Update and Release Notes for the LS-DYNA Environment Software

from Oasys Ltd

| SHELL | PRIMER | D3PLOT | T/HIS | REPORTER |

Version 20.0

Contents

1   Introduction

The Oasys Ltd LS-DYNA Environment 20.0 suite, dated March 2023, is a full release which supersedes all previous releases.

This document lists the enhancements that have been made during development, and the bugs that have been fixed (since 19.1). 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 20.0 release has been used and tested with LS-DYNA version R14 and the current development version. It supports all the keywords in volumes I, II and III of the released R13.0 User's Manual. Many of the new keywords in the released R14 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 20.0 is available on the following platforms:

Windows	Windows 10/11	64 bit
Linux	RedHat Enterprise 7.x, RedHat Enterprise 8.x	64 bit

The RedHat Enterprise 7.x/8.x builds have been released on the website for Linux as this has been found to run on all the machines we have tested (RHEL 7, RHEL 8, SuSE 12.4).

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

For Oasys V21, currently planned for spring 2024, will only be available on RHEL 8. This is because RedHat Enterprise 7 Linux will reach "End of life" on June 30th 2024. We would encourage all users currently running RHEL 7 to migrate to RHEL 8 during the life of the V20 release but we appreciate that this may present problems on legacy systems. If withdrawal of support for RHEL 7 will create problems for you, please contact us as soon as possible so that we can discuss possible solutions.

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 20.0 will bring, we recommend you update all your Oasys Suite license servers and files as soon as possible.

Action to take

If you're using a floating network license you will need to install the LM-X license server software (version 5.2). The software and supporting documentation are available to download from our website and are also included in our installation packages. If you updated to 5.2 with the Oasys 19.X release, you do not need to update for the Oasys 20.0 release.

Backwards compatibility

The Oasys Suite 20.0 LM-X license file and license daemons are backwards compatible for all currently supported versions of Oasys Suite. This means that any existing 19.x, 18.x and 17.x software will continue to work with new LM-X license files and servers.

2   Bugs Fixed

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

Adhesive

- **Case 50511**

The ability to select shells across multiple models under the 'Adh.Patch Info' tool on the connection table has been restored. This was accidentally removed when the front end was modified to include adhesive creation directly from solids.

- **Case 49739**

Two graphics problems were reported for patch adhesive connections. When these were remade from table, the solids did not always display properly. When selecting patch from the object menu, a mess of sketch lines could appear. Both issues are fixed.

Belts

- **Case 50816**

Automatic beam creation for belt stiffness on seatbelt does not work when consecutive base point has beam PID defined.

Fixed the problem. It should now create beam elements for consecutive base path points.

- **Case 48896**

Belt fitter was not remembering red drag handle only twist (from the 'Advanced' path definition settings) at points on model re-read which is now fixed.

- **Case 48361**

When (re)fitting a seatbelt using the command line 'Fit' command or the JavaScript 'Fit' method the thickness of a shell / 2D seatbelt belt as meshed was not set to the belt thickness defined in the fitting process, instead using whatever thickness the prototype element definition currently has set on its *SECTION card.

The same problem occurs in the interactive (re)fit case, although it was less likely to be a problem since the interactive meshing operation requires the user to define a prototype element, section and material for each type of element used in the belt.

This is now fixed as follows:

- In the interactive (re)fit case the thickness of any prototype shell or 2D belt element *SECTION card is compared with the thickness used for fitting and if there is a difference the user is warned and forced to decide which value to use.

- In the batch, command-line and JavaScript cases the same check is made but if a difference is made the relevant *SECTION card(s) are updated to use the as-fitted belt thickness.

- **Case 47211**

Fixed the issue of a seatbelt material error message not being displayed from the scalar editor.

- **Case 45744**

When a seatbelt is fitted in PRIMER it 'remembers' the prototype properties used to mesh the belt on the *PART card in the form of template *ELEMENT_SEATBELT and/or *ELEMENT_SHELL definitions so that a subsequent refit operation can reuse these. However if a belt was originally meshed using 2D belt elements and then it is refitted and remeshed using shells the old 2D belt *PART, *SECTION_SHELL and *MAT_SEATBELT definitions are remembered even if they are not being used.

PRIMER's Cleanup Unused function would not remove these definitions since they are referred to on the *BELT cards, even though they are not currently being used.

This is not a bug in the literal sense since the *PART card is referred to. However, LS-DYNA checks *SECTION_SHELL cards used with *MAT_SEATBELT and if these section definitions have no EDGSET (the node set used to specify 2D belt topology) then it exits with an error, even if there are no 2D belt elements using that section.

Therefore, Cleanup Unused now has some special exception logic which inspects *BELT definitions for unused 2D seatbelt element prototype definitions and if these are not being used they no longer prevent the associated *PART definitions from being deleted. This in turn no

longer blocks the relevant *SECTION and *MAT cards, allowing these to be deleted as well (so long as they are not used elsewhere).

Checking

- **Case 50813**

When VXVYVZ method is used to define orientation of a beam, PRIMER could issue spurious warning/error messages. Even though the LS-DYNA keyword manual comment suggested that V is a point relative to N1, V is actually a vector. Issue has been fixed.

- **Case 50721**

If the check panel is invoked with no models in memory the model selector button is now no longer greyed, so that a model subsequently keyed in can be loaded.

- **Case 49959**

Use of LOAD_BODY_PARTS with SET_PART_ADD was giving rise to spurious error messages because this set type was not being processed correctly. Now fixed.

- **Case 49798**

When a table contained a curve with ill-conditioned x data, the check that compares curves could get stuck in a loop. The table check is now only performed if all curves are defined with monotonically increasing x data.

- **Case 49746**

LS-DYNA will not initialize if there is a *MAT_ADD_THERMAL_EXPANSION keyword that refers to a part with MAT_172. We have added a check to detect it during Model → Check.

- **Case 49740**

The check category dropdown did not display properly if created with model with V3 keywords, when displayed subsequently for models with no V3 keywords. Now fixed.

- **Case 49325**

When the LS-DYNA Output Reader was reading the error message 'Material types 173 and 198 with NPLANES>0 should not be used with element formulation 2' it was showing it differently in the tree view. Now fixed.

- **Case 49071**

PRIMER now does not crash if an incorrect filename is entered in LS-DYNA check directory textbox. It throws a warning message instead.

- **Case 48821**

Model modified did not always detect changes in *INTERFACE correctly.
The logic that handles a mixture of labelled/unlabelled type has been improved.

- **Case 48269**

Added an error if INITIAL_VELOCITY_GEN PHASE=1 but the
*INITIAL_VELOCITY_GENERATION_START_TIME card is missing.
Added an error if *INITIAL_VELOCITY_GENERATION_START_TIME STIME is out-of-range of the analysis termination time.

- **Case 47360**

Autofix in high order solids was getting confused with interpolation nodes that are either in the wrong order, or simply slightly moved from their theoretical location. This has now been improved and it deals with both cases.

- **Case 46065**

When a user wants to call a DEFINE_FUNCTION entity creation panel from another keyword panel, the PRIMER user could change the keyword type to other related *DEFINE keywords. This is fixed now, and the PRIMER restricts the 'Curve Type' popup menu in this case to only DEFINE_FUNCTION_XXXX types.

Comments

- **Case 47192**

Keyword headers were being written out even if there are no remaining entries to be written for the keywords concerned. Fixed it.

Composites

- **Case 48752**

Changed the thickness hierarchy when contour plotting shell thicknesses to comply with the LS-DYNA manual comment section for *PART_COMPOSITE (The element thicknesses defined via the *ELEMENT_SHELL_THICKNESS card now override those defined in the *PART_COMPOSITE card)

Connections

- **Case 50536**

A new connection check has been added for case where nodes on different layers of clinch welds connect to the same segment. In PRIMER 19.0, if all nodes are tied in contact, they would

incorrectly be reported as REALIZED connections. Now they will be INVALID with clinch weld error.

- **Case 49777**

If line welds failed to make, no warning message was given. Now fixed.

- **Case 49685**

Multi-solid welds were not being created with correct area pi*d*d/4 where d is the specified diameter. This issue has now been fixed. Note that single hex welds had the correct value.

- **Case 48778**

After reading spotweld file (not xml), subsequent incarnations of connection create panel were missing the top buttons. Now fixed.

- **Case 46886**

The setting to allow MIG welds on feature lines was previously hidden in a preference. This is now available on the create panel.

Contacts

- **Case 49605**

For *CONTACT... _MPP, the isometric PARMAX when set to zero should resolve to 1.035. Due to an error in a condition, this was remaining at zero and could cause failure of tied contact between curved surfaces. Now fixed.

- **Case 49601**

Tiebreak contacts between solid bodies may generate no 'penetrations' as the segments have zero thickness. However, the nodes should be tied if the offset is below tolerance. Issue now fixed.

- **Case 38632**

Calculation of whether an element is within box of *SET_SOLID_GENERAL, *SET_SHELL_GENERAL or *SET_SEGMENT_GENERAL has been considerably speeded up by use of threading and where appropriate, use of pre-emptive bucket setup.

Control

- **Case 50146**

PRIMER will no longer crash when TSSFAC value is updated in CONTROL_TIMESTEP.

Crash test setup

- **Case 50525**

In the Batch Crash Test Setup script, running a RCAR Low-Speed (Front) load case with a user defined contact offset distance led to a script crash. This is now resolved and RCAR Low-Speed (Front) cases can be run with a user defined contact offset distance.

- **Case 50442**

Updated the FMVSS 214D Side Impact load case example image.

- **Case 50441**

Updated the default EuroNCAP Side Impact Mobile Deformable Barrier velocity to 60 km/h.

- **Case 50439**

EuroNCAP Frontal Impact MPDB changes:
- Updated the example Image, default barrier offset and barrier ground height.
- Added barrier speed.

- **Case 49575**

The Batch Crash Test Setup script will now write the <default> vehicle and barrier settings to the batch XML file as 'default' instead of '<default>'. This will allow the script to import the settings and apply the default settings again without crashing.

- **Case 48687**

In the UI Batch script, a crash occurred if the user selected <default> vehicle and barrier settings after reading in an XML file, this has been fixed.

Curves

- **Case 48824**

When using the 'Zoom' option and dragging the cursor to define the area to zoom into, some of the red squares do not get undrawn. This does not happen if the area is defined by selecting two points or dragging the cursor at a very low speed.

This has been fixed now.

Cut Section

- **Case 49849**

In PRIMER, the Plane Display option on cut section only displayed one cut direction when set to Wireframe or Transparent. Now, it displays all cut directions similarly to D3PLOT.

D3PLOT→PRIMER link

- **Case 49648**

The QP mass props drop-down uses the PRIMER mass property toll over the link. For each mass calculation the process must be closed in PRIMER. Making a second pick in D3PLOT without doing this will fail to re-calculate. In case this is not obvious to the user, a prominent warning message is now issued in PRIMER.

Damping

- **Case 42531**

Corrected the menu name for two keywords editors. Changed GLOBAL_DAMPING to DAMPING_GLOBAL and MODAL_DAMPING to DAMPING_GLOBAL. Also added box alias for these two editors so that old macros still work.

Deleting

- **Case 48263**

In the Cleanup Model menu, if a user only wants to delete some objects of a given type rather than all the ones listed, it is possible to toggle on/off individual objects. When an object type has some items selected for deletion and others not, the Delete button would be drawn in the wrong colour and, if the state was changed again such that all objects of that type are now selected for deletion or to be left in the model, some artifacts of the button would seem to remain when the colour updated. This has now been fixed so that the button is drawn in the intended colours (blue

grey in the Light and Dark themes; pale green in the Classic theme) and the artifacts are properly cleared when the button colour changes.

Dummies

- **Case 50111**

PRIMER was not able to determine the cable attachment nodes for the THUMS and GHBMC models while rigidifying the dummy tree assemblies for these HBMs. This has been fixed by retrieving the nodes mentioned in dummy tree files.

- **Case 50004**

When a THUMS HBM is positioned with the 'Dummy and Seatsquash' tool, the units for the time duration for simulation/settling were coming out wrong. Fixed this.

- **Case 48529**

When a user pressed the Rigidification ('R') button on the Dummies/HBM positioning tools panel, PRIMER used to take a bit of time to perform the rigidification process. This is now fixed, and PRIMER does the rigidification of the dummy assembly quite quickly.

Edit

- **Case 48899**

Following updates were done to the *SECTION_SHELL edit panel:
1. Corrected the position of ELFORM cards to remove the gap that occurred between mandatory shell cards and optional ELFORM cards.
2. Corrected the card numbers, to be consistent with the keyword manual.

Elements

- **Case 49541**

The filename text box for DIRECT_MATRIX_INPUT was un-necessarily truncated on the edit panel. Now fixed.

- **Case 49404**

The read of RBE2s in a NASTRAN model could cause the appearance of spurious latent nodes at very high labels due to an over-run while reading the nodal data array for RBE2s. Now fixed.

- **Case 48316**

Previously, all nodes were simply mirrored when reflecting solids with high order interpolation nodes. This resulted in a wrong order of those nodes, which was producing LS-DYNA errors.

Now, the nodes are re-ordered after reflecting so they remain as indicated in the LS-DYNA manual.

Encryption

- **Case 50190**

Partial encryption of define tables are now supported in the encryption tool.

- **Case 49975**

The encryption tool now keeps the order in which load curves appear in files and the select associated button now grabs all the load curves associated with a table.

- **Case 49737**

The encryption tool now correctly stores the order of the table and load curves.

- **Case 48645**

Added checks for cross-referenced load curves.

Explode

- **Case 50618**

After using the 'Conx between includes' option in the Tools → Explode menu, hovering the mouse over the model could sketch parts that were blanked. This has been fixed.

