

# Update and Release Notes for the LS-DYNA Environment Software

from Oasys Ltd



SHELL

PRIMER

D3PLOT

T/HIS

REPORTER

Version 21.1

# Contents

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	Page
<b>1 Introduction</b>	<b>1</b>
1.1 Compatibility with LS-DYNA releases	1
1.2 Hardware platforms supported	1
1.3 Graphics hardware supported	1
1.4 Licensing	2
<b>2 Bugs Fixed</b>	<b>3</b>
2.1 PRIMER	3
2.2 D3PLOT	50
2.3 T/HIS	75
2.4 REPORTER	89
2.5 SHELL	96
2.6 Oasys	97
<b>3 Enhancements</b>	<b>99</b>
3.1 PRIMER	99
3.2 D3PLOT	114
3.3 T/HIS	122
3.4 REPORTER	126
3.5 SHELL	129
3.6 Oasys	130

# 1 Introduction

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The Oasys Ltd LS-DYNA Environment 21.1 suite, dated November 2024, is a full release which supersedes all previous releases. It is primarily a bug fix release of the Oasys Ltd LS-DYNA Environment 21.0 suite.

This document lists the enhancements that have been made during development, and the bugs that have been fixed (since 21.0). Each ‘Case ID’ referred to in these lists is unique and should be cited if more information or clarification are required.

## 1.1 Compatibility with LS-DYNA releases

The 21.1 release has been used and tested with LS-DYNA version R15 and the current development version. It supports all the keywords in volumes I, II and III of the released R14.0 User’s Manual. Some of the new keywords in the released R15 User’s Manual are also supported.

LS-DYNA R11.0 is the default keyword output format from PRIMER. (However, output may be generated for later releases of LS-DYNA.)

## 1.2 Hardware platforms supported

The complete Oasys Ltd LS-DYNA Environment 21.1 is available on the following platforms:

<b>Windows</b>	Windows 10/11	64 bit
<b>Linux</b>	RedHat Enterprise 8.x	64 bit

The RedHat Enterprise 8.x build has been released on the website for Linux as this has been found to run on all the machines we have tested (RHEL 8, SuSE 15.2).

If you require a different Linux build, please contact Oasys Ltd.

Windows builds have been tested on Windows 10 and Windows 11. The software may run on Windows 8.1, but this is untested. It will not run on Windows versions prior to that because of changes in the way Microsoft configure displays.

## 1.3 Graphics hardware supported

The default graphics protocol used on all platforms in the table above is OpenGL, which gives good quality 3D performance on a wide range of hardware.

‘Legacy’ X-Windows (2D only) graphics drivers remain in PRIMER on Linux platforms only, since these are used by a small minority of clients who display over a network of mixed machine types. However, this X driver is not maintained or updated and will give poor performance, so it should only be used as a last resort. There are much better ‘thin wire’ graphics solutions available today, and Oasys Ltd can give advice about these on request.

## 1.4 Licensing

This latest version of the software will only use the LM-X licensing platform to provide an increased level of license security.

To ensure you're ready to enjoy all the great features Oasys Suite 21.1 will bring, we recommend you update all your Oasys Suite license servers and files as soon as possible (note, update not required if moving from Oasys Suite 21.0 to 21.1).

### Action to take

If you're using a floating network license you will need to install the LM-X license server software (version 5.5.7). The software and supporting documentation are available to download from our website and are also included in our installation packages.

### Backwards compatibility

The Oasys Suite 21.1 LM-X license file and license daemons are backwards compatible for all currently supported versions of Oasys Suite. This means that any existing 20.x, 19.x and 18.x software will continue to work with new LM-X license files and servers.

## 2 Bugs Fixed

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The enhancements and bug-fixes for each program have been broken down into a series of topics. Within each topic enhancements and bug-fixes are listed by case ID.

### 2.1 PRIMER

#### 2.1.1 Bugs fixed in 21.0

##### Adhesive

- **Case 53066**

The Auto-make adhesive tool was getting stuck when it is unable to process an extruded part. A trap has been added to prevent this and the process will now abort.

##### Assembly

- **Case 51773**

\*SET\_PART\_TREE creation was previously crashing when there are circular references. This issue has been fixed by adding a check for circular references in \*SET\_PART\_TREE.

##### Attached

- **Case 53040**

Previously, the Find Attached tool was not working for SPR-related keywords. The Find Attached tool has now been corrected to work with constrained SPR, SPR2 and interpolation\_spotweld (SPR3).

- **Case 51494**

Previously, we could not access \*CONSTRAINED sub-menu toggles via the JavaScript API Attached Class. This issue has been fixed. JavaScript API support for constrained types within the Attached tool is now enhanced.

##### Belts

- **Case 52964**

Changing the units of a model containing a belt definition from metre to millimetre units could cause a crash if the belt were subsequently (re)fitted. This would only occur if the belt had non-standard element lengths for one or more of its path segments, and then only if the belt had a lot of rows of elements.

This was caused by a failure to scale optional per-segment belt lengths resulting in this case in 1000x as many elements in the affected stretches of the belt which, in turn, caused some internal overflows. Now fixed.

- **Case 52737**

Previously, seatbelt advanced point handles are not shown after reading belt path points from a csv file. This has been fixed. Seatbelt advanced point handles will now remain active after reading belt path points from a csv file.

- **Case 52683**

Seatbelt X-section ID and names are lost when the belt is refitted. This has been fixed. Auto refitting a seatbelt will now reuse the X-section ID of the old meshed belt, and there is now an option to keep X-section names during a refit.

- **Case 52587**

Previously for Shoulder to Pelvis seatbelts, X-Section and Quick Adjust features only worked with belts going from shoulder to the Pelvis but not in reverse. This has now been fixed by adding a Belt direction radio button to the Explicit Slipping panel. A Shoulder to Pelvis belt direction means that the seatbelt goes from the shoulder slipping to the pelvis buckle and a Pelvis to Shoulder directions means the belt goes in the opposite way. This needs to be specified for the Adjust and Create X-Section function.

- **Case 52072**

When a seatbelt is meshed continuously (explicitly) through a slipping, it can pull material from one stretch of belt to the next through the slipping. This could lead to a row of elements in the vicinity of the slipping getting stretched far too much.

The reason for this is that the mathematical model of the belt was not originally set up to consider belt material flowing from one stretch to another. In the older logic, each stretch was delimited by a slipping element and the belt within that stretch only ever got shorter.

The issue is now fixed by changing the model so that flow between stretches works correctly.

- **Case 52070**

Previously after slipping rotation, old initial path points were not updated to account for the rotation. This meant that the belt no longer goes through the slipping slot due to its rotation. This has now been fixed.

Initial belt path points around slippings now have their coordinates updated after the belt path was accepted in the main panel. This allows the initial path points to remain positioned within the slipping slots after the slippings were rotated.

- **Case 51583**

Previously after using the explicit slipping 'Adjust' option, the belt length between the newly generated point behind the slipping and the one after would not update when you changed the belt length for the whole belt. This has been fixed.

- **Case 51574**

When loading a predefined seatbelt model, the 'Seatbelt Mesh Density' in 'Fitting options' panel is set to 'Coarse (default)' even though the belt length and number of rows are not set to the coarse values (length=10 and #rows=5).

This has been fixed by adding a new 'Custom' mode for the seatbelt mesh density in the 'Fitting options' panel that gets automatically selected if the related properties (Max curve angle, belt length and #rows) do not match any of the available modes. If they do match a specific mode, the matching mode will be automatically selected instead.

- **Case 51161**

For seatbelt fitting, we have fixed a bug that was causing the stored belt path points to be lost if the input model has some points defined but an empty structure definition and the 'Fit' panel is accessed before adding entities to the structure. The 'Fit' panel (and following steps) can now only be accessed if the structure definition is not null.

## Boundary

- **Case 53014**

Boundary prescribed motion animation has been corrected to transfer motion silently to rigid parts or nodal rigid bodies when the nodes of deformable parts attached to them have prescribed motion. Additionally, the centre of rotation when defined by VID (DOF = +/-8) has been corrected.

## Checking

- **Case 53879**

Excessively slow structural check on node of \*LOAD\_NODE has been fixed.

- **Case 53824**

Previously, the PRIMER Check tool detected an incompatible material type error if a beam element with ELFORM=1 uses thermal material \*MAT\_T01 or \*MAT\_T11-15. This has been fixed. Errors are no longer reported for beam parts which use thermal materials \*MAT\_T01 and \*MAT\_T11-15.

- **Case 53256**

The first field in card 2 of \*EM\_DATABASE\_ELOUT and \*EM\_DATABASE\_NODOUT were referring to an \*ELEMENT\_SOLID and a \*MESH\_NODE respectively. This is incorrect. This issue is now fixed and the field correctly refers to a \*SET\_SOLID and a \*SET\_NODE respectively in PRIMER 21.0.

- **Case 52546**

Previously, Model Check could crash while checking contacts if a tied contact had no content on side B in a big model. This is an internal error caused by presuming that both sides of the contact would be populated. Issue is now fixed.

- **Case 52483**

\*DEFINE\_DE\_INJECTION uses a latent node set ID to reference a set that LS-DYNA will create during the analysis. This set was wrongly reported as an error by model check. This issue is now fixed.

- **Case 52062**

Fixed a bug that caused PRIMER to issue error messages for

\*CONTROL\_DISCRETE\_ELEMENT and \*DEFINE\_DE\_BY\_PART keywords, when the fields 'lnorm' and 'lshear' on optional cards were not defined.

Corrected the writing and reading of optional cards in

\*CONTROL\_DISCRETE\_ELEMENT and \*DEFINE\_DE\_BY\_PART to follow the keyword manual.

- **Case 51541**

The fields LCID on \*LOAD\_NODE, LCID on \*LOAD\_MOTION\_NODE, and LCID, LCIDT and LCIDD on \*LOAD\_MOVING\_PRESSURE can refer to functions (\*DEFINE\_FUNCTION) as well as loadcurves. PRIMER would previously not permit these fields to refer to functions. This issue has now been fixed.

- **Case 46128**

\*CONSTRAINED\_INTERPOLATION should not contain nodes that are non-structural. Previously, there was no such indication in PRIMER. This issue is now fixed. A new check has been added to report \*CONSTRAINED\_INTERPOLATION nodes which are not on structural elements.

## Clipboard

- **Case 49080**

The clipboard model from visible function did not consider active cut section in the parent model. This has been corrected.

## Coating

- **Case 52486**

A flag used by the Coat panel was not being returned correctly in PRIMER 20.0, meaning PRIMER could run out of flagging bits after the panel were opened multiple times. This issue has now been fixed.

## Connections

- **Case 53500**

Some newline characters were accidentally added to connection detailed error messages previously. They adversely affect writing in the csv format. These newline characters have been removed and this issue is now fixed.

- **Case 52423**



For the beam connection during spotweld remeshing, we were getting different outputs if the Diameter column is enabled in the connection table or not. It is fixed now.

- **Case 52388**

If a connection rule script was used and the model was deleted and reread, the connection rule could fail with an exception. Now fixed.

- **Case 52144**

The process of ‘adding nodes around spotwelds’ in mesh reconstruction options was very slow and PRIMER was hanging during this process for a typical vehicle model. This is fixed now. The time for this process is significantly reduced and PRIMER does not hang now.

- **Case 52128**

HAZ elements attached to other spotwelds, which were not selected for remeshing, could get removed if the mesh reconstruction option is ON during spotweld remeshing. This is fixed now.

- **Case 52127**

The mesh reconstruction stage during spotweld remeshing was slow in large models. This has been sped up now and the issue is fixed.

- **Case 52126**

Preserving elements around hole during spotweld remeshing was slow in large models. It is now faster and the issue is fixed.

- **Case 51204**

Previously, the PRIMER connections table did not reflect changes made to connection settings using SetSettings() [e.g., c.SetSettings({same\_part : true})] in JavaScript. Issue is now fixed.

- **Case 51085**

Models where spotweld beam connections are read with missing diameter value can give spurious diameter differences on the connection table although all diameters are displayed correctly (i.e. from the section) and clearly match. Issue has been fixed. These values are now set to the correct diameter (from the section) before comparing to remove the spurious diffs.

## Constraints

- **Case 46024**

Previously, removing nodes from \*CONSTRAINED\_INTERPOLATION by screen area selection was slow. This has been fixed.

The node object menu for removing nodes from

\*CONSTRAINED\_INTERPOLATION is now filtered to the nodes of the constraint.

This means removal by screen area selection of nodes on a large model will now work much quicker.

## Contacts

- **Case 51994**

Model check where contacts contained SPH elements were giving spurious error messages about invalid type. Now fixed.

- **Case 51216**

Tiebreak contact for MPP has been corrected to take thickness from OPTT (if defined) in preference to thickness SST/MST on contact card. It seems, however, that tied contact (not tiebreak) still takes SST/MST in preference to OPTT.

- **Case 51086**

The LS-DYNA manual suggest that contact thickness SAST, SBST only applied for shells and beams. However, LS-DYNA seems to apply these to tied contact between solids too, so PRIMER now includes them.

- **Case 50858**

Contact with setting SOFT = 2 can give spurious penetrations when comparing segments which are near normal to one another. The algorithm has been improved.

## Contour

- **Case 52259**

The resizing logic for the Contour LEVELS panel was not quite right. Issue now fixed

- **Case 51876**

In PRIMER 20.0, when you change to a different component when a contour SETTINGS and/or LISTINGS panel is open, the panel is not updated to reflect the change in component.

- This has been fixed so that the SETTINGS and/or LISTINGS panel will be updated when the component that is being plotted has changed.

- **Case 51875**

A bug was discovered in PRIMER for the contouring LEVELS panel (aka. the “Levels & Format” panel):

- The title of some contours (Nodal Mass, SPC (Tr), SPC (Ro), Element Props → Formulation, Element Props → #Int Points, etc.) are incorrect in the LEVELS panel. This issue has now been fixed.

- **Case 51874**

Some bugs were discovered in PRIMER for discrete contouring, mainly related to the LEVELS panel (aka. the ‘Levels & Format’ panel). The following is a list of the issues discovered and what has been done to fix them:

1. There are some special discrete contours in PRIMER like Shell Normals, Load Shell Direction, Elem Qual → Fixed criteria, SPC (Tr), SPC (Ro), etc. that have special contour colours & non-numeric levels. When the LEVELS panel is opened in these cases, what is shown on the panel is completely unrelated to what is being plotted.
  - Since the number of levels, contour values and contour colours for these special cases cannot be modified by the LEVELS panel, a new logic has been added to issue a warning message and block the opening of this panel when you try to open it for these special cases.
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2. The disable discrete option is available even when the component that is being plotted does not allow discrete contours (aka. no discrete data or more than 13 discrete data → discrete contouring cannot be done). This can be confusing.
  - The disable discrete option is now greyed out when discrete contouring cannot be done. This has been done for the contour LEVELS panel as well as the contour SETTINGS and LISTINGS panels.
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3. When the contour LEVELS panel is opened when discrete contouring (e.g., 5 discrete levels) is done for the component that is plotted, the number of bands does not switch back to the number of bands set (e.g., 13 [set by the oa\_pref file or by the LEVELS panel]) after changing to do a continuous (non-discrete) plot (e.g., disable discrete or change component). This behaviour is inconsistent as compared to when the LEVELS panel is not opened.
  - This inconsistency has been fixed.
- 
4. When the LEVELS panel is opened when doing discrete contouring, the contour level values shown on the panel are not the actual discrete levels.
  - Since discrete contouring values are determined automatically and cannot be modified manually, a decision has been made to show '<auto>' in the contour value text boxes when discrete contouring is done. Additionally, new logic has been added to evaluate the number of discrete values.
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5. The disable discrete option buttons on the contour LEVELS panel is not in sync with the option on the contour SETTINGS/ LISTINGS panels.
  - This has been fixed so that the checkboxes for the disable discrete option are always in sync.

- **Case 48189**

While plotting contours, if contour band limits are set and contour option is changed to a different option, the limits are remembered the next time you come in to plot the

same option but are forgotten and reset to for some of these options.

#### Workflow 1:

1. Read a model and do a CT/SI plot.
2. Change the contour option to say Elem Qual → Min Elem Length.
3. Right click on some intermediate contour band value and select Display + Reset contours.
4. Switch contour option to Elem Qual → Aspect Ratio.
5. Switch to Timestep. Do the same for contour band here in timestep as well.
6. Switch back to Elem Qual → Min Elem Length, the contour band limits have been remembered.
7. Switch back to Timestep, here limits have been reset.

#### Workflow 2:

1. Read a model and do a CT/SI plot.
2. Change the contour option to say Elem Qual → Min Elem Length.
3. Right click on some intermediate contour band value and select Display + Reset contours.
4. Switch to Timestep. Do the same for contour band here in timestep as well.
5. Switch back to Elem Qual → Min Elem Length, the contour band limits have been reset.

This inconsistency (see workflow 1 steps 6 & 7, and workflow 2 step 5) has been fixed now. This is also now consistent with the behaviour in D3PLOT.

## Control

- **Case 53654**

Previously when there are no entries on card 2 of \*CONTROL\_SOLID but the card is written because there are entries on card 3, PRIMER will write card 2 with zeros for each field in the card. This causes error termination when running LS-DYNA. This issue is now fixed. PRIMER will now write a blank line for card 2.

## Crash Test Setup

- **Case 50798**

Previously, the 'Auto' mode was available for the Crash Test Setup tool but not available for the BATCH Crash Test Setup script. This has been fixed. The BATCH Crash Test Setup script now accepts the 'Auto' option for the Left, Side, Rear and Front Part Set for contact and alignment.

## Cut Section

- **Case 53022**

When a cut section defined by the LS-DYNA method was dragged with the middle or right mouse button for rotation, the coordinates on the panel did not update correctly. Now fixed.

Typing in an origin coordinate in the text box did not update the drawing of the plane as expected. Now, it retains the normal and edge heads and updates the plane position as expected. Issue fixed.

When there was a linked D3PLOT session, any cut plane defined in PRIMER by the LS-DYNA method came across to D3PLOT in the correct location, but with the normal and edge vectors scaled to unit length and made orthogonal. Although this defined the correct plane location, it was less obvious from the numbers on the panel that the planes were the same. Now, the normal head and edge head coordinates are sent across without changing any vector lengths so that the numbers are the same in both linked programs. Issue fixed.

- **Case 52928**

When a \*DATABASE\_CROSS\_SECTION is imported on the cut section panel with the LS-DYNA definition method, the same normal tail, normal head and edge head come across only for the \_PLANE suffix. With the \_SET suffix, \*DATABASE\_CROSS\_SECTION has not got these coordinates defined so importing does not make sense. Previously, PRIMER had got corrupted coordinates in the cut section definition in such an import and sometimes crashed. Now, there is an error message, and the previous cut section definition is retained. Issue has been fixed.

- **Case 52323**

When a thick cut section was defined as second or third direction and the other directions were turned off, PRIMER sometimes drew the whole model with faint lines at the boundary of the thick cut. When hovering the mouse over the graphics window, the drawing would have refreshed to the expected thick cut. Now, PRIMER draws the thick cut correctly regardless of whether it is defined as direction 1, 2 or 3. Issue fixed.

- **Case 51973**

The calculation of cut section properties (area, centroid, 2nd moment of area, etc.) was mathematically correct but was written in such a way that it was sensitive to the distance of the origin of the cut section from the elements being cut. If the section origin was a significant distance away, results would become inaccurate due to the use of single precision arithmetic and the way the calculations were performed. This has been improved:

- The logic now uses double (64 bit) arithmetic for most calculations, with key dimensions using long double (80 bit) arithmetic.

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- The logic has also been factorised, in effect separating the ‘local’ dimensions within a cut element from the ‘distant’ dimension from the plane origin.

The effect is to make the accuracy of the calculation nearly independent of the distance from the origin of the cut plane to the elements being cut, fixing the issue.

- **Case 51423**

When a cut plane intersects a solid or thick shell element, there is a cut polygon on the plane. When the face of an element is warped, there are cases of all four edges of a quadrilateral face intersecting the plane. In those cases, there was a very distorted cut polygon. This has been fixed. Now, the intersection points are connected in the expected order.

## Damping

- **Case 50414**

Previously, there is no 'PICK' option for the \*DAMPING\_PART\_STIFFNESS part/part set drop down. Issue now fixed. A 'PICK' option has now been added to the part/part set drop down for the \*DAMPING\_PART\_STIFFNESS keyword.

- **Case 50383**

Previously, the include file was not shown on create/modify panels for \*DAMPING cards. This issue has been fixed by adding the option to view or change the include file for \*DAMPING cards from the create/modify panel.

## Database

- **Case 50970**

In PRIMER, the direction of normal vectors of \*DATABASE\_CROSS\_SECTIONs created using the Feature Line method is not consistent. This is now fixed.

- **Case 50867**

Previously when using the create/modify panel for \*DATABASE\_CROSS\_SECTIONs, a circular cross section (non-zero radius) would not be auto sized when the auto size option was activated. Further to this, the auto size option was not available for circular cross sections with a negative radius. This has now been corrected. The auto size option now works for circular cross sections with either negative or positive radii.

## Deleting

- **Case 52606**

Cleanup removed joints that had node(s) on a deformable part. Whilst this is an error, removing the joint is not correct. Issue is now fixed. On the other hand, joints with non-structural node(s) will be removed.

- **Case 52317**

The Non\_Struct\_items 'Nodes' switch on the cleanup panel did not control the treatment of non-structural nodes. If deselected, nodes should be treated as per se

structural and neither they nor items on them should be offered for cleanup. The bug is not a serious one as types may easily be deselected on the subsequent deletion panel. Issue fixed.

## Dummies

- **Case 52517**

Fixed a bug that opened an infinite number of modify \*GENERAL\_GRAPHICS panels, when opened using Tools → Other → Gen Graphics → Modify → Key\_In.

- **Case 52416**

Fixed a bug that caused an improper functioning of 'Quit' button in LISTING window from the modify \*GENERAL\_GRAPHICS (Tools → Other → Gen Graphics → Modify) panel.

- **Case 52409**

If a child assembly is defined with NA-NB as rotation axis instead of JSTF, then PRIMER throws incorrect error. Fixed this.

- **Case 52150**

In the DUMMY positioning panel, if the DYNA\_POSITION nodes are undefined, the dummy panel textboxes must highlight these in CYAN background. Previously, they are not highlighted. Issue now fixed.

- **Case 48503**

When \*INCLUDE\_TRANSFORM is used to read a file and the label increment for sets IDSOFF is used, this can cause problems if the file contains \*SET\_XXX\_COLLECT. This is because the rule in LS-DYNA is that IDSOFF is applied to all sets except \_COLLECT ones. Therefore, you can end up with the situation:

- Some card references set N, which gets incremented to a reference to set (N + IDSOFF).

- However if set N is \*SET\_XXX\_COLLECT its label is not incremented and the reference becomes unresolved.

This problem showed up when reading a dummy include file in which the \*DUMMY cards after \*END made references to set N. Read in isolation, or as an include transform with IDSOFF unset, this worked fine. However, when read with IDSOFF set it broke the dummy definition in PRIMER.

To get round this problem, a new '\*SET\_COLLECT in \*INCLUDE\_TRANSFORM' switch has been added to the [Model] Read → Options panel. This has two settings:

(1) Read like LS-DYNA, the default, which will exhibit the problem above

(2) Map unresolved references to set

Option (2) above will look for the combination \*SET\_XXX\_COLLECT N and undefined \*SET\_XXX (N + IDSOFF). If it finds this then it presumes that the references to set (N + IDSOFF) should in fact be to set N and remaps them. This is

not technically correct, but it may provide a means of reading a model with this problem and then fixing it.

- **Case 48464**

PRIMER was sometimes crashing when the 'EDIT' function was called for an entity in an encrypted dummy-tree include file. Fixed this.

