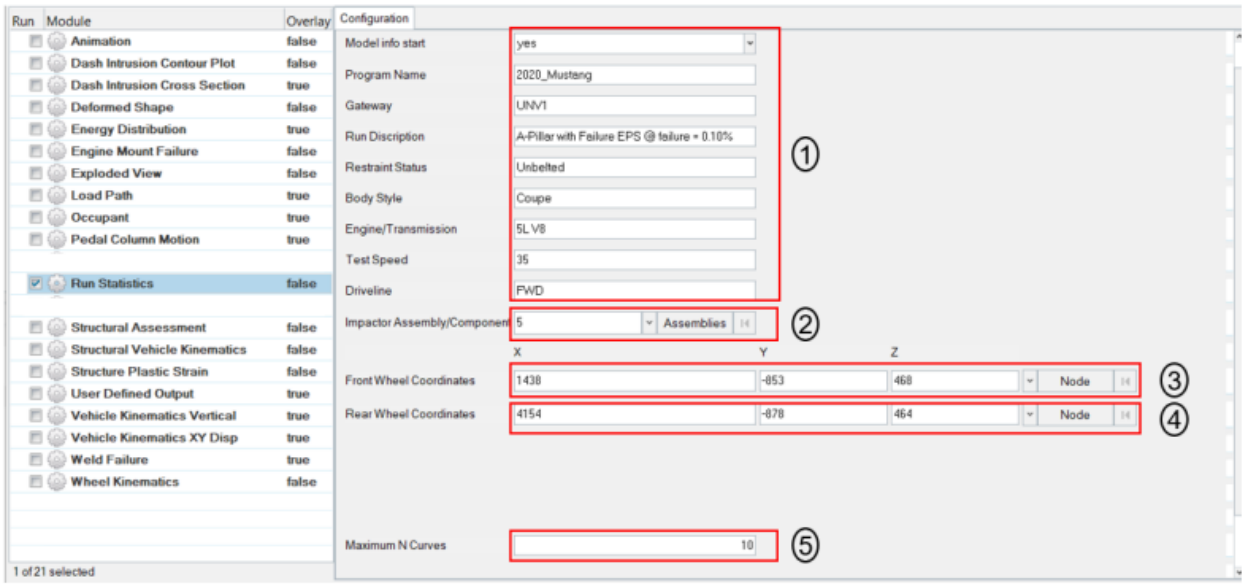
1) Model Information summary containing Program Name, Gateway, Run description, vehicle weight, solver version, run time etc.

2) Run Quality report which consists of termination time, termination type, mass added, energy ratio etc.

3) Plots consisting of global energy plots, added mass & time step plots and energy ratio plots

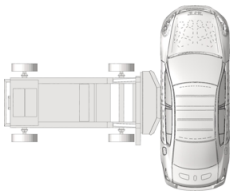
4) An image containing vehicle mass & geometric measurements

5) Material Internal Energy plots for the user defined Top N parts



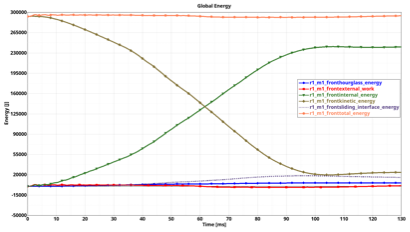
Model Info Summary & Run Quality Report

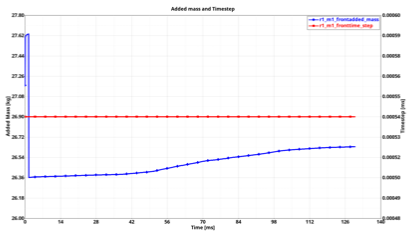
Program Name	Test
Gateway	abcd
Run Discription	Side Impact test run
Restraint Status	Belted
Body Style	Sedan
Engine/Transmission	V4
Test Speed	35 Kph
Driveline	AWD
Run Name	Main.k
Engineer	tejasr
Model Run Date	0 9 / 1 8 / 2 0 2 1
Test Mode	Side CIASI - IIHS OLD (Pre 2021) MDB
Gross Vehicle Weight	1826.09 kg
Impactor Weight	0.00 kg
Total Weight	1826.09 kg
Vehicle Front Axle Weight	1016.54 kg
Vehicle Rear Axle Weight	809.55 kg
Solver Version	mpp s R7.1.2
Number of CPU	8 CPU
Run Time	21 hr 41 min 54 sec

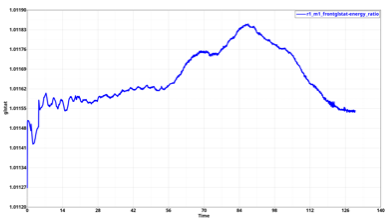


Run Quality	Result	Target
Termination Time	0.2 ms	0.2 ms
Termination Type	Normal Termination	
Mass Added @ T=0 [%]	0.44 %	< 1 %
Total Mass Added [%]	0.96 %	< 3 %
Total Mass Added [kg]	0.03 kg	
Energy -> Hourglass [%]	3.45 %	< 10 %
Energy -> Ratio [%]	1.00 %	1 >= Energy Ratio < 1.01