FMH

- **Case 50696**

For the Tools → Safety → FMH → FMH manual setup → Current head position → Create/ Edit panel, the 'Max HIC' button has been widened to prevent text truncation.

Graphics

- **Case 50959**

When creating a new *INITIAL_VELOCITY_NODE the visibility of this type should be turned on automatically (if not already on) so that the newly created item becomes visible. This didn't happen, instead it turned on the visibility of *INITIAL_FIELD_NODE. It will also affect a few

other *INITIAL keywords as well and possibly some *BOUNDARY, *CONSTRAINED and *LOAD too. Now fixed.

- **Case 50128**

When the user hovers over the first auto button in the keyword panel of the CONTACT keyword, the popup list does not flash constantly anymore.

- **Case 49477**

The graphics of translational joints was wrong if the nodes N5 and N6 were not orthogonally 'opposite' nodes N1 and N2, resulting in the symbol being skewed. (This did not affect its correctness as a keyword in the model.)

Corrected by treating N5 as defining the plane N1N3N5 and N6 the plane N2N4N6 and drawing the 'square section' of the joint accordingly.

- **Case 48715**

Odd bits of text were getting appended to Date in the graphics window when the Model had a long title. This has now been corrected.

- **Case 48406**

Beam true section display now considers _THICKNESS option if it is used with *ELEMENT_BEAM and override the properties on *SECTION_BEAM for ELFORM 1, 4, 5, 7, 8 and 9.

- **Case 47739**

Removed the need to press CT/SI while switching between child contour options.

- **Case 47738**

If plot is switched back to shaded plot after velocity vectors are plotted in nodal plot (over a shaded plot) with velocity vectors drawn in entities, the plot does not show the vectors. Fixed the issue with plotting initial velocity through the entity panel after a nodal plot.

IGA

- **Case 48526**

PRIMER previously calculated the mass of parts with multiple associated *ELEMENT_SHELL_NURBS_PATCH keywords incorrectly. Now, PRIMER outputs the correct masses when running mass calculations in this context.

- **Case 47748**

Blanking of IGA_SHELL type part via quick pick screen area (aka. when user drags rectangle on screen) did not work properly previously. Fixed issue with screen area blanking from quick pick for IGA_SHELL type part. Also added IGA_SHELL type filter in Part in quick pick.

Image

- **Case 50243**

Mesh Volume Analysis Tool help image now resized to fit the window.

- **Case 50237**

When the normal background colour of the graphics window is not white, it is possible to select 'use white background' when images are captured, which temporarily changes the colour of overlay and text to give contrast against the white background.

This was not working for the contour bar on SI, CT and Vector plots which retained their original colour, and since this was typically white for text it resulted in the text becoming unreadable.

Now fixed by swapping these colours temporarily.

Include

- **Case 47524**

Problems can arise when a 'once only' card such as *CONTROL or *LOAD_GLOBAL is defined in multiple files and these files are subject to transformations which modify the contents of the card in question. PRIMER's 'clone' logic used in this situation assumes a single true definition that can be referred to from multiple places, but if each reference is different in detail this assumption fails.

The only full solution to this problem is to permit multiple different definitions of 'once only' cards to co-exist inside PRIMER, but such duplication is really a modelling error and would introduce all sorts of problems. For example, model checking would become ambiguous if different versions of key control cards had different settings, which would be the 'true' one?

So the 'clone' logic is retained but the include file of residence of such definitions is now more tightly controlled:

- If a 'once only' card occurs in an include that is read both untransformed (by *INCLUDE etc.) and transformed (by *INCLUDE_TRANSFORM etc.) then the untransformed location will be used as the 'true' location regardless of what the users chooses when presented with this error during keyin.

- If the include file above is only ever read transformed then by default the 'true' definition will be placed in the last such file.

This logic is driven by changes that have been made to keyout. Previously each include file was written out in order of occurrence, with transformed files being untransformed first. This meant that an include file used multiple times would be written multiple times, moreover that the slight numerical precision errors introduced during 'transform when reading' and 'untransform when writing' would be those of the last file written to disk.

This logic remains with the exception that if an include file is read as both untransformed and transformed then during keyout only the untransformed version will actually be written. Not only does this speed up keyout by omitting duplicate write operations but it also removes the small precision errors introduced by transform/untransform operations. This also explains why the include file of residence for the 'true' definition of duplicated cards is the untransformed file.

If good modelling practice is followed the problem should never arise. However, it did occur with a real model, hence the changes made above.

Initial

- **Case 48690**

When sketching all *INITIAL_PWP_NODAL_DATA (pore water pressure) cards, PRIMER would appear to freeze while drawing things (consuming, and possibly exhausting all the

memory on the system).

The reason was that these cards can refer to a part, yet are defined at nodes, so many nodes will refer to the same part. This meant that when sketching definitions at many nodes the same part was being redrawn repeatedly, taking a long time and consuming memory.

There is now a test during sketching operations (of anything, not just PWP cards) for attempts to redraw 'expensive to draw' things such as parts and sets repeatedly, and they are no longer drawn more than once. Therefore, drawing all PWP in a model with ~100,000 such definitions is now nearly instant.

JavaScript API

- **Case 49922**

A script that imported a module and used a GUI Builder file would not run if another script was also running. This is now fixed.

- **Case 49827**

If a JavaScript ES6 module that was imported had an error in it, PRIMER would not give details on the error when the script was run. However, if the script was run in the debugger, PRIMER would correctly show the error. PRIMER now correctly shows the error in all cases.

- **Case 49800**

In some cases, the interrupt button did not work in the JavaScript debugger. This has now been fixed.

- **Case 49789**

History.Create() opened the wrong DATABASE_HISTORY editor.

For example, History.Create(m, History.NODE) opened a DATABASE_HISTORY_BEAM edit panel. This has been fixed.

- **Case 49778**

PRIMER was crashing when calling the JavaScript function GetInitialVelocities() on a node without initial velocities (without the nvels field populated). Now fixed.

- **Case 49598**

In the GUI Builder, sliders were being drawn with a '+' and '-' when the 'arrows' property was set to false. It now no longer draws them.

- **Case 49590**

Colour of individual NRBs and Joints can also be set from their respective JavaScript API classes.

This has now been extended to Airbag, Contact, CrossSection, ExtraNodes, NodeSet, RigidBodies and Spotweld classes.

- **Case 49589**

NRB colour can now be set from JavaScript with Options.nrb_colour

- **Case 49563**

Previously, PRIMER allowed the input of Infinite values through JavaScript. It is now updated to give an error if any Infinite values are encountered in the JavaScript.

- **Case 49557**

A GUI built from the GUI Builder was setting the macroTag of a widget to a blank string if nothing had been set for that property, which was not very useful when recording a macro.

If the macroTag has not been set, it is now ignored.

- **Case 49134**

The Fit() method will now work as intended. It will now consider new points (if any) during the fitting process using the JavaScript API.

- **Case 48653**

Fixed a PRIMER crash when the JavaScript API member function ImportInclude(incl) had a parameter incl which is a model without include files. This parameter had been previously returned by the function Include.GetFromID(m, 0) if model m did not have include files.

- **Case 48041**

Added MATEN to JavaScript API for *CONTROL_ENERGY

- **Case 44031**

When selecting text in a text button by dragging the mouse over the wanted characters, it could prove impossible to select the first character of the string if the text was left-justified in the box with no leading white space. This problem was more commonly encountered in JavaScript panels. This has nothing to do with JavaScript itself but rather because left-justified buttons were more commonly used in JavaScript panel textboxes.

Fixed by correcting the drag logic which could omit the 1st character of a string in some situations.

Keyword

- **Case 50844**

There was a typo in the heading of the <PROJ> popup in the *CONTROL_SHELL editor. This has now been corrected.

- **Case 50194**

The _TITLE suffix has now been added to the *SENSOR_CONTROL keyword.

- **Case 50011**

Fixed 2 bugs related to the *FREQUENCY_DOMAIN_SSD keyword:
1) FREQ_SSD Create/ Modify panel error: PRIMER enters infinite loop if users follow the following steps:
    1. Create/ open a model
    2. Keyword → FREQ → SSD → Create
    3. Select any non-SUBCASE option
    4. Add a load card
    5. Switch to SUBCASE option
2) FREQ_SSD field <SF> is a float in the manual but is currently an integer in PRIMER. (Fixed by making <SF> a float in PRIMER.)

- **Case 49999**

When other fields were set equal to <excl> in MAT_ADD_EROSION, the units change will now not operate and change these values.

- **Case 49791**

In the *ICFD_INIT_NONE keyword editor, there is now a radio option to select ICFD_PART or ICFD_PART_VOL for the <PID> type.

- **Case 49714**

There is a preference 'mat_173_r14_read' which can be set to false if user wants to read LS-DYNA R13.0 keyword instead of LS-DYNA R14.0

Added support to read LS-DYNA R13.0 'BATTERY_ECHEM_CONTROL_SOLVER'

- **Case 49454**

ICFD_PART and ICFD_PART_VOL are now treated as separate keywords and have their own edit panels.

- **Case 48380**

For *CONTROL_TIMESTEP, card 2 was not written out when only field <emscl> was present on card 2. Now fixed.

- **Case 47444**

PRIMER read in and keyed out *BOUNDARY_PRESCRIBED_MOTION_SET_LINE incorrectly previously by reading in and keying out card 4 before card 3.
This has been fixed and it now reads in and keys out card 4 after card 3.

Keyword Editor

- **Case 50388**

The *CONSTRAINED_SOIL_PILE and *CONSTRAINED_SOIL_PILE_CURVES Create panels previously greyed out their Create, Text Edit and Sketch buttons whenever the Check button was clicked. This has now been fixed.

- **Case 49514**

SENSOR_DEFINE_NODE_SET: NODE1 was previously always a node. However, it should be a node set except when NODE1 is negative and SETOPT is not defined. Now fixed.

- **Case 48293**

Corrected a typo on a keyword editor panel. 'DAMPING_FREQUENCY' is now replaced by the correct 'DAMPING_FREQUENCY_RANGE' for the *DAMPING_FREQUENCY_RANGE keyword editor.

MPP

- **Case 50268**

Removed additional end slash so LS-DYNA run can happen properly.

Macro

- **Case 48214**

If a macro that interacted with some tick boxes (such as those on the Edit Favourite Tools/Keywords panel) was recorded, it would not correctly tick/untick them when it was played back. This has been corrected.

Manual

- **Case 45952**

The LS-DYNA Keyword manual can now be opened on the correct page using the Keyword manual link (K) when Firefox, Chrome or Edge is used as PDF reader.

Mass

- **Case 49172**

Models with INITIAL_PWP_NODAL_DATA could report incorrect mass when an individual part is selected due to an error in propagation of the selection. Now fixed.

Materials

- **Case 49786**

Previously, the Material keyword editor would present the incorrect keyword structure for *MAT_OGDEN_RUBBER for instances that had values of PR < 0 and N > 0, or if N < -1. This has now been fixed.

Measure

- **Case 49795**

The Die closure option for measure Part to Part did not always work properly. This has been modified to use parametric of projected point on segment rather than angle check. If parametric exceeds +/-1.0 the measure is ignored.

- **Case 48381**

1) Added text background to measurement screen values displayed so that values are more visible and will no longer get blocked by lines.
2) Added 'Measurement Text Background Transparent' option to measure tools
    - Default: Text background drawn (like in D3PLOT), see (1) above
    - Option selected: No text background (original PRIMER behaviour)
    - The corresponding preference has also been added: measure_text_bg_transparent
3) Added measurement screen values to the 'Node angle', 'Point to Point' and 'Point angle' measure modes

- **Case 48239**

Fixed a bug in the Measure tool in which geometry points do not get properly processed in the 'Node to Part' and 'Node to Plane' modes (if a geometry point is selected in the 'Node to Part'

mode, it gets confused for a Node and the distance does not get computed in 'Node to Plane' if a geometry point is included in the list).

Menus

- **Case 50227**

Fixed the UI issue where the '_INTERIOR' button obscures the Drag wall directions in the DATABASE_CROSS_SECTION panel.

- **Case 49597**

When a floating window inside any of our applications' master window is moved upwards so that its top bar, which you must click on to drag it, is within the Window manager's outer decoration this would result on its top bar being obscured. This would make it impossible to drag thereafter.

Fixed by detecting this 'move into top decoration window' situation and 'snapping' the window down when the mouse button is released so that its top border abuts the bottom of the window manager's decoration. This means that its top bar remains visible and that it can continue to be dragged to a new position if needed.

- **Case 49328**

Closing the Read DYNA docked panel was opening the model panel in Contents mode instead of List mode. Now fixed.

Mesh

- **Case 49622**

In mesh extrude with direction option set to N1 → N2, node selection was getting reset if user have changed from distance to |N2-N1|. It is fixed now.

- **Case 48554**

Earlier thickness of thick shell was getting lost after mesh reconstruct using Area → Remesh. It has been fixed now. Now shell thickness is remapped after remesh.

- **Case 47919**

Constrained NRBs, Initial load, masses etc. were not preserved during spotweld remesh. It is now fixed. Now, all the node cross references within the remesh diameter from spotweld which gets affected during spotweld remesh are restored post spotweld remesh.

- **Case 39377**

Added a checkbox 'Make 3rd nodes unique'. This checkbox would be greyed out and checked if NREFUP=1. If NREFUP=0 it will not be greyed out and unchecked (by default), but the user

can choose to make the nodes unique or not. Use of this is that it will remind the user to set NREFUP if required. Feedback is given if it is already set.