## Edit

- **Case 53615**

Deleting entry row on the \*DEFINE\_TABLE edit panel caused error messages in dialogue box. Now fixed.

- **Case 53191**

Fixed a bug in PRIMER that gave out errors in MS DOS window when resizing the Create/Modify panels built by generic editor.

- **Case 51622**

The 'Text Edit' button was greyed out in the \*INITIAL\_VELOCITY\_GENERATION edit panel. Now fixed so that text edit is available for \*INITIAL\_VELOCITY\_GENERATION.

- **Case 50762**

The open-ended second card of the \*EM\_POINT\_SET keyword was previously not accessible through the create editor in PRIMER. This is now fixed. We can now add and remove instances of the second card.

## Elements

- **Case 51560**

The deletion hierarchy for \*ELEMENT\_BEAM and \*ELEMENT\_BEAM\_PULLEY has been corrected. Deletion of BPULL will not delete elements BID1, BID2. Deletion of these beams will cause the BPULL to be offered for deletion. This change has corrected an erroneous beam deletion seen in the model from visible function when applied with non-visible BPULL. That function has further been improved so that visibility of BPULL is implied if the underlying beams are visible.

- **Case 48394**

Orient copy with elements in same part (no part copy) when applied to \*ELEMENT\_BEAM\_THICKNESS with ELFORM = 6 did not copy the coordinate systems. The copy operation has been modified to recognize that PARM3 is CID in this case and new CIDs will be generated. Issue fixed.

## Encryption

- **Case 50410**



Previously, encrypting curves within define tables with full encryption caused errors because PRIMER does not associate the PGP blocks in the correct places. This only occurs if you tried to fully encrypt a curve within a table but did not encrypt the full table. Now, when you select a curve that is referenced by a table, a warning is thrown when using the encryption tool. The issue is now fixed.

## Favourites

- **Case 51683**

The Favourites menu for both Tools and Keywords would previously elide duplicate buttons specified using standard PRIMER terminology. However, text edited buttons still appeared multiple times previously.

To fix this, the duplicate check has now been extended to cover both custom tools (scripts for examples) and buttons for which custom text has been defined. In case custom text is encountered, the duplicate check is carried out based on core functionality and not based on the button text.

- **Case 51440**

Some \*DEFINE and \*INTERFACE keywords that previously could not be edited in PRIMER were, nevertheless, available in the Favourites menu for keywords. This has been fixed and these keywords are no longer in the Favourites menu.

## Frequency

- **Case 51163**

Two issues were identified and fixed:

- For \*DATABASE\_FREQUENCY\_BINARY, the frequency fields (e.g., FMIN, FMAX) did not have units associated. The issue is now fixed. \*DATABASE\_FREQUENCY\_BINARY units now apply.

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- For \*FREQUENCY\_DOMAIN\_SSD\_SUBCASE, the subcase CASEID must contain a letter. PRIMER did not check for this previously. Issue fixed. There is now an error check to make sure there is a letter in CASEID for \*FREQUENCY\_DOMAIN\_SSD\_SUBCASE.

## Geometry

- **Case 52859**

Previously, PRIMER could not read in a STEP file that contained a DIRECTION() entity defined by only two components. This has now been fixed.

## Graphics

- **Case 53800**

When using FIND to identify items by sketching them and centring the crosshairs on them, the centre of rotation for dynamic viewing should update to be at the crosshair's centre. This worked when the first item was 'found' but for second and subsequent items the crosshairs moved but the centre of rotation did not.

This was due to an internal error. The issue is now fixed. The centre of rotation will now move to the crosshair's location at the centre of each newly picked item.

- **Case 52874**

PRIMER would crash if display colour settings were reset for all models when the models with model number lesser than highest used model number was deleted. Fixed this.

- **Case 52230**

In some places in PRIMER, a repeated sketch operation could cause the wireframe sketched overlay to 'thicken up' in appearance, making the image look more congested.

This was due to the way sketched graphics were drawn which has been revised to give a crisper appearance which does not 'thicken'. Issue now fixed.

- **Case 51543**

Nodes and item labels can be set to be drawn as 'Not bg' in PRIMER to provide a contrast against the background. When this is done and the background colour is updated (Display → Colour), node and beam labels do not immediately get redrawn in a new colour. This issue has now been fixed.

- **Case 47809**

Previously, when turning on labels or names in the entities panel for CONNECTION, TARGET, TARGET MARKER, or GEN\_GRAPHICS, drawing of these entities was not also turned on (with 'Automatically display labelled/named entity types' turned on). This has now been fixed.

## Groups

- **Case 50092**

Previously, the labelling of the contents of a Group in the Group creation/modification panel was unclear as it only showed the contents of the Group in terms of the data entries (number of 'All', 'Range', and 'List' for a given entity type). Issue fixed. Now, alongside this label, there is also a label listing the actual number of a given entity contained within a Group.

Additionally, the Only/Blank/Unblank buttons only changed the visibility of the model based on the contents of the original definition of a Group previously. Therefore, the buttons seemed to be out of date when modifying a Group or were not even available when creating a new Group. This has now been corrected such that the

buttons are available when creating a new Group, and they Only/Blank/Unblank the contents of the current modified definition of the Group.

- **Case 50091**

Previously, the Group panel did not automatically refresh after Import. Now fixed.

## IPP

- **Case 52626**

The final test on length of the rod in FMVSS201 mode should shift the base point in Y to align with target point before measuring to centre of the head. Previously, we used H-point which is correct for ECER21, but over estimate for FMVSS201. Issue now fixed.

## IGA

- **Case 53344**

In the \*CONSTRAINED\_NODAL\_RIGID\_NODY create/modify panel, the space between the last 2 rows was missing. Repositioned the IDTHRM row. Issue fixed.

## Include

- **Case 52122**

Include replace was failing to delete the old connections of the replaced include, instead these were left in a latent state. They are now deleted. Issue fixed.

- **Case 51790**

PRIMER would previously not read in additional files specified by \*INCLUDE\_COSIM cards. This has now been fixed. Additionally, these files can now also be imported into a model via the Include tree as can be done for regular structural includes.

- **Case 51656**

Fixed bug for renaming the file name during edit in \*INCLUDE for \_AUTO\_OFFSET, \_COSIM, \_UNITCELL, \_TRANSFORM and \*DUALCESE cards.

## JavaScript API

- **Case 53504**

There was an issue of memory leak, when performing repeated contact penetration checks with the default threaded contact assembly setting. An improvement has been made for PRIMER 21.0, but the full fix for this issue is expected in future releases.

- **Case 53009**

Running a script with a GUI created from the GUI Builder would crash if the name of a Widget used the name of a Window property ('top', 'bottom', 'keepOnTop', etc.).

The GUI Builder has been updated so it will no longer allow you to set the name of a Widget to the name of a Window property. Issue fixed.

- **Case 52576**

When a JavaScript in PRIMER, D3PLOT or T/HIS had got a Widget object with the onTimer property set to a callback function again mapping windows, the program crashed. This happened for example with Window.Message, Window.Warning or Window.Error in the callback function. This has now been fixed so that the window is mapped with the time delay specified in the timerDelay property.

- **Case 52567**

If a WidgetItem was used in a tree widget, updating the text property of the WidgetItem did not update the tree. Now fixed.

- **Case 52493**

Tree widgets could not be made with a vertical size greater than 149. Now fixed.

- **Case 52148**

In the JointStiffness (Jstf) class for PRIMER JavaScript, the property to add a title was missing. Added the missing property as 'heading'. Issue fixed.

- **Case 51933**

When we do Part.GetFlagged for a group containing parts, an array containing the parts was not getting returned. This has been fixed now.

- **Case 51872**

Find attached run off JavaScript was significantly slower (10x) than interactive. This has been improved. By threading a core routine, it is now only 2x slower. Issue fixed.

- **Case 51844**

The solid constructor in the PRIMER JavaScript API used to take up to 27 nodes. It is out of date since solids can have up to 64 nodes. The old constructor has been deprecated and a new solid constructor that has only 2 arguments has been added. The second argument of the new constructor is an object that has a nodes array property. This array can have up to 64 node labels. Issue now fixed.

- **Case 51415**

A window could be left in a zombie state in an rare case of trying to minimise a window from JavaScript during a call to Sleep() before the window was hidden. Now fixed.

- **Case 49938**

Previously, JavaScript error messages got clipped. Now fixed. Error messages in the INFORMATION window will now show properly and not get clipped.

- **Case 48395**

Previously, JavaScript Copy functions failed to copy the include property. Now fixed. Added a new property to the Options class (Options.copy\_target\_include) that controls the target Include of copied elements/keywords, this can be set once to control the behaviour for the whole script. You can select it to go into the current include (Include.COPY\_INTO\_CURRENT) which is the default option or to copy new elements into the Include of the original source element (Include.COPY\_INTO\_SOURCE). You can also specify a specific Include number in which the new elements should be put into.

## Keyword

- **Case 53486**

Fixed a \*BOUNDARY\_THERMAL\_WELD\_TRAJECTORY keyout bug which caused Card 3 to output an extra field when the field IFORM was assigned a value of 5 (specific to R10 output).

- **Case 53146**

Macro tags pertaining to \*INITIAL\_VOLUME\_FRACTION\_GEOMETRY and \*INITIAL\_PWP\_NODAL were previously set up incorrectly. Macros pertaining to object menu selection for those keywords would record and play back correctly but would look odd. This issue has now been fixed. Old macros will need updating.

- **Case 52980**

Previously, PRIMER incorrectly complained about missing lines when reading in \*MAT\_068 without optional cards. This issue is now fixed.

Additionally, optional cards on

\*MAT\_NONLINEAR\_PLASTIC\_DISCRETE\_BEAM (\*MAT\_068) are no longer written out if they do not contain data. If \*MAT\_068 needs to be read into a previous version of PRIMER, please set the preference 'mat\_68\_write\_all\_cards'.

- **Case 52902**

The following bugs are fixed in

\*FREQUENCY\_DOMAIN\_RANDOM\_VIBRATION keyword:

- Incorrect values were read-in/copied during the key in of fields LDSPSD2 and LCTYP2. This is corrected now.

- 

- The field NCPSD on card 3 and it is corresponding card 6 were valid for only \_FATIGUE option. Now they are made generic.

- **Case 52459**

\*BOUNDARY\_PRESCRIBED\_ORIENTATION\_RIGID\_ANGLES\_ID needs a header for every card. However, PRIMER did not write out the header for every instance of the keyword previously. This bug is now fixed. PRIMER will now write

out the header for every

\*BOUNDARY\_PRESCRIBED\_ORIENTATION\_RIGID\_XXXX keyword.

- **Case 51241**

There were issues reading in \*DUALCESE\_CONTROL\_SOLVER and \*DUALCESE\_D3PLOT previously. This is now fixed.

- **Case 51215**

We have changed the logic for handling duplicate damping definitions for \*DAMPING\_PART\_MASS and \*DAMPING\_PART\_STIFFNESS. Previously, creating a duplicate damping definition for an existing PID or PSID would overwrite the old definition without any warning. Additionally, if a \*DAMPING\_PART\_MASS or \*DAMPING\_PART\_STIFFNESS card is created for a part referenced by a set in an existing \*DAMPING\_PART\_MASS\_SET or \*DAMPING\_PART\_STIFFNESS\_SET the part was removed from the set referenced in the \_SET card.

Given that DYNA accepts duplicate damping definitions, and to avoid any issues with automatic deletions, a warning check was added for duplicate damping definitions and the logic for deleting existing cards or parts from sets was removed. Issue resolved.

- **Case 51054**

In the \*DATABASE\_HISTORY\_NODE editor, there was a crash when unselecting all suffixes in filter options. Issue fixed. PRIMER will no longer crash.

- **Case 50296**

Reorganised and fixed the creation and keyword panels for \*BOUNDARY\_RADIATION\_SEGMENT and \*BOUNDARY\_RADIATION\_SET, including ensuring correct keyout with full backwards compatibility.

- **Case 49905**

In \*EM\_CIRCUIT keyword, the \_SOURCE suffix option was available in the keyword editor panel but it was missing in the create panel. Issue now fixed. The \_SOURCE suffix option is now made available in the create panel as well.

- **Case 49203**

Previous versions of PRIMER could process the keywords \*DUALCESE\_MODEL and \*DUALCESE\_INCLUDE\_MODEL but would not read in the files specified by these cards. This has now been fixed and the additional files can now be read in by PRIMER.

An error check has also been added to flag the presence of non-DUALCESE cards in these files. These new files are now available on the Include tree. Additionally, these two keywords are now editable by right-clicking on the relevant nodes in the include trees.

## Keyword Editor

- **Case 52595**

It is possible to select a subset of materials using Quick Pick for display in a keyword editor. This worked correctly, showing only that subset of materials, but the header rows at the top of the table made it appear that all possible types of material were being shown rather than just the subset represented by the selected materials. Now fixed. The header rows in this case will only show the types of the materials in the list below.

## Labels

- **Case 52121**

When capturing images in 2 times or 4 times the resolution, some labels would not be written out properly. This has been fixed now.

## Loading

- **Case 51791**

When all parts in the set of a \*LOAD\_BODY\_PARTS keyword are deleted, subsequent cleanup operations will remove the \*LOAD\_BODY\_PARTS. If other \*LOAD\_BODY instances are present, these will then apply to the whole model. It is preferable to delete all \*LOAD\_BODY, so cleanup has been modified to do this. Issue resolved.

## Manual

- **Case 52648**

Previously, some tutorials were missing from the list of Help → Tutorial. Issue now fixed. All available tutorials are now displayed in the application. This change lets you access the entire range of tutorials without restrictions.

## Mass

- **Case 53753**

Some materials (\*MAT\_084\_REINF, \*MAT\_148, \*MAT\_215) do not have density defined in the 2nd field. PRIMER cannot calculate mass for these parts. Previously, PRIMER might report an incorrect mass. Now, PRIMER 21.0 returns zero mass. Issue fixed.

## Materials

- **Case 52601**

Previously, PRIMER did not support negative LCREGD for \*MAT\_ADD\_EROSION. Issue now fixed. LCREGD on \*MAT\_ADD\_EROSION

can now sport negative values which would translate to a table input. An error check has been added to ensure that negative values refer to tables and not loadcurves. An additional keyword check has been added to ensure that negative values only apply to LS-DYNA R9.0 and above.

- **Case 49980**

There were some issues in the material selector panel. Now fixed. Material Name and Material Model fields in the material selector panel now have hover texts. This panel can be launched by clicking on the import button in \*MAT panel in PRIMER. Additionally, the material names are no longer capitalized automatically, which means that material names in the oa\_index file are now case sensitive.

## Mechanism

- **Case 48568**

Previously, the way positive and negative sliding limits on sliding joints are defined in mechanisms was not quite right. Issue is now fixed. In PRIMER 21.0, we added an option to change how mechanism sliding limits work. The new relative limit type treats the limits as signed numbers allowing the sliding limits to work the same way as the rot'n limits. The behaviour of the sliding limits can be selected using a dropdown in the move Connection list panel and the selected type is saved to the \*CONNECTION\_LINE keyword. The old limit behaviour remains as the default behaviour.

## Menus

- **Case 53725**

The Quick Pick 'Label' submenu disappears when a selection was made within it. This is now fixed, and the submenu stays until we close that panel or clicked outside. Also fixed a problem where the popup menu does not move along with its parent menu (in the Workflows panel).

- **Case 51203**

Previously, fields which do not require input were not greyed out for \*CONTROL\_ACOUSTIC and \*CONTROL\_ACOUSTIC\_COUPLING in the \*CONTROL editor. This issue has been fixed. Now, we have greyed out buttons in \*CONTROL\_ACOUSTIC and \*CONTROL\_ACOUSTIC\_COUPLING for the empty fields at end of each card.

## Merge

- **Case 52574**

Model merge requires a reasonable tolerance. Previously, applying the default of 0.1 to a model in metres caused the process to hang. Issue resolved. Now, if the model is detected to be in metres the tolerance of 0.1 will now be changed to 1e-4.



## Mesh

- **Case 53746**

Fixed a bug that occurred when a group of shells that contains more than two shells sharing the same edge is selected during Remesh area in PRIMER.

- **Case 53163**

Previously, PRIMER would crash intermittently when generating a surface from mesh via the 'Mesh->surf' tool. This has now been fixed.

- **Case 52907**

Some inputs to second feature line angle under mesh improvement options were leading to a crash. This is fixed now.

- **Case 51430**

Previously, an error would occur when trying to create swages mesh on shell entities with connections. Fixed this.

- **Case 50565**

A crash when using the 'Add nodes around spotweld' option while making connections on a flat plate with no feature lines has been fixed.

- **Case 46326**

In Mesh → Extrude, after Apply, selections used to get cleared. This is now fixed. Now, you continue extruding after Apply. You should change the direction after each Apply or it will keep extruding the same nodes in same direction.

## Morphing

- **Case 53581**

Previously, a morphing operation could potentially not be added to the list of operations that could be undone by the Undo button in the morphing panel if that morphing operation was interrupted by dynamic viewing. Further to this, if some morphing was applied to a morph box and the morph box was deleted, it was possible to trigger a crash if the Shift/Ctrl button was released before the mouse button while doing some dynamic viewing with the morph panel open. These issues have now been fixed.

- **Case 52257**

Previously, it could be difficult to tell which morph points were selected when using the morphing tool. This has now been improved.

## Nastran

- **Case 51083**

PRIMER was not translating `*CONSTRAINED_INTERPOLATION` correctly to RBE3 when the independent nodes are input as a node set. This is now corrected by spooling over the node set and adding the nodes present inside to RBE3.

- **Case 48447**

Previously, RBE2 were not getting written out in wide format. Issue fixed. PRIMER can now write and read RBE2s in wide format.

- **Case 37058**

Previously, there was a problem writing Nastran files with label clashes. Now fixed. Label de-clash is now performed automatically before Nastran write. If the model has already been de-clashed there will be no change.

## Node

- **Case 52348**

Previously, `*PART_MOVE` with `*CONSTRAINED_EXTRA_NODE` behaved differently in PRIMER and LS-DYNA. Now fixed by changing PRIMER to be consistent with LS-DYNA. `*PART_MOVE` when applied to a rigid part that uses `*CONSTRAINED_EXTRA_NODE` will now move those nodes too.

## Output

- **Case 50246**

Previously, when writing out a model after setting up a Frequency Domain FRF analysis in the Implicit Setup tool, the Model → Write filepath could be prepopulated with a filename in the temporary files area. This has now been fixed.

## Parameter

- **Case 53613**

The 'local' property on the JavaScript API Parameter class could sometimes have the value true even for parameters which had not actually got the `_LOCAL` suffix defined. This happened with duplicate parameter names in the model when there was either no `*PARAMETER_DUPLICATION` or a `*PARAMETER_DUPLICATION` setting of 1, 3 or 5. Issue fixed. Now, it is true if and only if the `_LOCAL` suffix is defined regardless of duplicate names and duplication settings.

- **Case 52550**

When a `_LOCAL` parameter was defined inside an `*INCLUDE_TRANSFORM` file, it could get confused if a reference to the parameter was made in an earlier include, generating errors on input and creating an extra spurious parameter.

It was wrongly using the include file of the earlier reference to the parameter as its 'include file of residence' and since it was `_LOCAL` this meant that its scope was being applied wrongly.

Issue fixed. The parameter will now be resident in the correct include file.

- **Case 52518**

Include find modified was not working after parameter modify. Processing of parameters (and some \*ALE cards) uses an internal keyout which was incorrectly overwriting the internal name of the file hence model modified was unable to find it. Issue now fixed.

- **Case 49102**

The UNDO option was not working properly for renumbering in models which had parameters. The panel which comes up to show the list of parameters that would get changed when renumbering happens comes up again when the undo button is pressed after renumbering. This has been fixed by applying CHANGE\_ALL option automatically when UNDO is pressed.

A new option has also been added under UNDO category in program options which controls the above process. If un-ticked it brings up the panel of differences during the UNDO process.

Additionally, a new preference has been added for the new option in program options.

- **Case 46842**

Resolved some parameter related inconsistencies:

- 1) Parameter creation (Keyword → PARAM → Create):
  - Changed initialisation from type I value 1 to type I value 0
  -
- 2) Latent parameter modification (Keyword → PARAM → Modify)
  - Changed display from type ? value ? to type ? value 0

## Part Table

- **Case 53514**

Previously, the Part Table did not display Part Contact data for IGA Parts. Now fixed. The Part Table has been corrected to allow setting Part Contact on IGA parts.

## Pedestrian

- **Case 53294**

Previously in the pedestrian markup tool, clicking Apply in a part/surface selection window without selecting any parts/surfaces would not update the status of the markup apply button. If the markup apply button was then pressed, the tool could throw some exceptions. This has now been fixed by ensuring that the markup apply button is greyed out when required data is missing.

- **Case 50533**

Previously, when using the Pedestrian Markup tool, if the WAD 1000 line was in front of the BLE while running a GTR/UN R127 based protocol, it was possible for some incorrect additional child head impact points to be generated. This has now been fixed.

## Program Crash

- **Case 53536**

Keyword Edit of \*LOAD\_SEGMENT with large number of entries (~50000) took several minutes to complete update and may on some platforms incur a crash. The logic has been modified to avoid excessive resorting of the label list to fix the problem.

## Program Hanging

- **Case 52338**

When we turned the 3D graticule ON and rotated any model like a flat plate, if the model becomes parallel to any of the X-Y, Y-Z or X-Z planes, PRIMER got stuck. This was because when the model became parallel to any of the planes, the difference between xmax/xmin or ymax/ymin or zmax/zmin of the model almost became zero. We have added a sanity check to fix this issue. Instead of having a flat plate when the model becomes parallel to any of the planes, we now get a box.

## Python API

- **Case 53150**

When we changed the port number to a different number than the default value then started and stopped the connection, the value in the text value reverted back to the default value. This has been fixed now.

## Read

- **Case 53864**

When reading LS-DYNA input files using the default threaded method, a crash could occur if the child thread was stalled for more than 10 seconds due to a network problem. The problem can be worked around by turning off threaded input in [Model] Read, options. This crash was caused by improper handling of this ‘stalled read’ situation and has now been fixed.

- **Case 53045**

The following sequence in the input deck caused PRIMER to reject the deck stating that the input was garbled:

```
*MAT_ADD_EROSION
```

```
card data
```

```
PGP encrypted data block
```

This was because of internal errors in the way \*MAT\_ADD\_EROSION was considering PGP encrypted data to form a partially encrypted keyword.

This issue is now fixed, and potential similar errors in other \*MAT and \*MAT\_ADD keywords are also fixed.

- **Case 52612**

Previously, PRIMER did not flag \*INCLUDE\_PATH that used relative path as an error during model read. Issue fixed. PRIMER will now report a keyin error if \*INCLUDE\_PATH using relative path is read.

- **Case 51638**

Previously, PRIMER did not allow duplicate \*DEFINE\_FRICTION cards. Issue fixed. PRIMER now merges multiple \*DEFINE\_FRICTION definitions with same label while reading the key file. Card 1 (row containing label) of the duplicated definitions is ignored while reading in the model.

- **Case 51540**

PRIMER was previously failing to read a \*DEFINE\_FUNCTION card that contained one or more commas in the title field. This issue has now been fixed.

## Renumber

- **Case 53743**

Previously in the Model → Renumber → Visualise panel, the initial 'Move to' value is '1' and you could renumber blocks accidentally. Issue now fixed. The initial 'Move to' value has been changed from '1' to '0' to prevent accidental renumbering of blocks.

## Rigidify

- **Case 52533**

When simplify rigidify delete is applied to a lead part in a merge which is itself chained to another, the part should not be deleted. In some cases, depending on order of merges it was incorrectly deleted. This has been fixed.

## Scripting

- **Case 53818**

Inputting a file path with spaces into the load curve textbox was not functioning correctly. This issue has been fixed now.