Global Energy, Added Mass, Time Step & Energy Ratio Plots

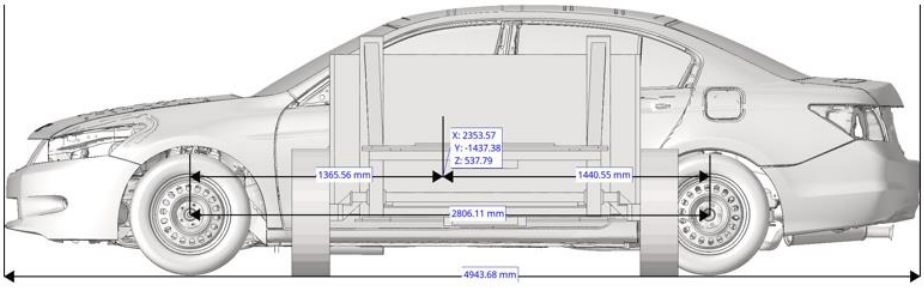




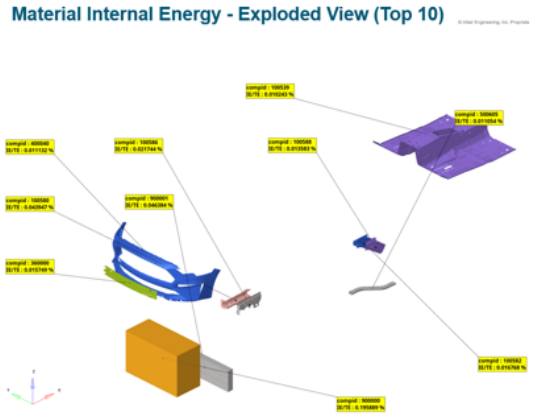


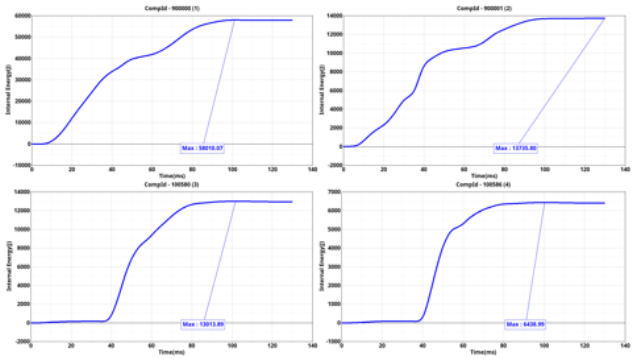
Vehicle Mass & Geometric Measurements

Vehicle Mass (kg)	1826.09 kg
Front Axle weight %	55.67%
Rear Axle weight %	44.33%



Material Internal Energy Summary



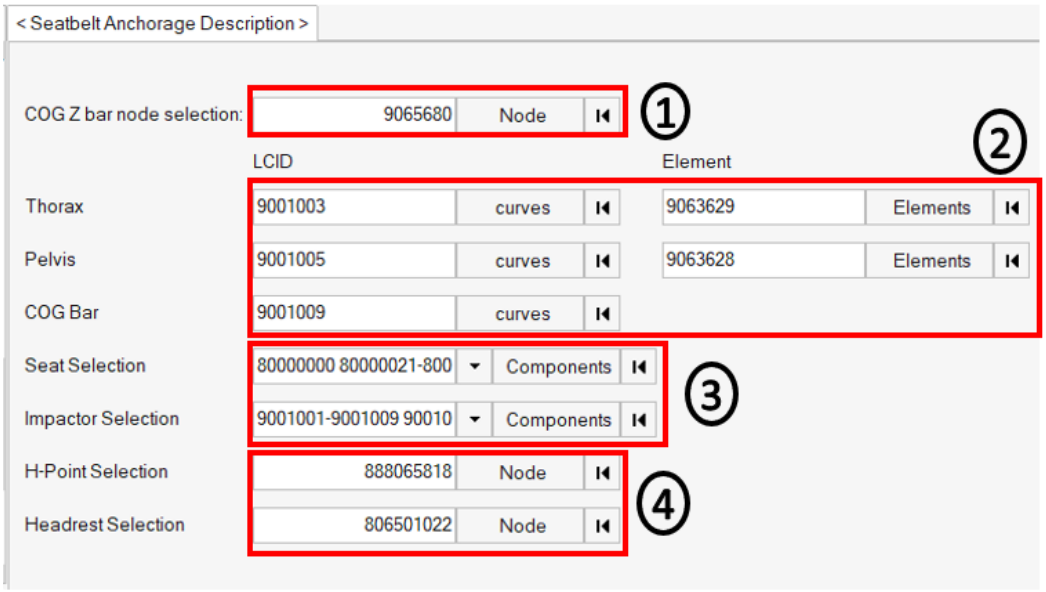


Seat Belt Anchorage Description

The Seat Belt Anchorage is part of the ECE R14 & FMVSS210 regulations. These are tests to ensure sufficient strength of all anchorage points. In these tests high forces are applied to the seatbelts over loading devices. All components of the system such as seats, seat & belt anchorages must resist the defined loads without damage. The loads are applied slowly and are sustained over a long period of time.

The module creates the following summary report from the selected simulation results data.

