Oasys
LS-DYNA Environment

Workflows Manual

PRIMER D3PLOT T/HIS REPORTER

Version 22.1

For help and support from Oasys Ltd please contact:

UK
Tel: +44 121 213 3399
Email: dyna.support@arup.com
China
Tel: +86 21 3118 8875
Email: china.support@arup.com
India
Tel: +91 40 69019723 / 98
Email: india.support@arup.com
USA West
Tel: +1 415 940 0959
Email: us.support@arup.com

Web: www.oasys-software.com/dyna

or contact your local distributor.

Workflows 22.1 PDF HTML

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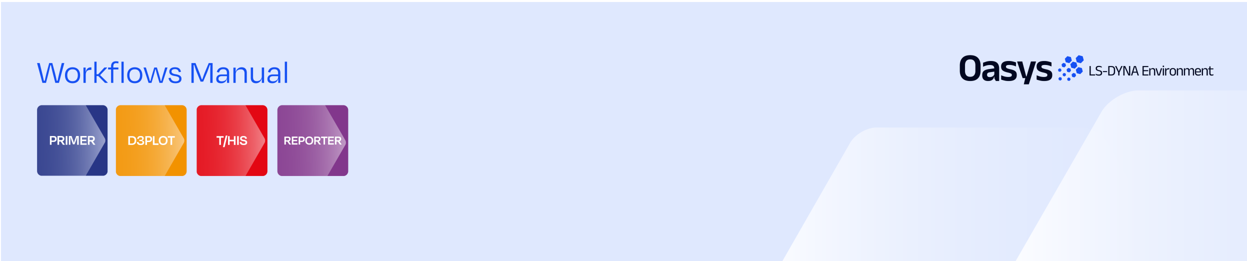
1. Title



Workflows manual

2. Workflows

Workflows 22.1 (released with Oasys Suite 22.1)

Many pre- and post-processors offer a range of tools that can be used to configure and interrogate Ansys LS-DYNA models. However:

1. The basic tools are not always customised for Ansys LS-DYNA, or for specific loadcases
2. You may need to perform many manual steps to process your results, which can be time-consuming and prone to error
3. Scripting APIs can be used to create tools to automate tasks, but this requires time, resource and knowledge, which is not always available

To address these issues, we introduced Workflows. Workflows is a powerful framework that provides you with customised tools that work seamlessly from pre-processing through to post-processing, providing results quickly and reliably.

Workflow Tools

Learn how to use the latest Workflow tools here.

Learn about Workflow User Data.

In addition to the tools provided, you can create your own bespoke tools. Please contact us if you have an idea for a tool and would like some help creating it.

Releases

The Workflows tools are constantly being improved and enhanced. If you have any requests for new features or experience issues using Workflows, please contact us and we will aim to address your requests in future releases. This documentation is for 22.1 (released with Oasys Suite 22.1). A record of all releases is listed below.

Workflows Releases

Date	Release	Description	Documentation	Minimum required version	Download	Changelog

Workflows Releases

	22.1	Many significant updates. Highlights include: • Support for new Automotive Assessments and SimVT for protocols including Euro NCAP 2026 Front, C-NCAP 2024 Front and Side • Added a "Use dv/dt" option to derive accelerations from velocity curves (instead of raw acceleration output) for use in Automotive assessments, SimVT and LS-DYNA to ISO-MME • New SimVT diagnostic tools to help you quickly pinpoint the causes of poor correlation • Head offset curves from C-NCAP test video data can now be imported	Workflow Tools 22.1	22.1		Version 22.1 Changelog

		from CSV in SimVT • The LS-DYNA to ISO-MME tool can now get mass information from the d3hsp/OTF file without the need of the d3thdt file • VTC Videos is now combined into a single Workflow tool for all protocols				
18 June 2025	22.0	Many significant updates. Highlights include: • Chinese language support in C-NCAP REPORTER templates • Easily configure the units, polarity and scale of imported ISO-MME or CSV data • Better handling of time offsets between simulation and test data	Workflow Tools 22.0	22.0	Oasys Suite 22.0 download	Version 22.0 Changelog

		• Support for new Automotive Assessments protocols, including UN ECE and Global NCAP • An upgraded Pulse Index Workflow with better usability • Enhancements to VTC Videos including target video file size • VTC Quality Criteria Workflows with support for draft Euro NCAP Frontal and HBM protocols				
21 Nov 2024	21.1	• Added support for C-NCAP Far Side Occupant Protection Protocol (2024 Edition) • Migrated the IIHS and US NCAP automotive library templates from REPORTER to the	Workflow Tools 21.1	21.1	Oasys Suite 21.1 download	Version 21.1 Changelog

Workflows Releases

		Workflows framework • Several bug fixes				
27 Aug 2024	21.0 W1	21.0 Workflows Update 1 – Comprehensive support for Euro NCAP Virtual Far Side Protocol v1.0	Workflow Tools 21.0 W1	21.0	Oasys 21.0 W1 Workflows Bundle	Version 21.0 W1 Changelog
15 May 2024	21.0	First version containing Virtual Testing tools	Workflow Tools 21.0	21.0	No longer available	Oasys 21.0 Release Notes
08 Nov 2023	20.1	Bug fix release	Workflow Tools 20.1	20.1	No longer available	Oasys 20.1 Release Notes
17 Apr 2023	20.0	First release of Workflows	Workflow Tools 20.0	20.0	No longer available	Oasys 20.0 Release Notes

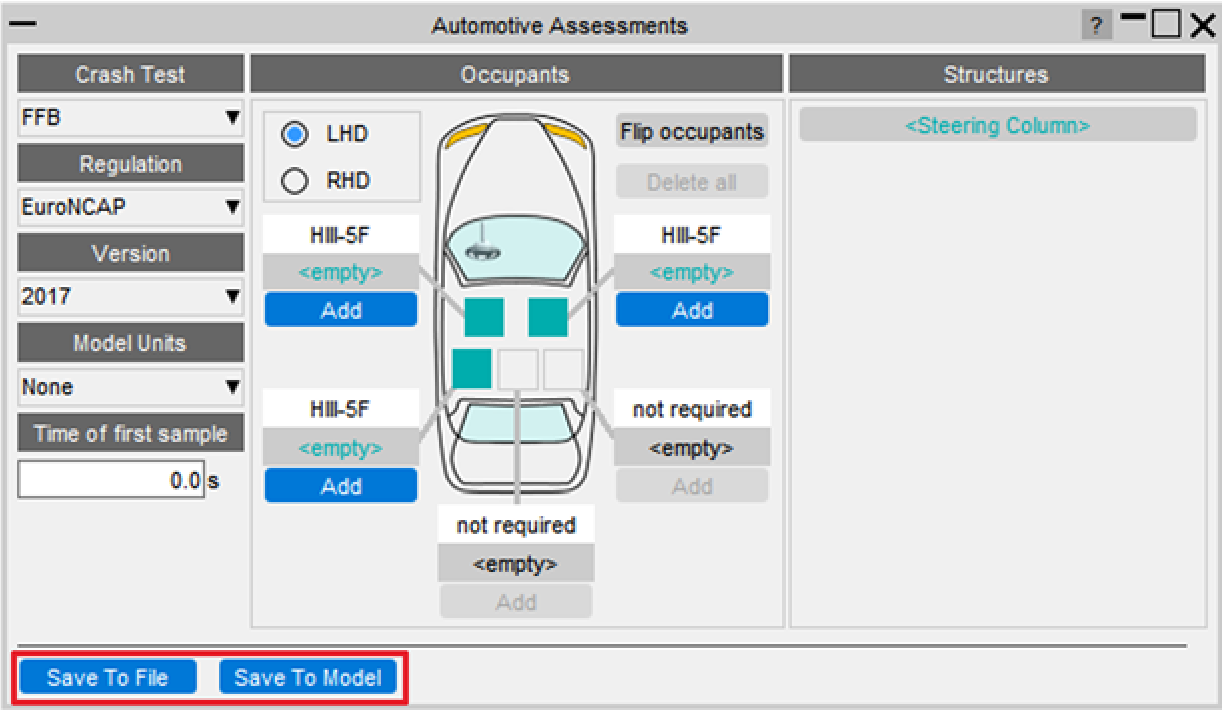
3. Workflow User Data

Saving user data

Workflows enable you to tag your models in PRIMER with user data which can be utilised in D3PLOT, T/HIS, and REPORTER to provide relevant post-processing analysis tools.

The user data can either be saved in a JSON file or as post *END data in the model keyword file.

In PRIMER, each Workflow Tool will have buttons in the main window for saving either to a file or to a model, e.g. for the Automotive Assessments workflow:



User data saved to JSON files

If the data is saved to a JSON file, the file either needs to be saved in the same directory as the model or in a parent directory for it to be found when loading model results in D3PLOT, T/HIS and REPORTER.

The name of the file can be anything you want, although it must have the ***.json*** extension.

Saving JSON files in parent directories means that you only have to setup the user data once and it can be used by multiple models.

For example, in the folder structure below, the ***parent_user_data.json*** file in dir_1 will be used for the results in dir_3 and dir_4 and the ***user_data.json*** file in dir_2 will be used for the model in dir_2:

```
- dir_1
    |- parent_user_data.json
    |
    |- dir_2
    |       |- model1.key
    |       |- d3thdt
    |       |- d3plot
    |       |- user_data.json
    |
    |- dir_3
    |       |- model2.key
    |       |- d3thdt
    |       |- d3plot
    |
    |- dir_4
    |       |- model3.key
    |       |- d3thdt
    |       |- d3plot
```

Maximum number of directories to search up

The maximum number of directories up from a model/results directory that will be searched is set to 4 by default, but it can be changed by setting the preference ***oasys*workflow_max_upward_folder_search_depth***.

For example, in the following folder structure, the ***grandparent_user_data.json*** file is 2 directories up from the model in dir_3 and will be found when reading the results into D3PLOT, T/HIS and REPORTER.

```
- dir_1
    |- grandparent_user_data.json
    |
    |- dir_2
    |       |- dir_3
    |             |- model1.key
    |             |- d3thdt
    |             |- d3plot
```

Search in workflow_user_data directory

The search for user data JSON files will also look in a folder named ***workflow_user_data*** in the model folder and its parent folders.

For example in the below folder structure, the ***parent_user_data.json*** file in dir_1/workflow_user_data will be used for the models in dir_3 and dir_4, and the ***user_data.json*** file in dir_2 will be used for the model in dir_2:

```
- dir_1
    |- workflow_user_data
    |       |- parent_user_data.json
```

```
|
|- dir_2
|      |- model1.key
|      |- user_data.json
|
|- dir_3
|      |- model2.key
|
|- dir_4
|      |- model3.key
```

The name of the directory to search can be changed by setting the preference **oasys*workflow_user_data_directory_name**. This allows you to store your user data files in a helpfully named directory in your Ansys LS-DYNA analysis area.

Writing user data for multiple Workflows

When writing user data for multiple Workflows, you have two options:

1. Write the user data for each Workflow to a separate JSON file:

```
- dir_1
    |- model1.key
    |- d3thdt
    |- d3plot
    |- user_data_workflow_1.json
    |- user_data_workflow_2.json
    |- user_data_workflow_3.json
```

2. Write the user data for each Workflow to a single JSON file:

```
- dir_1
    |- model1.key
    |- d3thdt
    |- d3plot
    |- user_data.json    ← Contains user data for Workflows 1, 2 and 3
```

The option you chose will depend on how you want to organise your files, but in terms of how the data is read in D3PLOT, T/HIS and REPORTER, there is no difference.

To write multiple Workflows, you need to select an existing user data JSON file when saving the file.

- If user data for the workflow already exists in the file it will overwrite that data, but preserve the user data for any other workflows that already exist in the file.
- If user data for the workflow doesn't exist in the file it will append it to the existing user data for any other workflows in the file.

User data saved in keyword files

If the data is saved to a model it is stored as post *END data in the master keyword file, e.g.:

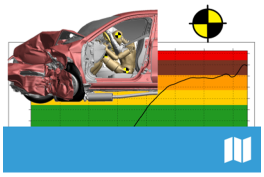
```
$
*END
*PRIMER_USER_DATA
WORKFLOW_START
{"workflows":[{"program":"PRIMER","major_version":21,"minor_version":0,"bu
ild_ +
number":34854,"workflow_definition":{"filename":"$OA_WORKFLOW\\automotive_
asse +
ssments.json"},"data":{"user_data_version":"21.0","regulations":["EuroNCAP
"]," +
crash_test":"FFB","version":"2017","drive_side":"LHD","occupants":[],"stru
ctur +
es":[],"b_pillar":null,"head_excursion":null,"head_intrusion":null},"model
_uni +
t_system":"U2"}]}
WORKFLOW_END
```

When you click **Save To Model** in the Workflow window, it is important to note that this adds the data to the model, but it doesn't automatically write the model to disk. You need to manually use **Model → Write** to save the data to the keyword file.

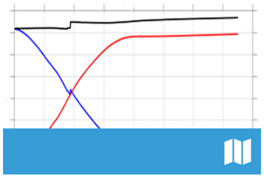
4. Workflow Tools

Workflow Tools

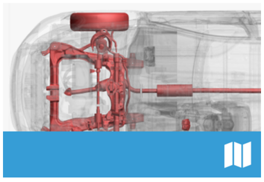
The Workflow Tools currently available are listed below (or use the topics navigator on the left). Please contact us if you have an idea for a tool and would like some help creating it.



Automotive Assessments
Process crash and occupant safety simulations according to legal regulations and consumer safety NCAP protocols

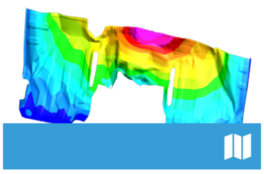


Energy Check
Plot total, kinetic, internal and hourglass energy, and perform various checks to highlight possible issues



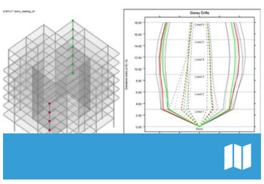
Entities of Interest
Perform actions on predefined groups of parts

Eroded Elements
Visualise deleted elements at different states

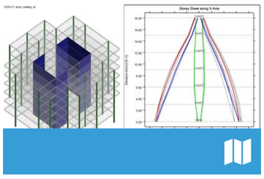


Intrusion Contour Plot
Produce a front intrusion contour plot (e.g. for vehicle cockpit intrusion) for selected parts

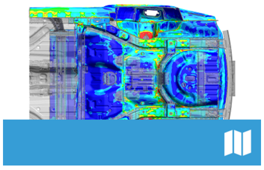
Pulse Index Tool
Perform a vehicle pulse index calculation for a virtual occupant



Storey Drift
Extract storey drift data from a seismic response time history analysis

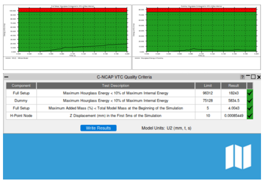


[Storey Force](#)
Extract storey force data from a seismic response time history analysis



[Strength Check](#)
Identify and visualise yielding parts

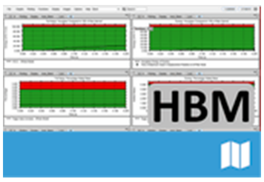
[Virtual Testing](#)



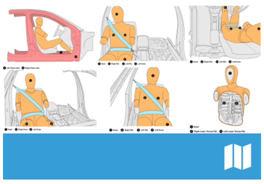
[C-NCAP VTC Quality Criteria](#)
Quality Criteria check according to Section Appendix H1.1(f) of the C-NCAP FAR-SIDE OCCUPANT PROTECTION PROTOCOL

[C-NCAP VTC Videos](#)
Create the videos specified in Section Appendix H2.8 of the C-NCAP FAR-SIDE OCCUPANT PROTECTION PROTOCOL

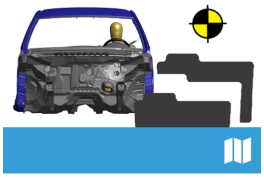
[Euro NCAP VTC Quality Criteria](#)
Quality Criteria check according to Section 6.1 of the Euro NCAP Virtual Far Side Simulation & Assessment Protocol



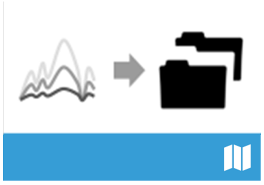
[Euro NCAP HBM Quality Criteria](#)
Quality Criteria check according to Section 7.1 of the Euro NCAP VTC HBM Frontal Protocol



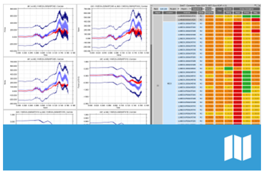
[VTC Videos](#)
Create the videos specified in various EuroNCAP and C-NCAP Protocols



LS-DYNA to ISO-MME
Automatically export ISO-MME channels from Ansys LS-DYNA results



Curve to ISO-MME
Export T/HIS curves in ISO-MME data format without the need of config file



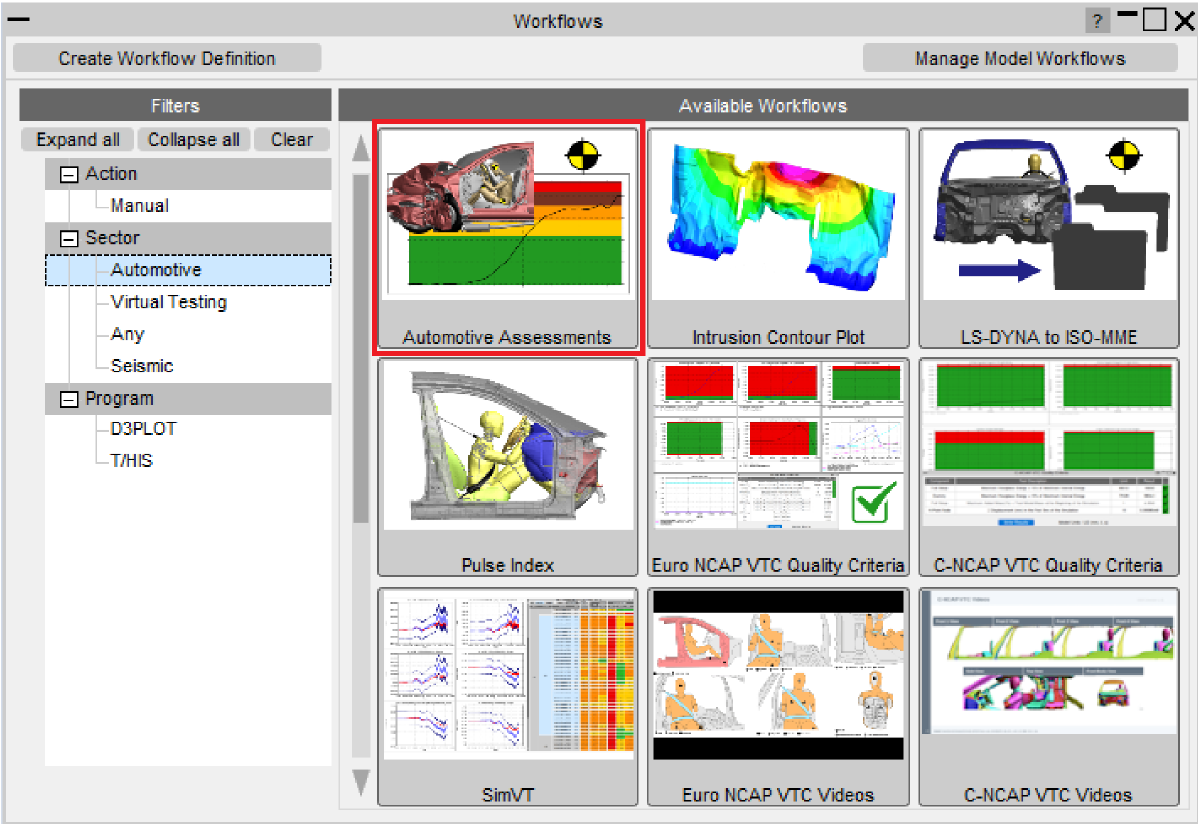
SimVT
Compare simulation versus test curves, or indeed any combination of: Ansys LS-DYNA models, ISO-MME data and CSV data.
Supports the ISO/TS 18571 rating method.

4.1. Automotive Assessments

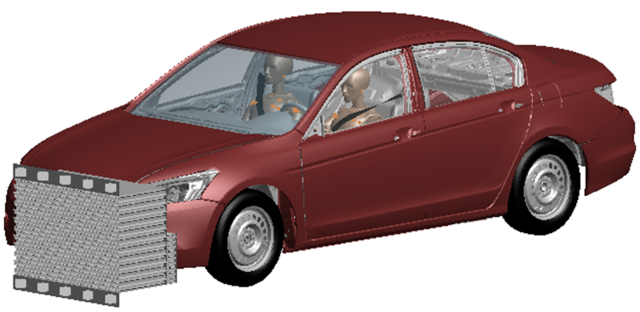
Automotive Assessments

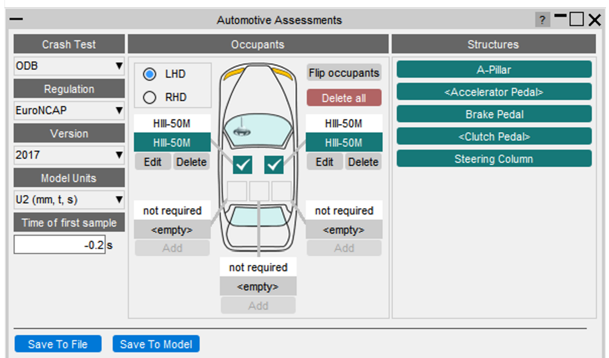
Tools → Workflows → Automotive Assessments

The Automotive Assessments workflow tool is used to post-process analyses according to various crash test regulations.

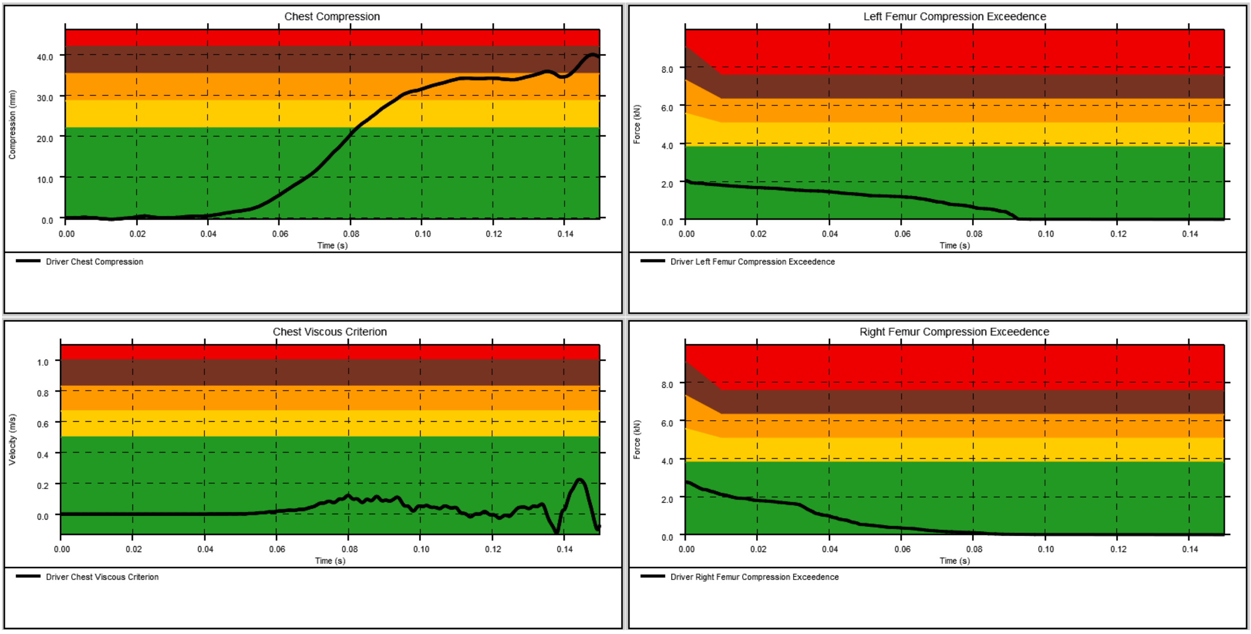


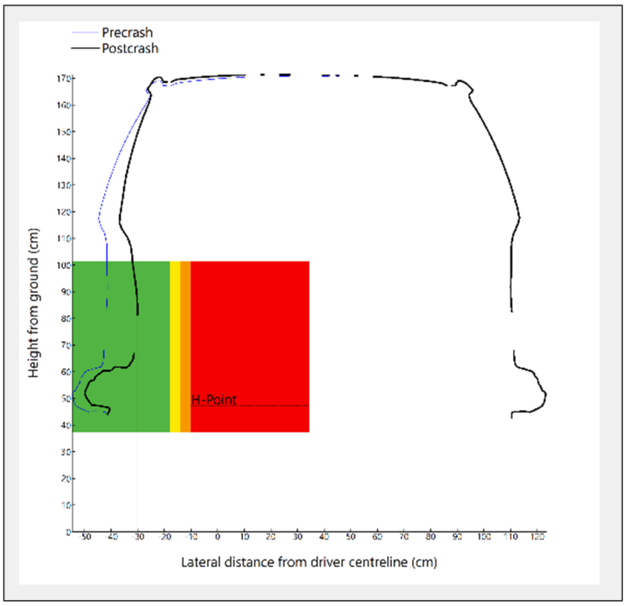
In PRIMER you select the crash test type and the occupants and structures to be assessed.





In D3PLOT, T/HIS and REPORTER this data is used to carry out assessments according to the crash test type and regulation.





4.1.1. Supported Protocols

Supported Protocols

The following table shows the current protocols supported by Automotive Assessments and shows the migration status of REPORTER templates from the standard library to the Workflows framework:

Legend

	Automotive Assessments Workflow
●	Available for some time
●	New in Version 22.1
●	New in Version 22.0

Supported Protocols

Regulation	Year	Loadcase/Workflow	PRIMER	T/HIS	D3PLOT	REPORTER (migrated to workflows)	REPORTER (standard template library)
C-NCAP	2018	ODB	●	●			●
C-NCAP	2021	Head Impact					●
C-NCAP	2021	Leg Impact					●
C-NCAP	2023	MPDB Compatibility					●
C-NCAP	2024	MPDB Occupant	●	●		●	
C-NCAP	2024	Side Pole	●	●		●	
C-NCAP	2024	Far Side Pole	●	●		●	
C-NCAP	2024	Far Side Sled	●	●		●	
C-NCAP	2024	VTC Quality Criteria	●	●		●	
C-NCAP	2024	VTC Videos	●		●	●	
C-NCAP	2024	Ansys LS-DYNA to ISO-MME	●	●		●	

Supported Protocols

C-NCAP	2024	SimVT		●		●	
C-NCAP	2024	FRB	●	●		●	
C-NCAP	2024	Side MDB	●	●		●	
C-NCAP	2024	Far Side CNCAP Format	●	●	●	●	
C-NCAP	2024	O2O CNCAP Format	●	●	●	●	
C-NCAP	2024	O2O VTC Quality Criteria	●		●	●	
C-NCAP	2024	O2O VTC Videos	●	●		●	
C-NCAP	2024	Front AEB OOP CNCAP Format	●	●	●	●	
C-NCAP	2024	Front AEB OOP Quality Criteria	●		●	Part of Official Format	
C-NCAP	2024	Front AEB OOP VTC VIdeos	●	●		Part of Official Format	
Euro NCAP	2017	FFB	●	●		●	
Euro NCAP	2017	ODB	●	●		●	
Euro NCAP	2020	MPDB Occupant	●	●		●	
Euro NCAP	2020	Side Pole	●	●			
Euro NCAP	2020	MDB	●	●	●		
Euro NCAP	2022	Far Side	●	●	●		
Euro NCAP	2022	MDB	●	●	●	●	
Euro NCAP	2022	Side Pole	●	●		●	
Euro NCAP	2023	MPDB Compatibility					●
Euro NCAP	2023	Head Impact					●
Euro NCAP	2023	Leg Impact					●
Euro NCAP	2024	Far Side Sled	●	●		●	
Euro NCAP	2024	MPDB Occupant	●	●		●	

Supported Protocols

Euro NCAP	2024	VTC Quality Criteria	●	●		●	
Euro NCAP	2024	VTC Videos	●		●	●	
Euro NCAP	2024	LS-DYNA to ISO-MME	●	●		●	
Euro NCAP	2024	SimVT		●		●	
Euro NCAP	2026	Front Sled	●	●		●	
Euro NCAP	2026	FWDB Full Vehicle	●	●		●	
Euro NCAP	2026	VTC Quality Criteria	●	●		●	
Euro NCAP	2026	VTC HBM Quality Criteria	●	●		●	
Euro NCAP	2026	SimVT		●		●	
FMVSS	2024	Front 208 FFB	●	●		●	
Global NCAP	2022	MDB	●	●		●	
Global NCAP	2023	ODB	●	●		●	
Global NCAP	2024	Side Pole	●	●		●	
GTR	2019	Leg Impact					●
GTR	2020	Head Impact					●
IIHS	2017	MDB	●	●	●		
IIHS	2017	ODB	●	●			
IIHS	2017	SOB	●	●			
IIHS	2021	MDB	●	●	●	●	
IIHS	2021	MDB Structure Only				●	
IIHS	2021	ODB	●	●		●	
IIHS	2021	ODB Structure Only				●	
IIHS	2021	SOB	●	●		●	
IIHS	2021	SOB Structure Only				●	

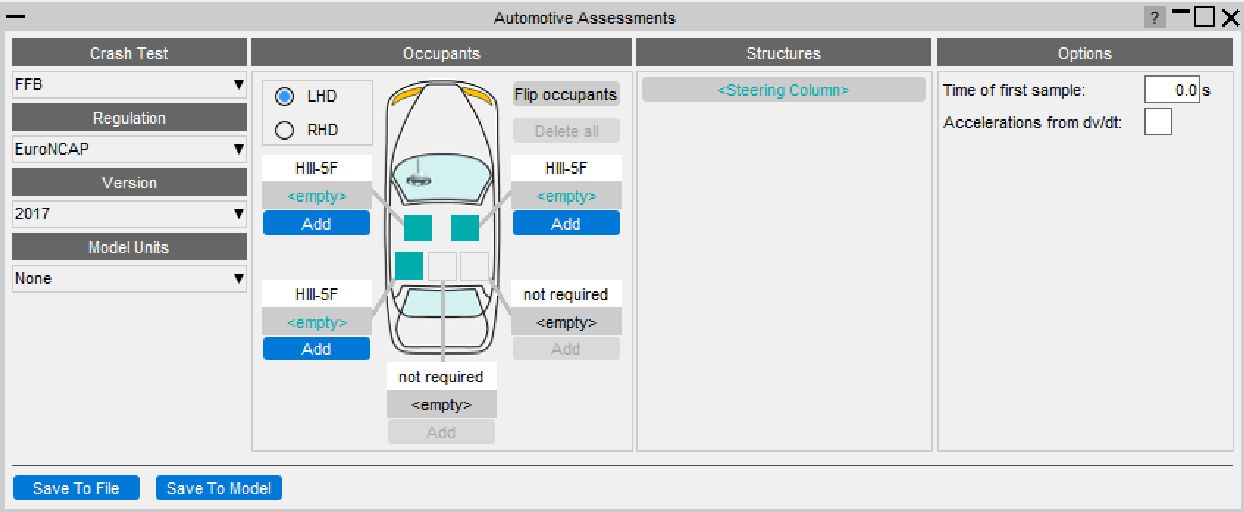
Supported Protocols

IIHS	2024	MDB	●	●		●	
IIHS	2024	MDB Structure Only				●	
IIHS	2024	SOB	●	●		●	
IIHS	2024	SOB Structure Only				●	
JNCAP	2018	Leg Impact					●
JNCAP	2023	FFB	●	●		●	
JNCAP	2023	MDB	●	●		●	
JNCAP	2023	ODB	●	●		●	
KNCAP	2019	Leg Impact					●
KNCAP	2024	FFB	●	●		●	
KNCAP	2024	MDB	●	●		●	
KNCAP	2024	Side Pole	●	●		●	
UNECE	2015	R135 (Side Pole)	●	●		●	
UNECE	2022	R94 (ODB)	●	●		●	
UNECE	2023	R95 (Side MDB)	●	●		●	
UNECE	2023	R137 (FFB)	●	●		●	

We are continuously adding support for new protocols. If you would like support for a particular protocol please contact us.

4.1.2. Automotive Assessments PRIMER

When Automotive Assessments is launched in PRIMER you are presented with this window. This is where you specify the crash test type and the occupants and structures you want to assess:

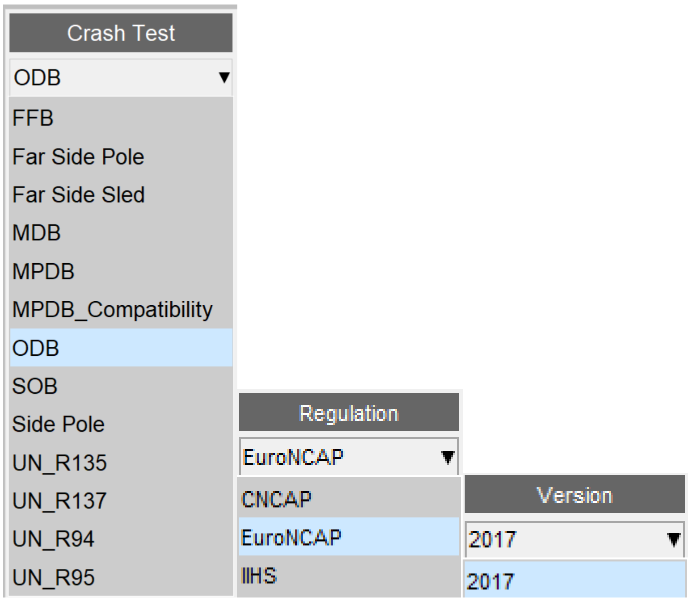


Automotive Assessments steps:

1. Specify the Protocol (Crash Test, Regulation and Version)
2. Specify the Model Units
3. Specify the Vehicle Drive Side and add Occupants
4. Define Structures
5. Configure Options
6. Saving the workflow user data

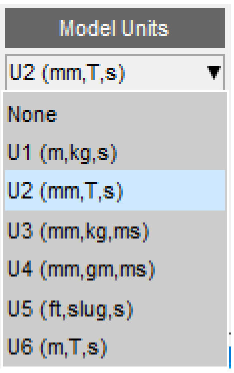
Step 1: Specify the Protocol (Crash Test, Regulation and Version)

Use the dropdown menus to select the protocol **Crash Test**, **Regulation** and **Version** of the occupants and vehicle structures being assessed. Select them top to bottom order in the gui as the regulation dropdown update based on the crash test selection and the protocol version update based on the crash test and regulation selection



Step 2: Specify Model Units

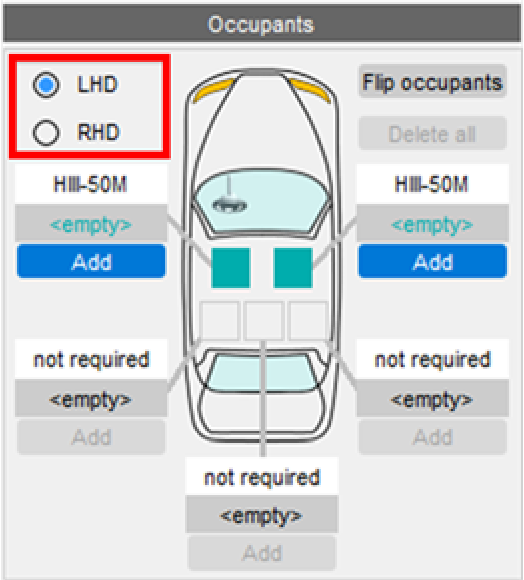
Select the unit system of your model from the **Model Units** dropdown. This will be used to ensure the LS-DYNA results are post-processed with the correct units.



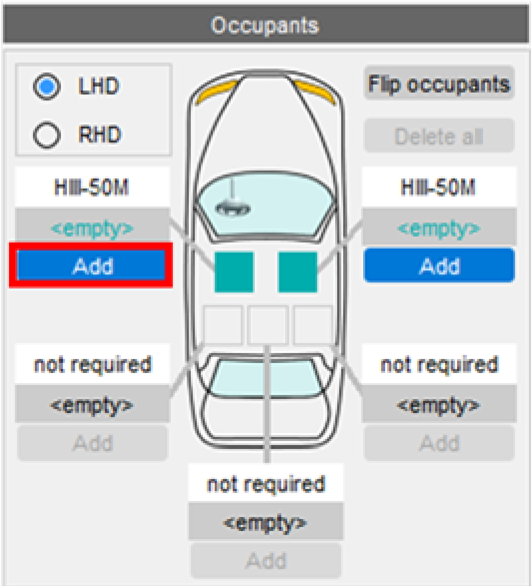
Step 3: Specify the Vehicle Drive Side and add Occupants

The Occupants section is used to select which occupants are in the vehicle, their positions in the vehicle and the IDs of the entities from which data can be read from. This section updates automatically to show the required occupants for the selected crash test type and regulation. In the image below it shows that two HIII-50M occupants are expected in the driver and front passenger positions.

The first thing to do is select whether the vehicle is left hand or right hand drive (LHD or RHD). The vehicle image will update to show the steering wheel on the correct side and the occupant positions will also update:



For each occupant, click **Add**. Note that if your model does not have an occupant (or you don't want to carry out an assessment on it) you can leave it empty. T/HIS and D3PLOT will only attempt to process results for occupants that have been added.

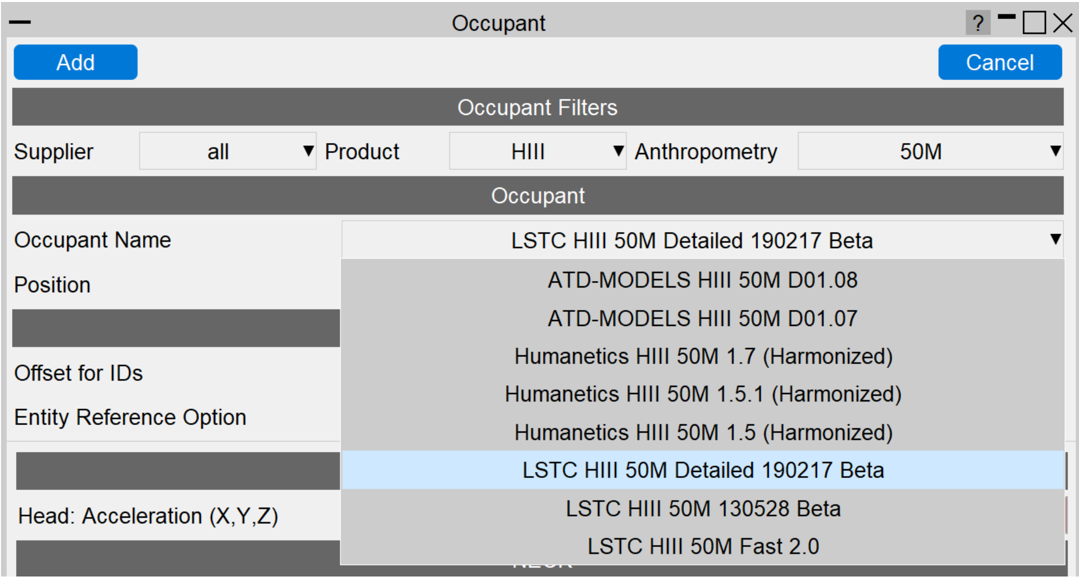


Clicking **Add** opens a window where you can set the occupant type and select the IDs of entities:

The occupant type can be selected from the **Occupant Name** dropdown menu.

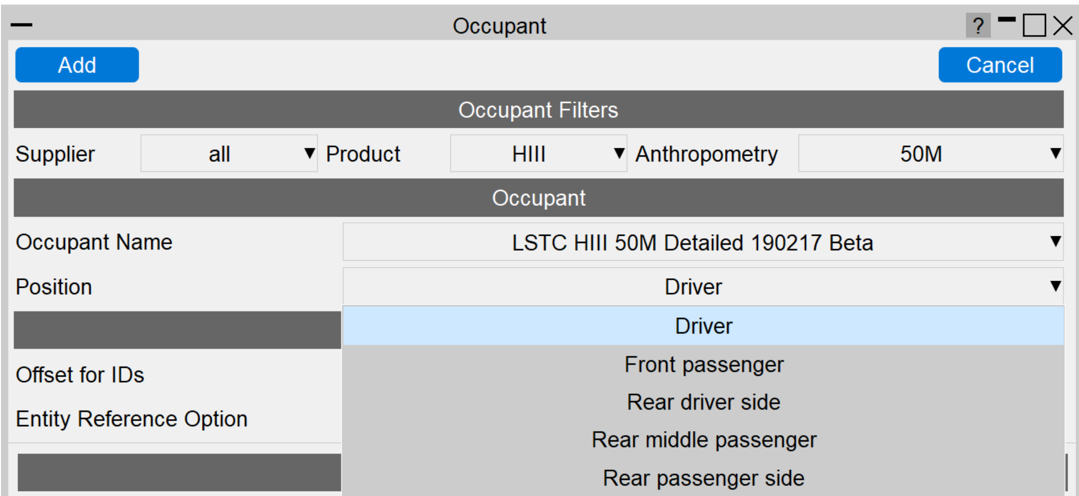
The options shown in this dropdown are filtered by the values in the **Supplier**, **Product** and **Physiology** dropdown menus. When the window is first opened these are automatically set so only occupant types that are relevant for the selected crash test type, regulation and occupant position are shown.

In this example the selected occupant is expected to be a HIII-50M occupant so the Product filter is set to HIII and the Physiology filter is set to 50M



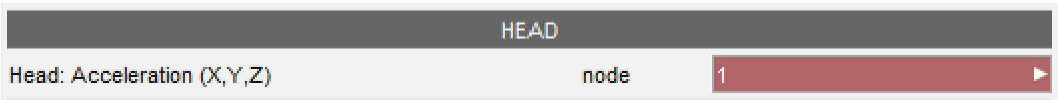
If for some reason you wish to select an occupant of a different type to the one expected, you can change the values of the filters to list other occupant types. A table of the currently supported occupant types can be found [here](). If you would like to request support for a new occupant type please reach out to us via our support channels.

The position of the occupant in the vehicle will be set automatically, but you can change this with the **Position** dropdown menu if required:

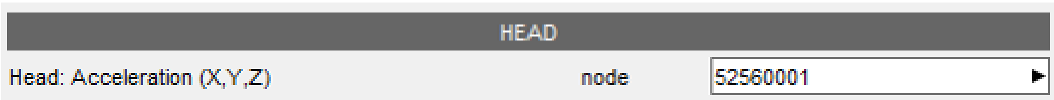


Entity IDs can be specified either by their numerical labels or DATABASE_HISTORY titles (for entities that have them defined) or DATABASE_CROSS_SECTION titles for X-Sections.

The tool knows what the default numerical labels are for each entity in each occupant type and will automatically fill the textboxes in with those values. If they do not exist in the model, for example if the model has been renumbered, the textboxes are coloured red, e.g.

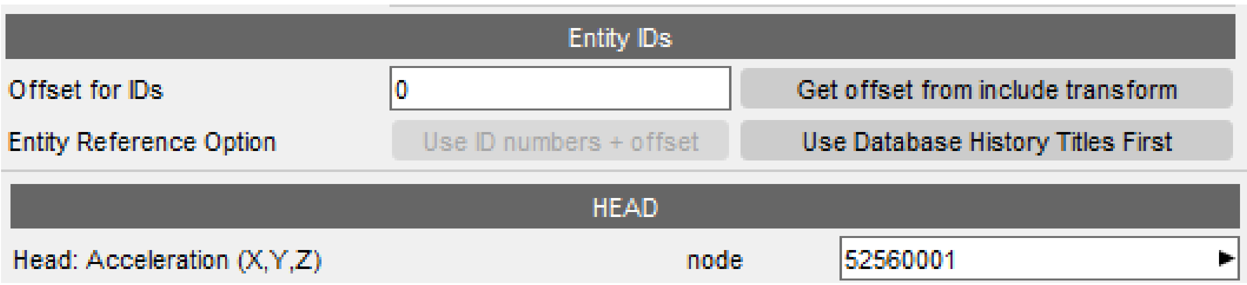


If they do exist the textboxes will change colour to indicate that (the colour will depend on the UI Theme), e.g.

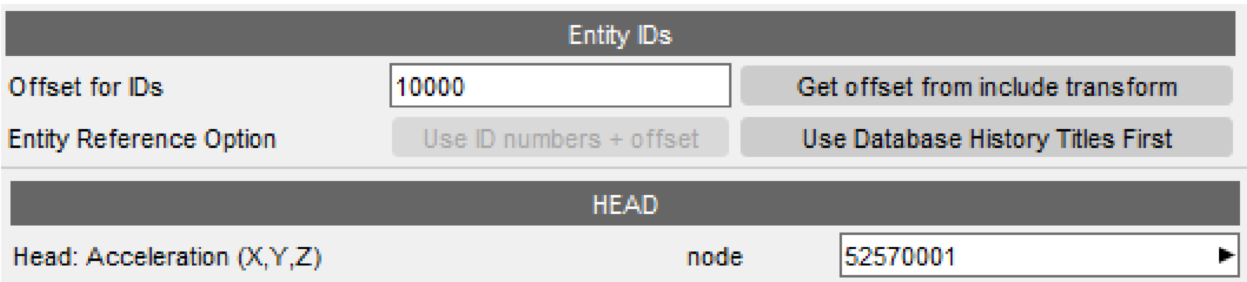


If the occupant has been renumbered so the labels are offset from the default ones, the Offset for IDs option can be used to apply the offset. This is useful when you have two or more occupants of the same type in the model as they both can't have the same entity labels.

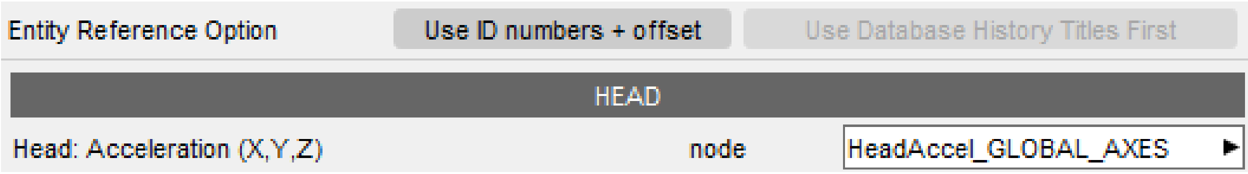
Offset = 0:



Offset = 10000:

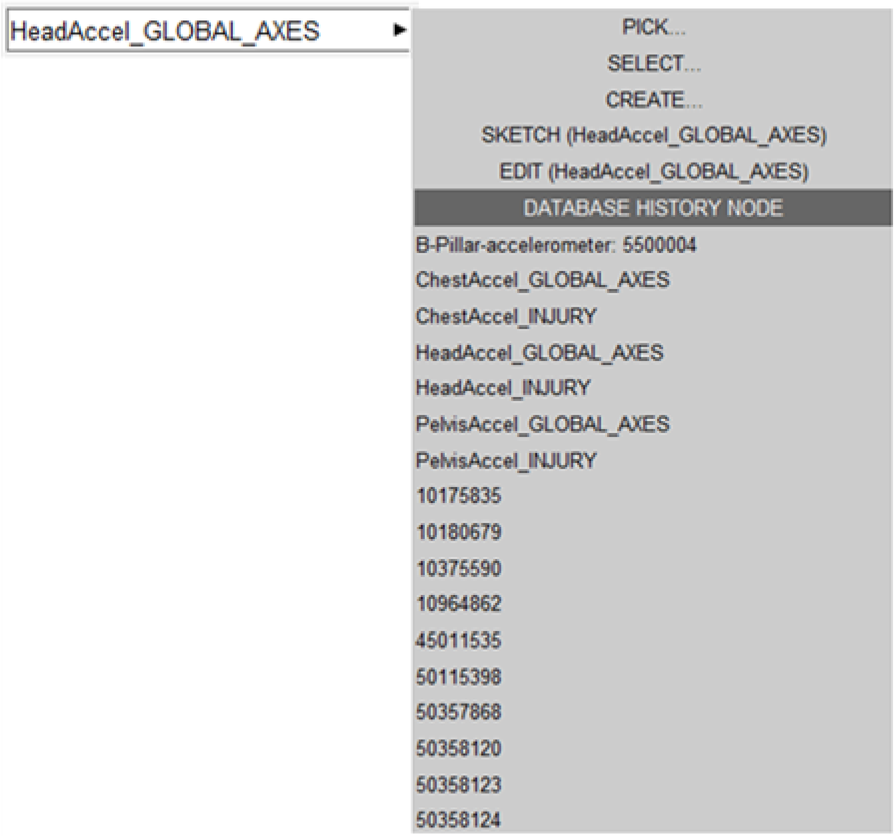


Alternatively, the entity IDs can be specified using DATABASE_HISTORY and DATABASE_CROSS_SECTION titles instead of their numerical labels. To automatically switch to use titles where they exist you can click on the Use Database History Titles button:

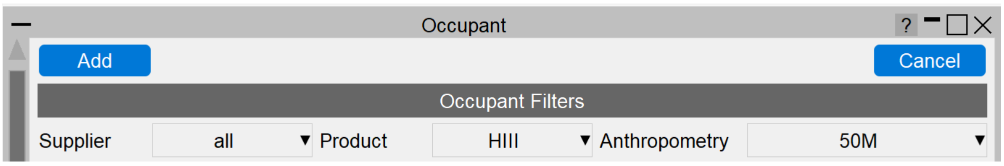


Note that a mix of defining some entities using numerical labels and others with titles is perfectly valid, they don't all have to be defined the same way.

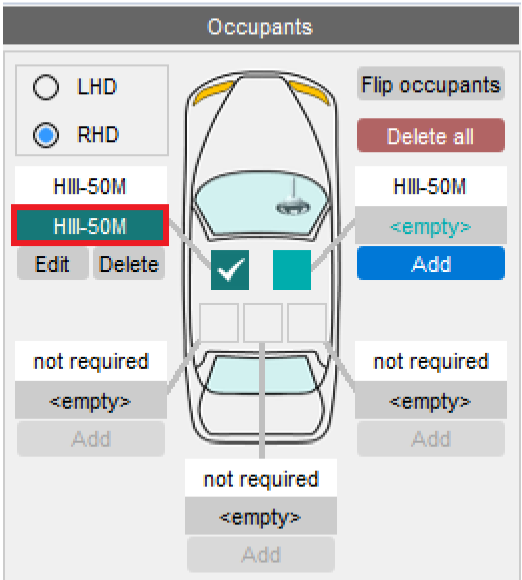
You can manually select entities by right clicking on a textbox. This opens a popup window which allows you to **Pick** or **Select** the entity interactively on the screen or select it from a list of DATABASE_HISTORY / DATABASE_CROSS_SECTION entities (ones with titles are listed first and ones without at the bottom).



Once the entities have been defined you can press **Add** at the top of the window to add the occupant definition.



This will close the window and the Occupants section will update to show that an occupant has been defined in the selected position. If all the entity IDs are defined and valid the occupant will be shown like this:



If there are any undefined or invalid entity IDs it will look like this, i.e. enclosed in angular brackets "< >":

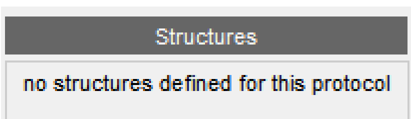
If the occupant is a different type to the one expected it will look like this:

T/HIS and D3PLOT will cope with any undefined or invalid, but obviously won't be able to carry out any assessments that require them.

If you want to edit or delete the occupant, you can click on the **Edit** or **Delete** buttons.

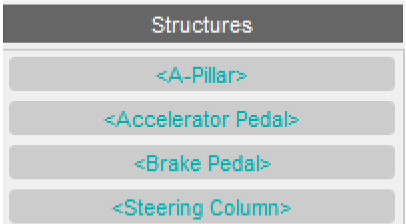
Step 4: Define Structures

Structures are additional entities (typically on the vehicle structure) which are required to conduct the full protocol assessment. Some protocols do not have any required structures:



Where structures are applicable for the selected protocol, they will appear in the Structures column on the main Automotive Assessments GUI.

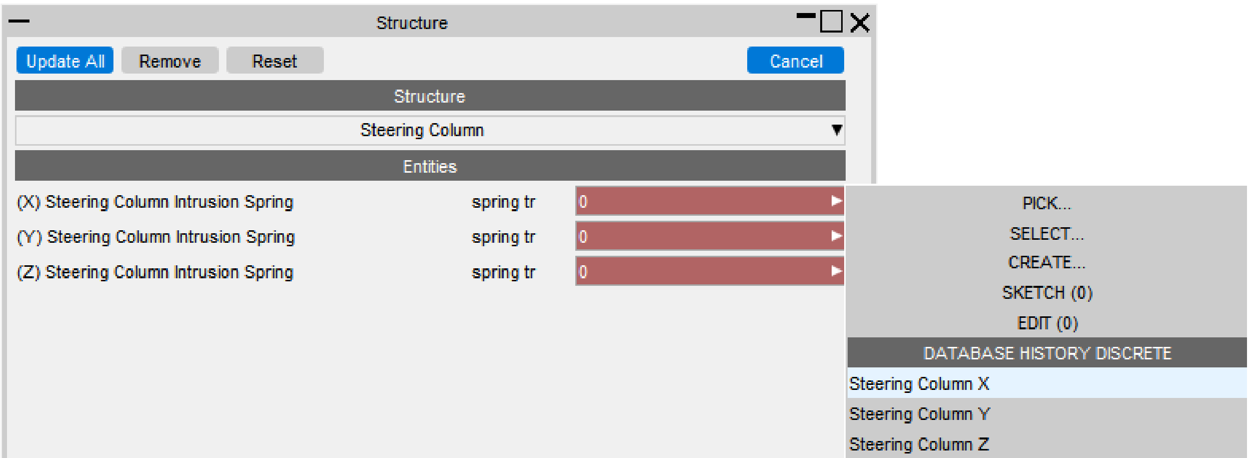
In the image below it shows that an A-Pillar, Accelerator Pedal, Brake Pedal and Steering Column structures are to be assessed.



To define a structure, simply click on it to open the structure window to see the entities which need to be defined for that structure (shown for the "Steering Column" structure below).

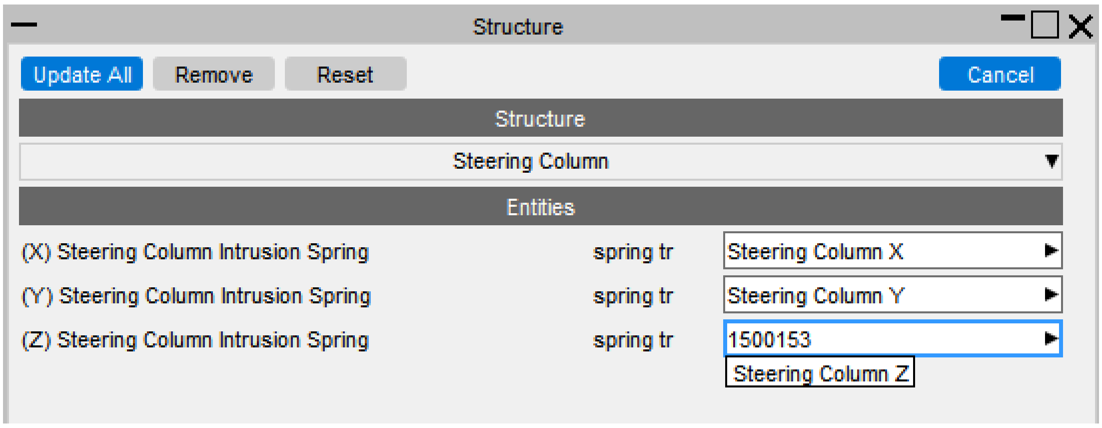
You can then enter the ID or history title for the entities or alternatively right click to open the popup to allow you to pick/select/create the entity. This works in the same way as the occupants window where IDs can be specified either by their numerical labels or DATABASE_HISTORY titles (for entities that have them defined).

For convenience, a list of the existing entities (e.g. *DATABASE_HISTORY_[NODE|BEAM|DISCRETE], *DATABASE_CROSS_SECTION etc.) are listed in the popup which is especially useful you have given the entities have meaningful titles.

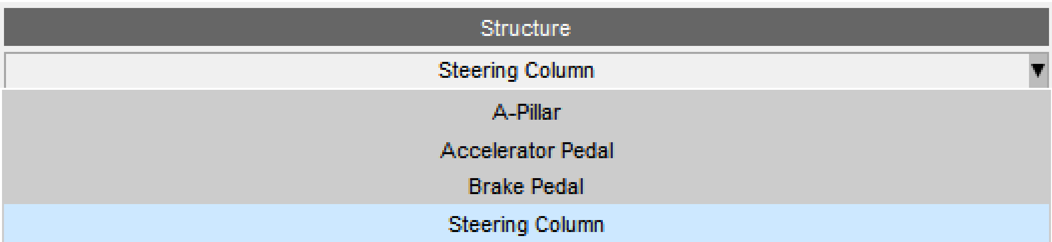


If the specified entity do not exist in the model, the corresponding textbox is coloured red. If they do exist they change colour (the colour will depend on the UI Theme: white for the light theme as shown in the image below).

Note how in the image below a mixture of history titles and numeric ids have been used to demonstrate both options. If the ID has a corresponding history title then it will also appear in the hover text.

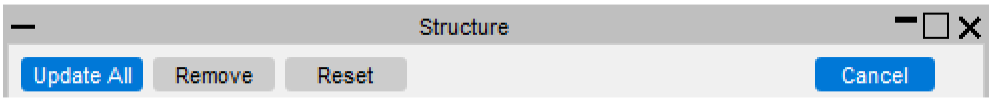


You can use the structure drop-down to select the next structure you would like to define.



Note that if your model does not have a structure (or you don't want to carry out an assessment on it) you can leave it empty. T/HIS and D3PLOT will only attempt to process results for structures that have been added.

Once you have selected all the entity IDs click on **Update All** to save them and close the window.

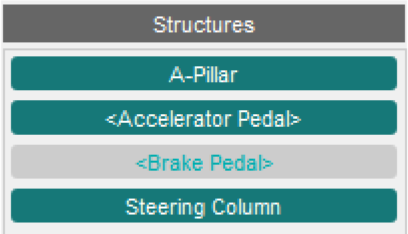


The Remove button sets all the entity IDs of the current structure to 0, effectively removing it from the assessment.

The Reset button sets the entity IDs back to what they were before any edits were made.

The Cancel button closes the window, without saving the selected entity IDs.

After you have selected entity IDs the structures section will update with different colours to show what is defined and what is not, e.g



Structures that are coloured like this mean they have all the required entity IDs defined and the exist in the model:

Structures that are coloured like this and enclosed in < >'s mean some of the required entity IDs are defined and exist in the model, but there are others that are either undefined or don't exist in the model:

Structures coloured like this and enclosed in < >'s mean none of the required entity IDs are defined or exist in the model:

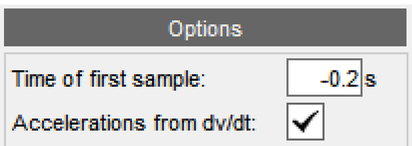
Non-standard Structures:

There are some structures which require additional inputs (i.e. not just entities). One such structure is the "Head Excursion" structure

Note that some structures may relate the particular occupants sat in the vehicle e.g. the Head Excursion structure must be defined to enable the post processing of the driver occupant head excursion relative to the vehicle.

Step 5: Configure Options

The options column allows you to configure options of how the LS-DYNA data will be post-processed. Some options have general applicability and some are specific to particular protocols.



Time of first sample

To accommodate the pre-crash (settling) phase in a simulation, a “Time of first sample” input is present. In accordance with ISO-MME convention, a **negative** time value is used to shift the start time of the output curves when post-processing using the Automotive Assessments, SimVT and LS-DYNA to ISO-MME workflows in T/HIS.

For example, if your analysis begins with 200 milliseconds of set-up (e.g. seat squash etc.) before the crash test load case commences then you would enter -0.2 in the “Time of first sample” input to shift the curves so that the crash test will effectively start at t=0.

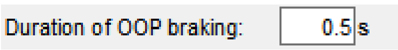
Accelerations from dv/dt

If ticked then accelerations will be derived from differentiated velocities when post processing in T/HIS

Duration of OOP braking

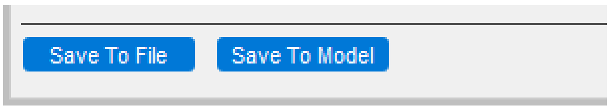
This option is specific to the *CNCAP Front AEB OOP 2024* protocol.

Enter a positive value to define the out of position (OOP) braking phase (e.g. 0.5 for a 500 ms braking phase). When post-processing with Automotive Assessments, the curve will be split in to two curves: one ends at "Time of OOP braking" and the other starts at "Time of OOP braking".



Step 6: Saving workflow user data

You can choose to save the data to a .JSON file or directly to the model. The user data from the file will then be picked up when the workflow is selected in T/HIS or D3PLOT. Note if you choose to save the data to the model then you will need to save the model in PRIMER to ensure that the data is written to the master keyword file.



Supported Dummies

The following table lists all the occupants supported in the Automotive Assessment Workflows, along with the corresponding supplier documentation filename that was referenced in creating the respective occupant JSON files.

Supplier	Product	Anthropometry	Version	JSON	Manual
DYNAmore-PDB	WSID	50M	v4.0 LHS ribs	DYNAmore-PDB WSID 50M v4.0 LHS ribs	wsid50_pdb_v4.0_manual_v0.0.pdf
DYNAmore-PDB	WSID	50M	v4.0 RHS ribs	DYNAmore-PDB WSID 50M v4.0 RHS ribs	wsid50_pdb_v4.0_manual_v0.0.pdf
DYNAmore-PDB	WSID	50M	v6.0 LHS ribs	DYNAmore-PDB WSID 50M v6.0 LHS ribs	wsid50_pdb_v6.0_manual_v0.0.pdf
DYNAmore-PDB	WSID	50M	v6.0 RHS ribs	DYNAmore-PDB WSID 50M v6.0 RHS ribs	wsid50_pdb_v6.0_manual_v0.0.pdf
DYNAmore-PDB	WSID	50M	v7.6 LHS ribs	DYNAmore-PDB WSID 50M v7.6 LHS ribs	wsid50_pdb_v7.6.1_manual_v0.pdf
DYNAmore-PDB	WSID	50M	v7.6 RHS ribs	DYNAmore-PDB WSID 50M v7.6 RHS ribs	wsid50_pdb_v7.6.1_manual_v0.pdf
DYNAmore-PDB	WSID	50M	v8.0 LHS ribs	DYNAmore-PDB WSID 50M v8.0 LHS ribs	wsid50_pdb_v8.0_manual.pdf
DYNAmo	WSID	50M	v8.0 RHS ribs	DYNAmore-PDB WSID	wsid50_pdb_v8.0_manual.pdf

Supplier	Product	Anthropometry	Version	JSON	Manual
re-PDB				50M v8.0 RHS ribs	
DYNAmore-PDB	WSID	50M	v8.1 LHS ribs	DYNAmore-PDB WSID 50M v8.1 LHS ribs	wsid50_pdb_v8.1_manual.pdf
DYNAmore-PDB	WSID	50M	v8.1 RHS ribs	DYNAmore-PDB WSID 50M v8.1 RHS ribs	wsid50_pdb_v8.1_manual.pdf
DYNAmore-PDB	WSID	50M	v9.0 LHS ribs	DYNAmore-PDB WSID 50M v9.0 LHS ribs	wsid50_pdb_v9.0_manual.pdf
DYNAmore-PDB	WSID	50M	v9.0 RHS ribs	DYNAmore-PDB WSID 50M v9.0 RHS ribs	wsid50_pdb_v9.0_manual.pdf
DYNAmore	ES-2re	50M	v6.0	DYNAMORE ES-2re 50M v6.0	es2_v_6.0_users_manual_v0.0.pdf
LSTC	SID2-SBLD	5F	v.0.150.beta	LSTC SID2-SBLD 5F v.0.150.beta	Documentation_for_LSTC_SID-IIs-D_Version_0.150.beta.pdf
LSTC	HIII	50M	Detailed 190217 Beta	LSTC HIII 50M Detailed 190217 Beta	LSTC.H3_50TH.130528_BETA.pdf

Supplier	Product	Anthropometry	Version	JSON	Manual
LSTC	HIII	50M	Fast 2.0	LSTC HIII 50M Fast 2.0	LSTC.H3_50TH_FAST.111130_V2.0_Documentation.pdf
LSTC	HIII	5F	Fast 2.0	LSTC HIII 5F Fast 2.0	LSTC.H3_5TH_FAST.111130_V2.0_Documentation.pdf
LSTC	HIII	5F	v2.0	LSTC HIII 5F v2.0	LSTC.H3_05TH_DETAILED.160920_V2.0.pdf
LSTC	HIII	5F	v2.1	LSTC HIII 5F v2.1	LSTC.H3_05TH_DETAILED.160920_V2.0.pdf
LSTC	HIII	95M	DETAILED Scaled 151214 V3.03_beta	LSTC HIII 95TH_DETAILED Scaled 151214 V3.03_BETA	LSTC.NCAC_H3_50TH.130528_BETA.pdf
LSTC	HIII	95M	scaled	LSTC HIII 95M scaled	LSTC.H3_50TH_FAST.111130_V2.0_Documentation.pdf
Humanetics	SID2-SBLD	5F	v.4.3.1	Humanetics SID IIs SBLD 5F v.4.3.1	Humanetics_SID2s_SBLD_V4.3.1_LS-DYNA_UserManual_TechnicalReport.pdf
Humanetics	SID2-SBLD	5F	v.4.3.1 RHS	Humanetics SID IIs SBLD 5F v.4.3.1 RHS	Humanetics_SID2s_SBLD_V4.3.1_LS-DYNA_UserManual_TechnicalReport.pdf
Humanetics	SID2-SBLD	5F	v.4.3.2	Humanetics SID IIs SBLD 5F v.4.3.2	Humanetics_SID2s_SBLD_V4.3.2_LS-DYNA_UserManual_TechnicalReport.pdf

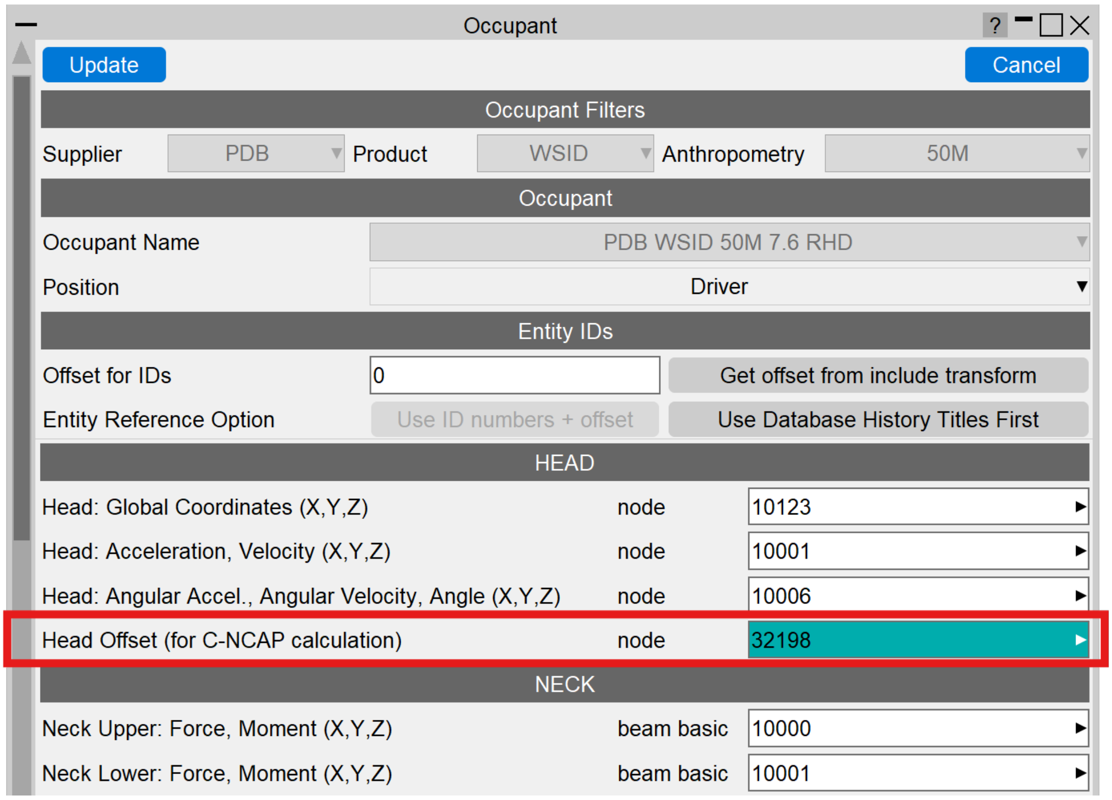
Supplier	Product	Anthropometry	Version	JSON	Manual
Humanetics	SID2-SBLD	5F	v.4.3.2 RHS	Humanetics SID IIs SBLD 5F v.4.3.2 RHS	Humanetics_SID2s_SBLD_V4.3.2_LS-DYNA_UserManual_TechnicalReport.pdf
Humanetics	SID2-SBLD	5F	v.4.3.5	Humanetics SID IIs SBLD 5F v.4.3.5	Humanetics_SID2s_SBLD_V4.3.5_LS-DYNA_UserManual_TechnicalReport.pdf
Humanetics	SID2-SBLD	5F	v.4.3.5 RHS	Humanetics SID IIs SBLD 5F v.4.3.5 RHS	Humanetics_SID2s_SBLD_V4.3.5_LS-DYNA_UserManual_TechnicalReport.pdf
Humanetics	THOR	50M	v1.9	Humanetics THOR 50M v1.9	HUMANETICS_THOR_50M_USNCAP_V1.9_LS_DYNA_TECHNICAL_REPORT_USERS_MANUAL.pdf
Humanetics	THOR	50M	v1.8	Humanetics THOR 50M v1.8	HUMANETICS_THOR_50M_EuroNCAP_V1.8_LS_DYNA_TECHNICAL_REPORT_USERS_MANUAL.pdf
Humanetics	THOR	50M	v1.9.2 US-NCAP	Humanetics THOR 50M v1.9.2 US-NCAP	HUMANETICS_THOR_50M_USNCAP_V1.9.2_LS_DYNA_TECHNICAL_REPORT_USERS_MANUAL.pdf
Humanetics	THOR3	50M	v1.9.2 C-NCAP	Humanetics THOR 50M v1.9.2 C-NCAP	HUMANETICS_THOR_50M_Euro_NCAP_V1.9.2_LS_DYNA_TECHNICAL_REPORT_USERS_MANUAL.pdf

Supplier	Product	Anthropometry	Version	JSON	Manual
Humanetics	THOR3	50M	v1.9.2 Euro-NCAP	Humanetics THOR 50M v1.9.2 Euro-NCAP	HUMANETICS_THOR_50M_Euro_NCAP_V1.9.2_LS_DYNA_TECHNICAL_REPORT_USERS_MANUAL.pdf
Humanetics	HIII	50M	v.1.5 (Harmonized)	HUMANETICS HIII 50M v.1.5 (Harmonized)	HUMANETICS_HIII_50M_V1.5.1_HARMONIZED_LS_DYNA_TECHNICAL_REPORT_USER_MANUAL.pdf
Humanetics	HIII	50M	v.1.5.1 (Harmonized)	HUMANETICS HIII 50M v.1.5.1 (Harmonized)	HUMANETICS_HIII_50M_V1.5.1_HARMONIZED_LS_DYNA_TECHNICAL_REPORT_USER_MANUAL.pdf
Humanetics	HIII	50M	v1.7 (Harmonized)	HUMANETICS HIII 50M v1.7 (Harmonized)	HUMANETICS_HIII_50M_V1.7_HARMONIZED_LS_DYNA_TECHNICAL_REPORT_USER_MANUAL.pdf
Humanetics	HIII	5F	v.2.02	HUMANETICS HIII 5F v.2.02	HUMANETICS_HIII_5F_V2.0_HARMONIZED_LS_DYNA_TECHNICAL_REPORT_USER_MANUAL.pdf
ATD - MODELS	HIII	50M	D01.07	ATD HIII vD01.07	atd-h350-d01.07_91_user_manual_v01.11_en.pdf
ATD - MODELS	HIII	50M	D01.08	ATD HIII vD01.08	atd-h350-d01.08_91_user_manual_v01.11_en.pdf

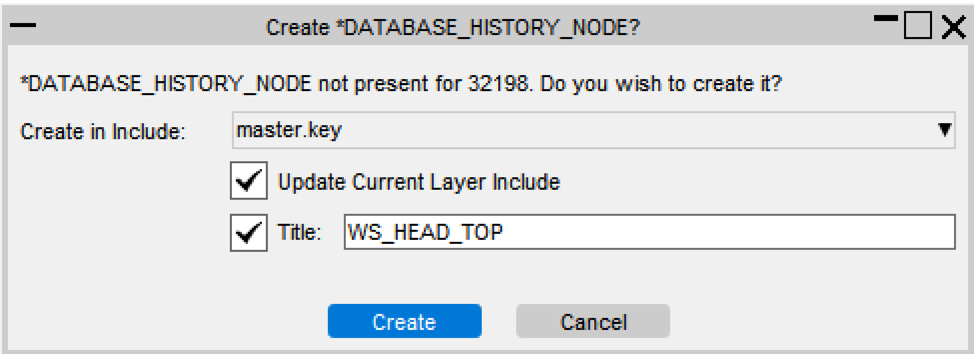
Supplier	Product	Anthropometry	Version	JSON	Manual
ATD - MODELS	HIII	5F	D03.06	ATD HIII vD03.06	atd-h305-d03.06_91_user_manual_v01.11_en.pdf
ATD - MODELS	HIII	95M	D01.04	ATD HIII vD01.04	atd-h395-d01.04_91_user_manual_v01.11_en.pdf
ATD - MODELS	THOR	50M	D00.17-sl_s3	ATD TH50 220509 v0017sls3	

Creating missing *DATABASE_HISTORY_XXX keywords

Any entity which exists in the model but which does not have the associated *DATABASE_HISTORY_XXX keyword defined will appear with a latent colour in the ID textbox:



Clicking on the textbox and pressing ENTER will open a window which can help you create the *DATABASE_HISTORY_XXX keyword:

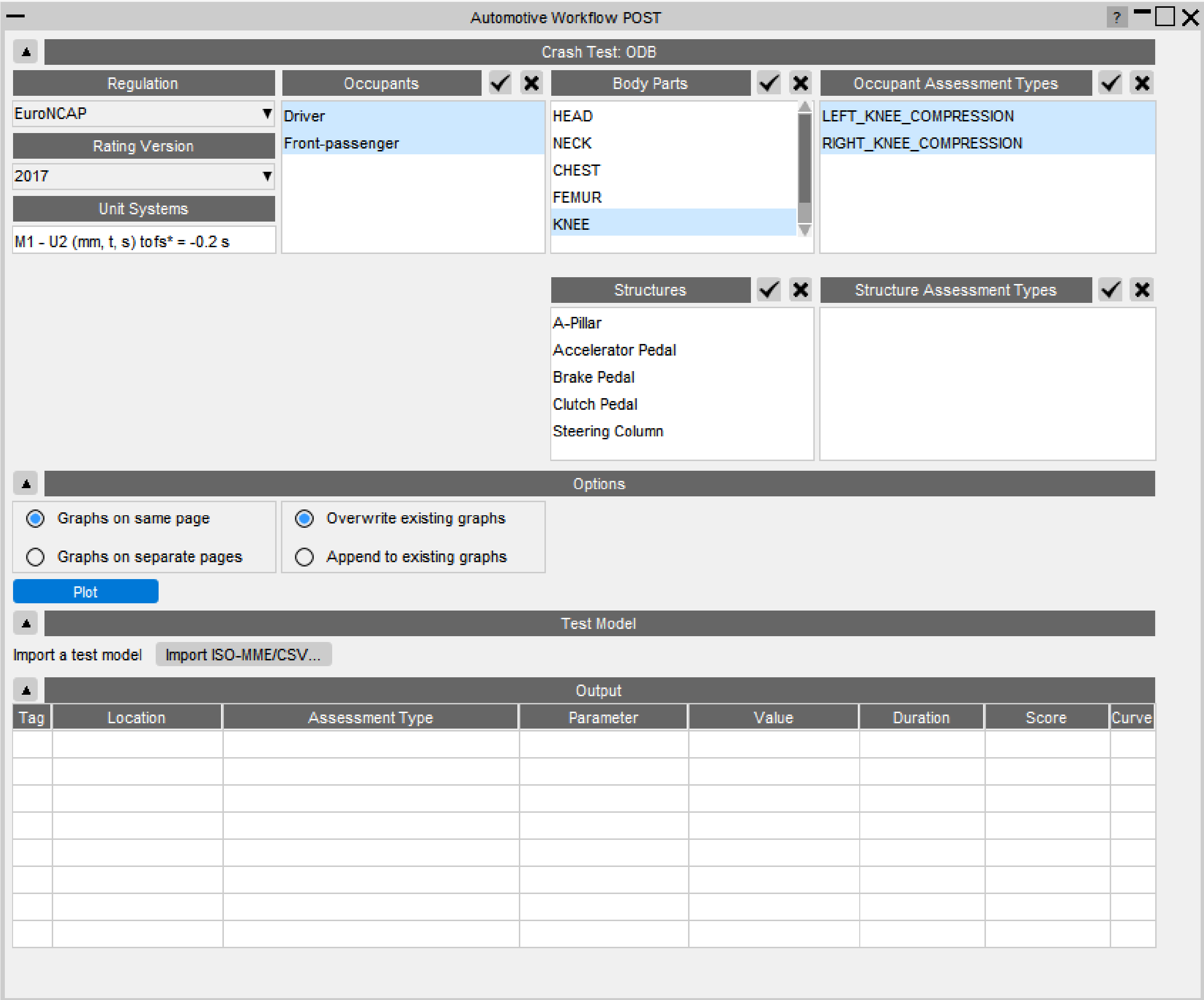


You can choose which include the new keyword is added to (it will default to the Current Layer) and can optionally provide a title for the history data too. In the example window above, a new *DATABASE_HISTORY_NODE_TITLE keyword will be created in the `master.key` file when **Create** is pressed. You must remember to save the keyword files that have been modified or any new *DATABASE_HISTORY outputs will not be present when the model is run.

4.1.3. Automotive Assessments T/HIS

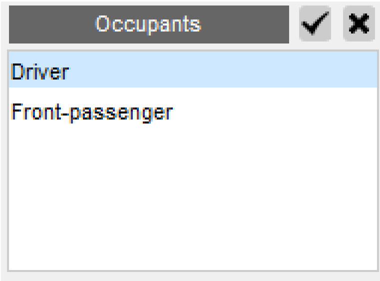
When the tool is launched in T/HIS you are presented with this window (below). This is where you select what assessments you want to carry out.

The dropdown menus on the left hand side show the regulation being used to carry out the assessments and the version. The model unit system is also shown along with any "Time of first sample" offset that will applied if it was defined in Automotive Assessments PRIMER. Curves will be shifted to start at "Time of first sample" and then any data before t=0 will be discarded.

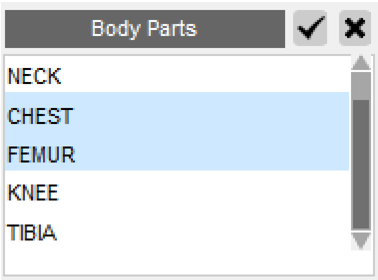


To select what assessments to carry out, you first need to select which occupant(s) you want to assess.

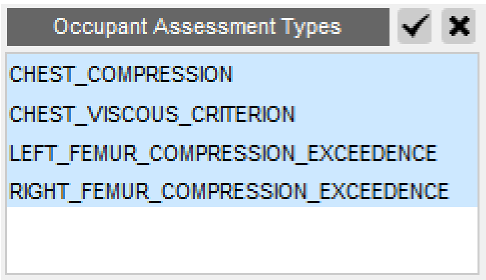
To select a single occupant, left-click on the one you want to assess. Use shift and left-click or ctrl and left-click to select multiple occupants. If you want to select all the occupants you can press the tick button and to deselect them all press the cross.



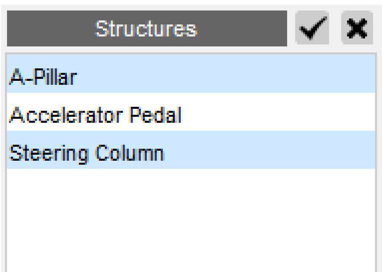
You can then select the body part(s) you want to assess.



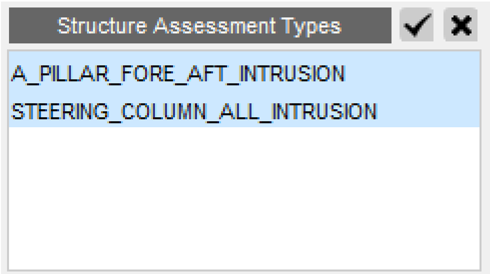
This will populate the Occupant Assessment Types list with the assessments that can be carried out for the selected body parts and occupants. By default they will all be selected, but you can chose to select only a subset of the list if you don't want to do them all.



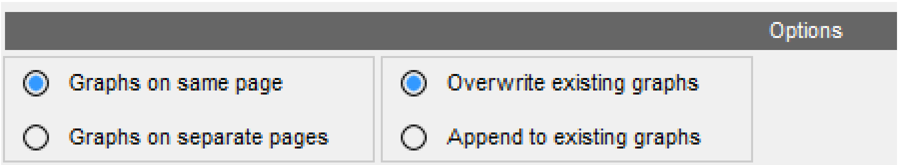
You can also select which structure(s) which you want to assess



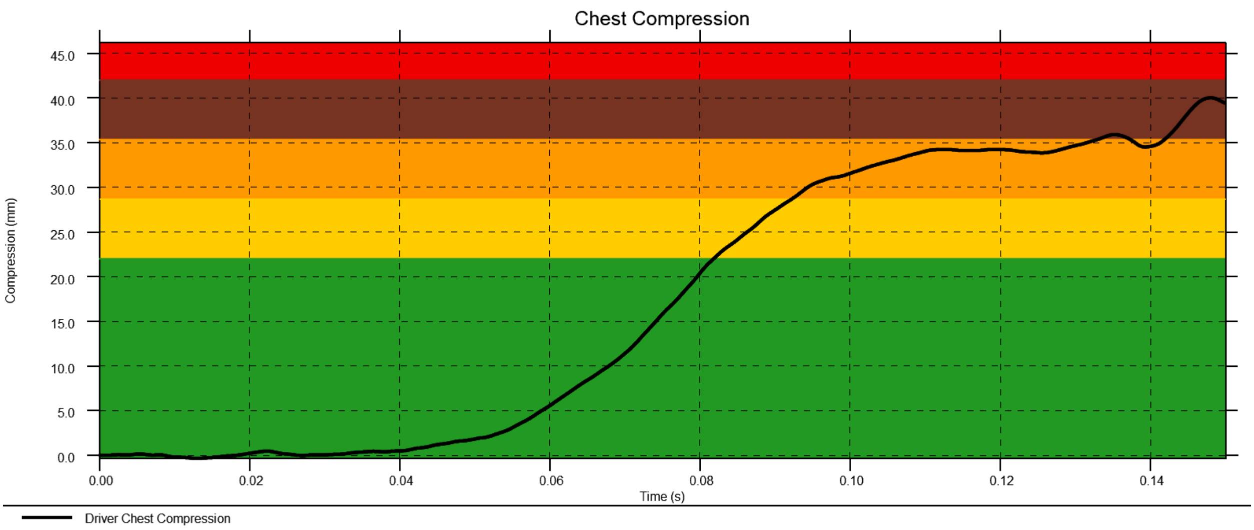
This will populate the Structure Assessment Types list with the assessments that can be carried out for the selected structures.



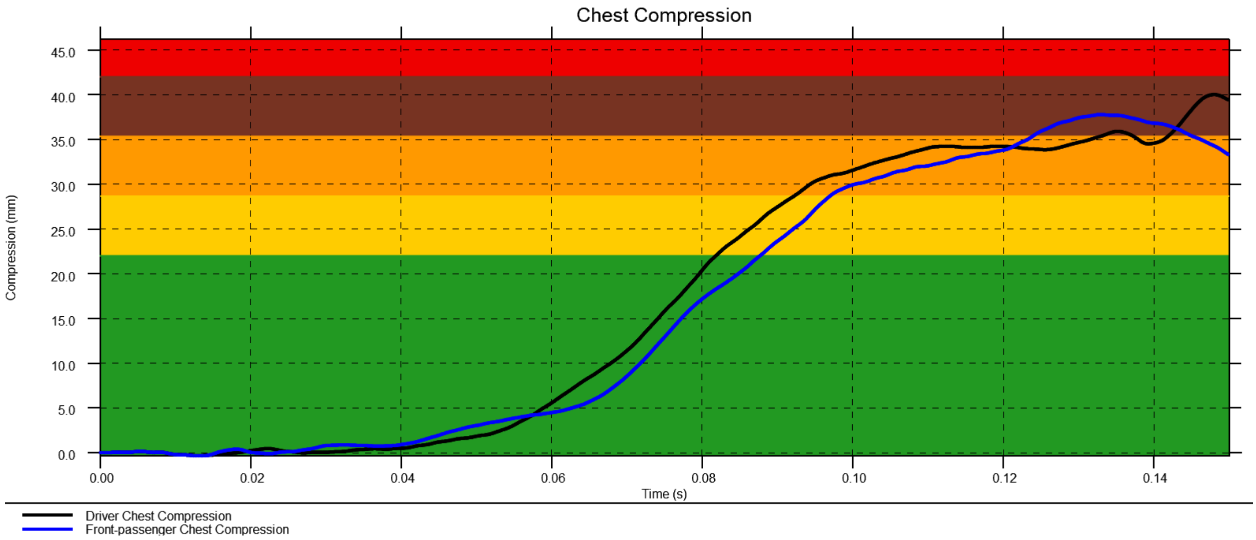
You can then chose how the graphs for each assessment should be displayed. By default they will all be put on one page and overwrite any existing graphs, but you can also chose to put each one on a separate page and append them to existing graphs.



Once you are happy with your choices, click **Plot** to carry out the assessments. T/HIS will extract the data required for each assessment, process it according to the rules set out in the regulation and plot the results on a graph with datums showing allowable limits (where they are defined by the regulation), e.g. the CHEST_COMPRESSION assessment for the driver:



If you have selected multiple occupants the curves for each occupant will be plotted on the same graph if the datum values are the same. If the datum values are different they will be plotted on separate graphs.



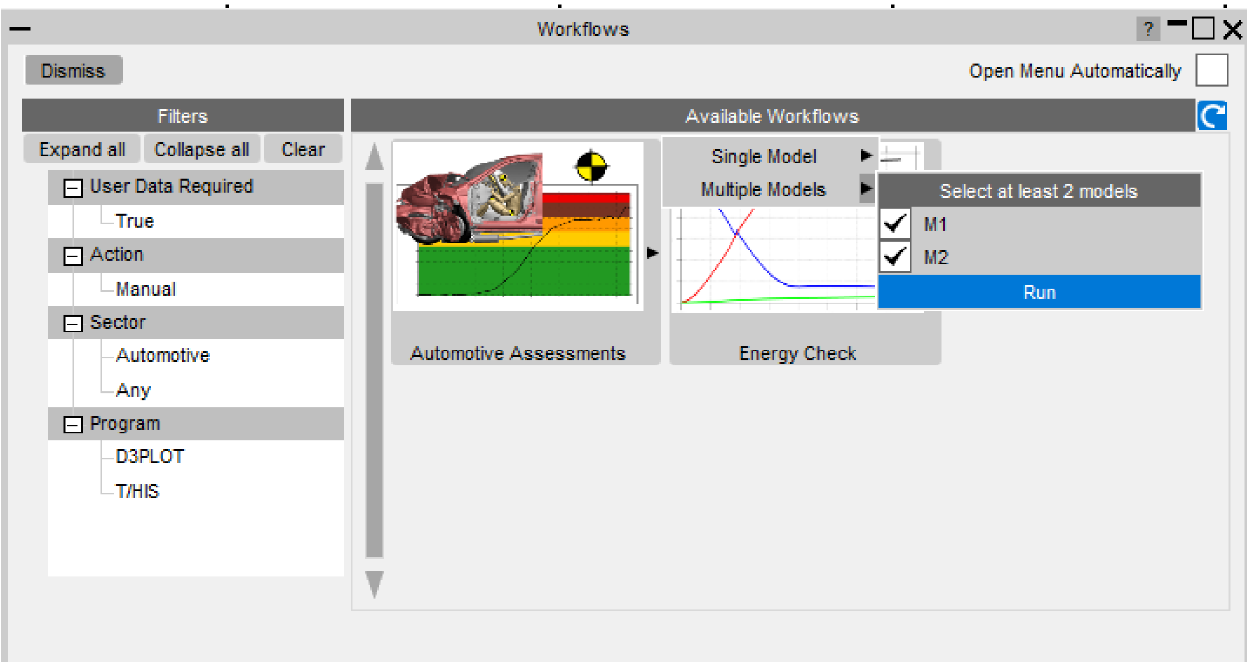
The output box at the bottom of the window lists the values and scores from the assessments carried out. Clicking on the '->' for each assessment will highlight the curve used for the assessment (and select the page if it's not on the current page) to make it easy to locate:

Tag	Location	Assessment Type	Parameter	Value	Duration	Score	Curve
M1	Driver	CHEST_COMPRESSION	Max	40.0235 mm		0.3953	->
M1	Front passenger	CHEST_COMPRESSION	Max	37.7902 mm		0.8420	->

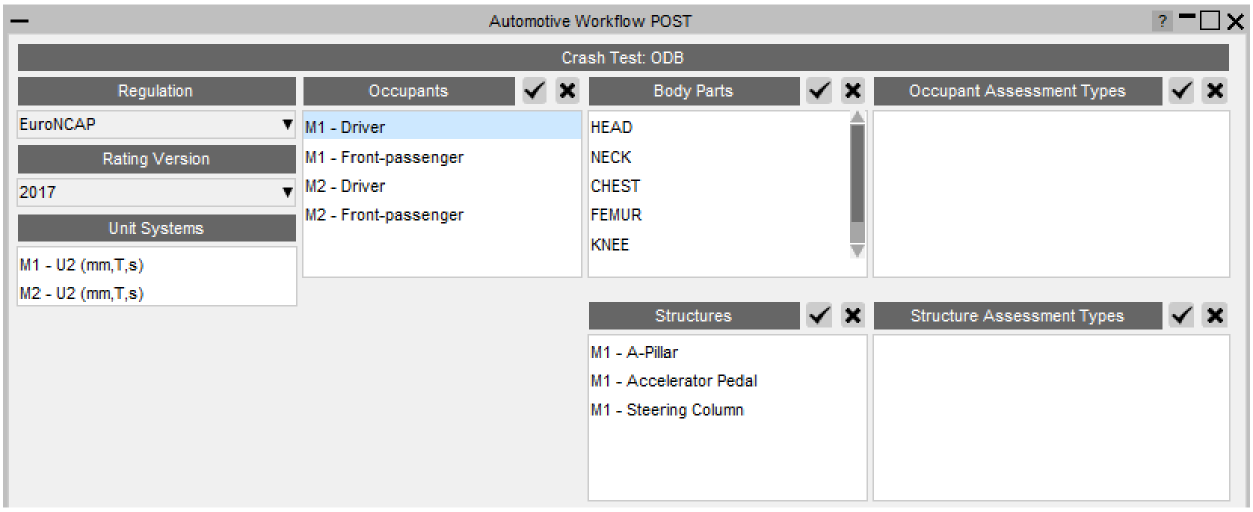
Multiple Models

It is also possible to plot results from multiple models on the same graphs. This is useful when you want to compare results between different runs.

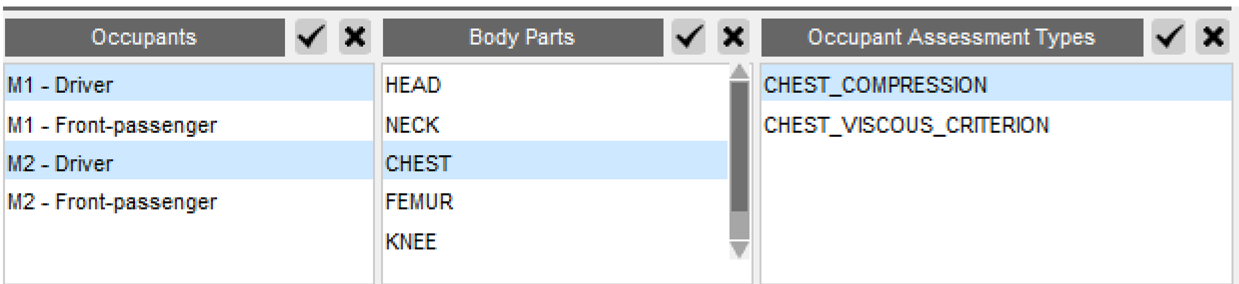
First you'll need to load the results from the models you want to compare into T/HIS and then on the workflow menu, select Multiple Models, pick the models you want to compare and press Run. Note that the models need to be of the same crash test type and regulation. If they're not the tool will refuse to run.

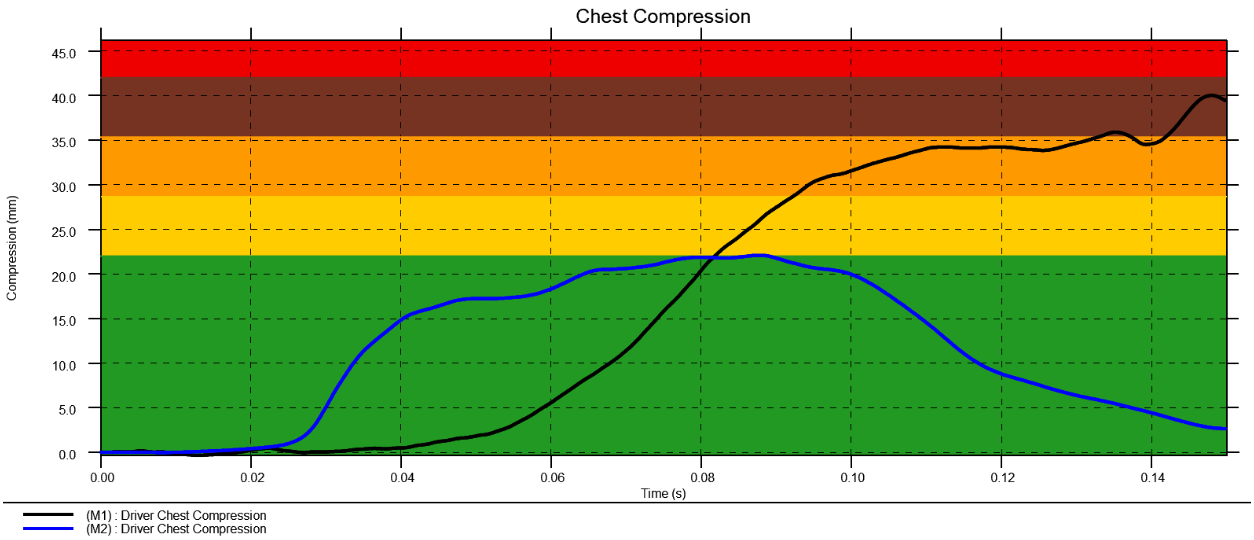


The window will then be populated with the occupants and structures from all the selected models, pre-pending them with the model number (M1, M2, etc)



If you wanted to compare the results for a CHEST_COMPRESSION assessment of the driver you would select the occupants in both models, select the chest body part and the CHEST_COMPRESSION assessment type.



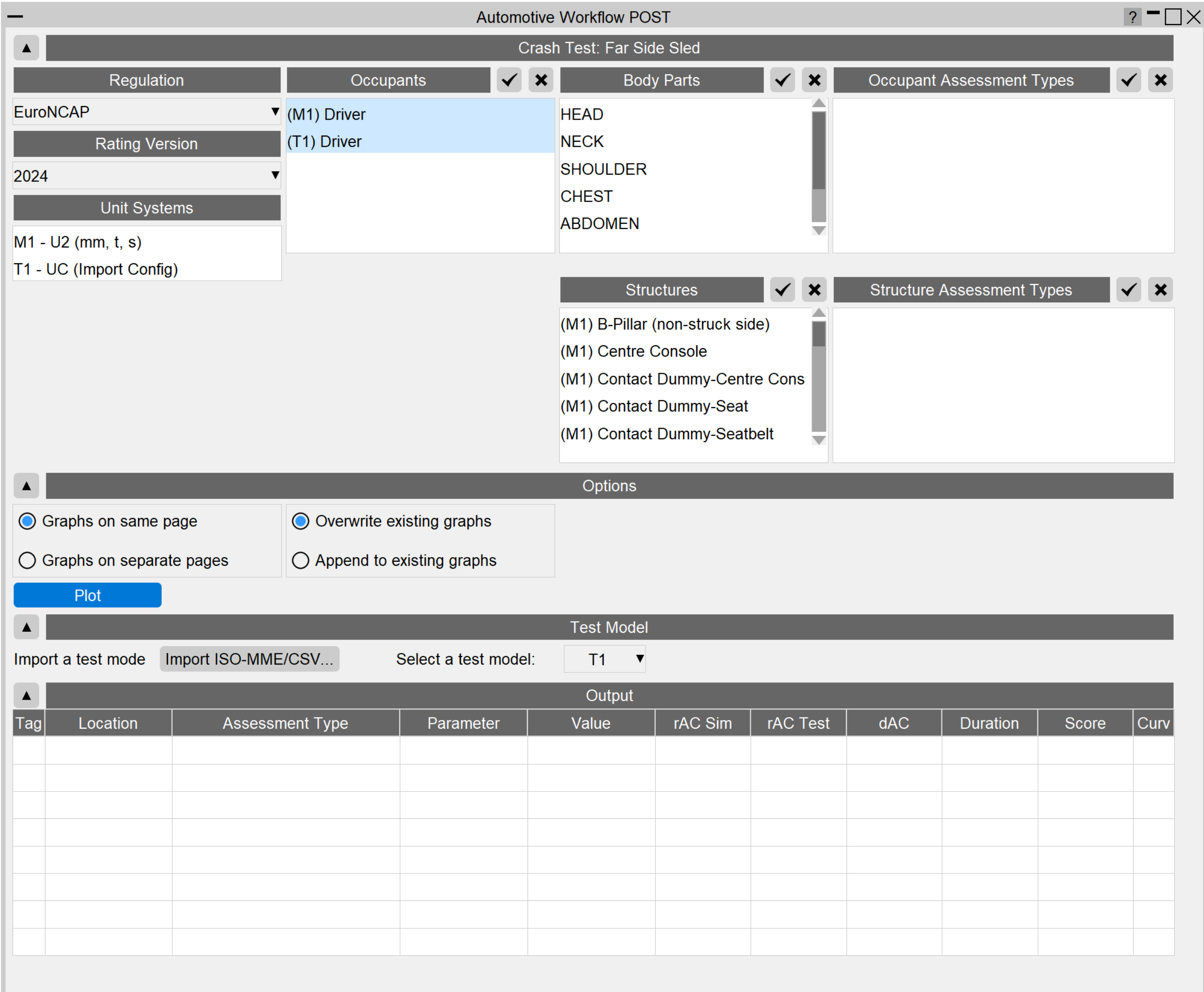


Euro NCAP Virtual Far Side Protocol Validation Criterion 2

Automotive Assessments can be used to check Validation Criterion 2, according to Section 6.3 of the Euro NCAP Virtual Far Side Simulation & Assessment Protocol. The Assessment Criteria ratios and differences are calculated and presented in the output table.

If you selected the crash test: Far Side Pole and Version: 2024, in PRIMER, then when you open Automotive Assessments in T/HIS, you will be presented with the window below. Here, you can import and select a test model and choose the assessments you want to carry out.

You can import a test model using the **Import ISO-MME/CSV...** button. You are given control over the Import Configuration to correct any inconsistencies with ISO-MME channel names and units. Once imported, you can choose which model to use as a test model from the **Select a test model** combo box.



The output table at the bottom of the window lists the injury values, Validation Criteria 2 ratios and differences ($r_{AC_{sim}}$, $r_{AC_{test}}$ and d_{AC} from Equation 4 of the Euro NCAP VTC protocol) and scores for the assessments carried out.

The following example below explains how $r_{AC_{sim}}$, $r_{AC_{test}}$ and d_{AC} are represented in the output table.

If you select simulation (M1) Driver and test data (T1) Driver in the Occupants selection and click **Plot**, assessments will be carried out for both M1 and T1, with T1 used as the test model (reference) for both.

- According to equation 4, the $r_{AC_{sim}}$ value is calculated as $r_{AC_{sim}} = \frac{AC_{sim}}{AC_{limit}}$, for all occupants selected, except for those where the assessment model is the same as the selected test model. In this example, it is only calculated for M1. Appropriate hover text is available for cells where $r_{AC_{sim}}$ was not calculated, and 'N/A' is displayed for such cells.
- According to equation 4, the $r_{AC_{test}}$ value is calculated as $r_{AC_{test}} = \frac{AC_{test}}{AC_{limit}}$, for all occupants. The model selected in the Select test model combo box will be used as the test model. The $r_{AC_{test}}$ cells

will have hover text displaying the Assessment Criteria Limit value for that particular assessment, as specified in Table 7 of the Euro NCAP VTC protocol.

- According to equation 5, the d_{AC} value is calculated as $d_{AC} = \left| r_{AC\text{ test}} - r_{AC\text{ sim}} \right|$. The d_{AC} values will only be calculated if the $r_{AC_{sim}}$ is calculated and $r_{AC\text{ test}} \geq 50\%$. If calculated, appropriate hover text will be added to the cell, and the cell will be colour-coded to indicate if that assessment meets Validation Criterion 2.

The deviations between the ratios must be < 30% for each considered assessment criteria to fulfill the validation criterion 2.

$$\text{Validation Criterion 2 (Assessment Criteria): } d_{AC} < 30\%$$

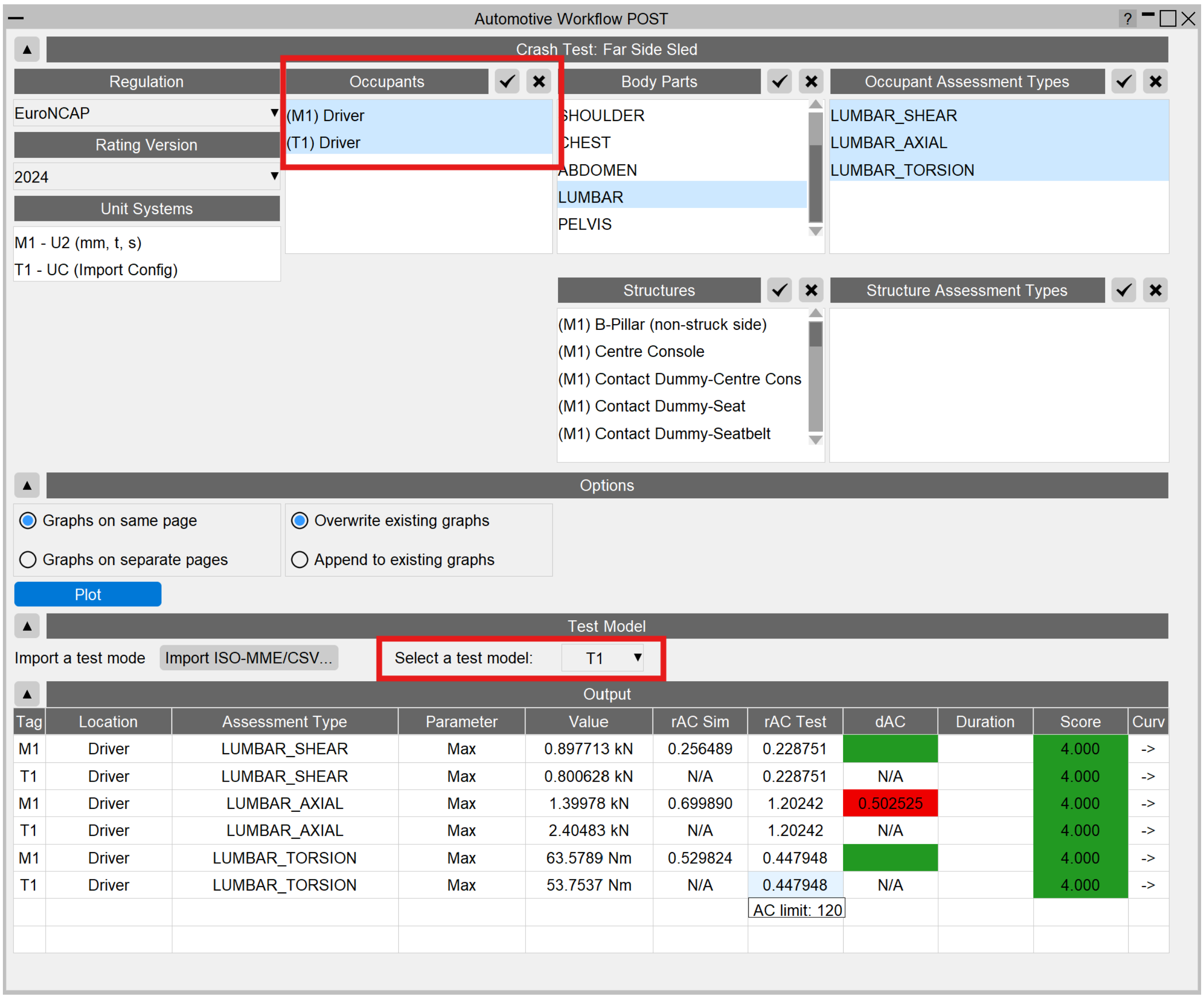


Table 7 of the [Euro NCAP Virtual Far Side Simulation & Assessment Protocol]() lists all the assessment types which must be fulfilled for VC2, along with their respective lower performance limit (AC_{limit}) values.

Table 7: List of analysed assessment criteria and lower performance limits applied to decide for which of the assessment criteria the validation criterion must be fulfilled.

Assessment criterion AC	Limit AC_{limit}
HIC15	700
a3ms	80 g
Upper Neck Fz	3.74 kN
Upper Neck MxOC	248 Nm
Upper Neck MyOC	50 Nm
Lower Neck Fz	3.74 kN
Lower Neck Mx(base of neck)	248 Nm
Lower Neck My(base of neck)	Monitored only
Chest compression	50 mm
Abdomen compression	65 mm
Pubic Symphysis Force	2.8 kN
Lumbar Fy	2 kN
Lumbar Fz	3.5 kN
Lumbar Mx	120 Nm
Head excursion	Lateral distance between original head CoG and orange line – 80 mm

Head excursion

One of the assessment types required for Validation Criterion 2 is head excursion, as specified in Table 7.

To plot the head excursion curve, select the DRIVER_HEAD_EXCURSION assessment type as shown in the image below.

A few inputs are required for this assessment:

- **Distance between head CoG and Orange line (mm)**: This is pre-filled with value equal to (2 * abs(head y coordinate)), based on simulation model data, with the assumption that seats are positioned symmetrically along the vehicle centreline. If the default values are not correct, then you can edit them.
- **Distance between head Cog and Red line (mm)**: The red line marks the maximum post-physical-test intrusion of the interior door panel. We have arbitrarily pre-filled a default value of (2 * abs(head y coordinate) + 125), based on simulation model data. Please adjust the value to match the intrusion from your physical tests.
- **Countermeasure**: The maximum head excursion score that can be obtained when in the red zone depends upon whether the vehicle is equipped with a countermeasure or not. The default state of the checkbox is set based on whether an Airbag structure (countermeasure) is defined in user data.

Calculation of Validation Criterion 2 ratios is a bit different for the DRIVER_HEAD_EXCURSION assessment compared to other assessment types described above.

DRIVER_HEAD_EXCURSION curves for Euro NCAP start with an 80 mm offset, as can be seen in the graph below, to account for the distance between the head CoG and the outer part of the head, to obtain the maximum head excursion. For example, considering this 80 mm offset, the maximum head excursion d_{Hmax} for models M1 and T1 is **639.97 mm** and **794.576 mm**, respectively, as shown in the graph below.

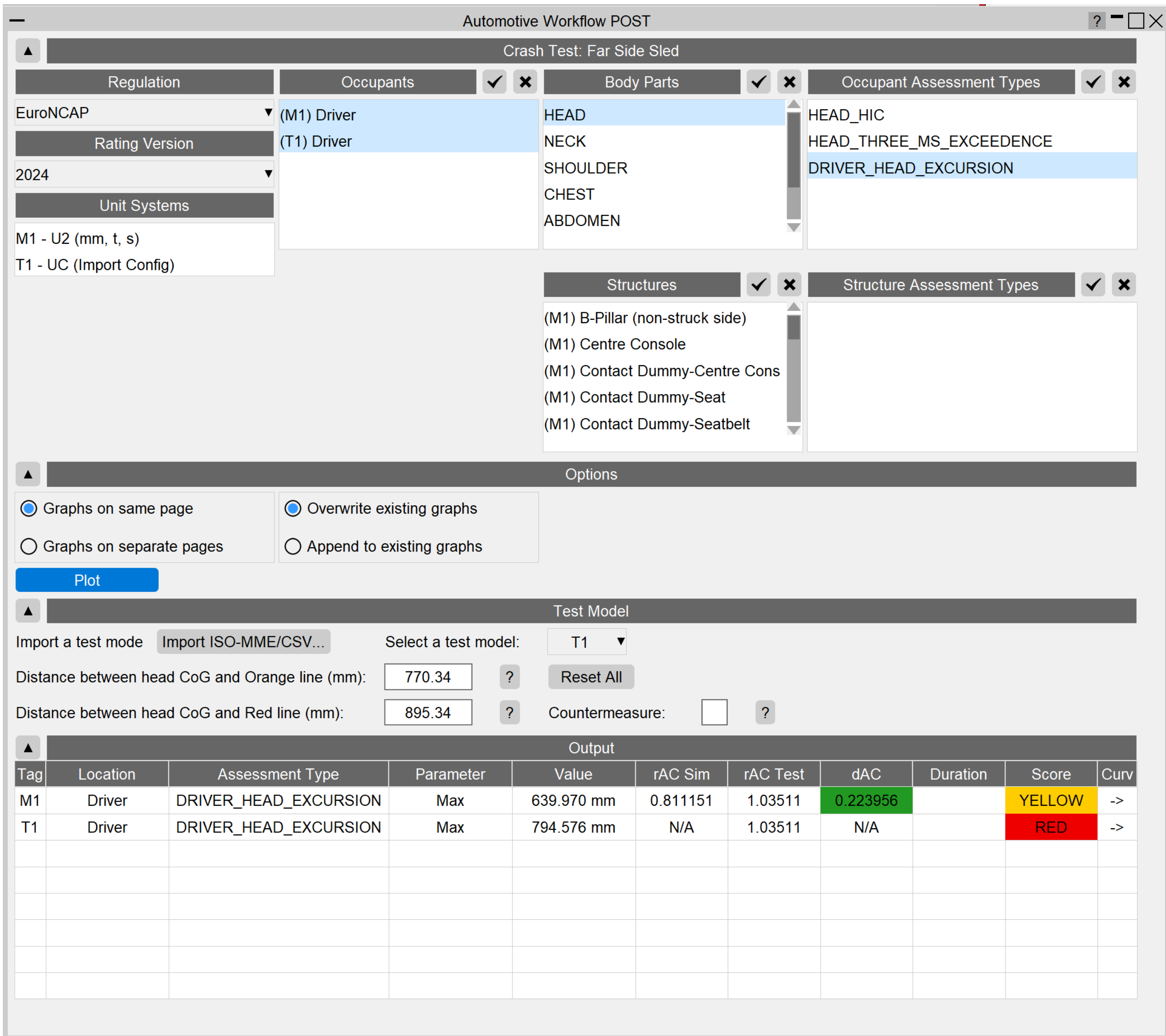
To calculate the $r_{AC_{sim}}$ and $r_{AC_{test}}$, we internally reduce the head excursion value by 80 mm, then divide the result by the ${AC_{limit}}$ value. This differs from the approach used for other assessment types, where the assessment value is simply divided by the limit. This adjustment is necessary because the calculation of the ${AC_{limit}}$ for head excursion requires subtracting 80 mm from the distance between the head CoG and the orange line (**770.34 mm** for this case), as specified in Table 7. To ensure consistency and to work with comparable quantities, we also subtract 80 mm from the head excursion value before dividing it with the ${AC_{limit}}$.

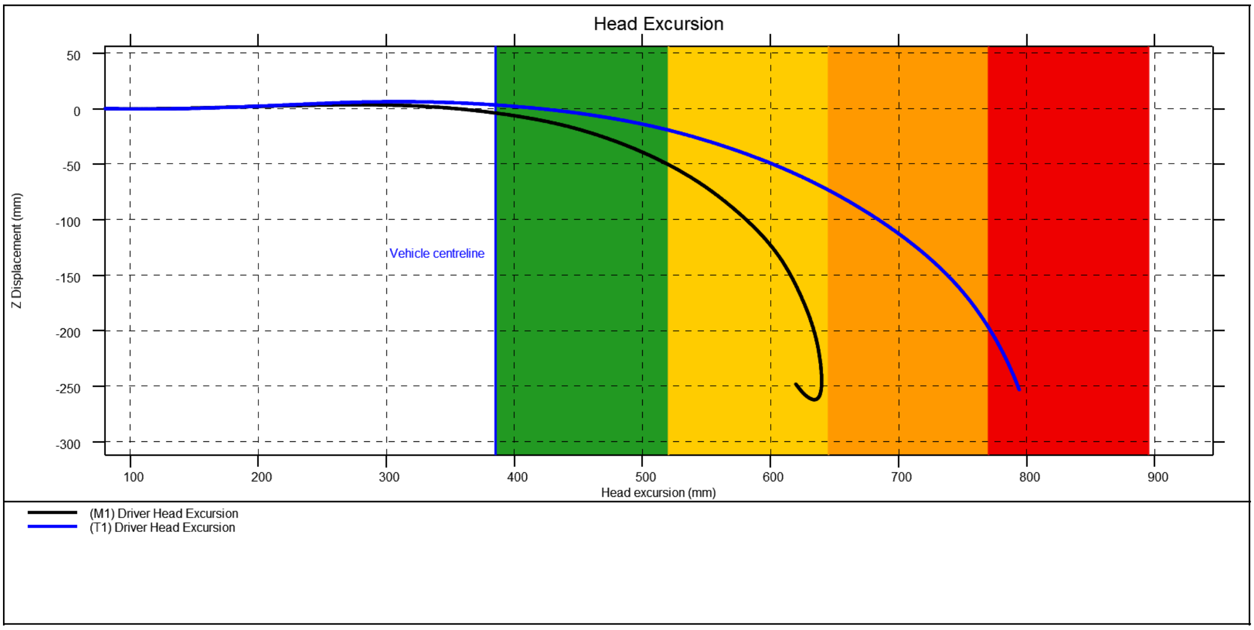
Thus, the $r_{AC_{sim}}$ for the M1 model will be:

$\frac{d_{Hmax} - 80}{AC_{limit}} = \frac{639.97 - 80}{770.34 - 80} = 0.811151$

And the $r_{AC_{test}}$ for the M1 model will be:

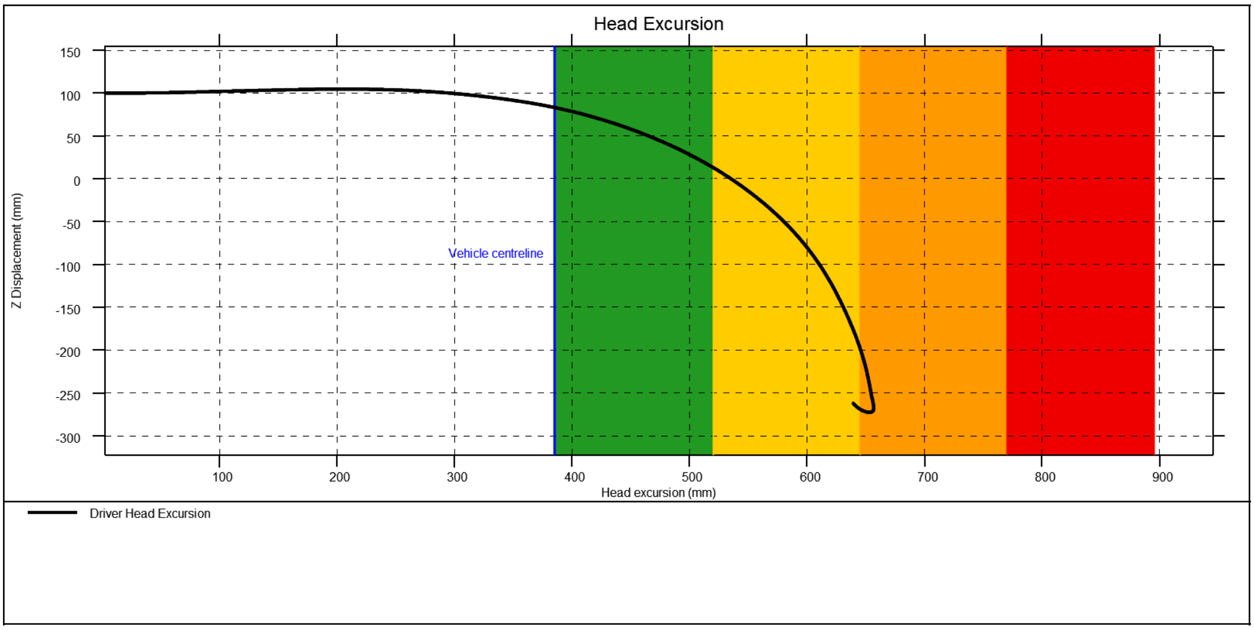
$\frac{d_{Hmax} - 80}{AC_{limit}} = \frac{794.576 - 80}{770.34 - 80} = 1.03511$


Automotive Workflow POST
Crash Test: Far Side Sled
Regulation
EuroNCAP
Rating Version
2024
Unit Systems
M1 - U2 (mm, t, s)
T1 - UC (Import Config)
Occupants
(M1) Driver
(T1) Driver
Body Parts
HEAD
NECK
SHOULDER
CHEST
ABDOMEN
Occupant Assessment Types
HEAD_HIC
HEAD_THREE_MS_EXCEEDENCE
DRIVER_HEAD_EXCURSION
Structures
(M1) B-Pillar (non-struck side)
(M1) Centre Console
(M1) Contact Dummy-Centre Cons
(M1) Contact Dummy-Seat
(M1) Contact Dummy-Seatbelt
Structure Assessment Types
Options
Graphs on same page
Graphs on separate pages
Overwrite existing graphs
Append to existing graphs
Plot
Test Model
Import a test mode
Import ISO-MME/CSV...
Select a test model:
T1
Distance between head CoG and Orange line (mm):
770.34
Reset All
Distance between head CoG and Red line (mm):
895.34
Countermeasure:
Output
Tag | Location | Assessment Type | Parameter | Value | rAC Sim | rAC Test | dAC | Duration | Score | Curv
M1 | Driver | DRIVER_HEAD_EXCURSION | Max | 639.970 mm | 0.811151 | 1.03511 | 0.223956 | | YELLOW | ->
T1 | Driver | DRIVER_HEAD_EXCURSION | Max | 794.576 mm | N/A | 1.03511 | N/A | | RED | ->


Head Excursion
Z Displacement (mm)
50
0
-50
-100
-150
-200
-250
-300
Vehicle centreline
100
200
300
400
500
600
700
800
900
Head excursion (mm)
(M1) Driver Head Excursion
(T1) Driver Head Excursion

Head excursion/offset curve for C-NCAP Far Side Occupant Protection

The head offset curve for C-NCAP Far Side Occupant Protection is extracted from the position at the front endpoint of the circular hole at the top of the head, as specified in Appendix H.1.2.1.3.3 of the C-NCAP Management Regulation (2024 Edition). Consequently, the DRIVER_HEAD_EXCURSION curve starts at an offset, as shown in the graph below:

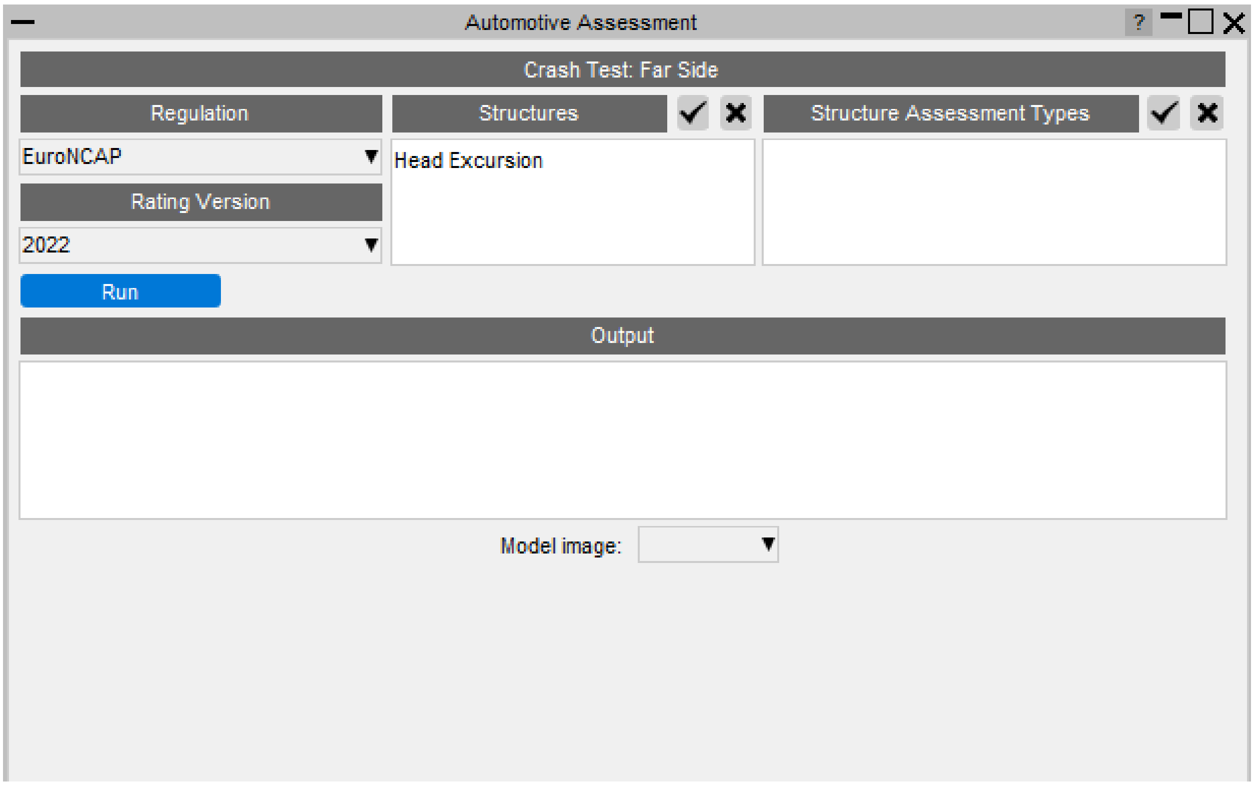


An option to specify which node to use for extracting the curve is provided in the Automotive Assessments Occupant panel in PRIMER. You may need to create the *DATABASE_HISTORY_NODE keyword as it is not defined as standard in the DYNAmore PDB WorldSID dummies.

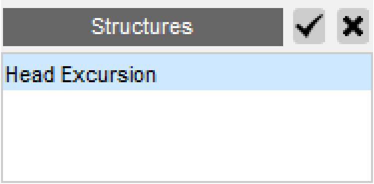
4.1.4. Automotive Assessments D3PLOT

Some structural assessments involve more than just plotting curves on graphs – for example, taking cut sections through the model to measure intrusion. These assessments are carried out in D3PLOT.

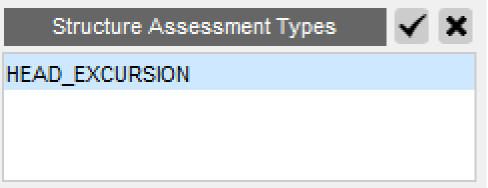
When the tool is launched in D3PLOT you are presented with this window. This is where you select what assessments you want to carry out.



Select the structure you want to assess

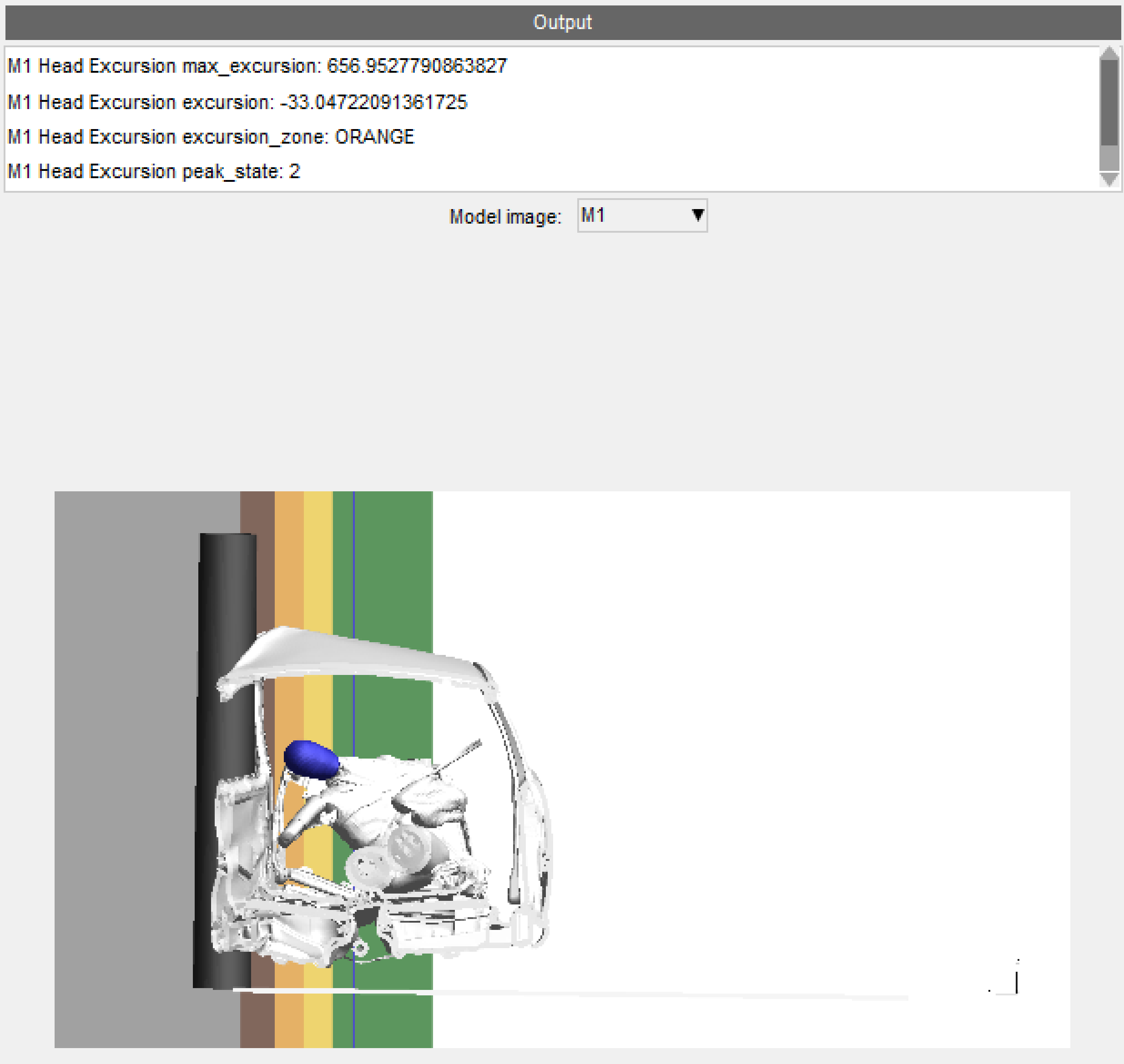


This will populate the Structure Assessment Types list with the assessments that can be carried out for the selected structures.



Click **Run** to carry out the assessment. D3PLOT will extract the data required for the assessment and process it according to the rules set out in the regulation. Depending on the assessment, this may involve starting other programs like PRIMER or REPORTER to carry out parts of the assessment.

It will eventually produce an image which it will display in the window and a list of output values in the Output window:



4.1.5. Automotive Assessments REPORTER

Standard Templates

The list of [standard library templates](#) that have been updated so they work with workflow data saved from PRIMER can be found [here](#)

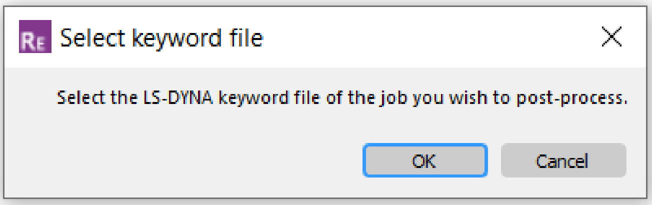
Running the templates interactively

As an example of how to use the templates we'll use the EuroNCAP Side Pole Impact 2022 template, but they all follow the same process:

- In PRIMER specify and save the required data using the Automotive Assessments workflow
- In REPORTER use **File → Open Library Template** to select the relevant template.

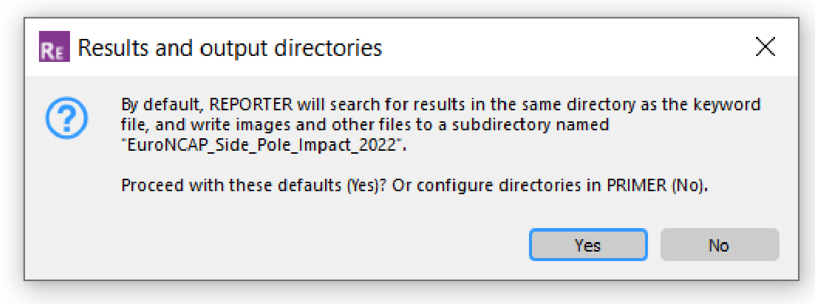
  Templates that use workflow data are indicated by the icon:

- On opening the template you will be prompted to select the keyword file of the job you want to post-process

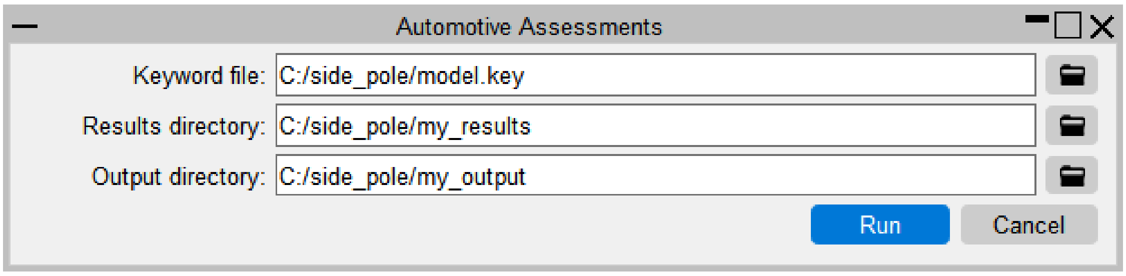


- After pressing **OK** a file selector is mapped for you to select the keyword file.
- After selecting the keyword file a prompt will ask if you want to proceed with some default directories to search for model results and for writing images and other files. The defaults assume:
  1. The results are in the same directory as the keyword file
  2. REPORTER will use a subdirectory in the keyword file directory named "EuroNCAP_Side_Pole_Impact_2022" to write images and other files to (the

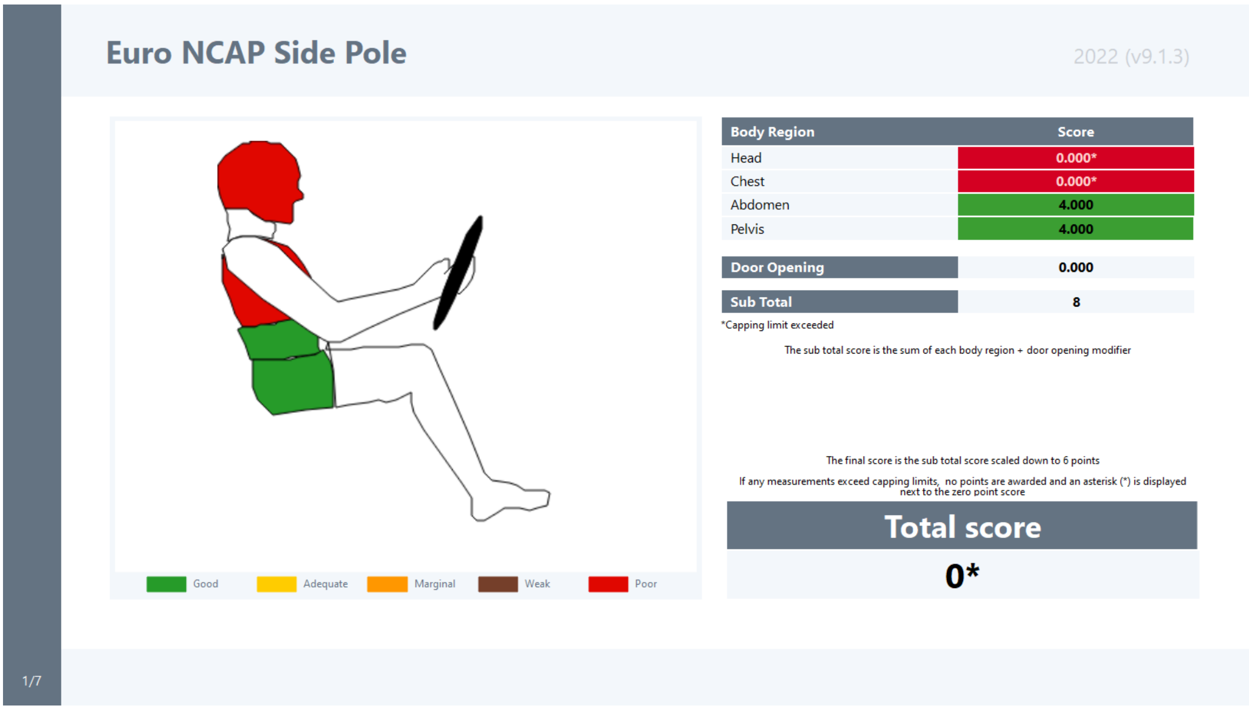
name will differ depending on the template). If the directory doesn't exist REPORTER will create it.



- If you are happy with the defaults press **Yes** and you can skip the next steps. T/HIS will start to post-process the results according to the protocol, generating the required graphs.
- If you want to change the directories press **No**. This will open PRIMER with a window where you can select the directories (and the model keyword file if you want to change this):



- Once selected, press Run. This will close PRIMER and start T/HIS to post-process the results according to the protocol, generating the required graphs
- Once finished, T/HIS will close and the template will be generated:



Running the templates in batch

The templates can also be run in batch mode, specifying the required information through command line arguments.

If your results are in the same directory as the keyword file then you only need to specify the keyword file on the command line:

<*reporter_exe*> -batch -file=<*template_name*> -varKEYWORD_FILE=<*keyword_file*> -exit

[Add the -pdf, -html, -pptx command line arguments to write the report out in the format you want]

Where:

reporter_exe	The full path and filename to the REPORTER executable
template_name	The full path and filename of the template you want to use. The workflow templates can be found in ***$OA_INSTALL/workflows/templates/automotive_assessments***
keyword_file	The full path and filename of the keyword file

If the results are in a different folder to the keyword file, you will need to add an extra argument to specify it:

```
<reporter_exe> -batch -file=<template_name> -
varKEYWORD_FILE=<keyword_file> -varRESULTS_DIR=<results_dir> -exit
```

Where:

results_dir	The full path to the results directory

Similarly if you want to output the images and other files generated by REPORTER to a different folder than the default, you will need to add an extra argument:

```
<reporter_exe> -batch -file=<template_name> -
varKEYWORD_FILE=<keyword_file> -varOUTPUT_DIR=<output_dir> -exit
```

Where:

output_dir	The full path to the output directory

Reasons for migrating the templates to the workflow framework

Migrating the standard templates to use data saved from the Automotive Assessment workflow has the following benefits:

- Setting up the data and generating the templates is simpler with fewer steps required
- The same data can be used in the Automotive Assessment workflow in T/HIS to interactively plot and interrogate results
- It makes it easier to add templates for new protocol versions and protocols not currently supported

4.2. Energy Check

Energy Check

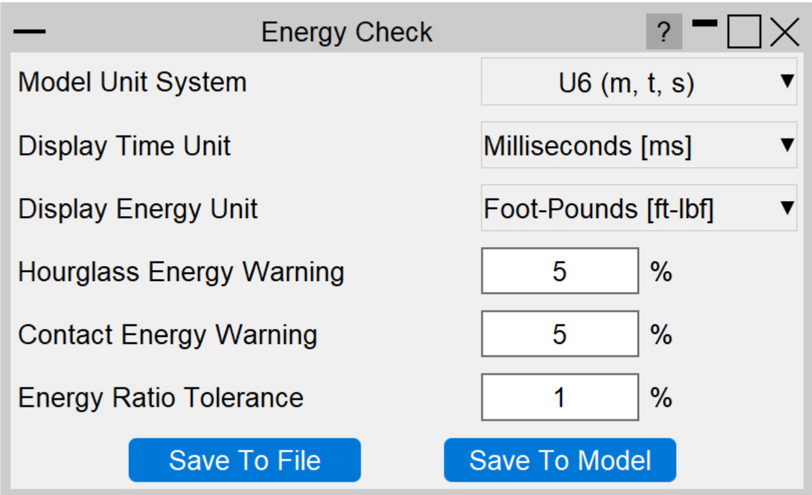
Tools → Workflows → Energy Check

The Energy Check Workflow is a quick tool to help plot global energies for your model and perform checks.
In PRIMER we can set the tool up, by selecting the model unit system, selecting the desired time and energy units and selecting the thresholds and percentages allowed for the energy checks.

In T/HIS, this tool displays the Kinetic Energy, Internal Energy, Hourglass Energy, Total Energy, Absolute Total Contact Energy, External Work and Total System Energy. Multiple checks are completed on these energies such as the percentage of Hourglass Energy compared to Total Energy, the Absolute Total Contact Energy compared to Internal Energy and Energy Ratio (Total System Energy).

Setup in PRIMER

When this tool is initially launched, PRIMER will ask you to select which model you want to use to configure for Energy Check. You can only configure a single model at a time.



Model Unit System

You can select the unit system used for the model from the drop-down menu.
Once you have selected the unit system, the Display Time Unit and Display Energy Unit will automatically update to match the model unit system.

Display Time Unit

You can select the display time unit to use: Seconds or Milliseconds.

Display Energy Unit

You can select the display energy unit to use: Joules, Millijoules, Kilojoules or Foot-Pounds.

Hourglass Energy Warning

You can change the warning value of which Hourglass Energy as a percentage of Total Energy will be flagged.
Hourglass Energy should be less than 5% of Total Energy, therefore the default for this check is 5%.

