D3PLOT 16.0

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General

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D3PLOT now supports DCOMP (*DATABASE_EXTENT_BINARY) options 5 and 6 which can be used to reduce the size of the PTF (d3plot) files.

5. Rigid body data compression active and rigid nodal data are eliminated from the database. Only 6 DOF rigid body motion is written.

6. Rigid body data compression active, rigid nodal data, and all nodal velocities and accelerations are eliminated from the database. Only 6 DOF rigid body motion is written.
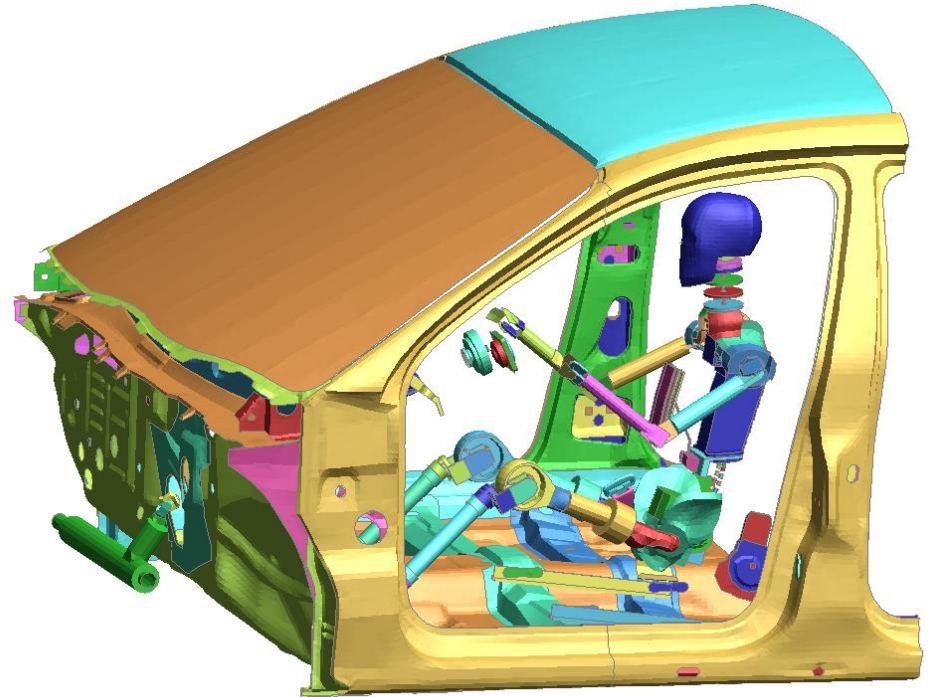
When these options are used, the nodal results (coordinates, velocities, accelerations etc) are not written out to the database for any nodes that are attached only to rigid bodies. Instead LS-DYNA writes an additional block of data containing the following information for each rigid body.

- X,Y, Z coordinates of geometric centre

- Rotation matrix from rigid body principle axes

- Translational and rotational velocities of geometric centre

- Translational and rotational acceleration of geometric centre

Using this information D3PLOT can calculate the position, velocity and acceleration of the nodes and display them as normal.
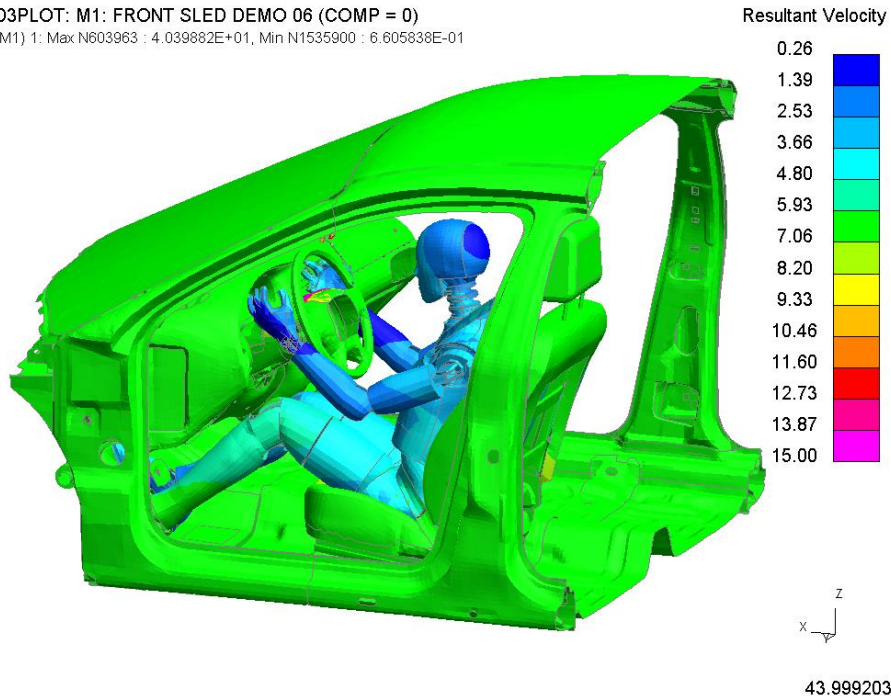
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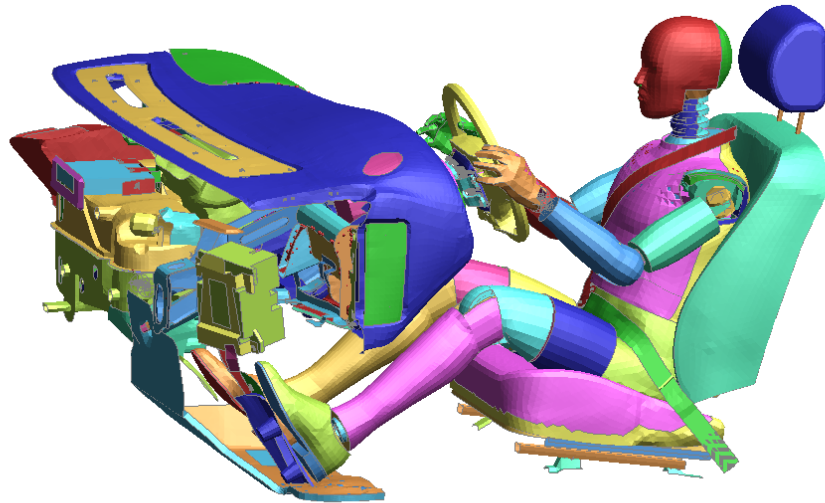
Deformable Parts

Rigid Parts

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D3PLOT: M1: FRONT SLED DEMO 06 (COMP = 0)
(M1) 1: Max N603963 : 4.039882E+01, Min N1535900 : 6.605838E-01

Resultant Velocity

0.26
1.39
2.53
3.66
4.80
5.93
7.06
8.20
9.33
10.46
11.60
12.73
13.87
15.00

43.999203

D3PLOT: M2: FRONT SLED DEMO 06 (COMP = 5)
(M2) 1: Max N603963 : 4.039882E+01, Min N1535900 : 6.605838E-01

Resultant Velocity

0.26
1.39
2.53
3.66
4.80
5.93
7.06
8.20
9.33
10.46
11.60
12.73
13.87
15.00

43.999203

DCOMP = 0
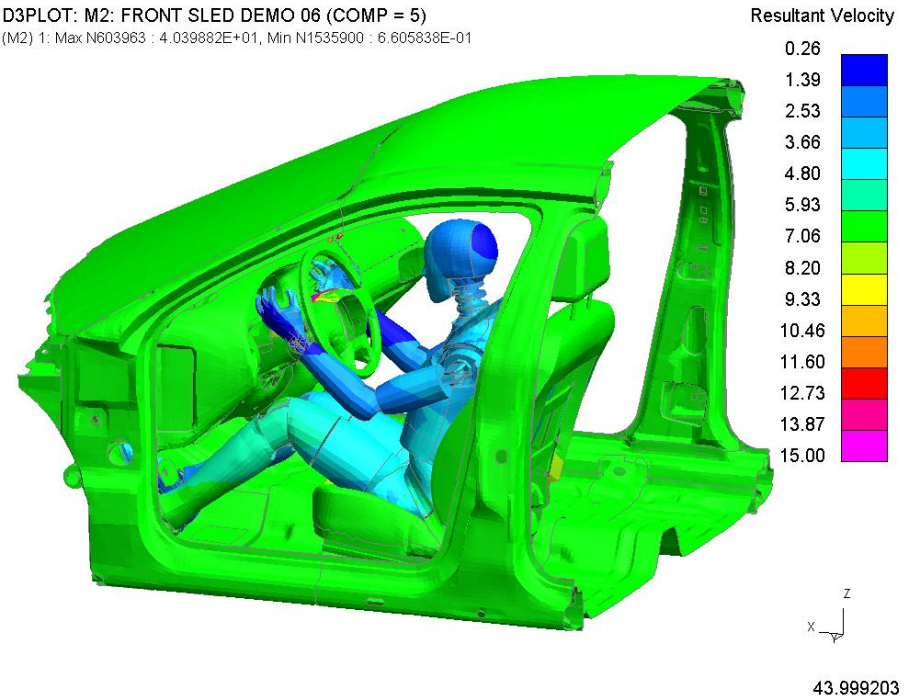
PTF State Size = 52 MB

DCOMP = 5

PTF State Size = 30MB

General – Cut Section Transparency

Cut Sections now have a new 'Transparent' option for drawing either side of a Cut Section. Within this option, there are two drawing modes for colouring the transparent region, namely 'Shaded', which takes the colours from the original colours of the elements in the model, and 'Current', which takes the current colours of the model, such as contours with respect to a data component. The percentage transparency can be adjusted using the slider.
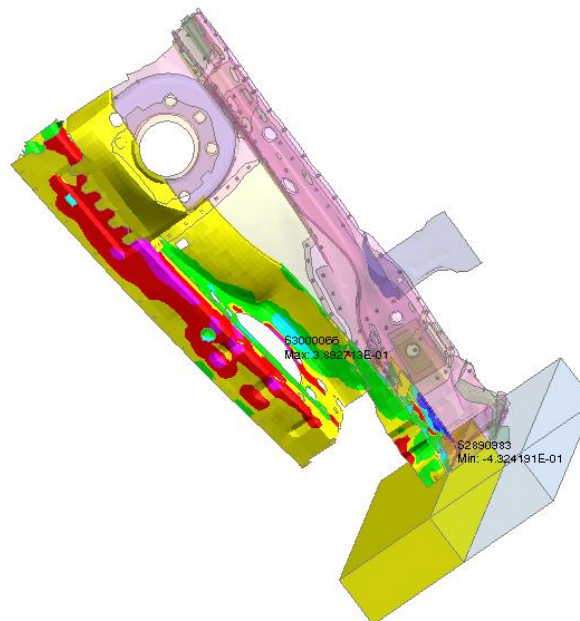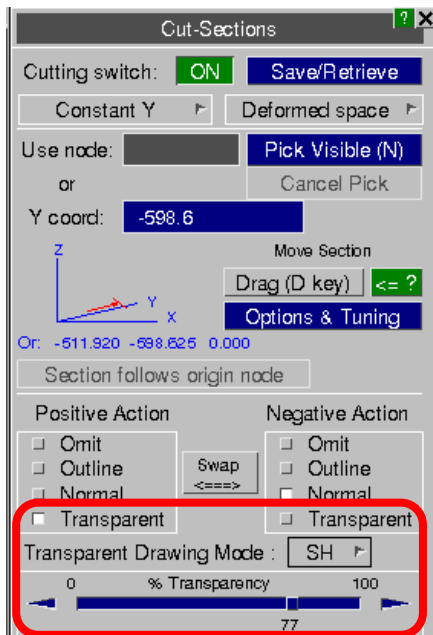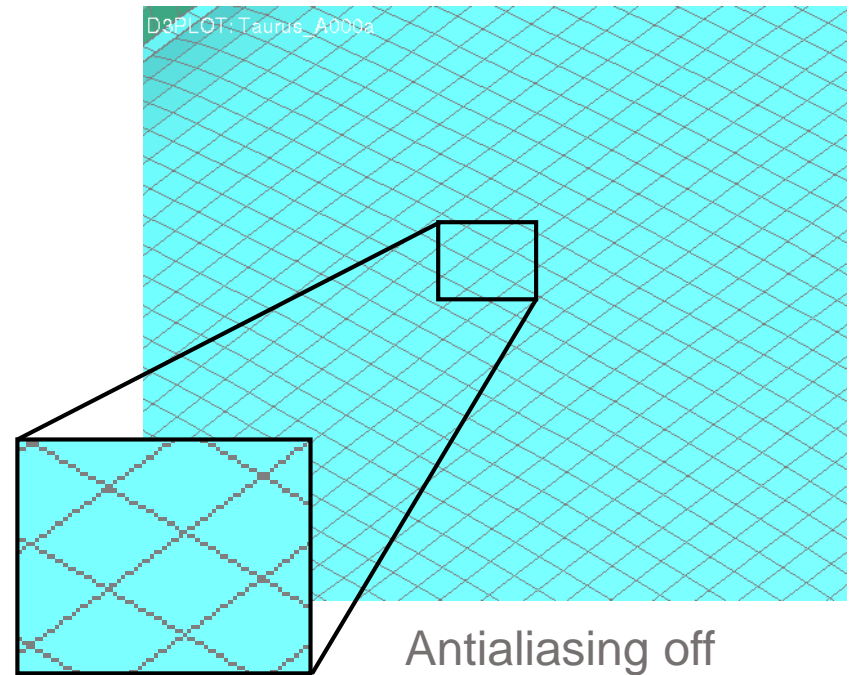