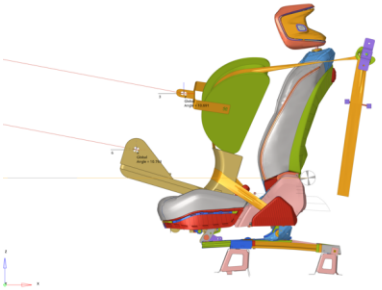
- A plot containing the applied loads on Thorax, Pelvis & COG mass
- An image of seat, seat belts & anchorages, shoulder & pelvis blocks and their angle of rotation
- An animation of the seat & the impactor parts along with the minimum distance measure between the H-point & Headrest point

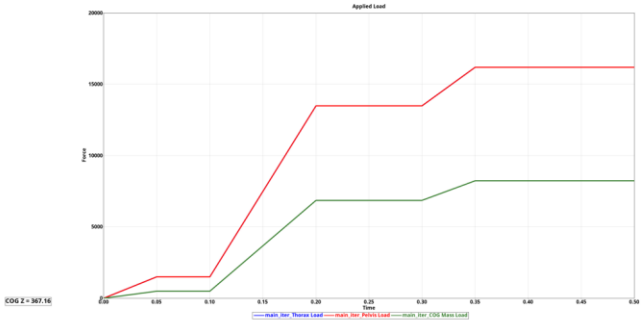


Inputs:

1) A node defining the center of gravity of the seat assy
2) Load curve IDs & the corresponding 1D bar/beam elements at the Thorax, Pelvis & COG bar defining the applied loads
3) Seat and the Impactor parts
4) H-point & Headrest point node locations

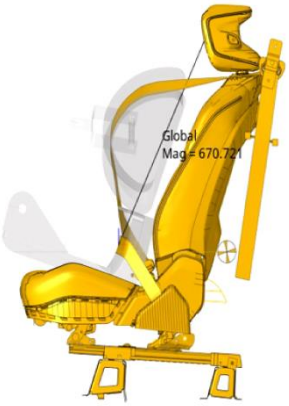
Outputs:

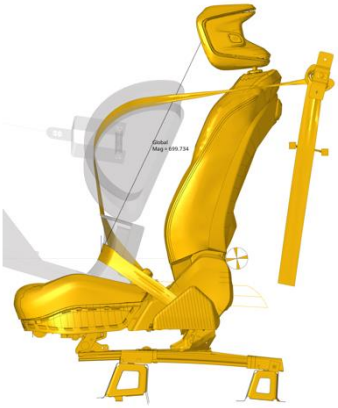




F Thorax	1500 >> 13500 >> 16200
F Pelvis	1500 >> 13500 >> 16200
F COG	500 >> 6867 >> 8240

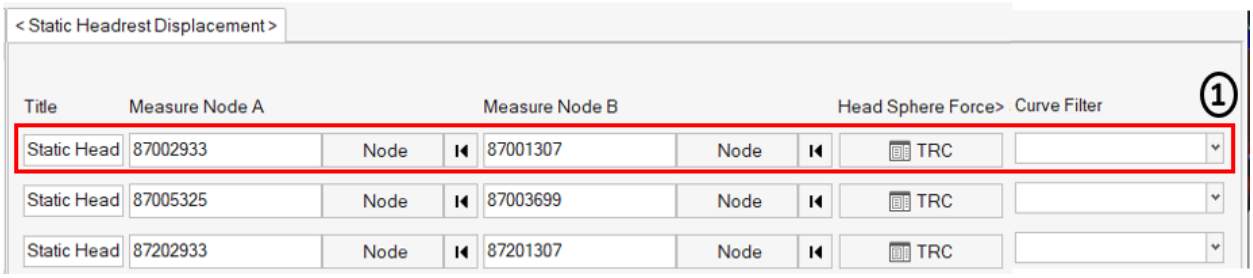
Boundaries:
1 Thorax Pull Rope End – constrain Y and Z translation
2 Pelvis Pull Rope End – constrain Y and Z translation
3 COG Pull Rope End – constrain Y and Z translation
4 COG Rear Tube – constrain Y and Z translation





Static Headrest Displacement

This module is used to generate a report which is part of the Static Headrest Test. The GUI and the inputs required are as below. For each of the selected impactor-headrest location, the report consists of a curve representing distance b/w impactor and displaced reference plane and force vs displacement curve as shown below.



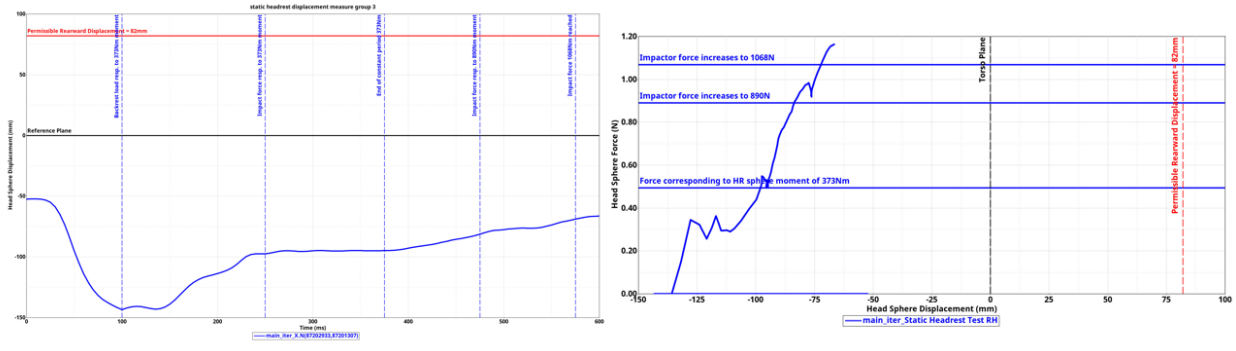
Inputs:

- Enter the Title which will be used for the slide title & curve names
- Select a Reference Plane node (node A) and an Impactor node (node B). These 2 nodes will be used to create a measure of type **Distance Between** (measured along X direction) and a curve will be created using the measure.
- Select Head Sphere Force request from the time history data.

Note:

The report includes separate slides for different impactor & headrest locations (Left / Center / Right). The user should select appropriate reference plane & impactor nodes and the respective TRC inputs for each of the impactor & headrest locations.

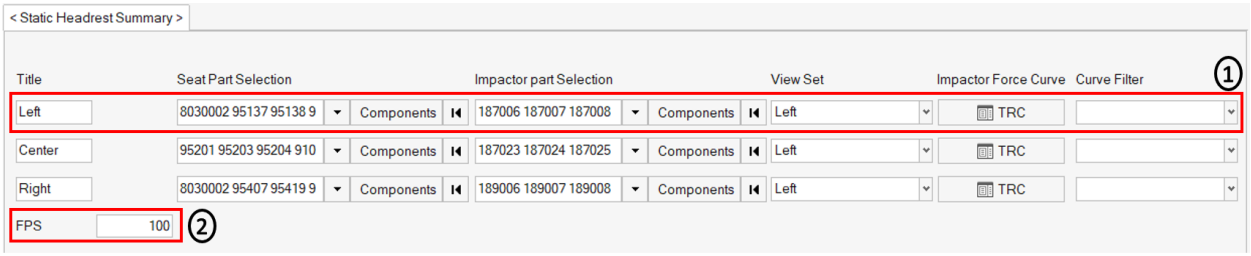
A standard report will be generated as shown below.



Distance between impactor and the displaced reference line: Head restraint Static Headrest Test RH	Force Displacement curve: Head restraint Static Headrest Test RH

Static Headrest Summary

This module is used to generate a report for Static Headrest Test. The GUI and the inputs required are as below.

