

# D3PLOT 22.0

# D3PLOT 22.0 – Contents

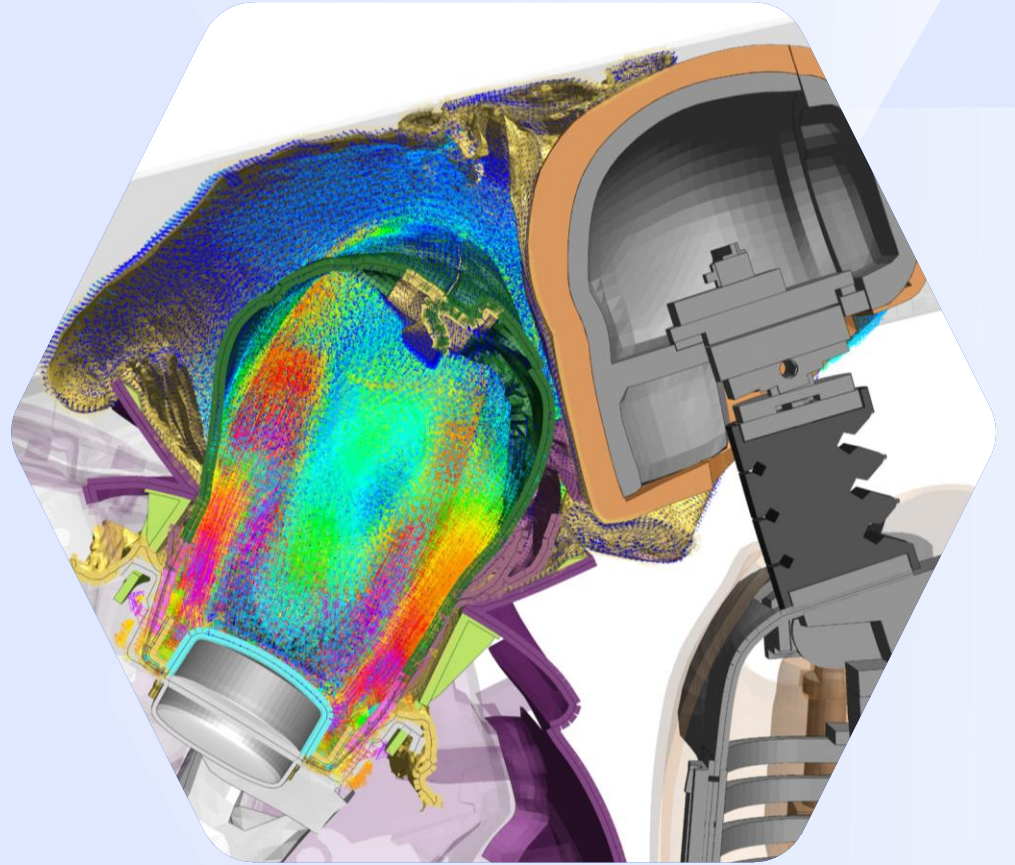
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# Complete Ansys LS-DYNA Support

# Airbags

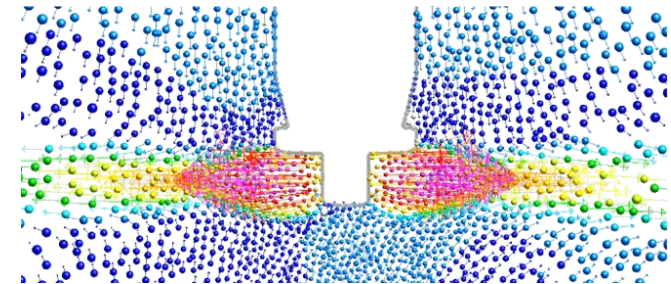
# Support for \*AIRBAG\_CPG

A New Airbag Gas Solver



# Support for Continuum-based Particle Gas (CPG)

- CPG is a new continuum-based particle approach for airbag simulations, available from Ansys LS-DYNA 2025R1 (R16).
- As a fully functional fluid solver, CPG is more effective at simulating gas flow than the corpuscular particle method (CPM), and more capable at internal fluid-structure interaction than ALE.
- Key features:
  - Compressible Navier-Stokes solver coupled with an ideal gas equation of state.
  - Meshless by design, based on a generalized finite-difference scheme.
  - Particle cloud fills airbag volume, gas passes from particle to particle (Eulerian approach).
  - Particles added or removed only when necessary.
  - Excellent accuracy, robustness & scalability to hundreds of cores.
- Designed for airbag simulation, validated by airbag CAE engineers:
  - Simple \*AIRBAG\_CPG keyword format that copies other \*AIRBAG\_ types. Same input data for inflators, fabric, etc.
  - First release supports internal structures, simple venting, fabric porosity, multiple gases/orifices/inflators, moving environment, local particle refinement, and more.
  - Inviscid with free-slip boundary by default, although viscosity and wall friction available.
- CPG is destined to take airbag simulation to the next level required for virtual testing, however accurate input data and well folded models are also vital to achieve useful results.



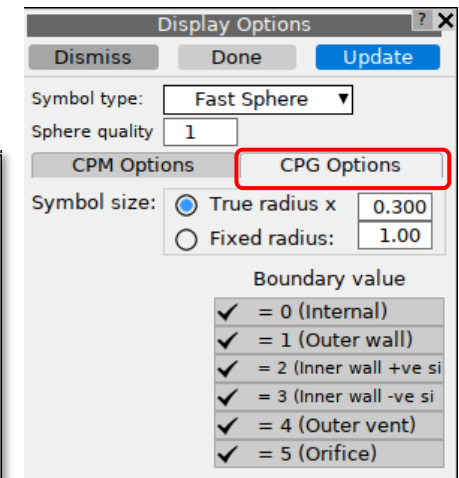
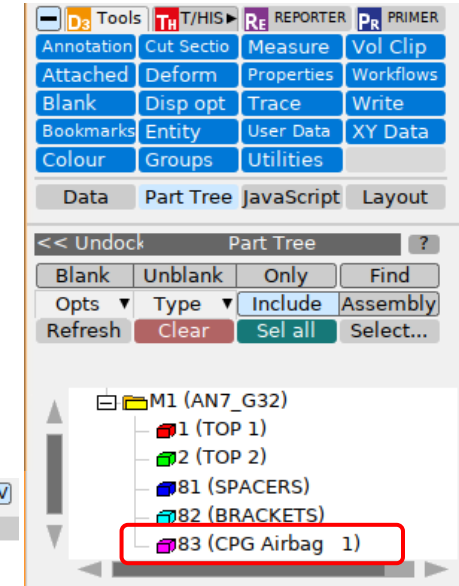
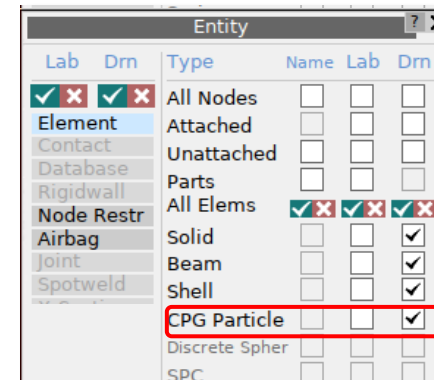
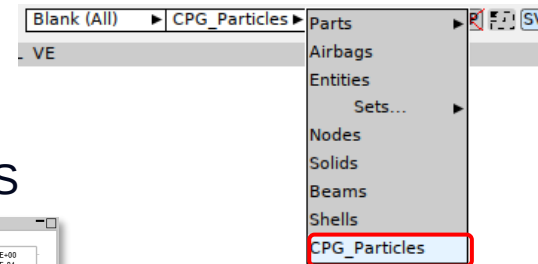
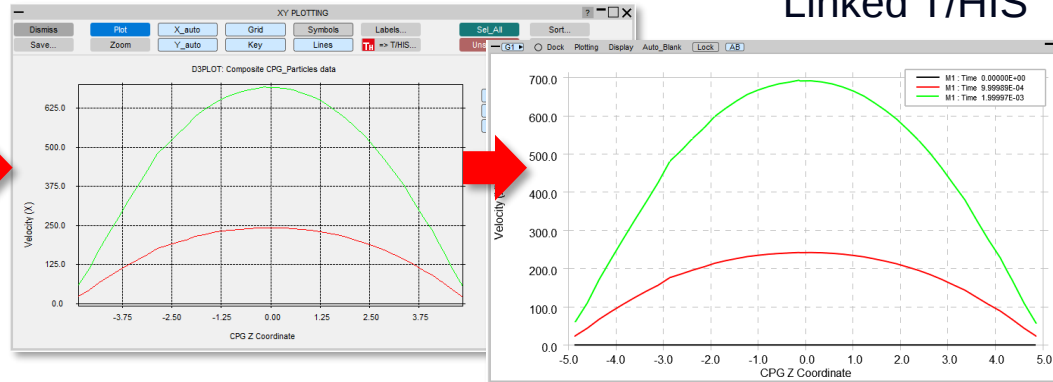
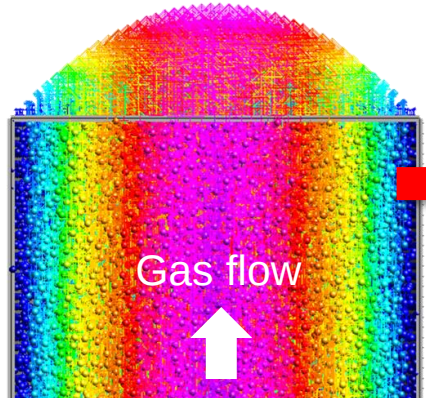
# Support for CPG Results in D3PLOT

We work closely with Ansys to ensure that the Oasys LS-DYNA Environment is the leading choice for CPG workflows

D3PLOT 22.0 supports all CPG data in the new d3dat output file:

- Particle visibility control: Part Tree, Quick Pick, and Entity panels
- Particle symbol size control and visibility per boundary type
- Trace lines, target markers, cut-sections
- Data output (Write to Excel) and composite graphs (XY Data)

Velocity profile plots can be made using Composite XY Data – helps understand flow characteristics through part of the airbag.

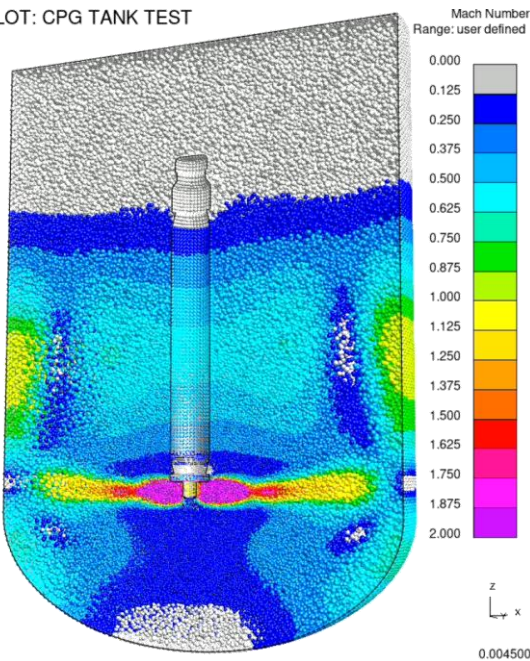


# Support for CPG Results in D3PLOT

We work closely with Ansys to ensure that the Oasys LS-DYNA Environment is the leading choice for CPG workflows

All CPG data components can be plotted on particles:

D3PLOT: CPG TANK TEST



Scalar 1 | Scalar 2 | Vector | "Vel" | ?

☒ Scalar 1 Active | Scalar 1 Options...

Category : CPG Particles

Component : CPG\_STATIC\_PRESSURE

Contours : CPG Scalar Data

Max & Min : CPG\_X\_COORD

Envelope : CPG\_Y\_COORD

Ref frame : CPG\_Z\_COORD

Opacity : CPG\_MACH\_NUMBER

Data Plot Ref

CPG\_VELOCITY

Explain this

X Vector X term

Y Vector Y term

Z Vector Z term

MAG Vector magnitude

CPG Vector Data

CPG\_MESH\_VELOCITY

CPG\_VELOCITY

CPG Mapped Data (Averaged)

CPG\_MACH\_NUMBER

CPG\_DENSITY

CPG\_STATIC\_PRESSURE

CPG\_TOTAL\_PRESSURE

CPG\_STATIC\_TEMPERATURE

CPG\_TOTAL\_TEMPERATURE

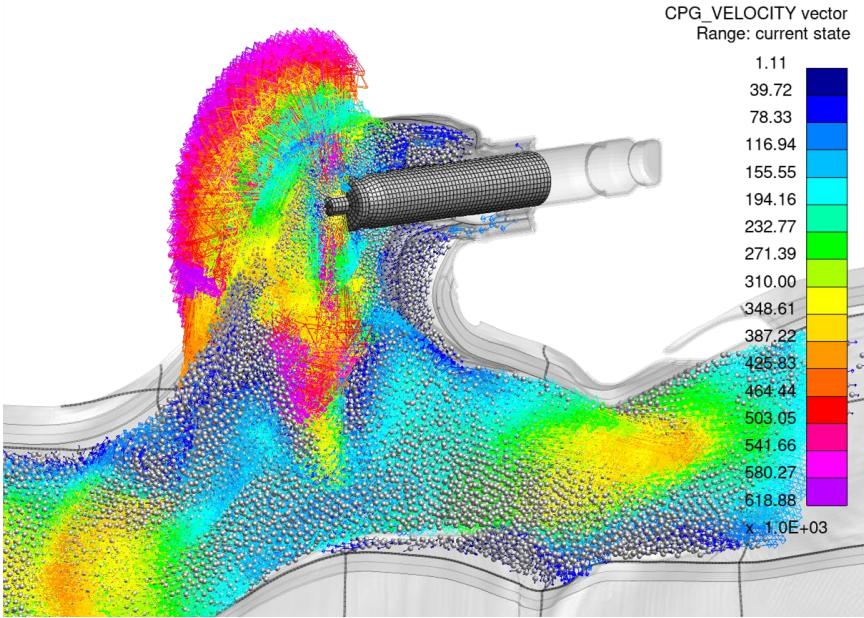
CPG\_SPECIFIC\_ENERGY

CPG\_GAS\_MASS\_FRACTION\_00

CPG\_RADIUS\_OF\_INFLUENCE

CPG\_PROC\_ID

Flow velocity can be visualised using **Vector** arrows:



Tools | T/HIS | Re | REPORTER | PR | PRIMER

Annotation | Cut Sectio | Measure | Vol Clip

Attached | Deform | Properties | Workflows

Blank | Disp opt | Trace | Write

Bookmarks | Entity | User Data | XY Data

Colour | Groups | Utilities

Data | Part Tree | JavaScript | Layout

Scalar 1 | Scalar 2 | Vector | "Vel" | ?

☒ Vector Active

Category : CPG Particles

Component : CPG\_VELOCITY

Contours : CPG Scalar Data

Max & Min : CPG Vector Data

Envelope : CPG\_MESH\_VELOCITY

Ref frame : GLOBAL

Opacity : Opacity ON

Data Plot Refre

Contour Options

Cloud Plots | Iso Plots | Princ Plots | Mapping

Levels | Limiting val | Resolution | Vec Plots

Arrow Properties

4.0 Arrow Lent | 1 Arrow Width (pixe

☐ Fixed length for all arrows

☐ Fixed Colour | Colour

CT | LC | SI | CL | Iso | Draw | Li | Hi | Sh | Save | Lock

PR | DP | Vel | Vec | REC | AC | Zoom | CN | All

Manu | Tidy | +XY | +YZ | +XZ | +ISO | Views | Rev

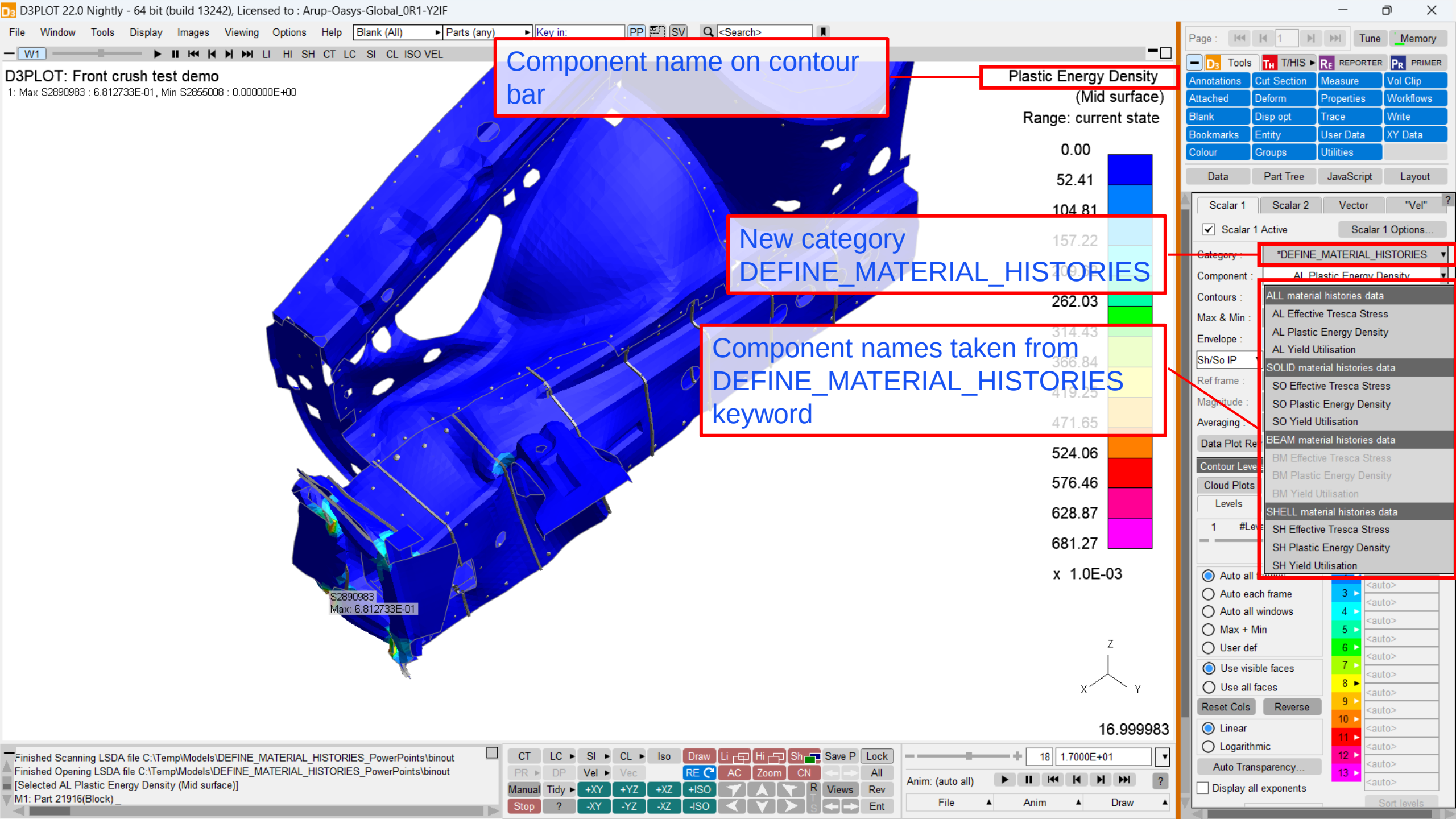
Stop | ? | -XY | -YZ | -XZ | -ISO | Ent

Images courtesy of JSOL Corporation

# Define Material Histories

# D3PLOT Supports \*DEFINE\_MATERIAL\_HISTORIES Results

- D3PLOT has a new component category called “\*DEFINE\_MATERIAL\_HISTORIES”.
- Components in this category use the user-defined names from the keyword, so you can more easily select the component you want.
- Components can be plotted on individual element types or across all element types at once.
- The contour bar is labelled with the component name, resulting in clearer results for reporting.
- The “Extra” component category remains available, so you can still plot extra history variables by number, if you prefer.
- This functionality relies on information in the ZTF file, so it must be available. You can generate a ZTF file for each model using PRIMER 22.0.