Shaded mode

Current mode

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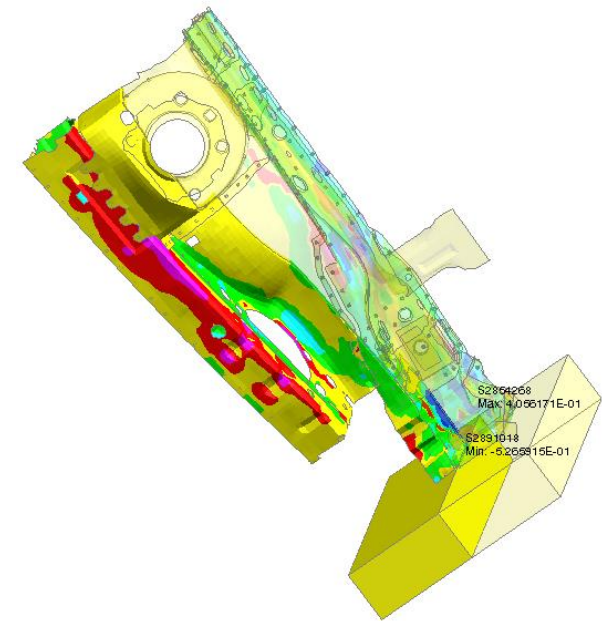
Lines in the D3PLOT graphics window are now antialiased by default, which gives them a smoother look. This can be turned on and off via:

Disp Opt -> Line Options -> Use Antialiased lines

There is also a preference that can be used to turn this on or off by default:

d3plot*line_antialias   ON/OFF

Antialiasing on

Antialiasing off

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Measure

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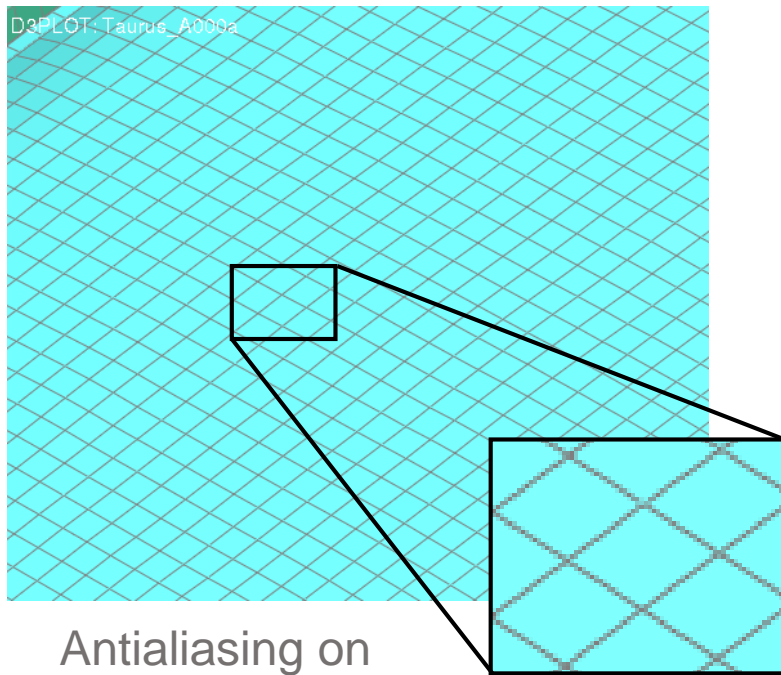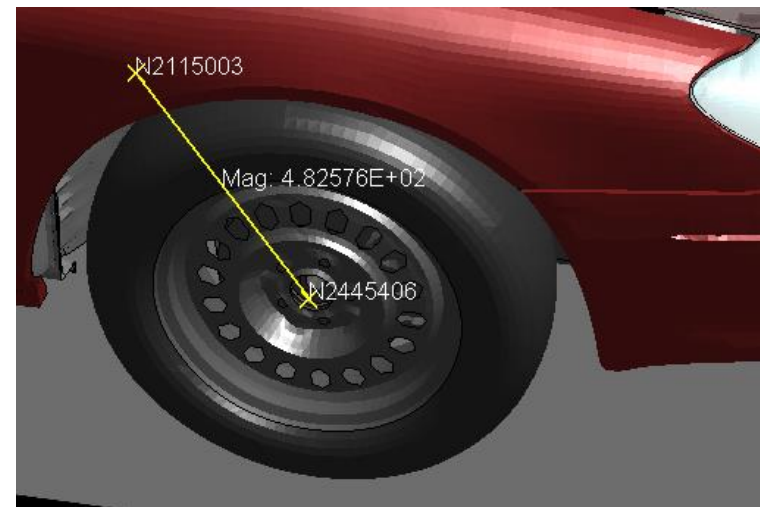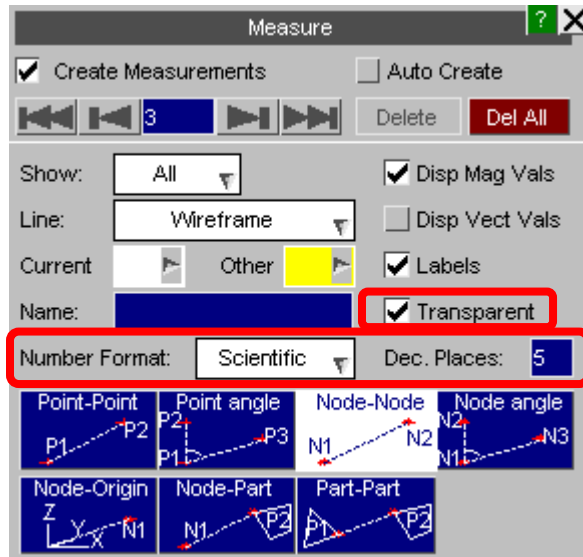
The following options have been added:

- "Transparent" to give the measurement a transparent background.

- "Number Format" to change the format and precision of the displayed measurement.

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Measure – Dialogue Output Changes

Measurement data displayed in the dialogue window is more formatted and more comprehensive.

There is an preference to display the vectors in row format rather than column format.

```
Shortest magnitude vector is between node        6 and element       285
                  Node       El Centre      Distance
       X :  0.00000E+00    4.76837E-07     4.76837E-07
       Y :  4.00000E+01    4.00000E+01     0.00000E+00
       Z : -5.00000E+01   -5.50000E+01    -5.00000E+00
Magnitude :  5.00000E+00
```

Part-to-Part measurement information in the dialogue window

```
Shortest magnitude vector is between node        644 and element      138
                  X            Y            Z
     Node :  3.99521E+01    7.80000E+01     1.23802E+02
El Centre :  1.71010E+01    7.00000E+01     4.69846E+01
 Distance : -2.28511E+01   -8.00000E+00    -7.68171E+01
Magnitude :  8.05422E+01
```
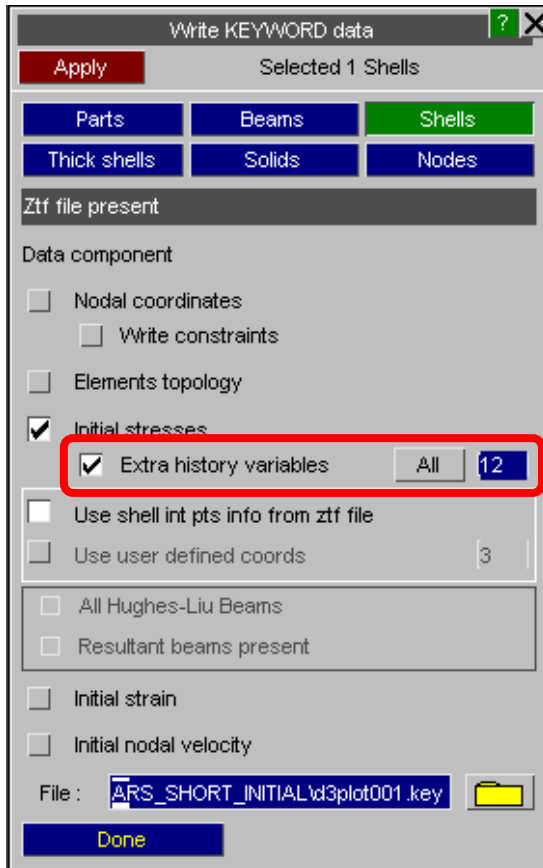
Vectors in row format using
d3plot*measure_dialogue_format_vec_rows: true

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Write

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Write KEYWORD data

Write KEYWORD data can now include extra variables on the *INITIAL_STRESS card

When "Initial stresses" option is ticked, user can select "Extra history variables".

By default all the extra variables present in the ptf file are written, but a reduced number can be specified by the user (here 12 extra variables will be written).

The number of extra variables can be reset to all of the extra variables by pressing "All".

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Write KEYWORD data can now include thickness values on the
*ELEMENT_SHELL_THICKNESS card.

When "Elements topology" is selected
for shell elements the user has the
option to also select "Shell thickness".

If "Shell thickness" is selected
*ELEMENT_SHELL cards will be
written with the _THICKNESS option.
The THIC1 to THIC4 values will be
written based on nodal average values.

The BETA / MCID value is not written,
because this information is not
available to D3PLOT.

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All Volume 3 elements are now supported in the D3PLOT Write menu.