- **Case 53742**

During include transform, the define curve functions were getting renumbered twice which has been fixed now.

- **Case 53353**

The HIC tool was unable to open T/HIS or open D3PLOT on Linux. This has now been fixed.

- **Case 52513**

Previously, the FMH markup tool considered markup points that were incorrect. This has been fixed. Additional checks have been added to the FMH markup tool

(FMVSS201U) to prevent consideration of incorrect markup points. This should improve the calculation of the AP1 point in particular.

- **Case 50635**

Previously on the SPH MESH GENERATION panel (SPH-MESH JavaScript), the part selected for PID got deselected after pressing cancel. Issue resolved. Clicking 'Cancel' now retains the already selected part/parts.

- **Case 43150**

For ICFD Setup tool:

- Some textboxes were not wide enough for large values, which has been fixed now.
- The scrollbar was not updating with changes to number of boundaries, which has been fixed now.

## Sensor

- **Case 48822**

Previously, PRIMER issued an error message when we try to create a \*SENSOR\_SWITCH with SWITID changed to the label of a latent \*SENSOR\_SWITCH. Issue fixed so that relabelling \*SENSOR\_SWITCH no longer issues an error message in the command window.

Additionally, the radio buttons for subtype were not mapped on the create/modify \*SENSOR\_SWITCH panel. This has also been fixed.

## Sets

- **Case 52618**

Previously, the object menu for sets in ADD mode only listed items that were not in the set. This has been corrected. The object menu for sets in ADD mode will now list all items. This allows you to make a selection that includes both new items and those already in the set, which is deemed to be less confusing.

## Sketch

- **Case 51691**

PRIMER draws some annotation information for joints when sketching said joints. Text colour was not being set correctly for said annotation with the result that they could appear in an unexpected colour or, in rare cases, even appear to shift colours. This issue has now been fixed and joint annotations are also depicted in the user-specified sketch colour.

- **Case 48304**

Previously for IGA type part, no arrow was drawn when sketching \*INITIAL\_VELOCITY\_GENERATION. Issue fixed. PRIMER now draws an arrow on the centroid of the IGA type part for \*INITIAL\_VELOCITY\_GENERATION.

## Transform

- **Case 52945**

LS-DYNA permits duplicate node label definitions so long as the coordinates of the duplicates are coincident. One way of modelling this is to have nodes in the model at coordinate A, and the same nodes in an include file at some position B which \*INCLUDE\_TRANSFORM moves to coincident position A. In this situation, PRIMER creates a single unique definition for each node and makes the copies in the include file 'clones' of the this.

An error in PRIMER 20.0 meant that, depending on the order of the include files, such a model might not transform the nodes correctly resulting in a refusal to read the model because the duplicate nodes were (wrongly) not coincident.

Earlier versions of PRIMER would read this model correctly. However, those earlier versions would write out the nodes in the include transform file in their as-transformed position, coordinate A in the example above, rather than their original untransformed position, coordinate B.

Both problems have been fixed in PRIMER 21.0.

## User Interface

- **Case 53343**

Previously, the directory button in the Pedestrian Markup tool, upper leg impact points section, did not appear to be a button. This has now been fixed.

- **Case 53292**

Previously, some keyword editor row on/off buttons were not big enough, resulting in truncated row number. Fixed this. Made the row on/off button in the keyword editor big enough to hold the row numbers according to the number of digits the row number has.

Also fixed the column sort function where the alpha entries were not sorted properly.

- **Case 52296**

Previously, the Apply button on the 'Database for CREATE MODEL' (Model → Build → 'Select existing xml database' → Apply) panel was incorrectly written in all-caps. Corrected this Apply button.

- **Case 51481**

The rows of the object menu in Safety → Dummies → Position → Move parts → Save/Retrieve → Delete were not getting highlighted when selecting them. Now fixed.

- **Case 50632**

Dealt with issues related to Model → Build → ‘Select existing xml database’:

- 1) The ‘Keyword file:’ and ‘Thumbnail:’ textboxes on the ‘Add entry to database’ panel (accessed via ‘INCLUDE FILE FOR MODEL BUILD’ tree → ‘Add new child’ → ‘Type:’ → ‘LS-DYNA keyword (.key)’) were right aligned and looked weird. This is now fixed.
- 
- 2) On the same panel as (1), fixed text ‘select version:’ with all lower case by updating to ‘Select version:’. Additionally, tick boxes on the ‘COMPONENT VERSION CONTROL’ panel (accessed by clicking on ‘List’) previously looked wrong (not consistent with other tick boxes in PRIMER). Now fixed.
- 
- 3) On the same panel as (1), in the extra data section (activated by clicking ‘Add extra data .key file’), fixed buttons with all lower case text ‘usage’ by updating to ‘Usage’. In the same extra data section, the file textboxes were right aligned and looked weird. This is now fixed.
- 
- 4) Fixed labels and popup buttons with all lower case text on the ‘EXISTING ORIENT POINT(S)’ panel (accessed via ‘INCLUDE FILE FOR MODEL BUILD’ tree → ‘Edit’ → ‘Create orient’ → ‘Add tracked orient point to database component’) by capitalising the first letter.
- 
- 5) On the ‘TEMPLATE CONTROL PANEL’, all buttons on the top looked the same. Issue fixed by making the ‘Reread all’ & ‘Quit’ buttons look different and more obvious. Additionally, many texts and buttons (especially for popups) are all in lower case. Fixed by capitalising first letter. On the same panel, there is a redundant ‘Help’ button (same as the [?] button). Button removed; issue fixed.
- 
- 6) The template name textbox on the ‘TEMPLATE CONTROL PANEL’ (accessed by right clicking on a template) is not clear. This issue is fixed by making the textbox more obvious.
- 
- 7) ‘^’ and ‘v’ were used for the up and down buttons on the ‘MODEL BUILD PANEL’ (accessed by clicking on ‘Build Models’ on ‘TEMPLATE CONTROL PANEL’). This has been fixed by using icons instead.
-



- 8) Additionally, on the 'MODEL BUILD PANEL', the tick boxes seem to resize vertically when hovering over them. They are now fixed.

Occurrences of 'LS-Dyna' were replaced with 'LS-DYNA' in PRIMER 21.0 to improve consistency within the program.

- **Case 49461**

Previously, out of date master/slave terminology was used in PRIMER. Issue fixed. Replaced the terms 'slave' and 'master' that appear on the PRIMER interface (e.g., buttons, print messages, help messages). Terms were updated based on category.

## Volume III

- **Case 51166**

Fixed a bug in the reading of \*EM\_RANDLES\_SOLID, \*EM\_RANDLES\_TSHELL, \*EM\_RANDLES\_MESHLESS and \*EM\_RANDLES\_BATMAC that was causing data from card 3.a to be incorrectly copied to card 4 when RDLTYPE<2.

## Workflows

- **Case 52350**

Previously, there was an issue with the support of PDB WSID 50M in PRIMER. Now fixed. We now support both left-hand side and right-hand side PDB WSID 50M dummies of versions 4.0 and 7.6.

## Write

- **Case 52290**

Previously, the Analysis Tracking Tool was not working because keyout was not interrupted by the Analysis Tracking Tool. Fixed this.

## Xref

- **Case 47768**

\*DEFINE\_CURVE\_FUNCTION can refer to load-curves, nodes, parts, etc.

Previously, they were not all supported with cross-references in PRIMER, and could lead to broken models. Now, they are all supported with cross-references. This will prevent accidental deletion of the item on cleanup (or otherwise). External label change will now update the contents of the function string.

## ZTF

- **Case 51985**

Writing a ZTF file for a model containing discrete beams with \_OFFSET could cause a crash.

In fact, the combination of discrete beams (ELFORM = 6) and the `_OFFSET` suffix is invalid in LS-DYNA. For this reason, some operations to configure the `_OFFSET` values were not performed prior to the ZTF file being written, and this caused the crash.

The crash has been fixed by pre-configuring `_OFFSET` in this context regardless of beam element formulation. A check for the usage of `_OFFSET` with invalid ELFORM values has also been added.

## 2.1.2 Bugs Fixed in 21.1

### Animation

- **Case 54087**

Animation of `*BOUNDARY_PRESCRIBED_MOTION_SET` cards was not considering the notional centre of gravity of the relevant sets for rotational degrees of freedom. This issue has now been fixed.

### Belts

- **Case 54569**

Seatbelt fitting tool: the tool was crashing when trying to run the fitting for a path that contains coincident points because belt segments of zero length should not be allowed. Coincident points can be added manually while defining the basic path, or automatically by PRIMER through the 'Adjust' feature in the 'Explicit Slipping' panel (if the new points generated fall on already existing points). A warning pops up when attempting to save a path that contains coincident points, but if this is ignored and the fitting is run without adjusting the initial path PRIMER will crash.

The check for coincident points is now also conducted when clicking on the Fit 'play' button which prevents the fitting to run if any coincident points are detected and prints the warning again to explain that the initial path should be adjusted.

Additionally, another check is added for belt segments (formed by adjacent points) that have a length less than the selected belt element length because this can also cause problems.

- **Case 54093**

Seatbelt fitting tool: Fixed a bug that was preventing the 'pause' interrupt button to work if while the 'Fit' process is running, the user clicks anywhere on the seatbelts menu (being a button or the background) and then tries to click on the 'pause' button.

- **Case 52738**

Fixed bug that when defining seat belt path with advanced checkbox checked prevented users picking any path points.

Now the advanced point handles will deactivate when trying to add new path points using the I-Be, I-Af or I-@P modes.

- **Case 52736**

Fixed an issue where using Adjust in the seatbelt explicit slipping could cause point deletions and incorrect adjustments when a belt was fitted.

The seatbelt explicit slipping Undo and Adjust buttons will only be active if no belt has been fitted. The buttons can be reactivated by resetting the belt path.

## Checking

- **Case 55219**

In \*FREQUENCY\_DOMAIN\_ACOUSTIC\_BEM, PRIMER was giving error messages when fields NSIDEXT and NSIDINT were 0, which are valid inputs. This has been fixed.

- **Case 54449**

Previously, PRIMER did not allow the use of \*CONSTRAINED\_BEAM\_IN\_SOLID with TSHELL. \*CONSTRAINED\_BEAM\_IN\_SOLID can now apply to TSHELL as well as SOLID. PRIMER checks have been updated.

- **Case 54184**

The check tree for displaying xml data could display meaningless error counts for contacts. This has now been fixed.

## Connections

- **Case 55220**

The connection adhesive maker was failing to make adhesive between two layers of solid elements. Some logic added to improve extrusion from solid faces to shell layers was inadvertently blocking the creation in the solid to solid case. This has been modified.

- **Case 55097**

Fixed crash that occurred when the user would press 'All' multiple times in the Connections Table panel.

- **Case 55048**

PRIMER previously crashed when trying to create adhesives that exceed the maximum number of layers specified. Issue is now fixed. PRIMER will issue a warning instead.

- **Case 54975**

PRIMER should render all \*MAT100 beams/solids to connections. This worked if the weld was between shell layers. If the weld was between solid layers the process could fail. The logic has been made more robust.

- **Case 54649**

Models with welds that are not PRIMER connections but directly connected by constraint (e.g. NRBC) were causing press on main connection tool button to be unnecessarily slow as PRIMER attempted to resolve welds without connections to no avail. These welds will now be ignored after the first lookup.

## Constraints

- **Case 54811**

Edit create of \*CONSTRAINED\_RIGID\_BODIES was missing the check on multiple constraint of child body. A rigid body can only have one master. The logic has now been added.

- **Case 52851**

The colour menu now updates to the default colours after resetting the PRIMER preference.

Selecting the default in the colour panel for NRB's, Rigid Bodies and Extra nodes will now reset them to default colours (unique colours based on their label), rather than setting them to white.

## Contacts

- **Case 54992**

Nodes to surface contact when used on beam was not extending the nodal thickness by 0.5 x the diameter, meaning that penetration was missed or underestimated. This has now been fixed.

## Control

- **Case 54577**

Fixed a bug due to which PRIMER didn't accept negative value inputs for 'MSGMAX' field in \*CONTROL\_OUTPUT keyword. MSGMAX takes negative values now.

- **Case 54356**

IADPN90 field on \*CONTROL\_ADAPTIVE card can now be set to '-1'.

## Crash test setup

- **Case 55054**

Nothing was happening when writing out the model after running the ECE42 positioning in crash set up with the default impactor. This is fixed now.

- **Case 54560**

Crash test setup script: accuracy of barrier positioning has been improved due to double precision updates in PRIMER.

## Cut section

- **Case 55365**

Cut sections panel could freeze when updating data in a cut section direction tab without the cut section direction being active. This has now been fixed.

- **Case 54365**

During the calculation of CUT SECTION properties, when there are both encrypted data for LCSS and yield stress input, previously PRIMER preferred yield stress calculated from the LCSS curve to direct yield stress input. Now, PRIMER prefers the direct yield stress input to the yield stress calculated from the encrypted data of the LCSS curve.

- **Case 54261**

When part contact uses SFT (rather than OPTT) the cut section capping thickness in 'use fixed thickness' mode was not correct. Now fixed.

- **Case 52997**

When more than one cut direction was defined, cut section properties were correct only for D1, but not for D2 or D3. This affected both the drawing on the floating panel with the properties and the actual numerical values for coordinates, area etc. Now the properties for D2 and D3 are calculated in the same way as for D1.

## Database

- **Case 52981**

PRIMER could omit cuts on triangular shells for very small circular cut sections in some cases. Now fixed.

## Deleting

- **Case 55098**

Cleanup unused incorrectly removed SPC on node of discrete element if there was no attached mass. The check on \*BOUNDARY\_SPC also reported the node as non-structural which is incorrect. The requirement for mass has been removed from this case.

## Dummies

- **Case 55024**

Fixed a crash when doing a dialog input Sequential HBM positioning.

- **Case 54840**

Editing a dummy definition (Safety, Dummies, Modify) and deleting an assembly can cause a crash in some circumstances.

Caused by an internal error due to not considering the possibility that deleting an assembly might 'break' the connectivity of the dummy tree. Now fixed.

## Edit

- **Case 53111**

Fixed bug in SET panel where PRIMER could show the wrong buttons when changing SET type

- **Case 52993**

Added Mandatory card2 which contains MID and SIGMA in \*FATIGUE\_MEAN\_STRESS\_CORRECTION to already pre existing open ended optional card2.

- **Case 52886**

Previously, the hover text for suffix options (Suffix #1, Suffix #2, etc.) on the keyword 'Create/ Modify' panel resembled the actual popup menu and caused some confusion. The hover text has been changed to resolve this issue. Now fixed.

## Elements

- **Case 54352**

SOLID Align would not work for a model with nodal coordinate values in meter units. Fixed this.

- **Case 32809**

Fixed a bug in SPH and DSPH elements, which prevented copying of these elements.

## Encryption

- **Case 53313**

The encryption tool no longer changes your working directory.

## Geometry

- **Case 55248**

Previously, PRIMER would crash when reading a STEP file containing a cylindrical surface that did not reference any trim curves, or whose trim curves were defined by unsupported entity types. This has now been fixed - in these cases, these cylindrical surfaces, and any similarly untrimmed conical surfaces, PRIMER will not render these surfaces.

- **Case 54218**

Previously, PRIMER could crash when reading an IGES file containing a surface that had more parametric trim curves than real space trim curves. This has now been fixed.

- **Case 54178**

Previously, some surfaces in STEP/IGES models could fail to render correctly in PRIMER due to their trimming curves using a reduced range of their full NURBs knot vector, or due to the trimming resulting in multiple surfaces. This has now been fixed.

## Graphics

- **Case 54438**

Resolved bug where selecting default colour for contacts in display colours would throw many error messages.

- **Case 53164**

Penta solid free edges were displayed erroneously. It is fixed now.

## Iga

- **Case 54183**

The mixed IGA and FEA model was incredibly slow to process. This has been optimised has significantly improved processing speed, allowing for quicker model reading.

- **Case 47122**

Added missing templates for \*SECTION\_IGA\_SHELL and \*SECTION\_IGA\_SOLID. Also fixed title of the popup for section type.

## Include transform

- **Case 54379**

PRIMER include label ranges (as read from special comments) when used by include transform were being offset by IDROFF. This is not logical if different LS-DYNA offsets are being applied as (for example) nodal rigid bodies are in the PRIMER node/element range but offset by IDPOFF in LS-DYNA. If all LS-DYNA offsets are same PRIMER applies that offset to both ranges, otherwise no offset is applied.

## JavaScript api

- **Case 55289**

The Ctrl+C and Ctrl+V shortcut keys to copy and paste widgets in the GUI builder did not work on Linux. Now fixed.

- **Case 54775**

Using the part mid or secid properties to set a character label could incorrectly set the value to a very large integer. Now fixed.

- **Case 54697**

Seatbelts tool: fixed a bug that was preventing the proper deletion of existing retractor elements referenced by a belt definition during the re-meshing phase when using the SetPoint() JS API method to change the fixity of end points from RETRACTOR to FIXED.

- **Case 54248**

Functions for the onClick, onChange etc. events that used .bind() stopped working. This has now been fixed.

- **Case 54247**

Promises would sometimes only resolve when an event (such as from moving the mouse) occurred. Now fixed.

- **Case 54198**

Parameter XREFs were lost if the parameter was used more than once and one instance was changed to a numeric value by a JavaScript.

- **Case 54195**

PRIMER would crash in the WidgetItem constructor if the selectable argument was given but the widget argument was null. Now fixed.

- **Case 54040**

Changed a few remaining instances of legacy terminology Master and Slave to appropriate terms in JS API.

- **Case 53979**

If the DialogueFunction callback was used and the function caused an exception, PRIMER would crash. Now fixed.

- **Case 53921**

Previously, if a parent script which launched a child script closed before the child script, both the parent and child script branches were removed from the 'running scripts' tree regardless of whether the child script was still running or not. This could potentially cause issues if the child script used a GUI but never called Exit(), as it would not be possible to end the script without closing PRIMER. This has now been fixed such that child scripts are only removed from the 'running scripts' tree when they have stopped running.

- **Case 53898**

If a custom JavaScript check does not run because of an error, an exception is now correctly thrown with the error.



- **Case 53149**

If a script used RunScript to run a child method and then later, had an error that caused an exception, the exception would have been ignored. Now fixed.

- **Case 52848**

The Part MaxMin method now returns null if the max/min values for a part cannot be calculated (e.g. if the part is empty).

- **Case 52152**

PRIMER could give undefined behaviour if the Spool method in the Set class was called without calling StartSpool. An exception will now be thrown in this case.

- **Case 51281**

Some operations in JavaScript did not trap NaN (Not a Number) values correctly. Now fixed.

- **Case 46410**

Parameters should now show correct number of xrefs for all keywords.

## Keyword

- **Case 55039**

In Keyword \*EM\_RANDLES\_BATMAC, the fields 'TEMP' and 'TAUOSCS' are defined as float fields, but were get written out with round off values. Fixed this.

- **Case 54827**

Corrected unit conversion for LCSRS in \*MAT\_ADD\_EROSION when first value of the load curve was negative.

- **Case 54401**

Updated keyword name from \*CONTACT\_EXCLUDE\_INTERACTIONS to \*CONTACT\_EXCLUDE\_INTERACTION in PRIMER, to keyout for R12 keyword files

- **Case 54035**

Removed \_TITLE option from \*DEFINE\_MATERIAL\_HISTORIES

- **Case 53827**

Pressing the K keyword button would crash PRIMER if the keywords.txt index file was incorrectly formatted. This has now been fixed.

- **Case 52858**

Removed the invalid Suffix #1 '(no type)' option on the 'Create/ Modify' editors for keywords \*DUALCESE\_SOLVER, \*EM\_EOS, \*EM\_MAT and \*EM\_SOLVER. Issue fixed.

## Kwd editor

- **Case 54244**

The editor for \*EM\_RANDLES\_BATMAC did not show the optional card fields. Fixed this.

## Loadcurves

- **Case 55020**

PRIMER could not read a CSV file into the curve editor if the file contained a UTF-8 BOM (Byte order mark). Now fixed.

## Manual

- **Case 54392**

Previously missing 'K' keyword button in \*DEFORMABLE\_TO\_RIGID Create panel is now implemented.

- **Case 54374**

The 'K' button to show the relevant LS-DYNA Keyword manual page was missing from the various \*PARAMETER editing panels. It is now there.

## Mass

- **Case 54994**

Calculation of mass of beam which uses \*INTEGRATION\_BEAM with ICST = 0 was incorrectly programmed. Now fixed.

## Materials

- **Case 55087**

Previously, PRIMER could not process the 'transfer\_source\_file' preference properly when quotes are used in the oa\_pref file. Example:

```
primer*transfer_source_file: '<filepath>\transfer.key'
```

This issue is now fixed.

- **Case 53569**

Fixed the error appearing in DOS box when there are fewer than that required to make a slider appear.

## Measure

- **Case 55142**

The 'Beam Label (Part Title)' text could overflow the buttons in the Safety->Dummies->Measure panel. This has been fixed.

## Mechanism

- **Case 54917**

A Seat MECHANISM with child DUMMY was not responding for a certain situation of coincident connections in the DUMMY.

Fixed this.

## Menus

- **Case 55161**

In PRIMER, applying a 'Tidy All' operation, either from the View panel or using keyboard shortcut 'T', would iconise all menus but not tidy them into the top left corner of the graphics window, unless the operation was applied a second time. This has now been fixed. Further to this, iconising a window using the [-] button in top right of the window, or from the - button in the top left of the window, now iconises the window in place rather than in the last location of the iconised window.

- **Case 55102**

When a free-floating window was positioned initially in a non-default location, e.g. aligned with the right hand margin, its icon window, shown only when minimised, was positioned wrongly.

Fixed this to ensure that the icon window remains positioned at the top left corner of the 'proper' window in this situation.

- **Case 53440**

The radio button icons on the Menu Attributes and the Mechanism Position panels previously visually overlapped, but this has been fixed.

- **Case 53273**

Popup menus would sometimes remain on the screen when they should auto-unmap themselves. They would disappear when a click was made somewhere else.

This could happen if the user navigated the mouse out of the popup via the button from which it was originally invoked. This had the effect of suppressing the auto-unmap event.

Now fixed: the test for whether a popup window should be unmapped is now more rigorous and will take into account the above situation (as well as some more obscure ones not mentioned here).

## Mesh

- **Case 53608**

In the Remove Hole option, the shell selection using Add Shells used to get cleared after entering the element size. This issue is now fixed.

- **Case 53212**

The vector alignment did not work with penta solid cohesive. This has been fixed.

## Morphing

- **Case 55150**

In rare situations the generic editor, used for many different keywords in PRIMER, could 'leave buttons in the wrong place' following changes to a keyword which affected the number or layout of rows. This would only happen if the editor window was already height-constrained and contained a vertical scroll-bar. The layout errors would disappear following any change to that scrollbar position or the size of the panel as a whole. Fixed.

- **Case 55125**

PRIMER could incorrectly report some connections as requiring a remake when they resided inside a morph box that had been restored to its original state via 'Undo' or indirectly through resetting an attached morph box(es). This has now been fixed.

## Nastran

- **Case 54674**

The Nastran output options 'convert MIG to 2 RBE3' and 'convert MIG to CBUSH' were not working as segments were only defined on the reference side of the contact. Now fixed.

- **Case 54338**

When keyword comment exists in

\*ELEMENT\_PART\_MASS

\*LOAD\_THERMAL\_CONSTANT\_NODE

\*LOAD\_NODE

Nastran write will cause PRIMER to crash. Now fixed.

## Nodal rb

- **Case 54340**

When 'spider' NRBs were connected at their master nodes using another NRB, PRIMER incorrectly reported that the connecting NRB was unattached to structural part and had no mass. Both fixed.

## Orient

- **Case 55036**

Stress and strains in \*INITIAL keywords were incorrectly scaled when doing an orient scale operation. The stress and strain data in \*INITIAL keywords will now not be scaled anymore.