Metal forming

- **Case 48646**

When mapping stress and strain data from source to target using the Metal-Forming tool in PRIMER, the orientation of shells is now taken into consideration as follows: If the angle between the normal vectors of matched shells is above 90° (meaning the orientation between the source and target shell is very different), then the sign of the parametric position (field 't') for each integration point in the *INITIAL_STRESS_SHELL and *INITIAL_STRAIN_SHELL cards is inverted before the data is mapped to target.

Model build

- **Case 50653**

Status of the toggle buttons for build options were not setting properly. It is fixed now.

Morphing

- **Case 48241**

Previously, morph boxes were unable to 'find' SPR rivets and so any rivets that were connected to some mesh being morphed would not get morphed with the mesh. This has now been fixed.

- **Case 44335**

Previously, when deselecting individual morph points after selecting them via a face/edge drag handle the deselected morph points would remain highlighted as if they were still selected, even though they were not. This has now been fixed such that the deselected morph points are no-longer highlighted.

- **Case 42601**

Previously, if a HAZ weld was created in a morph box that already existed, the box would be unable to 'find' the HAZ weld and hence subsequent morphing operations would not move the connection entity or the new mesh that resulted from the weld creation.

This has now been fixed as morph boxes now 'find' HAZ welds at the time of creation/remesh, as well as adding any new nodes from the remesh to those relevant morph boxes.

- **Case 42598**

Previously, PRIMER would automatically find connections and update their morphing information at the start of a morphing operation whenever PRIMER deemed that connections may have been altered. The logic for determining if a connection had been altered was quite conservative so this search/update of connection information could happen unnecessarily. This logic has been updated to more accurately determine when a new search/update is required.

It is also now possible to turn off the automatic search/update via an option in the Program options panel, or via the new preference primer*morph_find_new_connections_automatically. If turned off, a search/update can be triggered for all morph boxes by clicking (Find new connections) 'All Boxes', or for a selection of morph boxes by clicking 'Sel Boxes'. These buttons will only become active when a connection has been created or altered outside of the morphing panel.

- **Case 40919**

Previously, if a HAZ weld was morphed by a morph box and then remeshed, but then the model was written out before performing another morphing operation, PRIMER would not add the new nodes from the remesh to the morph box. As a result, after reading the model back in, any subsequent morphing operations on that morph box would not affect the connection entity or the new mesh, leaving 'wells' in the morphed mesh.

This has now been fixed as PRIMER now adds the new mesh to relevant morph boxes at the time of remesh.

Orient

- **Case 49840**

Contact orient will use CONTACT_AUTOMATIC_GENERAL if beams are included in the contact. Analysis of contact has recently been corrected to reduce contact thickness for small shells (as DYNA). However, in this context, the physical shell thickness should be used so that the final position is properly depenetrated.

Output

- **Case 50208**

For all SET keywords, spaces were always written for the <solver> field previously. Now, spaces would be left for the <solver> field only when we are writing out the <its> field and the <solver> field does not have a value.

PDF

- **Case 47825**

The default names for PDF and postscript files have been changed to primer001. Also, the custom names get incremented properly now.

Parameter

- **Case 50405**

PRIMER wrongly reordered include files in a deck containing parameters which were used in *INCLUDE_TRANSFORM statements.

It checked that include files containing parameters used by such statements must be written out before them, but it failed to consider that if those referred-to include files were written out 'early'

then any other include files referred to by expressions within them must also be written out 'early'.

This also had the effect of making the sequence order checks in the parameter editing panel report spurious order errors when none existed, it also meant that the 'auto reorder' function there failed to work because it was getting things wrong.

Now fixed. The test for writing out include files 'early' remains because it is correct, but PRIMER now considers the knock-on effects of that in other include files so that they get written out 'early' as well if required.

- **Case 49729**

The Model.Check() JavaScript capability can generate JSON format files, and these contained format errors if *PARAMETERs contained errors.

The problem was that parameters used to report their internal PRIMER label in error and other output, but this was not helpful since labels could change and it was impossible to relate label and parameter name, so parameters now report their names in these contexts. However, in JSON files a character string must be enclosed by quotes and the coding which output an unquoted numeric label had not been modified.

Fixed by inspecting the label prior to JSON output and quoting it if it contains anything other than the characters 0 - 9.

- **Case 49482**

Fixed some problems with the *PART_MOVE keyword:

(1) If a parameter was used to define a data field on this card it would calculate correctly when first read, but if the parameter values was changed within the PRIMER session the position of the part would not update correctly.

(2) If a local coordinate system was used for the movement vector PRIMER would show the part moving in the wrong direction, inverting the local coordinate system in this context.

(3) If a Part Move card used a local coordinate system or vector and the card was edited inside PRIMER to remove this, treating the movement vector as global, the position of the moved part would not revert to the global system.

These errors affected how the part was positioned visually in the PRIMER session, but because movement is 'undone' prior to keyword file output they would not have affected the ultimate analysis.

They are now all fixed.

- **Case 48880**

Opening the Parameter→ Modify panel was taking a long time when a parameter was used in many data fields. Now fixed.

- **Case 47543**

If a (scalar, not expression) *PARAMETER was itself defined by an implicit parameter using <xxx> syntax PRIMER would substitute the value of the parameter and 'lose' the <xxx> definition.

This is now fixed as follows:

- – *PARAMETER defined by <xxx> syntax 'remembers' this, using the value of the <xxx> expression in numerical contexts but preserving the <xxx> syntax.
- – - In the various editing panels for *PARAMETER this syntax is also preserved, or can be used when modifying and creating parameters.

A scalar *PARAMETER defined by another explicit parameter using '&name' (or plain 'name') syntax worked previously but required some internal compromises. In particular that syntax would not be used in parameter editing panels. This has been improved so that scalar parameters defined by '&name' or plain 'name' now also use that nomenclature in editing panels and, as with implicit parameters, may be modified or created using that syntax.

Part Replace

- **Case 47941**

Assembly replace may relabel items of source model to allow import. Issue fixed. The process now restores the original labels on completion.

Pedestrian

- **Case 50645**

Previously, after using the 'Only' part selection buttons in the Pedestrian Markup tool on Linux, the part selection would not immediately appear in the graphics window - a redraw event was required to show the 'Onlyd' selection. This has now been fixed such that the 'Onlyd' selection appears automatically.

Also, when writing out a .pmset file from the Pedestrian Markup tool, the WAD line distances

were not written out correctly, which could cause issues when reading the .pmset file if the WAD distances had were non-default values. This has also been fixed.

- **Case 50447**

The Pedestrian Markup tool in PRIMER offers users the ability to alter the angles of certain sticks/pads used to determine the markup lines for a given protocol. Previously, the tool was not honouring an alternative angle for the pad used to determine the corner bumper point during a CNCAP/GTR (UN R127) markup, and in fact could produce incorrect results for the corner point in these circumstances. This has now been fixed.

- **Case 50119**

Previously, if 'Write elements to keyfiles' was selected in the Pedestrian Markup tool, the nodes written to bonnet_rear_offset.key would have incorrect z-coordinates. This only occurred for the GTR / UN R127 protocol. This has now been fixed.

- **Case 49558**

Previously, the pedestrian markup tool could potentially crash after performing a markup if one of the bonnet rear reference line balls failed to contact the bonnet and windscreen at y=0. This has now been fixed.

Penetrations

- **Case 49302**

On the contact penetration check panel, there are buttons 'Pick & propagate' and 'Pick, propagate, fix' to fix crossed edges. With these buttons, nodes can be picked from the screen, but there was no feedback when the mouse was hovered over nodes. Now, there is the same feedback as in other picking operations.

Quick pick

- **Case 48871**

In the Quick Pick type menu, there is an 'other' category button which maps a sub-menu of less common types in the model. Previously, this showed a wide range of potential types, even when these did not actually exist in any model in the database, which did not make sense since you cannot pick something that is not there.

Changed this so the sub-menu now only consists of types present in the model(s).

Read

- **Case 49398**

If the read option 'skip & continue' is set and a missing include is encountered on keyin, the STOP button did not stop the read. Now fixed.

Renumber

- **Case 50250**

Lock Label panel was behaving oddly when attempting to resize, this has been fixed.

Scripting

- **Case 50240**

The following issues have been fixed in the GUI Builder:

1. Adding a new widget from the dropdown menu at the top of the window did not deselect any currently selected widgets. It now does.

2. If you clicked in the textbox used to set a widget item name, did not change the name and pressed return, it would issue a warning message to say it was not unique. This has been fixed.

3. Check boxes in GUIs written out as a raw JavaScript (.js) file with the theme set to THEME_DARK did not display the tick when they were selected. This has been fixed.

4. After reloading a .jsi file combo boxes showed the first item, rather than the selected item. This has been fixed.

- **Case 49195**

In SBA tool, belt fit was going wrong if seat's cushion was too thick. We have now increased the default distance to move lap block's belt point in +Z axis to fix the issue. Now, we have added

an option to move lap block's belt points in +Z axis to remove any initial belt penetration with the lap block and seat.

Selection

- **Case 47772**

Previously, some picking operations in PRIMER that allowed selection by area (e.g., selection of drag handles in the mesh morphing panel) would only reject the last item selected, rather than the selection group, when clicking the middle-mouse button. This has now been fixed.

- **Case 47736**

Previously, for object picking operations in PRIMER, clicking the middle mouse-button could result in multiple selection groups being rejected, rather than just the most recent one, if some items from those selection groups were deselected via a right mouse-button click. This has now been fixed.

Sensor

- **Case 50472**

Previously, PRIMER would throw a warning message about *SENSOR_CONTROL <ESTYP> being omitted when writing out in LS-DYNA R9.0 or earlier (LS-DYNA R8.0 or earlier if <TYPE> was set to ELESET), even when <ESTYP> was unpopulated (set to -NONE- in the PRIMER editor). This has now been fixed such that the warning is only thrown under those conditions when <ESTYP> is populated.

- **Case 48501**

ELESET on SENSOR_CONTROL was only being written out in LS-DYNA R10.0 previously. It will now be written out in LS-DYNA R9.0 as well.

Sets

- **Case 49970**

LOAD_BODY PSID may contain NRBCs. If a part label is changed to match one of these, the NRBC will be replaced by part in the set which may give an error in the LOAD_BODY. This behaviour has been corrected for parts created by orient copy and parts relabelled on the edit panel. Using different labels for NRBCs and PIDs is highly recommended.

Sketch

- **Case 50284**

If some entity is sketched from the top level [Keyword] Sketch menu, then hitting 'Apply' a second time could effectively 'unsketch' it.

This was due to the implicit assumption that whatever is being sketched and 'owning' the crosshairs must be different to what is already being sketched.

Now fixed. If the selected item is already being fixed then no visual change occurs.

Spotwelding

- **Case 49644**

When creating a weld, if a single spotweld part existed in model, PRIMER did not allow user to select another part with missing or encrypted material. PRIMER now only excludes parts from selection which cannot be welds.

Transfer

- **Case 48999**

PRIMER was crashing when there was no model in Other → Transfer and Apply clicked. Now fixed.

Transform

- **Case 45652**

On RIGIDWALLs the 8th significant figure of RADCYL and LENCYL fields could change during a transformation, even the transformation was null (i.e., no rotation, translation, scaling or reflection).

This was a precision problem caused by creating a trial vector for wall local axes to perform scaling, doing nothing to it and then deconstructing it again to update these data fields. Creating the vector requires subtraction which is numerically sensitive and adds a small amount of noise.

Fixed by checking to see if scaling is active and omitting the vector calculation if it is not.

Units

- **Case 49715**

Fixed typos for units in PRIMER. Changes made:
- Added spaces after commas (mm, kg, s)
- Made capitalisation consistent
- Reordered the units according to scale (Length: mm, cm, m, in, ft; Mass: g, kg, t, lb, slug; Time: μs, ms, s etc.)

- **Case 49633**

Usually, unit conversion for Load curves is done in PRIMER using scale factors. But for *DEFINE_CURVE_SMOOTH, no scale factors are present and hence no unit conversions are being applied. Issue is now fixed (see below).
Updated *DEFINE_CURVE_SMOOTH such that whenever the unit conversions tool is used in PRIMER, the relevant unit conversion factors will be applied directly to the fields DIST, TSTART, TEND, TRISE and VMAX.

Relative modification was also done to *BOUNDARY_PRESCRIBED_MOTION, such that the field SF remains as 1 (SF=1) when the field LCID refers to *DEFINE_CURVE_SMOOTH.

- **Case 49562**

The units of energy release rate parameters (G1C_O, G1C_INF, G2C_0, G2C_INF, G3C_0, G3C_INF) in *MAT_240 keyword were corrected.

User interface

- **Case 50589**

Renamed labels under SORT in Renumber Include panel. Made all the Sort options consistent by making them start as 'Sort by...'.

- **Case 50257**

There occurred an issue of left over checkbox borders of 'Save children', 'Retrieve children' and 'Delete children' checkboxes in the Save/Retrieve panel under the mechanism panel, when we switch between Save, Retrieve and Delete options. This is fixed now.

- **Case 50230**

If the Part Tree was undocked and then dragged onto the desktop then, on Windows only, redocking it would result in a subtle change in its behaviour. Anything which caused the overall PRIMER window to be redrawn, for example a size change or a change to the display of the tools or keyword panels, would result in the Part Tree window being shown at the top of the 'tabbed' area even if some other window was explicitly chosen to be top most.

This was due to an error in the internal (Windows) attributes of the Part Tree window when moved from the desktop back into the PRIMER window, causing it to appear to be 'On top'. Now fixed.

- **Case 50223**

'Target file' textbox in IPP TARGETTING PANEL and 'Output dir' textbox in KEYOUT PANEL under the same IPP TARGETTING PANEL are now updated to be left justified (default), which were right justified before.

- **Case 49497**

In the GUI Builder, if you tried to set the 'top' property of a widget to a value greater than the 'bottom' value, it refused to update the value.