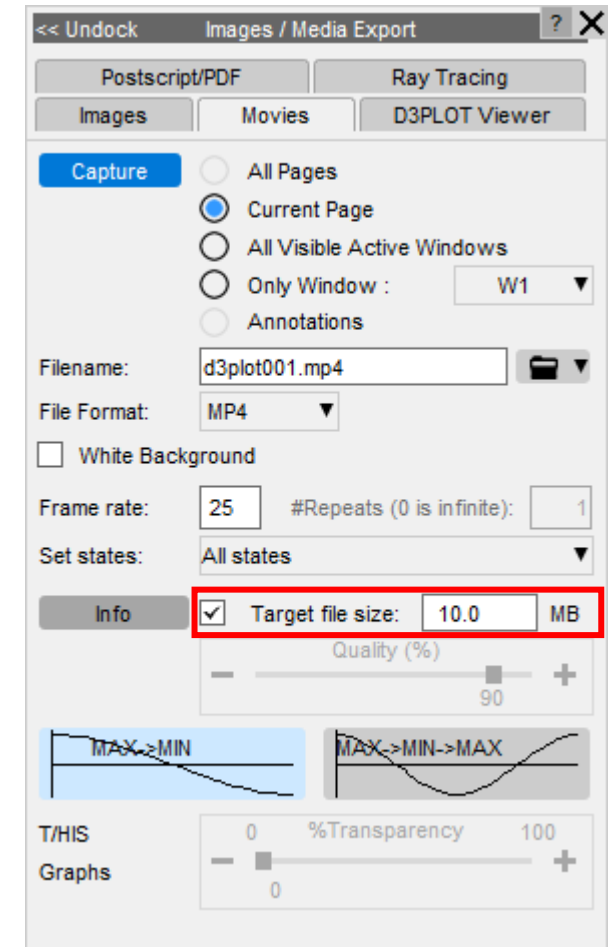


# Efficient End-to-End Workflows

# Movie File Size

# Movie target file size

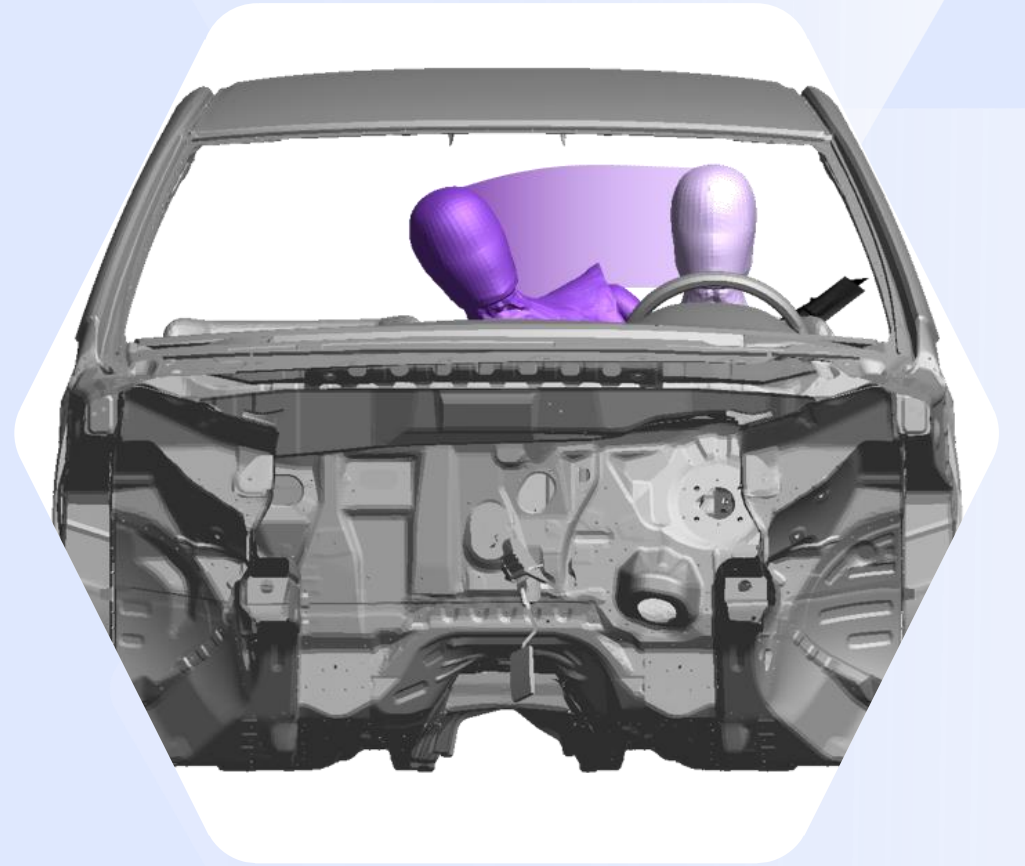
- By default, D3PLOT exports high quality videos at the screen resolution of the graphics window(s). For MP4 files, this can result in large file sizes. Sometimes, smaller file sizes are desired.
- For MP4 files, a target file size (in megabytes) can now be specified.
- When this option is selected, the required bitrate for the movie is determined by that size instead of the Quality (%) slider.
- The file size is a target and is not guaranteed. The actual size of the movie file can vary and can typically be smaller than requested by a few percent.



# Virtual Testing

- [C-NCAP Management Regulation](#)
- [Working with Test Data](#)
- [Automotive Assessments Improvements](#)
- [SimVT Graph Options](#)
- [VTC Quality Criteria Workflows](#)
- [VTC Videos File Size](#)

# C-NCAP Management Regulation

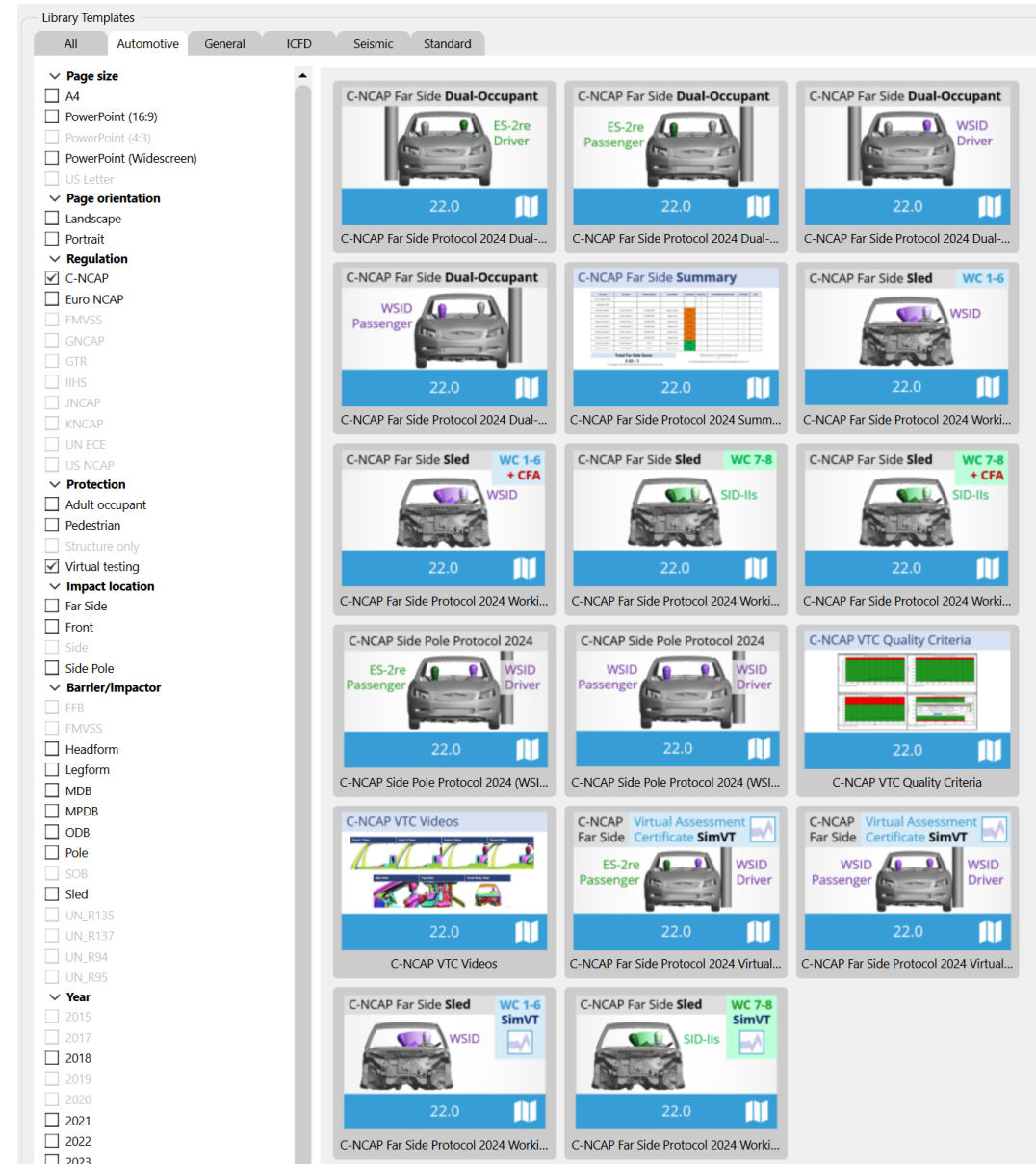


# C-NCAP Management Regulation (2024 Edition)

Since Oasys 21.1, there has been support for the various requirements of the C-NCAP Far Side Occupant Protection Protocol, including:

- For each of the eight Working Conditions:
  - Occupant injury assessment
  - ISO Correlation Fitting indices
  - Correction Factor A
- Dual-Occupant Penalty calculation
- ISO correlation fitting indices for the Virtual Assessment Certificate (prerequisite for the symmetry of far side occupant protection airbags)
- Overall score calculation

[Read the documentation to learn more](#)

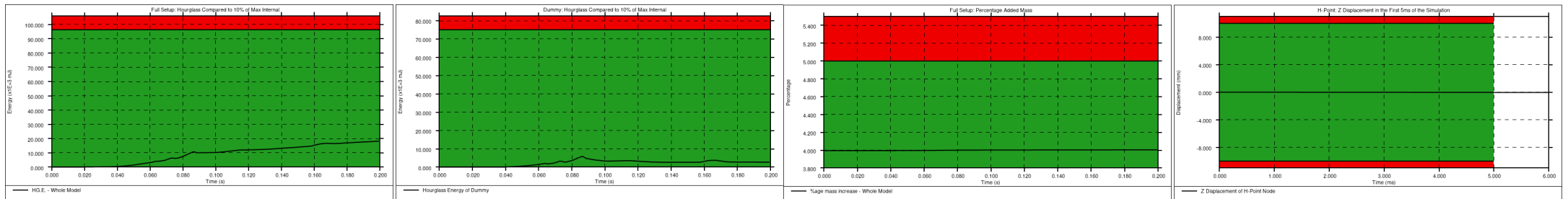


# C-NCAP VTC Quality Criteria

- The C-NCAP VTC Quality Criteria Workflow tool follows the same principals as the Euro NCAP version but assesses the quality criteria specified in section H.1.1(f) of the C-NCAP Far Side Simulation & Assessment Protocol.
- The tool can be automated using the REPORTER template provided.

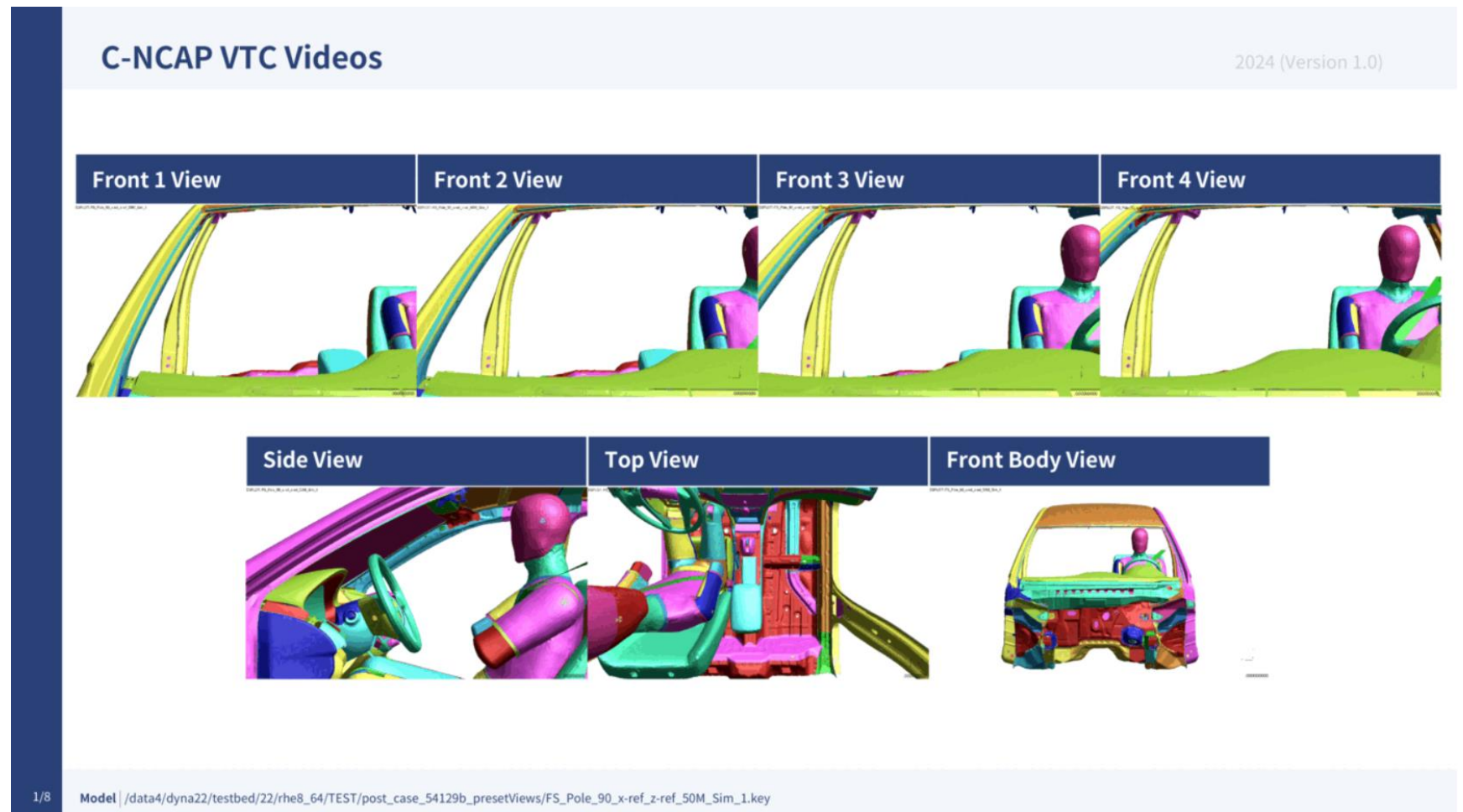
| C-NCAP VTC Quality Criteria |                                                                              |       |            |   |
|-----------------------------|------------------------------------------------------------------------------|-------|------------|---|
| Component                   | Test Description                                                             | Limit | Result     |   |
| Full Setup                  | Maximum Hourglass Energy < 10% of Maximum Internal Energy                    | 96312 | 18243      | ✓ |
| Dummy                       | Maximum Hourglass Energy < 10% of Maximum Internal Energy                    | 75128 | 5834.5     | ✓ |
| Full Setup                  | Maximum Added Mass (%) < Total Model Mass at the Beginning of the Simulation | 5     | 4.0043     | ✓ |
| H-Point Node                | Z Displacement (mm) in the First 5ms of the Simulation                       | 10    | 0.00085449 | ✓ |

Write Results      Model Units: U2 (mm, t, s)



# C-NCAP VTC Videos

- The **C-NCAP VTC Videos** Workflow tool follows the same principles as the Euro NCAP version but helps you calculate the views and export the videos specified in section H.2.8 of the C-NCAP Far Side Occupant Protection Protocol (2024 Edition).
- Use the standard Workflow method in **PRIMER** and **D3PLOT** or the whole process can be automated using the **REPORTER** template provided.