Contact Energy Warning

You can change the warning value of which absolute Total Contact Energy as a percentage of Internal Energy will be flagged.
Contact Energy should be less than 5% of Internal Energy, therefore the default for this check is 5%.

Energy Ratio Tolerance

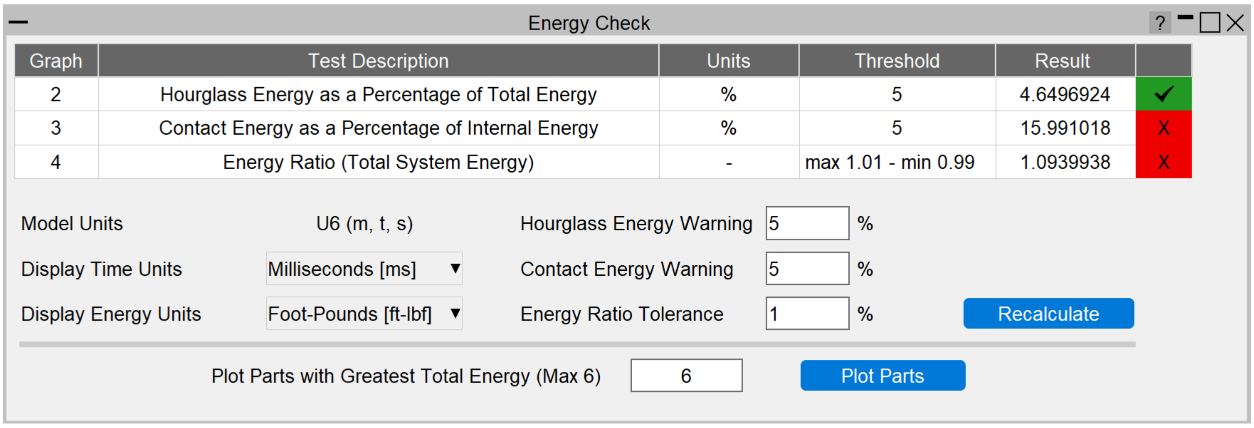
You can change the warning value of which Energy Ratio (Total Energy minus External Work or Total System Energy) will be flagged at if the curve has exceeded the threshold. Total System Energy should remain constant (Energy Ratio should stay at 1.0), although this is not realistic therefore the default for this check is 1%.

Saving

Save the Workflow data to a .json file or save it to your model and then write the keyword file from PRIMER.

Use in T/HIS

When this tool is initially launched, the tool will complete a first run of the script by producing the aforementioned energies and checks. Once the run has completed the GUI will look something like this by default:



Energy Checks

The first check determines if Hourglass Energy is below the percentage you specified of Total Energy. If this check is a fail, the maximum percentage will be displayed in the GUI.
On its graph, the Hourglass Energy as a percentage of Total Energy is displayed with datums used to visualise the warning threshold. If Hourglass Energy does not exist in the model or have the same number of points on the graph as Total Energy, the check will not be displayed.

The second check determines if absolute Total Contact Energy is below the percentage you specified of Internal Energy. If this check is a fail, the maximum percentage will be displayed in the GUI.
On its graph, the Contact Energy as a percentage of Internal Energy is displayed with datums used to visualise the warning threshold. If time intervals for contacts are not consistent with other energies, the check will not be displayed. Please edit the DT field for GLSTAT within the *DATABASE_ASCII card to enable fill accuracy of this check.

The third check is Energy Ratio, which determines if the Total System Energy (Total Energy minus External Work) is constant. The threshold is now shown as a range instead of a single value. This represents the acceptable deviation from a perfect energy ratio of 1.0 and flags both energy losses and gains. If this check is a fail, the energy ratio value will be displayed in the GUI.
On its graph, if TER - total/initial (Energy Ratio) is available as a curve in your model then it is displayed with datums to visualise the tolerance threshold.
If it is not available then (Total Energy - External Work) / Initial Total Energy is displayed, please note this check is calculated manually so may not be as accurate. Please request GLSTAT in your model to enable full accuracy of this check. If External Work is not available in your model, the check will not be displayed.

The graphs for all checks now ensure datum lines (representing warning thresholds) are always visible. The plot automatically scales to include both the energy curve and its associated datum line, allowing for clearer visual representation of whether the thresholds are being exceeded.

The Energy Checks results table now includes two additional columns:

- Graph ID: Identifies the curve used in the check (in the corresponding numbered format)
- Units: Displays the unit used in each check (e.g. "%", "J")

Model Unit System

The unit system that has been selected in PRIMER for this model.

Setup

You have the option to change the Display Time Unit, Display Energy Unit, Hourglass Energy Warning, Contact Energy Warning and Energy Ratio Tolerance just like in PRIMER, however any adjustments made here won't be saved upon re-load of the workflow, unlike in PRIMER if it was saved to a .json or to the model. Press 'Recalculate' to reproduce the graphs and energies with the updated setup options.

Recalculate

You can recalculate the energies and checks with the any changes made to the display time/energy units and warning thresholds taken into effect.

Plot Parts with Greatest Total Energy

Plots the Kinetic, Internal, Hourglass and Total Energies of the biggest N parts in the users model calculated by their greatest Total Energies. N is a value specified by the user, from 1 to 6.

4.3. Entities of Interest

Entities of Interest

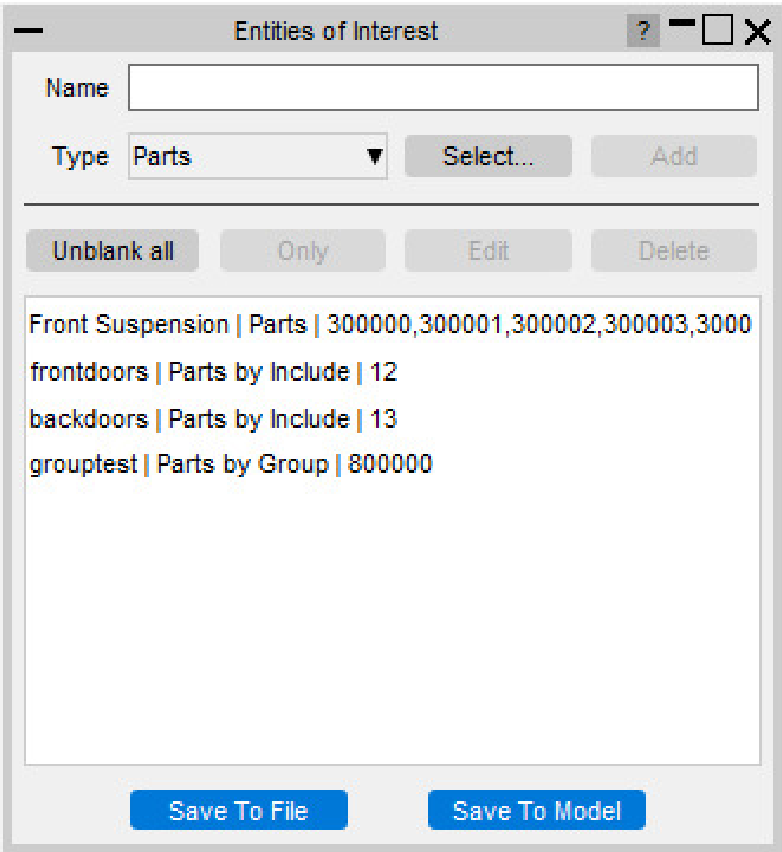
Tools → Workflows → Entities of Interest

The Entities of Interest tool allows you to visualise specific groups of entities quickly in D3PLOT and action them. Actions include:

- Only
- Zoom In
- GLB Export
- Mixed-Mode Plot
- Highlight
- Colour By

Setup in PRIMER

In PRIMER, open Entities of Interest from the Workflows menu (**Tools → Workflows → Entities of Interest**). In the menu that appears, you can a dd groups of entities to a list, and save it to a Workflows .json file or add the data to your model in PRIMER and then write the keyword file.



Adding Entries to the List

For each group of entities, make sure that you complete the following steps:

1. **Name**
   You must give your entry a name so it can be identitfied
2. **Type**
   Select the entity type for your entry. Current options are **Parts, Parts by Set, Parts by Include or Parts by Group**
3. **Select...**
   Select the entities for your entry by using the menu that appears on the right-hand side.
4. **Add**
   Once you have completed the above steps, **Add** your entry to the list.

Only and Unblank all

You can select as many entries from the list as you want and then click **Only** to show only the selected entries. You can click **Unblank all** at any time to unblank the entire model.

Edit

You can only have one entry selected to **Edit** an entry. Much like adding an entry to the list, you then update its name and/or the entities in the entry. You can not change entity type.

Delete

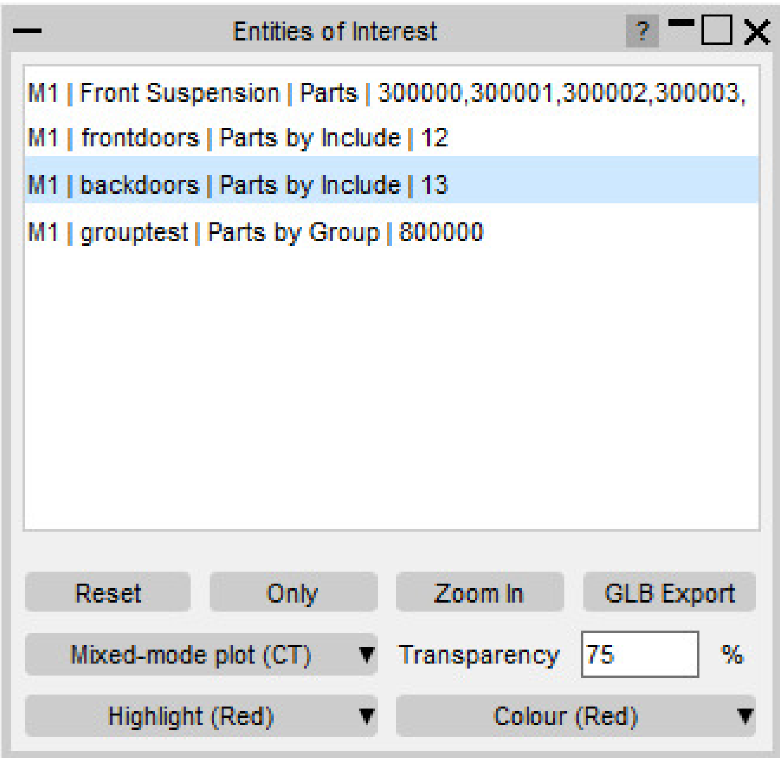
Select one or more entries from the list and click **Delete** to delete them.

Saving

You can either save your list of Entities of Interest to a .json file or directly to the model. The user data from the file will then be picked up when the Workflow is selected in D3PLOT.

Use in D3PLOT

When you open Entities of Interest in D3PLOT, your list of entries will be displayed, along with action buttons:



Reset

You can **Reset** the selected models to default.

Only

Select one or more entries and **Only** them.

Zoom In

Select one or more entries and **Zoom In** on them.

GLB Export

Select one or more entries and **GLB Export** them for use in D3PLOT Viewer. This will open the GLB Export Options window, which has the following options:

- **Directory**
  Provide a valid directory location for saving GLB files
- **Output**
  Select the output type – either **Current Frame** or **Animation**
- **Frame Rate**
  If Animation is chosen for output, select the default **Frame Rate**
- **Export**
  Once the above options are all valid, click **Export** to export one GLB file for each of the selected entries. The exported GLB filenames will correspond to the entry names.

Mixed-Mode Plot

Select one or more entries and perform a **Mixed-mode plot** on them.
The selected entities will be plotted by a method of the users choice. The default is CT however you can select from the following options using the dropdown menu:
Continous tone solid contour (CT), colour contours with lightning model (SI), line contour plot (LC), cloud points plot (CL), Iso-surface contour plot (ISO), velocity arrows plot (VEL) and interface stresses and forces (INT).
Any entities that are not selected will turn transparent and grey. The transparency can be set by the user using the transparency textbox, the default is 75%.

Highlight

Select one or more entries and **Highlight** them.
The highlighted entities will turn opaque and a colour of your choice from the dropdown menu, the default is red.

The non-highlighted entities will turn grey and transparent of which the value can be set the user using the transparency textbox, the default is 75%.

Transparency

The **Transparency** textbox is used to control the transparency value used in Mixed-Mode Plotting and Highlighting. The default is 75%.

Colour

Select one or more entries and **Colour** them.
The selected entities will become opaque and turn a colour of your choice from the dropdown menu, the default is red.

4.4. Eroded Elements

Eroded Elements

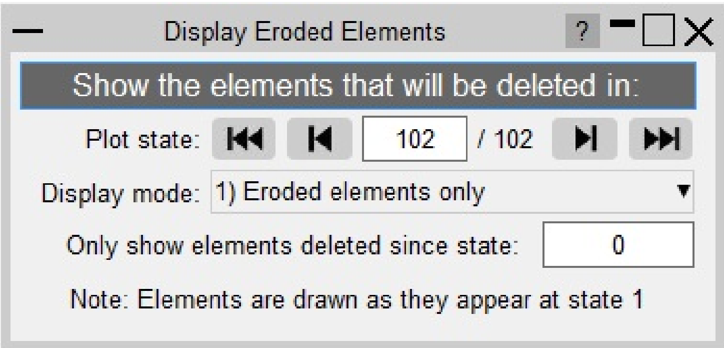
Tools → Workflows → Eroded Elements

The Eroded Elements tool allows you to visualise eroded (deleted) elements in your Ansys LS-DYNA simulation.
Note that while using this tool, elements are drawn as they appear at state 1.

Use in D3PLOT

You don't need to set up anything in PRIMER to use the Eroded Elements Workflow. Simply open it in D3PLOT (**Tools → Workflows → Eroded Elements**) to visualise Eroded Elements for any set of results.

When you open Eroded Elements, the elements deleted in the final state are displayed. The following menu will appear:



The menu provides several options to control the visualisation of eroded elements.

Plot state

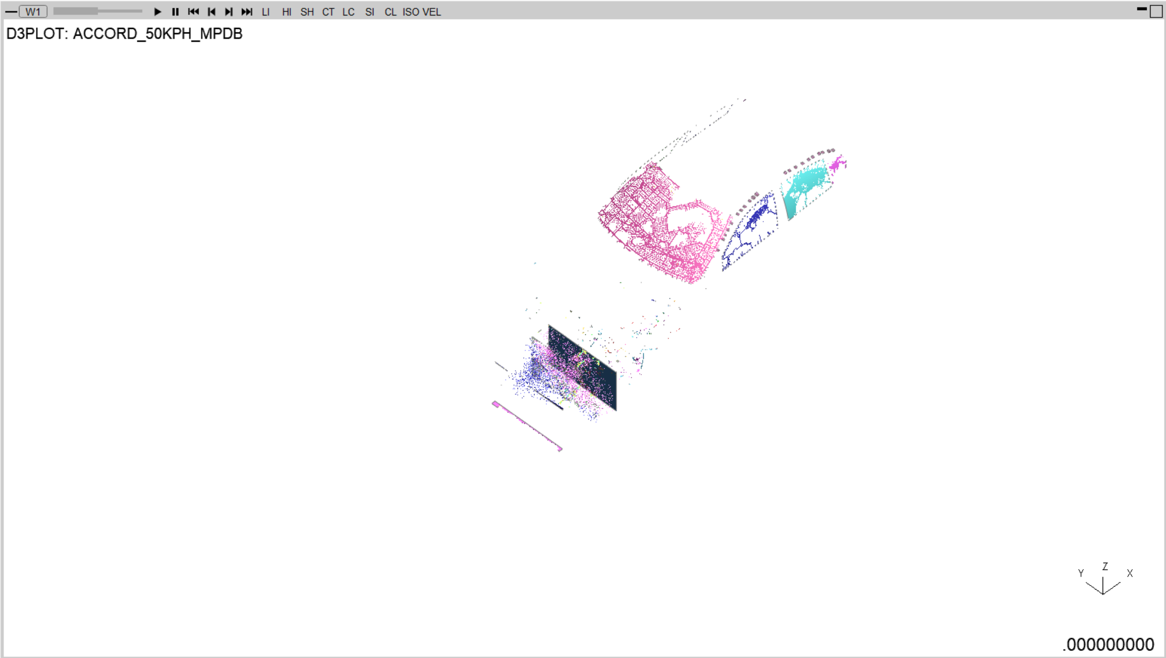
You can choose to display the elements deleted at any plot state. Use the controls in the menu to change plot state, rather than D3PLOT's main controls. Only elements deleted between the comparison state and the plot state will be displayed. Note that the plot state cannot be before the comparison state.

Display mode

There are three display modes:

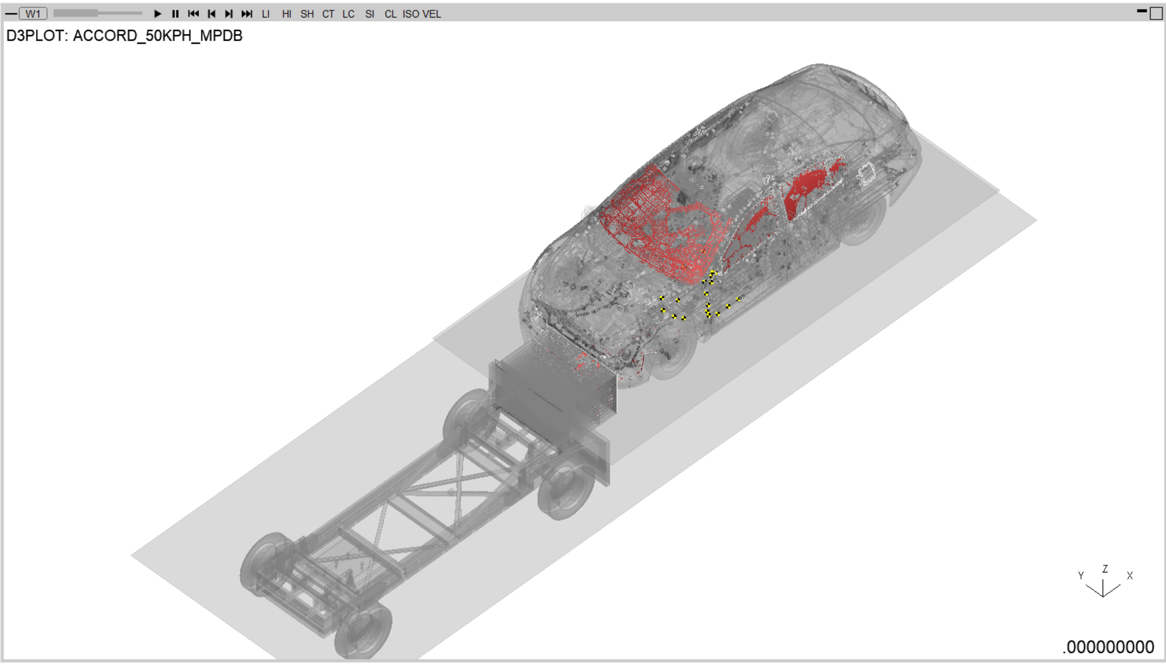
1. Eroded elements only (default)

Only the elements deleted between the comparison state and the plot state are shown (all other elements are blanked)



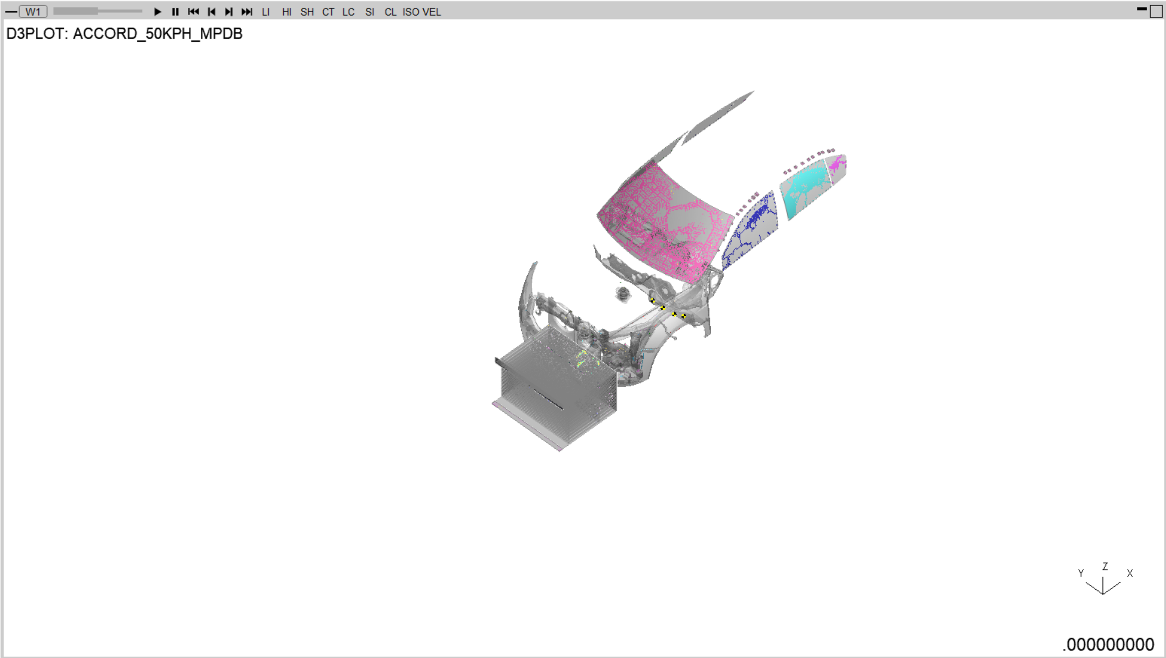
2. Eroded elements in red

Displays the elements deleted between the comparison state and the plot state in red and all other elements in transparent-grey.



3. Parts with eroded elements

Only the parts with elements deleted between the comparison state and the plot state are shown (all other parts are blanked). Elements on these parts that are not deleted will be shown in transparent-grey.



Comparison state

You can choose to display the elements deleted between the comparison state and the main selected state. The comparison state can be modified via the textbox. Only elements deleted after the comparison state will be displayed. Note that the comparison state cannot exceed the plot state.

Properties

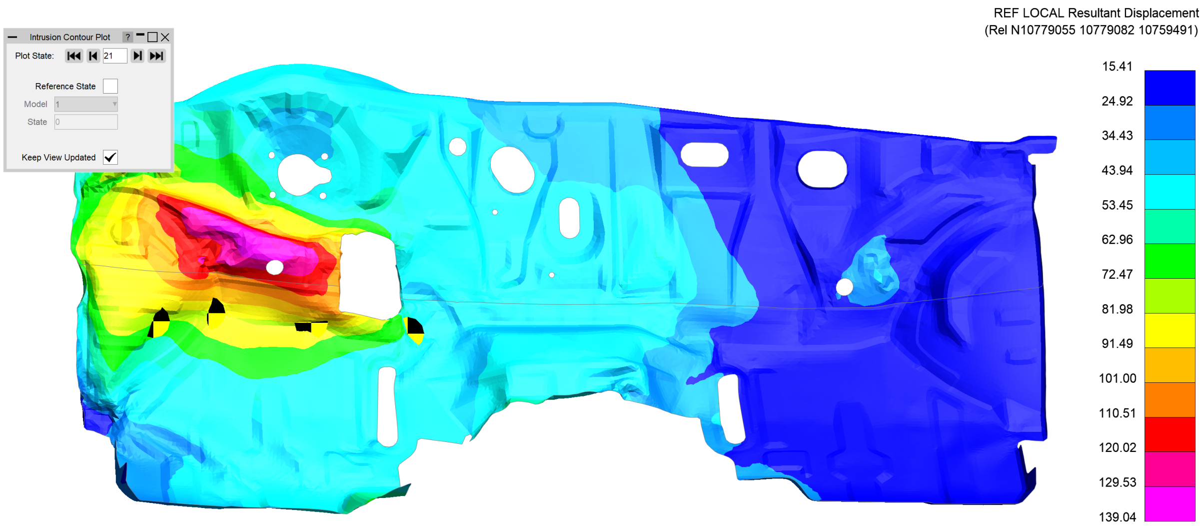
When Eroded Elements is opened, a temporary properties file is saved. When you exit the tool, you can choose to restore the model properties (view, blanking, colours, etc.) to their appearance before you opened the tool.

4.5. Intrusion Contour Plot

Intrusion Contour Plot

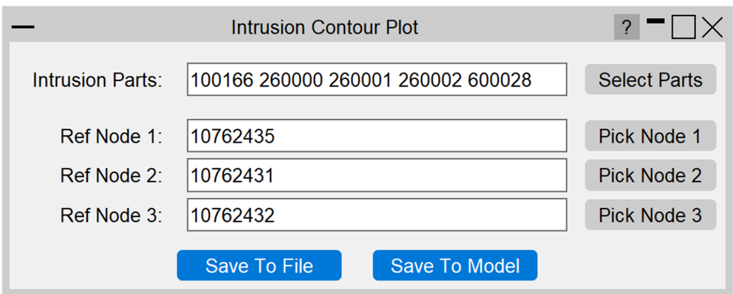
Tools → Workflows → Intrusion Contour Plot

The Intrusion Contour Plot tool creates a contour plot of intrusion displacements for selected parts, relative to specified reference coordinates:



Setup in PRIMER

In PRIMER, open Intrusion Contour Plot from the Workflows menu (**Tools → Workflows → Intrusion Contour Plot**). In the menu that appears, select intrusion parts and reference nodes , and then save the data to a Workflows .json file or add the data to your model in PRIMER and then write the keyword file:



Intrusion Parts

Select which parts you wish to include in the intrusion plot. The specified parts will be unblanked in D3PLOT by default, and the camera will adjust to point at the selected parts.

Reference Nodes

Select three reference nodes that will be used to define a reference coordinate system and for setting up the camera in D3PLOT. The intrusion contours are calculated relative to this reference system.

Saving

You can either save the setup data to a .json file or directly to the model. The user data from the file will then be picked up when the Workflow is selected in D3PLOT.

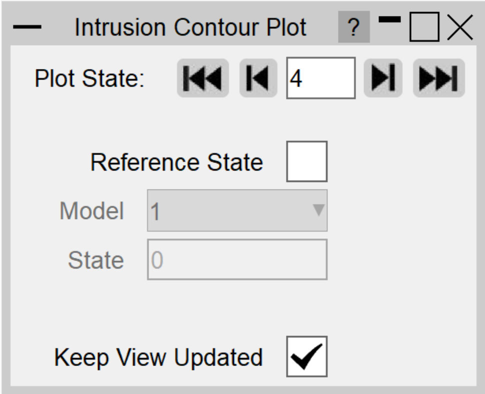
Use in D3PLOT

When you open Intrusion Contour Plot in D3PLOT, the plot will appear immediately. A menu will appear giving you further controls:

- **Plot State**
  You can display the intrusion contour plot at any state. Use the controls in the menu to change plot state, rather than D3PLOT's main controls.

- **Reference State**
  You can adjust the plot to show intrusion relative to a reference state (and, when using with multiple models, from a specified model rather than from the model itself).

- **Keep View Updated**
  If the checkbox is ticked then each time a state or reference state change is made, the camera resets. Uncheck this option if you wish to control the view manually.


Intrusion Contour Plot
Plot State:
4
Reference State
Model
1
State
0
Keep View Updated

4.6. Pulse Index Tool

Pulse Index

Tools → Workflows → Pulse Index

During the early stages of vehicle development, it can be useful to understand occupant acceleration without needing to include a complex and computationally expensive occupant model.

The Pulse Index Workflow allows you to estimate the acceleration that would be experienced by a vehicle occupant in a crash test scenario.

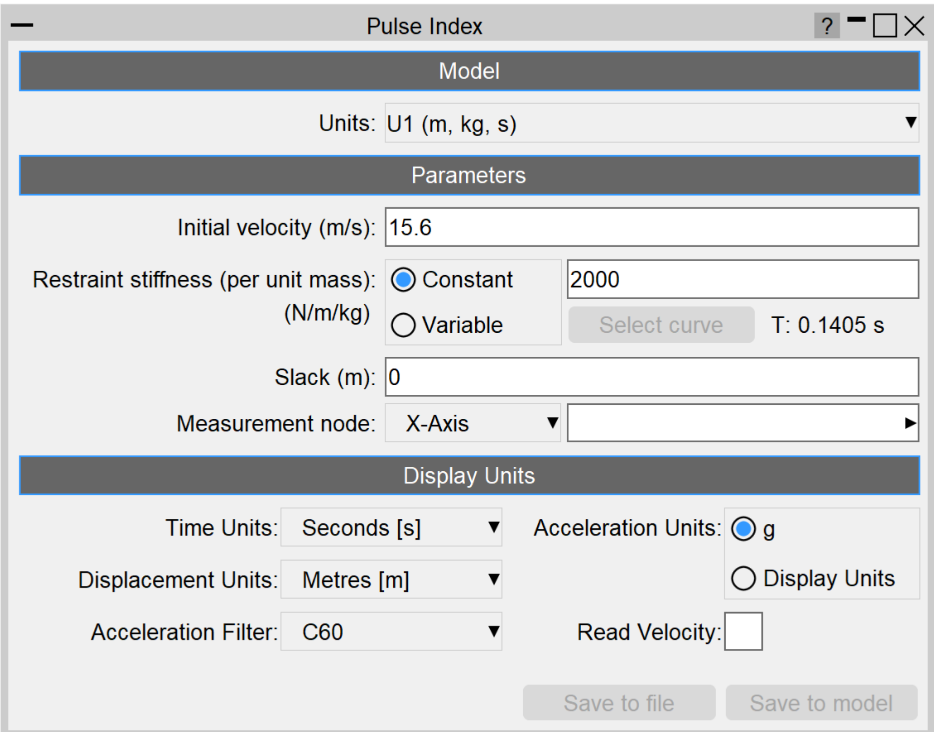
The tool assumes a virtual single-degree-of-freedom mass-spring system in which the occupant is represented by a **mass** and the seatbelt is represented by a **spring**. See below for more details of the pulse index calculation.

This virtual mass-spring system is effectively attached to a selected **node** moving with a set **initial velocity**.

The tool optionally takes a **slack** input to account for seatbelt engagement.

How to use the Pulse Index tool in PRIMER

Access the Pulse Index tool from the Workflows menu in PRIMER. Upon selecting the Pulse Index tool, the following menu will appear:



Units System

Select the appropriate units system for your model. All of the input **Parameters** will be expecting an input in the selected units system. When the selected unit system is changed, all existing inputs are automatically converted to the new units system.

Initial velocity

Enter the initial velocity of the vehicle.

Restraint stiffness

The Pulse Index can either be calculated with constant or variable restraint stiffness (must be a non-zero positive value). The model assumes a unit mass therefore the restraint stiffness must be scaled accordingly based on the expected mass of the occupant. For **Constant** stiffness, enter a non-zero stiffness value. For **Variable** stiffness, select a *DEFINE_CURVE keyword that defines the variable stiffness in terms of the model units (you may need to create a new keyword before making the selection). If a constant stiffness is provided, the time period \(T\) for the mass spring system will be displayed to the right of the Select Curve button (this allows the user to ensure the given stiffness is reasonable).

Slack (optional)

You can choose to add slack to the seatbelt. This option allows the virtual vehicle occupant to move freely for a specified distance before the restraint stiffness begins to take effect. Slack works with both constant and variable stiffness options.

Measurement node

Select a *DATABASE_HISTORY_NODE that will be used as the node on the vehicle structure to which the virtual single-degree-of-freedom mass-spring system will be attached.

Display Units

Select time (Seconds or Milliseconds) and displacement units (Metres, Millimetres or Feet) to use on the graphs using the dropdowns. For the acceleration graph use the radio buttons to calculate in g or the display units. Please note if the Unit System is changed, the Time and Displacement Units will default to the matching ones for the Unit

System, for example changing to U5 would default the Time units to Seconds and the Displacement units to Feet.

Acceleration Filter

Select the filter which is applied to the vehicle acceleration data before calculation. You can choose from three options, C60, C180, and C600.

Read Velocity

If desired, vehicle velocity can be used in the calculation rather than vehicle acceleration. This is done by differentiating the velocity curve with respect to time and using the resulting curve in place of direct vehicle acceleration data.

Save

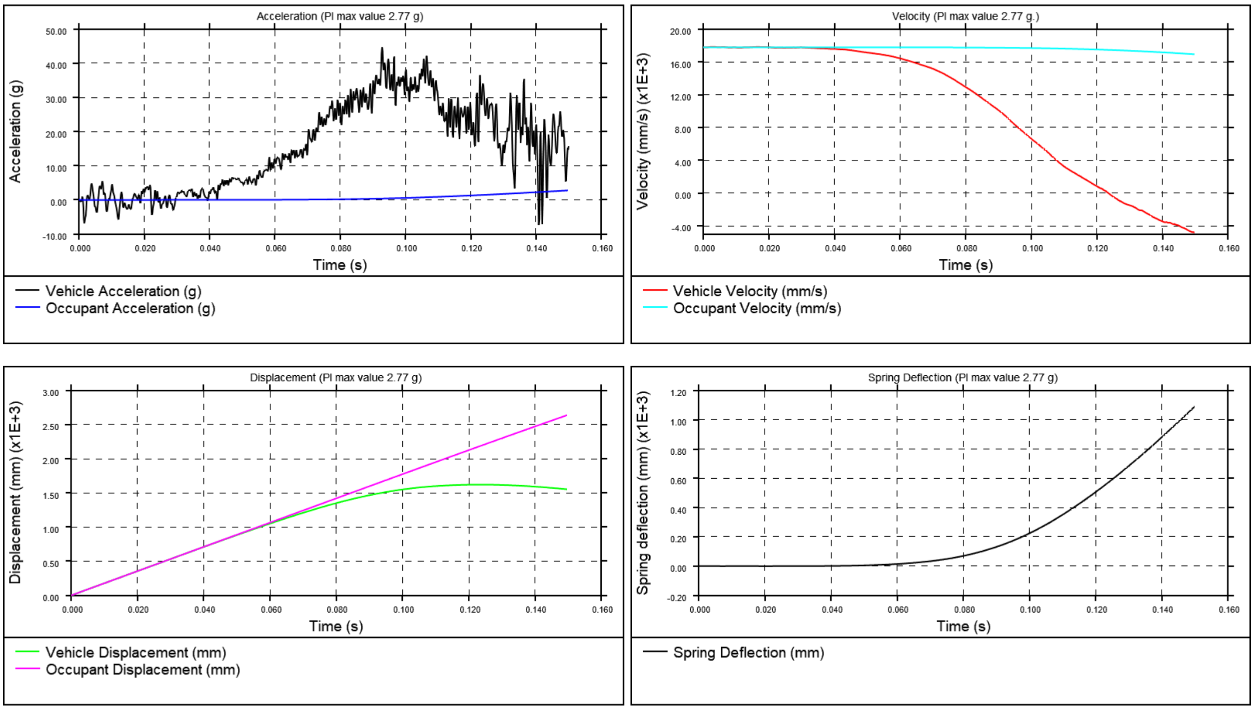
You can save the Workflow Definition to a .json file or to the model (as post-*END data). When saving to the model, you will need to write the model from PRIMER in order to save the changes to the keyword file.

How to use the Pulse Index tool in T/HIS

Access the Pulse Index tool from the Workflows menu in T/HIS. Upon selecting the Pulse Index tool, the same menu appears as in PRIMER. This allows you to adjust some of the input parameters when performing the pulse index calculation. The Measurement Node and Variable Stiffness settings can only be modified in PRIMER.

Calculate

If the input parameters are valid, the **Calculate** button will become active. Clicking **Calculate** executes the pulse index calculation and produces a four-graph layout comparing Vehicle and Virtual Occupant results, such as in this example:



Pulse Index Calculation

Initial Conditions

The vehicle and virtual occupant both start with zero initial displacement:

$$s_t^{veh} = s_t^{occ} = 0$$

The vehicle and the virtual occupant are both given the same initial velocity, defined by you in PRIMER. In PRIMER, you also specify the restraint system stiffness k and the measurement node for the vehicle acceleration a_t^{veh}.

Iterative Calculation

The Pulse Index Workflow performs an iterative calculation to determine the displacement s_t^{occ}, velocity v_t^{occ} and acceleration a_t^{occ} experienced by the virtual occupant over time. First, the vehicle's velocity v_{t+1}^{veh} and displacement s_{t+1}^{veh} at time $t+1$ are calculated from its acceleration a_t^{veh}:

$$v_{t+1}^{veh} = v_t^{veh} + a_t^{veh} * dt$$

$$s_{t+1}^{veh} = s_t^{veh} + v_t^{veh} * dt$$

Then the displacement x between the vehicle and virtual occupant is calculated and the effective spring displacement x_{eff} is found:

$$x = s_t^{occ} - s_t^{veh}$$

$$x_{eff} = (|x| - slack) \ge 0$$

The occupant acceleration is then calculated from the spring displacement, and the restraint stiffness k. Occupant mass m has been included in the below equation for clarity, however, since a unit mass is taken it can effectively be ignored:

$$a_t^{occ} = \frac{k}{m}x_{eff}$$

Finally, the occupant's resultant velocity and displacement are calculated, ready for the next time iteration:

$$v_{t+1}^{occ} = v_t^{occ} + a_t^{occ} * dt$$

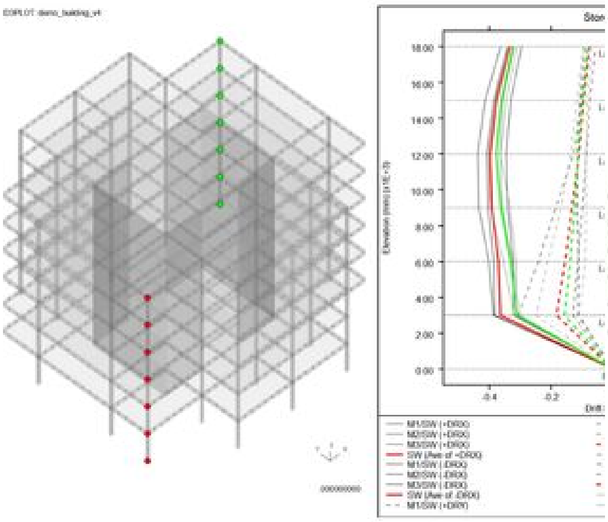
$$s_{t+1}^{occ} = s_t^{occ} + v_t^{occ} * dt$$

4.7. Seismic

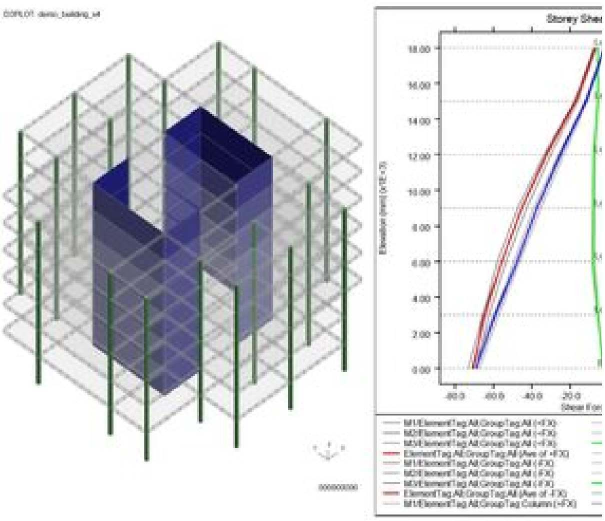
Seismic Workflows

These are a collection of workflows catered to help you interrogate the results of your seismic analysis and generate automated reports.

Currently, there are two workflows available for generating global structural results:



[Storey Drift]



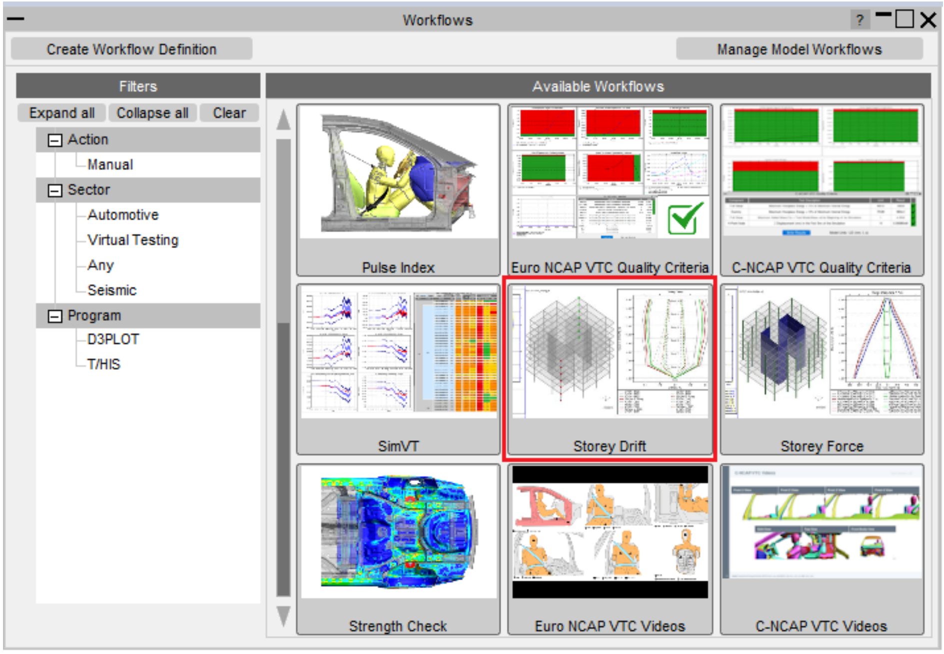
[Storey Force]

4.7.1. Storey Drift

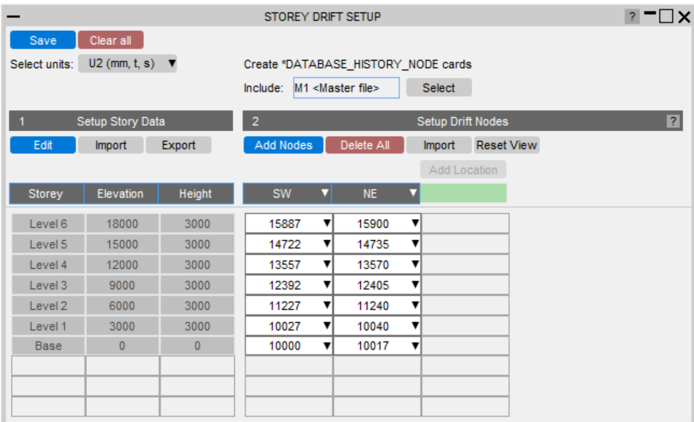
Storey Drift

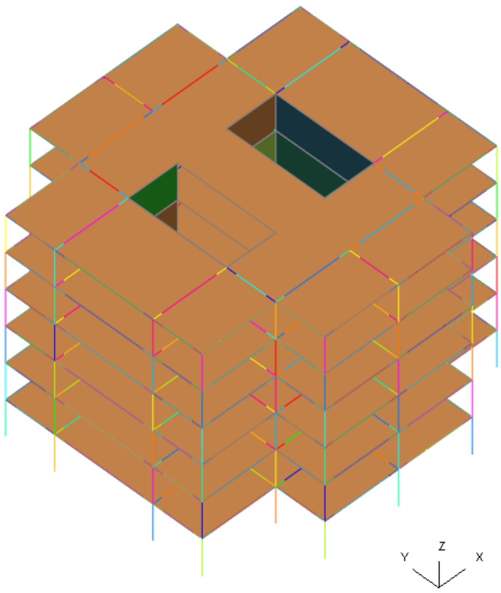
Tools → Workflows → Storey Drift

The Storey Drift workflow tool is used to post-process building drifts on various locations in the structure which can be used to check compliance against relevant building standards.



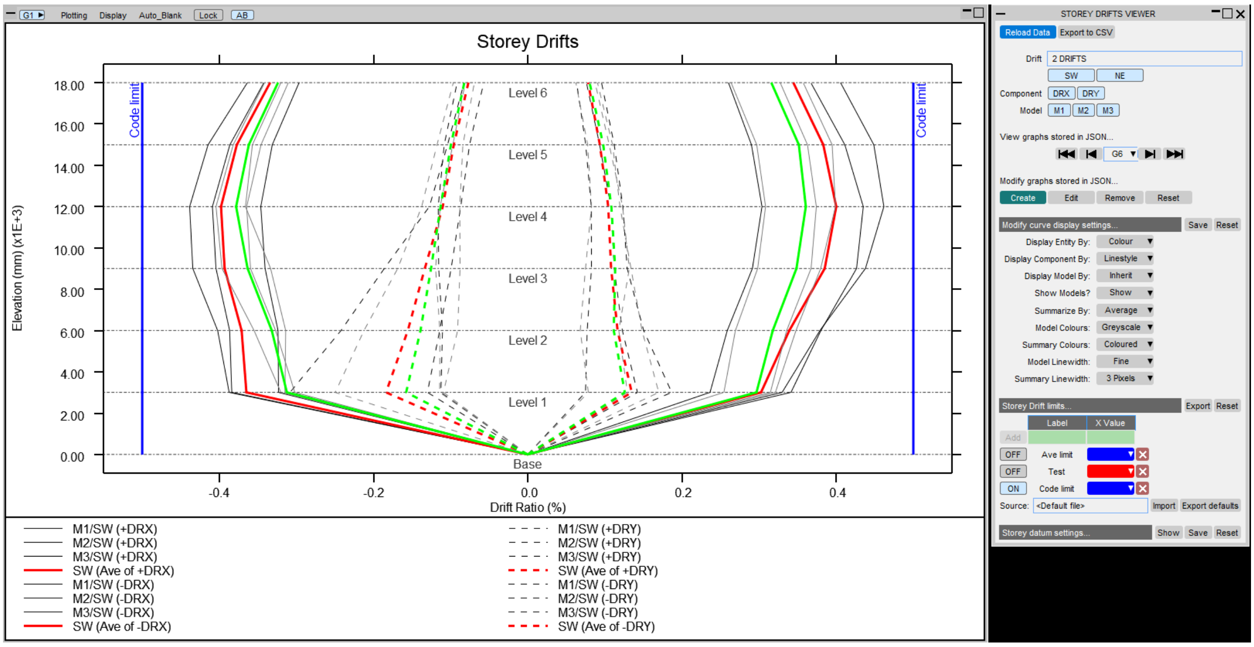
In PRIMER, you can setup drift locations, defining nodes for each storey of the building.





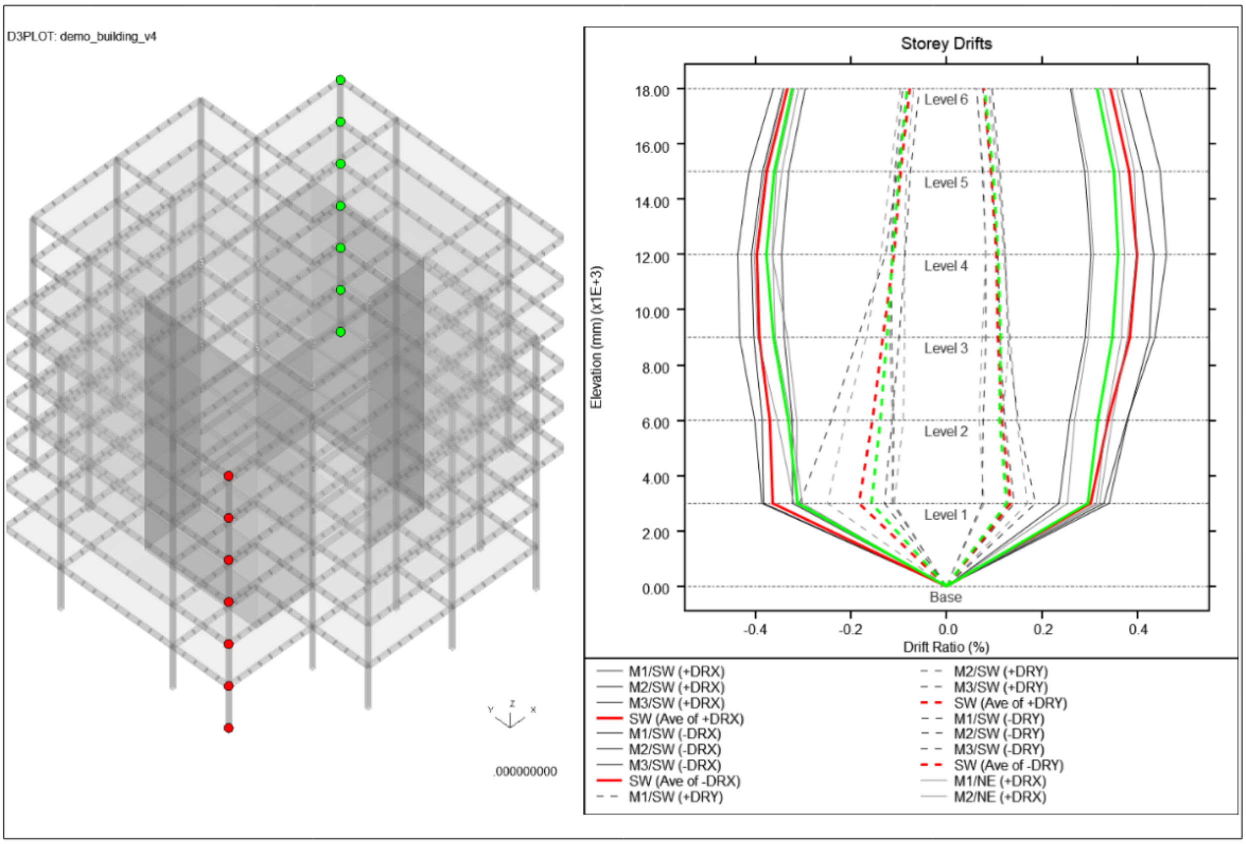
In T/HIS, storey drifts are calculated for each of the locations you defined in PRIMER and then storey curves are generated – plotted on graphs.

This allows you to interrogate the global behaviour of the structure and make changes to member designs or structural layout if necessary.



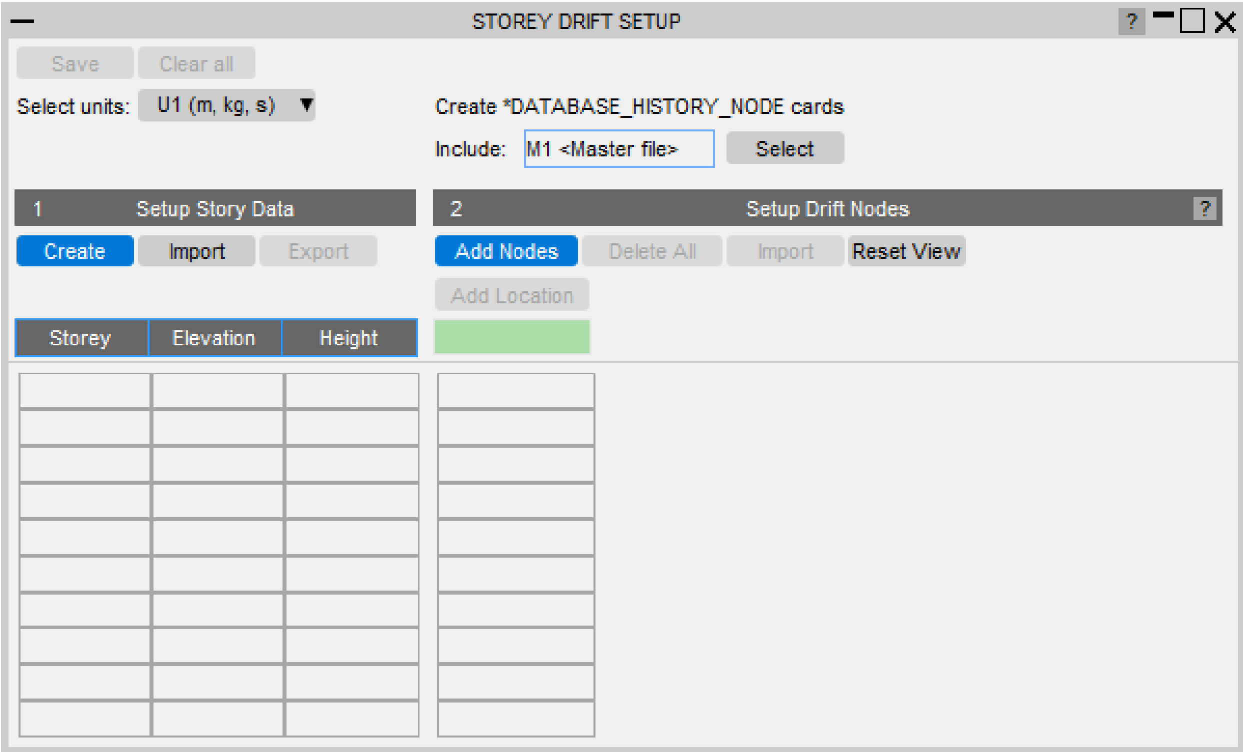
Finally, you can generate automated reports with the REPORTER templates provided.

In the report, corresponding D3PLOT views are paired with each T/HIS plot to visually locate the drifts in the model.

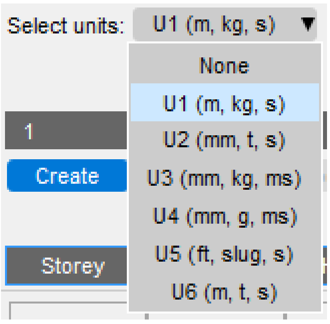

D3PLOT: demo_building_v4
Storey Drifts
Elevation (mm) (x1E+3)
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
Level 6
Level 5
Level 4
Level 3
Level 2
Level 1
Base
-0.4
-0.2
0.0
0.2
0.4
Drift Ratio (%)
M1/SW (+DRX)
M2/SW (+DRX)
M3/SW (+DRX)
SW (Ave of +DRX)
M1/SW (-DRX)
M2/SW (-DRX)
M3/SW (-DRX)
SW (Ave of -DRX)
M1/SW (+DRY)
M2/SW (+DRY)
M3/SW (+DRY)
SW (Ave of +DRY)
M1/SW (-DRY)
M2/SW (-DRY)
M3/SW (-DRY)
SW (Ave of -DRY)
M1/NE (+DRX)
M2/NE (+DRX)
.000000000

Storey Drift Setup

When the tool is launched in PRIMER, a window appears for you to set up the drift definitions you wish to process:

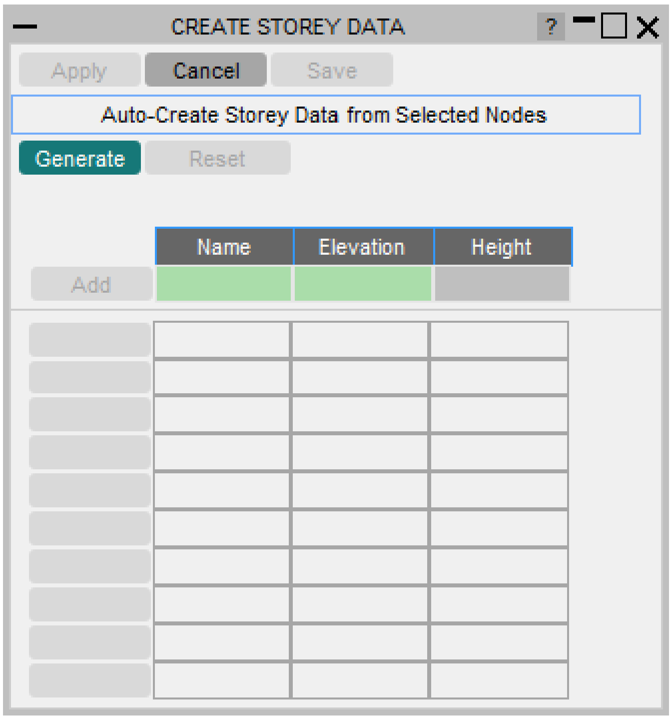


First, you need to choose the appropriate unit system from the dropdown menu:



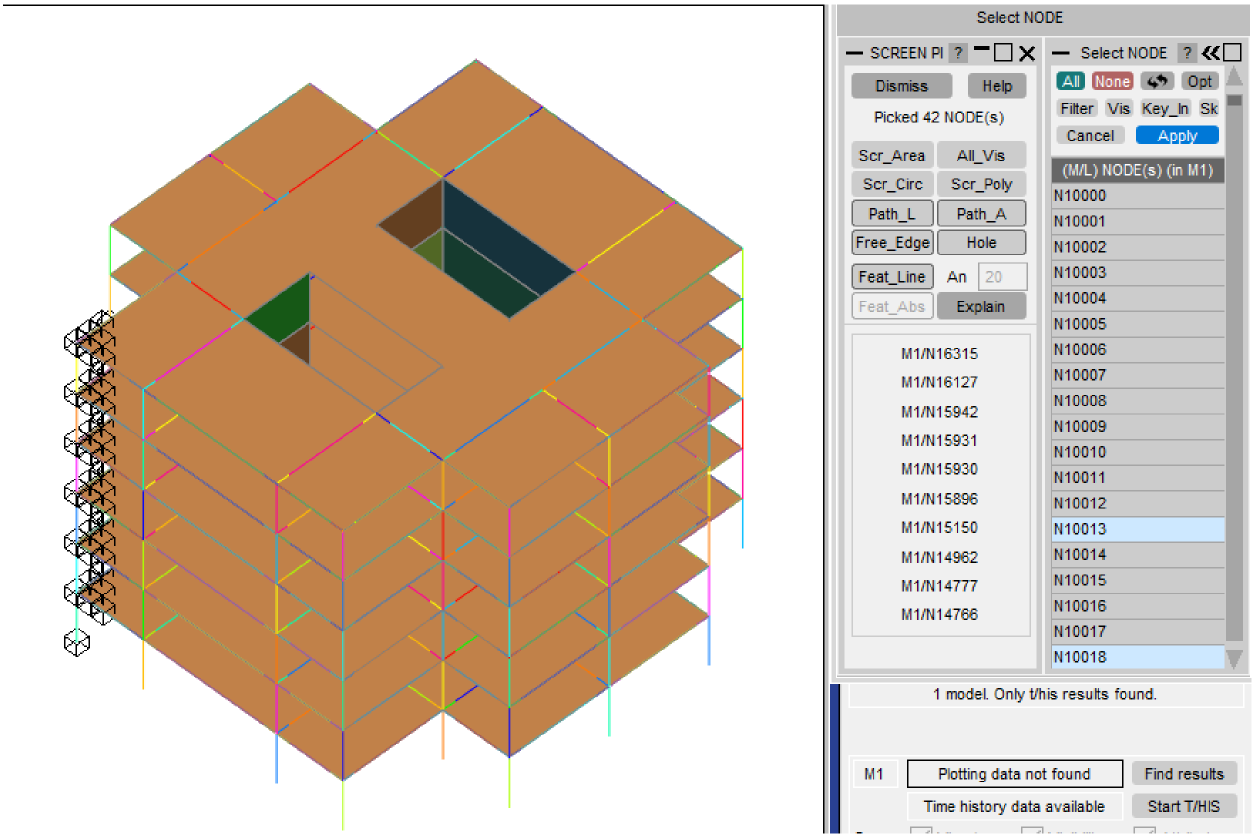
Defining Storey Data

You can define the storey data for the structure either by clicking the **Create** button or the **Import** button under the Setup Storey Data section. **Import** allows you to import previously saved storey definitions (e.g. those created for the Storey Force workflow). When you click **Create**, the Storey Data window appears:



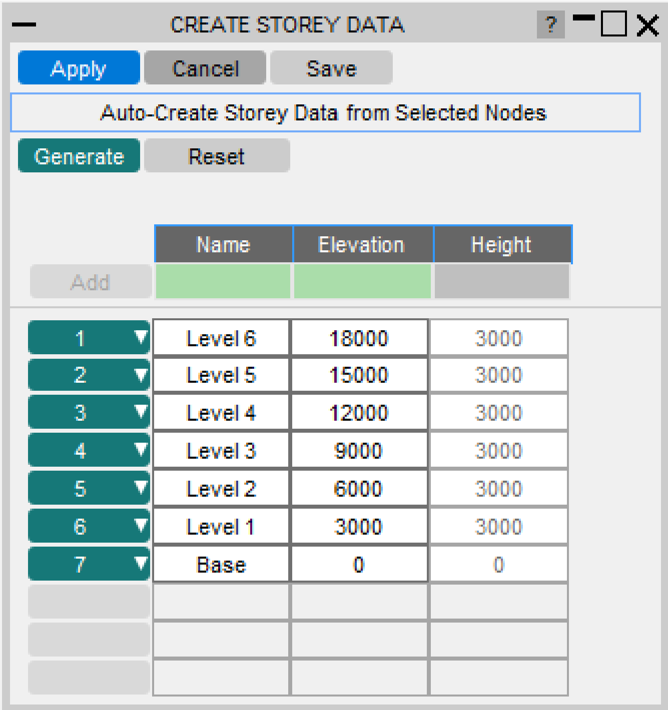
Each storey can be defined manually by populating **Name** and **Elevation** textboxes and then clicking the **Add** button which will be activated if the inputs are valid.

Alternatively, you can define multiple storeys automatically by clicking **Generate**. You will be prompted to select nodes in the model. This will then generate storeys for each unique elevation (z-coordinate) among the nodes you have selected. Finally, you can then modify the labels of each generated storey to be more informative for your project.



Click **Apply** to import the storey data back to the main setup window.

You can optionally save this data by clicking **Save**. This will write it to a separate JSON file, which you can **Import** when you are starting a new setup. Normally, storey data would be applicable to multiple Seismic workflows, so saving this data will be useful to those other workflows too.

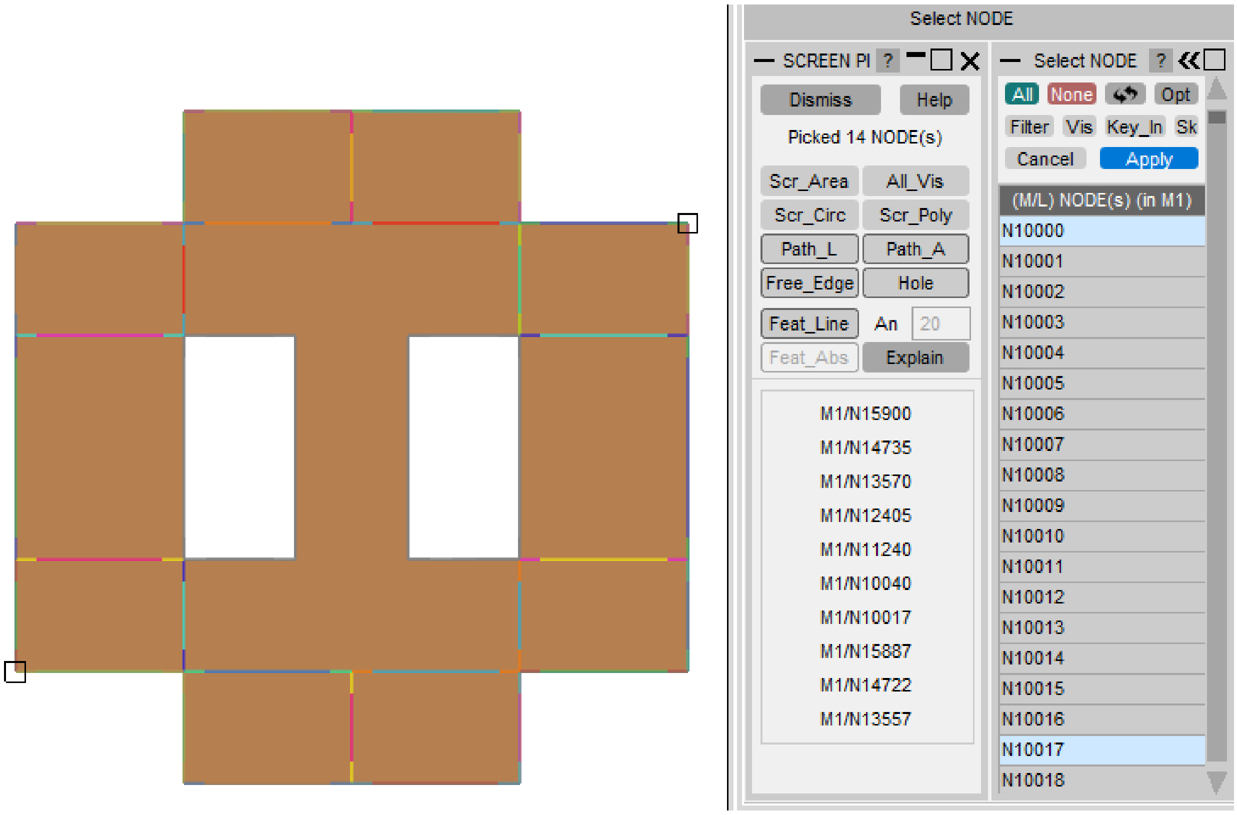


Defining Drift Locations

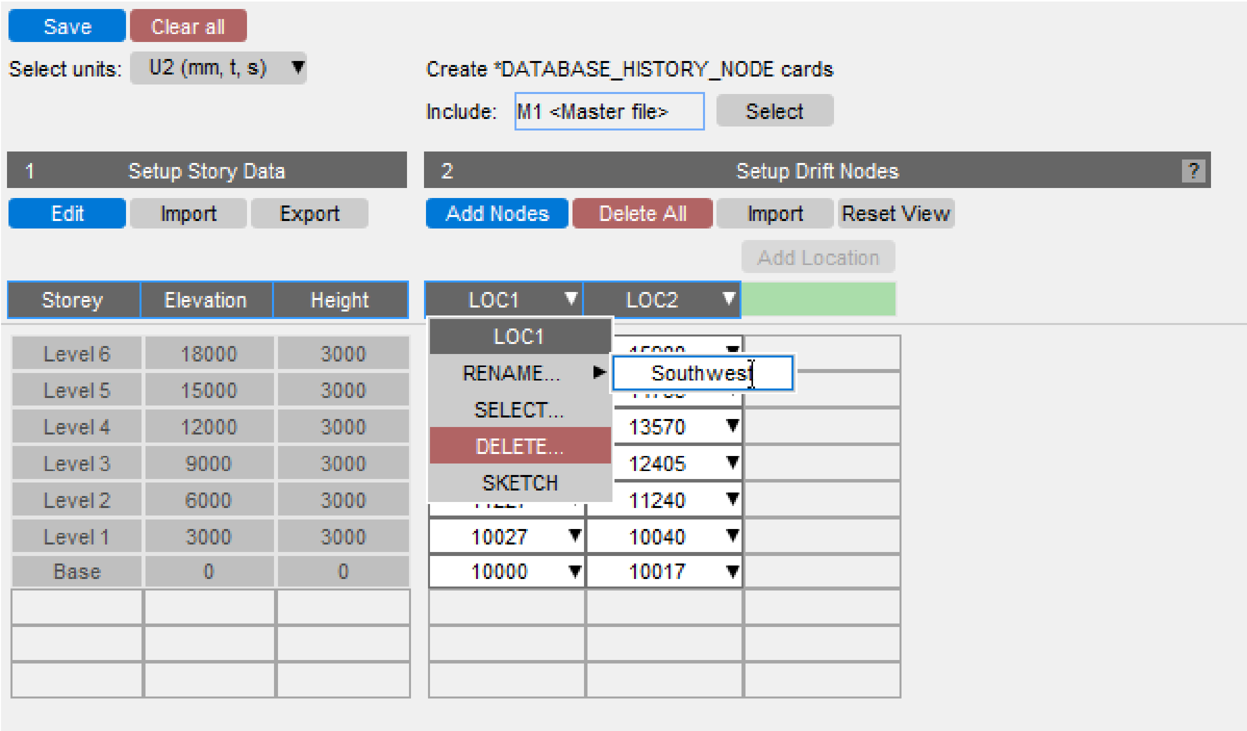
There are two ways to define drift locations.

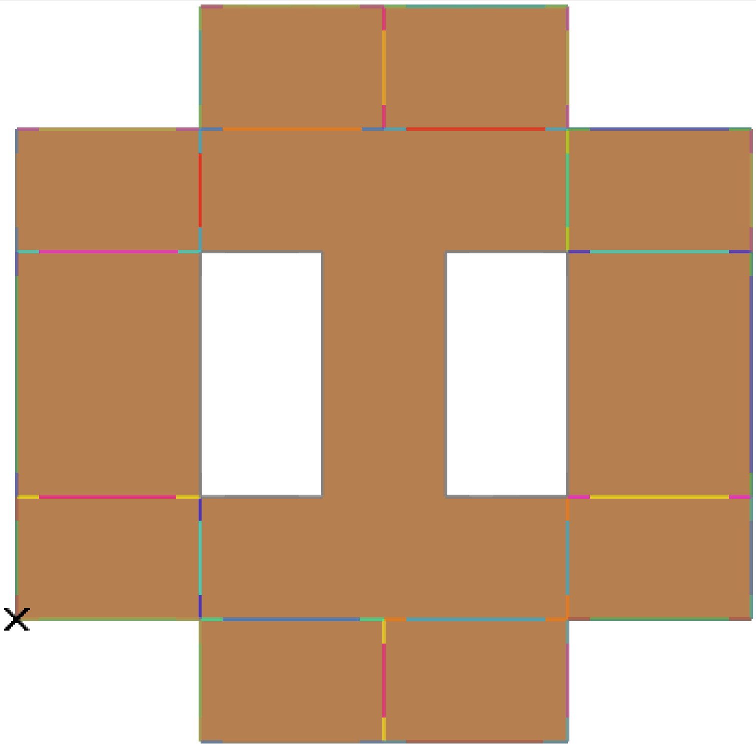
1. Create several at once using **Add Nodes**.
2. Create one at a time by defining the drift label in the column header text box and then clicking **Add Location**.

You can define multiple drift nodes at once by clicking **Add Nodes**. You will then be prompted to select nodes in the model. It is recommended to select nodes in plan view to do this quickly:

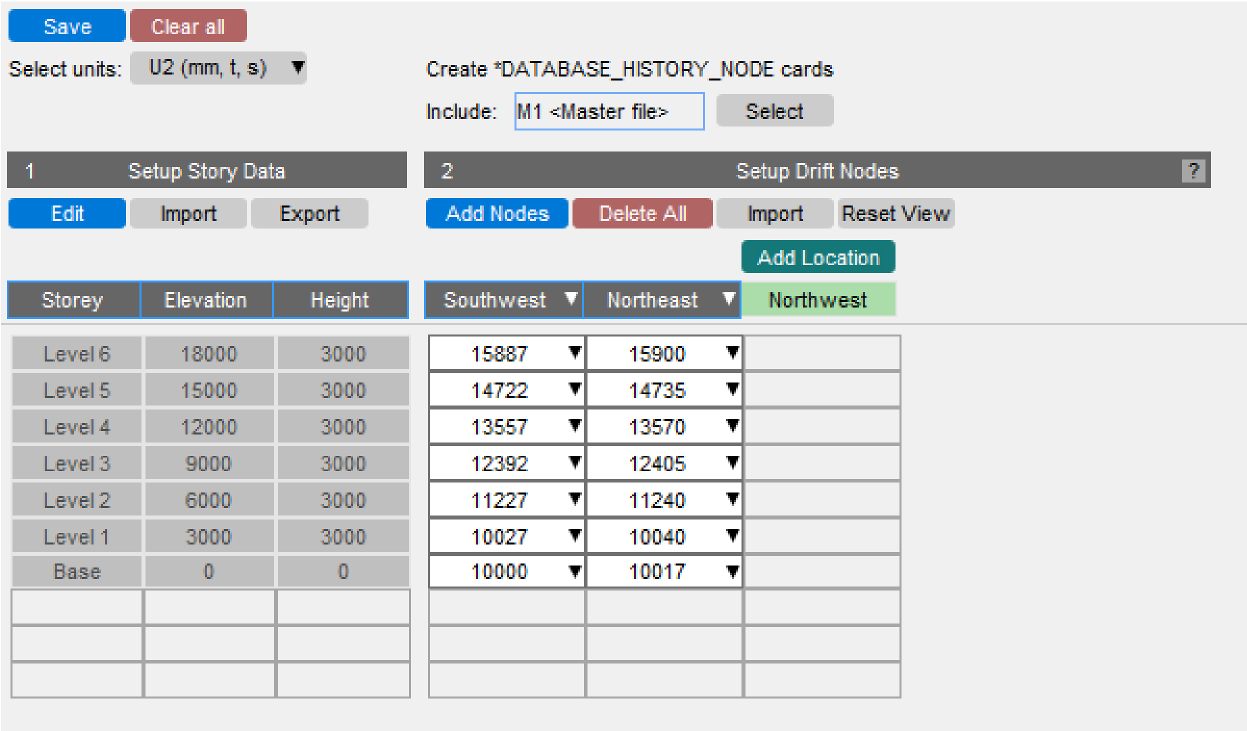


The drifts will be assigned with default labels. By right-clicking the drift header, you can rename the drift with a more informative label, as shown below. You can click **Sketch** in this popup menu to locate the drift nodes in the model, helping you to define an appropriate drift label. You can also redefine new drift nodes for an existing drift via **Select**, and even delete a current drift via **Delete**.



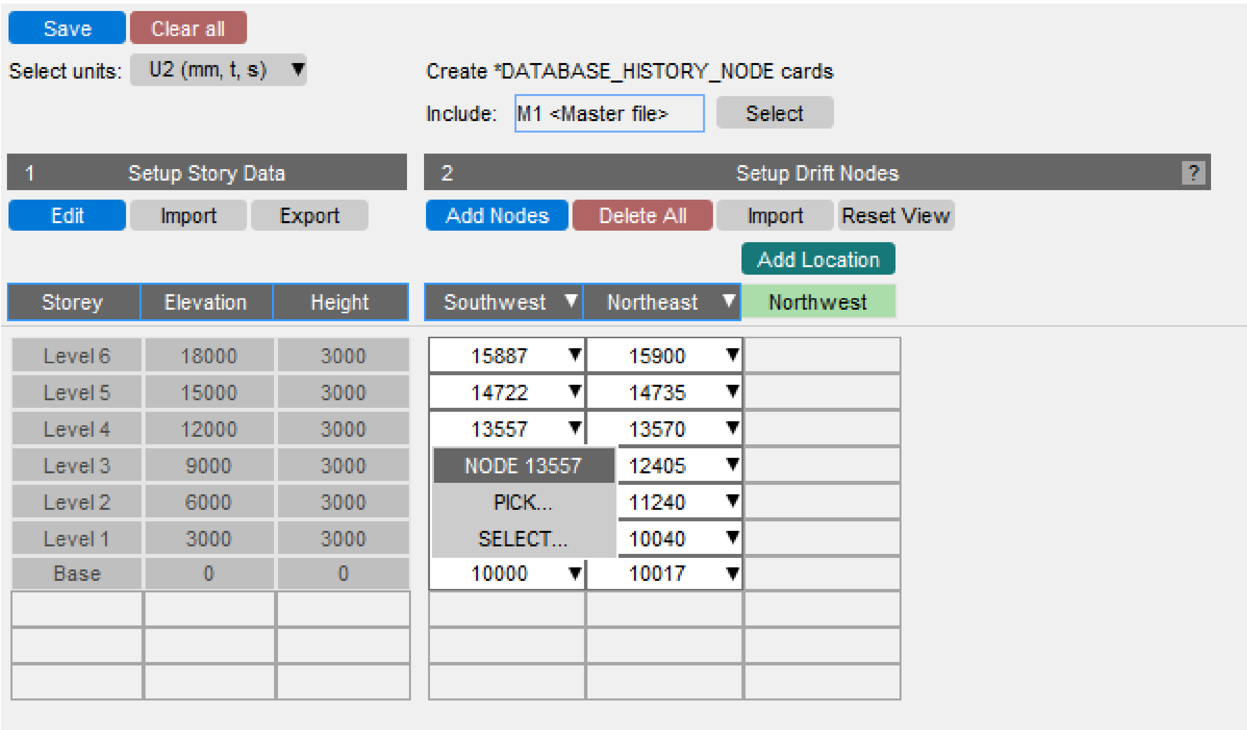


To add drift locations individually, define the drift label in the column header text box and click **Add Location**. A new blank drift column will be added to the table. You can then add nodes by right-clicking the drift header and then clicking **Select**.



You may wish to update specific nodes on each drift manually. To do this, right-click the desired drift node on the table and use either **Pick** or **Select** in the popup menu.

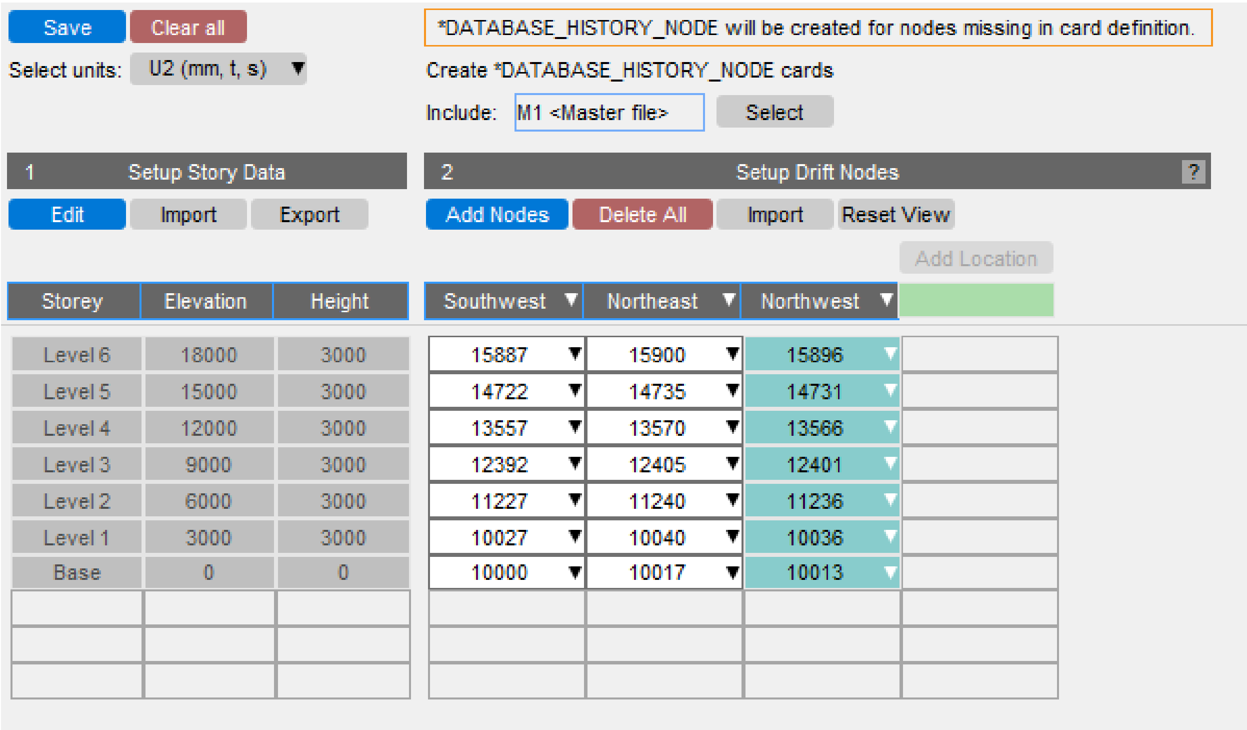
To delete a node for a particular storey in the drift, just delete the contents of the cell in the table.



Writing the Workflow File

Once all data has been defined, save the drift setup by clicking **Save**. This will write a Workflow file in JSON format. This file will be used to post-process the defined drifts in T/HIS and create a report in REPORTER.

The Storey Drift Workflow tool has been designed to be used on a sweep of Ansys LS-DYNA runs with different ground motions applied to the same model. It is advised to save the Workflow file in the parent folder (the folder containing several child folders, each containing one set of ground motion results). Currently, this Workflow will only work properly if only **one Workflow file exists** in the parent folder, including its child folders. If you save this file in the folder of an individual model, then there is a risk to duplicate the Workflow file, which might cause problems later. This will most probably happen when you duplicate the original model to create a new model with a different ground motion input.



Database history output

For this workflow, **DATABASE_HISTORY_NODE(s)** will be generated for each drift node. Remember to save the .key file and rerun the model if necessary. As shown above, some defined nodes will be latent (highlighted in light blue). This means that the DATABASE_HISTORY_NODE(s) do not exist in the model yet. You would need to rerun the model so the results will be available in T/HIS.

Before saving the drift setup, you may also wish to select an include file for the DATABASE_HISTORY_NODE(s). You can choose an include file by clicking **Select** above the Setup Drift Nodes header. The tool will add any DATABASE_HISTORY_NODE keywords created to your selected include file.

Resetting the data

To reset all data, click **Clear all** and start the whole process again to define a new drift setup. Alternatively, use **Delete All** under the Setup Drift Nodes section to reset only the drift nodes while retaining the storey data.

Importing existing Workflow Data

When an existing Workflow file is present in the root folder, the storey data and drift nodes are automatically imported when you run this Workflow.

After removing all data in a current session, you can import the storey data and the drift nodes by clicking the **Import** buttons on each sub-section. Storey data must be imported first before importing the drift nodes. Every node on each drift specified in the Workflow file are validated. If a node does not exist, it will be highlighted in the table, flagged as an error. For further details on importing storey data, please refer to the following section.

Importing existing Storey Data

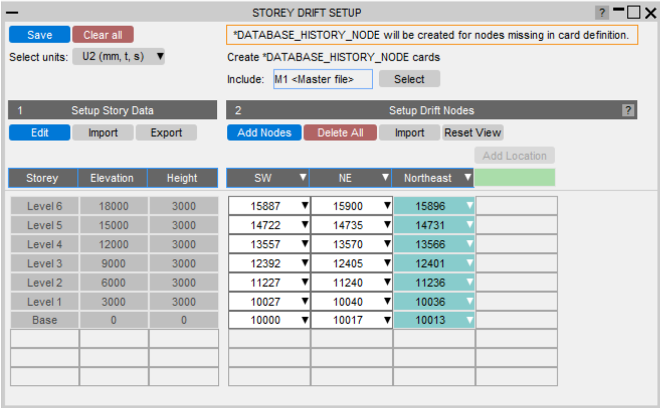
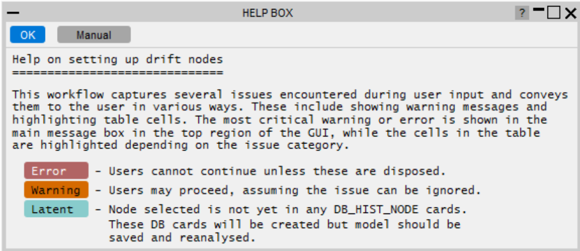
As mentioned on the section above, you can import pre-defined storey data to quickly define storeys. The storey data may exist in an **external JSON file** or in the **Workflow file**. If it is present, you will be prompted to use an existing Workflow file. If you **choose not to**, then a file selector popup will appear so you can select an external JSON file.

Dealing with input Errors/Warnings

You might encounter errors or warnings when populating the drift table.

If errors exists, the **Save** button will be disabled so you cannot proceed unless the errors are addressed. On the other hand, warnings will not disable the **Save** button so you may still proceed with caution. Make sure the warnings are expected and intended. For example, drift nodes on one drift location might sit on different XY coordinates. If the difference is outside the tool's tolerance, this tool will show you a warning. You may then proceed or update the selection.

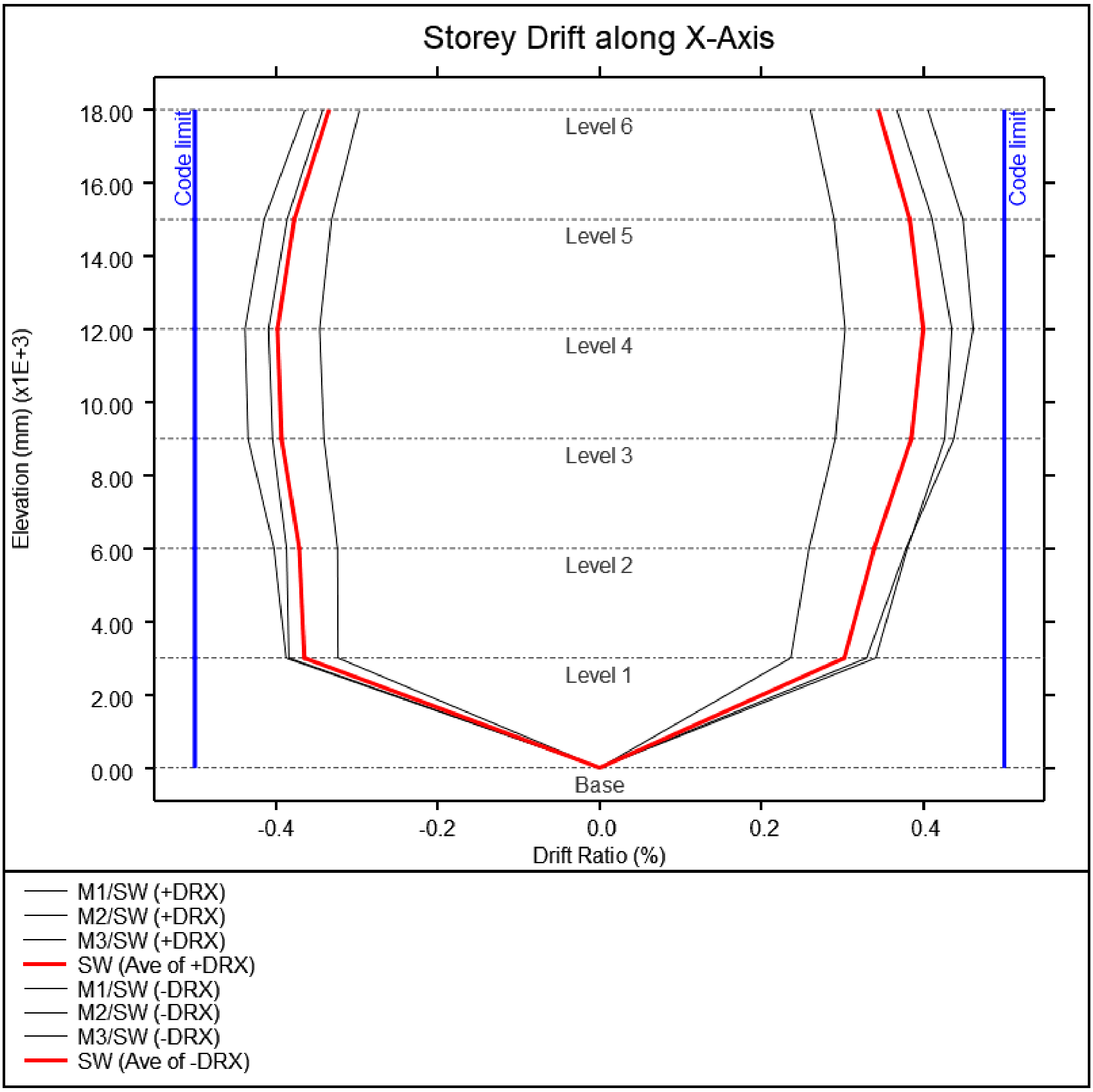
The **most critical warnings and errors** will be shown at the top of Setup Drift Nodes section for your information. The cells related to input errors/warnings will be **colour-coded**. More details on these is available on the **Help** button on the right side of the Setup Drift Nodes section header.


STOREY DRIFT SETUP
Save
Clear all
Select units:
U2 (mm, t, s)
*DATABASE_HISTORY_NODE will be created for nodes missing in card definition.
Create *DATABASE_HISTORY_NODE cards
Include:
M1 <Master file>
Select
1 Setup Story Data
Edit
Import
Export
2 Setup Drift Nodes
Add Nodes
Delete All
Import
Reset View
Add Location
Storey
Elevation
Height
SW
NE
Northeast
Level 6 18000 3000 15887 15900 15896
Level 5 15000 3000 14722 14735 14731
Level 4 12000 3000 13557 13570 13566
Level 3 9000 3000 12392 12405 12401
Level 2 6000 3000 11227 11240 11236
Level 1 3000 3000 10027 10040 10036
Base 0 0 10000 10017 10013

HELP BOX
OK
Manual
Help on setting up drift nodes
==============================
This workflow captures several issues encountered during user input and conveys them to the user in various ways. These include showing warning messages and highlighting table cells. The most critical warning or error is shown in the main message box in the top region of the GUI, while the cells in the table are highlighted depending on the issue category.
Error - Users cannot continue unless these are disposed.
Warning - Users may proceed, assuming the issue can be ignored.
Latent - Node selected is not yet in any DB_HIST_NODE cards. These DB cards will be created but model should be saved and reanalysed.

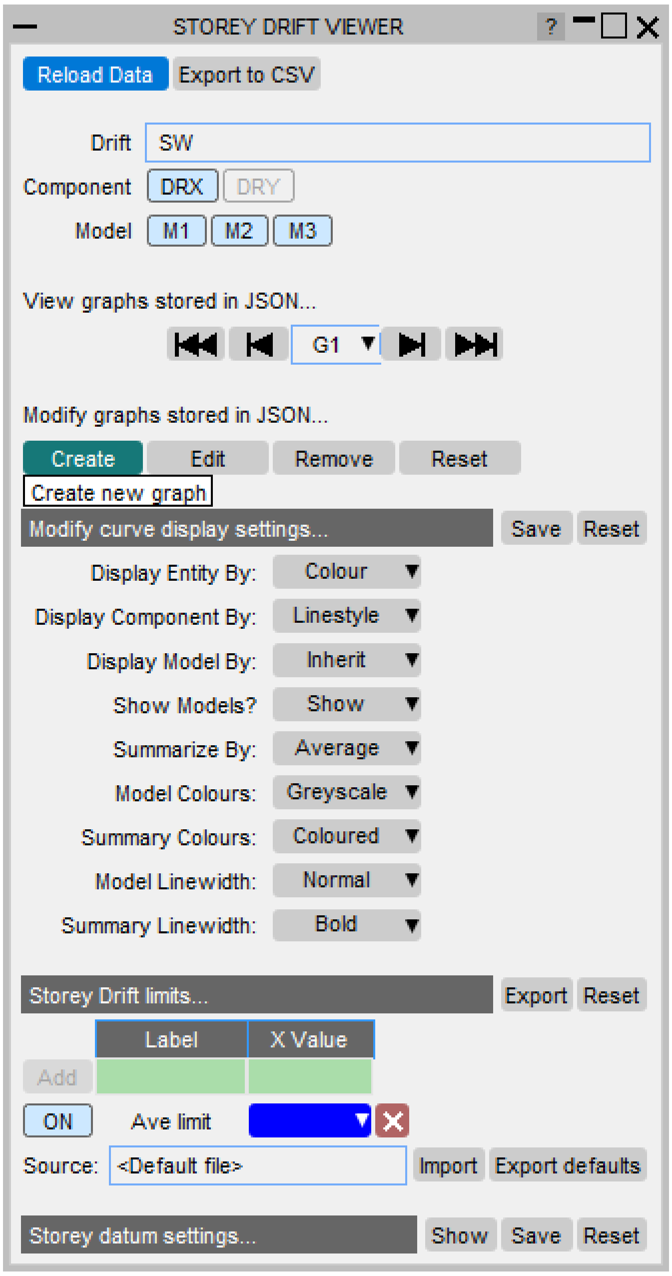
Storey Drift Viewer

When the tool is launched in T/HIS, the storey drift curves will be generated for each graph setup existing in the Workflow file. Then you will be presented with this window below.

When the Workflow file is initially created from PRIMER, default graph setups are included – one for each direction component, for each drift location defined. The storey drift curves will be created for each of these graph setups and the first graph setup will be plotted in T/HIS and will be active in the Viewer GUI:



Storey Drift along X-Axis
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
Elevation (mm) (x1E+3)
Code limit
Code limit
Level 6
Level 5
Level 4
Level 3
Level 2
Level 1
Base
-0.4
-0.2
0.0
0.2
0.4
Drift Ratio (%)
M1/SW (+DRX)
M2/SW (+DRX)
M3/SW (+DRX)
SW (Ave of +DRX)
M1/SW (-DRX)
M2/SW (-DRX)
M3/SW (-DRX)
SW (Ave of -DRX)

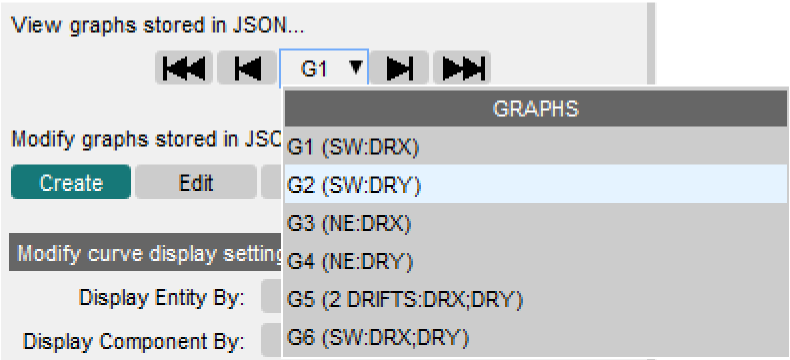


The Viewer GUI is generally split into four sections listed below:

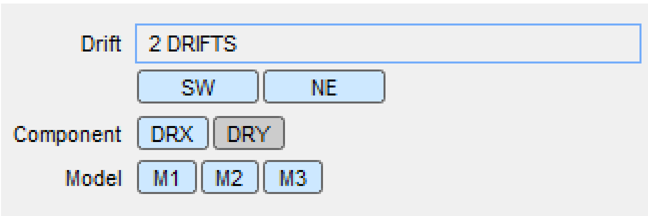
1. Graph selection/creation panel
2. Curve display settings
3. Storey drift limits definition
4. Storey datum settings

Graph selection/creation panel

This panel allows you to cycle through the graphs you have generated. You can use the navigation buttons to view the graphs sequentially or you can select a graph from the combo box.



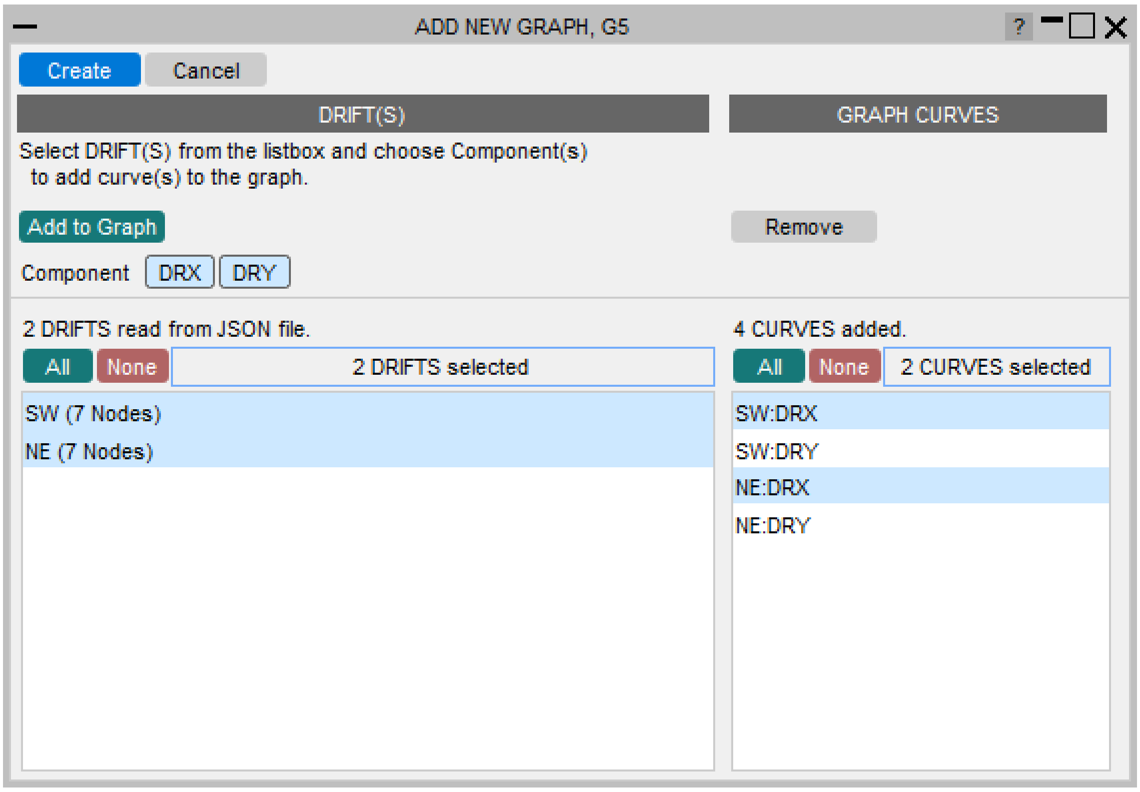
You will be provided with three toggles: **drift locations**, **direction components**, and **model**. The toggle for drift locations will only be shown if more than one drift is included in the current graph setup. All direction component toggles will be shown, but only those included will be active. Finally, the model toggles will only be visible if more than one model is loaded in the current T/HIS session.



In this panel, you are provided with control buttons allowing you to create or modify graph setups.

To create a new graph, click **Create**. You will then be presented with a new window as shown below. Select the drifts and direction components you want to include. Once the selection is made, the **Add to Graph** button will be active. Click **Add to Graph** to generate the list of curves that will be added to the graph, which will be shown on the list box on the right. You may then do some final selection adjustments (e.g. you can remove some of the curves listed by selecting them and clicking **Remove**).

Once you have finalised the curves you wish to include, click **Create** to generate the new graph and return to the **Plot Viewer** window.



Other commands available to you are as follows:

1. **Edit** allows you to modify the currently active graph setup in your **Plot Viewer**. You will be shown with a similar window as for **Create**.
2. **Remove** allows you to delete the currently active graph setup. This will not delete the T/HIS curves associated with the graph.
3. **Reset** deletes every graph setup and recreates the defaults set in PRIMER.

Modifications made in the graph selection panel will be automatically saved to the Workflow JSON file.

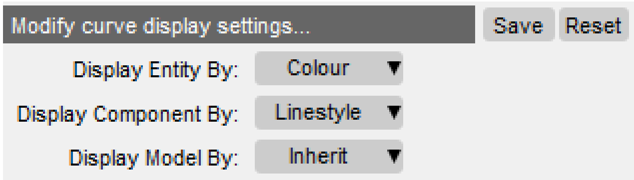
You can also export the current T/HIS curves to an external file. You can do this by clicking **Export to CSV**.

Curve display settings

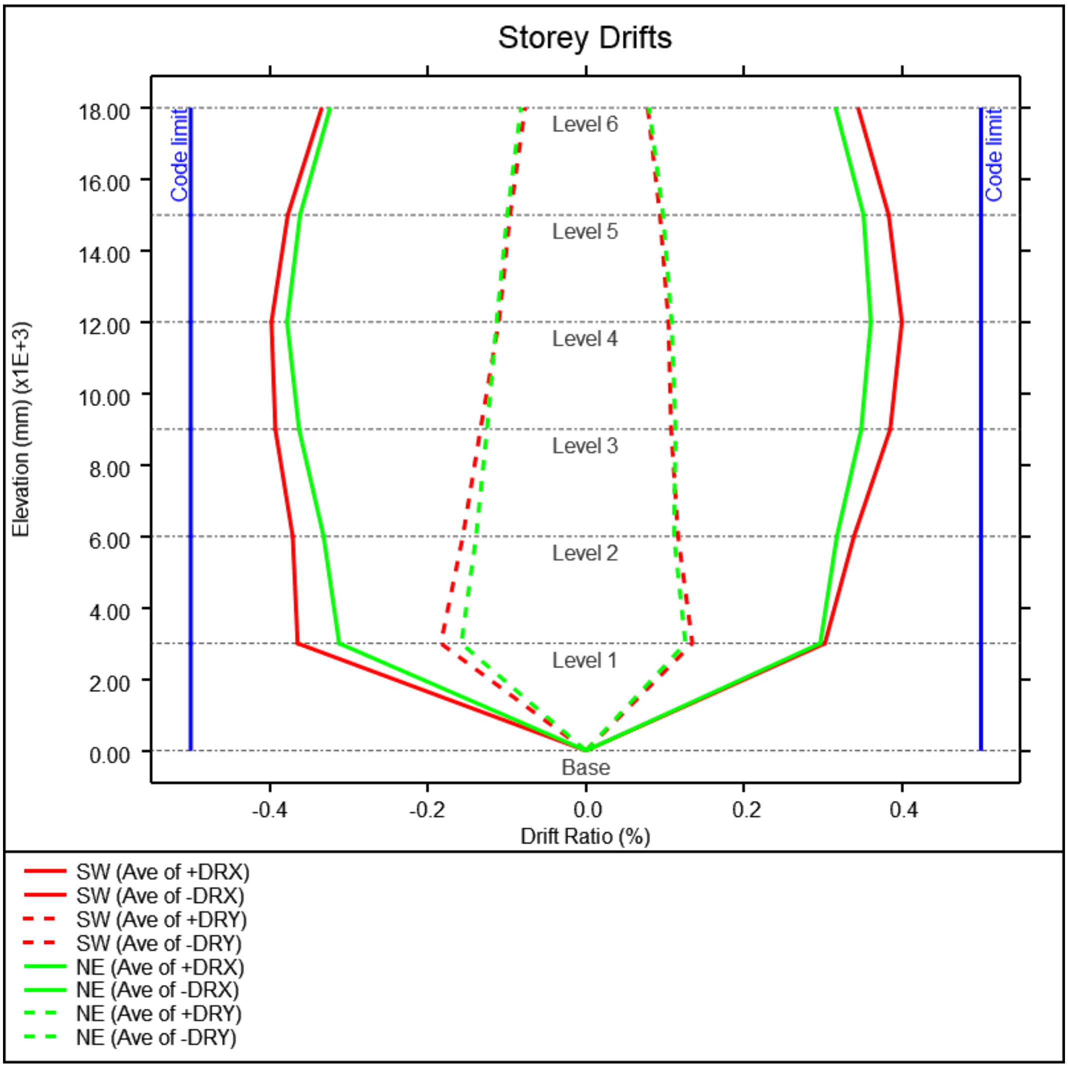
This panel allows you to define the formatting of the curves in the T/HIS graph. These settings will be applied to all graph setups stored in your Workflow file. Later, when you generate the report, REPORTER will read these settings and apply the styling you have defined.

The Workflow file will hold two separate sets of settings for **single model mode** and **multiple model mode**. This is because you may want to have different settings when you are plotting results for only one model and when you are plotting results for multiple models. If you are intending to generate reports containing results from a single model and from multiple models, you need to define the settings for these two modes separately.

The first three settings are responsible for categorising your curves by drift location, direction component and model – in the following hierarchy order:

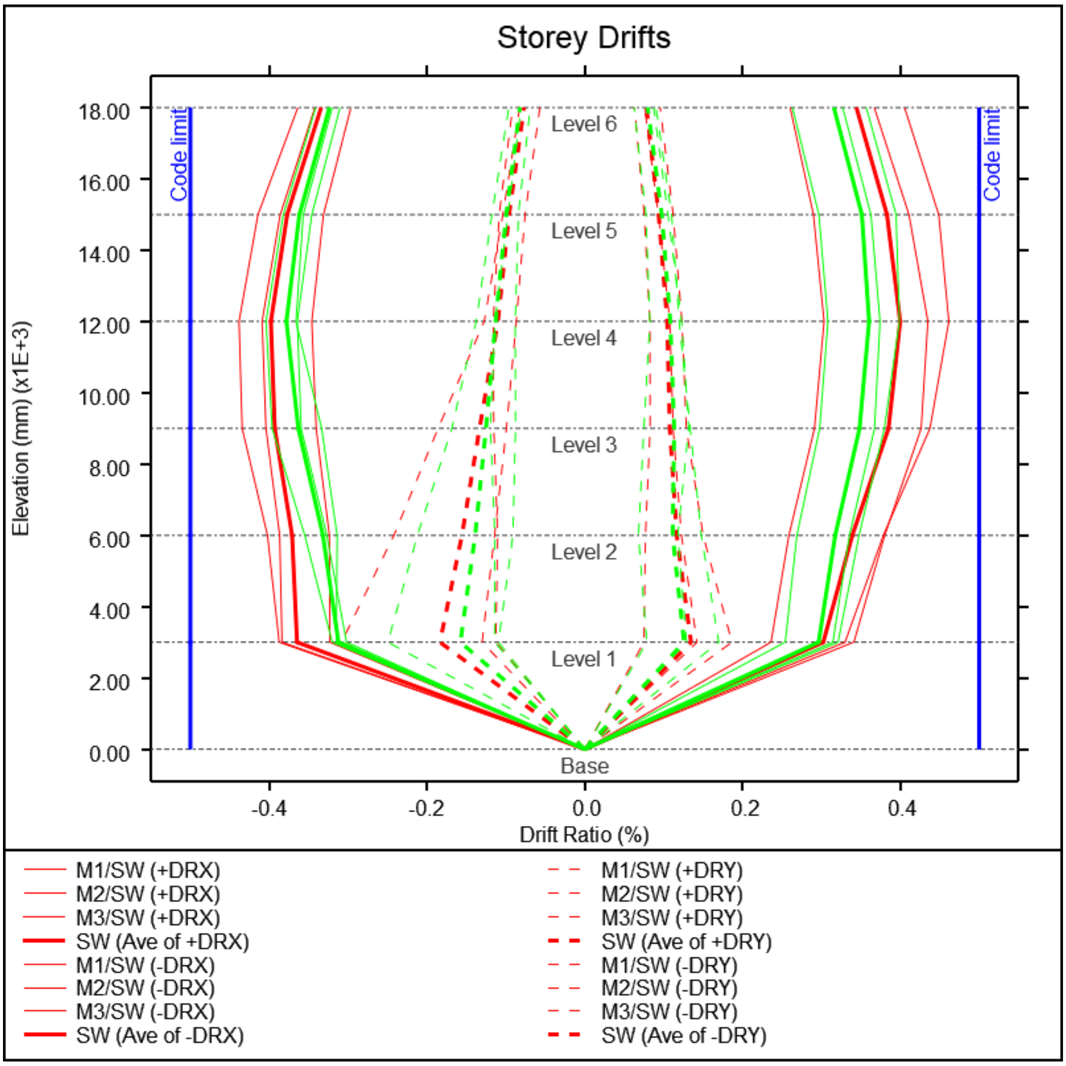


You can categorise the drift locations and direction components by **Colour** or **Line style.** For example, if you display the drift locations by colour and the direction components by line style, the tool will then assign one colour for all curves under a drift location and will assign one line style for all curves under a direction component. As shown in the example below, all curves under **Drift SW** are red and all the curves representing **drifts along the X direction** (DRX) have solid lines:



You can also categorise the models by Colour or Line style. For models, there is a third option called **Inherit** (which is set by default). This option essentially tells the tool that the curves **will not be categorised by model**. Instead, they will just follow the formatting of the first two categories. This is particularly useful if you are more concerned with the aggregate curves and you are just displaying the model curves to see if there is an outlier compared to the aggregate curve. If you use this option, you can quickly identify visually which model curves are associated with an aggregate curve.

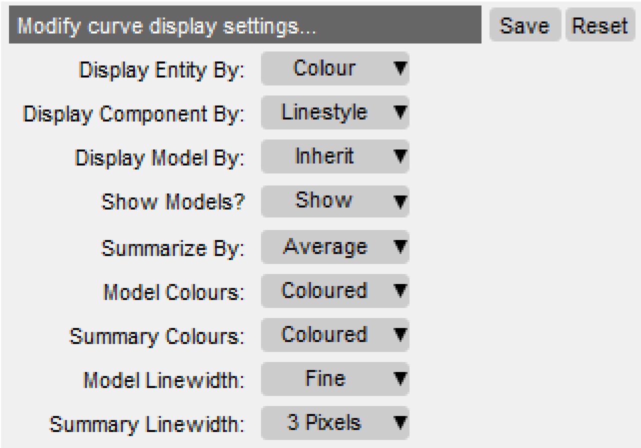
In the example below, the curves under **Drift SW** along **DRX** are solid lines in red colour. The curve representing the mean storey drifts follows the same format but with a thicker line width to differentiate it from the rest of the individual model curves under the same categories:



This current implementation of curve categorisation may not work for all scenarios, and could be improved further in future. Please contact us with your feedback.

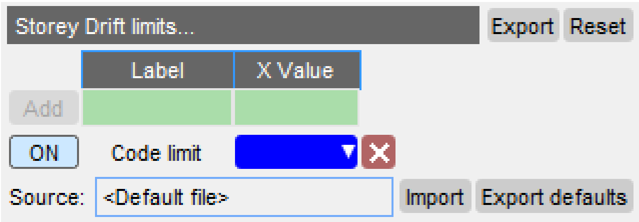
The other curve settings available to you are described below:

1. **Show Models** allows you to set if the model curves are shown or hidden in the plot. This is only relevant for **multiple model mode**.
2. **Summarize by** allows you to choose which aggregate curve is shown. You have the following options: **None, Average, Envelope**.
3. **Model Colours** allows you to choose if the model curves will be in **Colour** or **Greyscale**.
4. **Summary Colours** allows you to choose if the aggregate curves will be in **Colour** or **Greyscale**.
5. **Model Line width** allows you to set the line width for the model curves.
6. **Summary Line width** allows you to set the line width for the aggregate curves.



Any modifications made in this settings panel will not be automatically saved to the Workflow file. Click **Save** to write these settings to the Workflow file. You may also revert back to default settings by clicking **Reset**, which will simultaneously update these settings on the Workflow file.

Storey Drift limits



This panel allows you to define vertical curve limits on the positive and negative X-axis. These limits normally represent acceptable code standard drift limits. They are typically included in building design reports to demonstrate compliance.

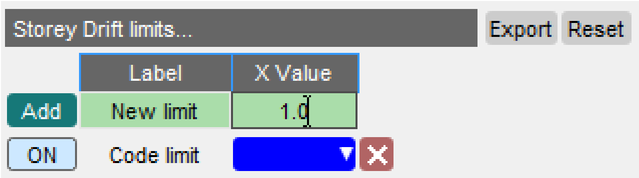
There are two types of vertical storey curve limits that you can define:

1. Constant curve limit along the structure elevation
2. Stepped curve limit, where the desired limit per storey extent varies

You can define a constant curve limit using this panel. In order to define a stepped curve limit, you need to import a CSV file. You can download an example plot limit input file by clicking **Export defaults**.

You can also import a constant curve limit using an external file and this file may contain multiple curve limits of different types. Theoretically, you can store all your curve limits into one file to quickly generate them later.

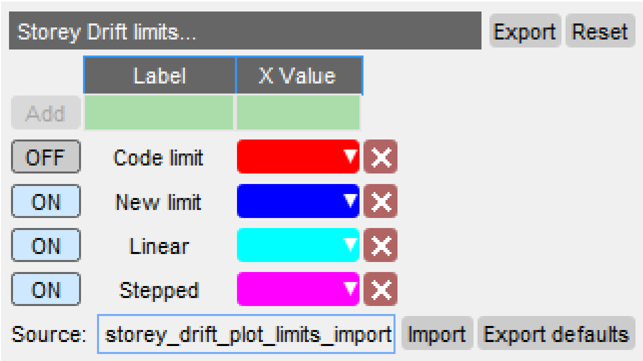
To define a constant curve limit, you would need to define a label and the X-axis value on the text boxes provided. Then, click **Add**.

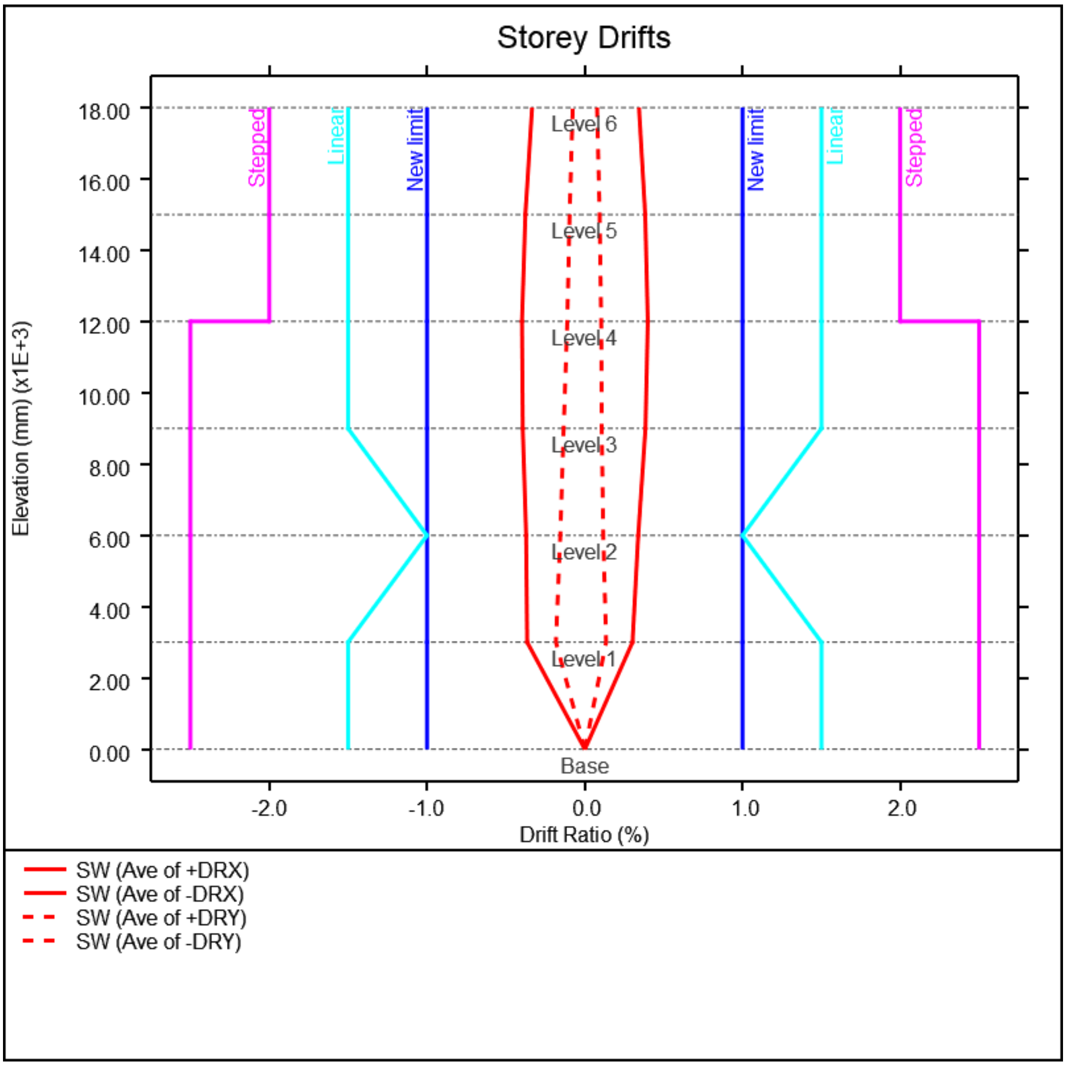


To define a stepped curve limit, create a CSV file following the data format of the exported default file. Click **Import** to add the data to the plot.

The limits created will be listed below along with some control buttons to manipulate them:

1. Show or hide the curve limits using the **ON/OFF** toggles
2. Change the colour of the curve limits using the colour selection dropdown.
3. Delete a curve limit using the delete **(X)** button. Currently, this panel does not allow you to edit an existing curve limit. You may need to recreate a curve limit to modify the X-value(s) along the storeys.





The storey curve limits will be automatically saved to the Workflow file upon creation. Curve colour and visibility settings will also be automatically updated in the Workflow file upon changing them in this panel. You may wish to store these data separately for future use. You can do so by clicking **Export** located on the right side of the panel header.

You may also revert back to default storey curve limits by clicking the **Reset** button.

Each Workflow will have a different set of default limits.

Storey datum settings

This panel allows you to define the formatting of the storey datums shown in the plot. This panel is hidden by default. Click **Show** to reveal this panel.

The settings available to you are as follows:

1. **Colour** allows you to choose the colour of the storey datums
2. **Line Style** allows you to choose the line style of the storey datums
3. **Line Width** allows you to choose the line width of the storey datums
4. **Label Font** allows you to choose the font of the storey datum labels
5. **Label Size** allows you to choose the font size of the storey datum labels
6. **Label Position** allows you to define the location of the labels relative to the storey datums

Any modifications made on this settings panel will not be automatically saved to the Workflow file. Click **Save** to write these settings to the Workflow file. You may also revert back to default settings by clicking **Reset**, which will simultaneously update these settings on the Workflow file.

Storey Drift Report

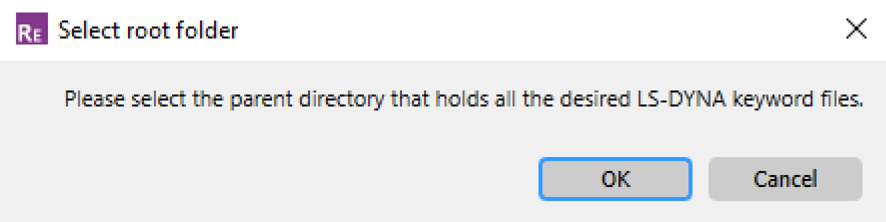
This workflow provides you with REPORTER templates to automatically generate report documents. The template compiles all T/HIS graphs you have set in PRIMER and T/HIS along with a model view from D3PLOT to show you the locations of drifts you have specified on each graph.

There are currently two templates with different report layouts available.

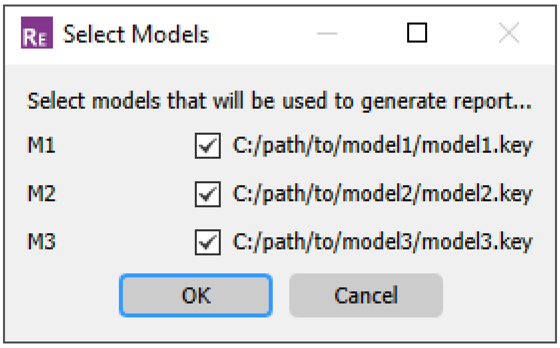
- **1x1** layout showing one T/HIS-graph/D3PLOT-model-view pair per page, split vertically.
- **2x1** layout showing two T/HIS-graph/D3PLOT-model-view pairs per page.

Running the template

Upon opening the template, you will be prompted to select the parent/root folder where all your model keyword files sit. If you have followed the recommendations for Writing the Workflow File from PRIMER, this should be the same directory where you have saved the Workflow file.



When multiple models are detected, the template will show you another window where you can choose which models to include in the report. By default, all models are selected assuming that the root folder only contains the relevant model analysis runs that you wish to process and report.



After this, the template generation should commence, running T/HIS and D3PLOT items to generate the report images. These images will also be saved into a subfolder named "reporter" that will be created when this template is generated. A sample page from a successful template run is shown below.

The REPORTER variables hold a record of the paths of models you have chosen to run. This can serve as a way to validate that you have run the models you intended.

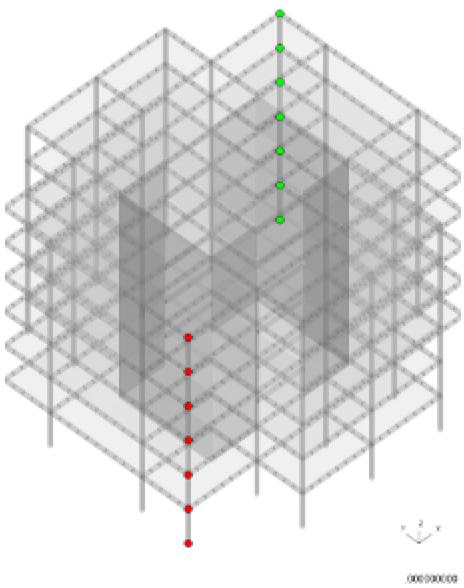
Storey Drift

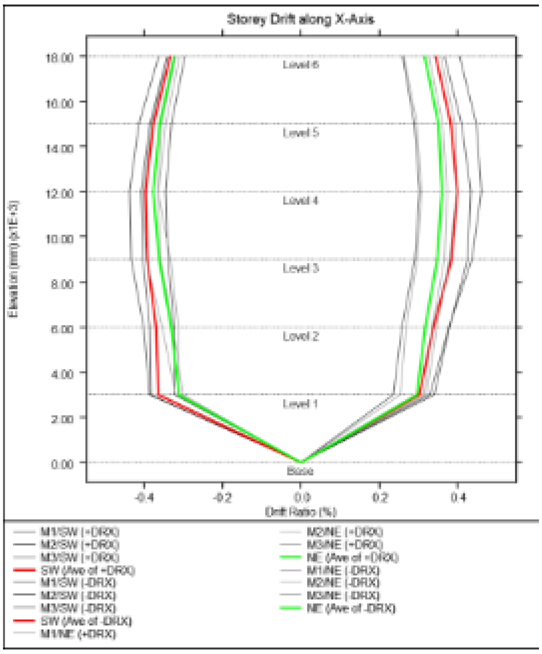
Seismic Analysis

2 DRIFTS

Drift along X

D3PLOT: demo_building_v1

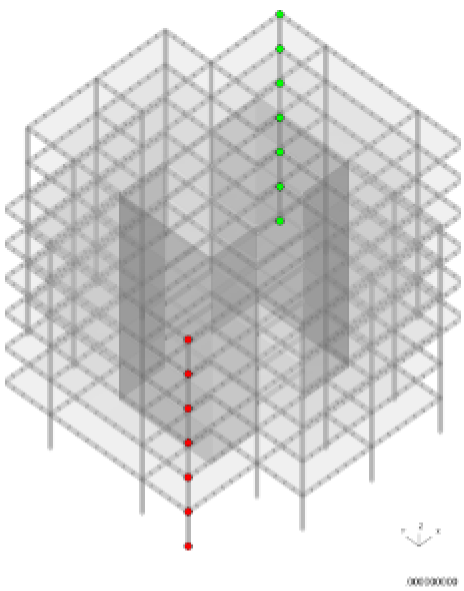


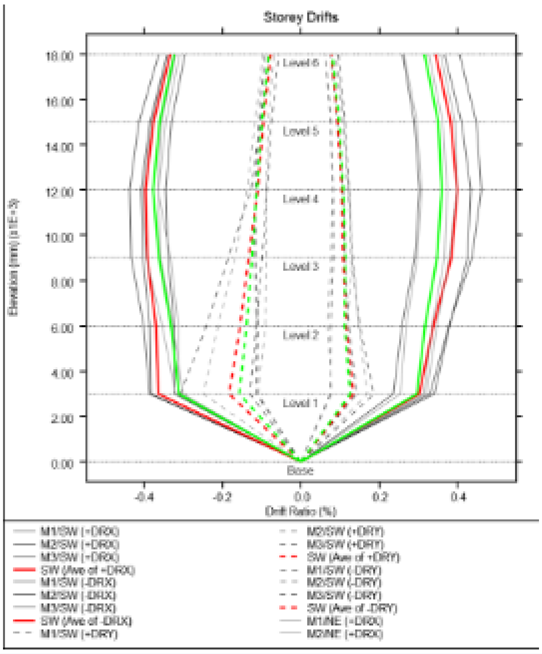


2 DRIFTS

Drift along X, Y

D3PLOT: demo_building_v1





4/4

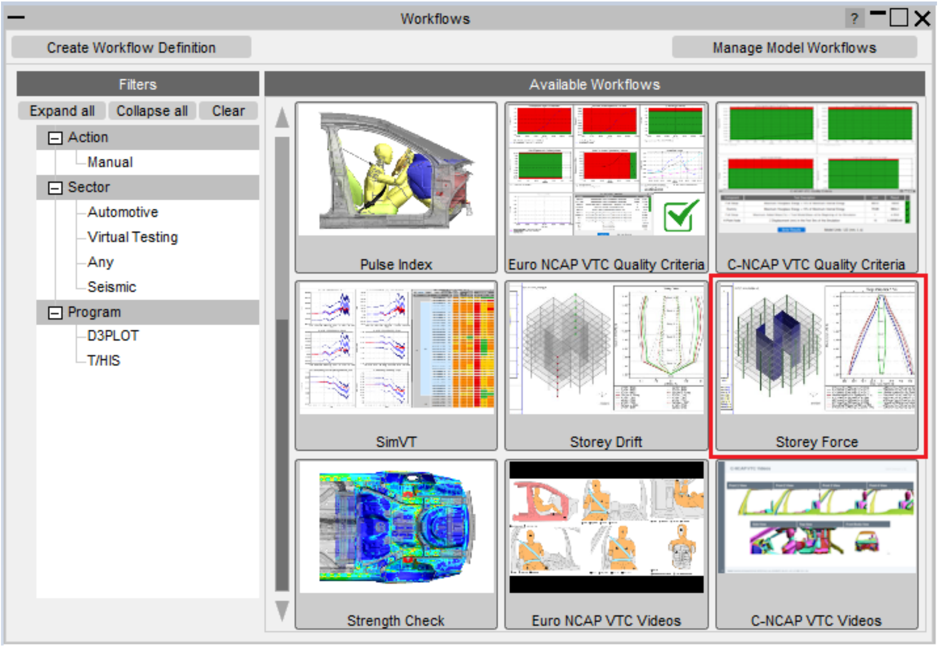
Model Directory | C:/Users/Ian-Keith.Relucio/OneDrive - Arup/Arup UK/LS-Dyna_Dev/DEMO_MDL/01_MULTI_MDL_TEST

4.7.2. Storey Force

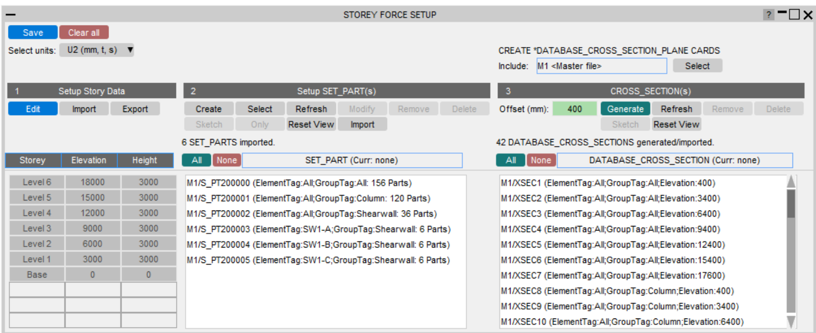
Storey Force

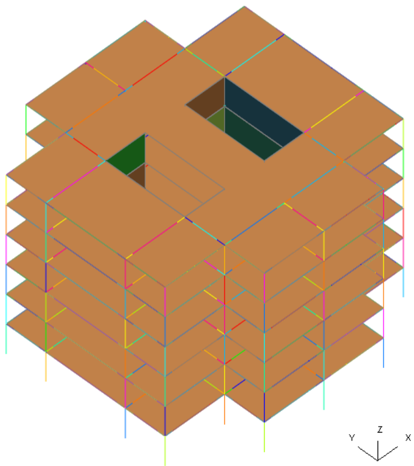
Tools → Workflows → Storey Force

The Storey Force workflow tool is used to show forces on each storey of the building to investigate the flow of force through the entire structure or on selected elements grouped into SET_PARTs.



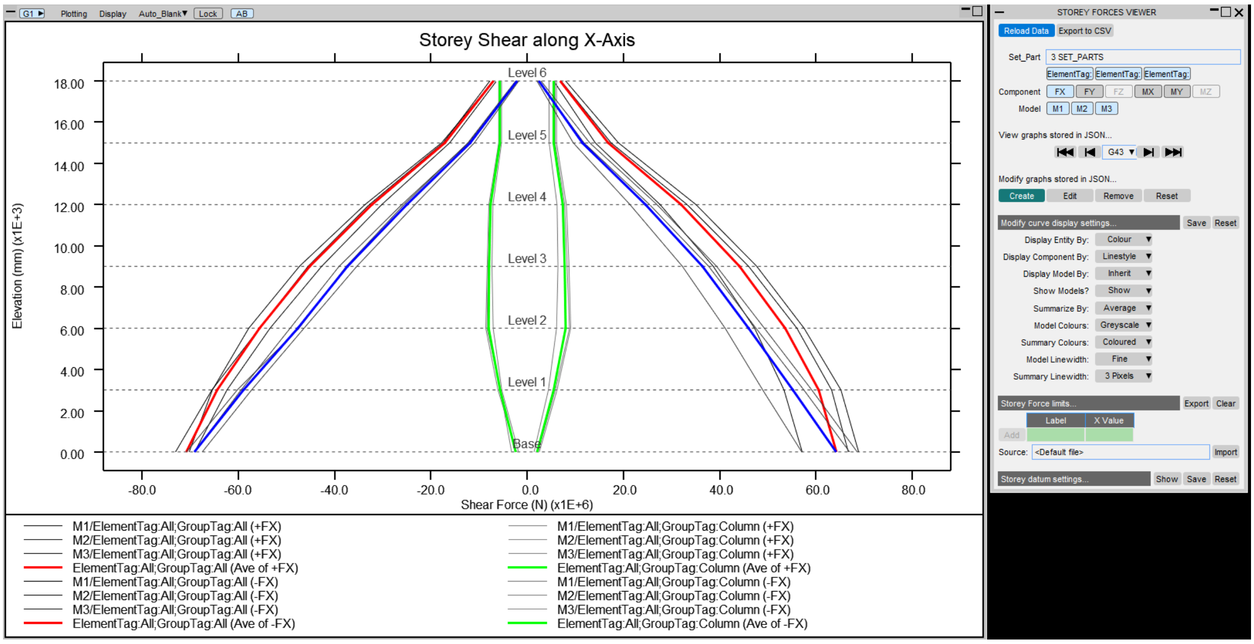
In PRIMER, you can define cross sections for each SET_PART, for every storey of the building.





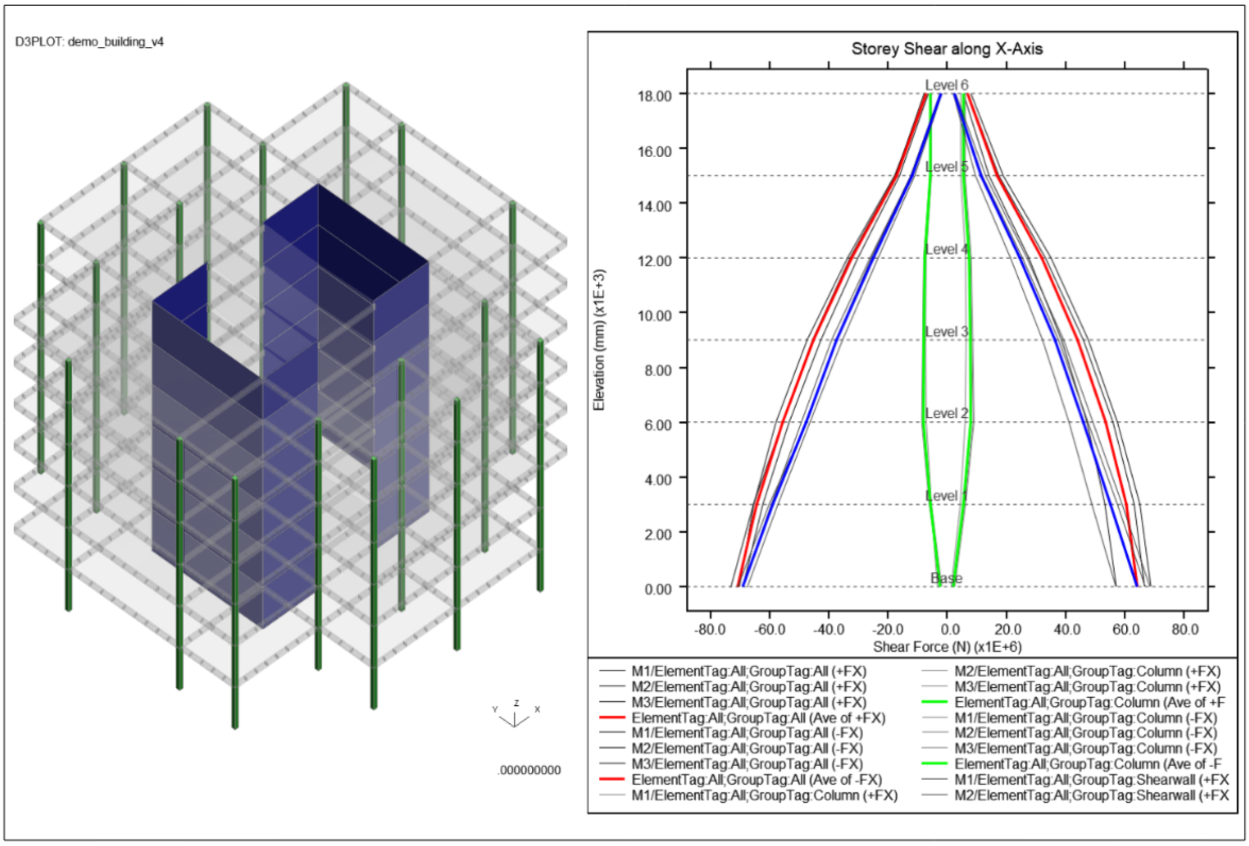
In T/HIS, storey forces are extracted for each of the cross sections you defined in PRIMER and then storey curves are generated – plotted on graphs.

This allows you to interrogate the global behaviour of the structure and make changes to member designs or structural layout if necessary.



Finally, you can generate automated reports with the REPORTER templates provided.

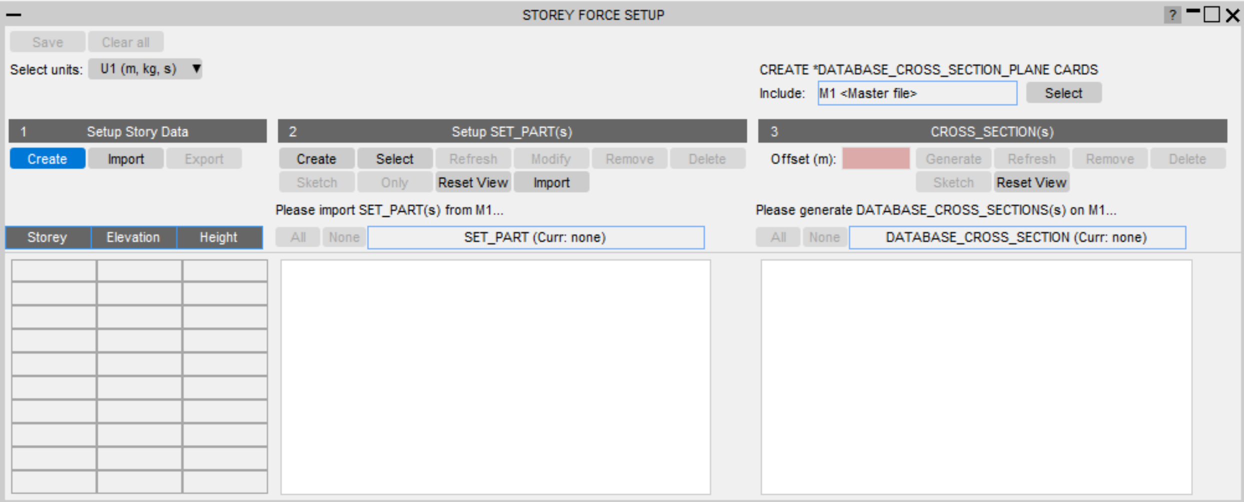
In the report, corresponding D3PLOT views are paired with each T/HIS plot to highlight the corresponding SET_PART(s) in the model.