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New Database Files

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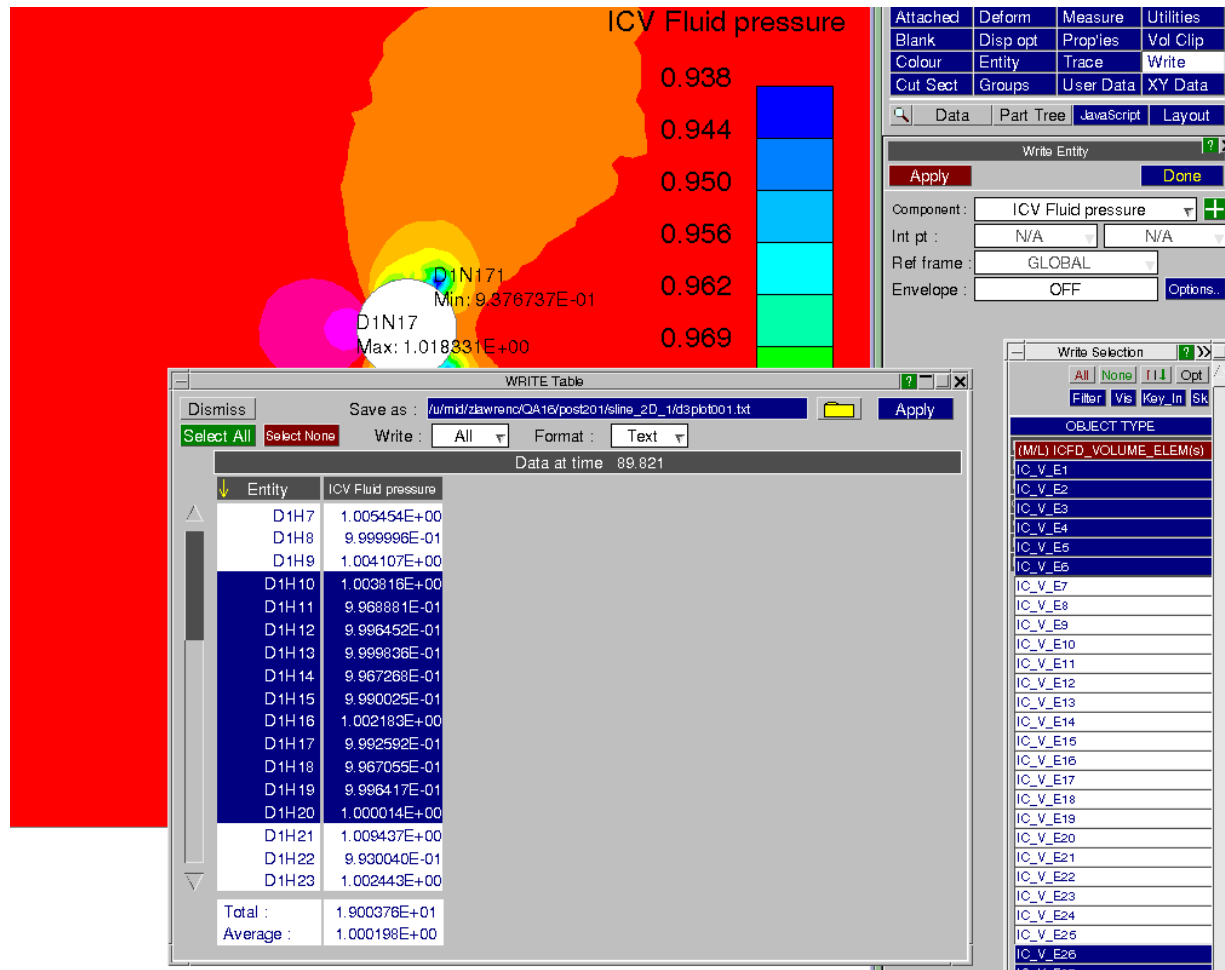
D3PLOT 16 now supports the binary plot file D3ERP which contains ERP (equivalent radiated power) analysis results.

The analysis is activated by the keyword *FREQUENCY_DOMAIN_SSD_ERP

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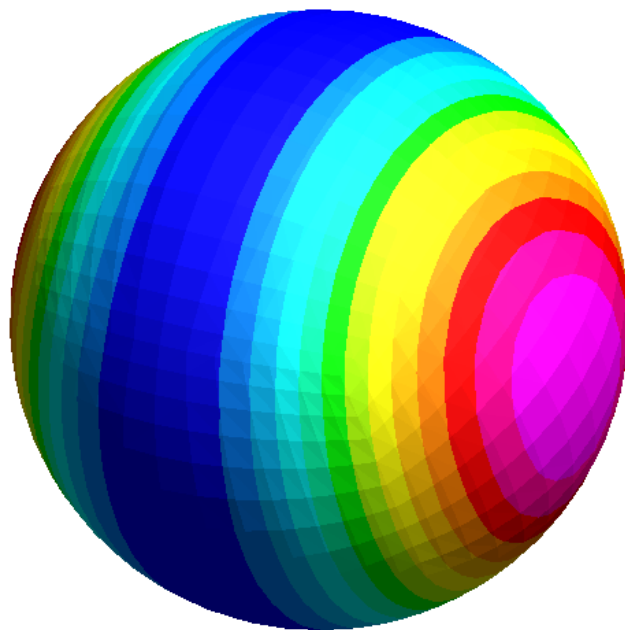
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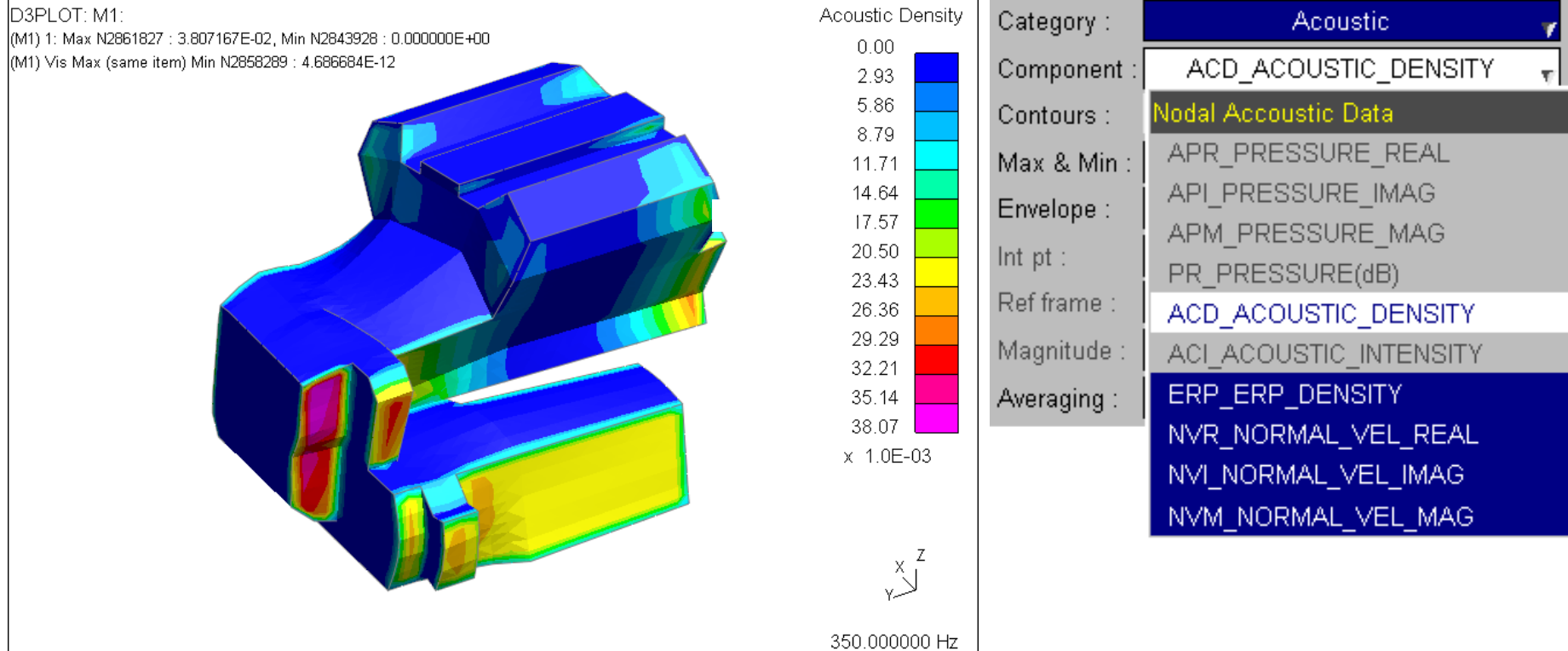
New Database Files – D3ACP

D3PLOT 16 now supports the binary plot file D3ACP which contains pressure at field points in BEM acoustic analysis.

The points are defined using *FREQUENCY_DOMAIN_ACOUSTIC_FRINGE_PLOT.

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D3PLOT 16 now supports the binary plot file D3ACC which contains element acoustic pressure contribution and contribution percentage on selected field.

The output of this file is activated by *DATABASE_FREQUENCY_BINARY_D3ACC.

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New Database Files – D3ZCF

D3PLOT 16 now supports the binary plot file D3ZCF which contains zero-crossing frequencies with positive slope for results from a random vibration analysis.

The output of this file is activated by *DATABASE_FREQUENCY_BINARY_D3CZF.
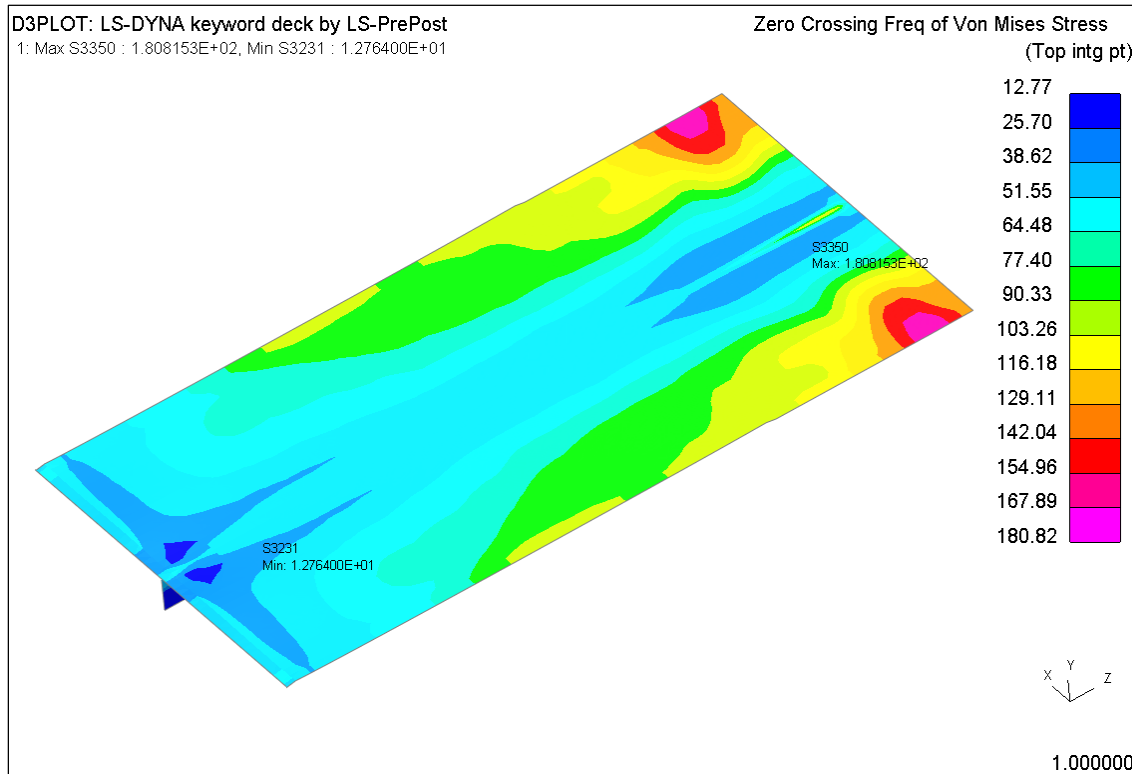
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Data Components

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New Data Components – Strain Energy Density

D3PLOT 16 can now read and display the Strain Energy Density values output to the "d3plot" and "d3eigv" files for Solids, Shells and Thick Shells by setting ISED on *DATABASE_EXTENT_BINARY_COMP.