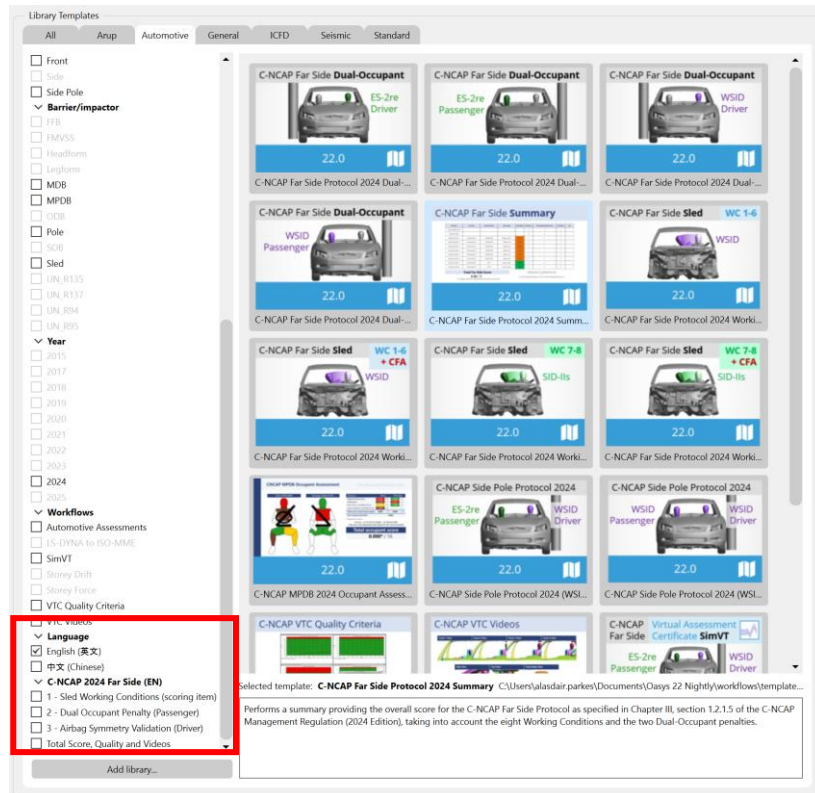


# Chinese Language Reports

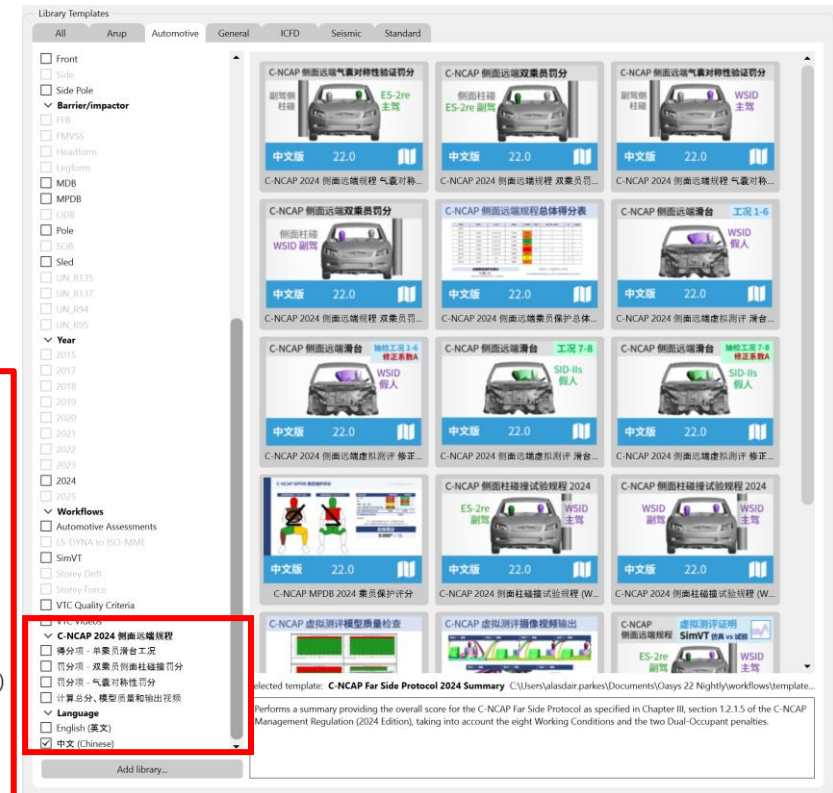
# 中文版报告模板

- You now have access to all the C-NCAP REPORTER templates in both English and Chinese, for ease of communication with your teams, partners, suppliers, and C-NCAP.

- 所有 C-NCAP REPORTER 模板都同时提供英文和中文版供您使用，方便您与团队、合作伙伴、供应商，和 C-NCAP 沟通。



- ✓ C-NCAP 2024 侧面远端规程
  - ☐ 得分项 - 单乘员滑台工况
  - ☐ 罚分项 - 双乘员侧面柱碰撞扣分
  - ☐ 罚分项 - 气囊对称性扣分
  - ☐ 计算总分、模型质量和输出视频
- ✓ Language
  - ☐ English (英文)
  - ☒ 中文 (Chinese)
- ✓ C-NCAP 2024 Far Side (EN)
  - ☐ 1 - Sled Working Conditions (scoring item)
  - ☐ 2 - Dual Occupant Penalty (Passenger)
  - ☐ 3 - Airbag Symmetry Validation (Driver)
  - ☐ Total Score, Quality and Videos



Chinese Language Reports

中文版报告模板

- Example reports generated by C-NCAP REPORTER templates, in English (left) and Chinese (right):
- 下方展示了由 C-NCAP REPORTER 模板自动生成的英文版（左侧）和中文版（右侧）报告示例。

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

| Head acceleration |                      |           |          |        |        |      |       |       |      |
|-------------------|----------------------|-----------|----------|--------|--------|------|-------|-------|------|
| Item              | Test                 | Condition | Category | Result | Weight | Unit | Value | Score | Pass |
| H1                | 11440000000000000000 | TS        | 1        | 1      | 1      | g    | 1.1   | 12.75 | 1    |
| H2                | 11440000000000000000 | TS        | 1        | 1      | 1      | g    | 1.1   | 12.75 | 1    |
| H3                | 11440000000000000000 | TS        | 1        | 1      | 1      | g    | 1.1   | 12.75 | 1    |

Sensor Score > 0.7 (PASS)

C-NCAP Far Side 2024 Working Condition 1 with Correction Factor A

| Assessment Criteria |           |      |        |        |      |       |       |      |  |
|---------------------|-----------|------|--------|--------|------|-------|-------|------|--|
| Region              | Component | Unit | Result | Weight | Unit | Value | Score | Pass |  |
| Head                | H1 (g)    | g    | 1.1    | 1      | g    | 1.1   | 12.75 | 1    |  |
|                     | H2 (g)    | g    | 1.1    | 1      | g    | 1.1   | 12.75 | 1    |  |
|                     | H3 (g)    | g    | 1.1    | 1      | g    | 1.1   | 12.75 | 1    |  |
| Upper Thorax        | U1 (mm)   | mm   | 100    | 1      | mm   | 100   | 12.75 | 1    |  |
| Lower Thorax        | L1 (mm)   | mm   | 100    | 1      | mm   | 100   | 12.75 | 1    |  |
| Abdomen             | A1 (mm)   | mm   | 100    | 1      | mm   | 100   | 12.75 | 1    |  |
| Upper Pelvis        | U2 (mm)   | mm   | 100    | 1      | mm   | 100   | 12.75 | 1    |  |
| Lower Pelvis        | L2 (mm)   | mm   | 100    | 1      | mm   | 100   | 12.75 | 1    |  |

Total Score for Working Condition 1

CFA 1 Sim 2/8 Test 2/8

C-NCAP Far Side 2024 Dual-Occupant Penalty (WSID Passenger)

| Assessment Criteria |           |      |        |        |      |       |       |      |  |
|---------------------|-----------|------|--------|--------|------|-------|-------|------|--|
| Region              | Component | Unit | Result | Weight | Unit | Value | Score | Pass |  |
| Head                | H1 (g)    | g    | 1.1    | 1      | g    | 1.1   | 12.75 | 1    |  |
| Upper Thorax        | U1 (mm)   | mm   | 100    | 1      | mm   | 100   | 12.75 | 1    |  |
| Lower Thorax        | L1 (mm)   | mm   | 100    | 1      | mm   | 100   | 12.75 | 1    |  |
| Abdomen             | A1 (mm)   | mm   | 100    | 1      | mm   | 100   | 12.75 | 1    |  |
| Pelvis              | P1 (mm)   | mm   | 100    | 1      | mm   | 100   | 12.75 | 1    |  |

Total Penalty

0

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

| Assessment Criteria |           |      |        |        |      |       |       |      |  |
|---------------------|-----------|------|--------|--------|------|-------|-------|------|--|
| Region              | Component | Unit | Result | Weight | Unit | Value | Score | Pass |  |
| Head                | H1 (g)    | g    | 1.1    | 1      | g    | 1.1   | 12.75 | 1    |  |
| Upper Thorax        | U1 (mm)   | mm   | 100    | 1      | mm   | 100   | 12.75 | 1    |  |
| Lower Thorax        | L1 (mm)   | mm   | 100    | 1      | mm   | 100   | 12.75 | 1    |  |
| Abdomen             | A1 (mm)   | mm   | 100    | 1      | mm   | 100   | 12.75 | 1    |  |
| Pelvis              | P1 (mm)   | mm   | 100    | 1      | mm   | 100   | 12.75 | 1    |  |

Total Penalty

0

C-NCAP Far Side 2024 Dual-Occupant Penalty (ES-2re Driver)

| Assessment Criteria |           |      |        |        |      |       |       |      |  |
|---------------------|-----------|------|--------|--------|------|-------|-------|------|--|
| Region              | Component | Unit | Result | Weight | Unit | Value | Score | Pass |  |
| Head                | H1 (g)    | g    | 1.1    | 1      | g    | 1.1   | 12.75 | 1    |  |
| Upper Thorax        | U1 (mm)   | mm   | 100    | 1      | mm   | 100   | 12.75 | 1    |  |
| Lower Thorax        | L1 (mm)   | mm   | 100    | 1      | mm   | 100   | 12.75 | 1    |  |
| Abdomen             | A1 (mm)   | mm   | 100    | 1      | mm   | 100   | 12.75 | 1    |  |
| Pelvis              | P1 (mm)   | mm   | 100    | 1      | mm   | 100   | 12.75 | 1    |  |

Total Penalty

0

C-NCAP Far Side Protocol 2024 Summary

| Assessment Criteria |           |      |        |        |      |       |       |      |  |
|---------------------|-----------|------|--------|--------|------|-------|-------|------|--|
| Region              | Component | Unit | Result | Weight | Unit | Value | Score | Pass |  |
| Head                | H1 (g)    | g    | 1.1    | 1      | g    | 1.1   | 12.75 | 1    |  |
| Upper Thorax        | U1 (mm)   | mm   | 100    | 1      | mm   | 100   | 12.75 | 1    |  |
| Lower Thorax        | L1 (mm)   | mm   | 100    | 1      | mm   | 100   | 12.75 | 1    |  |
| Abdomen             | A1 (mm)   | mm   | 100    | 1      | mm   | 100   | 12.75 | 1    |  |
| Pelvis              | P1 (mm)   | mm   | 100    | 1      | mm   | 100   | 12.75 | 1    |  |

Total Far Side Score

3.50 / 8

C-NCAP 2024 侧面远端虚拟测评 滑台工况 7 - 8 相关性对标项 (SID-IIs)

| Head acceleration |                      |           |          |        |        |      |       |       |      |
|-------------------|----------------------|-----------|----------|--------|--------|------|-------|-------|------|
| Item              | Test                 | Condition | Category | Result | Weight | Unit | Value | Score | Pass |
| H1                | 11440000000000000000 | TS        | 1        | 1      | 1      | g    | 1.1   | 12.75 | 1    |
| H2                | 11440000000000000000 | TS        | 1        | 1      | 1      | g    | 1.1   | 12.75 | 1    |
| H3                | 11440000000000000000 | TS        | 1        | 1      | 1      | g    | 1.1   | 12.75 | 1    |

作绩分数 > 0.7 (通过)

C-NCAP 2024 侧面远端虚拟测评 修正系数 A (抽检滑台工况 1, WSID)

| Assessment Criteria |           |      |        |        |      |       |       |      |  |
|---------------------|-----------|------|--------|--------|------|-------|-------|------|--|
| Region              | Component | Unit | Result | Weight | Unit | Value | Score | Pass |  |
| Head                | H1 (g)    | g    | 1.1    | 1      | g    | 1.1   | 12.75 | 1    |  |
| Upper Thorax        | U1 (mm)   | mm   | 100    | 1      | mm   | 100   | 12.75 | 1    |  |
| Lower Thorax        | L1 (mm)   | mm   | 100    | 1      | mm   | 100   | 12.75 | 1    |  |
| Abdomen             | A1 (mm)   | mm   | 100    | 1      | mm   | 100   | 12.75 | 1    |  |
| Upper Pelvis        | U2 (mm)   | mm   | 100    | 1      | mm   | 100   | 12.75 | 1    |  |
| Lower Pelvis        | L2 (mm)   | mm   | 100    | 1      | mm   | 100   | 12.75 | 1    |  |

远端虚拟测评修正系数 A 得分

修正系数 A 得分 2/8 合格

C-NCAP 2024 侧面远端虚拟测评 双乘员得分 (侧面碰撞, WSID 驾驶员)

| Assessment Criteria |           |      |        |        |      |       |       |      |  |
|---------------------|-----------|------|--------|--------|------|-------|-------|------|--|
| Region              | Component | Unit | Result | Weight | Unit | Value | Score | Pass |  |
| Head                | H1 (g)    | g    | 1.1    | 1      | g    | 1.1   | 12.75 | 1    |  |
| Upper Thorax        | U1 (mm)   | mm   | 100    | 1      | mm   | 100   | 12.75 | 1    |  |
| Lower Thorax        | L1 (mm)   | mm   | 100    | 1      | mm   | 100   | 12.75 | 1    |  |
| Abdomen             | A1 (mm)   | mm   | 100    | 1      | mm   | 100   | 12.75 | 1    |  |
| Pelvis              | P1 (mm)   | mm   | 100    | 1      | mm   | 100   | 12.75 | 1    |  |

总分

0

C-NCAP 2024 侧面远端虚拟测评 气腹对称性虚拟测评 (侧面碰撞, WSID 主驾, WSID 副驾)

| Assessment Criteria |           |      |        |        |      |       |       |      |  |
|---------------------|-----------|------|--------|--------|------|-------|-------|------|--|
| Region              | Component | Unit | Result | Weight | Unit | Value | Score | Pass |  |
| Head                | H1 (g)    | g    | 1.1    | 1      | g    | 1.1   | 12.75 | 1    |  |
| Upper Thorax        | U1 (mm)   | mm   | 100    | 1      | mm   | 100   | 12.75 | 1    |  |
| Lower Thorax        | L1 (mm)   | mm   | 100    | 1      | mm   | 100   | 12.75 | 1    |  |
| Abdomen             | A1 (mm)   | mm   | 100    | 1      | mm   | 100   | 12.75 | 1    |  |
| Pelvis              | P1 (mm)   | mm   | 100    | 1      | mm   | 100   | 12.75 | 1    |  |

总分

0

C-NCAP 2024 侧面远端虚拟测评 气腹对称性虚拟测评 (侧面碰撞, ES-2re 主驾)

| Assessment Criteria |           |      |        |        |      |       |       |      |  |
|---------------------|-----------|------|--------|--------|------|-------|-------|------|--|
| Region              | Component | Unit | Result | Weight | Unit | Value | Score | Pass |  |
| Head                | H1 (g)    | g    | 1.1    | 1      | g    | 1.1   | 12.75 | 1    |  |
| Upper Thorax        | U1 (mm)   | mm   | 100    | 1      | mm   | 100   | 12.75 | 1    |  |
| Lower Thorax        | L1 (mm)   | mm   | 100    | 1      | mm   | 100   | 12.75 | 1    |  |
| Abdomen             | A1 (mm)   | mm   | 100    | 1      | mm   | 100   | 12.75 | 1    |  |
| Pelvis              | P1 (mm)   | mm   | 100    | 1      | mm   | 100   | 12.75 | 1    |  |

总分

0

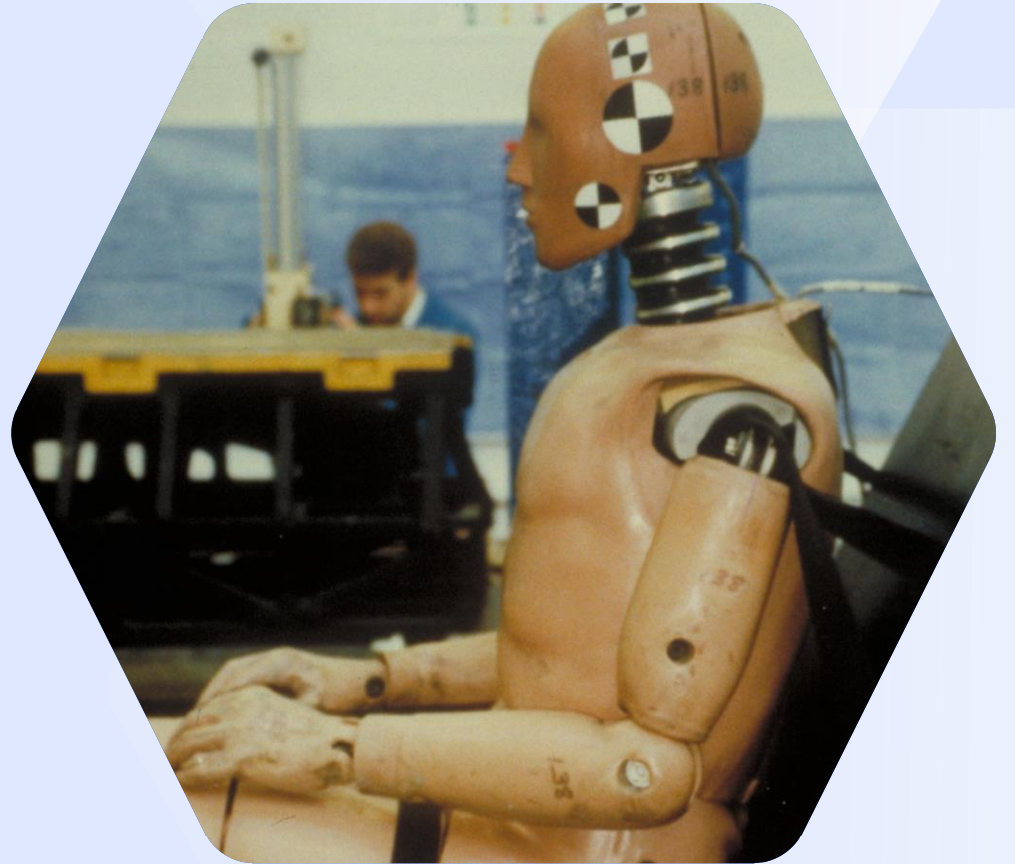
C-NCAP 2024 侧面远端虚拟测评 气腹对称性虚拟测评 (侧面碰撞, ES-2re 副驾)

| Assessment Criteria |           |      |        |        |      |       |       |      |  |
|---------------------|-----------|------|--------|--------|------|-------|-------|------|--|
| Region              | Component | Unit | Result | Weight | Unit | Value | Score | Pass |  |
| Head                | H1 (g)    | g    | 1.1    | 1      | g    | 1.1   | 12.75 | 1    |  |
| Upper Thorax        | U1 (mm)   | mm   | 100    | 1      | mm   | 100   | 12.75 | 1    |  |
| Lower Thorax        | L1 (mm)   | mm   | 100    | 1      | mm   | 100   | 12.75 | 1    |  |
| Abdomen             | A1 (mm)   | mm   | 100    | 1      | mm   | 100   | 12.75 | 1    |  |
| Pelvis              | P1 (mm)   | mm   | 100    | 1      | mm   | 100   | 12.75 | 1    |  |