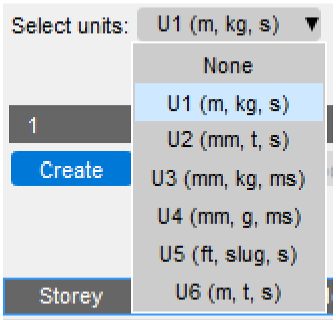
D3PLOT: demo_building_v4
.000000000
Storey Shear along X-Axis
Level 6
Level 5
Level 4
Level 3
Level 2
Level 1
Base
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
Elevation (mm) (x1E+3)
-80.0
-60.0
-40.0
-20.0
0.0
20.0
40.0
60.0
80.0
Shear Force (N) (x1E+6)
M1/ElementTag:All;GroupTag:All (+FX)
M2/ElementTag:All;GroupTag:All (+FX)
M3/ElementTag:All;GroupTag:All (+FX)
ElementTag:All;GroupTag:All (Ave of +FX)
M1/ElementTag:All;GroupTag:All (-FX)
M2/ElementTag:All;GroupTag:All (-FX)
M3/ElementTag:All;GroupTag:All (-FX)
ElementTag:All;GroupTag:All (Ave of -FX)
M1/ElementTag:All;GroupTag:Column (+FX)
M2/ElementTag:All;GroupTag:Column (+FX)
M3/ElementTag:All;GroupTag:Column (+FX)
ElementTag:All;GroupTag:Column (Ave of +F
M1/ElementTag:All;GroupTag:Column (-FX)
M2/ElementTag:All;GroupTag:Column (-FX)
M3/ElementTag:All;GroupTag:Column (-FX)
ElementTag:All;GroupTag:Column (Ave of -F
M1/ElementTag:All;GroupTag:Shearwall (+FX
M2/ElementTag:All;GroupTag:Shearwall (+FX

Storey Force Setup

When the tool is launched in PRIMER, the setup window opens. This where you select the SET_PARTs and cross-sections you wish to process:

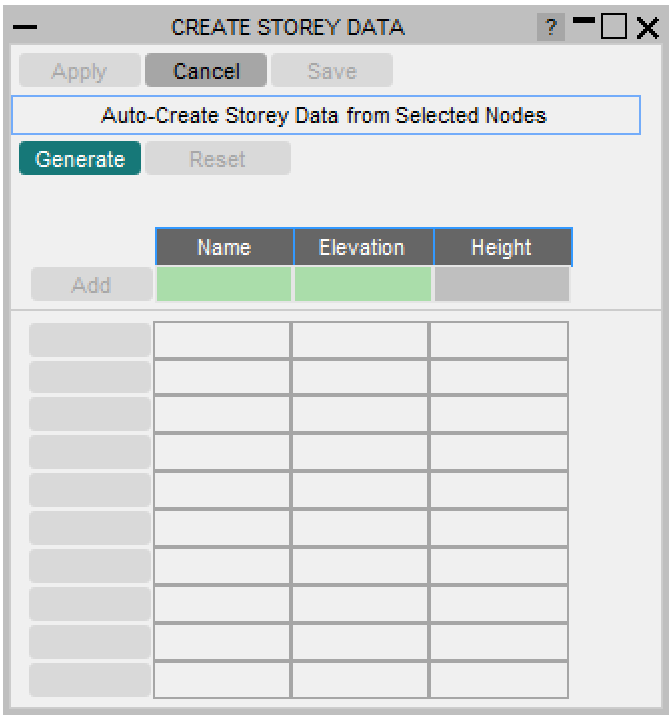


First, you need to choose the appropriate unit system from the dropdown menu:



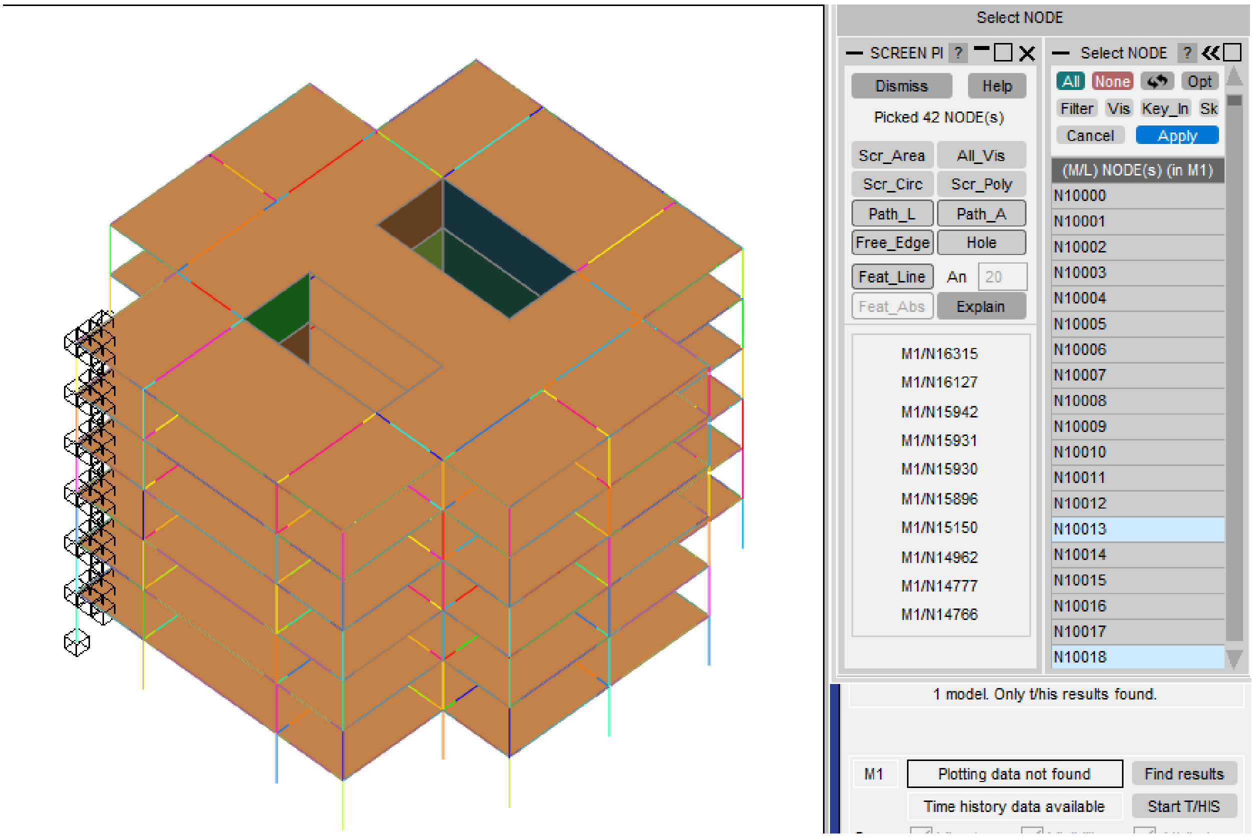
Defining Storey Data

You can define the storey data for the structure either by clicking the **Create** button or the **Import** button under the Setup Storey Data section. **Import** allows you to import previously saved storey definitions (e.g. those created for the [Storey Drift] workflow). When you click **Create**, the Storey Data window appears:



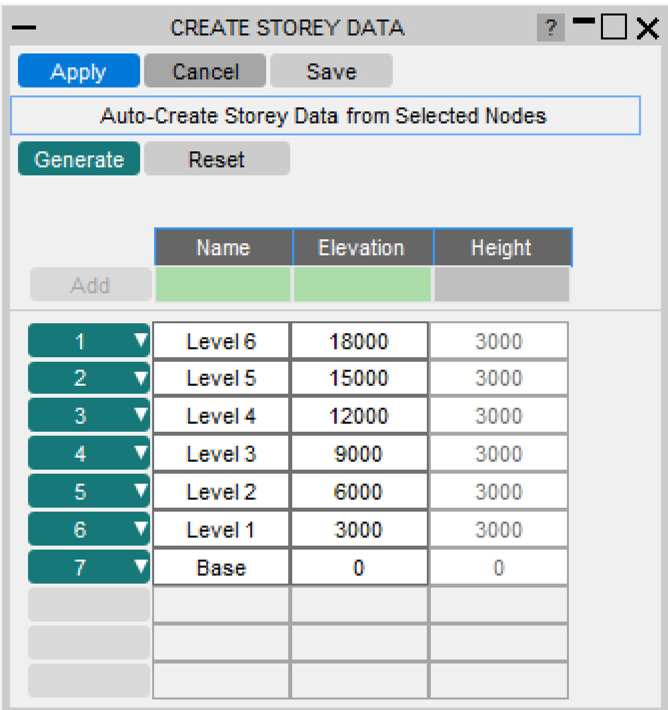
Each storey can be defined manually by populating **Name** and **Elevation** textboxes and then clicking the **Add** button which will be activated if the inputs are valid.

Alternatively, you can define multiple storeys automatically by clicking **Generate**. You will be prompted to select nodes in the model. This will then generate storeys for each unique elevation (z-coordinate) among the nodes you have selected. Finally, you can then modify the labels of each generated storey to be more informative for your project.



Click **Apply** to import the storey data back to the main setup window.

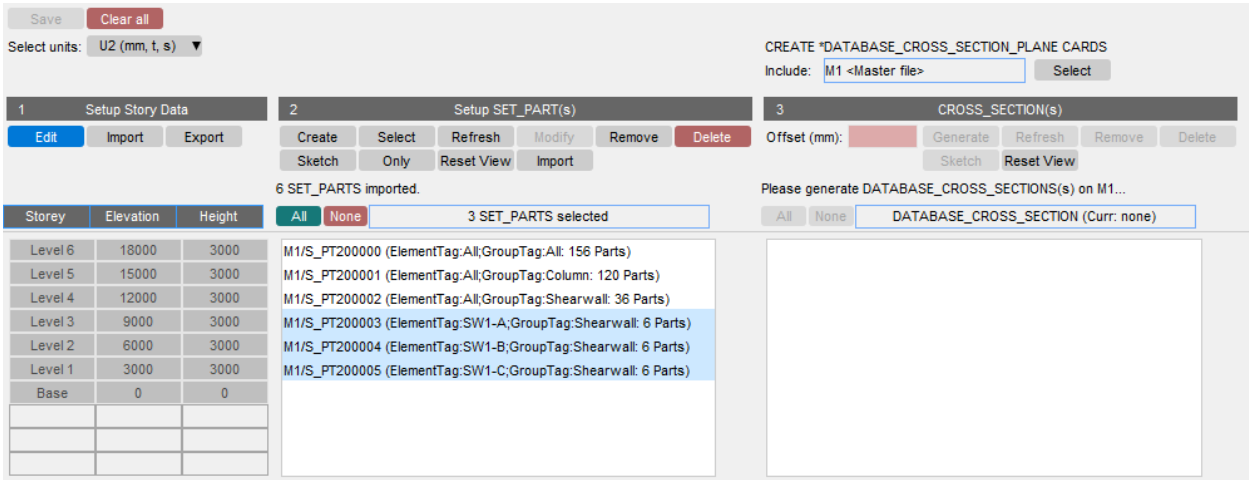
You can optionally save this data by clicking **Save**. This will write it to a separate JSON file, which you can **Import** when you are starting a new setup. Normally, storey data would be applicable to multiple Seismic workflows, so saving this data will be useful to those other workflows too.

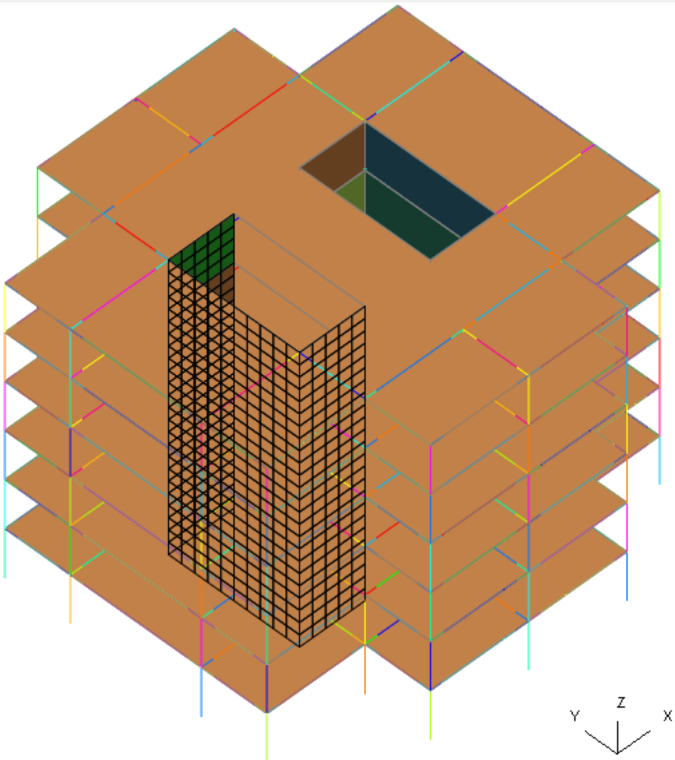


Defining SET_PARTs

If you have not defined any SET_PARTs prior to running this Workflow, you can use the **Create** button under the **Setup SET_PART(s)** section of the setup window. A popup window will appear allowing you the create a new SET_PART. This window is the same as PRIMER's usual Create SET_PART menu (**Volumes I & II→ SET→ PART→ Create**).

If you have defined some SET_PARTs beforehand, you can use them by clicking **Select**. A selection window will appear, prompting you to choose SET_PARTS in the model.



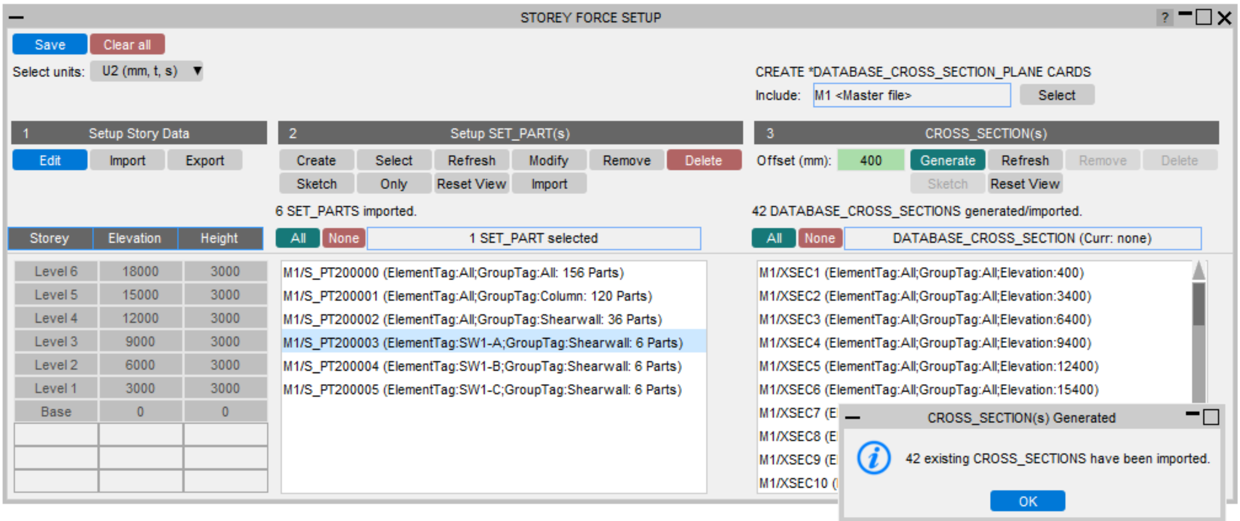


Some section controls will be active when you select SET_PARTs in the list box as shown above. You will have access to SET_PART commands that will allow you to modify a SET_PART or update your list.

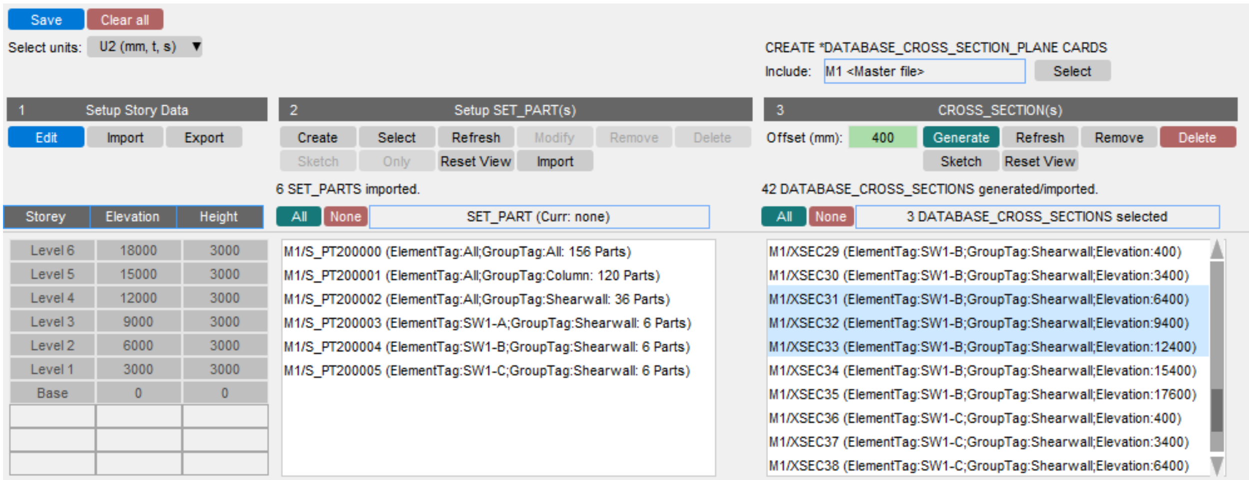
1. **Modify** – modify SET_PARTs one at a time. A popup window will appear to allow you to modify the properties of the SET_PART and add or remove PARTs from it.
2. **Remove** – remove existing SET_PARTs from the list. This will not delete them from the model.
3. **Delete** – remove existing SET_PARTs from the list and delete them from the model. The deletion is **not recursive** so the PARTs along with their components will still remain.
4. **Sketch** – highlight the contents of one or more SET_PARTs in the model.
5. **Only** – isolate the components of one or more SET_PARTs in PRIMER, blanking everything except those components.
6. **Reset view** – reset the state of the model in view and remove sketches.
7. **Refresh** – re-validate the SET_PARTs listed. If any SET_PARTs have been deleted using other PRIMER menus, this command will remove them from the list too.

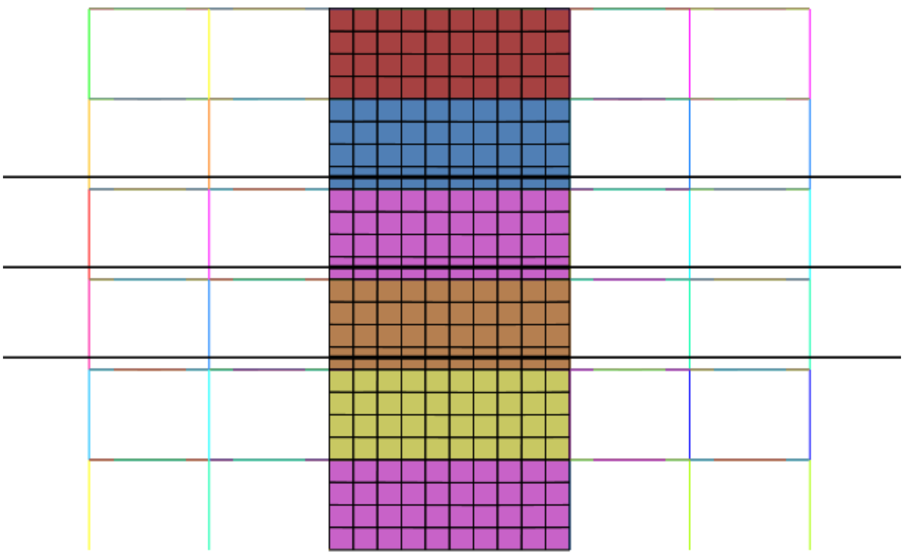
Defining Storey DATABASE_CROSS_SECTIONs

DATABASE_CROSS_SECTIONs can be derived from the storey and SET_PART definitions by clicking **Generate**. This button will be active only after you specify a positive offset value. The offset value applies a vertical offset for the cross-sections from each storey level z-coordinate. The purpose of the offset is to ensure that DATABASE_CROSS_SECTIONs intersect beam, shell and solid elements, preferably at their midpoint, rather than aligning with nodes at their ends (which would typically be the case without an offset, since storey levels are typically defined at node locations).



A popup window will appear upon successful cross-section generation. It will show you how many new DATABASE_CROSS_SECTIONs have been created in the model, and/or how many existing ones have been added to the CROSS_SECTION(s) sub-section list box.





Similar to the SET_PARTs, some commands will be available to you when you select DATABASE_CROSS_SECTIONs in the list box.

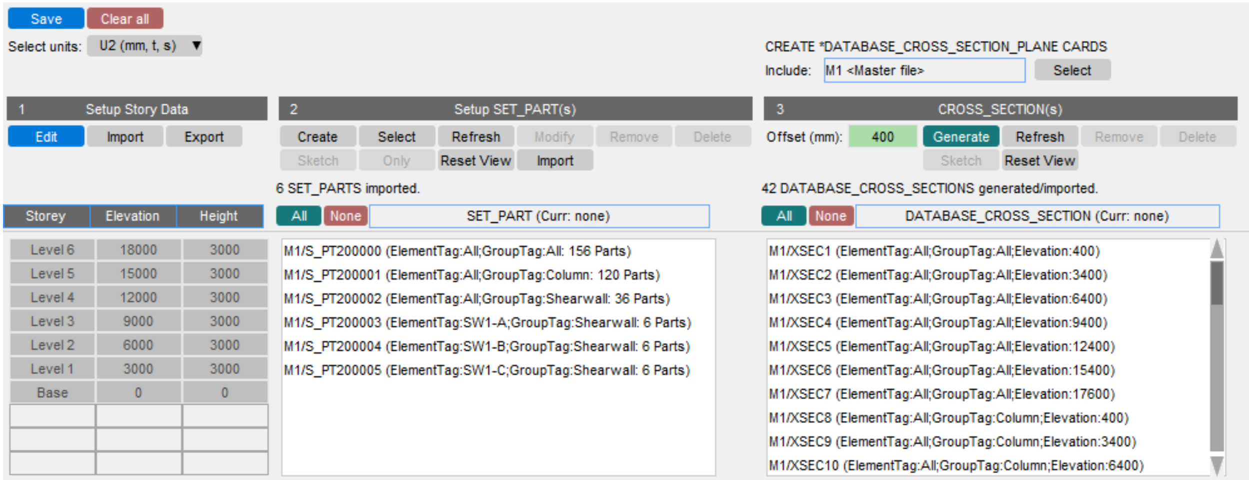
1. **Remove** – remove existing DATABASE_CROSS_SECTIONs from the list. This will not delete them from the model.
2. **Delete** – remove existing DATABASE_CROSS_SECTIONs from the list and delete them from the model.
3. **Sketch** – highlight the DATABASE_CROSS_SECTIONs you selected, along with the SET_PARTs they refer to.
4. **Reset view** – reset the state of the model in view and remove sketches.
5. **Refresh** – re-validate the DATABASE_CROSS_SECTIONs listed. If any DATABASE_CROSS_SECTIONs have been deleted via other PRIMER menus, this command will remove them from the list too.

Tip: You may want to delete an entire set of DATABASE_CROSS_SECTIONs from the model that were created by previously running this Workflow. To quickly delete unwanted DATABASE_CROSS_SECTIONs, repopulate the setup window with the previous storey data and SET_PARTs you have used, and then generate the CROSS_SECTIONs with the same offset value. Once these CROSS_SECTIONs are listed, you can select them all and click **Delete**.

Writing the Workflow File

Once all data has been defined, save the storey force setup by clicking **Save**. This will write a Workflow file in JSON format. This file will be used to post-process the defined DATABASE_CROSS_SECTIONs in T/HIS and create a report in REPORTER.

The Storey Force Workflow tool has been designed to be used on a sweep of Ansys LS-DYNA runs with different ground motions applied to the same model. It is advised to save the Workflow file in the parent folder (the folder containing several child folders, each containing one set of ground motion results). Currently, this Workflow will only work properly if only **one Workflow file exists** in the parent folder, including its child folders. If you save this file in the folder of an individual model, then there is a risk to duplicate the Workflow file, which might cause problems later. This will most probably happen when you duplicate the original model to create a new model with a different ground motion input.



For this workflow, one DATABASE_CROSS_SECTION will be generated for each storey, for each SET_PART definition. Remember to save the .key file and rerun the model if new DATABASE_CROSS_SECTIONs have been created, so their results will be available in T/HIS.

Before saving the drift setup, you may also wish to select an include file for the DATABASE_CROSS_SECTION(s). You can choose an include file by clicking **Select** above the DATABASE_CROSS_SECTION(s) header. The tool will add any DATABASE_CROSS_SECTION keywords created to your selected include file.

Resetting the data

To reset all data, click **Clear all** and repeat the whole process again to define a new storey force setup. Alternatively, you can select all items in sections 2 and 3 of the setup window and click the **Remove** buttons on each sub-section to remove the data defined on those sections only.

Importing existing Workflow Data

When an existing Workflow file is present in the root folder, the storey data and SET_PARTs are automatically imported when you run this Workflow.

After removing all data in a current session, you can import the storey data and the SET_PARTs by clicking **Import** on each sub-section. The SET_PARTs stored in the Workflow file are then validated, and only those existing in the model will be displayed. For further details on importing storey data, please refer to the following section of this manual.

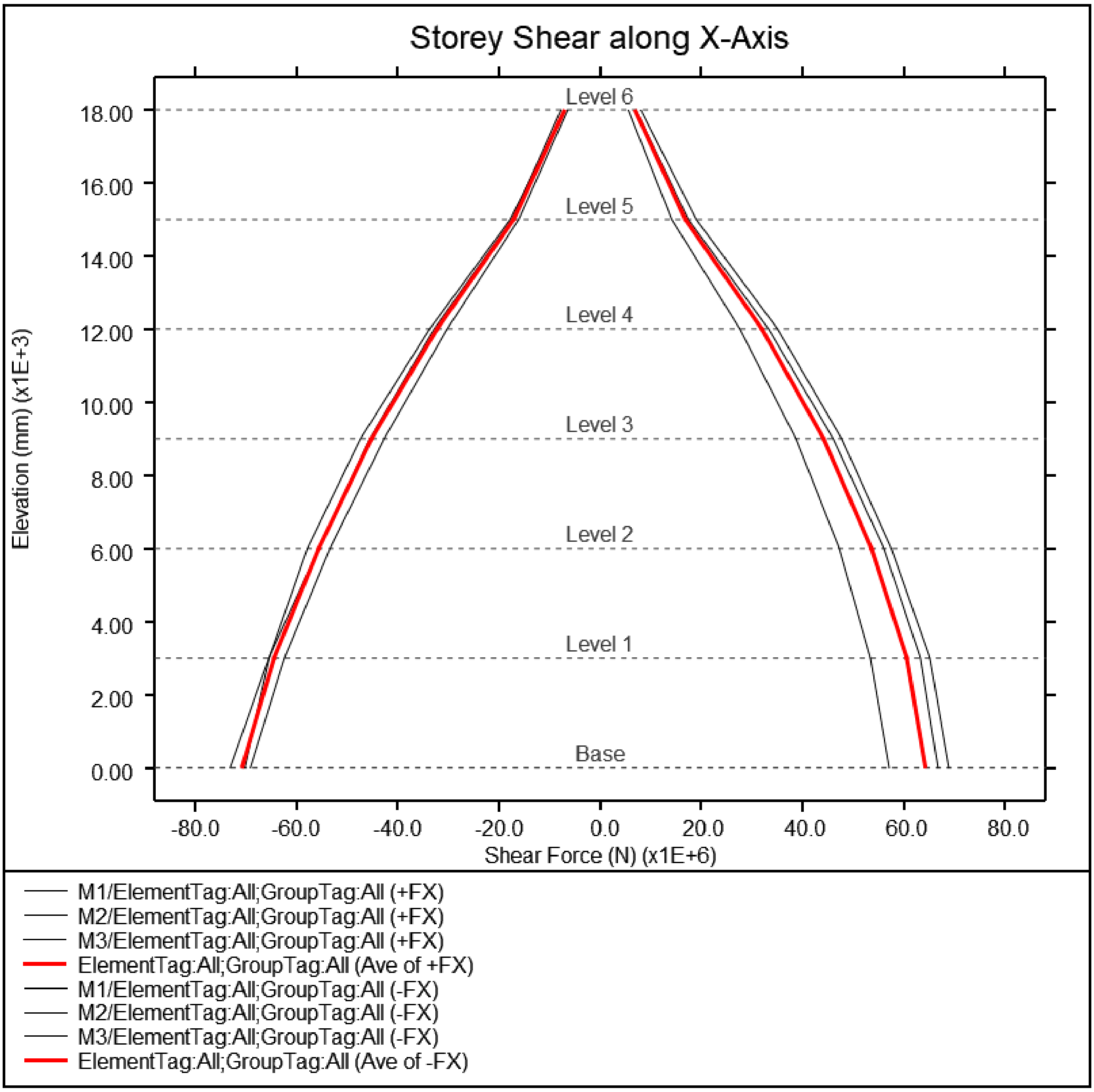
Importing existing Storey Data

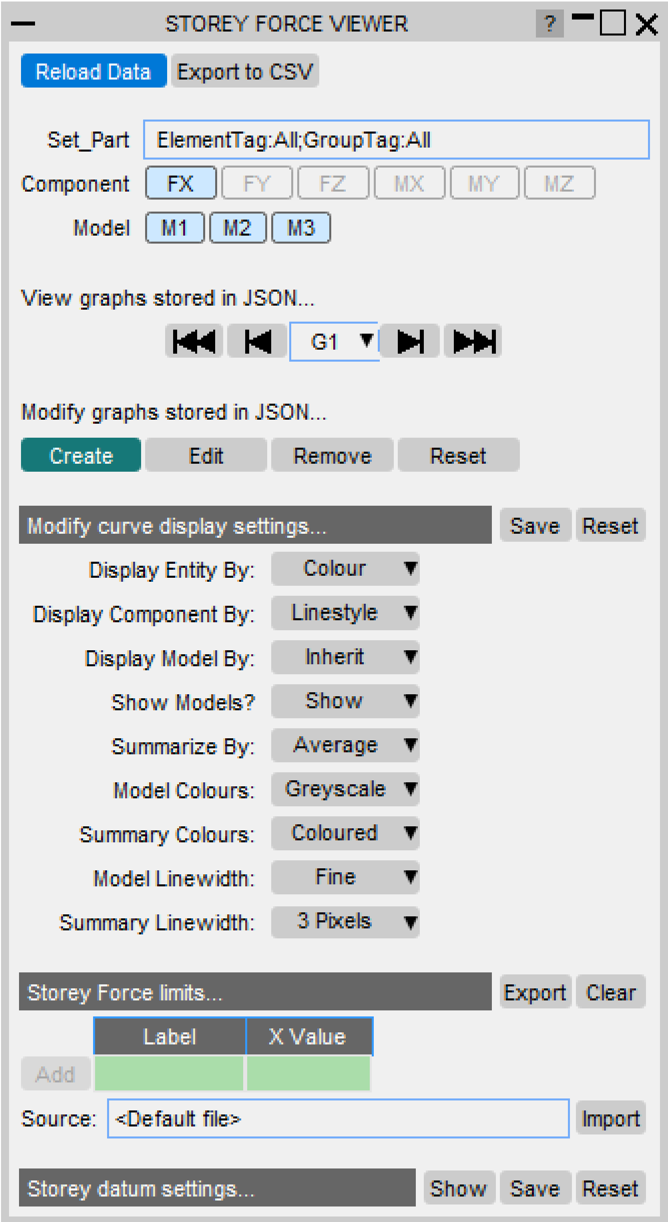
As mentioned on the section above, you can import pre-defined storey data to quickly define storeys. The storey data may exist in an **external JSON file** or in the **Workflow file**. If it is present, you will be prompted to use an existing Workflow file. If you **choose not to**, then a file selector popup will appear so you can select an external JSON file.

Storey Force Viewer

When the tool is launched in T/HIS, the storey force curves will be generated for each graph setup existing in the Workflow file. Then you will be presented with the window below.

When the Workflow file is initially created from PRIMER, default graph setups are included, one for each force component, for each SET_PART defined. The storey force curves will be created for each of these graph setups and the first graph setup will be plotted in T/HIS and will be active in the Viewer GUI.


Storey Shear along X-Axis
Elevation (mm) (x1E+3)
Shear Force (N) (x1E+6)
Level 6
Level 5
Level 4
Level 3
Level 2
Level 1
Base
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
-80.0
-60.0
-40.0
-20.0
0.0
20.0
40.0
60.0
80.0
M1/ElementTag:All;GroupTag:All (+FX)
M2/ElementTag:All;GroupTag:All (+FX)
M3/ElementTag:All;GroupTag:All (+FX)
ElementTag:All;GroupTag:All (Ave of +FX)
M1/ElementTag:All;GroupTag:All (-FX)
M2/ElementTag:All;GroupTag:All (-FX)
M3/ElementTag:All;GroupTag:All (-FX)
ElementTag:All;GroupTag:All (Ave of -FX)

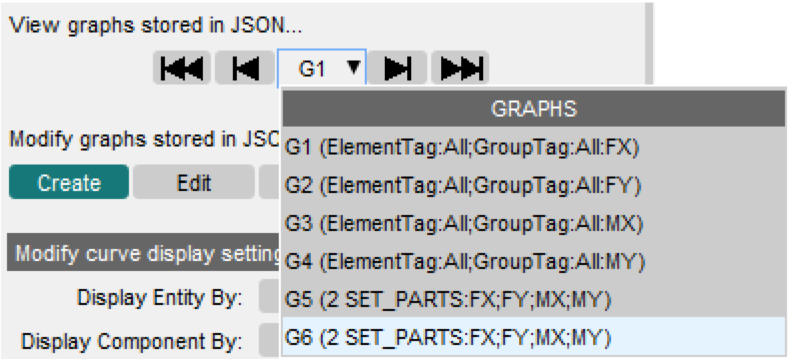


The Viewer GUI is generally split into four sections listed below:

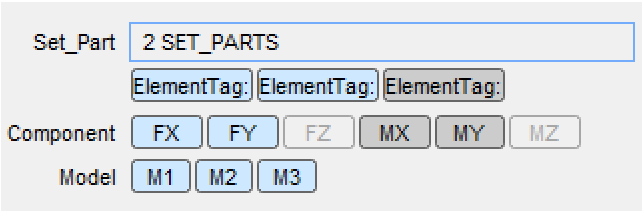
1. Graph selection/creation panel
2. Curve display settings
3. Storey force limits definition
4. Storey datum settings

Graph selection/creation panel

This panel allows you to cycle through the graphs you have generated. You can use the navigation buttons to view the graphs sequentially or you can select a graph from the drop-down list.



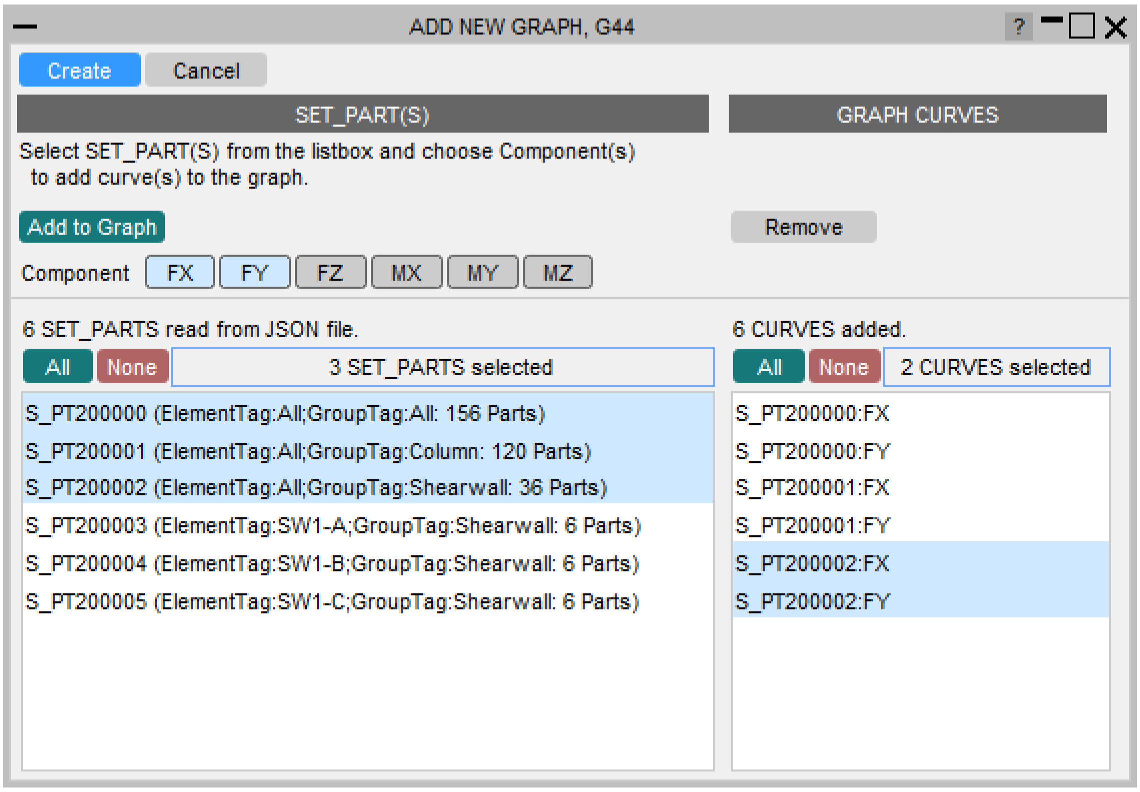
You will be provided with three toggles: **SET_PARTs**, **force components**, and **model**. The toggle for SET_PARTs will only be shown if more than one SET_PART is included in the current graph setup. All force component toggles will be shown, but only those included will be active. Finally, the model toggles will only be visible if more than one model is loaded in the current T/HIS session.



In this panel, you are provided with control buttons allowing you to create or modify graph setups.

To create a new graph, click **Create**. You will then be presented with a new window as shown below. Select the SET_PARTs and force components you wish to include. Once you have made your selections, the **Add to Graph** button will be active. Click **Add to Graph** to generate the list of curves that will be added to the graph, which will be shown on the list box on the right. You can then do any final selection adjustments (e.g. you can remove some of the curves listed by selecting them and clicking **Remove**).

Once you have finalised the curves you wish to include, click **Create** to generate the new graph and return to the **Plot Viewer** window.



Other commands available to you are as follows:

1. **Edit** – modify the currently active graph setup in your **Plot Viewer**. You will be shown a similar window as for **Create**.
2. **Remove** – delete the currently active graph setup. This will not delete the T/HIS curves associated with the graph.
3. **Reset** – delete every graph setup and recreate the defaults set in PRIMER.

Any modifications made in the graph selection panel will be automatically saved to the Workflow JSON file.

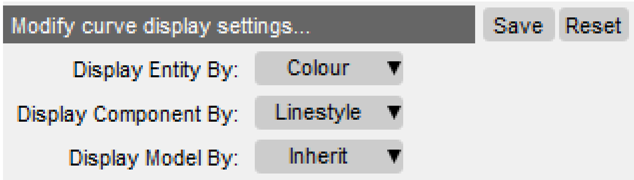
You may also wish to export the current T/HIS curves to an external file. You can do this by clicking **Export to CSV**.

Curve display settings

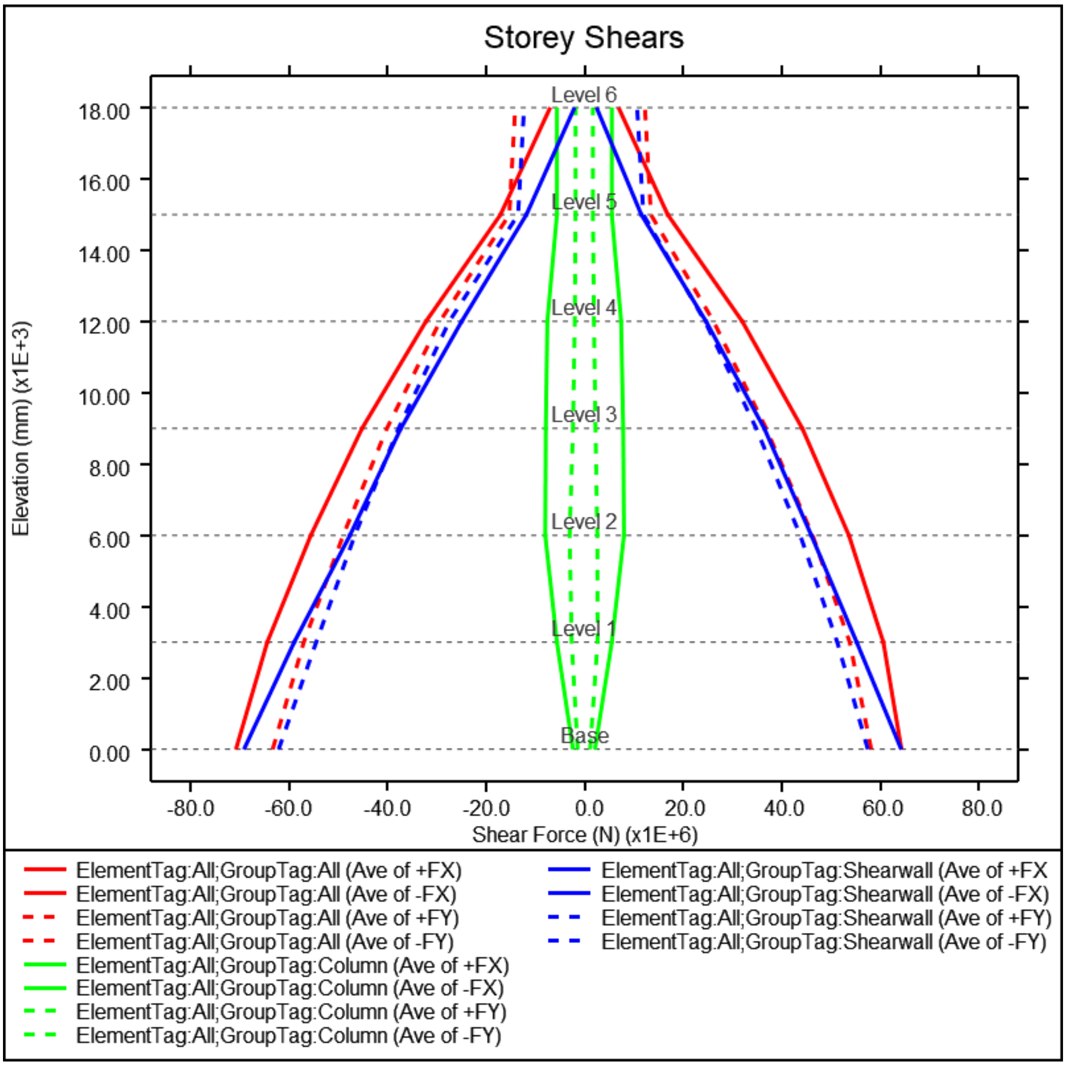
This panel allows you to define the formatting of the curves in the T/HIS graph. These settings will be applied to all graph setups stored in your Workflow file. Later when you generate the report, REPORTER will read these settings and apply the styling you have defined.

The Workflow file will hold two separate sets of settings for **single model mode** and **multiple model mode**. This is because you may want to have different settings when you are plotting results for only one model and when you are plotting results for multiple models. If you are intending to generate reports containing results from a single model and from multiple models, you need to define the settings for these two modes separately.

The first three settings are responsible for categorising your curves by SET_PART, force component and model – in the following hierarchy order:

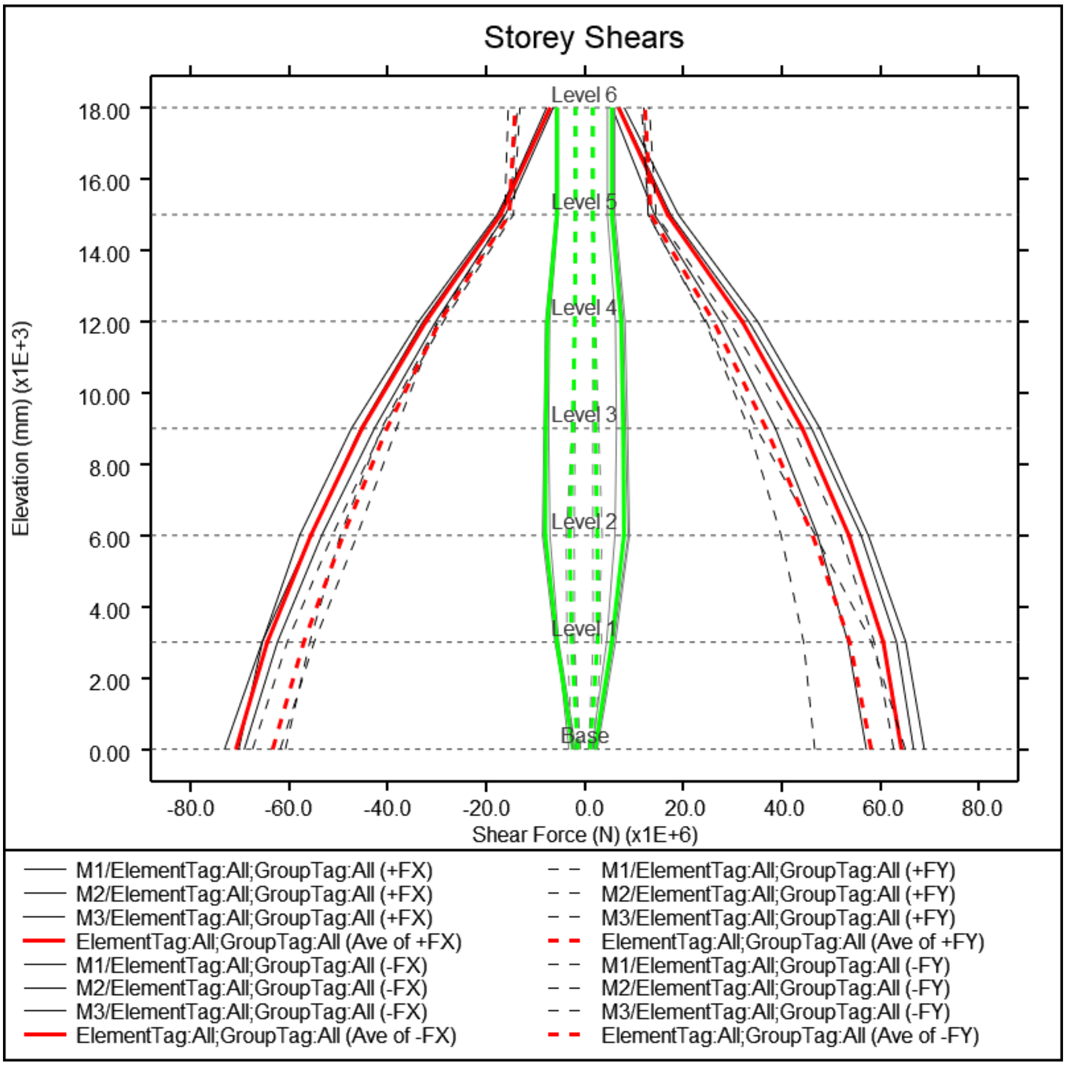


You can categorise the SET_PARTs and force components by **Colour** or **Line style.** For instance, if you display the SET_PARTs by colour and the force components by line style, the tool will then assign one colour for all curves under a SET_PART and will assign one line style for all curves under a force component. As shown in the example below, all curves under **ElementTag:All;GroupTag:All** are red and all the curves representing **shear force along the X direction** (FX) have solid lines:



You can also categorise the models by Colour or Line style. However, there is a third option called **Inherit** (which is set by default). This option essentially tells the tool that the curves **will not be categorised by model**. Instead, they will just follow the formatting of the first two categories. This is particularly useful if you are more concerned with the aggregate curves and you are just displaying the model curves to see if there is an outlier compared to the aggregate curve. If you use this option, you can quickly identify visually which model curves are associated with an aggregate curve.

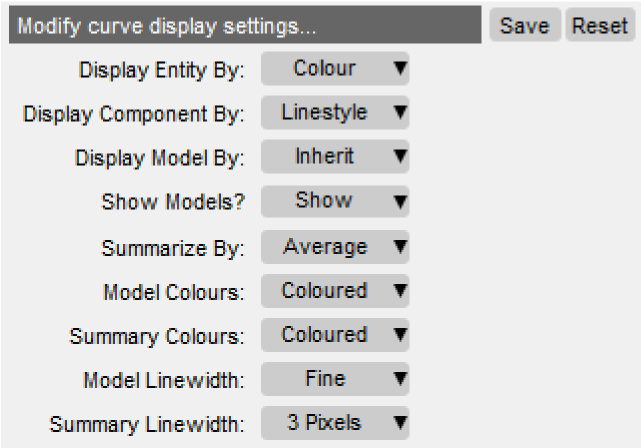
In the example below, the curves representing the **shear forces (FX)** of **ElementTag:All;GroupTag:All** are solid lines in red colour. The curve representing the mean storey forces follows the same format but with a thicker line width to differentiate it from the rest of the individual model curves under the same categories.



This current implementation of curve categorisation may not work for all scenarios, and could be improved in future. Please contact us with any feedback.

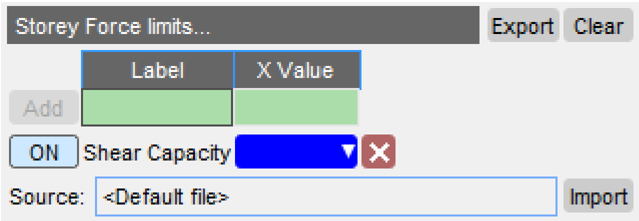
The other curve settings available to you are as follows:

1. **Show Models** – set whether the model curves are shown or hidden in the plot. This is only relevant for **multiple model mode**.
2. **Summarise by** – choose which aggregate curve is shown. You have the following options: **None, Average, Envelope**.
3. **Model Colours** – choose whether the model curves will be in **Colour** or **Greyscale**.
4. **Summary Colours** – choose whether the aggregate curves will be in **Colour** or **Greyscale**.
5. **Model Line width** – set the line width for the model curves.
6. **Summary Line width**– set the line width for the aggregate curves.



Any modifications made in this settings panel will not be automatically saved to the Workflow file. Click **Save** to write these settings to the Workflow file. You can also revert back to default settings by clicking **Reset**, which will simultaneously update these settings in the Workflow file.

Storey Force limits



This panel allows you to define vertical curve limits on the positive and negative X-axis. One scenario where this feature will be useful is when you are analysing member design utilisation – for a shear wall segment, for example. You can import the design capacity of the wall and plot it against the wall forces to illustrate whether the current wall design is acceptable.

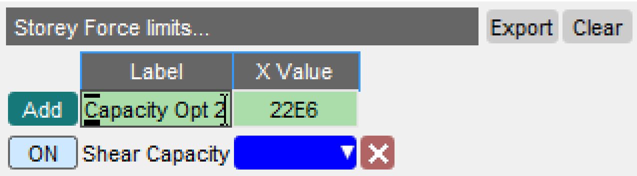
There are two types of vertical storey curve limits that you can define:

1. Constant curve limit along the structure elevation
2. Stepped curve limit, where the desired limit per storey extent varies

You can define a constant curve limit using the panel. In order to define a stepped limit curve, you need to import an external CSV file. There are no default curve limits for the Storey Force Workflow. One way to get an example curve limit input file is to create constant curve limits in the panel and then click the **Export** button to write them to a file which will show you how these data are structured.

You can also import a constant curve limit using an external file and this file can contain multiple curve limits of different types. Theoretically, you can store all your curve limits in one file to quickly generate them later.

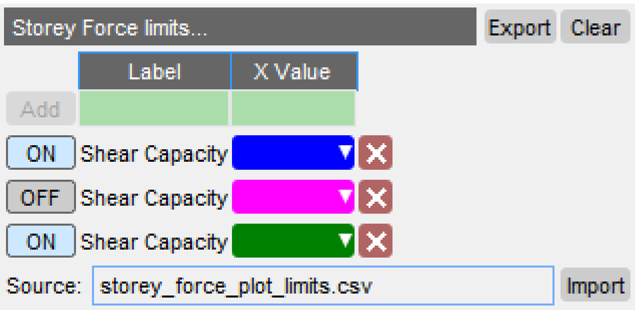
To define a constant curve limit, you need to define a label and the X-axis value in the textboxes provided. Then, click **Add**.

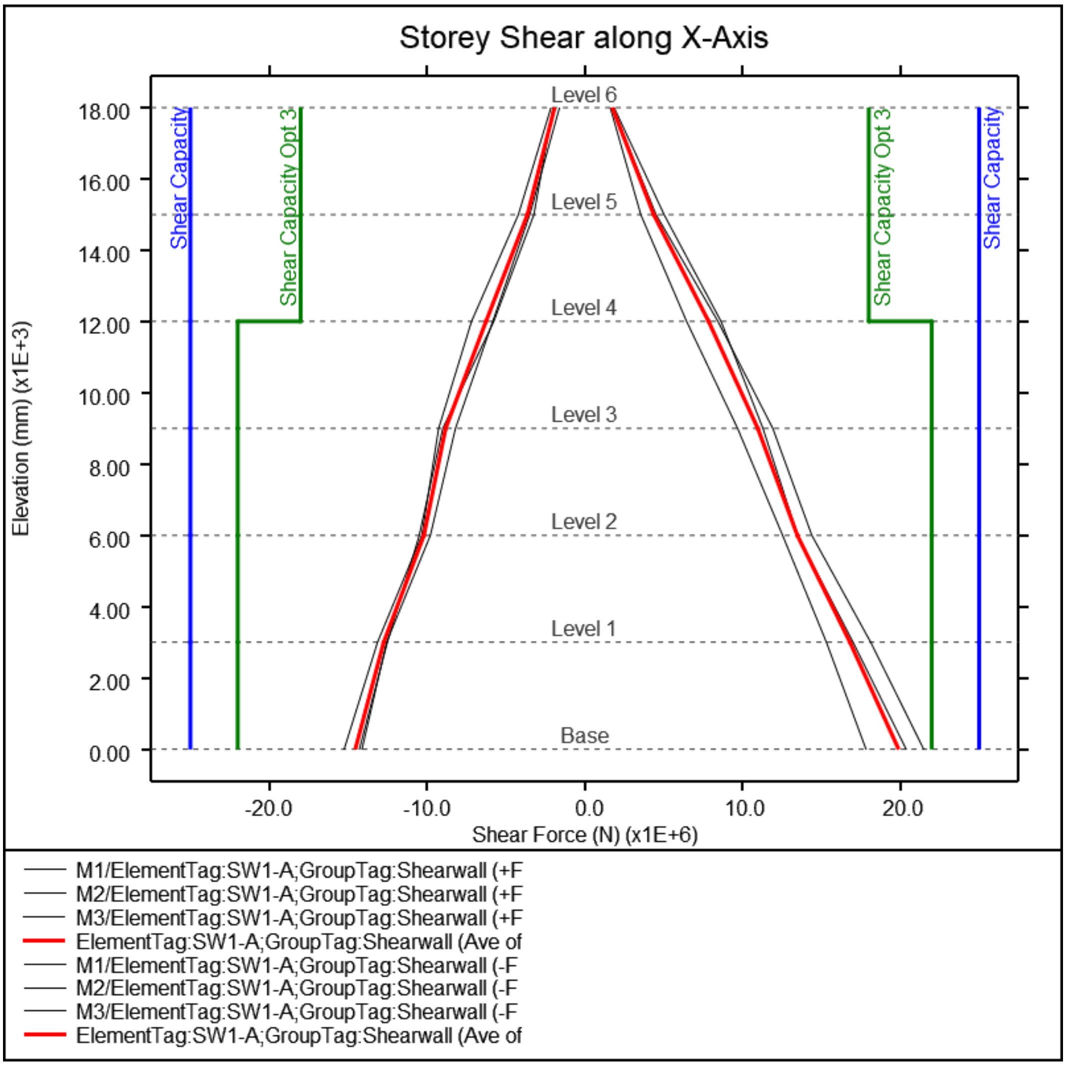


To define a stepped curve limit, create a CSV file following the data format of the exported sample file, as described above. Click **Import** to add the data to the plot.

The limits created will be listed below along with some control buttons to manipulate them:

1. Show or hide the curve limit using the **ON/OFF** toggle button
2. Change the colour of the curve limit using the provided colour selection drop-down
3. Delete a curve limit using the delete **(X)** button provided. Currently, this panel does not allow you to edit an existing curve limit. You may need to recreate a curve limit to modify the X-value(s) along the storeys.





The storey curve limits will be automatically saved to the Workflow file upon creation. Curve colour and visibility settings will also be automatically updated in the Workflow file. You may wish to store these data separately for future use. You can do so by clicking **Export** located on the right side of the panel header.

You can also revert back to default storey curve limits by clicking **Reset**.

Each Workflow will have a different set of default limits.

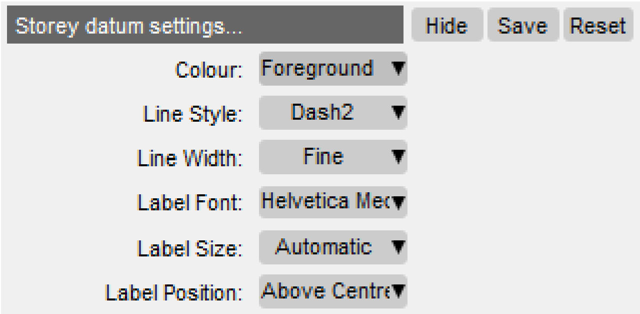
Storey datum settings

This panel allows you to define the formatting of the storey datums shown on the plot. This panel is hidden by default. Click the **Show** button to expand this panel.

The settings available to you are as follows:

1. **Colour** – choose the colour of the storey datums

2. **Line Style** – choose the line style of the storey datums
3. **Line Width** – choose the line width of the storey datums
4. **Label Font** – choose the font of the storey datum labels
5. **Label Size** – choose the font size of the storey datum labels
6. **Label Position** – define the location of the labels relative to the storey datums



Any modifications made in this settings panel will not be automatically saved to the Workflow file. Click **Save** to write these settings to the Workflow file. You can also revert back to the default settings by clicking **Reset**, which will simultaneously update these settings in the Workflow file.

Storey Force Report

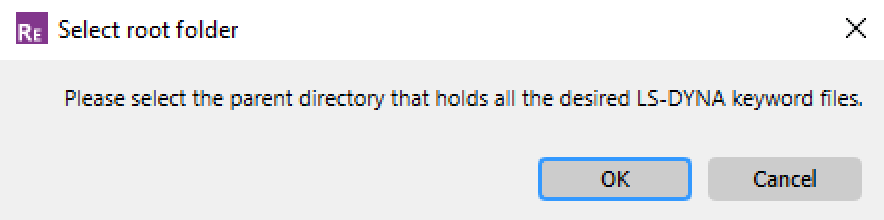
This workflow provides you with REPORTER templates to automatically generate report documents. The templates compile all T/HIS graphs you have set in PRIMER and T/HIS along with a model view from D3PLOT to show you the SET_PART(s) you have specified on each graph.

There are currently two templates with different report layouts available:

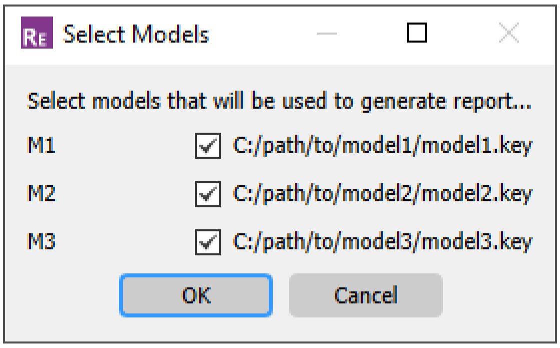
- **1x1** layout showing one T/HIS-graph/D3PLOT-model-view pair per page, split vertically.
- **2x1** layout showing two T/HIS-graph/D3PLOT-model-view pairs per page.

Running the template

Upon opening the template, you will be prompted to select the parent/root folder where all your model keyword files sit. If you have followed the recommendations for Writing the Workflow File from PRIMER, this should be the same directory where you have saved the Workflow file.

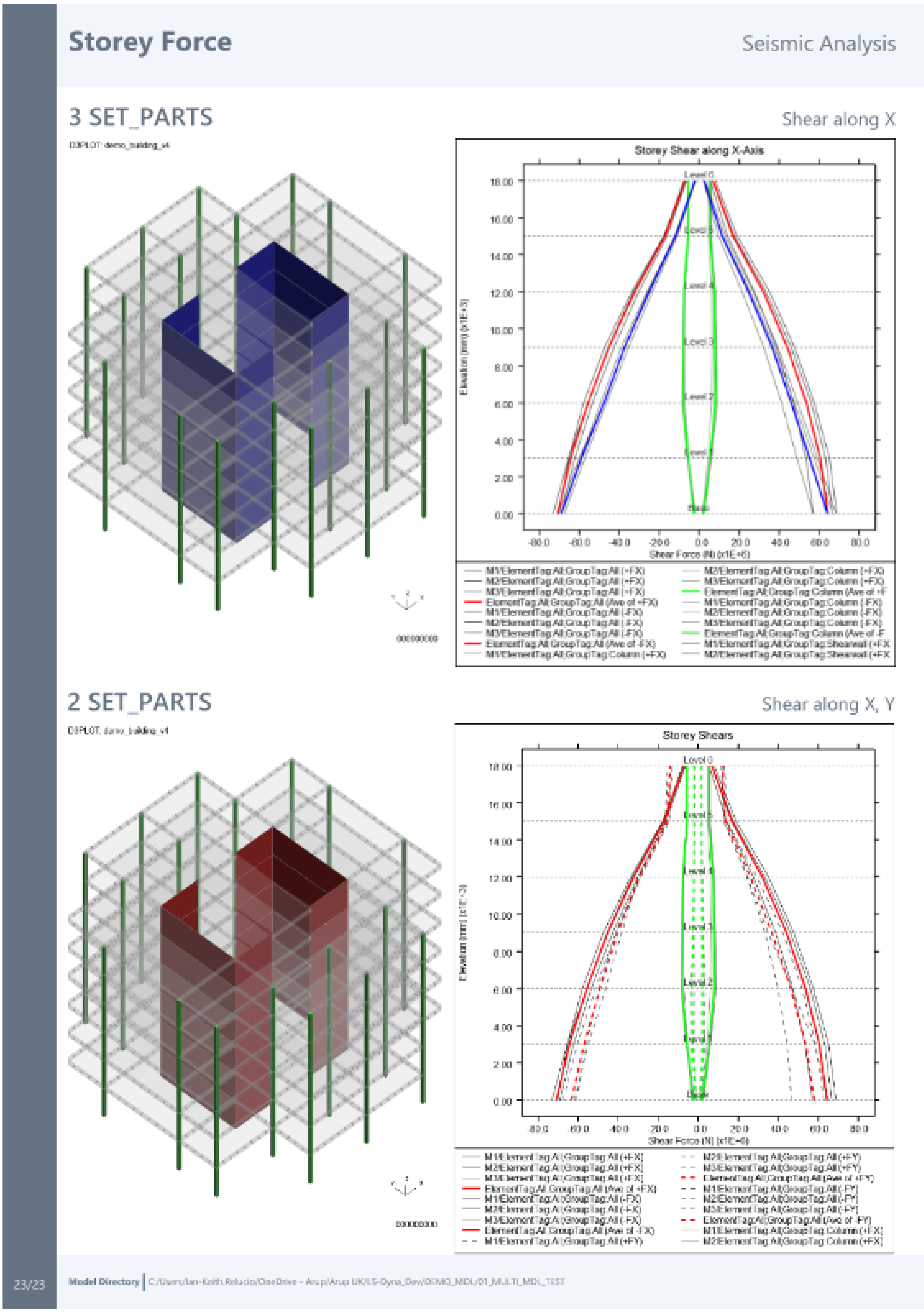


When multiple models are detected, the template will show you another window where you can choose which models to include in the report. By default, all models are selected assuming that the root folder only contains the relevant model analysis runs that you wish to process and report.



After this, the template generation should commence, running T/HIS and D3PLOT items to generate the report images. These images will also be saved into a subfolder named "reporter" that will be created when this template is generated. A sample page from a successful template run is shown below.

The REPORTER variables hold a record of the paths of models you have chosen to run. This can serve as a way to validate that you have run the models you intended.

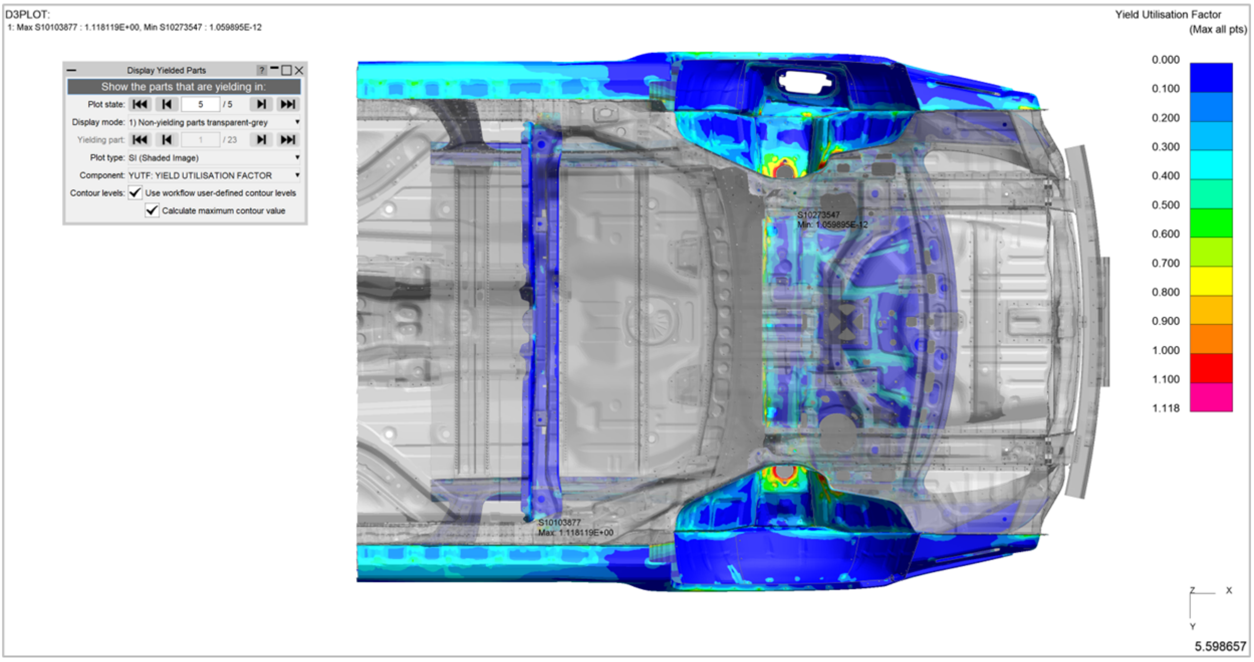


4.8. Strength Check

Strength Check

Tools → Workflows → Strength Check

The Strength Check tool allows you to visualise yielding shell, thick shell, and solid parts in D3PLOT. Note: Yielding parts are parts containing at least one yielding element, measured as an element with a Yield Utilisation Factor greater than one (or Yield Utilisation Percentage greater than 100%).



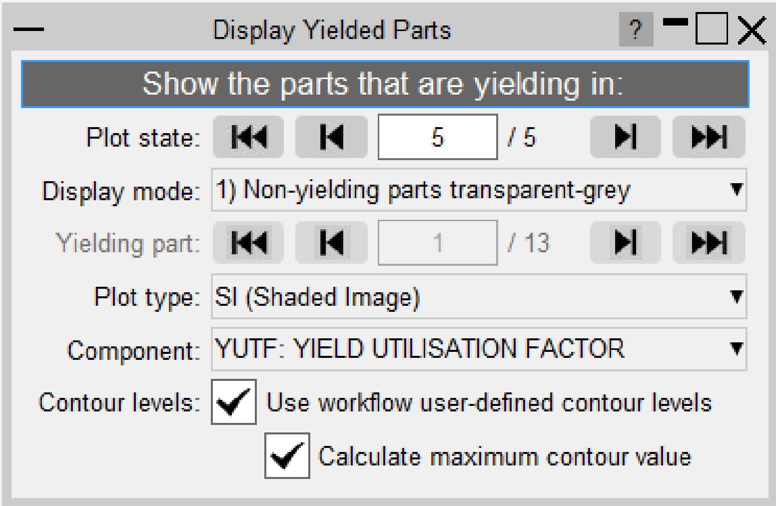
Setup in PRIMER

You don't need to set up anything in PRIMER to use the Strength Check Workflow, but you do need to make sure that you have generated a ZTF file to accompany your Ansys LS-DYNA results. D3PLOT will read the ZTF file along with the d3plot/PTF files. The ZTF file contains materials data that D3PLOT needs to determine the yield strength of the parts in your model.

Use in D3PLOT

Open the Strength Check Workflow in D3PLOT (**Tools → Workflows → Strength Check**) to visualise yielding parts for any set of results with a ZTF file.

When you open Strength Check, D3PLOT will perform a **SI (Shaded Image)** plot of the **YUTF: Yield Utilisation Factor** component of the model's final plot state with all non-yielding parts shown in transparent-grey. A menu will appear with further controls:



Plot state

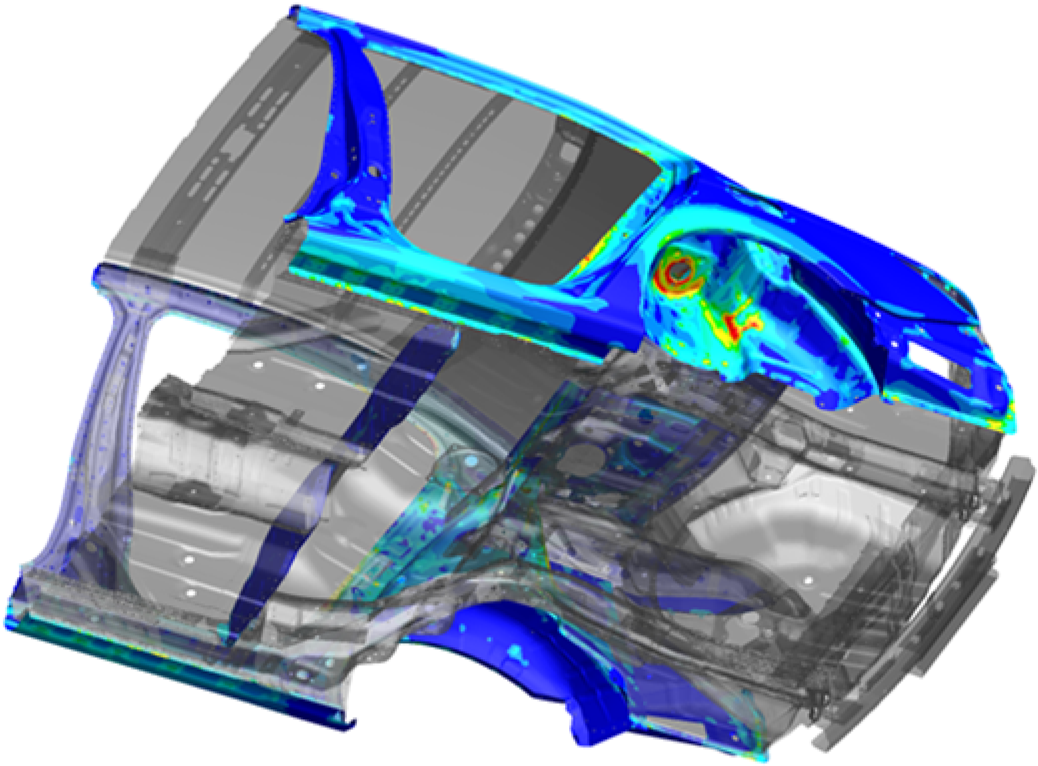
You can display the intrusion contour plot at any state. Use the controls in the menu to change plot state, rather than D3PLOT's main controls.

Display mode

This tool has three display modes:

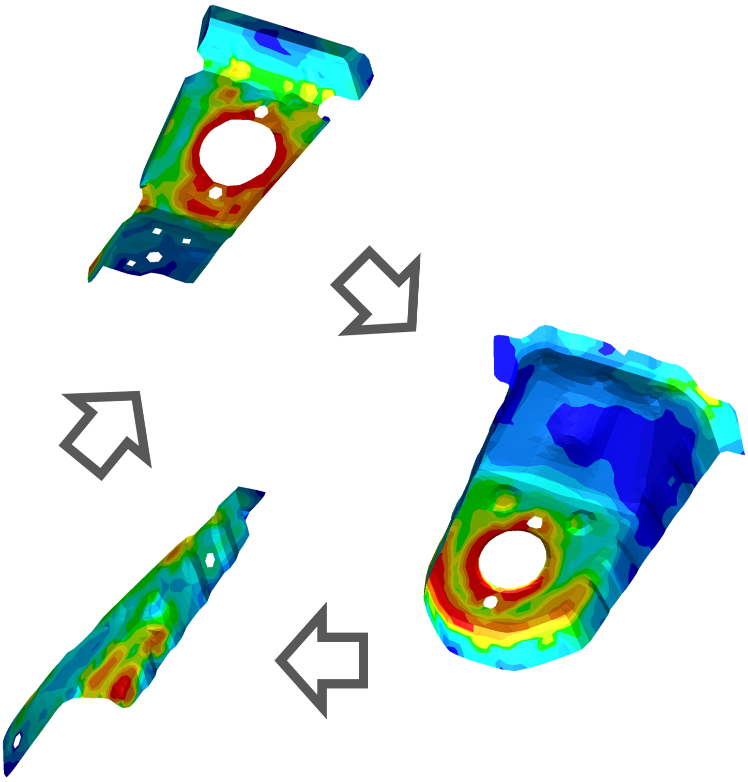
1. Non-yielding parts transparent-grey (default)

A CT (Continuous Tone) or SI (Shaded Image) contour plot of the YUTF/YUTP component of the model with the non-yielding parts displayed as transparent-grey:



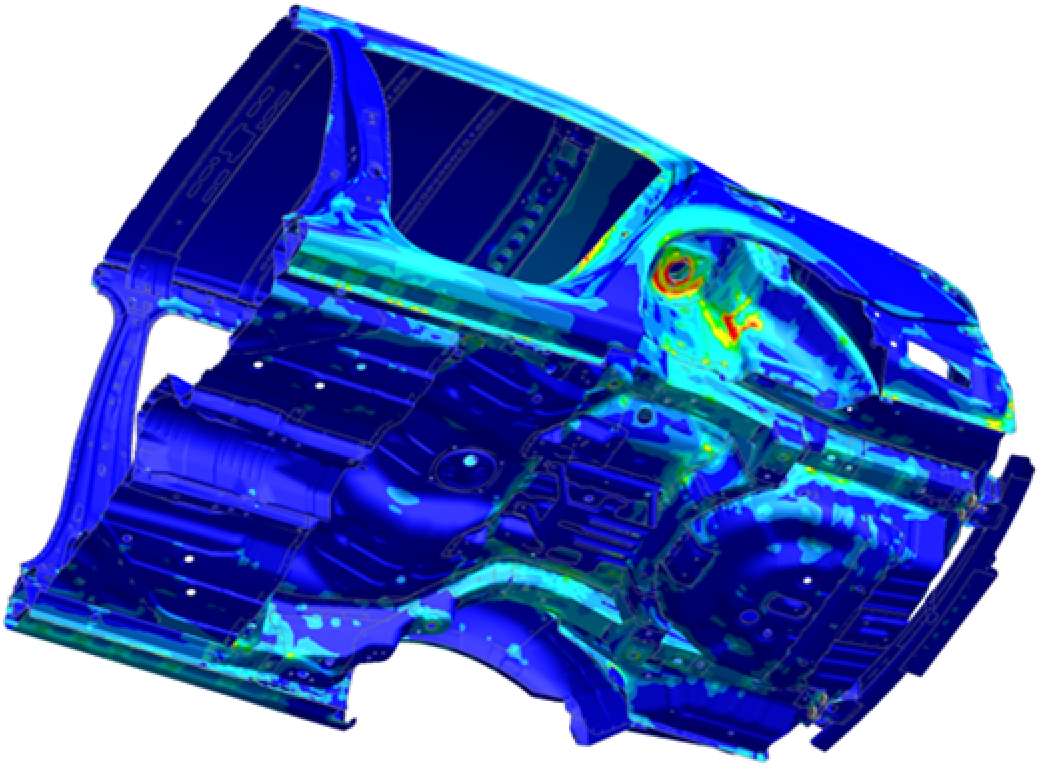
2. Cycle through yielding parts

A CT/SI plot of the YUTF/YUTP component of the specified yielding part. Cycle through yielding parts using the controls provided.



3. Plot of entire model

A normal CT/SI plot of the YUTF/YUTP component of the entire model:



Plot type

Choose between a SI (Shaded Image) contour plot (default) or a CT (Continuous Tone) contour plot.

Component

Choose to plot either the YUTF: Yield Utilisation Factor data component (default) or the YUTP: Yield Utilisation Percentage data component.

Contour Levels

There are several options regarding the contour levels:

- **Use workflow user-defined contour levels**
  To better visualise yielding parts, this option is enabled by default. The contour bar has values from 0.0 to 1.0 (blue to dark orange) in increments of 0.1, and then three further contour levels in red and magenta, so that all yielding material is clearly indicated in red/magenta. If this option is unchecked, automatic contour levels will be used.
    - **Calculate maximum contour value**
      With the above option enabled then by default, the actual maximum data value will be calculated for the maximum contour level. For example, if

the maximum yield utilisation factor is 1.263 then the contour levels above 1.0 will be 1.1, 1.2 and 1.263. This makes the maximum yield utilisation clearer. You can uncheck this option to speed up the plot (skips the maximum value calculation). In this case, the contour levels above 1.0 will be fixed to 1.1, 1.2 and 1.3.

Examples for different contour level settings

Non-user-defined	**User-defined without maximum calculation**	**User-defined with maximum calculation (Default)**
Yield Utilisation Factor (Max all pts)	Yield Utilisation Factor (Max all pts)	Yield Utilisation Factor (Max all pts)
0.000	0.000	0.000
0.097	0.100	0.100
0.194	0.200	0.200
0.291	0.300	0.300
0.389	0.400	0.400
0.486	0.500	0.500
0.583	0.600	0.600
0.680	0.700	0.700
0.777	0.800	0.800
0.874	0.900	0.900
0.971	1.000	1.000
1.069	1.100	1.100
1.166	1.200	1.200
1.263	1.300	1.263

Properties

When Strength Check is opened, a temporary properties file is saved. When you exit the tool, you can choose to restore the model properties (view, blanking, colours, etc.) to their appearance before you opened the tool.

4.9. Virtual Testing

What is Virtual Testing?

Historically, vehicle crashworthiness regulations and NCAP safety ratings have been based on physical testing alone. This is changing with the advent of virtual testing crashworthiness protocols. Virtual testing protocols aim to improve overall vehicle safety by testing the sensitivity of vehicle designs to a wider range of conditions, while minimising the cost of physical testing.

In virtual testing, a simulation model is validated against a physical test and then – if the validation is deemed acceptable – variations of the test are rated based on simulation results called “virtual loadcases”. Initially, these virtual loadcases will consider variations in impact angle or occupant seating position. In time, they may accommodate the introduction of human body models to augment the traditional use of anthropomorphic test devices. Virtual loadcases aim to improve the safety of vehicles in a greater number of representative real-world scenarios, and for a more diverse range of human physiologies.

Virtual Testing in Oasys LS-DYNA Environment

For the last thirty years, the software has enabled OEMs and their suppliers to develop vehicle designs that meet legal crashworthiness regulations and achieve excellent NCAP safety ratings. Automotive CAE has always been about ensuring that the vehicle performs on test day, so that it can make it to production, and beyond. Now, automotive CAE is itself part of the test.

We recognise the important role that Oasys LS-DYNA Environment can play, so that you can excel at Virtual Testing.

Workflows 22.1 (released with Oasys Suite 22.1)

At Oasys Ltd, we are working on software features to support the Virtual Testing protocols. The Euro NCAP Virtual Far Side Simulation & Assessment Protocol and C-NCAP Far Side Occupant Protection Protocol are already published and are supported in Workflows 22.1. Support for other upcoming protocols will follow in future releases. If you would like early access to an upcoming protocol, please contact us.

Oasys Suite 22.1 contains a set of integrated and complementary Workflow tools to power your Virtual Testing CAE workflows:

1. **Automotive Assessments**
   The Automotive Assessments Workflow now includes support for the Euro NCAP and C-NCAP Virtual Far Side Protocols, including the injury metrics that feed into Validation Criterion 2 and Correction Factor A. Automation is available via various REPORTER templates.

2. **LS-DYNA to ISO-MME**
   A new workflow tool to convert Ansys LS-DYNA results into the ISO-MME format as specified by the Euro NCAP Virtual Far Side Protocol, ready to upload to the VTC Server. The added REPORTER automation enables you to generate ISO-MME output after each Ansys LS-DYNA job. You can also use the tool to export the channels required by the C-NCAP Far Side Occupant Protection Protocol, to store your results data in a consistent ISO-MME format.

3. **Curve to ISO-MME**
   A new workflow tool that enables you to export T/HIS curves in ISO-MME data format without the need of config file.

4. **SimVT**
   A new, powerful tool for correlating simulation versus test curves, or indeed any combination of: Ansys LS-DYNA models, ISO-MME data, and CSV data. Supports the ISO/TS 18571:2024 rating method and calculates the ISO Scores used in Validation Criterion 1 of the Euro NCAP Virtual Far Side Protocol, and for the correlation fitting indices for the C-NCAP Far Side Occupant Protection Protocol. Enables detailed analysis of correlation results, so you can improve the validity of your CAE models. Automation available via various REPORTER templates.

5. **VTC Quality Criteria (Euro NCAP | Euro NCAP HBM | C-NCAP)**
   New, convenient tools for assessing the quality criteria specified in section 6.1 of the Euro NCAP Virtual Far Side Protocol and appendix H.1.1(f) of the C-NCAP Far Side Occupant Protection Protocol. The added REPORTER automation enables you to check the validity of your CAE models after each Ansys LS-DYNA job.

6. **VTC Videos (Euro NCAP | C-NCAP)**
   New, convenient tools for creating the videos specified in section 5.2.1 of the Euro NCAP Virtual Far Side Protocol and table H.8 of the C-NCAP Far Side Occupant Protection Protocol. The tool assists with camera positioning and can be automated to generate videos with your preferred settings.

Further Development

Development does not end with Oasys Suite 22.1. We continue to work on enhancements to the Virtual Testing Workflows, including:

- Improved usability and automation features
- Support for other upcoming protocols

If you are interested in early access to the latest features, or if you would like more information or a demonstration of Virtual Testing with Oasys LS-DYNA Environment, please contact Support.

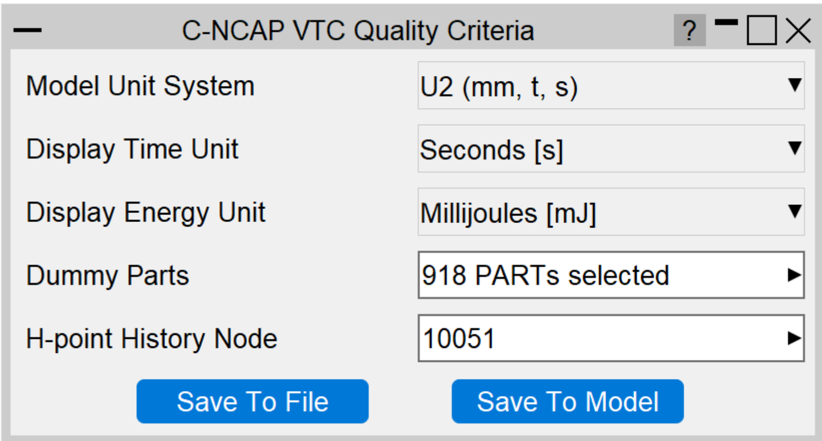
4.9.1. C-NCAP VTC Quality Criteria

Tools → Workflows → C-NCAP VTC Quality Criteria

The C-NCAP VTC Quality Criteria workflow tool is part of the virtual testing protocol and allows you to perform the quality checks outlined in section H.1.1(f) of the C-NCAP Far-Side Occupant Protection Protocol.
In T/HIS, this tool displays the results and graphs required for the Simulation.
In PRIMER, we set the tool up by selecting the model unit system, selecting the Dummy Parts and H-point History Node.

How to use the Workflow Tool in PRIMER

When this tool is initially launched, the tool will attempt to collect all previously saved data from the Automotive Assessents Workflow.
The GUI will look something like this by default:



Model Unit System

Select the unit system of your model.

Display Time Unit

Select the display time unit for the graph outputs, either Seconds or Milliseconds.

Display Energy Unit

Select the display energy unit for the graph outputs, either Joules, Millijoules, Kilojoules or Foot-Pounds.

Dummy Parts

Select the include file containing the Dummy by pressing the right arrow for selection and picking options or manually type in the textbox.

H-point History Node

Select the DATABASE_HISTORY_NODE matching the H-point Node of the Dummy by pressing the right arrow for multiple selection and picking options or manually typing in the textbox.

Saving

Save the Workflow data to a .json file or save it to your model and then write the keyword file from PRIMER.

How to use the Workflow Tool in T/HIS

When this tool is initially launched, the tool will perform the quality checks automatically.
Once the run has completed the GUI will look something like the following image by default, with 4 checks presented on it's own graph on a single page.
For a full breakdown of each graph and it's results please see 'Understanding Each Graph and the Results' further down this manual.

Write Results

Writes the results out as displayed in the table in CSV format.

Model Unit System

Displays the unit system that has been selected in PRIMER for this model.

Reset Graphs

Reproduces the graphs and resets them to default settings.

Curve Labels Off

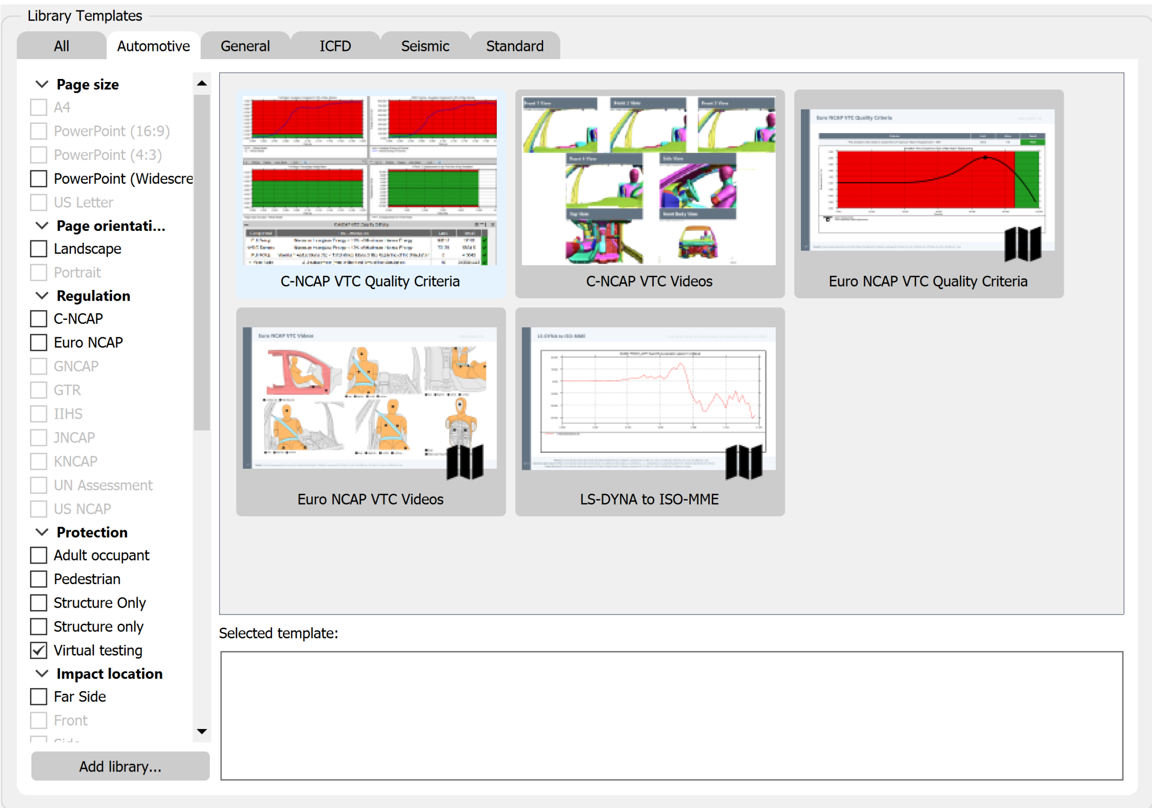
Turns off the labels written on the curves, to make them re-appear, then 'Reset Graphs'.

Datum Labels Off

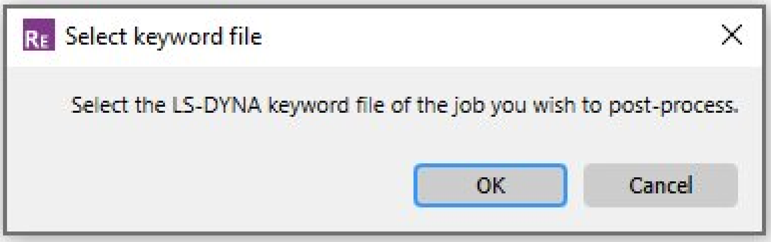
Turns off the Datum Labelsto make them re-appear, then 'Reset Graphs'.

How to use the Workflow Tool in REPORTER

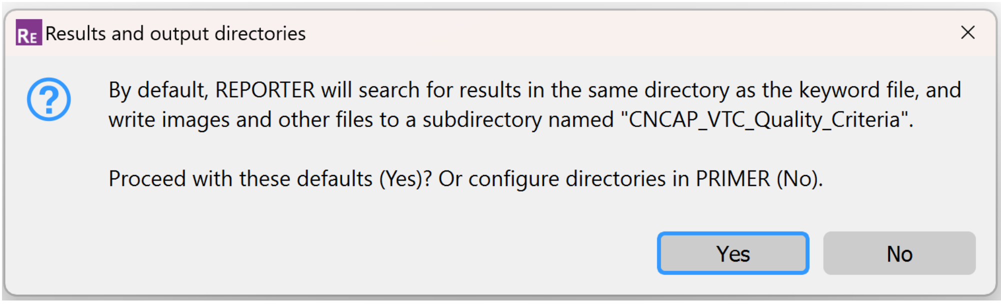
1. Within the Automotive tab in REPORTER, select the C-NCAP VTC Quality Criteria template. It can be found by filtering for 'Virtual Testing'.



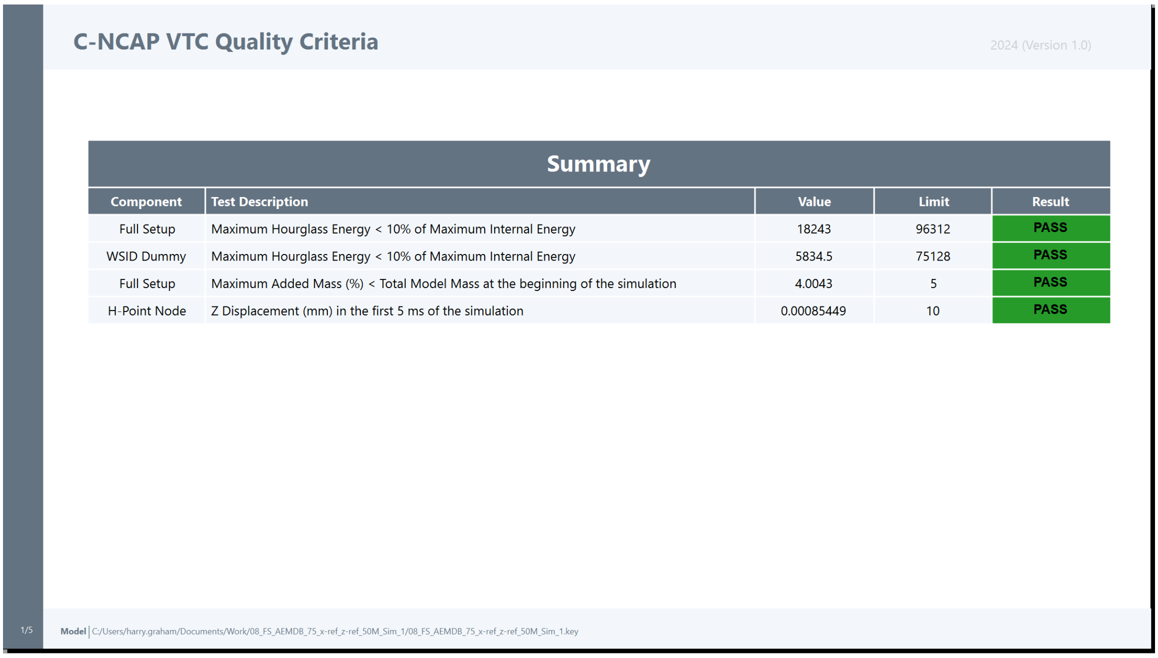
2. Once open you will be prompted to select the Ansys LS-DYNA keyword file of the job you wish to post-process.



3. You will then be asked whether you want to continue with the default results and output directories or configure them in PRIMER.



4. On the first page an overview of the results will be presented in a table format much like the GUI output when running the Workflow manually in T/HIS. On the remaining pages you can see each 'Check' one by one with its results in more detail.



C-NCAP VTC Quality Criteria

2024 (Version 1.0)

Summary

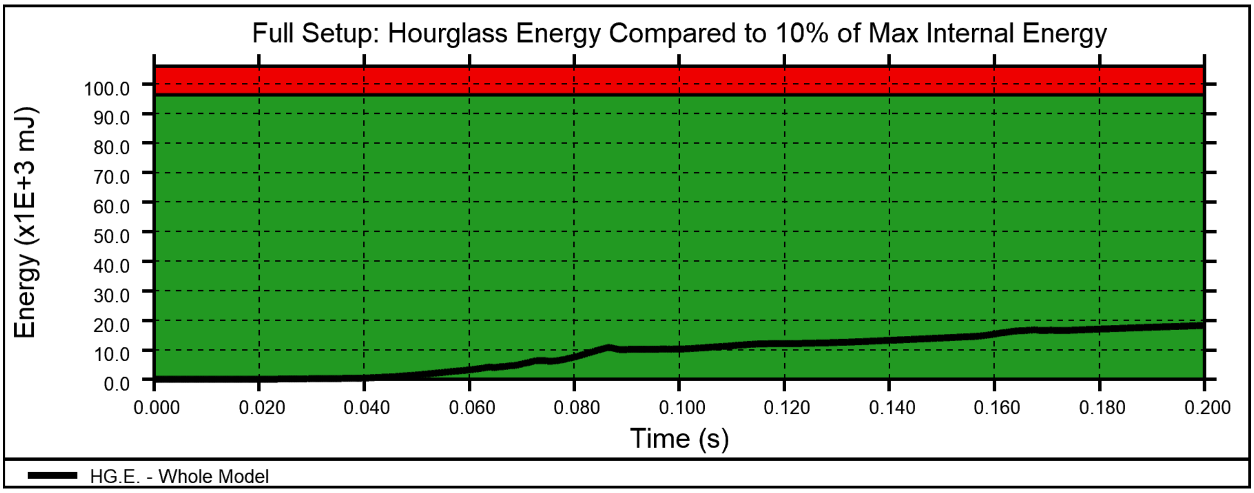
Component	Test Description	Value	Limit	Result
Full Setup	Maximum Hourglass Energy < 10% of Maximum Internal Energy	18243	96312	PASS
WSID Dummy	Maximum Hourglass Energy < 10% of Maximum Internal Energy	5834.5	75128	PASS
Full Setup	Maximum Added Mass (%) < Total Model Mass at the beginning of the simulation	4.0043	5	PASS
H-Point Node	Z Displacement (mm) in the first 5 ms of the simulation	0.00085449	10	PASS

1/5 **Model** | C:/Users/harry.graham/Documents/Work/08_FS_AEMDB_75_x-ref_z-ref_50M_Sim_1/08_FS_AEMDB_75_x-ref_z-ref_50M_Sim_1.key

Understanding Each Graph and the Results

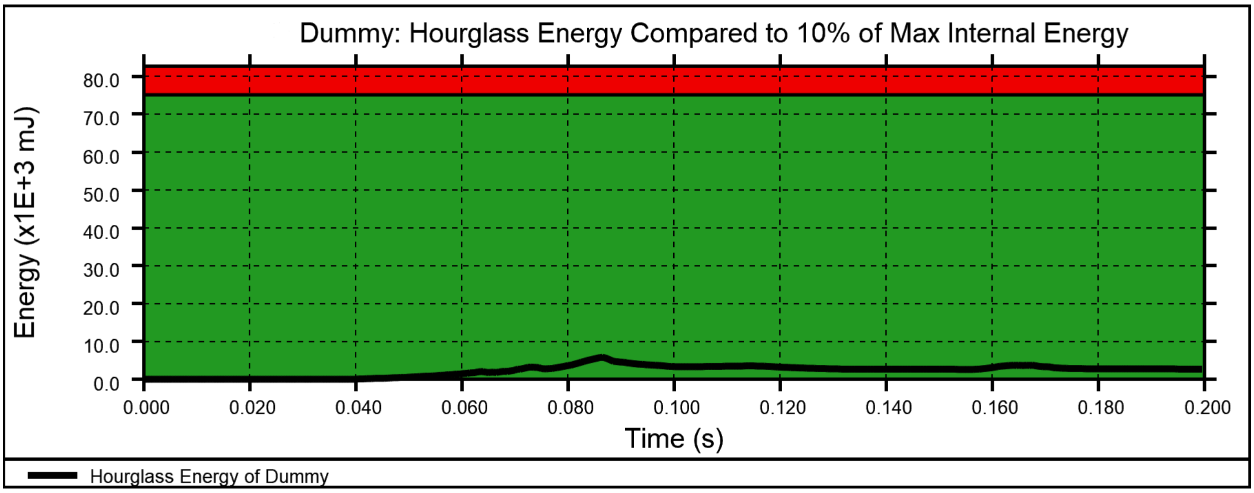
Full Setup: Hourglass Energy Compared to 10% of Maximum Internal Energy

The hourglass energy of the system should not exceed 10% of the internal energy of the system.
In blue colour, the internal energy of the full setup is displayed (only if the check is a fail).
The datum line is drawn at 10% of the maximum internal energy.
In foreground colour, the hourglass energy of the full setup is displayed.
For this check to pass, the peak of the hourglass energy curve must be within the green zone.
The limit and result are displayed in the table.



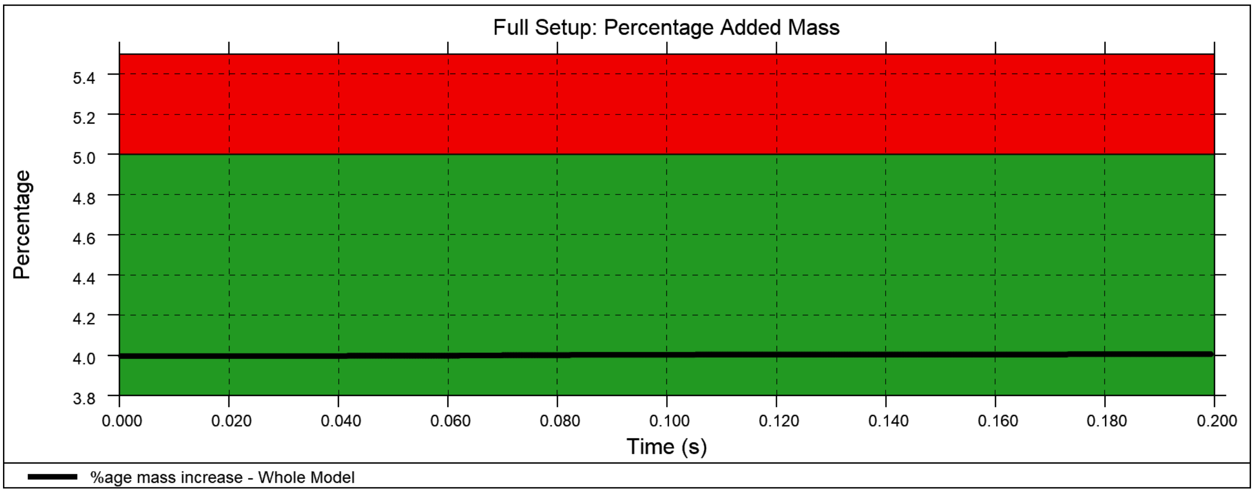
Dummy: Hourglass Energy Compared to 10% of Maximum Internal Energy

The hourglass energy of the dummy model components should not exceed 10% of the dummy’s internal energy.
In blue colour, the internal energy of the Dummy is displayed (only if the check is a fail).
The datum line is drawn at 10% of the maximum internal energy.
In foreground colour, the hourglass energy of the Dummy is displayed.
For this check to pass, the peak of the hourglass energy curve must be within the green zone.
The limit and result are displayed in the table.



Full Setup: Percentage Added Mass

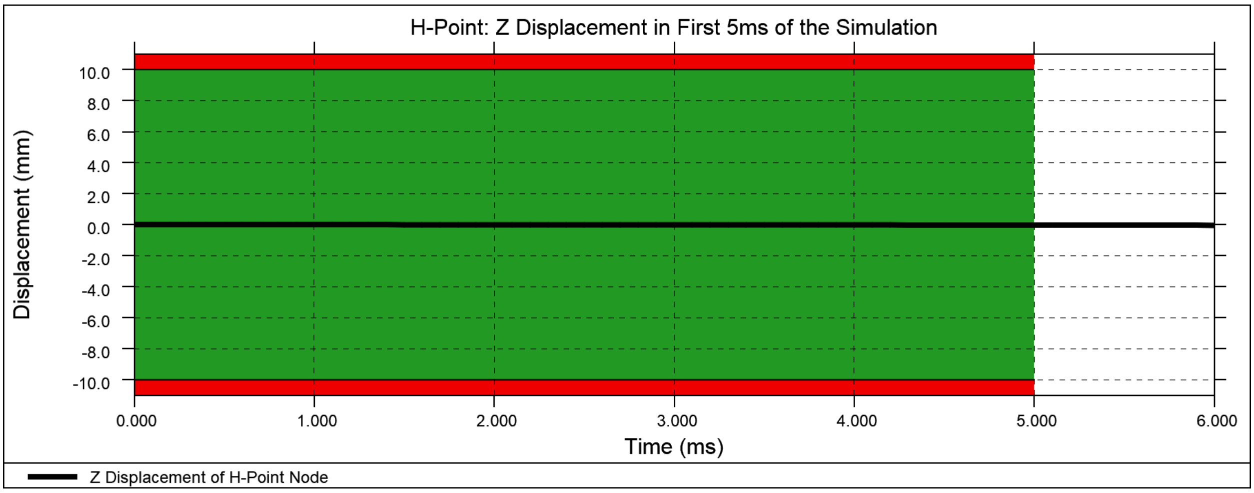
At the beginning of the calculation, the increase in the mass of the overall model due to mass scaling should be less than 5% of the total mass of the model.
In foreground colour, the percentage mass increase is displayed.
The datum line is drawn at 5%.
For this check to pass, the peak of the percentage mass increase curve must be within the green zone.
The limit and result are displayed in the table.



H-Point: Z Displacement in the First 5ms of the Simulation

Within the initial 0 to 5 ms of the calculation, the H-point Z displacement should be less than 10 mm.

In foreground colour, the Z displacement of the H-Point Node is displayed, zoomed in to the first 6ms.
The datum line is drawn at 10mm.
For this check to pass, the peak and trough of the Z displacement curve must be within the green zone within the first 5ms.
The limit and result are displayed in the table.



4.9.2. VTC Videos

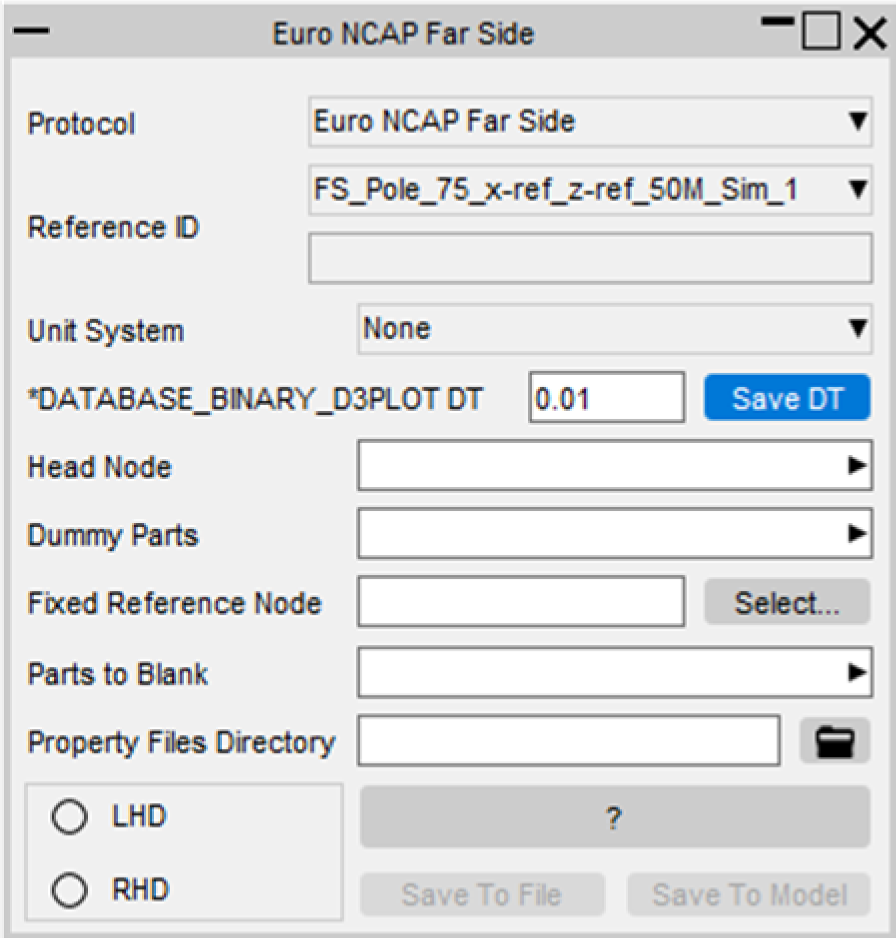
Tools → Workflows → VTC Videos

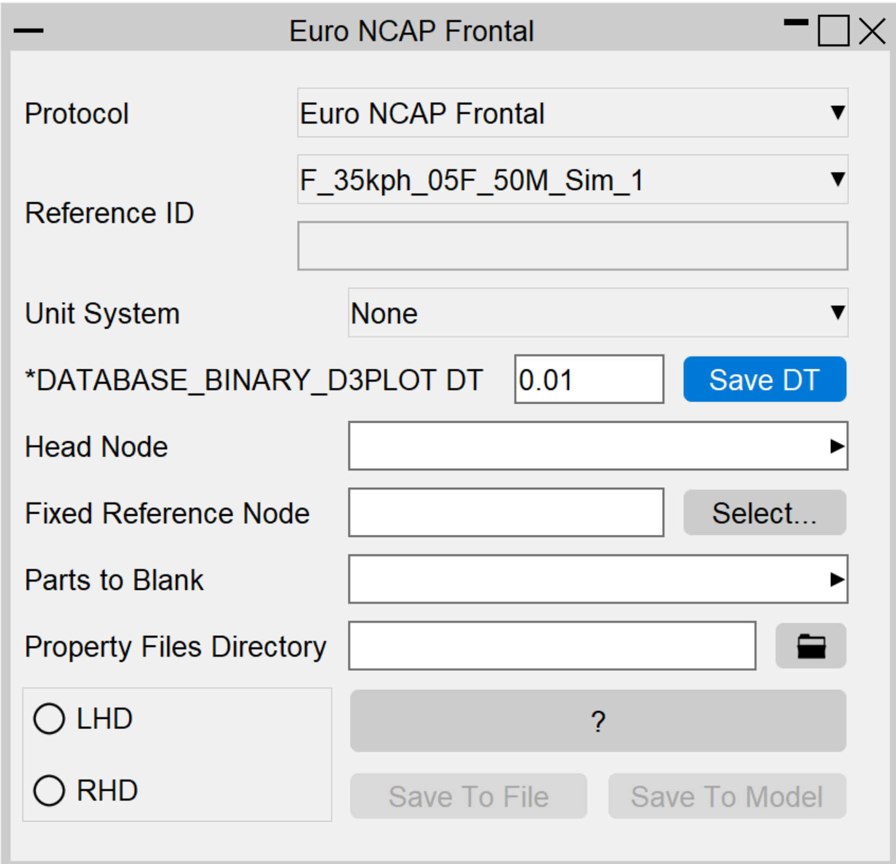
The VTC Videos workflow tool is part of the Virtual Testing Protocol and allows users to calculate the views and export the videos outlined in various EuroNCAP and C-NCAP protocols.

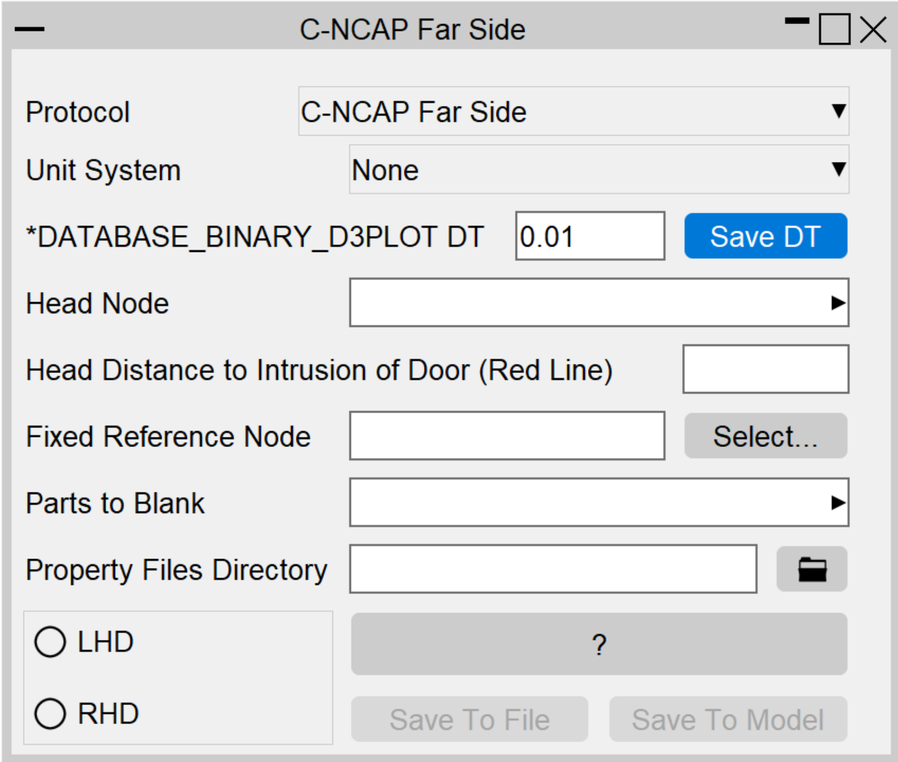
The tool attempts to calculate the camera positions automatically based on model entities you define in PRIMER. You can then adjust and save the views in D3PLOT to be reused to capture the videos for future Ansys LS-DYNA runs.

How to use the Workflow Tool in PRIMER

When this tool is initially launched, the GUI will look something like this by default:


Euro NCAP Far Side
Protocol
Euro NCAP Far Side
Reference ID
FS_Pole_75_x-ref_z-ref_50M_Sim_1
Unit System
None
*DATABASE_BINARY_D3PLOT DT
0.01
Save DT
Head Node
Dummy Parts
Fixed Reference Node
Select...
Parts to Blank
Property Files Directory
LHD
RHD
?
Save To File
Save To Model


Euro NCAP Frontal
Protocol
Euro NCAP Frontal
Reference ID
F_35kph_05F_50M_Sim_1
Unit System
None
*DATABASE_BINARY_D3PLOT DT
0.01
Save DT
Head Node
Fixed Reference Node
Select...
Parts to Blank
Property Files Directory
LHD
RHD
?
Save To File
Save To Model



ALL PROTOCOLS:

The following required selections are used to calculate the views for ALL Protocols.

Protocol

Select the NCAP Protocol you're testing from the dropdown. This will determine the remaining inputs needed.

Unit System

Select the Unit System of the model from the dropdown.

*DATABASE_BINARY_D3PLOT_DT

Animations need to be analysed with an output interval of 2ms (0.002s) or less. Changing the output interval will change the *DATABASE_BINARY_D3PLOT DT keyword field in the model and thus you will need to save the model and re-run in Ansys LS-DYNA to get the updated output files.

Fixed Reference Node

Press 'Select...' to Select or Pick a *NODE for the fixed reference node. The purpose of this is to hold the sled in position during the videos.

Parts to Blank

There might be some parts you wish to blank during all the videos, for example the windscreen. Press the right arrow for multiple selection or picking options or manually type the parts in the textbox.

LHD/RHD

Using the Radio buttons, select LHD or RHD for Left Hand Drive or Right Hand Drive Occupant.

Property Files Save Directory

Select the Directory by pressing on the Directory icon to save the view files (Property (.prp) and Cut-Section (.cut)).

Saving

Save the Workflow data to a .json file or save it to your model and then write out the keyword file from PRIMER.

EURO NCAP FAR SIDE

The following required selections are used to calculate the views for the Euro NCAP Far Side Protocol

Reference ID

Select the Virtual Testing Reference ID from the dropdown, if 'Other' is selected the textbox below will become active to write your own Reference ID.

Dummy Parts

Press the right arrow for multiple selection or picking options or manually type in the textbox for the Dummy.

EURO NCAP Frontal

The following required selections are used to calculate the views for the Euro NCAP Frontal Protocol

Reference ID

Select the Virtual Testing Reference ID from the dropdown, if 'Other' is selected the textbox below will become active to write your own Reference ID.

C-NCAP Far Side

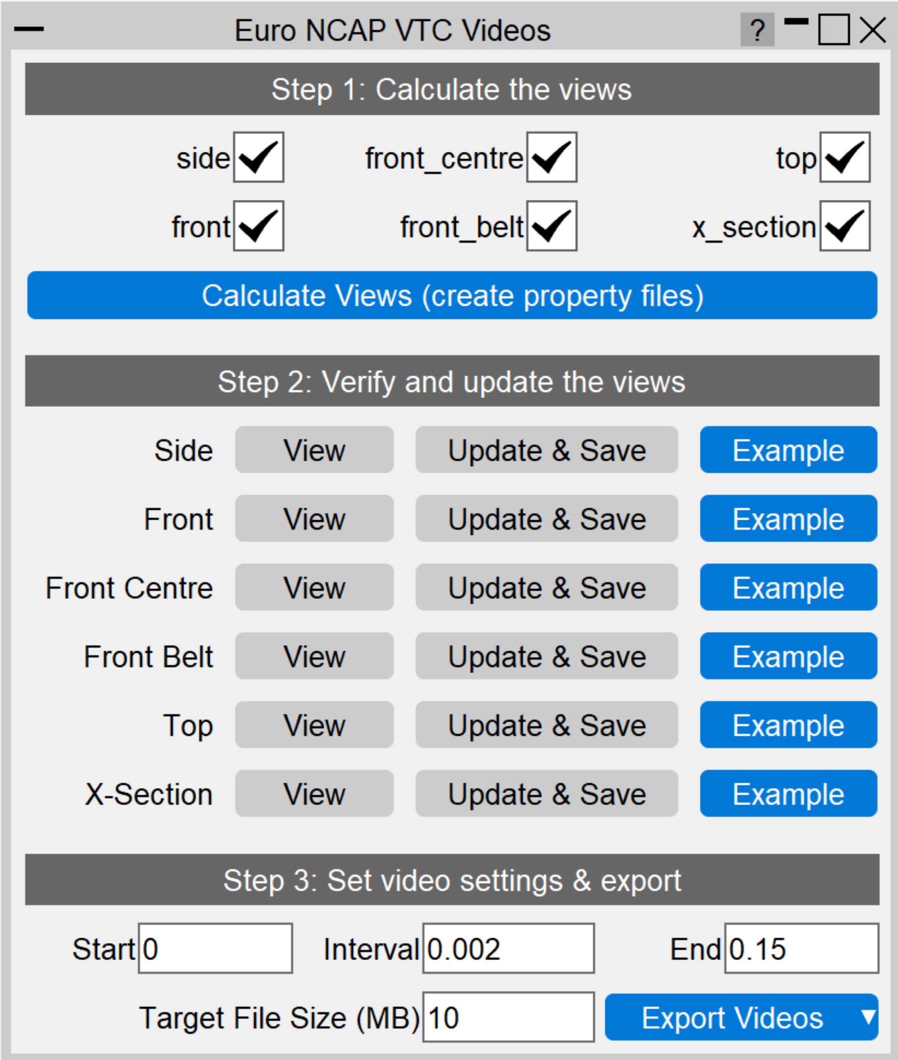
The following required selections are used to calculate the views for the C-NCAP Far Side Protocol

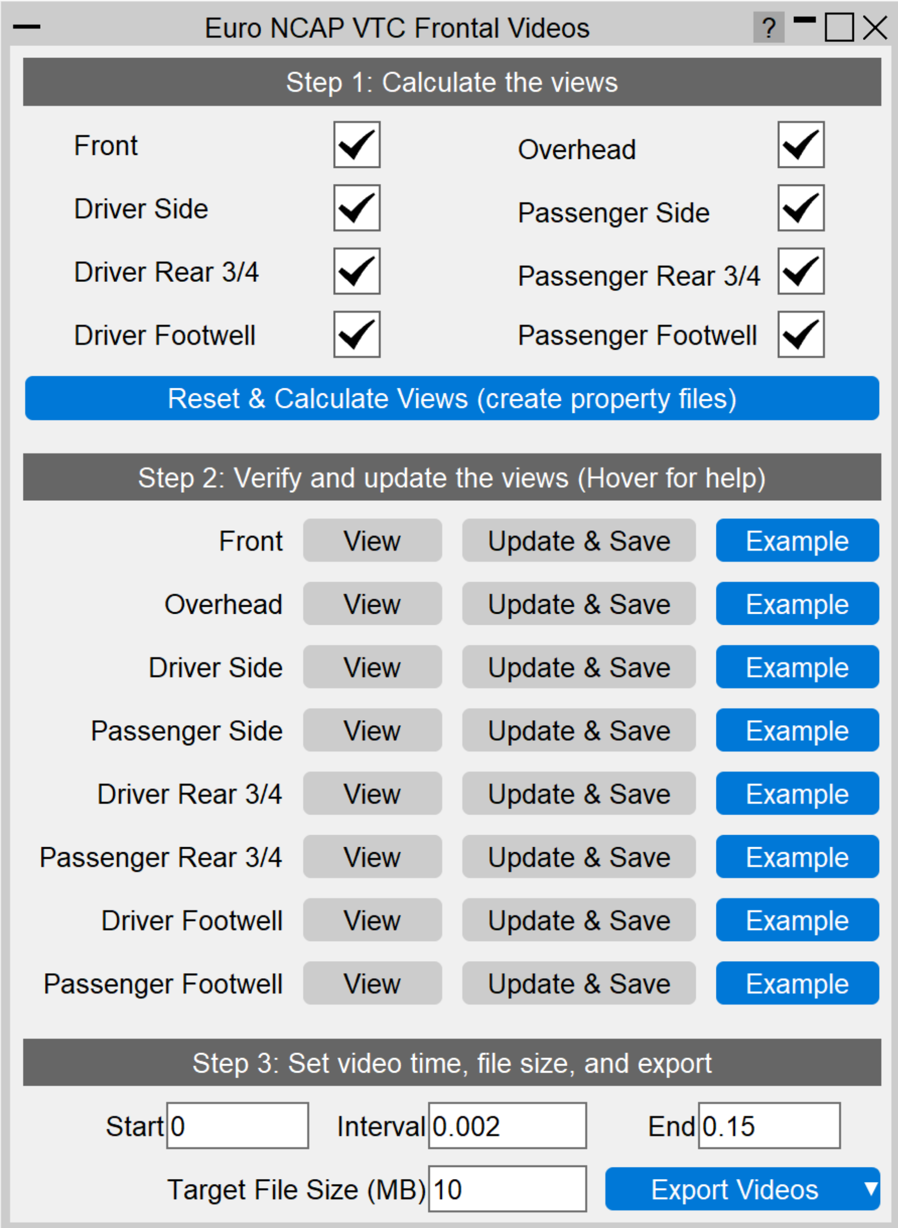
Head Distance to Intrusion of Door

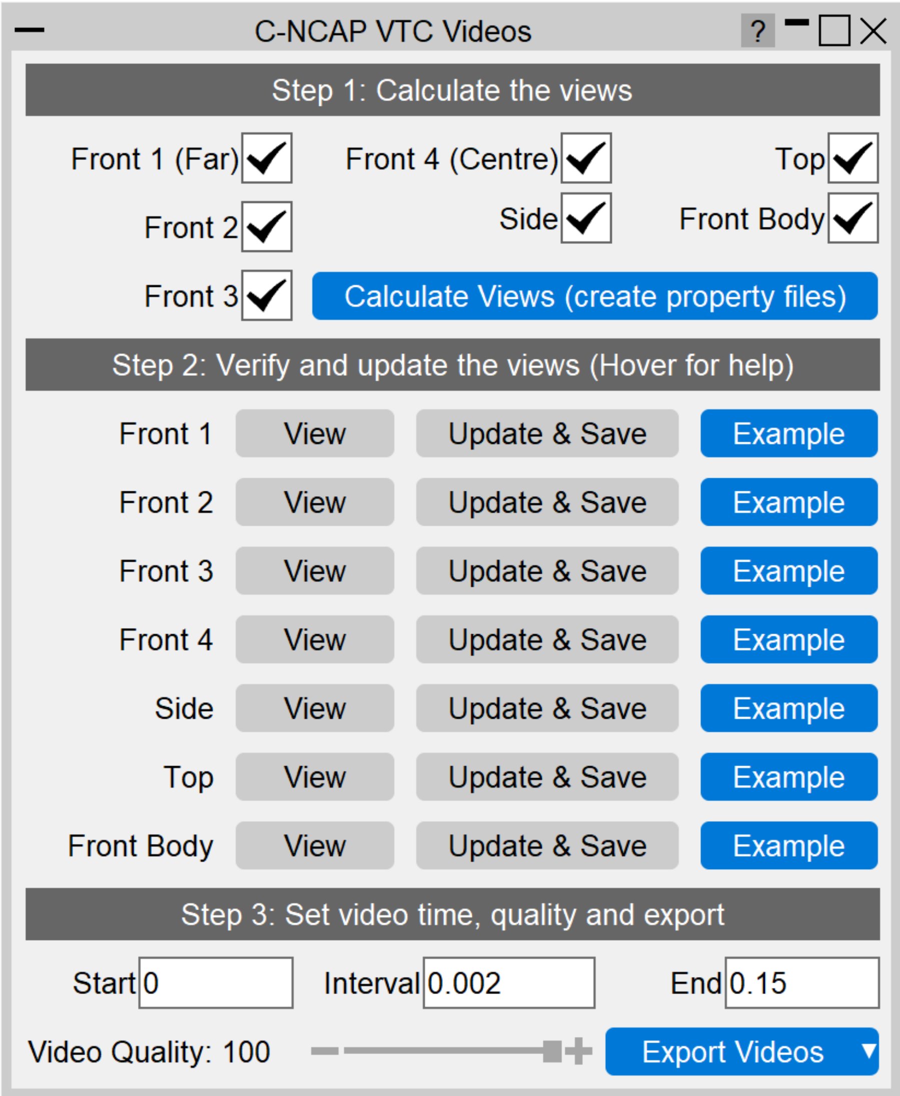
Manually type value of the maximum intrusion amount of the door on the impact side into the box. This uses the units selected in the Unit System

How to use the Workflow Tool in D3PLOT

When this tool is initially launched, the GUI will look something like this by default:


Euro NCAP VTC Videos
Step 1: Calculate the views
side
front_centre
top
front
front_belt
x_section
Calculate Views (create property files)
Step 2: Verify and update the views
Side
Front
Front Centre
Front Belt
Top
X-Section
View
Update & Save
Example
Step 3: Set video settings & export
Start
0
Interval
0.002
End
0.15
Target File Size (MB)
10
Export Videos


Euro NCAP VTC Frontal Videos
Step 1: Calculate the views
Front
Overhead
Driver Side
Passenger Side
Driver Rear 3/4
Passenger Rear 3/4
Driver Footwell
Passenger Footwell
Reset & Calculate Views (create property files)
Step 2: Verify and update the views (Hover for help)
Front
Overhead
Driver Side
Passenger Side
Driver Rear 3/4
Passenger Rear 3/4
Driver Footwell
Passenger Footwell
View
Update & Save
Example
Step 3: Set video time, file size, and export
Start 0
Interval 0.002
End 0.15
Target File Size (MB) 10
Export Videos



Step 1: Calculate the Views

Once the Workflow is clicked on, step 1 is to calculate the views. Use the checkboxes to control which views you wish to calculate.
When you click Calculate View, properties files are generated and saved in the directory you defined in PRIMER.

Step 2: Verify & Update the views

Once the views have been calculated, click the "View" buttons to see each view. If you are not satisfied with the view calculated, you can manually adjust the view by moving the camera position.
Click the "?" button to remind yourself of what the views should look like according to the NCAP specification.
Once you are satisfied with the new camera position, click "Update & Save".

Step 3: Set the video quality and export

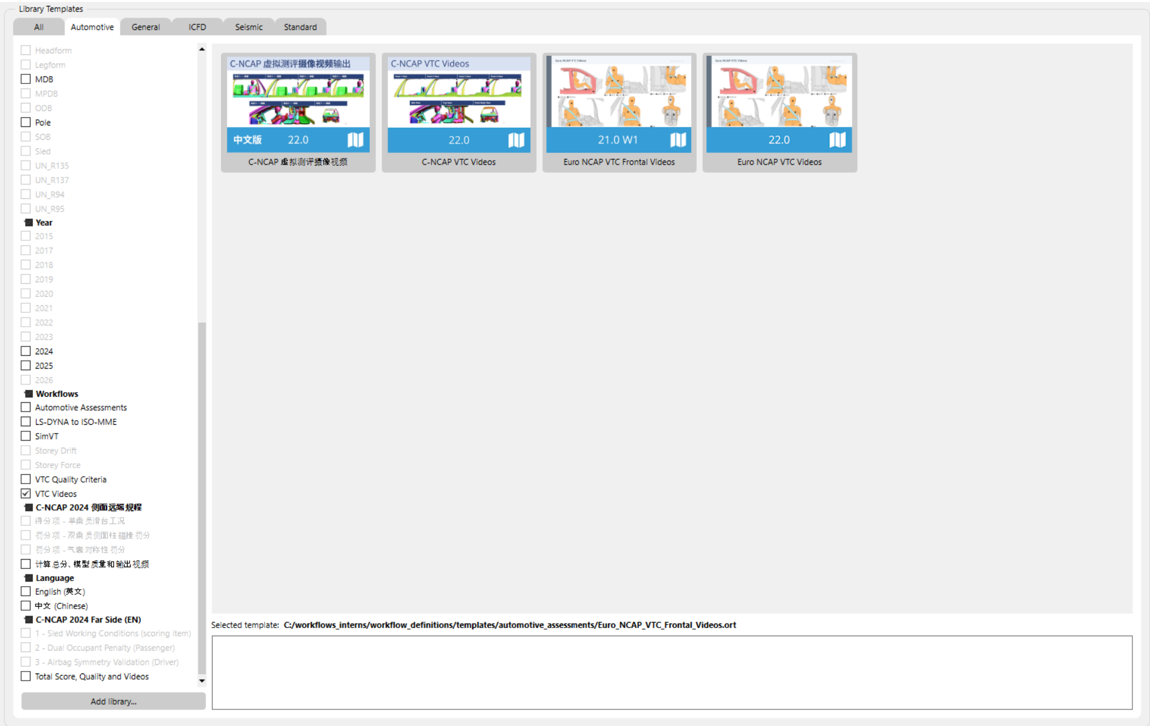
Once you have verified your views, set the start, interval and end time required for your videos:

- The default start time is set to zero
- The default interval time is set to either 2 or 0.002 dependant on your unit system as animations need to be analysed with an output interval of 2ms (0.002s) or less
- The end time needs to be set to the time of maximum head excursion x 1.2

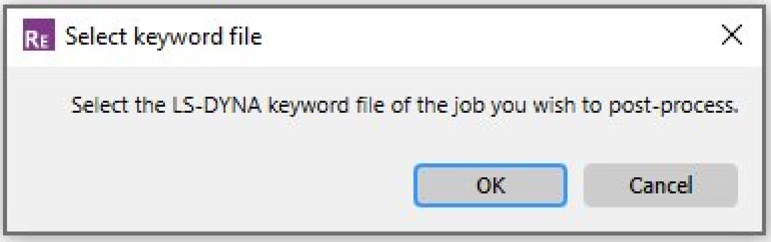
Then set the video target file size, or change the Video Quality slider. According to the NCAP specification, the videos should be 1-10 MB in size.
“Export Videos” will export all six videos by default to the directory you defined in PRIMER – you can change the views to be exported via the dropdown.

How to use the Workflow Tool in REPORTER

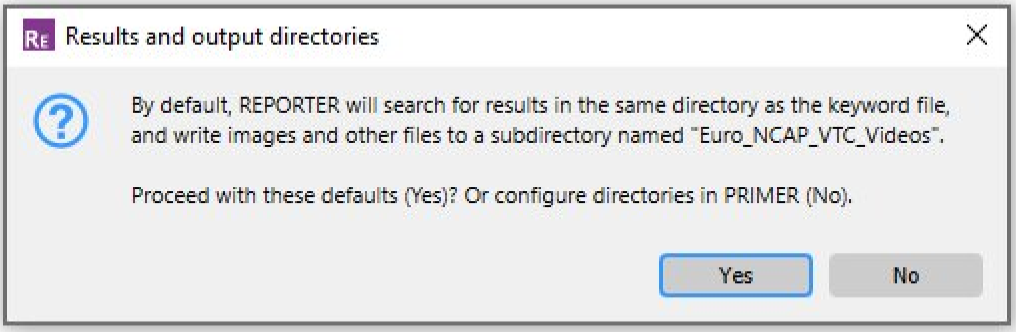
1. Within the Automotive tab in REPORTER, select the appropriate NCAP VTC Videos template. It can be found by filtering for 'VTC Videos’. This example uses the Euro NCAP Far Side template.



2. Once open you will be prompted to select the Ansys LS-DYNA keyword file of the job you wish to post-process.

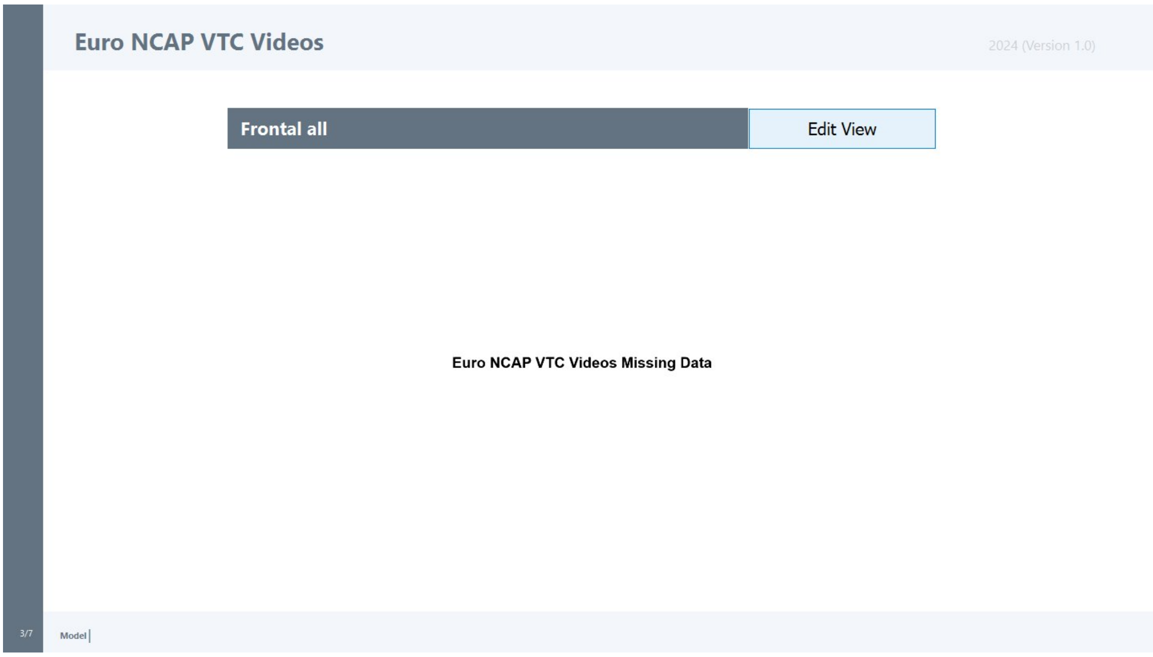


3. You will then be asked whether you want to continue with the default results and output directories or configure them in PRIMER.



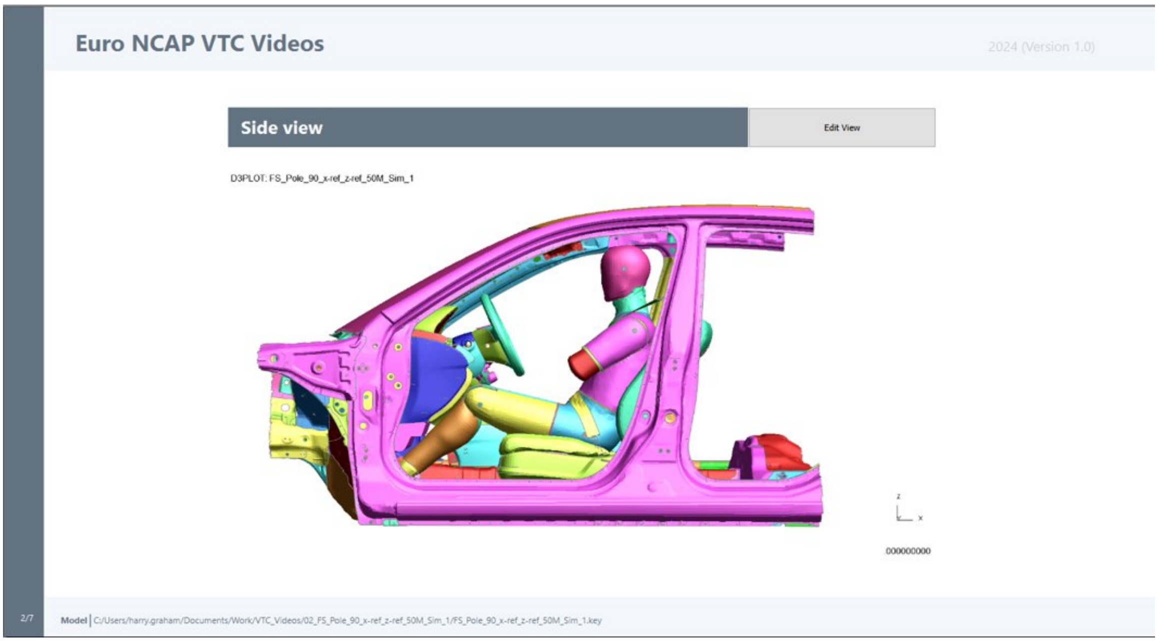
4. REPORTER will then proceed to generate the report. If there is any missing data, PRIMER will be launched for you to edit the setup. From then on, REPORTER will attempt to generate the report with the data it has available.

5. Where videos cannot be produced, a “missing data” image will be displayed.

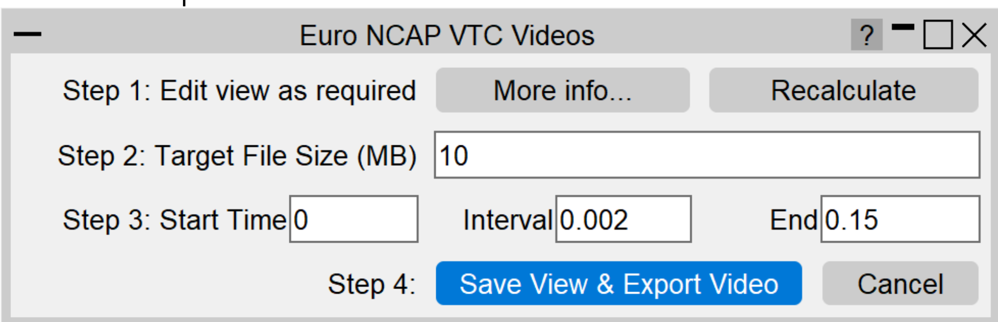


6. REPORTER automatically calculates the views and exports the videos. If you have previously adjusted any of the views, REPORTER will use the saved views. On the first page of the report, an overview of the results is presented.

7. The following pages show each view in more detail. Click "Edit View" to update the camera positions if you are not satisfied with a specific view.



8. Then use the simplified D3PLOT GUI to edit the view.



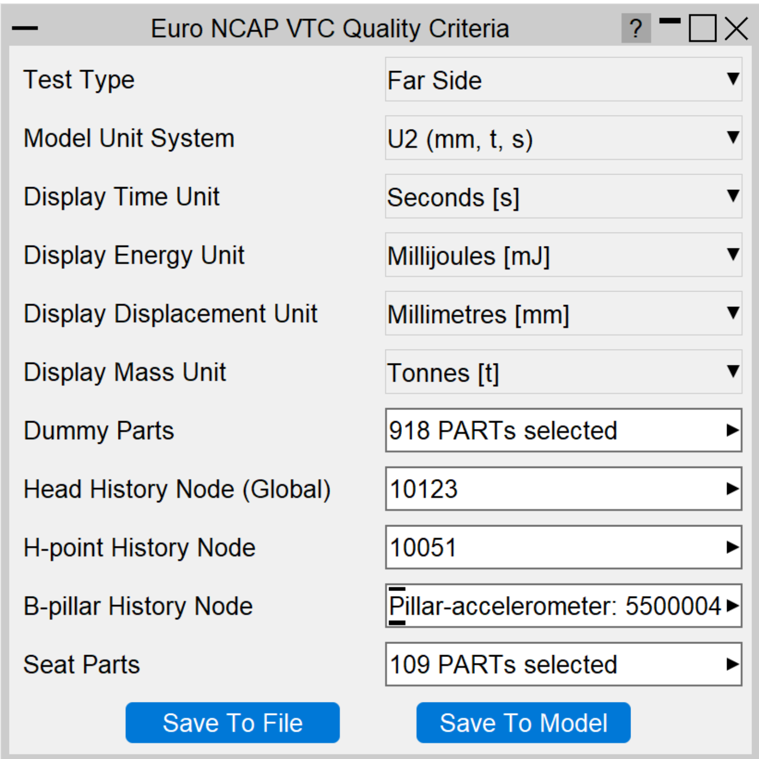
4.9.3. Euro NCAP VTC Quality Criteria

Tools → Workflows → Euro NCAP VTC Quality Criteria

The Euro NCAP VTC Quality Criteria workflow tool allows you to perform the quality checks outlined in Section 6.1 of both the Euro NCAP Virtual Far Side Simulation & Assessment Protocol and the Euro NCAP Virtual Frontal Simulation & Assessment Protocol. The Euro NCAP Virtual Frontal Simulation & Assessment Protocol is currently being developed with the intention of implementation in 2026 meaning the frontal assessment methodology of this tool is subsequent to change.

How to use the Workflow Tool in PRIMER

When this tool is initially launched, the tool will attempt to collect all previously saved data from the Automotive Assessments Workflow.
The GUI will look something like this by default:



Test Type

Select whether the model is for a far side or frontal crash test.

Model Unit System

Select the unit system of your model.

Display Time Unit

Select the display time unit for the graph outputs, either Seconds or Milliseconds.

Display Energy Unit

Select the display energy unit for the graph outputs, either Joules, Millijoules, Kilojoules or Foot-Pounds.

Display Displacement Unit

Select the display displacement unit for the graph outputs, either Metres, Millimetres or Feet.

Display Mass Unit

Select the display mass unit for the graph outputs, either Kilograms, Tonnes, Grams or Slugs.

Dummy Parts

Select the include file containing the Dummy by pressing the right arrow for multiple selection and picking options or manually typing in the textbox.

Head History Node (Global)

Select the DATABASE_HISTORY_NODE matching the Global Head Node of the Dummy by pressing the right arrow for multiple selection and picking options or manually typing in the textbox. The default is 10123.

H-point History Node

Select the DATABASE_HISTORY_NODE matching the H-point Node of the Dummy by pressing the right arrow for multiple selection and picking options or manually typing in the textbox. The default is 10501.

B-pillar History Node

Select the DATABASE_HISTORY_NODE matching the B-pillar Node of the Vehicle by pressing the right arrow for multiple selection and picking options or manually typing in the textbox.

Seat Parts

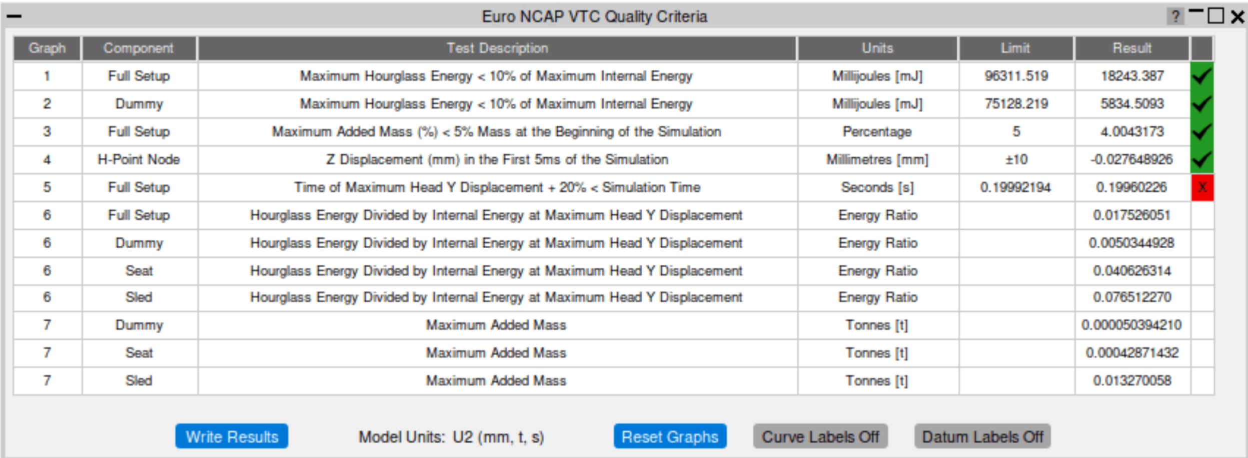
Select the include file containing the Seat of the model by pressing the right arrow for multiple selection and picking options or manually typing in the textbox.