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D3PLOT 16 can now read and display the Residual Forces and Moments that can be written to the d3iter file by setting D3ITCTL=1 on *CONTROL_IMPLICIT_SOLUTION
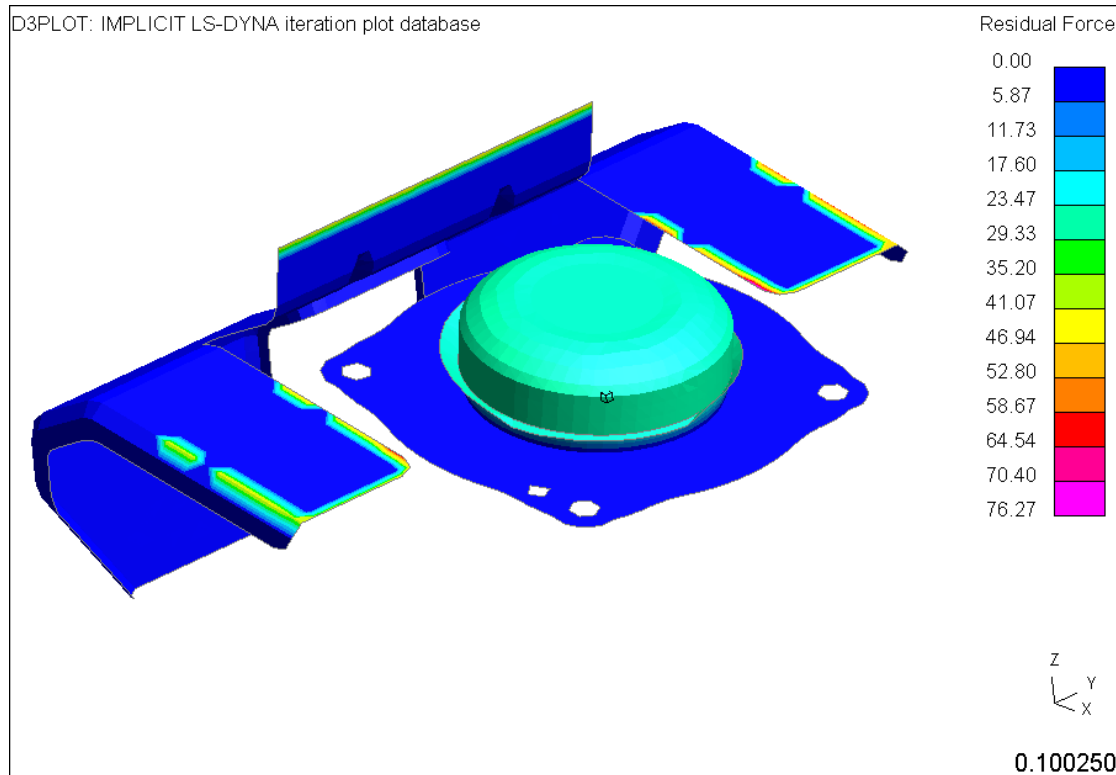
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D3PLOT 16 can display a component that shows whether the surface of a shell that the user can see is in tension or compression. The contour colours on the top and bottom surface of the shell can be different colours, e.g. if the shell is in bending.
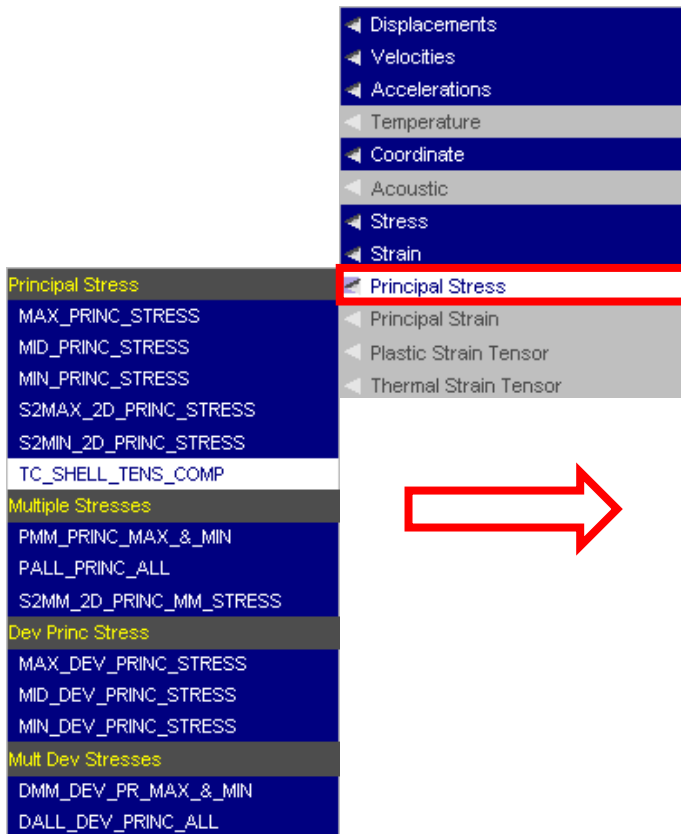
Front and back views of the same part, showing some areas of shells in bending
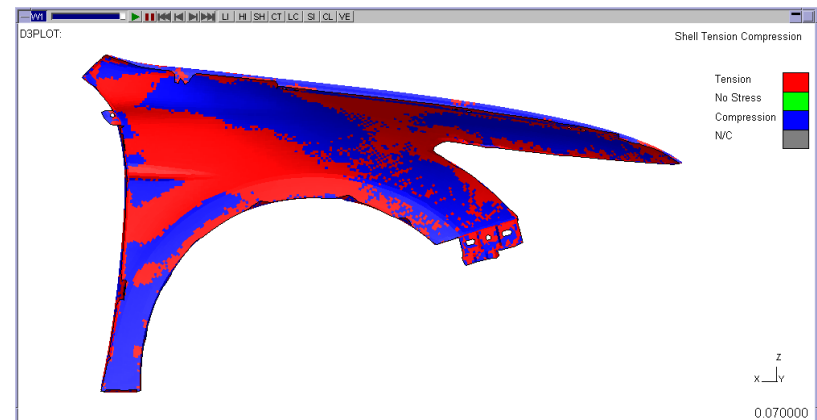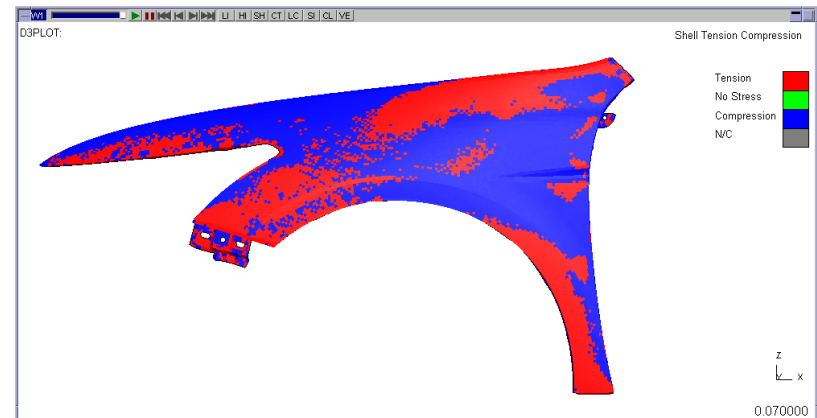
New Data Components – Shell Tension/Compression

The surface of the shell is considered to be in tension if the maximum principal stress is greater in magnitude than the minimum principal stress and vice versa for compression.

If the principal stress values on the shell surface are zero then the shell surface is contoured in green, e.g. at the beginning of an analysis.

If the shell surface cannot be computed then the shell surface is contoured in grey, for example if the number of through thickness integration points output does not include the top surface of the shell.

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Shell Max/Min/Mag Calculation

Max/Min/Mag Calculation for Thin Shells

For elements with no integration point at the mid-surface (even number of 'through thickness' integration points), D3PLOT calculates the mid-surface value by averaging the integration points immediately above and below the mid-surface.

However, in D3PLOT v15.0 MAX/MIN/MAG values were calculated by looping over only the integration points, so the mid-surface value was not included in the calculation. This could give confusing results, for example if the mid-surface value was lower than the MIN value, which could happen with derived components like von Mises stress.

In D3PLOT v16.0 MAX/MIN/MAG values are calculated by looping over all the integration points and additionally the mid-surface if there is no integration point at the mid-surface.

The v15 behaviour can be reverted to by setting the preference d3plot*max_min_mag_interpolate_mid_surface to NO.

4

3

Mid-surface · · ·

2

1
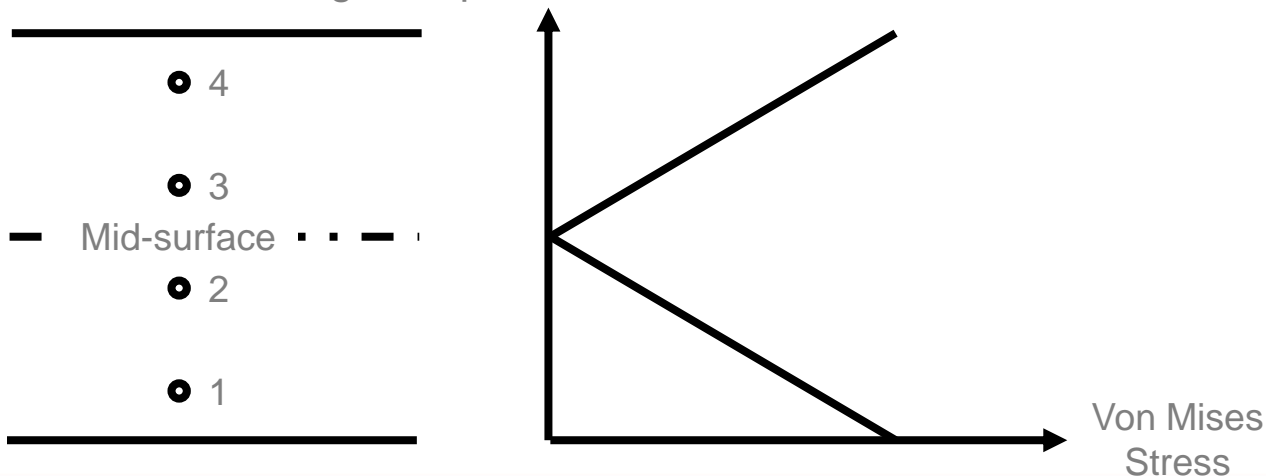
Von Mises
Stress

For a shell in bending, von Mises stress is a minimum at the mid-surface and increases towards the top and bottom surfaces.

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Session Files

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Session Files

D3PLOT 16.0 introduces the ability to save and restore 'sessions', permitting the user to quickly revert to the state they were at when they last exited D3PLOT. Sessions may be saved via either the File popup menu, the Utilities panel or the EXIT window.

Auto-save

Explicit session path and name

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Session Files
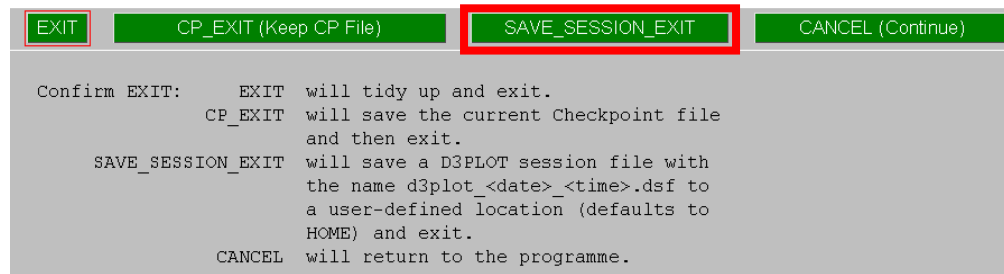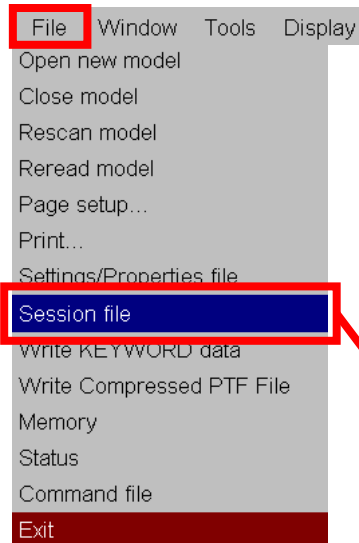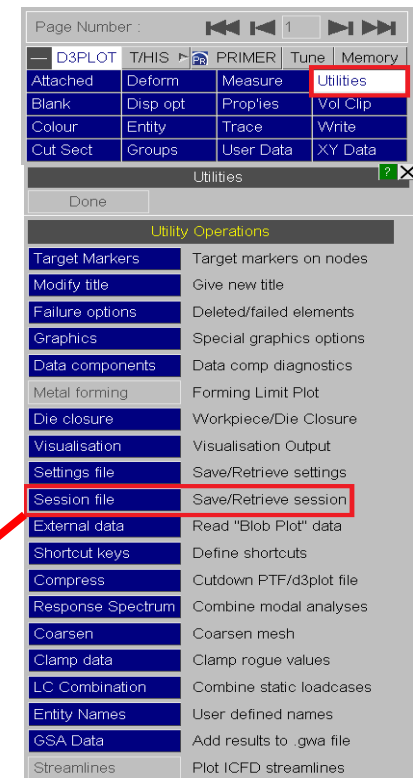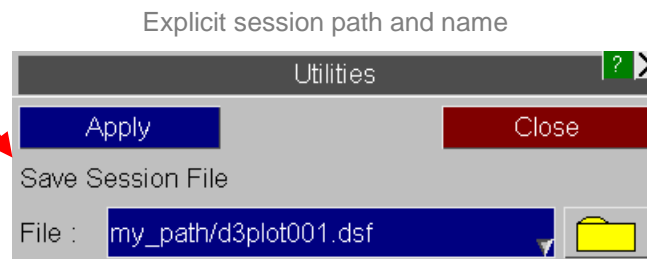
The "SAVE_SESSION_EXIT" button in the EXIT window will save the session to a location defined by the new preferences "d3plot*session_save_option" and "d3plot*session_save_dir". Sessions may also be saved unconditionally upon exit using the preference "d3plot*session_auto_save", which will save to the same location.