总分

0

## Working with Test Data



# Improved unit handling and configuration for imported data

- Previously, imported ISO-MME data was assumed to be in SI units. This assumption was not always valid and data with non-standard units (e.g. accelerations in 'g' or rotations in 'degrees') needed to be manually scaled.
- Additionally, the vehicle drive side was inferred from the position code of the first occupant channel, which was assumed to be the driver.
- Now, when importing ISO-MME channel data, T/HIS attempts to automatically determine the units from the unit header in each channel file and the drive side from the "Driver position object 1" header in the MME file. However, it is not always possible to correctly infer this information.
- The new Import Configuration window (and Import Config. file) gives you the option to correct any issues with the channel units, polarity, scale and naming before importing ISO-MME or CSV data.

| A                   | B                | C       | D                   |
|---------------------|------------------|---------|---------------------|
| #DATA_SOURCE        | /path/to/iso.mme |         |                     |
| #DRIVE_SIDE         | LHD              |         |                     |
| #PROTOCOL           | None             |         |                     |
| #UNITS              |                  |         |                     |
| TIME                | ms               |         |                     |
| ACCELERATION        | g                |         |                     |
| FORCE               | kN               |         |                     |
| LENGTH              | mm               |         |                     |
| MOMENT              | kN*m             |         |                     |
| ROTATIONAL_VELOCITY | deg/s            |         |                     |
| VELOCITY            | ft/s             |         |                     |
| #CHANNEL_DATA       |                  |         |                     |
| Channel             | New Name         | Y Scale | Unit Type           |
| 11HEAD0000WSDCX0    | <optional>       | 1       | LENGTH              |
| 11HEAD0000WSDCY0    | <optional>       | 1       | LENGTH              |
| 11HEAD0000WSDCZ0    | <optional>       | 1       | LENGTH              |
| 11HEAD0000WSAVX0    | <optional>       | 1       | ROTATIONAL_VELOCITY |
| 11HEAD0000WSAVY0    | <optional>       | 1       | ROTATIONAL_VELOCITY |
| 11HEAD0000WSAVZ0    | <optional>       | 1       | ROTATIONAL_VELOCITY |
| 11HEAD0000WSACX0    | <optional>       | 1       | ACCELERATION        |

Import  
Config.  
File

Configure import

Import Configuration

Configuration file:

Protocol: None

Drive side: LHD

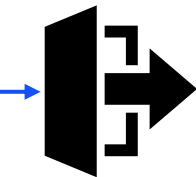
Units:

|                     |       |
|---------------------|-------|
| TIME                | s     |
| ACCELERATION        | g     |
| FORCE               | kN    |
| LENGTH              | mm    |
| MOMENT              | kN*m  |
| ROTATIONAL_VELOCITY | deg/s |
| VELOCITY            | ft/s  |

| Channel          | New Name   | Y Scale | Unit Type           |
|------------------|------------|---------|---------------------|
| 11HEAD0000WSDCX0 | <optional> | 1       | LENGTH              |
| 11HEAD0000WSDCY0 | <optional> | 1       | LENGTH              |
| 11HEAD0000WSDCZ0 | <optional> | 1       | LENGTH              |
| 11HEAD0000WSAVX0 | <optional> | 1       | ROTATIONAL_VELOCITY |
| 11HEAD0000WSAVY0 | <optional> | 1       | ROTATIONAL_VELOCITY |
| 11HEAD0000WSAVZ0 | <optional> | 1       | ROTATIONAL_VELOCITY |
| 11HEAD0000WSACX0 | <optional> | 1       | ACCELERATION        |
| 11HEAD0000WSACY0 | <optional> | 1       | ACCELERATION        |
| 11HEAD0000WSACZ0 | <optional> | 1       | ACCELERATION        |
| 11HEAD0000WSVEX0 | <optional> | 1       | VELOCITY            |
| 11HEAD0000WSVEY0 | <optional> | 1       | VELOCITY            |
| 11HEAD0000WSVEZ0 | <optional> | 1       | VELOCITY            |
| 11NECKUP00WSFOX0 | <optional> | 1       | FORCE               |
| 11NECKUP00WSFOY0 | <optional> | 1       | FORCE               |
| 11NECKUP00WSFOZ0 | <optional> | 1       | FORCE               |
| 11NECKUP00WSMOX0 | <optional> | 1       | MOMENT              |
| 11NECKUP00WSMOY0 | <optional> | 1       | MOMENT              |
| 11NECKUP00WSMOZ0 | <optional> | 1       | MOMENT              |
| 11NECKL000WSFOX0 | <optional> | 1       | FORCE               |
| 11NECKL000WSFOY0 | <optional> | 1       | FORCE               |

Import ISO-MME/CSV ...

Import ISO-MME or CSV data in  
Automotive Assessments  
and SimVT



Data Imported

# Time of first sample

To accommodate the pre-crash (settling) phase in a simulation, a new “Time of first sample” input has been added to the Automotive Assessments workflow set-up in PRIMER.

## Automotive Assessments and SimVT

- 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 or SimVT 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  $t=0$ .
- Any data before  $t=0$  is automatically discarded.

## LSDYNA to ISO-MME

- The “Time of first sample” value is also used by the LS-DYNA to ISO-MME workflow.
- If it is defined, then the “Time of first sample” header value will automatically be set in the channel files.
- Note that in this instance the samples which are shifted to time  $< 0$  will not be discarded as this only happens when the ISO-MME data is processed.

Automotive Assessments

Crash Test: Far Side Sled, Regulation: EuroNCAP, Version: 2024, Model Units: U2 (mm, t, s)

Time of first sample: -0.2s

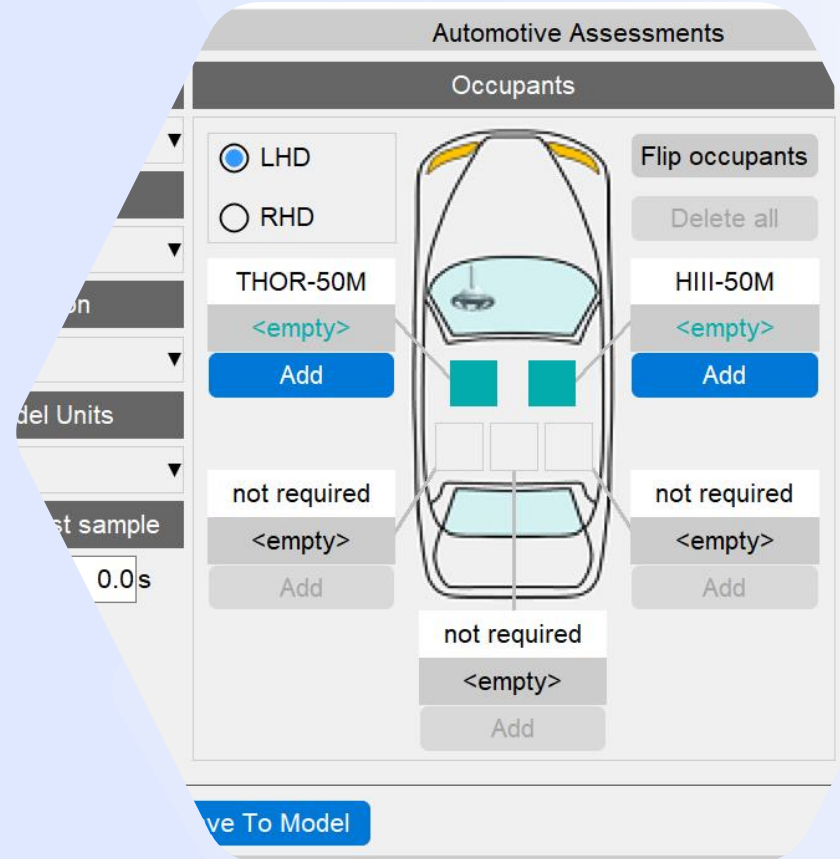
Occupants: LHD, WSID-50M, WSID-50M

Structures: <Airbag>, B-Pillar (non-struck side), Centre Console, <Contact Dummy-Airbag>, Contact Dummy-Centre Console, Contact Dummy-Seat, Contact Dummy-Seatbelt, Driver Seat, Driver Shoulder Belt (B3), Dummy

Save To File, Save To Model

```
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
```

# Automotive Assessments Improvements



# Automotive Assessments Improvements

- Entity IDs that are defined but don't have corresponding \*DATABASE\_HISTORY\_XXXX keyword defined are now shown with a latent cyan-coloured textbox background:

| HEAD                                                 |      |       |
|------------------------------------------------------|------|-------|
| Head: Global Coordinates (X,Y,Z)                     | node | 10123 |
| Head: Acceleration, Velocity (X,Y,Z)                 | node | 10001 |
| Head: Angular Accel. Angular Velocity. Angle (X,Y,Z) | node | 10006 |
| Head Offset (for C-NCAP calculation)                 | node | 32198 |

- A window is now mapped when such entity IDs are selected or typed into the text box, giving you 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. **Note:** you have to save the include and re(run) the analysis to obtain results for the corresponding entity.

Create \*DATABASE\_HISTORY\_NODE?

\*DATABASE\_HISTORY\_NODE not present for 32198. Do you wish to create it?

Create in Include: 08\_FS\_AEMDB\_75\_x-ref\_z-ref\_50M\_Sim\_1.key

☒ Update Current Layer Include

☐ Title:

Create Cancel

Dropdown to select the include file

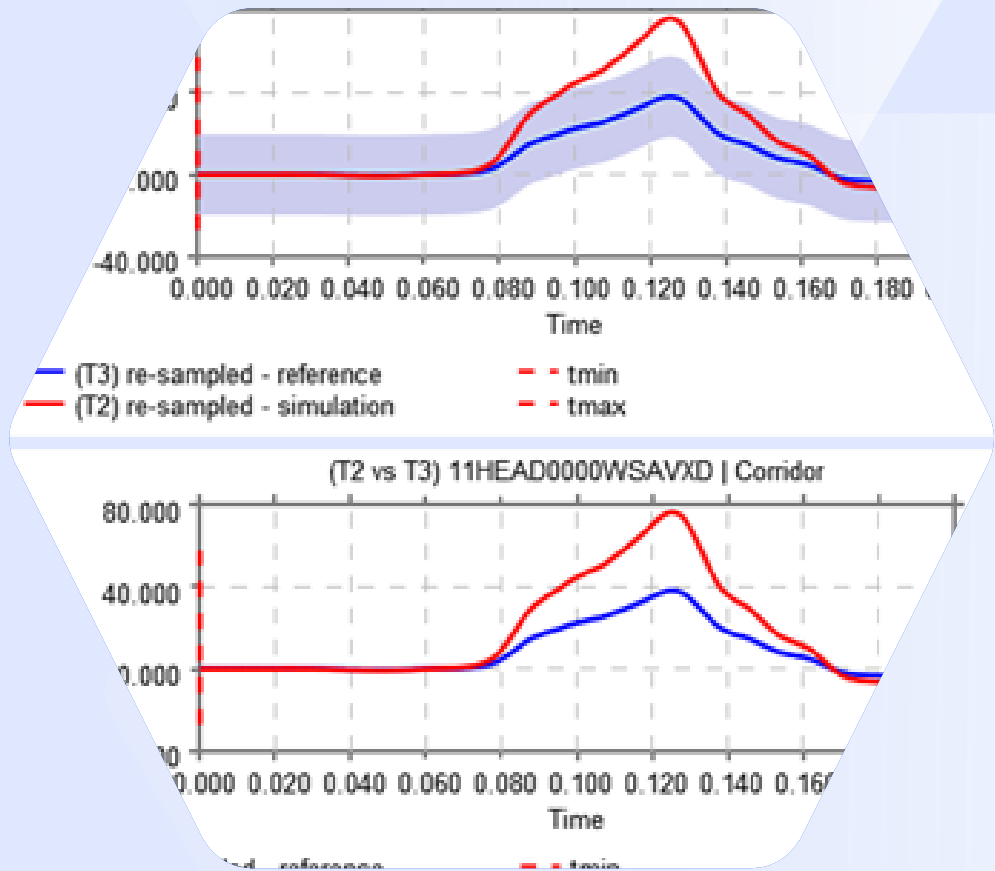
If ticked, then the current layer include will be updated to the one selected in the dropdown above

Option to provide optional Title

# Automotive Assessments Improvements

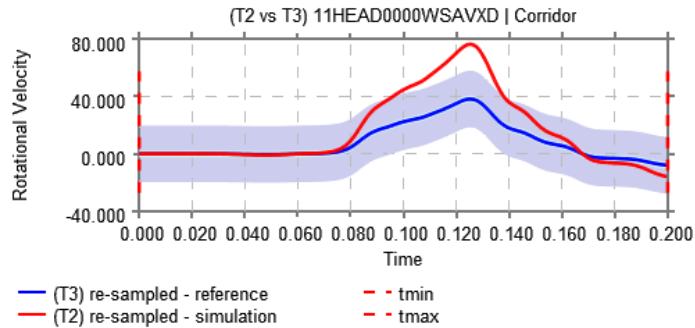
- The ISO channel codes have been updated for several channels in the Far Side VTC v1.1 draft protocol. The necessary changes have been incorporated in Automotive Assessments workflows tool, and backward compatibility support has been added for the older ISO codes. The channels whose ISO codes have changed are:
  - LAP Belt (SEBE00**03**B6FO00 to SEBE00**00**B6FO00)
  - Shoulder Belt (SEBE00**03**B3FO00 to SEBE00**00**B3FO00)
  - Contact Dummy-Airbag (**ARB**G0000WSFOX/Y/Z to **AIRB**0000WSFOX/Y/Z)
  - Thoracic Spine 04 and 12 Displacements (THSP04/1200**00**DCX/Y/Z0 to THSP04/1200**WS**DCX/Y/Z0).
- The 'Far Side + VTC' and 'Far Side' crash tests have been renamed to 'Far Side Sled' for consistency across the tools. The version for the former 'Far Side + VTC' is now 2024, while the version for the former 'Far Side' crash test is 2022. Support for backward compatibility has also been added.
- The term Physiology has been renamed to Anthropometry and support for backward compatibility has also been added.
- Users can now select multiple contacts for contact structures (Contact Dummy – Airbag, Contact Dummy – Centre Console, Contact Dummy –Seat and Contact Dummy - Seatbelt) via SELECT option.

# SimVT Graph Options

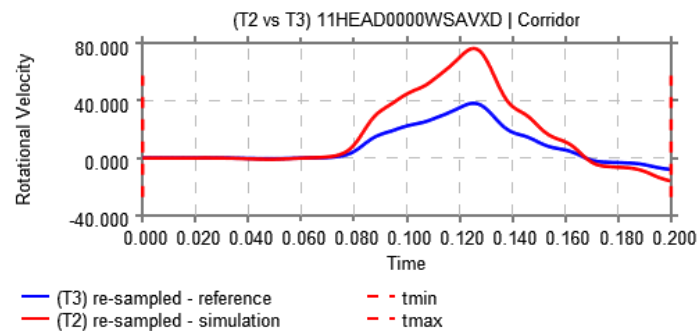


# SimVT Graph Options – Show Corridors

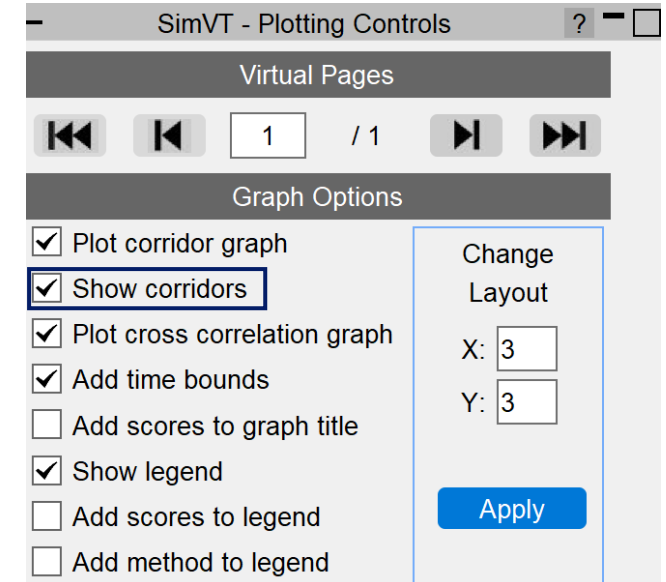
- A new graph option “Show corridors” has been added to SimVT plotting controls. This determines whether the inner and outer corridors are plotted along with the reference and simulation curves.
- Deselecting show corridors can help reduce clutter on the graphs.