Saving

Save the Workflow data to a .json file or save it to your model and then write the keyword file from PRIMER.

How to use the Workflow Tool in T/HIS

When this tool is initially launched, the tool will perform the quality checks automatically.
Once the run has completed the GUI will look something like the following image by default, with 7 checks presented on it's own graph on a single page.
For a full breakdown of each graph and it's results please see 'Understanding Each Graph and the Results' further down this manual.



Euro NCAP VTC Quality Criteria

Graph	Component	Test Description	Units	Limit	Result	
1	Full Setup	Maximum Hourglass Energy < 10% of Maximum Internal Energy	Millijoules [mJ]	96311.519	18243.387	✓
2	Dummy	Maximum Hourglass Energy < 10% of Maximum Internal Energy	Millijoules [mJ]	75128.219	5834.5093	✓
3	Full Setup	Maximum Added Mass (%) < 5% Mass at the Beginning of the Simulation	Percentage	5	4.0043173	✓
4	H-Point Node	Z Displacement (mm) in the First 5ms of the Simulation	Millimetres [mm]	±10	-0.027648926	✓
5	Full Setup	Time of Maximum Head Y Displacement + 20% < Simulation Time	Seconds [s]	0.19992194	0.19960226	X
6	Full Setup	Hourglass Energy Divided by Internal Energy at Maximum Head Y Displacement	Energy Ratio		0.017526051	
6	Dummy	Hourglass Energy Divided by Internal Energy at Maximum Head Y Displacement	Energy Ratio		0.0050344928	
6	Seat	Hourglass Energy Divided by Internal Energy at Maximum Head Y Displacement	Energy Ratio		0.040626314	
6	Sled	Hourglass Energy Divided by Internal Energy at Maximum Head Y Displacement	Energy Ratio		0.076512270	
7	Dummy	Maximum Added Mass	Tonnes [t]		0.000050394210	
7	Seat	Maximum Added Mass	Tonnes [t]		0.00042871432	
7	Sled	Maximum Added Mass	Tonnes [t]		0.013270058	

Write Results Model Units: U2 (mm, t, s) Reset Graphs Curve Labels Off Datum Labels Off

Write Results

Writes the results out as displayed in the table in CSV format.

Model Unit System

Displays the unit system that has been selected in PRIMER for this model.

Reset Graphs

Reproduces the graphs and resets them to default settings.

Curve Labels Off

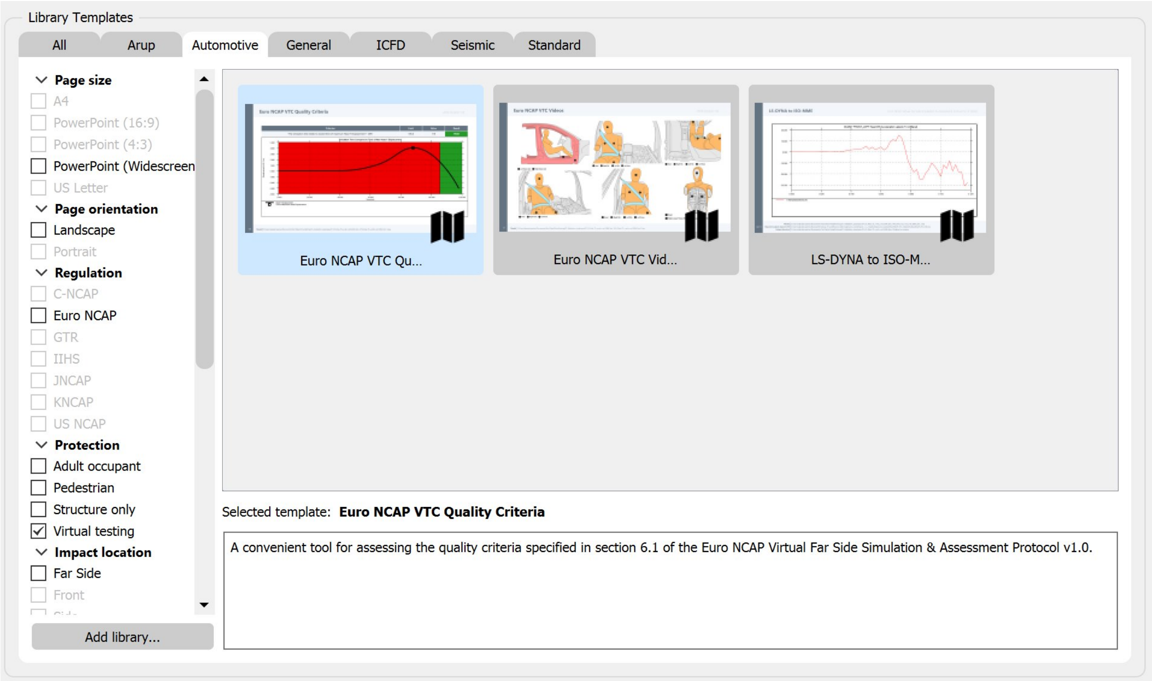
Turns off the labels written on the curves, to make them re-appear, then 'Reset Graphs'.

Datum Labels Off

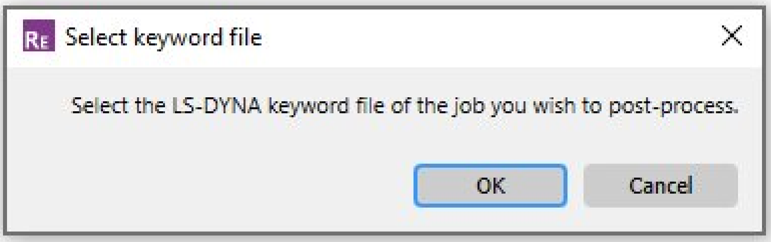
Turns off the Datum Labelsto make them re-appear, then 'Reset Graphs'.

How to use the Workflow Tool in REPORTER

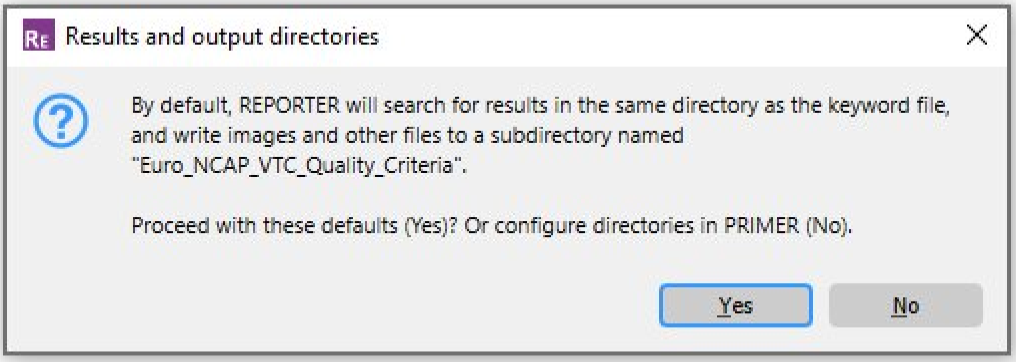
1. Within the Automotive tab in REPORTER, select the Euro NCAP VTC Quality Criteria template. It can be found by filtering for 'Virtual Testing’.



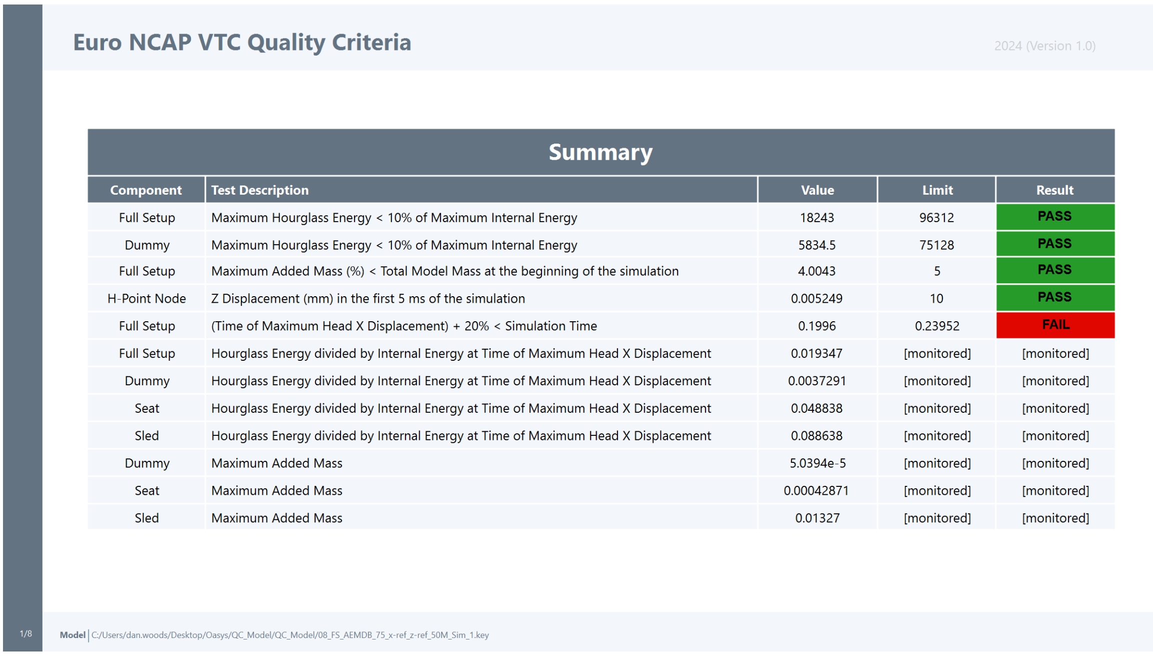
2. Once open you will be prompted to select the Ansys LS-DYNA keyword file of the job you wish to post-process.



3. You will then be asked whether you want to continue with the default results and output directories or configure them in PRIMER.



4. On the first page an overview of the results will be presented in a table format much like the GUI output when running the Workflow manually in T/HIS. On the remaining pages you can see each 'Check' one by one with its results in more detail.



Euro NCAP VTC Quality Criteria

2024 (Version 1.0)

Summary

Component	Test Description	Value	Limit	Result
Full Setup	Maximum Hourglass Energy < 10% of Maximum Internal Energy	18243	96312	PASS
Dummy	Maximum Hourglass Energy < 10% of Maximum Internal Energy	5834.5	75128	PASS
Full Setup	Maximum Added Mass (%) < Total Model Mass at the beginning of the simulation	4.0043	5	PASS
H-Point Node	Z Displacement (mm) in the first 5 ms of the simulation	0.005249	10	PASS
Full Setup	(Time of Maximum Head X Displacement) + 20% < Simulation Time	0.1996	0.23952	FAIL
Full Setup	Hourglass Energy divided by Internal Energy at Time of Maximum Head X Displacement	0.019347	[monitored]	[monitored]
Dummy	Hourglass Energy divided by Internal Energy at Time of Maximum Head X Displacement	0.0037291	[monitored]	[monitored]
Seat	Hourglass Energy divided by Internal Energy at Time of Maximum Head X Displacement	0.048838	[monitored]	[monitored]
Sled	Hourglass Energy divided by Internal Energy at Time of Maximum Head X Displacement	0.088638	[monitored]	[monitored]
Dummy	Maximum Added Mass	5.0394e-5	[monitored]	[monitored]
Seat	Maximum Added Mass	0.00042871	[monitored]	[monitored]
Sled	Maximum Added Mass	0.01327	[monitored]	[monitored]

1/8 Model | C:/Users/dan.woods/Desktop/Oasys/QC_Model/QC_Model/08_FS_AEMDB_75_x-ref_z-ref_50M_Sim_1.key

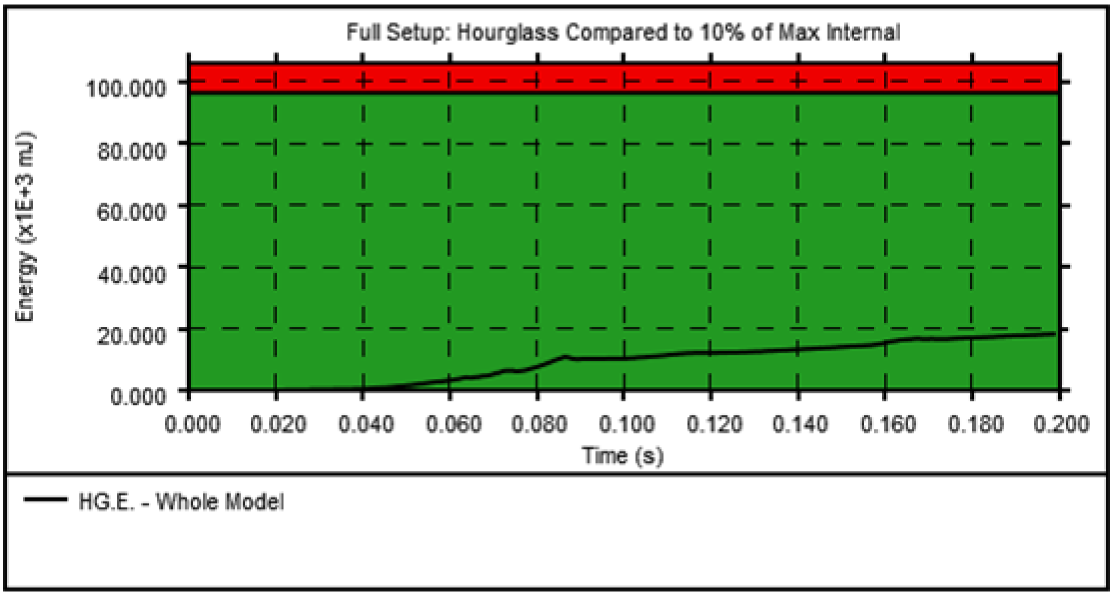
Understanding Each Graph and the Results

Full Setup: Maximum Hourglass Energy < 10% of Maximum Internal Energy

The first graph displays the quality check satisfying the following criteria from part 6.1.2 of the EuroNCAP Virtual Far Side/Frontal Simulation & Assessment Protocols:
Max. Hourglass Energy of full setup must be < 10% of max. internal energy.

In blue colour, the internal energy of the full setup is displayed (only if the test is a fail).

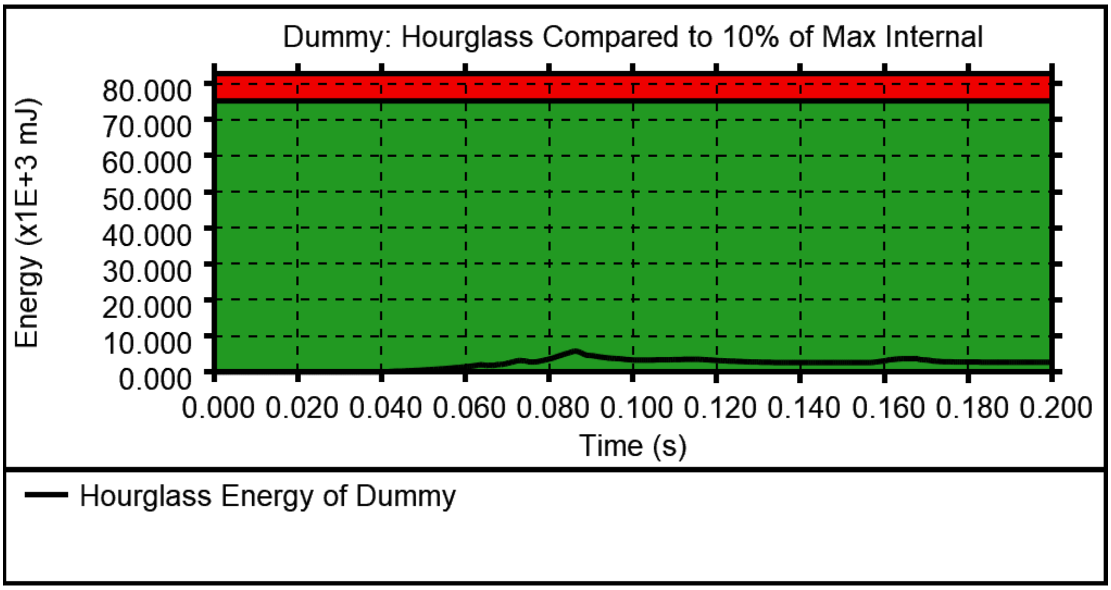
The datum line is drawn at 10% of the maximum internal energy.
In foreground colour, the hourglass energy of the full setup is displayed.
For this check to pass, the peak of the hourglass energy curve must be within the green zone.
The limit and result are displayed in the table.



Dummy: Maximum Hourglass Energy < 10% of Maximum Internal Energy

The second graph displays the quality check satisfying the following criteria from part 6.1.2 of the EuroNCAP Virtual Far Side/Frontal Simulation & Assessment Protocols: Max. Hourglass Energy of all Dummy components must be < 10% of max. internal energy of the Dummy.

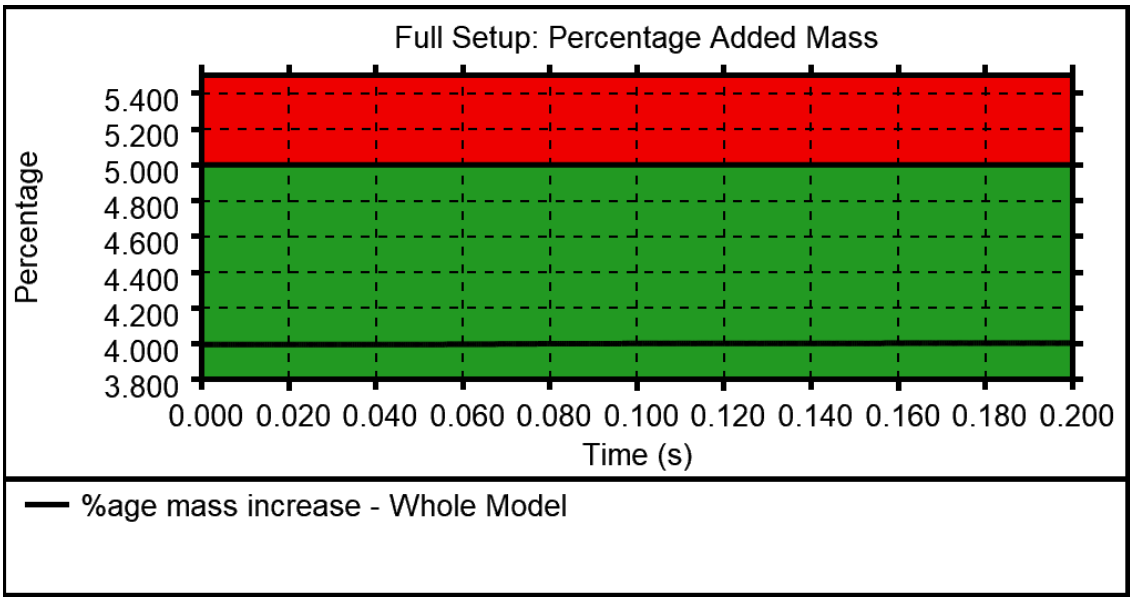
In blue colour, the internal energy of the Dummy is displayed (only if the test is a fail).
The datum line is drawn at 10% of the maximum internal energy.
In foreground colour, the hourglass energy of the Dummy is displayed.
For this check to pass, the peak of the hourglass energy curve must be within the green zone.
The limit and result are displayed in the table.



Full Setup: Maximum Added Mass (%) < 5% Total Model Mass at the Beginning of the Simulation

The third graph displays the quality check satisfying the following criteria from part 6.1.2 of the EuroNCAP Virtual Far Side/Frontal Simulation & Assessment Protocols: Max. mass added due to mass scaling to the total model is less than 5 % of the total model mass at the beginning of the run.

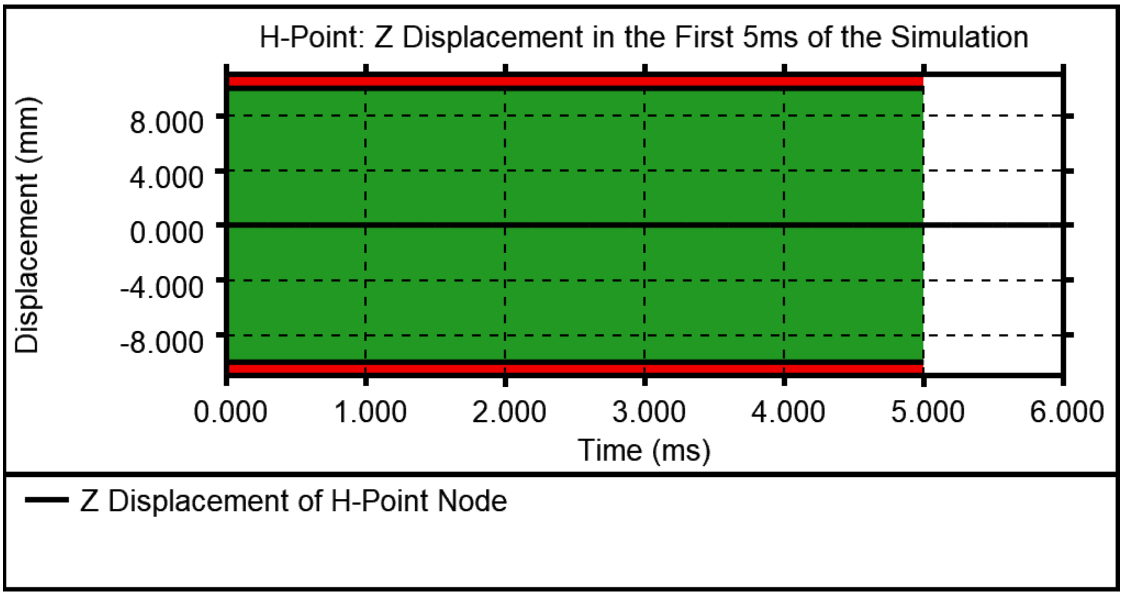
In foreground colour, the percentage mass increase is displayed.
The datum line is drawn at 5%.
For this check to pass, the peak of the percentage mass increase curve must be within the green zone.
The limit and result are displayed in the table.



H-Point Node: Z Displacement (mm) in the First 5ms of the Simulation

The fourth graph displays the quality check satisfying the following criteria from part 6.1.2 of the EuroNCAP Virtual Far Side/Frontal Simulation & Assessment Protocols: Less than 10 mm H-point z-displacement recorded in first 5 ms of the simulation (5ms after t0).

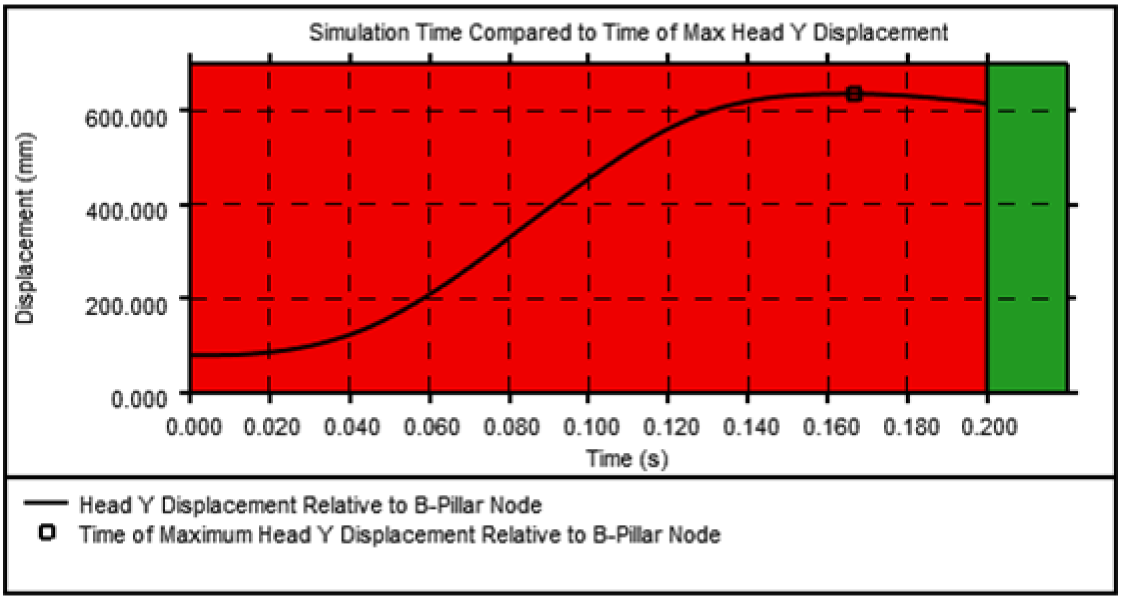
In foreground colour, the Z displacement of the H-Point Node is displayed, zoomed in to the first 6ms.
The datum line is drawn at 10mm.
For this check to pass, the peak of the Z displacement curve must be within the green zone within the first 5ms.
The limit and result are displayed in the table.



Full Setup: Time of Maximum Head Displacement + 20% < Simulation Time

The fifth graph displays the quality check satisfying the following criteria from part 6.1.2 of the EuroNCAP Virtual Far Side/Frontal Simulation & Assessment Protocols:
The simulation time needs to exceed time of maximum head displacement + 20% (Equation 1).
The Head Displacement is calculated by taking the relative displacement compared to the B-Pillar Node Displacement, plus 80mm for the approximate Head diameter.
For frontal tests X axis displacement is used while for far side tests the Y axis displacement is taken.

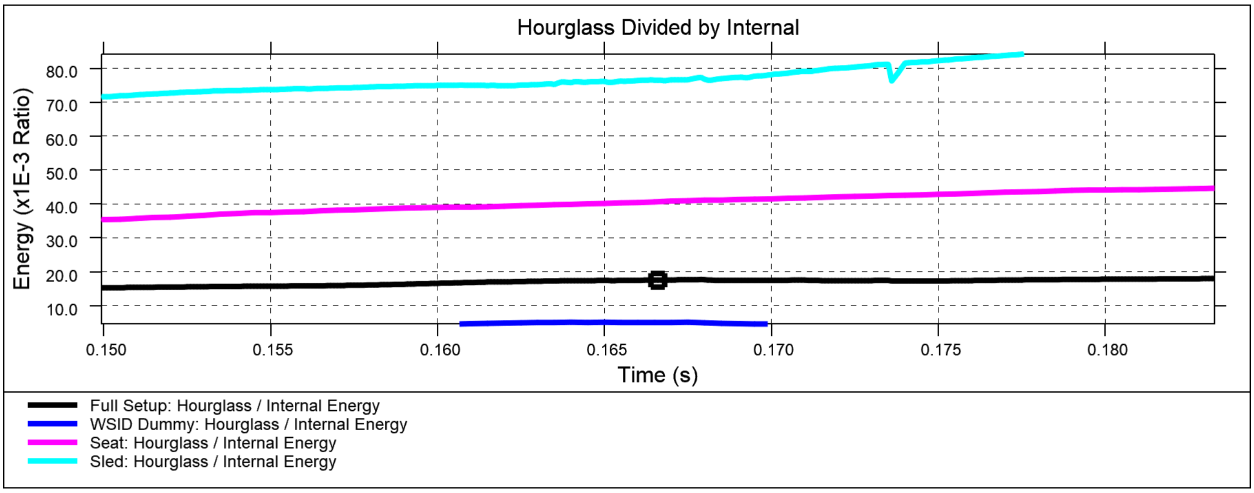
In foreground colour, the Head Displacement is displayed.
The datum line is drawn at Maximum Head Displacement Relative to B-Pillar Node Time + 20%.
For this check to pass, the Head Displacement curve should finish in the green zone.
The limit and result are displayed in the table.



Hourglass Energy Divided by Internal Energy at Maximum Head Displacement

The sixth graph displays the quality check satisfying the following criteria from part 6.1.3 of the EuroNCAP Virtual Far Side/Frontal Simulation & Assessment Protocols: Hourglass energy / internal energy at time of max. head excursion for setup, dummy, sled and seat.

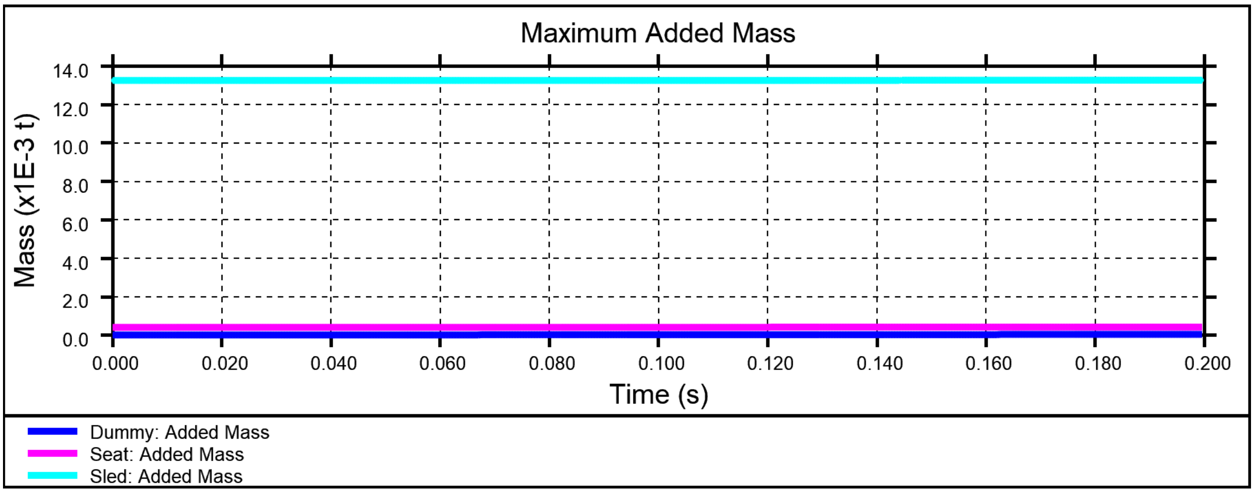
In foreground colour, the Hourglass divided by Internal Energy of the full setup is displayed.
In blue colour, the Hourglass divided by Internal Energy of the Dummy is displayed.
In magenta colour, the Hourglass divided by Internal Energy of the Seat is displayed.
In cyan colour, the Hourglass divided by Internal Energy of the Sled is displayed.
In foreground colour, the Maximum Head Displacement time is displayed as a square.
For frontal tests X axis displacement is used while for far side tests the Y axis displacement is taken.
There is no pass criteria for this check, it is just calculated and monitored.
The result of each curve at the Maximum Head Displacement is displayed in the table.



Maximum Added Mass

The seventh graph displays the quality check satisfying the following criteria from part 6.1.3 of the EuroNCAP Virtual Far Side/Frontal Simulation & Assessment Protocols: Max. added mass (Dummy, seat, sled).

In blue colour, the Added Mass of the Dummy is displayed.
In magenta colour, the Added Mass of the Seat is displayed.
In cyan colour, the Added Mass of the Sled is displayed.
There is no pass criteria for this check, it is just calculated and monitored.
The result of each curve at the peak is displayed in the table.



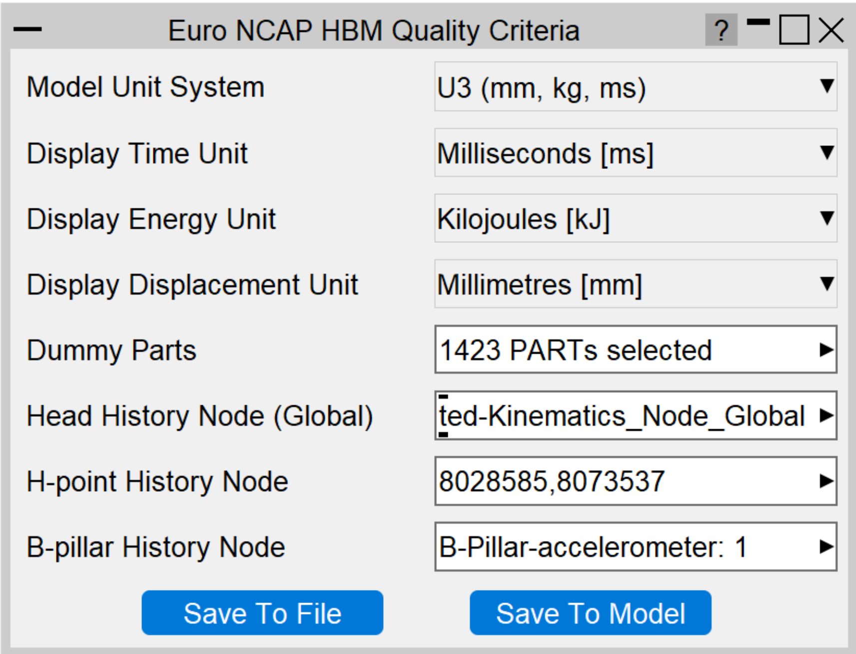
4.9.4. Euro NCAP HBM Quality Criteria

Tools → Workflows → Euro NCAP VTC HBM Quality Criteria

The Euro NCAP HBM Quality Criteria workflow tool allows you to perform the quality checks outlined in Section 7.1 of the Euro NCAP VTC HBM Frontal Protocol. The Euro NCAP Virtual HBM Frontal Simulation & Assessment Protocol is currently being developed with the intention of implementation in 2026 meaning the assessment methodology of this tool is subsequent to change.

How to use the Workflow Tool in PRIMER

When this tool is initially launched, the tool will attempt to collect all previously saved data from the Automotive Assessments Workflow.
The GUI will look something like this once the relevant details have been entered:



Model Unit System

Select the unit system of your model.

Display Time Unit

Select the display time unit for the graph outputs, either Seconds or Milliseconds.

Display Energy Unit

Select the display energy unit for the graph outputs, either Joules, Millijoules, Kilojoules or Foot-Pounds.

Display Displacement Unit

Select the display displacement unit for the graph outputs, either Metres, Millimetres or Feet.

Dummy Parts

Select the include file containing the HBM Dummy by pressing the right arrow for multiple selection and picking options or manually typing in the textbox.

Head History Node (Global)

Select the DATABASE_HISTORY_NODE matching the Global Head Node of the HBM Dummy by pressing the right arrow for multiple selection and picking options or manually typing in the textbox.

H-point History Node

Select the DATABASE_HISTORY_NODE matching the H-point Node of the HBM Dummy by pressing the right arrow for multiple selection and picking options or manually typing in the textbox. If multiple nodes are provided either by selecting a node set or through manual input, the displacement of these nodes will be averaged in the results.

B-pillar History Node

Select the DATABASE_HISTORY_NODE matching the B-pillar Node of the Vehicle by pressing the right arrow for multiple selection and picking options or manually typing in the textbox.

Saving

Save the Workflow data to a .json file or save it to your model and then write the keyword file from PRIMER.

How to use the Workflow Tool in T/HIS

When this tool is initially launched, the tool will perform the quality checks automatically.
Once the run has completed the GUI will look something like the following image by default, with 6 checks presented on it's own graph on a single page.
For a full breakdown of each graph and it's results please see 'Understanding Each Graph and the Results' further down this manual.

Write Results

Writes the results out as displayed in the table in CSV format.

Model Unit System

Displays the unit system that has been selected in PRIMER for this model.

Reset Graphs

Reproduces the graphs and resets them to default settings.

Curve Labels Off

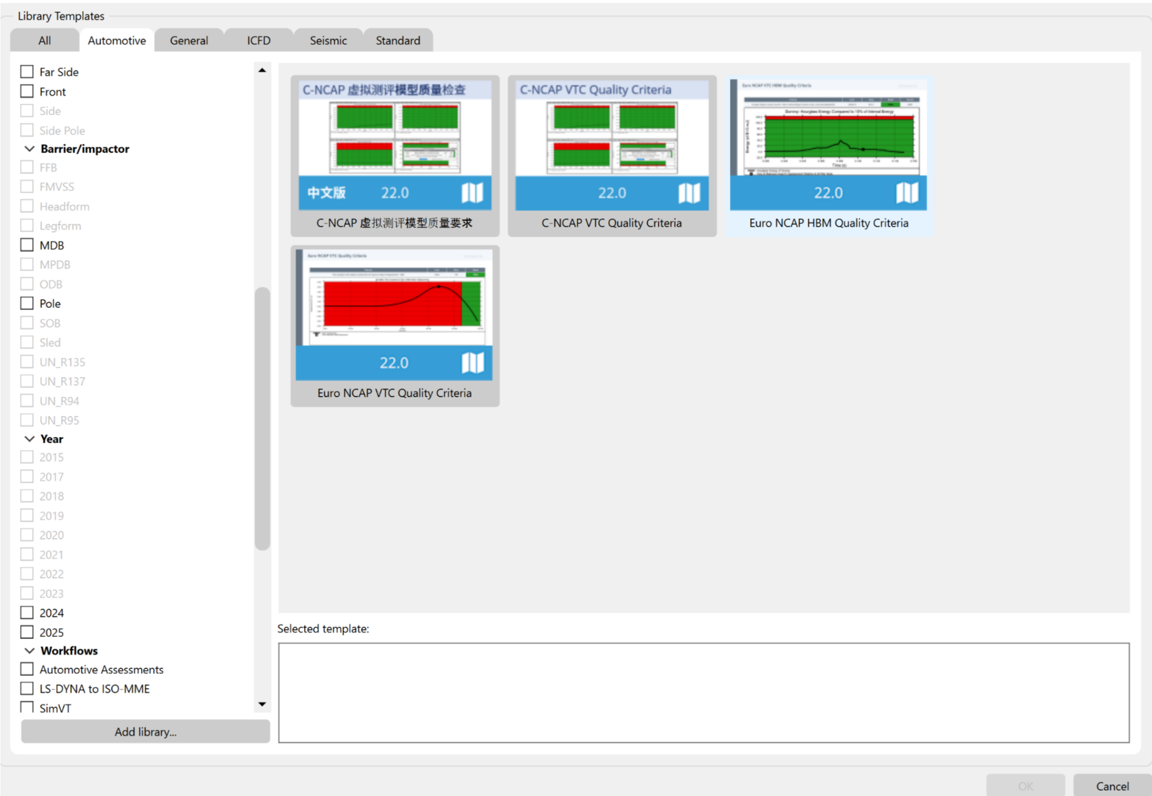
Turns off the labels written on the curves, to make them re-appear, then 'Reset Graphs'.

Datum Labels Off

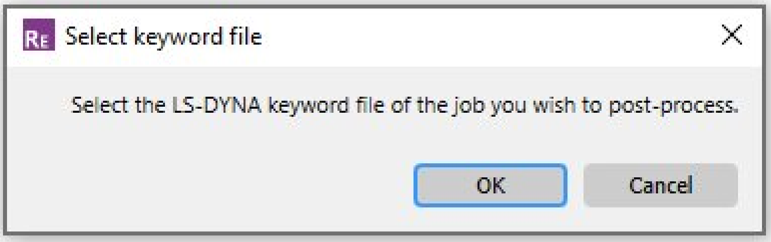
Turns off the Datum Labelsto make them re-appear, then 'Reset Graphs'.

How to use the Workflow Tool in REPORTER

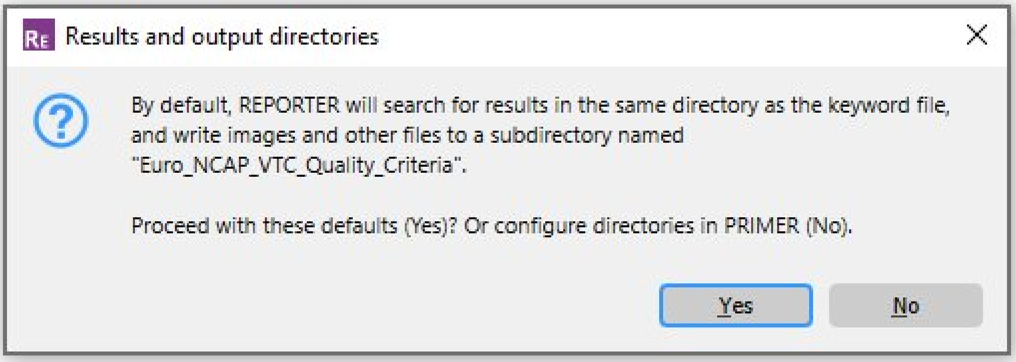
1. Within the Automotive tab in REPORTER, select the Euro NCAP HBM Quality Criteria template. It can be found by filtering for 'VTC Quality Criteria’.



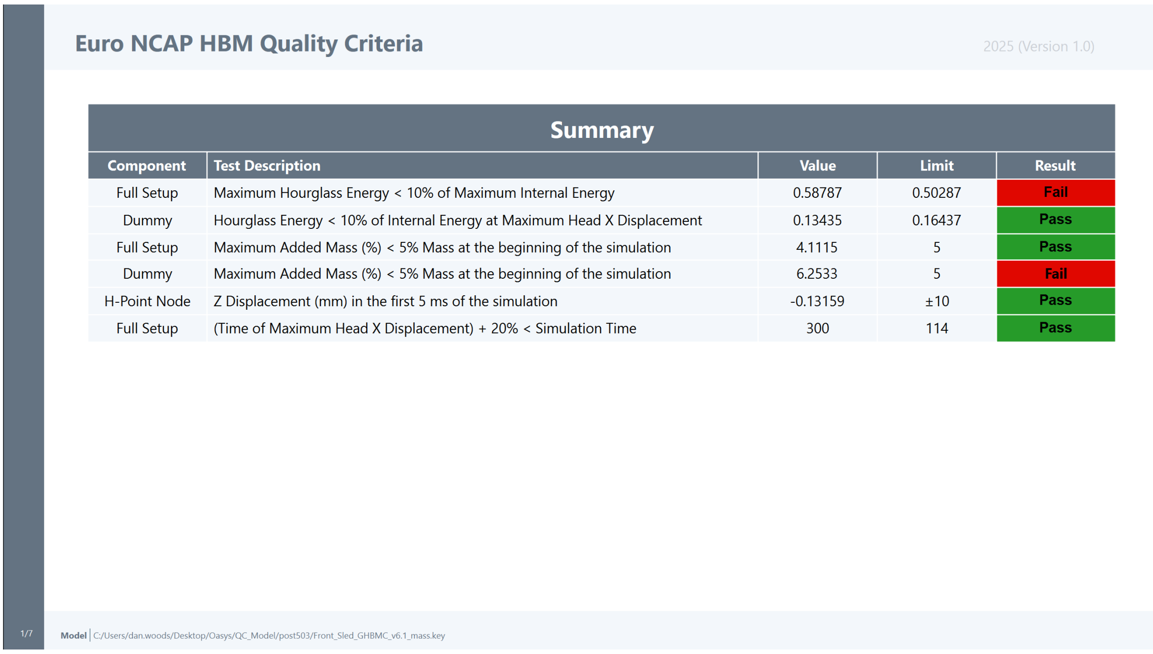
2. Once open you will be prompted to select the Ansys LS-DYNA keyword file of the job you wish to post-process.



3. You will then be asked whether you want to continue with the default results and output directories or configure them in PRIMER.



4. On the first page an overview of the results will be presented in a table format much like the GUI output when running the Workflow manually in T/HIS. On the remaining pages you can see each 'Check' one by one with its results in more detail.


Euro NCAP HBM Quality Criteria

2025 (Version 1.0)

Summary

Component	Test Description	Value	Limit	Result
Full Setup	Maximum Hourglass Energy < 10% of Maximum Internal Energy	0.58787	0.50287	Fail
Dummy	Hourglass Energy < 10% of Internal Energy at Maximum Head X Displacement	0.13435	0.16437	Pass
Full Setup	Maximum Added Mass (%) < 5% Mass at the beginning of the simulation	4.1115	5	Pass
Dummy	Maximum Added Mass (%) < 5% Mass at the beginning of the simulation	6.2533	5	Fail
H-Point Node	Z Displacement (mm) in the first 5 ms of the simulation	-0.13159	±10	Pass
Full Setup	(Time of Maximum Head X Displacement) + 20% < Simulation Time	300	114	Pass

1/7

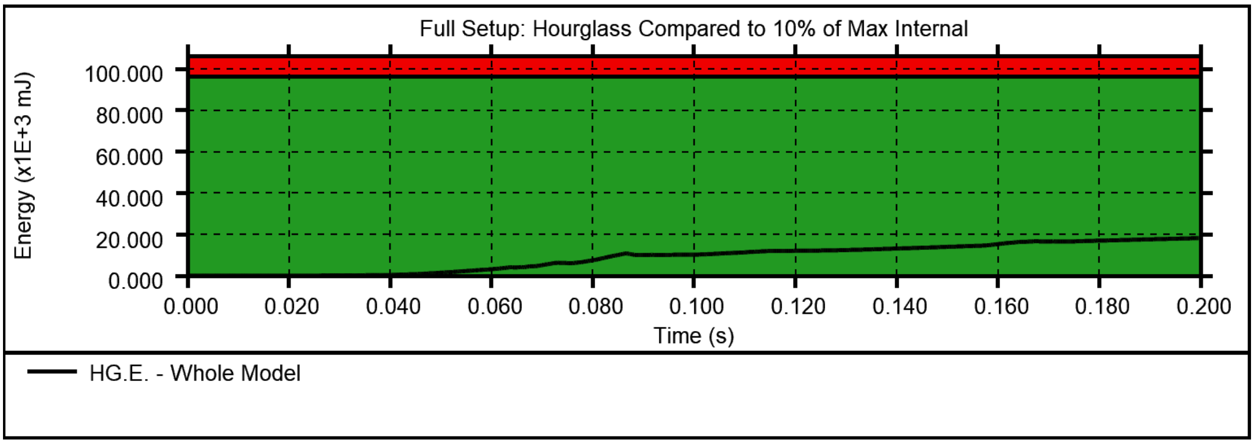
Model | C:/Users/dan.woods/Desktop/Oasys/QC_Model/post503/Front_Sled_GHBMC_v6.1_mass.key

Understanding Each Graph and the Results

Full Setup: Maximum Hourglass Energy < 10% of Maximum Internal Energy

The first graph displays the quality check satisfying the following criteria from part 7.1.2 of the Euro NCAP VTC HBM Protocol Frontal:
Max. Hourglass Energy of full setup must be < 10% of max. internal energy.

In blue colour, the internal energy of the full setup is displayed (only if the test is a fail).
The datum line is drawn at 10% of the maximum internal energy.
In foreground colour, the hourglass energy of the full setup is displayed.
For this check to pass, the peak of the hourglass energy curve must be within the green zone.
The limit and result are displayed in the table.

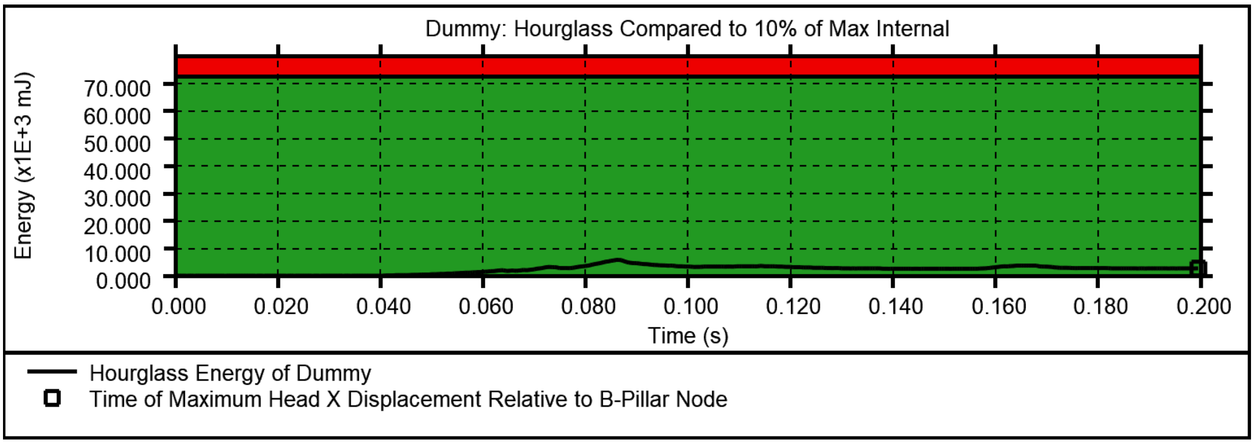


HBM Dummy: Maximum Hourglass Energy < 10% of Maximum Internal Energy

The second graph displays the quality check satisfying the following criteria from part 7.1.2 of the Euro NCAP VTC HBM Protocol Frontal:
Max. Hourglass Energy of all HBM Dummy components must be < 10% of max. internal energy of the HBM Dummy at the time of maximum X axis head extension.

In blue colour, the internal energy of the HBM Dummy is displayed (only if the test is a fail).
The datum line is drawn at 10% of the maximum internal energy.
In foreground colour, the hourglass energy of the HBM Dummy is displayed.

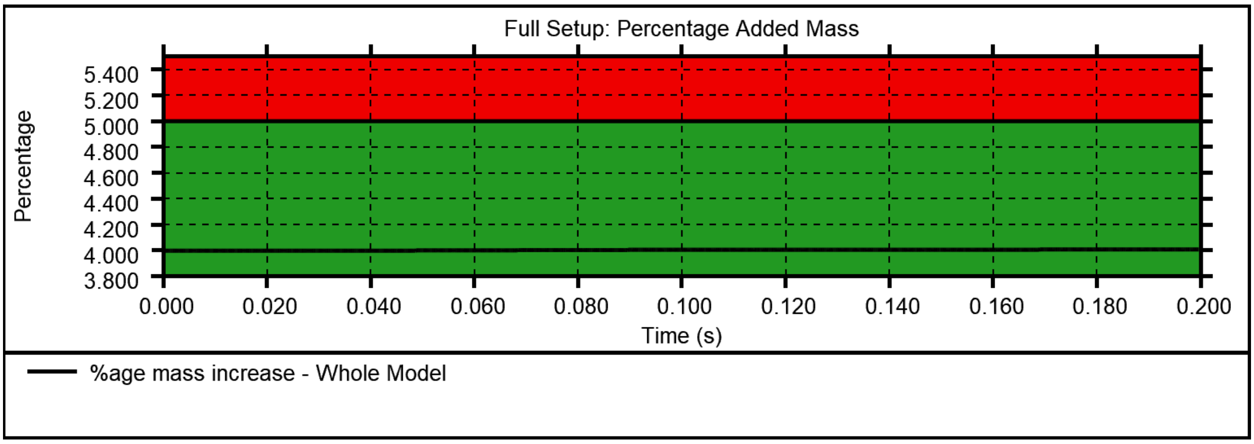
A square marker indicates the point in time at which maximum X axis head displacement occurs.
The Head X Displacement is calculated by taking the relative displacement compared to the B-Pillar Node X Displacement, plus 80mm for the approximate Head diameter.
For this check to pass, the peak of the hourglass energy curve must be within the green zone at the time of maximum X axis head extension.
The limit and result are displayed in the table.



Full Setup: Maximum Added Mass (%) < 5% Total Model Mass at the Beginning of the Simulation

The third graph displays the quality check satisfying the following criteria from part 7.1.2 of the Euro NCAP VTC HBM Protocol Frontal:
Max. mass added due to mass scaling to the total model is less than 5 % of the total model mass at the beginning of the run.

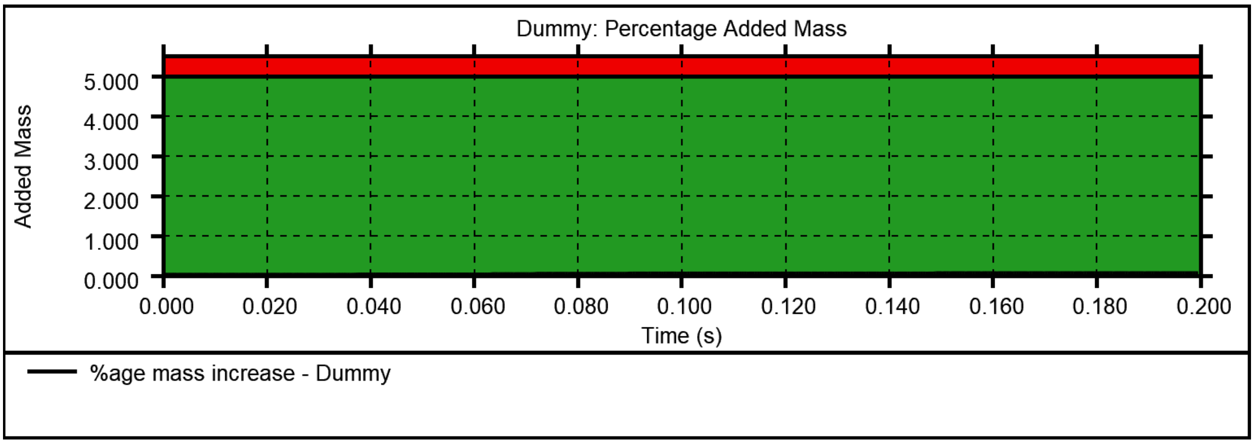
In foreground colour, the percentage mass increase is displayed.
The datum line is drawn at 5%.
For this check to pass, the peak of the percentage mass increase curve must be within the green zone.
The limit and result are displayed in the table.



Dummy: Maximum Added Mass (%) < Total Model Mass at the Beginning of the Simulation

The fourth graph displays the quality check satisfying the following criteria from part 7.1.2 of the Euro NCAP VTC HBM Protocol Frontal:
Max. mass added to the HBM Dummy due to mass scaling is less than 5 % of the HBM Dummy mass at the beginning of the run.

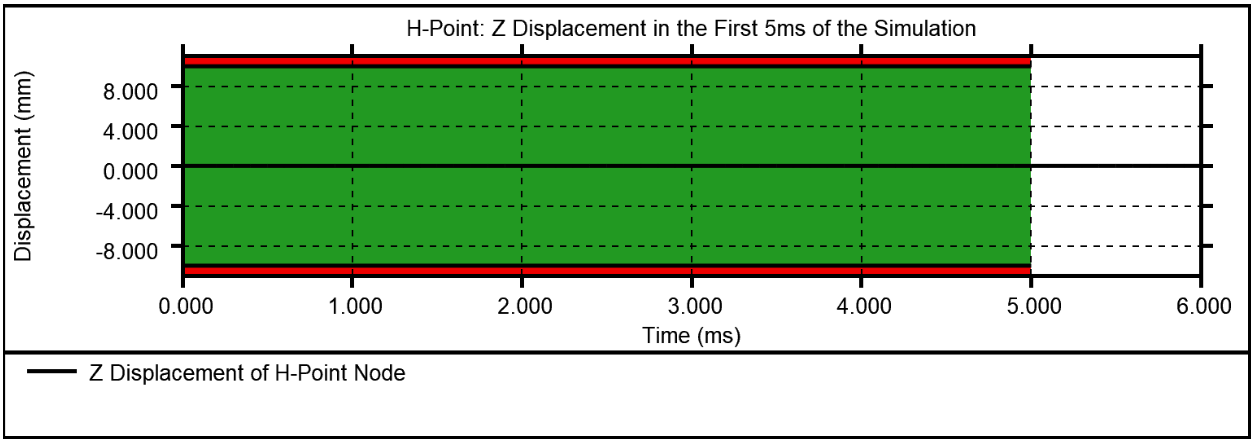
In foreground colour, the percentage mass increase is displayed.
The datum line is drawn at 5%.
For this check to pass, the peak of the percentage mass increase curve must be within the green zone.
The limit and result are displayed in the table.



H-Point Node: Z Displacement (mm) in the First 5ms of the Simulation

The fifth graph displays the quality check satisfying the following criteria from part 7.1.2 of the Euro NCAP VTC HBM Protocol Frontal:
Less than 10 mm H-point z-displacement recorded in first 5 ms of the simulation (5ms after t0).

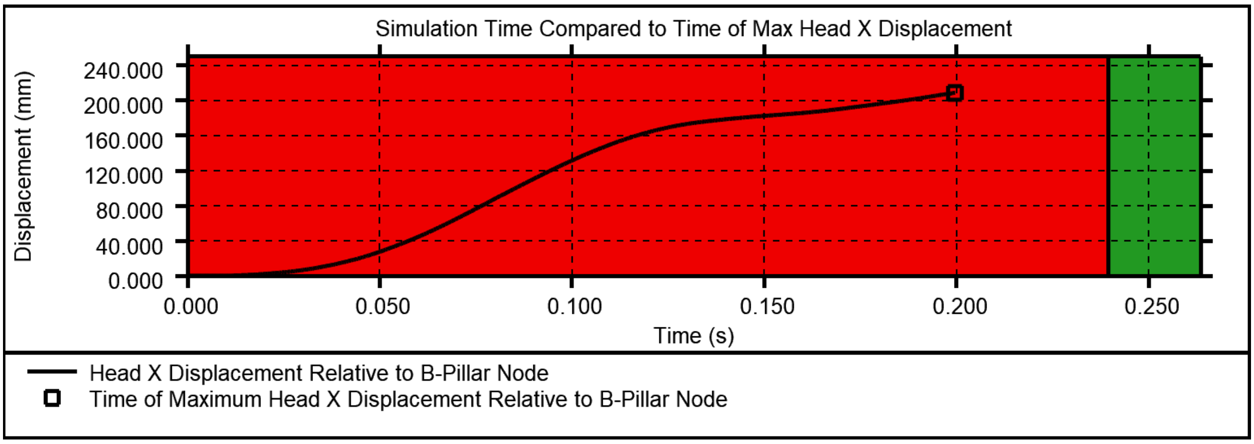
In foreground colour, the Z displacement of the H-Point Node is displayed, zoomed in to the first 6ms.
The datum line is drawn at 10mm.
For this check to pass, the peak of the Z displacement curve must be within the green zone within the first 5ms.
If multiple H-point nodes were provided, the average displacement will be used.
The limit and result are displayed in the table.



Full Setup: Maximum Head X Displacement + 20% < Simulation Time

The sixth graph displays the quality check satisfying the following criteria from part 7.1.2 of the Euro NCAP VTC HBM Protocol Frontal:
The simulation time needs to exceed time of maximum head X displacement + 20% (Equation 1).
The Head X Displacement is calculated by taking the relative displacement compared to the B-Pillar Node X Displacement, plus 80mm for the approximate Head diameter.

In foreground colour, the Head X Displacement is displayed.
The datum line is drawn at Maximum Head X Displacement Relative to B-Pillar Node Time + 20%.
For this check to pass, the Head X Displacement curve should finish in the green zone.
The limit and result are displayed in the table.


Simulation Time Compared to Time of Max Head X Displacement
Displacement (mm)
240.000
200.000
160.000
120.000
80.000
40.000
0.000
0.000
0.050
0.100
0.150
0.200
0.250
Time (s)
Head X Displacement Relative to B-Pillar Node
Time of Maximum Head X Displacement Relative to B-Pillar Node

4.9.5. LS-DYNA to ISO-MME

Tools → Workflows → LS-DYNA to ISO-MME

The LS-DYNA to ISO-MME workflow tool is one of the Virtual Testing tools. It helps you automatically export Ansys LS-DYNA results data to ISO-MME format as specified by the Euro NCAP Virtual Far Side Simulation & Assessment Protocol v1.0, ready for upload to the VTC Server. It can also be used to export the channels required by the C-NCAP Far Side Occupant Protection Protocol (Appendix H).

Automotive Assessments workflow user data removes the need to manually map Ansys LS-DYNA entities to ISO-MME channel codes.

The LS-DYNA to ISO-MME Workflow involves the following steps:

1. Create Automotive Assessments user data in PRIMER the for VTC protocol (e.g. "Euro NCAP Far Side Sled 2024" crash test)
2. Complete the LS-DYNA to ISO-MME setup in PRIMER
3. Perform the LS-DYNA to ISO-MME export in T/HIS
4. Optionally, automate the process in REPORTER

Some new MME headers are added in Euro NCAP 2026 version and some got removed compared to 2024. If the a field is not applicable for version then it will be greyed out and "N/A" will be shown for it. Take a look at list below:

New MME Headers in Euro NCAP 2026

1. Velocity test object 1
2. Name of test object 2
3. Velocity test object 2
4. Dummy Simulation Model Passenger
5. Dummy Qualification Ref Passenger
6. Contact Type dummy -airbag
7. Mass of dummy 2 in kg

Removed MME Headers in Euro NCAP 2026 (Compared to Euro NCAP 2024)

1. Virtual Testing Ref ID
2. Regulation
3. Velocity test object 1 lon.
4. Velocity test object 1 lat.
5. Mass of sled in kg
6. Mass of centre console in kg
7. Distance between head CoG and green line (in metres)
8. Distance between head CoG and yellow line (in metres)

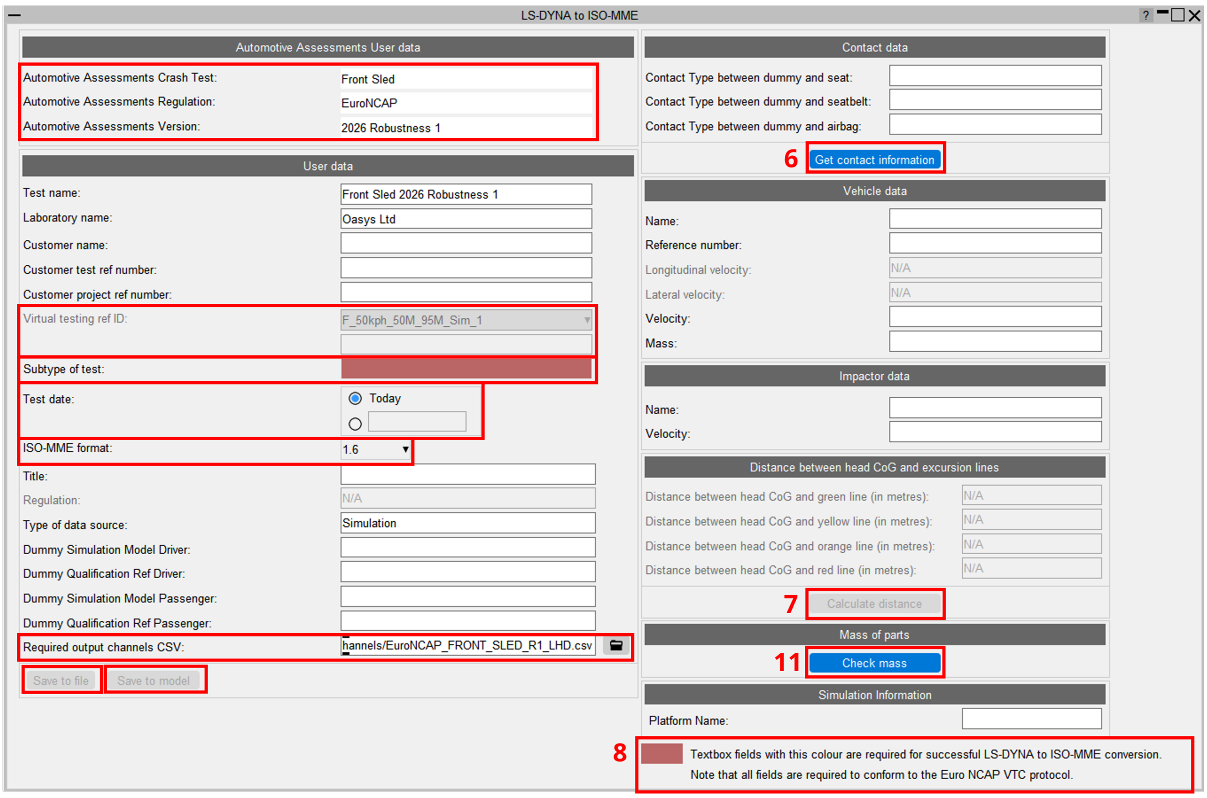
9. Distance between head CoG and orange line (in metres)
10. Distance between head CoG and red line (in metres)

Some MME headers were renamed in Euro NCAP 2026 compared to Euro NCAP 2024. Take a look at list below:

Old MME Header (Euro NCAP 2024)	New MME Header (Euro NCAP 2026)
Dummy Simulation Model Specification	Dummy Simulation Model Driver
Reference to Dummy Model Qualification Documentation	Dummy Qualification Ref Driver
Contact Type between dummy and seat	Contact Type dummy -seat
Contact Type between dummy and seatbelt	Contact Type dummy -belt
Number of contacts used in the overall simulation setup	Number of contacts
Mass of total setup (used for quality checks)	Mass of total setup in kg
Mass of dummy in kg	Mass of dummy 1 in kg

Setup in PRIMER

When this tool is initially launched, the GUI will look something like this by default:



All the inputs are divided in different categories e.g. User data, Contact data, Vehicle data. Some inputs are already given for reference purposes. e.g. Test name, Laboratory name, Customer name. You can see what input can be given for each textbox by hovering over it.

1. Virtual testing ref ID

Select the Virtual Testing Reference ID from the dropdown. If 'Other' is selected, the textbox below will become active to write your own Reference ID.

2. Subtype of test

Subtype of test is automatically updated corresponding to Virtual Testing ref ID. In 2026 version this input is not related to Virtual Testing ref ID. You have to define it yourself.

3. Test date

If you select "Today", the ISO-MME export will use the current date each time. If you want to enter the test date manually you can select the other radio button which will enable manual text entry.

4. ISO-MME format

You can choose between ISO-MME version 1.6 and 2.0. The Euro NCAP Virtual Far Side Simulation & Assessment Protocol v1.0 specifies version 1.6.

5. Required output channels CSV

This is the list of required channels to export according to the VTC protocol. It will be loaded automatically for list of supported protocol shown below. You can modify it or provide your own CSV list, but make sure to have it in same format. On each line of the CSV file, the first 16 characters need to be the ISO-MME channel code you wish to output. Supported protocols are as follows:

Automotive Assessments Crash Test	Automotive Assessments Regulation	Automotive Assessments Version	Description
Far Side Sled	EuroNCAP	2024	List of channels as per Appendix I in Euro NCAP Virtual Far Side Simulation & Assessment Protocol v1.0
Front Sled	EuroNCAP	2026 Robustness 1	
Front Sled	EuroNCAP	2026 Robustness 2	
Front Sled	EuroNCAP	2026 Robustness 3	
Front Sled	EuroNCAP	2026 Validation 1	
Front Sled	EuroNCAP	2026 Validation 2	
Far Side Sled	CNCAP	2024 (WSID)	List of channels for WSID dummy as per Appendix H.1.2.1.3 and Table H.7 in C-NCAP Far Side

Automotive Assessments Crash Test	Automotive Assessments Regulation	Automotive Assessments Version	Description
			Occupant Protection Protocol (Appendix H)
Far Side Sled	CNCAP	2024 (SID2-SBLD)	List of channels for SID-II dummy as per Appendix H.1.2.1.3 and Table H.7 in C-NCAP Far Side Occupant Protection Protocol (Appendix H)
Side Pole	CNCAP	2024 (WSID+WSID)	List of channels for WSID driver dummy and WSID passenger dummy combination as per Appendix H.1.2.2.2 first paragraph in C-NCAP Far Side Occupant Protection Protocol (Appendix H)
Side Pole	CNCAP	2024 (WSID+ES-2re)	List of channels for WSID driver dummy and ES-2re passenger dummy combination as per Appendix H.1.2.2.2 first paragraph in C-NCAP Far Side Occupant Protection Protocol (Appendix H)

6. Get contact information

You can retrieve the contact information required by the Euro NCAP Far Side VTC protocol automatically from the Automotive Assessments user data. Make sure you have added valid contact IDs in the Automotive Assessments user data to get it working. You can still input or modify information manually by editing the textbox values.

7. Calculate distance

PRIMER calculates the distance between the head centre of gravity (CoG) and green, yellow and orange lines using head node information from Automotive Assessments user data. We assume the vehicle is symmetric and centred on y = 0 and hence that the orange seat centreline y-coordinate is symmetrically opposite the occupant's head CoG y-coordinate.

8. Required inputs

Only “Test name” and “Required output channels CSV” are required for exporting channels. However, note that technically, all ungreyed out inputs are required to conform to the Euro NCAP Far Side VTC protocol.

9. Saving

Save the Workflow data to a .json file or save it to your model and then write out the keyword file from PRIMER.

10. Automotive Assessments User data

It is just to show you the configuration of automotive assessments user data. It is not editable.

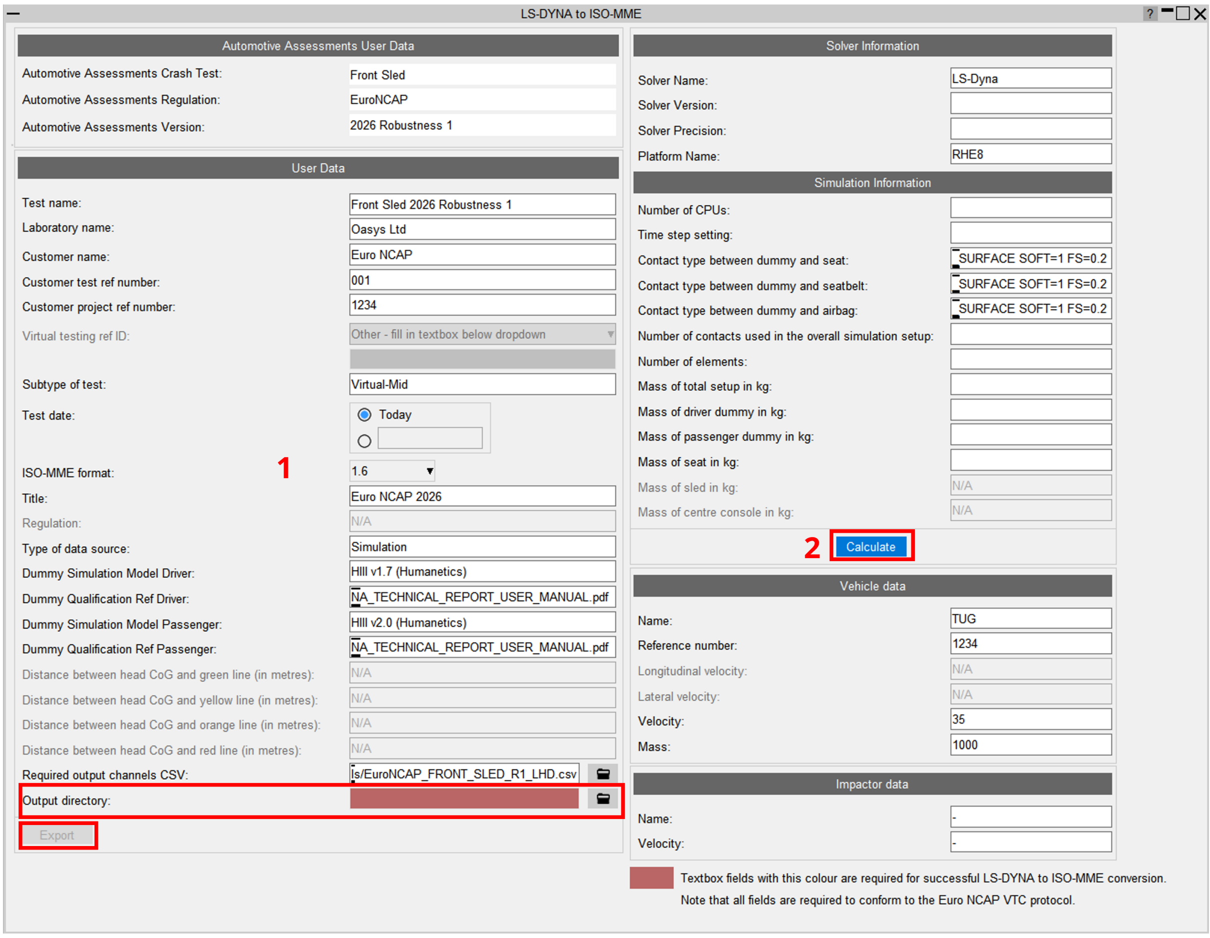
11. Check mass

For all the below mass of parts you can check mass in **PRIMER** that adds **total structural mass.** However, it is sometimes not accurate due to encryption.

1. **Mass of driver dummy in kg**: Calculates total mass of parts defined for driver dummy in Automotive assessments
2. **Mass of passenger dummy in kg (in case of Front Sled)**: Calculates total mass of parts defined for front passenger dummy in Automotive assessments
3. **Mass of driver seat in kg**: Calculates total mass of parts defined for driver seat in Automotive assessments
4. **Mass of sled in kg**: Calculates total mass of parts defined for sled in Automotive assessments
5. **Mass of centre console in kg**: Calculates total mass of parts defined for centre console in Automotive assessments

LS-DYNA to ISO-MME export in T/HIS

When this tool is initially launched, the GUI will look something like this by default (provided you have filled all information in PRIMER workflow panel):



1. Modify descriptors

Before performing the export in T/HIS, you can modify any of the descriptors you defined in PRIMER.

2. Calculate

Calculate can be used to automatically populate “Solver Information” and “Simulation Information” from the OTF/d3hsp file and Automotive Assessment user data.

T/HIS will automatically populate the following fields:

1. **Solver Version**: Gets LS-DYNA solver version from OTF/d3hsp file
2. **Solver Precision**: Gets LS-DYNA solver precision from OTF/d3hsp file
3. **Number of CPUs**: Gets number of CPUs from OTF/d3hsp file
4. **Time step setting**: Gets the minimum time step from OTF/d3hsp file
5. **Number of contacts used in the overall simulation setup**: Gets number of contacts using from T/HIS JS-API Model class function GetNumberOf
6. **Number of elements**: Gets total number of elements specified in "CONTROL CARD 1. Model Size-General" below "c o n t r o l   i n f o r m a t i o n" from OTF/d3hsp file

7. **Mass of total setup (used for quality checks)**: Gets total mass reported with "t o t a l m a s s" from OTF/d3hsp file
8. **Mass of driver dummy in kg**: Calculates total mass of parts defined for driver dummy in Automotive assessments from OTF/d3hsp file
9. **Mass of passenger dummy in kg (in case of Front Sled)**: Calculates total mass of parts defined for front passenger dummy in Automotive assessments from OTF/d3hsp file
10. **Mass of seat in kg**: Calculates total mass of parts defined for driver seat in Automotive assessments from OTF/d3hsp file
11. **Mass of sled in kg (only for version 2024)**: Calculates total mass of parts defined for sled in Automotive assessments from OTF/d3hsp file
12. **Mass of centre console in kg (only for version 2024)**: Calculates total mass of parts defined for centre console in Automotive assessments from OTF/d3hsp file

3. Output directory

Select the output directory where you want to export channels in ISO-MME format.

4. Export

Once the output directory is selected, the **Export** button will be enabled. To perform the export, the LS-DYNA to ISO-MME workflow tool generates a configuration file from all the data and runs a separate T/HIS session in batch mode to export ISO-MME channels in the selected output directory.

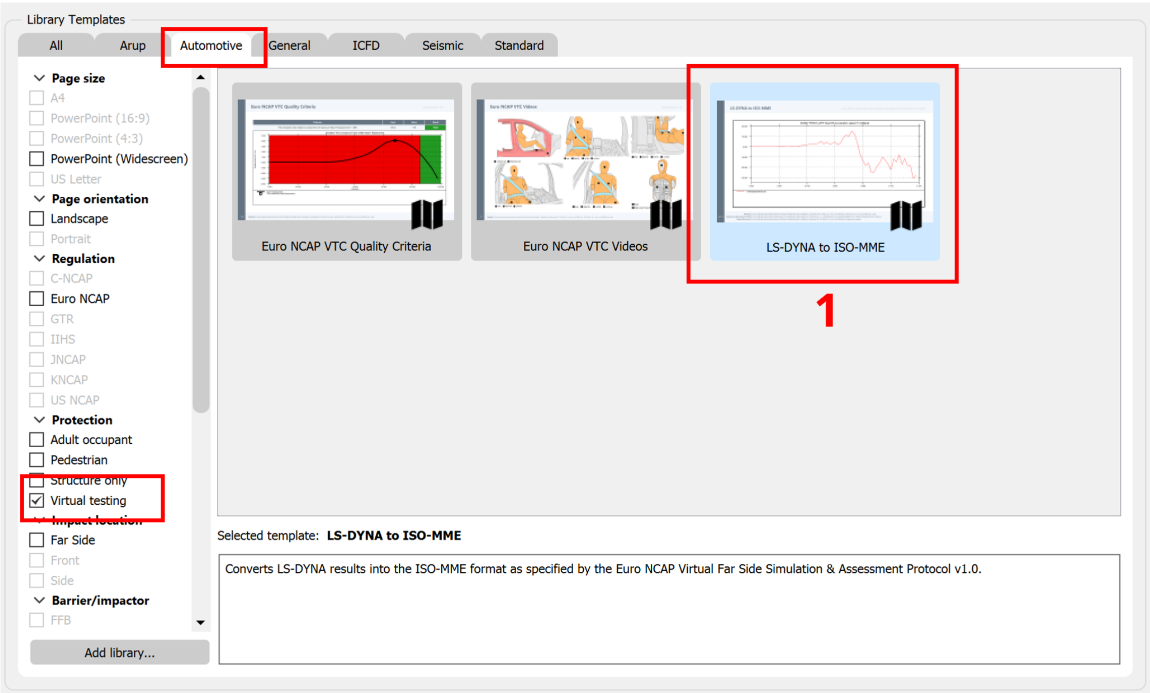
4.1. Time of first sample ISO-MME Header

If "Time of first sample” was defined (non-zero) in Automotive Assessments PRIMER, then the “Time of first sample” header value will automatically be set in the exported channel files. Note that samples which are shifted to time < 0 will not be discarded as this only happens when the ISO-MME data is processed.

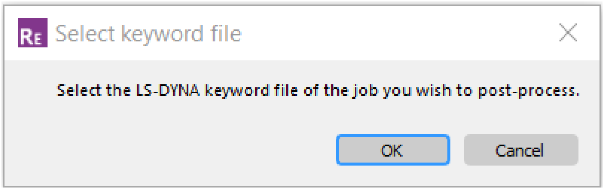
```
Test object number            :1
Name of the channel           :Accel x - Node 10001 : ( HEAD0000WSAC) (Reg 0.100E-03)
Laboratory channel code       :NOVALUE
Customer channel code         :NOVALUE
Channel code                  :11HEAD0000WSACX0
Unit                          :m/(s*s)
Reference system              :NOVALUE
Pre-filter type               :NOVALUE
Cut off frequency             :NOVALUE
Channel amplitude class       :NOVALUE
Sampling interval             :0.0001
Bit resolution                :NOVALUE
Time of first sample          :-0.02
Number of samples             :2000
0
-2.86178e-08
-5.19904e-09
```

Automation in REPORTER

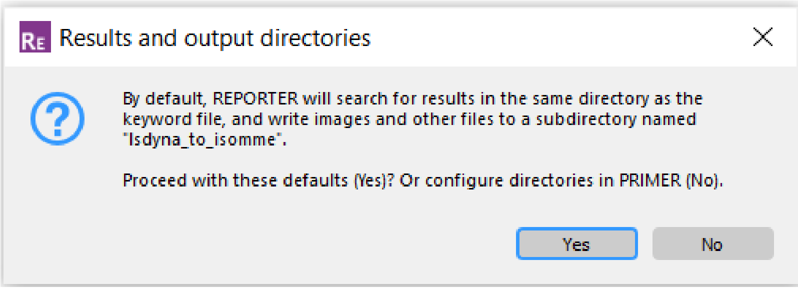
1. Within the Automotive tab in REPORTER, you will be able to select the LS-DYNA to ISO-MME Template. Filter by 'Virtual Testing' to easily find it.



2. Once open you will be prompted to select the Ansys LS-DYNA keyword file of the job you wish to post-process.

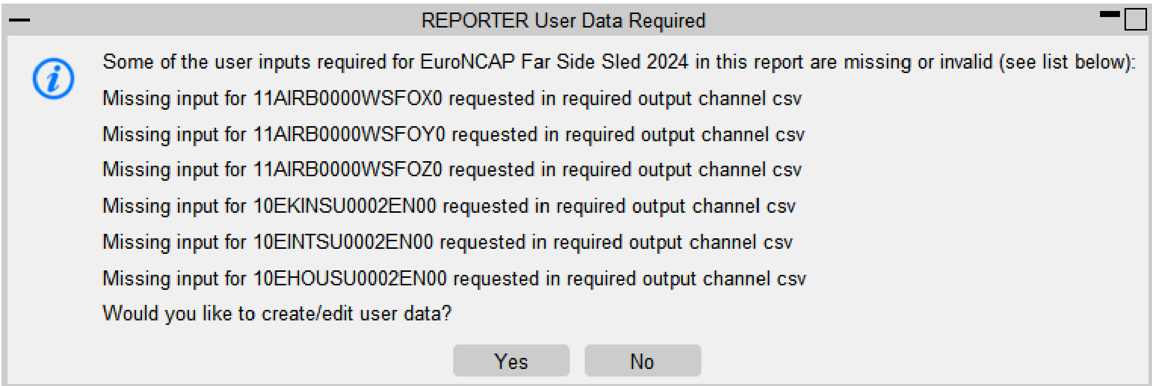


3. After you have selected your keyword file, you will then be asked if you want to continue with the default options of REPORTER searching for results in the same directory of the keyword file and writing images and outputs into a subdirectory called "lsdyna_to_isomme". If **No** is selected then PRIMER will be launched and a GUI will be displayed to configure the options. If **Yes** is selected the default options will be used.



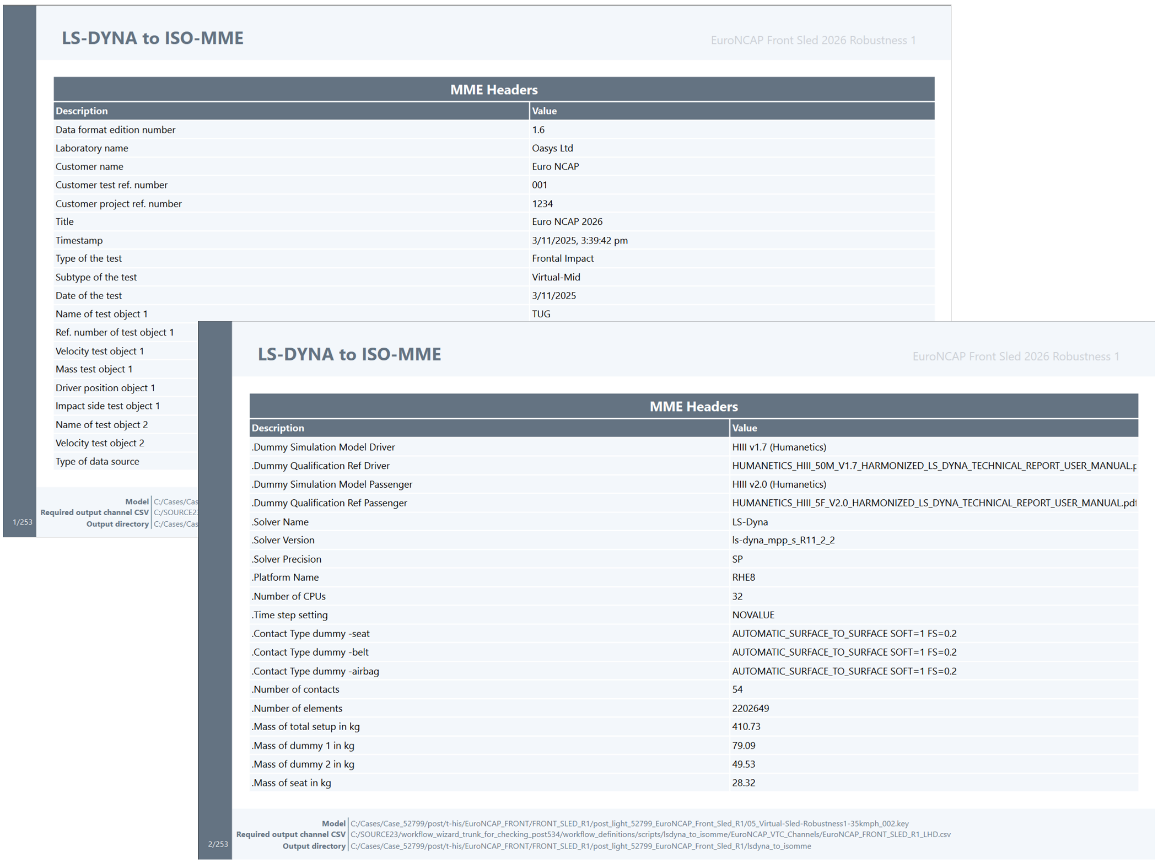
4. T/HIS will then launch automatically to produce the output files for the report.

5. If any of the required inputs are missing or invalid, T/HIS will prompt a message window (see example below) asking if you would like to create/edit user data. If you select **Yes**, PRIMER will be launched and panels will open for you to enter the required information. If you select **No** then T/HIS will try to generate the report with the data available.



6. Once it has completed, T/HIS will close and return back to REPORTER.

7. On the first two pages, summary information is shown in table format much like the GUI output when running the Workflow manually in T/HIS:



LS-DYNA to ISO-MME

EuroNCAP Front Sled 2026 Robustness 1

MME Headers	
Description	Value
Data format edition number	1.6
Laboratory name	Oasys Ltd
Customer name	Euro NCAP
Customer test ref. number	001
Customer project ref. number	1234
Title	Euro NCAP 2026
Timestamp	3/11/2025, 3:39:42 pm
Type of the test	Frontal Impact
Subtype of the test	Virtual-Mid
Date of the test	3/11/2025
Name of test object 1	TUG
Ref. number of test object 1	
Velocity test object 1	
Mass test object 1	
Driver position object 1	
Impact side test object 1	
Name of test object 2	
Velocity test object 2	
Type of data source	

Model C:/Cases/Cas
Required output channel CSV C:/SOURCE2
Output directory C:/Cases/Cas

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LS-DYNA to ISO-MME

EuroNCAP Front Sled 2026 Robustness 1

MME Headers	
Description	Value
.Dummy Simulation Model Driver	HIII v1.7 (Humanetics)
.Dummy Qualification Ref Driver	HUMANETICS_HIII_50M_V1.7_HARMONIZED_LS_DYNA_TECHNICAL_REPORT_USER_MANUAL.p
.Dummy Simulation Model Passenger	HIII v2.0 (Humanetics)
.Dummy Qualification Ref Passenger	HUMANETICS_HIII_5F_V2.0_HARMONIZED_LS_DYNA_TECHNICAL_REPORT_USER_MANUAL.pdf
.Solver Name	LS-Dyna
.Solver Version	ls-dyna_mpp_s_R11_2_2
.Solver Precision	SP
.Platform Name	RHE8
.Number of CPUs	32
.Time step setting	NOVALUE
.Contact Type dummy -seat	AUTOMATIC_SURFACE_TO_SURFACE SOFT=1 FS=0.2
.Contact Type dummy -belt	AUTOMATIC_SURFACE_TO_SURFACE SOFT=1 FS=0.2
.Contact Type dummy -airbag	AUTOMATIC_SURFACE_TO_SURFACE SOFT=1 FS=0.2
.Number of contacts	54
.Number of elements	2202649
.Mass of total setup in kg	410.73
.Mass of dummy 1 in kg	79.09
.Mass of dummy 2 in kg	49.53
.Mass of seat in kg	28.32

Model C:/Cases/Case_52799/post/t-his/EuroNCAP_FRONT/FRONT_SLED_R1/post_light_52799_EuroNCAP_Front_Sled_R1/05_Virtual-Sled-Robustness1-35kmph_002.key
Required output channel CSV C:/SOURCE23/workflow_wizard_trunk_for_checking_post534/workflow_definitions/scripts/lsdyna_to_isomme/EuroNCAP_VTC_Channels/EuroNCAP_FRONT_SLED_R1_LHD.csv
Output directory C:/Cases/Case_52799/post/t-his/EuroNCAP_FRONT/FRONT_SLED_R1/post_light_52799_EuroNCAP_Front_Sled_R1/lsdyna_to_isomme

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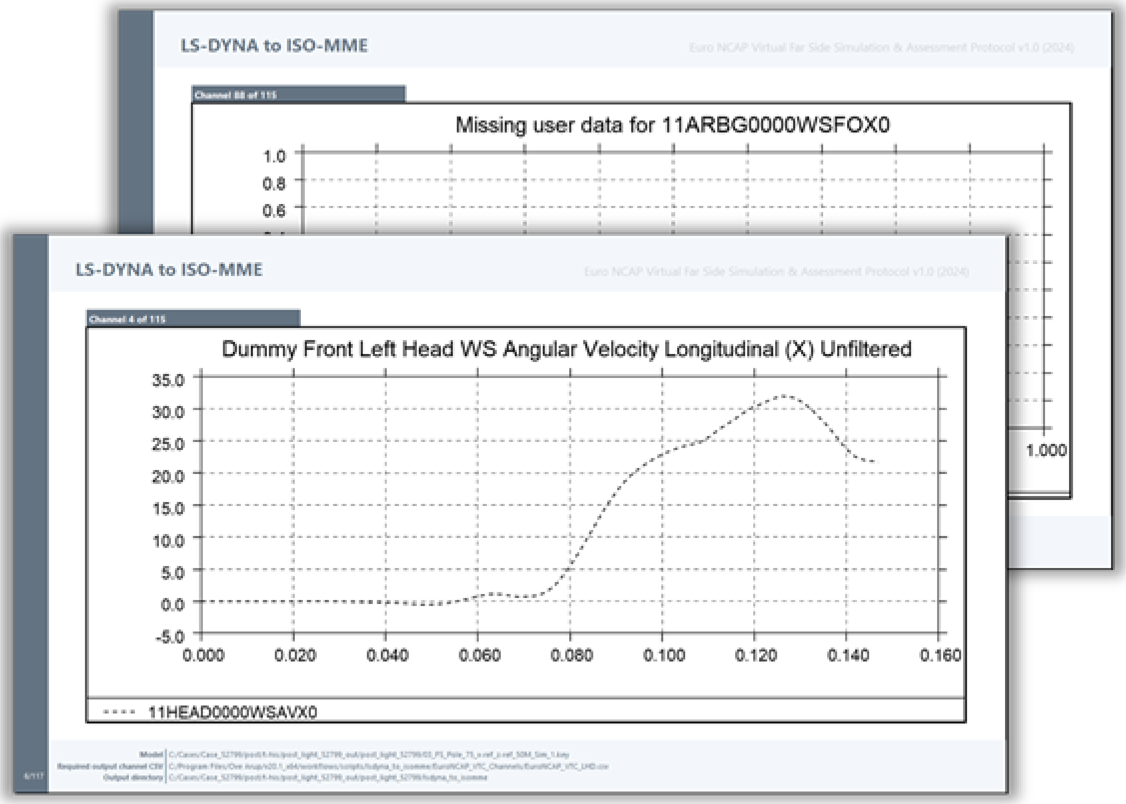
8. On the remaining pages you can see each channel image requested in "Required output channels CSV". If the input entities were missing or invalid for a given channel, an empty graph image with a missing or invalid graph title message will be shown in the report:


LS-DYNA to ISO-MME
Missing user data for 11ARBG0000WSFOX0
1.0
0.8
0.6
1.000
LS-DYNA to ISO-MME
Dummy Front Left Head WS Angular Velocity Longitudinal (X) Unfiltered
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
-5.0
0.000
0.020
0.040
0.060
0.080
0.100
0.120
0.140
0.160
11HEAD0000WSAVX0

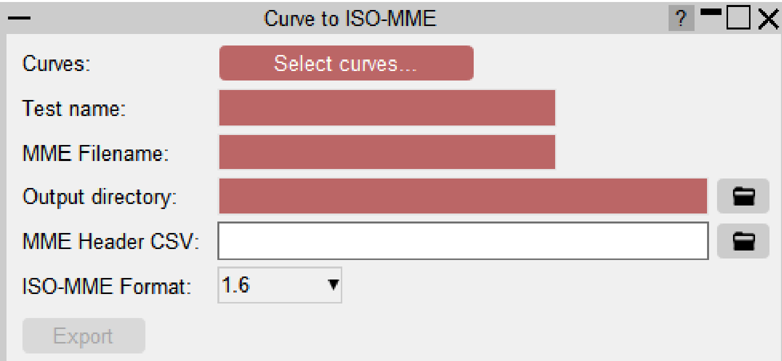
4.9.6. Curve to ISO-MME

Tools → Workflows → Curve to ISO-MME

The Curve to ISO-MME workflow tool that enables you to export T/HIS curves in ISO-MME data format without the need of a configuration file. It is a T/HIS workflow. It doesn't required setting up in PRIMER.

Curve to ISO-MME Export from T/HIS

When the tool is initially launched, the GUI will look something like this by default:



All the inputs in highlighted in red are required for **Export** to be enabled.

Select curves

Make sure that you have all the curves you want to export in ISO-MME format ready in your T/HIS session. Then click on **Select curves...** – this will open the curve selection panel. Select the curves you wish to export and click **Apply**. The **Select curves...** button will now indicate how many curves you have selected e.g. "3 curves selected".

Test name

Test name is the name you wish to give to the main ISO-MME folder that gets created in the output directory. For ISO-MME format 2.0, the **Test name** is also used for .mme, .mmi and .mmd files. Please do not include any of following characters: **\ / : * ? " < > |**.

MME Filename

MME Filename is the filename you wish to specify for .mme, .chn, and individual channel files (.001, .002, etc) for ISO-MME format 1.6. This field is not required if ISO-MME format is set to 2.0 as in that case, Test name is used. Please do not include any of following characters: **\ / : * ? " < > |**.

Output directory

Select the directory on your machine where you wish to export the ISO-MME channel data.

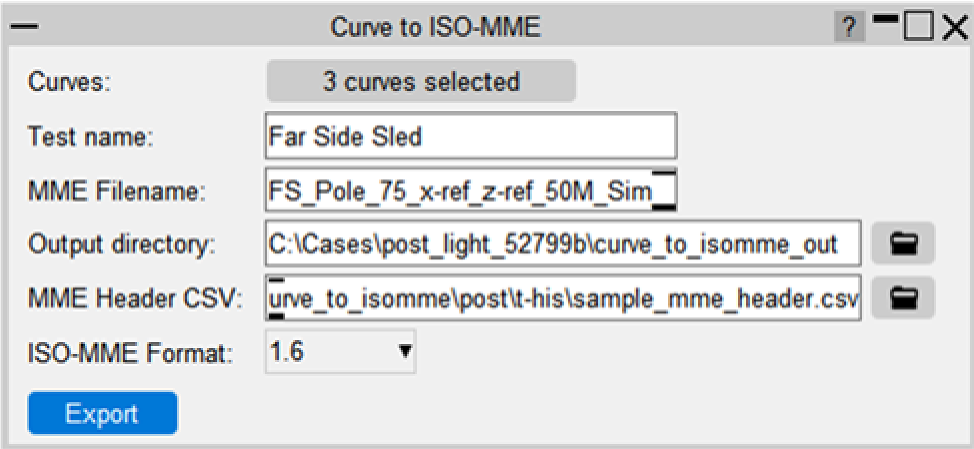
MME Header CSV

ISO-MME format requires some extra information to be included in the .mme file which we can't generate automatically. MME Header CSV file is an optional input containing all the extra information to put in the .mme file. The first column in the CSV file is the description of the MME header and the second column is the value of that MME header. Refer to the sample CSV file located in:

```
<INSTALLATION_DIR>/workflows/scripts/curve_to_isomme/post/t-his/sample_mme_header.csv
```

If you give this optional input then all those MME headers will be included in the .mme file when it is written.

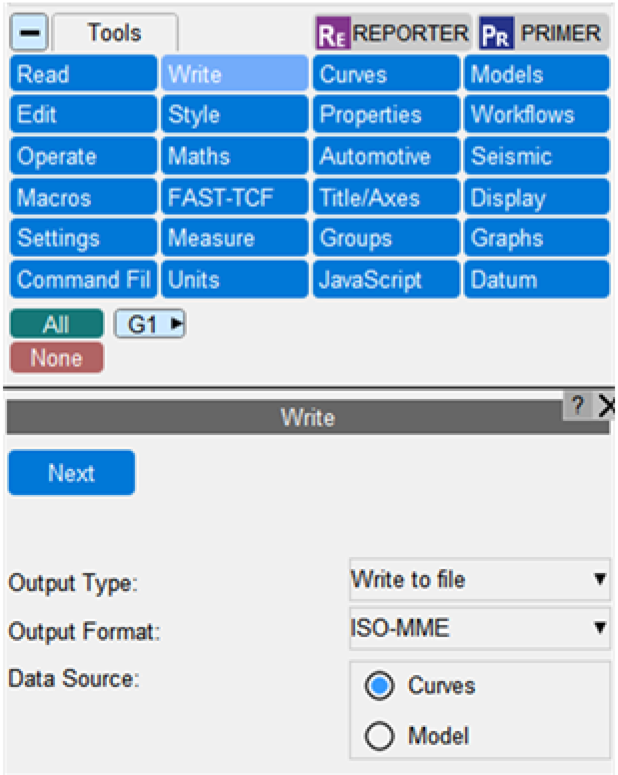
After you have provided all the inputs, the panel should look something like this:



Export

The **Export** button will become enabled once all inputs highlighted in red are defined. Click to export the selected curves in ISO-MME format.

NOTE: The same Curve to ISO-MME tool can be accessed from **Tools → Write → Output Format: ISO-MME; Data Source: Curves → Next**.


Tools
REPORTER
PRIMER
Read
Write
Curves
Models
Edit
Style
Properties
Workflows
Operate
Maths
Automotive
Seismic
Macros
FAST-TCF
Title/Axes
Display
Settings
Measure
Groups
Graphs
Command Fil
Units
JavaScript
Datum
All
G1
None
Write
Next
Output Type:
Write to file
Output Format:
ISO-MME
Data Source:
Curves
Model

4.9.7. SimVT

What is SimVT?

SimVT is a powerful tool for correlating curves from different data sources: LS-DYNA models, ISO-MME data and CSV data. SimVT removes the need to run the T/HIS CORA tool manually, repeatedly. Pairs of curves are matched automatically using tags. Many correlations can be performed and presented at once.

Why is it called "SimVT"?

The name "SimVT" comes from the fact that its primary purpose is to correlate **sim**ulation **v**ersus **t**est data. Additionally, the main motivation for the tool was to provide support for vehicle manufacturers who need to correlate their simulation crash results against their physical test results as part of **V**irtual **T**esting protocols.

Methods and Protocols

SimVT performs correlation analysis using the following methods:

- CORAplus 4.0.4
- ISO/TS 18571:2014
- ISO/TS 18571:2024 **(default)**

SimVT supports many Virtual Testing protocols (see list). Over time, SimVT will be enhanced to add support for new Virtual Testing protocols that are released. If there is a feature or protocol that you would like to see added to SimVT, please contact us.

Quick-start Guides

SimVT has been designed to be versatile to support different use cases. To help you get started, we have provided a number of quick-start guides which should cover the most common use cases:

1. I have ISO-MME test data from the lab and I want to compare my Ansys LS-DYNA simulation against it to see how well I perform according to the relevant Virtual Testing protocol: Using SimVT for Virtual Testing Protocols
2. I want to conduct a sensitivity study to see how the new simulations I have run compare against my baseline model: Using SimVT for Sensitivity Studies
3. I have processed simulation results curves myself and I want to compare them against physical test data: Using SimVT Without Ansys LS-DYNA Results

Using SimVT for Virtual Testing Protocols

SimVT has been designed to perform correlation analysis for Virtual Testing Crashworthiness (VTC) protocols. The table below lists the currently supported protocols and the corresponding protocol options in SimVT.

Protocol	Automotive Assessments Protocol in PRIMER (Crash Test; Regulation; Version)	Protocol options in SimVT	Description
Euro NCAP Virtual Far Side Simulation & Assessment Protocol v1.0	Far Side Sled; EuroNCAP; 2024	Euro NCAP Virtual Far Side v1.0	This protocol option is used to configure SimVT for performing the Euro NCAP Virtual Far Side Protocol Validation Criterion 1 check.
C-NCAP Far Side Occupant Protection Protocol (Appendix H)	Far Side Sled; CNCAP; 2024 (WSID)	C-NCAP Far Side Protocol 2024 Working Conditions 1-6 SimVT	This protocol option is used to configure SimVT for checking the correlation fitting index of working conditions 1 to 6 (WSID driver) according to C-NCAP Appendix H.1.2.1.3.
	Far Side Sled; CNCAP; 2024 (SID2-SBLD)	C-NCAP Far Side Protocol 2024 Working Conditions 7-8 SimVT	This protocol option is used to configure SimVT for checking the correlation fitting index of working conditions 7 and 8 (WSID driver) according to C-NCAP Appendix H.1.2.1.3.
	Side Pole; CNCAP; 2024 (WSID+WSID)	C-NCAP Far Side Protocol 2024 Virtual Assessment Certificate (WSID Driver, WSID Passenger)	This protocol option is used to configure SimVT for performing the Virtual Assessment Certificate check of the "Side Pole Impact" with a WSID driver and front passenger, according to C-NCAP Appendix H.1.2.2.2
	Side Pole; CNCAP; 2024 (WSID+ES-2re)	C-NCAP Far Side Protocol 2024 Virtual Assessment Certificate (WSID Driver, ES-2re Passenger)	This protocol option is used to configure SimVT for performing the Virtual Assessment Certificate check of the "Side Pole Impact" with a WSID driver and ES-2re front passenger, according to C-NCAP Appendix H.1.2.2.2

For this process you will first need Automotive Assessment Workflow data (AAWD) for the Ansys LS-DYNA model you wish to process. You can can follow these instructions to create the AAWD in PRIMER before proceeding to the steps below in T/HIS. Note that you can create the AAWD before running a simulation to help ensure that your model will output all of the required results data for processing according to the Euro NCAP Virtual Far Side protocol.

If you have defined the Automotive Assessment Workflow data (AAWD) for the Ansys LS-DYNA model you wish to process then SimVT will automatically configure itself to use the corresponding protocol option.

Steps in T/HIS

The steps below assume that you have Ansys LS-DYNA simulation data and ISO-MME or CSV test data. If you have converted your Ansys LS-DYNA simulation data to ISO-MME data (using Ansys LS-DYNA to ISO-MME) or CSV data (by writing X,Y,Y,Y data from T/HIS), then you will need to follow steps 1-5 of the quick start guide to use SimVT without Ansys LS-DYNA Results instead of steps 1-5 below.

1. **Open T/HIS** and **read in the Ansys LS-DYNA** results (e.g. binout000 or .thf files) you wish to use with the SimVT Workflow.
2. Select **Tools → Workflows**. Note, if you have "Open Menu Automatically" checked you can skip this step.
3. Filter for "Virtual Testing" and select **SimVT**
4. In the Correlation Setup window, click **Import ISO-MME or CSV...** to select an ISO-MME index file (the extension should be ".mmi", ".chn" or ".iso").
5. Select**T1** as the "Reference test" and select **M1** as the simulation (both should be set to this automatically).
6. Follow steps for specific to the selected protocol option linked below:
    - Euro NCAP Virtual Far Side v1.0
    - C-NCAP Far Side Protocol 2024 Working Conditions 1-6 SimVT
    - C-NCAP Far Side Protocol 2024 Working Conditions 7-8 SimVT
    - C-NCAP Far Side Protocol 2024 Virtual Assessment Certificate (WSID Driver, WSID Passenger)
    - C-NCAP Far Side Protocol 2024 Virtual Assessment Certificate (WSID Driver, ES-2re Passenger)
7. To correlate between simulation and test data, the data must contain matching pairs of ISO-MME channel codes. Add/remove any channel matching rules that you require to match T1 channels to M1. Note that test data typically uses filter class "P" whereas simulation data uses filter class "0" so the filter class equivalence ISO rule**"P|0"** is added by default to facilitate matching test data to simulation data.
8. Select the channels you wish to correlate in the channel list (or select all of them by clicking **All**). Any channels that are greyed out are missing from the provided simulation and/or test data.
9. Click **Correlate**. The setup window will disappear, and it will be replaced by three windows:
    a. Progress window
    b. Correlation Table

c. Plotting Controls

10. Once the progress window has disappeared you can inspect the results in the Correlation Table and plot the correlation graphs by using the buttons in the table.
11. You can also perform corrective operations to the input curves.
12. Finally, you can export a summary of the results as a CSV file, and save your SimVT settings for a future session.

Protocol Option Steps

Euro NCAP Virtual Far Side v1.0

6.1. In the "Protocol" section of the setup window select **Euro NCAP Virtual Far Side v1.0** (this will be automatically selected if you are using Ansys LS-DYNA results with AAWD). This will configure the following SimVT settings that are specific to the protocol:

- The correlation method will be set to "ISO/TS 18571:2024"
- The curves will be automatically regularised to 10 kHz before correlating
- The channels list will change to show "protocol channels" rather than "selectable channels" which makes it easier to identify which channels may be expected, by the protocol, but are missing from either the simulation or test data
- Protocol channels that specify the filter class will be automatically derived by filtering the corresponding unfiltered channel if they are not already defined
- The "Calculate Head Excursion" button will become active, and can be clicked to set the maximum evaluation window time to the time of the maximum head excursion + 20%.

6.2. Click Calculate Head Excursion to set the maximum evaluation window time to the time of the maximum head excursion + 20% (provided that the head excursion can be computed from the selected simulation channels and the analysis curves have a duration that exceeds the cut off).

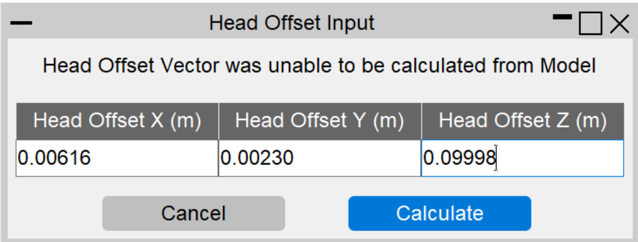
6.3. Inspect the head excursion plot that appears and read the message in the information window to check that the simulation passes (i.e. ensure that the simulation has run for long enough). If it fails, you will need to re-run the analysis for a longer time before repeating these steps.

C-NCAP Far Side Protocol 2024 Working Conditions 1-6 SimVT

6.1. In the "Protocol" section of the setup window select **C-NCAP Far Side Protocol 2024 Working Conditions 1-6 SimVT** (this will be automatically selected if you are using Ansys LS-DYNA results with AAWD). This will configure the following SimVT settings that are specific to the protocol:

- The correlation method will be set to "ISO/TS 18571:2024"
- The curves will be automatically regularised to 10 kHz before correlating
- The channels list will change to show "protocol channels" rather than "selectable channels" which makes it easier to identify which channels may be expected, by the protocol, but are missing from either the simulation or test data
- Protocol channels that specify the filter class will be automatically derived by filtering the corresponding unfiltered channel if they are not already defined
- The "Calculate Head Excursion" button will become active, and can be clicked to set the maximum evaluation window time to the time of the maximum head excursion if it is greater than the default cut-off of 1.5 seconds

6.2. Click Calculate Head Excursion. If the "Head Offset (for C-NCAP calculation)" node is not defined then you will need to enter the offset in the window that appears. The offset is the vector from the head CoG to "the front end point of the circular hole at the top of the head" (C-NCAP Appendix H.1.2.1.3.3a). For the supported WSID dummies the vector has been measured to be (0.00616 m, 0.00230 m, 0.09998 m). You should check this measurement for the WSID dummy you are using and input the X, Y and Z offsets in meters accordingly. Then click **Calculate**.



6.3. Inspect the head excursion plot that appears and read the message in the information window to check that the head excursion is realistic. If the time of maximum head excursion (t_head_max) exceeds 0.15 seconds then it the maximum evaluation interval should be set to the time of

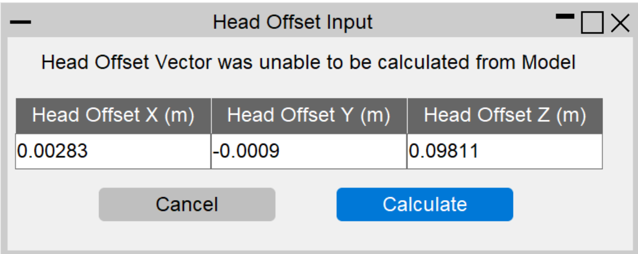
C-NCAP Far Side Protocol 2024 Working Conditions 7-8 SimVT

6.1. In the "Protocol" section of the setup window select **C-NCAP Far Side Protocol 2024 Working Conditions 7-8 SimVT** (this will be automatically selected if you are using Ansys LS-DYNA results with AAWD). This will configure the following SimVT settings that are specific to the protocol:

- The correlation method will be set to "ISO/TS 18571:2024"
- The curves will be automatically regularised to 10 kHz before correlating
- The channels list will change to show "protocol channels" rather than "selectable channels" which makes it easier to identify which channels may

- be expected, by the protocol, but are missing from either the simulation or test data
- Protocol channels that specify the filter class will be automatically derived by filtering the corresponding unfiltered channel if they are not already defined
- The "Calculate Head Excursion" button will become active, and can be clicked to set the maximum evaluation window time to the time of the maximum head excursion if it is greater than the default cut-off of 1.5 seconds

6.2. Click Calculate Head Excursion. If the "Head Offset (for C-NCAP calculation)" node is not defined then you will need to enter the offset in the window that appears. The offset is the vector from the head CoG to "the front end point of the circular hole at the top of the head" (C-NCAP Appendix H.1.2.1.3.3a). For the supported SID-IIs dummies the vector has been measured to be (0.00283 m, -0.0009 m , 0.09811 m). You should check this measurement for the WSID dummy you are using and input the X, Y and Z offsets in meters accordingly. Then click **Calculate**.



6.3. Inspect the head excursion plot that appears and read the message in the information window to check that the simulation passes (i.e. ensure that the simulation has run for long enough). If it fails, you will need to re-run the analysis for a longer time before repeating these steps.

C-NCAP Far Side Protocol 2024 Virtual Assessment Certificate (WSID Driver, WSID Passenger)

6.1. In the "Protocol" section of the setup window select **C-NCAP Far Side Protocol 2024 Virtual Assessment Certificate (WSID Driver, WSID Passenger)** (this will be automatically selected if you are using Ansys LS-DYNA results with AAWD). This will configure the following SimVT settings that are specific to the protocol:

- The correlation method will be set to "ISO/TS 18571:2024"
- The curves will be automatically regularised to 10 kHz before correlating
- The channels list will change to show "protocol channels" rather than "selectable channels" which makes it easier to identify which channels may be expected, by the protocol, but are missing from either the simulation or test data

- Protocol channels that specify the filter class will be automatically derived by filtering the corresponding unfiltered channel if they are not already defined

C-NCAP Far Side Protocol 2024 Virtual Assessment Certificate (WSID Driver, ES-2rePassenger)

6.1. In the "Protocol" section of the setup window select **C-NCAP Far Side Protocol 2024 Virtual Assessment Certificate (WSID Driver, ES-2re Passenger)** (this will be automatically selected if you are using Ansys LS-DYNA results with AAWD). This will configure the following SimVT settings that are specific to the protocol:

- The correlation method will be set to "ISO/TS 18571:2024"
- The curves will be automatically regularised to 10 kHz before correlating
- The channels list will change to show "protocol channels" rather than "selectable channels" which makes it easier to identify which channels may be expected, by the protocol, but are missing from either the simulation or test data
- Protocol channels that specify the filter class will be automatically derived by filtering the corresponding unfiltered channel if they are not already defined

Virtual Testing Automation in REPORTER

If you save your SimVT settings in step 12 above, you can then use the associated SimVT REPORTER template to automate the correlation process and generate a report of the sensor scores and the validation result.

Using SimVT for Sensitivity Studies

Three models are used for this example (but you can use as many as you like):

1. M1 – the baseline model
2. M2 – a variant of the baseline
3. M3 – another variant of the baseline

The purpose of this sensitivity study is to determine if the changes in M2 and M3 compared to M1 have significantly affected any of the results curves (output channels). Before following the steps in T/HIS, make sure that each model has Automotive Assessment Workflow Data (AAWD) defined. You can optionally choose to share the same AAWD for all the models in the study by placing the AAWD JSON file in a directory that is an ancestor to all the model results.

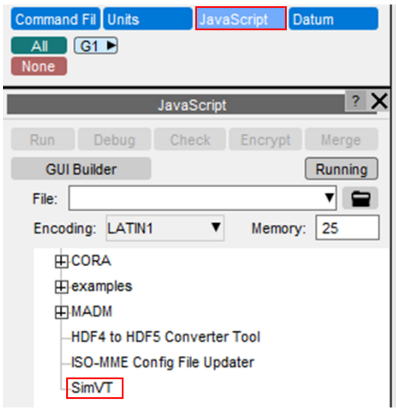
Steps in T/HIS

1. **Open T/HIS**
2. **Load the Ansys LS-DYNA results** for the baseline model
3. **Load the Ansys LS-DYNA results** for one or more models that you want to compare against the baseline.
4. Click **Tools → Workflows**. Note, if you have “Open Menu Automatically” checked you can skip this step.
5. Select **SimVT** and select all the models **M1**, **M1**, **M3** etc.,
6. Click on **Run** (this will open the "Correlation Setup" window)
7. On the Correlation Setup window, select the baseline model (**M1**) as the "Reference test".
8. Select all the other models as the simulation(s) (hold down shift when clicking to select multiple i.e. Shift + **M2** + **M3**).
9. Select the method you want to use for correlating.
10. Add/remove any channel matching rules that you require to match M1 channels to M2 and M3 etc. (note if you are sharing the same AAWD then the channels will all match without the need for matching rules)
11. Select the channels you want to correlate in the channel list (or select all of them by clicking on the **All**).
12. Click **Correlate**. The setup window will disappear, and it will be replaced by three windows:
    a. Progress window
    b. Correlation Table
    c. Plotting Controls
13. Once the progress window has disappeared you can inspect the results on the Correlation Table and plot the correlation graphs by using the buttons on the table.

14. You can also perform corrective operations to the input curves.

Using SimVT Without Ansys LS-DYNA Results

The SimVT tool can can be run directly from the JavaScript menu in T/HIS (**Tools → JavaScript → SimVT**). This is useful if you want to use the tool without loading Ansys LS-DYNA results into T/HIS.



Steps in T/HIS

In this example we will correlate CSV data vs. ISO-MME data to demonstrate using both types of data.

1. Open T/HIS
2. Select **Tools → JavaScript → SimVT**
3. On the Correlation Setup window click **Import ISO-MME or CSV...** and select an ISO-MME index file (the extension should be ".mme", ".mmi", ".chn" or ".iso").
4. On the Correlation Setup window click **Import ISO-MME or CSV...** and select a CSV data file.
5. On the Correlation Setup window, select **T1** as the "Reference test" and select **T2** as the simulation.
6. Select the method you want to use for correlating.
7. Add/remove any channel matching rules that you require to match T1 channels to T2.
8. Select the channels you want to correlate in the channel list (or select all of them by clicking on the **All**).
9. Click **Correlate**. The setup window will disappear, and it will be replaced by three windows:
    a. Progress window
    b. Correlation Table
    c. Plotting Controls
10. Once the progress window has disappeared you can inspect the results on the Correlation Table and plot the correlation graphs by using the buttons on the table.

11. You can also perform corrective operations to the input curves.

4.9.7.2. SimVT Windows

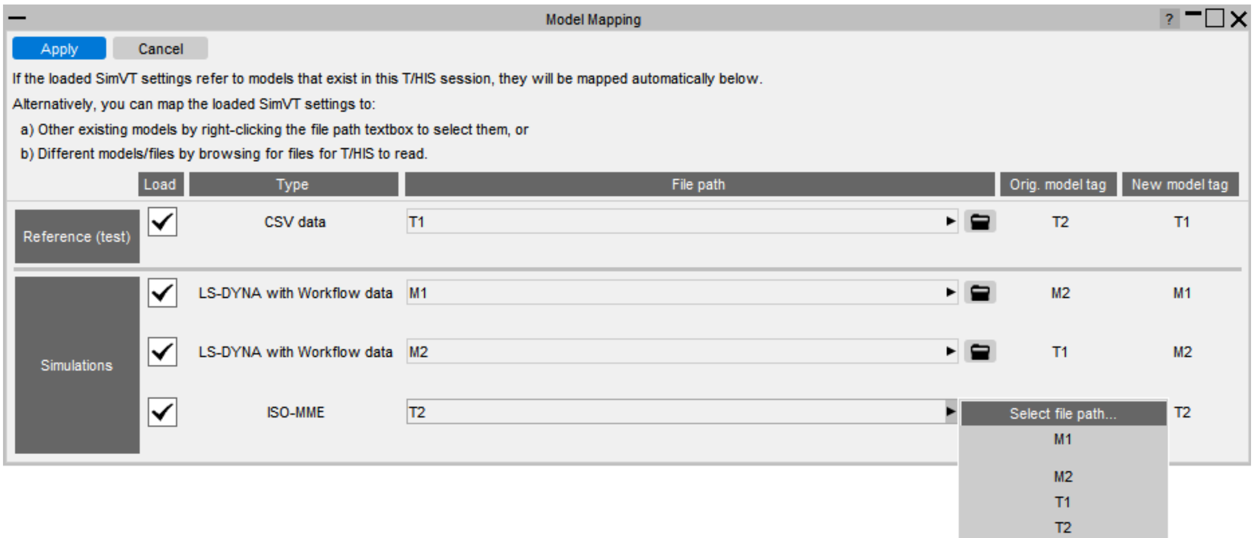
Model Mapping Window

The Model Mapping window appears when loading a SimVT settings file from the Correlation Setup window. It is used to "Map" the model tags defined in the setting file to the models (or data sources) which are defined in SimVT.

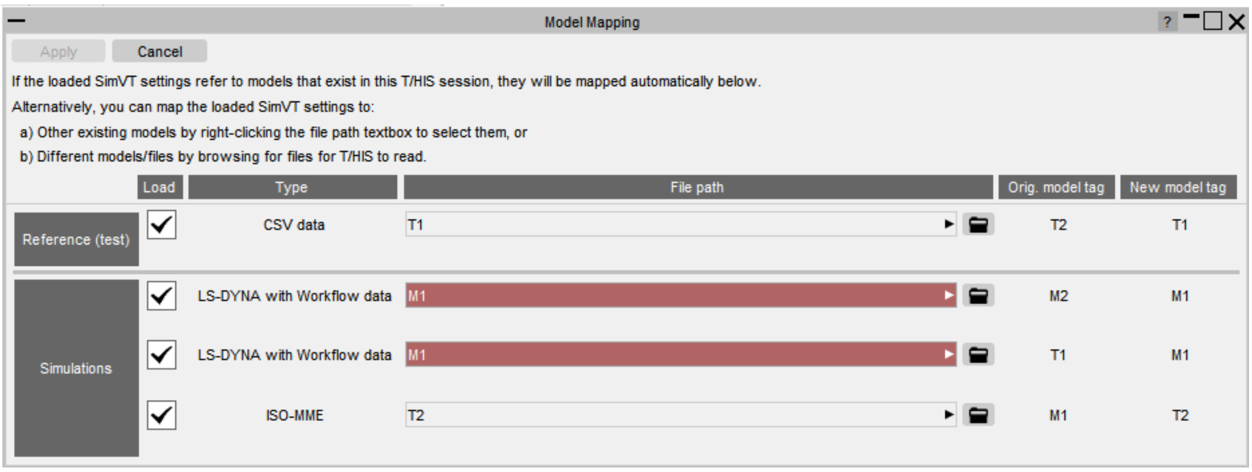
Mapping to Existing Data

In SimVT, existing data sources (i.e. those listed in the model list and imported data list) are represented by their model tag. For example, Ansys LS-DYNA models will be labelled M1, M2 etc. and ISO-MME and CSV data will be tagged T1, T2 etc. In the model mapping window you can select existing data sources using the selector arrow at the end of the file path textboxes. For example, you may have loaded the Ansys LS-DYNA models and imported data source in a different order to the order when the settings file was created. Alternatively, you may want to change which data source is used as the reference test. In the example below T2 was the reference test in the settings file, but it has been mapped to T1 which will become the reference test when **Apply** is clicked.

Note: You can use the checkboxes under load column to select which models to load, by default all models are selected for loading.

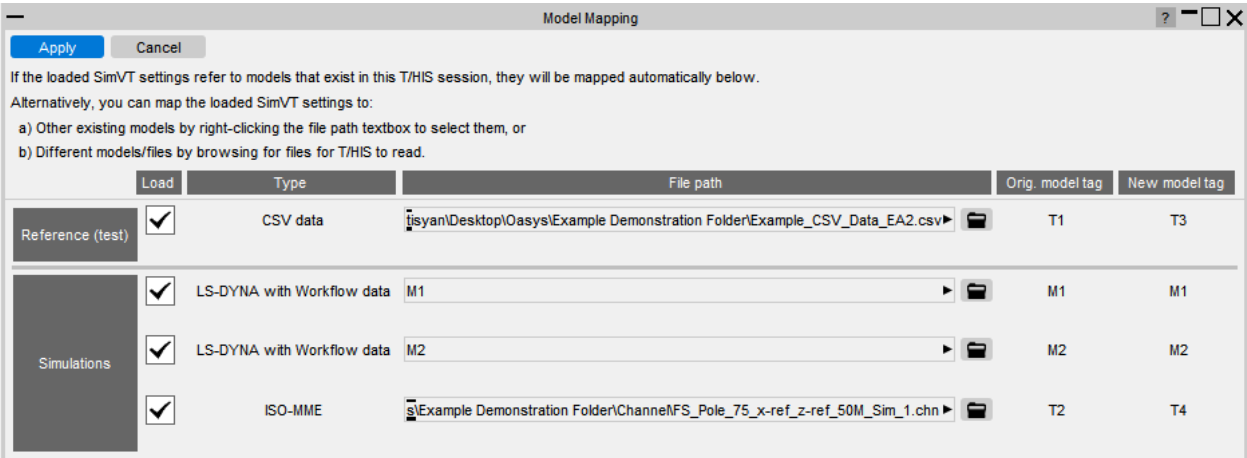


You cannot map the same data source multiple times and the file path textboxes will turn red to indicate the issue (e.g. M1 and M2 in the settings file cannot both map to the existing M1 model).



Mapping to New Data

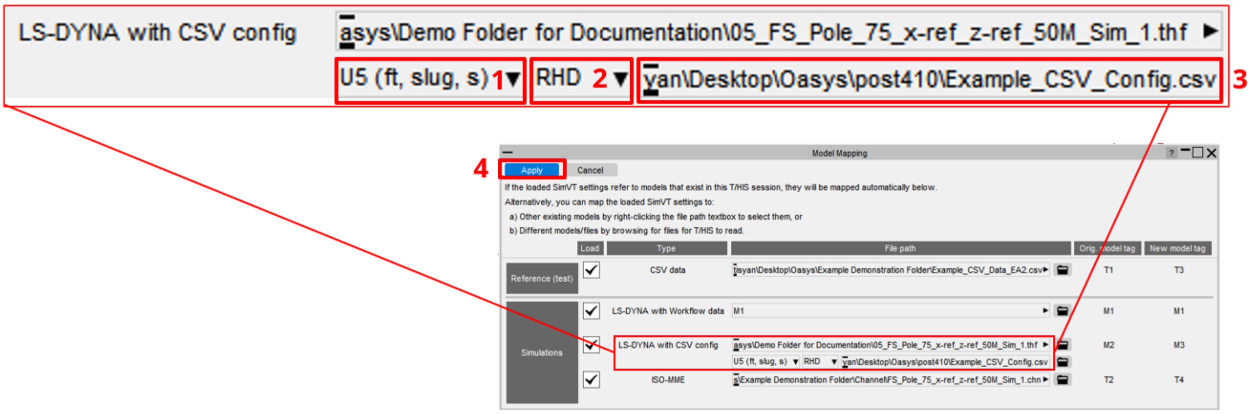
It is possible to import ISO-MME data and CSV data directly from the model mapping window. You can paste the path to the data into the file path textbox or you can click on the file selector and open it from there. In the example below T1 has been remapped to T3 which is a new CSV data source and T2 has been remapped to T4 which is a new ISO-MME data source. Note that the data for T3 and T4 will not be imported until **Apply** is clicked.



You can also load new Ansys LS-DYNA results into T/HIS from the Model Mapping window. The Ansys LS-DYNA models will not be imported until **Apply** is clicked. If your model does not have Automotive Assessments Workflow Data (AAWD) you will need to provide a CSV config which describes the channel entity-id pairings and select the appropriate unit system and vehicle drive side. The steps to follow are:

- Choose which of the original model tags (i.e. from the settings file) you want to remap with new Ansys LS-DYNA results.
- Use the file selector to select the Ansys LS-DYNA results file (or paste the path into the file path textbox)
- Select the unit system [1]
- Select the vehicle drive side [2] (LHD is default)

- Use the file selector to select the CSV config file (or paste the path into the CSV Config file textbox) [3].

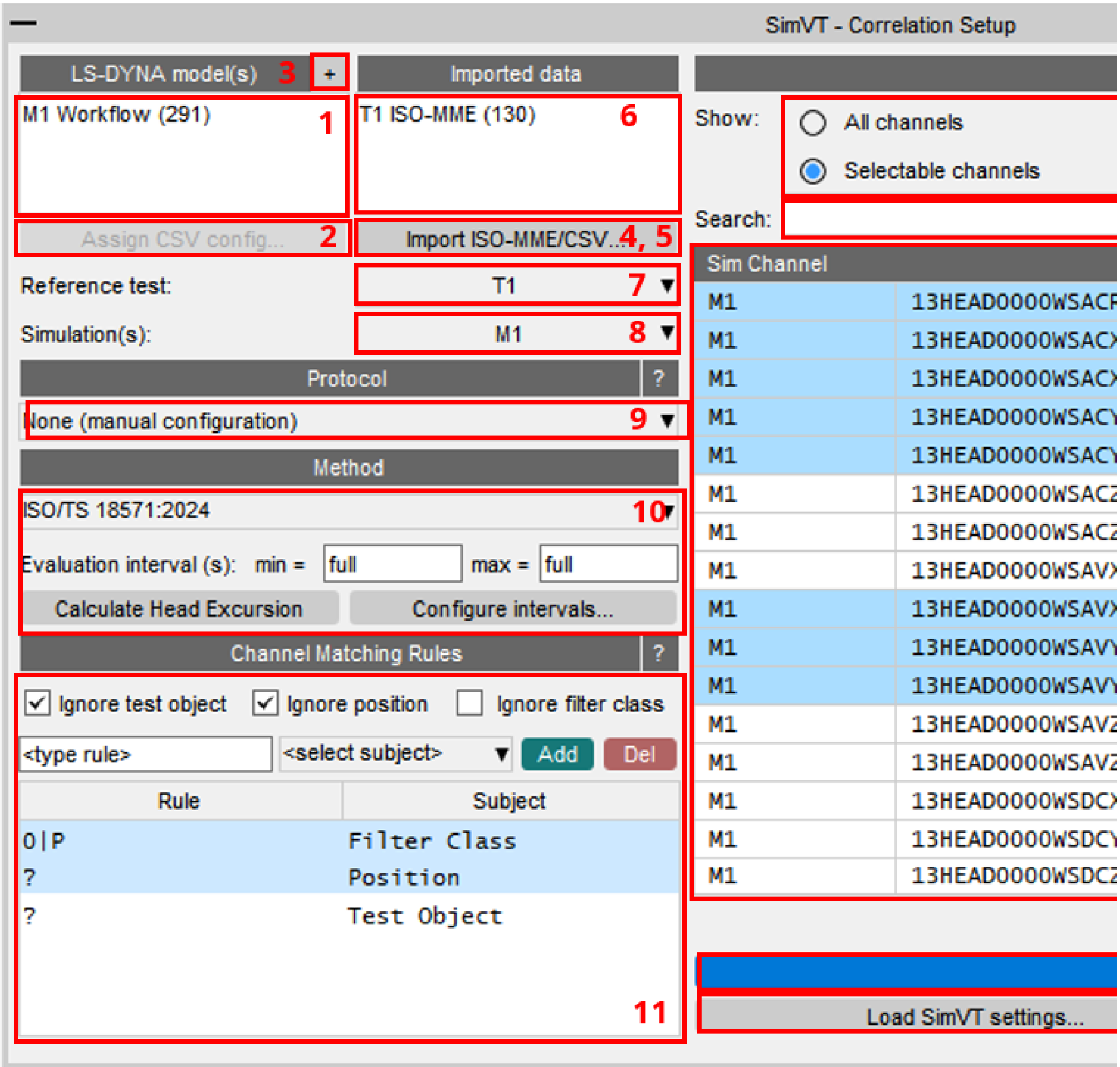


Correlation Setup Window

The Correlation Setup Window allows you to prepare your desired correlation(s). The window enables you to:

1. View a list of the available Ansys LS-DYNA model(s)
2. Assign a CSV configuration to Ansys LS-DYNA models that are missing Automotive Assessments Workflow Data (AAWD)
3. Import an Ansys LS-DYNA model
4. Import ISO-MME data
5. Import CSV data
6. View a list of the imported data
7. Select which model or data source will be used as the reference (this is typically physical test data from a laboratory)
8. Select which model(s) or data source(s) will be compared against the reference test (this is typically Ansys LS-DYNA simulation data)
9. Select the virtual testing protocol
10. Select the correlation method, the evaluation intervals and calculate head excursion
11. Apply channel matching rules
12. Inspect the available and selectable channels
13. Search for channels using regular expressions
14. Select the channels to be correlated
15. Perform “Simulation(s)” versus “Reference test” correlations on the selected channels
16. Save SimVT settings files

17. Load SimVT settings files

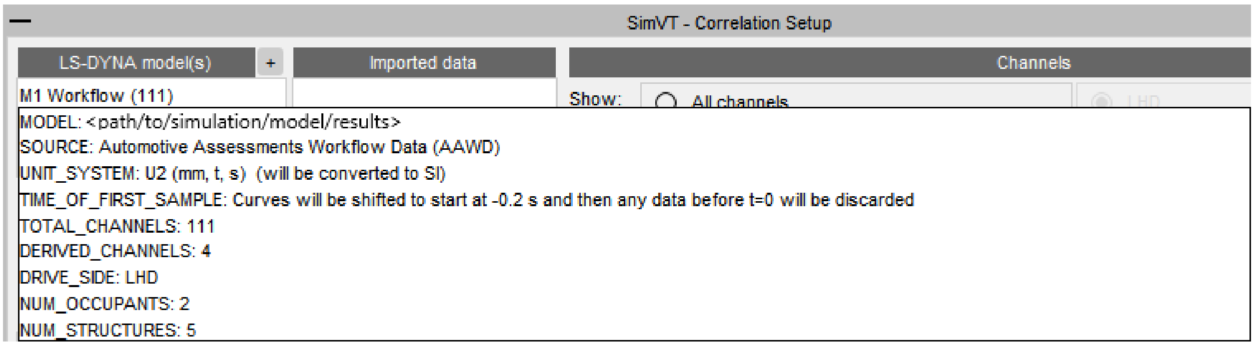


1. Model List

The models that are present in T/HIS when SimVT is loaded will be listed in the Correlation Setup window. If T/HIS can find Automotive Assessments Workflow Data (AAWD) for a model, it will appear with "Workflow" and the number of channels that are defined for the model next to the model tag (e.g. "M1 (336 channels)"). Alternatively, if T/HIS cannot find AAWD for a model, only the model tag (e.g. "M2") will be shown.

When you mouse over a model in the list, hover text with additional information will appear. This can be useful if you cannot remember which model is which as the hover text contains the path to the model results.

Additionally, if "Time of first sample" was defined (non-zero) in [Automotive Assessments PRIMER](), it will appear in the hover text with an explanation that "curves will be shifted to start at [Time of first sample] and then any data before t=0 will be discarded":



2. Assign a CSV configuration

Creating AAWD for Ansys LS-DYNA models is the recommended method for using Ansys LS-DYNA model results with SimVT. However, it is possible to use Ansys LS-DYNA results with SimVT without AAWD, but a CSV configuration file needs to be provided to define the channel mapping and the model units and vehicle drive side need to be provided in addition. The **Assign CSV config...** button will become active when a model which does not have AAWD is selected from the model list. Click **Assign CSV config...** to open a window where the CSV config can be loaded and checked before it is assigned to the selected model.

3. Import an Ansys LS-DYNA Model

Ansys LS-DYNA models can be imported into SimVT for correlating. Click the **+** button to open a file selector window. Navigate to your model file and open it to load the data into SimVT.

4. Import ISO-MME data

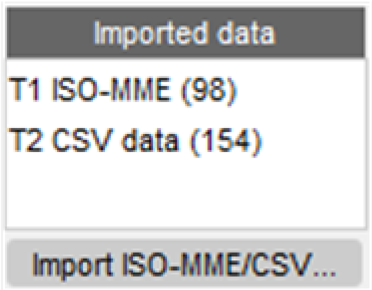
ISO-MME test data (v1.6 and v2.0) can be imported into SimVT for correlating. Click **Import ISO-MME or CSV...** to open a file selector window. Navigate to the ".chn" or ".mmi" file in your ISO-MME data and open it to load the data into SimVT.

5. Import CSV data

CSV channel data can be imported into SimVT for correlating. Click **Import ISO-MME or CSV...** to open a file selector window. Navigate to the ".csv" file with your channel data and open it to load the data into SimVT.

6. View a list of the imported data

Imported ISO-MME and CSV data will be displayed in the **Imported data** list along with the number of channels defined by the data.

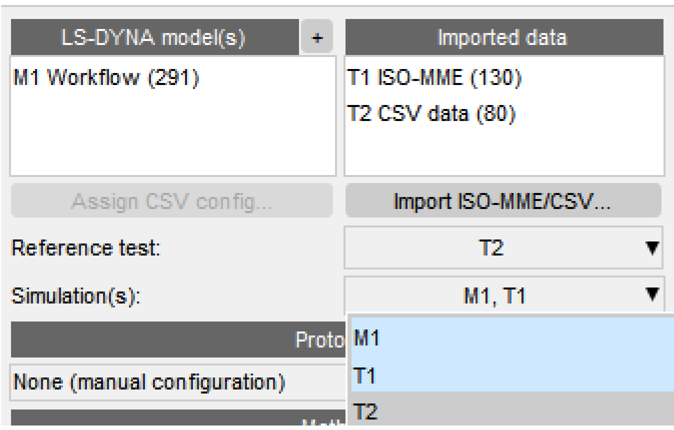


7. Selecting Reference (test) Source

The **Reference test** drop-down can be used to select the reference model or data source. This is typically physical test data from a laboratory, but an Ansys LS-DYNA model can also be selected (e.g. a baseline model when [conducting a sensitivity study](#)). Note that when ISO-MME or CSV data is imported, the reference test will automatically update to the tag of the newly imported data (e.g. T1). This is because imported data is expected to be test data so it is assumed to be the reference data.

8. Select the Simulation(s)

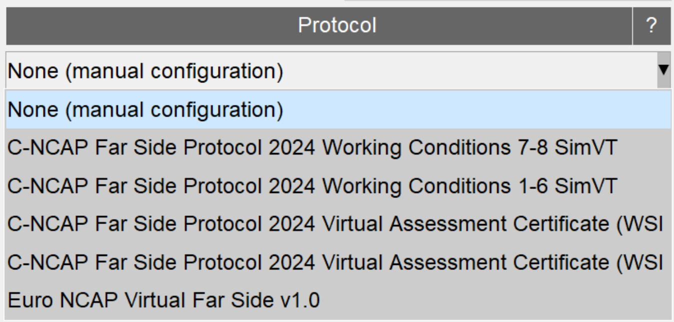
SimVT supports correlating multiple simulations against reference/test data. The simulations that are to be compared against the reference test data can be selected using the **Simulation(s)** drop-down (hold down Shift to select multiple). Note that the reference test data cannot be selected.



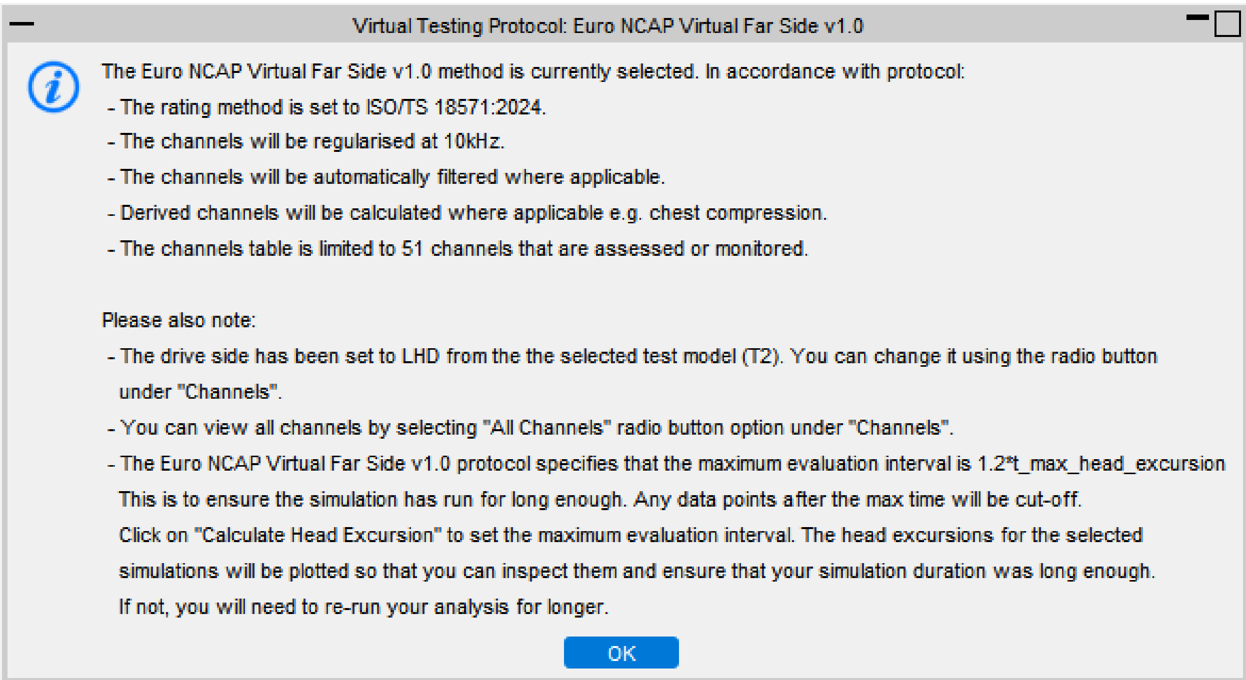
9. Select the Virtual Testing Protocol

The **Protocol** selector allows you to select a protocol option so that SimVT will be configured to meet the protocol requirements.

The protocol options are covered in the Using SimVT for Virtual Testing Protocols quick-start guide.