EXIT	CP_EXIT (Keep CP File)	SAVE_SESSION_EXIT	CANCEL (Continue)

```
Confirm EXIT:      EXIT  will tidy up and exit.
                CP_EXIT  will save the current Checkpoint file
                         and then exit.
      SAVE_SESSION_EXIT  will save a D3PLOT session file with
                         the name d3plot_<date>_<time>.dsf to
                         a user-defined location (defaults to
                         HOME) and exit.
                 CANCEL  will return to the programme.
```
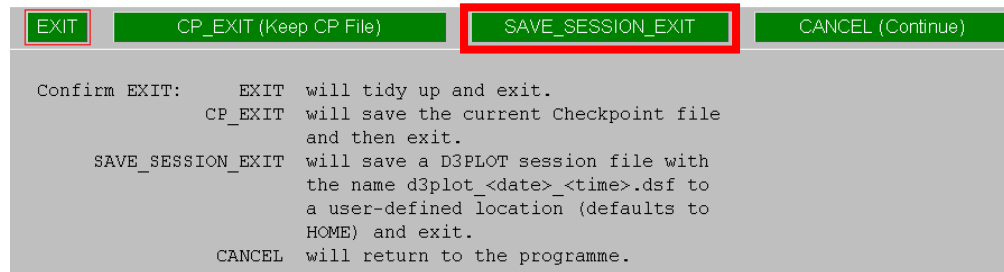
Auto-save

Session files are an extension to the functionality already provided by settings and properties files. They contain the vast majority of the information needed to fully restore a session, including linked T/HIS sessions. One exception is entity selections for XY data, which is not currently embedded in session files. The names of any results files used in the session are saved, allowing a session to be restored with similar but slightly different results.

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Session Files

Sessions can be restored either in the file read window when D3PLOT starts by selecting "Session file" in the "Open" popup, or by supplying the session filename as a command-line argument in the same manner as .ptf files. On Windows, sessions may also be restored by double-clicking on a session file. When reading a session file using the file read window in D3PLOT, the paths to any results files used will appear in a list at the bottom of the window.

If a results file cannot be found from the saved path, then the corresponding textbox will be highlighted in red. The path can then be updated using the file selector to point to a new location.

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Displaying Loads

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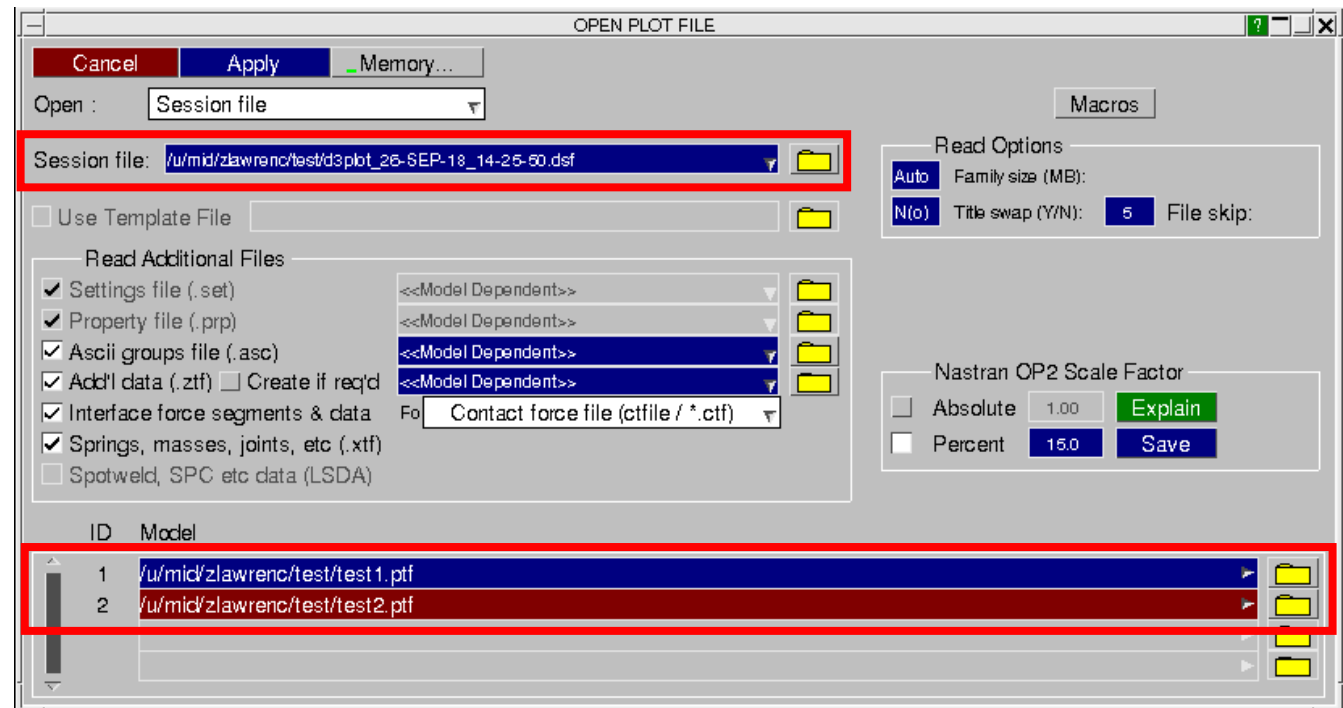
Displaying Loads

D3PLOT v16 introduces the ability to display loads on the model. Load information is transferred to D3PLOT via the ZTF file, so it is necessary to generate a ZTF file with PRIMER v16 for load plotting to be available.
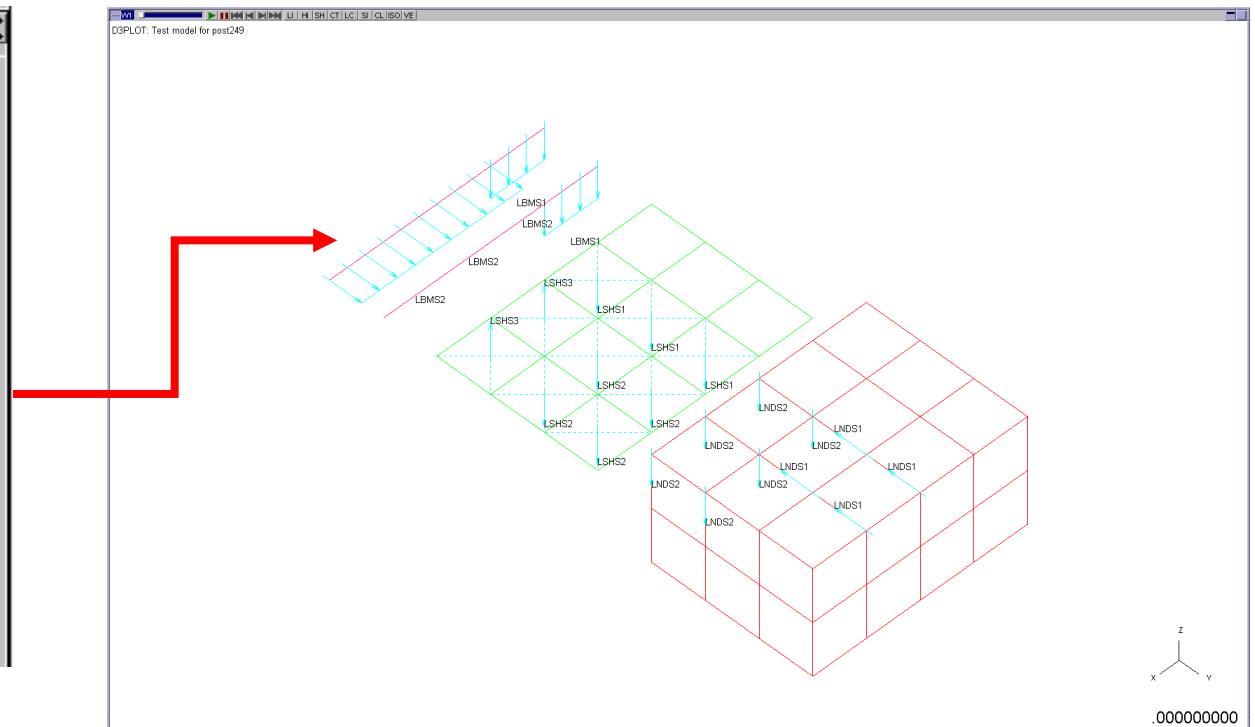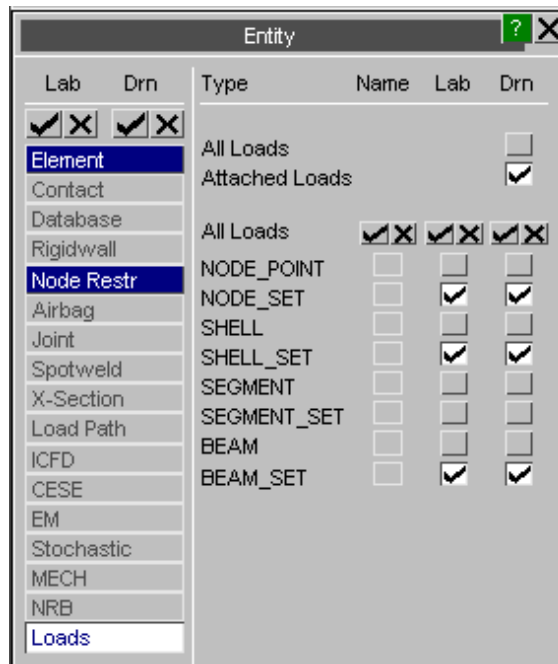
The display of loads can be controlled in Disp opt >> Loads

The size of load symbols can be adjusted.
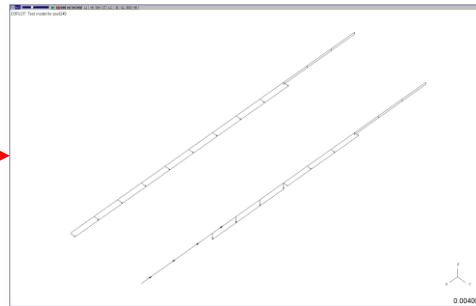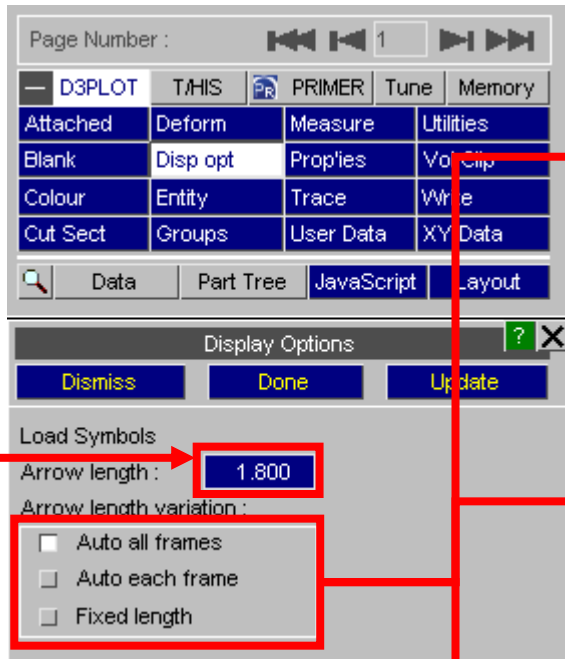
Auto all frames – load symbols normalised to maximum value across all states – as you step through states loads will 'grow'.
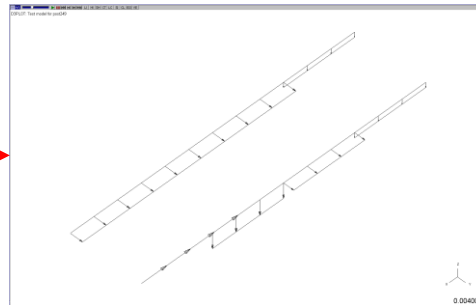
Auto each frame – load symbols normalised to maximum value in current state – shows distribution but not time variation.
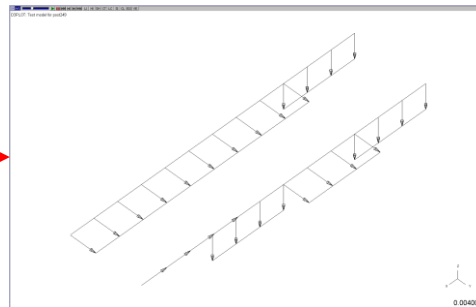
Fixed length – load symbols all shown with fixed length.