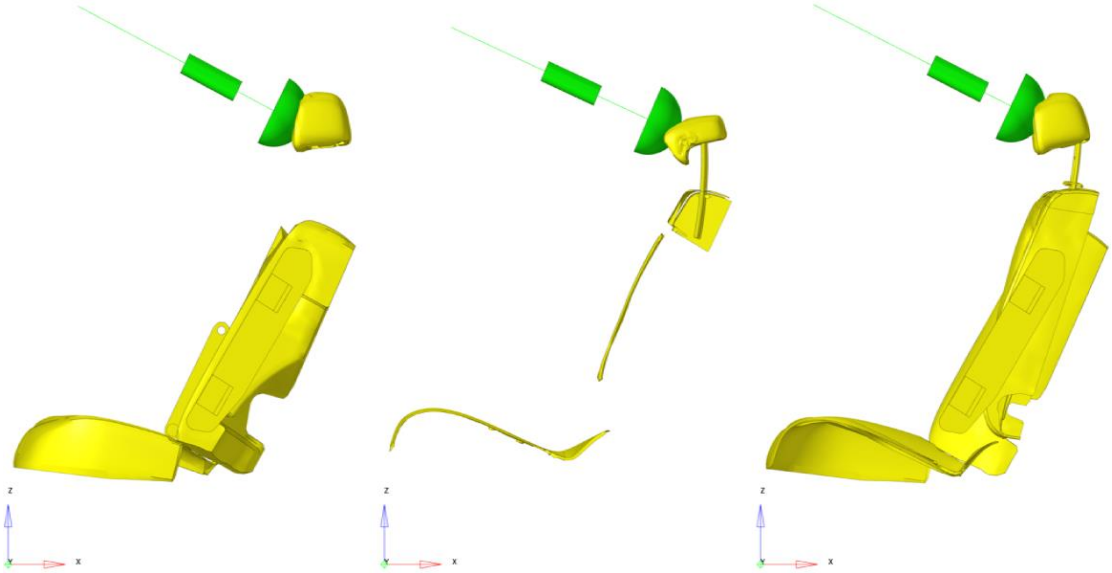


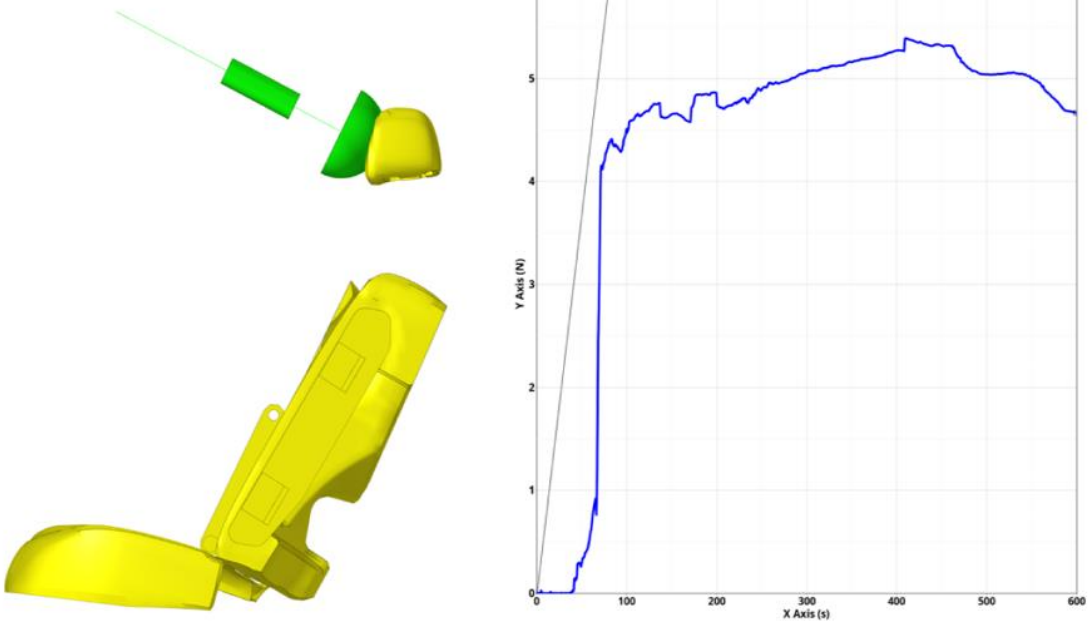
Inputs:

- Selection of Seat and Impactor parts (Components/Assemblies/Elements supported) to be included in the report.
- View set selection. The selected seat components (in step 1 above) will be oriented in the view set selected before capturing the animation.
- Impactor Force Curve Type, Request & Component selection from the time history data.
- FPS or Frames Per Second parameter is required for capturing the animation (avi file)

Note:

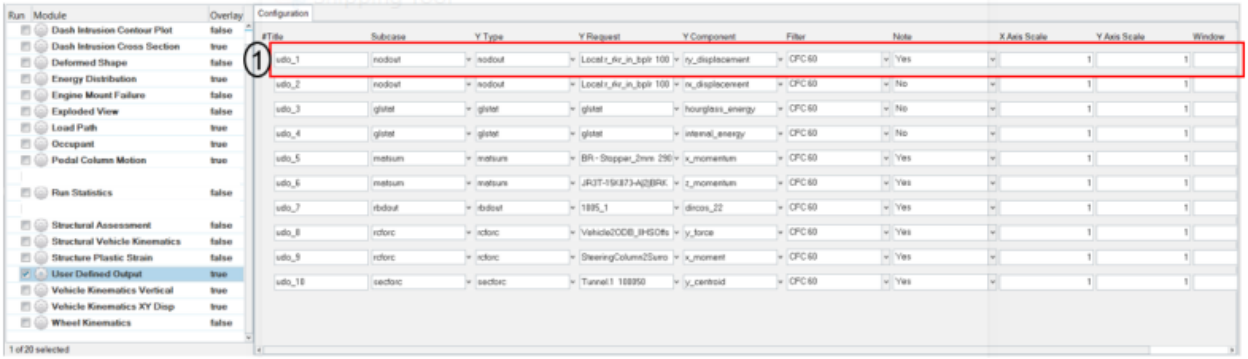
The report includes separate slides for different seat locations (Left / Center / Right). The user should select appropriate seat & impactor parts and the respective TRC inputs for each of the seat locations.




Contact closed at t=0.49977
Y Axis (N)
X Axis (s)
0
1
2
3
4
5
0
100
200
300
400
500
600

User Defined Output

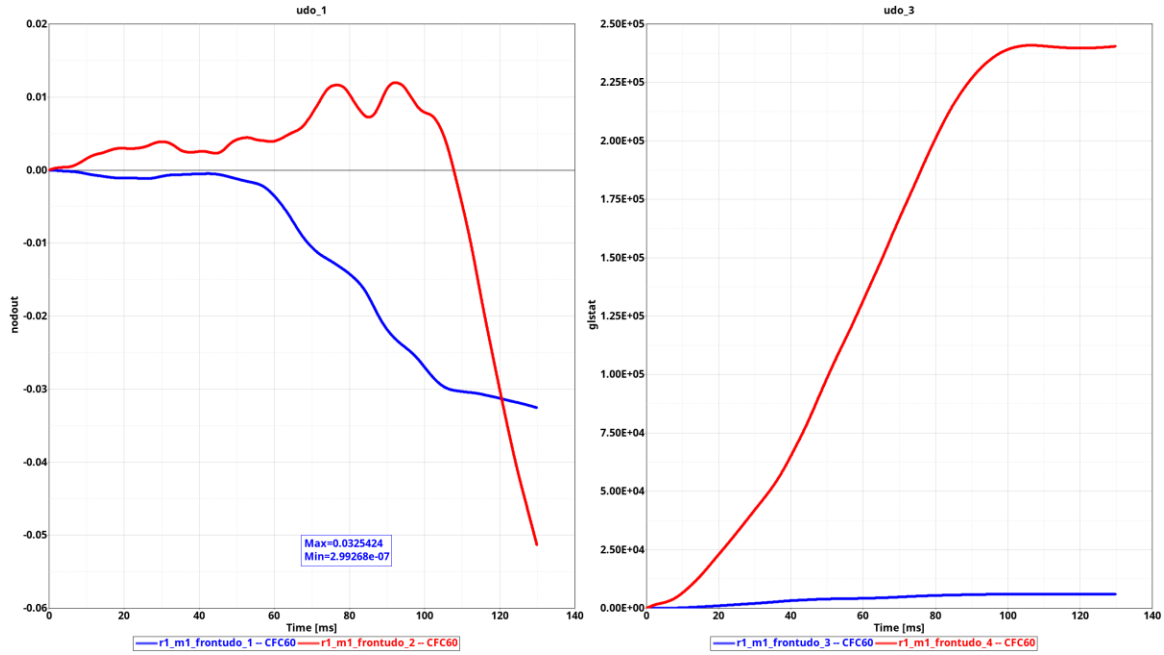
As the name suggests this module allows users to plot program specific Time History data. The plots are created based on user defined list of inputs as shown in the UI below.