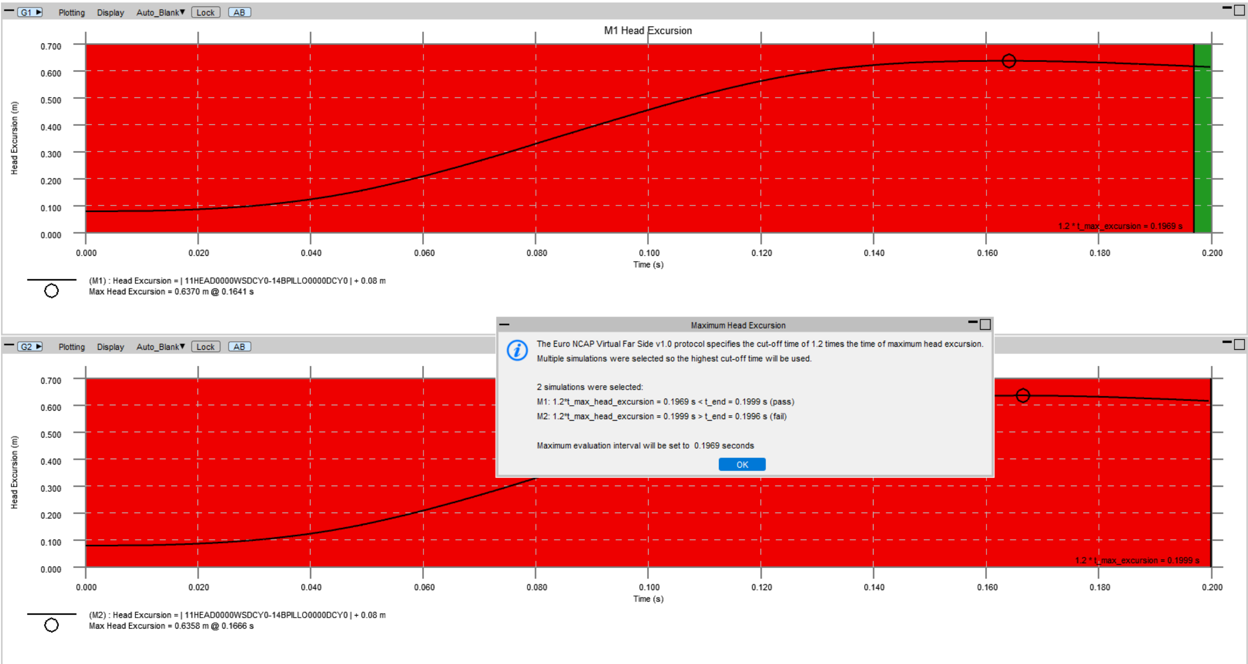


When a protocol is selected an information window will appear to explain the protocol specific configurations that have been applied. The information window for the Euro NCAP Virtual Far Side v1.0 protocol option is shown below.



Some protocol options require the head excursion to be calculated in order to determine the evaluation interval window. If applicable, the **Calculate Head Excursion** will become active. Clicking on it will cause SimVT to calculate* the head excursion (a.k.a. head offset) so that the maximum evaluation interval can be set according to the protocol. Additionally, the head excursions for the selected simulations will be plotted. For the Euro NCAP Virtual Far Side v1.0 protocol option, a message will also appear to communicate which simulations passed or failed (as shown below). Failed simulations should be re-run for longer so that the end time exceeds the cut-off time of 1.2 times the time of maximum head excursion.

*In order to compute the head excursion for a selected simulation, the simulation data source must have the head global Y displacement channel (1?HEAD0000WSDCY0) and the B-Pillar global Y displacement channel (1?BPILLO0000WSDCY0) defined. It is important that both channels should represent **global** Y displacement because using local Y will result in an incorrect head excursion.



10. Select the Correlation Method

SimVT supports the same correlation methods that CORA uses. The default correlation method is ISO/TS 18571:2024, which is consistent with the correlation method employed by the Euro NCAP and C-NCAP VTC protocols. Other correlation methods can be selected from the drop-down, or a CORA config file can be used for full control over the correlation options. This can be created in the T/HIS CORA tool.

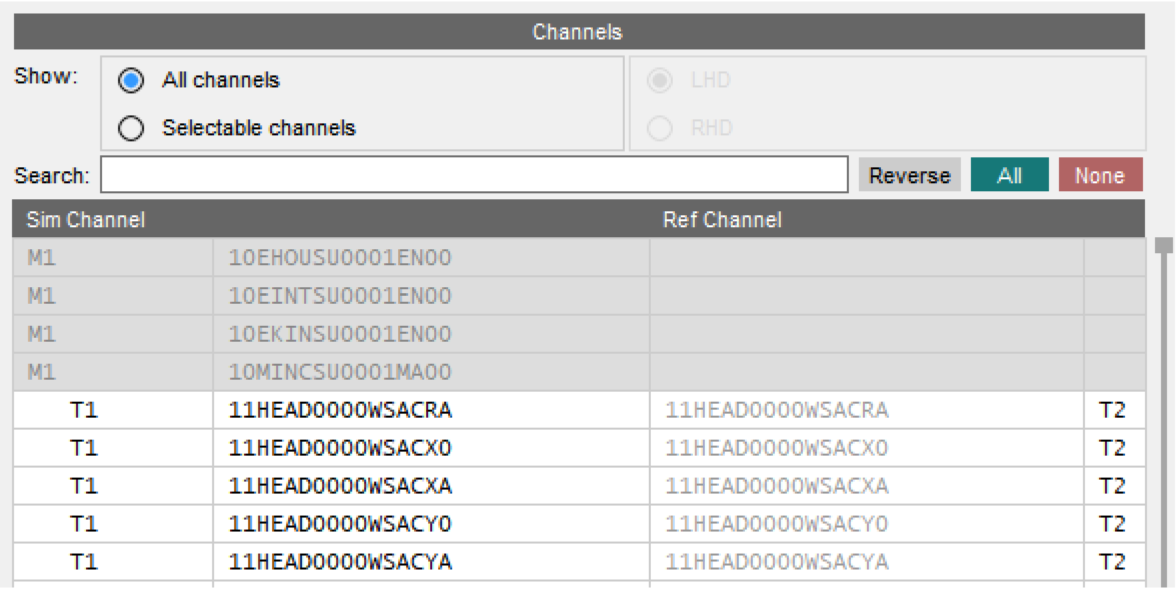
Evaluation intervals can also be set in this section by inputting into 'min' and 'max' to set the values globally or by clicking 'Configure intervals...' to open a window where values can be set individually for each sim vs test model pair.

11. Channel Matching Rules

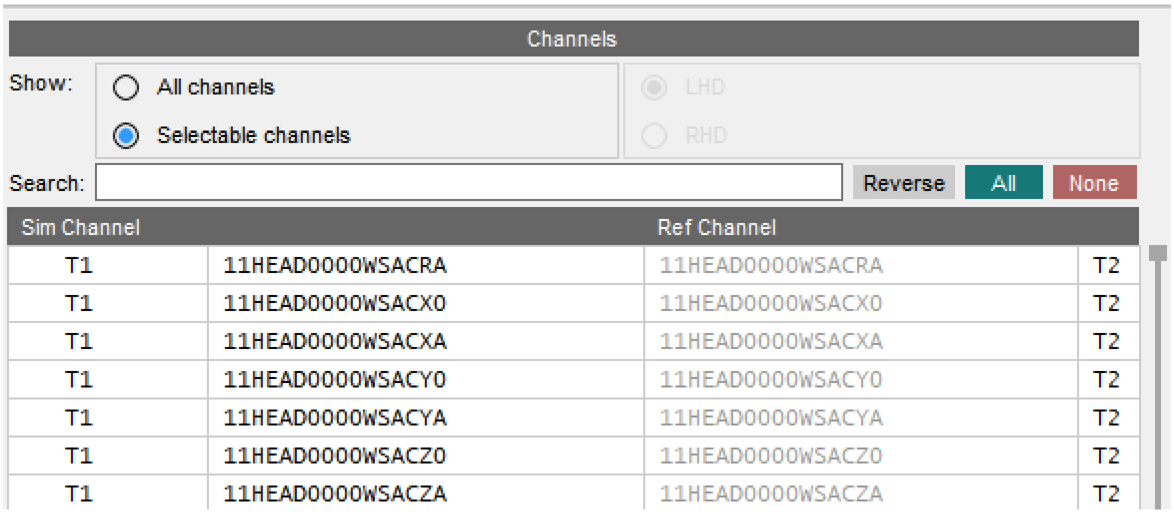
Channel matching rules can be used to help match channels from different data sources which may differ from the standard ISO-MME naming convention.

12. Inspect the available and selectable channels

The channel list shows the channels for the selected simulation(s) versus the reference test. The selected reference test model (T1) is shown in the first column of the associated model tags. Any selected simulations (M1, M2 and T2) are shown next to it separated by "|" provided that the channel is present in the simulation data (e.g."T2" is not shown for for any of the head acceleration channels shown below because it was not defined for the imported CSV data). Some channels may not be selectable because they are either not defined for (or only defined for) the reference model. They are excluded from the list when Selectable channels is selected, but shown as greyed out rows when All channels is selected to indicate that it is not possible to select them for correlating. For example, in the image below, the filtered head acceleration channels ("11HEAD0000WSACXA", "11HEAD0000WSACYA" and "11HEAD0000WSACZA") are shown as greyed out rows because the channels are not defined for the reference test (T1) so there would be nothing to compare the M1 and M2 simulation curves against.

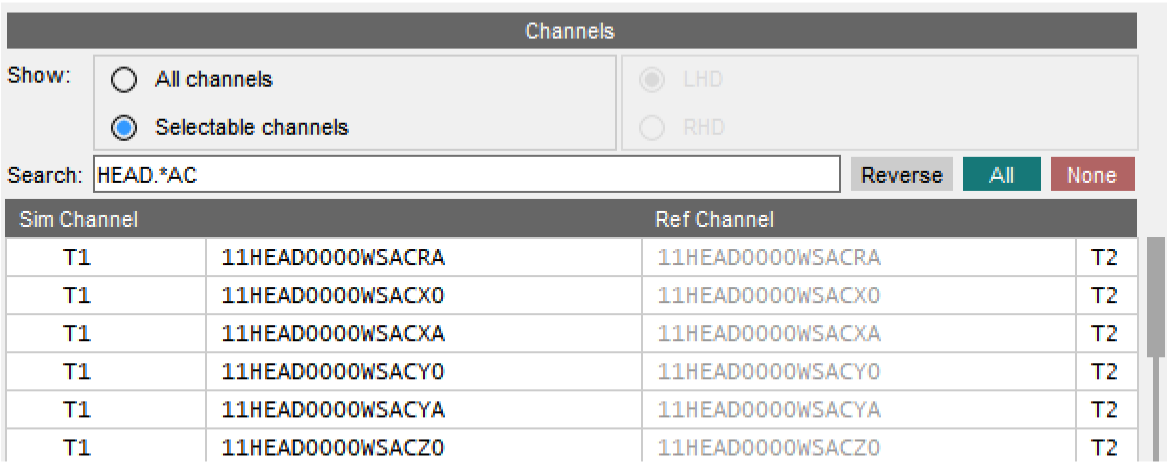


Selecting **Selectable channels** will update the list to only show channels which are selectable.

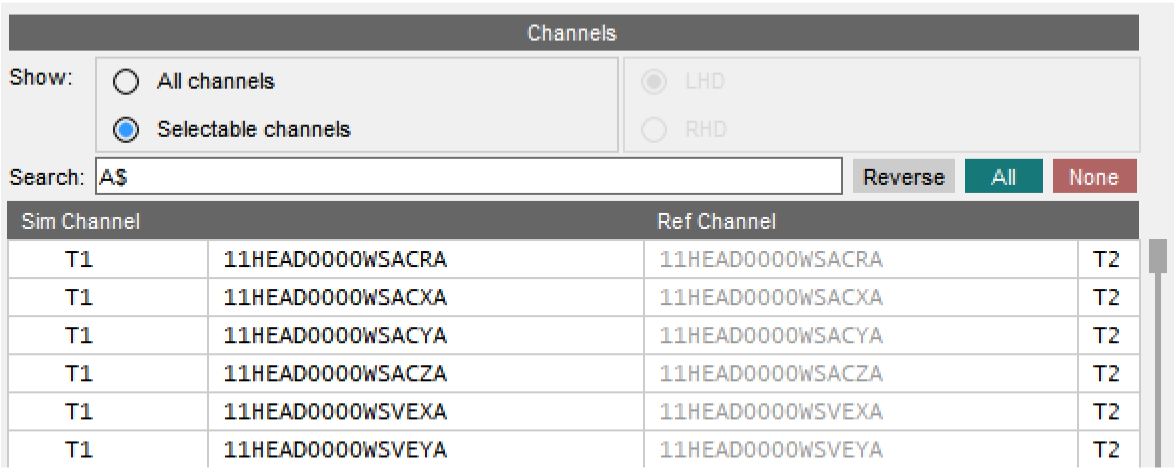


13. Search for channels using regular expressions

The channels shown in the the channel list can be filtered using the search box. The search box uses regular expression matching to determine which channels to show and it is case insensitive. For example searching for "HEAD.*AC" will filter the list to shown only the head acceleration curves.

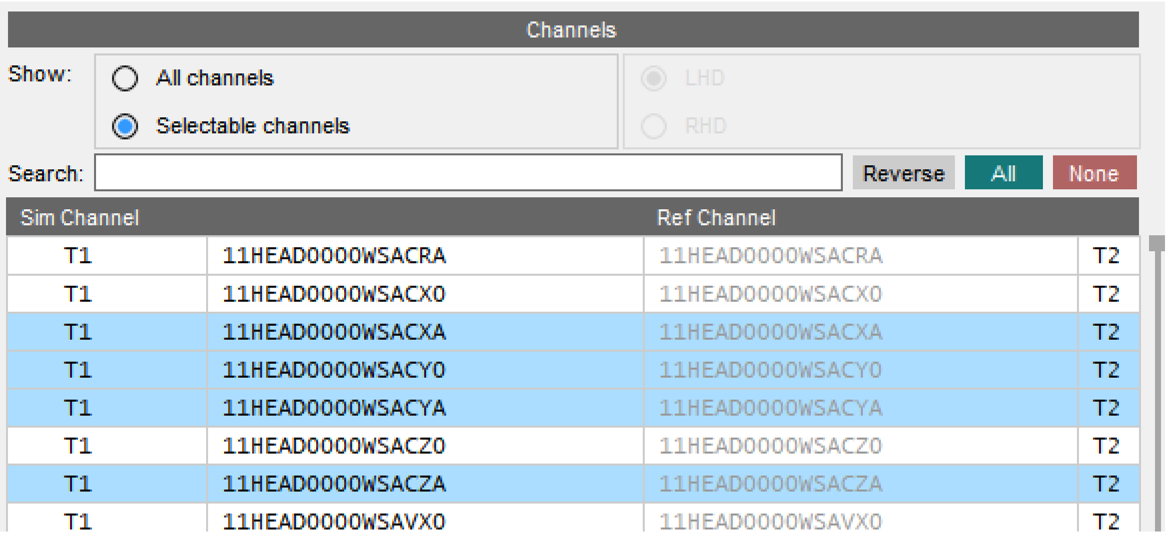


Or searching for "A$" will shown only the channels where the last character is "A" (i.e. ISO-MME channels that have been filtered with CFC1000).



14. Select the channels to be correlated

Channels to be correlated can be selected from the channel list using a combination of Shift+click and Ctrl+click. Clicking on "**All**" will select all of the channels shown in the list. Clicking on "None" will deselect all the channels. Selected channels will be highlighted in blue and the number of selected channels is indicated on the **Correlate** button.



15. Perform “Simulation(s)” versus “Reference test” correlations on the selected channels

The **Correlate** button will become active when 1 or more channels are selected from the channel list. Click **Correlate** to commence the correlation.

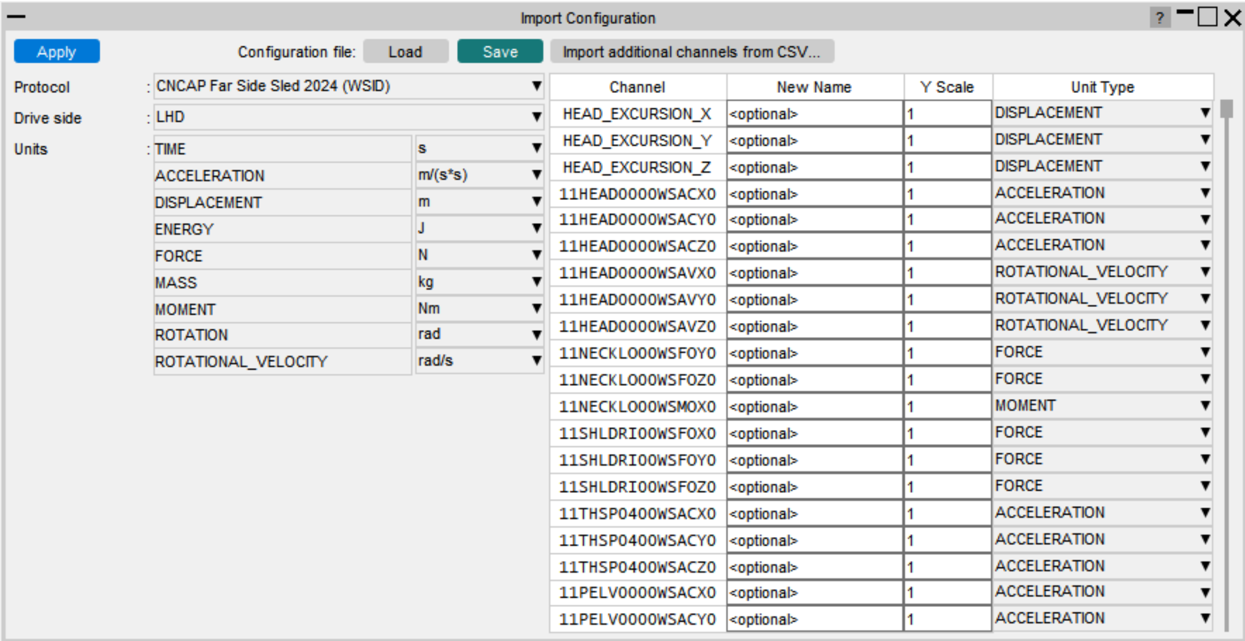
16. Saving SimVT settings files

A SimVT settings file (.simvt) can be saved from the correlation setup window by clicking **Save SimVT settings...**. The settings file saves all the information required to restore the session (e.g. data sources, correlation method, selected and plotted channels). Note that prior to saving a settings file, a channel selection must be made.

17. Loading SimVT settings files

A SimVT settings file (.simvt) can be loaded from the Correlation Setup window by clicking **Load SimVT settings...**. The model mapping window will appear which can be used to (re)assign models before loading the settings. When the settings are loaded the correlation will be automatically performed and the Correlation Table window will appear.

Import Configuration Window



When you click **Import ISO-MME or CSV...** on the Correlation Setup window in SimVT (or in the Automotive Assessments workflow in T/HIS) you will be prompted to select a file to import. If the selected file is a valid channel data source, the Import Configuration window will appear.

When importing channel data, T/HIS attempts to automatically infer meta data such as the units of each channel and the vehicle drive side. However, it is not always possible to correctly infer this information so the Import Configuration window enables you to configure how the data will be imported by giving you the option to:

- specify the associated crash test protocol
- correct the assumed drive side (if it was not possible to infer it)
- correct the units
- correct curve polarity and magnitude (invert and scale curves)
- rename curves (e.g. fix ISO-MME channel code inconsistencies)

If you prefer, you can press **Save** to write the Import Configuration inputs to a CSV file. You can then make all the required edits in a spreadsheet editor before loading the CSV file back into the Import Configuration window using the **Load** button. Doing so has a number of benefits. Firstly, you can simply load the CSV file again when you next want to import the data. The CSV will also serves as a record of the corrections you have made to the imported data.

Once you have configured all the options which need to be changed (either manually or via loading an Import Configuration CSV file), you can click **Apply** to apply the configuration to the data being imported.

Direct Import via Import Configuration File

The path to the channel data source is stored in the Import Configuration File (CSV) so if you select an Import Configuration File when you click on **Import ISO-MME or CSV...** the Import Configuration window will not appear, but instead the channels from the corresponding data source will automatically be loaded with the import configuration settings applied. This route is provided to speed up the process of importing data, but you may wish to select the data source first and then **Load** the Import Configuration File to check the configuration before it is applied.

Import additional Channels from CSV

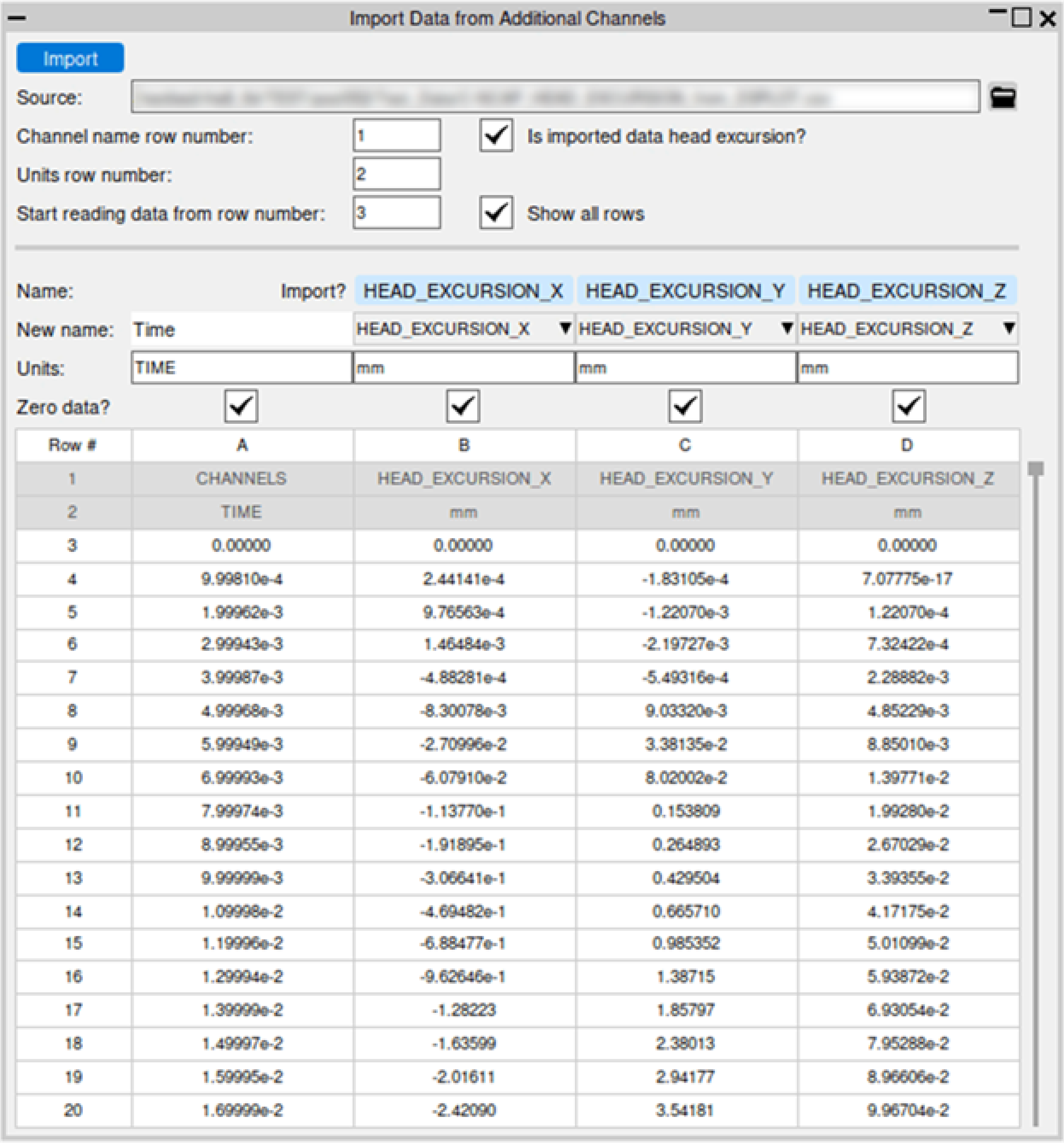
The **Import additional Channels from CSV...** button can be used to import additional channels from a CSV file. The most common use case for this is to import head excursion (a.k.a. head offset) channel data that has been extracted from the physical test video footage using tracking software (e.g. as part of the CNCAP Far Side 2024 protocols).

When you click **Import additional Channels from CSV...** a new window will appear enabling you to select the source CSV and specify the rows to use header, unit and start of data rows. The first row will be taken as the header row by default, and the first row containing all numeric data will be assumed to be the start of the data. You can optionally change these defaults, as well as specify a row to extract the units. The time unit (s or ms) and the individual channel units can also be manually entered in the corresponding textboxes. Ticking **Show all rows** reveals the rows above the "Start reading data from row number". This is useful if you need change the row numbers to extract header/unit/data from without having to open up the CSV separately.

You can also optionally choose to rename the channels that you are importing using new name textboxes. If you have the "Is imported data head excursion?" option ticked then the new names will default to HEAD_EXCURSION_X, HEAD_EXCURSION_Y and HEAD_EXCURSION_Z. You select a different order for the columns using the new name drop-downs if they do not match the default X, Y Z order.

If you do not want to import all the channels (e.g. you only have Y and Z head excursion data) then you can click on the name of that channel to disable importing.

The Zero data checkboxes provide a convenient way to ensure that time and channel data starts at 0 by subtracting the the first numeric data value from all other rows in that column. A common use case for this is to convert head excursion data from local coordinates to relative displacements.



The **Import** button will turn blue when the inputs are valid. Clicking it will add the imported channels to the channel table in the Import Configuration Window. You can apply any additional Y scaling or correct the unit type as with any other channel. Note you should avoid having multiple channels with the same name as they will clash.

When saving an Import Configuration File or SimVT settings file, any additional channel data will also be saved so that it can be reloaded in the future without having to re-import the additional channel.

CSV Configuration Window

When “[Assign config](#)” is clicked on the [Correlation Setup window](#), the CSV Configuration window will appear. The window enables you to load a CSV configuration file and preview any warnings or errors with your CSV file data before you actually assign it to an Ansys LS-DYNA model.

Steps to assign a config file:

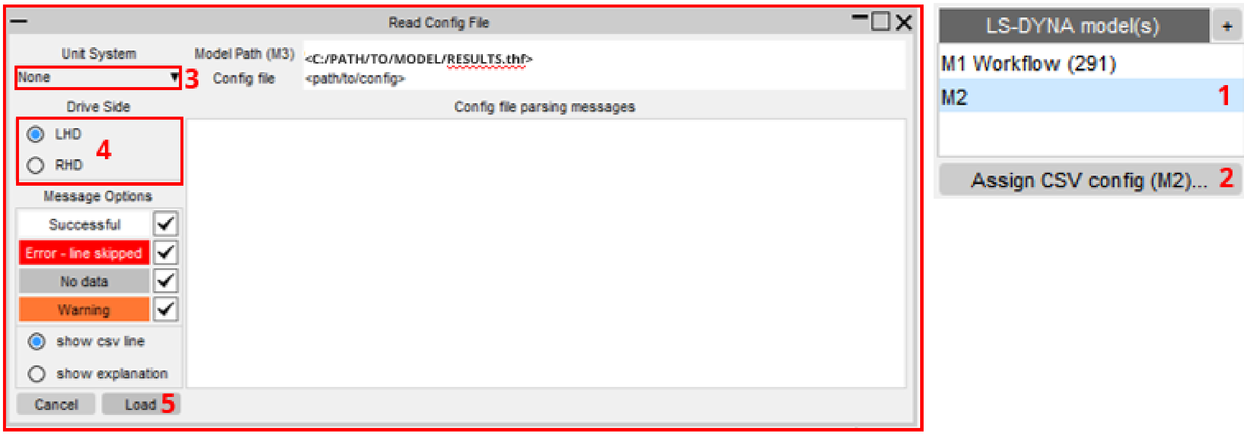
1. Select an Ansys LS-DYNA model from the [model list](#) that has no Automotive Assessment Workflow Data (AAWD) or CSV config data assigned (i.e. only the model tag will be listed (e.g. "M2"))

2. Click on “[Assign config](#)”, CSV Configuration Window will open.

3. Select the unit system from the drop-down

4. Select the vehicle drive side (LHD is default)

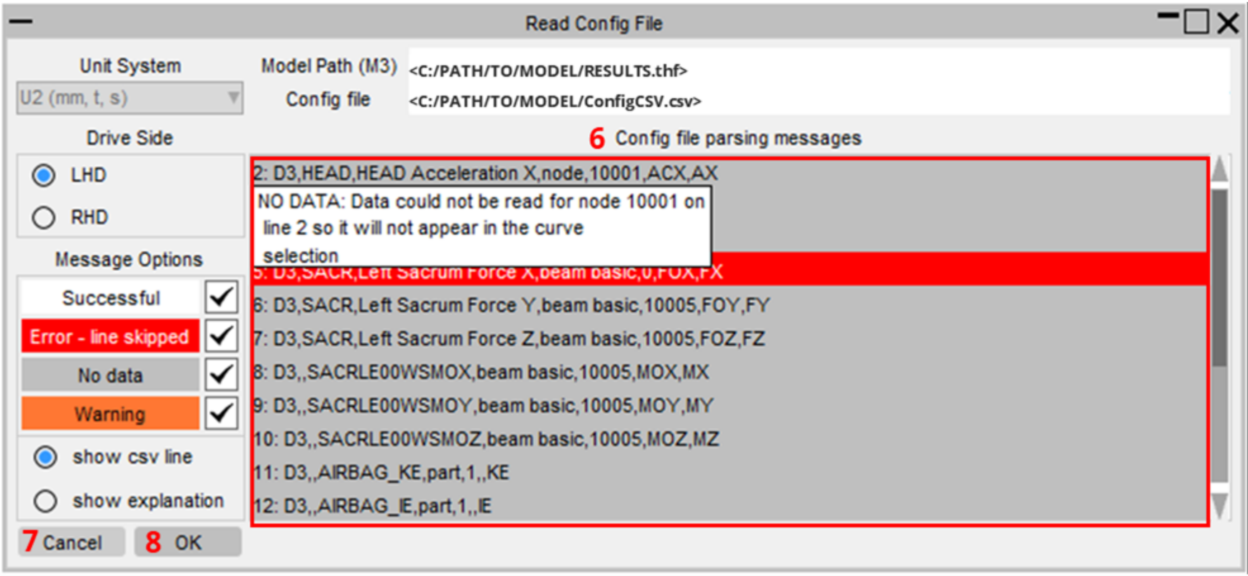
5. Click “Load” and open a CSV file with the correct [configuration file format](#). The **Load** button will change to say **OK** when a config CSV file has been loaded.



6. Check the messages that appear in the window to ensure that the loaded config CSV has no errors and that it has successfully mapped channel data.

7. If some of the parsing messages require attention click **Cancel** and update the CSV before repeating the steps. Note, you can cancel the CSV assignment by clicking **Cancel** at any stage.

8. If you happy to proceed with assigning the CSV config, click **OK**.



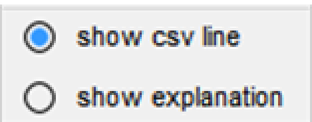
Checking Parsing Messages

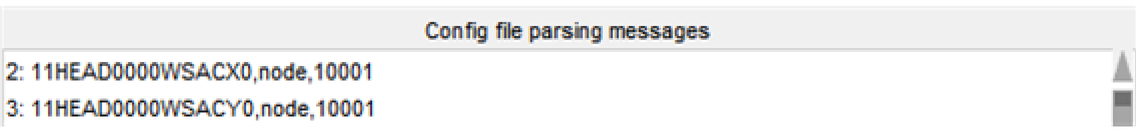
When the configuration file is loaded, messages will appear in the window. Each row is coloured according to the parsing status:

- White means that all the inputs were valid and that the model contains the entity and ID specified
- Red means there was an error with one or more inputs on the line
- Grey means that the model did not contain data for the entity type and ID (e.g., node 1001 below).
- Orange means that there was something wrong with the line, but it may still be possible to parse the line.

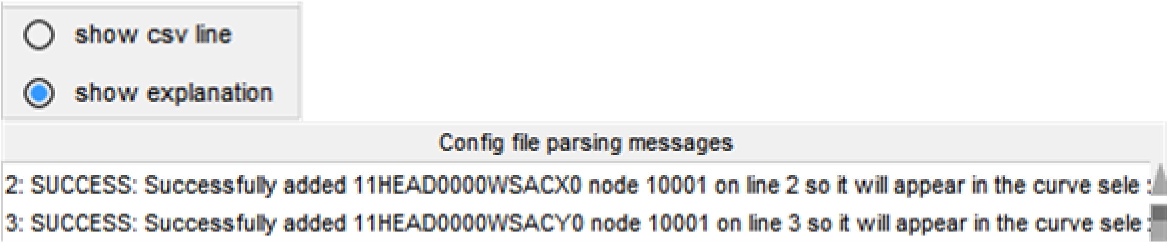
Messages can be hidden by unchecking the corresponding status in **Message Options** to make it easier to find problematic rows.

If **show CSV line** is selected then the messages will show each row of the CSV file.

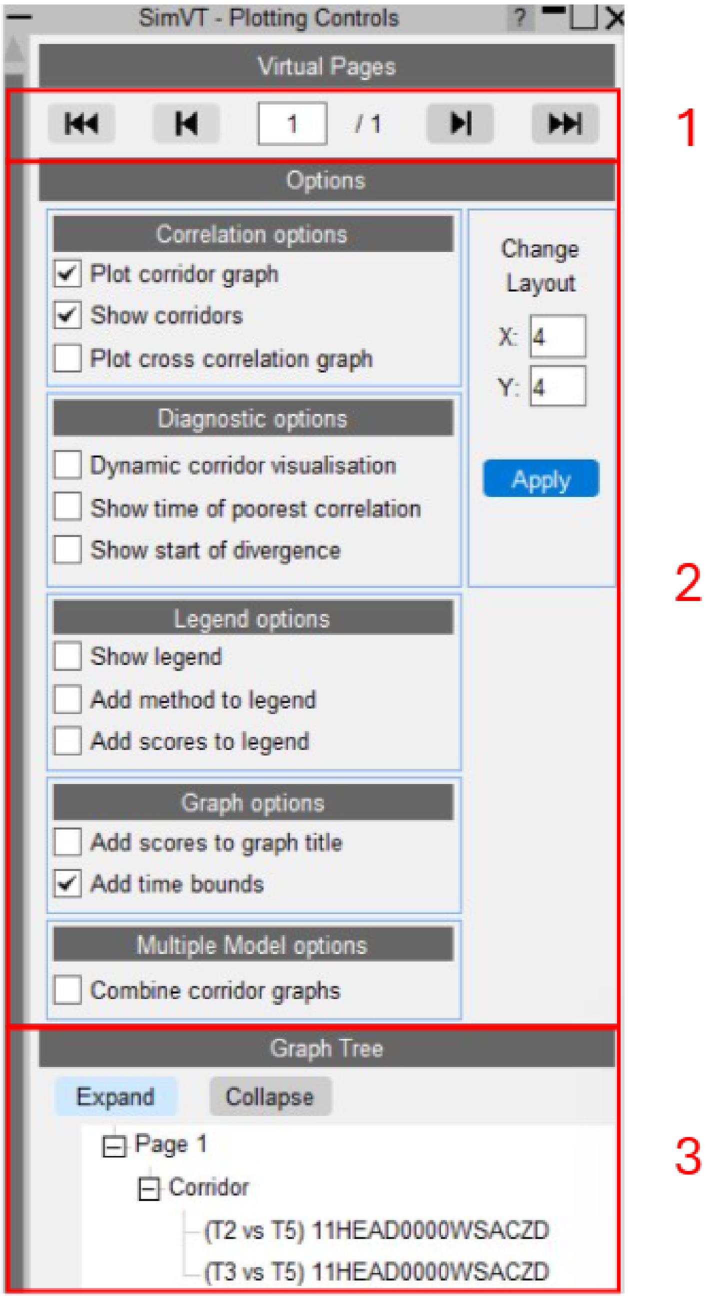




If **show explanation** is selected then the messages will explain the reason for the status. This is especially useful if there is an error with the CSV data which causes the line to be skipped. It can also help in identifying where an incorrect entity type or id has been provided in the config CSV so that it can be corrected before loading in the CSV again.



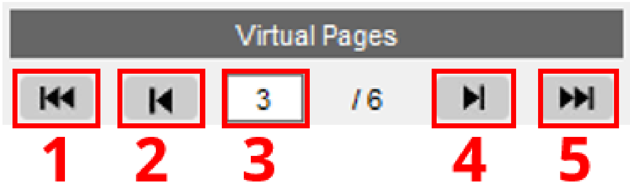
Plotting Controls Window



The Plotting Controls Window in SimVT is used to control which graphs appear for the selected correlation analyses, as well as how those graphs are presented and navigated. The window is divided into three main sections:

- Virtual Pages **[1]**
- Graph Options **[2]**
- Graph Tree **[3]**

Virtual Pages



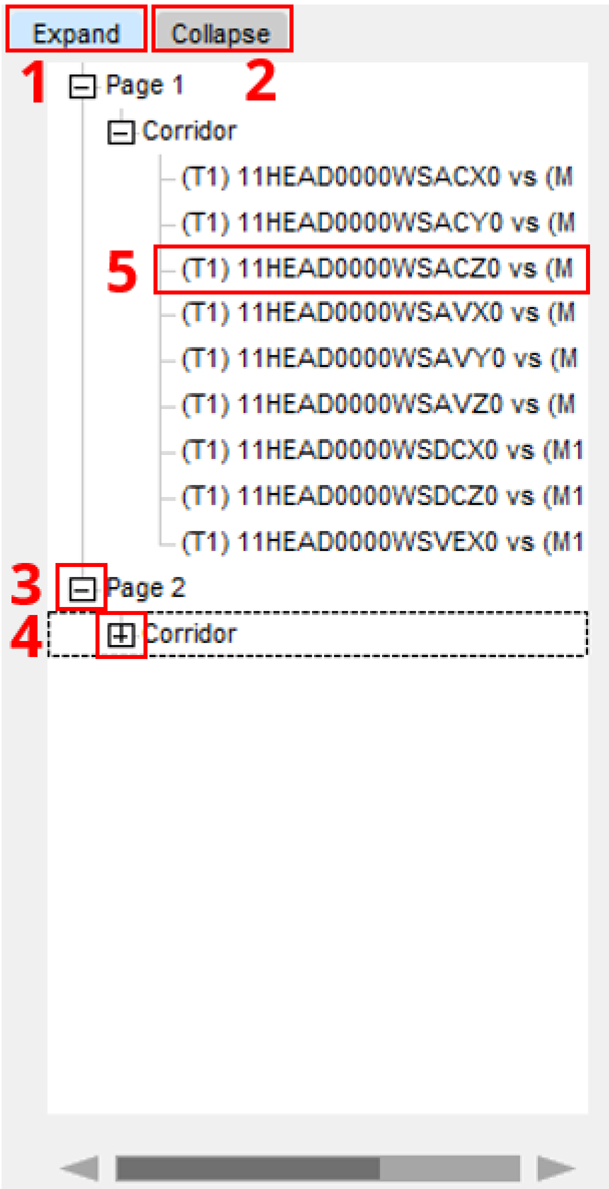
T/HIS currently has a limit of 32 graphs per session. Virtual pages are employed to work around this limitation, allowing SimVT to plot as many graphs as desired. When there is insufficient space to show the graphs for all the selected channels on the current page, additional graphs are added to Virtual Pages. The 'Virtual Pages' section in the Plotting Controls Window allows to navigate through the available virtual pages. The navigation options are as follows:

- Navigate to first virtual page **[1]**
- Navigate to previous virtual page **[2]**
- Navigate to a specific virtual page - requires numerical input **[3]**
- Navigate to next virtual page **[4]**
- Navigate to last virtual page **[5]**

Graph Options

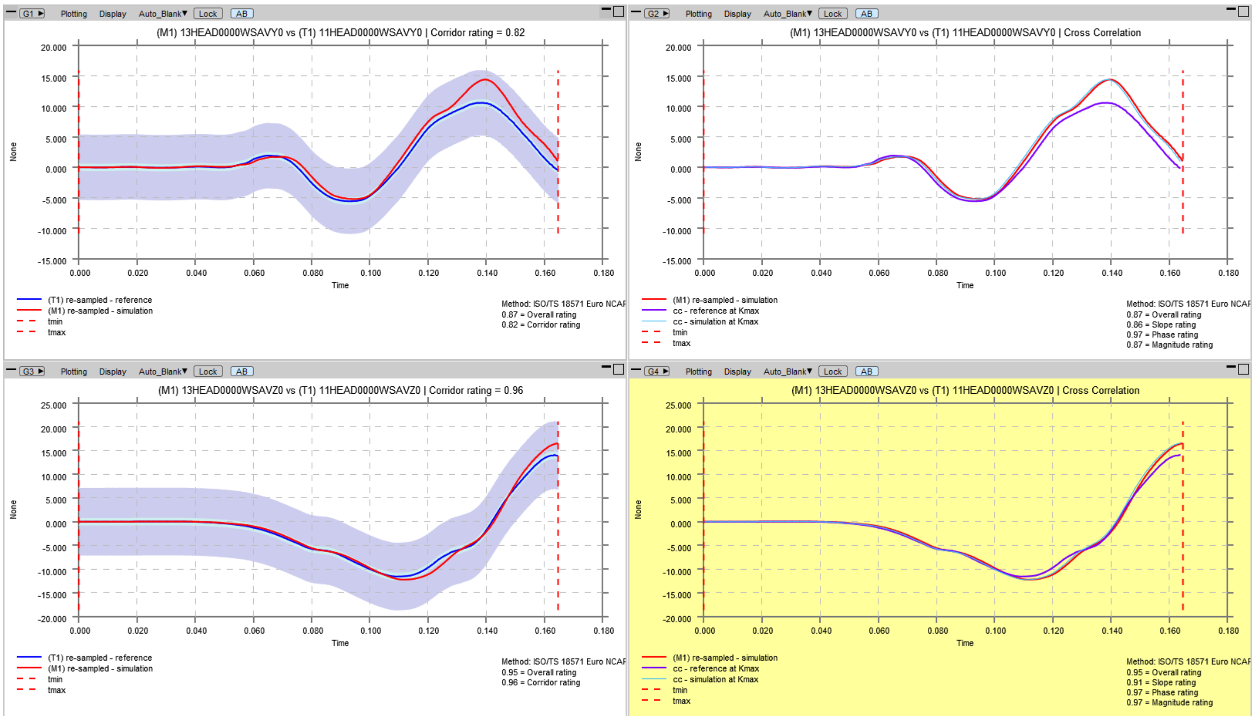
Under the Graph Options section of the Plotting Controls Window the main graph plotting options are located. These options are described in detail in Graph Options.

Graph Tree



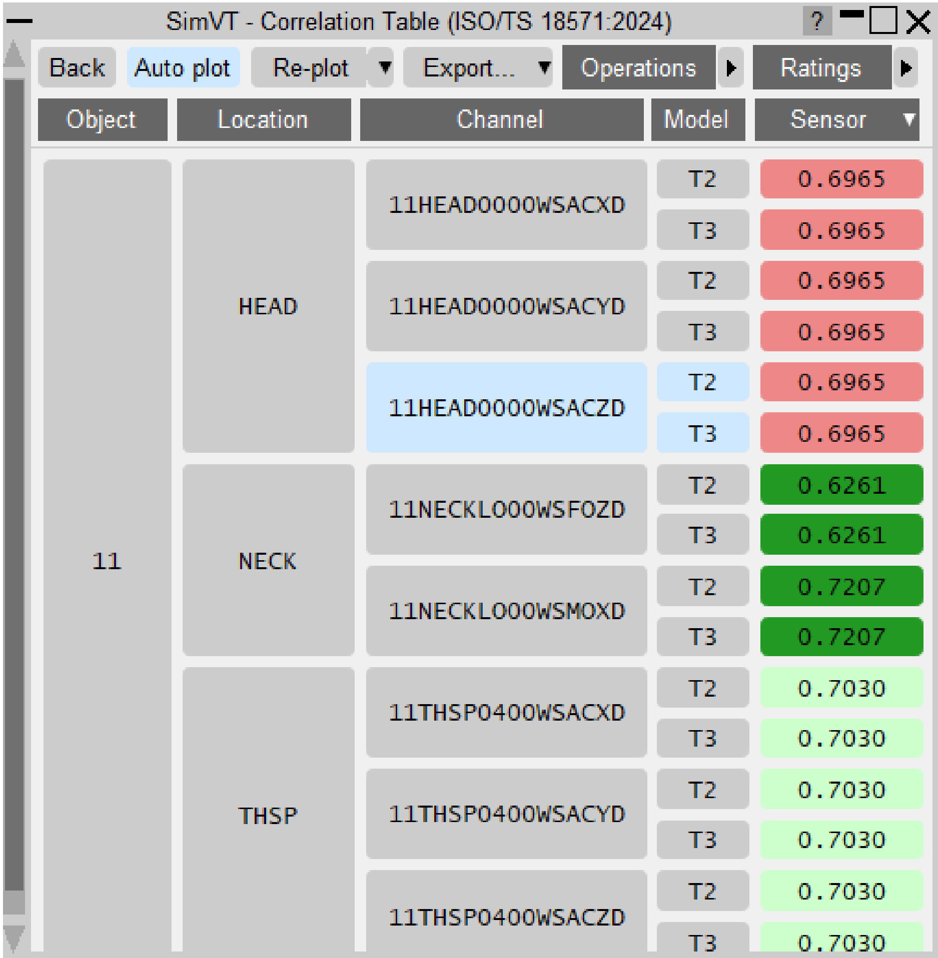
Under Graph Tree section a list of graph titles grouped by Corridor and Cross Correlation is presented. The functionality in this section includes:

- Expanding the whole graph tree view **[1]**
- Collapsing the whole graph tree view **[2]**
- Expanding an individual section of the graph tree **[3]**
- Collapsing an individual section of the graph tree **[4]**
- Highlighting individual graphs as shown below by clicking graph title in the graph tree view **[5]**


(M1) 13HEAD0000WSAVY0 vs (T1) 11HEAD0000WSAVY0 | Corridor rating = 0.82
(T1) re-sampled - reference
(M1) re-sampled - simulation
tmin
tmax
Method: ISO/TS 18571 Euro NCAP
0.87 = Overall rating
0.82 = Corridor rating
(M1) 13HEAD0000WSAVY0 vs (T1) 11HEAD0000WSAVY0 | Cross Correlation
(M1) re-sampled - simulation
cc - reference at Kmax
cc - simulation at Kmax
tmin
tmax
Method: ISO/TS 18571 Euro NCAP
0.87 = Overall rating
0.86 = Slope rating
0.97 = Phase rating
0.87 = Magnitude rating
(M1) 13HEAD0000WSAVZ0 vs (T1) 11HEAD0000WSAVZ0 | Corridor rating = 0.96
(T1) re-sampled - reference
(M1) re-sampled - simulation
tmin
tmax
Method: ISO/TS 18571 Euro NCAP
0.95 = Overall rating
0.96 = Corridor rating
(M1) 13HEAD0000WSAVZ0 vs (T1) 11HEAD0000WSAVZ0 | Cross Correlation
(M1) re-sampled - simulation
cc - reference at Kmax
cc - simulation at Kmax
tmin
tmax
Method: ISO/TS 18571 Euro NCAP
0.95 = Overall rating
0.91 = Slope rating
0.97 = Phase rating
0.97 = Magnitude rating

Correlation Table Window

The Correlation Table is used to toggle plotting of the correlations that have been performed. It also shows the results of all the correlations or “ERROR” if there was an error when performing the correlation and “NONE” is some of the input data is missing. The Correlation Table and Plotting Controls are the main way of interacting with the graphs and results.



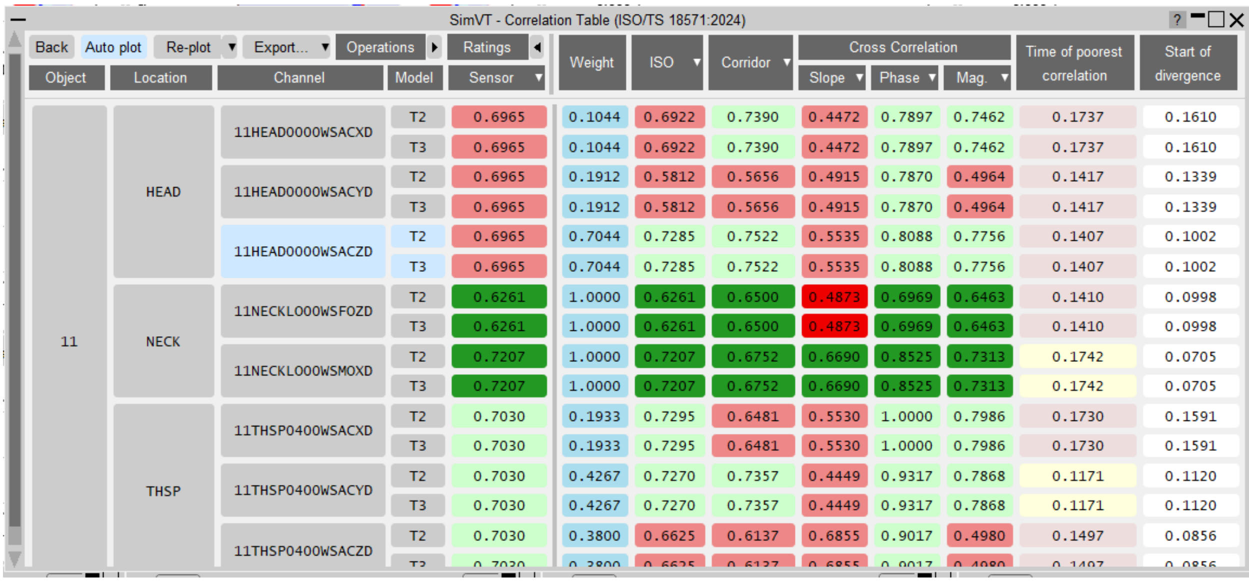
- **Back** - clicking this button goes back to showing the Correlation Setup Window
- **Auto plot** - When auto plot is selected any selections made in the table are automatically (and immediately) plotted. Pending operations are carried out when a selected channel is plotted too.
- **Re-plot** - clicking this button to refreshes the plotting. It switches to saying **Plot** when **Auto-plot** is off and is used to update the plotting to match the new selection.
    - the pop-up arrow next to **Re-plot** opens the graph options pop-up. Note, changing graph options also triggers a re-plot.

- **Export** - Clicking this button will open the file explorer so that a CSV file containing the results for all the channels shown in the table can be exported to the desired location.
    - The pop-up arrow next to Export reveals the option to export the results to CSV (this is the same as clicking Export directly) and also the option to save a SimVT settings file.
- **Operations** - clicking this button (or the expander arrow to the right of it) expands the operations that can be applied to correct curves if they need to be scaled, offset, inverted or filtered.
- **Ratings** - clicking this button (or the expander arrow to the right of it) expands the ratings section to give detailed view of the individual correlation ratings for each channel.

Toggling (selecting) plots

Each row of the Correlation table represents one (simulation versus test) correlation. The rows of the table are determined by the channels that were selected in the Correlation Setup window.

Selected channels appear as buttons in the **Channel** column of the Correlation Table. The **Model** column lists the simulation model tag(s) which are associated with the corresponding channel in the **Channel** column. Note that it is possible to have multiple simulations associated with the same channel. If this is the case, the channel button will occupy multiple rows. For example, in the image below the channel buttons each span 2 rows in the table below because 2 simulation models (T2 and T3) were selected for correlating versus the same test data.


SimVT - Correlation Table (ISO/TS 18571:2024)

Back | Auto plot | Re-plot | Export... | Operations | Ratings

Object	Location	Channel	Model	Sensor	Weight	ISO	Corridor	Cross Correlation Slope	Cross Correlation Phase	Cross Correlation Mag.	Time of poorest correlation	Start of divergence
11	HEAD	11HEAD0000WSACXD	T2	0.6965	0.1044	0.6922	0.7390	0.4472	0.7897	0.7462	0.1737	0.1610
			T3	0.6965	0.1044	0.6922	0.7390	0.4472	0.7897	0.7462	0.1737	0.1610
		11HEAD0000WSACYD	T2	0.6965	0.1912	0.5812	0.5656	0.4915	0.7870	0.4964	0.1417	0.1339
			T3	0.6965	0.1912	0.5812	0.5656	0.4915	0.7870	0.4964	0.1417	0.1339
		11HEAD0000WSACZD	T2	0.6965	0.7044	0.7285	0.7522	0.5535	0.8088	0.7756	0.1407	0.1002
			T3	0.6965	0.7044	0.7285	0.7522	0.5535	0.8088	0.7756	0.1407	0.1002
	NECK	11NECKLO00WSFOZD	T2	0.6261	1.0000	0.6261	0.6500	0.4873	0.6969	0.6463	0.1410	0.0998
			T3	0.6261	1.0000	0.6261	0.6500	0.4873	0.6969	0.6463	0.1410	0.0998
		11NECKLO00WSMOXD	T2	0.7207	1.0000	0.7207	0.6752	0.6690	0.8525	0.7313	0.1742	0.0705
			T3	0.7207	1.0000	0.7207	0.6752	0.6690	0.8525	0.7313	0.1742	0.0705
	THSP	11THSP0400WSACXD	T2	0.7030	0.1933	0.7295	0.6481	0.5530	1.0000	0.7986	0.1730	0.1591
			T3	0.7030	0.1933	0.7295	0.6481	0.5530	1.0000	0.7986	0.1730	0.1591
		11THSP0400WSACYD	T2	0.7030	0.4267	0.7270	0.7357	0.4449	0.9317	0.7868	0.1171	0.1120
			T3	0.7030	0.4267	0.7270	0.7357	0.4449	0.9317	0.7868	0.1171	0.1120
		11THSP0400WSACZD	T2	0.7030	0.3800	0.6625	0.6137	0.6855	0.9017	0.4980	0.1497	0.0856
			T3	0.7030	0.3800	0.6625	0.6137	0.6855	0.9017	0.4980	0.1497	0.0856

Channels with the same object and location strings are grouped together so that all the channels with the same location and object can be plotted by toggling on the corresponding button (which may span many rows) in the **Location** or **Object** columns (e.g. object "11" which represents the front left occupant in the vehicle.

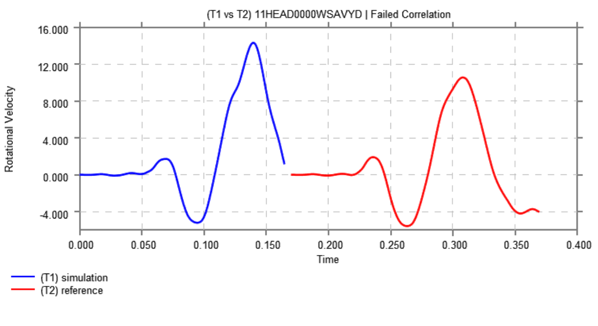
Any of the buttons in the **Object**, **Location**, **Channel** and **Model** columns of the Correlation Table can be clicked to toggle plots on and off. Clicking an un-toggled (grey) button in one these columns will automatically toggle all the buttons to the right of the button that was clicked. If the button in the **Model** column is toggled then the correlation plot(s) for that simulation model versus the selected test will be plotted for the channel defined for the row. Conversely, clicking a button that is already toggled (blue) in any of these columns automatically untoggles all the buttons to the right of the button that was clicked which will cause the corresponding plots to be 'unplotted'. Note that by default, only the corridor graph is plotted for each correlation, but the graph options can be used to show the cross-correlation plots instead or as well.

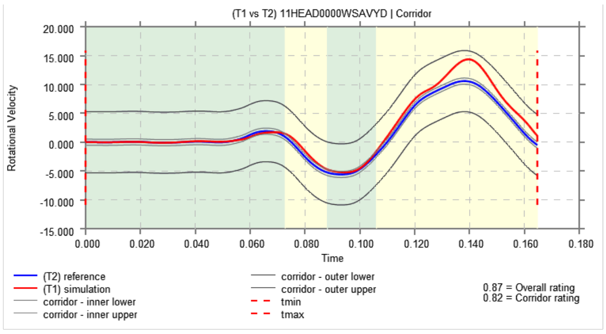
Clicking a button in a column and then holding down shift and clicking another button in the same column will change the selection of all the in-between buttons to match the first one clicked.

Clicking one of the ratings under Weighted, Total, Corridor and Cross Correlation columns highlights the plot if it is already plotted.

Error Graphs

If a correlation fails, error graphs will be shown. A common example of when a correlation might fail is when the simulation and reference curves are not aligned in time. This helps you identify any issues with the input data, and with this insight, you can correct any issues. An example is shown below with simulation and reference curves before correction (left), and after correction with correlation applied (right).



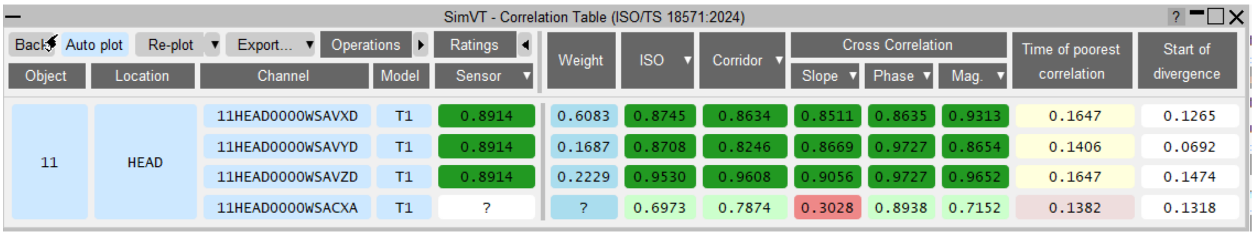


The curves can be made to overlap using the operations panel available in the Correlation Table (e.g. by using ADDX, etc to meaningfully shift the simulation curve in time to overlap).

4.9.7.3. SimVT Features

Individual Ratings

Ratings and Weightings



Object	Location	Channel	Model	Sensor	Weight	ISO	Corridor	Cross Correlation Slope	Cross Correlation Phase	Cross Correlation Mag.	Time of poorest correlation	Start of divergence
11	HEAD	11HEAD0000WSAVXD	T1	0.8914	0.6083	0.8745	0.8634	0.8511	0.8635	0.9313	0.1647	0.1265
		11HEAD0000WSAVYD	T1	0.8914	0.1687	0.8708	0.8246	0.8669	0.9727	0.8654	0.1406	0.0692
		11HEAD0000WSAVZD	T1	0.8914	0.2229	0.9530	0.9608	0.9056	0.9727	0.9652	0.1647	0.1474
		11HEAD0000WSACXA	T1	?	?	0.6973	0.7874	0.3028	0.8938	0.7152	0.1382	0.1318

SimVT provides the flexibility to calculate ratings using different methods available in the rating method dropdown in the [Correlation Setup Window](). The resulting rating scores are color-coded differently depending on the protocol that is selected in the [protocol]()dropdown in the [Correlation Setup Window](). It's important to note that when you select a protocol, SimVT automatically applies the corresponding rating method associated with that protocol. However, this default selection can be overridden if you wish to use a different rating method. This ensures that while protocols streamline the rating process, you still have the control to adjust the methodology as needed.

Sensor Scores

The virtual testing protocols specify validation criteria which must be met in order to validate a simulation model. The criteria is generally a threshold score which must be met or exceeded for each assessed sensor. Sensor scores are derived from one or more component channels. For most sensors where X, Y and Z components are combined, Euro NCAP and C-NCAP adopt a consistent method or computing the sensor scores. First, weight factors, , are calculated for each axis based on the maximum amplitude of the axis:

$w_i = \frac{max(|Channel_{test_i}|)}{max(|Channel_{test_x}|) + max(|Channel_{test_y}|) + max(|Channel_{test_z}|)}$ with $i = X, Y, Z$

The overall sensor score is then computed with the equation:

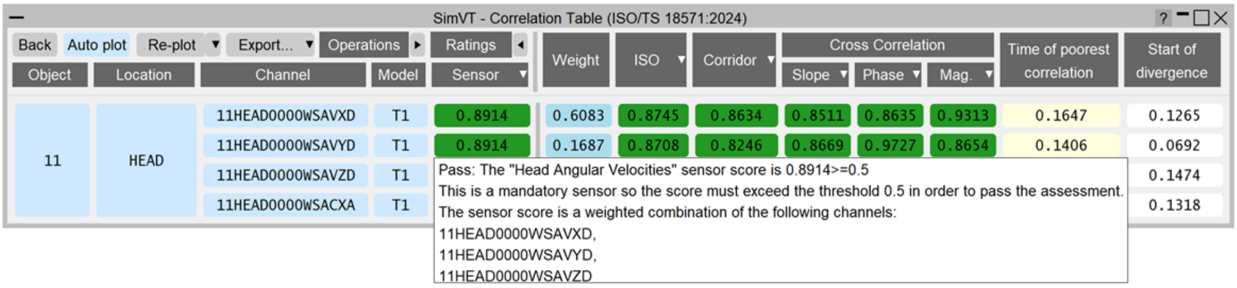
$S_{Sensor} = \displaystyle\sum_{i} w_i * S_i$ with $i = X, Y, Z$

The sensor scores are displayed in the "Sensor" column and the weight factors are presented in the "Weight" column so that the relative contribution of the individual axis ISO scores, , to the overall sensor score, sensor , is clearly visible

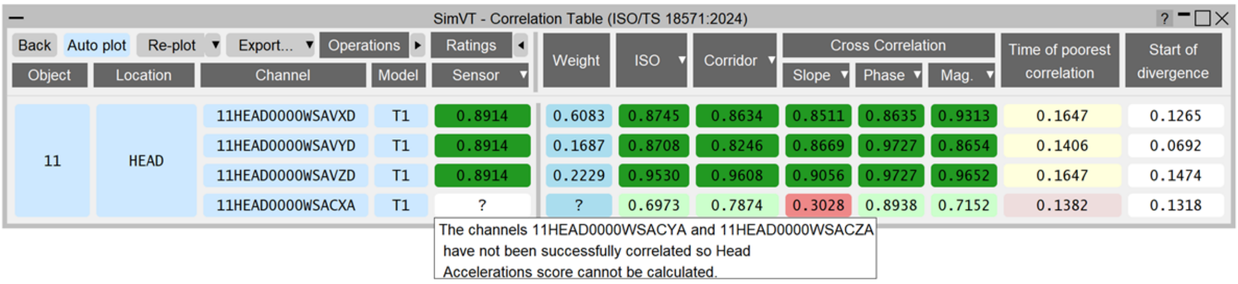
Some sensor scores are derived in a different way. For example, in the C-NCAP Far Side protocol the Head Offset sensor score is simply the average of the Y and Z offset component ISO Scores.

The thresholds for each sensor score also differ between the Euro NCAP and C-NCAP protocols. SimVT automatically configures the thresholds which are used for each sensor based on the selected protocol option and the sensor scores in the table are coloured coloured green and red to indicate if the sensor score exceeds the threshold (pass) or is less than the threshold (fail) respectively. Some channels are only monitored (i.e. they do not need to pass for the model to be validated) and they are coloured with pale green and pale red to indicate this.

The hover text on each sensor score entry reveals more information of how a sensor score was calculated.



Or, if the sensor score could not be calculated it will be displayed with a "?" and the hover text will provide details of any channel data which was expected but found to be missing.



For any channels which are not applicable to the selected protocol (or if no protocol is selected), the sensor score is un-weighted (i.e. it is the ISO score) so the weighting column entry will show "N/A". The colour bands used for the sensor score are consistent with those used for the individual ratings for non-protocol channels.

Individual Ratings

By default, the individual Corridor and Cross Correlation ratings are minimised to reduce the amount of space the Correlation Table occupies, but they can be shown by clicking the **Ratings** expander.The total rating is the weighted sum of the Corridor and all Cross Correlation ratings, with the weights depending on your selected correlation method.

For protocol channels (i.e. channels which mentioned as mandatory or monitored in the protocol), the ratings are coloured green and red to indicate if the rating exceeds the threshold (pass) or is less than the threshold (fail) respectively.

The ratings scores are coloured differently depending is they contribute to a mandatory or monitored protocol sensor or if the sensor is not specified by the selected protocol.

Mandatory protocol channels:

- rating >= threshold: green
- rating < threshold: red

Monitored protocol channels:

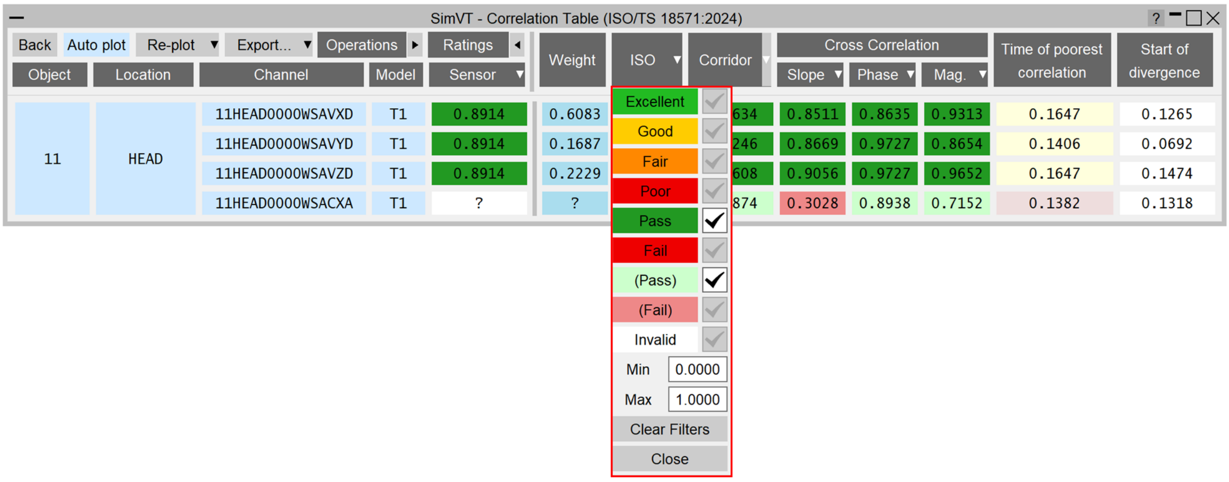
- rating >= threshold: pale green
- rating < threshold: pale red

For non-protocol channels:

- rating >= 0.94: green
- rating >= 0.80: yellow
- rating >= 0.58: orange
- rating < 0.58: red

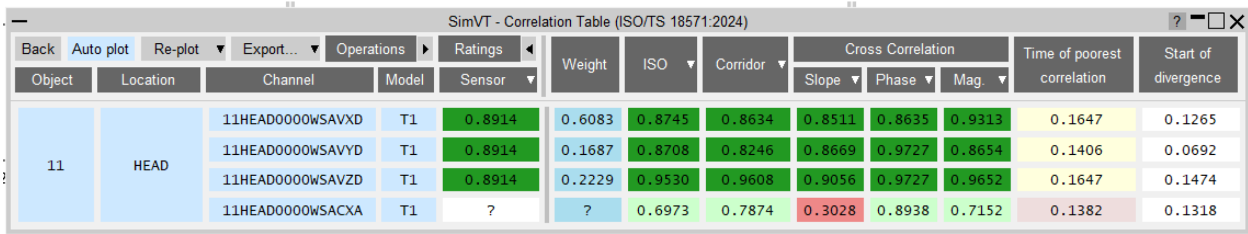
Filtering Ratings

To help you navigate and analyse results more efficiently, SimVT includes dropdown boxes similar to those in Excel for filtering ratings. When filters are applied, rows that do not meet the selected criteria are hidden from view. These dropdowns allow you to filter by various rating thresholds (e.g., pass/fail, with min/max values, etc). This feature improves usability, especially when working with large datasets, and ensures that you can quickly identify areas of interest or concern. To access them, right click on the header above a rating column (e.g. ISO). Below is an image with the popup visible for the ISO column:

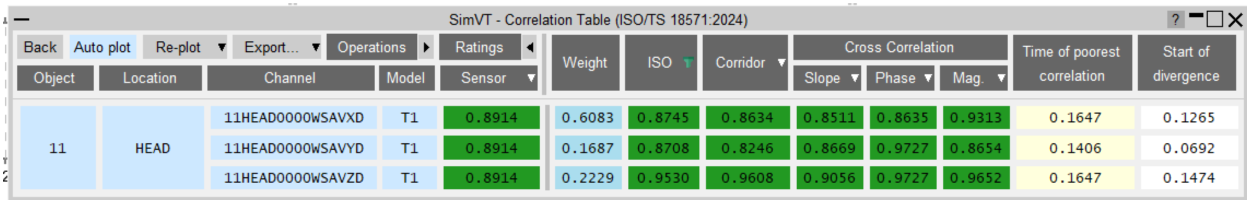


The rating categories available include **Excellent, Good, Fair, and Poor,** and **Pass** and **Fail** (available when the protocol is set). The **optional Pass** and **optional Fail** filter checkboxes are displayed with brackets around them. There is also an **Invalid** checkbox which can be used to filter out any rows with any scores that had issues in obtaining the result. For ease of use, only the relevant checkboxes are active (ungreyed) when the popup appears. Additionally, you can set the Min and Max values to limit values between a certain threshold. You can use the **Clear Filters** button to remove all applied filters and restore the full dataset. Directly beneath this, a **Close** button allows users to exit the filter popup.

Below is an example of the Correlation Table without any filters applied on it:

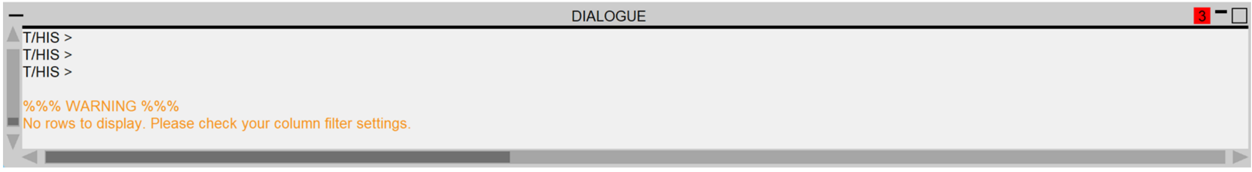


And here is an example when a filter is applied on the ISO rating column:



The row with the optional "Pass" result no longer appears in the ISO column because it was filtered out by unchecking the **(Pass)** checkbox. To indicate that a filter is applied to a column, the white triangle next to the column header changes to a green filter icon whenever any filter setting deviates from its default. This is shown in the image above.

If filtering results in no visible rows, SimVT will display a warning message to inform the user that all entries have been filtered out. This helps distinguish between an empty dataset due to filtering and one caused by missing or invalid data.



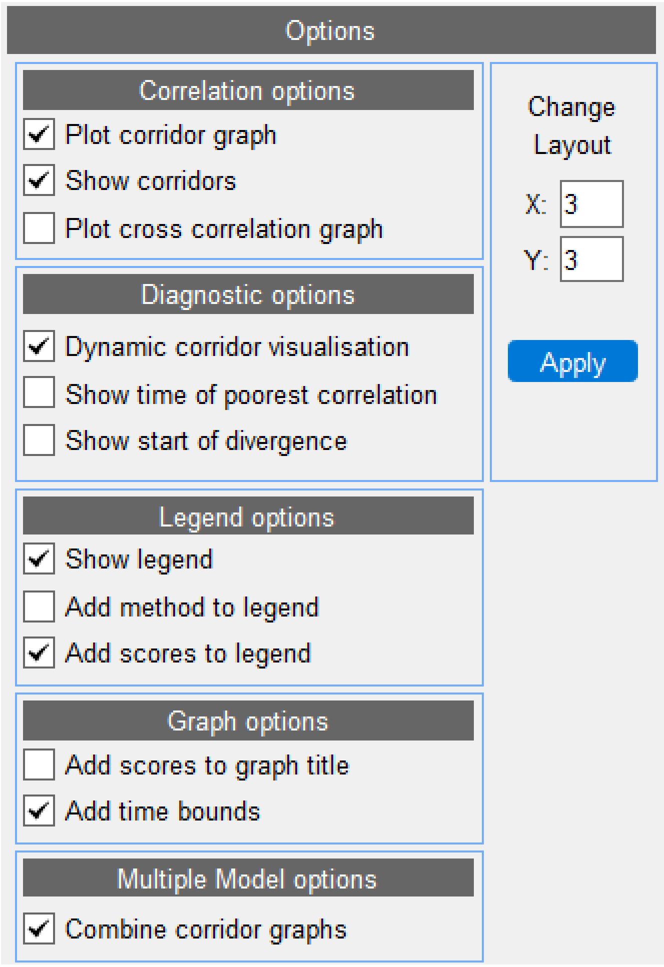
Time of poorest correlation and Start of divergence

Time of poorest correlation is shown with background colour correlation zone it falls into.

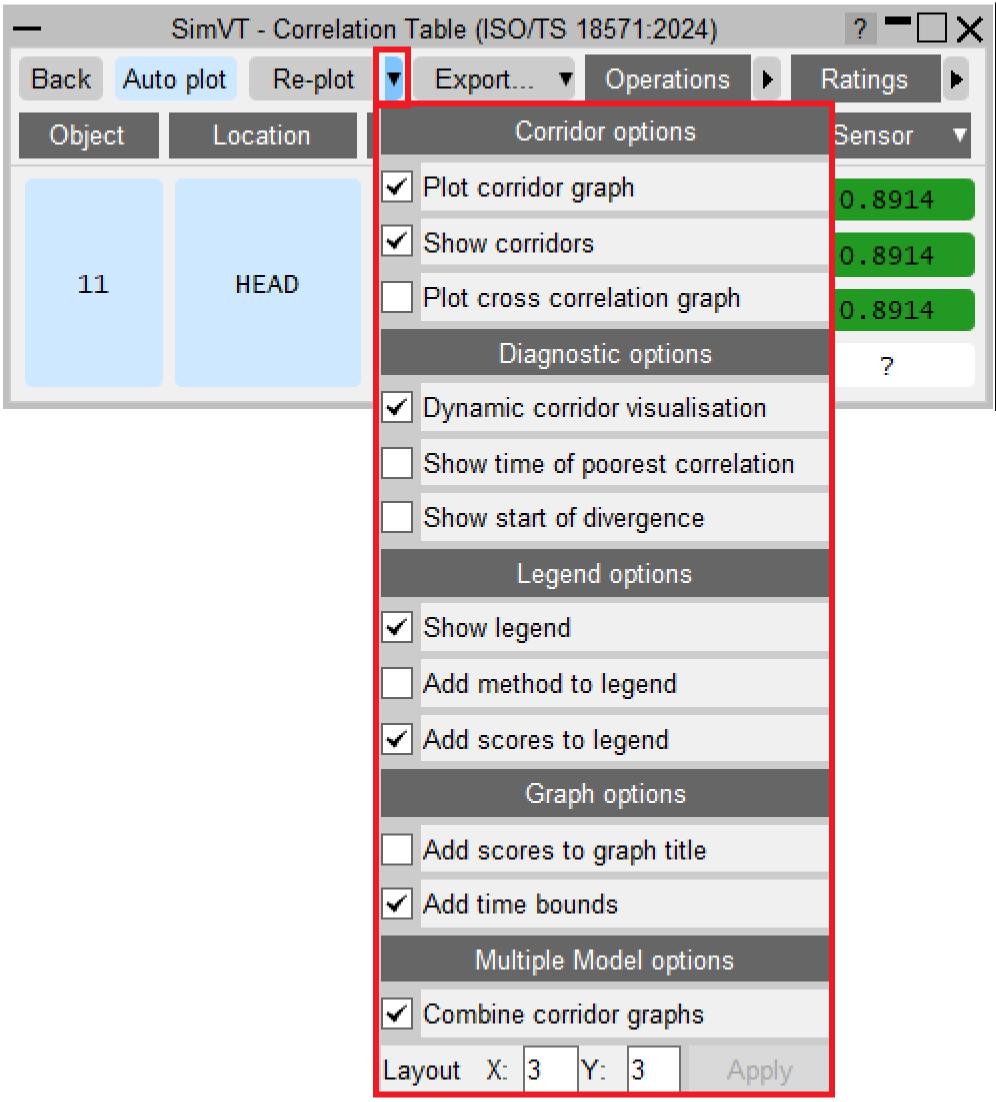
Start of divergence is shown with white background.

If the whole sim curve is within inner corridor the we show N/A with grey background.

Options


Options
Correlation options
Plot corridor graph
Show corridors
Plot cross correlation graph
Diagnostic options
Dynamic corridor visualisation
Show time of poorest correlation
Show start of divergence
Legend options
Show legend
Add method to legend
Add scores to legend
Graph options
Add scores to graph title
Add time bounds
Multiple Model options
Combine corridor graphs
Change Layout
X: 3
Y: 3
Apply

OR



The graph options controls can be found under the **Options** section of the Plotting Controls Window or in the Plot button dropdown of the Correlation Table Window. You can specify any combination of the following options:

Corridor options

- **Plot corridor graph** - controls if the corridor graph is plotted (Note: one of the graphs must be plotted).
- **Show corridors** - controls if the corridors are plotted on the corridor graph (if not, only the curves are plotted, not the corridors). Note that this option does not apply when multiple corridors graphs are combined (corridors cannot be shown in this case) and only when one simulation and test result is shown on a single plot.
- **Plot cross correlation graph** - controls if the cross correlation graph is plotted (Note: one of the graphs must be plotted).

Diagnostic options

- **Dynamic corridor visualisation** - controls if coloured zones to check corridor performance over time is shown.
  There are three coloured zone:
  1. **High correlation zone**: If data point on sim curve is within both inner and outer corridor curve then it falls into this zone. Zone is highlighted with pale green colour.
  2. **Moderate correlation zone**: If data point on sim curve is within both outer corridor curve but outside inner corridor curve it falls into this zone. Zone is highlighted with pale yellow colour.
  3. **Low correlation zone:** If data point on sim curve is outside both inner and outer corridor curve then it falls into this zone. Zone is highlighted with pale red colour.
- **Show time of poorest correlation** - controls if the time of poorest correlation is highlighted. Time of poorest correlation is the time at which sim curve and test curves are farthest among all the points (see example below)
- **Show start of divergence** - controls if the start time of divergence between sim and test curve leading to poorest correlation is highlighted. (see example below)

NOTE: If the whole sim curve is within inner corridor curve we don't show Time of poorest correlation and Start of divergence.

Legend options

- **Show legend** - controls if a legend is displayed on the graph.
- **Add scores to legend** - controls if the rating scores are written onto the legend of the graph.
- **Add method to legend** - controls if the rating method is written onto the legend of the graph.

Graph options

- **Add time bounds** - controls if vertical lines (dashed red) representing the evaluation interval are displayed on the graph.
- **Add scores to graph title -** controls if the rating score is added to the title of the graph (Note: this only applies to corridor graphs).

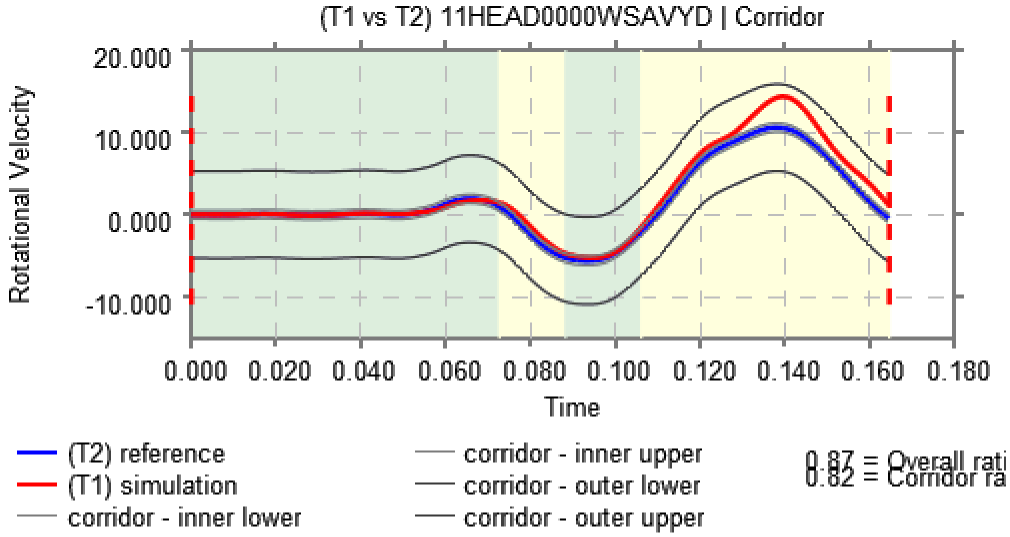
Multiple Model options

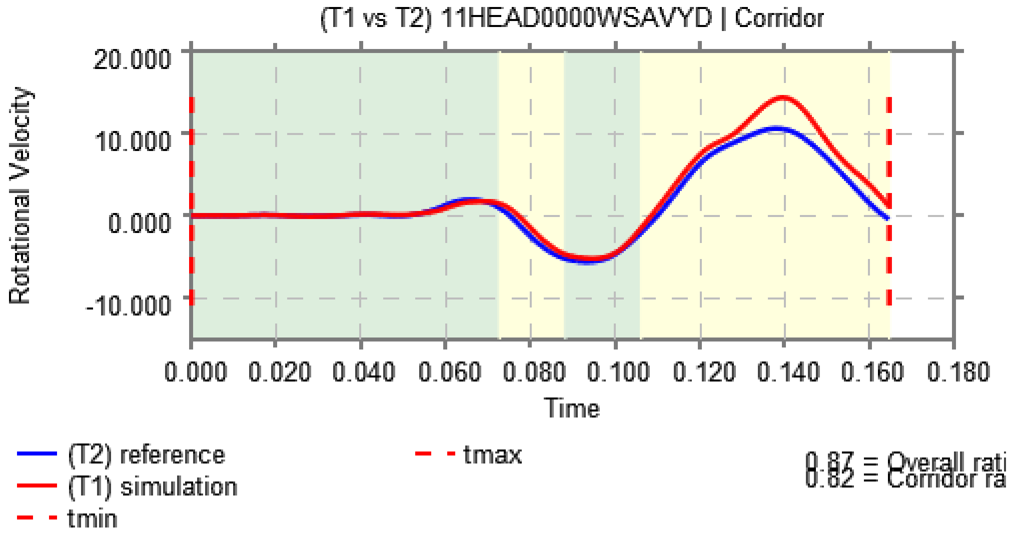
- **Combine corridor graphs** - controls if corridor graphs that share the same channel are combined in a single graph.

Layout

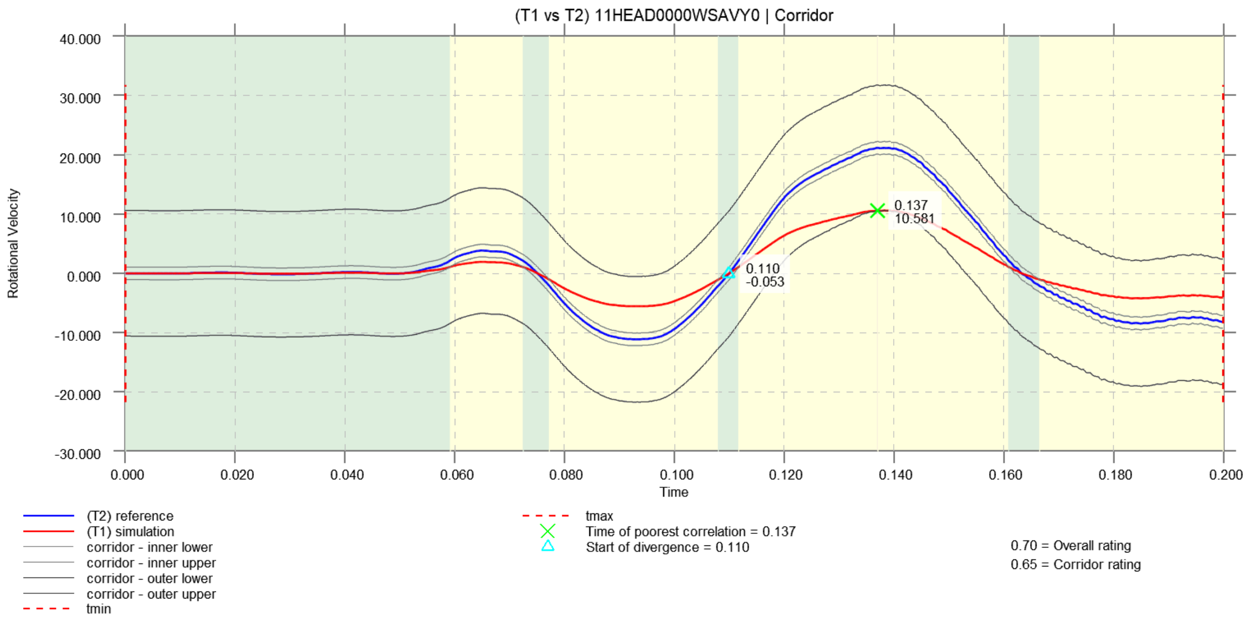
- **Change layout** – controls the graph layout of the T/HIS session.

Below is an example of a plot with **Dynamic corridors visualisation** ticked, **Show corridors** option is ticked (left) and when it is unticked (right).

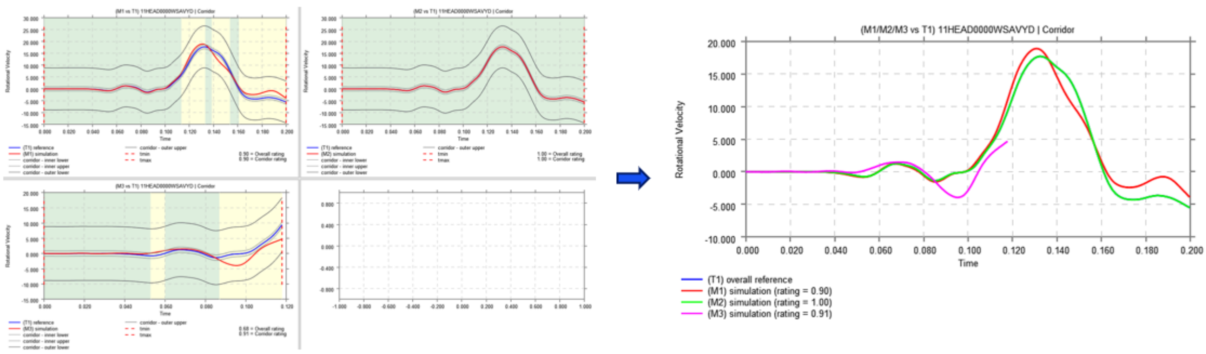




Below is an example of **Time of poorest correlation** highlighted on the sim curve with green cross and **Start of divergence** highlighted with cyan triangle.



Below is an example of a combination of plots with **Combine corridor graphs** unticked (left) and ticked (right).

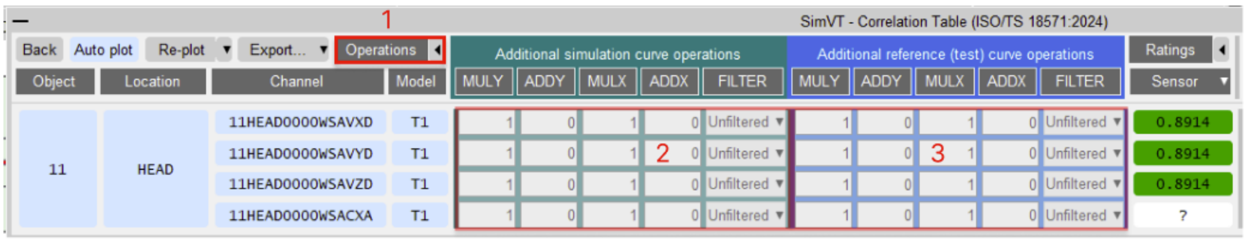


Operations

Corrective operations can be applied to both the simulation and test curves before the correlation is performed. When running with a Protocol option, operations, including filtering, are automatically applied according to the protocol and will not appear in the Operations table. The Operations table is available for performing additional operations, such as correcting for differences in sign or units, allowing you to fine-tune the process as needed.

Applying Operations

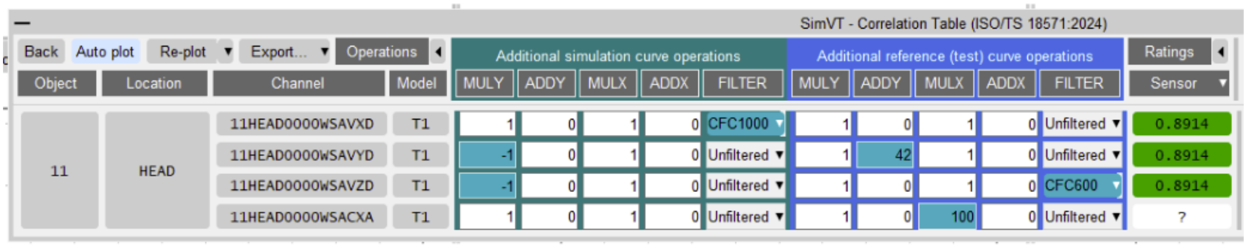
Operations are accessed by clicking **Operations** [1] in the Correlation Table Window which will expanding the window to show the operations that have been applied. This view is minimised by default to reduce the amount of space that the Correlation Table Window occupies.



Operations can be applied to both simulation [2] and reference [3] curves.
The order of application is in the order below: (i.e., from left to right)

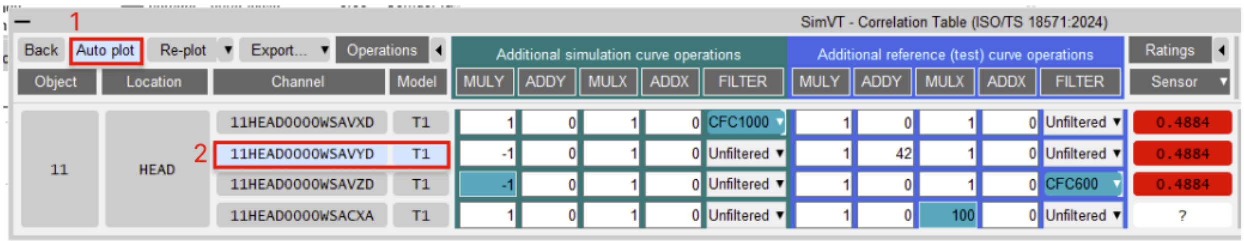
- **MULY** scales the Y coordinates by the value entered (default = 1, no scaling). For example, if you want to invert the sign of a curve, enter “-1”.
- **ADDY** offsets the Y coordinates by the value entered (default = 0, no offset).
- **MULX** scales the X coordinates by the value input (default = 1, no scaling).
- **ADDX** offsets the X coordinates by the value input (default = 0, no offset)
- **FILTER** applies a CFC filter: CFC1000, CFC600, CFC180, CFC60 are supported (default = Unfiltered. Note that the filter operation is in addition any filtering that may already have been applied. For example, in the image above, 11NECKLO00WSFOYB has 'B' filter class which indicates that CFC600 filtering has already been applied. No additional filter operations have been applied so they show "Unfiltered" as the default.)

When you change the value of an operation, the textbox will change to a latent colour to indicate that the operation is “pending”:



Pending operations are only executed on channels (rows) that are selected channels.

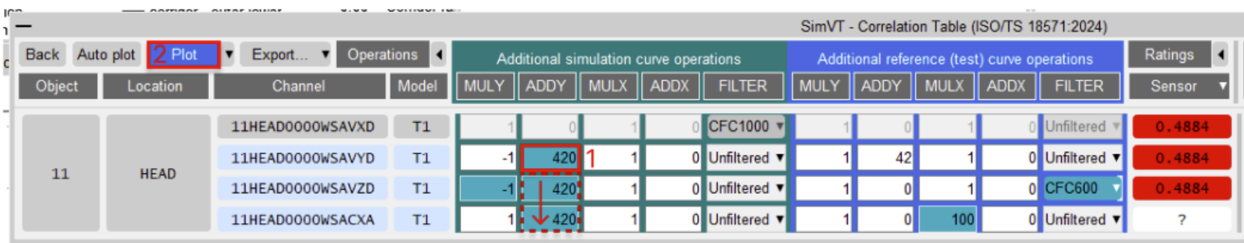
When **Auto plot** is active [1] and a channel is selected [2], operations are executed automatically. Note that the latent coloured textboxes change back to white to indicate that the operations have been applied and ratings will be recomputed.



Applying Multiple Operations (Auto plot off)

If you plan on applying lots of operations, turn **Auto plot** off and apply a batch at a time.

When multiple rows are selected, and **Auto plot** off, you can choose to input a value on any row and it will be propagated to all the active rows (e.g., the input “123” [1] is applied to all the active rows in the ADDY column). Pending operations are again shown as with a latent colour background. Pressing **Plot** [2] will execute pending operations but only for channels (rows) that are selected.



When no rows are selected all operation inputs become active, and you can input operations on a row-by-row basis, but note that pressing **Plot** will not result in the operations being applied, you need to select them first.

Regularisation

After applying the MULX scaling, the curve is regularised to an X axis interval of 0.0001, which corresponds to a sampling frequency of 10kHz. This is consistent with the Euro

NCAP Far Side VTC requirement to sample curves are 10kHz. Note that the regularisation happens **after** corrective scaling of the X axis since **curves are assumed to be in SI units** (i.e. time in seconds) and if MULX is used to scale a curve it is assumed to be converting the time seconds.

Filtering Operations

Care must be taken when using the filtering operations as filtering a channel curve which has already been filtered will result in different curve and therefore different results compared to filtering the unfiltered channel curve. In most cases the difference is small, but if you wish to be consistent with the Euro NCAP Far Side VTC protocol then you need to make sure that you do not apply another filter to channel curves which have already been filtered (i.e. their filter class in A, B, C, D etc.).

Saving Operations

Operations are saved in the SimVT settings file and they will be restored when loading SimVT settings. This can save a lot of time if you plan on reusing the operations you have defined.

Channel Matching Rules

Channel Matching Rules can be defined on the Correlation Setup Window. Creating matching rules facilitates correlating channels that do not have exactly matching channel names.

There are two categories of rules that can be created:

1. ISO – allows you to apply rules to specific parts of the ISO-MME channel code
2. General – applies rules to the entire channel string

ISO and General rules can coexist. ISO rules will be applied to everything that qualifies as ISO-MME channel code and General rules will be applied to the rest.

Matching is enabled through two types of matching rules:

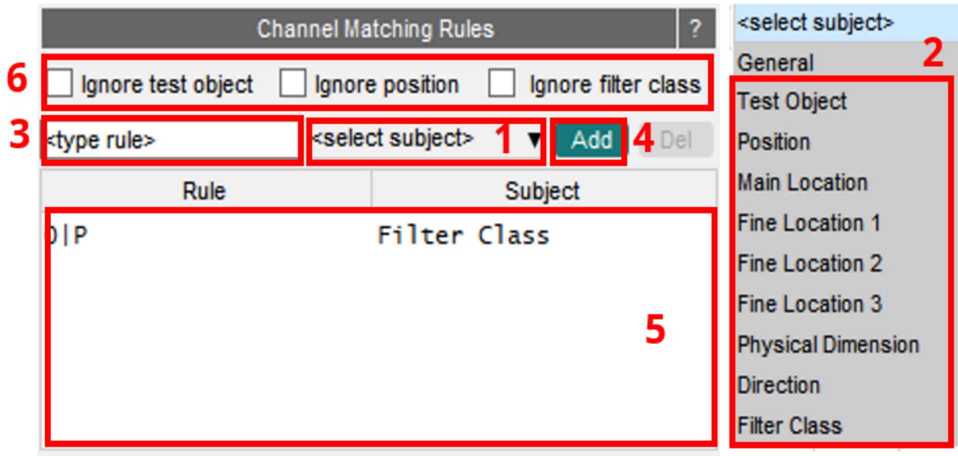
1. Ignore rule – allows you to ignore a part of a string, e.g. the main location (this rule is only applicable in ISO mode)
2. Equivalence rule – allows you to establish equivalency between two or more substrings (options).
    a. options are separated by the "|" e.g. <option1>|<option2>|<option3>|...
    b. there is no limit on the number of options
    c. options are case insensitive (e.g. "LE|RI" is equivalent to "le|ri")
    d. for ISO rules each option must have the same number of characters as the selected subject (e.g. Fine Location 1 has 2 characters so all the options that are treated as equivalent must be 2 characters long).
    e. for General rules options do not need to have the same number of characters as each other.

Adding an ISO rule

- Select an **ISO subject** by clicking [**1**] and picking from [**2**].
- Type a rule in [**3**]:
    - For the **ignore rule** enter "?"
    - For the **equivalence rule** type in <option1>|<option2>|<option3>|...
- Click **Add** [**4**]**.** If the rule is successfully validated it will appear in the list [**5**].

Alternatively, use the checkboxes [**6**] to add or delete any of the following rules with a single click:

- Ignore test object
- Ignore position
- Ignore filter class

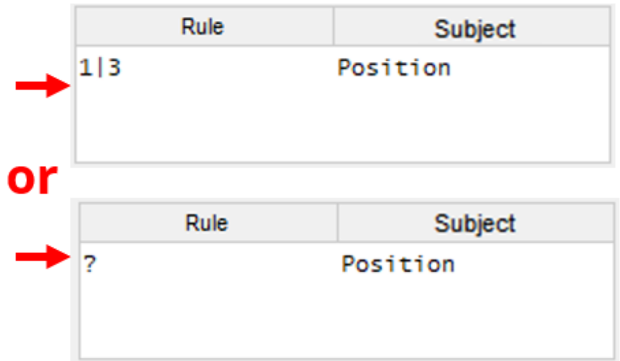


Note: you can add multiple rules for the same ISO subject.

Examples

To match channels 13HEAD000000ACX0 with 11HEAD000000ACX0:

- Add an equivalence rule by typing in **1|3** and selecting **Position** as the subject.
- Or add an ignore rule by typing in **?** and selecting **Position**.



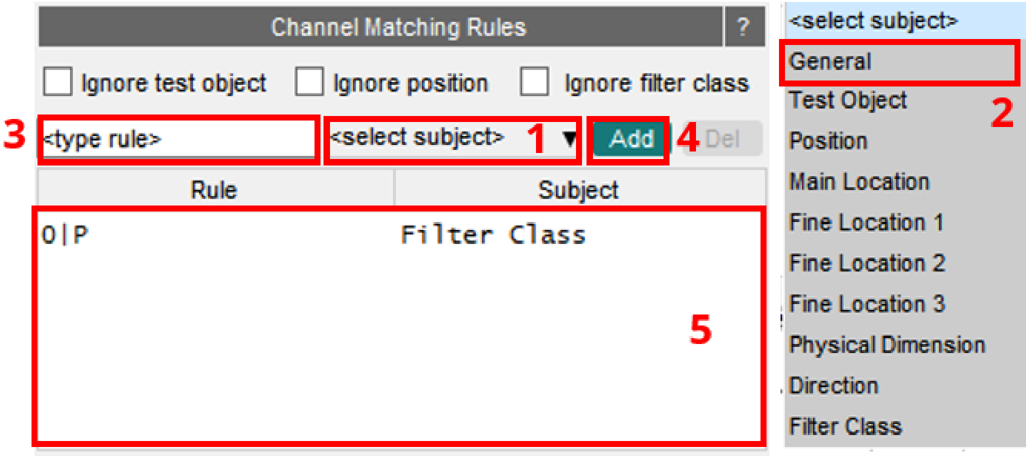
Similarly, to match 13HEAD000000ACX0 with 13ABRI000000ACXP:

- Add an equivalence rule by typing in **HEAD|ABRI** and selecting **Main Location** as the subject.
- And add another equivalence rule by typing **0|P** and selecting **Filter Class**.

Adding a General Rule

To add a General rule, follow a similar process, but not that only equivalence rules are supported.

-
- Select the General **subject** by clicking [**1**] and picking [**2**].
- Enter a rule in [**3**] in the format: <option1>|<option2>|<option3>...
- Press **Add** [**4**]. If the rule is successfully validated it will appear in the list [**5**].

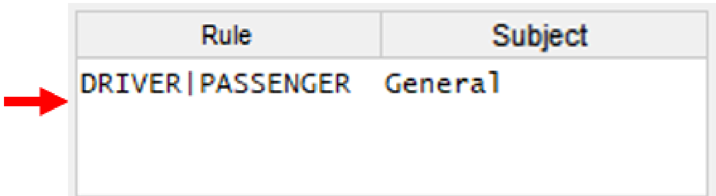


Note: you can add multiple General subject rules.

Examples

To match channels Driver_Airbag with Passenger_Airbag:

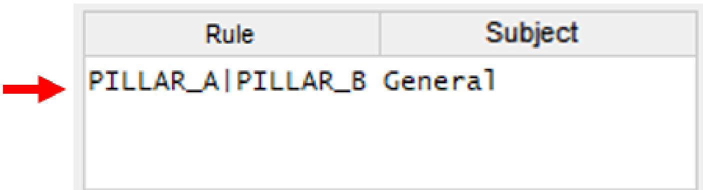
- Add an equivalence rule by selecting **General** in Mode and typing in **DRIVER|PASSENGER**. (Note: matching is case insensitive)



Rule	Subject
DRIVER|PASSENGER	General

Similarly, to match channels Accel_X_Pillar_A with Accel_X_Pillar_B:

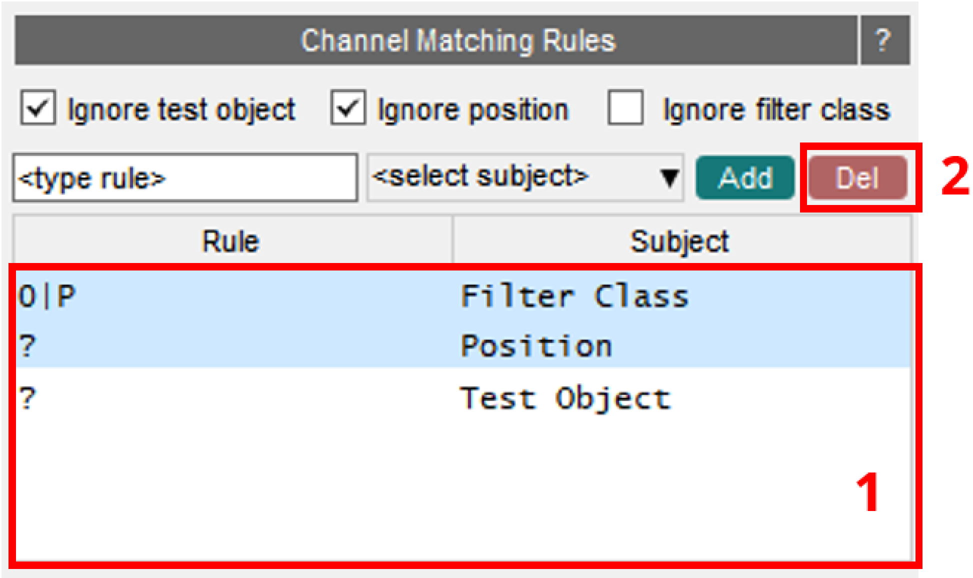
- Add an equivalence rule by selecting **General** in Mode and typing in **PILLAR_A|PILLAR_B**. (Note: matching is case insensitive)



Rule	Subject
PILLAR_A|PILLAR_B	General

Deleting Rules

Rules can be deleted by selecting one or more from the list [1] and then clicking **Del** [2] to delete them from the list.



Important note

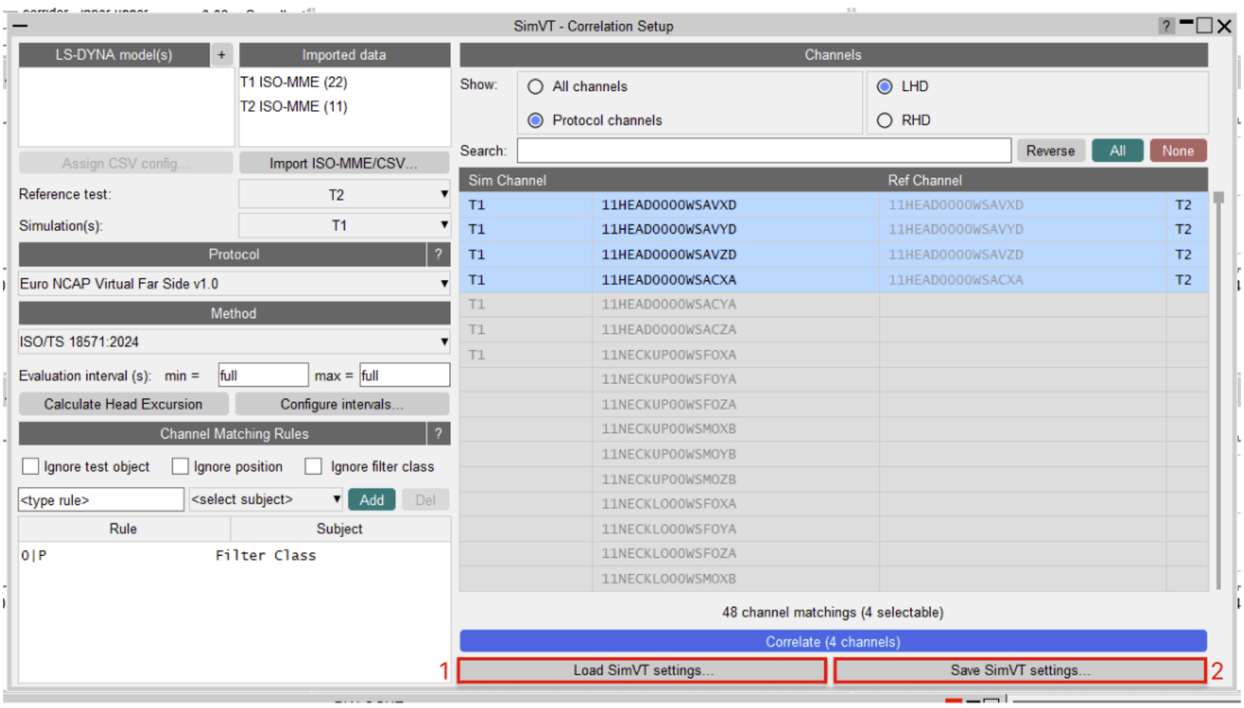
Matching rules are only applied when comparing simulation curves with the reference curves. If you are comparing multiple simulations against test simultaneously, the multiple simulation channels must match each other exactly. The rules allow them to differ from the reference only.

Settings File

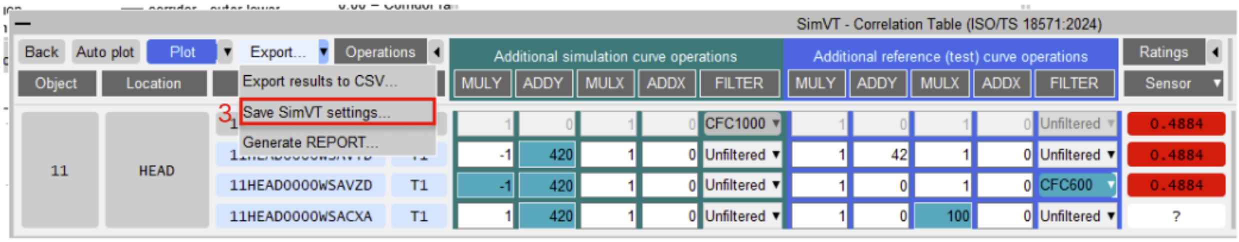
SimVT settings files are a new way for you to load and save your correlation settings from a particular SimVT session. You can load [1] and save [2] SimVT settings file from the Correlation Setup Window. A SimVT settings file can also be saved from the Correlation Table Window by going to **Export... → Save SimVT settings...** [3]. The settings file will have a *.simvt* extension and will contain the following data:

- Model data
- Channels selected for correlation in the channels list
- Operations associated with selected channels
- Channel matching rules
- Protocol (if selected)
- Rating method settings
- Graph layout settings
- Correlations toggled (pale blue) in the Correlation Table window

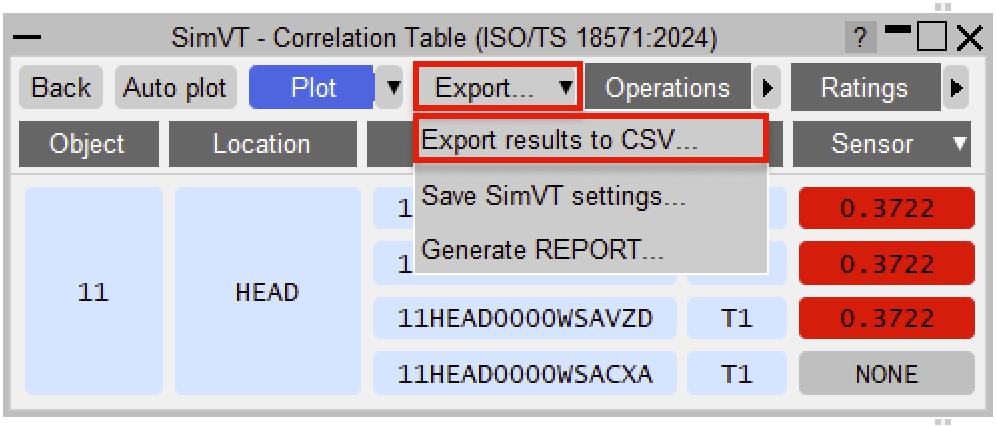
Once a settings file is loaded, the Model Mapping Window appears. It is populated with the saved models, allowing to map those to existing models or new model data.



OR


SimVT - Correlation Table (ISO/TS 18571:2024)
Back
Auto plot
Plot
Export...
Operations
Additional simulation curve operations
Additional reference (test) curve operations
Ratings
Object
Location
Export results to CSV...
Save SimVT settings...
Generate REPORT...
MULY
ADDY
MULX
ADDX
FILTER
Sensor
11
HEAD
11HEAD0000WSAVZD
11HEAD0000WSACXA
T1
CFC1000
Unfiltered
CFC600
0.4884
?

Exporting Results



RUN_ID	METHOD	TMIN	TMAX	MAX_CC_VALUE	CC_OFFSET_AT_MAX	CORRELATION_RATING	PROGRESSION_RATING	PHASE_RATING	SIZE_RATING	SLOPE_RATING	PHAS
(T1 vs T2) 11HEAD0000WSAVXD	ISO/TS 18571:2024	0	0.1647	0.9817486647543316	0.0045	0.8819542596050277		0.8634708737864077		0.8510725281374232	0.86
(T1 vs T2) 11HEAD0000WSAVYD	ISO/TS 18571:2024	0	0.1647	0.2633864507778377 3	0.0329	0.1414250363315623		0.001820388		0.4224547206451723	
(T1 vs T2) 11HEAD0000WSAVZD	ISO/TS 18571:2024	0	0.1647	0.2945068251495988	-0.0329	0.1378183939802401		0.001820388		0.4116347935912057	

SimVT allows you to export your correlation results from to a CSV file. To export results, select **Export.. → Export results to csv** from the Correlation Table Window and save in a desired location. The following fields will be written:

- RUN_ID - Analysis run identifier
- METHOD - Correlation method
- TMIN - Evaluation interval minimum (seconds)
- TMAX - Evaluation interval maximum (seconds)
- MAX_CC_VALUE - Maximum cross correlation value K, K ranges from -1 to 1
- CC_OFFSET_AT_MAX - Time offset at maximum cross correlation value
- CORRELATION_RATING - correlation rating
- PROGRESSION_RATING - correlation rating (specific to CORAplus4.0.4 method)
- PHASE_RATING - phase rating (specific to CORAplus4.0.4 method)
- SIZE_RATING - size rating (specific to CORAplus4.0.4 method)
- SLOPE_RATING - slope rating (specific to ISO18571 methods)
- PHASE_RATING - phase rating (specific to ISO18571 methods)
- MAGNITUDE_RATING - magnitude rating (specific to ISO18571 methods)
- CORRIDOR_RATING - corridor rating
- TOTAL_SIGNAL_RATING - total signal rating i.e. a combination of corridor and correlation ratings
- ISO_RATING_MEANING - a classification for the total rating according to the ISO18571 standard (specific to ISO18571 methods)
- MAX_AMPLITUDE - maximum amplitude of the correlation signal
- WEIGHT - weight calculated based on maximum amplitude
- WEIGHTED_SIGNAL_RATING - weighted signal rating
- TIME_OF_POOREST_CORRELATION - Time of poorest correlation value

- START_OF_DIVERGENCE - Start time of divergence value

SimVT FAQ

How can I change the layout of the graphs?

By default the layout is set to 3x3, but you can change the layout from either the using graph options which can be accessed from both the Correlation Table window and the Plotting Controls window.

How can I invert the sign of my simulation or test curve so that they are consistent?

You can invert the sign of either curve using the "MULY" operation. Assuming the curves are in the same units you simply need to enter "-1" in the "MULY" column for the curve that needs corrected.

Why are the operations I have entered not being applied?

Operations that have not been applied yet will show with a turquoise background. They are only applied when the row is selected **and** plotted. In "Auto plot" mode, selecting a row is equivalent to plotting it so to force pending operations to be applied you simply need to select the row by pressing one of the object/location/channel/model buttons that corresponds to the row in question. When not in "Auto plot" mode you need to press the **Plot** button to plot the selected row(s) and force the pending operations to be applied.

Why do the ratings say "NONE"?

The ratings will say none when it was not possible to perform the correlation. The main reason for this is that one or both of the curves do not lie within the min and max time window (a.k.a. evaluation interval) or there is a time offset between them such that they do not have points in the same X range. You should check the values of the "ADDX" and "MULY" operations to see if they could explain why the curves do not overlap.

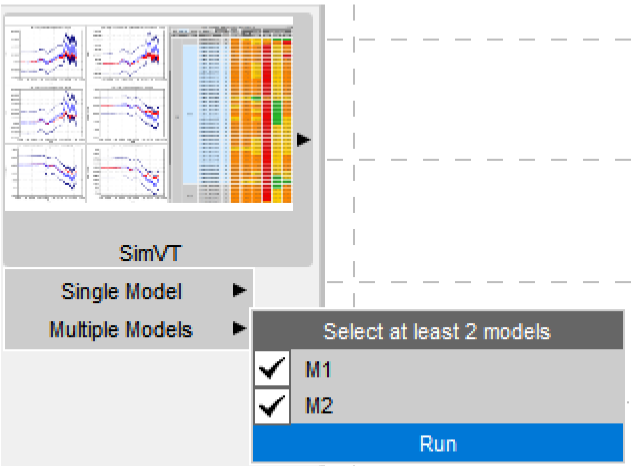
Data Sources

SimVT offers flexibility by supporting channel data from a range of different data sources:

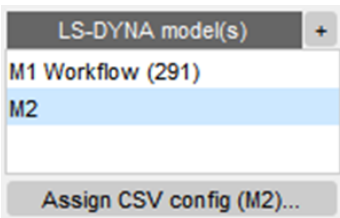
- Ansys LS-DYNA with Automotive Assessment Workflow Data
- Ansys LS-DYNA with CSV Config File
- CSV Data
- ISO-MME Data

Ansys LS-DYNA with Automotive Assessment Workflow Data

When you run SimVT from the workflow window you have the option of selecting which Ansys LS-DYNA models you would like to load into the tool. For each selected model ("M1" and "M2" in the image below), SimVT will [attempt to find](#) the associated Automotive Assessments workflow data (AAWD) because it requires this data to extract labelled channels from the model. The AAWD also contains additional meta-data such as model units, crash test protocol, and the vehicle drive side, which is used by SimVT to convert curves to SI units and to determine the protocol channels.



If SimVT successfully finds the AAWD for a model, it will appear in the model list along with the number of channels that are available for correlating (e.g. "M1" below). If the AAWD cannot be found, only the model tag will appear in the model list and you will have the option to [assign channel labels using the CSV Config file](#) (e.g. "M2" below).



Note that the model tags for all the Ansys LS-DYNA models that are present in the T/HIS session will be visible in the model list (even if you did not select them from the workflow window before launching SimVT).

Creating Automotive Assessments Workflow Data (AAWD)

Follow the steps here to create Automotive Assessments workflow data (AAWD) for an Ansys LS-DYNA model. Note that it is possible to reuse the same workflow data for multiple models provided that the entity-id mappings and additional meta data (e.g. unit system, crash test protocol, occupants and vehicle drive side) are the same for each model.

Ansys LS-DYNA with CSV Config File

Ansys LS-DYNA models without associated Automotive Assessment Workflow Data (AAWD) can still be used with SimVT, but a CSV Config File is required to assign channel labels to the entities in the model. **Note that it is recommended to use AAWD but the CSV Config File Format is provided for scenarios which AAWD does not support e.g. custom channel names.**

CSV Config File Format

- An example CSV configuration file format showing a mixture of the supported inputs is shown below.
- The header row is required, but the order of the columns can vary.
- The configuration file supports ISO-MME format channel codes.
- If you are not working with ISO-MME data, you can provide any name you like in the channel column.

	A	B	C	D	E	F	G
1	Object	Location	Channel	Entity type	ID	ISO Comp	T/HIS Component
2	D3	HEAD	HEAD Acceleration X	node	10001	ACX	
3	D3	HEAD	HEAD Acceleration Y	node	10001		AY
4	D3	HEAD	HEAD Acceleration Z	node	10001		AZ
5			D3HEAD0000WSAVXP	node	10006		
6			D3HEAD0000WSAVYP	node	10006		
7			D3HEAD0000WSAVZP	node	10006		
8	D3	SACR	Left Sacrum Force X	beam basic	10005	FOX	
9	D3	SACR	Left Sacrum Force Y	beam basic	10005	FOY	
10	D3	SACR	Left Sacrum Force Z	beam basic	10005	FOZ	
11	D3		SACRLE00WSMOX	beam basic	10005	MOX	
12	D3		SACRLE00WSMOY	beam basic	10005	MOY	
13	D3		SACRLE00WSMOZ	beam basic	10005	MOZ	
14	D3		AIRBAG_KE	part	[1 2 3]		KE
15	D3		AIRBAG_IE	part	1		IE
16	D3		AIRBAG_HE	part	1		HG
17	D3		BPILLAR Acceleration Magnitude	node	11001		AM
18	D3		CONTACT_DUMMY_AIRBAG	contact	1041		FM
19	D3		CONTACT_DUMMY_CC	contact	1041		FM
20	D3		CONTACT_DUMMY_SEAT	contact	1041		FM
21	D3		CONTACT_DUMMY_SEATBELT	contact	1041		FM
22	D3		LAP_BELT	section	1		FM

Assigning CSV Config File

When "Assign config" is clicked on the Correlation Setup window, the CSV Configuration window will appear. Follow these steps to assign a CSV config file.

CSV Data

CSV channel data can be imported into SimVT. Once in SimVT it is handled in the same way as other data sources, allowing you to correlate curves with matching channel names.

CSV Data file format

The CSV file format is based on the CSV format that can be exported from T/HIS using the CSV X,Y,Y,Y,Y,Y write option.

- The **first header row is required** and contains the names of the channels that will be imported
- The first column contains the time values (X points) and the Y value at the time is given in the adjacent columns. Note that if the Y value is empty or not a number the row will be skipped
- The word **"Time" must appear in one of the cells in the first column**. It marks the end of the header rows (i.e. the row below should contain time-value data)
- The "Time" row can optionally be used to defined the units of the non-ISO-MME channels.
- The "Object" and "Location" header rows are optional and are used to group non-ISO-MME channels in the SimVT Correlation Table.

ISO-MME CSV Channel Data Example

The table below shows some example CSV channel data with ISO-MME channels defined. Note that:

- The first cell (A1) is empty.
- The first row contains valid 16 character ISO-MME channel codes for each column.
- The first column contains the word "Time" in the second row and the data values begin on the row below.
- The second row has no unit data defined as the units can be determined from the ISO-MME channel codes' physical dimension (e.g. AC is acceleration so will have units of m/s^2 (Note that units are assumed to be in SI by default. If the units are not in SI (e.g. Acceleration in 'g' or force in 'kN') you will need to specify the units in the CSV file or alternatively in the Import Config CSV).

	11HEAD0000WSDCX0	11HEAD0000WSDCY0	11HEAD0000WSDCZ0	11HEAD0000WSAVX0	11HEAD0000WSAVY0	11HEAD0000WSAVZ0	11HEAD0000WSACX0	11HEAD0000WSACY0	11HEAD0000WSACZ0	11HEAD0000WSVEX0
Time										
0	0	0	0	-3.22E-27	7.77E-25	8.65E-27	0	0	0	0
0.000100001	0	0	0	5.00E-10	7.34E-11	-5.11E-10	-2.87E-08	-7.70E-08	1.36E-08	1.09E-12
0.000200002	0	0	0	3.03E-10	5.90E-11	-3.36E-10	-5.22E-09	-2.54E-08	1.34E-07	5.87E-14
0.000300003	0	0	0	1.46E-10	2.56E-11	-2.05E-10	3.38E-09	-1.59E-08	8.26E-08	1.90E-14
0.000400004	0	0	0	8.40E-11	2.34E-11	-8.60E-11	-5.79E-09	-8.33E-09	9.71E-08	9.91E-15
0.000500005	0	0	0	9.56E-10	6.46E-09	5.66E-10	0.000367982	-1.75E-05	-0.000660053	2.95E-09

Non-ISO-MME CSV Channel Data Example

The table below shows some example CSV channel data with non-ISO-MME channels defined. Note that:

- The first cell (A1) contains the word "Channel" - this is optional when the channel names are on the first row.
- The channel names are not valid ISO-MME channel codes so they will not benefit from the ISO-MME channel matching for each column.
- The first column contains the word "Time" (i.e. "Time | Units") in the fourth row and the data values begin on the row below.
- The "Time" row also has unit data defined as the units cannot be determined from non-ISO-MME channel codes.
- The "Object" and "Location" rows are defined, so the channels will be grouped together on the SimVT Correlation table.

Channel	Head X Disp.	Head Y Disp.	Head Z Disp.	Head X Ang. Vel.	Head Y Ang. Vel.	Head Z Ang. Vel.	Head X Accel.	Head Y Accel.	Head Z Accel.	Head X Vel.
Object	Driver	Driver	Driver	Driver	Driver	Driver	Driver	Driver	Driver	Driver
Location	Head	Head	Head	Head	Head	Head	Head	Head	Head	Head
Time|Units	m	m	m	rad/s	rad/s	rad/s	m/s^2	m/s^2	m/s^2	m/s
0	0	0	0	-3.22E-27	7.77E-25	8.65E-27	0	0	0	0
0.000100001	0	0	0	5.00E-10	7.34E-11	-5.11E-10	-2.87E-08	-7.70E-08	1.36E-08	1.09E-12
0.000200002	0	0	0	3.03E-10	5.90E-11	-3.36E-10	-5.22E-09	-2.54E-08	1.34E-07	5.87E-14
0.000300003	0	0	0	1.46E-10	2.56E-11	-2.05E-10	3.38E-09	-1.59E-08	8.26E-08	1.90E-14
0.000400004	0	0	0	8.40E-11	2.34E-11	-8.60E-11	-5.79E-09	-8.33E-09	9.71E-08	9.91E-15
0.000500005	0	0	0	9.56E-10	6.46E-09	5.66E-10	0.000367982	-1.75E-05	-0.000660053	2.95E-09

ISO-MME Data

ISO-MME data is supported (versions 1.6 and 2.0 are supported). All the channels (curves) defined in the index file will automatically be extracted and labelled (tagged) with their ISO channel codes. ISO-MME data will typically be test data obtained from a physical crash test, but the tool will work with ISO-MME data that has been generated from simulation results, for example, by using the Ansys LS-DYNA to ISO-MME workflow tool.

Instructions for importing ISO-MME data in SimVT can be found in this Ansys LS-DYNA with ISO-MME Example.

Click on the Import ISO-MME/CSV... button on the Correlation Setup window

IMPORTANT: ISO-MME data is assumed to be in SI units. Some test houses provide angular results in degrees rather than in radians. Please check your ISO-MME test data before importing it to ensure that angles are in radians. This applies to rotations, angular velocities and angular accelerations.

SimVT REPORTER Templates

As well as using SimVT to perform the correlation interactively in T/HIS, SimVT can be used in REPORTER to automatically generate reports of the channel correlations for the supported protocols. The v21.1 bundle includes the following SimVT REPORTER templates:

Template Name	$TEMPLATE_FILE (for Batch command)
Euro NCAP Virtual Far Side 2024 VC1 (ISO Scores)	EuroNCAP_Virtual_Far_Side_2024_VC1_ISO_Scores.ort
C-NCAP Far Side Protocol 2024 Working Conditions 1-6 SimVT	CNCAP_Far_Side_Protocol_2024_WorkingConditions1to6_SimVT.ort
C-NCAP Far Side Protocol 2024 Working Conditions 7-8 SimVT	CNCAP_Far_Side_Protocol_2024_WorkingConditions7to8_SimVT.ort
C-NCAP Far Side Protocol 2024 Virtual Assessment Certificate (WSID Driver, WSID	CNCAP_Far_Side_Protocol_2024_VirtualAssessmentCertificate_WSID_Driver_WSID_Passenger.ort

Template Name	$TEMPLATE_FILE (for Batch command)
Passenger)	
C-NCAP Far Side Protocol 2024 Virtual Assessment Certificate (WSID Driver, ES-2re Passenger)	CNCAP_Far_Side_Protocol_2024_VirtualAssessmentCertificate_WSID_Driver_ES2re_Passenger.ort

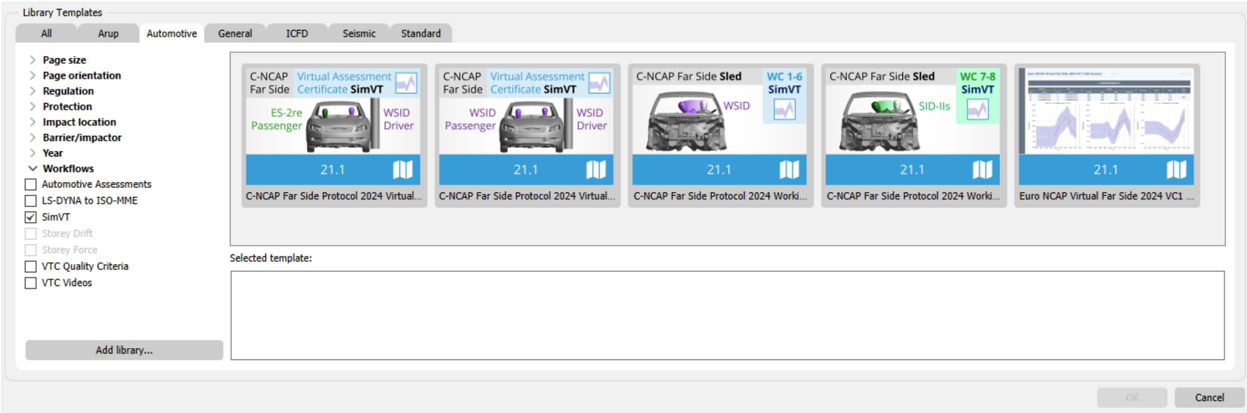
All the templates work in the same way and they can be run both interactively and in batch mode.

If the template is successfully generated it will show a report summarising the the sensor scores for all the mandatory and monitored channels as well as the correlation graphs for each channel so that you can inspect any channels which perform poorly. Additionally, a SimVT settings file (*REPORTER_settings.simvt*) is created which can be loaded in to the SimVT workflow tool to interrogate the results interactively.

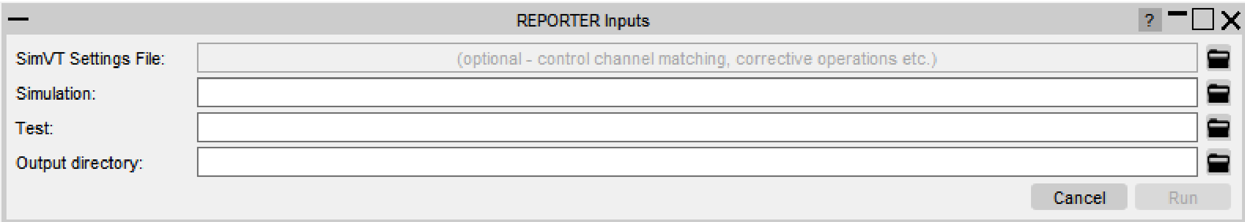
Note: If you intend to use the template with Ansys LS-DYNA results then you should already have defined the occupant and structures user data required for your model in PRIMER (see Automotive Assessments PRIMER for details).

Running the template interactively

In REPORTER, click the Automotive tab and then filter by SimVT (under Workflows) to locate the template you wish to run. Double-click on the template thumbnail to open it (alternatively click on it to select it then click on **OK**).



T/HIS will launch straight away and an input window will appear:



For convenience, and flexibility, there are three approaches to populating the REPORTER Inputs window:

1. Using a SimVT settings file
2. Using a SimVT settings file but overriding one or more of the "Simulation", "Test" and "Output Directory" inputs
3. Selecting the "Simulation", "Test" and "Output Directory" inputs without using a SimVT settings file

There are a number of advantages to using a SimVT file. For example, the inputs are populated automatically which can save you time trying to locate the relevant "Simulation" and "Test" data files. Additionally, channel matching rules and corrective operations can be defined in the settings file which unlocks more advanced capabilities of SimVT. However, it is still possible to use the templates without the need to create a SimVT settings file.

1. Using a SimVT settings file

This option is the simplest option if you already have created a SimVT settings file (*.simvt) which references the simulation and test data sources that you want to generate a report for.

1. Use the file explorer icon on the first row to select the desired SimVT settings file.
2. If the SimVT settings file is valid it will automatically populate the "Simulation", "Test" and "Output directory" path rows. If it is not valid or any of the paths are red then follow the steps below to override blank/invalid inputs.
3. Click **Run** to generate the report.

2. Using a SimVT settings file but overriding one or more of the "Simulation", "Test" and "Output Directory" inputs

When selecting a valid SimVT settings file the "Simulation", "Test" and "Output directory" path rows will automatically be populated. However, you may wish to repurpose an existing SimVT settings file for a different source of simulation and/or test data. This is similar tomapping to new data when loading a SimVT settings file when running SimVT in T/HIS interactively. For example, you may have a SimVT settings file which defines the channel matching rules and corrective operations to correlate *LS_DYNA_SIM_**1**.d3thdt* vs. *ISO_MME_TEST.chn*, but you want to correlate *LS_DYNA_SIM_**2**.d3thdt* vs. *ISO_MME_TEST.chn* so you could load the SimVT settings file in (which would populate the "Simulation" row with *LS_DYNA_SIM_1.d3thdt* and the "Test" row with *ISO_MME_TEST.chn*) then you can change the "Simulation" path to *LS_DYNA_SIM_2.d3thdt* so that it will be used instead.

1. Use the file explorer icon on the first row to select the desired SimVT settings file.
2. If the SimVT settings file is valid it will automatically populate the "Simulation", "Test" and "Output directory" path rows.
3. Use the file selectors at the end of each row which you want to override the path for (or type or paste the path in to the textbox)
4. Click **Run** to generate the report.

3. Selecting the "Simulation", "Test" and "Output Directory" inputs without using a SimVT settings file

This option is useful if you do not have a valid SimVT settings file but you still want to be able to generate the REPORT.

1. Use the "Simulation" file selector to select the simulation **data source** (e.g. files ending with d3thdt, .thf, binout0000, .csv, .mme, .chn, .mmi, .iso)
2. Use the "Test" file selector to select the test **data source** (e.g. files ending with d3thdt, .thf, binout0000, .csv, .mme, .chn, .mmi, .iso)
3. Use the "Output directory" file selector to choose the directory where the results will be saved.
4. Click **Run** to generate the report.

Note that a SimVT settings file (*REPORTER_settings.simvt*) is created in the "Output directory" which can be used to regenerate the report as well as loading it in to the SimVT workflow tool to interrogate the results interactively. You can then define any channel matching rules and corrective operations in T/HIS before saving a new SimVT settings file which can be used to regenerating the report.

REPORTER Results

All the SimVT REPORTER templates have the same basic format.

- The first page contains a **summary of the sensor score results** and the PASS/FAIL status of the protocol validation criteria. The layout and contents of the summary page vary from template to template.
- After the summary page there may be some **extra pages for protocol specific content**. For example, the "Euro NCAP Virtual Far Side 2024 VC1 (ISO Scores)" template has a page dedicated to the simulation duration and head excursion check
- After any extra protocol specific pages, the report contains **sensor correlation pages** (one for each mandatory and sensor) which contain a table of results and images of the corridor graphs for each channel which makes up the sensor. Note that sensors can be either a single channel (1D) or the weighted combination of 2 or 3 channels (e.g. X, Y and Z components).
- At the end of the report, all the results are summarised in a detailed results table. The table may continue over multiple pages if they do not all fit on a single page

Missing Data

If all the channel data required to calculate a given Sensor Score is found, then that Sensor Score will be displayed on the summary table (page 1) and the cell will be coloured to indicate the PASS/FAIL status. Monitored sensors are shown in lighter colours as their status does not impact the overall validation criteria PASS/FAIL status. If channel data required to perform a correlation is missing then the corresponding results will be shown as "Missing". The different cell colours and their corresponding status are shown in the table below.

Cell Colour	Status
	Mandatory sensor failed
	Monitored sensor failed
	Mandatory sensor passed
	Monitored sensor passed
	Missing data to calculate sensor score

If any of the mandatory sensors fail to pass the validation criteria then the overall result will be FAIL. Otherwise the overall result will be a PASS (regardless of the status on monitored sensors) unless any of the mandatory sensors have missing data, in which case the validation criteria result will show "Missing".

Running the template in Batch

The templates can also be run in batch mode, specifying the required information through command line arguments.

If you want to use the simulation and test data specified by the SimVT settings file then you only need to specify the output directory and SimVT settings file file on the command line:

<*reporter_exe*> -batch -file=<*template_file*> -varOUTPUT_DIR=<*output_directory*> -varSIMVT_SETTINGS_FILE=<simvt_settings_file> -exit

[Add the -pdf, -html, -pptx command line arguments to write the report out in the format you want]

Where:

reporter_exe	**The full path and filename to the REPORTER executable**
template_file	The full path of the template file e.g. ***$OA_WORKFLOW****/templates/simvt/****$TEMPLATE_FILENAME*** Note that **$OA_WORKFLOW** should be substituted with the full path to your workflows 22.1 directory. Note **$OA_WORKFLOW** is set using the *workflow_definitions_directory* preference Note that **$TEMPLATE_FILENAME** should be substituted with the filename of the template you wish to use. The template names and the corresponding filenames are listed in this table.
output_directory	The directory where the correlation graphs images, results.csv and REPORTER_settings.simvt are written to (it must exist and you must have write permissions).
settings_file	The full path and filename of the SimVT settings file. The SimVT settings file argument is optional, but if it is provided it will be used to configure the channel matching rules, corrective operations and correlation method* used.

reporter_exe	**The full path and filename to the REPORTER executable**
	*Note that the Euro NCAP protocol mandates that the default ISO/TS 18571:2024 protocol is used for correlations.

If you want to override the simulation and test data specified by the SimVT settings file then you only need to specify the extra arguments, varSIMULATION_DATA_PATH and varTEST_DATA_PATH respectively:

<*reporter_exe*> -batch -file=<*template_file*> -varOUTPUT_DIR=<*output_directory*> -varSIMVT_SETTINGS_FILE=<simvt_settings_file> **-varSIMULATION_DATA_PATH=<*simulation_file*> -varTEST_DATA_PATH=<*test_file*>** -exit

Where:

simulation_file	The full path and filename of the simulation data source. This is optional if -varSIMVT_SETTINGS_FILE is defined, but it can be used to override the simulation data source specified in the SimVT settings file.
test_file	The full path and filename of the test data source. This is optional if -varSIMVT_SETTINGS_FILE is defined, but it can be used to override the simulation data source specified in the SimVT settings file.

If you do not want to use a SimVT settings file you can remove -varSIMVT_SETTINGS_FILE provided that both varSIMULATION_DATA_PATH and varTEST_DATA_PATH are defined:

<*reporter_exe*> -batch -file=<*template_file*> -varOUTPUT_DIR=<*output_directory*> **-varSIMULATION_DATA_PATH=<*simulation_file*> -varTEST_DATA_PATH=<*test_file*>** -exit

4.9.8. C-NCAP Far Side Occupant Protection Protocol (2024 Edition)

C-NCAP Far Side Occupant Protection Protocol

The C-NCAP Far Side Occupant Protection Protocol forms Appendix H of the C-NCAP Management Regulation (2024 Edition). We will refer to it as the C-NCAP Far Side Protocol 2024.

The protocol has various components:

1. Correlation fitting index for one of eight different Working Conditions
2. Injury assessment for simulation and physical test for that Working Condition, to calculate Correction Factor A
3. Injury assessment for the remaining seven Working Conditions
4. Calculation of the Dual-Occupant Penalty for passenger in the Side Pole test (Appendix D), maximum 1.5 points
5. If the vehicle contains a countermeasure (centre console airbag), and the user wishes to conduct the airbag symmetry validation via virtual vesting:
    a. Check the Virtual Assessment Certificate (correlation fitting index for simulation versus test, in Side Pole specified in Appendix D)
    b. Calculate a further Dual-Occupant Penalty for the driver in the airbag symmetry validation, where a new far side pole simulation is conducted. The setup is based on the Side Pole specified in Appendix D, but impacted on the front passenger side, and the driver dummy is the one used as the passenger in the origional Side Pole, maximum 0.5 points
6. Calculate an overall score

English

Navigating the C-NCAP 2024 Far Side Protocol: A complete process supported by Workflows

The overall C-NCAP 2024 Far Side Protocol rating process is illustrated in the following flowchart, which explains the selections you need to make during setup in PRIMER with the Automotive Assessments Workflow, and the various REPORTER templates available for automated processing and reporting results:

REPORTER Templates

We have provided REPORTER Templates to help perform the injury assessments and results correlation – please see the following guides:

1. [C-NCAP Far Side Protocol 2024 Working Conditions 1-6 SimVT](#) [(and 7-8 SimVT)](#)

2. [Working Conditions 1 to 8 (and Correction Factor A)]()
3. [C-NCAP Far Side Protocol 2024 Virtual Assessment Certificate]()
4. [Dual Occupant Penalties]()
5. [Summary Template]()

Reference Table

The following table lists:

- Column 1-3: the loadcases required for the C-NCAP Far Side Occupant Protection Protocol, and the driver and passenger occupant model required for each
- Columns 4-6: the Crash Test, Regulation, and Version you should [select in Automotive Assessments to setup the user data required for each loadcase]()
- Columns 7-8: a description of the part of the protocol you are trying to assess, and the occupant(s) of interest for this assessment
- Columns 9-10: the relevant section of the protocol for this assessment
- Column 11: which Virtual Testing Workflow tool to use to process this loadcase interactively – note that some of the calculations, like the Dual-Occupant Penalty, are only available in the REPORTER templates
- Columns 12-13: the REPORTER template used to generate and report results automatically

Loadcase	Driver	Passenger	Automotive Assessments: Crash Test	Automotive Assessments: Regulation	Automotive Assessments: Version	What am I trying to assess?	Which occupant am I assessing?	C-NCAP Management Regulation Protocol	Section	How do I postprocess this interactively?	REPORTER Template	REPORTER Template Description
All	Any	Any	Any	CNCAP	Any	C-NCAP VTC Quality Criteria	Any	Appendix H Far Side Occupant Protection Protocol	H.1.1(f)	C-NCAP VTC Quality Criteria	C-NCAP VTC Quality Criteria	A convenient tool for assessing the quality criteria specified in sectio

	Loadcase	Driver	Passenger	Automotive Assessments: Crash Test	Automotive Assessments: Regulation	Automotive Assessments: Version	What am I trying to assess?	Which occupant am I assessing?	C-NCAP Management Regulation Protocol	Section	How do I postprocess this interactively?	REPORTER Template	REPORTER Template Description
													n H.1.1(f) of the C-NCAP Far Side Occupant Protection Protocol (2024 Edition).
	All	Any	Any	Any	CNCAP	Any	C-NCAP VTC Videos	Any	Appendix H Far Side Occupant Protection Protocol	H.2.8	C-NCAP VTC Videos	C-NCAP VTC Videos	A convenient tool for creating the videos specified in Table H.8 in section H.2.8 of the C-NCAP

	Loadcase	Driver	Passenger	Automotive Assessments: Crash Test	Automotive Assessments: Regulation	Automotive Assessments: Version	What am I trying to assess?	Which occupant am I assessing?	C-NCAP Management Regulation Protocol	Section	How do I postprocess this interactively?	REPORTER Template	REPORTER Template Description
													Far Side Occupant Protection Protocol (2024 Edition).
	All	Any	Any	Any	CNCAP	Any	The overall C-NCAP Far Side Occupant Protection score	Several	Chapter III Assessment Methods	1.2.1.5	REPORTER template	C-NCAP Far Side Protocol 2024 Summary	Performs a summary providing the overall score for the C-NCAP Far Side Protocol as specified in Chapter III, section 1.2.1.