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Loads can be blanked via the Blanking menu or using Quick Pick

Loads can be set to be shown only when the node or element they are applied to is visible, or to always be shown.

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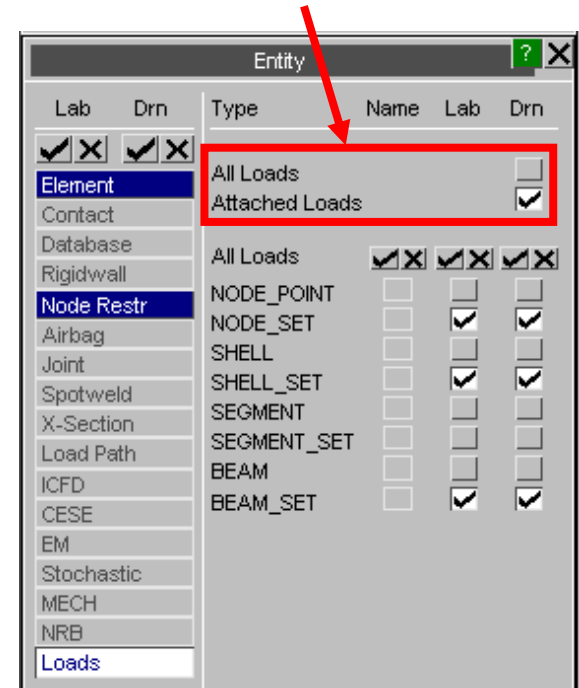
Displaying Loads
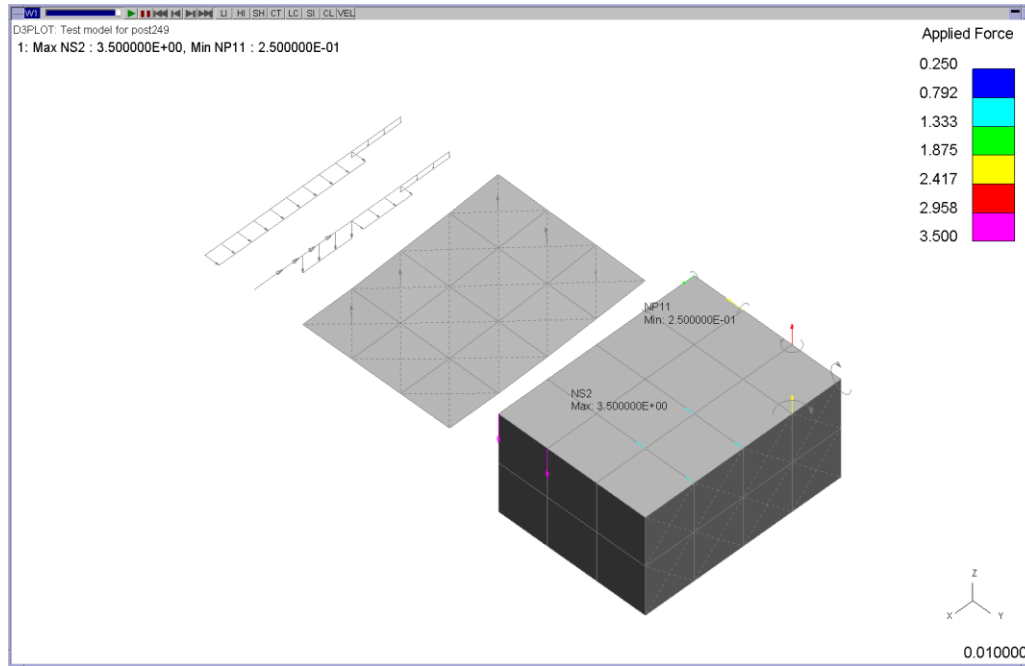
Loads can be contoured in CT and SI plot modes

A new component category "Applied Loads" has been added. This contains four components:

- LOAD_FORCE (node loads DOF 1-4)
- LOAD_MOMENT (node loads DOF 5-8)
- LOAD_LINE_LOAD (beam loads)
- LOAD_PRESSURE (shell & segment loads)

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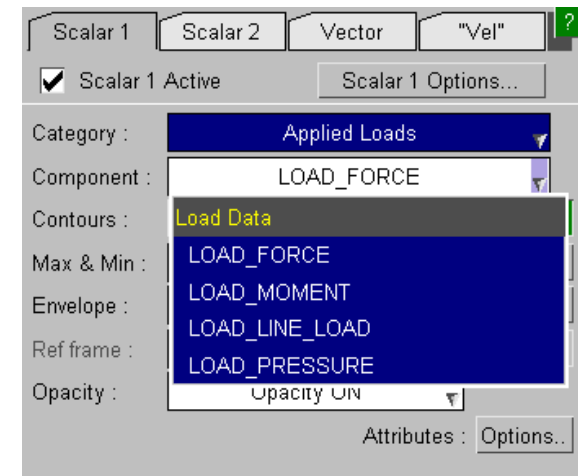
Displaying Loads

Load display has the following limitations:

- Only the following load types can be plotted:

  - LOAD_NODE_POINT / SET,

  - LOAD_BEAM(_SET),

  - LOAD_SHELL(_SET),

  - LOAD_SEGMENT(_SET).

- Loads defined with functions are not supported and will not be displayed.

- The information to display loads is new to the v16.0 ZTF file, so the ZTF file must be generated with v16.0 PRIMER.

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Images

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Images

D3PLOT 16 introduces the following changes to the handling of output image filenames:

- If an explicit filename is typed in or selected for one image type, say JPEG, that new filename and path will then become a seed for every image type, with the appropriate extension (.jpg, .png) and a unique increment <nnn> added.

- Attempting to save an image with the wrong extension, for example saving a BMP with a .gif filename, will result in the filename being corrected and a warning issued. Filenames ending in .image will not be corrected.

- If a user-chosen filename exists, clicking the 'NEW_FILE' option will now append a unique 3 digit increment <nnn> to the same name to generate a new filename.

- A sub-folder (one level only) can now be automatically created as a part of image creation, simply by writing the folder name into the file path.

- All of the above also applies to movie files (AVI, MPEG and animated GIF) and to postscript files (PS and PDF), although the handling of filenames for images, movies, and postscript files is kept separate.

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Material Attributes

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Material Attributes

New in D3PLOT 16, the Material Attributes panel allows for a greater range of part-specific colour and lighting control.

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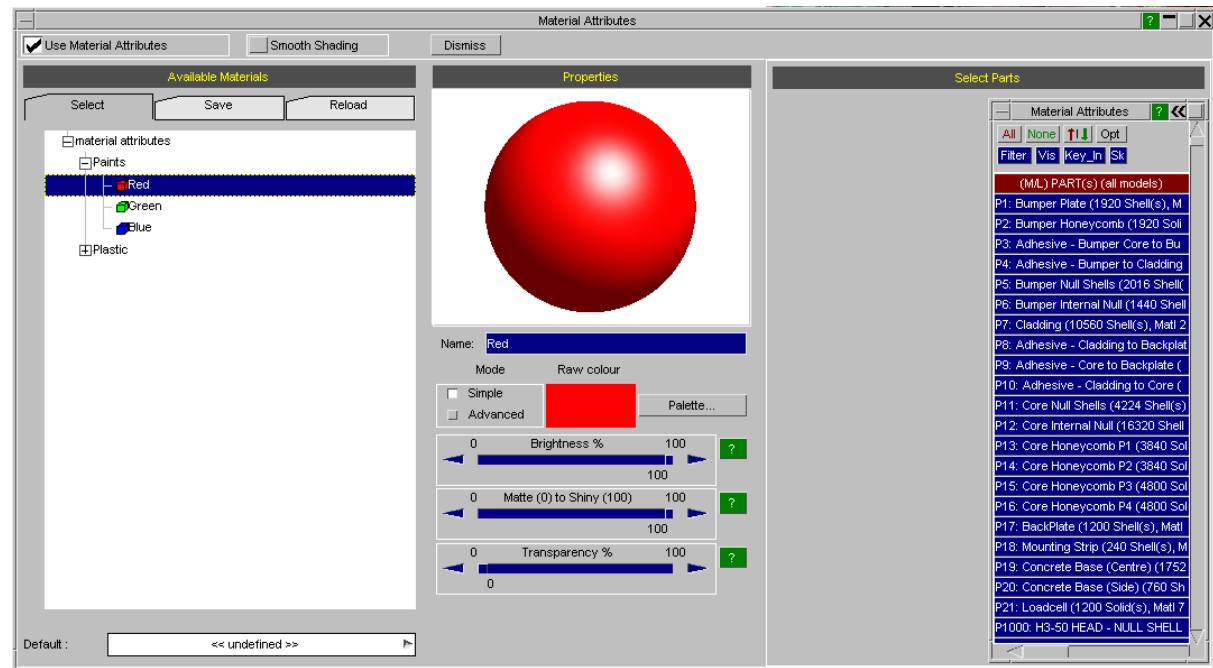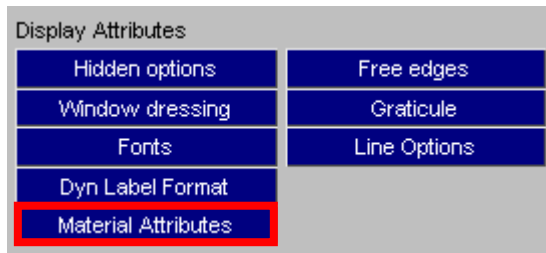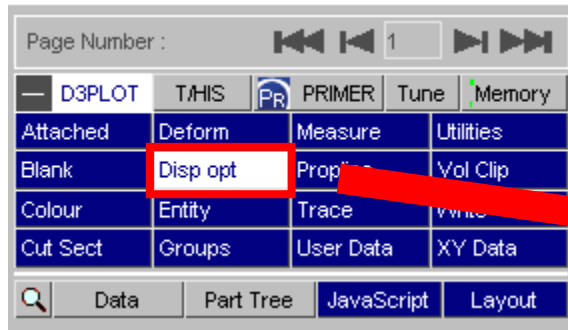
Material Attributes
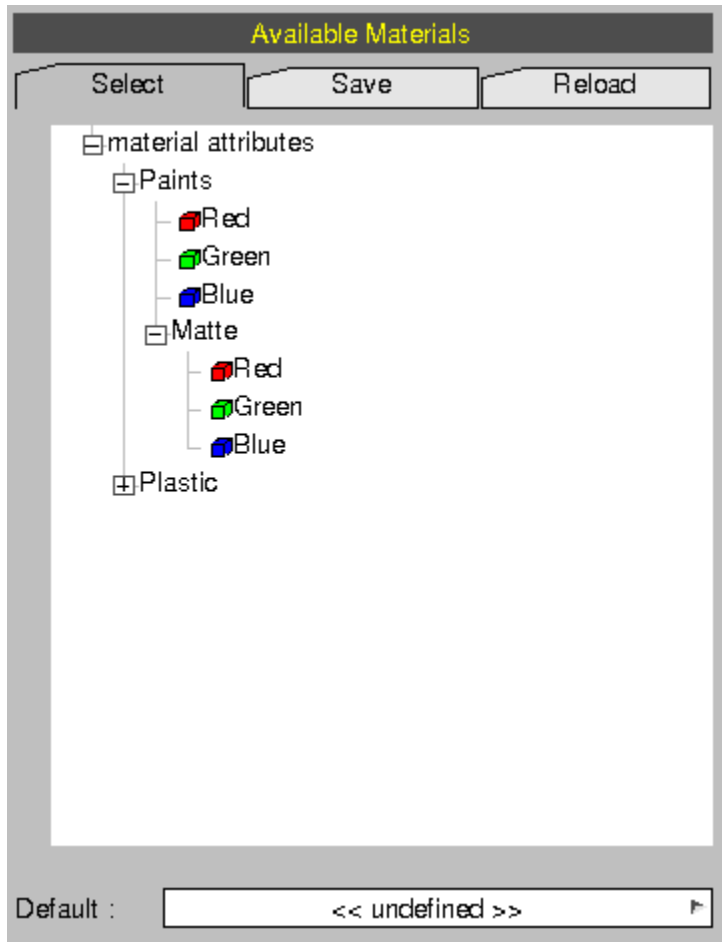
The left hand side of the panel lists User-Defined Material Attribute *Categories* and the *Attributes* that they contain.