- **Case 54833**

Reflecting a shell previously swapped topologies N1,N2 and N3,N4.

This has been changed to just swap N2,N4. This accords with how LS-DYNA splits warped shells into tria in \*CONTACT\_AIRBAG.

- **Case 53784**

While Orienting an entity while using a 'Local CSYS', the axes of orientation were being sketched wrongly. Fixed this.

## Parameter

- **Case 54791**

the WorldSID dummy contains over 25,000 parameters which are embedded in the main model file. If two such dummies are required in a model, i.e. reading the same file twice with the second instance transformed, it becomes necessary to convert all parameters to be either `_LOCAL` or `_MUTABLE` to avoid clashes.

PRIMER got this wrong in some respects because of errors handling `_LOCAL` parameters in `*INCLUDE_TRANSFORM` files. This is now fixed and multiple instances of this model, suitably modified as above, can now be processed.

- **Case 54609**

When an `*INCLUDE_TRANSFORM` file referenced a parameter duplicated in the model, the presence on an unrelated `_LOCAL` parameter in the include file could cause the wrong instance of the duplicated parameter to be used.

This was caused by internal errors dealing with the 'scope' of parameters in this particular situation and is now fixed.

- **Case 44491**

Extra unwanted definitions of mutable parameters can occur when the following sequence occurs:

Master file

```
|
+--- Read include file containing parameter definition
|
use that parameter in master file
```

For safety PRIMER tended to repeat the definition of a mutable parameter immediately before it was used if it had not previously been defined in the file being written out, here the master file. Normally this did not matter, but when the include file was encrypted for the analysis but a simplified file containing dummy values was substituted during pre-processing, this could lead to the dummy value being embedded in the master file so obscuring the real value during analysis.

PRIMER no longer assumes that the scope of a mutable parameter is unknown when it starts writing the master file, rather it presumes that the first usage it meets in that file is implicitly in scope (i.e. the right version) so it does not write a duplicate \*PARAMETER card.

## Part tree

- **Case 54479**

Error messages were displayed when dragging SET PART TREES in the treeview when the edit panel of the set was open, and then clicking on 'Update'. Fixed.

## Pedestrian

- **Case 55170**

In the pedestrian markup tool, when clicking Sketch or Only for the Bumper reference line, the popup window would say 'Bumper surfaces' rather than 'Bumper Parts' when performing a markup on FE. This has been fixed.

- **Case 55158**

Impact Analysis Tool Update

Added file selector buttons for easier file input.

Improved visibility of lines with higher-contrast colours in the UI.

## Penetrations

- **Case 54711**

A model with a thick flat plate aligned in global axes gave a small number of spurious penetrations of the same value as the thickness, when single surface contact with soft = 2 was applied.

The edge intersection routine has been upgraded to use double precision calculation for dot product and the spurious penetrations are now gone.

## Preferences

- **Case 55295**

The 'font\_quality' preference has the default option 'anti-alias' but the XML file used to define preferences to the preference editor mis-spelled this 'anti\_alias' so it failed to pick up a defined option or to specify it correctly.

Spelling in XML file now fixed.

## Program crash

- **Case 54835**

PRIMER could crash if units were changed for a model that contained \*INITIAL\_STRESS\_SOLID, \*INITIAL\_STRESS\_SHELL\_NURBS\_PATCH, \*INITIAL\_STRESS\_IGA\_SHELL or \*INITIAL\_SOLID\_SHELL\_NURBS\_PATCH cards. Now fixed

## Python api

- **Case 54783**

Updated wrong examples in the 'PlayMacro' Python API PRIMER function documentation. And the 'options' parameter has been updated in the documentation, indicating that it is a dictionary, not an object.

## Read

- **Case 55373**

In models with \*DEFINE\_FRICTION card referenced in \*CONTACT keyword, if the \*DEFINE\_FRICTION card is written after the \*CONTACT keyword definition, it is read as duplicate definition and card 1 was skipped from the \*DEFINE\_FRICTION keyword.

This has been fixed and even if the \*DEFINE\_FRICTION is referenced before its actual definition, the \*DEFINE\_FRICTION is read completely.

- **Case 54929**

Fixed a bug that was causing legal negative node labels referenced by \*ELEMENT\_SEATBELT (for example if the node label is less than the node offset defined in an INCLUDE\_TRANSFORM) to be detected as illegal when reading in a model causing PRIMER to delete the model and complain about these negative entries.

- **Case 54681**

On a very heavily loaded system two problems could occur while reading a model due to the threaded lookup of element topology:

(1) The PRIMER process could stall. This was due to it being configured for use on an interactive desktop in a way that was 'too nice' to other processes competing for system resources.

(2) After a period of stall the threaded lookup of element topology could fail, giving a warning message, and revert to serial operation. This could sometimes leave the occasional element unread or not read correctly.

Both problems were related, due to contention between threads, and have been fixed.

- **Case 54638**

If the \*ELEMENT\_MASS entities were taken from an \*INCLUDE\_TRANSFORM, the clashing labels for such entities were not getting sorted. Fixed this.

- **Case 54468**

If a \_LOCAL parameter was used inside a \*INCLUDE\_TRANSFORM file it could end up being misread: not being used correctly with an extra 'phantom' definition being created in the master file.

Due to internal confusion about include file numbering when an \*INCLUDE\_TRANSFORM file, which is read into a separate scratch model and then transformed, is merged back into the main model. Now fixed.

## Renumber

- **Case 54201**

Renumbering operations exclude latent items. However, the logic that doles out a new label for a renumbered item could, in some circumstances, wrongly dole out the label of a latent item. This occurred only if latent items were in the first place flagged for renumber. This is now fixed.

## Rigidify

- **Case 54623**

Rigidify and delete function did not conserve mass when the model contained \*ELEMENT\_MASS\_PART definitions where the part(s) are partially rigidified. This is now corrected by adjusting the \*ELEMENT\_MASS\_PART definitions.

## Scripting

- **Case 54740**

JavaScript function part.CentreOfGravity by default returned zero when applied to a rigid body that is a child of another.

This has been changed so the nominal CofG is returned, although this has no meaning in LS-DYNA as the mass of the rigid bodies will be combined.

The CofG of the parent rigid body will (as before) include the mass of the child.

- **Case 54607**

The convert LSTC dummy script now works with keywords that use the \_TITLE suffix.

- **Case 54583**

Macro errors caused by selecting Cut Section in the graphics window toolbar have now been fixed.

Running the Quick Check mode in the HRMD script with a no-leg occupant model



will now execute correctly, without attempting to position the missing legs.

Warning check and message has been added to the Head Restraint part selection to warn user that if non-shell element sets are selected, the operation will not proceed correctly.

## Seatsquash

- **Case 54843**

Safety->Seatsquash tool was showing problems for multiple models in a PRIMER session. Fixed this.

## Sets

- **Case 54654**

Creation of joints and nodal rigid bodies in a large model with many \*SET\_NODE\_GENERAL defined with boxes is very slow. This is repeated updates of cached set data. Some changes have been made to inhibit un-necessary updates.

- **Case 54466**

\*SET\_PART\_ADD refers to other part sets. If one of these was a \*SET\_COLLECT, PRIMER did not decompose the contents correctly. This has been corrected.

## Sketch

- **Case 54325**

When sketching \*DEFINE\_BOX, an additional plane is displayed sometimes. Fixed now.

## Units

- **Case 54635**

During a units change operation parameter values are changed based to become the new values of the parameterised fields in which they are used. However where a parameter was used both on some modified card and on a loadcurve which is not referenced the value on the loadcurve did not update, retaining its old value and breaking the association with the parameter.

This wasn't wrong since an unreferenced loadcurve has no units (uniquely it infers its units from the cards which reference it) therefore the underlying value was not modified by the units change operation so, arguably, the behaviour was correct. However it was a bit perverse and not really what a user would expect, so the behaviour has been changed to update the parameterised data field in this situation.

This is a change of behaviour so a preference

primer\*update\_params\_on\_unused\_curves: true | false

has been added to permit reversion to the old behaviour if needed.

## User interface

- **Case 55282**

HRMD script: Euro NCAP Rear procedure text in the initial options window is no longer cut-off.

- **Case 55216**

The display of the connections options panel was not refreshing correctly when expanding or contracting the options if the main PRIMER window was small and the options panel did not fit in it. This has now been fixed.

- **Case 54677**

A bit of UI decoration intended for the Graphics Text/Label Options sub-panel was unintentionally displayed on all the Display Options panels. This has now been fixed.

- **Case 54580**

Some popups mapped from the Part Table and Part Compare Table had inconsistencies causing buttons to not quite appear as intended, e.g. looking greyed out when they were not. This has now been fixed.

- **Case 54455**

Autofit columns for large model with lots of material keywords is much faster now.

- **Case 54419**

Replaced 'Sla' and 'Mas' with 'SA' and 'SB' respectively on contact colours fill button.

- **Case 54089**

A crash could occur on a high resolution screen running at 300% or higher resolution. This was caused by an error in a part of the user interface not dealing with very small pixel values correctly, now fixed.

- **Case 54029**

Previously, when inputting/changing data in the impact points panel of the Pedestrian markup tool some unmapped buttons could quickly appear and disappear. This has now been fixed.

- **Case 53843**

Some erroneous visual artefacts from radio buttons in the floating Spotweld panel have been cleaned up.

- **Case 52856**

Vertical sliders were not behaving correctly on Coat tools docked panel. Fixed it.

- **Case 52560**

Changed legacy terminology 'M' and 'S' to 'B' and 'A' respectively for surfB and surfA on pen check panel.

- **Case 50734**

The radio button icons on the Menu Attributes and the Mechanism Position panels previously visually overlapped, but this has been fixed.

## Volume 3

- **Case 54388**

Updated the list of options in the drop down menu for CONTYPE of \*EM\_ISOPOTENTIAL\_CONNECT in the keyword editor as follows:

- Changed the description of CONTYPE eq. 5 to 'Meshless Randles circuit' as it was incorrectly set to 'voltage source'.
- Added the missing '7:power' option

## Workflows

- **Case 55205**

Tag box overlapped with buttons on the Workflow Definition Creation Panel. Fixed this by moving Tags menu below.

- **Case 54430**

When searching for workflow data PRIMER would issue warning messages if it couldn't search in a particular folder, for example because it was a restricted folder. This was unnecessary since it was not a problem and there was nothing a user needed to do about it.

These messages are no longer issued.

## Write

- **Case 55361**

\*AIRBAG keywords with inactive fields in between used to write out zeros in these places. Now these inactive fields (in between/before two active fields) are written as spaces.

## 2.2 D3PLOT

### 2.2.1 Bugs fixed in 21.0

#### 3d

- **Case 51879**

Annotation marker positions were exported only for the annotation they corresponded to, so, for example, a marker on a static frame would be exported with only a single position. In the Viewer this meant markers would not necessarily animate correctly. Now the positions for all visible markers are exported for every annotation, so now in the Viewer they will animate correctly.

- **Case 50131**

When reloading a REPORTER item or an annotation D3PLOT could load a different state to that which was captured. This could happen if there were multiple models in a window with different numbers of states. This has been fixed.

#### Animation

- **Case 53483**

In a D3PLOT session containing multiple models in multiple windows the State Slider/Animation Menu didn't always update correctly when windows were turned on and off.

If all Windows were turned off and then one or more were turned on again the state slider would display state 0 even though the Windows were displaying a different state.

#### Annotation

- **Case 53735**

When reloading annotations that included graphs, curves could be added to other graphs in the session, the graphs on the annotation page may not have updated correctly and sometimes graphs could be missing from the reloaded page. These issues have been fixed.

- **Case 53386**

Marker symbol sizes varied with display resolution and window layouts. This has been fixed. Also, marker text size now set by label text size in Display Options >> Fonts.

Annotations with a window containing 3 or more models could be reloaded with the models appearing in the model list in a different order to when the annotation was captured. This has been fixed.

## Blanking

- **Case 50165**

Fixed an issue where the blank lock status was being reset to false when a new model was read in.

## Capture

- **Case 51958**

Following a settings and properties file read, parts could blank and unblank in the graphics window when rotating the model. This has been fixed.

- **Case 51956**

When reloading a capture with a command file from REPORTER, D3PLOT now makes sure to update the graphics when the command file is done executing.

## Component

- **Case 52411**

D3PLOT could crash if you created a user defined data component that used another user defined data component as one of the inputs.

## Contour

- **Case 52134**

Contours were not recalculated correctly when during an animation multiple cut sections were changed. This happened for custom spacing in one direction, when positions were added, deleted or modified. Also, with multiple directions any changes to the second or third direction did not trigger recalculation of contour bounds. Now the contour bounds update as expected in these cases.

- **Case 52099**

In D3PLOT, contour plots displayed wrong maximum and minimum labels at the top left corner, when users first displayed state 0 and then the last state from the result file. This is now fixed.

- **Case 51942**

With multiple models in one window and the default 'Auto all frames', contour bounds were correctly calculated across all frames in the animation, but with the Pause button in the animation they went back to those for the current frame. With a single model it is only the state slider changing back the bounds to the current state, but Pause in the animation keeps the bounds across all frames. Now multiple models in the same window behave in the same way as a single model.

- **Case 51719**

Added a contour range label in D3PLOT. This label provides context to the contour data on a contour plot. The label describes the extremal values. This will allow images captured from D3PLOT to retain the contour mode information. Range label is 'Range: all frames', 'Range: current frame', 'Range: all windows' for auto all frames, auto each frame, auto all windows modes respectively. Range label is 'Range: current state' when the contour plot displays state data. And the Range label is 'Range: automatic' for envelope plots in automatic contour modes and 'Range: user defined' for envelope plots in user defined contour modes.

- **Case 49178**

Until now D3PLOT could not determine whether a beam element was integrated or resultant. Consequently, integrated and resultant beam components were plotted on all beam elements. In a model with both types this would lead to inapplicable results, for example a plot of XX axial stress, an integrated component, would show total axial strain on resultant elements.

Now, if a ZTF file is available, D3PLOT uses the section information to identify which type beam elements are and only plots applicable components on them. There is a switch in Display Options >> Beam Symbols >> Ignore Beam Type that can be set to on to override this and plot integrated and resultant beam components on all beam elements. This switch can be set with preference `d3plot*ignore_beam_type ON/OFF`.

## Cut section

- **Case 52929**

When on the cut section panel with the LS-DYNA definition method a `*DATABASE_CROSS_SECTION` is imported, the same normal tail, normal head and edge head come across only for the `_PLANE` suffix. With the `_SET` suffix `*DATABASE_CROSS_SECTION` has not got these coordinates defined, so importing does not make sense. Previously D3PLOT had got corrupted coordinates in the cut section definition in such an import and sometimes crashed. Now there is an error message, and the previous cut section definition is retained.

- **Case 52488**

In version 20 onwards of D3PLOT some threaded (parallel) code was added to speed up cut section calculations and display.

In version 21 a new option has been added into the 'Tune->Threading' menu that can be used to turn off the cut-section threading logic if required.

A new preference has also been added

`d3plot*thread_cut_section`

that can be set to TRUE or FALSE to turn ON/OFF the threaded logic.

By default the logic is ON.

- **Case 52484**

When a model was open in D3PLOT with cut section custom spacing and the model was closed while the cut sections were still active, then D3PLOT could crash after opening another model. This has now been fixed.

- **Case 52456**

When a cut section defined by the LS-DYNA method was dragged with the middle or right mouse button for rotation, the coordinates on the panel did not update correctly.

Also, when another definition method is switched to the LS-DYNA method on the panel, the normal head and edge head appeared as 0.0 0.0 0.0 on the panel, whereas now they are calculated automatically so that the plane defined by the LS-DYNA method appears in the same location as the plane defined by the previous method.

Typing in an origin coordinate in the text box did not update the drawing of the plane as expected. Now it retains the normal and edge heads and updates the plane position as expected.

When there was a linked PRIMER session, any cut plane defined in D3PLOT by the LS-DYNA method came across to PRIMER in the correct location, but with the normal and edge vectors scaled to unit length and made orthogonal. Although this defined the correct plane location, it was less obvious from the numbers on the panel that the planes were actually the same. Now the normal head and edge head coordinates are sent across without changing any vector lengths so that the numbers are the same in both linked programs.

- **Case 52433**

When the cut section panel was open in PRIMER and D3PLOT at the same time while they were linked in the integration and the definition type was changed in PRIMER, sometimes D3PLOT still showed the wrong buttons. For example, if in PRIMER the type was changed from 'Constant X' to 'Origin and vectors', then the button in D3PLOT would show 'Origin and vectors' as well, but D3PLOT would still have shown the text box for the constant X coordinate rather than the origin and vectors. Now the text boxes are shown for the new definition type in both programs as expected.

- **Case 52331**

For \*PART\_CONTACT the thickness OPTT and the scale factor SFT were picked up in D3PLOT from ZTF files. This becomes visible for example in cut sections when in the element capping the PART\_CONTACT thickness is selected. When this option

was used in composites with `*PART_COMPOSITE_CONTACT`, then the thickness and scale factor did not appear in D3PLOT. This has now been fixed so that they appear in the same way as without `_COMPOSITE`.

- **Case 48663**

The default spacing for parallel cut sections was based on the model dimensions the first time in a D3PLOT session. If then all models were closed and a new model was reopened, the same spacing was used again even when the new model had got very different dimensions. Sometimes the planes in the new model were slow to draw because there were too many of them with a too small spacing. Sometimes the planes may not become visible at all when the spacing is greater than the model dimensions. Now D3PLOT recalculates a default spacing for the new model in these cases.

Also the thickness for thick cuts, custom spacing as well as the cut origin location are now reset similarly.

## Deform

- **Case 53817**

When using Fix Node, behaviour was inconsistent between screen picking a node versus keying a node ID into the text box. In the first case, the Fix Node switch would automatically toggle on when a valid node was selected, but not in the second case. This has now been made consistent so that the switch is always toggled on for a valid node.

Additionally, it was sometimes possible to cancel the picking action before selecting a node, at which point it was not possible to restart it. This has now been fixed.

Finally, in some cases of selecting a fixed node with multiple models active, a superfluous error message stating 'See warnings!' could be printed to the dialogue window, followed immediately by a warning with the actual information required. In this case, this error is now suppressed from the dialogue window.

- **Case 51685**

Magnifications are now applied to modal analysis (e.g. `d3eigv`, `d3ssd`, etc) plots in d3plot to make it consistent with how it is done for Nastran frequency response functions.

## Dialogue command

- **Case 52355**

Fixed a bug regarding the JS function `DialogueInput()` for D3PLOT where the range of part IDs requested would infinitely loop if the part IDs requested were not present in the model. It will now not lock the program however it's recommended to check



that the part IDs are valid before issuing any commands in this way to D3PLOT in order to ensure correct behaviour.

## Elements

- **Case 50568**

In D3PLOT 21 the PTF Compress Utility has been updated so that it now supports DES elements.

## Envelope

- **Case 53666**

Enveloped contour plots could get 'stuck' on models after enveloping was switched off due to contour resolution being changed on an envelope plot. The buttons for changing contour resolution are now greyed out if an enveloped window is the only / first selected window and if an enveloped window is selected but not as the first selected window the contour resolution for enveloped windows is not updated and will remain unaveraged until enveloping is switched off.

- **Case 52878**

If an envelope plot of a nodal data component (displacements, velocities, accelerations) was generated for a model that contained element deletion then the min/max values could include values from nodes which no-longer had any elements attached to them.

## Femzip

- **Case 52961**

Femzip reading from file paths greater than 256 characters were not allowed to be read into D3PLOT. This has now been fixed such that the upper limit is 512 characters.

## General

- **Case 49219**

The option to display Minimum and Maximum data values on top of a non-data plot (HI, LI, SH) didn't display any values. This has been corrected.

## Geometry

- **Case 53985**

If data was plotted on a contact surface and the model also contained Airbag Particles then the lighting in SI plots was missing from the contact segments if the Airbag particles were being rendered using the default 'Fast Sphere' method. This has been corrected.

## Graphics

- **Case 52995**

When capturing images in 2 times or 4 times the resolution, some labels would not be written out properly. This has been fixed now.

- **Case 52873**

If some of the elements in a DES part were blanked and then the image was rotated so that the part moved off of the screen and back on again the when the part moved back onto the screen all the elements in the part would be displayed again. This has been corrected.

- **Case 44443**

If the Material Attributes menu or the Lighting menu was used to reposition the default light positions, then the vector position displayed in the menu was sometimes inaccurate due to rounding errors in the positioning calculation.

There were also some menu issues that caused flickering and performance issues if you tried to edit the positions of lights when both menus were being displayed.

## Groups

- **Case 52549**

Blanking, and more probably unblanking, by group could sometimes leave things visible on the screen which should in fact have been blanked. This would not be very repeatable since it would depend upon what had happened previously, and in most cases you would never see this behaviour.

This was due to an internal error in the way blanking was applied in some circumstances which has now been fixed.

## Integration

- **Case 53087**

The behaviour of cut section dragging when PRIMER and D3PLOT are linked together has been improved:

- Initiating dragging in one code will also activate it in the other.

- Some problems with cursor symbols failing to change correctly to show the current dragging state have been fixed.

- **Case 49916**

Suppose that more than one model is open in D3PLOT, each in a separate window. If a PRIMER session was linked to the second model but not the first, then cut section locations were synchronised only if the first model/window was toggled off at the top

of the cut section panel in D3PLOT. Now D3PLOT sends the cut section data from the first window containing a model also open in PRIMER.

## JavaScript API

- **Case 53842**

Extracting von Mises, max principal or min principal stress from a shell element for a single on-plan integration point at the middle surface could cause a crash. This has been fixed.

- **Case 53697**

Fixed a bug due to which the Item() function of SetNode class in Javascript always returned the node object of the first node from the node set, irrespective of the 'index' value that is passed as an argument to the function.

- **Case 53673**

Fixed GetData with components UNOV, USST and UBMV giving arrays full of uninitialised values.

- **Case 53609**

Fixed an issue where ALE Components ADOMF, AMMG and AMMS were not giving the expected results in the JavaScript API. There was a typo in the manuals where ADMOF was spelt as ADOMF so that was fixed too.

- **Case 53240**

Fixed a crash when using JS API function GetData with the ADENS component. Also fixed using GetData with ALE components ADOMF, AMMG and AMMS giving the incorrect values.

- **Case 53125**

In previous versions of D3PLOT, clicking the 'Debug' button twice in the JavaScript menu could make the JavaScript debugger inoperable. This issue has now been fixed.

- **Case 42163**

A bug where the JavaScript API function SetCurrentState() could not be set to 0 was fixed.

- **Case 38162**

Fixed a crash in the D3PLOT JS debugger when something was not being garbage collected.

## Labels

- **Case 53776**

If the option in the Entity to display the labels of Volume 3 Parts was turned on, then the labels were still not displayed correctly on plot.

- **Case 52906**

The use of wildcards such as '\*' was working correctly from the various Tools menus but not from the quick pick box. Specifically, the following were not working correctly:

- '3\* 4' would work correctly, but '3\*' would not.
- Specifying '3\*', then 'Undo', then '\*' would make D3PLOT execute a quick pick on the original pattern of '3\*' rather than '\*' (all)

These issues have now been fixed.

## Materials

- **Case 50895**

In the material attributes panel if a vector was used to define the position of a light the vector displayed in the box after it had been normalised showed some rounding errors.

## Measure

- **Case 49108**

Part-Part measures were drawn at the wrong place when they were between two different models in the same window and one of these models had a model space offset. The measurement values were correct, but the end points of the line segment on the screen were based both on the offset of the same model. Now the visual end points are based on the model offset of the model where the respective part is from.

## Menus

- **Case 53565**

The 'Attached Loads Only' was displayed incorrectly in the entities panel. Fixed this.