	Loadcase	Driver	Passenger	Automotive Assessments: Crash Test	Automotive Assessments: Regulation	Automotive Assessments: Version	What am I trying to assess?	Which occupant am I assessing?	C-NCAP Management Regulation Protocol	Section	How do I postprocess this interactively?	REPORTER Template	REPORTER Template Description
													5 of the C-NCAP Management Regulation (2024 Edition), taking into account the eight Working Conditions and the two Dual-Occupant penalties.
	Far Side Pole	ES-2re	WSID	Far Side Pole	CNCAP	2024 (ES-2re+WSID)	Airbag symmetry validation	ES-2re Driver	Chapter III Assessment Methods	1.2.1.5.4 and section H.1	Automotive Assessments	C-NCAP Far Side Protocol 2024	Performs the ES-2re Driver occupant

	Loadcase	Driver	Passenger	Automotive Assessments: Crash Test	Automotive Assessments: Regulation	Automotive Assessments: Version	What am I trying to assess?	Which occupant am I assessing?	C-NCAP Management Regulation Protocol	Section	How do I postprocess this interactively?	REPORTER Template	REPORTER Template Description
							driver penalty (up to 0.5)		and Appendix H Far Side Occupant Protection Protocol	.2.2.2		Dual-Occupant Penalty (ES-2re Driver)	injury assessment for the C-NCAP Far Side Protocol dual-occupant scenario penalty as specified in Chapter III, section 1.2.1.5.4 of the C-NCAP Management Regulation (2024 Edition). The

	Loadcase	Driver	Passenger	Automotive Assessments: Crash Test	Automotive Assessments: Regulation	Automotive Assessments: Version	What am I trying to assess?	Which occupant am I assessing?	C-NCAP Management Regulation Protocol	Section	How do I postprocess this interactively?	REPORTER Template	REPORTER Template Description
													load case set-up is specified in Appendix H.1.2.2.2.
	Far Side Pole	WSID	WSID	Far Side Pole	CNCAP	2024 (WSID+WSID)	Airbag symmetry validation driver penalty (up to 0.5)	WSID Driver	Chapter III Assessment Methods and Appendix H Far Side Occupant Protection Protocol	1.2.1.5.4 and section H.1.2.2.2	Automotive Assessments	C-NCAP Far Side Protocol 2024 Dual - Occupant Penalty (WSID Driver)	Performs the WSID Driver occupant injury assessment for the C-NCAP Far Side Protocol dual-occupant scenario penalty as specifi

	Loadcase	Driver	Passenger	Automotive Assessments: Crash Test	Automotive Assessments: Regulation	Automotive Assessments: Version	What am I trying to assess?	Which occupant am I assessing?	C-NCAP Management Regulation Protocol	Section	How do I postprocess this interactively?	REPORTER Template	REPORTER Template Description
													ed in Chapter III, section 1.2.1.5.4 of the C-NCAP Management Regulation (2024 Edition). The load case set-up is specified in Appendix H.1.2.2.2.
	Side Pole	WSID	ES-2re	Side Pole	CNCAP	2024 (WSID+ES-2re)	Dual-Occupant side pole pass	ES-2re Passenger	Chapter III Assessment Methods	1.2.1.5.4	Automotive Assessments	C-NCAP Far Side Protocol 2024	Performs the ES-2re Passenger occup

	Loadcase	Driver	Passenger	Automotive Assessments: Crash Test	Automotive Assessments: Regulation	Automotive Assessments: Version	What am I trying to assess?	Which occupant am I assessing?	C-NCAP Management Regulation Protocol	Section	How do I postprocess this interactively?	REPORTER Template	REPORTER Template Description
							enger penalty (up to 1.5)					Dual-Occupant Penalty (ES-2re Passenger)	ant injury assessment for the C-NCAP Far Side Protocol dual-occupant scenario penalty as specified in Chapter III, section 1.2.1.5.4 of the C-NCAP Management Regulation (2024 Edition).

	Loadcase	Driver	Passenger	Automotive Assessments: Crash Test	Automotive Assessments: Regulation	Automotive Assessments: Version	What am I trying to assess?	Which occupant am I assessing?	C-NCAP Management Regulation Protocol	Section	How do I postprocess this interactively?	REPORTER Template	REPORTER Template Description
	Side Pole	WSID	WSID	Side Pole	CNCAP	2024 (WSID+WSID)	Dual-Occupant side pole passenger penalty (up to 1.5)	WSID Passenger	Chapter III Assessment Methods	1.2.1.5.4	Automotive Assessments	C-NCAP Far Side Protocol 2024 Dual-Occupant Penalty (WSID Passenger)	Performs the WSID Passenger occupant injury assessment for the C-NCAP Far Side Protocol dual-occupant scenario penalty as specified in Chapter III, section 1.2.1.5.4 of the C-NCAP Mana

Loadcase	Driver	Passenger	Automotive Assesments: Crash Test	Automotive Assesments: Regulation	Automotive Assesments: Version	What am I trying to assess?	Which occupant am I assessing?	C-NCAP Management Regulation Protocol	Section	How do I postprocess this interactively?	REPORTER Template	REPORTER Template Description
												gement Regulation (2024 Edition).
Side Pole	WSID	ES-2re	Side Pole	CNCAP	2024 (WSID +ES-2re)	Side Pole Driver Injury Assessment	WSID Driver	Chapter III Assessment Methods and Appendix D Side Pole Test Protocol	1.2.1.4 and Appendix D	Automotive Assessments	C-NCAP Side Pole Protocol 2024 (WSID Driver, ES-2re Passenger)	Performs the WSID Driver occupant assessment in accordance with Appendix D, Side Pole Impact Test Protocol, and scoring as specified in sectio

Loadcase	Driver	Passenger	Automotive Assesments: Crash Test	Automotive Assesments: Regulation	Automotive Assesments: Version	What am I trying to assess?	Which occupant am I assessing?	C-NCAP Management Regulation Protocol	Section	How do I postprocess this interactively?	REPORTER Template	REPORTER Template Description
												n Chapter III, 1.2.1.4 of the CNCAP Management Regulation (2024 Edition). Use this template if you have selected the WSID Driver, ES-2re Passenger configuration. Alternatively

Loadcase	Driver	Passenger	Automotive Assessments: Crash Test	Automotive Assessments: Regulation	Automotive Assessments: Version	What am I trying to assess?	Which occupant am I assessing?	C-NCAP Management Regulation Protocol	Section	How do I postprocess this interactively?	REPORTER Template	REPORTER Template Description
												, use the "C-NCAP Side Pole Protocol 2024 (WSID Driver, WSID Passenger)" template.
Side Pole	WSID	WSID	Side Pole	CNCAP	2024 (WSID +WSID)	Side Pole Driver Injury Assessment	WSID Driver	Chapter III Assessment Methods and Appendix D Side Pole Test Protocol	1.2.1.4 and Appendix D	Automotive Assessments	C-NCAP Side Pole Protocol 2024 (WSID Driver, WSID Passenger)	Performs the WSID Driver occupant assessment in accordance with Appendix D, Side Pole Impac

Loadcase	Driver	Passenger	Automotive Assesments: Crash Test	Automotive Assesments: Regulation	Automotive Assesments: Version	What am I trying to assess?	Which occupant am I assessing?	C-NCAP Management Regulation Protocol	Section	How do I postprocess this interactively?	REPORTER Template	REPORTER Template Description
												t Test Protocol, and scoring as specified in Chapter III, section 1.2.1.4 of the CNCAP Management Regulation (2024 Edition). Use this template if you have selected the WSID Driver

Loadcase	Driver	Passenger	Automotive Assessments: Crash Test	Automotive Assessments: Regulation	Automotive Assessments: Version	What am I trying to assess?	Which occupant am I assessing?	C-NCAP Management Regulation Protocol	Section	How do I postprocess this interactively?	REPORTER Template	REPORTER Template Description
												, WSID Passenger configuration. Alternatively, use the "C-NCAP Side Pole Protocol 2024 (WSID Driver, ES-2re Passenger)" template.
Side Pole	WSID	ES-2re	Side Pole	CNCAP	2024 (WSID +ES-2re)	Virtual Assessment Certificate correlati	WSID Driver, ES-2re Passenger	Appendix H Far Side Occupant Protection Protocol	H.1.2.2.2	SimVT	C-NCAP Far Side Protocol 2024 Virtual Asse	Uses SimVT to calculate the Virtual Assessment

Loadcase	Driver	Passenger	Automotive Assessments: Crash Test	Automotive Assessments: Regulation	Automotive Assessments: Version	What am I trying to assess?	Which occupant am I assessing?	C-NCAP Management Regulation Protocol	Section	How do I postprocess this interactively?	REPORTER Template	REPORTER Template Description
						on fitting indices as a prerequisite for the symmetry of far side occupant protection airbags					ssment Certificate (WSID Driver, ES-2re Passenger)	Certificate correlation fitting indices in accordance with section H.1.2.2.2 of the C-NCAP Far Side Protocol (2024 Edition), as a prerequisite for the symmetry of far side occupant protection

	Loadcase	Driver	Passenger	Automotive Assessments: Crash Test	Automotive Assessments: Regulation	Automotive Assessments: Version	What am I trying to assess?	Which occupant am I assessing?	C-NCAP Management Regulation Protocol	Section	How do I postprocess this interactively?	REPORTER Template	REPORTER Template Description
													airbags. Use this template if you have selected the WSID Driver, ES-2re Passenger configuration. Alternatively, use the "C-NCAP Far Side Protocol 2024 Virtual Assessment Certifi

Loadcase	Driver	Passenger	Automotive Assesments: Crash Test	Automotive Assesments: Regulation	Automotive Assesments: Version	What am I trying to assess?	Which occupant am I assessing?	C-NCAP Management Regulation Protocol	Section	How do I postprocess this interactively?	REPORTER Template	REPORTER Template Description
												cate (WSID Driver, WSID Passenger)" template.
Side Pole	WSID	WSID	Side Pole	CNCAP	2024 (WSID+WSID)	Virtual Assessment Certificate correlation fitting indices as a prerequisite for the symmetry of far side occu	WSID Driver, WSID Passenger	Appendix H Far Side Occupant Protection Protocol	H.1.2.2.2	SimVT	C-NCAP Far Side Protocol 2024 Virtual Assessment Certificate (WSID Driver, WSID Passenger)	Uses SimVT to calculate the Virtual Assessment Certificate correlation fitting indices in accordance with section H.1.2.2.2 of the C-NCAP Far

Loadcase	Driver	Passenger	Automotive Assesments: Crash Test	Automotive Assesments: Regulation	Automotive Assesments: Version	What am I trying to assess?	Which occupant am I assessing?	C-NCAP Management Regulation Protocol	Section	How do I postprocess this interactively?	REPORTER Template	REPORTER Template Description
						pant protection airbags						Side Protocol (2024 Edition), as a prerequisite for the symmetry of far side occupant protection airbags. Use this template if you have selected the WSID Driver, WSID Passenger config

Loadcase	Driver	Passenger	Automotive Assessments: Crash Test	Automotive Assessments: Regulation	Automotive Assessments: Version	What am I trying to assess?	Which occupant am I assessing?	C-NCAP Management Regulation Protocol	Section	How do I postprocess this interactively?	REPORTER Template	REPORTER Template Description
												uration. Alternatively, use the "C-NCAP Far Side Protocol 2024 Virtual Assessment Certificate (WSID Driver, ES-2re Passenger)" template.
Sled	WSID	None	Far Side Sled	CNCAP	2024 (WSID)	Far Side Occupant Injury Assessm	WSID Driver	Chapter III Assessment Methods and	1.2.1.5.3 and Table H.1	Automotive Assessments	C-NCAP Far Side Protocol 2024 Wor	Performs the WSID occupant injury asses

Loadcase	Driver	Passenger	Automotive Assessments: Crash Test	Automotive Assessments: Regulation	Automotive Assessments: Version	What am I trying to assess?	Which occupant am I assessing?	C-NCAP Management Regulation Protocol	Section	How do I postprocess this interactively?	REPORTER Template	REPORTER Template Description
						ent for one of Working Conditions 1-6		Appendix H Far Side Occupant Protection Protocol			king Conditions 1-6	sment for the C-NCAP Far Side Protocol Working Conditions 1 to 6 (Table H.1) as specified in Chapter III, section 1.2.1.5.3 of the C-NCAP Management Regulation (2024 Edition).

	Loadcase	Driver	Passenger	Automotive Assessments: Crash Test	Automotive Assessments: Regulation	Automotive Assessments: Version	What am I trying to assess?	Which occupant am I assessing?	C-NCAP Management Regulation Protocol	Section	How do I postprocess this interactively?	REPORTER Template	REPORTER Template Description
	Sled	WSID	None	Far Side Sled	CNCAP	2024 (WSID)	Far Side Occupant Injury Assessment for one of Working Conditions 1-6 and Correction Factor A	WSID Driver	Chapter III Assessment Methods and Appendix H Far Side Occupant Protection Protocol	1.2.1.5.3, Table H.1 and section H.1.2.1.6	Automotive Assessments	C-NCAP Far Side Protocol 2024 Working Conditions 1-6 with Correction Factor A	Performs the WSID occupant injury assessment for the C-NCAP Far Side Protocol Working Conditions 1 to 6 (Table H.1) as specified in Chapter III, section 1.2.1.5.3 of the C-NCAP Manageme

Loadcase	Driver	Passenger	Automotive Assessments: Crash Test	Automotive Assessments: Regulation	Automotive Assessments: Version	What am I trying to assess?	Which occupant am I assessing?	C-NCAP Management Regulation Protocol	Section	How do I postprocess this interactively?	REPORTER Template	REPORTER Template Description
												nt Regulation (2024 Edition) and the Correction Factor A (CFA) calculation according to section H.1.2.1.6 of the C-NCAP Far-Side Occupant Protection Protocol (2024).

	Loadcase	Driver	Passenger	Automotive Assesments: Crash Test	Automotive Assesments: Regulation	Automotive Assesments: Version	What am I trying to assess?	Which occupant am I assessing?	C-NCAP Management Regulation Protocol	Section	How do I postprocess this interactively?	REPORTER Template	REPORTER Template Description
	Sled	WSID	None	Far Side Sled	CNCAP	2024 (WSID)	ISO Correlation Fitting Indices for one of Working Conditions 1-6	WSID Driver	Appendix H Far Side Occupant Protection Protocol	Table H.1 and section H.1.2.1.3	SimVT	C-NCAP Far Side Protocol 2024 Working Conditions 1-6 SimVT	Uses SimVT to calculate the ISO correlation fitting indices and validation of selected simulation sled test Working Condition (1 to 6) with the corresponding physical sled test, according

	Loadcase	Driver	Passenger	Automotive Assessments: Crash Test	Automotive Assessments: Regulation	Automotive Assessments: Version	What am I trying to assess?	Which occupant am I assessing?	C-NCAP Management Regulation Protocol	Section	How do I postprocess this interactively?	REPORTER Template	REPORTER Template Description
													to section H.1.2.1.3 of the C-NCAP Far Side Occupant Protection Protocol (2024 Edition).
	Sled	SID-IIs	None	Far Side Sled	CNCAP	2024 (SID2-SBLD)	Far Side Occupant Injury Assessment for one of Working Conditio	SID-IIs Driver	Chapter III Assessment Methods and Appendix H Far Side Occupant Protection	1.2.1.5.3 and Table H.1	Automotive Assessments	C-NCAP Far Side Protocol 2024 Working Conditions 7-8	Performs the SID-IIs occupant injury assessment for the C-NCAP Far Side Protocol Worki

Loadcase	Driver	Passenger	Automotive Assessments: Crash Test	Automotive Assessments: Regulation	Automotive Assessments: Version	What am I trying to assess?	Which occupant am I assessing?	C-NCAP Management Regulation Protocol	Section	How do I postprocess this interactively?	REPORTER Template	REPORTER Template Description
						ns 7-8		Protocol				ng Conditions 7 and 8 (Table H.1) as specified in Chapter III, section 1.2.1.5.3 of the C-NCAP Management Regulation (2024 Edition).
Sled	SID-IIs	None	Far Side Sled	CNCAP	2024 (SID2-SBLD)	Far Side Occupant Injury Assessment	SID-IIs Driver	Chapter III Assessment Methods and Appe	1.2.1.5.3, Table H.1 and section	Automotive Assessments	C-NCAP Far Side Protocol 2024 Working	Performs the SID-IIs occupant injury assessment

	Loadcase	Driver	Passenger	Automotive Assessments: Crash Test	Automotive Assessments: Regulation	Automotive Assessments: Version	What am I trying to assess?	Which occupant am I assessing?	C-NCAP Management Regulation Protocol	Section	How do I postprocess this interactively?	REPORTER Template	REPORTER Template Description
							for one of Working Conditions 7-8 and Correction Factor A		ndix H Far Side Occupant Protection Protocol	H.1.2.1.6		Conditions 7-8 with Correction Factor A	for the C-NCAP Far Side Protocol Working Conditions 7 and 8 (Table H.1) as specified in Chapter III, section 1.2.1.5.3 of the C-NCAP Management Regulation (2024 Edition) and the Corre

	Loadcase	Driver	Passenger	Automotive Assessments: Crash Test	Automotive Assessments: Regulation	Automotive Assessments: Version	What am I trying to assess?	Which occupant am I assessing?	C-NCAP Management Regulation Protocol	Section	How do I postprocess this interactively?	REPORTER Template	REPORTER Template Description
													ction Factor A (CFA) calculation according to section H.1.2.1.6 of the C-NCAP Far-Side Occupant Protection Protocol (2024).
	Sled	SID-IIs	None	Far Side Sled	CNCAP	2024 (SID2-SBLD)	ISO Correlation Fitting Indices for one	SID-IIs Driver	Appendix H Far Side Occupant Protection Protocol	Table H.1 and section H.1.2.1.3	SimVT	C-NCAP Far Side Protocol 2024 Working Con	Uses SimVT to calculate the ISO correlation fitting

	Loadcase	Driver	Passenger	Automotive Assessments: Crash Test	Automotive Assessments: Regulation	Automotive Assessments: Version	What am I trying to assess?	Which occupant am I assessing?	C-NCAP Management Regulation Protocol	Section	How do I postprocess this interactively?	REPORTER Template	REPORTER Template Description
							of Working Conditions 7-8					ditions 7-8 SimVT	indices and validation of selected simulation sled test Working Condition (7 to 8) with the corresponding physical sled test, according to section H.1.2.1.3 of the C-NCAP Far Side Occup

Loadcase	Driver	Passenger	Automotive Assessments: Crash Test	Automotive Assessments: Regulation	Automotive Assessments: Version	What am I trying to assess?	Which occupant am I assessing?	C-NCAP Management Regulation Protocol	Section	How do I postprocess this interactively?	REPORTER Template	REPORTER Template Description
												ant Protection Protocol (2024 Edition).

中文 (Chinese)

C-NCAP 侧面远端乘员保护规程 (2024 版)

C-NCAP 2024 VTC 虚拟测评标准格式模板 (Far Side 1-8, O2O)

C-NCAP 侧面远端乘员保护规程

C-NCAP 侧面远端乘员保护规程由《C-NCAP管理规则（2024版）》的附录 H 定义。我们在此处统称为“C-NCAP 2024 侧面远端规程”。

该规程包含多个组成部分:

1. 八个单乘员滑台工况中，被抽检的一个工况的仿真结果与试验结果曲线的相关性拟合指标
2. 对该抽检工况进行仿真和试验测试的伤害评估，以计算修正系数 A
3. 对剩余七个工况的伤害值评估
4. 计算双乘员侧面柱碰撞工况罚分，由附录 D 侧面柱碰撞副驾假人伤害值得出，最高罚 1.5 分
5. 如果车辆配备了远端乘员保护对策（中置气囊），并希望通过虚拟测评方式进行气囊保护对称性验证：
    - 虚拟测评证明（附录 D 侧面柱碰撞中主副驾假人的仿真与试验结果曲线的相关性拟合结果）
    - 进行气囊保护对称性验证，即撞击副驾一侧的侧面柱碰撞工况，提取主驾假人伤害值，主驾假人类型与附录 D 侧面柱碰中副驾假人保持一致，若主驾假人伤害值不满足要求，则罚 0.5 分
6. 计算总分

C-NCAP 2024 侧面远端规程评分流程导览：由 Workflows 提供全流程支持

C-NCAP 2024 侧面远端乘员保护规程的评分流程图如下所示，该流程图展示如何在 PRIMER 中使用 Workflows 里的 Automotive Assessments 模块设置用户数据，随后使用多个 REPORTER 自动报告模板生成详细结果报告。

REPORTER 自动化报告模板

我们提供了如下的 REPORTER
自动化报告模板，用于进行伤害值评分与曲线相关性拟合对标。请查看以下指南：

1. C-NCAP Far Side Protocol 2024 Working Conditions 1-6 SimVT (and 7-8 SimVT)
滑台工况 1 - 6 / 7 - 8 相关性对标证明

2. Working Conditions 1 to 8 (and Correction Factor A) 修正系数 A (抽检滑台工况 1 - 6, WSID) / (7 - 8, SID-IIs)

1. C-NCAP Far Side Protocol 2024 Virtual Assessment Certificate
气囊对称性虚拟测评证明

2. Dual Occupant Penalties 罚分项

3. Summary Template 总体得分计算模板

参考信息表

下方表格列出了：

- 第 1-3 列: C-NCAP 侧面远端乘员保护规程中涉及的工况、主驾和副驾假人类型
- 第 4-6 列: 在 PRIMER 中使用 Workflows 里的 Automotive Assessments 模块设置用户数据时需要选择的测试工况、规程，和版本
- 第 7-8 列: 选择规程，从对应假人中提取结果
- 第 9-10 列: 规程中关于该工况的具体章节
- 第 11 列: 使用对应虚拟测评 Workflows
工具来进行后处理。请注意，部分计算结果（例如罚分项）只能通过 REPORTER
自动化报告模板提取
- 第 12-13 列: 使用对应 REPORTER 自动化报告模板提取结果，生成详细报告

工况	主驾	副驾	Automotive Assessments 中的 Crash Test 英文选项	Automotive Assessments 中的 Regulation 规程选项	Automotive Assessments 中的 Version 版本选项	需要提取的内容	从对应假人提取结果	C-NCAP 规则相关部分	章节	相关 Workflow 后处理模块（英文名称）	REPORTER 报告模板	模板描述
所有	任何	任何	Any	CNCAP	Any	C-NCAP 虚拟测评模型质量要求	任何	附录 H 侧面远端乘员保护规程	H.1.1 (f)	C-NCAP VTC Quality Criteria	C-NCAP 虚拟测评模型质量要求	此模板用于提取虚拟测评模型质量要求，具体内容详见 C-NCAP 2024 侧面远端乘员保护规程，附录 H.1.1 (f)
所有	任何	任何	Any	CNCAP	Any	C-NCAP 虚拟测评摄像视频	任何	附录 H 侧面远端乘员保护规程	H.2.8	C-NCAP VTC Videos	C-NCAP 虚拟测评摄像视频	此模板用于生成 C-NCAP 2024 侧面远端乘员保护规程中要求的所有摄像视频（附录 H.2.8 中的表格 H.8）

工况	主驾	副驾	**Automotive Assessments中的Crash Test英文选项**	**Automotive Assessments中的Regulation规程选项**	**Automotive Assessments中的Version版本选项**	**需要提取的内容**	**从对应假人提取结果**	**C-NCAP规则相关部分**	**章节**	**相关Workflow后处理模块（英文名称）**	**REPORTER报告模板**	**模板描述**
所有	任何	任何	Any	CNCAP	Any	侧面远端乘员保护总体得分	多个	第三章评价方法	1.2.1.5	REPORTER template	C-NCAP 2024 侧面远端乘员保护总体得分表	此模板在考虑 8 个单乘员远端滑台工况、双乘员侧柱碰副驾罚分，和气囊对称性验证罚分的情况下，得出 C-NCAP 2024 侧面远端乘员保护总体得分表，具体规则详见 C-NCAP 2024 管理规则第三章第 1.2.1.5 节
侧面远端柱碰	ES-2re	WSID	Far Side Pole	CNCAP	2024(ES-2re+W	气囊对称性验证罚分（最高 0.5 分）	ES-2re主驾	第三章评价方法和附录	1.2.1.5	Automotive Assessments	C-NCAP 2024 侧面远端规程气囊对	气囊对称性验证工况 (附录 H.1.2.2.2) 要求主驾假人与附录 D 侧面柱碰中的副驾假人保持一致，若您在侧面柱碰中使用的副驾假人

工况	主驾	副驾	Automotive Assessments 中的 Crash Test 英文选项	Automotive Assessments 中的 Regulation 规程选项	Automotive Assessments 中的 Version 版本选项	需要提取的内容	从对应假人提取结果	C-NCAP 规则相关部分	章节	相关 Workflow 后处理模块（英文名称）	REPORTER 报告模板	模板描述
					SID)			H 侧面远端乘员保护规程	.4 和 H.1.2.2.2		称性验证罚分(副驾侧柱碰, ES-2re 主驾)	是 ES-2re，则使用本模板计算碰撞侧为副驾一侧，主驾 ES-2re 假人的伤害评估值，得出 C-NCAP 侧面远端气囊对称性罚分，最高罚 0.5 分，假人伤害要求详见 C-NCAP 2024 管理规则第三章第 1.2.1.5.4 节
侧面远端	WSID	WSID	Far Side Pole	CNCAP	2024 (WSID+W	气囊对称性验证罚分（最高 0.5 分）	WSID 主驾	第三章评价方法	1.2.1.	Automotive Assessments	C-NCAP 2024 侧面远端规程	气囊对称性验证工况(附录 H.1.2.2.2) 要求主驾假人与附录 D 侧面柱碰中的副驾假人

工况	主驾	副驾	**Automotive Assessments中的Crash Test英文选项**	**Automotive Assessments中的Regulation规程选项**	**Automotive Assessments中的Version版本选项**	**需要提取的内容**	**从对应假人提取结果**	**C-NCAP规则相关部分**	**章节**	**相关Workflow后处理模块(英文名称)**	**REPORTER报告模板**	**模板描述**
柱碰					SID)			和附录H侧面远端乘员保护规程	5.4和H.1.2.2		气囊对称性验证罚分(副驾侧柱碰, WSID主驾)	保持一致，若您在侧面柱碰中使用的副驾假人是WSID，则使用本模板计算碰撞侧为副驾一侧，主驾WSID假人的伤害评估值，得出C-NCAP侧面远端气囊对称性罚分，最高罚0.5分，假人伤害要求详见C-NCAP 2024管理规则第三章第1.2.1.5.4节

工况	主驾	副驾	Automotive Assessments中的Crash Test英文选项	Automotive Assessments中的Regulation规程选项	Automotive Assessments中的Version版本选项	需要提取的内容	从对应假人提取结果	C-NCAP规则相关部分	章节	相关Workflow后处理模块（英文名称）	REPORTER报告模板	模板描述
侧面柱碰	WSID	ES-2re	Side Pole	CNCAP	2024(WSID+ES-2re)	双乘员侧面柱碰罚分（最高1.5分）	ES-2re副驾	第三章评价方法	1.2.1.5.4	Automotive Assessments	C-NCAP 2024侧面远端规程双乘员罚分(侧面柱碰, ES-2re副驾)	计算附录D侧面柱碰中副驾ES-2re假人的伤害评估值，得出C-NCAP侧面远端双乘员罚分，最高罚1.5分，具体规则详见C-NCAP 2024管理规则第三章第1.2.1.5.4节
侧面柱碰	WSID	WSID	Side Pole	CNCAP	2024(WSID+WSID)	双乘员侧面柱碰罚分（最高1.5分）	WSID副驾	第三章评价方法	1.2.1.5	Automotive Assessments	C-NCAP 2024侧面远端规程双乘员罚分	计算附录D侧面柱碰中副驾WSID假人的伤害评估值，得出C-NCAP侧面远端双乘员罚分，最高罚1.5

工况	主驾	副驾	Automotive Assessments中的Crash Test英文选项	Automotive Assessments中的Regulation规程选项	Automotive Assessments中的Version版本选项	需要提取的内容	从对应假人提取结果	C-NCAP规则相关部分	章节	相关Workflow后处理模块(英文名称)	REPORTER报告模板	模板描述
									.4		(侧面柱碰, WSID副驾)	分，具体规则详见 C-NCAP 2024 管理规则第三章第 1.2.1.5.4 节
侧面柱碰	WSID	ES-2re	Side Pole	CNCAP	2024(WSID+ES-2re)	侧面柱碰主驾伤害评估	WSID主驾	第三章评价方法和附录D侧面柱碰撞试验规程	1.2.1.4和附录D	Automotive Assessments	C-NCAP 2024 侧面柱碰撞试验规程(WSID主驾, ES-2re副驾)	依据 C-NCAP 2024 侧面柱碰规程，评估主驾 WSID 假人的损伤，详见第三章第 1.2.1.4 节和附录 D 如果您主驾为 WSID 假人，副驾为 ES-2re 假人，请使用本模板。另一个模板为“C-NCAP 2024 侧面柱碰撞试验规程

工况	主驾	副驾	Automotive Assessments 中的 Crash Test 英文选项	Automotive Assessments 中的 Regulation 规程选项	Automotive Assessments 中的 Version 版本选项	需要提取的内容	从对应假人提取结果	C-NCAP 规则相关部分	章节	相关 Workflow 后处理模块(英文名称)	REPORTER 报告模板	模板描述
												(WSID 主驾, ES-2re 副驾)”
侧面柱碰	WSID	WSID	Side Pole	C-NCAP	2024 (WSID+WSID)	侧面柱碰主驾伤害评估	WSID 主驾	第三章 评价方法和附录 D 侧面柱碰撞试验规程	1.2.1.4 和附录 D	Automotive Assessments	C-NCAP 2024 侧面柱碰撞试验规程 (WSID 主驾, WSID 副驾)	依据 C-NCAP 2024 侧面柱碰规程，评估主驾 WSID 假人的损伤，详见第三章第 1.2.1.4 节和附录 D 如果您主驾和副驾均为 WSID，请使用本模板。另一个模板为“C-NCAP 2024 侧面柱碰撞试验规程

工况	主驾	副驾	Automotive Assessments中的Crash Test英文选项	Automotive Assessments中的Regulation规程选项	Automotive Assessments中的Version版本选项	需要提取的内容	从对应假人提取结果	C-NCAP规则相关部分	章节	相关Workflow后处理模块(英文名称)	REPORTER报告模板	模板描述
												(WSID 主驾, WSID 副驾)”
侧面柱碰	WSID	ES-2re	Side Pole	CNCAP	2024 (WSID+ES-2re)	虚拟测评证明中的 ISO 相关性拟合指标值，用于满足远端乘员保护气囊对称性验证	WSID 主驾, ES-2re 副驾	附录H 侧面远端乘员保护规程	H.1.2.2.2	SimVT	C-NCAP 2024 侧面远端规程气囊对称性虚拟测评证明 (侧面柱碰, WSID	远端乘员保护气囊对称性验证需要先提供虚拟测评证明。本模板使用 SimVT 计算附录 D 侧面柱碰物理试验和虚拟仿真的 ISO 相关性拟合指标值（C-NCAP 2024 远端规程，H.1.2.2.2） 如果您在附录 D 侧面柱碰中的主驾假人

工况	主驾	副驾	Automotive Assessments中的Crash Test英文选项	Automotive Assessments中的Regulation规程选项	Automotive Assessments中的Version版本选项	需要提取的内容	从对应假人提取结果	C-NCAP规则相关部分	章节	相关Workflow后处理模块(英文名称)	REPORTER报告模板	模板描述
											主驾, ES-2re 副驾)	是 WSID，副驾为 ES-2re，请使用此模板。另一个模板为主驾和副驾均为 WSID 的设定
侧面柱碰	WSID	WSID	Side Pole	CNCAP	2024 (WSID+WSID)	虚拟测评证明中的 ISO 相关性拟合指标值，用于满足远端乘员保护气囊对称性验证	WSID 主驾, WSID 副驾	附录H 侧面远端乘员保护规程	H.1.2.2	SimVT	C-NCAP 2024 侧面远端规程气囊对称性虚拟测评证明(侧面柱碰,	远端乘员保护气囊对称性验证需要先提供虚拟测评证明。本模板使用 SimVT 计算附录 D 侧面柱碰物理试验和虚拟仿真的 ISO 相关性拟合指标值（C-NCAP 2024 远端规程，H.1.2.2.2） 如果您在附录 D

工况	主驾	副驾	Automotive Assessments 中的 Crash Test 英文选项	Automotive Assessments 中的 Regulation 规程选项	Automotive Assessments 中的 Version 版本选项	需要提取的内容	从对应假人提取结果	C-NCAP 规则相关部分	章节	相关 Workflow 后处理模块 (英文名称)	REPORTER 报告模板	模板描述
											WSID 主驾, WSID 副驾)	侧面柱碰中的主驾和副驾均为 WSID，请使用此模板。另一个模板为主驾假人为 WSID，副驾为 ES-2re 的设定
滑台	WSID	无	Far Side Sled	CNCAP	2024 (WSID)	远端乘员保护虚拟测评工况 1 - 6	WSID 主驾	第三章评价方法和附录 H 侧面远端乘员	1.2.1.5.3 和表格	Automotive Assessments	C-NCAP 2024 侧面远端虚拟测评滑台工况 1 - 6 (WSID)	提取 C-NCAP 2024 侧面远端规程虚拟测评单乘员滑台工况 1 - 6 中 WSID 假人的伤害值。详见 C-NCAP 2024 附录 H 表格 H.1

工况	主驾	副驾	Automotive Assessments中的Crash Test英文选项	Automotive Assessments中的Regulation规程选项	Automotive Assessments中的Version版本选项	需要提取的内容	从对应假人提取结果	C-NCAP规则相关部分	章节	相关Workflow后处理模块(英文名称)	REPORTER报告模板	模板描述
								保护规程	H.1			
滑台	WSID	无	Far Side Sled	C-NCAP	2024 (WSID)	远端乘员保护虚拟测评工况 1 - 6 和虚拟测评修正系数 A	WSID 主驾	第三章 评价方法和附录 H 侧面远端乘员保护规程	1.2.1.5.3, 表格 H.1	Automotive Assessments	C-NCAP 2024 侧面远端虚拟测评修正系数 A (抽检滑台工况 1 - 6, WSID)	提取 C-NCAP 2024 侧面远端规程虚拟测评单乘员滑台工况 1 - 6 中被抽检选中的工况中 WSID 假人的伤害值，并与抽检工况物理试验结果比对，得出修正系数 A。详见 C-NCAP 2024 附录 H 表格 H.1，和 H.1.2.1.6

工况	主驾	副驾	Automotive Assessments中的Crash Test英文选项	Automotive Assessments中的Regulation规程选项	Automotive Assessments中的Version版本选项	需要提取的内容	从对应假人提取结果	C-NCAP规则相关部分	章节	相关Workflow后处理模块(英文名称)	REPORTER报告模板	模板描述
									和章节 H.1.2.1.6			
滑台	WSID	无	Far Side Sled	C NCAP	2024 (WSID)	工况 1 - 6 的 ISO 相关性拟合结果	WSID 主驾	附录 H 侧面远端乘员	表格 H.1	SimVT	C-NCAP 2024 侧面远端虚拟测评	使用 SimVT 计算滑台工况 1 - 6 虚拟测评的 ISO 相关性拟合指标值，对比抽检试验和虚拟测评

工况	主驾	副驾	Automotive Assessments中的Crash Test英文选项	Automotive Assessments中的Regulation规程选项	Automotive Assessments中的Version版本选项	需要提取的内容	从对应假人提取结果	C-NCAP规则相关部分	章节	相关Workflow后处理模块（英文名称）	REPORTER报告模板	模板描述
								保护规程	和章节H.1.2.1.3		滑台工况 1 - 6 相关性对标证明(WSID)	结果。详见 C-NCAP 2024 附录 H 章节 H.1.2.1.3
滑台	SID-IIs	无	Far Side Sled	CNCAP	2024(SID2-SB)	远端乘员保护虚拟测评工况 7 - 8	SID-IIs主驾	第三章评价方法和	1.2.1.5	Automotive Assessments	C-NCAP 2024 侧面远端虚拟测评	提取 C-NCAP 2024 侧面远端规程虚拟测评单乘员滑台工况 7 - 8 中 SID-IIs 假人的伤害值。详见 C-

工况	主驾	副驾	Automotive Assessments中的Crash Test英文选项	Automotive Assessments中的Regulation规程选项	Automotive Assessments中的Version版本选项	需要提取的内容	从对应假人提取结果	C-NCAP规则相关部分	章节	相关Workflow后处理模块(英文名称)	REPORTER报告模板	模板描述
					LD)			附录H 侧面远端乘员保护规程	.3和表格H.1		滑台工况 7 - 8 (SID-IIs)	NCAP 2024 附录 H 表格 H.1
滑台	SID-IIs	无	Far Side Sled	C NCAP	2024 (SID2-SBLD)	远端乘员保护虚拟测评工况 7 - 8 和虚拟测评修正系数 A	SID-IIs 主驾	第三章 评价方法和附录H 侧面远端	1.2.1.5.3,	Automotive Assessments	C-NCAP 2024 侧面远端虚拟测评修正系数 A (抽检	提取 C-NCAP 2024 侧面远端规程虚拟测评单乘员滑台工况 7 - 8 中被抽检选中的工况中 SID-IIs 假人的伤害值，并与抽检工况物理试验结果比对，得出修正系数 A。详见 C-NCAP 2024

工况	主驾	副驾	Automotive Assessments中的Crash Test英文选项	Automotive Assessments中的Regulation规程选项	Automotive Assessments中的Version版本选项	需要提取的内容	从对应假人提取结果	C-NCAP规则相关部分	章节	相关Workflow后处理模块(英文名称)	REPORTER报告模板	模板描述
								乘员保护规程	表格 H.1和章节 H.1.2.1.6		滑台工况 7 - 8 , SID-IIs)	附录 H 表格 H.1，和 H.1.2.1.6

工况	主驾	副驾	Automotive Assessments中的Crash Test英文选项	Automotive Assessments中的Regulation规程选项	Automotive Assessments中的Version版本选项	需要提取的内容	从对应假人提取结果	C-NCAP规则相关部分	章节	相关Workflow后处理模块(英文名称)	REPORTER报告模板	模板描述
滑台	SID-IIs	无	Far Side Sled	CNCAP	2024(SID2-SBLD)	工况 7 - 8 的 ISO 相关性拟合结果	SID-IIs主驾	附录H侧面远端乘员保护规程	表格 H.1和章节 H.1.2.1.3	SimVT	C-NCAP 2024侧面远端虚拟测评滑台工况 7 - 8 相关性对标证明(SID-IIs)	使用 SimVT 计算滑台工况 7 - 8 虚拟测评的 ISO 相关性拟合指标值，对比抽检试验和虚拟测评结果。详见 C-NCAP 2024 附录 H 章节 H.1.2.1.3

4.9.8.2. C-NCAP 2024 VTC 虚拟测评标准格式模板 (Far Side 1-8, O2O)

C-NCAP 2024 Far Side VTC 单乘员工况 1-8 汇总报告模板

- **REPORTER** 欢迎界面中选择 Automotive，“C-NCAP VTC 标准格式模板” 打开

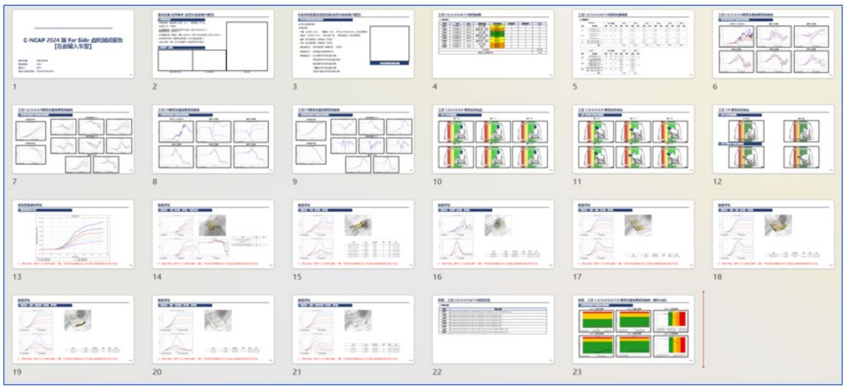
- **运行步骤：**

1. 对1-8中每个单独模型运行单工况正视图模板，结果保存在各个模型文件夹中
2. 运行 Far Side 虚拟测试报告模板，输入模型1-8的路径生成完整报告。最少输入一个模型即可生成报告，输入完整8个模型生成完整报告

注：需提前在 PRIMER / Workflows / Automotive Assessments 中定义 CNCAP 2024 Far Side Sled 工况的详细用户数据文件后再运行模板。

C-NCAP 2024 Far Side VTC 单乘员工况 1-8 汇总报告模板

- **报告内容包含：**
  1. 模型基本信息[用户填写]
  2. 8个工况模型的汇总得分表
  3. 8个工况模型的详细得分表
  4. 1-6 和 7-8 的曲线
  5. 头部偏移量彩图（*需对单个模型运行截图模板，然后本模板将自动抓取各个模型文件夹中的彩图插入到报告中）
  6. 附加质量
  7. 能量曲线和对应 Parts 的信息表
  8. 附录 – 输入的所有模型地址

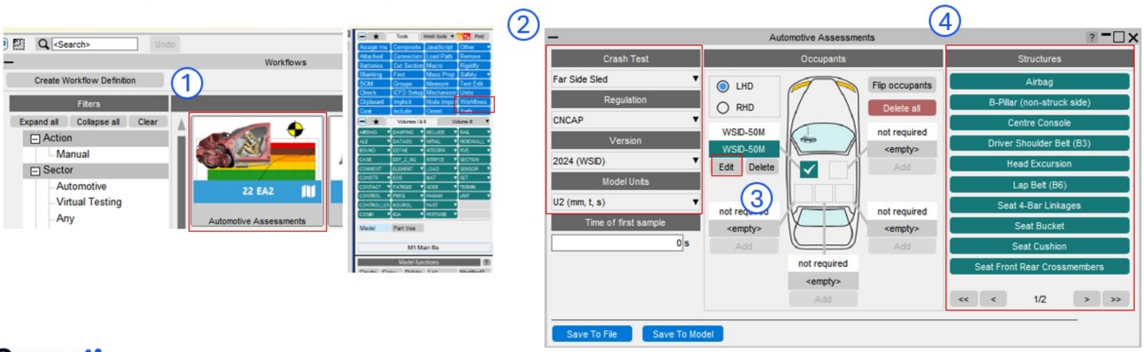


输出报告示例

C-NCAP 2024 Far Side VTC 用户数据 JSON 文件

PRIMER

1. 提取所有结果前，需在 **PRIMER** 中定义 workflows 用户数据 JSON 文件
2. 打开 Automotive Assessments，选择 Far Side Sled, CNCAP, 2024 (WSID) (或 SID2-SBLD，取决于您的工况是 1-6 或 7-8)
3. 填写假人输出 ID 信息
4. 填写结构输出信息。其中，Head Excursion 需完整定义才能计算头部得分 / 获得头部偏移量颜色区截图。相比 22.0 新增多个用于提取能量的新选项，请在相应的类别中选择相应的 Part



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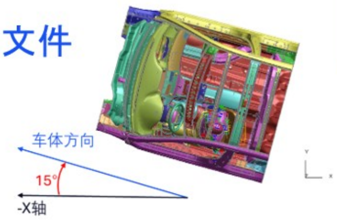
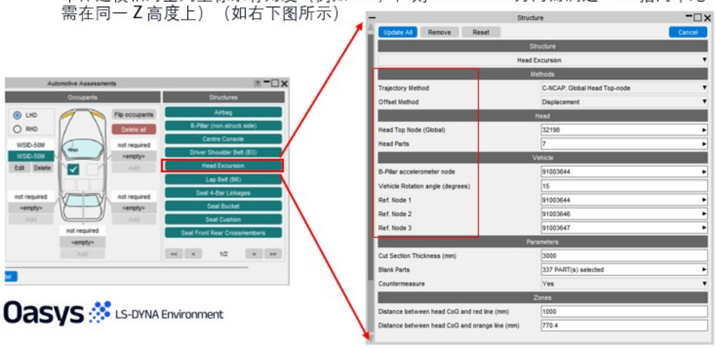
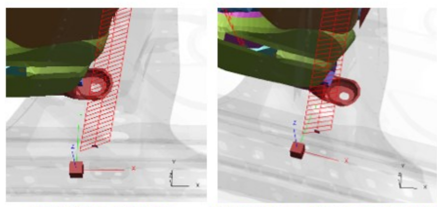
C-NCAP 2024 Far Side VTC 用户数据 JSON 文件

PRIMER



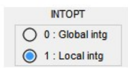
5. Head Excursion 的定义
   - “Trajectory Method”：选择C-NCAP即可;
   - “Offset Method”：选择Displacement 方法计算;
   - “Head Top Node(Global)”：选择假人头部顶端圆孔最前端点（用于提取头部偏移量）
   - “Head Part ”：选择一个假人头部part，用于显示使用，不参与计算;
   - “Vehicle Rotation angle (degree)”：如果车体方向并非朝向全局坐标系中的`-X`方向，而是存在一定的夹角，如上图所示，则在此处填入-X轴到车体方向的角度，以顺时针为正。因此图示模型中应该在此处填入15;（若车体朝向和全局 –X 一致，则填写 0 即可）
   - “B-Pillar accelerometer node”：选择 B 柱加速度计的 history node，当选择后，下方的 Ref. Node 1~3 会自动根据该加速度计的定义填入。**注意**：加速度计选择 **Local** 用于 T/HIS 头部偏移量计算. 若车体建模没有相对全局坐标系角度（即 0°），则 B 柱加速度计的 X Y Z 方向需要和全局坐标系保持一致；若车体建模相对全局坐标系有角度（例如 15°），则 local X Y Z 方向需满足：+X 指向车尾（N1 N2 定义），+ Y 由左侧主驾指向右侧副驾（N3 定义，N1 – N3 需在同一 Z 高度上）（如右下图所示）





车体建模和全局坐标系一致，车头指向 –X

车体建模相比全局坐标系有偏转角度的情况，局部加速度计方向定义



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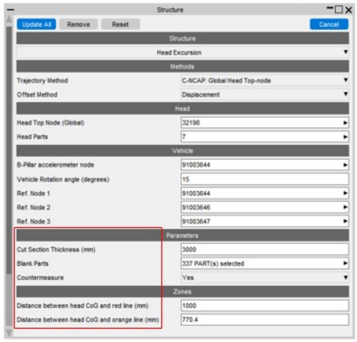
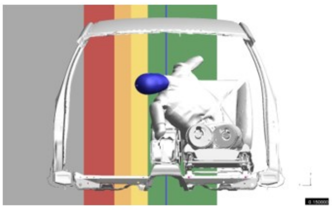
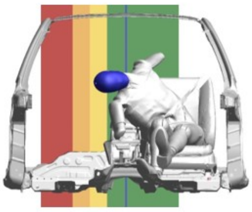
C-NCAP 2024 Far Side VTC 用户数据 JSON 文件

5. Head Excursion 的定义可参照slide11~12进行填写。
   - “Cut Section Thickness (mm)”：通过厚截面显示模型，推荐 800 mm 左右，此时在截图时会切到假人的腿部，如下左图所示；如果想截取完整的假人，同时避免汽车前方中控台等part的遮挡，可以在此处填入较大的数值，比如3000，同时在下方Blank Parts中选择汽车前方的part，得到的效果如下中图所示；
   - “Blank Parts”：隐藏不显示在动画中的 part，亦可确保模型主体最大化居中。用法如上一条所示；
   - “Countermeasure”：若车辆配备中置气囊，选择 yes (会影响得分计算)；
   - “Distance between Head CoG to Red Line(mm)”：头部中心点到红色线的距离，如右图所示；
   - “Distance between Head CoG to Orange Line(mm)”：头部中心点到橙色线的距离，如右图所示；

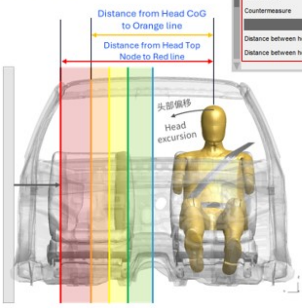




800 mm 截面，无 Blank Parts



2000 mm 截面，选中遮挡假人前方的 Parts 作为 Blank Parts



C-NCAP VTC 能量输出 Part 定义

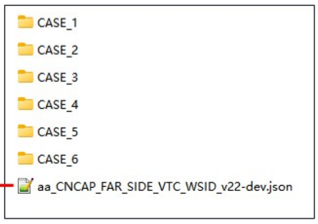
- Structures 中新增一些能量输出定义（其中气囊还有额外的压强输出）
- 请选择相应的 Part 至相应的类别中，所有需要的类别包括：Airbag, Centre Console, Seatbelt, Seat bucket, Seat cushion, Seat side member, Seat front rear crossmembers, Seat 4-bar linkages（对应气囊，中控，安全带，座盆，坐垫，座椅侧梁，前后梁，四连杆）
- 选中后保存用户数据，将在报告中自动获得能量数据和 Part 信息
- 填写完毕上述内容和 Head Excursion，确认都为深绿色后即可开始出报告（其他浅绿色未定义内容不影响报告输出）

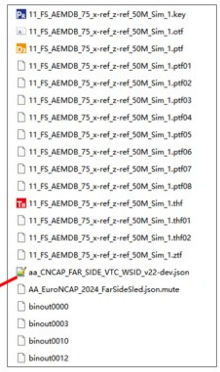
用户数据 JSON 文件管理

PRIMER

- 对于单个模型，推荐将 key 文件，动画和曲线文件放在同一个模型文件夹中
- 若多个模型（例如工况 1-6）所有的输出 ID 相同，那么它们可以共享一个用户数据 JSON 文件
- 您可以将一个共享的用户数据 JSON 文件放在上一级文件夹中，这样所有模型都可以共享这个文件（如下左图）
- 默认支持从打开模型的文件夹开始最多上跳 4 级搜索 JSON 文件
- 如果希望一个模型使用其专属的 JSON 文件，则直接将其保存在模型文件夹中即可（如下右图）
- 打开任何 key 文件，动画或曲线文件，需确保其所在文件夹或上跳 4 级文件夹之内可以搜索到其相应的用户数据 JSON 文件

Workflows 数据





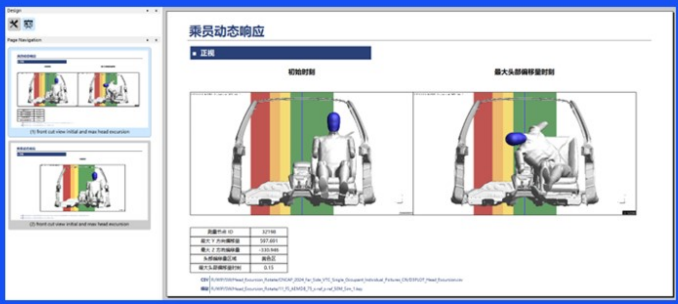
Workflows 数据

C-NCAP 2024 Far Side VTC 单乘员工况 1-8 汇总报告模板

REPORTER

- 在运行 CNCAP_2024_Far_Side_VTC_Single_Occupant_1-8_CN.ort 之前，需要先为每个模型单独运行 CNCAP_2024_Far_Side_VTC_Single_Occupant_Individual_Pictures_CN.ort template，以获得Head Excursion截图，随后运行 1-8 模板时会自动从各个模型文件夹中搜索图片粘贴进入完整报告。因此，我们建议您将各个工况的图片输出到各个模型的文件夹或其子文件夹中（一般默认情况下就可以实现）

C-NCAP 2024 Far Side 单工况正视图



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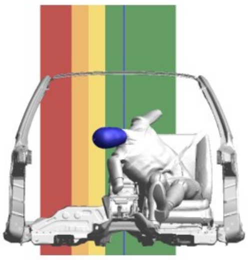
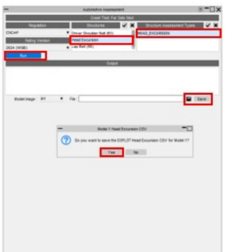
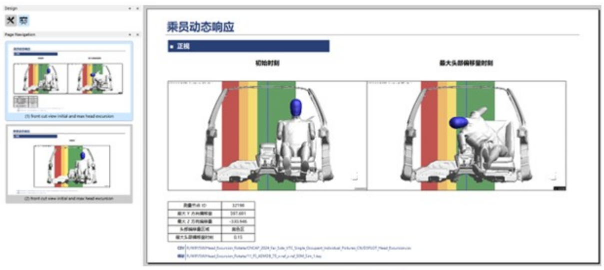
CNCAP 2024 Far Side VTC Single Occupant Individual Pictures

PRIMER

1. C-NCAP 2024 Far Side VTC Single Occupant Individual Pictures 是针对单个模型进行头部偏移量评估的工具，用于提供 C-NCAP 2024 Far Side VTC 整体报告中头部偏移量动画截图的部分。同时可生成头部偏移量 CSV 和 MP4 动画文件。
2. 请先根据本手册 5 – 9 页定义 Automotive Assessments 用户数据文件，特别是 6 - 7 页的头部偏移量数据。
3. 然后，您既可以在 D3PLOT 中手动输出头部偏移量截图 / CSV……
4. ……也可以跳过此步骤，直接在 REPORTER 输出报告。







D3PLOT

REPORTER

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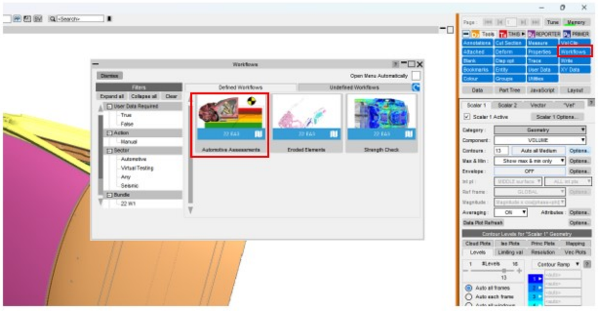
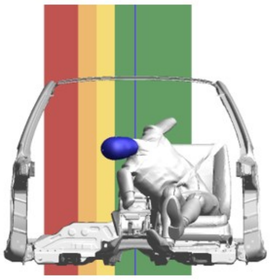
CNCAP 2024 Far Side VTC Single Occupant Individual Pictures

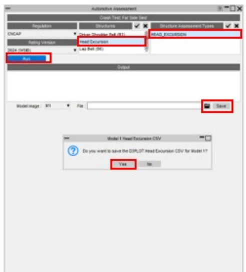
D3PLOT

5. 在D3plot中评估头部偏移量(Head Excursion Assessment)：Workflow→Automotive Assessment

- 在Structures 和 Structure Assessment Type中选择Head Excursion之后点击Run
- 运行结束前会弹出窗口询问是否保存头部偏移量结果，点击“Yes” 进行保存。
- 保存的CSV结果如右下图所示，包含时间和头部节点在X、Y、Z三个方向的位移。







	A	B	C	D
1	$	DX Node 32198	DY Node 32198	DZ Node 32198
2	CHANNELS	HEAD_EXCURSION_X	HEAD_EXCURSION_Y	HEAD_EXCURSION_Z
3	TIME	mm	mm	mm
4	0	-1.41E-11	2.50E-12	-7.08E-17
5	0.00999999	-0.306640625	0.429504395	0.033935547
6	0.019999979	-3.849121094	5.662902832	0.129852295
7	0.02999997	-11.69555664	17.27886963	0.258422852
8	0.039999958	-25.90429688	38.14611816	0.630523682
9	0.049999949	-47.99536133	69.84069824	1.228179932
10	0.059999939	-76.39672852	112	1.266357422
11	0.069999926	-109.0874023	162.5511475	0.226165771
12	0.079999916	-148.5532227	220.894104	-5.155822754

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***可跳过此步骤直接输出报告**

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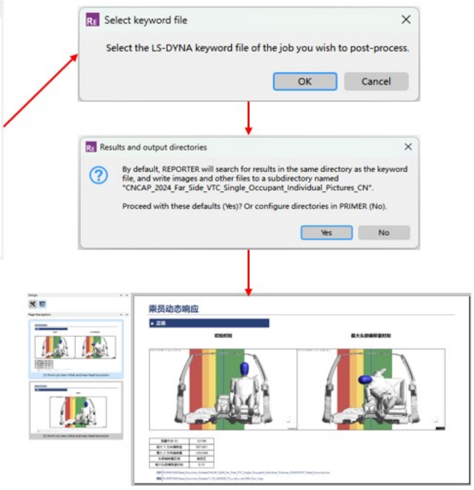
CNCAP 2024 Far Side VTC Single Occupant Individual Pictures

REPORTER

6. 在REPORTER中使用C-NCAP 2024 Far Side VTC Single Occupant Individual Pictures tool：

- 在REPORTER Library中, 选择C-NCAP 2024 Far Side 单工况正视图模板. 可以通过点击“Automotive → C-NCAP VTC 标准格式模板” 来快速找到该模板.



在reporter中，会额外捕捉一张模型初始时刻的图片以及在第二页中保存一个从开始到结束的视频文件。

所有图片，动画文件，和头部偏移量 CSV 文件将自动保存在输出结果的文件夹中。

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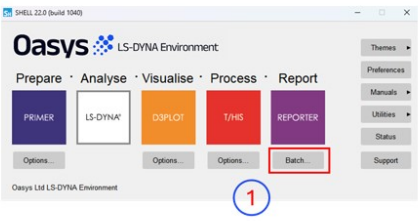
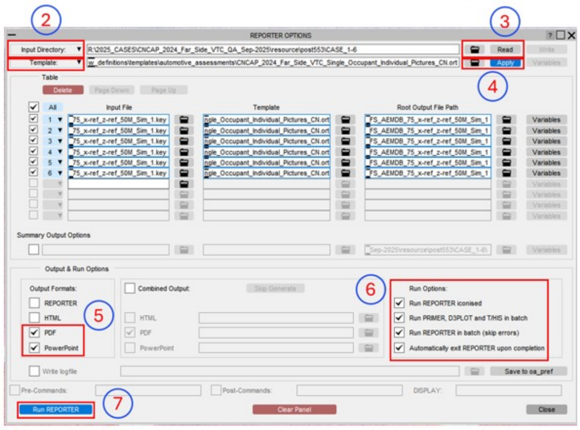
CNCAP 2024 Far Side VTC Single Occupant Individual Pictures

7. 使用 Batch Mode 批量运行 C-NCAP 2024 Far Side VTC Single Occupant Individual Pictures：
   ① 打开Shell，点击Reporter下方的Batch 按钮，打开右下图面板；
   ② 将左上角的`Input List`改为`Input Directory`，之后点击右侧的文件夹图标按钮，选择模型文件夹或更上一级的文件夹。
   ③ 软件会在点击`Read`之后，自动检索所选择文件夹下的所有模型文件并读取到下方。
   ④ 在Template中选择CNCAP_2024_Far_Side_VTC_Single_Occupant_Individual_Pictures_CN.ort，并点击Apply。
   ⑤ 在Output Formats中勾选需要输出的文件格式。
   ⑥ 在Run Options中建议全部勾选，以便于报告生成均在后台进行，减少弹窗。
   ⑦ 点击`Run REPORTER`开始生成报告。





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C-NCAP 2024 Far Side VTC 单乘员工况 1-8 汇总报告模板

- 打开模板后，**T/HIS** 将自动弹出模型选择窗口
- 请填入模型 **key** 文件，在同一个模型文件夹中，应包含 binout 数据用于提取伤害值，以及 Workflows 数据
- Workflows 产生的 Automotive Assessments 用户数据 JSON 文件需要事先按 C-NCAP 2024 Far Side Sled 定义完成，并保存在同一个模型文件夹中。若有多个模型共享一个 JSON 文件（例如工况 1-6 的所有模型），则可以把 JSON 文件放在上一级文件夹中。（最多支持上跳 4 级搜寻）
- **至少输入一个模型即可提取所有内容**。输入 8 个定义完整的模型可获得完整报告。若输入部分模型，所有能够获得的得分和曲线都会体现，剩余未输入的模型结果将在报告相应位置体现为缺失。

1.选择一个文件夹保存所有结果

2.选择模型 key 文件

4.点击 run 开始提取结果生成报告；
在模型选择完成后，可点击Save.lst按钮可以保存当前的设置到一个list文件，以便后续可以使用"Load.lst"来快速设置。**软件也会在 Output Directory 自动输出一个 Model.lst** 方便您后续直接选中进行重新加载

3.如果结果文件在其他位置，点击此处重新选择结果文件夹

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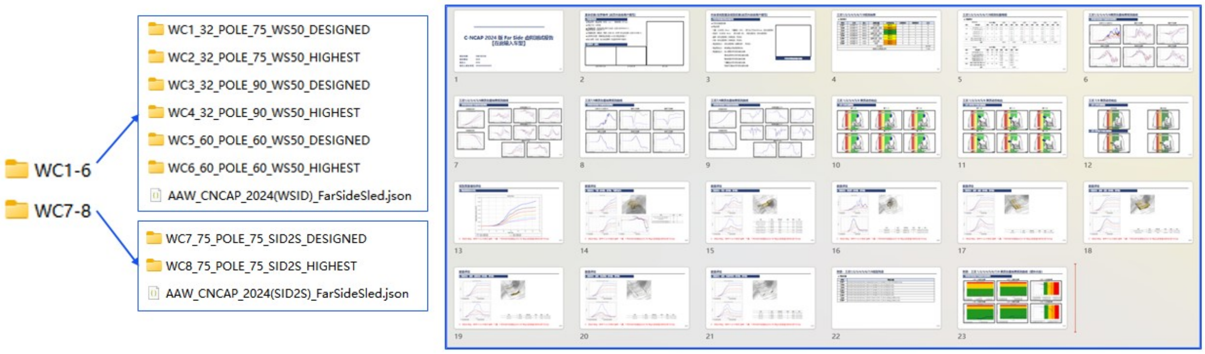
C-NCAP 2024 Far Side VTC 单乘员工况 1-8 汇总报告模板

REPORTER

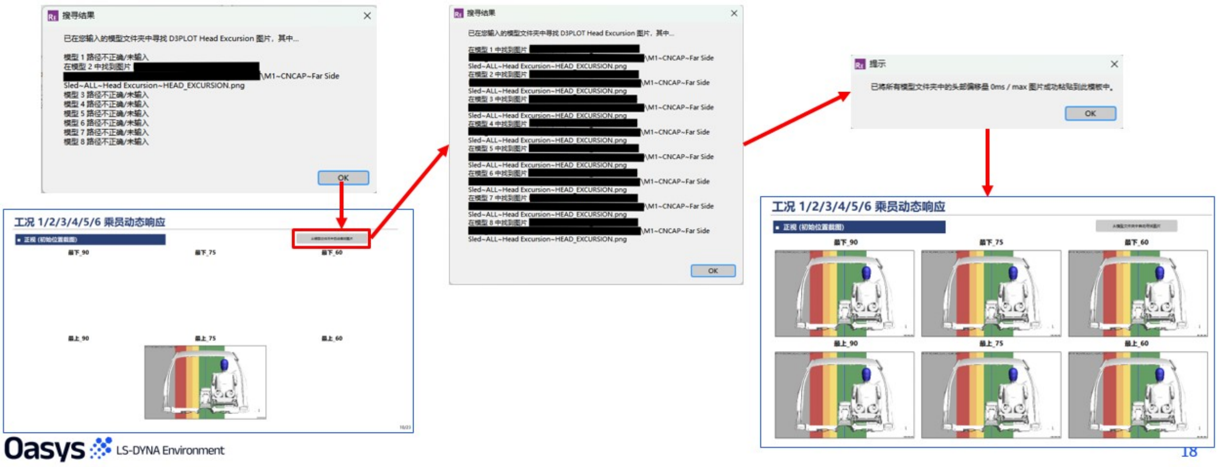
- 工况1~6可共享一个Automotive Assessment json 文件，因此可将json文件放置到工况1~6的更高一级的文件夹中，这样软件在检索用户数据时，即可使用同一个json文件。同理，对于工况7~8，也可将json文件放到工况7~8的父文件夹中。如下左图所示。如果所有json文件及模型结果均有效，最终得到的报告如下右图所示。
- 注意，需要避免模型工况与用户数据json文件对应工况不一致的情况（例如，工况1-6的模型文件夹内或其父级中可搜寻到的第一个json不能是工况7-8的文件）



C-NCAP 2024 Far Side VTC 单乘员工况 1-8 汇总报告模板

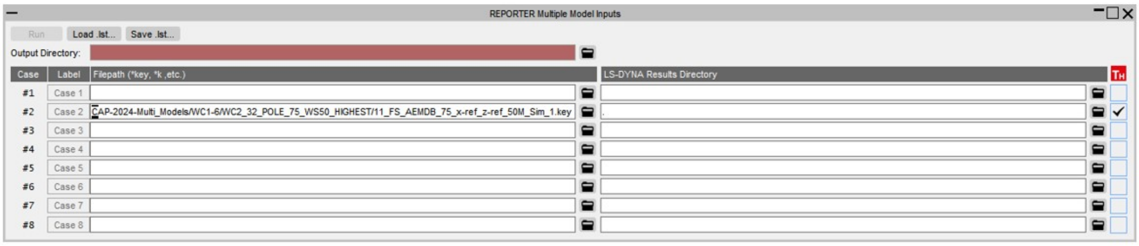
REPORTER

- 在手动运行CNCAP_2024_Far_Side_VTC_Single_Occupant_1-8_CN.ort template过程中，会提示Head Excursion图片搜寻结果，如下图所示为仅在case2中找到了相应的结果，此时需要为其他的模型单独运行CNCAP_2024_Far_Side_VTC_Single_Occupant_Individual_Pictures_CN.ort.，当相应图片生成在各个模型文件夹（或其子文件夹中）后，再回来点击本模板page10右上角的“从模型文件夹中自动寻找图片”刷新。



C-NCAP 2024 Far Side VTC 单乘员工况 1-8 汇总报告模板

- 打开模板后，**T/HIS** 将自动弹出模型选择窗口
- 请填入模型 **key** 文件，在同一个模型文件夹中，应包含 binout 数据用于提取伤害值，以及 Workflows 数据
- Workflows 产生的 Automotive Assessments 用户数据 JSON 文件需要事先按 C-NCAP 2024 Far Side Sled 定义完成，并保存在同一个模型文件夹中。若有多个模型共享一个 JSON 文件（例如工况 1-6 的所有模型），则可以把 JSON 文件放在上一级文件夹中。（最多支持上跳 4 级搜寻）
- **至少输入一个模型即可提取所有内容**。如果只选择1个模型，比如case2。在选择Output Directory之后，点击“Run”



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C-NCAP 2024 Far Side VTC 单乘员工况 1-8 汇总报告模板

- 运行结束后，报告如下所示，工况1~6的损伤图中只会显示case2的结果，工况7~8的损伤图则会显示“Missing Data”，在模型质量增加、能量评估和乘员损伤结果中，只显示case2的结果。

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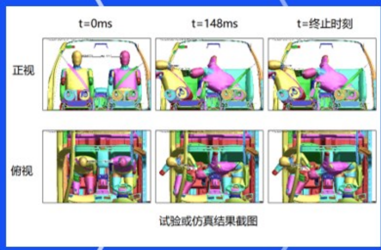
C-NCAP 2024 Far Side VTC
O2O VTC 报告模板 - 动画截图部分
（C-NCAP VTC 标准报告格式 ）



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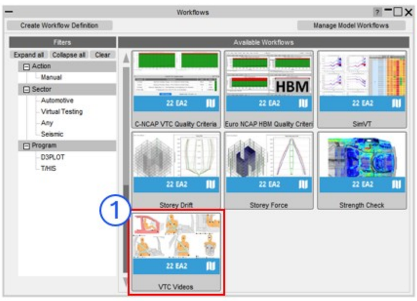
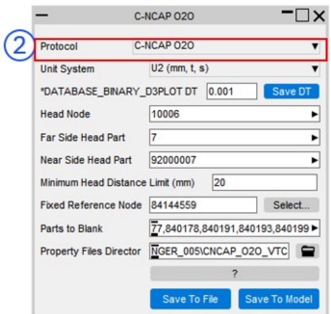
C-NCAP 2024 Far Side VTC O2O 用户数据 JSON 文件

PRIMER

1. 运行报告前，需在 **PRIMER** 中定义 workflows 用户数据 JSON 文件
2. 打开 VTC Vidoes，选择 C-NCAP O2O，填写所需的信息：
   - Head Node: 驾驶侧假人头部节点；
   - Far Side Head Part、Near Side Head Part: 分别选择远端假人头部part和近端假人头部part；
   - Fixed Reference Node: 选择动画输出中固定的点；
   - Parts to Blank: 选择需要隐藏的part，一般为假人前方的part；
   - Minimum Head Distance Limit: 判断Head Parts是否有接触风险的最小距离限值；
   - Property Files Directory: 图片输出所需的视角文件存储位置。





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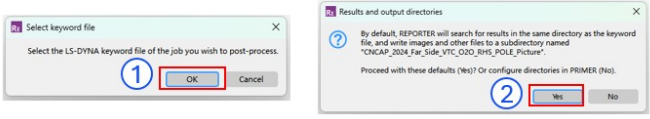
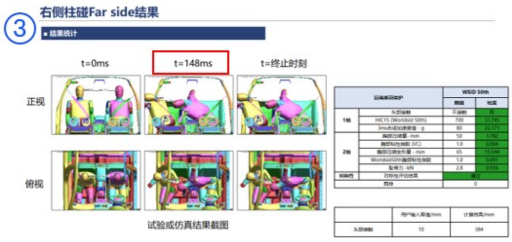
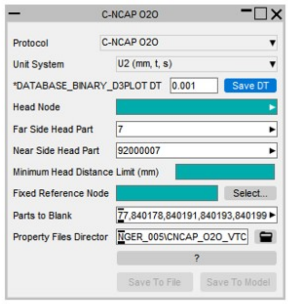
C-NCAP 2024 Far Side VTC O2O 报告

1. 运行报告，选择需要处理的模型，并点击“Yes”以将生成的图片文件保存至默认文件夹下。
2. 如果已经拥有所需的json文件，则自动生成完整的报告
3. 如果json文件丢失，或存在无效的数据，则会提示并弹出primer workflow以便填入所需的信息。
4. 在填入所有的信息之后，保存到json文件，reporter可以自动进行后续的输出。



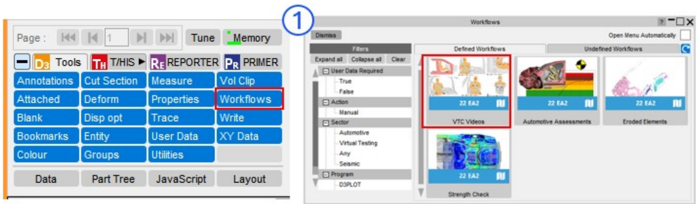


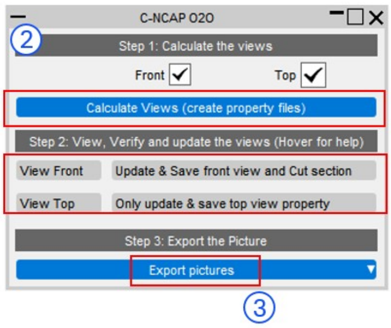
Reporter 可以捕捉到初始时刻，Far side Head part 和Near side Head Part 之间距离最小时刻，终止时刻的正视角和俯视角的图片。



C-NCAP 2024 Far Side VTC O2O 在D3PLOT中使用

1. 打开模型动画结果文件，并提前在 **PRIMER** 中定义 workflows 用户数据 JSON 文件
2. 打开 VTC Vidoes，点击“Calculate Views” 可自动生成正视角和俯视角的视图文件。
3. 点击“view Front” 或“view Top” 来检查生成的视角是否合适，如果不合适，可以调整视角后点击“Update & Save Front view and Cut section”/“Only Update & save top view property” 以更新视角。
4. 视角调整好之后，点击“Export pictures” 并选择输出图片的文件夹，可自动进行后续的图片截取。





C-NCAP VTC Quality Criteria
O2O(dual occupant) - 双乘员质量检查

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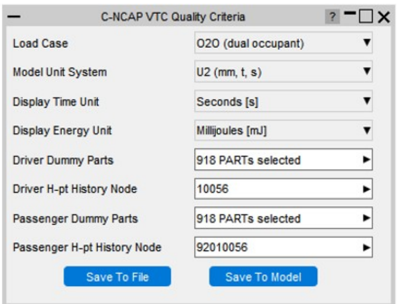
C-NCAP VTC Quality Criteria O2O(dual occupant)

PRIMER

1. The C-NCAP VTC Quality Criteria workflow O2O(dual occupant) tool is part of the virtual testing protocol and allows you to perform the quality checks.
2. 在primer中，打开Workflow → C-NCAP VTC Quality Criteria，选择 O2O (dual occupant)，填写所需的信息：
   - Model Unit System: 模型单位制；
   - Display Time Unit、Display Energy Unit: 分别选择与模型匹配的时间、能量单位；
   - Driver Dummy Parts: 选择模型中驾驶侧假人；
   - Driver H-pt History Node: 选择驾驶侧假人的H点；
   - Passenger Dummy Parts: 选择模型中乘员侧假人；
   - Passenger H-pt History Node: 选择乘员侧假人的H点；



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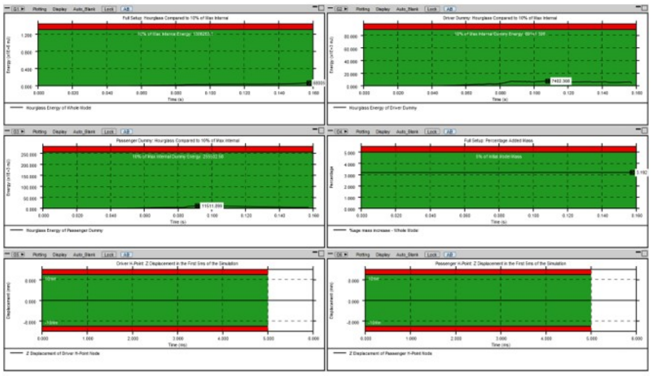
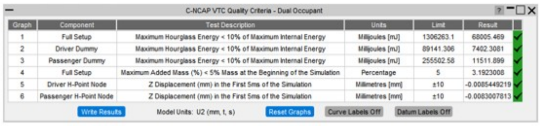
C-NCAP VTC Quality Criteria O2O(dual occupant)

3. 在primer中设置并保存json文件后，打开THIS中的Workflow→ C-NCAP VTC Quality Criteria
4. 如果json数据文件全部有效，程序会自动进行模型质量评估。运行成功后，THIS界面如下所示。





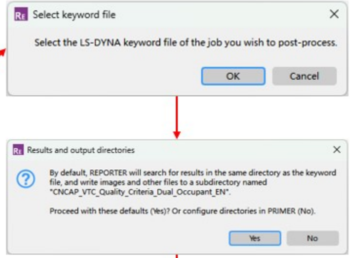
C-NCAP VTC Quality Criteria - Dual Occupant

Graph	Component	Test Description	Units	Limit	Result	
1	Full Setup	Maximum Hourglass Energy < 10% of Maximum Internal Energy	Millijoules [mJ]	1306263.1	68005.469	✓
2	Driver Dummy	Maximum Hourglass Energy < 10% of Maximum Internal Energy	Millijoules [mJ]	89141.306	7402.3081	✓
3	Passenger Dummy	Maximum Hourglass Energy < 10% of Maximum Internal Energy	Millijoules [mJ]	255502.58	11511.899	✓
4	Full Setup	Maximum Added Mass (%) < 5% Mass at the Beginning of the Simulation	Percentage	5	3.1923008	✓
5	Driver H-Point Node	Z Displacement (mm) in the First 5ms of the Simulation	Millimetres [mm]	±10	-0.0085449219	✓
6	Passenger H-Point Node	Z Displacement (mm) in the First 5ms of the Simulation	Millimetres [mm]	±10	-0.0083007813	✓

C-NCAP VTC Quality Criteria O2O(dual occupant)

5. 在REPORTER中使用C-NCAP VTC Quality Criteria workflow O2O(dual occupant) tool：

- Within the Automotive tab in REPORTER, select the C-NCAP VTC Quality Criteria O2O(Dual Occupant). It can be found by filtering for ‘VTC Quality Criteria’.



C-NCAP VTC Quality Criteria (Occupant to Occupant)

Summary				
Component	Test Description	Value	Limit	Result
Full Setup	Maximum Hourglass Energy < 10% of Maximum Internal Energy	68005	1.3063e+06	Pass
Driver Dummy	Maximum Hourglass Energy < 10% of Maximum Internal Energy	7402.3	89141	Pass
Passenger Dummy	Maximum Hourglass Energy < 10% of Maximum Internal Energy	11512	2.555e+05	Pass
Full Setup	Maximum Added Mass < 5% of Total Model Mass at the beginning of t	3.1923	5	Pass
H-Point Node of Driver	Z Displacement (mm) in the first 5 ms of the simulation	-0.0085449	±10	Pass
H-Point Node of Passenger	Z Displacement (mm) in the first 5 ms of the simulation	-0.0083008	±10	Pass

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C-NCAP 2024 Far Side VTC O2O 报告模板

（C-NCAP VTC 标准报告格式）

CNCAP_2024_Far_Side_VTC_O2O_LHS_POLE_ES2RE_Passenger_CN.ort
CNCAP_2024_Far_Side_VTC_O2O_LHS_POLE_WSID_Passenger_CN.ort
CNCAP_2024_Far_Side_VTC_O2O_RHS_POLE_ES2RE_Driver_CN.ort
CNCAP_2024_Far_Side_VTC_O2O_RHS_POLE_WSID_Driver_CN.ort

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C-NCAP 2024 Far Side VTC O2O 报告

1. C-NCAP 2024 Far Side VTC O2O 共包含4份报告模板，以分别对应四种工况。其中两个左侧柱碰模板为 CNCAP_2024_Far_Side_VTC_O2O_LHS_POLE_ES2RE_Passenger_CN.ort 和 CNCAP_2024_Far_Side_VTC_O2O_LHS_POLE_WSID_Passenger_CN.ort，两个右侧柱碰模板为 CNCAP_2024_Far_Side_VTC_O2O_RHS_POLE_ES2RE_Driver_CN.ort和 CNCAP_2024_Far_Side_VTC_O2O_RHS_POLE_WSID_Driver_CN.ort
2. 您可以在REPORTER Library中的Automotive → C-NCAP VTC 标准模板中找到上述四个模板。

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C-NCAP 2024 Far Side VTC O2O (LHS POLE) 报告

输出报告示例

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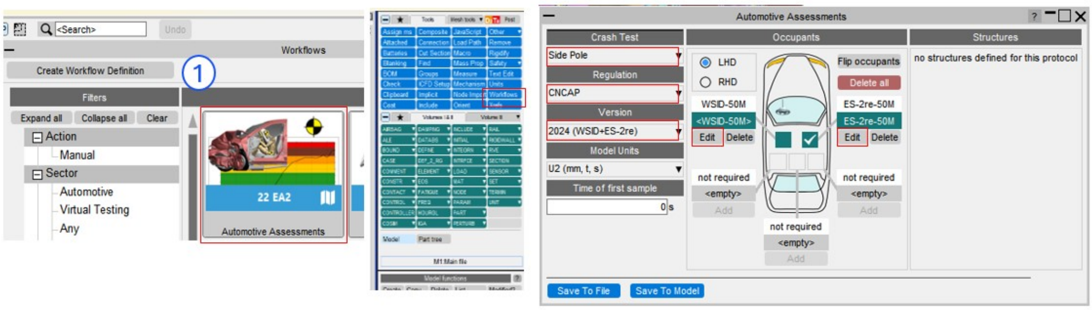
PRIMER

C-NCAP 2024 Far Side VTC O2O (LHS POLE) 报告

1. C-NCAP 2024 Far Side VTC O2O 左侧柱碰报告模板包含两个部分：
   ① 双乘员质量检查
   ② 曲线iso对标（SIMVT）
2. 关于双乘员质量检查的设置，可以参考上一章节的说明；
3. 对于iso曲线对标，需要在PRIMER → WORKFLOW→ Automotive Assessment 中进行设置，其具体步骤如下：
   ① 打开 Automotive Assessments，Crash Test中选择 Side Pole；Regulation中选择 CNCAP；Version中选择2024 (WSID + WSID) 或 2024(WSID + ES-2re)，取决于您的模型中副驾假人是WSID或者ES-2re；以及Model Units中选择模型单位制。

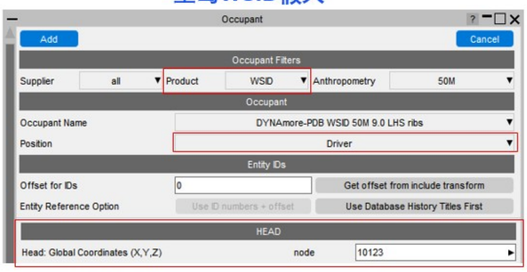


PRIMER

C-NCAP 2024 Far Side VTC O2O (LHS POLE) 报告

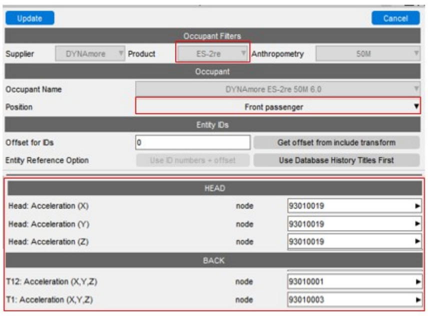
② 填写假人输出信息。对于主驾WSID假人需要填写用于提取头部加速度的节点；对于副驾假人，如果是WSID假人，需要头部加速度和胸部T4加速度相关的节点，如果是ES-2re假人，需要填写头部加速度和T1 T12加速度相关的节点。

主驾WSID假人



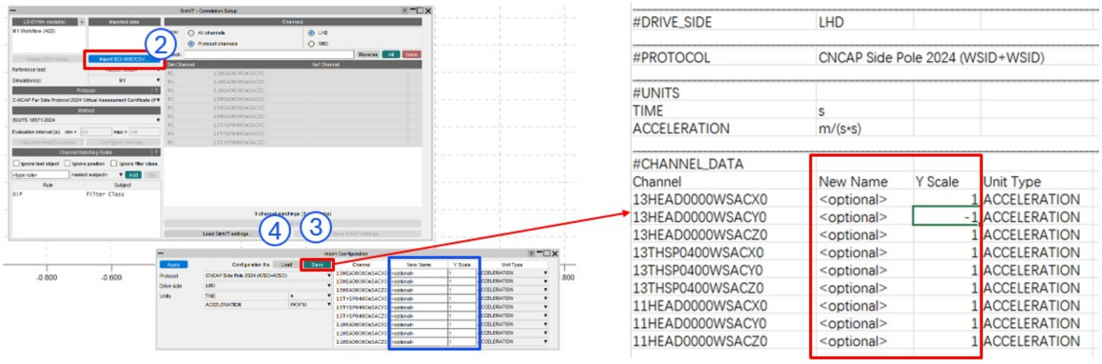
副驾WSID假人

副驾ES-2re假人



C-NCAP 2024 Far Side VTC O2O (LHS POLE) 报告

4. 在使用THIS进行对标前，需要先输入实验通道数据，确保通道名称、曲线正负等问题无误，步骤如下：
   ① 用 T/HIS 打开已经定义好 Automotive Assessments 用户数据的模型结果，然后打开 Workflows => SimVT
   ② 点击 Import ISO-MME/CSV 输入实验数据。如果通道名称不一致，可以在New Name一列进行修改，如果Y轴倍数需要修改，则在 Y Scale 一列输入。除了这种方法，另一种方法是……
   ③ ……直接点击“Save”将通道信息保存为config csv文件，在该csv文件中，可以在第二列对通道名称进行修改，也可以在第三列对Y Scale（Y轴倍数）修改，修改完毕后保存
   ④ 回到软件中，再点击 Load 载入这个 config csv 文件
   ⑤ **该文件亦可在 REPORTER 中作为实验数据输入**



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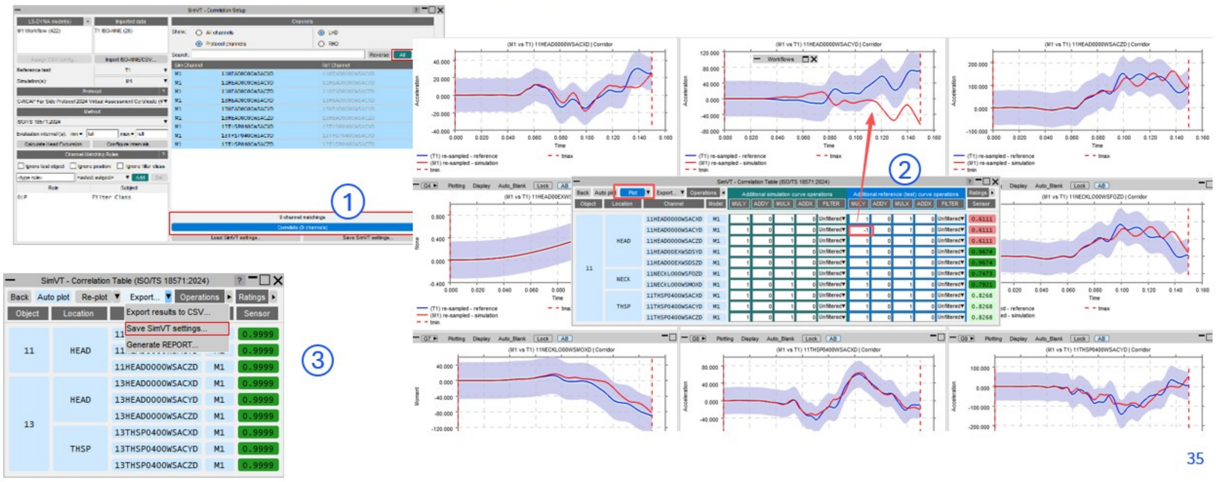
C-NCAP 2024 Far Side VTC O2O (LHS POLE) 报告

4. 除了 config csv，SimVT settings 文件也可用来记录实验数据的重命名 / 额外数学操作
   1. 点击 correlate
   2. 在 Operations 里修改 Y 轴倍数
   3. 修改完后，Export 下拉中选中 Save SimVT settings，可在以后的 T/HIS 或 REPORTER 中输入



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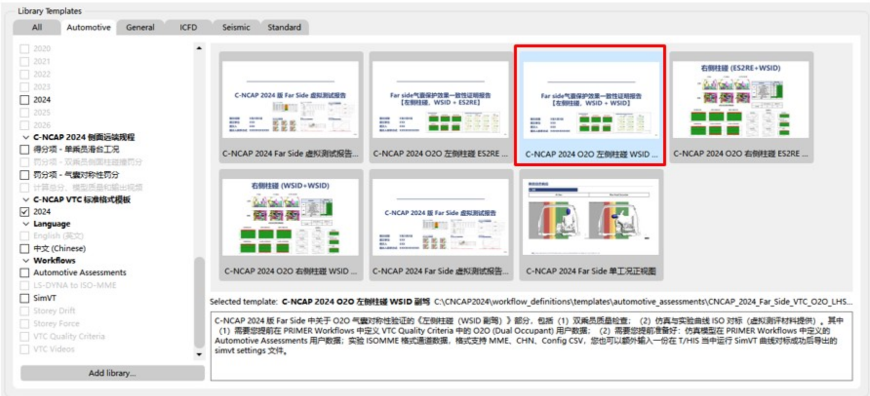
C-NCAP 2024 Far Side VTC O2O (LHS POLE) 报告

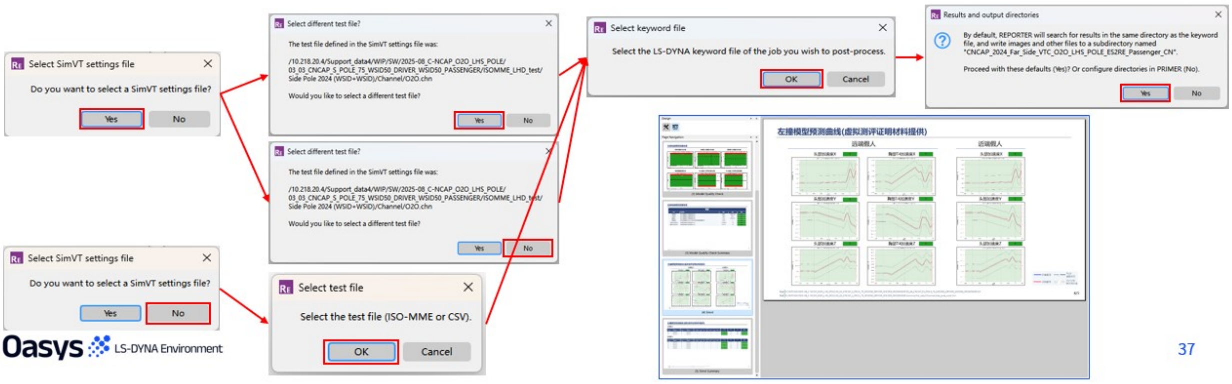
5. 在模型质量检查所需的json文件和SIMVT所需的文件均准备好后，即可开始生成报告，此处以“CNCAP_2024_Far_Side_VTC_O2O_LHS_POLE_ES2RE_Passenger_CN.ort”为例。
   ① 首先在REPORTER LIBRARY中找到该模板，双击运行。



C-NCAP 2024 Far Side VTC O2O (LHS POLE) 报告

5. 在模型质量检查所需的json文件和SIMVT所需的文件均准备好后，即可开始生成报告，此处以“CNCAP_2024_Far_Side_VTC_O2O_LHS_POLE_ES2RE_Passenger_CN.ort”为例。

   ② 首先选择SimVT settings file 文件（在THIS中手动对标后输出），之后可以选择是否更换试验数据文件(SimVT settings file 中已包含试验数据信息)，如果不需要可以选择“No”，之后选择对标模型并设置输出文件夹，即可自动生成报告。
   ③ 如果没有SimVT settings file 文件，可在第一次选择中点击“No”，之后依次选择试验文件(或config csv文件，该文件在THIS中通过手动输出)、对标模型，设置输出文件夹即可。
   ④ 如果模型质量检查的json文件丢失，或存在无效的数据，则会提示并弹出primer workflow以便填入所需的信息。
   ⑤ 在填入所有的信息之后，保存为json文件，reporter可以自动进行后续的输出。
   ⑥ 生成的报告如右下图所示。



REPORTER

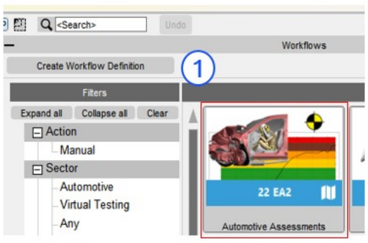
C-NCAP 2024 Far Side VTC O2O (RHS POLE) 报告

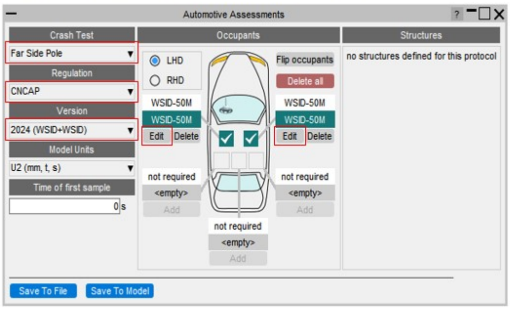
输出报告示例

PRIMER

C-NCAP 2024 Far Side VTC O2O (RHS POLE) 报告

1. C-NCAP 2024 Far Side VTC O2O 右侧柱碰报告模板包含三个部分：
   ① 双乘员质量检查
   ② 乘员损伤值评估
   ③ 模型动画截图
2. 关于双乘员质量检查的设置，可以参考上一章节的说明；
3. 对于损伤值评估，需要在PRIMER → WORKFLOW→ Automotive Assessment 中进行设置，其具体步骤如下：
   ① 打开 Automotive Assessments，Crash Test中选择 Far Side Pole；Regulation中选择 CNCAP； Version中选择2024 (WSID + WSID) 或 2024(ES-2re + WSID)，取决于您的模型中主驾假人是WSID或者ES-2re；以及Model Units中选择模型单位制。

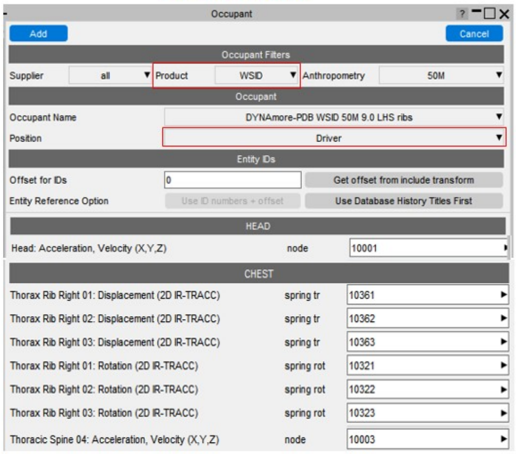


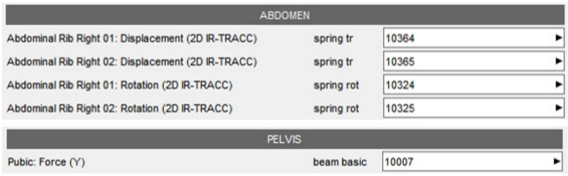


C-NCAP 2024 Far Side VTC O2O (RHS POLE) 报告

②填写假人输出信息。对于主驾WSID假人需要填写用于提取头部加速度的节点信息，用于提取胸部T4加速度、胸部压缩量及胸部粘性指数的信息，用于提取腹部压缩量、腹部粘性指数的信息、用于提取耻骨力的信息。

主驾WSID假人

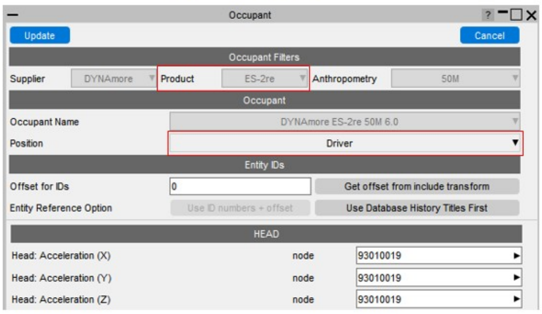


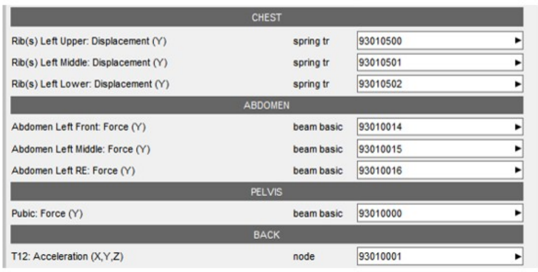


C-NCAP 2024 Far Side VTC O2O (RHS POLE) 报告

③填写假人输出信息。对于主驾WSID假人需要填写用于提取头部加速度的节点信息，用于提取胸部T12加速度、胸部压缩量及胸部粘性指数的信息，用于提取腹部压缩量、腹部粘性指数的信息、用于提取耻骨力的信息。

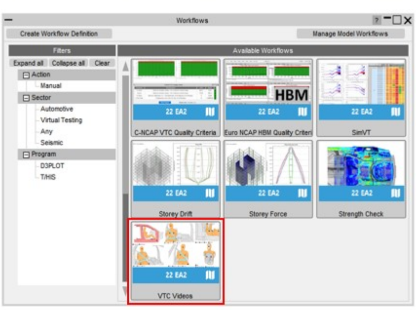
主驾ES-2re假人

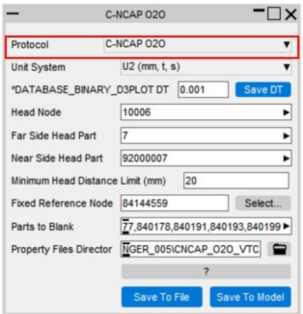




C-NCAP 2024 Far Side VTC O2O (RHS POLE) 报告

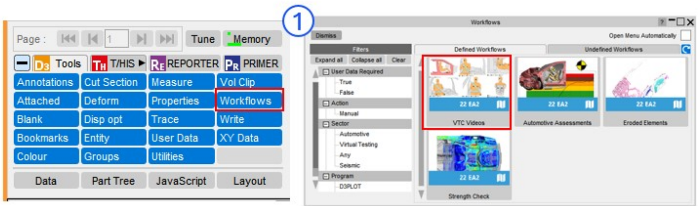
4. 在PRIMER Workflow中定义模型动画截图所需的json文件。打开 VTC Vidoes，protocol中选择 C-NCAP O2O，填写所需的信息：
   - Head Node: 驾驶侧假人头部节点；
   - Far Side Head Part、Near Side Head Part: 分别选择远端假人头部part和近端假人头部part；
   - Fixed Reference Node: 选择动画输出中固定的点；
   - Parts to Blank: 选择需要隐藏的part，一般为假人前方的part；
   - Minimum Head Distance Limit: 判断Head Parts是否有接触风险的最小距离限值；
   - Property Files Directory: 图片输出所需的视角文件存储位置。

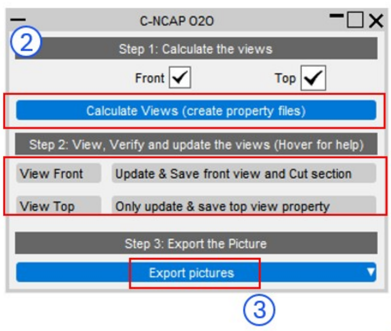




C-NCAP 2024 Far Side VTC O2O (RHS POLE) 报告

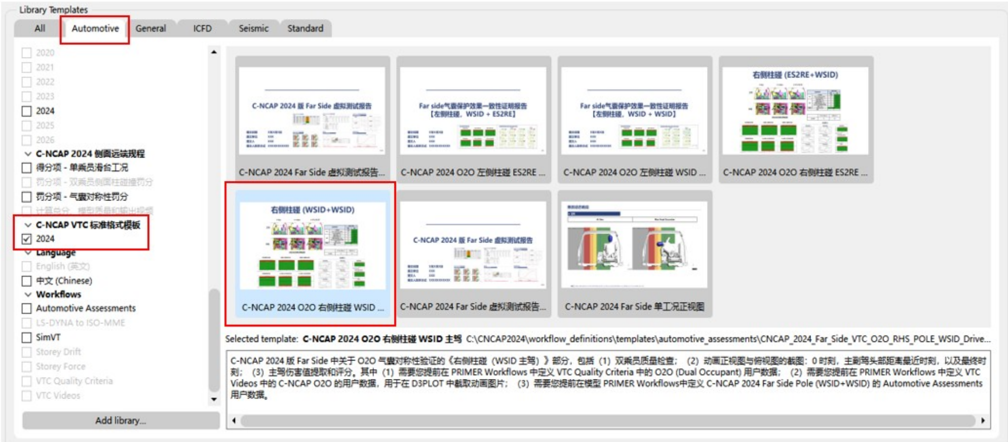
5. 在PRIMER Workflow中定义模型动画截图所需的json文件后。可以在D3PLOT中查看视角及截图情况是否符合模型设置
   - 使用D3PLOT打开模型动画结果文件。
   - 打开 Workflow → VTC Vidoes，点击"Calculate Views"可自动生成正视角和俯视角的视图文件。
   - 点击"view Front"或"view Top"来检查生成的视角是否合适，如果不合适，可以调整视角后点击"Update & Save Front view and Cut section"/"Only Update & save top view property"以更新视角。
   - 视角调整好之后，点击"Export pictures"并选择输出图片的文件夹，可自动进行图片截取,可以查看截取的图片是否合适，如果需要调整试图，请在D3PLOT中调整并更新视图文件后，重新输出。





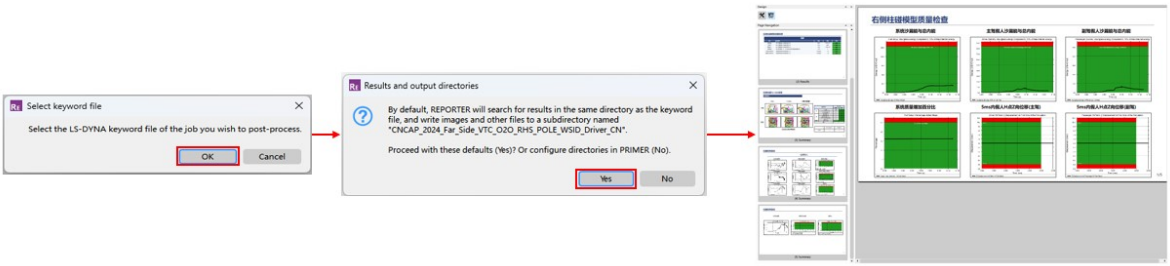
C-NCAP 2024 Far Side VTC O2O (RHS POLE) 报告

6. 在模型质量检查、乘员损伤评估和模型动画截图所需的json文件均准备好后，即可开始生成报告，此处以“CNCAP_2024_Far_Side_VTC_O2O_RHS_POLE_WSID_Driver_CN.ort”为例。
   ① 首先在REPORTER LIBRARY中找到该模板，双击运行。



C-NCAP 2024 Far Side VTC O2O (RHS POLE) 报告

6. 在模型质量检查、乘员损伤评估和模型动画截图所需的json文件均准备好后，即可开始生成报告，此处以“CNCAP_2024_Far_Side_VTC_O2O_RHS_POLE_WSID_Driver_CN.ort”为例。
   ② 首先选择模型并设置输出文件夹，即可自动生成报告。
   ③ 如果json文件丢失，或存在无效的数据(如下图所示)，则会提示并弹出primer workflow以便填入所需的信息。
   ④ 在填入所有的信息之后，保存到json文件，reporter可以自动进行后续的输出。

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LS-DYNA Environment
SHELL
PRIMER
D3PLOT
T/HIS
REPORTER
D3PLOT VIEWER
REPORT VIEWER
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微信公众号
Oasys 奥艾司
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C-NCAP Far Side Protocol 2024 Working Conditions 1-6 SimVT

This topic focuses on the **automation** of the correlation fitting index assessment using REPORTER. You can also use SimVT to perform the correlation interactively.

Introduction

The C-NCAP Virtual Far Side 2024 protocol requires correlation fitting between simulation and test data to validate the virtual (simulation) models before they can be used to compute an injury score.
The protocol specifies 8 sled test working conditions (i.e. load cases) which must be tested virtually (i.e. Ansys LS-DYNA simulations). C-NCAP will randomly pick one of the working conditions to conduct physical testing and channel data from the selected physical working condition must be correlated with the corresponding virtual working condition and the sensor correlation fitting index scores (a.k.a. sensor scores) must exceed the protocol thresholds in order for the virtual working conditions to be accepted for virtual testing.

This page describes the **C-NCAP Far Side Protocol 2024 Working Conditions 1-6 SimVT** REPORTER Template which can be used to check the correlation fitting index for Working Conditions 1-6 (i.e. sled model with WSID driver). If you want to check the correlation fitting index for Working Conditions 7 or 8 (i.e. sled model with SIDIIs driver) then please refer to this page.

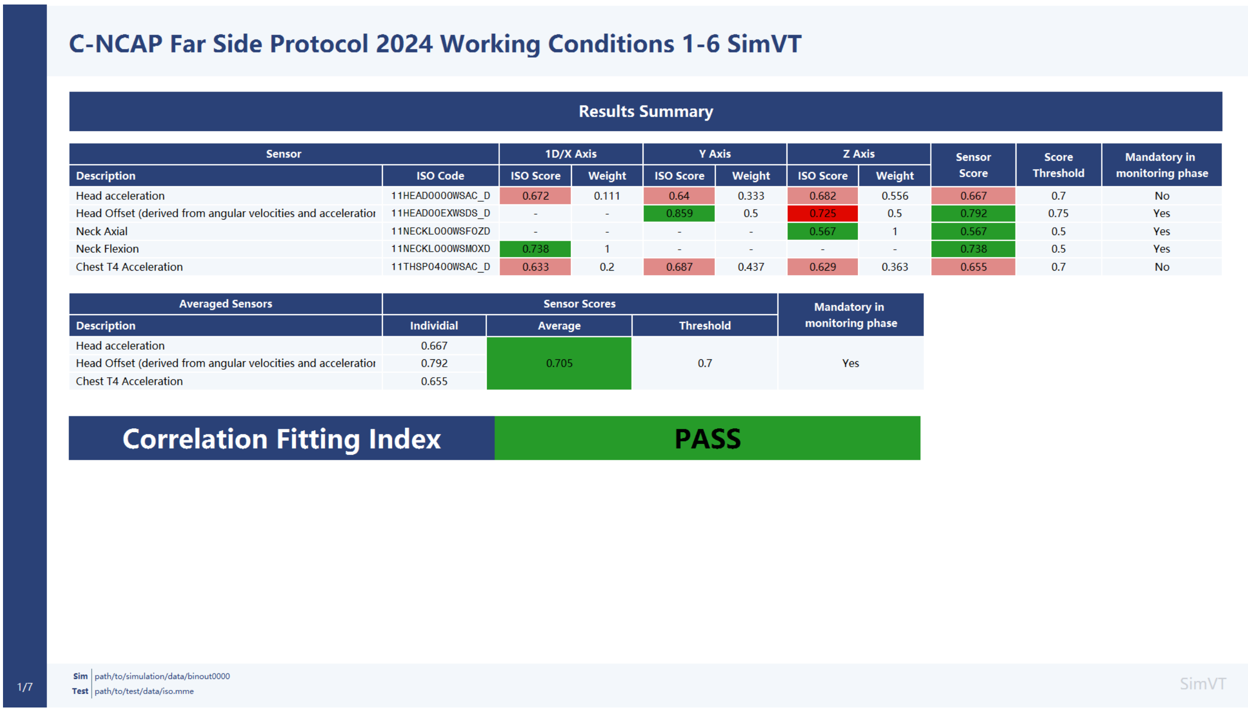
The **C-NCAP Far Side Protocol 2024 Working Conditions 1-6 SimVT** REPORTER Template can be run interactively or in batch mode to generate the REPORT and the instructions for running SimVT REPORTER Templates can be found here.

If the template is successfully generated it will show a report summarising the the sensor scores for all the mandatory and monitored channels (listed in C-NCAP Appendix H.1.2.1.3 of the protocol) as well as the correlation graphs for each channel so that you can inspect any channels which perform poorly. Additionally, a SimVT settings file (*REPORTER_settings.simvt*) is created which can be loaded in to the SimVT workflow tool to interrogate the results interactively.

Before using the REPORTER template with Ansys LS-DYNA data you should have defined the occupant and structures user data required for your model in PRIMER (see Automotive Assessments PRIMER for details).

Report Pages

Page 1 contains a summary of the results for all the assessed and monitored channels. It shows the PASS/FAIL status of the correlation fitting index. The protocol does not require that the "Head acceleration" and "Chest T4 Acceleration" sensor scores exceeds the threshold of 0.7 individually so they are considered as not mandatory. However, there is a requirement that the average sensor score for "Head acceleration", "Head Offset" and "Chest T4 Acceleration" sensors must exceed 0.7. As such although the "Head acceleration" and "Chest T4 Acceleration" sensors fail to meet the threshold, the overall result is still a pass as only mandatory scores affect the PASS/FAIL status.



C-NCAP Far Side Protocol 2024 Working Conditions 1-6 SimVT

Results Summary

Sensor		1D/X Axis		Y Axis		Z Axis		Sensor Score	Score Threshold	Mandatory in monitoring phase
Description	ISO Code	ISO Score	Weight	ISO Score	Weight	ISO Score	Weight			
Head acceleration	11HEAD0000WSAC_D	0.672	0.111	0.64	0.333	0.682	0.556	0.667	0.7	No
Head Offset (derived from angular velocities and acceleratio	11HEAD00EXWSDS_D	-	-	0.859	0.5	0.725	0.5	0.792	0.75	Yes
Neck Axial	11NECKLO00WSFOZD	-	-	-	-	0.567	1	0.567	0.5	Yes
Neck Flexion	11NECKLO00WSMOXD	0.738	1	-	-	-	-	0.738	0.5	Yes
Chest T4 Acceleration	11THSP0400WSAC_D	0.633	0.2	0.687	0.437	0.629	0.363	0.655	0.7	No

Averaged Sensors	Sensor Scores			Mandatory in monitoring phase
Description	Individial	Average	Threshold	
Head acceleration	0.667	0.705	0.7	Yes
Head Offset (derived from angular velocities and acceleratio	0.792			
Chest T4 Acceleration	0.655			

Correlation Fitting Index	PASS

1/7

Sim path/to/simulation/data/binout0000
Test path/to/test/data/iso.mme

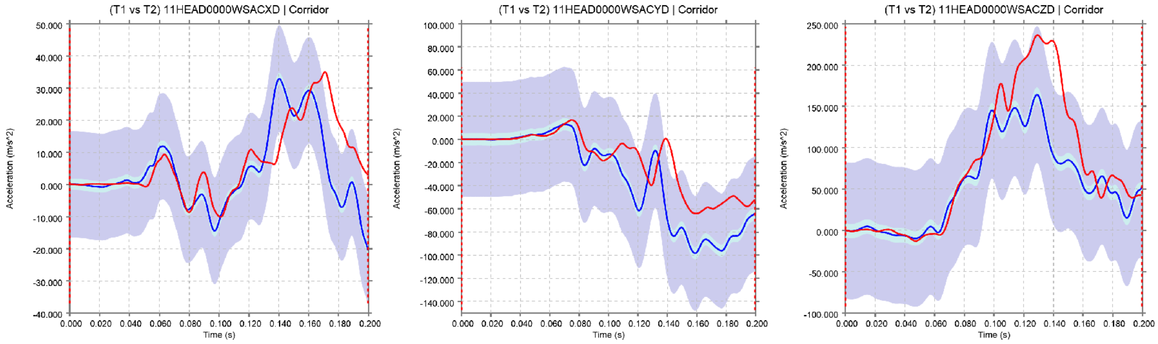
SimVT

Page 2-6 show a table of the scores and the corridor plots for each sensor. In the example below the "Head acceleration" sensor is a 3D sensors with X, Y and Z components. The parenthesis around "(FAIL)" and the lighter shade of red indicate that it is not a mandatory requirement for the sensor score to exceed the threshold.

C-NCAP Far Side Protocol 2024 Working Conditions 1-6 SimVT

Head acceleration

Simulation		Test		Ratings				ISO Score	|MAX|	Weight	Sensor Score
Tag	Channel	Tag	Channel	Corridor	Slope	Phase	Magnitude				
T1	11HEAD0000WSACXD	T2	11HEAD0000WSACXD	0.67	0.487	0.802	0.731	0.672	32.9	0.111	0.667
T1	11HEAD0000WSACYD	T2	11HEAD0000WSACYD	0.623	0.594	0.805	0.553	0.64	98.5	0.333	
T1	11HEAD0000WSACZD	T2	11HEAD0000WSACZD	0.684	0.455	0.83	0.757	0.682	164	0.556	



Simulation curve · Test Curve · Inner Corridor · Outer Corridor

Sensor score > 0.7 **(FAIL)**

2/7

Sim path/to/simulation/data/binout0000
Test path/to/test/data/iso.mme

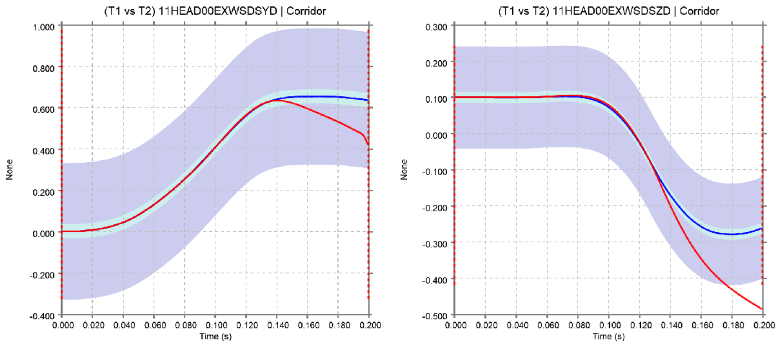
SimVT

Page 3 shows the head offset correlation. The sensor score is the average of the Y and Z ISO Scores so the weight is 0.5 for both. Passing is mandatory which is communicated by the use of bold green and red colours

C-NCAP Far Side Protocol 2024 Working Conditions 1-6 SimVT

Head Offset (derived from angular velocities and acceleration)

Simulation		Test		Ratings				ISO Score	|MAX|	Weight	Sensor Score
Tag	Channel	Tag	Channel	Corridor	Slope	Phase	Magnitude				
T1	11HEAD00EXWSDSYD	T2	11HEAD00EXWSDSYD	0.898	0.806	0.785	0.908	0.859	0.655	0.5	0.792
T1	11HEAD00EXWSDSZD	T2	11HEAD00EXWSDSZD	0.745	0.721	0.777	0.637	0.725	0.279	0.5	



Simulation curve · Test Curve · Inner Corridor · Outer Corridor

Sensor score > 0.75 **PASS**

3/7

Sim path/to/simulation/data/binout0000
Test path/to/test/data/iso.mme

SimVT

The final page of the report contain a table showing the detailed results for each correlation so that they can all be viewed in one place.

C-NCAP Far Side Protocol 2024 Working Conditions 1-6 SimVT

Detailed Results (Continued)

Simulation		Test		Ratings				ISO Score	|MAX|	Weight	Sensor Score
Tag	Channel	Tag	Channel	Corridor	Slope	Phase	Magnitude				
T1	11HEAD0000WSACXD	T2	11HEAD0000WSACXD	0.67	0.487	0.802	0.731	0.672	32.9	0.111	0.667
T1	11HEAD0000WSACYD	T2	11HEAD0000WSACYD	0.623	0.594	0.805	0.553	0.64	98.5	0.333	0.667
T1	11HEAD0000WSACZD	T2	11HEAD0000WSACZD	0.684	0.455	0.83	0.757	0.682	164	0.556	0.667
T1	11HEAD00EXWSDSYD	T2	11HEAD00EXWSDSYD	0.898	0.806	0.785	0.908	0.859	0.655	0.5	0.792
T1	11HEAD00EXWSDSZD	T2	11HEAD00EXWSDSZD	0.745	0.721	0.777	0.637	0.725	0.279	0.5	0.792
T1	11NECKLO00WSFOZD	T2	11NECKLO00WSFOZD	0.578	0.418	0.715	0.546	0.567	710	1	0.567
T1	11NECKLO00WSMOXD	T2	11NECKLO00WSMOXD	0.692	0.629	0.9	0.775	0.738	99.2	1	0.738
T1	11THSP0400WSACXD	T2	11THSP0400WSACXD	0.557	0.493	0.972	0.584	0.633	58.6	0.2	0.655
T1	11THSP0400WSACYD	T2	11THSP0400WSACYD	0.669	0.361	0.94	0.798	0.687	128	0.437	0.655
T1	11THSP0400WSACZD	T2	11THSP0400WSACZD	0.582	0.665	0.902	0.411	0.629	106	0.363	0.655

7/7

Sim path/to/simulation/data/binout0000
Test path/to/test/data/iso.mme

SimVT

C-NCAP Far Side Protocol 2024 Working Conditions 7-8 SimVT

This topic focuses on the **automation** of the correlation fitting index assessment using REPORTER. You can also use SimVT to perform the correlation interactively.

Introduction

The C-NCAP Virtual Far Side 2024 protocol requires correlation fitting between simulation and test data to validate the virtual (simulation) models before they can be used to compute an injury score.
The protocol specifies 8 sled test working conditions (i.e. load cases) which must be tested virtually (i.e. Ansys LS-DYNA simulations). C-NCAP will randomly pick one of the working conditions to conduct physical testing and channel data from the selected physical working condition must be correlated with the corresponding virtual working condition and the sensor correlation fitting index scores (a.k.a. sensor scores) must exceed the protocol thresholds in order for the virtual working conditions to be accepted for virtual testing.

This page describes the **C-NCAP Far Side Protocol 2024 Working Conditions 7-8 SimVT** REPORTER Template which can be used to check the correlation fitting index for Working Conditions 7-8 (i.e. sled model with SIDIIs driver). If you want to check the correlation fitting index for Working Conditions 1 to 6 (i.e. sled model with WSID driver) then please refer to this page.

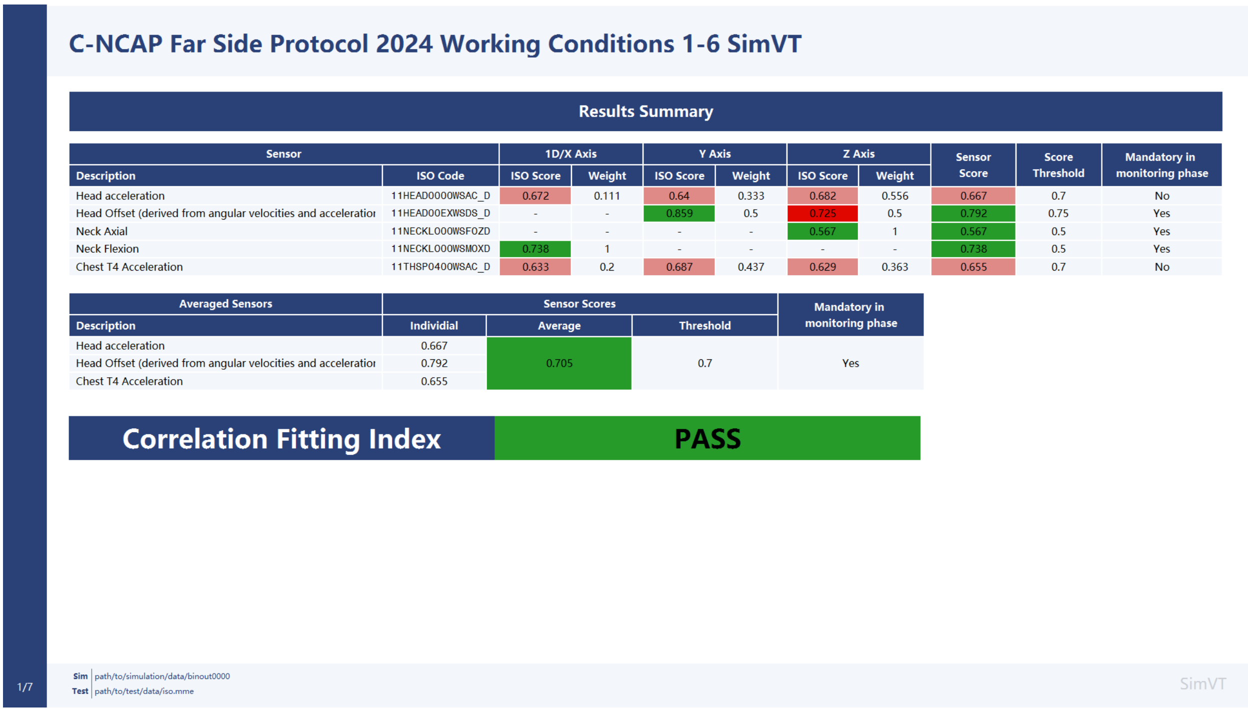
The **C-NCAP Far Side Protocol 2024 Working Conditions 7-8 SimVT** REPORTER Template can be run interactively or in batch mode to generate the REPORT and the instructions for running SimVT REPORTER Templates can be found here.

If the template is successfully generated it will show a report summarising the the sensor scores for all the mandatory and monitored channels (listed in C-NCAP Appendix H.1.2.1.3 of the protocol) as well as the correlation graphs for each channel so that you can inspect any channels which perform poorly. Additionally, a SimVT settings file (*REPORTER_settings.simvt*) is created which can be loaded in to the SimVT workflow tool to interrogate the results interactively.

Before using the REPORTER template with Ansys LS-DYNA data you should have defined the occupant and structures user data required for your model in PRIMER (see Automotive Assessments PRIMER for details).

Report Pages

Page 1 contains a summary of the results for all the assessed and monitored channels. It shows the PASS/FAIL status of the correlation fitting index. The protocol does not require that the "Head acceleration" and "Chest T4 Acceleration" sensor scores exceeds the threshold of 0.7 individually so they are considered as not mandatory. However, there is a requirement that the average sensor score for "Head acceleration", "Head Offset" and "Chest T4 Acceleration" sensors must exceed 0.7. As such although the "Head acceleration" and "Chest T4 Acceleration" sensors fail to meet the threshold, the overall result is still a pass as only mandatory scores affect the PASS/FAIL status.



C-NCAP Far Side Protocol 2024 Working Conditions 1-6 SimVT

Results Summary

Sensor		1D/X Axis		Y Axis		Z Axis		Sensor Score	Score Threshold	Mandatory in monitoring phase
Description	ISO Code	ISO Score	Weight	ISO Score	Weight	ISO Score	Weight			
Head acceleration	11HEAD0000WSAC_D	0.672	0.111	0.64	0.333	0.682	0.556	0.667	0.7	No
Head Offset (derived from angular velocities and acceleratio	11HEAD00EXWSDS_D	-	-	0.859	0.5	0.725	0.5	0.792	0.75	Yes
Neck Axial	11NECKL000WSFOZD	-	-	-	-	0.567	1	0.567	0.5	Yes
Neck Flexion	11NECKL000WSMOXD	0.738	1	-	-	-	-	0.738	0.5	Yes
Chest T4 Acceleration	11THSP0400WSAC_D	0.633	0.2	0.687	0.437	0.629	0.363	0.655	0.7	No

Averaged Sensors	Sensor Scores			Mandatory in monitoring phase
Description	Individial	Average	Threshold	
Head acceleration	0.667	0.705	0.7	Yes
Head Offset (derived from angular velocities and acceleratio	0.792			
Chest T4 Acceleration	0.655			

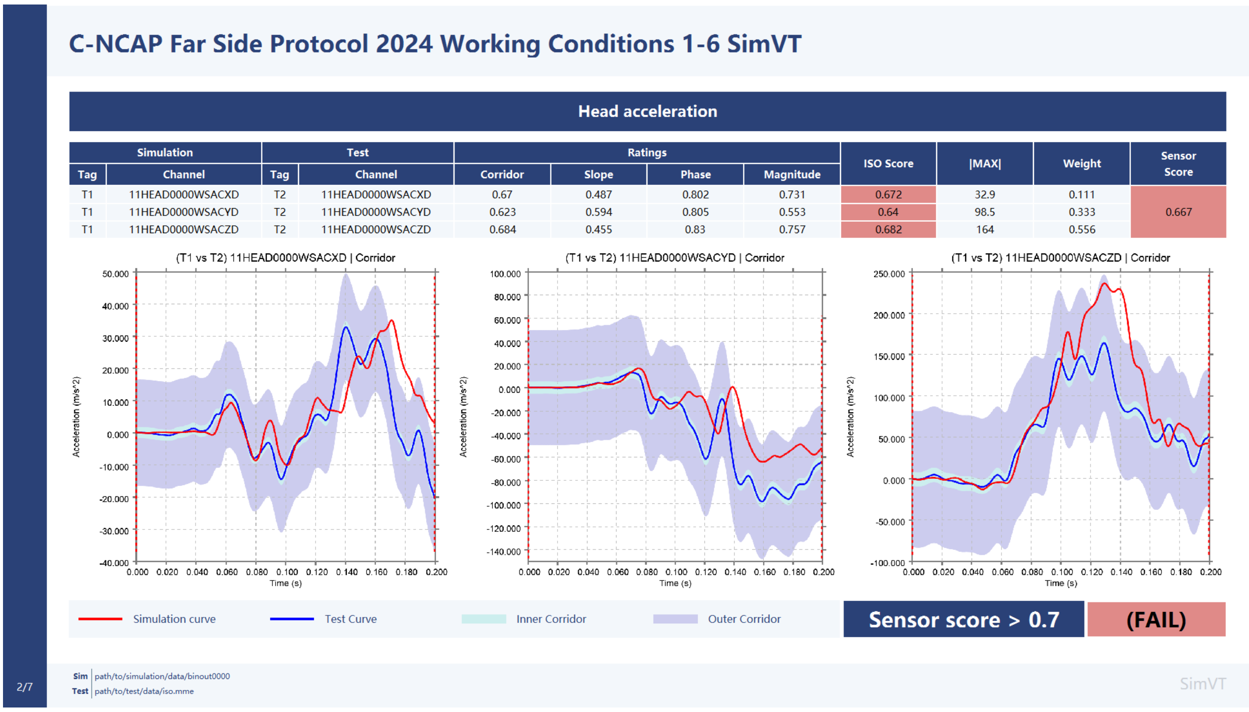
Correlation Fitting Index	PASS

1/7

Sim path/to/simulation/data/binout0000
Test path/to/test/data/iso.mme

SimVT

Page 2-6 show a table of the scores and the corridor plots for each sensor. In the example below the "Head acceleration" sensor is a 3D sensors with X, Y and Z components. The parenthesis around "(FAIL)" and the lighter shade of red indicate that it is not a mandatory requirement for the sensor score to exceed the threshold.

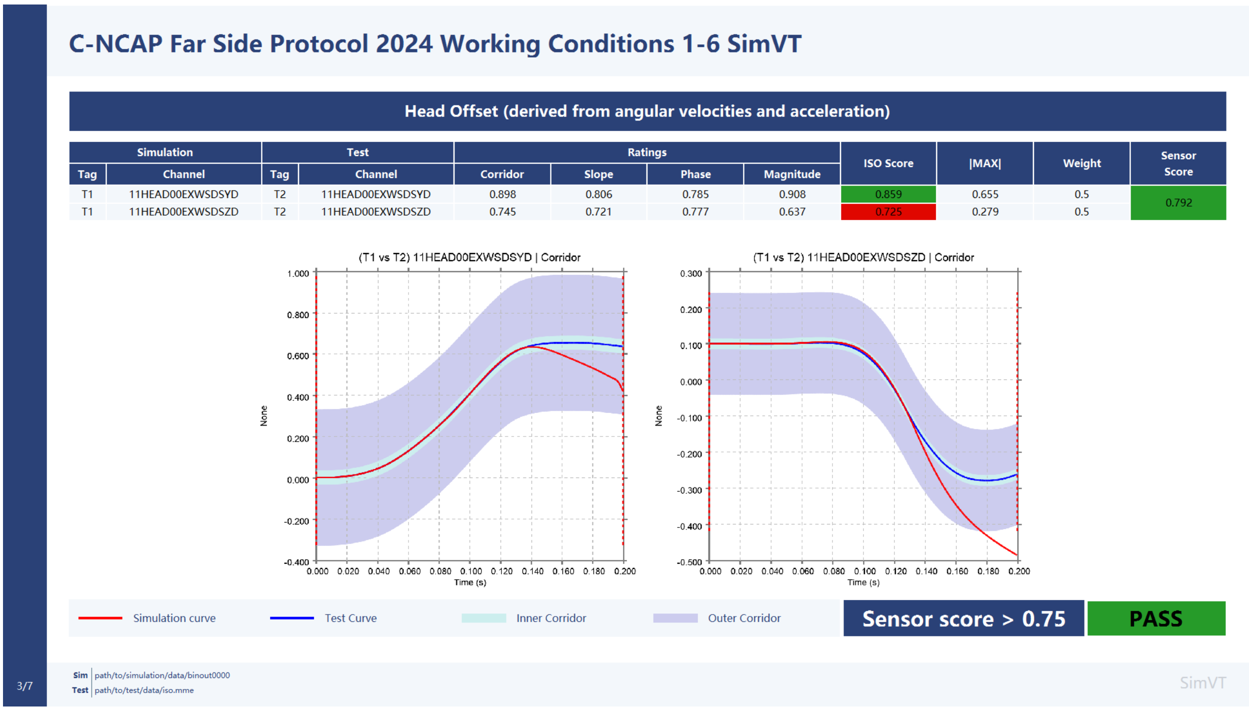


C-NCAP Far Side Protocol 2024 Working Conditions 1-6 SimVT

Head acceleration

Simulation		Test		Ratings				ISO Score	|MAX|	Weight	Sensor Score
Tag	Channel	Tag	Channel	Corridor	Slope	Phase	Magnitude				
T1	11HEAD0000WSACXD	T2	11HEAD0000WSACXD	0.67	0.487	0.802	0.731	0.672	32.9	0.111	0.667
T1	11HEAD0000WSACYD	T2	11HEAD0000WSACYD	0.623	0.594	0.805	0.553	0.64	98.5	0.333	
T1	11HEAD0000WSACZD	T2	11HEAD0000WSACZD	0.684	0.455	0.83	0.757	0.682	164	0.556	

Page 3 shows the head offset correlation. The sensor score is the average of the Y and Z ISO Scores so the weight is 0.5 for both. Passing is mandatory which is communicated by the use of bold green and red colours



C-NCAP Far Side Protocol 2024 Working Conditions 1-6 SimVT

Head Offset (derived from angular velocities and acceleration)

Simulation		Test		Ratings				ISO Score	|MAX|	Weight	Sensor Score
Tag	Channel	Tag	Channel	Corridor	Slope	Phase	Magnitude				
T1	11HEAD00EXWSDSYD	T2	11HEAD00EXWSDSYD	0.898	0.806	0.785	0.908	0.859	0.655	0.5	0.792
T1	11HEAD00EXWSDSZD	T2	11HEAD00EXWSDSZD	0.745	0.721	0.777	0.637	0.725	0.279	0.5	

The final page of the report contain a table showing the detailed results for each correlation so that they can all be viewed in one place.

C-NCAP Far Side Protocol 2024 Working Conditions 1-6 SimVT

Detailed Results (Continued)

Simulation		Test		Ratings				ISO Score	|MAX|	Weight	Sensor Score
Tag	Channel	Tag	Channel	Corridor	Slope	Phase	Magnitude				
T1	11HEAD0000WSACXD	T2	11HEAD0000WSACXD	0.67	0.487	0.802	0.731	0.672	32.9	0.111	0.667
T1	11HEAD0000WSACYD	T2	11HEAD0000WSACYD	0.623	0.594	0.805	0.553	0.64	98.5	0.333	0.667
T1	11HEAD0000WSACZD	T2	11HEAD0000WSACZD	0.684	0.455	0.83	0.757	0.682	164	0.556	0.667
T1	11HEAD00EXWSDSYD	T2	11HEAD00EXWSDSYD	0.898	0.806	0.785	0.908	0.859	0.655	0.5	0.792
T1	11HEAD00EXWSDSZD	T2	11HEAD00EXWSDSZD	0.745	0.721	0.777	0.637	0.725	0.279	0.5	0.792
T1	11NECKL000WSFOZD	T2	11NECKL000WSFOZD	0.578	0.418	0.715	0.546	0.567	710	1	0.567
T1	11NECKL000WSMOXD	T2	11NECKL000WSMOXD	0.692	0.629	0.9	0.775	0.738	99.2	1	0.738
T1	11THSP0400WSACXD	T2	11THSP0400WSACXD	0.557	0.493	0.972	0.584	0.633	58.6	0.2	0.655
T1	11THSP0400WSACYD	T2	11THSP0400WSACYD	0.669	0.361	0.94	0.798	0.687	128	0.437	0.655
T1	11THSP0400WSACZD	T2	11THSP0400WSACZD	0.582	0.665	0.902	0.411	0.629	106	0.363	0.655

7/7

Sim path/to/simulation/data/binout0000
Test path/to/test/data/iso.mme

SimVT

Working Conditions 1 to 8 (and Correction Factor A)

This guide helps users to set up and perform the occupant injury assessments for the Far Side Protocol Working Conditions 1 to 6 for the WSID dummy and the Working Conditions 7 and 8 for the SID2-SBLD dummy (Table H.1) as specified in section 1.2.1.5.3 of the C-NCAP Management Regulation and the Correction Factor A calculation according to section H.1.2.1.6 of the C-NCAP Far-Side Occupant Protection Protocol (2024).

Please note this guide runs through using the CNCAP Far Side Protocol 2024 Working Conditions 1-6 **with Correction Factor A** template, but this guide still applies for Working Conditions 1-6, Working Conditions 7-8 with Correction Factor A and Working Condition 7-8 templates.

Depending upon which Working Condition C-NCAP selects to be physically tested you must pass the C-NCAP Far Side Protocol 2024 Working Conditions 1-6 SimVT or C-NCAP Far Side Protocol 2024 Working Conditions 7-8 SimVT otherwise you automatically have a score of zero for the Far Side Protocol.

Firstly you need to select the working condition that was selected by C-NCAP to be physically tested from Table H.1 to get a Test score (out of 8) and Correction Factor A score (out of 1) and run a Working Conditions **with Correction Factor A template**. You will then select the seven remaining working conditions to get seven simulation scores by running a standard Working Condition template (without Correction Factor A).

Table H.1:

Test Name	Working Condition	Dummy	Seat position
Working condition 1 *	32-column collision * 75°	WSID 50th	Design location
Working condition 2	32-column collision * 75°	WSID 50th	Highest level
Working condition 3	32-column collision * 90°	WSID 50th	Design location
Working condition 4 *	32-column collision * 90°	WSID 50th	Highest level
Working condition 5	32-column collision * 60°	WSID 50th	Design location
Working condition 6 *	32-column collision * 60°	WSID 50th	Highest level
Working condition 7	32-column collision * 75°	SID2-SBLD	Design location
Working condition 8 *	32-column collision * 75°	SID2-SBLD	Highest level

Set-up using Automotive Assessments in PRIMER

Firstly, you need to attach Workflows Automotive Assessments data to your model(s). Follow this guide to see more: Automotive Assessments in PRIMER.

For Crash Test select Far Side Sled, for Regulation select CNCAP, for version select 2024 (WSID) for Working Conditions 1 to 6 or 2024 (SID2-SBLD) for Working Conditions 7 and 8.

Running the templates in REPORTER

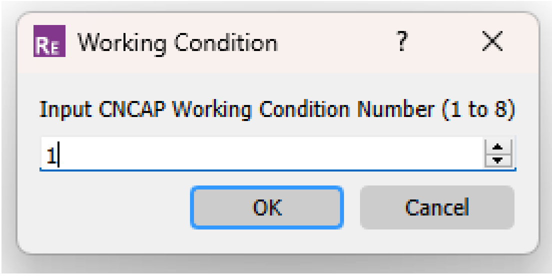
In REPORTER there are four related templates, to find them go to the Automotive tab and filter by 'Virtual testing' under Protection and 'C-NCAP' under Regulation.

1. C-NCAP Far Side Protocol 2024 Working Conditions 1-6 with Correction Factor A
2. C-NCAP Far Side Protocol 2024 Working Conditions 1-6
3. C-NCAP Far Side Protocol 2024 Working Conditions 7-8 with Correction Factor A

4. C-NCAP Far Side Protocol 2024 Working Conditions 7-8

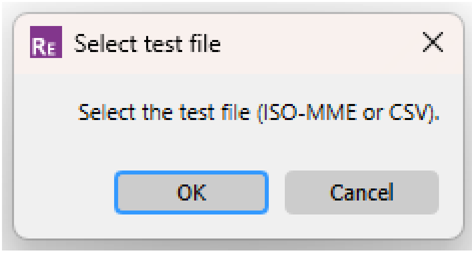
Upon opening the templates you will be asked a series of questions:

Firstly input your Working Condition number from 1 to 8

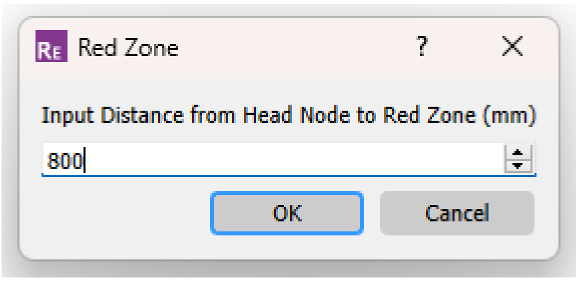


Then select your ISO-MME or CSV Test File. The result of this will be used for your single Test score, and to calculate the Correction Factor A

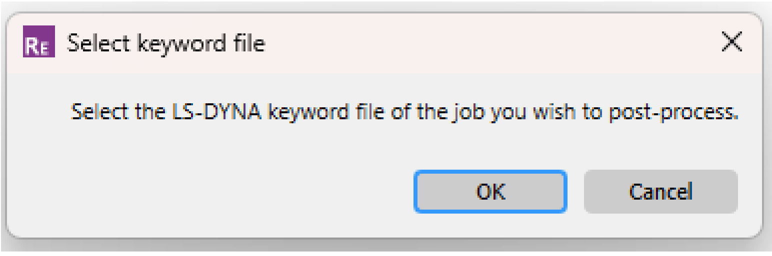
(with Correction Factor A Templates only)



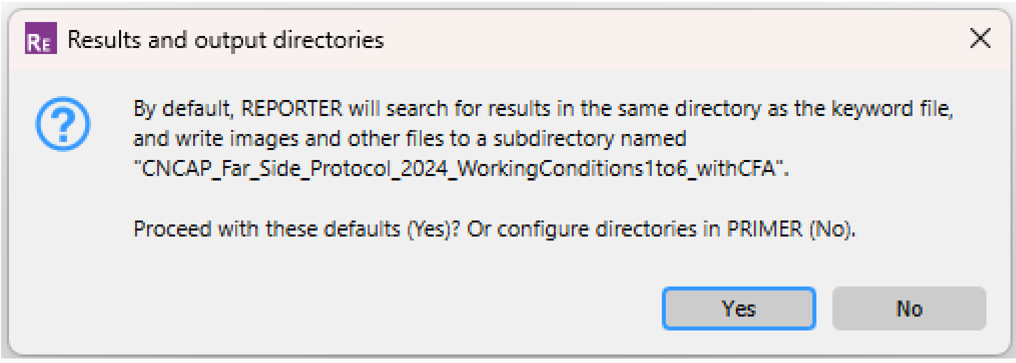
Then input the distance from the Head Node to the Red Zone (mm). This is the maximum intrusion amount of the door on the impact side in the vehicle side pole impact test. In most cases, the armrest in the intrusion area is the largest intrusion area, and the innermost surface of the armrest is the maximum amount of intrusion. If the maximum intrusion area is at the waist line, then ignore the door trim panel and define the point 50mm inward from the inner panel of the door structure as the maximum intrusion point. See H.2.1.4 in the Far Side Virtual Testing protocol for more. In C-NCAP the head node is defined as the front end of the circular hole at the top of the head



Then select your keyword file. In the case of a standard template this will become one of your seven Simulation scores, in the case of a with Correction Factor A template this will be used to calculate the Correction Factor A score



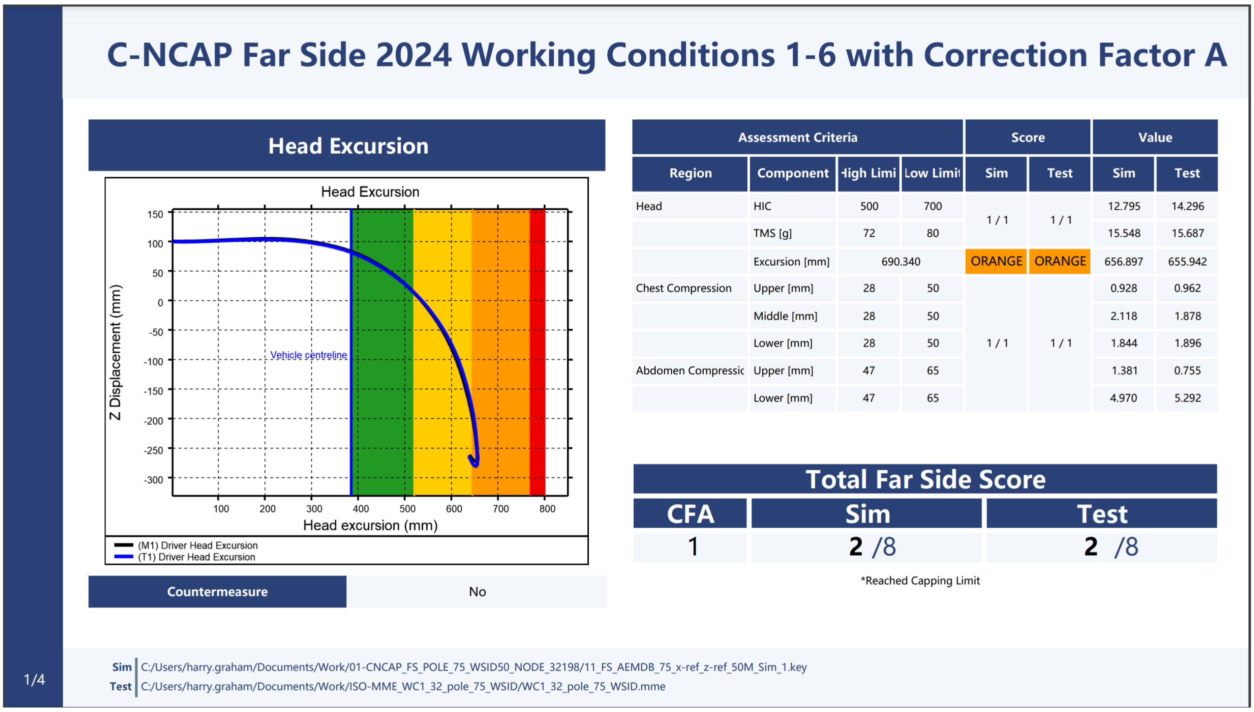
Finally you will then be asked whether you want to continue with the default results and output directories or configure them in PRIMER



REPORTER Results

Page 1 contains DRIVER_HEAD_EXCURSION and the limits, values and scores for each scored body region. The standard templates (non CFA) are identical but do not display 'Test' or 'CFA'.