This has been changed so that in this case it now sets the top property to whatever value the user set it to (so long as it's not outside the top window boundary) and modifies the bottom property so the height of the widget stays the same, with the caveat that if this would make the widget go outside the bottom window boundary it gets clamped to that.

The same logic applies if you try and set the bottom property to be a value that's less than the top

property, the left property is greater than the right property and the right property is less than the left property.

- **Case 49287**

The Volume Calculator Tool previously required the user to select the .csv and .xlsx write-out directories and filenames in two separate steps. This is now done in one step.

- **Case 47716**

The speed of scrolling through lists has been improved when using the new user interface. This is substantially faster when using a remote connection, also see case 48216 (Oasys enhancement case).

- **Case 44698**

When a graphics sub-window was dragged out of its master window (e.g., the PRIMER window) onto the desktop then clicking on one of buttons on the top such as 'File' to map a popup sub-menu could result in that popup being invisible, making it look as if it did not do anything. In fact, the popup was mapped underneath (behind) the graphics window meaning that it was not visible.

Caused by an internal error, now fixed.

- **Case 43904**

When text was highlighted in a text entry button then, with the button still selected, the mouse was moved out of the menu panel containing the button the text highlighting could be lost if the mouse was then moved back into the button.

This was due to an internal error in the way motion of the mouse and its behaviour when crossing window borders was being processed in this context, now corrected.

Volume 3

- **Case 43044**

Latent parts not distinguished on 'ICFD model setup' window. Now fixed by the following:
-Added Latent colouring for Part text box when used latent Part numbers
-Added Warning colouring for Part text box when used '0' or '<null>'

Write

- **Case 49756**

Default write directory and overwrite for images not working.
Fixed image overwrite logic. Default image directory now maps to the current directory for file browser when users drag & drop or use the recent file popup to read a file.

- **Case 47950**

Fixed the issue of resetting file type for LS-DYNA files in write menu when user has selected a type before selecting the model number.

X-sections

- **Case 48561**

'Only visible' option for *DATABASE_CROSS_SECTION has been fixed. The cross section scales itself accordingly to the elements that have not been blanked.

ZTF

- **Case 49475**

LS-DYNA permits the _ID or _JOBID suffices on the *KEYWORD card to be used to create a prefix for the output results files that will be produced.

When creating a ZTF file, PRIMER did not treat the _ID case correctly, resulting in a filename that might not match the other output filenames. Usually this did not matter because D3PLOT would pick it up anyway via 'fuzzy filename matching' but this has now been corrected.

In addition, it turns out that LS-DYNA treats the _JOBID option as a verbatim string with the consequence that if it contains any embedded white space this causes the filenames to get misinterpreted. So, a check for this has been added to PRIMER with an Autofix option to replace embedded white space with underscore characters.

2.2　D3PLOT

Airbag

- **Case 49925**

Fixed a crash that could occur when reading in a CPMFOR Interface file if a ZTF file was also read in. The crash would occur if the number of *CONTACT definitions in the model was greater than the number of CPMFOR surfaces.

Animation

- **Case 47923**

On a Linux system that did not have 'core' X11 fonts loaded, the alternative bitmap fonts used when animating could be drawn in the wrong size and place.

This has now been fixed. However, better results will be obtained if 75 dpi core fonts are loaded onto the system.

Blanking

- **Case 39602**

Wildcards in the form of <m>*<n> are now supported in the top bar Quick Pick box in D3PLOT, where <m> and <n> are optional and could be any numeric values. Previously, only a standalone '*' wildcard was supported which would denote 'ALL' entities.

Component

- **Case 50694**

Fixed a crash that could occur when opening a D3PLOT/PTF model followed by a FEMZIP model, closing both models, and then opening a new FEMZIP model.

- **Case 49895**

Fixed an issue where the PEMAG component would not read in for TSHELLs and would instead crash the program.

Contacts

- **Case 49842**

Fixed an issue that could cause the wrong contact surface to be displayed when intfor/CTF (contact interface force) files were read into D3PLOT and if the Part Tree was then used to blank/unblank contact surfaces.

Contour

- **Case 50153**

When isolating the highest contour band in a CT or SI plot by clicking on the bar in the graphics window, sometimes elements with the highest data value were not included in the plot. This has now been fixed.

- **Case 49815**

With negative MAXINT on *DATABASE_EXTENT_BINARY, stresses for shells and thick shells are written by LS-DYNA for each in-plane integration point instead of layer-averaged values. For thick shells, D3PLOT only showed the first value as the value for the whole layer, whereas now it averages all across the layer for that case.

- **Case 48417**

Previously invalid values for Yield Utilisation Factor and Percentage were given a value of -1 when they could not be calculated. Now they are given 'N/C' (not computed) which ensures that these invalid values do not affect the contour bar values when valid values are also shown.

Cut section

- **Case 50822**

Cut section forces were not updated when the cut direction tab was changed. Now this happens correctly whenever forces are displayed.

- **Case 50652**

Autoscaling sometimes zoomed out too far when there were joints in the model and enough other entities were blanked. This has been fixed.

- **Case 49564**

When *DATABASE_CROSS_SECTION_PLANE is used, D3PLOT will render these planes as 'thick slices' through the structure by calculating the intersection of the plane with its cut elements.

This works correctly, but when a (D3PLOT native) cut section was created which was exactly co-planar with a cross-section plane, it could it previously could have resulted in strange looking overlay graphics where the plane cut 3D elements.

The problem has been solved.

- **Case 48879**

When a cut section was defined with actions Normal and Omit, then parts with one node exactly on the plane and all others on the omitted side could appear fully drawn. Now, for such parts, only the node(s) exactly on the plane appear, but the rest is correctly omitted.

Data components

- **Case 50946**

If a model had Thermal Strain Tensor output turned on but didn't have Plastic Strain Tensor output turned on as well then the data plotted for thermal strains was wrong. This has been fixed.

- **Case 50048**

On the Cloud Plots tab in the Data menu the button text 'Point size options' overlapped with the radio button to switch between fixed size and size proportional to the magnitude. Now the buttons have been repositioned so that the text is readable.

- **Case 49588**

Fixed an issue with GLB export via the command line, in which the use of @ to specify integrations points while plotting data components on beams could produce incorrect results.

- **Case 49544**

Fixed crashes that could occur when plotting PMM_PRINC_MAX_&_MIN or S2MM_2D_PRINC_MM_STRESS in Direct mode for SPH elements.

Also fixed an issue preventing criterion plots of PMM_PRINC_MAX_&_MIN and PALL_PRINC_ALL for DES from being enabled.

- **Case 51020**

D3PLOT output would mix up the top and middle layers when reporting initial temperature. This has been corrected.

Deform

- **Case 50181**

Fixed a crash that could occur while screen picking inside windows containing multiple models.

- **Case 49200**

If the Shift Deformed option was used to remove a rigid body translation/rotation, the direction of any vector arrows was not updated to take into account any rotations applied to remove the rigid body rotation. Now fixed.

- **Case 46672**

When entering a reference node either under 'Single node' or under '3 Nodes', it was applied to all models in which the node label existed even when a specific model had been selected. Now, the node label is only applied to the selected model when a model is specified.

Dialogue command

- **Case 50304**

Dialogue commands for contouring with envelope plots did not work correctly when averaging was switched on. When the envelope plot is opened from the Data menu interactively, then averaging is automatically switched off. The same now happens when the envelope options are selected with dialogue commands.

Also, the Data menu did not always update when the envelope options were changed with dialogue commands. This has also been fixed.

Envelope

- **Case 49671**

If a Contact/Interface data component is being plotted then the option to switch on and off Envelope plotting is now available within the Data Menu.

Errortrapping

- **Case 50318**

Removed an unnecessary error message saying 'No parent for slave window id' that could occur when applying a template that removed models from a window.

Filename

- **Case 50714**

When reading additional files along with a model, the file filter for Groups files only showed binary .grp files by default. This has been corrected to filter for both ASCII .asc Groups files and binary .grp Groups files.

General

- **Case 50633**

If a model was displayed in multiple windows and the options to display free edges was set, then the full mesh overlay could still be displayed in windows showing SH, SI, CT plots if in another window, the same state was being displayed in a HI or LI plot.

Now this is fixed so the mesh in the windows showing SH, SI and CT plots will not be drawn, showing only the free edges when Wire and Hidden Line plots are drawn in another window.

Graphics

- **Case 50526**

Fixed an issue that could cause airbag particles to continue to be drawn at the current state when airbag particles display was switched off via the Entities menu.

- **Case 49674**

If a model with SPG Solid elements was displayed in D3PLOT then in a SI or SH plot the SPG elements could be drawn looking almost white if they were being drawn as spheres. The problem would only occur if the model contained other SOLID parts that were not SPG parts and the SPG part was not the 1st SOLID Part drawn.

This is fixed so the spheres are now coloured correctly.

- **Case 49478**

Fixed the graphics of translational joints, which was incorrect if nodes N5 and N6 were not orthogonally 'opposite' nodes N1 and N2, resulting in the symbol being skewed.

- **Case 47835**

When using a 3D mouse, the centre of rotation of the model tends to shift dynamically.

When the '0' shortcut key was used to export a view from a window in which the model had been positioned using a 3D mouse to other windows this change to the rotation centre was not exported. This meant that while the orientation of the model in the 'exported to' windows was correct its position on the screen might not be, and moreover subsequent rotations might take place about a subtly different centre coordinate.

The centre of rotation on the screen is now exported in this situation, leading to more consistent results.

Groups

- **Case 49485**

For binary group files that are automatically produced with the preference 'd3plot*delete_group_file' set to TRUE, we appended a process ID to the file names from V19.1 onwards. This was because we observed very slow processing when multiple D3PLOT instances

were accessing the same group file concurrently.

However, there is a small but non-negligible chance that if those D3PLOT instances ran on different machines, they might have the same PID causing the issue to occur once again. To make this more unique, time information is now appended, resulting in a considerably more unique name, and making the chances of this happening again very unlikely.

Help

- **Case 49529**

Updated the Blanking menu help text to make things clearer. The View/Hide and Ent(tity) help text now refer to the relevant panels and additional newer options such as 'M ==> M' propagate option are now included.

Image

- **Case 49844**

Exporting from D3PLOT to D3PLOT Viewer format using dialog commands always exported window 1 regardless of the image window selection. This has been fixed.

Integration

- **Case 46930**

When entities are sketched in PRIMER from the LS-DYNA output tree viewer, the sketching did not immediately happen in a linked D3PLOT session, but only after other operations forcing the graphics to refresh. Now it appears immediately in D3PLOT. Also, when the model was open in multiple windows in D3PLOT, the sketching from PRIMER would only have appeared in the first window after such a refresh, whereas now it appears in all windows in D3PLOT containing that model.

JavaScript API

- **Case 49825**

The dialogue command /CM to set the current model changed the current window to the first window containing that model. If another current window is already set, this is now retained if this also contains the model specified with /CM. If it does not, then it uses the first window with the specified model as before.

- **Case 48971**

Bug fixes for the D3PLOT JavaScript API:
- Fixed JavaScript bug 'DES is not defined' as the SharedConstants constant DES was previously not defined.
- Added DataComponents constants LODE_PA, YUTF & YUTP to JS API manual.

- **Case 48850**

If you use functions GetData or GetMultipleData to retrieve results for yield utilisation factor or yield utilisation percentage that are unable to be computed, an exception is now thrown instead of returning a large value (3.402E+38).

- **Case 48816**

The functions DialogueInput and DialogueInputNoEcho did not always work correctly for operations with multiple windows, for example when colours were set with dialogue commands from a script. This has now been fixed.

- **Case 48141**

In the JS API manual, the list of arguments of functions are not shown in a table any more. This will avoid cells of tables that get too big and do not fit in a page of the PDF version of the manual.

Labels

- **Case 46117**

With the Quick Pick 'Dynamic Labelling' option in D3PLOT, it is possible to display the data value for an entity alongside its label.

This option worked for node- and element-based data components, but if a PART based component was selected and plotted (Kinetic Energy) and a PART was selected for 'Dynamic Labelling', no data value was displayed.

This has now been fixed.

Materials

- **Case 47544**

In models with *PART_STACKED_ELEMENTS, new parts for the layers are created by LS-DYNA during analysis. Previously, D3PLOT was not able to plot material properties for these parts. Now, the layer data is written to the .ztf file by PRIMER 20.0 and picked up by D3PLOT 20.0 so that it can associate the layer parts with their materials and plot properties correctly.

Measure

- **Case 50321**

When a Part-to-Part measure is defined and then a part is added to one side under the contour options, there is a selection menu. When there are no part sets in the model, the only object type to pick is PART..., but this row needed to be explicitly clicked. If a part was picked from the screen before clicking PART..., the buttons to add new parts were disabled. Now, parts can be picked immediately if there are no part sets present.

- **Case 48109**

On the Measure panel there are new offset options (both on by default):
- Deform: uses the transformed coordinates when there is a Deform option like Shift Deform switched on in the window containing the measurement.
- Model space: takes into account the model space offset applied to a model in its window. If there is an offset in screen space defined, this will not be considered, since it changes with rotation of the view.

Menus

- **Case 50764**

There was an error in the logic which highlights 'common edges' between windows which could cause a crash when the number of windows on a page increased from 16 to 17 or more. This was due to an internal storage error which, while generic, in practice only seemed to cause problems on RHEL 7 Linux platforms.

The storage error has now been corrected and the problem fixed.

Movies

- **Case 50951**

Movie capture could fail if:

 - Two models had been read

 - There was just one graphics window and both were in this window.

The error message would say that there were no states to animate in the window.

This was due to internal confusion about which model was being captured. Now fixed.