- **Case 52402**

Text filters, as applied to object menus, would, at times, work the first time around but not if a different filter were applied subsequently in the same menu. This issue has now been fixed.

- **Case 49466**

When using the Workflows panel with more than one model it is usually the case that you need to choose the model to work on via a popup next to the button in question. This worked but it could:

- Get left behind on the screen if the Workflows panel was unmapped.
- Get left in the same position on the screen if the Workflows panel was moved or resized, instead of staying next to the button.

Both problems, in fact not specific to workflows, have been fixed.

## Metal forming

- **Case 53780**

In the FLD panel when picking a single point from the FLD plot shells corresponding to all points could be labelled instead of only the shell corresponding to the picked point. This has been fixed.

## Nastran

- **Case 52063**

Fixed a problem with reading in certain OptiStruct OP2 files which contained a large number of file records.

## Performance

- **Case 52548**

The reading of ascii groups files (.asc) and their conversion to binary groups files (.grp) worked correctly but it could become slow when a big model contained many groups.

The logic has been recoded to make this many times faster, keeping the same functionality.

In addition the optional Colour, Transparency, Blanking, etc. information that could be added to a group in an ascii file is now 'remembered' in the binary file. This means that the (new) only option in the groups menu can now also restore visual properties of the selected group if these are defined.

## Program crash

- **Case 50889**

D3PLOT has a database management system which tries to trade off the need to conserve system memory resources with the requirement for reasonable performance. This worked reasonably well on Linux but on Windows 10 it suffered from two problems:

(1) Overall system page file usage ('virtual memory') was not reported or monitored.

(2) The physical memory usage of this process was monitored correctly but changes in the way that Windows 10 handles memory meant that the various checks and balances were not working as intended.

Memory monitoring has now been improved, and in particular virtual memory reporting has been restored. In addition, the database storage strategy for results has

been tuned to make it cooperate better with Windows 10, meaning that the code is far less likely to halt with a 'cannot allocate further memory' error.

## Ptf compress

- **Case 47454**  
Fixed an issue where ptfcut= was not working in tty mode.

## Quick pick

- **Case 53410**  
Updated Quick Pick search bar in D3PLOT to accept more than 10 characters.
- **Case 50251**  
QuickPick key-in previously supported label ranges in the format '<label1> to <label2>' and '<label1>:<label2>'. It now also supports the format '<label1> - <label2>' to be more consistent with behaviour in PRIMER.

## Read

- **Case 53880**  
D3PLOT would incorrectly display a model as harmonic data if the only shell data components in the file were the shell energies and thicknesses.
- **Case 53833**  
For double precision models containing large IDs, PTF Cutdown files would be incorrectly written when outputting airbag particle data making them unreadable. This has now been fixed.
- **Case 53225**  
D3PLOT could crash when reading a D3PART file if a ZTF file was also present in the directory and the model contained \*DATABASE\_CROSS\_SECTION cards defined using both the \_SET and \_PLANE options.
- **Case 52119**  
D3PLOT would often crash if a LS-PrePost database file (.db) that was > 2GB was opened.

If D3PLOT failed to recognise the .db file, found an error in it or found something it didn't support then that could also cause D3PLOT to crash. These errors should now be trapped within D3PLOT and D3PLOT should now generate an error message and then continue.

- **Case 48326**  
The 'Re-read Model' option in D3PLOT has been modified so that if a linked T/HIS session is running the re-read menu now displays an additional set of buttons that

gives an option to automatically re-create any T/HIS curves for that model when the model is re-read.

## Selection

- **Case 49059**

The ambiguous menu, when triggered from the Measure tool, no longer displays the All button. 'All' isn't appropriate in this context as the Measure tool typically expects selections to be made sequentially but one entity at a time - such as Node 1, then Node 2 for Node<->Node.

## Session

- **Case 53874**

D3PLOT crashes when trying to load session file from later versions.

From version 21, an error is thrown rather than crashing, when trying to read a session file from later versions.

D3PLOT and T/HIS now doesn't allow session files from later versions to be read in older program versions (applicable from version 21 onwards).

## Settings file

- **Case 50997**

When adding a second model into a window that already contained a model the window could be drawn with the wrong shininess. This would generally result in a less shiny appearance than set in the Properties panel. This has been fixed.

## Text

- **Case 52365**

When there are multiple breaking characters in succession (whitespace, brackets etc...) if the cursor is placed within the middle of that set of breaking characters if you were to issue a Ctrl+Right then the cursor would only jump one space to the next breaking character instead of to the beginning of the first word to the right of it. This should now be fixed.

## User interface

- **Case 53448**

fixed colour of Read/Close buttons in the Model and Window panels for consistency. Also renamed all caps button texts to lower case texts (except for the first letter).

- **Case 53447**

fixed colour of Apply button on Traces panel for consistency.

- **Case 51598**

The Lighting panel would previously always appear docked on the right-hand side, but with a horizontal scrollbar at the bottom. Scrolling the panel would appear to just show empty space and two mostly obscured buttons. These two buttons were duplicates of the existing help and dismiss buttons on the panel, so they have been removed and the empty space and scrollbar are no longer present either.

- **Case 51558**

The threshold at which D3PLOT's Quick Pick undo stack will warn the user that it is using a lot of memory has been increased by a factor of 5 and the warning message in question has been clarified.

There is also a new preference, <show\_qpick\_stack\_warning> to control whether this warning popup will appear. If this is set to FALSE, the popup will not appear, and the Quick Pick undo stack will only be cleared on exiting the program. There is an option on the popup to set this preference for this behaviour.

- **Case 50353**

When using any of the Brightness, Theta and Phi sliders in the Material Attributes Panel, the preview sphere flickers.

- **Case 50174**

Prevented the HDF button from remaining active when the Read Equation menu is accessed via Edit Equation.

- **Case 48385**

In the D3PLOT user interface the terminology slave and master for contact surfaces has now been renamed to surface A and surface B.

## User defined

- **Case 52704**

If a user created a user defined data component and then plotted 'MAX/MIN/MAG All' before plotting any individual integration point values, then when individual integration points were plotted the wrong values were displayed.

## Webgl

- **Case 52457**

Exporting annotations to D3PLOT Viewer could cause D3PLOT to crash if animations were exported and state selections were different for different annotations. This has been fixed.



## Workflows

- **Case 53401**

Confirmation question has been added if the user is overwriting a file when saving.

## Write

- **Case 53919**

If multiple models were loaded into D3PLOT and only a subset of them contained multiple on-plan integration point data then the popup menu that allows the user to select between the following options

Average at Centre  
All On Plan Points  
On plan pt #1  
On plan pt #2  
On plan pt #3  
On plan pt #4

wasn't always available in the WRITE and XY-DATA menus.

## X-sections

- **Case 51977**

When on the cut section panel the option to display the section force summary was selected and the cut section was defined by constant X, Y or Z, then any changes to the defining coordinate value through the text box did not refresh the forces displayed. Now the forces update as expected when a new coordinate or node ID is typed or the coordinates for 'Origin and vectors' or 'LS-DYNA method' are changed manually.

## Xy plot

- **Case 53549**

Sometimes Object Menus in D3PLOT contained an additional row that was labelled as 'unknown type'.

- **Case 48786**

In the XY-Data menu the option to specify the reference frame coordinate system wasn't always available for nodal data components (displacement, velocity, acceleration, temperature flux).

If the user selected an element-based component and changed the coordinate system and the swapped back to a nodal component then the option was available.

## 2.2.2 Bugs fixed in 21.1

### Annotation

- **Case 55242**

If bookmarks were opened and annotations were opened from tools menu, quick find or shortcut the annotations panel would be opened in the bookmarks tab rather than the edit tab. This has been fixed. A bookmarks shortcut has also been added.

- **Case 54731**

When reloading an annotations file with a different model the markers could be applied to entities with different IDs. This has been fixed.

- **Case 54513**

If an annotation was created using a single model in D3PLOT and if the annotation were to be reloaded when an extra model is loaded, the second model (and window) would be disabled. This behaviour, while justified, could nevertheless be off-putting for users. In order to work around this issue, the Annotations panel is now opened in Edit mode even if it were previously closed while in Playback mode. This will prevent automatic reload of annotations thereby suppressing the aforementioned behaviour.

- **Case 54512**

The Annotations function could in previous versions appear to briefly load a second model in D3PLOT if users were to create an annotation and quickly switch to Playback mode. This issue has now been fixed.

- **Case 54420**

In v21.0 following reloading an annotation models could fail to animate properly, and quick-pick operations could cause D3PLOT to crash. This has been fixed.

- **Case 52990**

Previous versions of D3PLOT would permit users to export annotations to D3PLOT Viewer even when no annotations were present, which would then provoke an error. This has now been fixed. Annotations export is no longer available in these situations. The current image source is also automatically changed to 'Current Page' if necessary, in such situations.

## Capture

- **Case 52830**

Following a capture operation, screen view keyboard shortcut keys operated with a time lag. This has been fixed.

## Command files

- **Case 52965**

When reloading a REPORTER item with a command 'STATE LAST' on a model with more states than the model that was used to create the item, the wrong state would be reloaded. This has been fixed.

Also if a REPORTER item or an annotation was captured with two models in a window and the first model had a smaller analysis end time than the second the animation was set to interpolated time and the frame was beyond the analysis end time of the first model then on reload the last frame before the first model analysis end time would be shown rather than the correct frame. This has been fixed.

- **Case 51092**

The functionality of the Set States and Set Times panels (accessed through various routes including when selecting states for animation playback, when creating cutdown PTF files, and when plotting XY data) could not reliably be included in command files. This has now been fixed. These panels now also conform to the standard approach of displaying user feedback within the panel itself, for better visibility.

## Contour

- **Case 54274**

When cut sections in two directions were defined in union mode with basic space, contour values on elements omitted by cut direction D1 but drawn by D2 or D3 were sometimes wrong. When the location of one of the cut planes was changed, the contours refreshed correctly. This has now been fixed.

- **Case 53677**

In a contour plot where some selected parts are turned to shaded mode with quick pick, the contour bounds are usually the minimum and maximum across the contoured parts only. For node-based data components, for example displacements, where nodes were also used in element types without contour values like mass or springs, these nodes were included in contour bound calculations by mistake. This could cause minimum and maximum labels in the graphics window to appear on parts which are

actually shaded. Now those nodes are no longer included and bounds are based on contoured parts only in all cases.

- **Case 52581**

Contour mode in D3plot did not return to the previous mode from max-min mode after limiting the contour band values consecutively twice. This is now fixed.

- **Case 51734**

Limit switch in D3PLOT now restores original contour bar values along with any user specified levels in case of user-defined/max-min contour modes.

## Cut section

- **Case 55070**

When on the cut section panel all directions D1, D2 and D3 were turned off and then the Forces table was opened, D3PLOT crashed. Now an empty table is opened with a warning message because no cut planes are defined.

- **Case 55009**

The 'Output Forces' dropdown menu has been modified, to avoid text accidentally truncating in the dropdown menu.

- **Case 54592**

For cut sections, the 'View on Plane' action under the Display Settings section now orients to face the most transparent side. Also, for ease of use, the 'V' shortcut now does 'View on Plane'.

- **Case 54207**

When a cut section in basic space was defined by a node and the switch that the origin follows the node was on, the cut plane moved relative to the elements, which should not be the case by definition of basic space (Lagrangian) cut sections. Now the same elements remain visible throughout the animation, where the switch to follow the node has no effect as basic space sections follow nodes anyway.

- **Case 54206**

Suppose that a cut section is defined by a node and the option is on that the origin follows that node during the animation. If thick cuts were then used, some parts of the drawing did not actually follow the node whereas others did, so the slice of the model looked strange. This has been fixed and now the whole drawing follows the node correctly.

## Data access

- **Case 54187**

The vector tab could be difficult to select with models containing limited results, e.g. thermal results only. This has been fixed.

## Data components

- **Case 54377**

D3PLOT could crash when plotting mid-surface strain values if the model contained Shell membrane elements that had been defined using material model 34 and the \*SECTION card had 2 beta angles defined on it.

The crash would only randomly occur when mid-surface strain values were plotted first but only if a ZTF file generated by PRIMER had also been read in. This has been fixed.

- **Case 53980**

If the PTF Compress option was used to generate a reordered format file with embedded Von Mises Stress values, then the values reported for Shell average centre values were wrong if the original model contained multiple on-plan integration points. This issue has been fixed now.

## Deform

- **Case 54251**

D3ssd, d3rms, and other related model types that do not need to be magnified when read in are no longer magnified by the eigenmode magnification factors.

## Envelope

- **Case 55043**

If the option to use a reference state was turned on when generating an envelope plot of X, Y or Z displacement then D3PLOT could produce an ERROR message while extracting data if the model contained entities other than solids, beams, shells and thick shells and would then generate an incorrect envelope plot. This was a bug that was introduced in V21.0 and did not previously exist. This is fixed now.

- **Case 54491**

When the state selection list on the Write menu was open, then the Write menu was closed and reopened, there was an error message. This has now been fixed.

## Errortrapping

- **Case 54119**

A warning message about MIG Lines referencing non-existent beams could sometimes be displayed in a popup window, even when the “input\_warnings” preference was set to DIALOGUE or NONE. This has now been fixed.

## Femzip

- **Case 54053**

The speed of reading large FEMZIP models was not as fast as it should have been. The main causes were less than optimal parallelism and configuration in the database storage management.

These have been fixed and the speed of reading should be between 2x and 3x faster, and in some cases less database memory will be used.

## Graphics

- **Case 55111**

The contour range label was not getting updated for other windows in auto all windows when slider position changed in the first window. This is now fixed.

- **Case 54585**

If a Thick Cut was created with a model containing ABP, DES or SPH elements then those elements would disappear if a Velocity plot, Vector plot or Principal Stress plot was generated. This has been fixed now.

## Groups

- **Case 53892**

Fixed the functionality issues with ONLY in PART TREE with GROUPS, when the D3PLOT session has multiple models.

## JavaScript API

- **Case 55243**

LSDA data component constants (e.g. Component.SW\_FAIL) within JavaScript were incorrectly returning as undefined. These will now return the correct constants.

The JavaScript function QueryDataPresent() would crash D3PLOT when supplied with an LSDA component, this has been fixed.

The JavaScript function GetConditionParts() would get stuck in an infinite loop when supplied with an LSDA component, this has been fixed. However, there is still a known bug with GetConditionParts() for Spotwelds which will cause those parts containing spotwelds to never be flagged and placed within the pass list.

- **Case 55019**

When getting the title of a group in a JavaScript, the string contained corrupted characters at the end. This has now been fixed.

- **Case 54922**

Running a JavaScript to write out an image file with the same filename as an existing image file causes D3PLOT to hang. This is now fixed. Now, when the user writes out an image file with an existing filename through JavaScript, D3PLOT maps 'File Exists Action' panel and awaits user input.

- **Case 54608**

If the user accessed the JavaScript panel after running a JavaScript from the command line or using a Workflows tool, the panel UI would not be displayed correctly. Subsequently running any JavaScript from this panel would cause D3PLOT to crash. This has now been resolved and the panel UI will be displayed correctly.

- **Case 53975**

The Material class had the following errors:

- The .Total() method returned 1 more material than was in the model
- The .GetAll() method returned an array with one extra material with an ID of 0
- The .Last() method returned a material with ID 0

These errors have been fixed.

## Labels

- **Case 53364**

Certain labels drawn over 1D entities like LOAD\_SEGMENT\_SHELL or Springs would flicker in certain orientations. This issue has been fixed for V21.1.

## Lsda (binout)

- **Case 54381**

D3PLOT throws out an error when we try to call GetData function for a lsda file through JavaScript. This is now fixed. We now wait until the lsda file is read before processing the JavaScript.

## Measure

- **Case 54246**

Fixed an issue where D3SSD and D3EIGV models were giving the wrong Node to Node measure results when the Deform checkbox was ticked.

## Multiple windows

- **Case 55388**

When the Setting file or Session file submenu of the Utilities panel was opened in a session with multiple windows and then in a different menu window tabs were changed, there were error messages sometimes. Also, the window tabs at the main panel in the Utilities menu disappeared when it was opened again. Now these errors have been fixed.

## Part tree

- **Case 55073**

When at least two models with groups were open in D3PLOT, the part tree sometimes showed group names from the wrong model. This has been fixed.

## Program crash

- **Case 54076**

In some circumstances D3PLOT could crash when 32 windows were already open, and the user then tried to open a new model. If the user added the model to an existing window, then D3PLOT was fine, if however, the default option of 'Next' window was



selected then D3PLOT could crash. It was also possible to crash D3PLOT if a JavaScript tried to open a 33rd window. This has been fixed now.

## Python API

- **Case 54993**

When a D3PLOT session was started with the Python call `Oasys.D3PLOT.start` and then a model was read with `Oasys.D3PLOT.Model.Read`, the dialogue box was confused and often caused D3PLOT to crash. When just pressing Enter in the dialogue box, it was stuck with the prompt 'Give .PTF filename' even after a model had been read in. Any other input, including 'q' to get to the top level input, then crashed D3PLOT.

The same problem happened when D3PLOT was started with `-grpc` on the command line and then a model was opened inside the session, either with the Python function `Oasys.D3PLOT.connect` followed by `Oasys.D3PLOT.Model.Read`, the JS API function `Model.Read` or interactively. These issues have been fixed now.

## Quick pick

- **Case 54576**

D3PLOT could crash if the Quick Pick entity type was set to one of the `SET_...` options and then the user used the right mouse button to change either the display mode or the overlay colour for the set. This has been fixed now.

- **Case 54267**

If the Quick Pick 'KeyIn' option was used with the entity type set to either 'A Surface' or 'B Surface' then the wrong contact segments could be selected. This has been fixed now.

- **Case 54245**

If the Quick Pick entity type was set to 'Contact Surfaces' then only one side of surface to surface contacts was sketched/highlighted when both sides should have been. This issue has been fixed now.

## Read

- **Case 55047**

D3PART files are now included in the list of valid input types to read into D3PLOT.

- **Case 54371**

Experience has shown that on some network filesystems holding a database file open for reading, even in shared mode, can 'lock' it against receiving further data as viewed from that computer. This means that if you open database files on a partially complete analysis run you may be unable to view further results written by the analysis. It should not be the case and appears to be some malign problem with SAMBA file mounts, but it happens.

A solution which has been successful for the binout file in T/HIS is to auto-close the file if it is not used for a while, which frees it to receive further data. It is reopened automatically (and invisibly to the user) if further data needs to be read. This solution has been extended to the PTF (d3plot), CTF (intfor), XTF (xtfile) and ZTF files used by D3PLOT.

## Selection

- **Case 55317**

The popup for blanking, un-blanking etc. operations in write table in D3PLOT auto selected options when the write panel was smaller in size compared to popup. This is now fixed.

## Settings file

- **Case 54605**

When opening a D3PLOT model with a settings file that referred to two or more models a warning popup is shown, but some windows could be set up with a model shown but no model drawn in Edit Window panel. This has been fixed.

## States

- **Case 54125**

When reloading a D3PLOT capture from reporter with '/STATE LAST' added in the command file line, then D3PLOT will always updates to 'Current state'.

Now if the command '/STATE LAST' is coming from reporter the D3PLOT now will retain plot mode whether it is animation plot (All frames) or static plot (Current state).

## T/HIS link

- **Case 54069**

When T/HIS is run linked with D3PLOT it is possible to undock the T/HIS window so that it runs as a normal top level desktop window. This worked, but on multiple monitors where the layout was such that the top of one monitor was below the other on the Windows desktop this could restrict the positioning of that undocked window in the taller window to the vertical position in that window of the top of the smaller monitor.

Caused by internal confusion about the limits of height in desktop coordinates, now fixed.

- **Case 53445**

D3PLOT could crash when running the D3PLOT -> T/HIS link if an animation was running in D3PLOT with a timeline in being drawn in multiple graphs and one of the graphs was deleted while the animation was still playing. This has been fixed.

## User interface

- **Case 53852**

Some buttons on the Entity Names panel were still using legacy icons. They have now been updated to match the rest of the user interface.

## Volume 3

- **Case 54171**

When defining a cut-section by selecting nodes it wasn't possible to select nodes belonging to volume 3 (ICFD, CESE, EMAG) parts. This has been fixed.

## Workflows

- **Case 54692**

Fixed bug where an already opened Eroded Elements & Strength Check Workflow Tools would freeze if 'leave model' was selected on a closed window and then a workflow for that model was opened

## Write

- **Case 54400**

If the WRITE menu was used with Volume 3 elements then the default component selected was one that wasn't valid for the element type.

If, after selecting some elements and displaying data for them the user cleared the current list of selected elements by selecting 'None' in the object menu and selecting a 2nd set of elements then the 1st set of elements were still displayed in addition to the 2nd set. These issues have been fixed.

## XY plot

- **Case 54417**

Transferring curves from XY Data in D3PLOT to T/HIS in the link when one or more of the curves included points with values exceeding the truncation limit (1e18 by default) could lead to the programs hanging. This has been fixed.

- **Case 54412**

In the XY-Data menu it was possible to select Vol 3 (ICFD, CESE, EMAG) elements but the data extraction for these elements failed and generated error messages in the Dialogue window.

On version 21.1 Volume 3 elements have been removed from the XY-Data menu and support will be added in version 22.

- **Case 54118**

In the XY Data panel if an entity was selected for which there was no valid data the component drop down would show X\_DIRECT\_STRESS and if clicked a blank menu would be shown. This has been fixed.

## 2.3 T/HIS

### 2.3.1 Bugs fixed in 21.0

#### Airbag

- **Case 53822**

T/HIS would fail to read the ASCII version of the 'cpm\_sensor' file if the file had been created using the L2A software or had been created by T/HIS from the LSDA/binout files.

If a LSDA/binout file was read into T/HIS and it contained cpm\_sensor data then the 'npart' (Number of Particles) data component wasn't available in T/HIS.

#### Curves

- **Case 53037**

Fixed a problem with Graph.GetAllCurveIDs() and Graph.GetNumCurves() where it would sometimes report a curve is active on its respective graph after the curve had been deleted.

#### Deleting

- **Case 48343**

Added additional 'every graph' options in the T/HIS curve manager for deletion of 'All Blanked' and 'All Visible' curves. Now, you can delete curves in the curve manager as if all graphs were flagged as active, even if they are not. The behaviour of the old buttons is retained with the 'in active graphs' buttons.

#### Filename

- **Case 52116**

T/HIS now supports Vol 3 Keywords with long (9-16 digits) Part id filenames.

- **Case 51699**

When undocked, expanding the Read Data panel now also expands the Model title box (during Multi model select).

#### Graphs

- **Case 53766**

When you dynamically view a graph (e.g. Mouse scroll zoom), then immediately delete that graph and then an Autoscale or redraw gets issued, T/HIS would sometimes crash. This has been fixed.

- **Case 53013**

On a high-resolution display, typically a laptop running at 3840 x 2200 so around 240 dots per inch (DPI), the lines in the T/HIS graphics window tended to look too thin when compared with the same plot performed on a standard display running at 96 DPI. This was because line widths were not scaled in proportion to display resolution.

This is now fixed. By default, all the lines in the T/HIS graphics window (border, grid, curves, etc) are now scaled with DPI. So, in the example above the scale factor would be 240 / 96 meaning that the lines now have a pixel width roughly 2.5x thicker.

This behaviour is controllable and can be switched off in the Display options panel, or by preference.

## Integration

- **Case 52994**

If a set of D3PLOT results were compressed with FEMZIP (jobname.fz) and then the LSDA /BINOUT files was renamed to 'jobname.binout0000' then T/HIS failed to find and open the BINOUT files when T/HIS was started via the D3PLOT=>T/HIS link.

## Javascript api

- **Case 53221**

In previous versions of T/HIS, clicking the 'Debug' button twice in the JavaScript menu could make the JavaScript debugger inoperable. This issue has now been fixed.