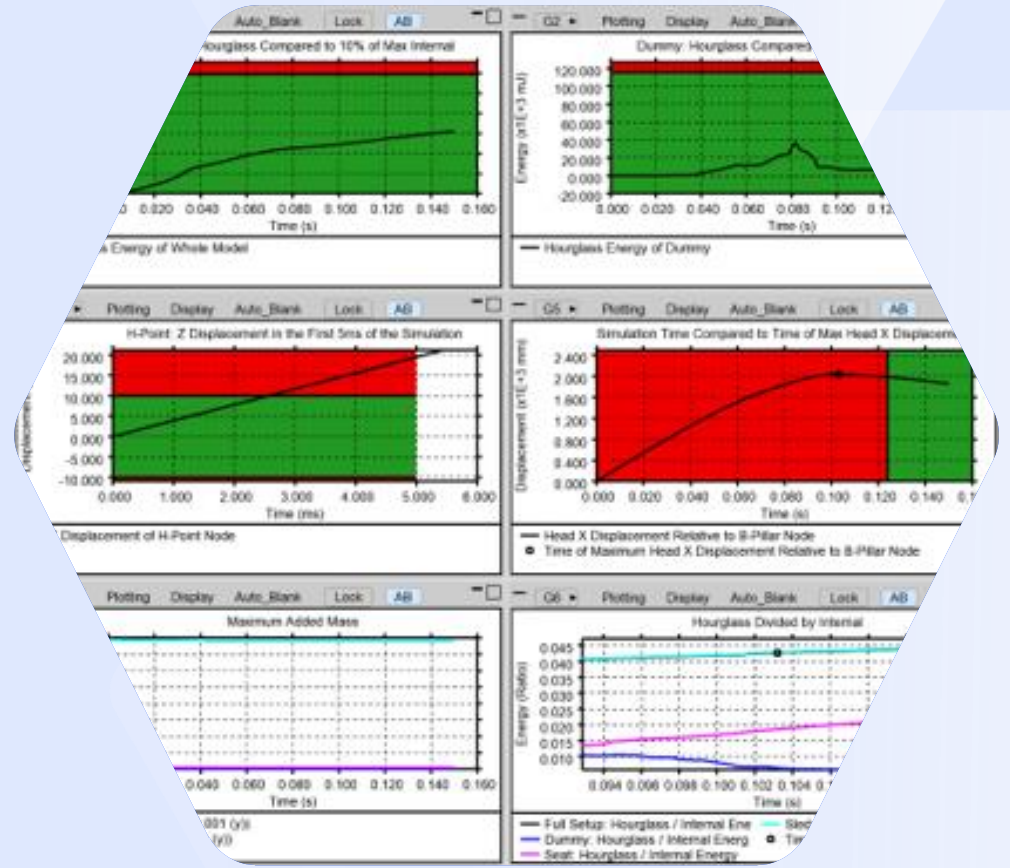
Corridors turned on



Corridors turned off

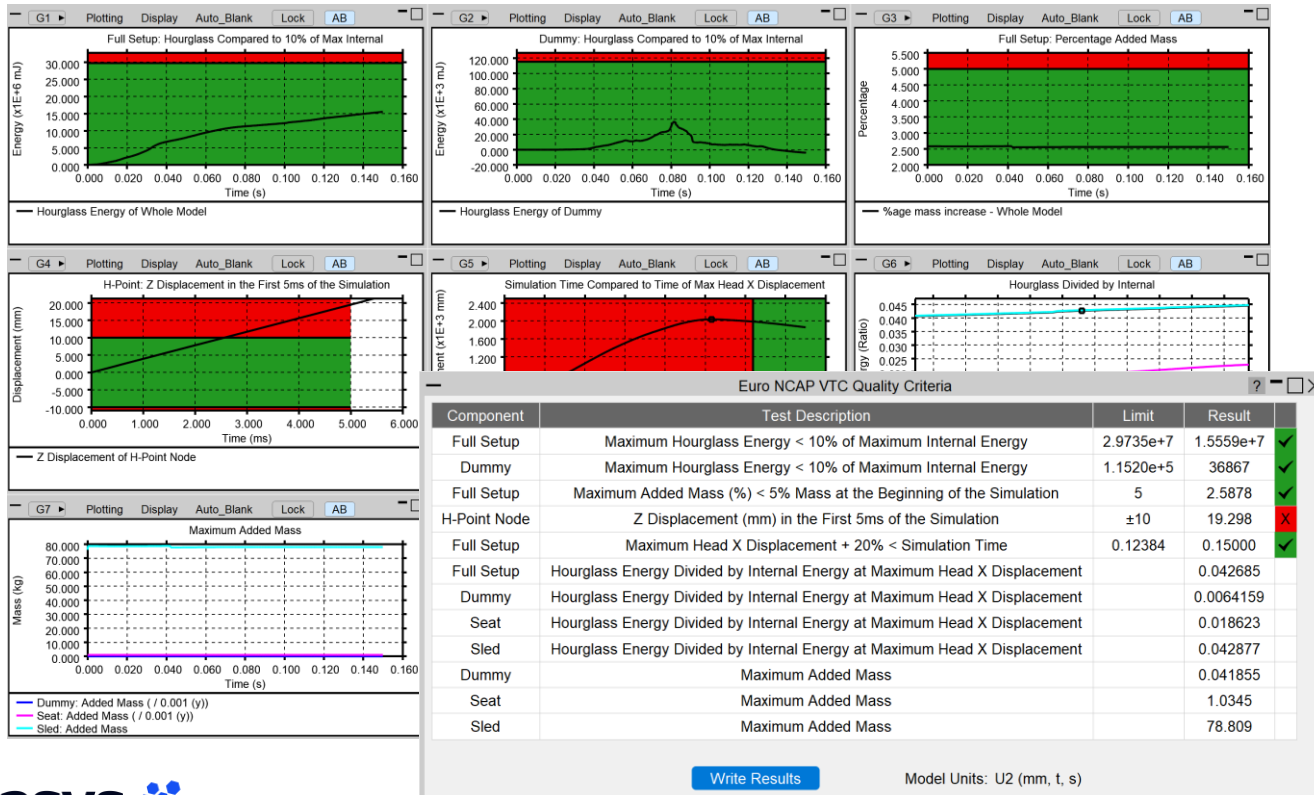


# VTC Quality Criteria Workflows



# Quality Criteria – Euro NCAP Frontal

- The Euro NCAP VTC Quality Criteria Workflows tool and associated REPORTER Template are now capable of assessing the Euro NCAP Virtual Frontal Simulation & Assessment Protocol (draft) as well as the existing Far Side protocol.



Euro NCAP VTC Quality Criteria

Test Type: Frontal (Draft)

Model Unit System: U2 (mm, t, s)

Display Time Unit: Seconds [s]

Display Energy Unit: Millijoules [mJ]

Display Displacement Unit: Millimetres [mm]

Display Mass Unit: Kilograms [kg]

Dummy Parts: 1030 PARTs selected

Head History Node (Global): 01HEAD0000T3ACX

H-point History Node: 01PELV0000T3ACZ

B-pillar History Node: 45011535

Seat Parts: 109 PARTs selected

Save To File Save To Model

# Quality Criteria – Euro NCAP HBM

- The Euro NCAP HBM Quality Criteria Workflows tool and associated REPORTER Template allow you to perform the quality checks outlined in Section 7.1 of the Euro NCAP VTC HBM Frontal Protocol (draft) relating to energy, added mass and displacements.



Euro NCAP HBM Quality Criteria

Model Unit System

U3 (mm, kg, ms)

Display Time Unit

Milliseconds [ms]

Display Energy Unit

Kilojoules [kJ]

Display Displacement Unit

Millimetres [mm]

Dummy Parts

1423 PARTs selected

Head History Node (Global)

ted-Kinematics\_Node\_Global

H-point History Node

e-History-Node\_Node\_Global

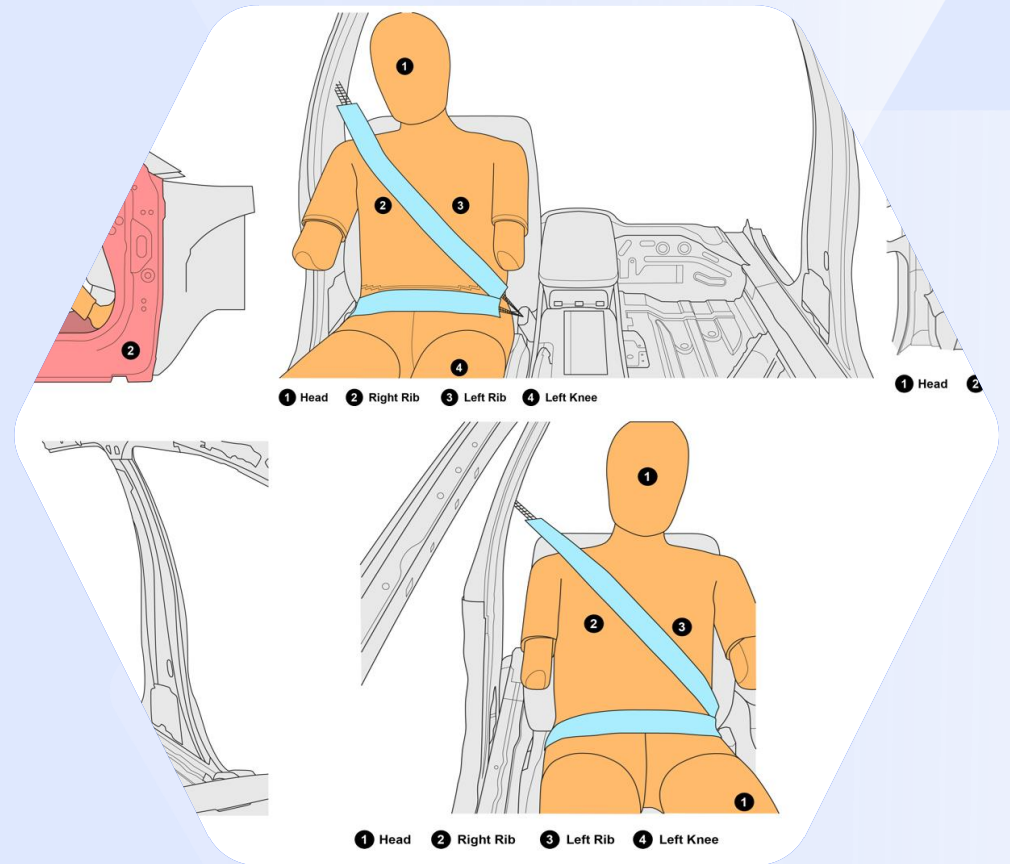
B-pillar History Node

B-Pillar-accelerometer: 1

Save To File

Save To Model

# VTC Videos File Size



# VTC Videos Settings Improvements

- The displayed End time is now determined by model simulation end time rounded down to three decimal places rather than model simulation end time minus 1 interval step (which had caused issues with video capture previously).
- For the Euro NCAP version, the Video Quality slider has been replaced with a target file size option to allow users to satisfy the 1-10 MB video requirement.

Step 3: Set video settings & export

Start0

Interval0.002

End0.15

Target File Size (MB)10

Export Videos ▼

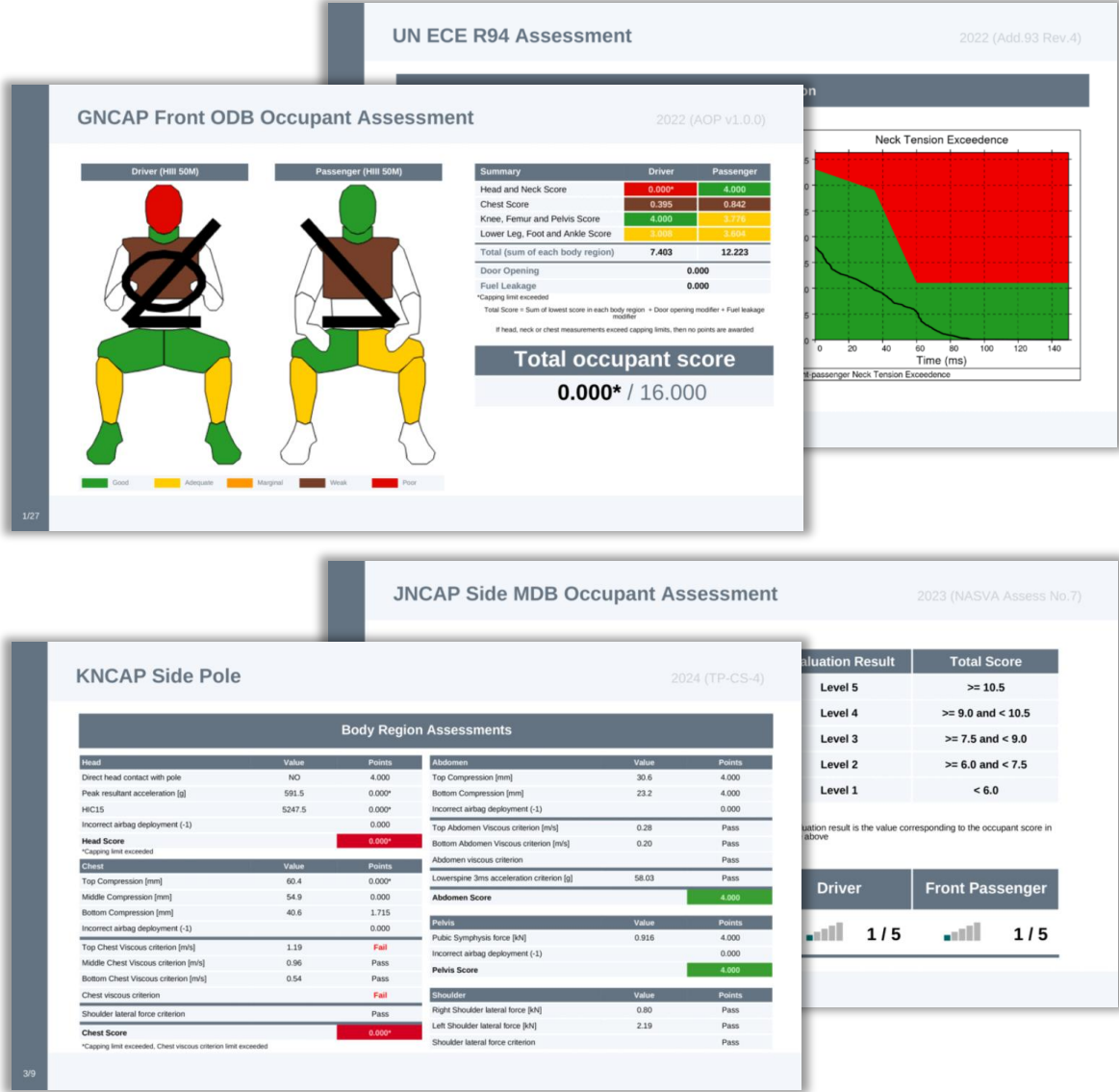
# Human-Safe Design

# Automotive Protocols

# New Protocols and Regulations

- Automotive Assessments and REPORTER now support the following new protocols and regulations:

| Regulation  | Loadcase                     |
|-------------|------------------------------|
| C-NCAP      | Far Side Occupant Protection |
| Global NCAP | MDB, ODB, Side Pole          |
| JNCAP       | FFB, MDB, ODB                |
| KNCAP       | FFB, MDB, Side Pole          |
| UN ECE      | R94, R95, R135, R137         |



# Upgraded Protocols

- The following protocols have been updated:

| Regulation | Loadcase                 | Update                                                                                                                                    |
|------------|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| Euro NCAP  | MPDB Occupant Assessment | <ul style="list-style-type: none"><li>• 2024 (Follows Adult Occupant Protocol v9.3)</li><li>• Includes DAMAGE assessment</li></ul>        |
| IIHS       | Front SOB                | <ul style="list-style-type: none"><li>• 2024 (Version VII)</li><li>• New fuel modifier</li></ul>                                          |
| IIHS       | Side MDB                 | <ul style="list-style-type: none"><li>• 2024 (Version IV)</li><li>• New fuel modifier and updated head protection rating system</li></ul> |

# Latest Protocol Support

Automotive Assessments Workflow

- Available for some time
- New in version 21.1
- New in version 22.0

| Regulation | Year | Loadcase/Workflow    | PRIMER | T/HIS | D3PLOT | REPORTER<br>(migrated to workflows) | REPORTER<br>(standard template) |
|------------|------|----------------------|--------|-------|--------|-------------------------------------|---------------------------------|
| C-NCAP     | 2018 | ODB                  | ●      | ●     |        |                                     | ●                               |
|            | 2021 | Head Impact          |        |       |        |                                     | ●                               |
|            |      | Leg Impact           |        |       |        |                                     | ●                               |
|            | 2022 | MPDB Occupant        | ●      | ●     |        | ●                                   |                                 |
|            | 2023 | MPDB Compatibility   |        |       |        |                                     | ●                               |
|            | 2024 | Side Pole            | ●      | ●     |        | ●                                   |                                 |
|            |      | Far Side Pole        | ●      | ●     |        | ●                                   |                                 |
|            |      | Far Side Sled        | ●      | ●     |        | ●                                   |                                 |
|            |      | VTC Quality Criteria | ●      | ●     |        | ●                                   |                                 |
|            |      | VTC Videos           | ●      |       | ●      | ●                                   |                                 |
|            |      | LS-DYNA to ISO-MME   | ●      | ●     |        | ●                                   |                                 |
|            |      | SimVT                |        | ●     |        | ●                                   |                                 |

# Latest Protocol Support

Automotive Assessments Workflow

- Available for some time
- New in version 21.1
- New in version 22.0

| Regulation | Year         | Loadcase/Workflow  | PRIMER | T/HIS | D3PLOT | REPORTER<br>(migrated to<br>workflows) | REPORTER<br>(standard<br>template) |
|------------|--------------|--------------------|--------|-------|--------|----------------------------------------|------------------------------------|
| Euro NCAP  | 2017         | FFB                | ●      | ●     |        | ●                                      |                                    |
|            |              | ODB                | ●      | ●     |        | ●                                      |                                    |
|            | 2020         | MPDB Occupant      | ●      | ●     |        | ●                                      |                                    |
|            |              | Side Pole          | ●      | ●     |        |                                        |                                    |
|            |              | MDB                | ●      | ●     | ●      |                                        |                                    |
|            | 2022         | Far Side           | ●      | ●     | ●      |                                        |                                    |
|            |              | MDB                | ●      | ●     | ●      | ●                                      |                                    |
|            |              | Side Pole          | ●      | ●     |        | ●                                      |                                    |
|            | 2023         | MPDB Compatibility |        |       |        |                                        | ●                                  |
|            |              | Head Impact        |        |       |        |                                        | ●                                  |
|            |              | Leg Impact         |        |       |        |                                        | ●                                  |
|            | Continued... |                    |        |       |        |                                        |                                    |

# Latest Protocol Support

Automotive Assessments Workflow

- Available for some time
- New in version 21.1
- New in version 22.0

| Regulation | Year            | Loadcase/Workflow        | PRIMER                              | T/HIS | D3PLOT | REPORTER<br>(migrated to<br>workflows) | REPORTER<br>(standard<br>template) |
|------------|-----------------|--------------------------|-------------------------------------|-------|--------|----------------------------------------|------------------------------------|
| Euro NCAP  | 2024            | Far Side Sled            | ●                                   | ●     |        | ●                                      |                                    |
|            |                 | MPDB Occupant            | ●                                   | ●     |        | ●                                      |                                    |
|            |                 | VTC Quality Criteria     | ●                                   | ●     |        | ●                                      |                                    |
|            |                 | VTC Videos               | ●                                   |       | ●      | ●                                      |                                    |
|            |                 | LS-DYNA to ISO-MME       | ●                                   | ●     |        | ●                                      |                                    |
|            |                 | SimVT                    |                                     | ●     |        | ●                                      |                                    |
|            | 2026<br>(Draft) | Front Sled               | Early access – available on request |       |        |                                        |                                    |
|            |                 | FWDB Full Vehicle        |                                     |       |        |                                        |                                    |
|            |                 | VTC Quality Criteria     | ●                                   | ●     |        | ●                                      |                                    |
|            |                 | VTC HBM Quality Criteria | ●                                   | ●     |        | ●                                      |                                    |
|            |                 | SimVT                    | Early access – available on request |       |        |                                        |                                    |