- **Case 49560**

Fixed an issue that could cause the contour bar in exported movie files to show N/C values when contouring spotweld failure time (SPOTWELD_FTIME) on a model with a ZTF file while the option not to display unfailed spotwelds was selected.

Output

- **Case 49029**

For sessions containing multiple models, some users prefer the default output directory for images and other output files to switch to the latest model read in, whilst other users prefer the default output directory to remain as the location of the first model read in. In D3PLOT and T/HIS, a new 'output_directory' preference has been added to control the default output directory. For this preference, D3PLOT has options 'LATEST_MODEL_READ' and 'FIRST_MODEL_READ', with the additional option of 'LEGACY' in T/HIS to preserve old behaviour (which was a mix of the two). For both programs, the new default behaviour is 'LATEST_MODEL_READ'. During a session, if you read in a new model, the default output

directory in all menus will update to use the new model's location. However, if you have manually selected a different directory for any given output file type, your manual selection will continue to be honoured for that file type.

Part tree

- **Case 49226**

Fixed an issue in the Part Tree where the labels for entities within an include were not changing colour when the include's colour had changed.

Performance

- **Case 48282**

If Quick Pick was used with predictive picking to select include files then the process of sketching the contents of the include file could be slow.

In D3PLOT 20.0, the logic has been modified so that if, after starting the sketch, a mouse movement greater than a threshold is detected then D3PLOT will now stop the sketch operation and will start responding to mouse movements and key presses immediately.

Program crash

- **Case 50805**

When a model contained both springs and beams, and the option to superimpose beams on top of springs for visualisation was used (field BEAM on *DATABASE_BINARY), then a crash could occur in predictive picking when highlighting a spring.

This was due to internal confusion between beams and springs in this context and has now been fixed.

- **Case 50538**

Fixed a crash that could occur if the option in the Write menu to find and display coincident elements was used.

- **Case 50179**

Fixed a crash that could occur if a model containing only the undeformed state was loaded and the user then tried to generate a cut-down PTF file.

Properties

- **Case 49678**

Fixed an issue that if a command file was recorded from a session containing multiple models then none of the actions on the tabs that select and propagate models were recorded in the file.

PTF compress

- **Case 50591**

In some circumstances, writing out a compressed PTF with fully integrated TSHELLs could crash D3PLOT. This has now been fixed.

Quick pick

- **Case 50544**

Fixed a crash that could occur if the Quick Pick type was set to 'Entity' and then the option to dynamically label items on the screen was used.

- **Case 49227**

Fixed an issue where Quick Pick undo was not reverting a part or include to its previous colour, overlay colour, transparency, brightness, shine, display mode, or overlay mode.

Read

- **Case 49394**

On some Windows computers where remote files are hosted on Linux systems and exported via a SAMBA server we have seen problems of files being locked unnecessarily when opened for reading. A typical scenario is:

- User submits an LS-DYNA job on a remote system
- User opens results file for viewing in D3PLOT or T/HIS while the job is still running
- Later, user reopens the results file on the same computer to check progress and finds that no more results appear to have been written
- However, opening the file on a different computer shows that further results have in fact been written

To solve this, D3PLOT and T/HIS have been fixed to allow normal updates to occur so that the files are not locked unnecessarily.

- **Case 48572**

D3PLOT failed to read the LS-PrePost '.db' files that were generated by the double precision version of LS-PrePost. If some of the options to embed precomputed values for von Mises stress

were used in LS-PrePost then D3PLOT would also fail to read those files. These issues have now been fixed.

Selection

- **Case 49061**

When the Ambiguous Pick menu was opened whilst screen picking for a single item (e.g. from Deform > Fix Node), if the label option was switched on, D3PLOT would crash during graphics refresh once an item was selected from the menu. This has now been fixed.

Sketch

- **Case 50436**

If a window contained two models then screen picking entities in the first model in the window via an object menu could cause D3PLOT to crash. If D3PLOT didn't crash, then the item selected was incorrectly marked with pick symbols in the second model rather than the first. These issues have now been fixed.

T/HIS link

- **Case 49553**

When opening a model in D3PLOT with the T/HIS link already open, error message 'the list of entity IDs sent from T/HIS for model 2 do not match the IDs in the PTF file. Any unknown IDs have been ignored' could be displayed. This has been fixed.

- **Case 49386**

Fixed an issue that could occur with a multiple monitor setup where the main display was not the left-hand-most display and the displays had different screen resolutions: when T/HIS was fully undocked from D3PLOT (in a linked session), the T/HIS window could become positioned so that the top bar was off the screen. This made it very difficult to drag/resize the window as required.

User interface

- **Case 50314**

Corrected the colour of the Apply button in the 'Entities to exclude' portion of the Cut Section menu.

- **Case 50305**

When using the XY Data or Write panels, if a model contains composites, it is possible to select the ply from which to extract data. However, the feedback box on the Ply Selection panel could be obscured by the Help and Dismiss buttons. The panel is no longer docked in the right-hand side menu so this feedback box is no longer obscured.

- **Case 49480**

Fixed a crash that could occur when deleting graphics windows using the popup at the top-left of a window.

- **Case 49420**

The Deform panel has been improved: some typos corrected and buttons recoloured for clarity.

- **Case 49159**

In the Data Component Strain submenu, the component listed as 'GXY_GAMMA_ZX_STRAIN' has been corrected to GZX_GAMMA_ZX_STRAIN.

Utilities

- **Case 49872**

When a model was in multiple windows and it was the first in Window 1 but the second in Window 2, for example, then Utilities -> Modify title could have applied the new title to the wrong model. This has now been fixed.

Volume 3

- **Case 50965**

With multi-threading on and with models containing multi-physics elements D3PLOT could crash when opening a settings file from the File Open panel. This has been fixed.

Write

- **Case 50069**

Fixed an issue that could cause the Save button in the Write table to become disabled if you cancelled a file selection operation.

2.3 T/HIS

Curve menu

- **Case 50129**

In T/HIS 19.0 the labels for the Generalised Stiffness Joint data components were wrong. The data components for these joints were incorrectly setup as though they generated x,y,z displacement based components when they should have been phi,theta,psi rotational components. This has been fixed.

Curve table

- **Case 50326**

Fixed a crash for D3PLOT-T/HIS linked session curve table writing when models had been read in from D3PLOT with no data associated with them.

Curves

- **Case 48826**

The min/max values in X/Y/Y2 axis will be the same as the values set even in logarithmic scale, provided the autoscale is OFF for that particular(min/max) value.

Errortrapping

- **Case 50665**

On high resolution displays, typically laptops running at 3840 horizontal resolution (around 250 Dots Per Inch (DPI)) the 'little red button' in the T/HIS dialogue box used to display the number of error and warning messages reported could be too small to display anything. It still worked, it was simply that no text was written inside it.

This was a scaling issue in the user interface caused by the high DPI value, now fixed.

FAST-TCF

- **Case 50398**

Fixed issue where backward slashes in all the lines of the FAST-TCF scripts were converted to forward slashes when they were read into T/HIS. Now only the file path is converted when read in a different platform from which the script was created.

- **Case 49898**

If a FAST-TCF script was generated in T/HIS and one of the curves had been created using the 'Equation' option then T/HIS would crash if one of the inputs to the Equation was a curve that had also been generated using an equation.

- **Case 49148**

If a FAST-TCF script was pasted into a T/HIS item in REPORTER and the script created a number of curves and variables associated with those curves, but only displayed a subset of curves, the variables would not be exported to REPORTER correctly. This has been fixed.

Filename

- **Case 46875**

Previously, the image capture tool in T/HIS would sometimes cause errors by automatically overwriting an existing file before presenting the overwrite options. This occurred if you clicked the Capture button immediately after entering the name of an existing file into the filename textbox, without clicking elsewhere in the window first.

This error has been fixed, and the buttons have been reworked so that when you click on Apply or the Capture button, a popup window appears which lets you decide to either overwrite or append the file.

Additionally, writing a file name in any filename textbox, or selecting a file using the file browser, will now highlight the textbox in red if the file already exists.

Graphics

- **Case 50634**

When creating a curve by clicking on the screen to define points ([Read], Screen mode) the graphics of the curve could go wrong if the scale was changed using the mouse scroll wheel, leaving what looked like a 'ghost' image of the curve at a different scale.

This was due to a conflict between the way the curve being created was drawn and how scroll wheel zoom was working. Now fixed.

- **Case 49603**

All our applications have logic to keep floating menu windows 'in front of' graphics windows so that they don't get lost behind them.

This stacking order control was not applied to minimised windows which, as a consequence, *could* get 'lost behind' other windows giving the impression that they had disappeared.

Fixed by applying the same logic to minimised windows.

Image

- **Case 49467**

Saved and restored the active graphs when the results are captured.

Integration

- **Case 50337**

In previous versions, the 'PRIMER' panel in T/HIS could, at times, fail to automatically locate the corresponding LS-DYNA input model as specified in the ztf file. This issue has now been fixed.

- **Case 49506**

REPORTER variables and FAST-TCF table output for curve property MAXA would instead give the value MAX. This has been fixed.

JavaScript API

- **Case 49790**

If multiple graphs were added to a page using the JavaScript function Graph.AddToPage() the last graph wasn't being displayed on the page. This has been fixed.

- **Case 49526**

Page.AddToGraph() would throw an exception if there were 32 graphs in T/HIS and one of the existing graphs was added to a page, e.g. add graph 1 to page 2, Page.AddToGraph(2, 1).

This has been fixed.

Output

- **Case 49941**

For sessions containing multiple models, some users prefer the default output directory for images and other output files to switch to the latest model read in, whilst other users prefer the default output directory to remain as the location of the first model read in. In D3PLOT and T/HIS, a new 'output_directory' preference has been added to control the default output directory. For this preference, D3PLOT has options 'LATEST_MODEL_READ' and 'FIRST_MODEL_READ', with the additional option of 'LEGACY' in T/HIS to preserve old behaviour (which was a mix of the two). For both programs, the new default behaviour is 'LATEST_MODEL_READ'. During a session, if you read in a new model, the default output directory in all menus will update to use the new model's location. However, if you have

manually selected a different directory for any given output file type, your manual selection will continue to be honoured for that file type.

Read

- **Case 49768**

If Option 3 on *DATABASE_ASCII_ELOUT was set, T/HIS failed to read results for Thick Shells from the LSDA/binout file correctly. In some cases it failed to read anything, while in others it would read the wrong data if a Thick Shell element was fully integrated and had multiple in-plane integration points.

- **Case 49635**

Drag and drop of a valid filename now remembers the file location when opened file selector.

Added drag and drop feature to file types Group, Keyword, Bulk Data, ISO Channel/Index, Diadem and Nastran.

- **Case 49058**

Fixed an issue where data from THF source files could produce zeroed out PEMAG curve data for TSHELLs, SHELLs and SOLIDs.

- **Case 48384**

In LS-DYNA R14 the terms 'slave' and 'master' have been replaced with 'SURFA' and 'SURFB' in the ASCII RCFORC and SLEOUT files that T/HIS reads. T/HIS 20.0 has been modified to support these alternative files.

Recent files

- **Case 43524**

Added a popup option for reading multiple models directories.

Session

- **Case 50555**

T/HIS was unable to write curves from a JavaScript source into an embedded T/HIS session file if those curves had an ID that was greater than 9. This has now been fixed.

- **Case 48976**

Added a CHECK BOX whenever 'Embed cur/csv files into session' is unchecked followed by checking it first. So when we save the session with embedded files and then uncheck the tick box

we would get a conform message saying the saved embedded files(if any) will be lost and ask for continue or cancel the operation.

T/HIS link

- **Case 50301**

Linked D3PLOT<->T/HIS sessions could previously crash under rare circumstances while attempting to navigate between pages involving multiple models and specific layouts. Additionally, an error message could previously be provoked while attempting to undock T/HIS for the aforementioned layout. Both issues have now been fixed.

- **Case 49617**

If you had the environment variables D3PLOT_AUTO_MACRO and THIS_AUTO_MACRO set to automatically record a MACRO file then T/HIS would display some %%% ERROR %%% messages in it's dialogue box if T/HIS was started from within D3PLOT via the D3PLOT->T/HIS link.

- **Case 49383**

If an animation was captured in a linked D3PLOT>T/HIS session then the timeline in the graph windows didn't move on the screen - it did however move in the captured animation.

- **Case 49245**

If a T/HIS curve was created by combining data sent across the D3PLOT > T/HIS link with data read in T/HIS which did not have an x-axis unit of 'time' then the time based 'timeline' was incorrectly displayed on the graph.

Units

- **Case 49140**

Fixed minor text formatting in the Units menu.
-Added spaces after commas (mm, kg, s)
-Made capitalisation more consistent
-Changed the order from (Mass, Length, Time) to (Length, Mass, Time) in the display to make it consistent with PRIMER and the popup.

- **Case 47800**

The layout of the HDF panel has been improved, and it now responds better to resizing.

Write

- **Case 49757**

Now T/HIS will update the file paths for file browser in case the user drags a file into a T/HIS session.

2.4   REPORTER

Animation

- **Case 50982**

After navigating to a new page in REPORTER, the playback speed of animated Items is now updated to match the current value shown in the animation toolbar.

- **Case 50983**

When duplicating a page, items on the new page would sometimes be located at incorrect coordinates. This could occur if a user had previously copied an item to the clipboard and right-clicked somewhere on the current page without then pasting the item. This issue should now be resolved.

Errortrapping

- **Case 49982**

If you insert a variable that does not exist in the report/template, REPORTER will now only log one error when the report/template is generated. REPORTER will no longer log an error when failing to render the missing variable in Presentation view.

Filename

- **Case 50434**

REPORTER now automatically adds any missing extensions to file names when you save a new file from REPORTER. Your selected file filter will be used to add the appropriate missing extension.