The correction factor A is calculated by test score/simulation score of the corresponding working condition. If the calculated result ≥0.9, the correction factor A is adjusted to 1.


C-NCAP Far Side 2024 Working Conditions 1-6 with Correction Factor A

Head Excursion

Countermeasure	No

Assessment Criteria				Score		Value	
Region	Component	High Limit	Low Limit	Sim	Test	Sim	Test
Head	HIC	500	700	1 / 1	1 / 1	12.795	14.296
	TMS [g]	72	80			15.548	15.687
	Excursion [mm]	690.340		ORANGE	ORANGE	656.897	655.942
Chest Compression	Upper [mm]	28	50	1 / 1	1 / 1	0.928	0.962
	Middle [mm]	28	50			2.118	1.878
	Lower [mm]	28	50			1.844	1.896
Abdomen Compression	Upper [mm]	47	65			1.381	0.755
	Lower [mm]	47	65			4.970	5.292

Total Far Side Score

CFA	Sim	Test
1	2 /8	2 /8

*Reached Capping Limit

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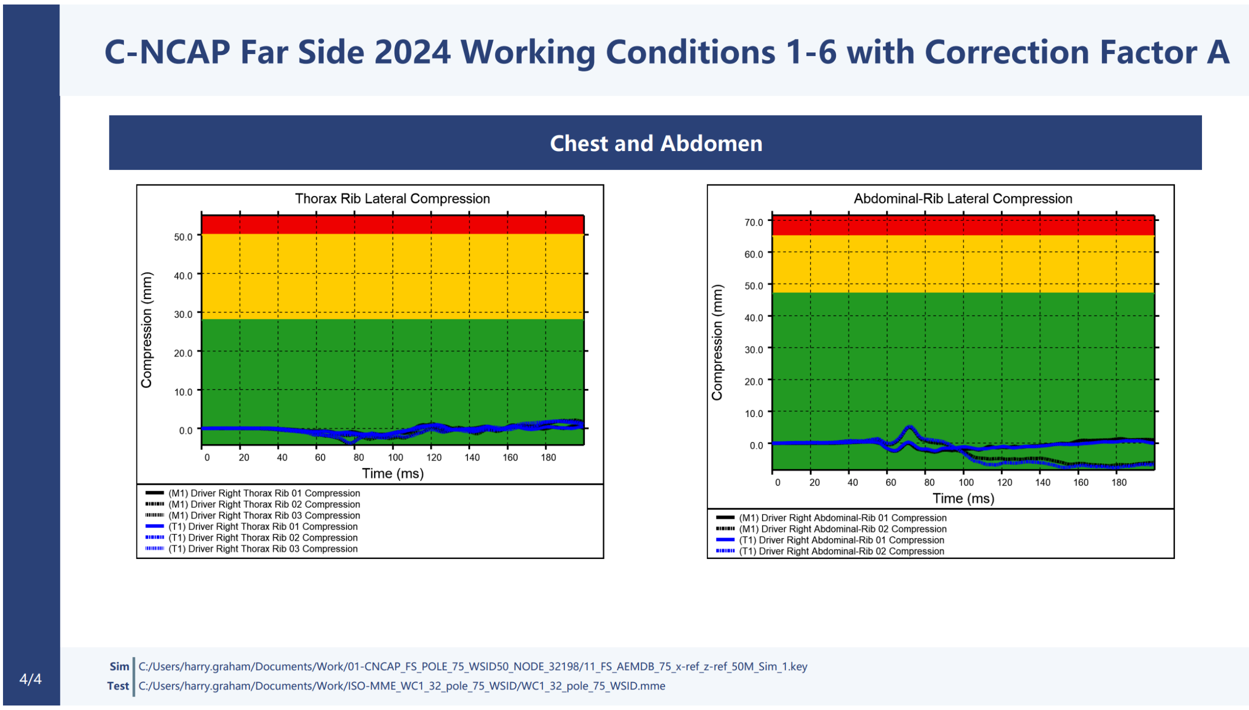
Sim C:/Users/harry.graham/Documents/Work/01-CNCAP_FS_POLE_75_WSID50_NODE_32198/11_FS_AEMDB_75_x-ref_z-ref_50M_Sim_1.key
Test C:/Users/harry.graham/Documents/Work/ISO-MME_WC1_32_pole_75_WSID/WC1_32_pole_75_WSID.mme

Page 2 contains more in depth results of the scores and pages 3 and 4 display the injury graphs.


C-NCAP Far Side 2024 Working Conditions 1-6 with Correction Factor A

Chest and Abdomen

4/4

Sim C:/Users/harry.graham/Documents/Work/01-CNCAP_FS_POLE_75_WSID50_NODE_32198/11_FS_AEMDB_75_x-ref_z-ref_50M_Sim_1.key
Test C:/Users/harry.graham/Documents/Work/ISO-MME_WC1_32_pole_75_WSID/WC1_32_pole_75_WSID.mme

Running in Batch

IMPORTANT: When running the standard non Correction Factor A Templates simply omit the 'TEST_FILE' variable

The template can also be run in batch mode, specifying the required information through command line arguments.

If your results are in the same directory as the keyword file then you only need to specify the keyword file on the command line and the test file and red zone which are specific to this template:

<*reporter_exe*> -batch -file=<*template_name*> -varKEYWORD_FILE=<*keyword_file*> -varSUMMARY_NAME=<*summary_name*> -varTEST_FILE=<*test_file*> -varRED_ZONE=<*red_zone*> -exit

[Add the -pdf, -html, -pptx command line arguments to write the report out in the format you want]

Where:

reporter_exe	**The full path and filename to the REPORTER executable**
template_name	The full path and filename of the template you want to use. The workflow templates can be found in ***$OA_INSTALL/workflows/templates/automotive_assessments***
keyword_file	The full path and filename of the keyword file
summary_name	The working condition number used for the summary template
test_file	The full path to the ISO-MME or CSV file to be used for the Test model
red_zone	Distance between the Head CoG and the Red Line

If the results are in a different folder to the keyword file, you will need to add an extra argument to specify it:

<*reporter_exe*> -batch -file=<*template_name*> -varKEYWORD_FILE=<*keyword_file*> -varSUMMARY_NAME=<summary_name> -varTEST_FILE=<*test_file*> -varRED_ZONE=<*red_zone*> **-varRESULTS_DIR=<results_dir>** -exit

Where:

results_dir	**The full path to the results directory**

Similarly if you want to output the images and other files generated by REPORTER to a different folder than the default, you will need to add an extra argument:

<*reporter_exe*> -batch -file=<*template_name*> -varKEYWORD_FILE=<*keyword_file*> -varSUMMARY_NAME=<summary_name> -varTEST_FILE=<*test_file*> -varRED_ZONE=<*red_zone*> **-varOUTPUT_DIR=<output_dir>** -exit

Where:

output_dir	**The full path to the output directory**

C-NCAP Far Side Protocol 2024 Virtual Assessment Certificate (prerequisite for virtual airbag symmetry check)

This page describes the C-NCAP Far Side Protocol 2024 Virtual Assessment Certificate REPORTER templates which can be used to determine if the correlation between the physical "Side Pole impact" and the virtual "Side Pole impact" is close enough to achieve the Virtual Assessment Certificate. This is a prerequisite is opting to conduct a virtual airbag symmetry check. You can also use SimVT to perform the correlations and check interactively.

Introduction

The C-NCAP Virtual Far Side 2024 protocol requires correlation fitting between simulation and test data to validate the virtual (simulation) models before they can be used to compute an injury score.

If the vehicle contains centre console airbags then there is a requirement to conduct an airbag symmetry assessment to ensure that the airbags are effective when the vehicle is struck from either side (not just the Driver side). The airbag performance is implicitly checked for a driver side impact when the front passenger injury from the physical "Side Pole impact" is assessed according to the dual occupant scenario. However, a "Far Side Pole impact" where the driver is assessed is also required for the airbag symmetry check.

OEMs have the option to perform a physical **or** virtual "Far Side Pole impact". If virtual assessment is chosen the a virtual assessment certificate is required to validate the simulation model. The C-NCAP Far Side Protocol 2024 Virtual Assessment Certificate REPORTER templates can be used to determine if the correlation between the physical "Side Pole impact" and the virtual "Side Pole impact" is close enough to achieve the Virtual Assessment Certificate.

There are two C-NCAP Far Side Protocol 2024 Virtual Assessment Certificate REPORTER templates that support the two possible variants of front passenger respectively:

- If your physical "Side Pole impact" was conducted with a WSID driver and WSID front passenger then you will need to set up a virtual "Side Pole impact" (Ansys LS-DYNA simulation) which also has a WSID driver and WSID front passenger and you will need to use the ***C-NCAP Far Side Protocol 2024 Virtual Assessment Certificate (WSID Driver, WSID Passenger)*** REPORTER template to check if you will meet Virtual Assessment Certificate requirements.

- If your physical "Side Pole impact" was conducted with a WSID driver and ES-2re front passenger then you will need to set up a virtual "Side Pole impact" (Ansys LS-DYNA simulation) which also has a WSID driver and ES-2re front passenger and you will need to use the ***C-NCAP Far Side Protocol 2024 Virtual Assessment Certificate (WSID Driver, ES-2re Passenger)*** REPORTER template to check if you will meet Virtual Assessment Certificate requirements.

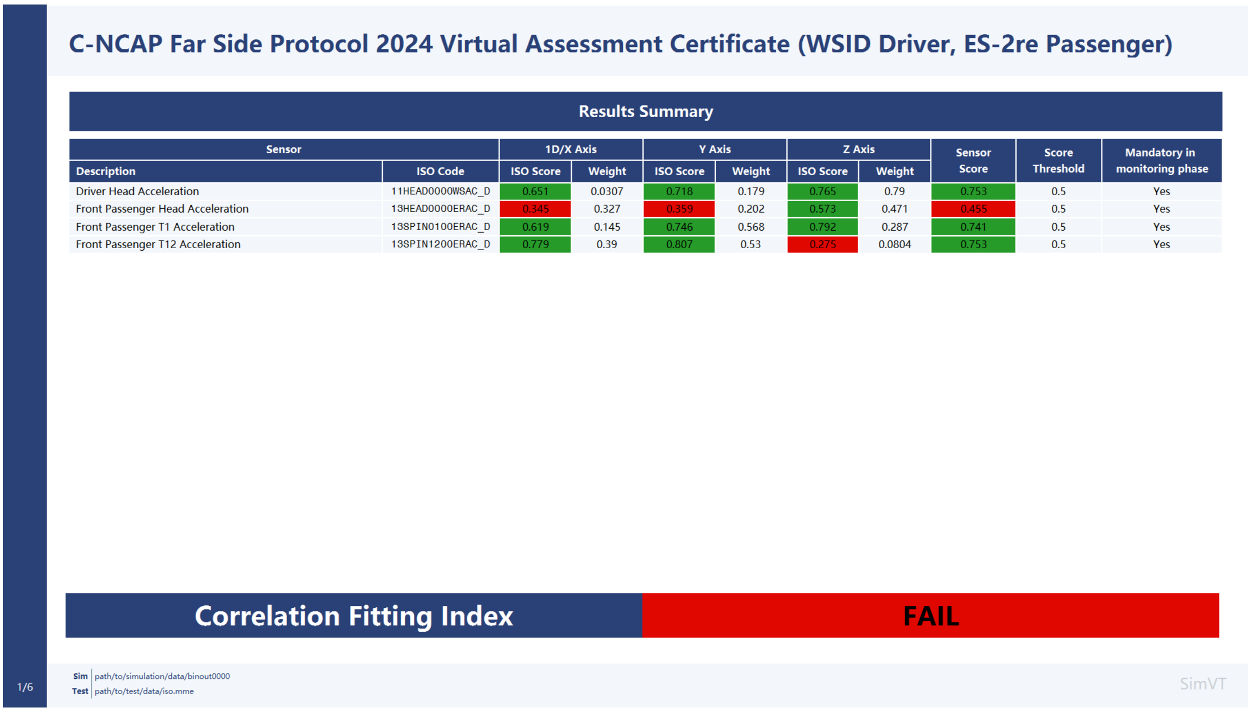
Both C-NCAP Far Side Protocol 2024 Virtual Assessment Certificate REPORTER templates can be run interactively or in batch mode to generate the REPORT and the instructions for running SimVT REPORTER Templates can be found here.

If the template is successfully generated it will show a report summarising the the sensor scores for all the channels required to obtain the Virtual Assessment Certificate (C-NCAP Appendix H.1.2.2.2). The report also contains the correlation graphs for each channel so that you can inspect any channels which perform poorly. Additionally, a SimVT settings file (*REPORTER_settings.simvt*) is created which can be loaded in to the SimVT workflow tool to interrogate the results interactively.

Before using the REPORTER template with Ansys LS-DYNA data you should have defined the occupant and structures user data required for your model in PRIMER (see Automotive Assessments PRIMER for details).

Report Pages

Page 1 contains a summary of the results for all the assessed and monitored channels. It shows the PASS/FAIL status of the correlation fitting index. In the example image below, the "Front Passenger Head Acceleration" sensor score fails to exceed the 0.5 threshold so the correlation fitting index is a FAIL which means that the Virtual Assessment Certificate will not be awarded.



C-NCAP Far Side Protocol 2024 Virtual Assessment Certificate (WSID Driver, ES-2re Passenger)

Results Summary

Sensor		1D/X Axis		Y Axis		Z Axis		Sensor Score	Score Threshold	Mandatory in monitoring phase
Description	ISO Code	ISO Score	Weight	ISO Score	Weight	ISO Score	Weight			
Driver Head Acceleration	11HEAD0000WSAC_D	0.651	0.0307	0.718	0.179	0.765	0.79	0.753	0.5	Yes
Front Passenger Head Acceleration	13HEAD0000ERAC_D	0.345	0.327	0.359	0.202	0.573	0.471	0.455	0.5	Yes
Front Passenger T1 Acceleration	13SPIN0100ERAC_D	0.619	0.145	0.746	0.568	0.792	0.287	0.741	0.5	Yes
Front Passenger T12 Acceleration	13SPIN1200ERAC_D	0.779	0.39	0.807	0.53	0.275	0.0804	0.753	0.5	Yes

Correlation Fitting Index FAIL

1/6
Sim path/to/simulation/data/binout0000
Test path/to/test/data/iso.mme
SimVT

The subsequent pages show a table of the scores and the corridor plots for each sensor.

The ***C-NCAP Far Side Protocol 2024 Virtual Assessment Certificate (WSID Driver, WSID Passenger)*** REPORTER template has 3 sensor pages, one for each sensor:

1. "Driver Head Acceleration"
2. "Front Passenger Head Acceleration"
3. "Front Passenger T4 Acceleration"

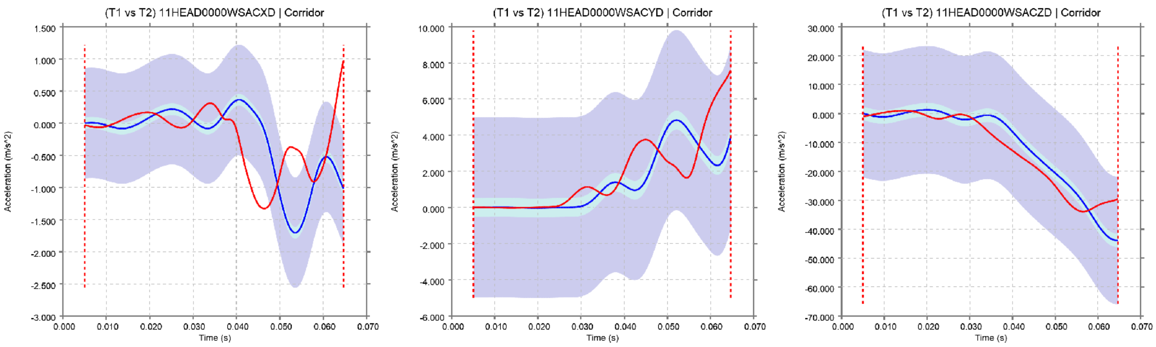
The ***C-NCAP Far Side Protocol 2024 Virtual Assessment Certificate (WSID Driver, ES-2re Passenger)*** REPORTER template has 4 sensor pages, one for each sensor:

1. "Driver Head Acceleration" (shown in the image below)
2. "Front Passenger Head Acceleration"
3. "Front Passenger T1 Acceleration"
4. "Front Passenger T12 Acceleration"

C-NCAP Far Side Protocol 2024 Virtual Assessment Certificate (WSID Driver, ES-2re Passenger)

Driver Head Acceleration

Simulation		Test		Ratings				ISO Score	|MAX|	Weight	Sensor Score
Tag	Channel	Tag	Channel	Corridor	Slope	Phase	Magnitude				
T1	11HEAD0000WSACXD	T2	11HEAD0000WSACXD	0.577	0.862	0.398	0.842	0.651	1.71	0.0307	0.753
T1	11HEAD0000WSACYD	T2	11HEAD0000WSACYD	0.749	0.867	0.39	0.834	0.718	9.93	0.179	
T1	11HEAD0000WSACZD	T2	11HEAD0000WSACZD	0.82	0.875	0.431	0.878	0.765	43.9	0.79	



Simulation curve | Test Curve | Inner Corridor | Outer Corridor

Sensor score > 0.5 **PASS**

2/6

Sim | path/to/simulation/data/binout0000
Test | path/to/test/data/iso.mme

SimVT

The final page of the report contain a table showing the detailed results for each correlation so that they can all be viewed in one place.

C-NCAP Far Side Protocol 2024 Virtual Assessment Certificate (WSID Driver, ES-2re Passenger)

Detailed Results (Continued)

Simulation		Test		Ratings				ISO Score	|MAX|	Weight	Sensor Score
Tag	Channel	Tag	Channel	Corridor	Slope	Phase	Magnitude				
T1	11HEAD0000WSACXD	T2	11HEAD0000WSACXD	0.577	0.862	0.398	0.842	0.651	1.71	0.0307	0.753
T1	11HEAD0000WSACYD	T2	11HEAD0000WSACYD	0.749	0.867	0.39	0.834	0.718	9.93	0.179	0.753
T1	11HEAD0000WSACZD	T2	11HEAD0000WSACZD	0.82	0.875	0.431	0.878	0.765	43.9	0.79	0.753
T1	13HEAD0000ERACXD	T2	13HEAD0000ERACXD	0.153	0.42	1	0	0.345	20.4	0.327	0.455
T1	13HEAD0000ERACYD	T2	13HEAD0000ERACYD	0.369	0.335	0.00602	0.715	0.359	12.6	0.202	0.455
T1	13HEAD0000ERACZD	T2	13HEAD0000ERACZD	0.452	0.677	0.431	0.852	0.573	29.4	0.471	0.455
T1	13SPIN0100ERACXD	T2	13SPIN0100ERACXD	0.514	0.843	0.415	0.812	0.619	16.6	0.145	0.741
T1	13SPIN0100ERACYD	T2	13SPIN0100ERACYD	0.787	0.875	0.39	0.891	0.746	65	0.568	0.741
T1	13SPIN0100ERACZD	T2	13SPIN0100ERACZD	0.725	0.791	0.915	0.805	0.792	32.9	0.287	0.741
T1	13SPIN1200ERACXD	T2	13SPIN1200ERACXD	0.824	0.898	0.448	0.9	0.779	121	0.39	0.753
T1	13SPIN1200ERACYD	T2	13SPIN1200ERACYD	0.898	0.886	0.431	0.921	0.807	165	0.53	0.753
T1	13SPIN1200ERACZD	T2	13SPIN1200ERACZD	0.225	0.447	0.00502	0.476	0.275	25	0.0804	0.753

6/6

Sim | path/to/simulation/data/binout0000
Test | path/to/test/data/iso.mme

SimVT

Dual Occupant Penalties

This guide helps users to set up and perform the occupant injury assessments for the Far Side Protocol Dual Occupant Scenario Penalties for the Passenger and Driver for the WSID and ES-2re dummies as specified in section 1.2.1.5.4 of the C-NCAP Management Regulation (2024).

Please note this guide runs through using the CNCAP Far Side Protocol 2024 Dual-Occupant Penalty (WSID Passenger) template, but this guide still applies for WSID Driver, ES-2re Passenger and ES-2re Driver templates.

The dual-occupant side pole impact scenario calculates two penalties to be deducted from the overall Far Side Protocol score. The passenger penalty is required and contributes towards a maximum 1.5 penalty points. The driver airbag symmetry penalty is required if centre console airbags are present and contributes towards a maximum 0.5 penalty points, you must pass the C-NCAP Far Side Protocol 2024 Virtual Assessment Certificate otherwise the driver airbag symmetry penalty will be automatically set to 0.5.

Set-up using Automotive Assessments in PRIMER

Firstly, you need to attach Workflows Automotive Assessments data to your model(s). Follow this guide to see more: Automotive Assessments in PRIMER.

- For WSID Passenger, for Crash Test select Side Pole, for Regulation select CNCAP, for version select 2024 (WSID+WSID)
- For WSID Driver, for Crash Test select Far Side Pole, for Regulation select CNCAP, for version select 2024 (WSID+WSID)
- For ES-2re Passenger, for Crash Test select Side Pole, for Regulation select CNCAP, for version select 2024 (WSID+ES-2re)
- For ES-2re Driver, for Crash Test select Far Side Pole, for Regulation select CNCAP, for version select 2024 (ES-2re+WSID)

Running the templates in REPORTER

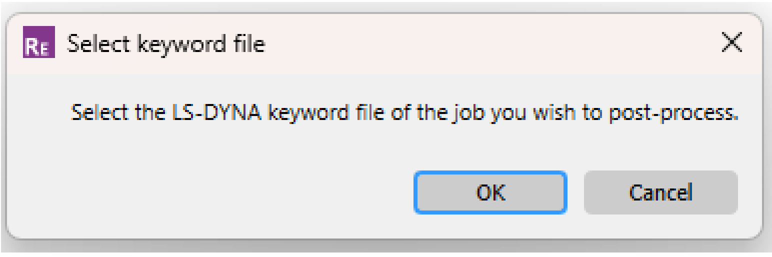
In REPORTER there are four related templates, to find them go to the Automotive tab and filter by 'Virtual testing' under Protection and 'C-NCAP' under Regulation.

1. C-NCAP Far Side Protocol 2024 Dual-Occupant Penalty (WSID Passenger)
2. C-NCAP Far Side Protocol 2024 Dual-Occupant Penalty (WSID Driver)
3. C-NCAP Far Side Protocol 2024 Dual-Occupant Penalty (ES-2re Passenger)

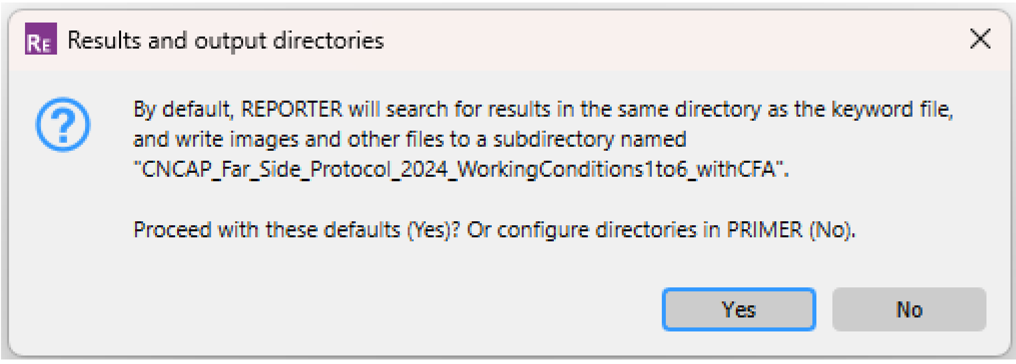
4. C-NCAP Far Side Protocol 2024 Dual-Occupant Penalty (ES-2re Driver)

Upon opening the templates you will be asked a series of questions:

Firstly, select your Ansys LS-DYNA (.key) keyword file

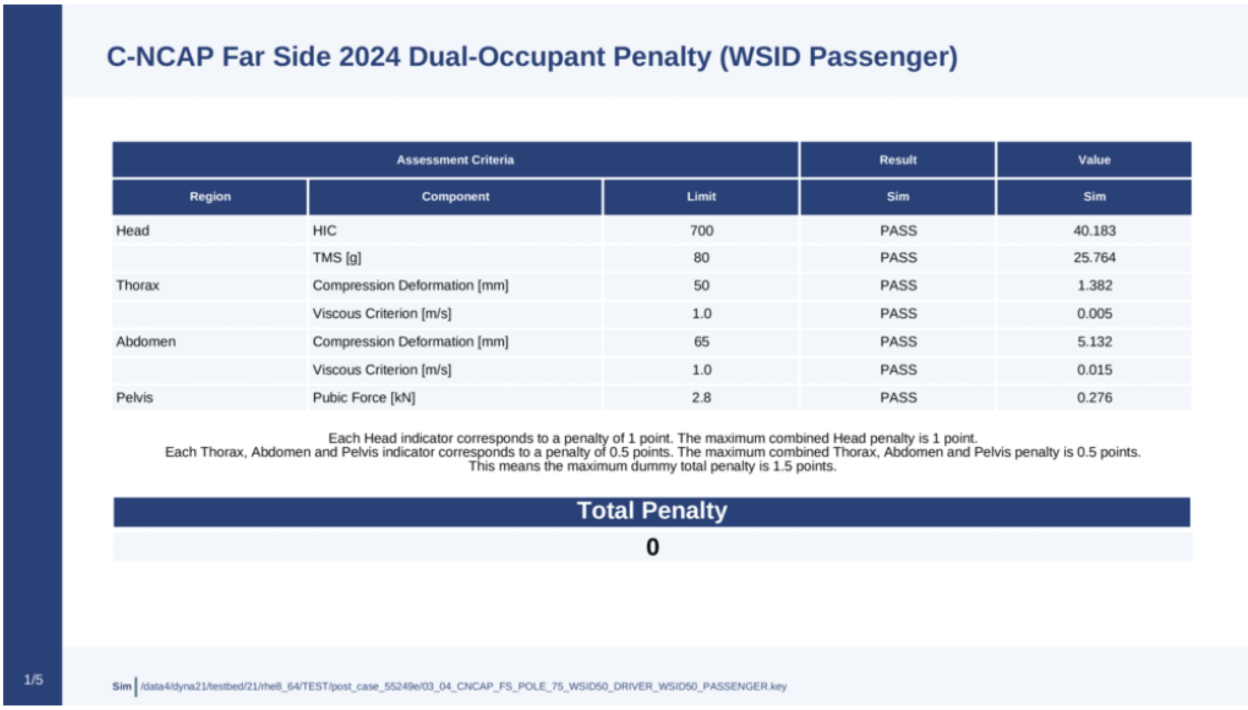


Then you will then be asked whether you want to continue with the default results and output directories or configure them in PRIMER



REPORTER Results

Page 1 contains the limits, values and results (pass or fail) for each assessed body region, an explaination of the penalties and the total penalty score.



C-NCAP Far Side 2024 Dual-Occupant Penalty (WSID Passenger)

Assessment Criteria			Result	Value
Region	Component	Limit	Sim	Sim
Head	HIC	700	PASS	40.183
	TMS [g]	80	PASS	25.764
Thorax	Compression Deformation [mm]	50	PASS	1.382
	Viscous Criterion [m/s]	1.0	PASS	0.005
Abdomen	Compression Deformation [mm]	65	PASS	5.132
	Viscous Criterion [m/s]	1.0	PASS	0.015
Pelvis	Pubic Force [kN]	2.8	PASS	0.276

Each Head indicator corresponds to a penalty of 1 point. The maximum combined Head penalty is 1 point.
Each Thorax, Abdomen and Pelvis indicator corresponds to a penalty of 0.5 points. The maximum combined Thorax, Abdomen and Pelvis penalty is 0.5 points.
This means the maximum dummy total penalty is 1.5 points.

Total Penalty
0

1/5

Sim | /data4/dyna21/testbed/21/rhe8_64/TEST/post_case_55249e/03_04_CNCAP_FS_POLE_75_WSID50_DRIVER_WSID50_PASSENGER.key

Pages 2 and beyond display the injury graphs.

Running in Batch

The template can also be run in batch mode, specifying the required information through command line arguments.

If your results are in the same directory as the keyword file then you only need to specify the keyword file on the command line and the test file and red zone which are specific to this template:

<*reporter_exe*> -batch -file=<*template_name*> -varKEYWORD_FILE=<*keyword_file*> -exit

[Add the -pdf, -html, -pptx command line arguments to write the report out in the format you want]

Where:

reporter_exe	**The full path and filename to the REPORTER executable**
template_name	The full path and filename of the template you want to use. The workflow templates can be found in ***$OA_INSTALL/workflows/templates/automotive_assessments***
keyword_file	The full path and filename of the keyword file

If the results are in a different folder to the keyword file, you will need to add an extra argument to specify it:

<*reporter_exe*> -batch -file=<*template_name*> -varKEYWORD_FILE=<*keyword_file*> **-varRESULTS_DIR=<results_dir>** -exit

Where:

results_dir	**The full path to the results directory**

Similarly if you want to output the images and other files generated by REPORTER to a different folder than the default, you will need to add an extra argument:

<*reporter_exe*> -batch -file=<*template_name*> -varKEYWORD_FILE=<*keyword_file*> **-varOUTPUT_DIR=<output_dir>** -exit

Where:

output_dir	**The full path to the output directory**

Summary Template

This guide helps users to perform a summary providing the overall score for the C-NCAP Far Side Protocol as specified in section 1.2.1.5 of the C-NCAP Management Regulation (2024) taking into account the eight Working Conditions and the two dual-occupant penalties.

To use this template you first must have run:

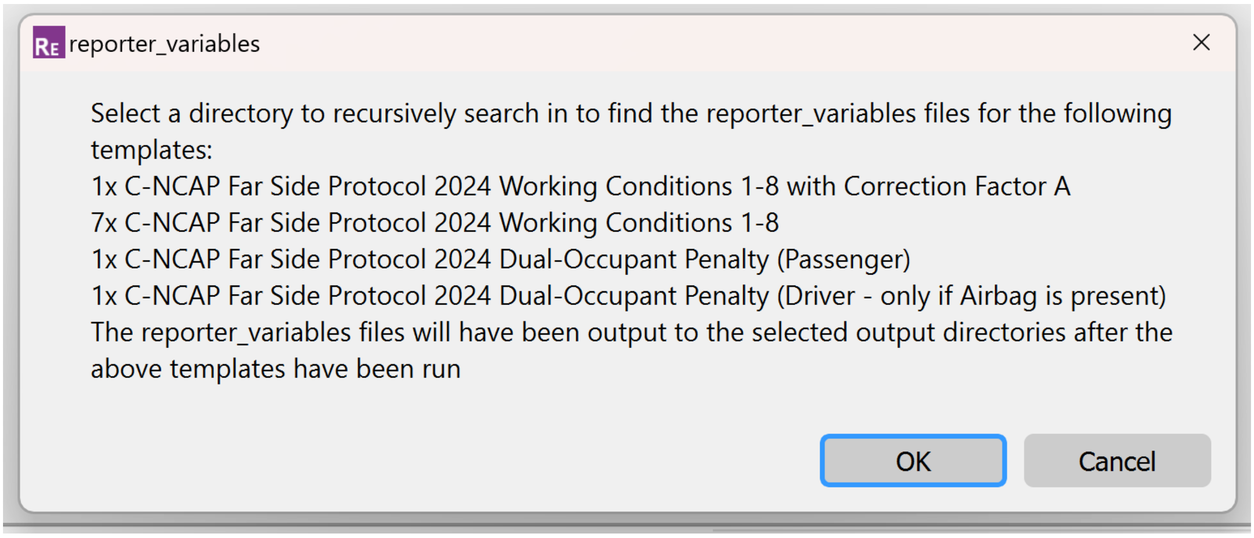
- 1x C-NCAP Far Side Protocol 2024 Working Conditions with Correction Factor A template
- 7x C-NCAP Far Side Protocol 2024 Working Condition templates
- (Suggested but not required) C-NCAP Far Side Protocol 2024 Dual-Occupant Penalty (WSID or ES-2re Passenger) template
- (Suggested but not required) C-NCAP Far Side Protocol 2024 Dual-Occupant Penalty (WSID or ES-2re Driver) templates (if you have centre console airbags)

The templates will produce *reporter_variables* files on completion, this will be used to populate the summary template.

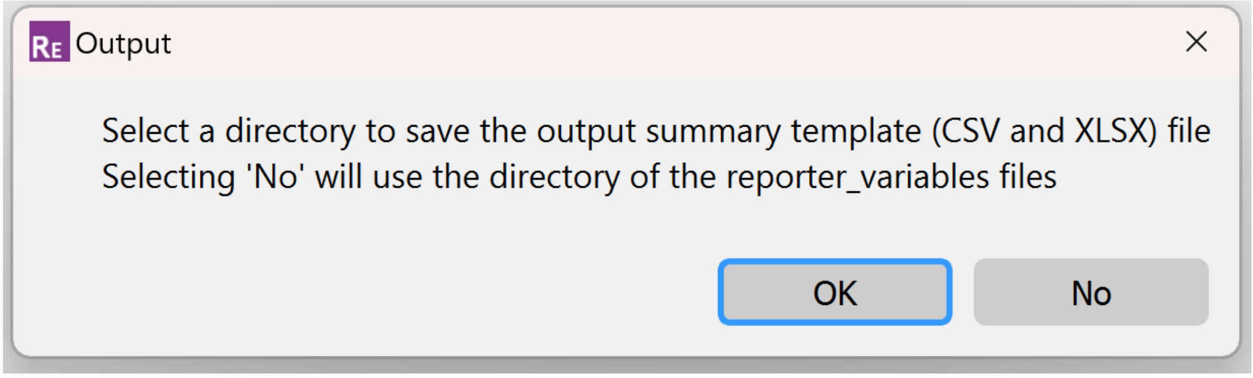
Running the template in REPORTER

In REPORTER you can now run the C-NCAP Far Side Protocol 2024 Summary Template. To find it go to the Automotive tab and filter by 'Virtual testing' under Protection and 'C-NCAP' under Regulation. Upon opening the template you will be asked a few questions:

Firstly to select a directory to recursively search in to find the aforementioned *reporter_variables* files



Then select a directory to save the output summary template .CSV and .XLSX files to. Selecting 'No' will use the selected *reporter_variables* directory

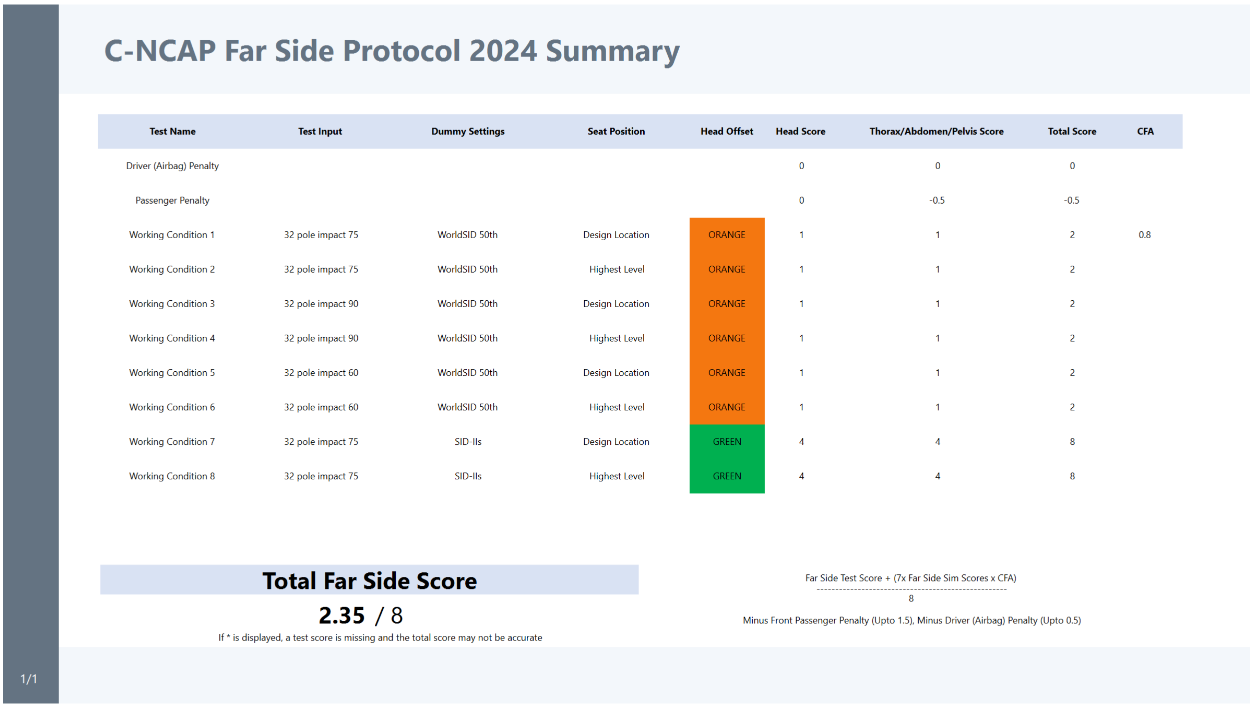


The template will then generate

REPORTER Results

The template displays the summary table of all the Working Conditions and Penalties, including head offset, scores and Correction Factor A (CFA)

The total far side score is then displayed next to a reminder of how it is calculated.



C-NCAP Far Side Protocol 2024 Summary

Test Name	Test Input	Dummy Settings	Seat Position	Head Offset	Head Score	Thorax/Abdomen/Pelvis Score	Total Score	CFA
Driver (Airbag) Penalty					0	0	0	
Passenger Penalty					0	-0.5	-0.5	
Working Condition 1	32 pole impact 75	WorldSID 50th	Design Location	ORANGE	1	1	2	0.8
Working Condition 2	32 pole impact 75	WorldSID 50th	Highest Level	ORANGE	1	1	2	
Working Condition 3	32 pole impact 90	WorldSID 50th	Design Location	ORANGE	1	1	2	
Working Condition 4	32 pole impact 90	WorldSID 50th	Highest Level	ORANGE	1	1	2	
Working Condition 5	32 pole impact 60	WorldSID 50th	Design Location	ORANGE	1	1	2	
Working Condition 6	32 pole impact 60	WorldSID 50th	Highest Level	ORANGE	1	1	2	
Working Condition 7	32 pole impact 75	SID-IIs	Design Location	GREEN	4	4	8	
Working Condition 8	32 pole impact 75	SID-IIs	Highest Level	GREEN	4	4	8	

Total Far Side Score

2.35 / 8

If * is displayed, a test score is missing and the total score may not be accurate

Far Side Test Score + (7x Far Side Sim Scores x CFA)

8

Minus Front Passenger Penalty (Upto 1.5), Minus Driver (Airbag) Penalty (Upto 0.5)

1/1

Running in Batch

The template can also be run in batch mode, specifying the required information through command line arguments.

<*reporter_exe*> -batch -file=<*template_name*> -varREPORTER_VARIABLES_DIR=<*reporter_variables_dir*> -varOUTPUT_DIR=<*output_dir*> -exit

[Add the -pdf, -html, -pptx command line arguments to write the report out in the format you want]

Where:

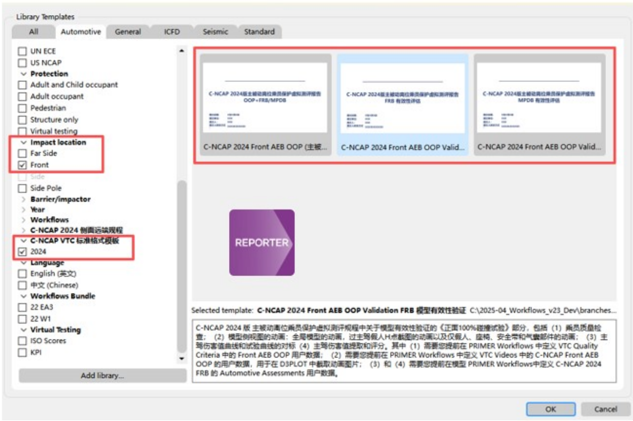
reporter_exe	**The full path and filename to the REPORTER executable**
template_name	The full path and filename of the template you want to use. The workflow templates can be found in ***$OA_INSTALL/workflows/templates/automotive_assessments***
reporter_variables_dir	The full path for the reporter_variables files to be recursively searched from
output_dir	The full path for the CSV and XLSX output files to be written to

4.9.9. C-NCAP 2024 AEB OOP 正碰主被动离位虚拟测评报告流程

C-NCAP 2024 Front AEB OOP 主被动离位乘员保护虚拟测评报告模板

共包括三个报告模板：

1. CNCAP_Front_AEB_OOP_2024_Validation_FRB_CN.ort - 用于FRB碰撞模型的有效性验证，需提前填写并生成的 Workflows 用户数据：
   - Automotive Assessments
   - C-NCAP VTC Quality Criteria
   - VTC Videos
2. CNCAP_Front_AEB_OOP_2024_Validation_MPDB_CN.ort - 用于MPDB碰撞模型的有效性验证，需提前填写并生成的 Workflows 用户数据：
   - Automotive Assessments
   - C-NCAP VTC Quality Criteria
   - VTC Videos
3. CNCAP_Front_AEB_OOP_2024_CN.ort - 用于制动+碰撞(OOP+FRB/MPDB)工况下的乘员伤害预测和动态响应，需提前填写并生成的 Workflows 用户数据：
   - Automotive Assessments
   - VTC Videos



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FRB碰撞模型的有效性验证

定义Automotive Assessments用户数据：

1. 在PRIMER 中打开FRB碰撞模型，点击 Workflows , 然后进入Automotive Assessments模块
2. 在左侧工况栏依次选择 FRB, CNCAP, 2024 , 并选择正确的模型单位制
3. 填写假人(驾驶员,Hybrid III 50th,男性假人)各个测量部位的输出 ID 信息(见下一页)
4. 填写车辆结构的输出信息：安全带肩带力B3和腰带力B6
5. 点击 **Save To File** 输出所选信息到.json文件

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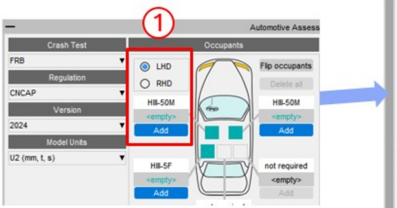
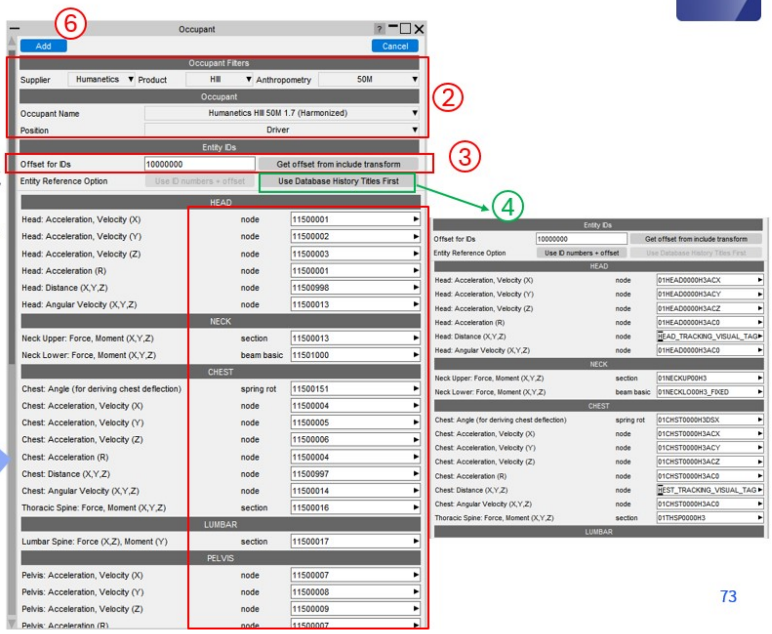
FRB碰撞模型的有效性验证

假人输出 ID 定义

1) 选择方向盘位置：左舵LHD/右舵RHD，点击Add开始添加驾驶员假人信息
2) 选择相应的假人 FE 模型供应商，产品以及版本信息
3) 若 ID 有 offset 偏置，可通过手动输入修改，或从 INCLUDE 文件中自动获取 transform
4) 除了修改 ID 之外，亦可直接通过标题来识别对应的输出通道名称
5) 若有红色底的文本框，请点击右侧箭头选择相应的 database history 输出
6) 填写完毕后，点击顶部 Add 添加假人信息





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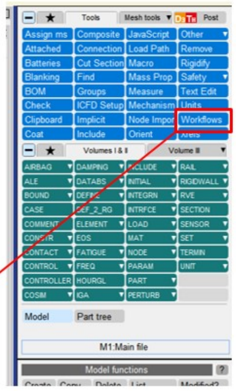
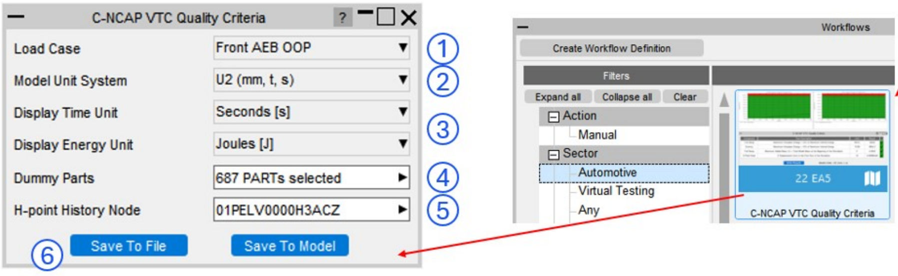
FRB碰撞模型的有效性验证

定义C-NCAP VTC Quality Criteria 用户数据：

1) 打开 Workflows C-NCAP VTC Quality Criteria，选择 Load Case 为 Front AEB OOP
2) 选择您的模型单位
3) 选择将要输出的时间和能量单位
4) 选择主驾假人的所有 Parts 用于能量检查
5) 选择假人 H 点对应的 History Node 用于位移检查
6) Save To File 保存用户数据 JSON 文件

（您可以复写之前已经填写的 Automotive Assessments JSON 文件，让同一个 JSON 文件拥有多个 Workflows 信息）



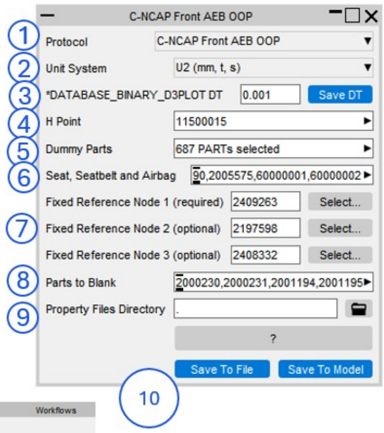


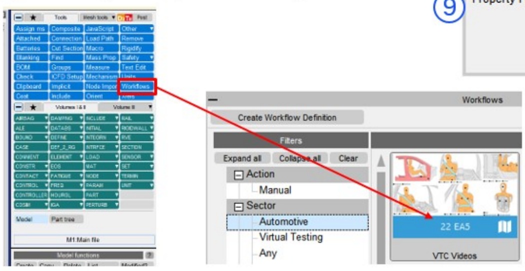
FRB碰撞模型的有效性验证

定义 VTC Videos用户数据：

1) 选择 Protocol 为 C-NCAP Front AEB OOP
2) 选择您的模型单位
3) 输入 D3PLOT 时间步长，若和目前模型定义的不一致，可以 Save 更新模型后重跑
4) 选择主驾假人 H 点 Node ID
5) 选择主驾假人的 Parts
6) 选择座椅，安全带，和气囊 Parts 用于截取只有假人和约束系统的动画
7) 选择 3 个点通过局部坐标系在动画中固定车体，建议选择车体结构上的 3 点
8) 如果有 Parts 遮挡假人，选中它们，将在动画中隐藏
9) 选择一个保存动画视角配置文件的文件夹，D3PLOT 中会自动计算视角并保存
10) Save to file 保存用户数据 JSON 文件

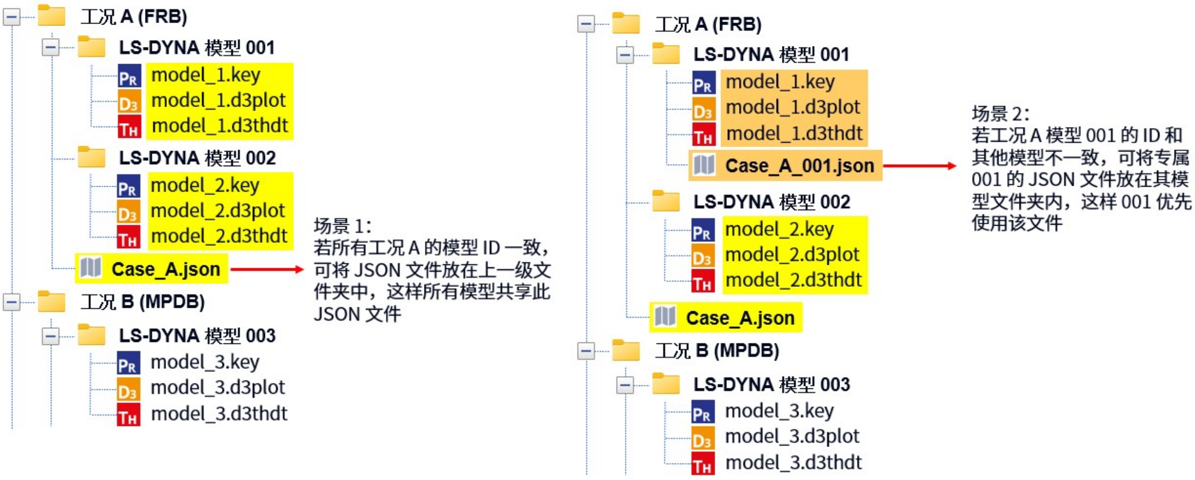
（您可以复写之前已经填写过其他 Workflows 信息的 JSON 文件，让同一个 JSON 文件拥有多个 Workflows 信息）





Workflow User Data 用户数据 JSON 文件

用户数据 JSON 文件管理：默认最多上跳 4 级文件夹寻找 Workflows 用户数据 JSON 文件



FRB碰撞模型的有效性验证 – 曲线ISO对标

T/HIS

在使用THIS进行对标前，需要先输入实验通道数据，确保通道名称、曲线正负等问题无误，步骤如下：

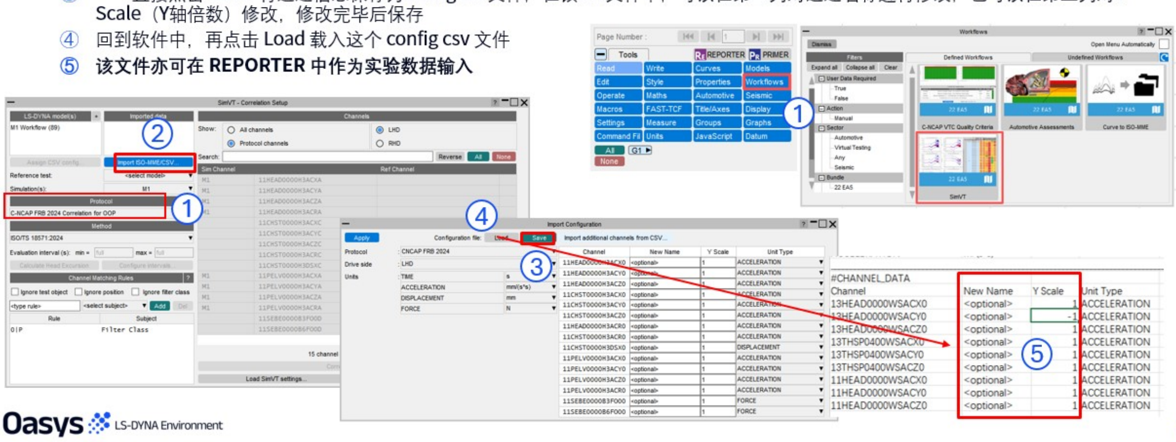
① 用 T/HIS 打开已经保存好 Automotive Assessments 用户数据的模型结果 binout，然后打开 Workflows => SimVT，左侧 Protocol 选择 C-NCAP FRB 2024 Correlation for OOP

② 点击 Import ISO-MME/CSV 输入实验数据。支持输入 MME, CHN, 或 config csv 文件。如果通道名称不一致，可以在New Name一列进行修改，如果Y 轴倍数需要修改，则在 Y Scale 一列输入。除了这种方法，另一种更系统的方法是……

③ ……直接点击"Save"将通道信息保存为config csv文件，在该csv文件中，可以在第二列对通道名称进行修改，也可以在第三列对Y Scale（Y轴倍数）修改，修改完毕后保存

④ 回到软件中，再点击 Load 载入这个 config csv 文件

⑤ **该文件亦可在 REPORTER 中作为实验数据输入**

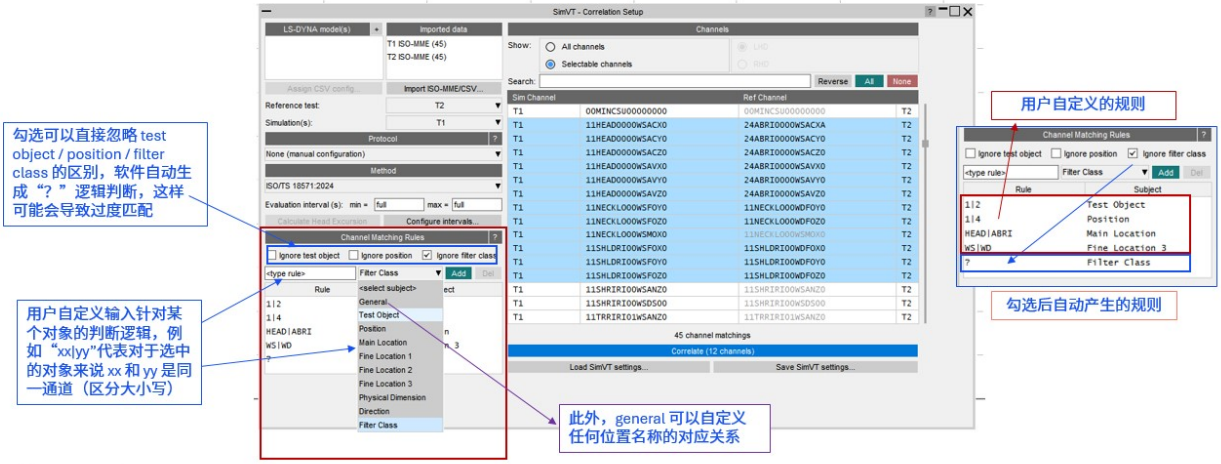


T/HIS

FRB碰撞模型的有效性验证 – 曲线ISO对标

除了 config csv 对实验通道进行名称更换，您还可以输入名称匹配方法匹配仿真和实验通道名称：

- 在面板左下角，用户可以自定义通道名称中各个部分的匹配方式



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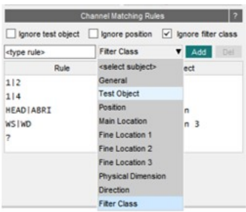
T/HIS

FRB碰撞模型的有效性验证 – 曲线ISO对标

除了 config csv 对实验通道进行名称更换，您还可以输入名称匹配方法匹配仿真和实验通道名称：

- 在面板左下角，用户可以自定义通道名称中各个部分的匹配方式
- 通道名称示例如下：



1 1 HEAD LE 00 H3 AC X A

Test object: 1 (Vehicle no. 1); **Position**: 1 (Front left); **Main location**: HEAD (Dummy head)

1 1 HEAD LE 00 H3 AC X A

Fine location 1: LE (Left); **Fine location 2**: 00 (Undefined); **Fine location 3**: H3 (H III dummy)

1 1 HEAD LE 00 H3 AC X A

Dimension: AC (Acceleration); **Direction**: X (X-direction); **Filter class**: A (CFC 1000)

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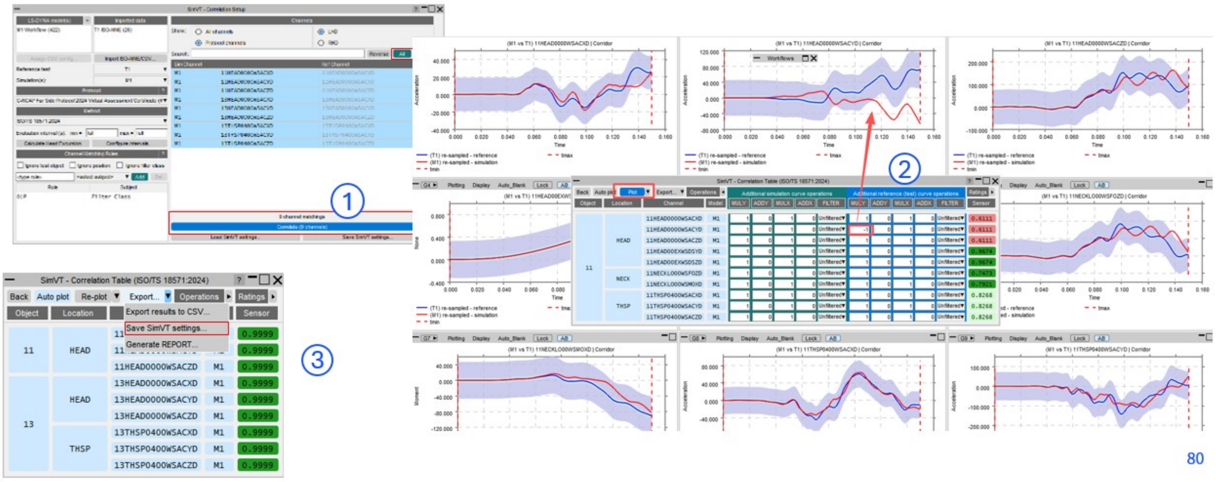
FRB碰撞模型的有效性验证 – 曲线ISO对标

您可以保存 SimVT settings 文件来记录实验数据的重命名 / 额外数学操作，可在以后的 T/HIS 或 REPORTER 中输入

1. 点击 correlate
2. 在 Operations 里修改 Y 轴倍数
3. 修改完后，Export 下拉中选中 Save SimVT settings，可在以后的 T/HIS 或 REPORTER 中输入



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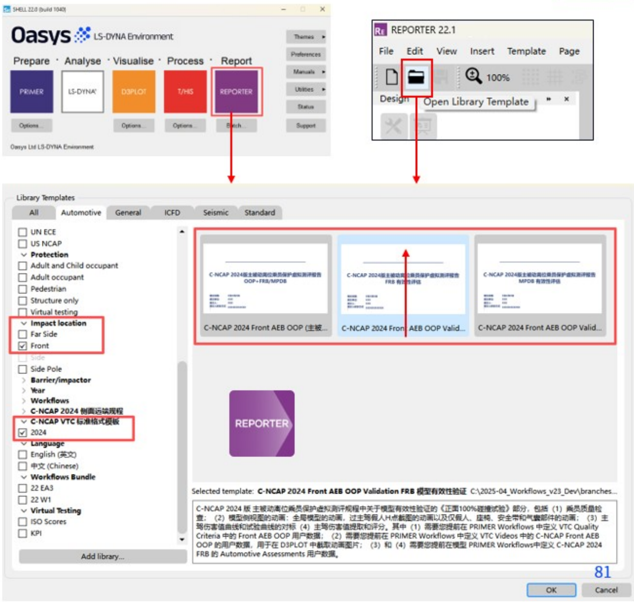
FRB碰撞模型的有效性验证

自动化报告输出：

1. 确保 FRB 模型的结果文件夹内，或上跳 4 级文件夹内能找到的第一个 JSON 文件包含按照前面方法提前填写并生成的 Workflows 用户数据：
   - Automotive Assessments
   - C-NCAP VTC Quality Criteria
   - VTC Videos
2. 打开 REPOTER 软件，或在已经打开的 REPORTER 中选则左上角的 Open Library Template 按钮图标，在 Library Templates 中选择 Automotive 标签，在左侧过滤器中勾选 Front 和 C-NCAP VTC 标准格式模板 2024
3. 此时会出现 AEB OOP 要求的三个工况报告
4. 选择 FRB 有效性评估报告，开始生成报告



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FRB碰撞模型的有效性验证

FRB 有效性验证报告输出：

① 首先如果您有 SimVT settings file 文件（在THIS中手动对标后得到的，见前几页的介绍），选择 Yes.

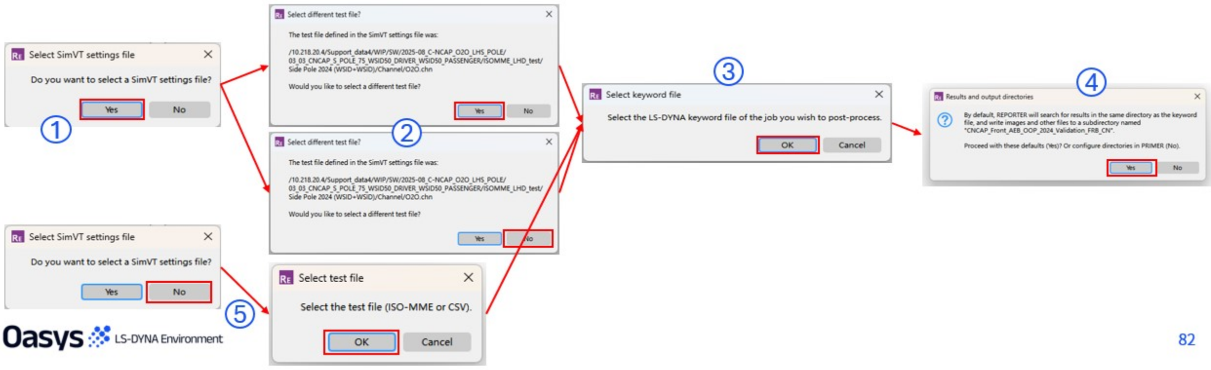
② 若您的 SimVT settings file 中引用的实验数据就是您想输入的实验数据，那么在第二个 Select different test file? 中选择 No. 否则选择 Yes 提供新的实验数据（mme, chn 或 config csv）

③ 选择对标模型 key 文件，软件会在同一个文件夹中寻找模型 binout 文件作为模型数据

④ 设置输出文件夹，默认自动创建，如选择 No 则用户自定义输出结果文件夹

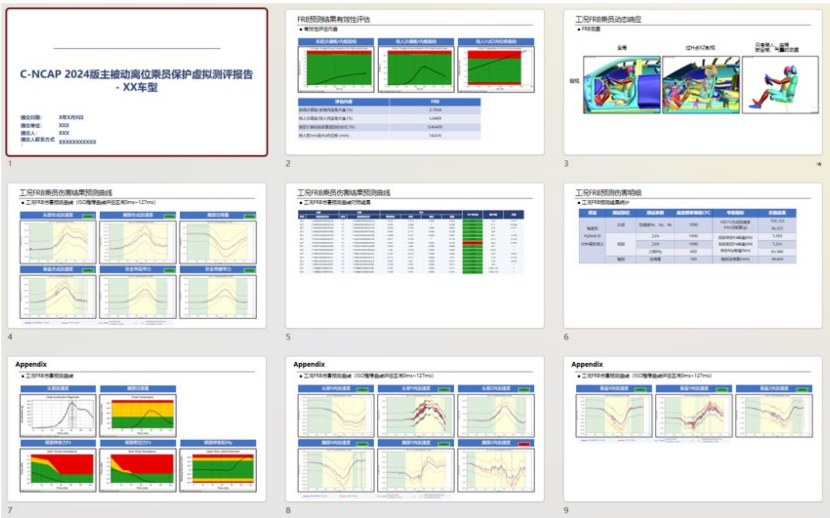
⑤ 如果第一步点击“No”，之后依次选择试验文件（mme, chn 或 config csv）、对标模型，设置输出文件夹即可。

⑥ 如果模型质量检查的json文件丢失，或存在无效的数据，则会提示并弹出primer workflow以便填入所需的信息。



FRB碰撞模型的有效性验证

FRB 有效性验证报告输出示例：

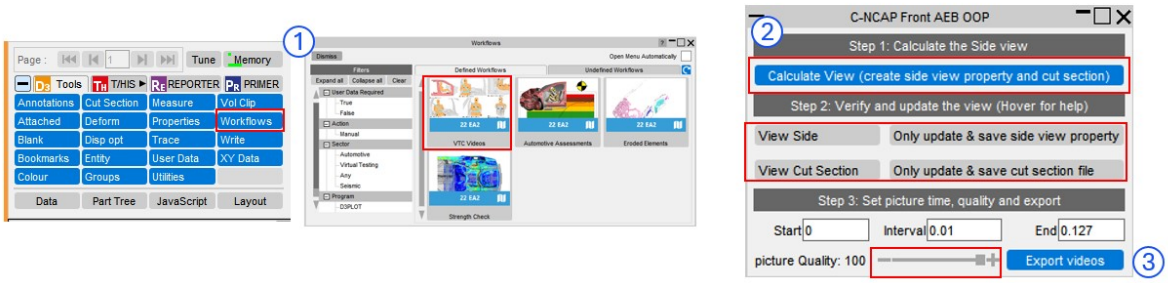


FRB碰撞模型的有效性验证 – 动画视频

D3PLOT

REPORTER 默认自动输出动画视频。如果需要修改动画视角 / 手动输出动画，可以进入 D3PLOT 进行

1. 使用D3PLOT打开模型动画结果文件，打开 Workflow → VTC Vidoes，点击“Calculate Views” 可自动生成正视角和俯视角的视图文件。
2. 点击“View Side” 或“View Cut Section” 来检查生成的视角是否合适，如果不合适，可以调整视角后点击“Only update & Save Side View” / “Only Update & save cut section file” 以更新视角
3. 视角调整好之后，点击“Export videos” 并选择输出图片的文件夹，软件自动进行截取
4. 如果需要继续调整视图，请在D3PLOT中调整并更新视图文件后，保存并重新输出

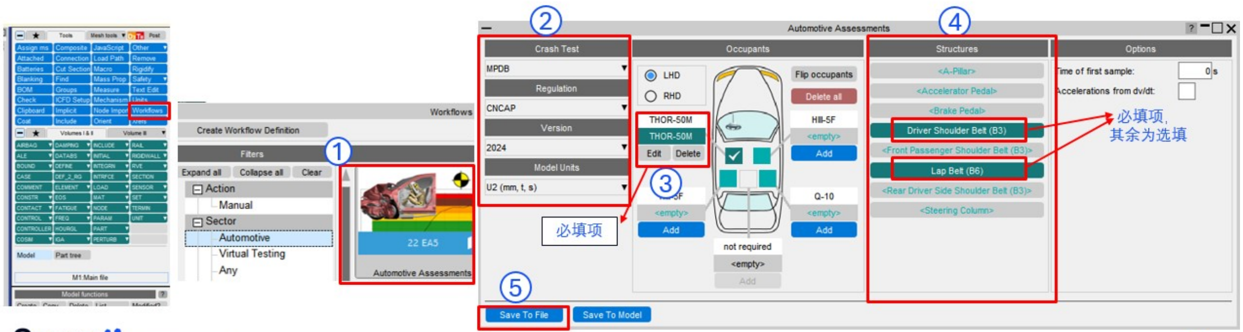


MPDB碰撞模型的有效性验证

PRIMER

定义Automotive Assessments用户数据：

1. 在PRIMER 中打开MPDB碰撞模型，点击 Workflows，然后进入Automotive Assessments模块
2. 在左侧工况栏依次选择 MPDB, CNCAP, 2024，并选择正确的模型单位制
3. 填写假人(驾驶员，THOR 50th CNCAP，男性假人) 各个测量部位的输出 ID 信息(参考之前 FRB 的相似情况，此处省略)
4. 填写车辆结构的输出信息：安全带肩带力B3和腰带力B6
5. 点击 **Save To File** 输出所选信息到.json文件

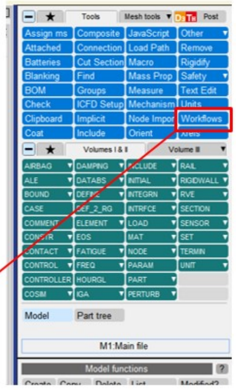


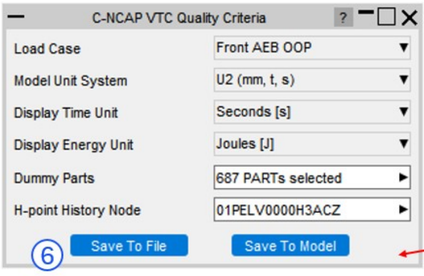
MPDB碰撞模型的有效性验证

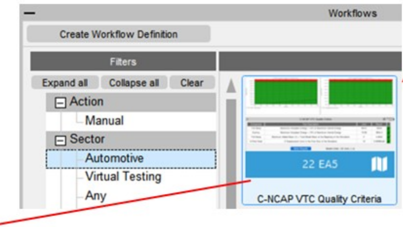
定义C-NCAP VTC Quality Criteria 用户数据：

1) 打开 Workflows C-NCAP VTC Quality Criteria，选择 Load Case 为 Front AEB OOP
2) 选择您的模型单位
3) 选择将要输出的时间和能量单位
4) 选择主驾假人的所有 Parts 用于能量检查
5) 选择假人 H 点对应的 History Node 用于位移检查
6) Save To File 保存用户数据 JSON 文件

（您可以复写之前已经填写的 Automotive Assessments JSON 文件，让同一个 JSON 文件拥有多个 Workflows 信息）





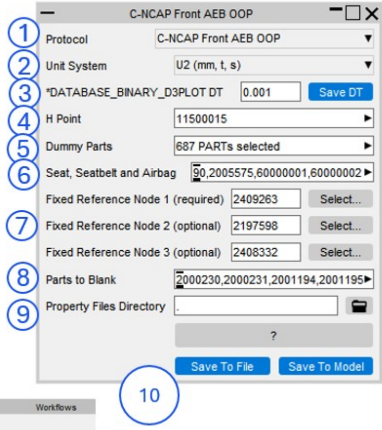


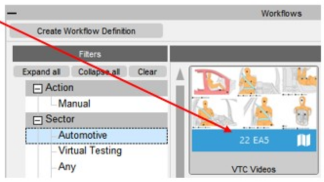
MPDB碰撞模型的有效性验证

定义 VTC Videos用户数据：

1) 选择 Protocol 为 C-NCAP Front AEB OOP
2) 选择您的模型单位
3) 输入 D3PLOT 时间步长，若和目前模型定义的不一致，可以 Save 更新模型后重跑
4) 选择主驾假人 H 点 Node ID
5) 选择主驾假人的 Parts
6) 选择座椅，安全带，和气囊 Parts 用于截取只有假人和约束系统的动画
7) 选择 3 个点通过局部坐标系在动画中固定车体，建议选择车体结构上的 3 点
8) 如果有 Parts 遮挡假人，选中它们，将在动画中隐藏
9) 选择一个保存动画视角配置文件的文件夹，D3PLOT 中会自动计算视角并保存
10) Save to file 保存用户数据 JSON 文件

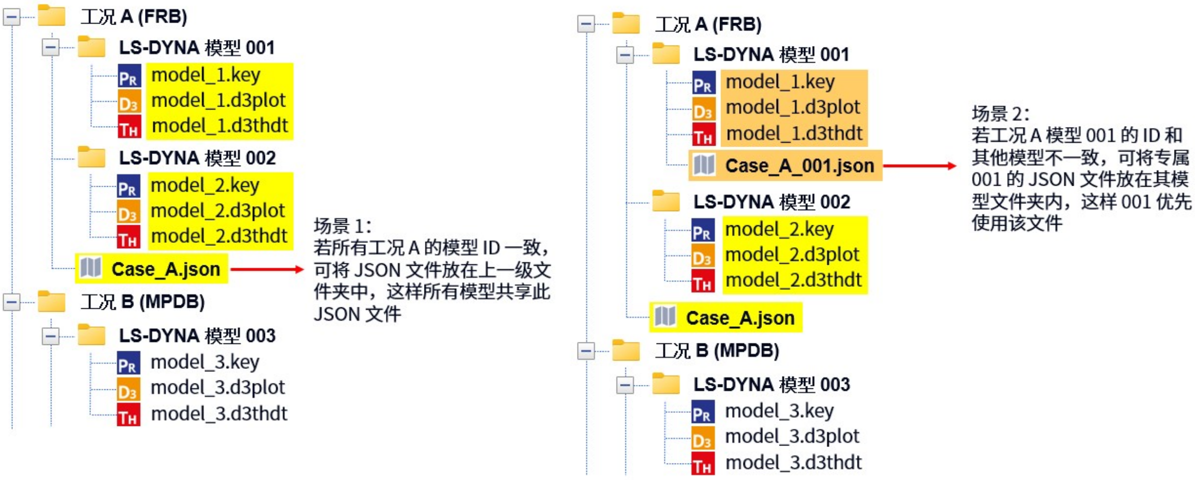
（您可以复写之前已经填写过其他 Workflows 信息的 JSON 文件，让同一个 JSON 文件拥有多个 Workflows 信息）





Workflow User Data 用户数据 JSON 文件

用户数据 JSON 文件管理：默认最多上跳 4 级文件夹寻找 Workflows 用户数据 JSON 文件



MPDB碰撞模型的有效性验证

T/HIS

在使用THIS进行对标前，需要先输入实验通道数据，确保通道名称、曲线正负等问题无误，步骤如下：

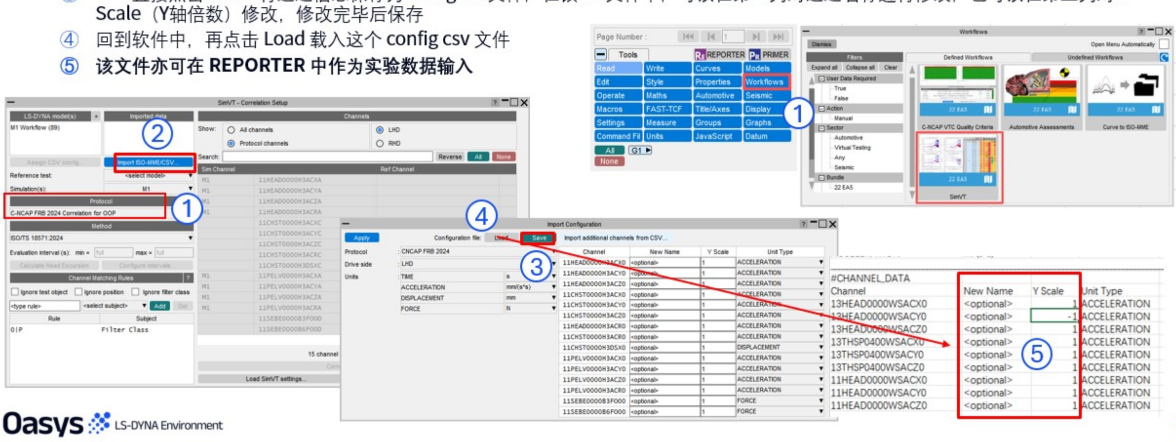
① 用 T/HIS 打开已经保存好 Automotive Assessments 用户数据的模型结果 binout，然后打开 Workflows => SimVT，左侧 Protocol 选择 C-NCAP MPDB 2024 Correlation for OOP。其余步骤和前面展示的 FRB 部分相似，在此省略后续页面

② 点击 Import ISO-MME/CSV 输入实验数据。支持输入 MME, CHN, 或 config csv 文件。如果通道名称不一致，可以在New Name一列进行修改，如果Y 轴倍数需要修改，则在 Y Scale 一列输入。除了这种方法，另一种更系统的方法是……

③ ……直接点击"Save"将通道信息保存为config csv文件，在该csv文件中，可以在第二列对通道名称进行修改，也可以在第三列对Y Scale（Y轴倍数）修改，修改完毕后保存

④ 回到软件中，再点击 Load 载入这个 config csv 文件

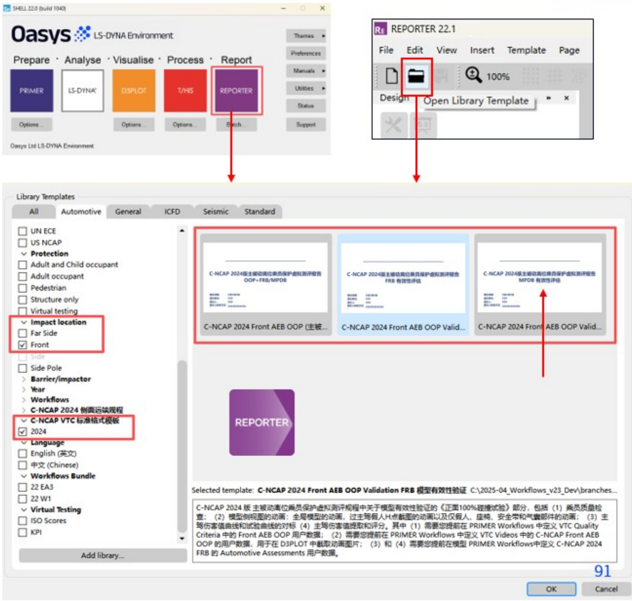
⑤ **该文件亦可在 REPORTER 中作为实验数据输入**



MPDB碰撞模型的有效性验证

自动化报告输出：

1. 确保 MPDB 模型的结果文件夹内，或上跳 4 级文件夹内能找到的第一个 JSON 文件包含按照前面方法提前填写并生成的 Workflows 用户数据：
   - Automotive Assessments
   - C-NCAP VTC Quality Criteria
   - VTC Videos
2. 打开 REPOTER 软件，或在已经打开的 REPORTER 中选则左上角的 Open Library Template 按钮图标，在 Library Templates 中选择 Automotive 标签，在左侧过滤器中勾选 Front 和 C-NCAP VTC 标准格式模板 2024
3. 此时会出现 AEB OOP 要求的三个工况报告
4. 选择 MPDB 有效性评估报告，开始生成报告，报告生成方法和前面的 FRB 相似，在此省略后续页面



Oasys LS-DYNA Environment

MPDB碰撞模型的有效性验证

MPDB 有效性验证报告输出示例：

Oasys LS-DYNA Environment

MPDB碰撞模型的有效性验证 – 动画视频

REPORTER 默认自动输出动画视频。如果需要修改动画视角 / 手动输出动画，可以进入 D3PLOT 进行

1. 使用D3PLOT打开模型动画结果文件，打开 Workflow → VTC Vidoes，点击“Calculate Views” 可自动生成正视角和俯视角的视图文件。
2. 点击“View Side” 或“View Cut Section” 来检查生成的视角是否合适，如果不合适，可以调整视角后点击“Only update & Save Side View” / “Only Update & save cut section file” 以更新视角
3. 视角调整好之后，点击“Export videos” 并选择输出图片的文件夹，软件自动进行截取
4. 如果需要继续调整视图，请在D3PLOT中调整并更新视图文件后，保存并重新输出

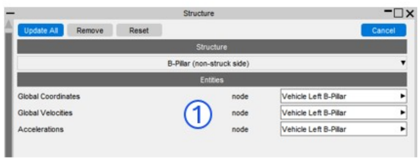
C-NCAP 2024 Front AEB OOP
OOP+FRB/MPDB 乘员伤害预测报告

OOP+FRB/MPDB 乘员伤害预测

定义Automotive Assessments用户数据：

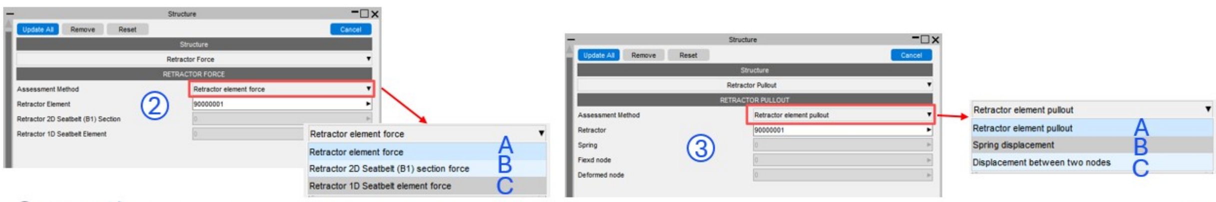
1. 在PRIMER 中打开MPDB碰撞模型，点击 Workflows，然后进入Automotive Assessments模块
2. 在左侧工况栏依次选择 MPDB, Front AEB OOP, 2024，并选择正确的模型单位制
3. 填写假人(驾驶员，THOR 50th CNCAP, 男性假人) 各个测量部位的输出 ID 信息(参考之前 FRB / MPDB 的相似情况，此处省略)
4. 填写车辆结构的输出信息：全部都是必填项，关于 B-pillar, Retractor Force 和 Retractor Pullout 填写，见后面几页的操作方法
5. 填写 AEB 紧急制动阶段的结束时刻（即 FRB / MPDB 波形开始加载的时刻），默认 0.5 s，可根据模型实际情况修改
6. 点击 **Save To File** 输出所选信息到.json文件

OOP+FRB/MPDB 乘员伤害预测



定义Automotive Assessments用户数据：

1. B-pillar：填写加速度计的 History Node，用于在报告中输出车体加速度波形图
2. Retractor Force：填写卷收器受力大小输出，支持三种不同测量方式选其一：
   A. 使用关键字 *ELEMENT_SEATBELT_RETRACTOR 定义卷收器，并且 *DATABASE_ASKII 中打开 SBTOUT
   B. 对 2D 安全带进行 *DATABASE_CROSS_SECTION 定义截面，填写 B1 截面力输出
   C. 若安全带部分为 1D 单元，将其加入 *DATABASE_HISTORY_SEATBELT，并且 *DATABASE_ASKII 中打开 SBTOUT
3. Retractor Pullout：填写卷收器位移测量输出，支持三种方法选其一：
   A. 使用关键字 *ELEMENT_SEATBELT_RETRACTOR 定义卷收器，并且 *DATABASE_ASKII 中打开 SBTOUT
   B. 若使用弹簧测量，则输入 *DATABASE_HISTORY_DISCRETE 单元输出
   C. 您也可以定义两个 History Node，其中一个位于模型底部为固定点 Fixed Node，另一个在固定点上方可移动 Deformed node

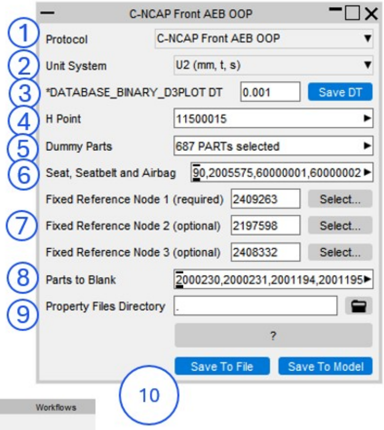


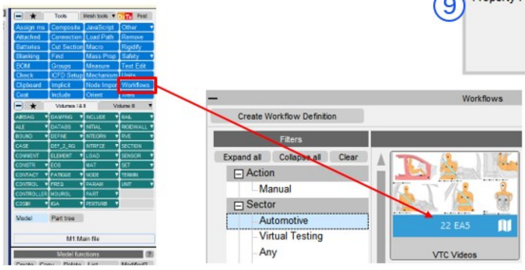
OOP+FRB/MPDB 乘员伤害预测

定义 VTC Videos用户数据：

1) 选择 Protocol 为 C-NCAP Front AEB OOP
2) 选择您的模型单位
3) 输入 D3PLOT 时间步长，若和目前模型定义的不一致，可以 Save 更新模型后重跑
4) 选择主驾假人 H 点 Node ID
5) 选择主驾假人的 Parts
6) 选择座椅，安全带，和气囊 Parts 用于截取只有假人和约束系统的动画
7) 选择 3 个点通过局部坐标系在动画中固定车体，建议选择车体结构上的 3 点
8) 如果有 Parts 遮挡假人，选中它们，将在动画中隐藏
9) 选择一个保存动画视角配置文件的文件夹，D3PLOT 中会自动计算视角并保存
10) Save to file 保存用户数据 JSON 文件

（您可以复写之前已经填写过其他 Workflows 信息的 JSON 文件，让同一个 JSON 文件拥有多个 Workflows 信息）



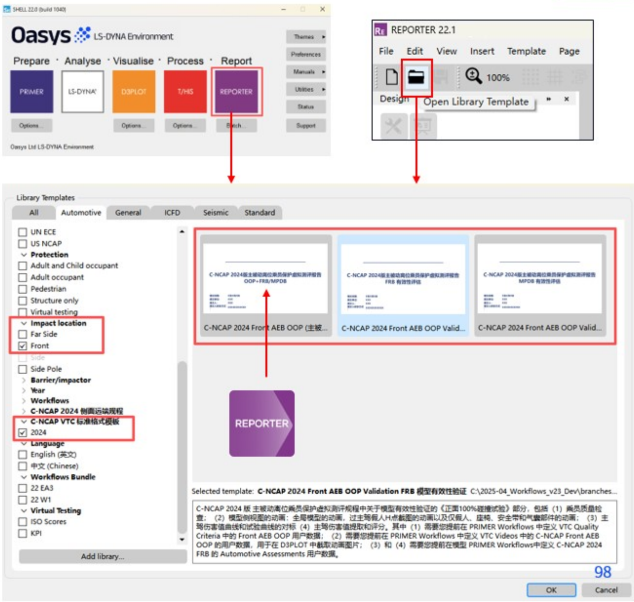


Oasys LS-DYNA Environment

OOP+FRB/MPDB 乘员伤害预测

自动化报告输出：

1. 确保 OOP+FRB/MPDB 模型的结果文件夹内，或上跳 4 级文件夹内能找到的第一个 JSON 文件包含按照前面方法提前填写并生成的 Workflows 用户数据：
   - Automotive Assessments
   - VTC Videos
2. 打开 REPOTER 软件，或在已经打开的 REPORTER 中选则左上角的 Open Livrary Template 按钮图标，在 Library Templates 中选择 Automotive 标签，在左侧过滤器中勾选 Front 和 C-NCAP VTC 标准格式模板 2024
3. 此时会出现 AEB OOP 要求的三个工况报告
4. 选择 OOP+FRB/MPDB 报告，开始生成报告



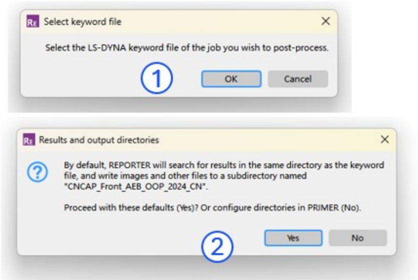
Oasys LS-DYNA Environment

OOP+FRB/MPDB 乘员伤害预测

REPORTER

自动化报告输出：

1. 打开模板后，选择模型 key 文件，软件会在同一个文件夹中寻找模型 binout 和动画文件作为模型数据
2. 设置输出结果的文件夹，选择 Yes 则软件自动在模型文件夹中创建子文件夹，选择 No 则会进入 PRIMER，用户自定义输出文件夹
3. 然后将开始启动 T/HIS 和 D3PLOT 来输出伤害值曲线和动画视频，自动完成报告内容。
4. 在报告首页右上角点击按钮，输入此工况属于 OOP + FRB 还是 MPDB



Oasys LS-DYNA Environment

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OOP+FRB/MPDB 乘员伤害预测

REPORTER

OOP+FRB/MPDB 乘员伤害预测报告输出示例：

Oasys LS-DYNA Environment

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4.9.10. Euro NCAP Virtual Far Side VC2 (Assessment Criteria)

Euro NCAP Virtual Far Side VC2 (Assessment Criteria)

This topic focuses on the **automation** of the Validation Criterion 2 (Assessment Criteria) assessment using REPORTER. You can also use Automotive Assessments to perform the correlation interactively.

Introduction

The **Euro NCAP Virtual Far Side 2024 VC2 (Assessment Criteria)** REPORTER Template can be used to perform the Validation Criterion 2 (Assessment Criteria) check according to section 6.3.10 of the Euro NCAP VTC Simulation and Assessment Protocol v1.0:

Validation Criterion 2 (Assessment Criteria): $d_{AC} < 30\%$

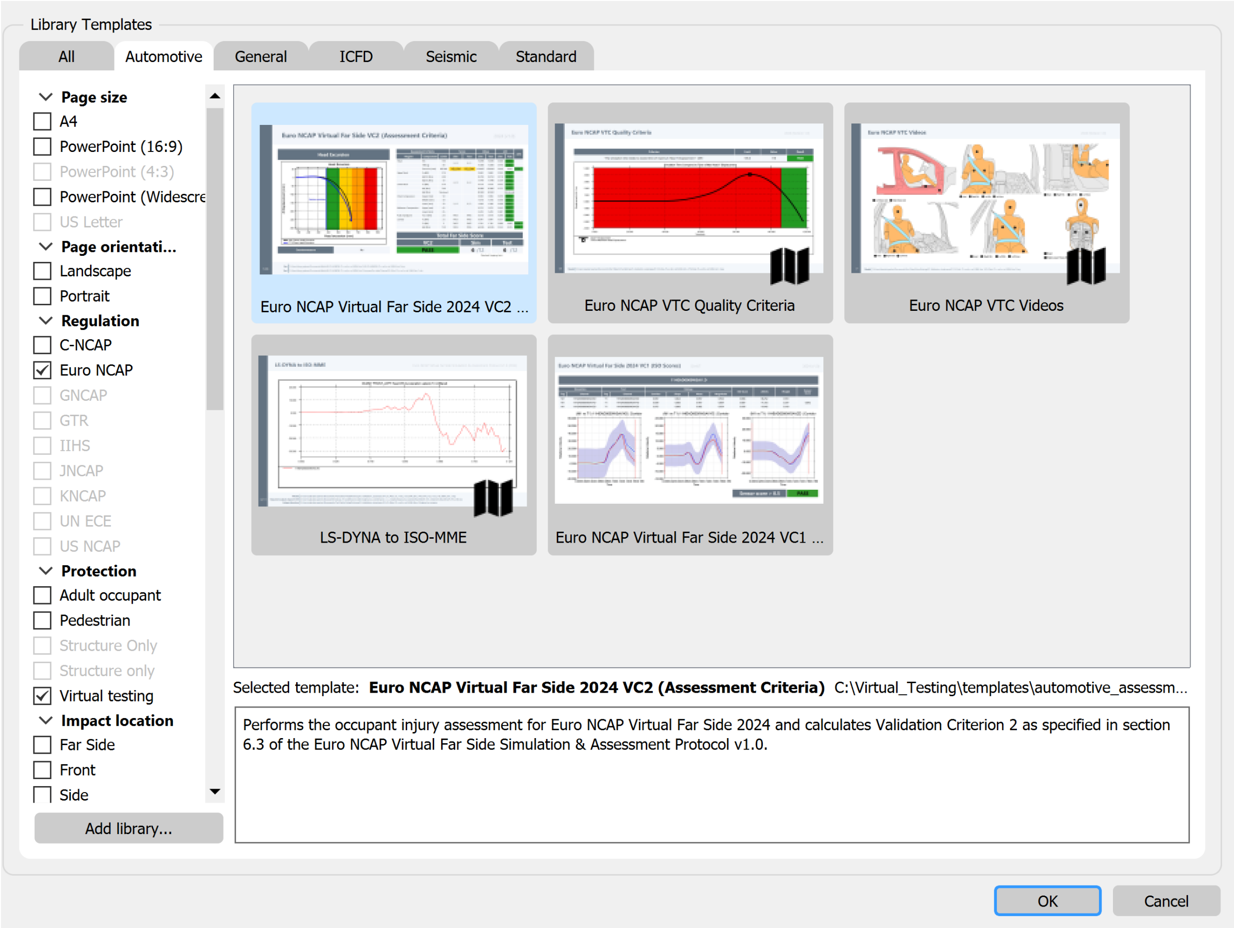
If the template is successfully generated it will show a report summarising the assessment criterion limits, values, $r_{AC_{sim}}$, $r_{AC_{test}}$ and d_{AC} as well as Far Side scores. The graphs for all the assessment data and structures are plotted to allow you to understand the results in more detail.

Firstly, in PRIMER, you should have set up the occupant and structures required for your Simulation model. This can be found in Workflows in the tools menu, then Automotive Assessments and under the Crash Test dropdown find 'Far Side + VTC' and fill out the Driver and Structures (Airbag is optional). Then save the created Workflows data using the Save to File or Save to Model buttons. For more information see the 'Automotive Assessments PRIMER' manual.

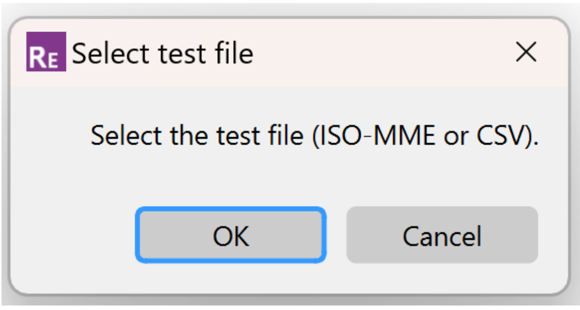
Using the REPORTER template

Before using the REPORTER template, you should have defined the occupant and structures user data required for your model in PRIMER (see Automotive Assessments PRIMER for details).

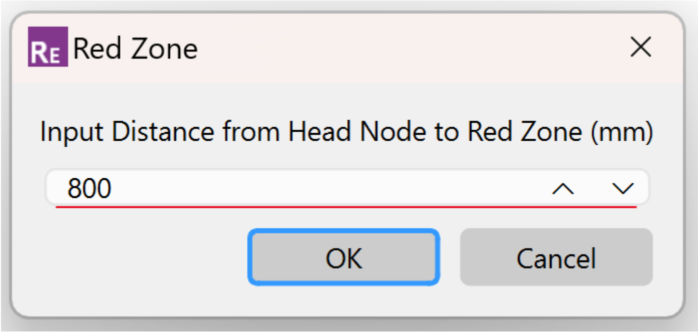
In REPORTER, click the **Automotive** tab and then filter by Virtual Testing (under protection) & Euro NCAP (under regulation) and double-click **Euro NCAP Virtual Far Side 2024 VC2 (Assessment Criteria)** to open the template.



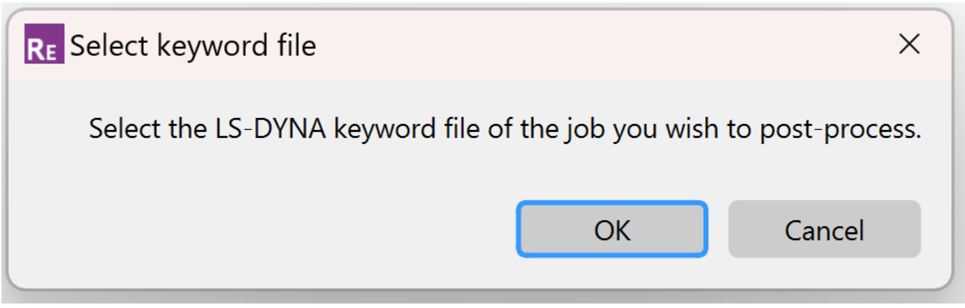
You will first be prompted to select your Test file, this can be .iso, .mme, .chn or .csv format:



Next you will be prompted for the distance between the Head CoG and the Red Line which marks the inboard intrusion from your previous Side MDB or Side Pole simulation.

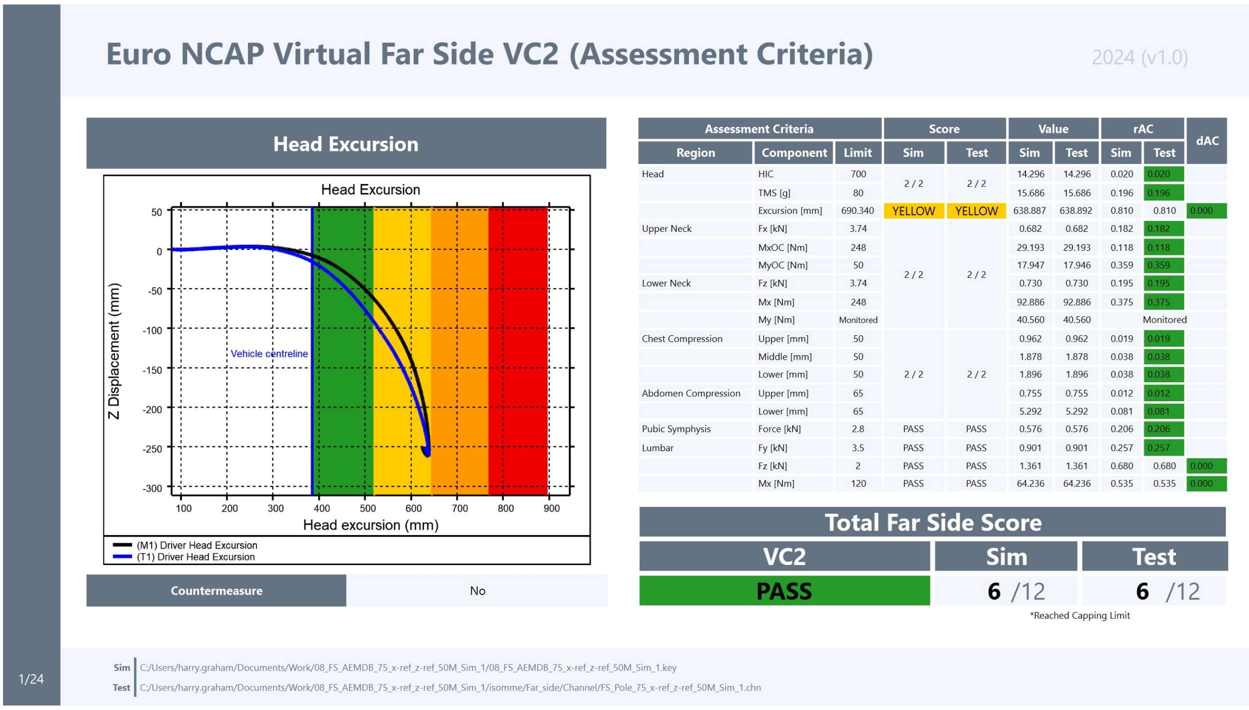


Finally you will be prompted for the Simulation (.key) file. Once selected the REPORTER Template will run and produce the results.



REPORTER Results

Page 1 contains the DRIVER_HEAD_EXCURSION, and all the required assessment data (Values, Far Side Scores, Assessment Criteria Limits, $r_{AC_{sim}}$, $r_{AC_{test}}$ and d_{AC} values). The total Validation Criterion 2 pass or fail is then displayed next to the Far Side Assessment Criteria scores out of 12.



Assessment Criteria			Score		Value		rAC		dAC
Region	Component	Limit	Sim	Test	Sim	Test	Sim	Test	
Head	HIC	700	2 / 2	2 / 2	14.296	14.296	0.020	0.020	
	TMS [g]	80			15.686	15.686	0.196	0.196	
	Excursion [mm]	690.340	YELLOW	YELLOW	638.887	638.892	0.810	0.810	0.000
Upper Neck	Fx [kN]	3.74	2 / 2	2 / 2	0.682	0.682	0.182	0.182	
	MxOC [Nm]	248			29.193	29.193	0.118	0.118	
	MyOC [Nm]	50			17.947	17.946	0.359	0.359	
Lower Neck	Fz [kN]	3.74			0.730	0.730	0.195	0.195	
	Mx [Nm]	248			92.886	92.886	0.375	0.375	
	My [Nm]	Monitored			40.560	40.560	Monitored		
Chest Compression	Upper [mm]	50	2 / 2	2 / 2	0.962	0.962	0.019	0.019	
	Middle [mm]	50			1.878	1.878	0.038	0.038	
	Lower [mm]	50			1.896	1.896	0.038	0.038	
Abdomen Compression	Upper [mm]	65			0.755	0.755	0.012	0.012	
	Lower [mm]	65			5.292	5.292	0.081	0.081	
Pubic Symphysis	Force [kN]	2.8	PASS	PASS	0.576	0.576	0.206	0.206	
Lumbar	Fy [kN]	3.5	PASS	PASS	0.901	0.901	0.257	0.257	
	Fz [kN]	2	PASS	PASS	1.361	1.361	0.680	0.680	0.000
	Mx [Nm]	120	PASS	PASS	64.236	64.236	0.535	0.535	0.000

Total Far Side Score		
VC2	Sim	Test
PASS	6 /12	6 /12

*Reached Capping Limit

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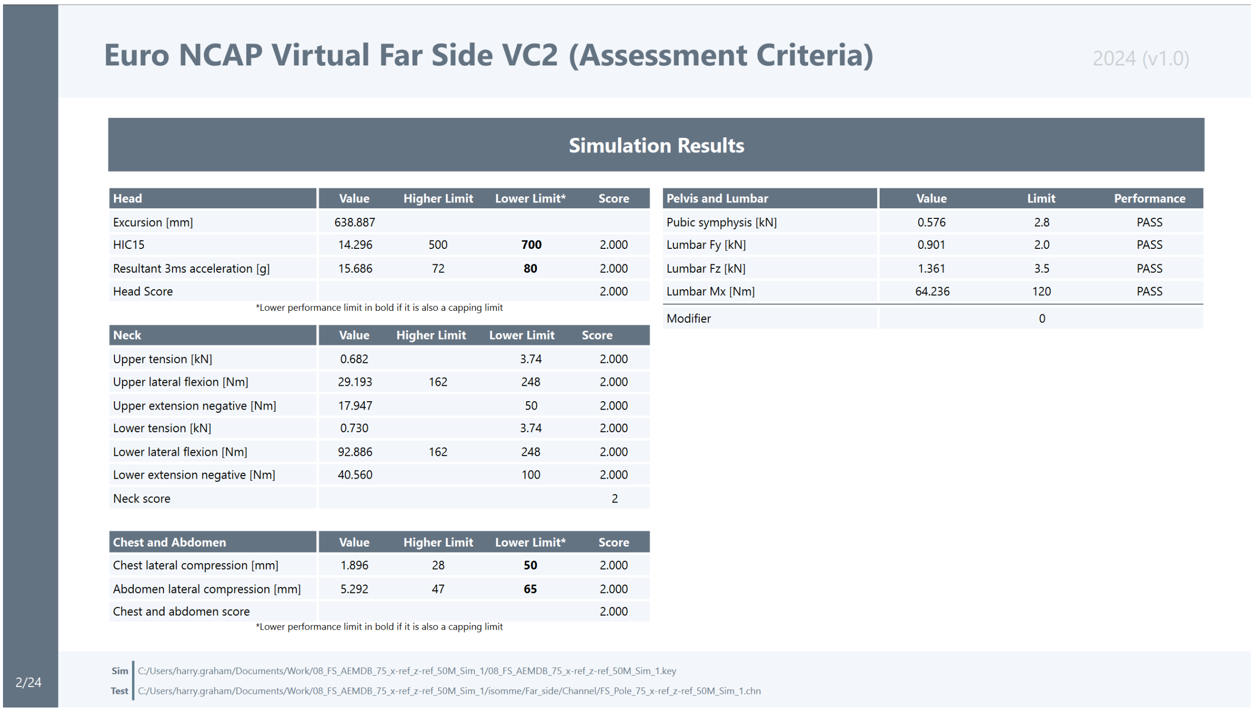
Sim C:/Users/harry.graham/Documents/Work/08_FS_AEMDB_75_x-ref_z-ref_50M_Sim_1/08_FS_AEMDB_75_x-ref_z-ref_50M_Sim_1.key

Test C:/Users/harry.graham/Documents/Work/08_FS_AEMDB_75_x-ref_z-ref_50M_Sim_1/isomme/Far_side/Channel/FS_Pole_75_x-ref_z-ref_50M_Sim_1.chn

Page 2 contains more in depth results for the Simulation Model and Page 3 contains the same set of results for the Test Model.



Euro NCAP Virtual Far Side VC2 (Assessment Criteria) 2024 (v1.0)

Simulation Results

Head	Value	Higher Limit	Lower Limit*	Score
Excursion [mm]	638.887			
HIC15	14.296	500	**700**	2.000
Resultant 3ms acceleration [g]	15.686	72	**80**	2.000
Head Score				2.000

*Lower performance limit in bold if it is also a capping limit

Neck	Value	Higher Limit	Lower Limit	Score
Upper tension [kN]	0.682		3.74	2.000
Upper lateral flexion [Nm]	29.193	162	248	2.000
Upper extension negative [Nm]	17.947		50	2.000
Lower tension [kN]	0.730		3.74	2.000
Lower lateral flexion [Nm]	92.886	162	248	2.000
Lower extension negative [Nm]	40.560		100	2.000
Neck score				2

Chest and Abdomen	Value	Higher Limit	Lower Limit*	Score
Chest lateral compression [mm]	1.896	28	**50**	2.000
Abdomen lateral compression [mm]	5.292	47	**65**	2.000
Chest and abdomen score				2.000

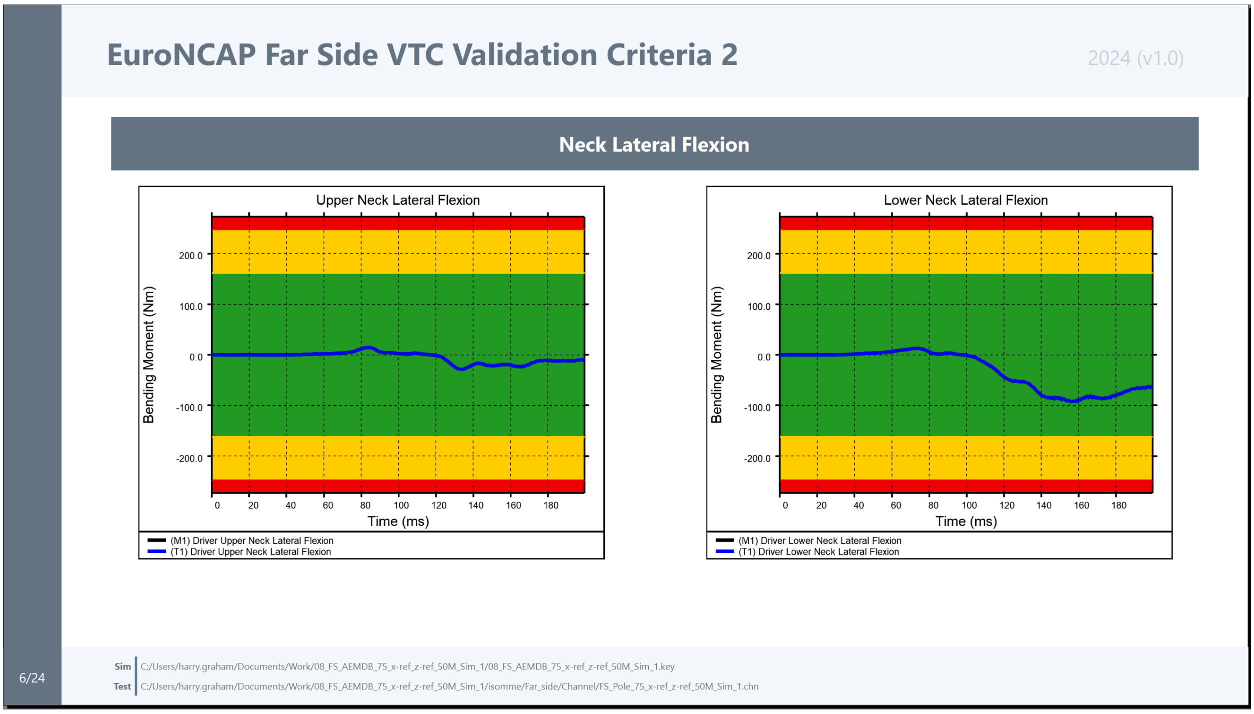
*Lower performance limit in bold if it is also a capping limit

Pelvis and Lumbar	Value	Limit	Performance
Pubic symphysis [kN]	0.576	2.8	PASS
Lumbar Fy [kN]	0.901	2.0	PASS
Lumbar Fz [kN]	1.361	3.5	PASS
Lumbar Mx [Nm]	64.236	120	PASS
Modifier		0	

2/24

Sim C:/Users/harry.graham/Documents/Work/08_FS_AEMDB_75_x-ref_z-ref_50M_Sim_1/08_FS_AEMDB_75_x-ref_z-ref_50M_Sim_1.key
Test C:/Users/harry.graham/Documents/Work/08_FS_AEMDB_75_x-ref_z-ref_50M_Sim_1/isomme/Far_side/Channel/FS_Pole_75_x-ref_z-ref_50M_Sim_1.chn

Pages 4 to 10 display the graphs for the required assessment data and pages 11 to 24 display the structure data from Table 6 in the Euro NCAP VTC protocol.



Running in Batch

The template can also be run in batch mode, specifying the required information through command line arguments.

If your results are in the same directory as the keyword file then you only need to specify the keyword file on the command line and the test file and red zone which are specific to this template:

```
<reporter_exe> -batch -file=<template_name> -
varKEYWORD_FILE=<keyword_file> -varTEST_FILE=<test_file> -
varRED_ZONE=<red_zone> -exit
```

[Add the -pdf, -html, -pptx command line arguments to write the report out in the format you want]

Where:

reporter_exe	The full path and filename to the REPORTER executable
template_name	The full path and filename of the template you want to use. The workflow templates can be found in ***$OA_INSTALL/workflows/templates/automotive_assessments***
keyword_file	The full path and filename of the keyword file
test_file	The full path to the ISO-MME or CSV file to be used for the Test model
red_zone	Distance between the Head CoG and the Red Line

If the results are in a different folder to the keyword file, you will need to add an extra argument to specify it:

```
<reporter_exe> -batch -file=<template_name> -
varKEYWORD_FILE=<keyword_file> -varTEST_FILE=<test_file> -
varRED_ZONE=<red_zone> -varRESULTS_DIR=<results_dir> -exit
```

Where:

results_dir	The full path to the results directory

Similarly if you want to output the images and other files generated by REPORTER to a different folder than the default, you will need to add an extra argument:

```
<reporter_exe> -batch -file=<template_name> -
varKEYWORD_FILE=<keyword_file> -varTEST_FILE=<test_file> -
varRED_ZONE=<red_zone> -varOUTPUT_DIR=<output_dir> -exit
```

Where:

output_dir	The full path to the output directory

4.9.11. Euro NCAP Virtual Far Side VC1 (ISO Scores)

Euro NCAP Virtual Far Side VC1 (ISO Scores)

This topic focuses on the **automation** of the Validation Criterion 1 (ISO Scores) assessment using REPORTER. You can also use SimVT to perform the correlation interactively.

Introduction

The **Euro NCAP Virtual Far Side 2024 VC1 (ISO Scores)** REPORTER Template can be used to perform the Validation Criterion 1 (ISO Scores) check according to section 6.3.5 of the Euro NCAP VTC Simulation and Assessment Protocol v1.0:

Validation Criterion 1 (ISO Scores): \(S_{Sensor} > 0.5\)

If the template is successfully generated it will show a report summarising the the sensor scores for all the mandatory and monitored channels (listed in Table 6 of the protocol) as well as the correlation graphs for each channel so that you can inspect any channels which perform poorly. Additionally, a SimVT settings file (*REPORTER_settings.simvt*) is created which can be loaded in to the SimVT workflow tool to interrogate the results interactively.

Before using the REPORTER template with Ansys LS-DYNA data you should have defined the occupant and structures user data required for your model in PRIMER (see Automotive Assessments PRIMER for details).

The REPORTER Template can be run interactively or in batch mode to generate the REPORT and the instructions for running SimVT REPORTER Templates can be found here.

Report Pages

Page 1 contains a summary of the results for all the assessed and monitored channels. It shows the PASS/FAIL status of Validation Criterion 1 as well as the run duration PASS/FAIL status that requires the simulation time to be greater than 1.2 times the time of maximum head excursion.

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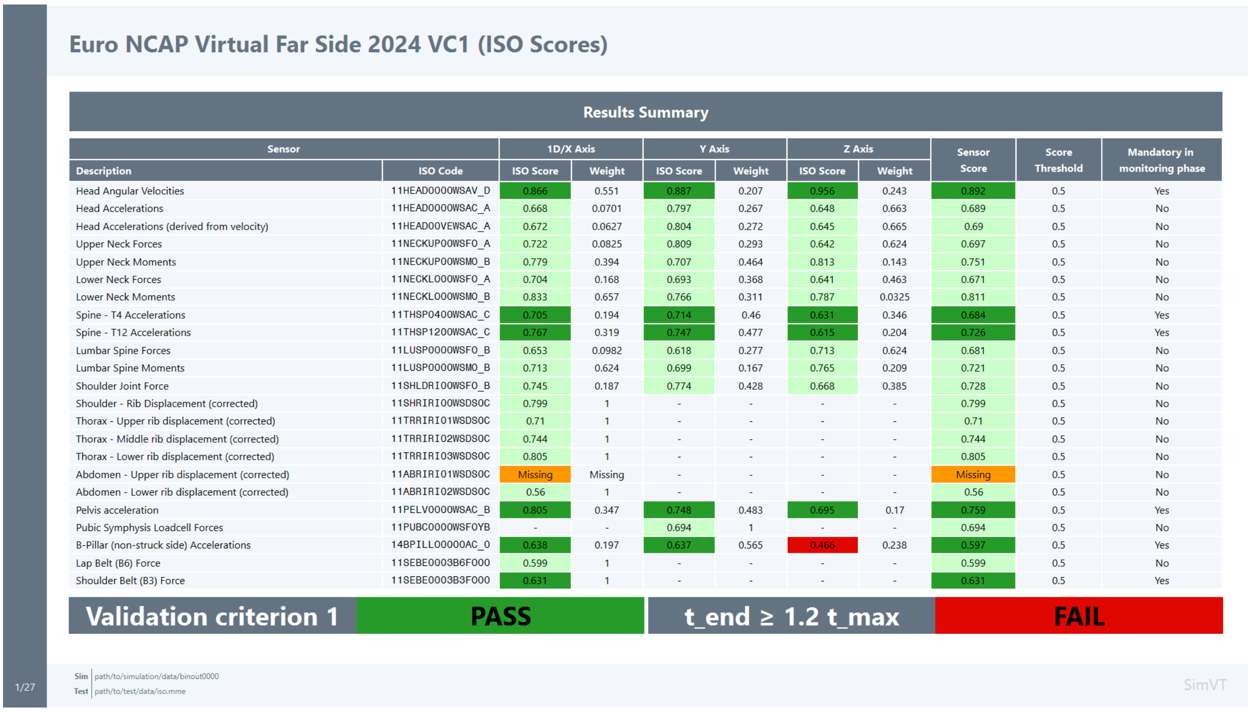

Euro NCAP Virtual Far Side 2024 VC1 (ISO Scores)

Results Summary

Sensor		1D/X Axis		Y Axis		Z Axis		Sensor Score	Score Threshold	Mandatory in monitoring phase
Description	ISO Code	ISO Score	Weight	ISO Score	Weight	ISO Score	Weight			
Head Angular Velocities	11HEAD0000WSAV_D	0.866	0.551	0.887	0.207	0.956	0.243	0.892	0.5	Yes
Head Accelerations	11HEAD0000WSAC_A	0.668	0.0701	0.797	0.267	0.648	0.663	0.689	0.5	No
Head Accelerations (derived from velocity)	11HEAD00VEWSAC_A	0.672	0.0627	0.804	0.272	0.645	0.665	0.69	0.5	No
Upper Neck Forces	11NECKUP00WSFO_A	0.722	0.0825	0.809	0.293	0.642	0.624	0.697	0.5	No
Upper Neck Moments	11NECKUP00WSMO_B	0.779	0.394	0.707	0.464	0.813	0.143	0.751	0.5	No
Lower Neck Forces	11NECKLO00WSFO_A	0.704	0.168	0.693	0.368	0.641	0.463	0.671	0.5	No
Lower Neck Moments	11NECKLO00WSMO_B	0.833	0.657	0.766	0.311	0.787	0.0325	0.811	0.5	No
Spine - T4 Accelerations	11THSP0400WSAC_C	0.705	0.194	0.714	0.46	0.631	0.346	0.684	0.5	Yes
Spine - T12 Accelerations	11THSP1200WSAC_C	0.767	0.319	0.747	0.477	0.615	0.204	0.726	0.5	Yes
Lumbar Spine Forces	11LUSP0000WSFO_B	0.653	0.0982	0.618	0.277	0.713	0.624	0.681	0.5	No
Lumbar Spine Moments	11LUSP0000WSMO_B	0.713	0.624	0.699	0.167	0.765	0.209	0.721	0.5	No
Shoulder Joint Force	11SHLDRI00WSFO_B	0.745	0.187	0.774	0.428	0.668	0.385	0.728	0.5	No
Shoulder - Rib Displacement (corrected)	11SHRIRI00WSDS0C	0.799	1	-	-	-	-	0.799	0.5	No
Thorax - Upper rib displacement (corrected)	11TRRIRI01WSDS0C	0.71	1	-	-	-	-	0.71	0.5	No
Thorax - Middle rib displacement (corrected)	11TRRIRI02WSDS0C	0.744	1	-	-	-	-	0.744	0.5	No
Thorax - Lower rib displacement (corrected)	11TRRIRI03WSDS0C	0.805	1	-	-	-	-	0.805	0.5	No
Abdomen - Upper rib displacement (corrected)	11ABRIRI01WSDS0C	Missing	Missing	-	-	-	-	Missing	0.5	No
Abdomen - Lower rib displacement (corrected)	11ABRIRI02WSDS0C	0.56	1	-	-	-	-	0.56	0.5	No
Pelvis acceleration	11PELV0000WSAC_B	0.805	0.347	0.748	0.483	0.695	0.17	0.759	0.5	Yes
Pubic Symphysis Loadcell Forces	11PUBC0000WSF0YB	-	-	0.694	1	-	-	0.694	0.5	No
B-Pillar (non-struck side) Accelerations	14BPILL00000AC_0	0.638	0.197	0.637	0.565	0.466	0.238	0.597	0.5	Yes
Lap Belt (B6) Force	11SEBE0003B6F000	0.599	1	-	-	-	-	0.599	0.5	No
Shoulder Belt (B3) Force	11SEBE0003B3F000	0.631	1	-	-	-	-	0.631	0.5	Yes

Validation criterion 1	PASS	t_end ≥ 1.2 t_max	FAIL

Sim path/to/simulation/data/binout0000
Test path/to/test/data/iso.mme

SimVT

Page 2 shows the trace of simulation head excursion versus time. The trace must extend in to the green zone in order for the check to pass.

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Euro NCAP Virtual Far Side 2024 VC1 (ISO Scores)

Head Excursion (Simulation)

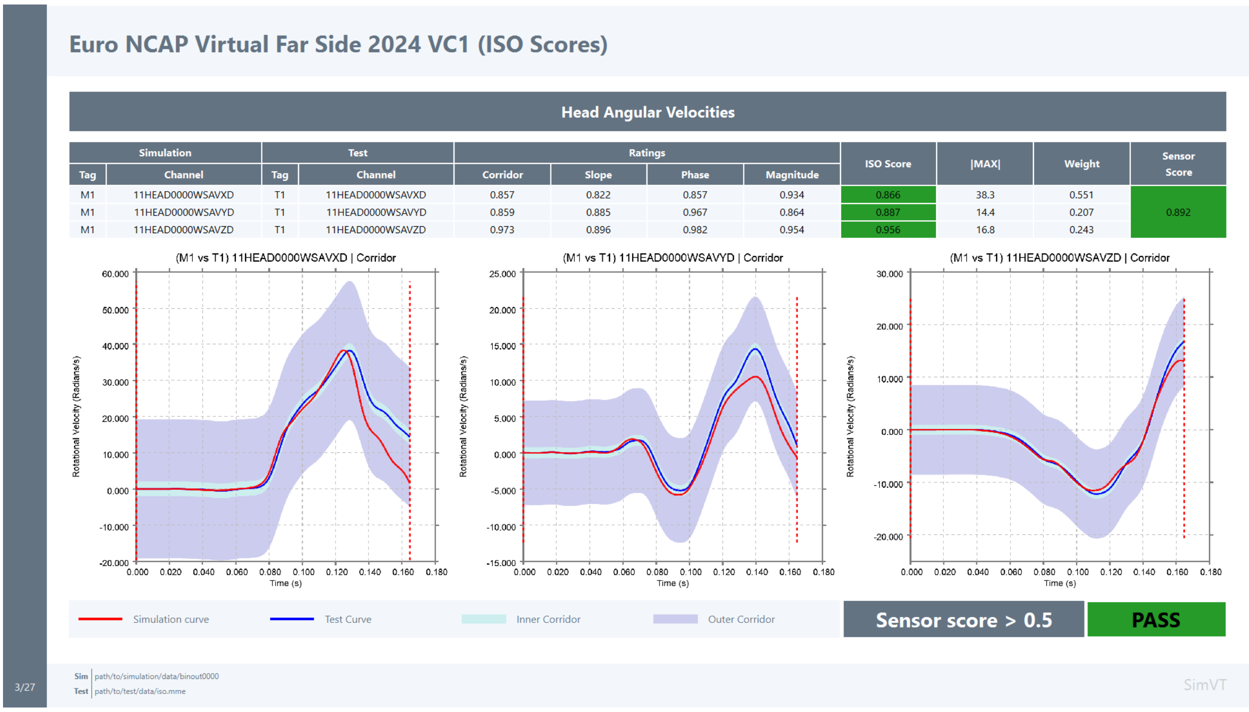
Head Excursion	Value	Unit
Max Head Excursion	0.639	metres
Time of max Head Excursion (t_max)	0.167	seconds
Analysis end time (t_end)	0.200	seconds

t_end ≥ 1.2 t_max	FAIL

Sim path/to/simulation/data/binout0000
Test path/to/test/data/iso.mme

SimVT

Pages 3-25 show the corridor plots for each sensor. 3D sensors will have X, Y and Z plots:

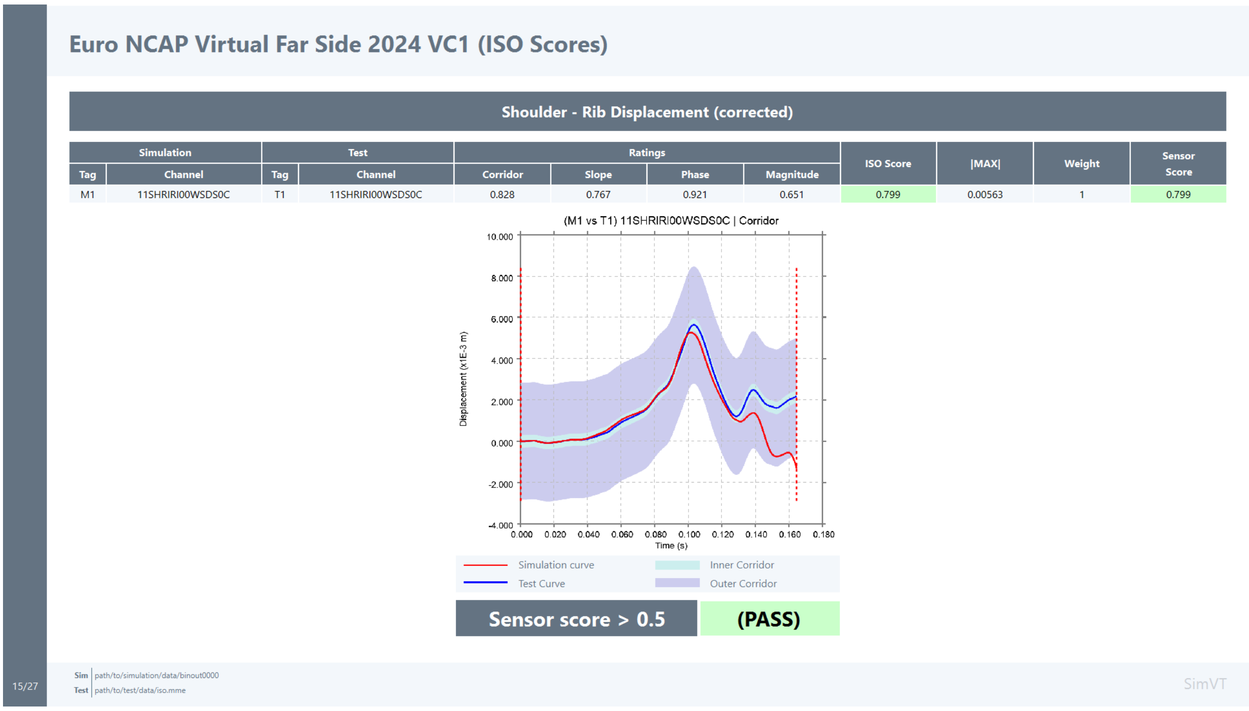


Euro NCAP Virtual Far Side 2024 VC1 (ISO Scores)

Head Angular Velocities

Simulation		Test		Ratings				ISO Score	|MAX|	Weight	Sensor Score
Tag	Channel	Tag	Channel	Corridor	Slope	Phase	Magnitude				
M1	11HEAD0000WSAVXD	T1	11HEAD0000WSAVXD	0.857	0.822	0.857	0.934	0.866	38.3	0.551	0.892
M1	11HEAD0000WSAVYD	T1	11HEAD0000WSAVYD	0.859	0.885	0.967	0.864	0.887	14.4	0.207	
M1	11HEAD0000WSAVZD	T1	11HEAD0000WSAVZD	0.973	0.896	0.982	0.954	0.956	16.8	0.243	

1D Sensors will have a single plot:



Euro NCAP Virtual Far Side 2024 VC1 (ISO Scores)

Shoulder - Rib Displacement (corrected)

Simulation		Test		Ratings				ISO Score	|MAX|	Weight	Sensor Score
Tag	Channel	Tag	Channel	Corridor	Slope	Phase	Magnitude				
M1	11SHRIRI00WSDS0C	T1	11SHRIRI00WSDS0C	0.828	0.767	0.921	0.651	0.799	0.00563	1	0.799

Monitored sensors are shown with the PASS/FAIL status in parenthesis (e.g. "(PASS)" in the image above means that the seatbelt B3 force sensor passed the check, but the Euro NCAP protocol only requires it for monitoring purposes at the moment).

The final pages of the report contain a table showing the detailed results for each correlation so that they can all be viewed in one place.

Euro NCAP Virtual Far Side 2024 VC1 (ISO Scores)

Detailed Results (Continued)

Simulation		Test		Ratings				ISO Score	|MAX|	Weight	Sensor Score
Tag	Channel	Tag	Channel	Corridor	Slope	Phase	Magnitude				
M1	11HEAD0000WSAVXD	T1	11HEAD0000WSAVXD	0.857	0.822	0.857	0.934	0.866	38.3	0.551	0.892
M1	11HEAD0000WSAVYD	T1	11HEAD0000WSAVYD	0.859	0.885	0.967	0.864	0.887	14.4	0.207	0.892
M1	11HEAD0000WSAVZD	T1	11HEAD0000WSAVZD	0.973	0.896	0.982	0.954	0.956	16.8	0.243	0.892
M1	11HEAD0000WSACXA	T1	11HEAD0000WSACXA	0.714	0.353	0.86	0.698	0.668	33.3	0.0701	0.689
M1	11HEAD0000WSACYA	T1	11HEAD0000WSACYA	0.891	0.406	0.921	0.875	0.797	127	0.267	0.689
M1	11HEAD0000WSACZA	T1	11HEAD0000WSACZA	0.699	0.437	0.812	0.596	0.648	314	0.663	0.689
M1	11HEAD00VEWSACXA	T1	11HEAD00VEWSACXA	0.71	0.362	0.863	0.715	0.672	29.8	0.0627	0.69
M1	11HEAD00VEWSACYA	T1	11HEAD00VEWSACYA	0.896	0.416	0.918	0.891	0.804	129	0.272	0.69
M1	11HEAD00VEWSACZA	T1	11HEAD00VEWSACZA	0.7	0.422	0.812	0.59	0.645	316	0.665	0.69
M1	11NECKUP00WSFOXA	T1	11NECKUP00WSFOXA	0.76	0.385	0.924	0.781	0.722	164	0.0825	0.697
M1	11NECKUP00WSFOYA	T1	11NECKUP00WSFOYA	0.907	0.448	0.885	0.898	0.809	582	0.293	0.697
M1	11NECKUP00WSFOZA	T1	11NECKUP00WSFOZA	0.697	0.444	0.812	0.558	0.642	1.24e+3	0.624	0.697
M1	11NECKUP00WSMOXB	T1	11NECKUP00WSMOXB	0.805	0.528	0.918	0.838	0.779	19.3	0.394	0.751
M1	11NECKUP00WSMOYB	T1	11NECKUP00WSMOYB	0.715	0.435	1	0.673	0.707	22.7	0.464	0.751
M1	11NECKUP00WSMOZB	T1	11NECKUP00WSMOZB	0.847	0.445	0.979	0.946	0.813	6.98	0.143	0.751
M1	11NECKLO00WSFOXA	T1	11NECKLO00WSFOXA	0.745	0.438	0.985	0.606	0.704	467	0.168	0.671
M1	11NECKLO00WSFOYA	T1	11NECKLO00WSFOYA	0.812	0.421	0.812	0.61	0.693	1.02e+3	0.368	0.671
M1	11NECKLO00WSFOZA	T1	11NECKLO00WSFOZA	0.698	0.405	0.794	0.609	0.641	1.29e+3	0.463	0.671
M1	11NECKLO00WSMOXB	T1	11NECKLO00WSMOXB	0.926	0.628	0.803	0.884	0.833	129	0.657	0.811
M1	11NECKLO00WSMOYB	T1	11NECKLO00WSMOYB	0.792	0.567	0.967	0.711	0.766	61	0.311	0.811
M1	11NECKLO00WSMOZB	T1	11NECKLO00WSMOZB	0.822	0.45	0.927	0.913	0.787	6.39	0.0325	0.811
M1	11THSP0400WSACXC	T1	11THSP0400WSACXC	0.702	0.554	0.961	0.609	0.705	69.8	0.194	0.684
M1	11THSP0400WSACYC	T1	11THSP0400WSACYC	0.701	0.476	0.982	0.713	0.714	165	0.46	0.684
M1	11THSP0400WSACZC	T1	11THSP0400WSACZC	0.64	0.456	0.824	0.594	0.631	124	0.346	0.684
M1	11THSP1200WSACXC	T1	11THSP1200WSACXC	0.697	0.639	0.961	0.84	0.767	124	0.319	0.726
M1	11THSP1200WSACYC	T1	11THSP1200WSACYC	0.78	0.485	0.927	0.764	0.747	185	0.477	0.726

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Sim path/to/simulation/data/binout0000
Test path/to/test/data/iso.mme

SimVT

4.9.12. Euro NCAP 2026 Protocols

Scoring and Colours

Euro NCAP 2026 introduces a new scoring and coloring system. This system uses a score banding system that will be explained below. Understanding the new scoring and colouring system is key to utilizing the new workflow templates.

Euro NCAP FWDB 2026

Simulation Resu

Occupant	Body Region	Criterion	Value	HPL	LPL	Cap. Limit
Driver	Head & Neck	HIC	451.18	500	700	700
		Resultant 3ms Acc.	64.89	72.0	80.0	80.0
		Neck Shear	-1.48	-1.20	-2.00	-2.00
		Neck Tension	1.99	1.70	2.60	2.60
		Neck Extension	-20.44	-36.0	-49.0	-49.0
	Chest	Compression	34.17	18.0	34.0	34.0
		Viscous Criterion	0.18	0.50	1.00	1.00
	Knee, Femur & Pelvis	Left Femur	0.00	2.60	6.20	6.20
		Left Knee	0.18	6.00	15.00	15.00
		Right Femur	0.00	2.60	6.20	6.20
		Right Knee	0.21	6.00	15.00	15.00
	Lower Leg	Left Compression	0.00	2.00	8.00	8.00
		Left Upper Tibia Index	2.40	0.40	1.30	1.30
		Left Lower Tibia Index	0.87	0.40	1.30	1.30
		Right Compression	0.00	2.00	8.00	8.00
		Right Upper Tibia Index	3.60	0.40	1.30	1.30
		Right Lower Tibia Index	0.89	0.40	1.30	1.30

1. Protocols

All scoring and colour band information may be found in more detail under the official Euro NCAP 2026 protocols.

2026-Protocols

2026-Frontal-Impact

2026-Colour-Band-Excel

All 2026 Frontal REPORTER Templates are in accordance with the latest protocols and methodologies.

2. Colour Banding

The 2026 Colour Banding has five possible outcomes. This new method of coloring the occupant data partitions the occupants score into five possible categories.

The way the colour is determined is by splitting the performance range (High Performance Limit - Low Performance Limit) into thirds.

Lets take a look at an example below: 2026-Colour-Band-Excel

< 500.00	500.00 - 566.67	566.67 - 633.33	633.33 - 700.00	>=700.00
< 72.00	72.00 - 74.67	74.67 - 77.33	77.33 - 80.00	>=80.00
< 1.20	1.20 - 1.47	1.47 - 1.73	1.73 - 2.00	>=2.00
< 1.70	1.70 - 2.00	2.00 - 2.30	2.30 - 2.60	>=2.60
< 36.00	36.00 - 40.33	40.33 - 44.67	44.67 - 49.00	>=49.00
< 18.00	18.00 - 23.33	23.33 - 28.67	28.67 - 34.00	>=34.00
< 0.50	0.50 - 0.67	0.67 - 0.83	0.83 - 1.00	>=1.00
< 2.60	2.60 - 3.80	3.80 - 5.00	5.00 - 6.20	>=6.20
< 6.00	6.00 - 9.00	9.00 - 12.00	12.00 - 15.00	>=15.00
< 0.00	0.00 - 0.43	0.43 - 0.87	0.87 - 1.30	>=1.30
< 0.00	0.00 - 2.67	2.67 - 5.33	5.33 - 8.00	>=8.00

In the first Row we have a Possible Head HIC range with a High Performance Limit (HPL) of 500 and a Low Performance Limit (LPL) of 700. The range is then split into equal thirds, each portion having a size of 66.67.

If the occupant HIC value is lower than the HPL then the Banded Score will be Green.

If the occupant HIC value is within the first third 500 - 566.67 then the Banded Score will be Yellow.

If the occupant HIC value is within the middle third 566.67 - 633.33 then the Banded Score will be Orange.

If the occupant HIC value is within the final third 633.33 - 700 then the Banded Score will be Brown.

Lastly, If the occupant HIC value is greater than OR equal to the LPL the score will be Red.

3. Score Banding

The colour band scheme directly influences how the body region values are translated into percent scores. The scores are also banded in a similair fashion to the colour schemes.

Section 3.4 in 2026-Frontal-Impact outlines the banded scoring procedure.

3.4 Colour band scheme

Adult	Criterion		Green	Yellow	Orange	Brown	Red
Body region	**Limit value points**		< HPL 100%	80%	40%	20%	≥ LPL 0%
Head & Neck	HIC_{15}	-					
	A_{res}-3ms	g					
	$F_{X,shear}$	kN					
	$F_{Z,tension}$	kN					
	$M_{Yextension}$	Nm					
Chest & Abdomen	$D_{chest\ compression}$	mm					
	$V_{viscous\ criterion}$	m/s					
	$D_{abdomen\ compression}$	mm					
Knee, femur and pelvis	$F_{acetabulum}$	kN					
	F_{femur}	kN					
	D_{knee}	mm					
Lower Leg, Foot & Ankle	I_{tibia}	-					
	F_{tibia}	kN					

As we see above, the colour bands have an associated percentage.

Green: 100%

Yellow: 80%

Orange: 40%

Brown: 20%

Red: 0%

Since the colour bands are split by percentage into thirds the score banding will operate the same way.

If the body region value is below the HPL you will score 100%

If the body region value is in the first third that means your percent score BEFORE banding will be between 100% - 66.6%. That score will be automatically banded to the **yellow** region and receive an 80%

If the body region value is in the middle third that means your percent score BEFORE banding will be between 66.6% - 33.3%. That score will be automatically banded to the **orange** region and receive a 40%

If the body region value is in the last third that means your percent score BEFORE banding will be between 33.3% - 0.01%. That score will be automatically banded to the **brown** region and receive a 20%

Lastly, if the body region value is equal to or above the LPL you will receive 0%

4. Score Banding with Modifiers

A question arises from the above score banding on how modifiers are factored into banded scoring.

From section 4.3.1 from 2026-Frontal-Impact

4.3.1 Occupant Modifiers

The modifier penalties mentioned in the table below are defined as a percentage of the maximum body region score for each dummy, in each loadcase and are applied to that body region. Further details regarding the modifiers and how they are applied to the rating can be found in Technical Bulletin CP 007.