# Latest Protocol Support

Automotive Assessments Workflow

- Available for some time
- New in version 21.1
- New in version 22.0

| Regulation  | Year         | Loadcase/Workflow | PRIMER | T/HIS | D3PLOT | REPORTER<br>(migrated to<br>workflows) | REPORTER<br>(standard<br>template) |
|-------------|--------------|-------------------|--------|-------|--------|----------------------------------------|------------------------------------|
| Global NCAP | 2022         | MDB               | ●      | ●     |        | ●                                      |                                    |
|             | 2023         | ODB               | ●      | ●     |        | ●                                      |                                    |
|             | 2024         | Side Pole         | ●      | ●     |        | ●                                      |                                    |
| GTR         | 2019         | Leg Impact        |        |       |        |                                        | ●                                  |
|             | 2020         | Head Impact       |        |       |        |                                        | ●                                  |
| IIHS        | 2017         | MDB               | ●      | ●     | ●      |                                        |                                    |
|             |              | ODB               | ●      | ●     |        |                                        |                                    |
|             |              | SOB               | ●      | ●     |        |                                        |                                    |
|             | Continued... |                   |        |       |        |                                        |                                    |

# Latest Protocol Support

Automotive Assessments Workflow

- Available for some time
- New in version 21.1
- New in version 22.0

| Regulation | Year | Loadcase/Workflow  | PRIMER | T/HIS | D3PLOT | REPORTER<br>(migrated to workflows) | REPORTER<br>(standard template) |
|------------|------|--------------------|--------|-------|--------|-------------------------------------|---------------------------------|
| IIHS       | 2021 | MDB                | ●      | ●     | ●      | ●                                   |                                 |
|            |      | MDB Structure Only |        |       |        | ●                                   |                                 |
|            |      | ODB                | ●      | ●     |        | ●                                   |                                 |
|            |      | ODB Structure Only |        |       |        | ●                                   |                                 |
|            |      | SOB                | ●      | ●     |        | ●                                   |                                 |
|            |      | SOB Structure Only |        |       |        | ●                                   |                                 |
|            | 2024 | MDB                | ●      | ●     |        | ●                                   |                                 |
|            |      | MDB Structure Only |        |       |        | ●                                   |                                 |
|            |      | SOB                | ●      | ●     |        | ●                                   |                                 |
|            |      | SOB Structure Only |        |       |        | ●                                   |                                 |

# Latest Protocol Support

Automotive Assessments Workflow

- Available for some time
- New in version 21.1
- New in version 22.0

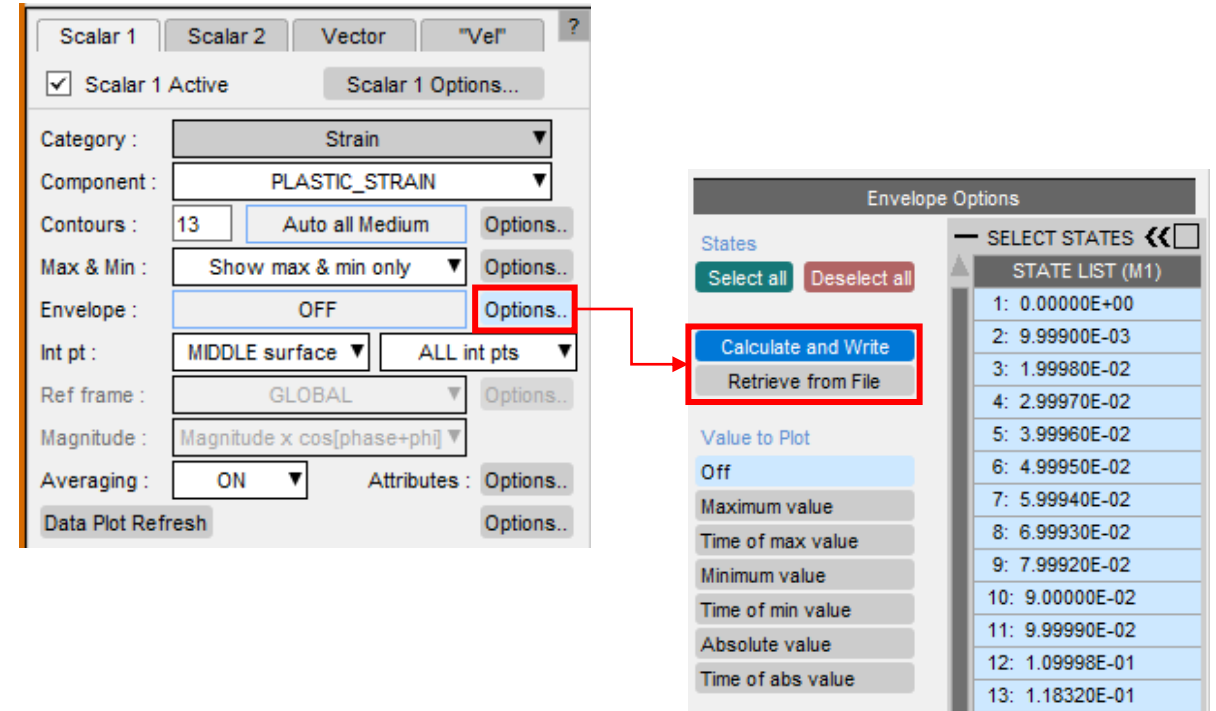
| Regulation | Year | Loadcase/Workflow | PRIMER | T/HIS | D3PLOT | REPORTER<br>(migrated to workflows) | REPORTER<br>(standard template) |
|------------|------|-------------------|--------|-------|--------|-------------------------------------|---------------------------------|
| JNCAP      | 2018 | Leg Impact        |        |       |        |                                     | ●                               |
|            | 2023 | FFB               | ●      | ●     |        | ●                                   |                                 |
|            |      | MDB               | ●      | ●     |        | ●                                   |                                 |
|            |      | ODB               | ●      | ●     |        | ●                                   |                                 |
| KNCAP      | 2019 | Leg Impact        |        |       |        |                                     | ●                               |
|            | 2024 | FFB               | ●      | ●     |        | ●                                   |                                 |
|            |      | MDB               | ●      | ●     |        | ●                                   |                                 |
|            |      | Side Pole         | ●      | ●     |        | ●                                   |                                 |
| UN ECE     | 2015 | R135 (Side Pole)  | ●      | ●     |        | ●                                   |                                 |
|            | 2022 | R94 (ODB)         | ●      | ●     |        | ●                                   |                                 |
|            | 2023 | R95 (Side MDB)    | ●      | ●     |        | ●                                   |                                 |
|            |      | R137 (FFB)        | ●      | ●     |        | ●                                   |                                 |

# Speed and Performance

# Envelope Data

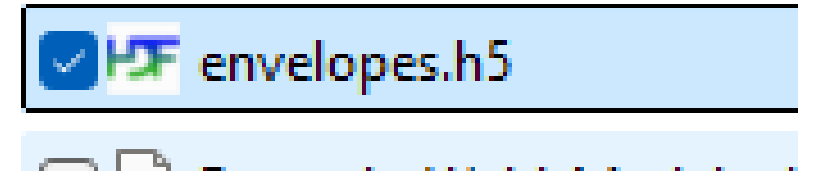
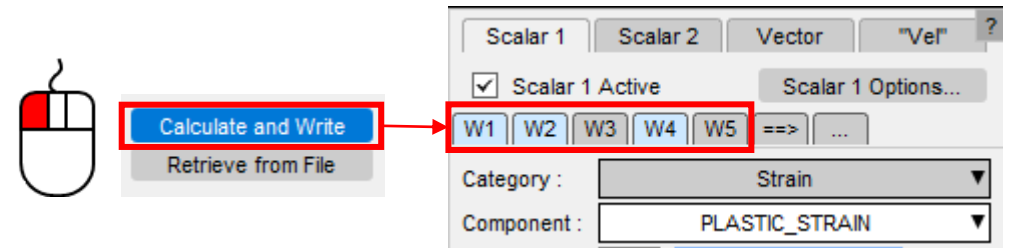
# Saving and Retrieving Envelope Data

- An envelope plot is a contour plot of data across all (or several selected) states in a model – typically used to check the maximum values that have occurred across the duration of a simulation.
- We've recognised that sometimes envelope plots can take a while to calculate because of the size of a model.
- D3PLOT now has the capability to save and retrieve enveloped data. This means that once you have computed the envelope plot, you can save and retrieve it for rapid reuse later in the session or in future sessions.
- Retrieving a saved envelope plot is many, many times faster than computing it from scratch.



# Saving an Envelope – Interactive

- Upon clicking the “Calculate and Write” button, D3PLOT will loop through all currently active windows as designated by the data panel window selection.
- Any windows that are active and have models which have components that are valid for enveloping will automatically be calculated and the envelope data will be placed within an *envelopes.h5* file within the respective model results directory.

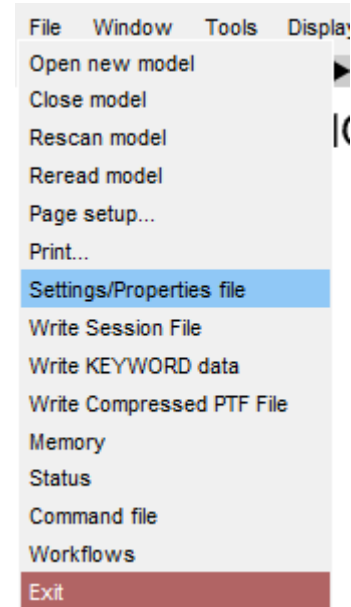


# Saving an Envelope – Batch

- To save time, you can write the envelope data as a batch process – for example, as a step to complete automatically at the end of your LS-DYNA run.
- You will first require a Settings file:
  - For each envelope plot, create a unique Window in your D3PLOT session, add the same model to each, and configure the envelope plot.
  - Write a Settings file from the File menu.
- Then for a given run you can issue the following command:

```
<install-dir>/d3plot22_x64.exe -d=batch -env_out  
-set="<settings file path>/d3plot001.set"  
"model_path/model_filename.d3plot"
```

- When the **-env\_out** command is issued, it will flag all the components you had setup in the settings file to automatically calculate the envelope data and then write to the corresponding model's path with the "envelopes.h5" file.



# Saving an Envelope – Limitations

- The batch mode currently has the limitation that each settings file should contain a single model. For multiple LS-DYNA runs you will have to loop each \*.d3plot/\*.ptf output with the same settings file.
- Currently, the batch mode can only output envelopes across all states rather than over a selected subset of states.
- Currently, envelope data is always written to an *envelopes.h5* file in the results directory. In future versions, we will aim to make output directory and filename more flexible.

# Retrieving an Envelope

- Upon clicking Retrieve from File and selecting your file you will be greeted with a list of the envelopes saved within it.
- Hovering a Data Component will give you more context about the envelope data:

Calculate and Write

Retrieve from File

Retrieve Envelopes

Cancel Empty List Apply Map or choose models

Browse for a HDF5 (\*.h5) file

|                                     | Envelope Name | Data Component (Hover for more details) | Model pathname of original model                          | Map envelope to model |
|-------------------------------------|---------------|-----------------------------------------|-----------------------------------------------------------|-----------------------|
| <input checked="" type="checkbox"/> | envelope_1    | VON_MISES_STRESS                        | C:\Users\Jonathan.Moxey\Desktop\models\post172\crush4.ptf | M1 : DEMO             |
| <input type="checkbox"/>            | envelope_2    | YZ_SHEAR_STRESS                         | C:\Users\Jonathan.Moxey\Desktop\models\post172\crush4.ptf | M1 : DEMO             |
| <input type="checkbox"/>            | envelope_3    | QXZ_SHEAR_FORCE                         | C:\Users\Jonathan.Moxey\Desktop\models\post172\crush4.ptf | M1 : DEMO             |
| <input type="checkbox"/>            | envelope_4    | INTERNAL_ENERGY_DENS                    | C:\Users\Jonathan.Moxey\Desktop\models\post172\crush4.ptf | M1 : DEMO             |
| <input type="checkbox"/>            | envelope_5    | MASS                                    | C:\Users\Jonathan.Moxey\Desktop\models\post172\crush4.ptf | M1 : DEMO             |

Integration Point: MIDDLE surface

On plan/ solid integration point: ALL int pts

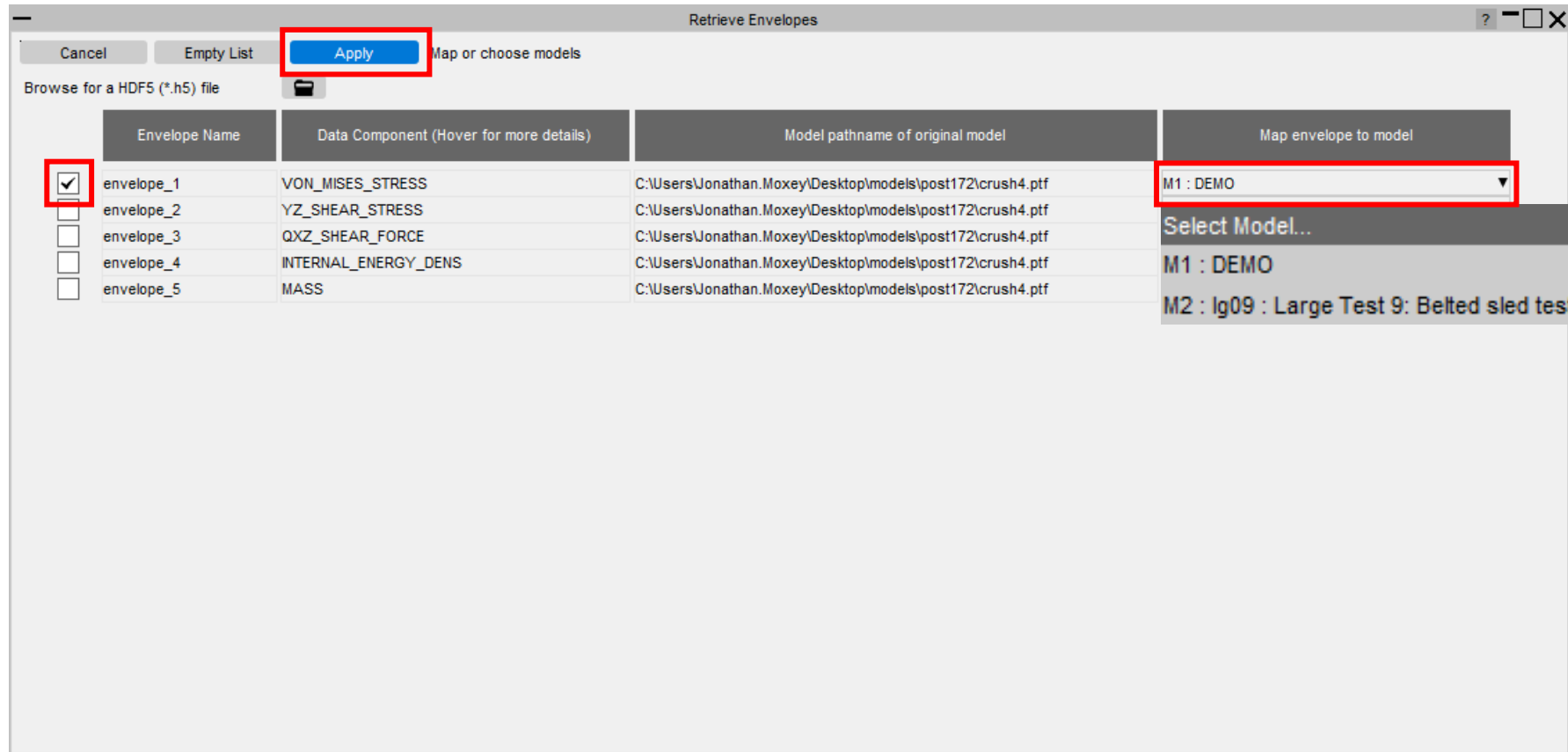
Reference Frame: Global

States: 7 selected

States: 1-7

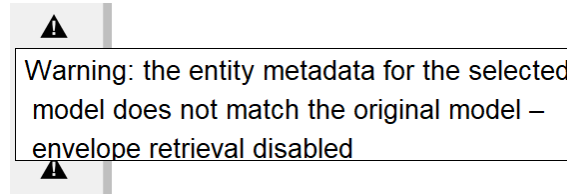
# Retrieving an Envelope (continued)

- You can then map this data onto another model present in your session that corresponds to the model it was saved from:

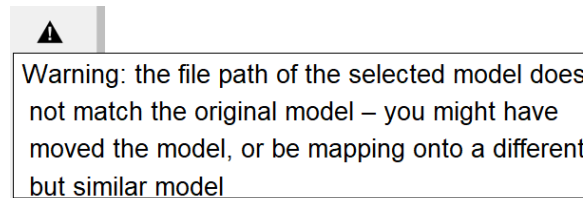


## Retrieving an Envelope (continued)

- If the model you're trying to map onto does not match the model data from the envelope that you have saved, you will not be able to retrieve the envelope onto it
- This could either be missing entity metadata (e.g. a different number of elements) where you are **not** permitted to read.



- Or it could be that you have moved the envelope file or model to a different directory, but you **will** be permitted to read.



# Data Plots

# Data Plot Refresh Options

- Large models can take a long time to update, so by default, D3PLOT doesn't automatically refresh data plots when you make changes in the Data menu.
- A new panel has been added that allows you to control when data plots are refreshed automatically:
  - For models smaller than a certain size (number of nodes)
  - When you change specific settings
  - When envelope plots are active
- If the automatic refresh options are deactivated and a manual refresh is required, click the "Data Plot Refresh" button.

The screenshot shows the 'Scalar 1 Options' panel in D3PLOT. The 'Data Plot Refresh' button is highlighted with a red rectangle. Below it is the 'Data Plot Refresh Options' panel, which contains a list of settings that can be toggled for automatic refreshing.

| Data Plot Refresh Options |                                                              |
|---------------------------|--------------------------------------------------------------|
| Max Model Size (#nodes)   | 1000000 <input type="checkbox"/> Help                        |
| Refresh on Change         | <input type="checkbox"/> Update on Envelope                  |
| All Settings              | <input checked="" type="checkbox"/> <input type="checkbox"/> |
| Component                 | <input type="checkbox"/>                                     |
| Contours                  | <input type="checkbox"/>                                     |
| Max/Min                   | <input type="checkbox"/>                                     |
| Envelope                  | <input type="checkbox"/>                                     |
| Int Pt                    | <input type="checkbox"/>                                     |
| Ref Frame                 | <input type="checkbox"/>                                     |
| Magnitude                 | <input type="checkbox"/>                                     |
| Averaging                 | <input type="checkbox"/>                                     |
| Opacity                   | <input type="checkbox"/>                                     |
| Scalar/Vector Active      | <input type="checkbox"/>                                     |

100M+ Element Models

# Improvements for very large models

We have had the opportunity to work on a gigacasting project featuring a model with 330 million elements and 70 million nodes.