- **Case 52608**

When the JavaScript function Page.Layout() was issued with a non-global set of pages (e.g. single page number or 0), the position of the graphs on the main window was not being recalculated. This has now been fixed.

## Macro

- **Case 52540**

The example T/HIS Macro script 'to\_g\_c180.thm' that was included within the release package contained an extra line that shouldn't have been there and would generate an Error if the Macro was run.

This can be fixed by editing the file and deleting the last line.

- **Case 52455**

When the environment variable SHOW\_MACRO\_BUTTON was set to true, the gGRPC/Python button in the 'Options' dropdown wasn't getting shown and working properly. This has been now fixed by pushing the Macros button to the end of the 'Options' dropdown.

## Menus

- **Case 53452**

The model selection menu in T/HIS - used to select a model from which entities can be edited in PRIMER - has been resized to make it more accessible.

- **Case 52306**

Fixed row highlighting on the Curve Table panel in T/HIS when left clicking a textbox.

- **Case 48491**

If the user selected the option to search directories in one of the read menu options then the filename option in some of the other read menus was greyed out by mistake.

## Operations

- **Case 51856**

Fixed an issue in the CORA tool preventing the TMIN evaluation interval from working.

## Program crash

- **Case 53829**

If the automotive assessment workflow was run in a T/HIS session linked with D3PLOT, then T/HIS would crash when the automotive assessment window was closed. This has been fixed.

- **Case 52731**

T/HIS could crash when reading in a THF file if the ZTF file was also present and being read if the number of items in the THF was greater than the number of items in the ZTF file. This could happen in the case of Beam elements written to the Time History block if the option to automatically create 'dummy' beams in top of springs and dampers (the BEAM option on \*DATABASE\_BINARY\_DPLOT) was left set to 0 (the default).

## Program hanging

- **Case 52616**

Fixed an issue where T/HIS could lock up while dynamic viewing when there's a curve that has been assigned to the Y2 Axis and Align Y=0 has been selected. However, because of this fix, manually typed in values for min and max on the Y-Axis while the Y2 Alignment option is active will once again be changed automatically (as it did in V19), prioritizing the alignment over what you have just typed in.

## Python api

- **Case 53832**

A new 'Constant' class has been added to the T/HIS API.

## Read

- **Case 52571**

Subsystem Inertia tensor rows, Principal inertia, Principal directions and Mass components were not being correctly read in for FastTCF. This has now been fixed.

- **Case 51837 & 51814**

If a COSIM analysis was run then 2 set of results files are generated in the same directory. The 1st 'Main' model uses the default naming convention for all of the results files but the 2nd 'Cosim' model prepends 'cs\_' to all of the file names.

In previous versions T/HIS would fail to associate all of the 'cs\_' files correctly with the 'Cosim' model.

## Selection

- **Case 43549**

When running the D3PLOT > T/HIS link the option to select SPCs in the T/HIS entities menu by interactively picking SPCs in the D3PLOT graphics window didn't work.

## T/his link

- **Case 52447**

The timeline in D3PLOT->T/HIS Link now updates correctly when the graph is in logarithmic mode.

- **Case 52174**

When T/HIS is linked with D3PLOT it normally runs 'docked' inside the D3PLOT user interface. However, it is possible to undock the entire T/HIS window or just its right hand side command bar.

This did not work correctly on Windows if the desktop had multiple monitors and the primary monitor was not the left-most one. The undocked T/HIS window would come up in the wrong place, sometimes with its top above the top of the screen making it impossible to reposition it.

This was because of the way desktop coordinates work on Windows: monitors to the left (or below) the primary monitor have -ve coordinates and the undocking logic was not considering this. Now fixed.



## User interface

- **Case 53859**

On some larger, high-resolution monitors (e.g. QHD screens), scrolling to the bottom of the list of points on the Curve Editor would sometimes fail to show the last few points. This has now been fixed.

- **Case 53823**

The following T/HIS curve operations have been added to the popup menus that hang off of the 'Functions' button in the T/HIS Top bar.

Automotive->CORA

Automotive->MADM

Operate->db

Operate->dbA

Operate->Octave

Operate->Regression

Maths->ATan2

Seismic->IFFT

- **Case 53790**

In the [Model] Read, Shell menu when extracting data for per integration point data (through the depth of the element) there is a further sub-menu which allows selection of in-plane integration point. Displaying this could cause the programme to get stuck in an endless loop with the panel 'flickering'.

This was caused by an internal error in the way the new size of the panel required to show the extra in-plane integration point selection buttons was processed. Now fixed.

- **Case 53672**

The CORA and MADM tools were not available as results when using the QuickFind search feature. This has been fixed.

Additionally, selecting the Bessel Filter from QuickFind search results produced an error message instead of launching the tool. This has also been fixed.

- **Case 52909**

In the T/HIS user interface the terminology slave and master for contact surfaces has now been renamed to surface A and surface B.

- **Case 51603**

Question mark icon in popup window created by JS function (Window.Question('Title' 'Question')) in T/HIS now has the same colour as in PRIMER/D3PLOT

## Variables

- **Case 48021**

Default variable names in T/HIS and D3PLOT are now prefixed with the item name from REPORTER. If the item name contains characters that are not supported in variable names, e.g. spaces, !, \*, etc, these are replaced.

## Workflows

- **Case 53442**

The curves plotted of tibia compression for HIII occupants were the incorrect sign. This has been fixed.

## Write

- **Case 53848**

T/HIS now outputs accurate ISO-MME Units in accordance with the specifications outlined in the RED B ISO-MME Document, applicable to both ISO MME Version 1.6 and 2.0.

- **Case 53501**

The -iso\_config command line option did not work if it used a relative path. This has been fixed.

- **Case 52430**

T/HIS ISO\_MME Config file only supports certain keywords for objects. So, Added an error check for cases there is an incorrect keyword and T/HIS doesn't have any objects to read from the config file.

- **Case 51979**

T/HIS can now read both strings and integer as an input for the id's in config file for exporting ISO-MME Output.

## Xy plot

- **Case 52499**

The white spaces in the data fields in csv are now treated as an empty field.

## 2.3.2 Bugs fixed in 21.1

### Curves

- **Case 54614**

Input curve textboxes accepted the non-existent curve IDs as inputs. This has been fixed now.

- **Case 54565**

D3PLOT->T/HIS Link Reread model option can now recreate T/HIS curve.

### Datum

- **Case 54617**

T/HIS, could under rare circumstances, crash while attempting to insert datums. This issue has now been fixed.

- **Case 54520**

When a popup from a button is mapped near the edge of its window, there are situations where the popup did not have sufficient space to be mapped but does not get shifted to the opposite side of the button as intended. This led to some situations where the popup would reposition itself over the mouse cursor and inadvertently click an item on the popup from the release of the initial mouse click on the button. Popup space detection has now been improved such that this situation should no longer occur.

- **Case 54518**

Changed the label from “Quit” button to “Cancel” button in Create tab of Datums panel, to fix datum panel UI inconsistency.

### Dialogue command

- **Case 52651**

When a window was created with a JavaScript and the onClick function for a button called DialogueInput, sometimes parts of the button text were misread as dialogue command when the button was clicked. This has now been fixed.

## Edit

- **Case 55305**

The Edit Popup Panel will now unmap along with the Edit Panel when we click on the Edit Panel in T/HIS Edit window.

## FAST-TCF

- **Case 55141**

When writing curves from an equation source to a FAST-TCF script, the program would sometimes crash when trying to read back in. This has been fixed.

- **Case 54714**

FAST-TCF now writes the 'clip' operation with 'auto' for the bounds (X min, X max, Ymin, Ymax) when 'auto' is set for that particular bound during the clip operation, whether that clip operation is done using a FAST-TCF script or through dialogue window command line.

Example,

```
operation cli curve_1 1.5e-6 auto 0 auto tag curve_2
```

- **Case 54094**

The FAST-TCF wildcard asterisk character (or 'all' word) to select all for Rigidwalls, Rigidwall Segments, Airbags, Airbag Parts and Airbag Chambers was not working as intended. This has now been fixed.

## Graphics

- **Case 54721**

T/HIS axes, legend top and legend box will now not go out of bounds of the graph window when dragged.

## JavaScript API

- **Case 55231**

The CORA and ISO-18571 tutorial and example scripts have been updated to correct some issues that were introduced when the CORA module was updated.

- **Case 54726**

Operating on T/HIS curves via JavaScript (for integration and differentiation operations), which previously did not update the label and units of the resulting curve, now calculates the new units and also displays the new label on the graph.

- **Case 54672**

Corrected USNCAP FFB Femur Compression.

- **Case 54525**

Turning on/off strict mode in the debugger for a script that used modules would cause T/HIS to crash. This has now been fixed.

Additionally if you used try/catch to catch an exception but the exception occurred in a child function then the debugger would not trap the exception (it would only catch it if the exception was in the same function that contained the try/catch block). This has now been fixed.

- **Case 54439**

Both Model.GetDataFlagged() and Model.QueryDataPresent() JavaScript functions were not correctly picking up BEAM\_EXTRA components even though they were present in the model. This has now been fixed.

- **Case 53127**

For the CORA tool the JavaScript tree of scripts available listed some files which were not actually scripts. When they were clicked, T/HIS tried to run them as scripts and then found errors. This affected several .json files with settings. Now these files are no longer offered in the tree view.

## Menus

- **Case 54414**

The popup for 'Blank' within the Curve Manager had an empty button which was accidentally being shown, this has been fixed.

- **Case 53851**

When a menu row has been horizontally scrolled left/right and then that row is hovered over by the mouse cursor, the text would incorrectly redraw the text from the row at its left most position. This has been fixed.

## Operations

- **Case 55370**

Right clicking on a curve generated from a JavaScript and selecting 'History' to view its history would show a 'JavaScript' button, but the hover text for it was random characters. This has been fixed and it now displays the filename of the script.

In addition T/HIS would crash when updating the history of the curve. This has been fixed.

## Program crash

- **Case 54769**

T/HIS would crash if a JavaScript that deletes a graph was run from the command line on Unix in batch mode. This has been fixed.

- **Case 54586**

T/HIS would crash when using the `-js_arg` command line argument, this has now been fixed.

## Program hanging

- **Case 55107**

If the initial Splash Screen was drawn and then Model Database was used to open models it was possible, by mapping child windows, to obscure the Model Database window behind the Splash screen with no way of bringing it to the front again.

Now fixed: the Model database window will now remain in front of the splash screen in this situation.

## Read

- **Case 55061**

Fixed a potential issue that could occur when using FAST-TCF to access 2D and 3D datasets in HDF5 files.

- **Case 54758**

Reading an X,Y,Y,Y,Y format CSV file into T/HIS could cause a crash if the time column wasn't the first column and any columns before the time column had more rows of data than the time column. This has been fixed.

- **Case 54658**

For Linux, Dialogue commands for ISO and CSV reading were not accepting Linux file paths. This has now been fixed.

- **Case 54564**

When using linked D3PLOT-T/HIS at certain screen resolutions, the list of nodal data components displayed to plot could appear 'scrolled down' whilst the scroll bar handle itself was still at the top. This has now been fixed and the list will appear in the correct order.

- **Case 54067**

Added the read types in the File->read popup to be in consistent with Tools/Read types.

## Recent files

- **Case 55350**

While capturing images or post-script/pdf in T/HIS, the recent files entry gets updated to the next instance of the filename. This has been fixed.

- **Case 54004**

T/HIS now adds the file to the Recent files and directory dropdown when LS-DYNA files are drag and dropped in T/HIS.

## Scripting

- **Case 55476**

There was a bug with the CORA tool where selecting defaults would overwrite the the drop down text options for `i_type`, `step_type` and `S_TYPE`. This was only problematic if they were not already set to the default values, but this issue has now been fixed.

## T/HIS link

- **Case 54418**

In a model with the states very close to each other the timeline in the T/HIS link sometimes remained at the same position for multiple states and then jumped by a larger amount when stepping through the states. This has now been fixed.

## User interface

- **Case 55322**

Fixed minor UI issue for the 'Delete Curve' option in the Curves popup, in the Curve Manager panel.

- **Case 55187**

When the text within a text box contains more characters than the text box can hold and you issue a 'Select All', sometimes the highlighted text would appear to spill out of the text box. The text would also incorrectly get scrolled to the first character. This has been fixed.

- **Case 54733**

T/HIS axis bottom border and legend top are now configured to not clash with each other when dragged.

## Workflows

- **Case 55075**

The Viscous Criterion calculation uses two constants, A and B, whose values vary depending on the occupant being assessed.

However, the automotive assessments workflow was deciding which values to use based on whether the crash test was a front or side impact.

For side impacts the script used  $A=1.0$  and  $B=0.14$  (metres)

For front impacts the script used  $A=1.3$  and  $B=0.229$  (metres)

It has been corrected to use the following values:

HIII 95% Male:  $A=1.3$ ,  $B=0.254$  (metres)

HIII 50% Male:  $A=1.3$ ,  $B=0.229$  (metres)

HIII 5% Female:  $A=1.3$ ,  $B=0.187$  (metres)

SID2:  $A=1.0$ ,  $B=0.138$  (metres)

ES2:  $A=1.0$ ,  $B=0.14$  (metres)



WSID: A=1.0, B=0.17

- **Case 54936**

The refresh button did not get shown on the workflows menu in a T/HIS session started from D3PLOT. This has been fixed.

- **Case 54926**

In Pulse Index workflow, the default value of restraint stiffness is corrected to 160000 N/m. This change gives the k/m ratio as 2000 s<sup>-1</sup>, which is typical in the pulse Index calculations.

- **Case 54920**

Images did not get displayed on the workflows menu buttons when run from a T/HIS session started from D3PLOT. This has been fixed.

- **Case 54831**

The Viscous Criterion for IIHS crash tests in the Automotive Assessments workflow was using the 'ECER95' method, but should have been using the 'IIHS' method. This has been corrected.

- **Case 54698**

If the allowable shoulder lateral force was below the limit for the EuroNCAP MDB test an asterisk was incorrectly being appended to the score to indicate that it had exceeded a capping limit.

This assessment is a modifier (a score of -4 if the limit is exceeded and 0 otherwise), so the asterisk is no longer applied.

- **Case 54331**

The torso assessment for the IIHS MDB crash test was incorrect in the automotive assessment workflow.

Instead of averaging the compressions from the 3 sensors in the chest and 2 sensors in the abdomen it was assessing the maximum of each individual sensor. This has been corrected.

In addition the abdomen compression, compression rate and viscous criterion were not being assessed. They have been added.

The shoulder deflection assessment was being given a rating, but this was not

necessary as it is only used to downgrade the torso rating if it is above 60mm. It is now plotted, but not given a rating. Also, the shoulder deflection rate and viscous criterion assessments were not required and have been removed.

## Write

- **Case 54467**

After this fix, T/HIS iso mme config path and iso mme output directory path are not related. The iso\_config\_path is relative to start\_in directory instead of output\_dir.

## 2.4 REPORTER

### 2.4.1 Bugs fixed in 21.0

#### Capture

- **Case 53551**

Enveloping for all windows was switched off if a new window was created, if a model was opened in a new window or added to an existing window or if a model was removed from an existing window or deleted. Now only windows affected by the change have enveloping switched off.

#### Generate

- **Case 50750**

REPORTER now always shows the 'Generate' option in the context menu whenever you right-click on selected item(s) in the template or report. REPORTER previously removed this option if any of the selected items do not change when generated.

#### Help

- **Case 47090**

REPORTER opens HTML and PDF files to give you access to documentation and additional user guides. REPORTER now uses the same logic to open these files as PRIMER, D3PLOT, T/HIS and SHELL. This fixes an issue where PDF files sometimes failed to open on Linux. You can now specify your preferred HTML and PDF applications via the REPORTER preferences, `html_application` and `pdf_application`.

#### Pages

- **Case 53107**

When importing a template or a report, REPORTER now lets you choose what happens with the incoming master page. You can merge the master page into your current master page, overwrite your current master page with the incoming one, ignore the incoming master page or cancel the import.

- **Case 52802**

Duplicating a page or copy-pasting an item will no longer change the new item's image filename to the default `%DEFAULT_DIR%/ %DEFAULT_JOB%_image00X.png`. Instead, the new item's image filename will be derived from the original one.

## Preferences

- **Case 53402**

If any of REPORTER's default generic fonts are unavailable on your machine, REPORTER will automatically attempt to substitute them with an alternative font within the same generic category.

- **Case 49585**

The reporter\*maximise preference now works not only for the main window, but also for the 'Choose a Template' dialog and 'Choose a Page' dialog as well.

## Standard templates

- **Case 53485**

Fixed an issue preventing the LSTC HIII 50M Detailed v190217\_beta dummy model from working with the US NCAP REPORTER templates.

## Text

- **Case 53462**

There is a small number of fonts available in REPORTER for which certain characters/symbols cannot be written to PDF. In this case, a warning will be recorded in the Logfile to inform you which font it is.

- **Case 51340**

Previously, when you opened a template or report that contained fonts that were unavailable on your system, you were prompted to select font substitutions. However, when you imported a page, you were not prompted, and REPORTER would revert any unavailable fonts to an arbitrary system font.

REPORTER now asks you to choose font substitutions whenever you open templates or reports or import pages with unavailable fonts. A new option in the font substitution dialog allows you to remember your substitution choices and automatically make the same substitutions to future templates, reports and pages opened within the same REPORTER session.

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- **Case 50312**

Fixed an issue that could cause the titles of templates and pages in Choose Template and Choose Template dialogs to become truncated on buttons.

## User interface

- **Case 53584**

The 'Edit Template Properties' dialog box is no longer duplicating entries in the drop-down menus every time it is re-opened.

- **Case 53480**

The Choose Template and Choose Page dialogs now show the filename of the selected template or page next to the title and description. This can help clarify the location when multiple Library or Workflows locations have been specified in preferences.

- **Case 47886**

Previously, drop-down menus on Linux would display top and bottom scroll arrows regardless of the size of the list, obscuring the item names. Now the drop-down list will be displayed without arrows, with item names fully visible.

## Variables

- **Case 52900**

When capturing from D3PLOT or T/HIS, the default names for the variables associated with the capture are now derived from their corresponding REPORTER Oasys item names.

- **Case 42430**

When opening the variables menu in a new template, the 'When generating save variables to directory' option will be disabled by default. This is to prevent frequent issues with autotable generation where it would save its own reporter\_variables file and read from it. This change would not apply to existing templates that were generated with versions < 21.0.

### 2.4.2 Bugs fixed in 21.1

## Command files

- **Case 54328**

REPORTER now correctly accounts for any line breaks present in variables when expanding them in D3PLOT item command files.

## Conditional formatting

- **Case 54750**

Conditions will now also work with empty input text and empty comparison text.

## Generate

- **Case 47533**

When generating a D3PLOT item using the new capture method, REPORTER previously reverted to the old capture method if the D3PLOT item lacked capture data. Now, REPORTER will throw an error and stop the generation process instead.

## Javascript API

- **Case 54760**

REPORTER will no longer crash in the situation when a script item being generated deletes the page or closes the template it lives on. Instead, the generation of the item will stop and an error will be raised.

- **Case 53926**

The JavaScript and Python API Image object constructor will now require positive, non-zero width and height arguments. Previously, the constructor allowed optional width and height arguments, which would result in a null image. This null image prevented the use of any image methods and setting the width and height.

- **Case 53909**

The JavaScript and Python API Item method GetCellProperties would previously crash REPORTER when used on an autotable item. The documentation has now been fixed to indicate that this method is only valid for normal table items and the program will now raise an error if used on any other item type.

## Menus

- **Case 54686**

Opening the Template Properties dialog in an instance of REPORTER where the Choose a Template dialog has not been shown yet (e.g. when REPORTER is opened in batch or iconised) will no longer cause a crash.

## Pages

- **Case 54832**

REPORTER now updates the page thumbnails after editing or formatting an item.

- **Case 54613**

The Hyperlink menu no longer prevents the Page Navigation bar and the Design menu from expanding; it can now be expanded as well.

- **Case 54389**

REPORTER no longer crashes when you drag and drop a page button to the last position in the page navigation bar.

- **Case 54192**

REPORTER now properly exits the master page when you generate the template or report from the master page.

- **Case 54153**

REPORTER now properly toggles the correct page button in the page navigation bar when you delete a page using the 'Delete page' button in the top toolbar.

- **Case 52564**

The page navigation bar now scrolls to the correct page when you add, duplicate, or delete a page in REPORTER.

## Program crash

- **Case 55137**

You will no longer be able to interact with the REPORTER window while saving a pdf, pptx or html file.

- **Case 54727**

REPORTER no longer crashes if you close it while the library templates are being scanned.

## Scripting

- **Case 54155**

The 'Generate page', 'Generate items' and page navigations buttons are now disabled if the master page is the currently enabled page. This will prevent incorrect behaviour if new pages are created from scripts on the master page.

- **Case 54154**

REPORTER no longer crashes when you duplicate a page using the JavaScript API.

## Shortcut

- **Case 54432**

The template keyboard shortcuts (e.g. 'P' key, PageUp key, 'PageDown' key, etc.) no longer get deactivated when you interact with the Page Navigation bar and the Tools bar.

## Tables

- **Case 55157**

Inserting a new column in a Table item will no longer cause font issues in unrelated cells.

## Template files

- **Case 55278**

REPORTER can now create a combined report from '.orrx' files, in addition to '.orr' files.

- **Case 54475**

The EuroNCAP\_Head\_Impact\_2023.ort template opened .blob files for Adult, Child and Cyclist impact points, but did not write any data to them. This has been fixed.

## User interface

- **Case 54334**

When opening a table item to edit it, the first cell will no longer be selected by default. When deselecting and then reselecting the same cell, the focus will now correctly be on the line edit to allow you to edit it.

- **Case 53867**

The 'Choose a Template' dialog and the splash screen will no longer be shown when starting REPORTER with the '-batch' or '-iconise' command line arguments.

- **Case 53597**

If you save the report/template while on the master page, REPORTER will no longer exit the master page after saving.



- **Case 53561**

It will no longer be possible to access the menus and toolbars in REPORTER while a template/report is loading. This will prevent unwanted behaviour since the menus will not be properly processed until the loading is complete. The 'Select All' and 'Deselect All' options in the 'Edit' menu will now also appropriately enable or disable the corresponding 'Edit' menu options like 'Copy', 'Cut' and 'Delete'.

## Variables

- **Case 54268**

REPORTER now correctly expands any variables present in command files associated with D3PLOT items. Previously, REPORTER could not expand these variables if their names contained special characters such as '-', '@', etc.

- **Case 53927**

The JavaScript API function Template.EditVariables now accepts the constant Variable.PRECISION for its columns input argument. Previously, it was not registering it as a valid input argument.

## Workflows

- **Case 55358**

The DRIVER\_HEAD\_EXCURSION/HEAD\_OFFSET curve may have been incorrect previously due to the following issue, which has now been addressed. Inputs to DRIVER\_HEAD\_EXCURSION/HEAD\_OFFSET (i.e., acc x, acc y, acc z, ang vel x, ang vel y, and ang vel z) are now regularized to ensure consistent x-axis intervals. Afterwards, if the inputs are not of the same length (number of points), they are adjusted to match the minimum number of points among all input curves.

## 2.5 SHELL

### 2.5.1 Bugs fixed in 21.0

#### General

- **Case 54039**

Previously, it wasn't possible to submit a job using the option to create a BASH compatible submission script if the option to specify an MPI executable was used. This issue has now been fixed.

#### Program crash

- **Case 53580**

There was a crash in the REPORTER batch panel while adding "Input Keywords". This issue has been fixed.

#### User interface

- **Case 53458**

On Linux platforms the logic for testing whether it is running on a remote server via a slow network has been modified:

- The default round trip time threshold at which it reverts to 'simple' graphics has been increased from 1ms to 5ms
- Previously this threshold was hard-wired, now it is configurable in the range 0 to 1000ms using new environment variable SHELL\_THRESHOLD\_RTT
- A new information message is written to stdout when this threshold is exceeded which explains what is happening, giving times and also an explanation of what to do about it.