For example, in this image "Paints" is the category and "Red" is the attribute belonging to "Paints".

Categories can also contain sub-categories to further sub-divide attributes. In this example, "Matte" is a sub-category of "Paints".

This list can be saved as a .XML format and also read back in via the "Reload" tab.

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Material Attributes

An Attribute can be set as the "Default" attribute to apply by right clicking the attribute.

Setting this will apply the selected attribute to all parts within the model that do not currently have an attribute applied to them.

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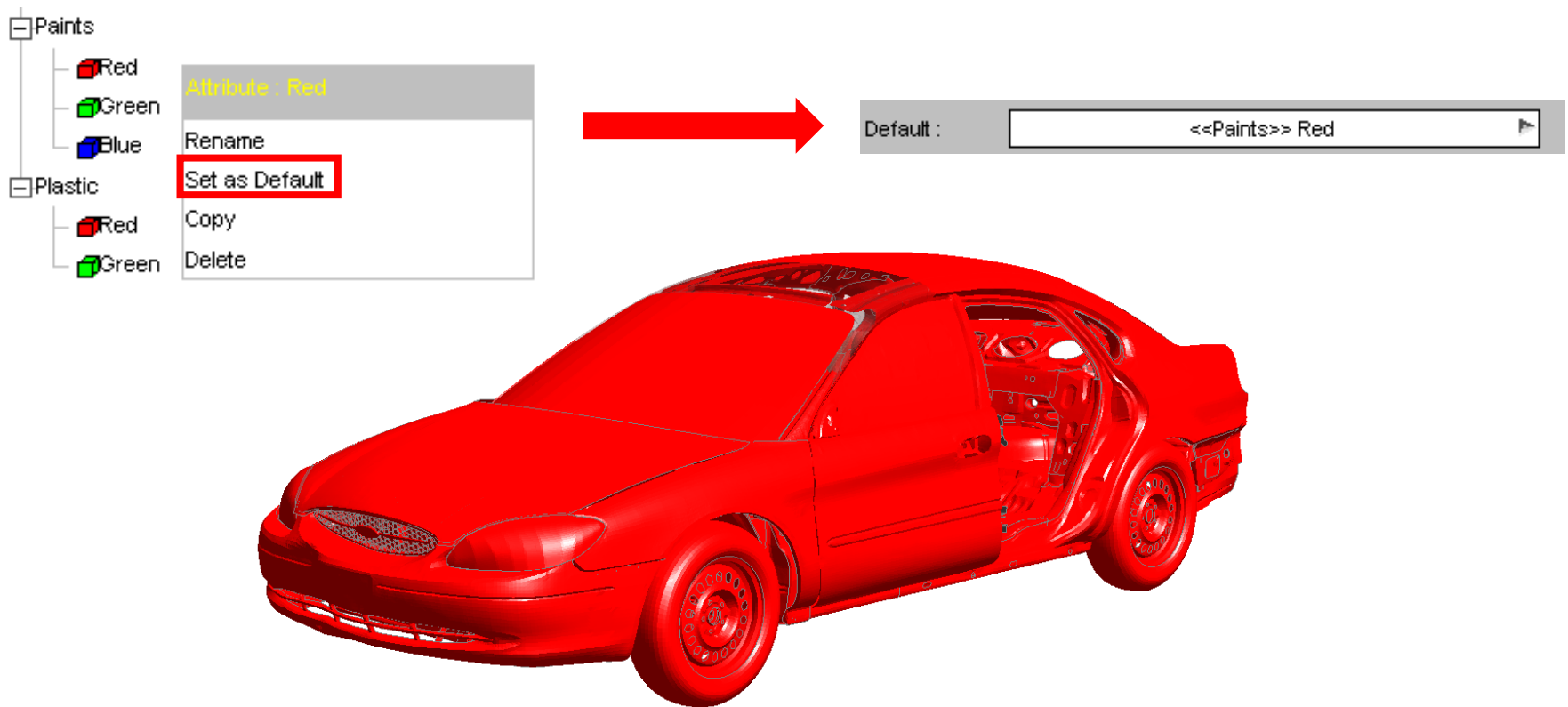
Material Attributes

Attributes can be copied and pasted into other categories so that variants can be quickly created without having to re-adjust all of the material properties.

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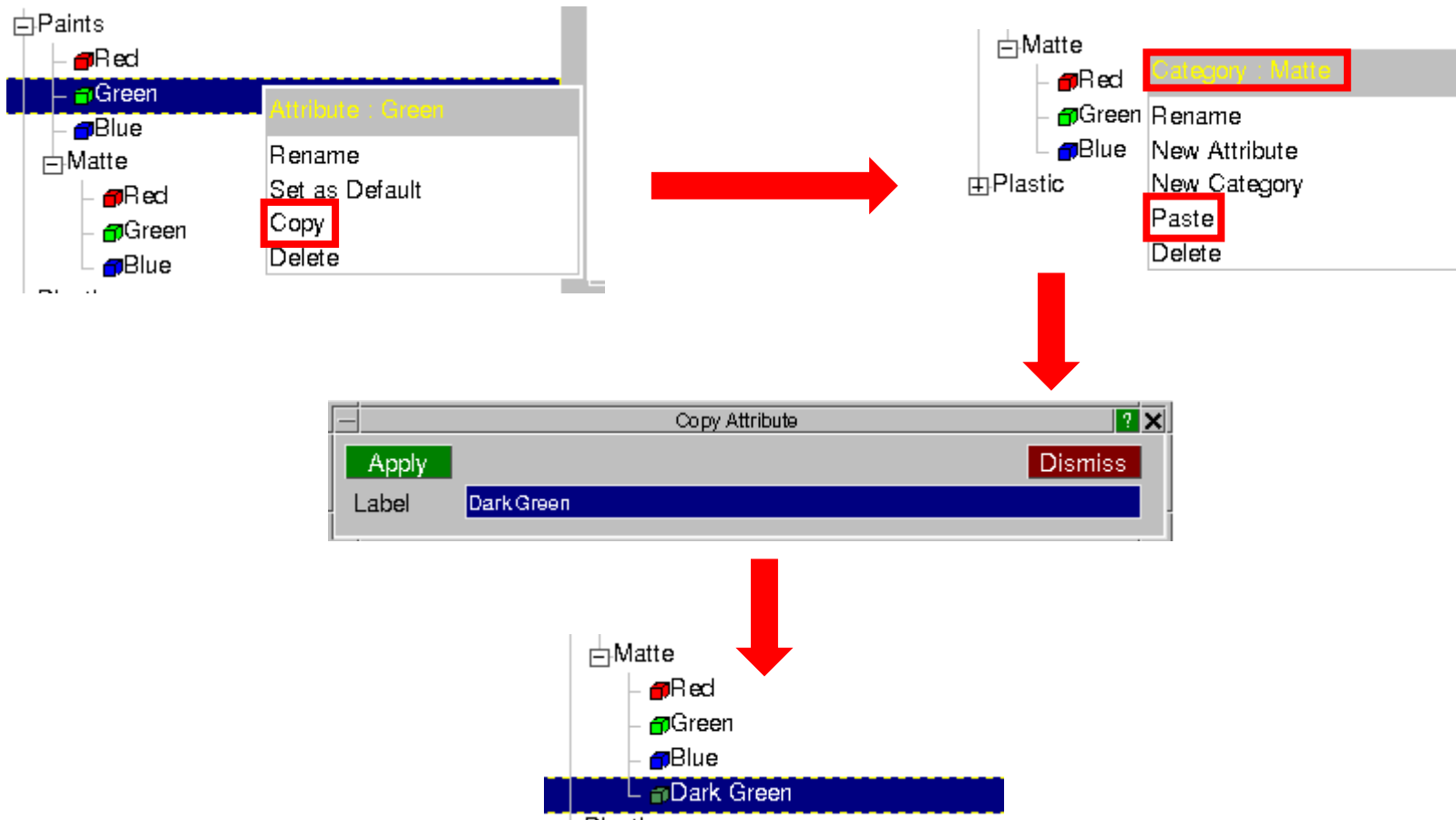
Material Attributes

For each Attribute the properties can be adjusted to your own customised options.

Further advanced options can be selected, giving you even greater control of the attribute's appearance.

Simple

Advanced

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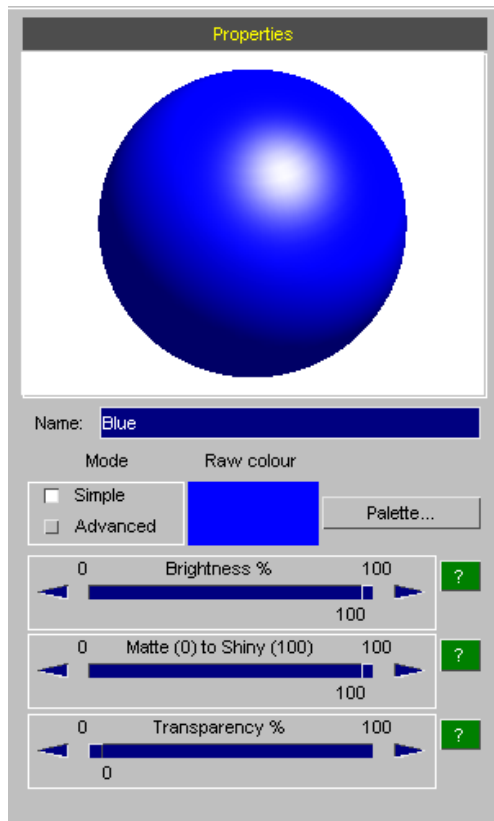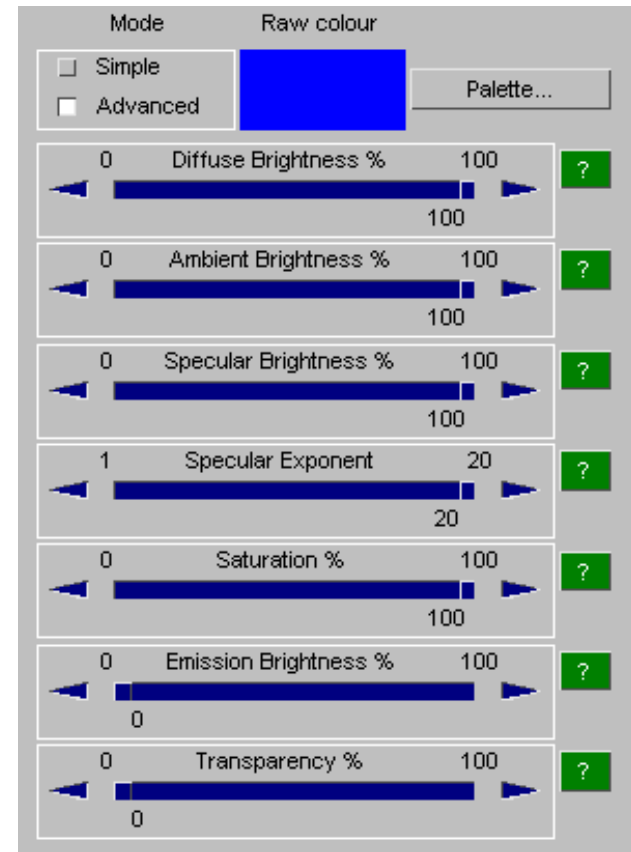
Material Attributes
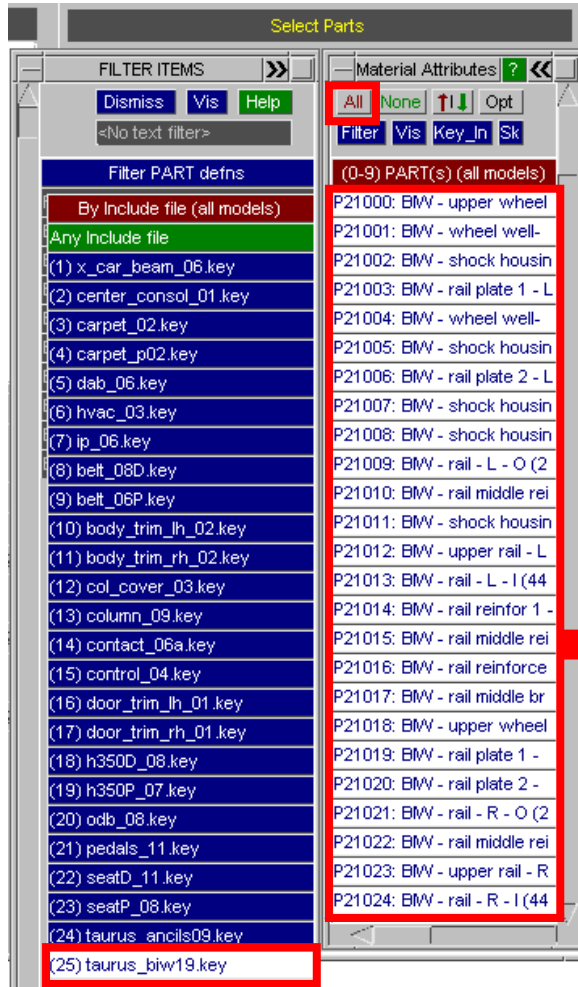
Attributes can be assigned to Parts easily through the use of the entity panel shown on the right.