- **Case 49570**

Fixed an issue introduced in REPORTER 19.1, in which a user-defined 'Image File' filename for a new PRIMER/D3PLOT/T-HIS Item was being overwritten by a default name when first creating the Item.

- **Case 49468**

When modifying a PRIMER, D3PLOT, or T/HIS Item in REPORTER, the file browser launched by the Choose button for the Image File field will now allow for the creation of a new file. Previously, only an existing file could be selected.

Library

- **Case 50349**

The following scripts have been deprecated in REPORTER 20: pedestrian_zone_area_from_csv.js and pedestrian_zone_area_from_variables.js. It is

recommended to use the HIC Area Calculator in PRIMER and the Euro NCAP and GTR Head Impact templates in REPORTER instead.

Menus

- **Case 50054**

In rare circumstances following modification of the OA_INSTALL environment variable, it was possible for the 'New Library Page...' Dialog to prompt a crash to desktop. This is no longer the case.

Preferences

- **Case 50317**

REPORTER will now ignore any environment variable whose name includes non-word characters. Previously, REPORTER incorrectly allowed a sequence of non-word characters at the beginning of an environment variable name. This meant that '#OA_HOME' (for example) would have been interpreted as 'OA_HOME', leading to unexpected consequences for users.

Session

- **Case 49174**

When exporting a template to a report, the REPORTER session will no longer update (i.e. the session remains as the current .ort/.ortx).

Standard templates

- **Case 50089**

The Automotive library templates allow you to process results located in a different directory from your keyword file (to accommodate HPC clusters with this configuration). However, the D3PLOT items in several templates were found to be lacking this feature, and would throw an error unless the results were in the same directory as the keyword file. This has been fixed for the following templates:
Euro NCAP Far Side Impact 2022
Euro NCAP Side MDB 2022
Euro NCAP Side Pole 2022
IIHS Side MDB 2021
IIHS Side MDB 2021 Structure Only

Text

- **Case 48794**

When mapping fonts, if the default font is not available for a generic type (sans-serif, serif, etc.) then REPORTER now searches for the first available font of the same type before switching to the default sans-serif as a last attempt.

Write

- **Case 50448**

When saving a Template to a new location using the 'File -> Save As' option, the 'Read-Only' label will no longer persist incorrectly in the REPORTER title bar.

2.5   SHELL

Case

- **Case 40251**

LS-DYNA job submissions with the *CASE option could crash certain versions of the MPP LS-DYNA executable. It was found that this could be prevented by performing the submission with a 'names' file. SHELL does not create a 'names' file for a LS-DYNA submission with the *CASE option.
In V20 we have added a new SHELL preference "create_names_file" to allow user to choose whether to 'ALWAYS' or 'NEVER' create a 'names' file during LS-DYNA submission. The default value of this preference is 'PRE-V20' - which will create a 'names' file for non-CASE and no-MCHECK option submissions and otherwise.

Edit

- **Case 50286**

The text editor other than machine default was sometimes not launching on a Linux machine. This has been fixed.

Memory

- **Case 46654**

The 'Consistency Flag' option has been deactivated for the MPP run of the LS-DYNA in the SHELL. Also if the number of CPUs in just 1, the option value is not inquired in the command-line SHELL.

Menus

- **Case 47684**

Text fields in SHELL were non-responsive and wouldn't take keyboard input, when we alternated between SHELL and other programs, this has since been fixed.

3   Enhancements

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

Belts

- **Case 49991**

Added a new feature to the seatbelt fitting tool that allows effortless path definition at an explicitly meshed shoulder slipring (D-ring) and automatically pulls the slipring into its correct position during the fitting process.

- **Case 49990**

Seatbelt fitting tool: Changed the behaviour of the red twist handles in the 'Advanced' path definition settings so that any handle can be modified independently without affecting red vectors at neighbouring path points.

- **Case 49989**

Seatbelt fitting tool: Added the option to fit belt segments independently.

- **Case 48513**

Added automatic creation of stiffener beam option between two base path points. The user needs to define part id that needs to be used for number of beams to be created. PRIMER will automatically create number of beams on seatbelt using the part id given by the user.

- **Case 48511**

Enabled changing current layer of include while creating seatbelt definition.

- **Case 42694**

Added Write CSV option in seatbelt path definition panel to write out seatbelt path point information.

Checking

- **Case 49569**

When checking a mechanism it will report if nodes or parts are incorrectly defined in more than one assembly, but in any location other than the mechanism positioner itself it did not provide any details of which nodes or parts.

This is now fixed so that in the context of a free-standing check of a mechanism the 'details'

output option will list the parts and/or nodes in question and also the assemblies in which they are present.

- **Case 48457**

The orthogonality check on universal/cv joints has been improved so error is reported if misalignment is > 1 degree, warning if > 1/1000th radian (a somewhat severe test). Additionally, there are Autofix options to correct misalignment.

- **Case 46552**

Added warning for *CONTROL_IMPLICIT_SOLVER, if AUTOSPC is set to 2 (turned off), LS-DYNA analysis will ignore unconstrained/unattached degrees of freedom in stiffness matrix.

Added warning for *CONTROL_IMPLICIT_INERTIA_RELIEF, if THRESH is a positive value, LS-DYNA analysis might not find all rigid body modes correctly if negative frequency modes are reported.

- **Case 44977**

A warning has been added when using second order shells with ELFORM 16.

- **Case 43850**

New material orthotropic option check:
- If AOPT = 2, check that vector A is not parallel to any SHELL normal

Coating

- **Case 48918**

Coat part tool has been enhanced to coat hole edges and/or free edges of shell parts with beams or 1d segments.

- **Case 48089**

New option to coat high order solids considering the interpolation nodes.

Comments

- **Case 48459**

The comments 'WARNING... was referenced but not defined' & 'USAGE....' messages will no longer be written when the 'Xref comments' option is turned off during keyout.

Connections

- **Case 49660**

The elements around hole were not retained if it is within remesh diameter during spotweld remeshing. Now, an option 'Preserve shells around hole in the HAZ remesh zone' is added in the

connection option panel which can be enabled to preserve elements around hole. The user can also enter size of hole in 'Max hole diameter to preserve' textbox which should be preserved.

- **Case 48788**

Added new option 'Mesh size for adhesive patch' by which the user can specify the mesh size for the solid elements which will be extruded from quad biased grid. If this option is not turned ON, then PRIMER will use average size as before else will use the size specified by the user.

- **Case 48476**

The stored/default settings column is now displayed by default on connection table and a warning is given if 'options' is activated when stored settings apply to 1 or more connections.

- **Case 48443**

Spotweld and adhesive connections have a new test for nodes that tie but do not lie on the surface of the attached layers. These incur out of plane error. This means the connection needs a reproject.

The tolerance is 0.01*spot_thickness which is 1/10th mm for model in mm.

- **Case 42919**

The connection compare tool has been enhanced with new options to display only the connections that appear on the table and to only consider connections in the visible domain.

- **Case 39055**

Added a new option in connection panel to skip spotweld remeshing if the connection is close to something like NRB which would be modified.

Crash test setup

- **Case 49212**

In the barrier settings of the IIHS Small Overlap Right or Left load case, an option to use the default impact side was added. This will allow the user to easily select the default barrier impact side and is active by default.

- **Case 49211**

The Batch Crash Test Setup script can now do a Frontal Rigid Wall load case. To select this case in the batch script, in the main Crash Test Setup script, the user must save the EuroNCAP Full Width Frontal Impact with the 'Use Rigidwall' option ticked to the user or system tests. The Frontal Rigid Wall load case will then be available in the batch script by running the user created test.

- **Case 49182**

Changes to the Occupant's Head – Center of Mass panel allows the user to specify up to three head positions. The head positions can be written to the vehicle xml file and reused later. If more

than one head position is defined, the script will do the barrier setups for the different head positions successively.

If the user runs multiple head positions in the batch script, a '_head_position_' + setup number suffix will be added to the name of the keyword file to distinguish between the different head positions.

- **Case 49181**

Crash test setup: Added the option to 'Filter by' in the test selection window in the batch crash test setup script (like the one in the main script).

- **Case 49180**

Crash test setup script: Added the option to skip the Import Include Transform window when importing the barrier model through a new preference Skip Import Include Transform Window and the option to save/import the labelling offsets and the DEFINE_TRANSFORMATION ID

(TRANID) into/from the barrier settings through the 'Apply labelling offsets to include transforms by default' preference.

- **Case 49064**

The Batch Crash Test Setup script now reuses vehicle models if they are the same for multiple setups rather rereading the same model. This will speed up the script as it skips unnecessary rereads of vehicle models.

Curves

- **Case 47048**

When adding points in DEFINE_CURVE and adding entries in DEFINE_TABLE, the graph is now autoscaled automatically. This can be disabled with the toggle button 'Autoscale'.

- **Case 23427**

Added two 'Log' buttons to the DEFINE_CURVE and DEFINE_TABLE editors that can be used to set the graph x and/or y axis to a logarithmic scale.

Cut Section

- **Case 49904**

Previously in PRIMER, in Cut Sections panel at least one direction switch was turned on by default. Now we can have the cutting switch turned on/off with no direction switches turned on. In the case where no direction switch is active, we show the entire model.

- **Case 46164**

Added the functionality to exclude part/set from the cut-section.

Database

- **Case 49044**

Options 1-4 fields now supported for the BNDOUT entry of DATABASE (ASCII).

Dummies

- **Case 49931**

When users go through dummy/HBM positioning, a joint check is now performed upon progressing through the stages. If joints are out of place, then an automatic Autofix is performed.

- **Case 49890**

Users can now control the rotation and translation locks for all assemblies at one time within the Mechanism positioning panel. Popups found under the 'Lock tr' and 'Lock rot' buttons.

- **Case 49774**

Users can now set 'Permit Rotation' for all assemblies at once, per axis. Find popups in the 'Rotate Angles' panel on the Phi, Theta, and Psi buttons.

- **Case 49593**

To make it possible to combine arbitrarily connected dummies/HBMs with mechanisms it is now possible to convert a *DUMMY definition (as defined by its tree file) into a *MECHANISM definition. In this process the dummy/HBM assembly definitions are unchanged but the tree connectivity between them is converted into mechanism connections. Dummies/HBMs can also be imported directly into existing mechanisms, being converted in the process.

Dummies/HBMs converted in this way are 'true' mechanisms which can be combined with existing mechanisms as siblings, doing away with the parent/child limitations of a dummy/HBM imported into a mechanism as a child. This dispenses with the hierarchical dummy/HBM 'tree' and permits arbitrary connectivity between assemblies.

- **Case 49152**

If users perform a node import to a dummy/HBM containing sliprings, then they may find that the seatbelts pass through the sliprings, leaving the sbid1 and sbid2 variables wrong.

Users can now choose if they want to automatically update these variables (for all sliprings) after reading in a dynain file. Alternatively, users can fix an individual slipring through the Autofix method within a model check.

- **Case 48966**

Dummy/HBM position panel now has feature to Undo/Redo assembly positions.

- **Case 48964**

The reading in of dynain files (through Node Import and Seatsquash) is now more accepting of severe errors. Severe errors are skipped over, rather than terminating the process.

This is now the default choice. However, users can turn this off through the 'skip_severe_errors_dynain' preference.

- **Case 48781**

Dummy/HBM users can now manipulate the columns of the 'T All' and 'R All' buttons for assembly positioning. These options can be found under the 'Lock tr' and 'Lock rot' text titles, with the options of selecting: All, None, Reverse, All x, All y and All z.

- **Case 48694**

Users are now able to mirror the positioning of a HBM dummy, via Safety → Dummies → Position → Move Parts.

Opening the mirror panel here provides options for the axes of reflection and the direction of the mirroring.

Opening individual assembly panels (via the buttons in the Move Parts panel) allows for mirroring individual assemblies and access to the assembly pairs.

- **Case 48502**

The encrypted include file can now be added into the Include tree from within the PRIMER 'Include Tree' panel.
Also enabled certain useful popup menus for the encrypted include files in this panel.

- **Case 48494**

Users can now add new SET_PARTs and SET_NODEs to dummy/HBM assemblies, even with an encrypted dummy tree. This can be accessed through Tools → Safety → Dummies → Modify.

Encryption

- **Case 49649**

When definitions such as materials, load curves and parameters in an input deck are wholly encrypted it can cause problems if PRIMER does not 'know' that the labels of these definitions are in use. One way round the problem is to have a *ENCRYPTED block after *END which contains simplified copies of these definitions which PRIMER reads but LS-DYNA does not.

This works but the existing method of putting all such definitions within a single *ENCRYPTED_START ... _END block was problematic for some workflows so an alternative format which places each material, curve, etc inside its own *ENCRYPTED_START .. _END card pair has been introduced.

This is controlled by the preference

primer*keyout_post_end_encrypted OMIT | INDIVIDUAL | COMBINED

where 'combined', the original format, remains the default but 'individual' gives the alternative of individual headers per definition.

- **Case 49559**

The encryption tool now supports *AIRBAG, *ELEMENT_SEATBELT_RETRACTOR, 'ELEMENT_SEATBELT_SLIPRING, *ELEMENT_SEATBELT_PRETENSIONER,

- **Case 48287**

Adding a new feature that allows you to apply full encryption to individual keywords at scale.

Geometry

- **Case 49049**

It is now possible to open IGES and STEP files in PRIMER on the command line, and by double clicking on the file in windows.

- **Case 46710**

Now 'Geometry options' that include 'Curve Segs', 'Surf Segs', 'SH Overlay', 'Tolerance', 'Merge Tol', 'Ignore curves <', 'NURB tol', 'Max trim split', in 'Display Options' panel in PRIMER can be saved as preferences in oa_pref file using 'save display settings' button.