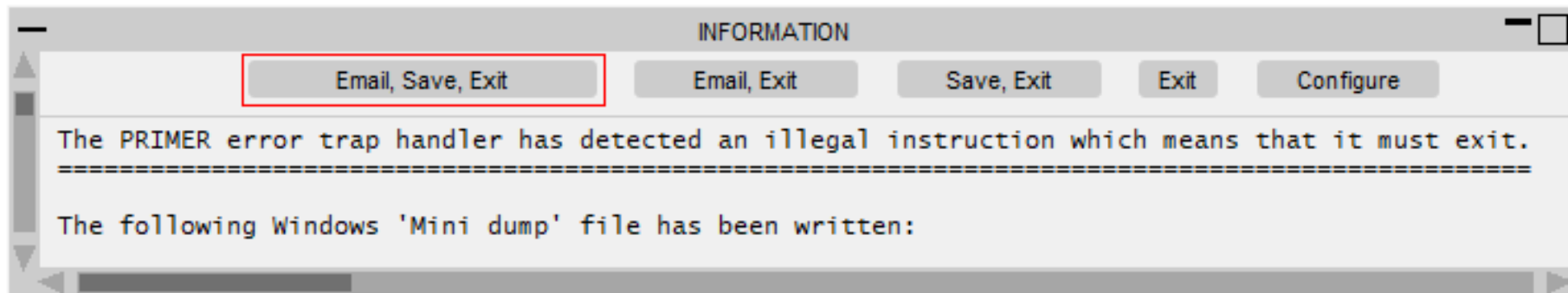
This presented problems because the lengths of some data vectors exceeded the  $\sim 2.147\text{e}9$  limit ( $2^{31}-1$ ) imposed by 32-bit signed integer arithmetic, with the result that some internal calculations overflowed.

In D3PLOT 22, those limits have been removed by substituting 64-bit arithmetic and models of this size are now processed successfully.

# Email Minidump Files

# Windows Minidump files can now be emailed

- Following a crash on Windows a “minidump” file is created which, if sent, can sometimes enable us to diagnose the cause of the crash, suggest workarounds and fix the bug. Historically this file has been written to an obscure temporary directory making it laborious to extract and send it.
- D3PLOT can now:
  - Compose an email automatically, attaching the minidump file.
  - Include further information about the crash (stack trace) in that email.
  - Launch the default email handler on the system so that you can add further information if you wish.
- This email is ***not*** sent automatically, you can choose to send it or not.
- Composition of these emails is optional; they can be turned off.



# Email Minidump Files (continued)

- Minidump files and crash handling generally can be configured by preferences, but to make this easier there is now an interactive GUI which can be used to control this behaviour:



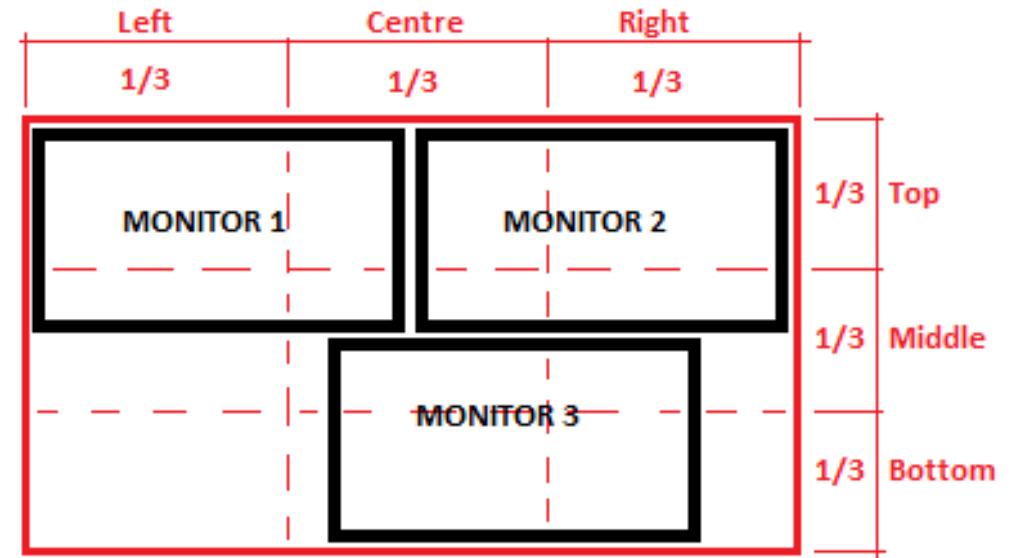
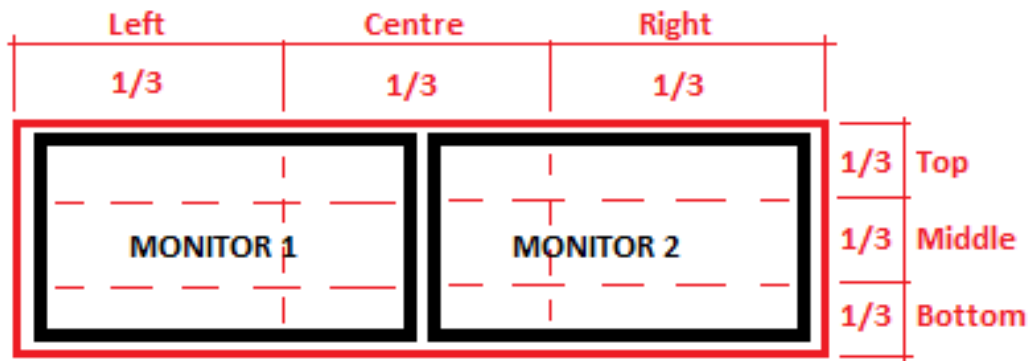
- Crash dump behaviour can also be configured at the “admin” or “installation” levels during software installation, configuring it for all users.

A screenshot of a 'Crash handling and configuration' dialog box. The dialog has a title bar with a question mark icon and standard window controls. It contains several sections with 'Explain' buttons. The 'Action to be taken after a crash' section has four radio button options: 'Minidump file and exit' (selected), 'Trap and continue', 'Trace and exit', and 'No action'. The 'Preference files to update' section has checkboxes for 'ADMIN directory', 'INSTALL directory', and 'User's HOME directory' (checked), along with 'Lock at ADMIN level' and 'Lock at INSTALL level'. The 'Code(s) to configure' section has a checked 'All Modion products' checkbox and checkboxes for 'PRIMER', 'D3PLOT', 'T/HIS', 'REPORTER', and 'SHELL'. The 'Minidump files' section has a checked 'Save minidump files' checkbox and a 'Default' radio button with a file path 'C:\Users\ALASDA~1.PAR\AppData\Local\Temp\'. The 'Feedback email details' section has a checked 'Compose emails' checkbox, a 'Test email' button, and text fields for 'To address' (filled with 'dyna.support@arup.com') and 'Cc address(es)'. The 'Email method' section has a 'Best effort' radio button selected and a text field for 'Outlook CLI' containing 'C:\Program Files\Microsoft Office\root\Office16\OUTLOOK.EXE'.

# Initial Window Placement

# Initial Window Placement

- On a multi-monitor desktop, the “placement” preference can be used to select which of multiple monitors on a desktop the master D3PLOT window starts in. Previously this was always the main display window. The bounding box (red) around the monitors (black) that make up the desktop in pixel space which is divided into 1/3rds. For example:



The preference value may be a combination of  
**LEFT | CENTRE | RIGHT**  
and / or  
**TOP | MIDDLE | BOTTOM**

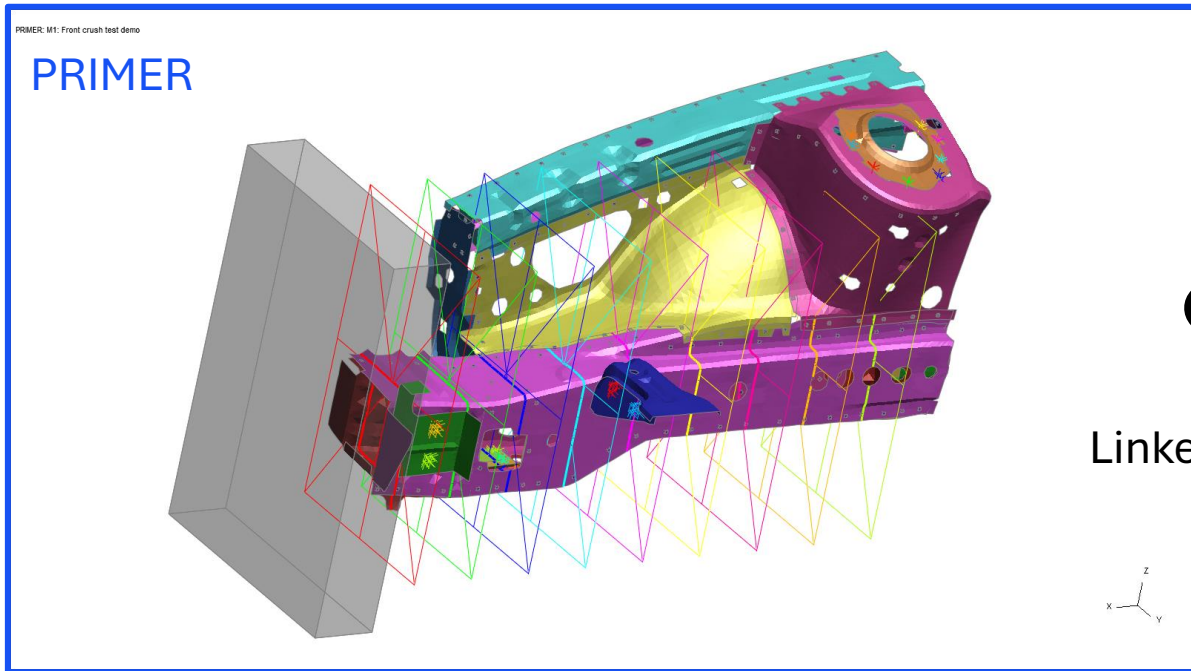
The monitor nearest to the centre of that 1/3rd sub-area is used.

# Flexible Automation and Integration

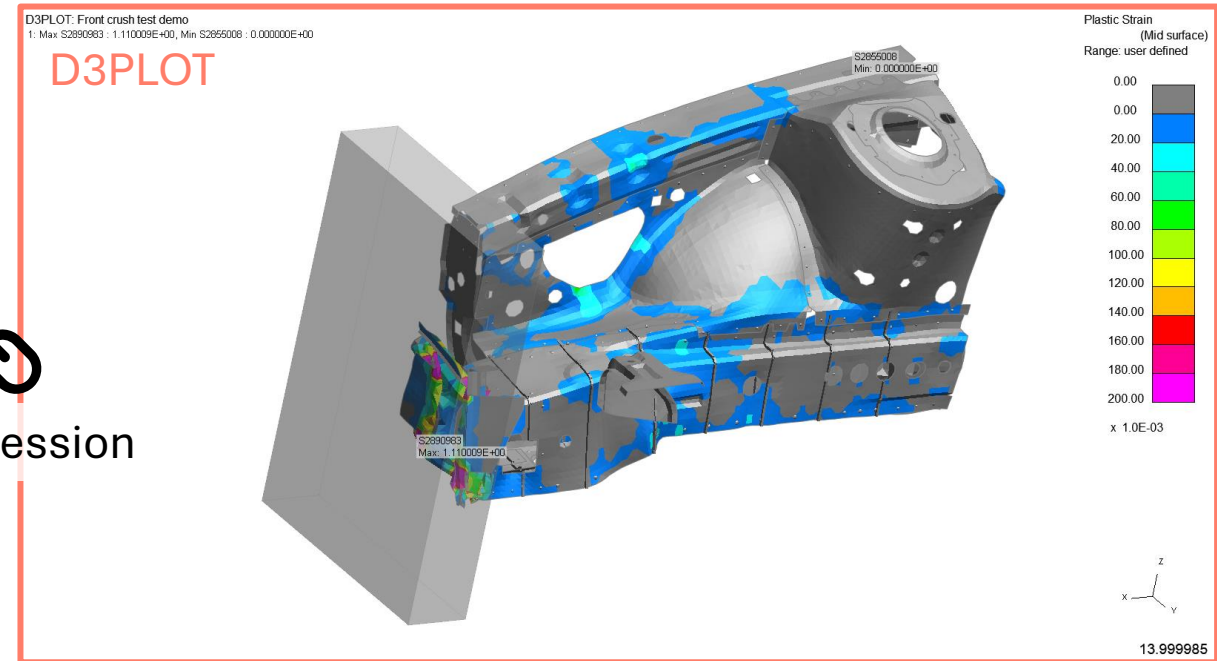
# D3PLOT-PRIMER Integration

# Linked PRIMER Session Blanking Lock Behaviour

- D3PLOT now preserves the blanking **Lock** status when an Unblank action is carried out in linked PRIMER sessions (and vice versa).



Linked session



# JavaScript API

# JavaScript API

- It is no longer necessary to specify the memory required when running a script. The memory is now automatically increased as required.
- The **GetAll** and **GetFlagged** methods available for several classes can now take an optional argument, which is a property from the object to return in the array, instead of the object itself.
- The following has been added to the Part class:
  - A **composite** property which returns true if the Part is a \*PART\_COMPOSITE
  - A **nip** property to get the number of integration points in a \*PART\_COMPOSITE
  - A **GetCompositeData()** method to get the Material ID and Thickness at a specified integration point in a \*PART\_COMPOSITE

# JavaScript API

- The function assigned to the Window **onClose** event can now return false to prevent the window closing if required.
- **GetTargetEye** and **SetTargetEye** instance methods have been added to the **GraphicsWindow** class to enable getting/setting the target and eye position.

# Python API

# Python API

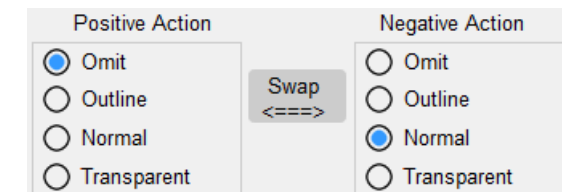
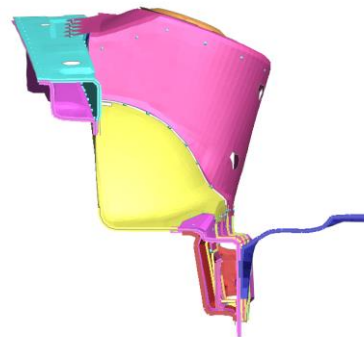
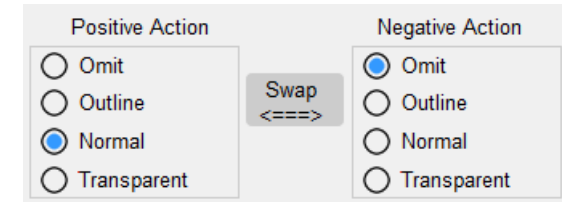
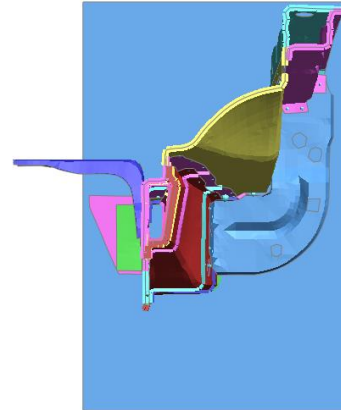
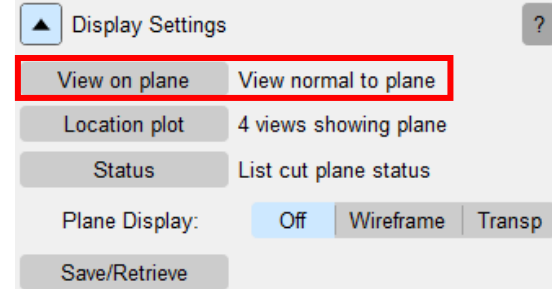
- The **GetAll** and **GetFlagged** methods available for several classes now work for very large lists. In version 21 there was a limit of ~300,000 items.
- Similarly, the **GetMultipleData** method for several classes also had a limit which has now been removed.

# Other Developments and Preferences

# Cut Sections

# View on Plane Behaviour

- For Cut Sections, the "View on Plane" button under the Display Settings section now orients to face the most transparent side.
- Priority of transparency: Omit, Outline, Transparent, then Normal.
- For ease of use, the "V" shortcut key (uppercase "V" – lowercase "v" shortcut is for the View menu) now sets the currently active window to "View on Plane".



# Cut Forces Table

- The cut forces table can now be sorted by clicking on column headers similarly to the Write table.