Inputs:

For each user defined plot, following set of inputs are required.

- Label to be used as plot header
- Subcase name, Y Type, Y Request & Y Component from the Time History file
- Filter class to be used
- Note with Min & Max value is required to be created
- X & Y axes scale factors if required to be used
- Window number to be used when plotting the curves
- Y axis unit to be used for plotting the Y vector



Weld Failure

This module generates a detailed report of all the welds ruptured based on the user selected weld material. Following weld types are supported.

a. 1D beam spot welds

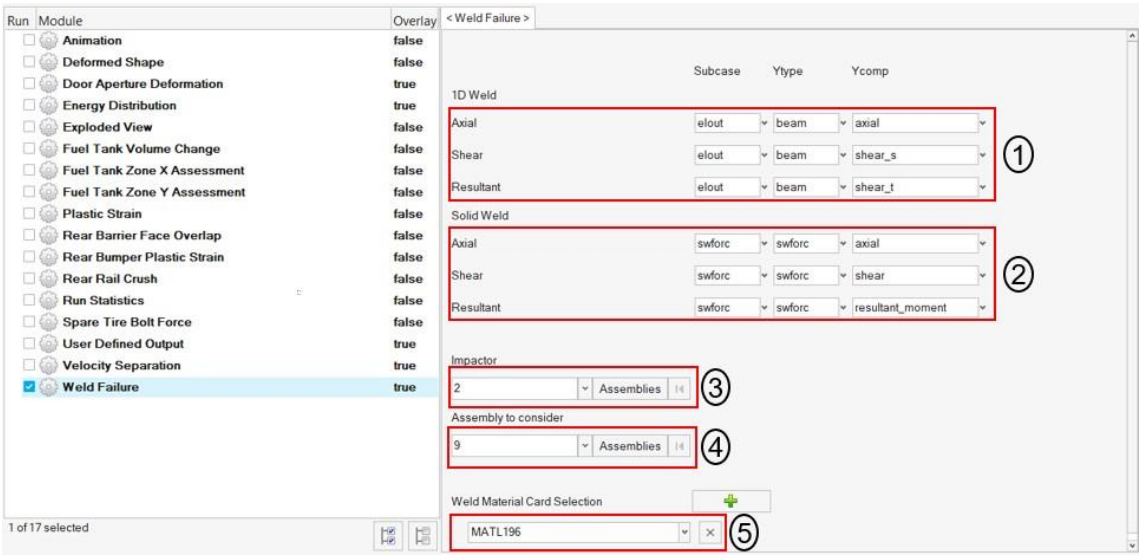
b. Single hexa spot welds

c. Hexa nuggets (cluster of hexa elements)

d. Hexa adhesives

The detailed PPT report generated can be categorized into following different sections.

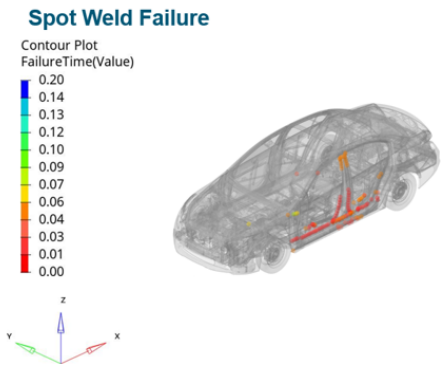
- First two slides give you the global viewpoint. It contains the complete view of the vehicle withall the ruptured welds color coded as per the failure time contour & another slide showing the cumulative graph of the ruptured welds across the simulation time steps.
- The subsequent slides capture the detailed report for each of the ruptured weld for each of theweld type found in the model.
- For 1D beam spot weld & single hexa spot weld types, the report contains an isolated view ofthe weld & its linked components & a graphs showing the axial, shear & resultant plots acrossthe time steps.
- For hexa nuggets & hexa adhesive weld types, the report contains detailed view of the weldcontaining the linked components.