- **Case 24994**

PRIMER 20.0 can now read STEP files (beta).

Graphics

- **Case 48722**

A new 'Generalised Graphics' capability has been added to PRIMER. This is really for internal Oasys LS-DYNA use when we wish to create a single graphical entity which is an arbitrary mixture of underlying primitive types. I typical use is in the assemblies used to position Human Body Model dummies since these tend to contain an eclectic mixture of components which span across part boundaries.

The capability is available users under [Tools] Other but you should probably seek advice from Oasys Ltd before attempting to use it as part of a workflow.

- **Case 35300**

Users can now choose between Model - Title/Filename/Path to be displayed in the graphics window by using the new radio buttons in Display → Options panel.

IGA

- **Case 48525**

PRIMER can now calculate mass of IGA shells and display them in the Part table, Mass Properties and Summary file output and Contouring visualisation.

- **Case 48392**

Added view interpolated element functionality in IGA Refine panel.

- **Case 48339**

In *ELEMENT_SHELL_NURBS_PATCH edit panel, we have added an option to visualise interpolated elements grid.

- **Case 46269**

Added IGA Options in CNRB panel, which will enable users to create number of nodes and IGA_POINT_UVWs on IGA_1D_BREP (trimming loop), anywhere on IGA_SHELL automatically.

Also updated IGA_POINT_UVW create panel such that users can create IGA_POINT_UVW by picking anywhere on IGA_SHELL or on IGA_1D_BREP (trimming loop) automatically.

PRIMER will also add IGA_POINT_UVWs on SET_IGA_POINT_UVW on corresponding IGA_FACE_XYZ definition.

JavaScript API

- **Case 49699**

We have added JavaScript API to support sketching and selection of Dummy's assemblies.

- **Case 49690**

Element property settings options like parametric coordinates, integration points, min strain and max strain can now be enabled using JavaScript API. These are applicable for Plastic strain,

form, area, and volume in element property setting. 'Parametric coordinates' is the default option if the third argument is not passed while calling the function,

- **Case 49177**

Added COLOUR_LATENT for widgets in JavaScript API.

- **Case 48676**

Added *INITIAL_STRAIN_SHELL and *INITIAL_STRAIN_SOLID to JavaScript API

- **Case 47786**

The connection bolt option 'use_parent_layer' can now be set/unset in JavaScript by Conx.UseParentLayer()

- **Case 47483**

From LS-DYNA R13.0, on *DATABASE_CROSS_SECTION_PLANE the fields XCT and XCH would be defined as node IDs if RADIUS was negative. This was supported in the main body of PRIMER but not in the JavaScript API. This support has now been added to the PRIMER JavaScript API.

- **Case 47482**

The Contact class in JavaScript API now takes into consideration the following regarding complex fields BT and DT:

If DT = -9999, BT is interpreted as the curve or table ID defining multiple pairs of birth-time/death-time. Otherwise, if DT > 0, birth time applies both during and after dynamic relaxation.

- **Case 47018**

'AspectRatio', 'Jacobian' and 'Warpage' member functions have been added in the classes Solid and TShell.

- **Case 46741**

Users can now specify any existing retractor id in the model using SetMesh in belt JavaScript API.

- **Case 46740**

Added a property for retractor class called 'nsbi'. Users can get and set number of seatbelt elements inside retractor using it.

- **Case 46353**

1) Added new LS-DYNA R13.0 VOLFRAC field to *MAT_ADD_EROSION keyword.
2) Deprecated old *MAT_ADD_EROSION JavaScript API methods.

3) Added new JavaScript API support for *MAT_ADD_EROSION & *MAT_ADD_DAMAGE_GISSMO keywords.

- **Case 46093**

The Material JavaScript API now contains a typeNumber property that provides the material type in the number format ('001', '034M' etc.)

- **Case 42147**

Added JavaScript API support for *FREQUENCY_DOMAIN_FRF (class FreqFRF) and *FREQUENCY_DOMAIN_SSD (class FreqSSD).

- **Case 32512**

Radio button widgets have been added to JavaScript.

- **Case 15582**

Added new JavaScript API classes for *INITIAL_STRESS_SOLID and *INITIAL_STRESS_BEAM.

Keyword Editor

- **Case 47491**

In *AIRBAG_PARTICLE the radio buttons have been repositioned to avoid so much blank space in the panel.

Mass

- **Case 48569**

When reporting mass of model with *RIGIDWALL with _PLANAR = 1, PRIMER now gives mass properties both with/without the rigid wall. If value of RO is zero, the default 1e-9 is now used in the calculation.

- **Case 47709**

Assign mass panel on calculate shows the proposed mass properties before the assign mass is made. This allows users to easily modify the target definition to tune overall mass properties.

Materials

- **Case 46268**

USER_DEFINED_MATERIAL_MODELS have been extended to include the materials in the range 281-290.

Measure

- **Case 48510**

Users can now see the vector magnitude displayed when creating a new *DEFINE_VECTOR.

- **Case 47309**

Added new Measure mode: Node to Line.

Menus

- **Case 48819**

The button 'Script' from the PRIMER Tools menu is now called 'JavaScript'.

Mesh

- **Case 50097**

Added a new option 'Add nodes around spotweld to improve mesh quality' in connection creation options panel. When turned ON PRIMER will add few new nodes around spotweld to improve the quality of mesh produced after spotweld remesh. This option works with HAZ mesh reconstruct.

- **Case 49137**

A new option 'Preserve elements around hole' is added in Remesh area panel. When ON, PRIMER will preserve all elements while remeshing which are present immediately around hole. By specifying 'Max hole size', users can control which hole elements should be preserved.

- **Case 46051**

Added 'First Align' and 'Second Align' options to TSHELL → Align panel. TSHELLs can now be aligned by specifying either or both axes. Axis alignment can also be done by specifying a vector direction.

Orient

- **Case 47920**

Single node picking buttons in the Orient panel changed to display the 'Select Node' panel which allows defining a node through selection or node number ('key_in' option).

Parameter

- **Case 48145**

Fields referring to latent or encrypted parameters will be written as &name (where 'name' is the name of the parameter) even when the pre-output option 'Write Parameters as values' is set to

TRUE. Previously, this was written as the default value '0'. The only exception is for the IDEAS output format that does not support the concept of parameters.

- **Case 48044**

When a field refers an entity like node and defined by a parameter, and when the entity is renumbered, we get a panel that suggests options to modify the scalar parameters.

This has now been extended to expression parameters by having an option inside the old panel. This brings up a new panel with options for both scalar and expression parameters.

A new option has also been introduced to leave the field untouched (original case).

Part replace

- **Case 47899**

Remake of spotweld beams was reported to have removed the beams from a set used in *CONTROL_SPOTWELD_BEAM.
Some generic logic has been added to remake solid/beam sets where all the entities of the connection are in the set.

Pedestrian

- **Case 49528**

Support has been added to the Pedestrian Markup tool for the 03 series of amendments to the UN R127 protocol (issued in 2022). These changes are accessible by selecting the 'GTR / UN R127 (2022)' protocol - the previous version of this protocol is still accessible via the 'GTR / UN R127 (pre 2022)' protocol.

Control over the calculation of the windscreen zone is available through the Windscreen Zone Markup Parameters window (accessible through the Windscreen Zone 'Define...' button). This window offers the ability to choose whether the offset lines are calculated from the edge of a windscreen obscuration part or from the free edge of the windscreen part. The offset distances for these lines are editable through this panel, or via corresponding command line/settings file options. When the calculation is performed without an obscuration part a pseudo obscuration width can be applied in addition to the front and side line offset distances, to mimic the presence of an obscuration part.

Finally, the head impact points window has been updated to allow the control of the new Windscreen/Cowl zone Child and Adult head impact points, and specification of corresponding impactor orientation angles.

- **Case 49100**

Added a new Head impact point labelling scheme to the Pedestrian Markup tool - Coordinate labelling. This will assign a label to an impact point based on the impact point's coordinates of the format: P_XXXX_YYY; where P is the point name ('A' for adult etc.), XXXX is the x-coordinate of the point, and YYY is the y-coordinate of the point. If a duplicate label occurs, the duplicate will have the corresponding impact point's z-coordinate appended to the end:

P_XXXX_YYY_ZZZZ. Further duplicates to this label will then have a counter index appended to the end.

- **Case 47710**

The ability to use CAD model as input for Pedestrian Markup Script has been added to PRIMER.

Penetrations

- **Case 47428**

By default, contact of beam-beam and beam-shell elements with CONTACT_AUTOMATIC_GENERAL now uses an enhanced algorithm which will give more rigorous penetration detection. Program options > contact > beam contact method can be switched back to basic method.

Performance

- **Case 44560**

Editor panel buttons formatted their text using 'left justification with leading white space', for example [_____10] where '_' is white space.

This meant that clicking to the left of a number positioned the cursor in white space rather than immediately in front of the first digit. It also meant that using the [home] keyboard button to reposition the cursor at the start of the string in fact positioned it at the start of that leading white space, also that a triple-click to select the whole string would select both white space and number.

This has been fixed in two related ways:

- Text is now centre-justified in editor buttons with no leading white space. This causes some minor changes to the positioning of numbers in buttons, but in most cases, you would need to put 'old' and 'new' side by side to spot any differences.

- Where text still does have leading white space then a click 'in front' of the number or using the <home> key will now position the cursor in front of the leading digit.

Quick pick

- **Case 46136**

Quick Pick now supports *INITIAL_AXIAL_FORCE_BEAM and *INITIAL_STRESS_SECTION

- **Case 45819**

Unblank option added for SET types of NODE, BEAM, BOX, PART, SHELL, SOLID, and TSHELL.

Read

- **Case 47759**

Primer can now read include files with negative labels having sufficient *INCLUDE_TRANFORM offset.

- **Case 45967**

Added a new pre-output check option 'Post *END data' that controls writing data after *END. This overrules other options/preferences that control writing specific types of data (for example: 'write out all connections'). A preference variable 'db_write_post_end_data' connected to this new option was also added.

Scripting

- **Case 48303**

The following changes have been made to the Multi Param Script, to improve users' understanding of how to utilise the script:

- Addition of a help button.
Which provides an explanation and an example of how to create a valid CSV file to be used within the script

- Increased UI window size
To accommodate the new help button.

- **Case 47708**

Seatbelt Anchorage Enhancements:

- Panel reorganisation and help images added
- Option to create *DATABASE_HISTORY cards for Loading Beams and Belts
- Options to change Section and Material ID's for Seatbelt
- Contact between Body Block and Seatbelt created
- Items created by the script sent to a *SET_PART_COLLECT_TITLE
- Options to control Seatbelt length, width and thickness

- Option to change input load keyword from *LOAD_NODE to *BOUNDARY_PRESCRIBED_MOTION_LOAD
- New Inertia Centre of Gravity options using coordinates or seat structure part set
- Vehicle Category option added which automatically sets load on blocks and seat inertia loading values as per specification
- Option to change body blocks from *PART to *PART_INERTIA
- Errors in Formers removed
- Option to use your own formers by selecting a user-defined directory
- Option to re-number meshing start labels

- **Case 41705**

Seat belt options for the SBA script moved from Settings panel into the main input screen.

Selection

- **Case 48681**

When using object menus to filter by include file the option to choose the current include (layer) has been added to the list of files in the menu.

Sets

- **Case 47940**

Creating a set by picking or multiple area selections can result in out of order items. A switch 'Re-order items' has been added to the set view/edit panel.

User interface

- **Case 50554**

The ability to create a list of Favourite Tools or Favourite Keywords was added in PRIMER 19.0. Now, options from the Mesh Tools list can also be added to Favourite Tools. Additionally, greater granularity has been added so that individual sub-keywords can be added to Favourite Keywords directly.

Further additions to this feature:

- A filter has been added to make it easier to find Tools or Keywords to add to Favourites
- The ability to specify custom button text for standard Tools and Keywords in Favourites has been added
- Popup buttons can be created for Favourite Tools to allow options to be grouped together
- The Edit Favourites panel now uses a tree widget to display the hierarchy of buttons more clearly
- Admin-specified Favourites options (e.g. organisation-wide Tools) can be saved in oa.conf file (see below) in the OA_ADMIN directory. These will be locked for editing by individual users so they will always be present for them.

To better support these additional features, Favourite Tools & Keywords data is now saved to a user's oa.conf file, instead of their oa_pref file. Favourites options saved in the oa_pref file prior

to PRIMER 20.0 will still be read into PRIMER at this time, but any changes made will not be saved out to the oa_pref file, as this is now deprecated functionality. When starting PRIMER 20.0, Favourites options in the oa.conf file will take precedence over those in the oa_pref file.

- **Case 48440**

The connection options panel has been re-designed. The order and the wording of some options has been improved. And help buttons with direct links to the relevant sections of the manual have been added.

- **Case 46154**

Labels 'Set ESORT = 1' and 'Create true thickness solid' in Mesh Extrude panel of PRIMER now have tick boxes instead of toggle buttons.

- **Case 43481**

Custom JavaScript Tools (created using the PRIMER JavaScript API) can now be added to your Favourite Tools.

Volume 3

- **Case 43058**

Updated definition of pressure 'p'- for Outlet type boundaries in ICFD setup script. This is the prescribed relative pressure (zero for atmospheric conditions).

Write

- **Case 49765**

The ability to install Analysis Tracking Tool and setup keyout hook has been added to PRIMER.

- **Case 48210**

PRIMER can now write out in free format (comma - separated files) for all keywords irrespective of whether the fields contain parameter or not. The original enhancement was meant for INITIAL_STRESS and INITIAL_STRAIN keywords, but options have been provided to write them out for all keywords as well. Nothing will be written between the commas if the data in the field is zero.