The parts list can be filtered down to the parts that you want to select through a variety of different options.

One of the more useful options is to filter by Include file if they exist in your model. For example, In the case of a car, this allows you to quickly select all of the parts which belong to the "Body in White" and assign a Material Attribute to only these parts (shown below in blue).

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JavaScript

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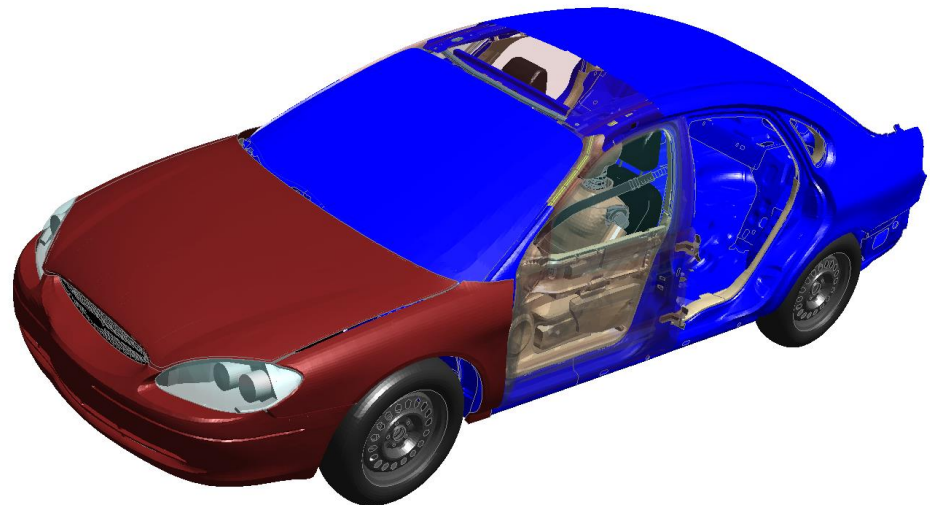
JavaScript

The following new functions have been added to the D3PLOT JavaScript API. Optional arguments are given in italics.

Function	Description
IsVisible(*type_code, item, window_id, state_id*)	Returns JS_TRUE if the item is currently visible, otherwise it returns JS_FALSE. An entity is considered "visible" if the following conditions are all true: 1. Not blanked, 2. The visibility switch is ON for type 'type_code', 3. Is not empty, if type is PART, 4. The entity 'item' has not been deleted in the current state if the type is an element. Arguments: type_code (constant), item (integer), window_id (integer), optional state_id (integer).

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JavaScript

Function	Description
Colour.RGB(*red, green, blue*)	Specify a colour by the RGB value with *red*, *green* and *blue* in the range 0-255.
Colour.*COLOUR_CONSTANT*	Specify a colour by the associated colour constant, which can be any of: DEFAULT, WHITE, GREY, BLACK, MAGENTA, RED_MAGENTA, RED, DARK_ORANGE, ORANGE, YELLOW, YELLOW_GREEN, GREEN, GREEN_CYAN, CYAN, LIGHT_BLUE, MEDIUM_BLUE, BLUE.

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JavaScript

Function	Description
Include.NATIVE	Use the native directory separators.
Include.UNIX	Use unix directory separators.
Include.WINDOWS	Use windows directory separators.

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Preferences

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The following preferences have been added to D3PLOT:

Preference	Description
d3plot*lode_param_tension_sign	Can be set to POSITIVE or NEGATIVE to set the sign convention for the lode parameter for uniaxial tension. The default is NEGATIVE.
d3plot*session_auto_save	Can be set to ON to instruct D3PLOT to save a session on exit
d3plot*session_save_option	Can be set to one of HOME, DESKTOP or USER_DEFINED to define the save location for sessions during exit.
d3plot*session_save_dir	Can be set to a location of the user's choice and is applicable if d3plot*session_save_option is set to USER_DEFINED.

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New Preferences

Preference	Description
d3plot*line_width	Controls the default line width used to draw the wireframe overlay. The value is defined in pixels and had the range 1 to 10.
d3plot*line_antialias	Can be set to ON or OFF and controls if the wireframe overlay is drawn using antialiasing.
d3plot*measure_dialogue_format_vec_rows	For the Measure tool, choose if the measurement vectors output to the dialogue window are formatted with the vector displayed in a column or row format.
d3plot*drive_n	Mapping from Windows drive "n" to a unix path, where n is any drive from [a-z] i.e. drive_a, drive_q etc. This can be used with the "oasys*" prefix as the preference is now common between PRIMER, D3PLOT and T/HIS.

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Miscellaneous

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XY Data for Solids with Multiple Integration Points

Quadratic tetrahedron elements (types 4, 16 and 17) can have either 4 or 5 integration points. The number of integration points is set by the NIPTETS parameter on the *CONTROL_SOLID card.

When outputting all integration point data for a quadratic tetrahedron element with 4 or 5 integration points 5 curves are produced. In the case that the element only has 4 integration points the 5th curve values will all be 0.0.

The reason that the additional curve is output is that D3PLOT identifies the number of integration points for quadratic tetrahedron elements by checking for non-zero data in the 5th integration point slot in the results. However, for XY data, because often the curve is plotted for time zero where often the data is zero this check cannot be used reliably. Consequently the 5th integration point is always output. For elements with only 4 integration points it can be disregarded.

It is planned to pass the value of NIPTETS to D3PLOT via the ZTF file in future releases, which will solve this issue.

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Licensing 16.0

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Licenses for multiple programs

A PRIMER server license can be extended to be used by the post software. Short-term trial licenses for the post software are also available. Please contact your local distributor.

Situation	License details
Extend PRIMER server licenses to work with D3PLOT and T/HIS.	primer + primer_post server license An individual using PRIMER and D3PLOT on their machine will use two PRIMER licenses. An individual using PRIMER, D3PLOT and T/HIS will also use two PRIMER licenses. In this instance, D3PLOT and T/HIS share a PRIMER license. D3PLOT and T/HIS can be prevented from using PRIMER licenses by setting the following preference in the oa_pref file. oasys*post_uses_primer = FALSE

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Licenses for multiple programs (trial access)

Situation	License
PRIMER with trial access to D3PLOT and T/HIS for server licenses.	primer + post_trial server license An individual can use PRIMER, D3PLOT and T/HIS simultaneously on their machine. Doing so will use one 'primer' server license and one 'post_trial' server license. Once the trial license expires, only PRIMER can be accessed.
PRIMER with trial access to D3PLOT and T/HIS for node-locked licenses.	primer + post_trial node-locked license You can use PRIMER, D3PLOT and T/HIS simultaneously on your machine. Once the trial license expires, only PRIMER can be accessed.
D3PLOT with trial access to T/HIS. This will enable you to use the T/HIS link.	d3plot + post_trial You can use D3PLOT and T/HIS simultaneously on your machine. Once the trial license expires, only D3PLOT can be accessed.

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Licenses for single or multiple programs

You can buy server or node locked licenses which allow access to all programs in the Oasys Suite.

It is also possible to buy server or node locked licenses for individual programs.

Program	License required
PRIMER	primer
D3PLOT	d3plot
T/HIS	this
D3PLOT and T/HIS link	d3plot + this
REPORTER	reporter*
All programs in the Oasys Suite	primer, d3plot, this + reporter

*REPORTER is also able to run without the reporter license. In this situation the software checks for any available Oasys license and then releases it again.

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Restricted-use licenses for all programs

We provide restricted-use licenses free of charge through our website www.arup.com/dyna for certain domain names, for example for students at UK Universities.

These licenses can also be sold commercially by a local distributor.

Similar licenses are available restricted to a different number of nodes or curves.

Program	License
All programs in the Oasys Suite, restricted to models with less than 10,000 nodes (PRIMER and D3PLOT) and 12 curves (T/HIS).	primer, d3plot and this licenses restricted

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REPORTER

If you have licenses for any of our programs, you are licensed to use REPORTER to interact with that program.

For example, if you have a "primer" license, you can use PRIMER, or use REPORTER to create reports with PRIMER objects in them.

SHELL

The Oasys SHELL can be used without a license.

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FAQs

Using the extended PRIMER license

1. License check-out priority - When customer has both the extended PRIMER license (primer + primer_post) and D3PLOT license (d3plot), which license will be checked out first when running D3PLOT?

   D3PLOT will always look for a D3PLOT license first. If no D3PLOT licenses are available, it will then try and use a PRIMER license. If D3PLOT uses a PRIMER license then by default a window is displayed warning the user that they are using a PRIMER license.

2. Can a user on one machine have a unlimited number of PRIMER sessions with one primer license (as was previously the case)?

   This hasn't changed if they are running versions 16 or 15. In versions 16 or 15 if a user runs multiple copies of PRIMER on the same machine then they all share a single license.

   If a user runs version 14 and either version 16 or 15 at the same time then they will count as 2 separate licenses.

Using the extended PRIMER license (CON'T)

3.   Can you let me know how to prevent D3PLOT and T/HIS using a PRIMER license?

To disable license sharing the following preference can be set:

`d3plot*post_uses_primer:`   FALSE
(disables D3PLOT from using a PRIMER license)

`this*post_uses_primer:`   FALSE
(disables T/HIS from using a PRIMER license)

`oasys*post_uses_primer:`   FALSE
(disables D3PLOT and T/HIS from using a PRIMER license)

4. How many extended PRIMER licenses does an individual use?

D3PLOT (or T/HIS) using a PRIMER license is counted separately to a user running PRIMER so an individual on one terminal, running the following combinations of program uses these licenses:

1)	*1 x PRIMER only*	*:*	*1 primer license*
2)	*2 x PRIMER*	*:*	*1 primer license*
3)	*PRIMER + D3PLOT*	*:*	*2 primer licenses*
4)	*2 x PRIMER + 2 x D3PLOT*	*:*	*2 primer licenses*
5)	*PRIMER + T/HIS*	*:*	*2 primer licenses*
6)	*PRIMER + T/HIS + D3PLOT*	*:*	*2 primer licenses (D3PLOT and T/HIS share)*

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Changing from FLEXlm to LMX licensing

We are planning to discontinue the use of FLEXlm licensing in our software from version 17.0 onwards. We will instead use LMX licensing.   Support for LMX licenses is included in our Oasys suite versions 15.x and 16.x software. The table shows which Oasys suite versions work with each license type.

LMX licenses will be available later in the year for testing purposes.

Oasys Suite version	FLEXlm licensing	LMX licensing
14.x and earlier	✓	✗
15.x and 16.x	✓	✓
17.x onwards	✗	✓

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www.arup.com/dyna

For more information please contact the following:

UK Contact:	**China Contact:**	**India Contact:**	**USA West Contact:**
The Arup Campus	Arup China	Arup India	Arup Americas
Blythe Valley Park	39/F-41/F Huaihai Plaza	Ananth Info Park, HiTec City	c/o 560 Mission Street Suite 700
Solihull	1045 Huaihai Road (M)	Madhapur Phase-II	San Francisco
United Kingdom	Xuhui District, Shanghai	Hyderabad	United States
B90 8AE	China	India	CA 94105
	200031	500081, Telangana	
T: +44 121 213 3399	T: +86 21 3118 8875	T: +91 40 44369797 / 98	T: +1 415 940 0959
dyna.support@arup.com	china.support@arup.com	india.support@arup.com	us.support@arup.com

or your local Oasys distributor

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