WRITE Table

Dismiss

Save as : C:\models\ACCORD\_56KPH\_FFB\_DEMO\ld3plot001.txt

Save

Select All

Select None

Write : All

Format : Text

| Model | Window | Direction | Offset | Part   | Time        | X Cut Force   | Y Cut Force   | Z Cut Force   | Mag Cut Force | XX Moment     | YY Moment     | ZZ Moment     |
|-------|--------|-----------|--------|--------|-------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| 1     | 1      | 1         | 0.0    | 100213 | 1.20001E-01 | -5.423575E+03 | 3.342152E+03  | 8.399012E+03  | N/A           | -2.741988E+06 | -5.828919E+06 | 5.143698E+05  |
| 1     | 1      | 1         | 0.0    | 100067 | 1.20001E-01 | -8.749117E+02 | -3.173624E+00 | 7.376201E+02  | N/A           | -1.565791E+05 | -6.741361E+05 | -3.863178E+05 |
| 1     | 1      | 1         | 0.0    | 100009 | 1.20001E-01 | -6.046431E+02 | -3.281265E+02 | 3.575662E+02  | N/A           | -1.279910E+05 | 8.170148E+04  | 1.095315E+05  |
| 1     | 1      | 1         | 0.0    | 100320 | 1.20001E-01 | -5.971558E+02 | 3.774984E+00  | 7.382128E+02  | N/A           | 5.587798E+05  | -5.779490E+05 | 4.352366E+05  |
| 1     | 1      | 1         | 0.0    | 100239 | 1.20001E-01 | -5.192515E+02 | -3.467118E+03 | -2.104020E+03 | N/A           | 9.871526E+05  | -1.595096E+06 | 2.424992E+06  |
| 1     | 1      | 1         | 0.0    | 400003 | 1.20001E-01 | -5.138940E+02 | -1.327578E+02 | -3.505966E+01 | N/A           | 1.364306E+04  | -2.726323E+04 | -1.537546E+05 |
| 1     | 1      | 1         | 0.0    | 100109 | 1.20001E-01 | -4.333562E+02 | 7.692681E+02  | 8.913616E+02  | N/A           | 1.817913E+05  | -6.939262E+05 | 4.923005E+05  |
| 1     | 1      | 1         | 0.0    | 400010 | 1.20001E-01 | -3.839746E+02 | -3.753535E+01 | -1.172090E+03 | N/A           | 6.468858E+05  | 1.534707E+05  | -2.314133E+05 |
| 1     | 1      | 1         | 0.0    | 400000 | 1.20001E-01 | -2.793947E+02 | 8.543321E+00  | 7.796779E+02  | N/A           | -6.584674E+03 | -1.434585E+05 | 8.723012E+04  |
| 1     | 1      | 1         | 0.0    | 600056 | 1.20001E-01 | -2.329324E+02 | 1.748479E+02  | 1.651135E+03  | N/A           | -8.576731E+05 | -1.624380E+05 | -2.192976E+05 |
| 1     | 1      | 1         | 0.0    | 550020 | 1.20001E-01 | -1.376559E+02 | -5.249579E+02 | -1.603969E+03 | N/A           | -8.668425E+04 | -2.035400E+04 | 1.341989E+05  |
| 1     | 1      | 1         | 0.0    | 550023 | 1.20001E-01 | -1.255875E+02 | -1.175276E+02 | -2.304759E+02 | N/A           | -1.770217E+05 | -2.489932E+04 | 2.766222E+04  |
| 1     | 1      | 1         | 0.0    | 100077 | 1.20001E-01 | -1.194911E+02 | 1.518446E+02  | -9.122614E+01 | N/A           | -2.090689E+04 | 6.275254E+04  | 1.725499E+05  |
| 1     | 1      | 1         | 0.0    | 100050 | 1.20001E-01 | -1.065623E+02 | 6.501924E+02  | 1.215948E+03  | N/A           | -4.208049E+05 | 9.401897E+05  | -5.383864E+05 |
| 1     | 1      | 1         | 0.0    | 100332 | 1.20001E-01 | -8.498953E+01 | -4.950859E+02 | 1.633163E+03  | N/A           | 1.066205E+06  | 9.818324E+05  | 3.554444E+05  |
| 1     | 1      | 1         | 0.0    | 550022 | 1.20001E-01 | -5.818669E+01 | 2.501112E+02  | 6.567514E+02  | N/A           | 1.996697E+05  | -4.432918E+05 | 7.645319E+04  |

Cut Sections

Cutting switch: ON

Deformed space

Direction: ☒ ☐ ☐

Drag (D)

<= ?

D1

D2

D3

Constant X

X coordinate: -683.15

Pick Node (N)

Cancel Pick

Section follows origin node

Positive Action

Negative Action

Thick cut

Thickness: 55.9

Multiple cuts

Custom spacing

Spacing: 111.7

# planes +/-: 999 999

Transparency Settings

Element Capping and Outline

Entities to exclude

Output Forces

Forces...

System: Local (def)

Write to File

tCrushDemo\sectforce001.csv

Display section force summary

(Summary forces turned off)

Exclude Solid SPG Parts From Forces

Display Settings

Options & Tuning

# New preferences

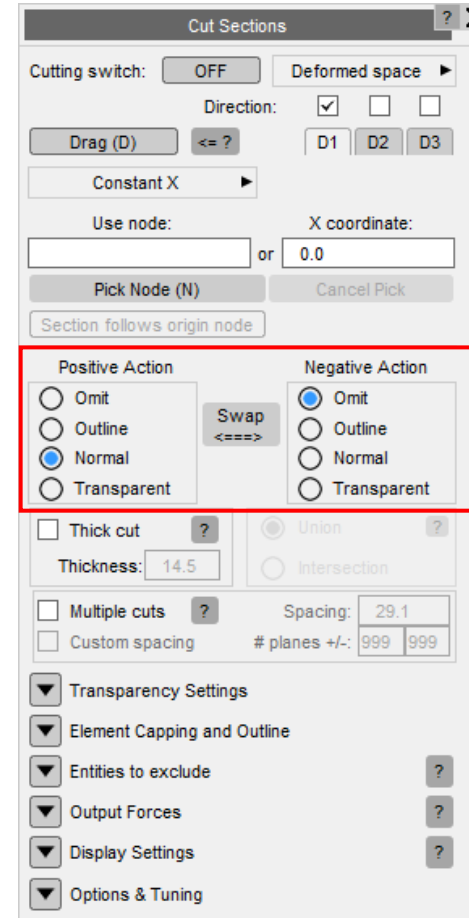
- There are now preferences

`d3plot*cut_section_pos_action`

and

`d3plot*cut_section_neg_action`

for positive and negative actions of cut sections.



# Eigenmode Magnification

# Eigenmode Magnification Controls

- New controls to modify eigenmode model (d3eigv, Nastran, and OptiStruct) magnification factors after they have been read in have been added to the Deform → Magnify panel.
- Both absolute and percentage factors can be set, just like in the OPEN PLOT FILE menu.
- Note that the magnification value specified in this panel overrides the value set in the OPEN PLOT FILE panel. The two values are not applied to the model in a compound way.

Displacement Magnifications

Fx: 1.00 Fy: 1.00 Fz: 1.00

x 0 x .001 x .01 x .1

Cancel (x1) x 5 x 50 x 500

x 10 x 100 x 1000

Auto 15.0 % ?

Factor on Curr

1.00

Magnification Text Display Options:

Magnification Switch

Format Automatic

Exponent 3

Dec. Plac 3

Eigenmode Magnification Factor:

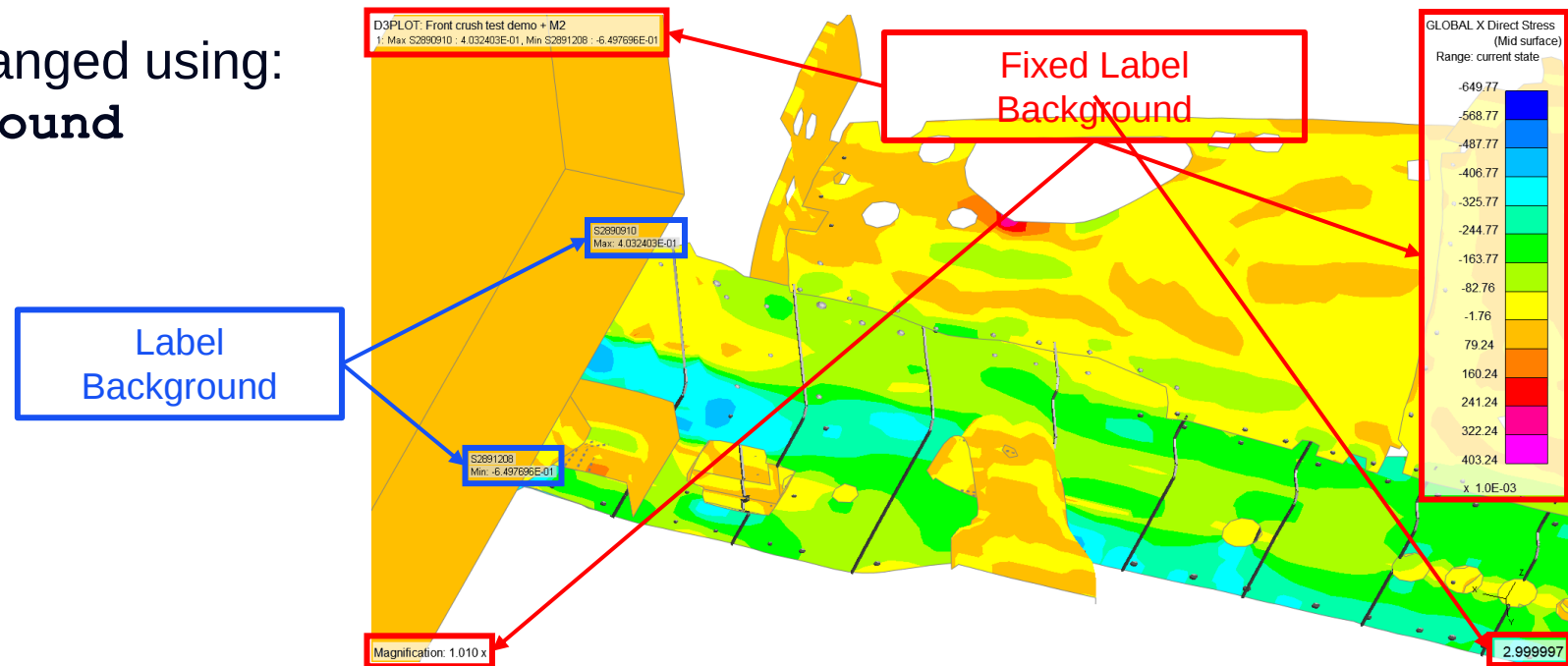
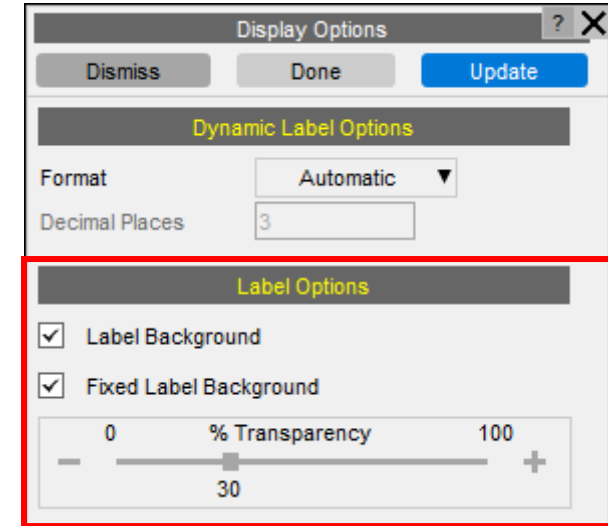
☐ Absolute 1.00 Explain

☒ Percent 15.0

# Label Background

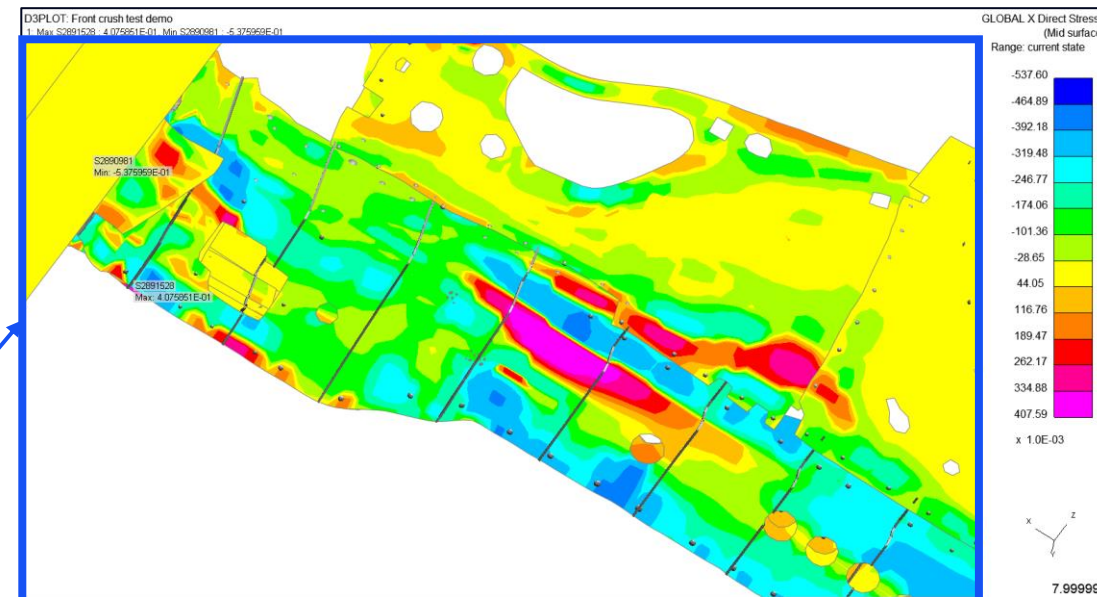
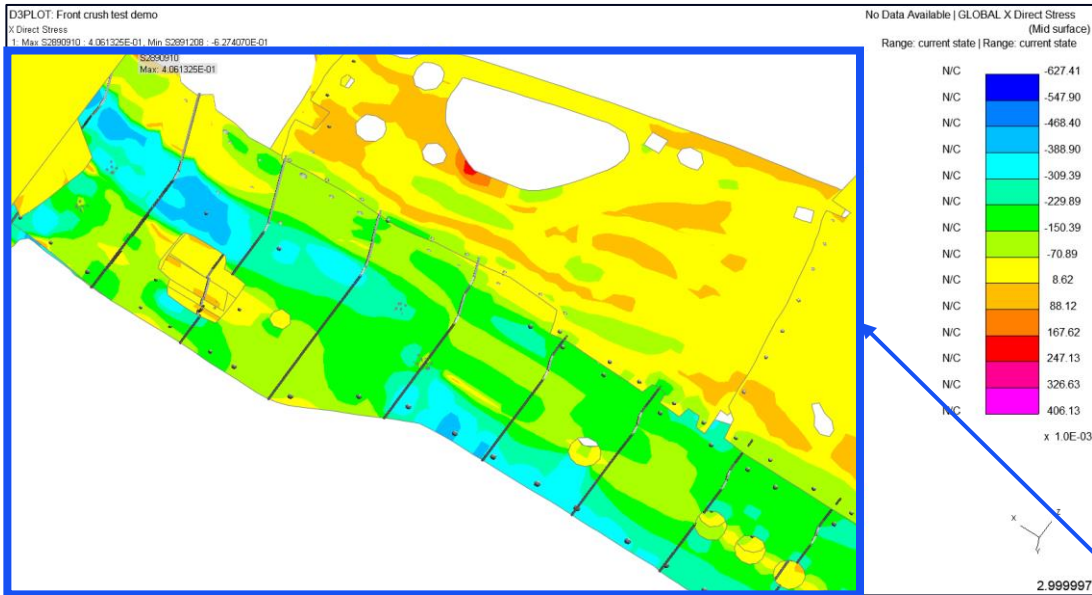
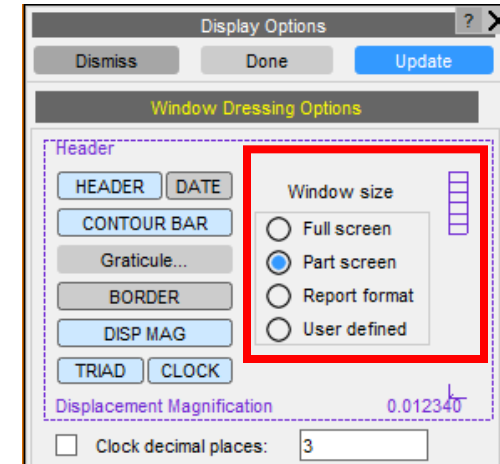
# Label Background

- New “Fixed Label Background” option in **Display Options** → **Label Options** maps a background to increase legibility of fixed labels that do not move with the model.
- This includes header, clock, contour bars, deform factor and any other ‘fixed’ label written in the graphics area.
- Additionally, an option is given to adjust the transparency of these backgrounds.
- Inactive by default, this can be changed using: `d3plot*fixed_label_background`



# Window Dressing – Part Screen

- Changes have been made to the way **Display Options** → **Window Dressing** → **Window size** → **Part Screen** works.
- The graphics window area in Part Screen mode will now dynamically adjust to the maximum possible available area that can be used without overlapping with the header or the contour bar.
- Full screen by default, this can be changed using: `d3plot*window_mode`



Part Screen  
Graphics Area

# New Preferences

# New preferences

| Preference                                                                    | Description                                                             |
|-------------------------------------------------------------------------------|-------------------------------------------------------------------------|
| <code>oasys*javascript_maximum_memory_size</code>                             | Maximum memory allocated for garbage collection (MB)                    |
| <code>oasys*cd_compose_email</code><br><code>d3plot*cd_compose_email</code>   | Whether or not to offer to compose an email for sending minidump files. |
| <code>oasys*cd_email_address</code><br><code>d3plot*cd_email_address</code>   | Email address in To: field of crash dump emails.                        |
| <code>oasys*cd_cc_addresses</code><br><code>d3plot*cd_cc_addresses</code>     | Email address(es) in Cc: field of crash dump emails.                    |
| <code>oasys*cd_custom_email</code><br><code>d3plot*cd_custom_email</code>     | Custom method of sending emails.                                        |
| <code>oasys*cd_dump_directory</code><br><code>d3plot*cd_dump_directory</code> | Directory in which to save crash dump files                             |
| <code>oasys*cd_email_method</code><br><code>d3plot*cd_email_method</code>     | Method used to create crash dump emails.                                |
| <code>oasys*cd_minidump_file</code><br><code>d3plot*cd_minidump_file</code>   | Whether or not to create minidump files, and what to do with them.      |

# New preferences

| Preference                                         | Description                                                                            |
|----------------------------------------------------|----------------------------------------------------------------------------------------|
| <code>d3plot*cut_section_cap2d_fac2</code>         | True-thickness-constant factor for shell element cut section capping                   |
| <code>d3plot*cut_section_neg_action</code>         | Negative action for cut sections                                                       |
| <code>d3plot*cut_section_pos_action</code>         | Positive action for cut sections                                                       |
| <code>d3plot*cache_data_mode</code>                | How data storage is managed                                                            |
| <code>d3plot*cache_data_limit</code>               | Percentage of memory used at which automatic storage switches to scalar                |
| <code>d3plot*recycle_tensors</code>                | Percentage of memory used at which unused tensor data is evicted from memory           |
| <code>d3plot*data_refresh_max_model_size</code>    | Maximum number of nodes allowable for any model in any window for an immediate refresh |
| <code>d3plot*data_refresh_max_model_size_on</code> | When TRUE, enable the max model size (#nodes) option for immediate refreshes           |
| <code>d3plot*data_update_on_envelope_on</code>     | When TRUE, the plot is updated regardless of the envelope status if needed             |

# New preferences

| Preference                                  | Description                                                                     |
|---------------------------------------------|---------------------------------------------------------------------------------|
| <code>d3plot*data_force_refresh_opts</code> | When set to ALL, all data plot refresh on change settings tick boxes are ticked |
| <code>d3plot*fixed_label_background</code>  | Fixed label background display                                                  |
| <code>d3plot*window_mode</code>             | Controls how the graphics window occupies the screen                            |
| <code>d3plot*cpg_visibility</code>          | CPG (Airbag Continuum-base Particle Gas) visibility                             |
| <code>d3plot*des_visibility</code>          | DES (Discrete Element Sphere) visibility                                        |
| <code>d3plot*sph_visibility</code>          | SPH (Smooth Particle Hydrodynamics) visibility                                  |

# Contact us

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