X-sections

- **Case 48314**

Previously Reverse Direction button in DATABASE_CROSS_SECTION create menu did not redraw the reversed directions instantly, it either needed a graphics update event (moving the cursor in graphics window etc.) or clicking the sketch button in the DATABASE_CROSS_SECTION create menu.
This is now fixed. and redraw is instantaneous.

3.2 D3PLOT

Annotation

- **Case 7144**

D3PLOT 20.0 includes a new Tools → Annotations feature, enabling you to annotate your LS-DYNA results in 3D with descriptions, comments, and insights to share with your team and partners.

- Capture a series of page views with a title, description and markers that can be simply reloaded

- Save annotations to a file for retrieving in a later session of D3PLOT

- Display annotations in a playback mode for simple presentation to colleagues

- Annotations saved with one set of models can be reloaded with a different set of models allowing annotation 'templates' to be created.

Cut section

- **Case 49906**

Previously, in the Cut Sections panel, at least one direction switch was switched on by default. Now, the cutting switch can be switched on/off with no direction switches switched on. In the case where no direction switch is active with the cutting switch on, we show the entire model for all the active windows.

- **Case 49606**

Parts excluded from the cut plane are now also excluded from the total force calculation. The Write table launched from the Forces button in the Cut Section menu no longer shows forces for excluded parts.

- **Case 48959**

The ability to add a cut section capping colour for 2D shells has been added. Additionally, a cut outline for solids, shells and thick shells can also be toggled on and off. Both features allow you to customise the thickness and colour of the capping/outline.

- **Case 42789**

When D3PLOT cutting planes intersect shell elements these are 'capped' with a cut face. By default this uses either a fixed thickness value or the actual true thickness of the shell element. An option has been added to use the contact thickness defined on *PART_CONTACT.

With this option active:

If OPTT is defined that thickness is used verbatim.
If SFT is defined that factor scales the true thickness of the shell.

For this option to function correctly, a ZTF file must be present to provide information about *PART cards. Without a ZTF file, the capping will revert to the unfactored true shell thickness.

Deform

- **Case 44584**

The deformation magnification value is now visible in the bottom-left corner of the graphics window by default, unless the magnification is equal to unity (1.0 x magnification). Controls to toggle on/off the visibility of these values and customise the number formatting for these values are available under the Display Option sub-header in the Deform -> Magnify panel. Another button to toggle the visibility is also under Display Options -> Window Dressing. A new dialogue command DISP_MAG_SWITCH under DISPLAY_OPTIONS has been added. New preferences d3plot*plot_disp_mag and d3plot*footer_size have been added to control default behaviour. All these settings can be saved and retrieved from settings files as required.

Dialogue command

- **Case 49066**

SHOW_NODES_ON and SHOW_NODES_OFF have been added as dialogue commands to DEFORM > REF_NODE to switch on and off the display of the selected nodes.

- **Case 48642**

Added dialogue command history into PRIMER, D3PLOT and T/HIS. You can now use the Up and Down arrow keys to scroll through previously issued commands which can be used to reissue them.

JavaScript API

- **Case 49568**

A ModelExists() function has been added to the JavaScript API so that you can check whether a model exists in the database.

Previously you could use SetCurrentModel() to check if a model existed, but it issued an error message if it didn't exist, e.g.

let n = GetNumberOf(MODEL);

for(let i = 1; i <= n; i++)
{
if(SetCurrentModel(i)) // TRUE if present
{
// do something...
}
}

You can now do:

let n = GetNumberOf(MODEL);

for(let i = 1; i <= n; i++)
{
if(ModelExists(i)) // TRUE if present
{
SetCurrentModel(i);
// do something...
}
}

And you will no longer get the error message.

- **Case 48971**

Enhancements for the D3PLOT JavaScript API:
- Functions Blank() and Unblank() can now accept strings ('ALL', 'ALL_DEL' etc.) for the <item> parameter
- Functions Blank() and Unblank() can now accept number arrays for the <item> parameter
- New function NumDeleted() is now available
- New function GetContourLimit() is now available
- New function GetConditionParts() is now available

Preferences

- **Case 49753**

Several new preferences have been added that allow you to change the default beam symbol, default line thickness for thick beam symbols, and switching on/off spot weld beam end caps.

Text

- **Case 49623**

A new option has been added under Display Options to toggle on/off the 'D3PLOT: ' prefix in model titles/filenames.

Workflows

- **Case 39020**

Added a Strength Check Workflow tool to D3PLOT. This tool allows you to quickly visualise and cycle through parts containing yielding elements.

- **Case 34330**

A new 'Workflows' feature has been added to the Oasys Suite 20.0 to make it easier to interrogate and post-process results. It allows you to tag your models in PRIMER with data which can then be used in D3PLOT and T/HIS to provide relevant tools for post-processing

analysis results.

This release contains a collection of tools:

- 'Automotive Assessments': Allows you to tag your model with relevant data such as crash test type and a description of the occupants and structural items in the model. With this data D3PLOT and T/HIS can create graphs and images following the rules set out in a crash test regulation, such as Euro NCAP or IIHS. Results from multiple models can be interrogated at the same time, making it easy to compare results from different runs.

- 'Eroded Elements': Visualise deleted elements at different states in D3PLOT.

- 'Strength Check': Visualise yielding parts in D3PLOT.

- 'Intrusion Contour': Visualise an intrusion plot in D3PLOT.

- 'Pulse Index': A tool to tag a model with data required to carry out a pulse index analysis in T/HIS, to estimate the acceleration that would be experienced by an occupant in a crash test.

- 'Energy Check': Plot total energy, kinetic energy, internal energy and hourglass energy in T/HIS

- 'Entities of Interest': Allows you to tag your model with groups of parts. This can be used in D3PLOT to show the groups of parts, highlight them and export them to a GLB file to view in D3PLOT Viewer

We plan to update the existing tools in future releases as well as adding new tools. If you have any ideas for additional features you would like to see in the existing tools or any ideas for new tools, please contact Oasys Ltd.

In addition to the tools provided it is possible for users to add their own bespoke tools. Please contact Oasys Ltd if you have an idea for a tool and would like some help creating it.

3.3   T/HIS

Curve menu

- **Case 48656**

In the Style menu, you can use the Search and Replace fields to make bulk modifications to curve labels. The characters '^' and '$' can be used to insert or append the replacement string at the start or the end of each label respectively. In T/HIS 20.0, the asterisk character '*' can now be used to replace the entire label of the selected curve(s) with the specified replacement string.

General

- **Case 47773**

The new features HDF panel supports for V20 are:
1) Curve history support
2) FastTCF and dialog input support
3) Multiple selection for Y axis
4) Convenience functions
5) Attribute data is read in and supported now

6) The panel has been redesigned

7) FastTCF now supports column label for compound datasets

JavaScript API

- **Case 49782**

A new member function IsOnGraph() has been added to the Datum class. This makes it possible to check if a datum exists on a graph or not.

Operations

- **Case 49436**

Added CORA and MADM Buttons to Automotive panel in T/HIS

Preferences

- **Case 48486**

Added a preference for List Labels in the Read ISO panel to be set to Channel Codes or Filenames: this*iso_list_labels

Read

- **Case 48915**

T/HIS can now read all the columns from the files with large columns.

T/HIS link

- **Case 49566**

A new Quick-Pick option has been added to D3PLOT to make it easier to display the internal and kinetic energy of Parts. When the new option is selected, a linked T/HIS session is started automatically and the Energy time histories for the selected parts are plotted.

This new quick pick options is currently only available for Parts and for displaying either the Internal or Kinetic energy.

User interface

- **Case 44793**

Added pop-up option to the FAST-TCF menu for both Create and Run option in case user needs to access any old .inp files.

Added the support for accessing recent directories and files in almost all possible places in T/HIS.

3.4   REPORTER

3D

- **Case 30943**

Alongside REPORTER 20.0 is the launch of Report Viewer (https://oasysreportviewer.com), a brand-new 3D web viewer for LS-DYNA results.

Capture

- **Case 50124**

D3PLOT Items have been updated to support the Capture of 3D GLB content from D3PLOT to REPORTER. GLB content is displayed using a static image in REPORTER itself but can be viewed properly using Report Viewer (and the GLB files created in the job destination can be viewed individually using D3PLOT Viewer). When using the GLB (Current frame, Uncompressed) option, exporting to PowerPoint is also supported.

Generate

- **Case 45690**

When writing to PPTX, PDF, or HTML, REPORTER will return to the original page once finished.

Installation

- **Case 49981**

Added the new .ortx and .orrx file formats to the Oasys Suite installer so that REPORTER 20.0 can be registered as the default application for opening these types of files.

Powerpoint

- **Case 49043**

A new standard page size, 'PowerPoint slide (Widescreen)', has been added. This new size is 338.7 x 190.5 mm and matches the 'Widescreen' slide size available in Microsoft PowerPoint since 2013. It has the same 16:9 aspect ratio as the older, smaller 'PowerPoint slide (16:9)' size (254.0 x 142.9 mm), which is referred to as 'On-screen Show (16:9)' in Microsoft PowerPoint. The new 'Widescreen' size should make it easier to create reports that match the latest PowerPoint content.

Preferences

- **Case 49969**

Added support for the oasys*workflow_definitions_directory oa_pref option to REPORTER. This preference can be used to point to a user-defined workflows directory. Any

Templates/Pages contained in a templates/pages subfolder of the workflows directory will be added to REPORTER's list of library templates/pages on startup.

- **Case 10685**

REPORTER now honours the user-defined start-in directory during file selection when a session is first opened. When subsequent file selections are required, REPORTER uses the retained information about the most recently used directory to help direct the user in browsing.

Standard templates

- **Case 50192**

Automotive and ICFD Library templates that process D3PLOT items will now automatically locate FEMZIP results files (Zd3plot, *.fz) in the results directory you specify.

Template files

- **Case 50120**

New file formats have been introduced for REPORTER: '.ortx' for Templates and '.orrx' for Reports. Using these formats, it is now possible to save multimedia content like MP4 (and the newly-added GLB) within your Templates and Reports. The older '.ort' and '.orr' formats have been marked as '[LEGACY]' and may be removed in a future release.

User interface

- **Case 37394**

Added the ability to toggle the 'Active' status of an Item through the right-click context menu. Items which are 'Inactive' cannot be Generated.

Variables

- **Case 49016**

Two new Library Programs have been added: one to delete all temporary variables, and another to reset all temporary variables to a specified value (default being to reset to an empty string).

3.5 SHELL

General

- **Case 13160**

Users can now provide a directory location to write out REPORTER log files for their REPORTER batch submission. SHELL writes out REPORTER log files for all the jobs in submission, in the specified directory. If no directory is specified i.e., if the user leaves the 'Write logfile' text field as 'default', then SHELL writes out the logfile in the respective job directories.

Mpp

- **Case 50412**

We now do not write out u=XTF to SHELL command line for MPP LSDYNA job submission.

Memory

- **Case 38723**

Fixed SHELL to use less memory while working with large lists of files (like REPORTER lists).

Preferences

- **Case 50201**

Changed the default value of the MAX_CPUS in the SHELL preferences to 256.

- **Case 36643**

Users can click on 'Save to oapref' button in REPORTER OPTIONS panel, to save preferences for 'output and run options' which include combined output options, run reporter iconised, run reporter in batch, run d3plot and t/his in batch, automatically exit reporter upon completion.

Restart

- **Case 46104**

SHELL can now read the 'restart files' for all LS-DYNA versions up to R13.

Solver

- **Case 49362**

LS-DYNA submission for keyword files with *KEYWORD_ID cannot be given kill commands via the SHELL. This has been fixed.

- **Case 48804**

Added new 'fluids' command line option in Input/Output tab of the SHELL Submission panel. This works with the command line preview of SHELL. 'fluids' option is for the R14 version of LS-DYNA.

User interface

- **Case 49704**

If certain files are not present in the installation area, SHELL will now deactivate the relevant buttons in the Manual popup menus.

- **Case 46224**

It is now easy to manipulate REPORTER variables in REPORTER batch panel in SHELL. Users can add new variables by clicking on '+' button and can remove existing variables by using 'x' button. Also, users can add as many variables as they want and manipulate these with a scroll list.

- **Case 37871**

The updated REPORTER batch panel is now easier to use with improved button layout. We can read in keyword files through directory search, manipulate multiple entries, and insert/delete rows in the table section.

Variables

- **Case 48500**

Users can now declare REPORTER variables temporary in 'Variables' panel with a tick. Users can open the Variables panel by clicking on the Variables button in the REPORTER batch panel.

3.6   Oasys

Deleting

- **Case 41391**

Added an Eroded Elements workflow tool to D3PLOT
- This tool displays deleted elements as specified by the user.

Javascript api

- **Case 49540**

An OpenManual() function has been added to the JS-API to open the Oasys manuals at a specified page, e.g. OpenManual('primer', '3d-pdf.html');

User interface

- **Case 48216**

The speed of the graphical user interface (GUI) has been improved.
- On all operating systems the way that some of the new button and panel decorations are drawn has been changed to a faster method, meaning that the 'new' UI (light / dark / classic themes) now run as fast as or faster than the 'old' (legacy) theme.
- On Windows platforms some further optimisation of the GUI graphics have improved rendering speed further.
- On Linux platforms a bug that slowed down rendering when displaying over a network has been fixed so that remote rendering using the native X11 display directly back to a desktop using the raw X11 protocol' (as distinct from more modern 'thin wire' rendering methods) now runs at an acceptable speed. Rendering to a local Linux desktop display is also faster as a consequence.

- **Case 47629**

Added a close button to the top right corner of the ambiguous pick menu in PRIMER and D3PLOT. And added a cancel button in the information panel for "Don't Ask" button in ambiguous pick menu.