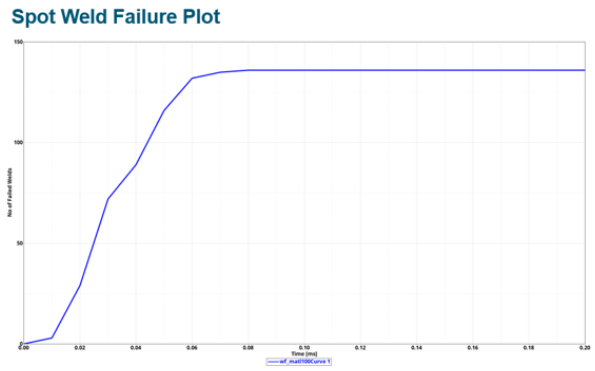


Inputs:

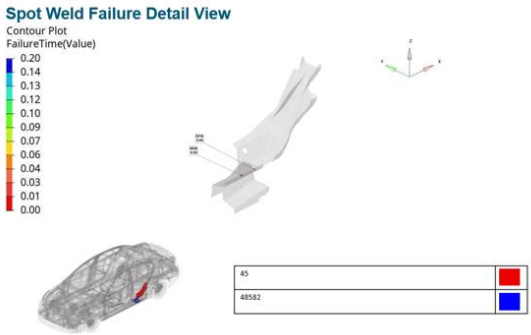
1) The time History info (binout) to be used for 1D beam spot welds axial, shear & resultant graphs
2) The time History info (binout) to be used for single hexa spot welds axial, shear & resultant graphs
3) Impactor assembly / component ID
4) Assembly ID / Component ID list (optional) to be used to find ruptured welds for reportgeneration
5) Weld material ID used to find the ruptured welds

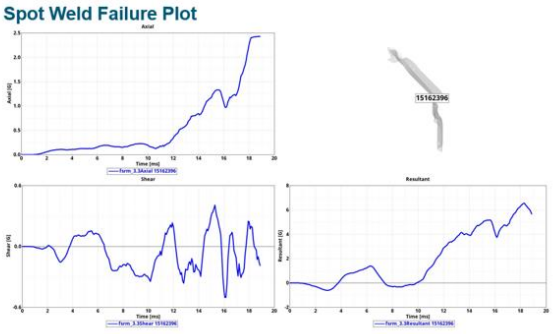
Global viewpoint:



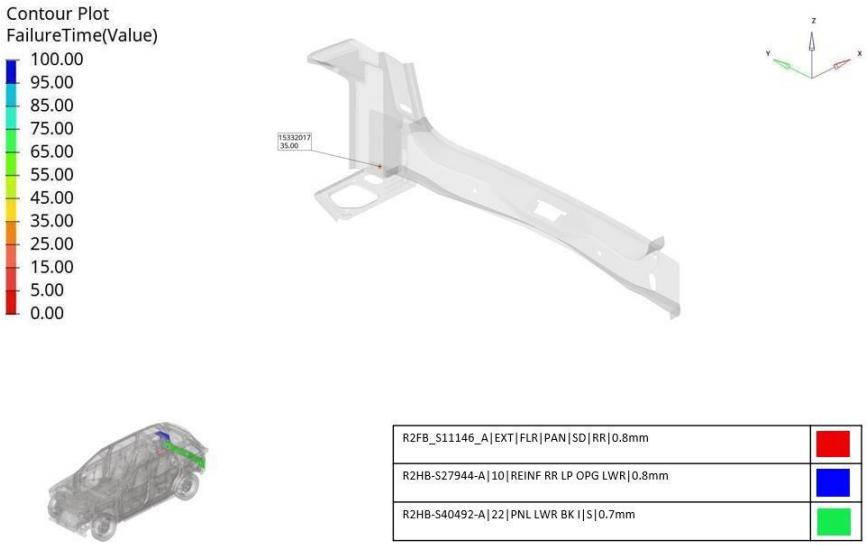


1D beam spot weld / Single hexa spot weld report

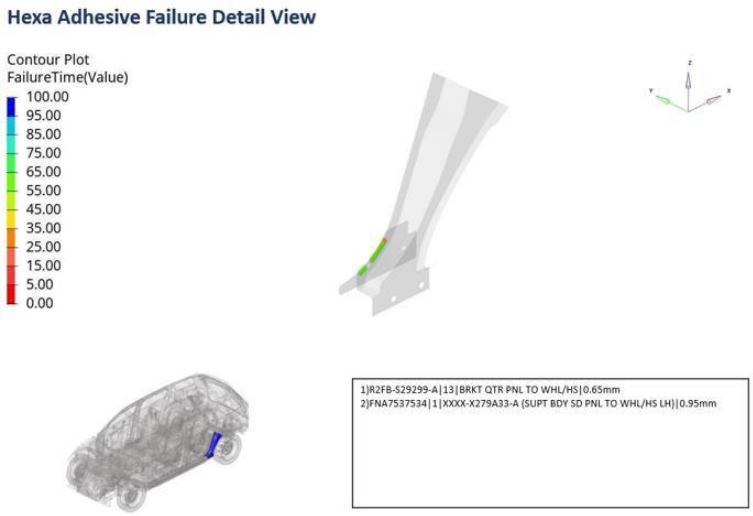




Hexa nuggets report:



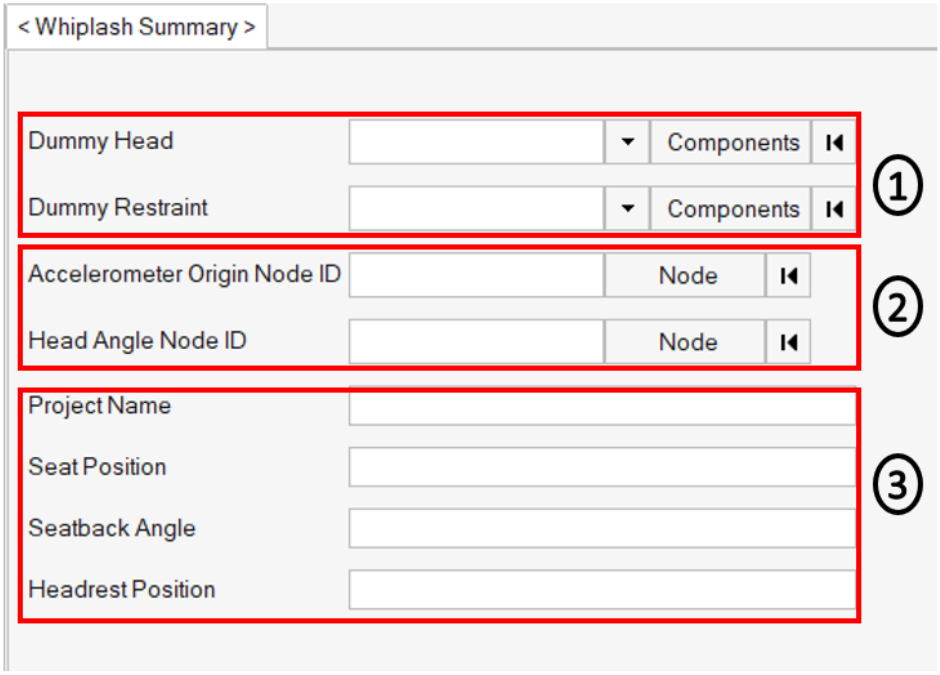
Hexa adhesives report:



Whiplash Summary

This module generates a specific report (as per customer requirement) and includes following information (slides)

1) A Title slide.
2) A result description summary slide that includes info such as author, customer, project, part / component info, test / load case info, result rating etc.
3) A pulse slide capturing the pulse curve, a static image of the seat & dummy positioned on it and a summary table with info such as H-point, head angle, pelvis angle & backset distance.
4) A backset distance slide capturing the cut section of head & head restraint and the backset distance.

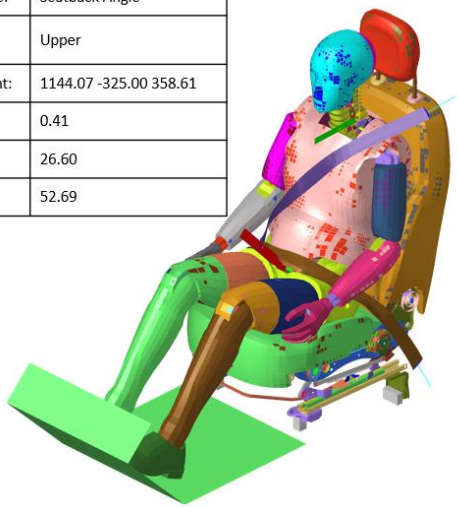


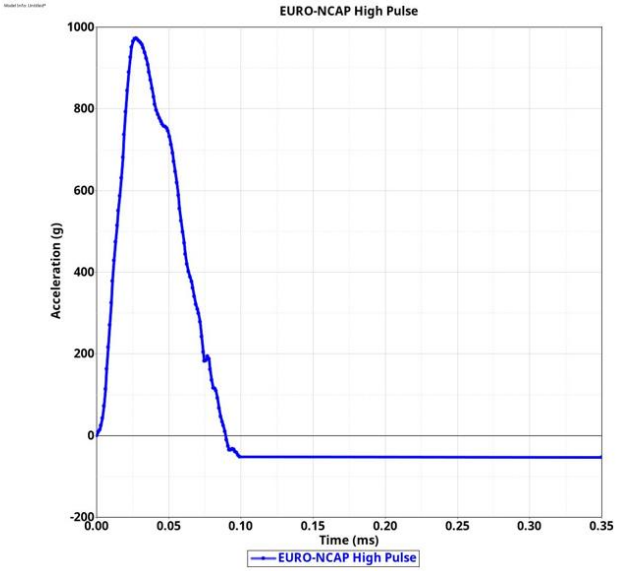
Inputs:

1) Dummy head & head restraint component IDs
2) Accelerometer node ID and Head angle node ID. These 2 nodes will be used to calculate the head angle.
3) User inputs for project name, customer name, seat position etc.

Outputs:

Seat Position:	FWD
Seatback Angle:	Seatback Angle
Headrest Position:	Upper
Dummy H-Point:	1144.07 -325.00 358.61
Head Angle:	0.41
Pelvis Angle:	26.60
Backset:	52.69





Backset Distance

Model Info: Untitled*