## 2.6 Oasys

### 2.6.1 Bugs fixed in 21.0

#### PDF

- **Case 50903**

“Acroread” has not been supported on Linux based OS’s for a few years now. We have now demoted the priority of “Acroread” when searching for a suitable program to launch PDFs on Linux machines. “Evince” and “Okular” are now the first two options that the program will try before reverting to other PDF readers and web browsers.

#### Scripting

- **Case 51595**

A JavaScript using a GUI written from the GUI Builder would crash with an error if a widget had a double quote in its text or hover text. This has been fixed.

#### User Interface

- **Case 53376**

When trying to double click some text on a textbox and a breaking character (characters like whitespace, parenthesis, etc.) was the first character on the string, the breaking character would incorrectly get highlighted. Problem is now fixed as follows:

- Altered the behaviour of double clicking to the left of a breaking character. Previously, this would highlight the word to the left. However, it was expected that it should highlight the breaking character to the right of it instead.

- Altered the behaviour of double clicking at the right most part of a textbox if there was a breaking character as the very last character on the string. Previously, nothing got highlighted. Now, the breaking character will be highlighted.

- **Case 47280**

Previously, Oasys Suite 20.0 (and earlier) applications were not DPI-aware. These applications would be sized correctly for the primary monitor on which they start but would be too big or too small when transferred to another monitor of a different resolution. This has been fixed. PRIMER 21.0, D3PLOT 21.0 and T/HIS 21.0 are now all ‘Per Monitor DPI Aware’ on Windows.

This means that when a Windows desktop has monitors of different Dots Per Inch (DPI) values, typically when a high-resolution laptop is connected to a lower resolution monitor, the size and scale of an Oasys Suite 21.0 application (PRIMER, D3PLOT or T/HIS) will adjust itself when moved between monitors.

## 2.6.2 Bugs fixed in 21.1

### Javascript api

- **Case 54530**

VScode \*.d.ts files modified to return correct Intellisense return type for the File.ReadCSV function.

### Recent files

- **Case 50147**

Recent files list (dropdown) will now contain the full filename with the path. Even when relative path is given, it will be stored as absolute path in the “recent\_files” file (which is in HOME).

### User interface

- **Case 54337**

When a Windows desktop had monitors of different resolutions and the monitor on which a PRIMER session was shown was disconnected that session will move to a different monitor. When that happened the text in the dialogue box could come out the wrong size (usually too big).

The same thing could happen if the monitor on which the PRIMER session was displayed had its resolution changed while the PRIMER session was still active and that session was moved to a different monitor.

In both cases the problem was internal confusion about which display had which resolution following the changes. Now fixed.

## 3 Enhancements

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The enhancements and bug-fixes for each program have been broken down into a series of topics. Within each topic enhancements and bug-fixes are listed by case ID.

### 3.1 PRIMER

#### 3.1.1 Enhancements in 21.0

##### Assembly

- **Case 50684**

Confirmation for overwriting file when writing part tree assembly files has been added.

- **Case 50173**

Added support for processing HyperMesh Components formed of \*CONSTRAINEDs when reading in a LS-DYNA .key file containing HyperMesh comments (PRIMER only supported Components formed of \*PARTs previously).

Now, all \$HMNAME COMPS, \$HWCOLOR COMPS, and \$HMCOLOR COMPS comments get preserved when read into PRIMER, and all \*CONSTRAINED instances get added to their corresponding PRIMER groups and assemblies as listed in the \$HMASSEM comment.

##### Attached

- **Case 49421**

For the Attached → Constrained → Sub types panel, the ‘Dismiss’, ‘All on’ and ‘All off’ buttons at the top of the panel are now always visible, even after scrolling.

##### Batteries

- **Case 53920**

Added a new tool to PRIMER called ‘Battery setup’ that is accessible through the ‘Batteries’ button from the Tools panel. It can be used to easily setup a pouch battery structure and combine it with relevant \*EM\_RANDLES cards to model Randles circuits within the battery. It can also automatically generate the necessary isopotentials and isopotential connections. It also offers the option to activate or create relevant analysis keywords.

##### Belts

- **Case 52080**

The seatbelt shoulder slipping quick fit function now creates a 90-degree belt bend on the outside point, a 45-degree bend on the inside point, and a narrower span between the two updated points.

- **Case 51880**

Added a new feature to the seatbelt fitting tool that allows effortless path definition at an explicitly meshed pelvis slipping.

- **Case 51878**

Added an option to create \*DATABASE\_CROSS\_SECTION for explicit Pelvis slipping.

- **Case 51849**

Added a new 'Automatic' option for the belt\_reference\_geometry preference that would automatically turn on the 'create reference geometry' option in the Seatbelts 'Mesh' panel if an explicitly meshed slipping is detected in the model. Otherwise, this will be turned off. The new 'Automatic' option is now the default belt\_reference\_geometry value.

- **Case 51720**

Added a file overwrite check for writing a seatbelt path to a CSV file.

- **Case 51592**

Update to seatbelt tapering: ensuring that seatbelt tapers to unskewed position at mid span and tapering between end point vectors when required.

- **Case 51577**

In the seatbelts tool, the 'Accept' button from the 'Explicit Slipping' panel is redundant (the general 'Accept' button in the 'Fit' panel can be used to save the updated path) and has been removed. Also greyed out the 'Adjust' button in the 'Explicit Slipping' panel because if it is clicked more than once, it will generate multiple points at the same locations. It will be reactivated if the 'Undo' button is pressed.

- **Case 51573**

For seatbelts, the list of editable points in the 'Define path' panel (from 10 to 19 points) has been expanded to make it easier for you to visualise and edit the data.

- **Case 50878**

Seatbelt fitting tool: The 'Explicit Slipping' panel can now be mapped using the 'Slipping' button in the path editor.

- **Case 50719**

Improved efficiency of shoulder slipping rotation during seatbelt fitting by decoupling it from the #Iter setting. Instead, you can select an Update frequency determining how often the shoulder slipping is rotated. Additionally, a Sensitivity slider has been added

to the Shoulder slipping panel which can automatically turn the slipping rotation on/off as required during seatbelt fitting.

- **Case 48512**

Added an option for adding additional prefix text for \*DATABASE\_CROSS\_SECTION created on seatbelt as per ISO standard. Also added an option to create \*DATABASE\_CROSS\_SECTION for explicit slipping.

## Checking

- **Case 52853**

A check has been added to report multiple definitions of \*BOUNDARY\_PRESCRIBED\_MOTION on the same node.

- **Case 51569**

If an include file name exceeds 80 characters, PRIMER will give a warning in the dialogue box. A new preference allows you to treat this as an error or ignore it altogether.

- **Case 51382**

The check LS-DYNA output tool now recognises shell entities for error INI+373.

- **Case 50760**

Reporting duplicate seatbelt 2D as an error now.

## Clipboard

- **Case 52863**

New options have been added to control clipboard selection. Additional to existing selection of junior items and ‘missing’ items, optionally, you can now select sets from selected item(s) and/or propagate to senior items.

## Contour

- **Case 51497**

Added Viridis, Plasma, Magma and Inferno contour ramp colour options to the ‘Contour Level & Value Format Settings’ panel. A new primer\*contour\_ramp preference is also available to support this new feature.

- **Case 30409**

You can now choose between the following contour level options for PRIMER 21.0:

- ‘Automatic levels’ (original behaviour)
  - A uniform distribution of level values.
  - Number of levels can be changed with the #levels slider.
- ‘User-defined levels’ (new option)

- Manually specify the level values.
- Insert/delete levels with the popup buttons from the contour level value textboxes.
- This option is not available for integer data components.

## Crash Test Setup

- **Case 49744**

For the Crash Test Setup tool, added a new barrier setting component in the ‘Check Nodes’ window that allows choosing between two methods for automatically configuring the positioning nodes on the barrier. You can choose the default option that selects the lowest corner nodes of the barrier front face (old method), or a newly implemented option that creates external nodes at the intersections of the lowest edges of the barrier front face. The latter option can be useful for barrier models with curved lower corners, providing more accurate positioning results.

## Cut Section

- **Case 50988**

Added two new properties to the cut section properties panel:

- Fully plastic equal force axes in global coordinates ( $Xf_g$ ,  $Yf_g$ ,  $Zf_g$ ), and
- Equal area axes in global coordinates ( $Xe_g$ ,  $Ye_g$ ,  $Ze_g$ ).

Also changed the labels of the centroid global coordinates from ( $Xg$ ,  $Yg$ ,  $Zg$ ) to ( $Xc_g$ ,  $Yc_g$ ,  $Zc_g$ ) for consistency.

- **Case 50931**

For multiple parallel cut planes with uniform spacing, there are now two separate text boxes for the numbers of positive and negative planes instead of one less intuitive text box for both.

- **Case 50758**

Previously on the cut section custom spacing panel, positions were sorted immediately after editing them. This seemed unintuitive when many positions were edited after each other. In PRIMER 21.0, the positions now remain where they are until the new ‘Sort positions’ button is clicked, or the panel is closed and reopened.

- **Case 50535**

New methods have been added to the CrossSection class in the PRIMER JS API: `CrossSection.Autosize()` and `CrossSection.CreateAlongFeatureLine()`.

`CrossSection.Autosize()` is a member function that will alter the size of the \*DATABASE\_CROSS\_SECTION such that it is just big enough to cut through all elements in that plane (limited to the Part Set, PSID, if set on the cross section) plus an additional percentage scale to ensure cuts at the edge of the plane are not missed



due to floating point precision, as well as centring the cross section on all of the cuts. The additional percentage scale can be altered by providing it as an optional argument, otherwise, the function uses the default value which can be controlled by the preference `primer*cross_section_auto_size_percent`.

`CrossSection.CreateAlongFeatureLine()` is a class function which creates a series of `*DATABASE_CROSS_SECTION`s along a free edge or feature line starting at a specified node. The number of cross sections, and their pitch, can be specified as arguments. This function also has the option to autosize the cross sections.

Furthermore, two new optional arguments have been added to the `_PLANE` version of the `CrossSection` constructor: `autosize`, and `autosize_pct`. These arguments control whether the new `*DATABASE_CROSS_SECTION` will be autosized or not.

## Dummies

- **Case 52610**

The HBM visualisation entities can now be loaded and viewed in D3PLOT as well. You can create a groups file (\*.vis) from HBM visualisation table in PRIMER and load this groups file into D3PLOT via the groups tools menu.

You can view the HBM entities based on PRIMER assemblies, or based on the HBM anatomy, or both.

- **Case 49413**

A new `WRITE_DUMMY_ANGLE` dialog command is added to write out a Dummy Angles File through Command-line mode.

- **Case 48515**

For the 'Position parts' → 'Move points' option in the Dummy/HBM panel, the restriction of Node selection (from only one PRIMER model that the Dummy is in) for the 'Move to node' option is now relaxed so that you can select/pick a node from any of the open models in the session.

## Edit

- **Case 49960**

Added an editing panel for keyword `*CONTROLLER_PLANT`.

- **Case 41957**

It has always been possible to open multiple editor panels on the same entity in PRIMER and these do not conflict since each works on its own definition. However, if subsequently, the entity is updated from both panel A and panel B, the one which is updated later will supersede any changes made earlier, leading to possible confusion.

To guard against this, PRIMER 21.0 now detects the 2nd and subsequent editing

panels opened on an entity, and these are configured in ‘browse’ mode which only gives read access to the data. This is configurable in the ‘Options’ → ‘Panel behaviour’ menu, and also by preference, where the old behaviour can be restored if desired.

## Element Quality

- **Case 51068**

Setting the `ignore_null_part_element_checks` to `FALSE` or unticking the ‘Ignore null elements’ tick box in the ‘Check options’ panel will now ensure that Null elements are displayed in element quality contour plots.

## Encryption

- **Case 49976**

When an incompatible key is selected for output version, a warning is now thrown in the encryption tool.

## Favourites

- **Case 51605**

When selecting from existing Tools or Keywords to add to your Favourites, the options are now displayed in a tree widget. This provides a better representation of the existing button hierarchy and more consistent support for non-ASCII characters in button names. It is also now possible to use Shift + left-click to select a run of contiguous buttons in the widget.

- **Case 51208**

The limit on the maximum number of buttons that can be supported by the Favourites menus has been increased to 100 (up from 20 in PRIMER 20.0).

## Graphics

- **Case 53838**

PRIMER labels are now displayed against a background in order to make the label text more legible. This background can, optionally, be turned off either from Display Options → Text & Labels → Label Background drop down, or by setting the preference `primer*label_background`.

## JavaScript API

- **Case 52541**

The argument list for the `CrossSection` constructor was very long and contained many optional arguments, making it impossible to define one of the later optional arguments without also defining the earlier ones. To simplify the constructor, the argument list

has been deprecated in favour of a new argument list: model and option (cross section type) as before, and a third argument in the form of an object, the properties of which define the arguments that could be found in the deprecated list. There are also additional properties in the object argument to control autosizing of `_PLANE` type cross sections.

- **Case 51844**

Some classes (Joint, JointStiffness, CoordinateSystem, Curve, HexSpotweldAssembly, Vector and InterfaceSpringback) in the PRIMER JavaScript API used to have multiple constructors. To simplify things and to make sure the Python API constructors for these classes work properly, old constructors have been deprecated and a new constructor that has only 2 arguments has been added for each class. In the new constructors, the first argument is the model, and the second argument is an object that has various properties. For details, refer to the new PRIMER JavaScript reference manual.

- **Case 51447**

Graticule-related improvements:

1. A new preference for graticule mode has been added
2. ‘Save display settings’ in the Display options panel will now save all the graticule preferences to the `oa_pref` file
3. Logic to override `tick_XYZ_auto` when 3D tick interval preferences are manually set has been added
4. Graticule plane colour option and transparency option are now greyed out for 2D graticule mode (similar to D3PLOT)
5. Option to turn graticule ON/OFF has been added to the list of shortcuts available via dropdown in shortcuts menu (has been added for both PRIMER and D3PLOT)

- **Case 49966**

Added JavaScript API support for `*FREQUENCY_DOMAIN_RANDOM_VIBRATION` keyword (class `FreqVibration`).

- **Case 43881**

Added JavaScript API support for `*DAMPING` cards:

- Added class functions for the following keywords:
  - `*DAMPING_FREQUENCY_RANGE`
  - `*DAMPING_PART_MASS`
  - `*DAMPING_PART_STIFFNESS`
  - `*DAMPING_RELATIVE`
- 
- Added object type for the following keywords:
  - `*DAMPING_MODAL`

- \*DAMPING\_STRUCTURAL

## Keyword Editor

- **Case 49484**

Added a new feature to the keyword editor to be able to drag the edge of the field headers to make them wider (or shorter if needed).

Also enabled double-clicking on the edges to auto-fit the particular column to the left based on the length of entries in the data fields.

Added two new buttons below the 'Single Row Format', one to autofit all the columns, and the other to reset the column widths to the default widths.

## Labels

- **Case 16980**

Controls in the 'Display Options' panel to adjust the size of text in the graphics window have been updated to behave in the same way as in D3PLOT and T/HIS. This means a specific point size can be specified for the text which will not scale if the graphics window is resized. An 'Automatic' option is still available to display scalable text. This can be applied to entity labels, model titles, the text shown with the contour bar, etc.

Preferences `primer*label_pt_size`, `primer*contour_text_pt_size` and `primer*title_date_pt_size` have been added to support this, and the existing `primer*label_size`, `primer*date_size` and `primer*contour_text_size` preferences are now considered deprecated. They will still be read in, but it is recommended for you update to using the new preferences.

Similarly, options for `LABEL_PT_SIZE`, `TITLE_DATE_PT_SIZE` and `CONTOUR_TEXT_PT_SIZE` have been added to the JavaScript API, and the existing `LABEL_SIZE`, `DATE_SIZE` and `CONTOUR_TEXT_SIZE` options are now considered deprecated.

## Mass

- **Case 51609**

If assign mass calculations complete without error, the assign mass → recalculate tool will now print to the dialogue box (not a listing box).

- **Case 50549**

The mass properties tool now supports the selection of material, section, hourglass, etc. It will find the referenced parts and calculate mass for them.

## Measure

- **Case 50783**

Picking of nodes on line using the ‘free edge’ option on object menus has been improved so that nodes on feature line can be selected when both initial picks fall on the feature line. The same applies when nodes on line are being picked for measure.

## Mechanism

- **Case 52835**

A popup option for the ‘Lock’ button is added in the Tools → Mechanism → Position → Connection list panel, that opens a popup menu to Lock All/Unlock All Connections with a single click.

## Menus

- **Case 52845**

Object menus in PRIMER will not automatically auto-expand or auto-undock anymore. This behaviour can be controlled by the `primer*menu_expand` preference.

The ambiguous pick menu for PRIMER (previously auto-populated while screen picking in an area containing a cluster of entities) will also no longer map automatically, except for composite plies. Again, relevant behaviour can be controlled using the preference `primer*query_ambiguous`.

## Mesh

- **Case 33534**

Added a new Solid Split feature ‘Split and Propagate’.

Splits the solids from the selected face and propagates the split through the solid.

Three types of splits are provided:

- 1) Split both axes - splits the face by mid edges from all sides.
- 2) Split with one axis - splits face by mid edges from one pair of opp. sides (only hexas)
- 3) Split direction normal to the face - splits solid in the third axis normal to the face.

A ‘Grow out face’ option is available in Multi Select with similar functionality as in Coat function, with ‘Break angle’ to control the selection growth.

Added a ‘Visible only’ option to control the propagation up to visible solid elements, if required.

Also added an ‘Align’ button to align the selected elements in the same orientation.

This feature might be useful when splitting with option ‘Split with one axis’ when the individual elements are in different orientation.

## Model Build

- **Case 52048**

The model build tree and the template panel now red-light components where the file referenced does not exist. Hover text gives the full path name.

## Model Modified

- **Case 51767**

When modified (red-lit) includes are written to an incremented name (i.e. not overwritten) they are now marked with a dark grey background.

The dark grey background is removed after the master file is written.

## Nastran

- **Case 50485**

Nastran write out improvements:

1. Added checks on length of beam element or orientation vector
2. Declashing labels on writing out NASTRAN format
3. Switching on ‘Convert tied contact to RBE3’ by default
4. Cleaning up RBE2 and RBE3 elements
5. Translating \*MAT\_057 to \*MAT1
6. Creating PBUSH property to accompany CBUSH element for \*MAT\_067
7. Restraining all 6 DOFs for RBE3s for SHELL\_EDGE\_TIED\_CONTACT
8. Added an option to convert rigid parts into CONM2 elements
9. Added an option to correct stiffness when using \*MAT\_ARUP\_ADHESIVE
10. RBE2 will now be written out in wide format correctly
11. Added an option to autofix ‘Node is on another nodal rigid body’ on write out
12. \*CONSTRAINED\_INTERPOLATION translated to RBE3 correctly
13. Improving DOF constraint when RBE3 ties beam node in Nastran output

- **Case 50055**

PRIMER can now read in NASTRAN’s PLOAD2 card. It is converted to \*LOAD\_SHELL keyword inside PRIMER.

## Orient

- **Case 52395**

A new option has been added to orient whereby the orient of a node will move any constraint to which that node belongs, e.g., NRB, JNTC, CONSTRAINED\_EXTRA\_NODE(SET).

- **Case 51404**

PRIMER now stores nodal coordinates in 64-bit double precision (DP), and all transformation arithmetic on coordinates is also carried out in DP. In summary, this means:

- Nodal coordinates are now stored to roughly 16 decimal digits of precision. The 16th digit is a little unreliable so rounding to 15 digits is the default for output.
- Transformation calculations such as \*INCLUDE\_TRANSFORM, \*NODE\_TRANSFORM, \*PART\_MOVE and all internal Orient operations are now carried out at full DP resolution.
- Keyword input and output of nodal coordinates now uses the full width of the 16 characters wide data field in small and I10 formats. This means that nodal coordinates are typically written out at 12 or more decimal digits of precision once exponents and minus signs are considered.
- In 20 characters wide fields used in the large format, the default is to round nodal coordinate output to 15 significant figures.
- In all cases, this precision can be controlled by you.

Testing suggests that memory consumption for a typical model will increase between 3% and 5% due to the extra storage required. There has been no measurable effect on the overall speed of the code.

## Parameter

- **Case 51471**

Previously, PRIMER did not permit parameter names to start with ‘\_’, only the letters ‘A-Z’. This was an oversight. Parameters with names starting with ‘\_’ can now be used.

- **Case 51227**

The \*PARAMETER edit panel can now be opened from the part tree.

## Part Table

- **Case 50812**

If part material is latent (defined but missing) or has undefined density, the CofG calculation will be performed for the part table using unit density.

## Part Tree

- **Case 51487**

The \*SET\_PART\_TREE keyword can now be visualised in the part tree.

## Pedestrian

- **Case 50479**

Support has been added for the GB 24550 202X protocol in the Pedestrian Markup tool.

## Quick Pick

- **Case 36916**

\*ICFD\_PART and \*ICFD\_PART\_VOL are now available in Quick pick and for visual selection in object menus.

## Read

- **Case 50154**

BROWSE MISSING INCLUDE FILE → APPLY TO ALL has been enhanced so that files where the format has been externally modified will be found. E.g., the referenced include may be 'fred.k' but the on disk file is 'fred.kby' (converted to binary) or 'fred.kby.zip' (converted and compressed).

## Renumber

- **Case 52588**

A new option 'relabel all to next free range' has been added on the renumber selection panel which will allow you to keep the labels of the selected items in continuous range(s).

Additionally, the ranges displayed on the renumber selection panel have been corrected for the 'relabel item to next free' option.

- **Case 50688**

A dialogue message is now printed when post renumber declash has occurred from the visualise panel.

## Scripting

- **Case 51022**

The new Closures Setup Tool has been added to the JavaScript menu. This tool is designed to control the position of a model via a \*PARAMETER. The intended application of this is for vehicle closures (e.g., bonnets, doors, tailgates).

## Text

- **Case 51663**



Updated headers in excel file produced by contact → write to be consistent with master slave terminology changes.

## User Interface

- **Case 52161**

Added axes labels processor ID and time to load profile, contact profile, and message profile.

Also added labels processor ID, no. of elements, type, and value to show its respective values in their textboxes while hovering over the graph.

- **Case 51180**

A quick way to change the background colour was introduced by adding a ‘Swap Fore/Back’ button under Display menu (Display → Swap Fore/Back). Clicking this button swaps the background and foreground colours of the graphics area.

This is also added as one of the options in the Programmable Shortcut Keys list, which can be assigned to any of the desired keys.

## Volume III

- **Case 53869**

The sketch functionality is now available for \*EM\_ISOPOTENTIAL.

## Workflows

- **Case 53137**

The workflow definition filename written to the workflow user data now uses a \$OA\_WORKFLOW variable to substitute the path to a workflow in a user-defined directory set with the oasys\*workflow\_definitions\_directory and workflows in the OA\_INSTALL directory.

- **Case 53060**

The version, build number, and name of the program used to write out workflow user data is now written to the user data.

They can be read from the data using the JavaScript API Workflow functions:

- Workflow.ModelUserDataVersionFromIndex(),
- Workflow.ModelUserDataBuildFromIndex(),
- Workflow.ModelUserDataProgramFromIndex()

- **Case 52927**

A new preference oasys\*workflows\_user\_data\_directory\_name has been added to specify the name of a folder to search for workflow user data in.