Adult Occupants	Modifiers	Criterion	Modifier score
Head & neck	Head bottoming out	Inspection	-20%
	Unstable airbag contact	Inspection	-20%
	Hazardous airbag deployment	Inspection	-20%
	DAMAGE (THOR-50)	$0.42 \leq$ DAMAGE < 0.47 ≥ 0.47	-20% -40%
	Incorrect airbag deployment	Inspection	-20%
	Excursion (rear seats)	≥ 450mm ≥ 550mm	-50% -100%
Chest	Steering wheel contact	Inspection	-20%
	Shoulder belt load	5th & 50th Percentile ≥ 6.00kN	-40%
	Incorrect airbag deployment	Inspection	-20%
Knee, femur and pelvis	Submarining	Inspection	-100%
	Knee load – Variable	≥ 3.8kN or 6.0mm Inspection	-20%
	Knee load – Concentrated	Inspection	-20%
	Incorrect airbag deployment	Inspection	-20%
Lower leg, foot and ankle	Pedal displacement	Rearward ≥ 100mm Rearward ≥ 200mm Vertical 72mm	-50% -100% -20%
	Pedal blocking	50mm	-20%

Modifiers in the 2026 Euro NCAP protocols are an additive percent deduction from the banded percent score.

Meaning that modifiers are added AFTER the initial score has been banded and affect only the final body region score

Modifiers are also stackable meaning that a single body region may receive multiple modifiers.

IE The Head and Neck body region may receive two -20% modifiers. This would result in a -40% deduction to the total Head and Neck banded score.

5. Points

The 2026 Euro NCAP protocols use a point system to determine how well a virtual test performed.

Section 3 from 2026-Frontal-Impact gives a breakdown of points based on protocol

3.2 FWDB

Occupant	Head & Neck	Chest & Abdomen	Knee, Femur & Pelvis	Lower leg, Foot & Ankle	Total points
Driver	1.25	1.25	1.25	1.25	**5.0**
Front passenger	0.625	0.625	0.625	0.625	**2.5**
Rear passenger	0.625	1.25	0.625	-	**2.5**

3.3 Sled and Virtual testing

Loadcase	Occupant	Head & neck	Chest & abdomen	Knee, femur & pelvis	Lower leg, foot & ankle	Total points
Sled	Driver	0.625 / 2	0.625 / 2	0.625 / 2	0.625 / 2	**2.5**
	Front passenger	0.625 / 2	0.625 / 2	0.625 / 2	0.625 / 2	**2.5**
Virtual	Driver	0.625 / 3	0.625 / 3	0.625 / 3	[0.625 / 3]*	**2.5**
	Front passenger	0.625 / 3	0.625 / 3	0.625 / 3	[0.625 / 3]*	**2.5**

*Points awarded by default unless in any physical test (including full-scale) any dummy exceeds the LPL for Tibia index or Tibia force

[To be implemented once lower leg certification procedure is adopted and virtual models qualify]

The final test score will be a summation of each occupants **total points.**

The total points are a summation of each occupants body region points.

Points are awarded based on the banded pecent score.

If an occupant scores a green 100%, then they will receive full points for that region

If an occupant recieves a yellow 80%, they will recieve 80% of the maximum point value for that region

If an occupant recievs an orange 40%, they will recieve 40% of the maximum point value for that region

If an occupant receives a brown 20%, they will receive 20% of the maximum point value for that region

If an occupant receives a red 0%, they will receive 0 points for that region

Lastly, if an occupant receives a modifier on top of their score, they will receive a point value equal to the % associated with the modified final score

***** IMPORTANT *****

For ease of readability all Frontal Sled and Virtual REPORTER Templates provide two final point values

as seen in section 3.3 of [2026-Frontal-Impact]() Sled and Virtual are divided by 2 and 3 respectively. This is due to there being 2 sled protocols and 3 virtual protocols

The REPORTER Templates will present the points as having a possible max value of 0.625 throughout the template. Only on the front page will the templates automatically divide by the correct value to present the true points

This is done so that the user may easily assess and address any problematic body regions using a universal point value. This is done on request of multiple industry professionals who prefer a cleaner point system.

If you would like an accurate body region point value, make sure to divide the presented score by its respective denominator.

3.3 Sled and Virtual testing

Loadcase	Occupant	Head & neck	Chest & abdomen	Knee, femur & pelvis	Lower leg, foot & ankle	Total points
Sled	Driver	0.625 / 2	0.625 / 2	0.625 / 2	0.625 / 2	**2.5**
	Front passenger	0.625 / 2	0.625 / 2	0.625 / 2	0.625 / 2	**2.5**
Virtual	Driver	0.625 / 3	0.625 / 3	0.625 / 3	[0.625 / 3]*	**2.5**
	Front passenger	0.625 / 3	0.625 / 3	0.625 / 3	[0.625 / 3]*	**2.5**

*Points awarded by default unless in any physical test (including full-scale) any dummy exceeds the LPL for Tibia index or Tibia force

[To be implemented once lower leg certification procedure is adopted and virtual models qualify]

6. Example Calculation

To better understand the band colours, scoring, modifiers and point system lets look at an example:

Occupant	Body Region	Criterion	Value	HPL	LPL	Cap. Limit	Band %	Total %	Mod. %	Modified	Points	Occupant Points
Driver	Head & Neck	HIC	51.57	500	700	-	100	100	0	100	0.625	2.1250 / 2.5
		Resultant 3ms Acc.	26.08	72.0	80.0	-	100					
		Neck Shear	1.11	-1.90	-3.10	-	100					
		Neck Tension	0.89	2.70	3.30	-	100					
		Neck Extension	10.37	-42.0	-57.0	-	100					
	Chest	Compression	23.56	20.0	42.0	-	80	80	-40	40	0.250	
		Viscous Criterion	0.08	0.50	1.00	-	100					
	Knee, Femur & Pelvis	Left Femur	0.81	3.80	9.10	-	100	100	0	100	0.625	
		Left Knee[2]	1.40	6.00	15.00	-	N/A					
		Right Femur	1.94	3.80	9.10	-	100	100	0			
		Right Knee[2]	0.77	6.00	15.00	-	N/A					
	Lower Leg[1]	Left Compression	1.70	2.00	8.00	-	100	100[1]	0	100	0.625	
		Left Upper Tibia Index	0.29	0.40	1.30	-	100					
		Left Lower Tibia Index	0.21	0.40	1.30	-	100					
		Right Compression	2.46	2.00	8.00	-	80					
		Right Upper Tibia Index	0.33	0.40	1.30	-	100					
		Right Lower Tibia Index	0.23	0.40	1.30	-	100					

[1] Lower leg score points awarded by default unless in any physical test (including full-scale) any dummy exceeds the LPL for Tibia index or Tibia force
[2] Knee Scores are not applicable for virtual tests

Here is a real example calculation taken directly from EuroNCAP_Front_Sled_2026_robustness1.ort

We are looking at the DRIVER occupant and we are on the Full Body Assessment slide

- **Head & Neck:** All Head & Neck criterion fall under their respective HPL meaning they all receive 100% scores. This gets banded to the Green 100% score and since their are no modifiers selected the modified points are the same as the banded score. The total possible points for Head & Neck is 0.625 (please see important), and this DRIVER receives full points.

- **Chest:** The DRIVER Viscous Criterion Max Value is below the HPL so it receives a banded score of Green 100%; however, the Chest Compression has a Max Value that lands within the first third of the chest compression performance limit. This results in the score being banded to the Yellow 80%.

The Total % is the minimum value of all the body region criterion; therefore, the Total % is that of the Chest Compression Banded 80%

Then we apply any modifiers which we can see we have an active -40% selected for the chest. This is applied POST banding so we have a Modified Score of 40% (80%-40%)

Lastly, we convert % to points and we receive 40% of the maximum 0.625 points, resulting in 0.250 points (0.625 * 0.4)

- **Knee, Femur & Pelvis:** Similar to the Head & Neck Score all Knee, Femur & Pelvis Max Values are below the HPL resulting in Green 100%. An important note here is that Knee Scores are not applicable for Virtual Tests as per section 3 in 2026-Frontal-Impact. We still show the Knee Max Value for transparency, but the score is not calculated and will not effect the final points.

3.5.3 Knee, femur & pelvis

Criterion		HIII 5th HPL - LPL	HIII 50th HPL - LPL	THOR 50th HPL - LPL	HIII 95th HPL - LPL
$F_{acetabulum}$	kN	-	-	3.3 - 4.1	-
F_{femur}	kN	2.6 - 6.2	3.8 - 9.1	3.8 - 9.1	4.8 - 11.5
D_{knee}*	mm	6 - 15	6 - 15	6 - 15	6 - 17

*Not applicable to virtual tests.

- Lower Leg: Similar to Knee Scores the Lower Leg scores are not applicable to Virtual Tests according to section 3 of 2026-Frontal-Impact. Again Max Values are shown for the benefit of the user, but will not be scores or used in the final point calculations. Instead, Lower Leg Points are automatically awarded full points unless the user selects the appropriate modifier to set the value to 0. Therefore, the DRIVER receives the full 0.625 points.

3.5.4 Lower leg, foot & ankle

Criterion		HIII 5th LPL	HIII 50th HPL - LPL	THOR 50th HPL - LPL	HIII 95th HPL - LPL
I_{tibia}*	-	1.3	0.4 - 1.3	0.4 - 1.3	[0.4] - 1.3
F_{tibia}*	kN	8.0	2.0 - 8.0	2.0 - 8.0	[4.0] - 10.0

*Not applicable to virtual tests.
Limits in [square brackets] are to be implemented once a lower leg certification procedure is adopted.

- Total: The final step in this calculation is to sum up all the body region points.

Head & Neck + Chest + Knee, Femur & Pelvis + Lower Legs

Head & Neck : 0.625

Chest: 0.250

Knee, Femur & Pelvis: 0.625

Lower Legs: 0.625

Total Occupant Points = 0.625 + 0.250 + 0.625 + 0.625 = 2.125

True Total Occupant Points = Total/3 = 2.125/3 = 0.708 (Important)

Euro NCAP Validation KPI

Euro NCAP VTC Simulation and Assessment Protocol Frontal Impact

This topic focuses on the **automation** of the Validation Criterion 2 (Assessment Criteria) assessment using REPORTER. You can also use Automotive Assessments to perform the correlation interactively.

Introduction

The **Euro NCAP Full Frontal Validation KPI** REPORTER Template can be used to perform the Validation 1 & 2 Key Performance Indicator or KPI (Assessment Criteria) Highlighted in Section 5.3.2 in Euro NCAP Crash Protection Virtual Testing. The equations used for the KPI calculations, taken from Section 5.3.2 are shown below:

$$r_{AC_{test}} = \frac{AC_{test}}{AC_{limit}}$$

$$r_{AC_{sim}} = \frac{AC_{sim}}{AC_{limit}}$$

$$if\ r_{AC_{Test}} \geq 50\%$$

$$d_{AC} = \left| r_{AC\,Test} - r_{AC\,Sim} \right|$$

Section 5.4.1 Mentions the sensors that are required for evaluation for Frontal Impact.

Frontal Impact	Sensor location	Type	Axes
Head & Neck	Head CoG	Accelerations	x,y,z
Chest & Abdomen	Chest	Accelerations	x,y,z
		Deflection	x
Knee, femur and pelvis	Pelvis	Accelerations	x,y,z

According to section 5.4.2, if $r_{AC} \geq 50\%$ then d_{AC} must be calculated and evaluated for pass/failure determined by Validation Criterion 2 (Assessment Criteria): $d_{AC} < 30\%$

For each sensor, the AC_{limit} mentioned is shown in tables in [Euro NCAP Crash Protection Frontal Impact] Section 3.5 under Lower Performance Limit or LPL.

Criterion		HIII 5th		HIII 50th		THOR 50th		HIII 95th
		HPL - LPL	Capping	HPL - LPL	Capping	HPL - LPL	Capping	HPL - LPL
HIC_{15}	-	500 - 700	700	500 - 700	700	500 - 700	700	500 - 700
A_{res}-3ms	g	72 - 80	80	72 - 80	80	72 - 80	80	72 - 80
$F_{X,shear}$	kN	1.2 - 2.0	2.7 Driver only	1.9 - 3.1	3.10	1.9 - 3.1	3.1	2.3 - 3.8
$F_{Z,tension}$	kN	1.70 - 2.6	2.9 Driver only	2.7 - 3.3	3.30	2.7 - 3.3	3.3	3.3 - 4.0
$M_{Yextension}$	Nm	36 - 49	57 Driver only	42 - 57	57	42 - 57	57	56 - 76

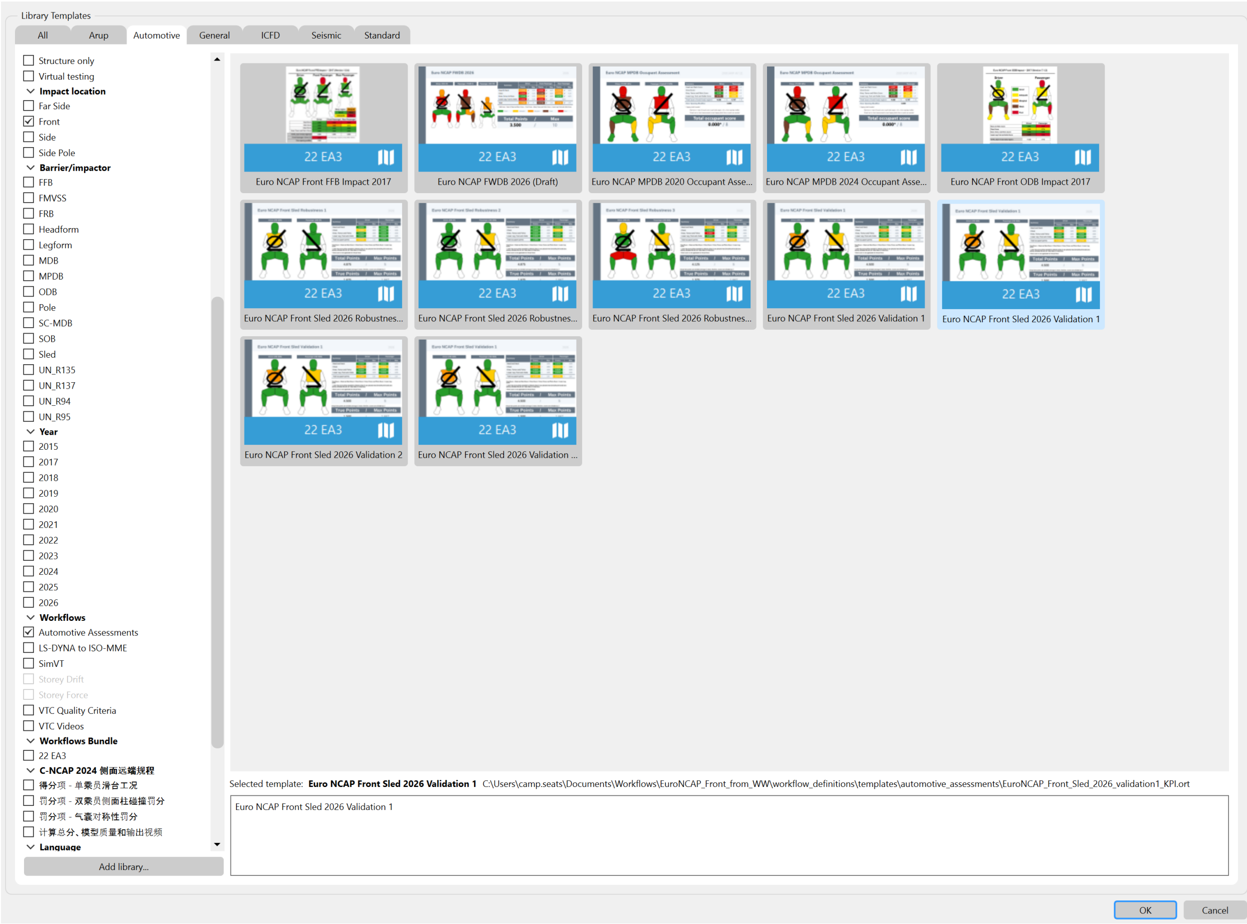
If the template is successfully generated it will show a report summarising the assessment criterion limits, values, $r_{AC_{sim}}$, $r_{AC_{test}}$ and d_{AC} as well as Full Frontal scores. Note that d_{AC} will only be calculated if $r_{AC_{test}}$ is greater than 50%. The graphs for all the assessment data and structures are plotted to allow you to understand the results in more detail.

Firstly, in PRIMER, you should have set up the occupant and structures required for your Simulation model. This can be found in Workflows in the tools menu, then Automotive Assessments and under the Crash Test dropdown find 'Front Sled' and under Version select either 'Validation 1' or 'Validation 2' and fill out the Driver and Structures. Then save the created Workflows data using the Save to File or Save to Model buttons. For more information see the 'Automotive Assessments PRIMER' manual.

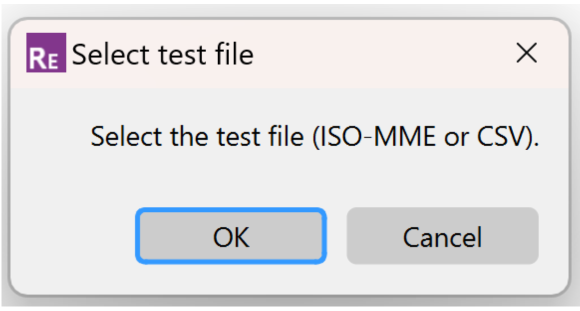
Using the REPORTER template

Before using the REPORTER template, you should have defined the occupant and structures user data required for your model in PRIMER (see Automotive Assessments PRIMER for details).

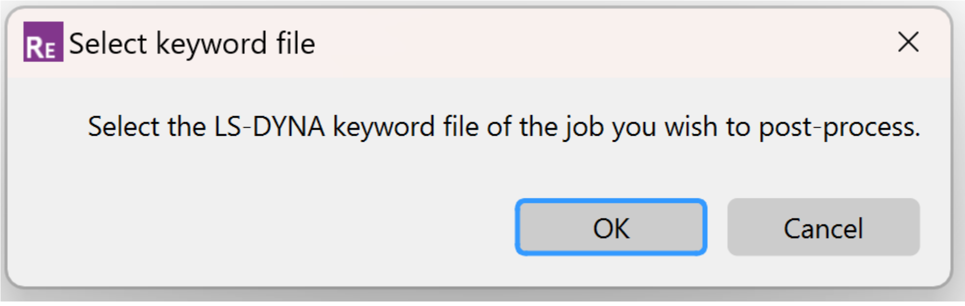
In REPORTER, click the **Automotive** tab and then filter by Front (under Impact location) & Automotive Assessments (under Workflows) and double-click **Euro NCAP Front Sled 2026 Validation (1 or 2) KPI** to open the template.



You will first be prompted to select your Test file, this can be .iso, .mme, .chn or .csv format:



Finally you will be prompted for the Simulation (.key) file. Once selected the REPORTER Template will run and produce the results.



REPORTER Results

Page 1 contains all the required assessment data (Values, Far Side Scores, Assessment Criteria Limits, $r_{AC_{sim}}$, $r_{AC_{test}}$ and d_{AC} values) for the Driver compared with the test data. Page 2 has the same information but for the Passenger.

Occupant	Assessment Criteria			Score		Value		rAC		dAC
	Region	Component	Limit	Sim	Test	Sim	Test	Sim	Test	
Driver	Head	HIC	700	0.625 / 0.625	0.625 / 0.625	227.899	51.719	0.326	0.074	
		TMS [g]	80			48.745	26.248	0.609	0.328	
	Neck	Fx [kN]	4			1.842	0.891	0.460	0.223	
		MyOC [Nm]	76			30.254	10.363	0.398	0.136	
		Shear [kN]	3.8			1.539	1.116	0.405	0.294	
	Chest	Compression [mm]	55	0.125 / 0.625	0.625 / 0.625	50.330	23.542	0.915	0.428	
		Viscous Criterion [m/s]	1			0.175	0.081	0.175	0.081	
	Femur	Left Compression [kN]	11.5	0.625 / 0.625	0.625 / 0.625	0.488	0.811	0.042	0.071	
		Right Compression [kN]	11.5			1.232	1.929	0.107	0.168	

Page 3 through the end of the report contains the same content as the Validation templates, documentation for the validation templates can be found here: [Euro NCAP Front Sled 2026 Validation]

Running in Batch

The template can also be run in batch mode, specifying the required information through command line arguments.

If your results are in the same directory as the keyword file then you only need to specify the keyword file on the command line and the test file and red zone which are specific to this template:

```
<reporter_exe> -batch -file=<template_name> -
varKEYWORD_FILE=<keyword_file> -varTEST_FILE=<test_file> -
varRED_ZONE=<red_zone> -exit
```

[Add the -pdf, -html, -pptx command line arguments to write the report out in the format you want]

Where:

reporter_exe	The full path and filename to the REPORTER executable
template_name	The full path and filename of the template you want to use. The workflow templates can be found in ***$OA_INSTALL/workflows/templates/automotive_assessments***
keyword_file	The full path and filename of the keyword file
test_file	The full path to the ISO-MME or CSV file to be used for the Test model
red_zone	Distance between the Head CoG and the Red Line

If the results are in a different folder to the keyword file, you will need to add an extra argument to specify it:

```
<reporter_exe> -batch -file=<template_name> -
varKEYWORD_FILE=<keyword_file> -varTEST_FILE=<test_file> -
varRED_ZONE=<red_zone> -varRESULTS_DIR=<results_dir> -exit
```

Where:

results_dir	The full path to the results directory

Similarly if you want to output the images and other files generated by REPORTER to a different folder than the default, you will need to add an extra argument:

```
<reporter_exe> -batch -file=<template_name> -
varKEYWORD_FILE=<keyword_file> -varTEST_FILE=<test_file> -
varRED_ZONE=<red_zone> -varOUTPUT_DIR=<output_dir> -exit
```

Where:

output_dir	The full path to the output directory

Euro NCAP Robustness

Euro NCAP VTC Simulation and Assessment Protocol Frontal Impact

This topic focuses on the **automation** of the Robustness (Virtual) Criterion (Assessment Criteria) assessment using REPORTER.

Introduction

The **Euro NCAP Front Sled 2026 Robustness** REPORTER Templates can be used to perform the Robustness 1, 2 & 3 (Assessment Criteria) Euro NCAP VTC Simulation and Assessment Protocol Frontal Impact
Section 3.3. The Robustness cases are treated as the Virtual loadcases and are scored accordingly. For more information about scoring and methodology please refer to Euro NCAP Scoring and Colour Bands

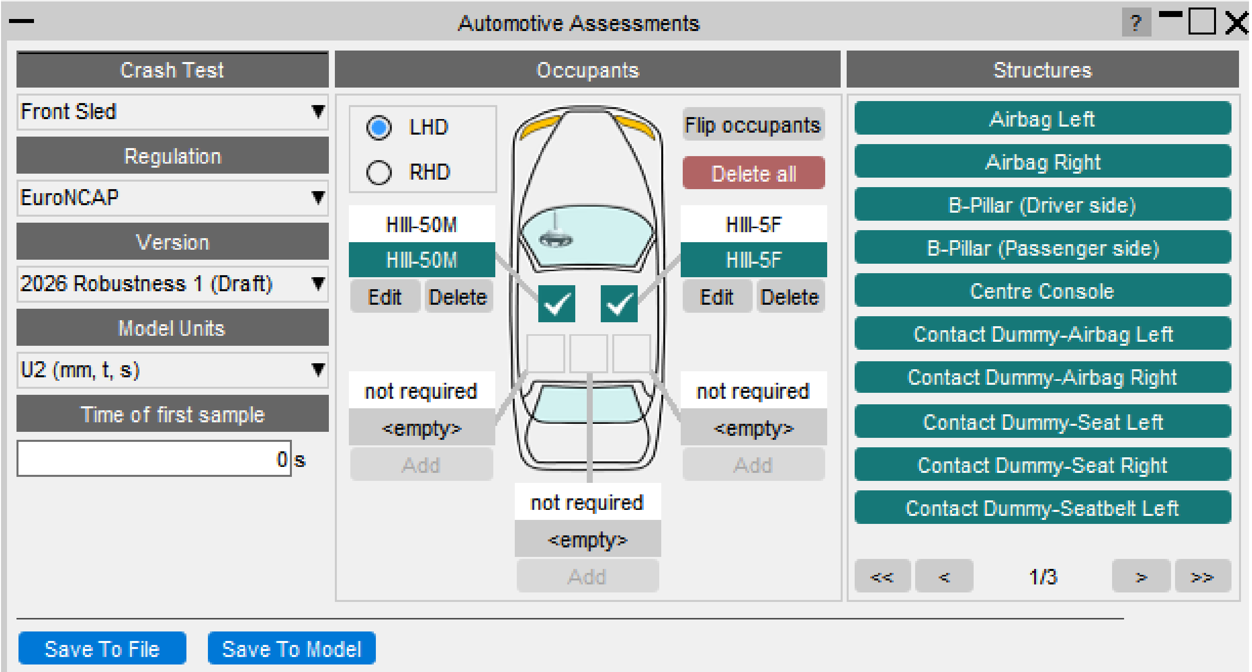
3.3 Sled and Virtual testing

Loadcase	Occupant	Head & neck	Chest & abdomen	Knee, femur & pelvis	Lower leg, foot & ankle	Total points
Sled	Driver	0.625 / 2	0.625 / 2	0.625 / 2	0.625 / 2	**2.5**
	Front passenger	0.625 / 2	0.625 / 2	0.625 / 2	0.625 / 2	**2.5**
Virtual	Driver	0.625 / 3	0.625 / 3	0.625 / 3	[0.625 / 3]*	**2.5**
	Front passenger	0.625 / 3	0.625 / 3	0.625 / 3	[0.625 / 3]*	**2.5**

*Points awarded by default unless in any physical test (including full-scale) any dummy exceeds the LPL for Tibia index or Tibia force

[To be implemented once lower leg certification procedure is adopted and virtual models qualify]

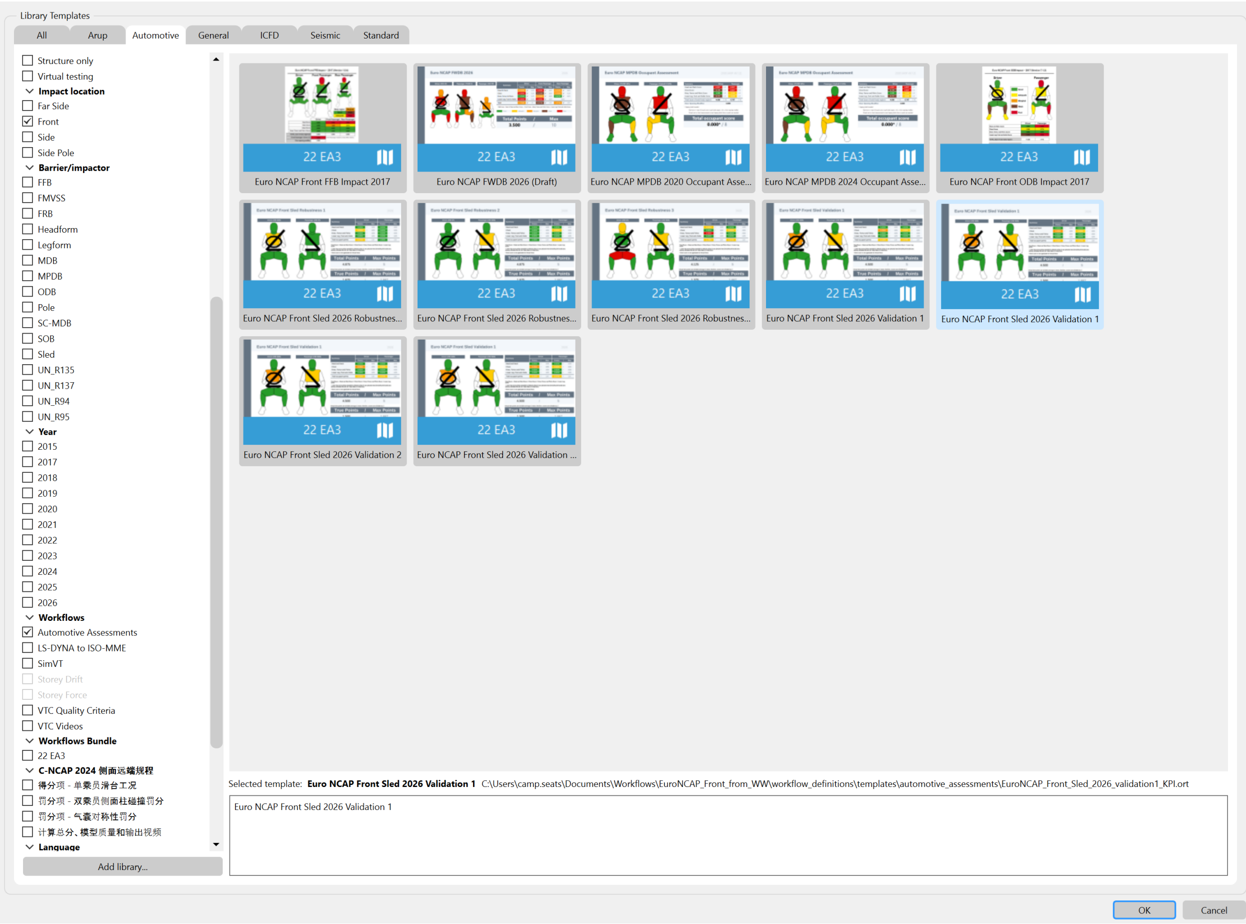
Firstly, in PRIMER, you should have set up the occupant and structures required for your Simulation model. This can be found in Workflows in the tools menu, then Automotive Assessments and under the Crash Test dropdown find 'Front Sled', and for Version select "2026 Robustness 1,2 or 3" and fill out the occupants and Structures. Then save the created Workflows data using the Save to File or Save to Model buttons. For more information see the 'Automotive Assessments PRIMER' manual. Automotive Assessments PRIMER



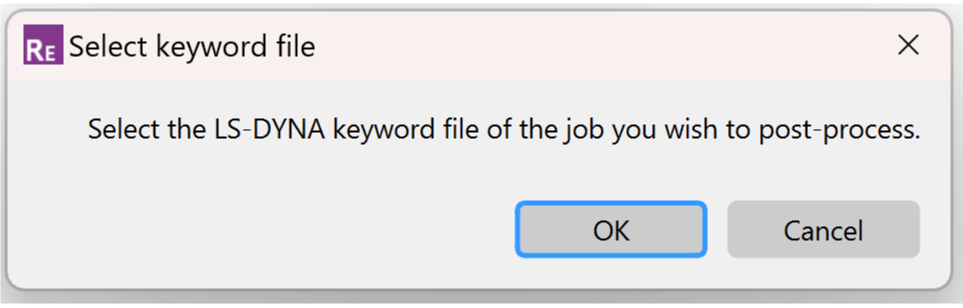
Using the REPORTER template

Before using the REPORTER template, you should have defined the occupant and structures user data required for your model in PRIMER (see Automotive Assessments PRIMER for details).

In REPORTER, click the **Automotive** tab and then filter by Virtual Testing (under protection) & Euro NCAP (under regulation) and double-click **Euro NCAP Front Sled 2026 Robustness 1,2 or 3** to open the template.



You will be prompted for the Simulation (.key) file. Once selected the REPORTER Template will run and produce the results.



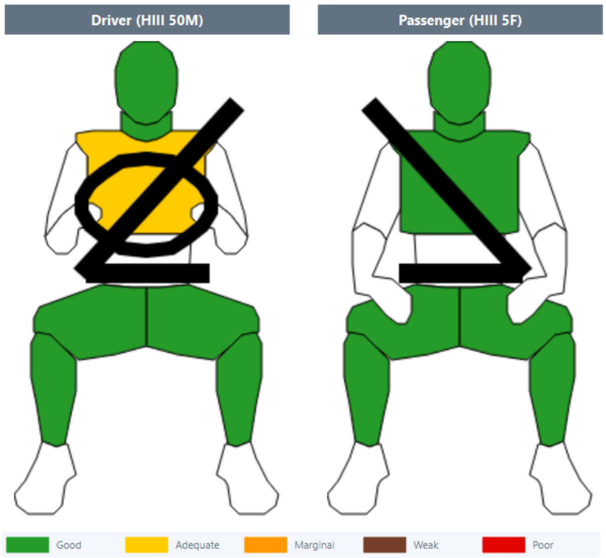
REPORTER Results

Page 1: Contains all point totals for each occupant body region as well as the overall point total and the true point total. For more information on the colours, points and scoring please refer to [Euro NCAP Scoring and Colour Bands](). The user can change the point calculation in REPORTER to calculate Overall points (out of 5) or True points (out of 1.667 5/3). The two buttons below allow for switching between points in an active reporter session, the selection will result in all points adjusted along with relevant text. Load Case Points is shown in the image below, the default is to display Load Case

Points. For more explanation of Loadcase Points and Overall Points please refer to Euro NCAP Points

Euro NCAP Front Sled Robustness 1

2026



Summary	Driver			Passenger		
	Points	/	Max	Points	/	Max
Head and Neck	0.6250	/	0.6250	0.6250	/	0.6250
Chest	0.5000	/	0.6250	0.6250	/	0.6250
Knee[2], Femur and Pelvis	0.6250	/	0.6250	0.6250	/	0.6250
Lower Leg, Foot and Ankle[1]	0.6250	/	0.6250	0.6250	/	0.6250
Total occupant points	2.3750	/	2.5000	2.5000	/	2.5000

Total Score = Head and Neck Score + Chest Score + Knee, Femur and Pelvis Score + Lower Leg Score

[1] Lower leg score points awarded by default unless in any physical test (including full-scale) any dummy exceeds the LPL for Tibia index or Tibia force

[2] Knee score is not applicable for Virtual Tests

Overall Points

4.875	/	5.0000

Overall Points: point values in this report are presented with a weighting of 1/3 applied for the contribution of this loadcase to the overall score.

Change to Overall Points | Change to Load Case Points

Superscripts:

1. Lower leg score points awarded by default unless in any physical test (including full-scale) any dummy exceeds the LPL or Tibia index or Tibia force.

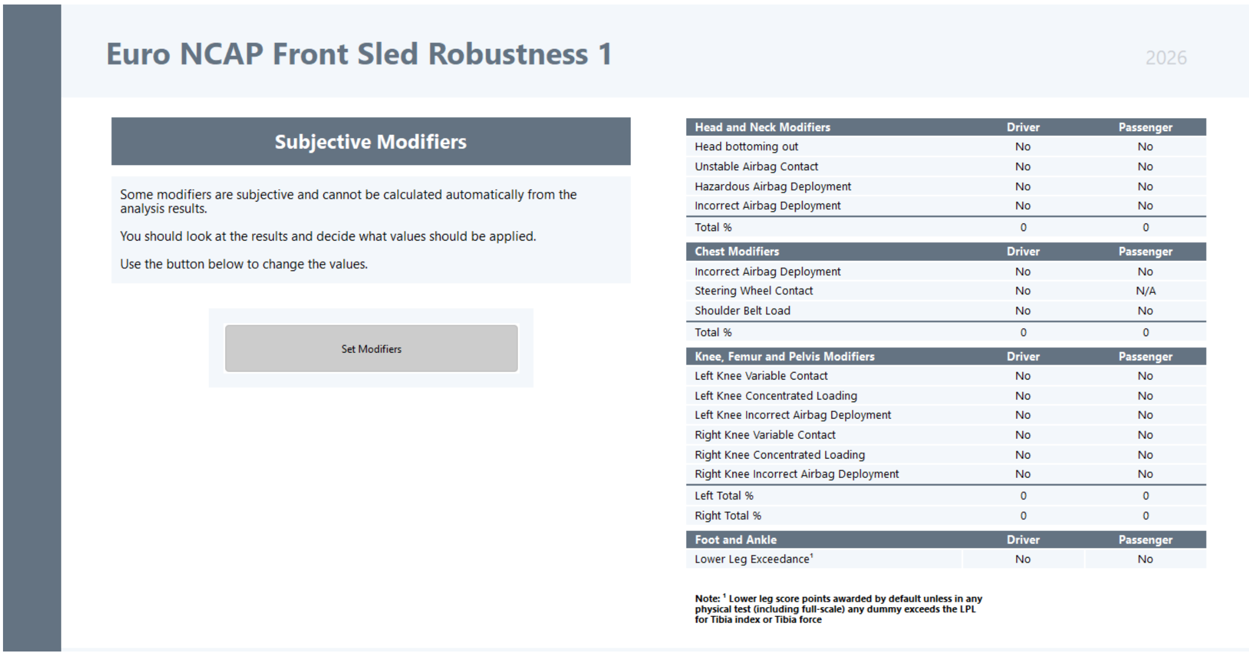
This comes from section 3.3 in Euro NCAP Frontal Protocol. To toggle between leg scores receiving full points and leg scores receiving no points use the modifiers on page 2 of the template.

2. Knee score is not applicable for Virtual Tests

This comes from section 3.5.3 in Euro NCAP Frontal Protocol.

Page 2: Contains the subjective modifiers

To turn on a subjective modifier just click on the "Set Modifiers" button and type "Yes" into the respective modifier box. The Template will automatically compute the new scores.



Euro NCAP Front Sled Robustness 1

2026

Subjective Modifiers

Some modifiers are subjective and cannot be calculated automatically from the analysis results.

You should look at the results and decide what values should be applied.

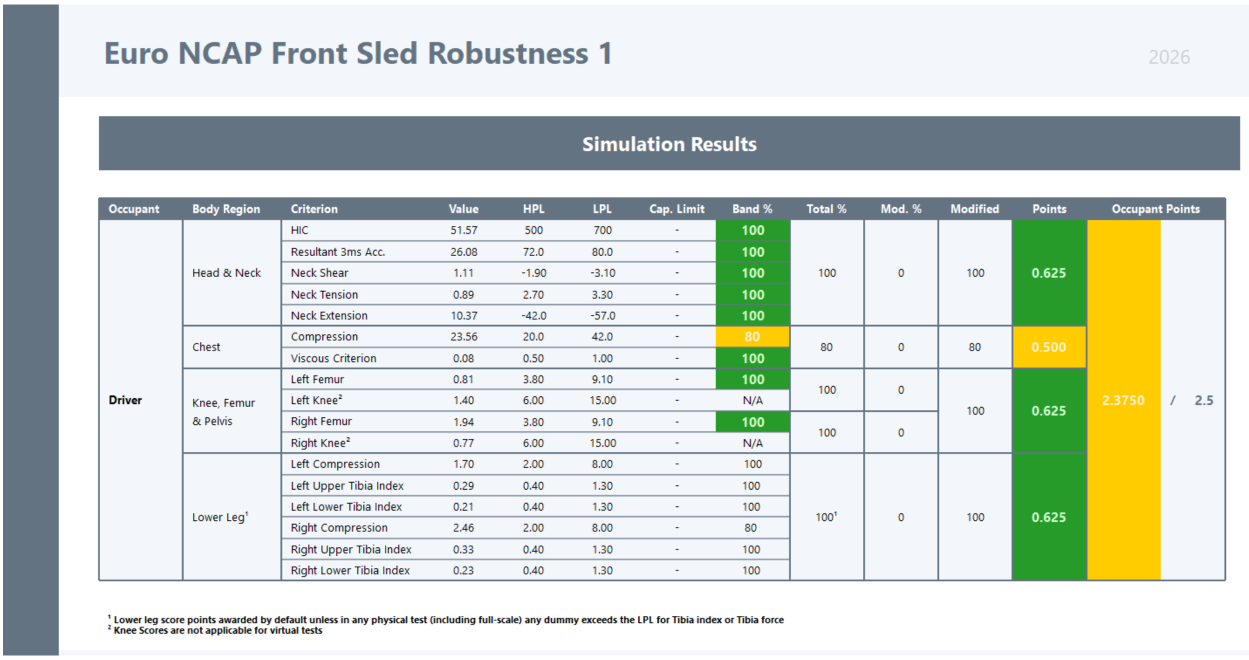
Use the button below to change the values.

Set Modifiers

Head and Neck Modifiers	Driver	Passenger
Head bottoming out	No	No
Unstable Airbag Contact	No	No
Hazardous Airbag Deployment	No	No
Incorrect Airbag Deployment	No	No
Total %	0	0
Chest Modifiers	**Driver**	**Passenger**
Incorrect Airbag Deployment	No	No
Steering Wheel Contact	No	N/A
Shoulder Belt Load	No	No
Total %	0	0
Knee, Femur and Pelvis Modifiers	**Driver**	**Passenger**
Left Knee Variable Contact	No	No
Left Knee Concentrated Loading	No	No
Left Knee Incorrect Airbag Deployment	No	No
Right Knee Variable Contact	No	No
Right Knee Concentrated Loading	No	No
Right Knee Incorrect Airbag Deployment	No	No
Left Total %	0	0
Right Total %	0	0
Foot and Ankle	**Driver**	**Passenger**
Lower Leg Exceedance[1]	No	No

Note: [1] Lower leg score points awarded by default unless in any physical test (including full-scale) any dummy exceeds the LPL for Tibia index or Tibia force

Pages 3 and 4: give a more detailed score overview for each occupant. The occupant is split into its respective body regions and criterion.



Euro NCAP Front Sled Robustness 1

2026

Simulation Results

Occupant	Body Region	Criterion	Value	HPL	LPL	Cap. Limit	Band %	Total %	Mod. %	Modified	Points	Occupant Points
Driver	Head & Neck	HIC	51.57	500	700	-	100	100	0	100	0.625	2.3750 / 2.5
		Resultant 3ms Acc.	26.08	72.0	80.0	-	100					
		Neck Shear	1.11	-1.90	-3.10	-	100					
		Neck Tension	0.89	2.70	3.30	-	100					
		Neck Extension	10.37	-42.0	-57.0	-	100					
	Chest	Compression	23.56	20.0	42.0	-	80	80	0	80	0.500	
		Viscous Criterion	0.08	0.50	1.00	-	100					
	Knee, Femur & Pelvis	Left Femur	0.81	3.80	9.10	-	100	100	0	100	0.625	
		Left Knee[2]	1.40	6.00	15.00	-	N/A					
		Right Femur	1.94	3.80	9.10	-	100	100	0			
		Right Knee[2]	0.77	6.00	15.00	-	N/A					
	Lower Leg[1]	Left Compression	1.70	2.00	8.00	-	100	100[1]	0	100	0.625	
		Left Upper Tibia Index	0.29	0.40	1.30	-	100					
		Left Lower Tibia Index	0.21	0.40	1.30	-	100					
		Right Compression	2.46	2.00	8.00	-	80					
		Right Upper Tibia Index	0.33	0.40	1.30	-	100					
		Right Lower Tibia Index	0.23	0.40	1.30	-	100					

[1] Lower leg score points awarded by default unless in any physical test (including full-scale) any dummy exceeds the LPL for Tibia index or Tibia force
[2] Knee Scores are not applicable for virtual tests

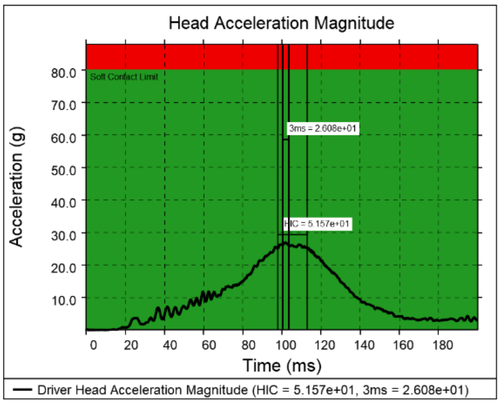
The Lower Leg Max Values are presented only for the Users information. The Banded Scores are not coloured in to show that these scores are only for informational purposes the true score and point values come from the "Lower Leg Exceedance" modifier.

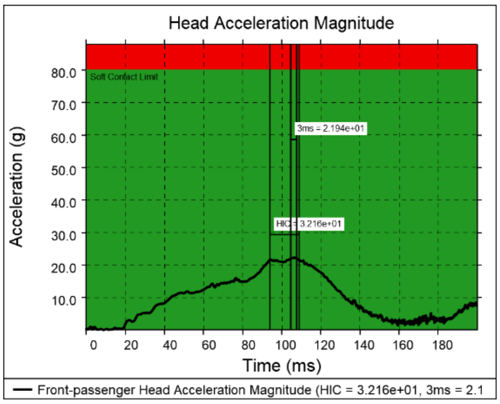
Pages 5 - 44: Contain T/HIS graphs and plots of all the occupant and structure criterion

Euro NCAP Front Sled Robustness 1

2026

Head Acceleration





Running in Batch

The template can also be run in batch mode, specifying the required information through command line arguments.

If your results are in the same directory as the keyword file then you only need to specify the keyword file on the command line and the test file and red zone which are specific to this template:

<*reporter_exe*> -batch -file=<*template_name*> -varKEYWORD_FILE=<*keyword_file*> -varTEST_FILE=<*test_file*> -varRED_ZONE=<*red_zone*> -exit

[Add the -pdf, -html, -pptx command line arguments to write the report out in the format you want]

Where:

reporter_exe	The full path and filename to the REPORTER executable
template_name	The full path and filename of the template you want to use. The workflow templates can be found in ***$OA_INSTALL/workflows/templates/automotive_assessments***
keyword_file	The full path and filename of the keyword file

If the results are in a different folder to the keyword file, you will need to add an extra argument to specify it:

```
<reporter_exe> -batch -file=<template_name> -varKEYWORD_FILE=<keyword_file> -varRESULTS_DIR=<results_dir> -exit
```

Where:

results_dir	The full path to the results directory

Similarly if you want to output the images and other files generated by REPORTER to a different folder than the default, you will need to add an extra argument:

```
<reporter_exe> -batch -file=<template_name> -varKEYWORD_FILE=<keyword_file> -varOUTPUT_DIR=<output_dir> -exit
```

Where:

output_dir	The full path to the output directory

Euro NCAP Validation

Euro NCAP VTC Simulation and Assessment Protocol Frontal Impact

This topic focuses on the **automation** of the Validation (Sled) Criterion (Assessment Criteria) assessment using REPORTER.

Introduction

The **Euro NCAP Front Sled 2026 Validation** REPORTER Templates can be used to perform the Validation 1 & 2 (Assessment Criteria) Euro NCAP VTC Simulation and Assessment Protocol Frontal Impact
Section 3.3. The Validation cases are used both as the Sled loadcase as well as a way to test simulation data and are scored accordingly. For more information about scoring and methodology please refer to Euro NCAP Scoring and Colour Bands

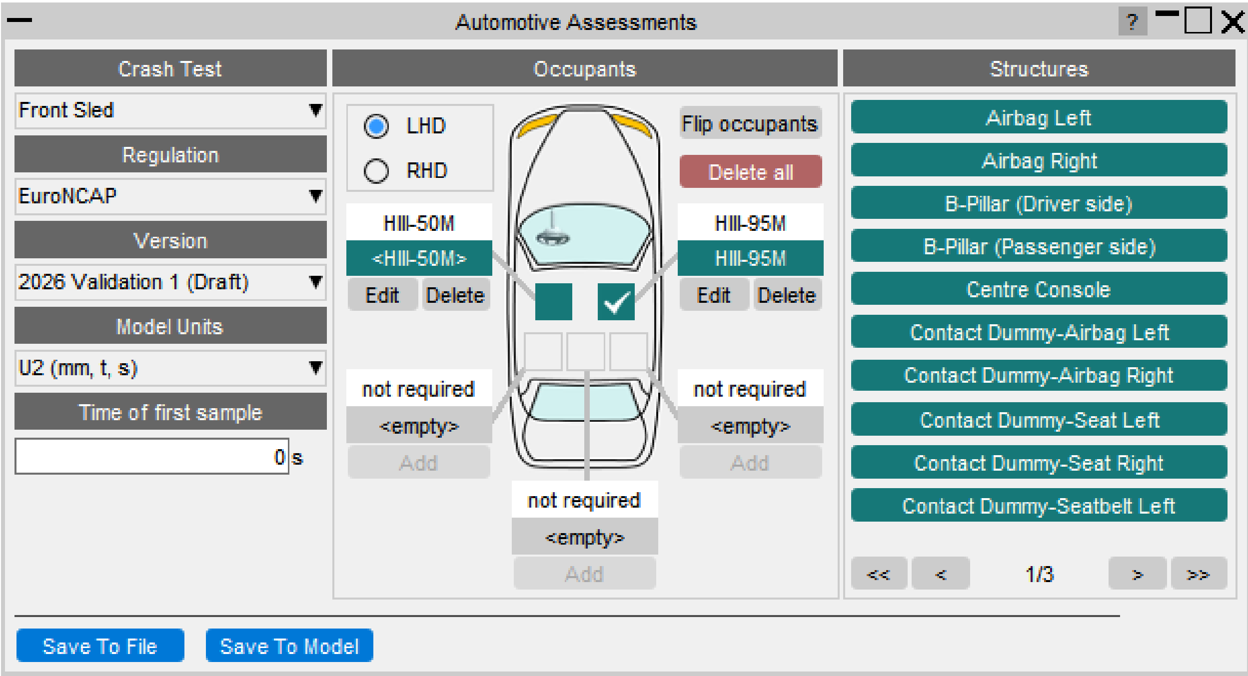
3.3 Sled and Virtual testing

Loadcase	Occupant	Head & neck	Chest & abdomen	Knee, femur & pelvis	Lower leg, foot & ankle	Total points
Sled	Driver	0.625 / 2	0.625 / 2	0.625 / 2	0.625 / 2	**2.5**
	Front passenger	0.625 / 2	0.625 / 2	0.625 / 2	0.625 / 2	**2.5**
Virtual	Driver	0.625 / 3	0.625 / 3	0.625 / 3	[0.625 / 3]*	**2.5**
	Front passenger	0.625 / 3	0.625 / 3	0.625 / 3	[0.625 / 3]*	**2.5**

*Points awarded by default unless in any physical test (including full-scale) any dummy exceeds the LPL for Tibia index or Tibia force

[To be implemented once lower leg certification procedure is adopted and virtual models qualify]

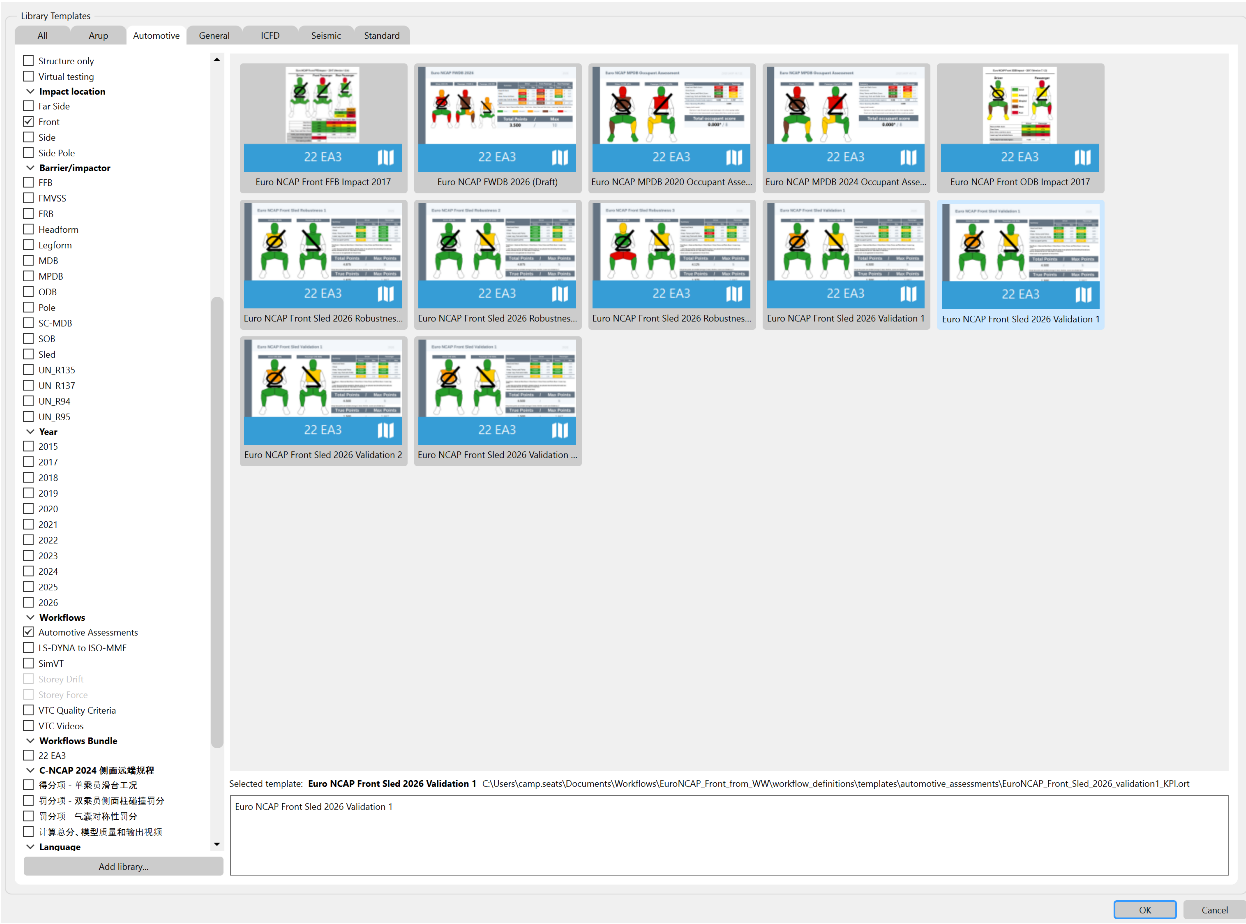
Firstly, in PRIMER, you should have set up the occupant and structures required for your Simulation model. This can be found in Workflows in the tools menu, then Automotive Assessments and under the Crash Test dropdown find 'Front Sled', and for Version select "2026 Validation 1 or 2" and fill out the occupants and Structures. Then save the created Workflows data using the Save to File or Save to Model buttons. For more information see the 'Automotive Assessments PRIMER' manual. Automotive Assessments PRIMER



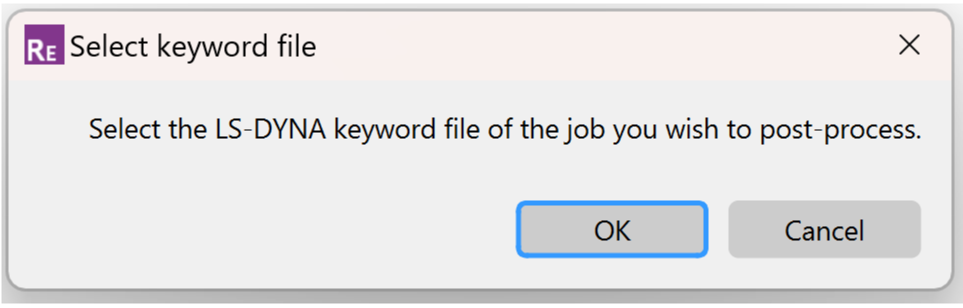
Using the REPORTER template

Before using the REPORTER template, you should have defined the occupant and structures user data required for your model in PRIMER (see Automotive Assessments PRIMER for details).

In REPORTER, click the **Automotive** tab and then filter by Virtual Testing (under protection) & Euro NCAP (under regulation) and double-click **Euro NCAP Front Sled 2026 Validation 1 or 2** to open the template.

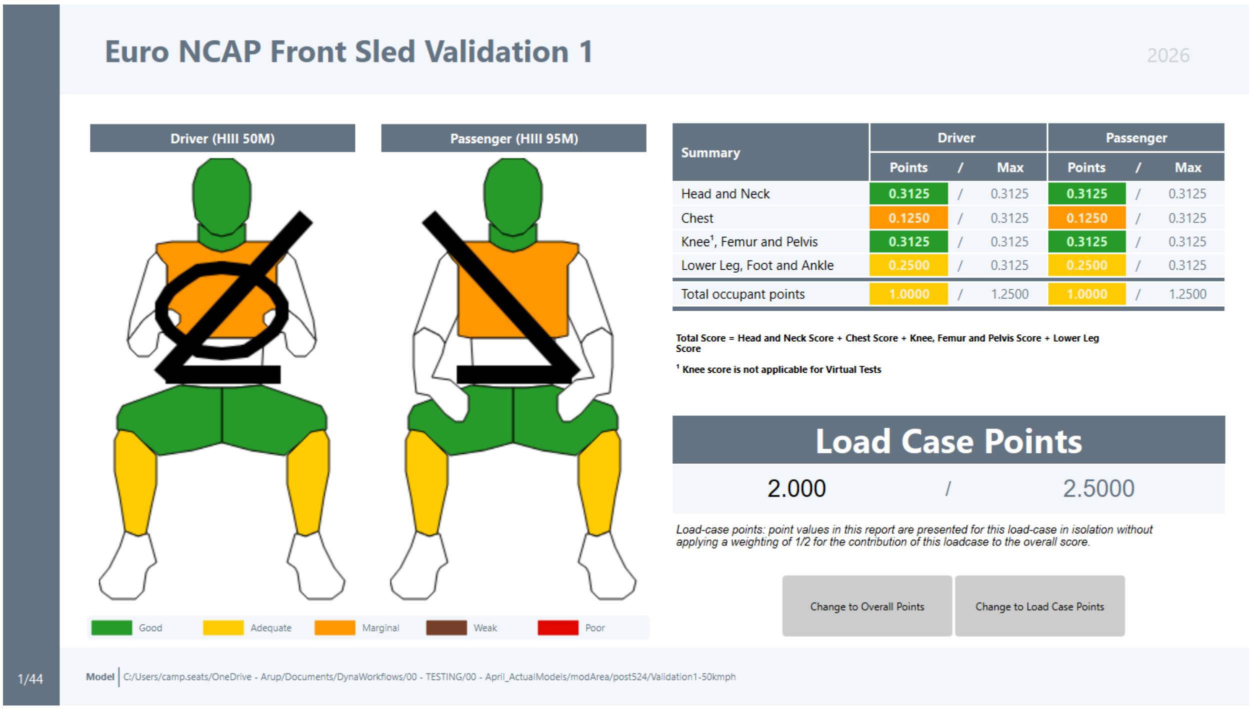


You will be prompted for the Simulation (.key) file. Once selected the REPORTER Template will run and produce the results.



REPORTER Results

Page 1: Contains all point totals for each occupant body region as well as the point total. For more information on the colours, points and scoring please refer to [Euro NCAP Scoring and Colour Bands](). The user can change the point calculation in REPORTER to calculate Overall points (out of 5) or True points (out of 2.5). The two buttons below allow for switching between points in an active reporter session, the selection will result in all points adjusted along with relevant text. Load Case Points is shown in the image below, the default is to display Load Case Points. For more explanation of Loadcase Points and Overall Points please refer to Euro NCAP Points.



Superscripts:

1.Knee score is not applicable for Virtual Tests. However, unlike Euro NCAP Front Sled 2026 Robustness, the knee scores are not automatically removed from the score since Validation templates can be used with physical test data.

This comes from section 3.5.3 in Euro NCAP Frontal Protocol.

Page 2: Contains the subjective modifiers

To turn on a subjective modifier just click on the "Set Modifiers" button and type "Yes" into the respective modifier box. The Template will automatically compute the new scores.

Validation Templates are more dynamic than the Euro NCAP Front Sled 2026 Robustness. They are intended to both be used with physical test data and simulation data. For the test data keep "Lower Leg Exceedance" modifier set to "Off" this allows lower leg scores to be scored. If the user instead wants to use virtual data, then select either the "Yes" or "No" option to set the leg score points with accordance to section 3.3 from Euro NCAP Frontal Protocol.

Euro NCAP Front Sled Validation 1

2026

Subjective Modifiers

Some modifiers are subjective and cannot be calculated automatically from the analysis results.

You should look at the results and decide what values should be applied.

Use the button below to change the values.

Set Modifiers

[1] Note: Optional Modifier, use Lower Leg Exceedance Modifier if input data is from virtual test. Lower leg score points will be awarded by default unless in any physical test (including full-scale) any dummy exceeds the LPL for Tibia index or Tibia force

Head and Neck Modifiers	Driver	Passenger
Head bottoming out	No	No
Unstable Airbag Contact	No	No
Hazardous Airbag Deployment	No	No
Incorrect Airbag Deployment	No	No
Total %	0	0
Chest Modifiers	**Driver**	**Passenger**
Incorrect Airbag Deployment	No	No
Steering Wheel Contact	No	N/A
Shoulder Belt Load	No	No
Total %	0	0
Knee, Femur and Pelvis Modifiers	**Driver**	**Passenger**
Left Knee Variable Contact	No	No
Left Knee Concentrated Loading	No	No
Left Knee Incorrect Airbag Deployment	No	No
Right Knee Variable Contact	No	No
Right Knee Concentrated Loading	No	No
Right Knee Incorrect Airbag Deployment	No	No
Left Total %	0	0
Right Total %	0	0
Foot and Ankle	**Driver**	**Passenger**
Lower Leg Exceedance[1]	Off	Off
Pedal Displacement	0	N/A
Pedal Bloacking	No	N/A

Pages 3 and 4: give a more detailed score overview for each occupant. The occupant is split into its respective body regions and criterion.

Euro NCAP Front Sled Validation 1

2026

Simulation Results

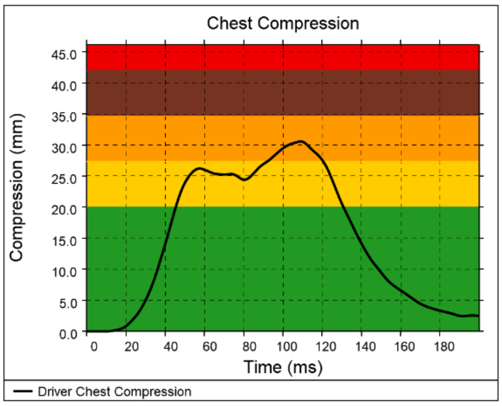
Occupant	Body Region	Criterion	Value	HPL	LPL	Cap. Limit	Band %	Total %	Mod. %	Modified	Points	Occupant Points
Driver	Head & Neck	HIC	133.43	500	700	-	100	100	0	100	0.625	2.0000 / 2.5
		Resultant 3ms Acc.	38.68	72.0	80.0	-	100					
		Neck Shear	-1.31	-1.90	-3.10	-	100					
		Neck Tension	1.53	2.70	3.30	-	100					
		Neck Extension	-15.78	-42.0	-57.0	-	100					
	Chest	Compression	30.56	20.0	42.0	-	40	40	0	40	0.250	
		Viscous Criterion	0.12	0.50	1.00	-	100					
	Knee, Femur & Pelvis	Left Femur	1.39	3.80	9.10	-	100	100	0	100	0.625	
		Left Knee[1]	2.09	6.00	15.00	-	100					
		Right Femur	2.07	3.80	9.10	-	100	100	0			
		Right Knee[1]	0.80	6.00	15.00	-	100					
	Lower Leg	Left Compression	2.97	2.00	8.00	-	80	80	0	80	0.500	
		Left Upper Tibia Index	0.43	0.40	1.30	-	80					
		Left Lower Tibia Index	0.32	0.40	1.30	-	100					
		Right Compression	2.66	2.00	8.00	-	80					
		Right Upper Tibia Index	0.35	0.40	1.30	-	100					
		Right Lower Tibia Index	0.19	0.40	1.30	-	100					

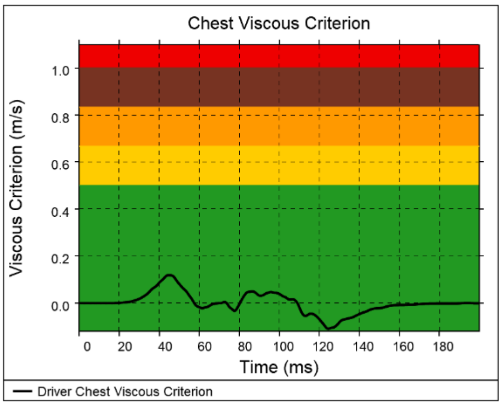
[1] Knee Scores are not applicable for virtual tests

Pages 5 - 44: Contain T/HIS graphs and plots of all the occupant and structure criterion

Euro NCAP Front Sled Validation 1 2026

Driver Chest





Running in Batch

The template can also be run in batch mode, specifying the required information through command line arguments.

If your results are in the same directory as the keyword file then you only need to specify the keyword file on the command line and the test file and red zone which are specific to this template:

```
<reporter_exe> -batch -file=<template_name> -varKEYWORD_FILE=<keyword_file> -varTEST_FILE=<test_file> -varRED_ZONE=<red_zone> -exit
```

[Add the -pdf, -html, -pptx command line arguments to write the report out in the format you want]

Where:

reporter_exe	The full path and filename to the REPORTER executable
template_name	The full path and filename of the template you want to use. The workflow templates can be found in ***$OA_INSTALL/workflows/templates/automotive_assessments***
keyword_file	The full path and filename of the keyword file

If the results are in a different folder to the keyword file, you will need to add an extra argument to specify it:

```
<reporter_exe> -batch -file=<template_name> -
varKEYWORD_FILE=<keyword_file> -varRESULTS_DIR=<results_dir> -exit
```

Where:

results_dir	The full path to the results directory

Similarly if you want to output the images and other files generated by REPORTER to a different folder than the default, you will need to add an extra argument:

```
<reporter_exe> -batch -file=<template_name> -
varKEYWORD_FILE=<keyword_file> -varOUTPUT_DIR=<output_dir> -exit
```

Where:

output_dir	The full path to the output directory

Euro NCAP FWDB

Euro NCAP VTC Simulation and Assessment Protocol Frontal Impact

This topic focuses on the **automation** of the FWDB Criterion (Assessment Criteria) assessment using REPORTER.

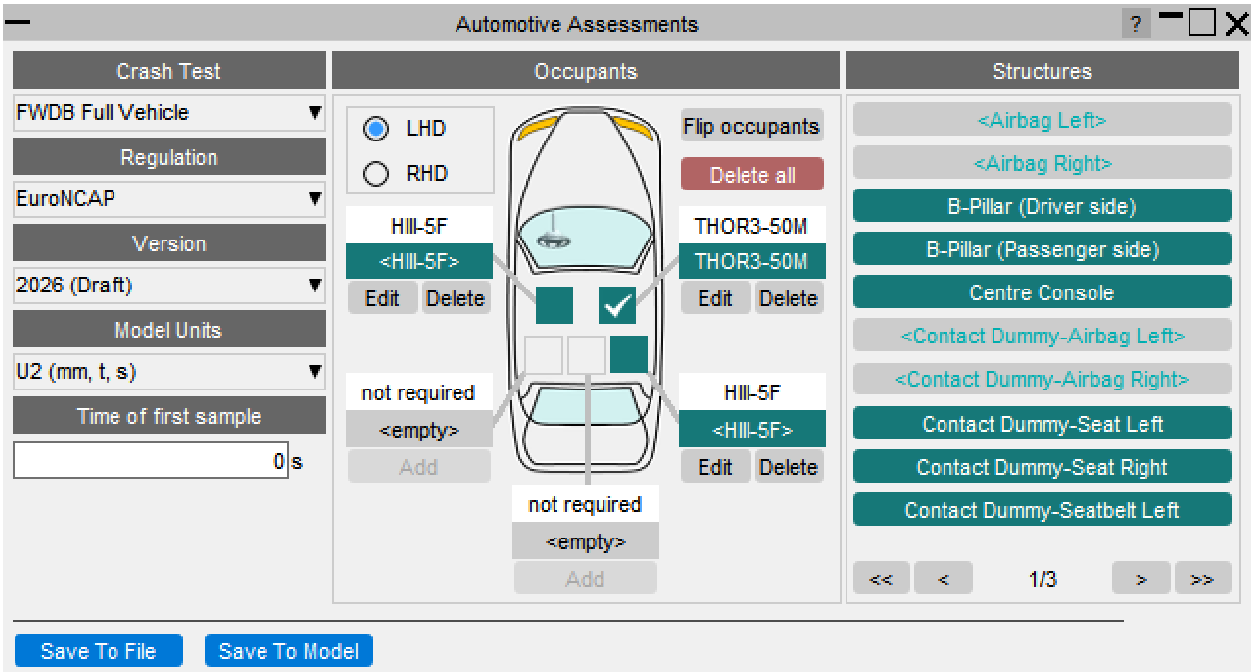
Introduction

The **Euro NCAP Front FWDB 2026** REPORTER Template can be used to perform the FWDB (Assessment Criteria) Euro NCAP VTC Simulation and Assessment Protocol Frontal Impact
Section 3.2. The FWDB case. For more information about scoring and methodology please refer to Euro NCAP Scoring and Colour Bands

3.2 FWDB

Occupant	Head & Neck	Chest & Abdomen	Knee, Femur & Pelvis	Lower leg, Foot & Ankle	Total points
Driver	1.25	1.25	1.25	1.25	**5.0**
Front passenger	0.625	0.625	0.625	0.625	**2.5**
Rear passenger	0.625	1.25	0.625	-	**2.5**

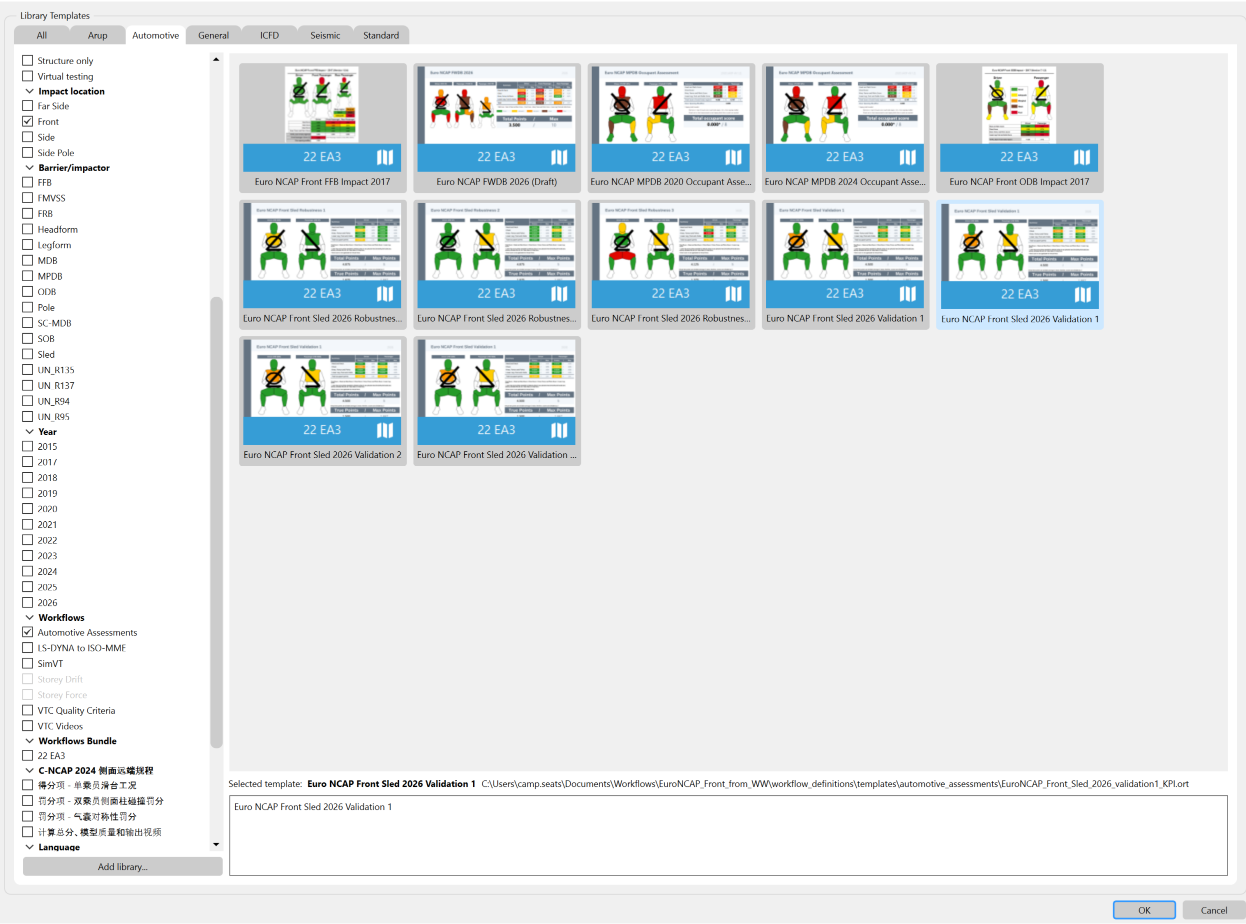
Firstly, in PRIMER, you should have set up the occupant and structures required for your Simulation model. This can be found in Workflows in the tools menu, then Automotive Assessments and under the Crash Test dropdown find 'FWDB Full Vehicle', and for Version select "2026" and fill out the occupants and Structures. Then save the created Workflows data using the Save to File or Save to Model buttons. For more information see the 'Automotive Assessments PRIMER' manual. Automotive Assessments PRIMER



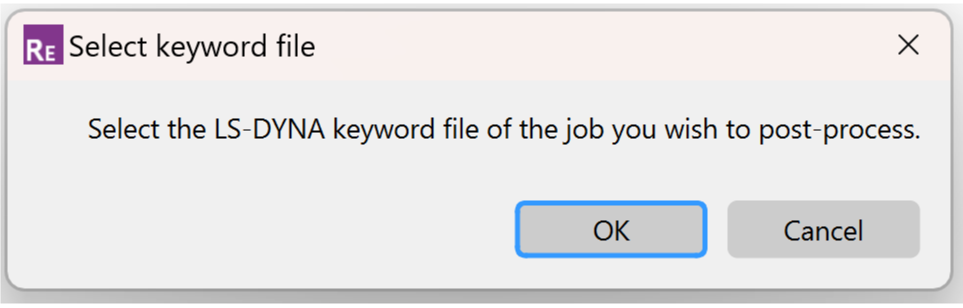
Using the REPORTER template

Before using the REPORTER template, you should have defined the occupant and structures user data required for your model in PRIMER (see Automotive Assessments PRIMER for details).

In REPORTER, click the **Automotive** tab and then filter by Virtual Testing (under protection) & Euro NCAP (under regulation) and double-click **Euro NCAP Front FWDB 2026** to open the template.



You will be prompted for the Simulation (.key) file. Once selected the REPORTER Template will run and produce the results.



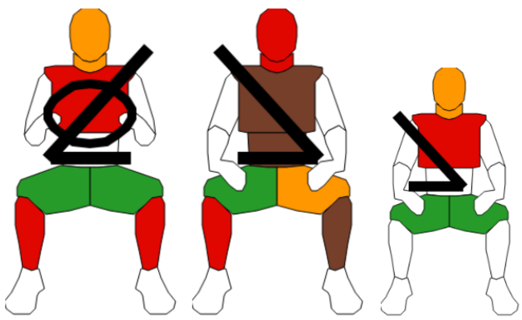
REPORTER Results

Page 1: Contains all point totals for each occupant body region as well as the overall point total and the true point total. For more information on the colours, points and scoring please refer to [Euro NCAP Scoring and Colour Bands]

Euro NCAP FWDB 2026

2026

Driver (HF)	Front Passenger (T3)	Rear Passenger (HF)



Summary	Driver			Front Passenger			Rear Passenger		
	Points	/	Max	Points	/	Max	Points	/	Max
Head & Neck	0.5000	/	1.25	0.0000	/	.625	0.2500	/	.625
Chest	0.0000	/	1.25	0.1250	/	.625	0.0000	/	1.25
Knee, Femur & Pelvis	1.2500	/	1.25	0.2500	/	.625	0.6250	/	.625
Lower Leg, Foot & Ankle	0.0000	/	1.25	0.0000	/	.625	N/A		
Total	1.7500	/	5	0.3750	/	2.5	0.8750	/	2.5

Total Score = Sum of Head and Neck Score + Chest Score + Knee, Femur and Pelvis Score + Lower Leg, Foot and Ankle Score.

Good | Adequate | Marginal | Weak | Poor

Total Points	/	Max
3.000	/	10

Page 2: Contains the subjective modifiers

Euro NCAP FWDB 2026

2026

Subjective Modifiers

Some modifiers are subjective and cannot be calculated automatically from the analysis results.

You should look at the results and decide what values should be applied.

Use the button below to change the values.

Set Modifiers

Head and Neck Modifiers	Driver	Passenger	Rear Passenger
Head bottoming out	No	No	No
Unstable Airbag Contact	No	No	No
Hazardous Airbag Deployment	No	No	No
Head Damage (THOR only)	N/A	0%	N/A
Excursion (rear seats)	N/A	N/A	0%
Incorrect Airbag Deployment	No	No	No
Total [%]	0%	0%	0%

Chest Modifiers	Driver	Passenger	Rear Passenger
Incorrect Airbag Deployment	No	No	No
Steering Wheel Contact	No	N/A	N/A
Shoulder Belt Load	No	No	No
Total	0%	0%	0%

Knee, Femur and Pelvis Modifiers	Driver	Passenger	Rear Passenger
Pelvis Submarining	N/A	0%	N/A
Left Knee Variable Contact	No	No	No
Left Knee Concentrated Loading	No	No	No
Left Knee Incorrect Airbag Deploymer	No	No	No
Right Knee Variable Contact	No	No	No
Right Knee Concentrated Loading	No	No	No
Right Knee Incorrect Airbag Deployme	No	No	No
Left Total [%]	0.00	0.00	0.00
Right Total [%]	0.00	0.00	0.00

Foot and Ankle	Driver	Passenger	
Pedal Displacement	0%	N/A	N/A
Pedal Blocking	No	N/A	N/A

Pages 3 and 4: give a more detailed score overview for each occupant. The occupant is split into its respective body regions and criterion.

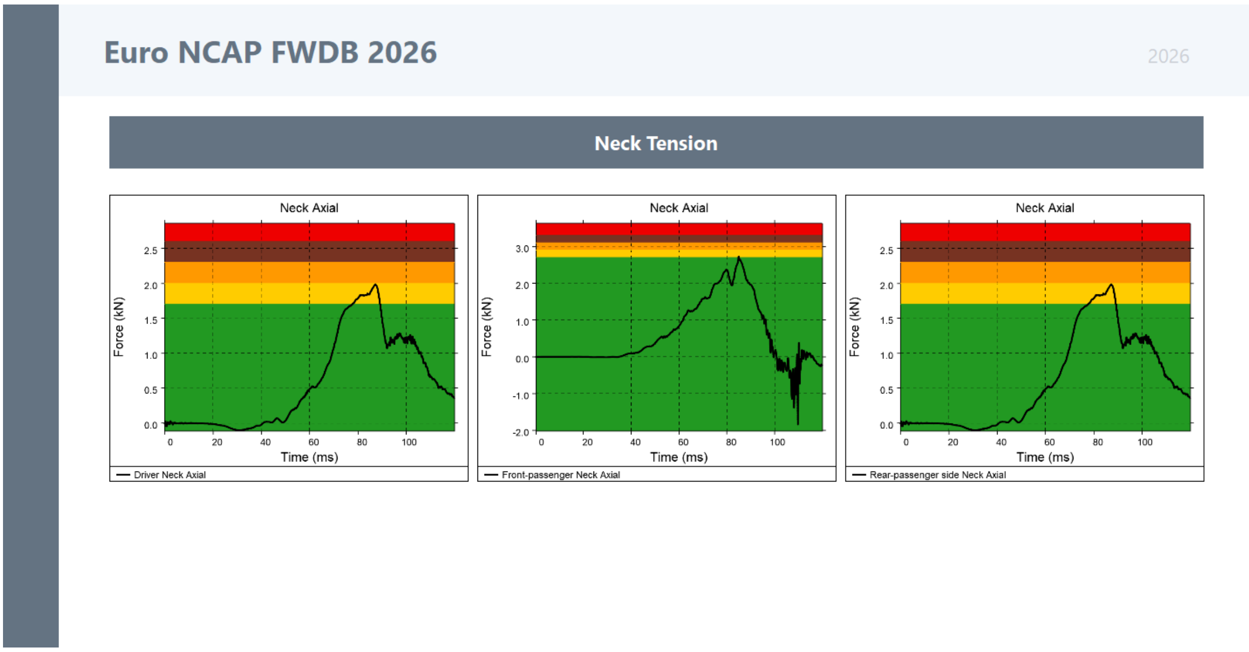

Euro NCAP FWDB 2026

2026

Simulation Results

Occupant	Body Region	Criterion	Value	HPL	LPL	Cap. Limit	Band %	Total %	Mod. %	Modified	Points	Occupant Points
Driver	Head & Neck	HIC	451.18	500	700	700	100	40	0	40	0.500	1.7500 / 5
		Resultant 3ms Acc.	64.89	72.0	80.0	80.0	100					
		Neck Shear	-1.48	-1.20	-2.00	-2.00	40					
		Neck Tension	1.99	1.70	2.60	2.60	80					
		Neck Extension	-20.44	-36.0	-49.0	-49.0	100					
	Chest	Compression	34.17	18.0	34.0	34.0	0	0	0	0	0.000	
		Viscous Criterion	0.18	0.50	1.00	1.00	100					
	Knee, Femur & Pelvis	Left Femur	0.00	2.60	6.20	6.20	100	100	0	100	1.250	
		Left Knee	0.18	6.00	15.00	15.00	100					
		Right Femur	0.00	2.60	6.20	6.20	100	100	0			
		Right Knee	0.21	6.00	15.00	15.00	100					
	Lower Leg	Left Compression	0.00	2.00	8.00	8.00	100	0	0	0	0.000	
		Left Upper Tibia Index	2.40	0.40	1.30	1.30	0					
		Left Lower Tibia Index	0.87	0.40	1.30	1.30	40					
		Right Compression	0.00	2.00	8.00	8.00	100					
		Right Upper Tibia Index	3.60	0.40	1.30	1.30	0					
		Right Lower Tibia Index	0.89	0.40	1.30	1.30	40					

Pages 5 - 52: Contain T/HIS graphs and plots of all the occupant and structure criterion



Running in Batch

The template can also be run in batch mode, specifying the required information through command line arguments.

If your results are in the same directory as the keyword file then you only need to specify the keyword file on the command line and the test file and red zone which are specific to this template:

```
<reporter_exe> -batch -file=<template_name> -
varKEYWORD_FILE=<keyword_file> -varTEST_FILE=<test_file> -
varRED_ZONE=<red_zone> -exit
```

[Add the -pdf, -html, -pptx command line arguments to write the report out in the format you want]

Where:

reporter_exe	The full path and filename to the REPORTER executable
template_name	The full path and filename of the template you want to use. The workflow templates can be found in ***$OA_INSTALL/workflows/templates/automotive_assessments***
keyword_file	The full path and filename of the keyword file

If the results are in a different folder to the keyword file, you will need to add an extra argument to specify it:

```
<reporter_exe> -batch -file=<template_name> -
varKEYWORD_FILE=<keyword_file> -varRESULTS_DIR=<results_dir> -exit
```

Where:

results_dir	The full path to the results directory

Similarly if you want to output the images and other files generated by REPORTER to a different folder than the default, you will need to add an extra argument:

```
<reporter_exe> -batch -file=<template_name> -
varKEYWORD_FILE=<keyword_file> -varOUTPUT_DIR=<output_dir> -exit
```

Where:

output_dir	The full path to the output directory

Protocol Loadcase Points

With the Euro NCAP protocols, there are two Load Cases for validation and three for robustness. The aggregation of these load cases and their scores make up a total score. However, depending on the use and application, it may be convenient to view results looking at the protocol as a whole or looking at load cases individually. This can be seen in **Section 3.3** of the Full Frontal protocol from [Euro NCAP 2026 Crash Protection Protocol](). Here it can be seen that the Sled tests' total points sum to 5 (2.5 + 2.5) and the Virtual tests' total points also sum to 5 (2.5 + 2.5). The Sled Load Case contains Validation 1 & Validation 2 while the Virtual Load Case contains Robustness 1 - 3, thus the **Overall Points** are the points scored by each individual Load Case which are intended to be summed to create a total score. The **Load Case Points** are the non-factored points, these numbers are more simple and can be useful when viewing a Load Case by itself.

3.3 Sled and Virtual testing

Loadcase	Occupant	Head & neck	Chest & abdomen	Knee, femur & pelvis	Lower leg, foot & ankle	Total points
Sled	Driver	0.625 / 2	0.625 / 2	0.625 / 2	0.625 / 2	**2.5**
	Front passenger	0.625 / 2	0.625 / 2	0.625 / 2	0.625 / 2	**2.5**
Virtual	Driver	0.625 / 3	0.625 / 3	0.625 / 3	[0.625 / 3]*	**2.5**
	Front passenger	0.625 / 3	0.625 / 3	0.625 / 3	[0.625 / 3]*	**2.5**

*Points awarded by default unless in any physical test (including full-scale) any dummy exceeds the LPL for Tibia index or Tibia force

[To be implemented once lower leg certification procedure is adopted and virtual models qualify]

Using the table from **Section 3.3,** it can be seen that a divisor is present throughout the cells in the table. The numerator values correspond to the Load Case points where the Load Case is considered independently, here a single Load Case has a maximum score shown in the Total Points column (5). This is referred to in the templates as **Load Case Points**

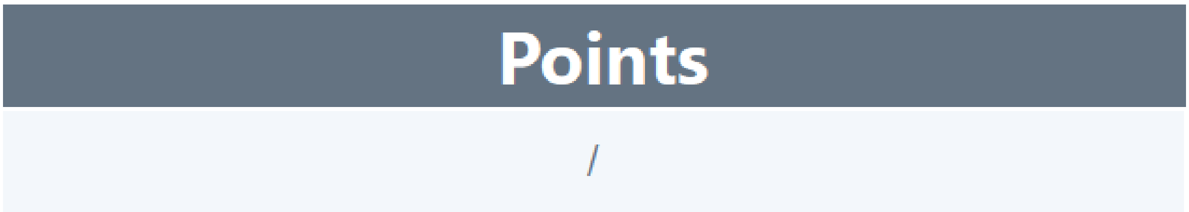
When the tests are considered as a group, the divisor is included, in this scenario the ***summation*** of the test scores has a maximum score shown in the Total Points column (5). In the protocol the individual load cases have a maximum score of the total points divided by the number of Loadcases in the test. This is referred to in the templates as **Overall Points.**

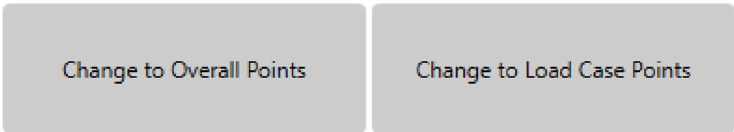
For example the Sled tests include Validation 1 and Validation 2. Validation 1, when evaluated using Loadcase Points, has a max score of 5.

When using Overall points, Validation 1 has a max score of 2.5 (5/2). Note here that the divisor represents the number of load cases, there are 2 Sled Load Cases (Validation 1,2) and 3 Virtual Load Case (Robustness 1-3)

REPORTER Templates

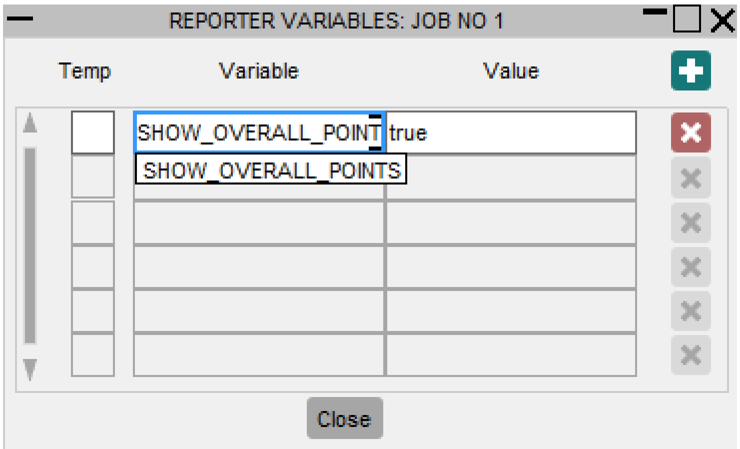
When using REPORTER to create the reports for these protocols the default settings will create a report showing the Load Case Points. However, this can be changed in the interactive mode by selecting the buttons shown below. (this will change all points throughout the report). These buttons are on the first page of the report for all templates except for the KPI templates, there it is on the third page.





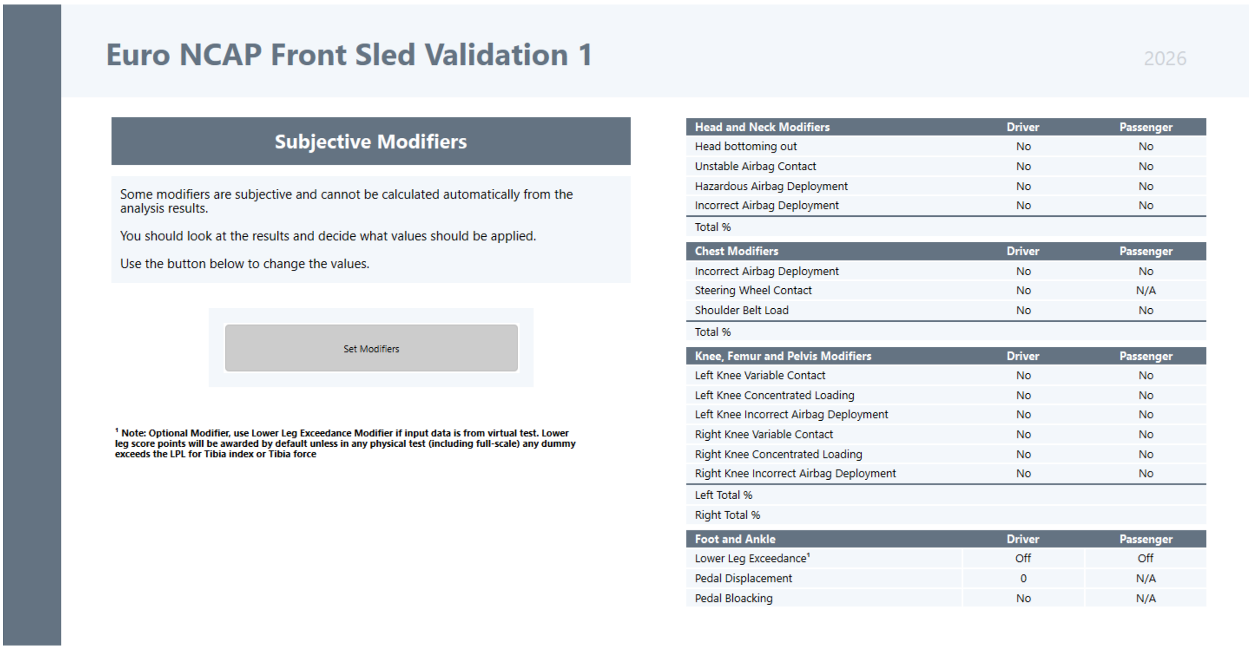
When running REPORTER through the batch option, then Point Distinctions can be controlled by setting the variable "SHOW_OVERALL_POINTS". This variable can be set by defining the variable in the run command prior to setting the variable name for the pdf output: <-varSHOW_OVERALL_POINTS=true>

In batch mode you can enter your Variables as such


REPORTER VARIABLES: JOB NO 1
Temp
Variable
Value
SHOW_OVERALL_POINT
true
SHOW_OVERALL_POINTS
Close

Validation Template Subjective Modifiers

In the Euro NCAP Frontal 2026 tests the Subjective Modifiers are consistent across the Load Cases. The exception being the "Lower Leg Exceedance" Modifier which is specific to only Validation Load Cases.



The "Lower Leg Exceedance" Modifier has three options in these REPORTER templates which are: **Off**, **No**, and **Yes**. This is to account for physical and virtual test data.

"Off": When set to Off there will be no modifier set allowing "Lower Leg" to be scored along with the other body regions. Total % is the minimum of the Band % and the Points are scored accordingly. The user should use this setting if either they have physical test data input or want to get an understanding of how the Lower Leg is behaving.

The REPORTER template will default the "Lower Leg Exceedance" Modifier as "Off" since this is the most flexible option and gives the most insight into how the model is behaving.

See Example 1 below: Set to "Off"

Euro NCAP Front Sled Validation 1

2026

Simulation Results

Occupant	Body Region	Criterion	Value	HPL	LPL	Cap. Limit	Band %	Total %	Mod. %	Modified	Points	Occupant Points
Driver	Head & Neck	HIC	133.43	500	700	-	100	100	0	100	0.3125	1.0000 / 1.2500
		Resultant 3ms Acc.	38.68	72.0	80.0	-	100					
		Neck Shear	-1.31	-1.90	-3.10	-	100					
		Neck Tension	1.53	2.70	3.30	-	100					
		Neck Extension	-15.78	-42.0	-57.0	-	100					
	Chest	Compression	30.56	20.0	42.0	-	40	40	0	40	0.1250	
		Viscous Criterion	0.12	0.50	1.00	-	100					
	Knee, Femur & Pelvis	Left Femur	1.39	3.80	9.10	-	100	100	0	100	0.3125	
		Left Knee[1]	2.09	6.00	15.00	-	100					
		Right Femur	2.07	3.80	9.10	-	100	100	0			
		Right Knee[1]	0.80	6.00	15.00	-	100					
	Lower Leg	Left Compression	2.97	2.00	8.00	-	80	80	0	80	0.2500	
		Left Upper Tibia Index	0.43	0.40	1.30	-	80					
		Left Lower Tibia Index	0.32	0.40	1.30	-	100					
		Right Compression	2.66	2.00	8.00	-	80					
		Right Upper Tibia Index	0.35	0.40	1.30	-	100					
		Right Lower Tibia Index	0.19	0.40	1.30	-	100					

[1] Knee Scores are not applicable for virtual tests

The report is currently showing Load Case Points

"Yes": When set to Yes the modifier value will be set to -100% resulting in "Lower Leg" to be scored as **0 Points**. This setting should be used if the physical test data <u>has exceeded</u> the LPL for Tibia index or Tibia force.

See Example 2 below: set to "Yes"

Euro NCAP Front Sled Validation 1

2026

Simulation Results

Occupant	Body Region	Criterion	Value	HPL	LPL	Cap. Limit	Band %	Total %	Mod. %	Modified	Points	Occupant Points
Driver	Head & Neck	HIC	133.43	500	700	-	100	100	0	100	0.3125	0.7500 / 1.2500
		Resultant 3ms Acc.	38.68	72.0	80.0	-	100					
		Neck Shear	-1.31	-1.90	-3.10	-	100					
		Neck Tension	1.53	2.70	3.30	-	100					
		Neck Extension	-15.78	-42.0	-57.0	-	100					
	Chest	Compression	30.56	20.0	42.0	-	40	40	0	40	0.1250	
		Viscous Criterion	0.12	0.50	1.00	-	100					
	Knee, Femur & Pelvis	Left Femur	1.39	3.80	9.10	-	100	100	0	100	0.3125	
		Left Knee[1]	2.09	6.00	15.00	-	100					
		Right Femur	2.07	3.80	9.10	-	100	100	0			
		Right Knee[1]	0.80	6.00	15.00	-	100					
	Lower Leg	Left Compression	2.97	2.00	8.00	-	80	80	-100	0	0.0000	
		Left Upper Tibia Index	0.43	0.40	1.30	-	80					
		Left Lower Tibia Index	0.32	0.40	1.30	-	100					
		Right Compression	2.66	2.00	8.00	-	80					
		Right Upper Tibia Index	0.35	0.40	1.30	-	100					
		Right Lower Tibia Index	0.19	0.40	1.30	-	100					

[1] Knee Scores are not applicable for virtual tests

The report is currently showing Load Case Points

"No": When set to No the Modifier value will be set to +100% resulting in "Lower Leg" to be scored as the **Maximum Points**. This setting should be used if the physical test dummy <u>has not</u> exceeded the LPL for Tibia index or Tibia force.

See Example 3 below: Set to "No"

Euro NCAP Front Sled Validation 1

2026

Simulation Results

Occupant	Body Region	Criterion	Value	HPL	LPL	Cap. Limit	Band %	Total %	Mod. %	Modified	Points	Occupant Points
Driver	Head & Neck	HIC	133.43	500	700	-	100	100	0	100	0.3125	1.0625 / 1.2500
		Resultant 3ms Acc.	38.68	72.0	80.0	-	100					
		Neck Shear	-1.31	-1.90	-3.10	-	100					
		Neck Tension	1.53	2.70	3.30	-	100					
		Neck Extension	-15.78	-42.0	-57.0	-	100					
	Chest	Compression	30.56	20.0	42.0	-	40	40	0	40	0.1250	
		Viscous Criterion	0.12	0.50	1.00	-	100					
	Knee, Femur & Pelvis	Left Femur	1.39	3.80	9.10	-	100	100	0	100	0.3125	
		Left Knee[1]	2.09	6.00	15.00	-	100					
		Right Femur	2.07	3.80	9.10	-	100	100	0			
		Right Knee[1]	0.80	6.00	15.00	-	100					
	Lower Leg	Left Compression	2.97	2.00	8.00	-	80	80	100	100	0.3125	
		Left Upper Tibia Index	0.43	0.40	1.30	-	80					
		Left Lower Tibia Index	0.32	0.40	1.30	-	100					
		Right Compression	2.66	2.00	8.00	-	80					
		Right Upper Tibia Index	0.35	0.40	1.30	-	100					
		Right Lower Tibia Index	0.19	0.40	1.30	-	100					

[1] **Knee Scores are not applicable for virtual tests**

The report is currently showing Load Case Points

5. Changelog

This section was imported from CHANGELOG.zip.

This section contains:

5.1. Version 22.1 Update

Version 22.1 Update

This section lists all the changes made to **Workflows** since the Oasys 22.0 release.

Automotive Assessments

Enhancements

1. M23-181 - Renamed WSID 50M dummy supplier from "PDB" to "DYNAmore-PDB" to make it clearer that the dummy is from DYNAmore and co-developed with the PDB consortium.
2. M23-377 - Support for HIII 5F Knee Displacement has been added.
3. M23-595 - Acceleration curves from LS-DYNA results can be derived by differentiating velocity curves (instead of raw acceleration output) by ticking the "Use dv/dt" option in PRIMER Automotive Assessments before saving user data.
4. M23-596 - Added support to locate and load femzip files in REPORTER templates when original D3PLOT results files have been deleted.
5. M23-671 - When the Occupant window is open, the main window is now inactive to prevent an invalid state if the user interacts with the main window while the occupant window is open.
6. M23-199 - Entity Picker "Select By SET_PART..." now works for SET_COLLECT.
7. M23-1309 - The file selector now defaults to the model's directory when saving workflow JSON data in PRIMER.
8. M23-1503 - Changed scoring value for WS dummy LOWER_NECK_EXTENSION to use Abs(Min) instead Max(Abs). Also renamed parameter from "Max" → "Abs(Min)" to clarify the new behaviour.
9. M23-1544 - The main window is now hidden when opening occupants and structures windows to reduce screen clutter and make it easier to pick entities from the model window.

Bug fixes

1. M23-457 - Fix the components definition of chest and abdomen ribs deflection transducer(springs) in Humanetics SID IIs SBLD v.4.3.5.json, and keep consistant with other versions.
2. M23-458 - Corrected occupant JSON for HIII dummies so that chest rotation is correctly calculated (in some cases the ISO code for the rotational spring was "DSX" but should have been "AN0")
3. M23-460 - Automotive Assessments REPORTER templates which require an input test file used to only accept lower case file extensions (e.g. ".mme", ".chn", ".csv").

This limitation has been addressed and case insensitive file extension matching is now used.
4. M23-478 - Corrected Euro NCAP Far Side Sled 2024 AC limits for Lumbar Shear and Axial Force which were incorrectly swapped.
5. M23-752 - Fix inconsistent colours incrementing for structures curves when not all Assessment Types are selected in T/HIS.
6. M23-381 - Modified the constants in the polynomial and linear equations for the calculation of chest compression in the Humanetics HIII 95M Dummy so that compression is positive, expansion is negative, and that both functions produce an output that has the same sign.
7. M23-1287 - Fixed issue where if the protocol version combobox selection would default to the first version when loading multiple the workflow with multiple models.
8. Now able to Sketch parts from entity selector popup
9. M23-1561 - Corrected Humanetics THOR 50M v1.9.2 C-NCAP.json occupant definition to use THOR3 (i.e. THOR + H3 Legs) product rather than THOR product.
10. M23-1561 - Changed driver from THOR to THOR3 for CNCAP MPDB 2024 protocol.

Protocols

Newly supported

1. Euro NCAP Front Sled Robustness 1 2026
2. Euro NCAP Front Sled Robustness 2 2026
3. Euro NCAP Front Sled Robustness 3 2026
4. Euro NCAP Front Sled Validation 1 2026
5. Euro NCAP Front Sled Validation 2 2026
6. Euro NCAP Front FWDB 2026
7. CNCAP FRB 2024
8. CNCAP MDB 2024
9. CNCAP MPDB 2024 (Addition of Rear Occupants)
10. M23-259: CNCAP Far Side 2024 CNCAP Official Format Template (including O2O)
11. M23-925: CNCAP Front AEB OOP CNCAP Official Format Template

VTC Quality Criteria

Enhancements

1. O22-1533 - H-point displacement graph: Increased y-axis to +-12 so it appears on the axis units (before it would stop at 8 and make it unclear where the red datum starts).
2. O22-1532 - Percentage added mass and Hourglass/Internal graphs: Y-axis minimum fixed to zero on graph rather than auto.

3. O22-1531 - Head Displacement - A cross is given on the time of end of simulation, like it does for the max displacement point.
4. O22-1529 - Added 'Time of' in the title for Time of Maximum Head ? Displacement + 20% < Simulation .
5. O22-1524 - Added reset graphs button on the results window.
6. O22-1528 - Added column on results window with units.
7. O22-1525 - Added graph number to results window to make it clear which result is on what graph.
8. O22-1523 - Changed .toPrecision(5) to .toPrecision(8) to reduce likelihood of scientific numbers.
9. O22-1516 - Adding more hover texts to inputs in PRIMER.
10. Improved curve labels when they are manipulated with different unit systems.
11. O22-1526 - Labels added for relevant ymin/ymax values. Labels added for Datums. These can be turned off with respective buttons, to turn them back on, press the new reset graphs button.
12. Added CNCAP O2O (dual occupant) load case.
13. Added CNCAP Front AEB OOP load case.

Bug fixes

1. M23-1481 Fixed issue where Head Excursion check for Euro NCAP Frontal load case wasusing "Time of Max Y displacement + 20%" instead of "Time of Max X displacement + 40%".

VTC Videos

Enhancements

1. M23-185 - New textbox has been added in PRIMER GUI for Property Files Directory.
2. M23-187 - Example buttons added for all views, rather than a general help '?' button.
3. M23-498 - EuroNCAP inputs simplified, meaning less inputs are required and now modular with other protocols.
4. C-NCAP, EuroNCAP Frontal & EuroNCAP Far Side Workflows merged into one workflow called 'VTC Videos'. Added a dropdown box to change between protocols.
5. M23-499 - POST GUI redesigned for simplification and more help.
6. REPORTER Templates used to used reporter output location for property files, now REPORTER will use the Property files specified from the Property Directory from the Workflows saved data.
7. M23-1063 - Reintroduction of using three fixed reference nodes (shift deform) to hold vehicle in place, as well as keeping the option to just use 1 fixed reference node.

8. Added CNCAP O2O Protocol.
9. Added CNCAP Front AEB OOP load case.

Bug fixes

1. 1MB was being calculated as 1,000,000 bytes, now correctly calculated as 1,048,526 bytes which fixes issue where it would complain a video is over 10MB if it was slightly under it for Euro protocols.

LS-DYNA to ISO-MME

Enhancements

1. O22-1552 - Test name now populated with default name using automotive assessments crash test and version.
2. O22-1562 - Updated number of digit after decimal point to 2 for all mass values. Also added "Calculate Mass" button in PRIMER which calculates struct mass for the parts.
3. O22-1351 - Added support for frontal VTC protocol channels export, virtual testing ref ID and subtype of tests.
4. M23-581 - Mass calculation in T/HIS workflow for mass of different parts now works using d3hsp/otf file rather than relying on D3THDT.
5. M23-595 - Acceleration curves from LS-DYNA results can be derived by differentiating velocity curves (instead of raw acceleration output) by ticking the "Use dv/dt" option in PRIMER Automotive Assessments before saving user data.
6. M23-878 - Added a "Check mass" button which pop up a window to show mass information. This way we can avoid saving mass information in user data as we always needs to overwrite in T/HIS which always reports correct value from d3hsp/otf file.
7. M23-1480 - Added new inputs according to 2026 version and disabled the non-applicable ones. Also updated workflow to output the MME headers accordingly.

Bug fixes

1. O22-1561 - Corrected the timestep settings to report minimum timestep value rather than 100 smallest timestep.
2. O22-1560 - Removed functinality which gets platform name from d3hsp/otf as it was reporting platform on which LS-DYNA was built on rather than where analysis was ran. Platform name is now manual input in PRIMER workflow.
3. O22-1510 - Fixed extra slash for required output channel csv.
4. Fixed a bug where loading LS-DYNA to ISO-MME for first time when there is more than one model read in PRIMER, Test name was not getting updated.

SimVT

Enhancements

1. M23-595 - Acceleration curves from LS-DYNA results can be derived by differentiating velocity curves (instead of raw acceleration output) by ticking the "Use dv/dt" option in PRIMER Automotive Assessments before saving user data.
2. M23-228 - Added "Dynamic corridor visualisation" option to show corridor performance over time.
3. M23-240 - Added "Show time of poorest correlation" option.
4. M23-495 - Added "Show start of divergence" to highlight start time of divergence leading to poorest correlation.
5. M23-480 - Grouped options on SimVT - Plotting Controls panel.
6. M23-582 - Change what options are on and off by default on SimVT - Plotting Controls panel.
7. M23-238 - Added ability to overlay multiple model results on the same graph.
8. M23-223 - Added filters to score columns to SimVT Correlation Table.
9. M23-479 - Added Error graphs which are shown when correlations cannot be successfully completed.
10. M23-1349 - Improved performance when loading large number of channels in SimVT.
11. M23-251 - Head offset curves from CNCAP test video data can now be imported from CSV instead of derived from head acceleration angular velocities which could give inaccurate results.

Bug fixes

1. M23-1402 - Fixed issue where the sensor score was showing the score for the final sim vs test correlation when comparing multiple simulations against test.
2. M23-1560 - Corrected legend colour for simulation (red) and test curves (blue) in SimVT REPORTER templates.

Energy Check

Enhancements

1. Updated Y-axis autoscaling to include both warning curve and datum line for hourglass, contact and energy ratio graphs
2. Renamed "Tolerance" column to "Threshold"
3. Modified Energy Ratio row to display both upper and lower threshold values
4. Added Graph ID and Units columns to the table of results

Bug fixes

1. Fixed crash if Energy data was not present in model, instead displays helpful warning message.

REPORTER Templates

Additions

1. Euro NCAP Front Sled Robustness 1 2026 [EuroNCAP_Front_Sled_2026_robustness1.ort]
2. Euro NCAP Front Sled Robustness 2 2026 [EuroNCAP_Front_Sled_2026_robustness2.ort]
3. Euro NCAP Front Sled Robustness 3 2026 [EuroNCAP_Front_Sled_2026_robustness3.ort]
4. Euro NCAP Front Sled Validation 1 2026 [EuroNCAP_Front_Sled_2026_validation1.ort]
5. Euro NCAP Front Sled Validation 1 2026 KPI [EuroNCAP_Front_Sled_2026_validation1_KPI.ort]
6. Euro NCAP Front Sled Validation 2 2026 [EuroNCAP_Front_Sled_2026_validation2.ort]
7. Euro NCAP Front Sled Validation 2 2026 KPI [EuroNCAP_Front_Sled_2026_validation2_KPI.ort]
8. Euro NCAP Front FWDB 2026 [EuroNCAP_Front_FWDB_2026.ort]

Enhancements

1. M23-595 - Euro NCAP Virtual Far Side 2024 VC1 (ISO Scores) [EuroNCAP_Virtual_Far_Side_2024_VC1_ISO_Scores.ort] - Acceleration curves from LS-DYNA results are now derived by differentiating velocity curves in SimVT so the **HEAD00VEWSAC** ISO-MME channels are now redundant so have been removed.
2. M23-1480 - LS-DYNA to ISO-MME (lsdyna_to_isomme.ort) - Updated MME header table to be dynamic based on what headers is output in .mme file.

Bug Fixes

1. M23-595 - Euro NCAP Virtual Far Side 2024 VC1 (ISO Scores) [EuroNCAP_Virtual_Far_Side_2024_VC1_ISO_Scores.ort] - Changed scoring value for WS dummy LOWER_NECK_EXTENSION to use Abs(Min) instead Max(Abs).
2. M23-671 - Euro NCAP Virtual Far Side 2024 VC2 (Assessment Criteria) [EuroNCAP_Virtual_Far_Side_2024_VC2_Assessment_Criteria.ort] - Corrected typo of Upper Neck Compontent from Fx → Fz

General

Enhancements

1. M23-614 - Added support for .dyn keyword files in addition to .k and .key files. This is now supported in all workflows which prompt the user to select a keyword file.
2. M23-265 - Import Configuration window can be used to import additional channels from CSV. This allows users to add channels from other sources e.g. head excursion data from a physical test.

5.2. Version 22.0 Update

Version 22.0 Update

This section lists all the changes made to **Workflows** since the Oasys 21.1 release.

Automotive Assessments

Enhancements

1. O22-1050 - Changed the order of occupant versions so the most recent ones are at the top.
2. O22-1233 - Renamed "Shoulder Belt (B3)" structure to "Driver Shoulder Belt (B3)" to distinguish between the driver and passenger shoulder belt structures.
3. O22-1190 - Filter out occupant based on drive side. Occupants are filtered out based on the impact side and drive side of the vehicle. For example, if the drive side is LHD and impact side is on the passenger side (right) then the occupant with ribs on the RHS should only be selectable.
4. O22-1048 - Instructions and confirmation message added after saving user data to file or to model in all Workflows.
5. Red Zone head node question explained in more detail in relevant REPORTER Templates.
6. O22-706,1196 - Entity IDs that are defined but don't have a DATABASE_HISTORY_XXXX keyword defined are now shown with a latent cyan-colored textbox background. A window is now mapped when such entity IDs are selected or typed into the text box, giving users the option to create the corresponding DATABASE_HISTORY_XXXX keyword for them. It also provides an option to select the include file to which the keyword will be added.
7. O22-1210 - Some of the ISO channel codes have been updated in the Euro NCAP Far Side VTC v1.1 draft protocol. The ISO codes that have been changed are: LAP Belt (SEBE0003B6FO00 to SEBE0000B6FO00), Shoulder Belt (SEBE0003B3FO00 to SEBE0000B3FO00), Contact Dummy-Airbag (ARBG0000WSFOX/Y/Z to AIRB0000WSFOX/Y/Z), and Thoracic Spine 04 and 12 Displacements (THSP04/120000DCX/Y/Z0 to THSP04/1200WSDCX/Y/Z0). Backward compatibility support has also been added for the older ISO codes.
8. O22-1025 - The 'Far Side + VTC' and 'Far Side' crash tests have been renamed to 'Far Side Sled' for consistency. The version for the former 'Far Side + VTC' is now 2024, while the version for the former 'Far Side' crash test is 2022. The corresponding datum files for each test are now stored in their respective version folders. This change has been made to maintain consistency across our tools, and support for backward compatibility has also been added.
9. O22-701 - The term Physiology has been renamed to Anthropometry and support for backward compatibility has also been added.

10. O22-216 - "Harmonized" has been added to the version for the relevant Humanetics dummies. E.g., the name would now appear as Humanetics HIII 50M v1.5 (Harmonized). Support for backward compatibility and also been added for these dummies.
11. O22-1358 - Added IIHS Front SOB Impact 2024 with new fuel modifier.
12. O22-1364 - Added IIHS Side MDB Impact 2024 with new fuel modifier and updated head protection rating system.
13. O22-1365 - Added Euro NCAP MPDB 2024 (Occupant Assessment) with new DAMAGE modifier.
14. O22-556,1049,1140 - Added import configuration window (and CSV) to configure the units, polarity and scale when importing ISO-MME and CSV data.
15. O22-1419 - Added support for allowing users to select multiple contacts for contact structures.
16. O22-630,923 - Added "Time of first sample" input in PRIMER. This is used to ignore the pre-crash phase of the simulation by offsetting the curves in T/HIS so that the first sample is at the given "Time of first sample" and the curves are clipped at t=0.
17. O22-1439 - Curve data before t=0 is removed for imported data sources (e.g. ISO-MME data with "Time of first sample" set to a negative value). The assumption is that the data before t=0 is not relevant to the crash event.

Bug fixes

1. O22-1235 - Fixed issue where if there was no number/text in the node selection in the Occupant Window it would show SKETCH (NaN) and EDIT (NaN) in the popup menu. Now these two buttons are greyed out if this is the case.
2. C-NCAP REPORTER Templates have corrected page names.
3. O22-1171 - In REPORTER Templates with Sim and Test files, the Simulation will now run even if the Test data is invalid.
4. O22-1308 - Clicking the 'Select All Body Parts' or 'Deselect All Body Parts' button in T/HIS Automotive Assessments does not map or activate/deactivate the DRIVER_HEAD_EXCURSION user input widgets when a fresh session of the tool is opened. The tool used to throw an error if the user clicked on those buttons and then directly tried plotting the assessments. This issue applied only to the 'Far Side + VTC' crash test. It has now been fixed.
5. O22-1299 - B-Pillar Distance was returning different curves for simulation and test data, this is now fixed, using the coordinate values in both scenarios.
6. O22-1382 - Removed unused head excursion limit in C-NCAP Far Side CFA REPORTER Templates.

Protocols

Newly Supported

1. Global NCAP MDB 2022

2. Global NCAP ODB 2023
3. Global NCAP Side Pole 2024
4. JNCAP FFB 2023
5. JNCAP MDB 2023
6. JNCAP ODB 2023
7. KNCAP FFB 2023
8. KNCAP MDB 2023
9. KNCAP Side Pole 2023
10. UN ECE R135 (Side Pole) 2015
11. UN ECE R94 (ODB) 2022
12. UN ECE R95 (Side MDB) 2023
13. UN ECE R137 (FFB) 2023

Updated

1. Euro NCAP Front MPDB Impact 2024 Occupant Assessment
2. IIHS MDB 2024 (& Structure Only version)
3. IIHS SOB 2024 (& Structure Only version)

VTC Quality Criteria

Enhancements

1. C-NCAP REPORTER Template has added page names.
2. O22-1225 - Create *DATABASE_HISTORY_NODE question and auto generation added.
3. O22-1263 - Euro NCAP VTC Quality Criteria now does the Frontal protocol as well as Far Side.
4. O22-1663 - Euro NCAP HBM Frontal Quality Criteria added.

Bug fixes

1. Slider on the right hand side of the table that appears on hover is removed.

VTC Videos

Enhancements

1. O22-1225 - Create *DATABASE_HISTORY_NODE question and auto generation added.
2. If a PRIMER input was invalid, the users input would wipe, this is no longer the case and is stored to be consistent with other Workflow tools. (Latent colour still shows to show invalid input).

3. O22-1264 - End Time in the GUI now populated by model simulation end time rounded down to 3DP rather than model simulation end time minus 1 interval step.
4. O22-1387 - In Euro NCAP version you can set the target file size for the videos to satisfy the 1-10MB requirement.

Bug fixes

1. C-NCAP REPORTER Template has corrected page names.
2. O22-1247 - 'Parts to Blank' for Euro NCAP side view now correctly blanks requested parts.
3. When using Edit mode in REPORTER, the view no longer unblanks requested blank parts after pressing recalculate.

LS-DYNA to ISO-MME

Enhancements

1. O22-1209 - A new textbox has been added in the PRE and POST LS-DYNA to ISO-MME GUI to display the subtype of the test. The subtype is now automatically populated based on the Virtual Testing Ref ID, instead of being set to 'crash test' as it was before.
2. O22-632 - "Time of first sample" header is now set to the "Time of first sample" input in Automotive Assessments workflow PRIMER.
3. O22-1250 - Contact type is now give more information. In case of SURFACE_TO_SURFACE and NODE_TO_SURFACE it will use abbreviation S2S and N2S but for other type of contacts it will output the whole type.
4. O22-1443 - Since the updated Automotive Assessments workflow now supports the selection of multiple contact definitions, LS-DYNA to ISO-MME will now display "Multiple contact types SOFT=multiple FS=multiple" when different types of contact (SOFT and FS) are detected.

Bug fixes

1. O22-1348 - Corrected the format of subtype of test to exactly match with the protocol.
2. O22-1349 - Corrected the format of type of test to exactly match with the protocol.
3. O22-1324 - MME headers and their order should now match exactly to Euro NCAP format. Also all individual channel files should now show Test object number as 1 as per Euro NCAP requirement.
4. Fixed C-NCAP Side Pole Subtype of test which was coming undefined. Now it should come empty field as this protocol document doesn't have it.

5. O22-1455 - Missing data information panel from REPORTER template was not showing correct protocol for C-NCAP VTC protocols. Now it should show correct protocol according to Automotive Assessments user data.
6. Made LS-DYNA to ISO-MME workflow panel non-modal so you can interact with other parts of the program.

SimVT

Enhancements

1. O22-556,1049,1140 - Added import configuration window (and CSV) to configure the units, polarity and scale when importing ISO-MME and CSV data and changed imported data hover text to show IMPORT_CONFIG and UNITS (instead of UNIT_SYSTEM).
2. O22-1265 - Demoted ErrorMessage to WarningMessage when the user attempts to load a model with no AAWD data as it is possible to proceed without AAWD data by assigning CSV config data manually.
3. O22-225 and O22-569 - Exit confirmation message added when pressing 'x' on the GUI or escape on the keyboard.
4. O22-568 - Added new check box option to toggle visibility of corridors on/off.
5. O22-630,631 - New "time_of_first_sample" property in user data (Created with PRIMER Automotive Assessments Workflow) is used to ignore the pre-crash phase of the simulation by offsetting the curves in T/HIS so that the first sample is at the given "Time of first sample" and the curves are clipped at t=0.
6. O22-1439 - Curve data before t=0 is removed for imported data sources (e.g. ISO-MME data with "Time of first sample" set to a negative value). The assumption is that the data before t=0 is not relevant to the crash event.
7. O22-1469 - Change SimVT default regularisation from 100kHz to 10kHz when no protocol is selected - this significantly speeds up correlation (by more than a factor of 10).

Bug fixes

1. O22-272 - Fixed issue that occurred on 4k monitors where the correlation setup window was not resized correctly so the channel table scroll bar was not visible without increasing the window width manually.
2. O22-1258 - When loading SimVT all existing graphs would be cleared even if the user selected "Cancel" on the "SimVT Initialisation" window. This fix ensures that the graphs are only cleared if the user selects "OK" on the "SimVT Initialisation" window.
3. O22-1266 - Fixed bug where SimVT would attempt to read the model tag as a new LS-DYNA model when an existing LS-DYNA model without AAWD was selected in the model mapping window. This also meant that the CSV config data would not be assigned.

T/HIS CORA

Enhancements

1. O22-763 - Made the script being run by CORA in the Automotive panel point to the version in workflows scripts directory instead of the this_library scripts directory.

Euro NCAP Virtual Far Side 2024 VC1 (ISO Scores)

Enhancements

1. O22-1412 - Changed "PASS" to "Pass" and "FAIL" to "Fail" as capitalising only the first letter is more consistent with what we do in other templates.

Bug Fixes

1. O22-758 - Fixed bug where if an invalid input was entered from a SimVT settings file on the REPORTER Inputs window then it would not highlight red unless you hovered over the textbox.

CNCAP_Far_Side_Protocol_2024_WorkingConditions1to6_EN

Enhancements

1. O22-1350 - Display the user-selected working condition number as a variable in the template header and total score
2. O22-1333 - Merged first column cells

Bug Fixes

1. O22-1328 - Correct typo of "Individual" on summary page.

CNCAP_Far_Side_Protocol_2024_WorkingConditions1to6_withCFA_EN

Enhancements

1. O22-1350 - Display the user-selected working condition number as a variable in the template header and total score
2. O22-1333 - Merged first column cells

Bug Fixes

1. O22-1328 - Correct typo of "Individual" on summary page.

CNCAP_Far_Side_Protocol_2024_WorkingConditions7to8_EN

Enhancements

1. O22-1350 - Display the user-selected working condition number as a variable in the template header and total score
2. O22-1333 - Merged first column cells

CNCAP_Far_Side_Protocol_2024_WorkingConditions7to8_withCFA_EN

Enhancements

1. O22-1350 - Display the user-selected working condition number as a variable in the template header and total score
2. O22-1333 - Merged first column cells

CNCAP_Side_Pole_Protocol_2024_WSID_Driver_ES2re_Passenger_EN

Enhancements

1. O22-1412 - Changed "PASS" to "Pass" and "FAIL" to "Fail" as capitalising only the first letter is more consistent with what we do in other templates.
2. O22-1333 - Added conditional formatting to Pass/Fail column and merged table cells for visual clarity.

Bug Fixes

1. O22-1373 - Add missing subjective modifier to C-NCAP Side Pole Templates, which is seat belt failure counting as -1 point. See 1.2.1.4.5 of C-NCAP Regulation 2024
2. O22-1392 - Fix labels marked "Side" instead of "Side Pole" for all C-NCAP 2024 Side Pole protocol templates
3. O22-1405 - Add borders to C-NCAP 2024 Side Pole Protocol for EN and CN templates to make edges of table align with each other in final report
4. O22-1407 - Swap Side Pole EN exceed type low limit with high limit

CNCAP_Side_Pole_Protocol_2024_WSID_Driver_WSID_Passenger_EN

Enhancements

1. O22-1412 - Changed "PASS" to "Pass" and "FAIL" to "Fail" as capitalising only the first letter is more consistent with what we do in other templates.
2. O22-1333 - Added conditional formatting to Pass/Fail column and merged table cells for visual clarity.

Bug Fixes

1. O22-1373 - Add missing subjective modifier to C-NCAP Side Pole Templates, which is seat belt failure counting as -1 point. See 1.2.1.4.5 of C-NCAP Regulation 2024
2. O22-1392 - Fix labels marked "Side" instead of "Side Pole" for all C-NCAP 2024 Side Pole protocol templates
3. O22-1405 - Add borders to C-NCAP 2024 Side Pole Protocol for EN and CN templates to make edges of table align with each other in final report
4. O22-1407 - Swap Side Pole EN exceed type low limit with high limit

All C-NCAP 2024 Far Side Templates including Side Pole in both English and Chinese languages

Enhancements

1. O22-1375 - Changed all C-NCAP 2024 Far Side related templates (both EN and CN language 17x2, including all 2x2 Side Pole ones) fonts from "Microsoft YaHei" to "Microsoft YaHei UI"

All CNCAP Far Side Protocol 2024 Dual Occupant Penalty EN templates

Enhancements

1. O22-1333 - Added conditional formatting and merge cells for EN version of CN templates
2. O22-1393 - Add "Far Side" impact label for Dual Occupant Penalty 2024 templates (missing items)

All C-NCAP 2022-2023 Front MPDB Templates

Enhancements

1. O22-1375 - Change Template fonts from "Microsoft YaHei" To "Microsoft YaHei UI"

All C-NCAP 2024 Far Side Protocol Templates

Enhancements

1. O22-1391 - Add new TAGs specific to Far Side Protocol's 3 different categories of score rating to guide user through the whole process more easily.

All C-NCAP 2024 Dual Occupant templates

Bug Fixes

1. O22-1406 - Fix all TAGs by removing "MDB" or "Side Pole"

Pulse Index

Enhancements

1. O22-941 - Removed mass input and normalised for a unit mass instead
2. O22-942 - Exposed filtering options and allowed for user selection
3. O22-943 - Added an option to use a differentiated velocity curve in place of the acceleration curve
4. O22-955 - Added a time period display to the GUI

5. O22-956 - Allowed for saved user inputs to be read and populated in PRIMER, similar to in T/HIS
6. O22-992 - Allowed tool to be used with default values in T/HIS without first going through PRIMER
7. O22-991 - Added additional hover text to GUI components
8. O22-993 - Improved error message clarity

Bug Fixes

1. O22-944 - Corrected curve indices in T/HIS such that they are sequential
2. O22-994 - Corrected minor errors in some GUI labels
3. O22-995 - Changed the default stiffness to a realistic value
4. O22-1012 - Corrected the condition for the pulse index location exception
5. O22-1013 - Prevented the -1 factored acceleration curve from being displayed on the incorrect charts

CFA from C-NCAP 2024 Far Side Protocol

Bug Fixes

1. O22-1446 - Corrected CFA calculation such that CFA = test_score / sim_score

Curve to ISO-MME workflow tool added

The new Curve to ISO-MME workflow tool enables you to export T/HIS curves in ISO-MME data format without the need of config file. See Curve to ISO-MME section in the documentation for more information.

Eroded Elements

Bug Fixes

1. Fixed edge case: If workflow model is not found in any window, script now exits automatically.
2. Fixed edge case: If workflow model is found in more than 1 window, a warning message is now issued.

Strength Check

Bug Fixes

1. Fixed edge case: If workflow model is not found in any window, script now exits automatically.
2. Fixed edge case: If workflow model is found in more than 1 window, script now exits automatically.

5.3. Version 21.1 Update

Version 21.1 Update

This section lists all the changes made to **Workflows** since Version 21.0 W1 (Workflows Update 1) release.

Automotive Assessments

Enhancements

1. The following standard templates in the OA_INSTALL/reporter_library/templates folder have been replaced with templates that use data saved from the Automotive Assessment workflow.

- IIHS
  - Front ODB Impact 2021
  - Front ODB Impact 2021 - Structure Only
  - Front SOB Impact 2021
  - Front SOB Impact 2021 - Structure Only
  - Side MDB Impact 2021
  - Side MDB Impact 2021 - Structure Only
- USNCAP
  - Front FFB Impact 2015
  - Side MDB Impact 2015
  - Side Pole Impact 2015

2. Inputs added to dummies required in the C-NCAP Virtual Testing Protocol
3. Added Head Offset calculation for C-NCAP Virtual Testing Protocol.
4. Added C-NCAP Side Pole Protocol along with its REPORTER templates
   - C-NCAP Side Pole Protocol 2024 (WSID Driver, ES-2re Passenger)
   - C-NCAP Side Pole Protocol 2024 (WSID Driver, WSID Passenger)
5. Added C-NCAP Far Side (+VTC) Protocol which comes with the following REPORTER Templates:
   - CNCAP Far Side Protocol 2024 Working Conditions 1-6 with Correction Factor A
   - CNCAP Far Side Protocol 2024 Working Conditions 1-6
   - CNCAP Far Side Protocol 2024 Working Conditions 7-8 with Correction Factor A
   - CNCAP Far Side Protocol 2024 Working Conditions 7-8
   - CNCAP Far Side Protocol 2024 Dual-Occupant Penalty (WSID Passenger)
   - CNCAP Far Side Protocol 2024 Dual-Occupant Penalty (WSID Driver)
   - CNCAP Far Side Protocol 2024 Dual-Occupant Penalty (ES-2re Passenger)
   - CNCAP Far Side Protocol 2024 Dual-Occupant Penalty (ES-2re Driver)
   - CNCAP Far Side Protocol 2024 Summary

Bug fixes

1. The DRIVER_HEAD_EXCURSION/HEAD_OFFSET curve may have been incorrect previously due to the following issue, which has now been addressed. Inputs to DRIVER_HEAD_EXCURSION/HEAD_OFFSET (i.e., acc x, acc y, acc z, ang vel x, ang vel y, and ang vel z) are now regularized to ensure consistent x-axis intervals. Afterwards, if the inputs are not of the same length (number of points), they are adjusted to match the minimum number of points among all input curves.
2. When editing multiple parts via the entity selector popup, a window would appear which would incorrectly say the next part to edit was the part ID that was just edited. This has been correct to show the next part ID.
3. When sketching entities via the entity selector popup previous sketches would persist if the entity type was different. This has been corrected so that everything is un-sketched before sketching a new entity.
4. The warning 'Dummy type xxx not supported in calculate_red_and_orange_lines' was being printed unnecessarily in T/HIS Automotive Assessments and is only relevant to the DRIVER_HEAD_EXCURSION assessment type. This issue has now been fixed.
5. The scaling to convert energy curves to Joules was incorrectly multiplying by the converison factor when it should have been dividing by it. This has been corrected.
6. If the model unit system and display unit system were set T/HIS would automatically scale curves to the display unit system and they would be scaled a second time by the conversion logic. To prevent this double scaling, the model unit system is unset before reading in new curves
7. Abdomen Force for ES2-re dummy was using the wrong sign convention so compressive force was negative. This has been fixed and now compressive force is positive.
8. REPORTER would freeze if it tried to write report outputs (images, curves etc.) with a file name that was too long for the Microsoft Windows operating system. This has been fixed by checking if files can be written safely before attempting to write them.

C-NCAP VTC Quality Criteria Tool Added

C-NCAP VTC Videos Tool Added

Ansys LS-DYNA to ISO-MME

Enhancements

1. Updated the tool to work with C-NCAP Far Side + VTC and Side Pole as per C-NCAP regulation.

2. Added Automotive assessments user data Crash test, Regulation and Version to show so user know for what protocol they are doing the export.

Bug fixes

1. Slightly shifted the custom date text box so it doesn't come on top of second radio button.
2. Changed the red colour for required inputs so that it matches with other workflows.
3. Removed default inputs for customer name, ref number and project ref number as it was saying EuroNCAP by default.
4. Now we report FS not FD. And I have changed text that said "nu" to "FS" now. We also now show "FD" and "DC" if DC is present as FD matters only if DC is present.

SimVT

Enhancements

1. The text next to the Graph options checkboxes can be clicked on to toggle the checkbox.
2. Added hover text to ratings widgets to explain colors
3. Added hover text to sensor score widgets to explain how the score is calculated and if any data was missing which prevented it from being calculated
4. Added hover text to the weight widgets to explain how the weight is calculated and to show the maximum amplitude of the signal which is used in the "MAGNITUDE" method.
5. The ratings for monitored channels are now distinguished by using paler shades of green for pass and red for fail. The sensor score hover text also clarifies if the sensor is mandatory or monitored.
6. The sensor scores for channels which are not required by the protocol (i.e. not monitored or mandatory) are no longer weighted as they do not have a pass/fail threshold and the weighting is not applicable. The ratings for such channels are coloured according to the ISO bands (excellent, good, fair, poor, bad).
7. Added C-NCAP Virtual Testing protocol options and the corresponding SimVT REPORTER templates:
    - C-NCAP Virtual Testing Protocol 2024 Working Conditions 1-6 SimVT
    - C-NCAP Virtual Testing Protocol 2024 Working Conditions 7-8 SimVT
    - C-NCAP Virtual Testing Protocol 2024 Virtual Assessment Certificate (WSID Driver, WSID Passenger)
    - C-NCAP Virtual Testing Protocol 2024 Virtual Assessment Certificate (WSID Driver, ES-2re Passenger)
8. Added logic to automatically set the protocol option if it can be determined from the Automotive Assessments User Data from a selected Ansys LS-DYNA model. If not, it defaults "None (manual configuration)".

9. Head Excursion Offset added for C-NCAP Virtual Testing Protocol 2024 Working Conditions 1-8.
10. Added hover text to protocol options so that the full name of the protocol option can be read when the name is too long for the selection box.

Bug fixes

1. Fixed bug where the Ansys LS-DYNA models would not be found if relative paths were used when running the SimVT REPORTER templates in batch.
2. The HEAD_EXCURSION/HEAD_OFFSET curve may have been incorrect previously due to the following issue, which has now been addressed. Inputs to HEAD_EXCURSION/HEAD_OFFSET (i.e., acc x, acc y, acc z, ang vel x, ang vel y, and ang vel z) are now regularized to ensure consistent x-axis intervals. Afterwards, if the inputs are not of the same length (number of points), they are adjusted to match the minimum number of points among all input curves.
3. Hover text for plot corridor and correlation graph options has been removed as it was incorrect.
4. The scaling to convert energy curves to Joules was incorrectly multiplying by the converison factor when it should have been dividing by it. This has been corrected.
5. If the model unit system and display unit system were set T/HIS would automatically scale curves to the display unit system and they would be scaled a second time by the conversion logic. To prevent this double scaling, the model unit system is unset before reading in new curves
6. When loading a SimVT settings file, the max and min evaluation intervals were being overwritten by the defaults of the correlation method specified by the selected protocol. This has been fixed so that the values defined in the SimVT settings file take precedence.

T/HIS CORA

Enhancements

1. Support for the ISO/TS 18571:2024 correlation method has been added.

Bug Fixes

1. The CORA and ISO-18571 tutorial has been updated to reflect changes to the CORA module as it was out of date and contained incorrect information.

EuroNCAP Virtual Far Side 2024 VC2 Assessment Criteria Template

Bug Fixes

1. Max chest score when head is in the brown zone is corrected to 0 (was 2)

Euro NCAP Virtual Far Side 2024 VC1 (ISO Scores)

Enhancements

1. The summary page now shows the weights of each channel rather than the maximum signal magnitude

Bug Fixes

1. The operations from SimVT settings files were not being applied as intended. This has been fixed.

Pulse Index

Bug Fixes

1. Default value of Restraint stiffness was incorrect previously (was 2000 N/m). It is now corrected to 160,000 N/m, which results in the k/m ratio of 2000 s^{-1}.

5.4. Version 21.0 W1 (Workflows Update 1)

Version 21.0 W1 (Workflows Update 1)

This section lists all the changes made to **Virtual Testing** Workflows since Version 21.0 release.

Automotive Assessments

Enhancements

1. All the Structure channels which take PARTs as input in the Far Side + VTC crash test now have a single entity selection textbox. This means you only have to select entity IDs once for such channels and eliminates the need to perform the same repetitive selection multiple times.
2. Graphs for failed occupant assessments (e.g. missing channel data) are now displayed with a helpful title explaining that there was no output for that particular assessment.
3. Structure assessments can now be plotted for imported data (e.g. ISO-MME or CSV). The structures are derived from ISO-MME channel data (by matching channel codes to Structure names).
4. When clicking EDIT for a entity textbox that contains a list of parts, the Edit window will appear for each part successively after clicking Yes on a window that asks if you want to keep editing (previously only the first part was shown).
5. Removed restriction of suppliers to just the supported list: ATD-MODELS, DYNAmore, Humanetics, LSTC, PDB. Users can now define their own custom supplier name.
6. Added a new Euro NCAP Virtual Far Side VC2 (Assessment Criteria) REPORTER template for Validation Criterion 2.
7. Added Head Excursion assessment type for Far Side + VTC crash test.
8. Added support for the Validation Criterion 2 ratio calculation and included the results in the T/HIS results table.

Bug fixes

1. Made Clutch pedal an optional input for Automotive Assessment REPORTER templates. You are no longer prompted for missing Clutch Pedal input data.
2. Fixed an issue where selecting an entity with a comma in the title would be incorrectly considered invalid as commas were assumed to only be in part lists.
3. Fixed an issue where Occupant assessment graphs with no curves were deleted which meant that all subsequent assessments failed as they referenced a non-existent graph ID.
4. Fixed an issue where CSV data could not be imported.

5. In PRIMER, if an entity textbox contained a heading (or database history title) string that started with a number, the corresponding entity ID was incorrectly taken as the leading number characters which would lead to the incorrect entity being edited/sketched or a "does not exist" warning. Now fixed.
6. Fixed an issue where a capping limit asterisk was incorrectly being appended to the Euro NCAP MDB Shoulder Lateral Force assessment score when the limit had not been exceeded.

Euro NCAP VTC Quality Criteria

Enhancements

1. Results generation is now significantly faster.
2. Entity selection improved to match Automotive Assessment methods and allows DATABASE_HISTORY headings as well as IDs.
3. The PRIMER GUI is now automatically pre-populated with any data found from Automotive Assessments.
4. For 10% Max Internal vs Hourglass curves, the Internal Energy curve is removed from the graph (if test is a pass) so that the critical Hourglass Energy curve is shown in more detail.

Euro NCAP VTC Videos

Enhancements

1. Entity selection improved to match Automotive Assessment methods and allows DATABASE_HISTORY headings as well as IDs.
2. The PRIMER GUI is now automatically pre-populated with any data found from Automotive Assessments.
3. The three Shift Deform reference nodes have been changed to one Fixed reference node.
4. An Output Interval option has been added in PRIMER that sets the *DATABASE_BINARY_D3PLOT DT field to ensure output interval is 2 ms or less.
5. Added simulation start, interval and end time options to give more control over video export.
6. File size visibility added to the REPORTER Template so you don't have to search through your file system to check.
7. Euro NCAP Cut Section view now uses true thickness rather than fixed fixness.
8. New option added in PRIMER to allow you to blank parts such as the windscreen during video export.

Bug fixes

1. The Cut Section view is now normal to the x-axis.

Ansys LS-DYNA to ISO-MME

Enhancements

1. When writing out user data, the default Required output channel csv path is now written out using $OA_WORKFLOW to make the user data more portable across different machines.

SimVT

Enhancements

1. The new, recently published ISO/TS 18571:2024 method replaces ISO/TS 18571:Euro NCAP v1.0.
2. The Correlation Setup window layout has been changed to landscape with a larger, clearer and more informative Channels Table.
3. Evaluation intervals can be controlled individually for each Sim vs Test model pair.
4. A Weight column has been added to Correlation Table window.
5. Channel selection from search improved. e.g. search for HEAD, select all, search for LUSP, select all.
6. Reverse button added to channel selection.
7. Evaluation interval from Head Excursion calculation is automatically applied to relevant Sim vs Test model pair.
8. Added support for multiple channel matching rules for same subject.
9. Added a derived channels counter to model hover text.
10. Updated the Protocol explainer text.
11. Improved the Channel Table update time.
12. Added ability to load new Ansys LS-DYNA models in to T/HIS from SimVT
13. Added functionality that enables SimVT to check if a new Ansys LS-DYNA model has associated Automotive Assessments Workflow Data (AAWD) and to assign AAWD to the new model.
14. Added checkboxes to the Model Mapping window so that only the selected rows will be loaded from the SimVT settings file.
15. Added labels to the Model Mapping window to make it clearer which entries correspond to "Reference (test)" and "Simulation(s)".
16. The Protocol option now defaults to "Euro NCAP Virtual Far Side v1.0" when SimVT is loaded as most users are expected to use SimVT for the Euro NCAP Far Side Validation Criterion 1 check.

Bug fixes

1. The "Save SimVT settings" button is now disabled when no channels are selected, removing the possibility of saving invalid SimVT settings files.
2. Fixed an issue where Protocol change did not update model tag channels counter.
3. Fixed an issue where evaluation intervals saved to a SimVT settings file were not validated during reload.
4. Fixed an issue where ISO-MME or CSV data file was interpreted as an Ansys LS-DYNA model path if it was in the same directory as an existing Model in T/HIS.
5. The number of channels shown in brackets after the "Ansys LS-DYNA model" and "Imported Data" sources was not updated correctly when the Protocol option was selected. This has been fixed and more information is shown in data source hover text too.

T/HIS CORA

Enhancements

1. The new, recently published ISO/TS 18571:2024 method replaces ISO/TS 18571:Euro NCAP v1.0.
2. Updated the T/HIS CORA tutorial to reflect the latest changes.

Bug fixes

1. Fixed an issue where CSV export would omit some column titles.