For example, if it is set to 'my\_workflow\_user\_data', then in the folder structure below, the models in folder3 and folder4 will use the user\_data.json file in folder1/my\_workflow\_user\_data:

```
- folder1
  | - my_workflow_user_data
  |   | - user_data.json
  |
  | - folder2
  |   | - model1.key
  |   | - user_data.json
  |
  | - folder3
  |   | - model2.key
  |
  | - folder4
  |   | - model3.key
```

- **Case 51729**

When a model is opened in PRIMER, D3PLOT or T/HIS, the model directory is scanned to look for any workflow JSON user data files for that model. This has been extended so it will now scan parent folders as well.

This makes it possible to have one JSON user data file that can be used for multiple models (previously you had to have a copy of the JSON file in each model directory, which made it hard to maintain if you wanted to update the data).

For example, in the folder structure below, the user\_data.json file in folder1 will be used for the models in folder3 and folder4, and the user\_data.json file in folder2 will be used for the model in folder2:

```
- folder1
  | - user_data.json
  |
  | - folder2
  |   | - model1.key
  |   | - user_data.json
  |
  | - folder3
  |   | - model2.key
  |
  | - folder4
  |   | - model3.key
```

The preference `oasys*workflow_max_upward_folder_search_depth` can be set to control the number of parent folders that are searched. The default is 4.

## Write

- **Case 51643**

When rounded output format is used, results are rounded to the nearest value. When a value is a ‘tie’ lying exactly between upper and lower candidates (e.g., 2.5 between 3.0 and 2.0) PRIMER rounds away from zero.

The IEEE 754 standard give two options for this ‘tied’ case when writing decimal values:

- Round to even (default)
- Round away from zero

So technically PRIMER is IEEE 754 compliant, but in practice this means that when comparing rounded output from PRIMER with the same output from other codes using standard libraries, there may (rarely) be a difference at the last significant figure for tied values. This can present a problem in a workflow which uses a tool like ‘diff’ to compare output files.

As part of the double precision upgrade in PRIMER 21.0, it is now possible to choose between the two rounding methods.

## X-sections

- **Case 51606**

The ‘Renumber’ option is now available for `*DATABASE_CROSS_SECTION` cards. These cards can now be renumbered.

## 3.2 D3PLOT

### 3.2.1 Enhancements in 21.0

#### Annotation

- **Case 50421**

Added in the ability to increase and decrease the text size for the Annotation Playback title and description as well as adding a slider for very long descriptions and titles.

Also added the option to save this text size as a preference.

#### Contour

- **Case 51644**

Contour Options 'Levels' tab:

- Added improved logic to set the text colour of contour level indices on the contour level buttons to be white or black depending on how dark or light contour level colour is.
- Added colons to 'Format', 'Exponent' and 'Dec. Places'

- **Case 51626**

The 'Convert to log scale' button from D3PLOT 20 has now been replaced with a radio button for linear or logarithmic interpolation. This can be used for all Auto contours, Max + Min as well as the new automatic completion for User defined contours. This makes it easier to switch back to linear contours without losing intermediate values.

Also, the log scale was only available between two positive numbers in D3PLOT 20. In D3PLOT 21 it is also calculated between two negative numbers in the same way, whereas between numbers of opposite sign or zero there are levels close to zero added automatically.

- **Case 51445**

In D3PLOT 21.0, a new 'Reset Colour' button has been added to the popup colour panel (when initialised from a contour bar level) so that the contour level colour can now be reset to the default colour specified by the current contour ramp option.

- **Case 49927**

For user-defined contours the level values needed to be defined all explicitly. Now new tick boxes for each intermediate level have been added to switch between explicit

definition and values calculated by linear interpolation.

Also the first or last level can be left open so that it is populated with the minimum or maximum across the whole model.

- **Case 26317**

In addition to the existing contour modes 'Auto all frames', 'Auto each frame', 'Max + Min' and 'User defined' there is now a new option 'Auto all windows'. If this is selected for multiple windows, all these windows will get the same minimum and maximum on the contour bar, which are the extremal values across all these windows.

## Cut section

- **Case 52437**

When PRIMER and D3PLOT are linked across the integration, there are now the following improvements:

With multiple cut plane directions, a change of the currently selected direction in one program will also be transferred to the other program.

When a cut plane is dragged in one program, the dragging is now also activated in the other program. This means that only one Drag button needs to be toggled to enable dragging in both programs.

- **Case 50932**

For multiple parallel cut planes with uniform spacing there are now two separate text boxes for the numbers of positive and negative planes instead of one less intuitive text box for both.

- **Case 50759**

On the cut section custom spacing panel in PRIMER 20 positions were sorted immediately after editing them. This seemed unintuitive when many positions were edited after each other. In PRIMER 21 the positions now remain where they are until the new 'Sort positions' button is clicked or the panel is closed and reopened.

## Deform

- **Case 44868**

In D3PLOT 21 a new option "Freeze Coordinates" has been added to the DEFORM menu. This option can be used to display the results from any state on top of the deformed geometry from another state.

This option is similar to using Magnify with the magnification set to 0.0 to display results on a fixed geometry but unlike Magnify this option can be used to fix the geometry at any state within the analysis.

## Dummies

- **Case 52060**

The HBM visualisation entities can now be loaded and viewed in D3PLOT also.

You can create a groups file (\*.vis) from HBM visualisation table in PRIMER and load this groups file into D3PLOT via the groups tools menu.

You can view the HBM entities based on PRIMER assemblies, or based on the HBM anatomy or both.

## Graphics

- **Case 53839**

D3PLOT labels are now displayed against a background in order to make the label text more legible. This background can, optionally, be turned off either from Display Options -> Label Options -> Label Background drop down or by setting the preference `d3plot*label_background`.

## JavaScript API

- **Case 52435**

In the new D3PLOT JS API there is a 'Node' class, which has an 'Elements' member function to find elements using that node.

- **Case 51269**

In the new D3PLOT JS API there is a 'Model' class, which allows reading models.

- **Case 48914**

In the new D3PLOT JS API there is now a Material class.

- **Case 48825**

In the new D3PLOT JS API there is a 'GraphicsWindow' class, with a 'SetModelInfo' method, which allows to change the colour of a model and of the title.

- **Case 48000**

The new D3PLOT JS API has a 'Part' class, which has an 'elementType' property.

- **Case 47999**

In the new D3PLOT JS API there is a 'Group' class.

- **Case 40873**

In the new D3PLOT JS API there is a 'Model' class, which allows reading/deleting models.

- **Case 40868**

In the new D3PLOT JS API, the Node, Shell, Solid, etc classes have a GetFromID method which will return null if entity does not exist.

- **Case 36792**

It is now possible to get the number of through thickness integration points for a given shell or tshell. In the new D3PLOT JS API there is a 'Shell' and a 'Tshell' class with 'integrationPoints' property.

- **Case 30615**

In the new D3PLOT JS API there is a 'Model' class and a 'GraphicsWindow' class, which allow reading/deleting models and to add/subtract them in graphics windows.

- **Case 27377**

In the new D3PLOT JS API it is possible to convert from external ID to internal ID, as Node, Shell, Solid, etc classes all have a label and index property.

- **Case 20100**

There is now a Model class in the new D3PLOT JS API.

## Local axes

- **Case 29881**

In the Entities menu there are new options in version 21 that control the size and display Element, Material and Ply local axes.

These options include the ability for the symbols to be sized automatically by D3PLOT based in the element dimensions or to use a fixed size for all elements.

## Materials

- **Case 50010**

From version 21 onwards D3PLOT will now display the local material axes triads on elements if D3PLOT can find and read a ZTF file generated by PRIMER.

As well as displaying the triad using the normal symbol with X, Y and Z axis labels new options have been added to speed-up the display that will display a coloured triad (without labels) or just the local X, Y or Z axes.

## Menus

- **Case 53587**

When entities are screen-picked, the screen pick menu is auto-populated and gives you further information about the entities picked. This menu also includes options to refine picking and can be explicitly invoked by clicking 'Vis' in any PRIMER-style object menu.

The 'Vis' (screen pick) menu has been redesigned to make various options more accessible and intuitive. Buttons have been reorganised, icons introduced, and hover text added

This menu can now, optionally, be made a floating menu by setting the preference `d3plot*vis_menu_position` and giving it the value 'FLOATING'

## Nastran

- **Case 51665**

When an OP2 file is read into D3PLOT, any RBE2 definitions are now translated into separate NRBCs instead of being converted into rigid beam elements.

RBAR definitions in the OP2 file are still translated into rigid beams.

## Part tree

- **Case 52733**

Performing an ONLY operation on Groups from Part Tree will now restore the visual attributes of the selected group, if defined.



## Session

- **Case 42520**

A bookmarks tool has been added to D3PLOT allowing fast capture and reloading of page views. Bookmarks can be accessed via the TOOLS menu. Bookmarks can be captured using a new icon on the top bar.

## Shortcut

- **Case 51667**

A 'Swap Fore/Back colour' shortcut key is added under Programmable shortcut keys list in D3PLOT and T/HIS, which can be assigned to any user desired keys and used to swap the foreground and background colours.

## Views

- **Case 49891**

A new preference 'initial\_view\_orientation' for PRIMER and D3PLOT accepts the eight pre-programmed views (+XY, +YZ, +XZ, -ISO, -XY, -YZ, -XZ, -ISO) as its value.

The preference sets the initial view of the graphics window in which PRIMER and/or D3PLOT opens. It also sets the dialogue command 'ZERO\_VIEW' to the specified view.

-oasys\*initial\_view\_orientation (For both PRIMER and D3PLOT)

-primer\*initial\_view\_orientation (For PRIMER)

-d3plot\*initial\_view\_orientation (For D3PLOT)

## Webgl

- **Case 53035**

Added the new contour range label and the envelope plot label to D3PLOT Viewer export.

## Workflows

- **Case 52421**

The workflows menu has been split into two tabs:

- Defined Workflows - shows workflows that have the required data and can be run in

## D3PLOT

- Undefined Workflows - shows workflows that can be run in D3PLOT, but don't have the required data.

Selecting a workflow in the Undefined Workflows tab opens the model in PRIMER and starts the workflow to select the required data.

A window also opens in D3PLOT where you can update the workflow menu when the data has been saved. This will move the workflow to the Defined Workflows tab so it can then be run in D3PLOT.

- **Case 51150**

The WorkflowDefinitionFilename() and WriteToFile() methods that exist on the Workflow class in PRIMER have been added to the Workflow class in D3PLOT and T/HIS.

## 3.2.2 Enhancements in 21.1

### JavaScript API

- **Case 54778**

The following has been added to the JS-API Part class to make it easier to work with \*PART\_COMPOSITE parts:

- A .composite property which returns true if the part is a \*PART\_COMPOSITE.
- A .nip property to get the number of integration parts in a \*PART\_COMPOSITE.
- A .GetCompositeDate() method to get the Material ID and Thickness at a specified integration point in a \*PART\_COMPOSITE.

## 3.3 T/HIS

### 3.3.1 Enhancements in 21.0

#### JavaScript API

- **Case 53507**

T/HIS and D3PLOT can now return build number when Utils class Build() method is called in JS script.

#### Operations

- **Case 51286**

In T/HIS CORA, when you click Calculate, corridor and cross-correlation graphs are now created automatically with rating information provided in the legend and graph title as appropriate.

#### Performance

- **Case 50157**

Four new functions have been added to the JavaScript interface in T/HIS that can be used to speed up scripts that generate a lots of graphs and curve manager updates.

The 1st pair enable and disable some menu updates.

```
EnableMenuUpdates();  
DisableMenuUpdates();
```

At the moment these calls are limited to the curve manager, curve table, read menu and entity selection menu.

The 2nd pair of calls

```
EnableGraphWindowUpdates();  
DisableGraphWindowUpdates();
```

enable/disable the graph redraw logic that normally gets called whenever the contents or setting in a graph are modified.

#### Read

- **Case 53866**

When reading data from THF (d3thdt) files from a network disk T/HIS could be considerably slower than a local disk and the performance could be affected further on a system with high latencies.

To improve the performance the internal buffer size inside T/HIS has been increased from 512 to 2048 Words as this has been found to be faster on all the systems it has been tested on.

On some systems increasing the buffer size further could improve performance so a new preference:

`this*file_buffer_size`

and Environment variable

`THIS_BUFFER_SIZE`

have been added which can be used to set the buffer size between 512 and 1048576.

## Workflows

- **Case 52422**

The workflows menu has been split into two tabs:

- Defined Workflows - shows workflows that have the required data and can be run in T/HIS
- Undefined Workflows - shows workflows that can be run in T/HIS, but don't have the required data.

Selecting a workflow in the Undefined Workflows tab opens the model in PRIMER and starts the workflow to select the required data.

A window also opens in D3PLOT where you can update the workflow menu when the data has been saved. This will move the workflow to the Defined Workflows tab so it can then be run in T/HIS.

- **Case 51697**

T/HIS now supports ISO-MME Version 1.6 Export according to Euro NCAP Virtual Testing Protocol.

You can now add operations in ISO-MME Config file to operate on existing curves and do required operations to get to the required output according to your ISO Code. The ISO-MME Export can now Display Units in Data File(.001,.002 and so on) based on Units defined by the user.

T/HIS now supports descriptor option in Test Data Block, Objects Block, Channel Block and Operation Block which can be used to define any additional property to be displayed in (Test File(.mme), Object File(.mmi), Data File(.mmd,.001)).

- **Case 51060**

Added Display Unit options for Pulse Index and Energy Check Workflows

- **Case 50690**

Oasys 21 includes several new Workflow tools to support Virtual Testing and, in particular, the Euro NCAP Virtual Far Side Simulation & Assessment Protocol Version 1.0. The new tools are:

1. Automotive Assessments

The Automotive Assessments Workflow includes support for the Euro NCAP VTC protocol.

2. LS-DYNA to ISO-MME

A new tool to convert LS-DYNA results into the ISO-MME format as specified by the Euro NCAP VTC protocol.

3. SimVT

A new, powerful tool for correlating simulation versus test curves, or indeed any combination of: LS-DYNA models, ISO-MME data and CSV data. Supports the Euro NCAP implementation of the ISO/TS 18571 rating method.

4. Euro NCAP VTC Quality Criteria

A new, convenient tool for assessing the quality criteria specified in section 6.1 of the Euro NCAP VTC protocol.

5. Euro NCAP VTC Videos

A new, convenient tool for creating the videos specified in section 5.2.1 of the Euro NCAP VTC protocol.

- **Case 50417**

Updates to the Energy Check Workflow Tool allowing users to visualise different energies of a model and perform checks.

### 3.3.2 Enhancements in 21.1

#### Operations

- **Case 53141**

Correlation graphs produced by T/HIS CORA and SimVT now use datums to display the corridors more clearly.

#### Workflows

- **Case 54842**

Calculates Head Offset Excursion for the C-NCAP Virtual Testing Protocol which is used to select the evaluation interval of virtual assessment correlations

## 3.4 REPORTER

### 3.4.1 Enhancements in 21.0

#### Frequency

- **Case 51591**

A new script has been added for Library Program items to extract eigenvalues (modal frequencies) from LS-DYNA's eigout file. The script creates REPORTER variables, allowing the eigout results to be tabulated in a report. The following library templates and pages are now provided:

- Eigout\_Table\_A4\_Portrait\_Layout.orp
- Eigout\_Table\_PowerPoint\_Layout.orp
- Eigout\_Table\_A4\_Portrait\_Layout.ort
- Eigout\_Table\_PowerPoint\_Layout.ort

#### Pdf

- **Case 52154**

PRIMER, D3PLOT, T/HIS, and REPORTER now warn you if the PDF and HTML applications you have set via the `oasys*pdf_application` and `oasys*html_application` preferences, respectively, are not valid.

#### Pages

- **Case 50875**

REPORTER now features enhanced page navigation functionality with the introduction of a new page navigation toolbar. Page thumbnails are displayed for the current template or report. Using this page navigation toolbar, you can navigate between pages by clicking the relevant page thumbnail. Right-clicking the page thumbnails allows you to execute context menu actions such as deleting, duplicating and adding pages. Additionally, you can now re-order the pages in the template or report by dragging and dropping the page thumbnails to change their order. The page thumbnails update dynamically when you interact with the template.

To accommodate the new page navigation toolbar, the Tools toolbar has been relocated to the right, creating two tabs: (1) the Tools tab, and (2) the Format tab. The Format tab becomes visible when an item in the template or report is selected.

#### Preferences

- **Case 52769**

New preferences are available to control the Library and Workflows directories scanned for templates, pages and scripts when REPORTER opens. By default,



REPORTER will scan all of the directories listed. If you check 'Only this' in the Preferences dialog, REPORTER will scan only the specified Library or Workflows directory, and none of the directories above it (Library and Workflows are treated separately via `reporter*library_only_use_specified_directory` and `oasys*workflow_only_use_specified_directory`). This allows you to switch REPORTER to use a different directory when you customise the templates provided with the installation, or when you receive an updated bundle of templates from Oasys Ltd.

In addition, when REPORTER scans Library and Workflows directories for templates and pages, it now scans subdirectories recursively. The scripts directory is not scanned recursively.

- **Case 52153**

You can now set your preferred PDF and HTML applications through REPORTER's preferences dialog. These preferences will allow you to choose the application that will be launched when opening a PDF or HTML file from REPORTER.

## Properties

- **Case 45398**

D3PLOT items in REPORTER now have two extra options: (1) pre-blank the D3PLOT model before reading the properties file, and (2) ignore elements when reading the properties file. These options are originally preferences, and still are, but are now also per-item options. Since these options are now part of the report or template, using them will ensure similar captures when the report or template is shared with users that do not have the corresponding preferences set. If you open a version 21 and above template or report, the preferences are ignored and the per-item options are honoured. If you open a version 20.1 and below template or report, the preferences are only honoured as long as none of the two options are selected in the D3PLOT dialog.

## Python api

- **Case 52123**

To make the most out of the newly introduced Python API, REPORTER now allows you to create a gRPC server connection from both the command line via '-grpc' and from the Script menu.

## 3.4.2 Enhancements in 21.1

### Generate

- **Case 53537**

REPORTER now automatically updates the thumbnails of the page navigation buttons in the following scenarios: deleting items, pasting items, and moving items using the arrow keys. Also, when you press on script button in presentation mode, REPORTER will update all the pages that have been affected by the generation of this script item.

### JavaScript API

- **Case 54928**

The Unix() and Windows() functions have now also been added to the REPORTER JavaScript and Python APIs.

### Standard templates

- **Case 55065**

The library templates for the USNCAP and IIHS crash tests have been replaced with versions that use data from the Automotive Assessments workflow.

### Workflows

- **Case 55252**

REPORTER Templates to perform the C-NCAP Side Pole Protocol as specified in section 1.2.1.4 of the C-NCAP Management Regulation (2024).

- **Case 55249**

REPORTER Templates to perform the C-NCAP Far Side Protocol as specified in section 1.2.1.5 of the C-NCAP Management Regulation (2024) which takes into account eight Working Conditions (Table H.1 & 1.2.1.5.3) and two dual-occupant penalties (Passenger & Driver, 1.2.1.5.4) to calculate a score out of eight.

## 3.5 SHELL

### 3.5.1 Enhancements in 21.0

#### Process

- **Case 51805**

In SHELL 21, a new input option NCSP has been introduced. The NCSP allows you to specify the number of processors that will be used for local model in a co-simulation.

## 3.6 Oasys

### 3.6.1 Enhancements in 21.0

#### JavaScript API

- **Case 43709**

The way that scripts, which use windows/ GUIs, are run has changed in Oasys Suite 21.0

Please see the ‘What’s new’ guide for details.

#### Licensing

- **Case 51631**

After a licence is checked out initially, the LMX system periodically checks that there is still a valid connection with the licence server. If this is lost for more than 10 minutes, we tell you and kill the job.

This was a ‘sudden death’ situation with no prior warning, and hence no opportunity to save work in progress. Therefore, it has been modified as follows:

- If the connection to the server is lost for more than 5 minutes, a warning is issued explaining the problem and suggesting that work is saved.
- If connection continues to be lost, this warning is repeated at 2 minute intervals until finally the termination time is reached.
- At termination, we now perform an emergency keyout of all models in the database. On Windows, the MS-DOS controlling terminal window will also remain so that there is a record of what happened.

#### Menus

- **Case 52059**

Object menus in D3PLOT will not automatically auto-expand or auto-undock anymore. This behaviour can now be controlled by the `d3plot*menu_expand` preference.

The ambiguous pick menu for D3PLOT (previously auto-populated while screen picking in an area containing a cluster of entities) will also not automatically map anymore (except for composite plies). Again, the relevant behaviour can be controlled using the preference `d3plot*query_ambiguous`.

## Standard Templates

- **Case 38164**

Oasys Suite 21.0 features two new Workflow tools for seismic analysis: Seismic Storey Drift and Seismic Storey Force. These workflows help you process and report the calculation of storey drifts and section forces. Setup on one model in PRIMER and then process any number of ground motions in D3PLOT and T/HIS, and automate the workflows using the new Seismic REPORTER templates.

## User Interface

- **Case 52547**

When entities are screen-picked, the screen pick menu is auto-populated and gives you further information on the entities picked. This menu also includes options to refine picking and can be explicitly invoked by clicking 'Vis' in any object menu.

The 'Vis' (screen pick) menu has been redesigned to make various options more accessible and intuitive. Buttons have been reorganised, icons introduced, and hover text added

This menu can now, optionally, be made a floating menu by setting the preference `primer*vis_menu_position` and giving it the value 'FLOATING'

## Workflows

- **Case 52799**

Added LS-DYNA to the ISO-MME workflow tool as part of Virtual testing support which can export LS-DYNA entity data in ISO-MME format.

- **Case 52617**

This new Euro NCAP VTC Videos Workflow tool helps you calculate the views and export the videos as specified in section 5.2.1 of the Euro NCAP Virtual Far Side Simulation & Assessment Protocol.

- **Case 52347**

Added an extra 'workflow\_name' argument to some of the Workflow API functions.

In PRIMER:

For `Workflow.NumberOfModels()`

- If defined, it returns the number of models that have data for the specified workflow.
- If not defined, it works as before where it returns the number of models that have data for the workflow selected in the workflows menu.

### For Workflow.ModelIdFromIndex()

- If defined, it looks through the list of models that have data for the named workflow and returns the model ID of the model at the specified index in the list.
- If not defined, it works as before where it returns the model ID of the model at the specified index in the list of models that have data for the workflow selected.

### In D3PLOT / T/HIS:

### For Workflow.WorkflowDefinitionFilename()

- If defined, it returns the filename of the workflow definition filename for the specified workflow.
- If not defined, it returns the workflow definition filename for the workflow in the workflows menu.

### For Workflow.NumberOfSelectedModels()

- If defined, it returns the number of models that have data for the specified workflow (out of the models that were selected in the workflows menu).
- If not defined, it works as before where it returns the number of models that were selected in the workflows menu.

### For Workflow.ModelIdFromIndex()

- If defined, it looks through the list of models that have data for the named workflow out of the models selected and returns the model ID of the model at the specified index in the list.
- If not defined, it works as before where it returns the model ID of the model at the specified index in the list of models that were selected.

- **Case 51862**

In Oasys Suite 21.0, a new workflow tool for assessing the quality criteria specified in section 6.1 of the Euro NCAP Virtual Far Side Simulation & Assessment Protocol v1.0 is now available as part of Virtual testing support.

## 3.6.2 Enhancements in 21.1

### Workflows

- **Case 54637**

Added a new Euro NCAP Virtual Far Side VC2 (Assessment Criteria) REPORTER template for Validation Criterion 2

- **Case 54129**

C-NCAP VTC Videos workflow tool is part of the Virtual Testing Protocol and allows users to calculate the views and export the videos outlined in part H.2.8 of the C-NCAP Far-Side Occupant Protection Protocol.

- **Case 54111**

C-NCAP VTC Quality Criteria workflow tool is part of the virtual testing protocol and allows you to perform the quality checks outlined in section H.1.1(f) of the C-NCAP Far-Side Occupant Protection Protocol.